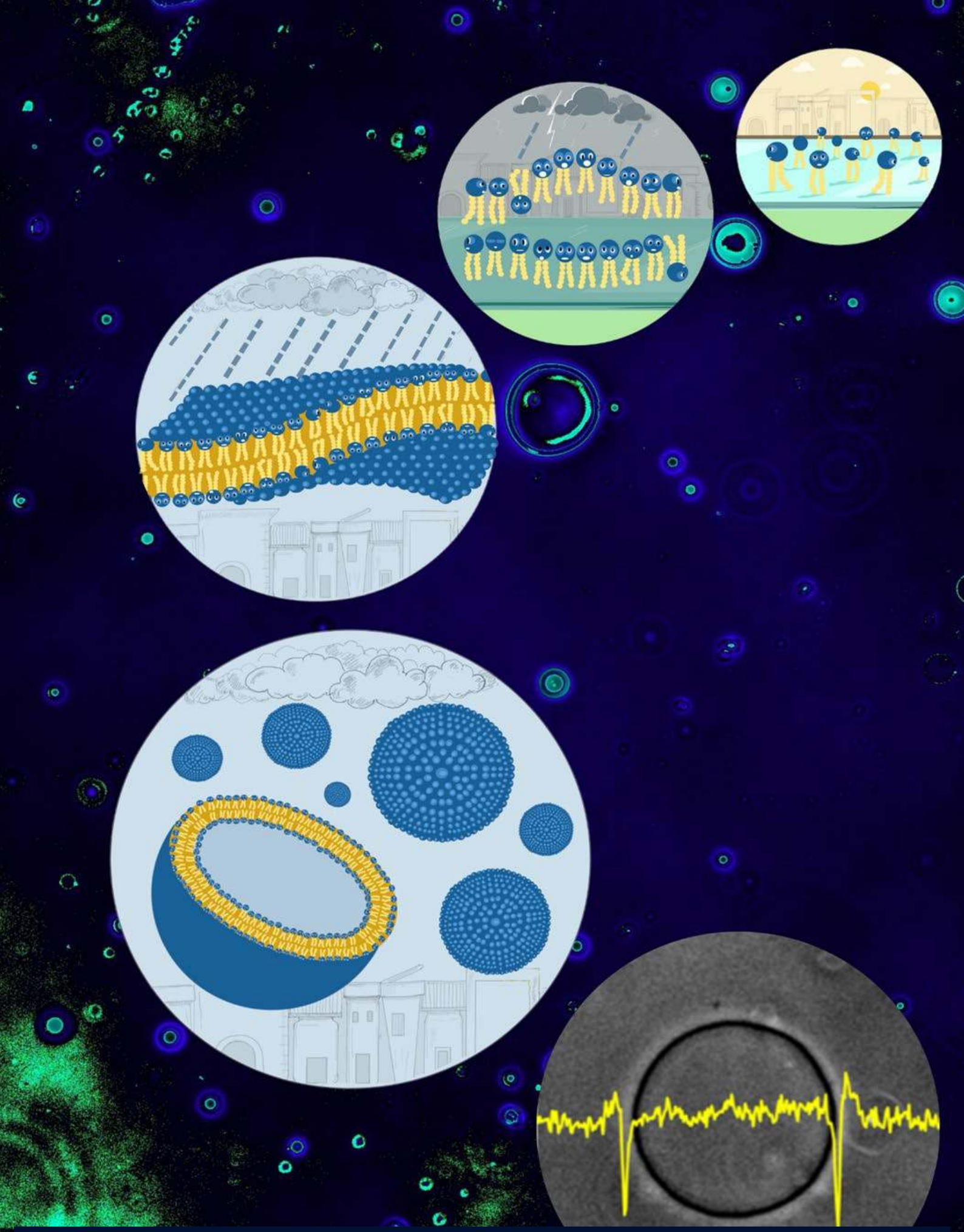
Annual Report 2021-22

Indian Institute of Science Education and Research Mohali

In pursuit of knowledge



Front and back cover art: **Integration of multidisciplinary science** (Mr. Manav A Manohar)

Front inner cover art: **Making of a synthetic cell** (Lab of Dr. Tripta Bhatia)

Annual Report
2021-22

Indian Institute of Science Education and Research Mohali

Contents

Preface

It is my pleasure and privilege, on behalf of all faculty and staff of IISER Mohali, to present the Institute's Annual Report for 2021-22. The Annual Report covers the activities and events undertaken at the Institute that were in addition to the various teaching courses offered to the students during the reporting period, and in the paragraphs below I offer some of the highlights of the Institute's achievements.

The Department of Biological Sciences (DBS) at IISER Mohali has performed extremely well in research, teaching, and mentoring students. A research study has unraveled a novel role for the post-synaptic protein Norbin in the trafficking of group I mGluRs and mGluR-mediated synaptic plasticity in the central nervous system that may have clinical relevance. Two pieces of work revealed significant molecular insights into the mechanism of biological phase separation and aberrant protein phase transitions associated with neurodegenerative diseases. Another study reported that physiological reactive oxygen species controls Upd3-dependent modeling of extracellular matrix to support cardiac function in a Drosophila fruit fly model. The issue of coevolution between fruit fly host and bacterial pathogen has been addressed, while another study showed that Ubx-Collier signaling cascade maintains blood progenitors in the posterior lobes of the Drosophila larval lymph gland. It has been shown in a mouse model that Salmonella Typhimurium Adhesin OmpV activates host immunity to confer protection against systemic and gastrointestinal infection. In Escherichia coli, a novel role has been identified for an isoform of translation initiation factor 1F2 in homologous recombination and two-ended DNA double strand break repair.

In the Department of Chemical Sciences, research related to a fundamental reaction-diffusion process has shown how different enzyme-responsive nucleotide-mediated multivalent interactions over nanoparticle or vesicular surface can be used as a catalytic switch. A microflow-based technology was developed which can detect acetylcholine esterase activity and its inhibition by adenine-nucleotides in blood plasma. Red-green-blue light harvesting antennae capable of multi-stimuli energy transfer were designed that can ratiometrically sense temperature, pH and multiple metal ions and serve as electrochromic smart materials. The complex photoinduced electron and energy transfer dynamics of dyads, consisting of perylenediimides (PDIs) and mono/di styryl-BODIPYs, was unraveled by steady state and ultrafast spectroscopy. A new palladium-carbene complex as a potent catalyst for Heck-Mizoroki and Suzuki-Miyaura cross-coupling reactions was discovered. It was shown that a predominantly ligand-redox state can control cascade hydrogenation and dehydrogenation reactions to forge a series of cycloalkanes, starting from different diols, and that mechanistically these steps adopt a complete one-electron pathway as a complementary route to popular Noyori-type hydrogenations. Parallel to this, several simple small molecules have been developed whose deprotonated forms are potent reductants under photoexcited state and can steer cross-coupling chemistry under very mild reaction conditions. Towards our understanding of the mechano-electrical transduction process of hearing auditory stimuli, it was deciphered that a pair of proteins function as gate-springs in the ear by serving as 'low-force-pass filter' to dampen the mechanical tension from loud sound while conveying the threshold for signal.

Research at the Department of Earth and Environmental Sciences showed that precipitation in the Western Himalayas is increasing due to intensified eastward moving synoptic meteorological systems from the Mediterranean Sea. Research on the Degana tungsten deposit in NW India has highlighted the importance of fluid-rock interaction and crustal fluid evolution towards the enrichment of tungsten in granitic rocks. A study of the concentration levels and distribution characteristics of environmental contaminants such as phthalic acid esters (PAEs or phthalates) and petroleum hydrocarbons, in surface sediments of the tropical estuaries advanced our understanding of their hazardous impact on aquatic systems. The study depicts intense pollution as a result of land-derived plastic waste and petroleum contamination through spillage of oil from boats and tankers. Biogas is one of the promising renewable energy sources with enormous market potential, but the presence of CO2 hampers its direct use for

several applications. Last year, research in the department reported an electricity-driven bioproduction technique to upgrade biogas through CO2 sequestration into acetic acid via the microbial electrosynthesis process. Researchers in the Department also proposed a new index to assess the air quality impact of urban tree plantation, which factors in both the stomatal uptake of trace gases and the impact of biogenic volatile organic compound emissions on ozone and aerosol formation.

From the Department of Humanities and Social Sciences, a monograph was published titled Streets in Motion: The Making of Infrastructure, Property and Political Culture in Twentieth-century Calcutta (Cambridge University Press). The book studies the social production of motion in the 20th-century urban context, and uncovers the social tectonics of spatial mobilization, thereby developing an approach to urban history by theorizing and historicizing the street as an apparatus of city-making and subject formation.

At the Department of Mathematical Sciences, a novel method involving a new decomposition of the bilinear Bochner-Riesz multiplier has been employed to establish, sharpen, and improve Lp estimates for the maximal bilinear Bochner-Riesz means in all dimensions. Interesting connections between cohomology and symmetries of certain families of solutions of the Yang-Baxter equation have been established, including solutions arising as knot invariants; new invariants of glued knot called gluing degree have been defined and knots up to gluing degree 6 have been classified. Interesting criteria for discreteness of two-generator subgroups of isometries of the complex and quaternionic hyperbolic spaces have been obtained. Distal action of the group of automorphisms of locally compact groups on the set of closed subgroups have been classified. Interesting results on quasiconvex subgroups of hyperbolic groups and metric bundles of groups have been derived. Minimal fields of definition for valuation of transcendental extensions have been introduced and it has been proved that they share some common ramification theoretic properties. Explicit description of the A1-chain homotopy classes of morphisms from a smooth henselian local scheme into a smooth projective surface, which is birationally ruled over a curve of genus >0, has been given. Necessary and sufficient condition for an element of the base field to have an antiderivative in a field extension generated by transcendental elementary functions and dilogarithmic integrals has been proven. New formula for the discriminant of rational field extensions of finite degree has been attained. Interesting asymptotic formula concerning the power maps in linear algebraic groups over finite fields has been derived. A new generalization of Fiedler's lemma is obtained by introducing the concept of the main function of a matrix. As applications, the universal spectra of the H-join of any graphs (possibly non-regular) and the adjacency spectra of the H-generalized join constrained by (arbitrary) vertex subsets are obtained. Interesting properties of circulant graphs have been discovered. Precise number of standard monomials of certain Artinian quotients has been computed.

At the Department of Physical Sciences, a pair of large scale (size of a galaxy) cavities in hot X-ray emitting gas in a cluster of galaxies that have been carved out by strong radio sources was discovered, and evidence was obtained that mechanical power associated with the cavities is heating the gas. The spectral evolution from ultraviolet to gamma-rays has been studied using AstroSat observations over three years in an active nucleus of a galaxy containing two supermassive black-holes, connecting the synchrotron and inverse Compton radiation. Analytic expressions have been obtained of two-loop master integrals, relevant to the Golden decay channel of the Higgs Boson, in terms of Chen’s iterated integrals with dlog one-forms; this work will allow the development of an efficient and precise event generator to study Higgs decay at particle colliders. The potential of the proposed future Large Hadron-Electron collider in probing the anomalous couplings of the Higgs boson with the massive electroweak gauge bosons has also been predicted, and this work has quantified the improvement in constraining anomalous couplings when using differential cross section over inclusive cross section. It has been demonstrated that one can successfully perform learning tasks using a single driven pendulum by utilizing the rich patterns of the transient dynamics (which has so far been an untapped resource), suggesting a new promising candidate for reservoir computing.

The Technology Business Incubator (TBI) has grown exponentially in the past year, and it is now the leading incubator in the region with 20 plus incubated start-ups. The renovated TBI facility was inaugurated on 2nd November, 2021 by Dr Jitendra Singh, Hon'ble Union Minister of State (Independent Charge) for the Ministries of Science and Technology and of Earth Sciences. Along with the main program of i-SIP (IISER- Start-up Incubation Program), the TBI has organized multiple sessions under Open Knowledge series in association with other stakeholder organizations. TBI has also provided platform to the students of IISER Mohali to present their futuristic/innovative concepts.

In the following sections, I touch upon the awards and honors received by the faculty and students during the reporting period.

From the Department of Biological sciences, the prestigious grants, fellowships, memberships and awards include the DBT/Wellcome Trust India Alliance Senior Fellowship (Dr. Rachna Chaba), SERB-POWER grant (Dr. Arunika Mukhopadhaya), “C. R. Krishna Murti Award” of Society of Biological Chemists (India) (Prof. Kausik Chattopadhyay), Young Affiliate of The World Academy of Sciences (Dr. Mahak Sharma), membership of the Education Committee of International Society for Stem Cell Research (Dr. Lolitika Mandal), and invitation to deliver the New and Notable Lecture of the Biophysical Society, USA (Prof. Samrat Mukhopadhyay). The Department has set up state-of-the-art research facilities such as the Super-resolution Microscopy Facility and Metabolic Analyzer using generous support from the FIST (Fund for Improvement of S&T Infrastructure) scheme of the Department of Science and Technology, Govt. of India.

From the Department of Chemical sciences Dr. R Vijaya Anand has been awarded the Bronze Medal by the Chemical Research Society of India (CRSI) for 2022. Dr. Sanchita Sengupta was appointed as member of the early career advisory board (ECAB) of journal ChemistrySelect in 2021 and also received the SERB POWER grant in 2022. Dr. Sanjay Singh joined the Editorial Board of ChemistrySelect. Dr. S. V. Ramasastry was selected to receive the CDRI Award for Excellence in Drug Research 2022 and also joined the Editorial Board of Organic & Biomolecular Chemistry. Dr. Jino George was recipient of Young Scientists Award 2021-Asian Oceanian Photochemistry Association

From the Department of Earth and Environmental Sciences, Dr. Vinayak Sinha has been appointed to the World Meteorological Organization's Environmental Pollution and Atmospheric Chemistry Scientific Steering Committee, and Dr. Ojha is an active member of the Joint Working Group “Understanding the monsoon phenomenon from a geodetic perspective” of the Inter-Commission Committee on “Geodesy for Climate Research” at the International Association of Geodesy (IAG).

From the Department of Physical Sciences, Prof. Sudeshna Sinha was appointed Associate Editor of Communications in Nonlinear Science and Numerical Simulation (Elsevier), and also was elected to the Council of the Indian National Science Academy (INSA). Prof. Kulinder Pal Singh has been awarded INSA Senior Scientist position for three years, and also received a Team award from the Astronomical Society of India for contributions to the building and operations of AstroSat. Dr. Ambresh Shivaji was invited to present the "Status of theory computations" for measuring Higgs self-coupling in single Higgs channels in a meeting organized by the LHC Higgs X-section WG2, CERN (Geneva). Colleagues in the High Energy Physics group and Cosmology and Astrophysics group organized a hybrid conference, `Shivalik HEPCATS Meeting - Winter 2021’. Dr. Anosh Joseph co-organized an international conference on 'Numerical Methods in Theoretical Physics' at the Asia Pacific Center for Theoretical Physics, Pohang, South Korea.

I am happy to record that the students and postdoctoral fellows of IISER Mohali have also won several laurels in the academic and research arenas during the past year. The list includes:

1. Mr. Warsimakram, (Ph.D. student) has received the PMRF award for his thesis proposal on "Hunting Dark Matter Candidates at Hadron Colliders via Precision Calculation".

2. Mr. Ashutosh Tripathi (BS-MS) has been awarded the Japanese Government's MEXT scholarship to pursue a Ph.D. in Physics at The Graduate University for Advanced Studies in Japan.
3. Dr. Praveen Kumar Mishra, postdoctoral fellow in the Department of Earth and Environmental Sciences with Dr. Ambili, joined as Assistant Professor at Cluster University, Jammu.
4. Dr. Satyam Ravi (PhD student) joined VIT Bhopal as Assistant Professor in Chemistry.
5. Dr. Monika Gupta (PhD student) joined as Ramanujan Fellow, Indian Institute of Technology, Ropar.

With respect to the academic programs, the Institute undertook measures to cope with the difficulties imposed by the COVID-19 pandemic. Several courses were run in hybrid mode (15 and 35, respectively, in monsoon and spring semesters of 2021-22), while the remainder were conducted fully online; all end of semester evaluations for the academic year were carried out in person. The option of doing lab work during the summer / winter breaks was made available for students who were not on campus during the semester.

The Institute has also initiated several measures to implement the National Education Policy (NEP) 2020, which is a significant document envisaging major changes in the education landscape. The majority of the academic programs here are already largely in compliance with NEP-2020; in addition, the Institute has approved online courses of NPTEL to be taken by students, a review of the curriculum is to be undertaken, an Institute Development Plan is being formulated, and procedures for credit transfers across institutions are being put in place.

Finally, the COVID-19 testing facility in the Institute which was set up in 2020 continued its operations through 2021-22. Several faculty and students have volunteered their services in its operation, along with personnel deputed by the Government of Punjab and with kits and equipment given by ICMR/UNICEF.

With these words, I commend the Annual Report to the reader.

Thank you.

31 March 2022

Professor J. Gowrishankar
Director IISER, Mohali

1. Board of Governors

Professor Ajay Sood
Chairperson
BOG IISER Mohali and Professor
Department of Physics
IISc. Bangalore
Email: asood@iisc.ac.in,
secretary.prof.sood@gmail.com

The Additional Secretary (TE)
Ministry of Education
Department of Higher Education
107-C, Shastri Bhawan, New Delhi-110001
011-23381097(O), Email: ashe-mhrd@gov.in

The Chief Secretary or Nominee
Govt. of Punjab
Room No.28, 6th Floor
Punjab Civil Secretariat, Chandigarh-160001
Email: cs@punjab.gov.in
Ph.:2740156, 2742488, 2740860,

Professor Govindan Rangarajan
Director, Indian Institute of Science
Bangalore-560012
Email: diroff@admin.iisc.ernet.in
Ph.:080-23600690, 22932222, 22932954, 23600936

Professor Rajeev Ahuja
Director IIT Ropar
Rupnagar, Punjab-140001
Email : director@iitropar.ac.in
Ph.01881-231006

The Secretary
Ministry of Micro, Small & Medium Enterprises
Udyog Bhawan, New Delhi
Email: Secretary-msme@nic.in

The Secretary,
Department of Bio-Technology,
CGO Complex, Lodhi Road, New Delhi
Phone: 011-24362950, 24362881, 24360747
Email: secy.dbt@nic.in; swarup@dbt.nic.in

Ms Darshana M Dabral
Joint Secretary& Financial Adviser
Ministry of Education
Department of Higher Education
Room No.120-C, Shastri Bhawan, New Delhi-110001
Ph.: 011-23382696, 23070668
Email: jsfa.edu@gov.in

Professor J Gowrishankar
Director, IISER Mohali
Sector 81, Mohali
Email:director@iisermohali.ac.in

Professor Sanjay Mandal
Professor, IISER Mohali
Email: Sanjaymandal@iisermohali.ac.in

Professor Chanchal Kumar
Professor, IISER Mohali
Email: chanchal@iisermohali.ac.in

Professor Jagdeep Singh
Secretary & Registrar, IISER Mohali
Email: registrar@iisermohali.ac.in

2. Senate

Professor J Gowrishankar
Director, IISER Mohali, Sector 81, Mohali
Email: director@iisermohali.ac.in

Professor S. Anantha Ramakrishna
Director, CSIO Chandigarh

Professor Rajeev Ahuja,
Director, IIT Ropar

Professor Rajesh Gill,
Deptt. of Sociology, Panjab University,

Professor Anand K. Bachhawat
IISER Mohali, Sector 81, Mohali

Professor Kapil Hari Paranjape
IISER Mohali, Sector 81, Mohali

Professor Sudeshna Sinha
IISER Mohali, Sector 81, Mohali

Professor P. Guptasarma
IISER Mohali, Sector 81, Mohali

Professor J. S. Bagla
IISER Mohali, Sector 81, Mohali

Professor Sanjay Mandal
IISER Mohali, Sector 81, Mohali

Professor Kavita Dorai
IISER Mohali, Sector 81, Mohali

Professor Chanchal Kumar
IISER Mohali, Sector 81, Mohali

Professor Ramandeep Singh Johal
IISER Mohali, Sector 81, Mohali

Professor Kausik Chattopadhyay
IISER Mohali, Sector 81, Mohali

Professor N. G. Prasad
IISER Mohali, Sector-81, Mohali

Professor Samrat Mukhopadhyay
IISER Mohali, Sector 81, Mohali

Dr. Sanjay Singh
IISER Mohali, Sector 81, Mohali

Dr. Yogesh Singh
IISER Mohali, Sector 81, Mohali

Dr. V. Rajesh
IISER Mohali, Sector 81, Mohali

Dr. Krishnendu Gongopadhyay
IISER Mohali, Sector 81, Mohali

Dr. R. Vijaya Anand
IISER Mohali, Sector 81, Mohali

Dr. Baerbel Sinha
IISER Mohali, Sector 81, Mohali

Dr. Rachna Chaba
IISER Mohali, Sector 81, Mohali

Dr. Sugumar Venkataramani
IISER Mohali, Sector 81, Mohali

Dr. Abhishek Chaudhuri
IISER Mohali, Sector 81, Mohali

Dr. Dipanjan Chakraborty,
IISER Mohali, Sector 81, Mohali

Dr. Kamal Priya Singh
IISER Mohali, Sector 81, Mohali

Dr. Ramesh Ramachandran
IISER Mohali, Sector 81, Mohali

Dr. Parth Chauhan
IISER Mohali, Sector 81, Mohali

Dr. Sunil Anil Patil
IISER Mohali, Sector 81, Mohali

Dr. Arunika Mukhopadhaya
IISER Mohali, Sector 81, Mohali

Dr. P. Visakhi
IISER Mohali, Sector 81, Mohali

Dr. Lingaraj Sahu
IISER Mohali, Sector 81, Mohali

Dr. Tanusree Khandai
IISER Mohali, Sector 81, Mohali

Professor Jagdeep Singh
Secretary & Registrar, IISER Mohali
Email: registrar@iisermohali.ac.in

3. Research Advisory Committee (till May 31, 2021)

Professor Arun Grover, Chandigarh (Chairperson)
Professor Hans-Gill, Emeritus Professor, CAS in Mathematics, Panjab University, Chandigarh
Professor T. R. Sharma, National Agri-Food Biotechnology Institute, Mohali
Professor Raghuram Rao Akkinepally, NIPER Mohali
Professor Kausik Chattopadhyay, Dean R&D, IISER Mohali Convener

Research Advisory Committee (June 1, 2021)

Professor Arun Grover, Chandigarh
Professor Ram Ramasamy, IIT, Delhi
Professor Prasad Bharatam, Chemistry, NIPER, Mohali
Professor Sanjeev Khosla, Biology, Director, IMTECH Chandigarh
Professor T. Ramadas, Mathematics, CMI, Chennai
Dean R&D, IISER Mohali (Convener)
Associate Dean R&D, IISER Mohali

4. Administration

Director	**Professor J. Gowrishankar**
Deputy Director	**Professor Sudeshna Sinha**
Registrar	**Professor Jagdeep Singh**
Deputy Registrar	**Sh Harjit Singh**
Dean Faculty	**Professor J Gowrishankar** **Professor Anand K. Bachhawat (03.03.2022)**
Dean Academics	**Professor Jasjeet Singh Bagla**
Associate Dean Academics	**Dr. Sugumar Venkataramani**
Dean Students	**Dr. Abhishek Chaudhuri**
Associate Dean Students	**Dr. Dipanjan Chakraborty**
Dean R&D	**Dr. R. Vijaya Anand**
Associate Dean R&D	**Dr. Rachna Chaba**
Dean International Relations and Outreach	**Dr. Amit Kulshrestha**
Librarian	**Dr. P. Visakhi**
Executive Engineer cum Estate Officer	**Shri Praveen Kumar Srivastava**
Sr. Medical Officer	**Dr. Gurpreet Singh**
Assistant Registrars	**Shri Sandeep Ahlawat** **Shri Mukesh Kumar** **Ms. Amandeep Saini** (27.10.2021) **Ms. Nancy Gupta** (18.11.2021) **Shri Sanjeev Kumar Yadav** (30.11.2021)
Wardens	**Dr. Adrene Freeda D' cruz** **Dr. Tanushree Khandai** **Dr. Santosh B Satbhai** **Dr. Ambresh Shivaji** **Dr. Raju Attada** **Dr. Subhabrata Maity** **Dr. Soma Maity**
Veterinarian (Animal House)	**Dr. Chander Shekhar**
Scientific Officer/Computer Centre	**Dr. Paramdeep Singh Chandi**
Software Engineer/Computer Centre	**Ms. Garima Kaushik**
Software Assistant/Computer Centre	**Ms. Sangeetha Gurusamy**
Assistant Security Officer	**Shri Kamal Jeet**
Assistant Exe Engineer (Electrical)	**Shri Atul Kadwal**
Assistant Exe Engineer (Civil)	**Shri Rajiv Kumar**
Sr. Private Secretary (Director's Office)	**Ms. Amandeep Saini** (26.10.2021)
Sr. Personal Assistant (Registrar's Office)	**Ms. Poonam Rani**
Sr. Personal Assistant (Establishment Section)	**Ms. Yashoda**

Sr. Accountant	**Shri Sachin Jain**
	Shri Raman Kumar (on lien)
Accountant	**Shri Mansa Ram Gupta**
Office Superintendent	**Shri Arup Kumar Saha**
Sr. Library Information Assistant	**Shri Peeyush Dwivedi**
Office Assistants	**Ms. Kavita Pandey**
	Shri Charanjit Singh (20/03/13 to 08.11.2021 (FN) on lien)
	Shri Tarandip Singh
	Ms. Neena Kumari
	Ms. Deepika
Physical Education Instructor	**Shri Kirpal Singh**
Data Entry Operators	**Ms. Bhupali Sharma**
	Shri Sukhpreet Singh (on lien)
Sr. Technical Scientific Assistants	**Shri Rakesh Kumar**
	Shri Ramesh Kumar
Sr. Scientific Assistants	**Shri Bhavin R. Kansara**
Scientific Assistants	**Shri Jayaraju Battula**
Technical Assistant	**Shri Triveni Shanker Verma**
Technical Assistant	**Shri Avtar Singh**
Lab Technicians	**Shri Anupam Pandey**
	Shri Mangat Ram
Lab Assistants	**Shri Prahlad Singh**
	Shri Balbir Singh
Staff Nurse	**Shri C. Periyasamy**
Peon	**Shri Bhopal Singh**

5. Faculty

5.1 Faculty Members

1. **Debashis Adhikari** (Assistant Professor, Chemistry)
Catalysis, Small Molecule Activation, M–L Multiple Bonding
2. **Anoop Ambili** (Assistant Professor, Earth & Environmental Sciences)
Paleoclimate and Geochemistry
3. **R. Vijaya Anand** (Associate Professor, Chemistry)
Synthetic organic chemistry
4. **Chandrakant S. Aribam** (Assistant Professor, Mathematics)
Number theory
5. **Arvind** (Professor, Physics)
Quantum information theory, Quantum optics
6. **Raju Attada** (Assistant Professor, Earth & Environmental Sciences)
Weather and Climate Modelling; Monsoon Dynamics
7. **S. Arulananda Babu** (Associate Professor, Chemistry)
Synthetic organic chemistry
8. **Anand K. Bachhawat** (Professor, Biology)
Glutathione and Sulphur Metabolism in Yeasts
9. **Jasjeet Singh Bagla** (Professor, Physics)
Cosmology, Astrophysics
10. **P. Balanarayan** (Assistant Professor, Chemistry)
Computational & Theoretical Chemistry
11. **Chetan T. Balwe** (Assistant Professor, Mathematics)
Applications of Homotopical Algebra to Algebraic Geometry
12. **Ritajyoti Bandyopadhyay** (Assistant Professor, Humanities and Social Sciences)
Urban History, Informal Economy and Infrastructure Studies
13. **Indranil Banerjee** (Assistant Professor, Biology)
Cellular Infectiology of Human Pathogenic Viruses
14. **Suman Kumar Barman** (Assistant Professor, Chemistry)
Bio-Inorganic Chemistry, Catalysis
15. **Vishal Bhardwaj** (Assistant Professor, Physics)
Experimental High Energy Physics: Exotic particles, Beauty and Charm physics
16. **Manabendra Nath Bera** (Assistant Professor, Physics)
Quantum Information and Quantum Physics
17. **Tripta Bhatia** (Assistant Professor, Physics)
Soft Matter & Biological Physics, Synthetic Biology
18. **Sourabh Bhattacharya** (Assistant Professor, Earth & Environmental Sciences)
Economic Geology, Granite metallogeny, Crustal fluids, Fluid inclusions
19. **Samarjit Bhattacharyya** (Associate Professor, Biology)
Neurobiology
20. **Samir Kumar Biswas** (Assistant Professor, Physics)
Bio-NanoPhotonics and BioPhysics
21. **Rachna Chaba** (Associate Professor, Biology)
Bacterial Genetics and Physiology
22. **Dipanjan Chakraborty** (Associate Professor, Physics)
Soft Condensed Matter, Statistical Physics
23. **Kausik Chattopadhyay** (Professor, Biology)
Structure-Function Studies on Pore-Forming Protein Toxins
24. **Abhishek Chaudhuri** (Associate Professor, Physics)
Soft condensed matter physics
25. **Parth R. Chauhan** (Assistant Professor, Humanities and Social Sciences)
Paleoanthropology & Archaeology
26. **Rhitoban Ray Choudhury** (Assistant Professor, Biology)

Evolution, Genetics and Genomics
27. **Angshuman Roy Choudhury** (Assistant Professor, Chemistry)
X-ray Crystallography
28. **Sadhan Das** (Assistant Professor, Biology)
Epigenetic Mechanisms in Diabetic Vascular Complications
29. **Prasenjit Das** (Assistant Professor, Physics)
Theoretical soft condensed matter physics, statistical mechanics and computational physics.
30. **Adrene F. D'cruz** (Assistant Professor, Humanities and Social Sciences)
English Literature
31. **Arijit Kumar De** (Associate Professor, Chemistry)
Ultrafast non-linear spectroscopy and fluorescence microscopy
32. **Kavita Dorai** (Professor, Physics)
Biomolecular NMR, Quantum computing
33. **Shane D'mello** (Assistant Professor, Mathematics)
Topology of Real Algebraic Varieties
34. **Abhik Ganguli** (Assistant Professor, Mathematics)
Number Theory
35. **Jino George** (Assistant Professor, Chemistry)
Molecular Strong Coupling
36. **Krishnendu Gongopadhyay** (Associate Professor, Mathematics)
Groups, Geometry & Dynamics
37. **Samrat Ghosh** (Assistant Professor, Chemistry)
Materials chemistry
38. **Ujjal K. Gautam** (Associate Professor, Chemistry)
Functional nanomaterials and applications
39. **Sandeep K. Goyal** (Assistant Professor, Physics)
Quantum optics and quantum information theory
40. **J. Gowrishankar** (Professor, Biology)
(Director)
41. **Purnananda Guptasarma** (Professor, Biology)
Protein Engineering & Structural Biochemistry
42. **Manjari Jain** (Associate Professor, Biology)
Behavioural Ecology & Evolutionary Biology
43. **Anosh Joseph** (Assistant Professor, Physics)
Theoretical High Energy Physics
44. **Harvinder Kaur Jassal** (Associate Professor, Physics)
General Relativity and Cosmology
45. **Satyajit Jena** (Assistant Professor, Physics)
Experimental High Energy Particle and Nuclear Physics
46. **Ramandeep Singh Johal** (Professor, Physics)
Statistical Physics, Thermodynamics and Quantum Theory
47. **Rajeev Kapri** (Associate Professor, Physics)
Statistical Mechanics and Soft Condensed Matter Physics
48. **Jotsaroop Kaur** (Assistant Professor, Mathematics)
Fourier Analysis
49. **Tanusree Khandai** (Assistant Professor, Mathematics)
Lie Algebras and Representation Theory
50. **Amit Kulshrestha** (Associate Professor, Mathematics)
Quadratic forms, Central simple algebras and related structures
51. **Chanchal Kumar** (Professor, Mathematics)
Algebraic Geometry and Combinatorial Commutative Algebra
52. **Pankaj Kushwaha** (Assistant Professor, Physics)
High Energy Astrophysics and its interface with Cosmology, Astro-particle physics, and Cosmic rays, Physics of Relativistic jets, Gamma-ray Astronomy
53. **Sanjeev Kumar** (Associate Professor, Physics)

Condensed Matter Theory: Correlated electron systems, disordered systems
54. **Indrajit Lahiri** (Assistant Professor, Biology)
Molecular Mechanism of DNA replication
55. **Kinjalk Lochan** (Assistant Professor, Physics)
56. **Soma Maity** (Assistant Professor, Mathematics)
Riemannian geometry
57. **Alok Kumar Maharana** (Assistant Professor, Mathematics)
Algebraic Geometry
58. **Subhabrata Maiti** (Assistant Professor, Chemistry)
Bio-organic Chemistry, Molecular Self-assembly and Systems Chemistry
59. **Lolitika Mandal** (Associate Professor, Biology)
Hematopoiesis, Cardiogenesis and Molecular pathways in stem and progenitor cell development in Drosophila
60. **Sanjay Mandal** (Professor, Chemistry)
Organometallic Chemistry, Nanomaterials, and X-ray Diffractometry
61. **Sudip Mandal** (Associate Professor, Biology)
Mitochondrial regulation of cellular function
62. **Shravan Kumar Mishra** (Associate Professor, Biology)
RNA Splicing
63. **Arunika Mukhopadhaya** (Associate Professor, Biology)
Immunology
64. **Samrat Mukhopadhyay** (Professor, Biology/Chemistry)
Protein folding, Misfolding, Prion & Amyloid biology
65. **Vidya Devi Negi** (Assistant Professor, Biology)
Infection biology and host-pathogen interaction
66. **Chandrakanta Ojha** (Assistant Professor, Earth & Environmental Sciences)
Microwave Remote Sensing, Satellite radar interferometry, Crustal deformation, Groundwater, Parallel computing
67. **Santanu Kumar Pal** (Associate Professor, Chemistry)
Liquid Crystals, Interfacial Phenomena, Colloid and Gel Chemistry, Chemical and Biological Sensing, Nanoscale Science and Engineering
68. **Yunus Ali Pulpadan** (Assistant Professor, Earth & Environmental Sciences)
Geomorphology, Remote Sensing and GIS, Disaster Mitigation
69. **Santhosh Kumar Pamula** (Assistant Professor, Mathematics)
Operator Theory, Functional Analysis
70. **Yashonidhi Pandey** (Assistant Professor, Mathematics)
Algebraic Geometry
71. **Shashi Bhushan Pandit** (Associate Professor, Biology)
Computational structural and systems biology, protein-ligand interactions, metabolomics
72. **Kapil Hari Paranjape** (Professor, Mathematics)
Geometry
73. **Sunil Anil Patil** (Assistant Professor, Earth & Environmental Science)
Environmental Microbiology and Biotechnology
74. **N. G. Prasad** (Professor, Biology)
Evolutionary genetics
75. **V. Rajesh** (Associate Professor, Humanities and Social Sciences)
History
76. **Sabyasachi Rakshit** (Associate Professor, Chemistry)
Single Molecule Manipulation & Imaging and Nano biology
77. **Rajesh Ramachandran** (Associate Professor, Biology)
Cellular basis of tissue regeneration
78. **Ramesh Ramachandran** (Associate Professor, Chemistry)
Development of Solid-state NMR methods, Quantum mechanics
79. **Raj Kumar Roy** (Assistant Professor, Chemistry)
Polymer Chemistry

80. **Anu Sabhlok** (Associate Professor, Humanities and Social Sciences)
Feminist geography, Political-economy of contemporary India, Globalization, Identity (Gender and nation), Participatory Action Research, Ethnography
81. **Debdulal Saha** (Assistant Professor, Humanities and Social Sciences)
Labour Economics, Development Economics, Informal Economy, Public Policy
82. **Neeraja Sahasrabudhe** (Assistant Professor, Mathematics)
Theoretical and Applied Probability
83. **Lingaraj Sahu** (Associate Professor, Mathematics)
Operator Theory, Operator Algebras
84. **Kuljeet Singh Sandhu** (Associate Professor, Biology)
Systems Biology of Gene Regulation
85. **Pranab Sardar** (Assistant Professor, Mathematics)
Geometric Group Theory
86. **Santosh B. Satbhai** (Assistant Professor, Biology)
Plant genetics, plant stress physiology
87. **Sharvan Sehrawat** (Associate Professor, Biology)
Immunology and immunopathology
88. **K. R. Shamasundar** (Assistant Professor, Chemistry)
Quantum Chemistry
89. **Sanchita Sengupta** (Assistant Professor, Chemistry*)*
Functional Organic Material
90. **Mahak Sharma** (Associate Professor, Biology)
Cell Biology
91. **Goutam Sheet** (Associate Professor, Physics)
Condensed Matter Physics and Scanning Probe Microscopy
92. **Ambresh Shivaji** (Assistant Professor, Physics)
Particle Physics
93. **Kamal P. Singh** (Associate Professor, Physics)
Ultrafast Quantum Dynamics and Stochastic nonlinear dynamics
94. **Mahender Singh** (Associate Professor, Mathematics)
Topology and Groups
95. **Mandip Singh** (Associate Professor, Physics)
Quantum Optics and Bose Einstein Condensation
96. **Sanjay Singh** (Associate Professor, Chemistry)
Synthetic Inorganic and Organometallic Chemistry
97. **Yogesh Singh** (Associate Professor, Physics)
Experimental Condensed Matter Physics
98. **Jogender Singh** (Assistant Professor, Biology)
Cellular stress biology, innate immunity, C. elegans genetics
99. **Baerbel Sinha** (Associate Professor, Earth & Environmental Sciences)
Environmental Science
100. **Sudeshna Sinha** (Professor, Physics)
Nonlinear Dynamics, Chaos, Complex Systems, Networks, Computation
101. **Vinayak Sinha** (Associate Professor, Earth & Environmental Sciences)
Environmental Science: Atmospheric Chemistry Field Experiments
102. **Varadharaj R. Srinivasan** (Associate Professor, Mathematics)
Differential Algebra
103. **Sripada S. V. Rama Sastry** (Associate Professor, Chemistry)
Synthetic Organic Chemistry
104 **Vaibhav Vaish** *(*Assistant Professor, Mathematics)
Algebraic Geometry
105. **Sugumar Venkataramani** (Associate Professor, Chemistry)
Physical Organic Chemistry
106. **Ananth Venkatesan** (Associate Professor, Physics)
Mesoscopic Electronic & Electromechanical systems

107. **Ram Kishor Yadav** (Associate Professor, Biology)
Plant Developmental Genetics
108. **K. P. Yogendran** (Assistant Professor, Physics)
Quantum Aspects of Gravity

5.2 Honorary Faculty
1. **A.R. Ravishankara** (Professor, EES)
2. **Gautam Desiraju** (Professor, Chemistry)
3. **Raghvendra Gadagkar** (Professor, Biology) *Ecology*
4. **P. Balaram** (Professor, Biology) *Biochemistry*
5. **Mahesh Rangarajan** (Professor, HSS) *History and Environmental Studies*
6. **N. Sathyamurthy** (Professor, Chemistry)
7. **Sabyasachi Bhattacharya** (Professor, Biology)
8. **P P Majumder** (Professor, Biology)
9. **Sudesh Kaur Khanduja** (Professor, Mathematics & INSA Honorary Scientist)

5.3 Visiting Faculty
1. **Charanjeet Singh Aulakh** Visiting Faculty, Physics
2. **Kulinder Pal Singh** Visiting Faculty, Physics & INSA Senior Scientist
3. **Sadhna Saxena** Visiting Faculty, Humanities and Social Sciences
4. **Srihari Keshvamurthy** Visiting Faculty, Chemistry
5. **Philose Koshy** Visiting Faculty, Humanities and Social Sciences

5.4 Adjunct Faculty
1. **Amitabha Joshi** (Biology)
2. **A. Pati** (Physics)
3. **Hriday Kant Dewan** (Physics)
4. **Pinaki Majumdar** (Physics)
5. **R. Murugavel** (Chemistry)
6. **Sarabjot Singh Anand** (Physics)
7. **Shiv Grewal** (Biology), Distinguished Investigator, NIH, USA
8. **T. Padmanabhan** (Physics), Distinguished Professor at the Inter-University Center for Astronomy and Astrophysics (IUCAA) at Pune
9. **Somdatta Sinha** (Biology)
10. **Souvik Maiti** (Chemistry)
11. **Arindam Ghosh** (Physics)
12. **Vijay Balakrishna Shenoy** (Physics)
13. **Nissim Kanekar** (Physics)
14. **V. Ravindran** (Physics)

5.5 INSPIRE Faculty Fellows
1. **Aru Beri** (Physics)
2. **Monika Sharma** (Chemistry)
3. **Anirban Bose** (Mathematics)
4. **Sanjib Dey** (Physics)
5. **Sugandha Maheshwary** (Mathematics)
6. **Sharmila Bhattacharya** (Earth & Environmental Sciences)

6 Events and activities: 2021-22

6.1 Meetings of Institute Bodies

During 2021–22, due to the COVID-19 pandemic, most of the meeting of Institute bodies took place through video conferencing (VC) mode or online platform. The following are the details.

Board of Governors Meetings	**44th Meeting of the BOG** (VC Mode)	**22.06.2021**
	45th Meeting of the BOG (VC Mode)	**07.09.2021**
	46th Meeting of the BOG	**24.12.2021**
	47th Meeting of the BOG	**29.03.2022**

Finance Committee Meetings	**36th Meeting of the Finance Committee** (VC Mode)	**22.06.2021**
	37th Meeting of the Finance Committee (VC Mode)	**07.09.2021**
	38th Meeting of the Finance Committee	**23.12.2021**

Academic Senate Meetings	**46th Meeting of the Academic Senate** (VC Mode)	**06.05.2021**
	47th Meeting of the Academic Senate (VC Mode)	**18.06.2021**
	48st Meeting of the Academic Senate (LH-5)	**31.08.2021**
	49nd Meeting of the Academic Senate (LH-5)	**22.12.2021**
	50rd Meeting of the Academic Senate (VC Mode)	**12.01.2021**

Research Advisory Committee Meeting	**20.08.2021**

6.2 Convocation 2021

Due to the COVID-19 pandemic, the Convocation 2021 was conducted through an online platform on June 28, 2021. The 10th batch graduated from IISER Mohali. Amongst a total of 218 students who received their degrees, 46 were PhD students. Programs where students graduated are: PhD, MS-PhD, MS, BS-MS, and BS. The Chairperson, Board of Governors, Prof. Ajay Sood presided over the function. Professor N. Sathyamurthy (former and Founding Director IISER Mohali) was the Chief Guest.

Professor N Sathyamurthy obtained his Ph.D from Oklahoma State University, and after a postdoc at the University of Toronto he joined IIT Kanpur in 1978, where he went on to become the Head of the Department of Chemistry and Dean of Faculty Affairs. In 2007 he joined the Indian Institute of Science Education and Research Mohali as the Founder Director and guided the growth of the Institute for a decade.

Professor N Sathyamurthy is a renowned theoretical chemist, with outstanding contributions to molecular reaction dynamics, in particular relating features of potential energy surface to dynamical outcome and exploring the utility of time - dependent quantum mechanics to reactive scattering and fractals in chemical processes. He has also made important contributions to the determination of the stability and degradation of polysilanes, analysis of the state of water clusters in a confined nonpolar environment, shapes of boric acid clusters, roles of pentagon and hexagon motifs and stacking interactions in aromatic systems. He has also studied the process of flowering and formation of patterns in flowers.

Professor N. Sathyamurthy has a keen interest in science education and he was the chief editor of Resonance, journal of science education during 2018-2020. He is a fellow of Indian Academy of Science (IAS), Bangalore, Indian National Science Academy (INSA), New Delhi and The World Academy of Sciences (TWAS), Trieste, Italy. His honours include the S.S. Bhatnagar Prize in Chemical Sciences, the C.V. Raman Award, the FICCI Award and the JC Bose National Fellowship. He was the President of the Chemical Research Society of India during 2017-2020.

Professor J. Gowrishankar presented the Director's report on the occasion. Ms. Shradha Sapru received the President's gold medal. Professor S N Kaul medal was presented to Ms. Cheshta Bhatia. Certificates of academic excellence were presented to Ms Dipannita Ghosh, Ms Shradha Sapru, Mr. Puneeth Deraje and Mr. Rahul Ramesh.

6.3 Foundation Day 2021

The IISER Mohali Foundation Day was celebrated on 27th September, 2021. The Foundation Day Lecture was delivered by Professor Ramesh V. Sonti, Dean Faculty at IISER Tirupati. The title of the lecture was "How do plants ward off pathogens?".

Professor Ramesh Sonti obtained his BSc degree (Botany, Zoology and Chemistry) from Andhra University in Visakhapatnam, India. He obtained his MSc and MPhil degrees in Plant Sciences from the University of Hyderabad, Hyderabad and a PhD in bacterial genetics from the University of Utah, followed by post-doctoral research on plant genetics at the Massachusetts Institute of Technology (MIT), USA. In 1993, he joined the CSIR-Centre for Cellular and Molecular Biology (CCMB), Hyderabad, India. In November 2017, he joined the National Institute of Plant Genome Research, New Delhi as Director and served until his superannuation in May 2020. After a short stint at CCMB as a J. C. Bose Fellow in 2020, he moved to IISER Tirupati, where he is a Professor and Chair of the Department of Biology. He is also serving as the Dean Faculty at IISER Tirupati. His research expertise is in the area of microbial and plant genetics and the use of various microscopic techniques, expression profiling, etc. for studying the mechanisms of plant- pathogen interactions. He was awarded the Shanti Swarup Bhatnagar Prize (2004) for Science and Technology, the highest science award in India, in the biological sciences category. He was also the recipient of the prestigious National Bioscience Award for Career Development of the Department of Biotechnology, Government of India in 2004.

6.4 Independence Day 2021

Independence Day 2021 was celebrated at IISER Mohali Campus. National Flag was hoisted by the Director, Professor J. Gowrishankar. CNR Rao foundation award and Academic Excellence awards were presented to the students by the Director on this occasion.

CNR Rao Foundation Prize

Reg. No	Name	Reg. No	Name
MS20024	Ransan Galib Ahmed	MS20169	Abdul Gani
MS 20056	Sachin G Iyer	MS20175	Aprameyan Desikan
MS20098	Shreyas Jain	MS20220	Shigha
MS20130	Harsh Kashyap		

Certificate of Academic Excellence for the Best performing students (2nd, 3rd & 4th year of BS-MS) in the 2020-21, 2nd semester

MS19

Reg. No	Name
MS19029	Ritam Das
MS19045	Chinmayi Subramanya
MS19053	Radhika Rajendra

MS18 Biology

Reg. No	Name
MS18023	Abhilasha Jakhar
MS18060	Vishnu Soman
MS18083	Poonam Dhiman
MS18092	Tanvi Madaan
MS18099	Maia Lisa Dsouza
MS18123	Ayushi Mahajan
MS18150	Yashvi Bhat
MS18153	Divyanshu Sahu
MS18165	Srishti
MS18194	Mirudula. E
MS18212	Muskan Kalra
MS18219	Maithily Somesh Hingmire

MS18 Chemistry

Reg. No	Name
MS18180	Aastha

MS18 Mathematics

Reg. No	Name
MS18007	Himanshu Nirankarnath Tiwari

MS18 Physics

Reg. No	Name
MS18013	Arka Dutta
MS18094	Abineet Parichha
MS18117	Akshay Shankar
MS18118	Aalhad Abhay Bhatt
MS18221	Suroj Dey

MS17 Biology

Reg. No	Name
MS17026	Barsa Das
MS17030	Spatika C Jayaram
MS17034	Achuthan Raja Venkatesh
MS17040	Abhishek Dubey
MS17049	Geetika Aggarwal
MS17070	Jasmine
MS17107	Sanat Mishra
MS17119	Aishwarya Ramya Viswamitra
MS17122	Jennifer John
MS17132	Bhavya Deepti Vadavalli
MS17133	Meesha Katyal
MS17176	Harshit Jain
MS17186	Aiswarya Sajeevan
MS17202	Akhil Ratan Mishra

MS17 Chemistry

Reg. No	Name
MS17009	Abhishek Roy
MS17113	Prateek Pranjal
MS17145	Rupali Singh

MS17 Mathematics

Reg. No	Name
MS17004	Sayan Chattopadhyay
MS17123	Nilendu Das

MS17 Physics

Reg. No	Name
MS17074	Ritoban Datta
MS17109	K S Swaparjith
MS17156	Dhruv Pathak
MS17184	Aswini R
MS17204	Abhinna Sundar Samantaray

Certificate of Academic Excellence for the Best Performing Students (first & second year of Integrated PhD program) in the second semester of the academic session 2020-21

MP20 Biology

Reg. No	Name
MP20001	Roopali Khanna
MP20014	Dhruba Chatterjee

MP20 Chemistry

Reg. No	Name
MP20002	Neetu

MP20 Mathematics

Reg. No	Name
MP20011	Anunoy Chakraborty

MP19 Biology

Reg. No	Name
MP19002	Walimbe Anuja Anand
MP19003	Aditya Biswas
MP19005	Anuraag Ghosh
MP19012	Yogita

MP19 Chemistry

Reg. No	Name
MP19014	Anshika Baghla

MP19 Mathematics

Reg. No	Name
MP19001	Deepanshi Saraf

6.5 Republic Day 2022

Republic Day of the Nation was celebrated in the Institute on 26th January 2022. Director, Prof. J. Gowrishankar hoisted the flag and gave away the prizes for the best academic performances in various academic programs. Following students received the awards.

CNR Rao Foundation Prize for the Best Performance to the 1st Year Students of the BS-MS Programme (2021-22, 2nd Semester)

Reg. No	Name
MS20017	Aditya Raj
MS20020	Aditi
MS20024	Rabsan Galib Ahmed
MS20043	Nitya Ahuja
MS20052	Rochan Das
MS20056	Sachin G Iyer
MS20112	Ansh Mishra
MS20130	Harsh Kashyap
MS20133	Prateek Mayur Vaniawala
MS20169	Abdul Gani

Certificate of Academic Excellence for the Best Performing students (2nd, 3rd and 4th Year BS-MS students) in (2021-22, 1st semester)

MS20

Reg. No	Name
MS20018	Aniket Patel
MS20024	Rabsan Galib Ahmed
MS20149	A Vignesh

MS19 Biology

Reg. No	Name
MS19096	Soumyadev Paul
MS19127	Harshitha Vasan

MS19 Chemistry

Reg. No	Name
MS19034	Marva V Abdul Ravuf
MS19114	Soumyadev Das

MS19 Mathematics

Reg. No	Name
MS19170	Rupkatha Chand

MS19 Physics

Reg. No	Name
MS19004	Vasudev Mittal

MS18 Biology

Reg. No	Name
MS18060	Vishnu Soman
MS18153	Divyanshu Sahu
MS18194	Mirudula. E
MS18220	Ruben Aju George

MS18 Chemistry

Reg. No	Name
MS18180	Aastha

MS17 Physics

Reg. No	Name
MS18094	Abineet Parichha
MS18117	Akshay Shankar
MS18148	Kunal Verma

Certificate of Academic Excellence for the Best Performing Students (first & second year of Integrated PhD program) in the first semester of the academic session 2021-22

MP21 Biology

Reg. No	Name
MP21003	Riya Madan

MP21 Chemistry

Reg. No	Name
MP21011	Ramanpreet Kaur

MP21 Mathematics

Reg. No	Name
MP21004	Ananya Gaur

MP20 Biology

Reg. No	Name
MP20001	Roopali Khanna
MP20014	Dhruba Chatterjee
MP20015	Prakash Chandra Joshi

MP19 Chemistry

Reg. No	Name
MP20002	Neetu

MP19 Mathematics

Reg. No	Name
MP20003	Deepanshi Sara

6.6 Outreach Activities at IISER Mohali

Engagement with students, teachers and public
A brainstorming online workshop for Science and Mathematics teachers of Education Department, Chandigarh UT was organized under Rashtriya Avishkar Abhiyan on February 17-18, 2022. Subsequently, an online interaction of faculty members of IISER Mohali with students of Chandigarh UT schools was organized on February 26, 2022. Dr. Sabyasachi Rakshit was the coordinator of these events from the Institute.

Due to Covid restrictions, the activity of school and college visits to IISER Mohali was mostly on halt. Toward the end of 2021-22, on March 25, 2022 undergraduate students of
Government College, Gurdaspur, Punjab visited the Institute.

The Institute continued its online Public Engagement Series lectures. The following sessions were conducted under this series.

- Episode 07 (May 29, 2021): Microreaction Technology: Is Small Better? by Dr. Ramasamy Vijaya Anand
- Episode 08 (June 26, 2021): Feminism on the Road: Ethnographic explorations of gendered infrastructures by Dr. Anu Sabhlok
- Episode 09 (July 31, 2021): Urns, Ants and the Internet by Dr. Neeraja Sahasrabudhe
- Episode 10 (October 09, 2021): Retina Regeneration: Lessons from Zebrafish by Dr. Rajesh Ramachandran

IISER Mohali Foundation Day 2021
The Foundation Day 2021 was largely organized online. The events included science fiction story writing, art, quiz and photography competitions for school students. Despite delays due to COVID-19, students from various schools in the tricity area participated enthusiastically. Students from various departments of IISER Mohali volunteered to make video demonstrations of some experiments, which were then shown to the participants. Dr. Neeraja Sahasrabudhe was the coordinator of Foundation Day program.

Mathematics Gallery at Pushpa Gujral Science City, Kapurthala
Institute contributed to the creation of the Mathematics Gallery at Pushpa Gujral Science City, Kapurthala. Dr. Amit Kulshrestha was the subject expert in its conceptualization and designing. The gallery was inaugurated on November 24, 2021.

Prime Ministers Research Fellowship
During the year 2021-22, a total of 9 students were awarded Prime Ministers Research Fellowship to pursue PhD at IISER Mohali. These students are

PMRF Cycle 7
Department of Mathematical Sciences
Harish Kishnani
Nidhi Gupta
Department of Physical Sciences
Warsimakram Imamsab

PMRF Cycle 8
Department of Biological Sciences
Deepanshi Awasthi
Department of Chemical Sciences
Monojit Roy
Nirmal Malik
Anshika Baghla

Department of Mathematical Sciences
V Pravin Kumar
Department of Physical Sciences
Vipin Chand Devrari

Apart from their engagement in cutting edge research, PMRF fellows are required to make teaching contributions. Our PMRF fellows taught at MCM DAV College, Chandigarh, Government College, Mohali, and Government School, Chilla.

Alumni Association Meeting
The Third biannual meet of Alumni Association was held December 26-28, 2021. A new board of Directors took over the administration of Alumni Association during this meeting.

Student Exchange
The Institute participated in an online meeting on November 26, 2022 organized by the Indian Embassy in Germany to facilitate student exchange between Max-Plack Institutes and Indian Institutes. Mehak, a MS18 student has been selected for an internship at Max-Planck-Institute for Plant Breeding Research (Cologne, Germany) under these exchanges.

Gender Advancement for Transforming Institutions (GATI)
The Institute is a part of the Gender Advancement for Transforming Institutions (GATI), which is a pilot project supported by the Department of Science and Technology (DST). It envisages gender equity in science and technology in India. The project is carried out through the GATI Self Assessment Team (GSAT) of IISER Mohali which has representatives from all categories of people at IISER Mohali from faculty, students, administrative staff, housekeeping staff, etc. The following activities were carried out under this project.

1. The Curie Club student talked about the work of women Nobel laureates by Sonit Dhusia from MS21 on February 06, 2022.
2. Talks WiPMA (Women in Physics, Maths, and Astronomy) talks
   - "She is on her way: Women and Science in India and the Developing World", by Dr Shobhana Narasimhan, JNCASR Bangalore (February 11, 2022)
   - "The Supernova Foundation: A mentoring and networking programme for women in physics", by Dr. Michelle Lochner, University of the Western Cape (UWC), South Africa (February 16, 2022)
3. The panel discussions by the Astronomy Club on the topic of Women in Astronomy, on the occasion of The International Day of Women and Girls in Science. The panelists were Dr. H K Jassal, Dr. Aru Beri, and Dr Mamta Gulati (February 20, 2022)
4. The screening of Hidden Figures (2016), a movie about the three African-American female mathematicians, by the Movie Club (March 1, 2022).
5. The ITEHAD, the Dance club organized an online dance competition, 'Relevé'. It featured the theme of gender equality and sensitivity. (March 01, 2022)
6. The Literary and Debating Society in collaboration with the Centre for Studies in Gender and Sexuality (CSGS) organized a two-day workshop on "Understanding the Law and Expanding Diversity" to initiate a non-judgemental dialogue for developing a critical perspective on gender, sexuality, law, and diversity. (March 3-4, 2022)
7. Praxis, the Humanities and Social Sciences club conducted
   - a talk by MS17 students Aishwarya Viswamitra titled 'Why menopause awareness matters', to celebrate International Women's Day (March 7, 2022).
   - a talk on "The Production of Science Bearing Gender, Caste and More", by Dr. Karthik Bittu Kondaiah, Ashoka University, and Shalini Mahadev, University of Hyderabad (March 16, 2022).
8. Special talk on "Technology facilitated harms against women - old wine in a new bottle?" by Dr. Sreeparna Chattopadhyay, Associate Professor in Sociology, Flame University, Pune. (14 March 2022)

6.7 Teachers' Day 2021

The Best Teacher Award of IISER Mohali for the year 2021 was awarded to Dr. Ritajyoti Bandyopadhyay (Dept. of Humanities & Social Sciences) & Dr. Sunil A. Patil (Dept. of Earth and Environmental Sciences) on Teachers Day, September 5, 2021 for their contributions to teaching. Prof. J. Gowrishankar, Director IISER Mohali presided over the function.

6.8 Students' Activities

The students of IISER Mohali participated in many competitive and non-competitive events organised by the Sports Department. Inter-batch Basketball Tournament 2021 was organised within the campus. The Inter Hostel Sports Meet 2022 was introduced for the 1st time in the campus and had a good number of participants. The winner team was awarded with a trip to Wildlife Sanctuary Chandigarh. The Intra IISER Sports Tournament 2022 was successfully organised with approx. more than 500 participants. List of sports introduced in these tournaments are given below:-

Inter Hostel Sports Meet 2022: -

Mix Volleyball

Volleyball Men's

Tug of War Men's

Tug of War Women's

Inter Hostel Sports Meet 2022

Inter Hostel Sports Meet 2022

Intra IISER Sports Tournament 2022:-

Athletics
Chess
Yoga
Badminton
Lawn Tennis
Table Tennis
Basketball Men's
Basketball Women's
Football Men's
Football Women's
Kho Kho Men's
Kho- Kho Women's
Cricket Men's
Volleyball Men's
Volleyball Women's
Kabaddi Men's
Kabaddi Women's

Opening Ceremony "Intra IISER Sports Tournament 2022"

Closing Ceremony "Intra IISER Sports Tournament 2022"

Fitness Trainings: To increase the fitness and wellness of our students Aerobics and Yoga classes are also running successfully at the institute. Students are highly motivated to take benefits of these classes to live a healthy life.

Aerobics and Yoga Practice

Institute also encourage non-competitive events. The list of the non competitive events organised by the institute under the guidelines of Ministry of Youth Affairs and MHRDA is given below:

Fit India Freedom Run 2.0
Ek Bharat Shreshth Bharat Campaign
Swachch Bharat Abhiyan
Run For Unity
Tokyo 2020 Olympics Campaign – Cheers4India
Swachhta Pakhwada 2021
Azadi Ka Amrut Mahotsav was also celebrated at the institute by organising different events at the institute like Plantation Drive, Cycling Rally, Rashtra Gaan & Poster Making.

Tokyo 2020 Olympics Campaign- Cheers4India

7th International Yoga Day 2021 was celebrated online with 120 participants. The voluntary's of NSS and The Bharat Scouts & Guides units have also participated in 7th International Yoga Day celebration by preparing yoga motivational posters.

Achievements and Activities outside the campus:

One of our BS/MS student Nishant participated in Open Prize Money Chess Tournament in cooperation with Ludhiana Chess Association and got a cash prize of Rs. 2500/-.

Our BS/MS students Naveen Bagel and Jayant got a chance to attend BSG Camp at Taradevi Shimla accompanied by with our Rover captain Mr. Amandeep Singh. They have put our institute's flag at the altitude of 7100 feet.

Institute flag at Taradevi Hills, Shimla, altitude 7100 feet

7. Scientific Meetings/Conferences/Workshops

Kuljeet Singh Sandhu
Title: PERSPECTIVES IN COMPUTATIONAL BIOLOGY, Apr 01-03, 2021
Name of the Organizers: Kuljeet Singh Sandhu, Somdatta Sinha, Shashi B. Pandit, Monika Sharma, Yachna Jain

Brief description of the meeting: It was a three day virtual symposium, primarily hosting the top women pioneers in the field of computational biology in India. The topics covered were Big data & Machine Learning, Nucleic Acids, Genomics, Proteins, Networks, Antimicrobial Resistance, and Evolution. The conference was a tribute to the legendary biophysicist Prof. G. N. Ramanachandran on his remembrance day.

Rachna Chaba
Title: INST – IISERM Bilateral Meeting 2022
Name of the Organizers: Dr. Rachna Chaba (Coordinator, IISER Mohali) & Dr. Suvankar Chakraverty (Coordinator, INST)

Brief description of the meeting: Institute of Nano Science and Technology (INST) and Indian Institute of Science Education and Research Mohali (IISER Mohali) jointly organized the first bilateral meeting on 14th and 15th March 2022. Faculty members from both the institutions across various disciplines presented and discussed their research activities followed by a poster session. This meeting provided a platform to discuss the emerging trends in science and technologies with an aim to foster collaborations on the various topics of mutual interest of the faculty members of the two neighbouring institutions.

S. S. V. Ramasastry
Title: RSC Desktop Seminar with OBC during 25, 26-Nov-2022
Name of the Organizers: Dr. S. S. V. Ramasastry

Brief description of the meeting: Royal Society of Chemistry organized a series of Desktop Seminars with premier research institutes in India including Indian Institute Technology (IITs) and Indian Institute of Science Education and Research (IISERs). Each seminar featured a journal published by the RSC and discussed research targeted on subject areas related to it. The fifth event in the RSC Desktop Seminar Series was jointly organized by Organic & Biomolecular Chemistry (OBC) and IISER Mohali. This virtual event had scientific talks by renowned researchers including OBC board members talking about their exciting science at sessions focused on Organic Synthesis, Organic Catalysis and Chemical Biology.

Sabyasachi Rakshit
Title: Cholesterol and GPCR Function: A Molecular Sensor for Cholesterol in the Serotonin Receptor
Name of the Organizers: Dept. of Chemical Sciences, Webinar

Brief description of the meeting: It was an invited Webinar by Prof. Amit Chattopadhya, CCMB, and Hyderabad.

Ujjal K. Gautam
Title: MRSI Conclave 2021, December 20-23, 2021
Name of the Organizers:. Organizer: IITM (Co-chair)

Anoop Ambili
Title: Ist Indian Quaternary Congress "Integrative Quaternary Sciences for Societal Service (focal theme). International Virtual Conference, 19-21 January 2022

Name of the Organizers: Association of Quaternary Researchers (AOQR) (Organizing committee member)

Brief description of the meeting: The first Indian Quaternary Congress (IQC) brings forth contributions from 267 researchers working across India in different aspects of the Quaternary sciences. With the Focal theme of- Integrative Quaternary Sciences for Societal Services, papers are classified into sessions on Climate: Past, Present and Future; Earth Surface Processes in Quaternary; Oceans in Quaternary; Humans in Quaternary; Fossil records from Quaternary and Quaternary landscape evolution. The congress spanning three days (19-21 January 2022) provides opportunity for listening to 3 keynote talks, 42 oral and 49 poster presentations.

Baerbel Sinha
Title: Side Event on "Risk to agriculture from air pollution" during the United Nations Food Systems Summit Science Day's
Name of the Organizers: IISER Mohali and World Meteorological Organization (WMO)

Brief description of the meeting: Agricultural production is at risk due to the double threats of climate change and air pollution. Deposition of ozone causes substantial crop yield losses in many parts of the world. Certain estimates put the global loss in wheat yields at between 6% and 9% on average in the southern and northern hemispheres, respectively. The international community is developing approaches to provide globally consistent maps of ozone deposition as a tool for evaluating the risks to agriculture. The concept of measurement-model fusion was presented at the event in the context of the UN's Sustainable Development Goals. The session reflected on the complex interactions between atmospheric composition and agriculture and presented examples of agricultural practices that can be used to reduce crop losses due to ozone deposition in India. The event took place on 6th July 2021 in online mode and was inaugurated by the honourable Director IISER Mohali.

Chandrakant S Aribam

1. Title: **Explicit Reciprocity Laws in Number Theory**
   Speaker: Otmar Venjakob (Heidelberg University)
   Name of the Organizers: Chandrakant Aribam

   Brief description of the meeting: *Seminar on Number theory*

2. Title: **A foray into non-associativity.**
   Speaker: Jayanta Manoharmayum (Sheffield University, UK)
   Name of the Organizers: Chandrakant Aribam

   Brief description of the meeting: *Seminar on Number theory*

Krishnendu Gongopadhyay

1. **Title:** Geometry and Topology Symposium at the 87th Annual Conference of the Indian Mathematical Society, December 4--7, 2021
   Name of the Organizers: Krishnendu Gongopadhyay

   Brief description of the meeting: The Indian Mathematical Society (IMS) is the oldest and the largest Mathematical Society of the Country. Every year, the society organizes its annual conference at different locations of the country. The 87th annual conference of the IMS was organised by the Mahatma Gandhi Mission University, Aurangabad (Maharashtra) virtually during 4-7 December, 2021.

   Several subject specific symposiums covering current research are important sections of the conference. In the organised symposium, subject specific research talks on Geometry and Topology were organised. The symposium was held online and lectures are available in the following link:

https://youtu.be/XsRXpE8npuo.

2. **Title:** CONIAPS XXVII: Recent Advances in Differential geometry and Topology, October 26--28, 2021.
   Name of the Organizers: Dr. Krishnendu Gongopadhyay (IISER Mohali), Prof Gauree Shanker (Central University of Punjab, Bhatinda)

   Brief description of the meeting: The International Conference on Recent Advances in Differential Geometry and Topology in collaboration with International Academy of Physical Sciences (IAPS) was intended to bring pioneering and upcoming researchers to a common platform to discuss the pressing issues in Differential Geometry, Topology and allied areas. This was a virtual activity hosted at the central university of Punjab, Bhatinda.

3. **Title:** NASI-TIMC Summer School on Differential Geometry, July 5—24, 2021.
   Name of the Organizers: Dr. Krishnendu Gongopadhyay (IISER Mohali), Prof Gauree Shanker (Central University of Punjab, Bhatinda)

   Brief description of the meeting: This 3-week event will mainly focus to promote student-initiative activities at the PG and Research levels, and to increase the knowledge of the fundamentals of the college teachers, unity of mathematics, and problem-solving abilities. Emphasis will be given on basic Examples.

Sugandha Maheshwary (INSPIRE Faculty)
Organised "Exam Analysis in Mathematics (EXAM)-2021" (all sessions on https://www.youtube.com/c/INYASYouTube), a week long Web based orientation workshop for preparation of various entrance exams in Mathematics at post graduate level, during July 19-July 24, 2021. Also, delivered two teaching sessions on topics from Abstract Algebra (https://www.youtube.com/watch?v=2zkdi8lFb7Y) and a talk on Research opportunities: Motivation and awareness (https://www.youtube.com/watch?v=46BKgOJBtAs).

Co-organised "Popular Science Talk Webinar series", a fortnight long Webinar series in association with by DST, Govt. of Rajasthan, during June 16-July 1, 2021. The target audience was undergraduate and post graduate students from Science streams, and the motive was to expose them to various research topics and there where bouts, from excellent young scientists from India (https://www.youtube.com/channel/UCpBkbM8xHtUjTfGcX7Kzg-Q [DST Rajasthan YouTube channel]).

Organised a talk on "A counterexample to the first Zassenhaus conjecture", inviting Dr. Leo Margolis as speaker, for Mathematics community in IISER Mohali and interested group theorists in India, on April 19, 2021.

Vaibhav Vaish
Title: Math Circles
Name of the Organizers: Chetan Balwe, Jotsaroop Kaur, Neeraja Sahasrabudhe, Shane D'Mello, Vaibhav Vaish

Brief description of the meeting: We organized a local chapter (IISER Mohali) under the Math Circles program of ICTS (TIFR). The program intends to recognize and nurture early talent in mathematics through discussions around problems and problem solving.

Ambresh Shivaji
Title: DPS Seminar Series
Name of the Organizers: Ambresh Shivaji, H K Jassal

Brief description of the meeting: We have organized a series of seminars where external speakers are invited to deliver talks on research topics relevant to the department. 10 such talks were organised during the last academic calendar year.

Anosh Joseph

1. **Title:** (Online) MPI Workshop - 2021
   Name of the Organizers: Minati Biswal, Navdeep Singh Dhindsa, Anosh Joseph, Arpith Kumar, Vamika, and Bana Singh Sangtan

   Brief description of the meeting: The first edition of the MPI Workshop was held in online mode from 26th to 29th of April 2021. This workshop aimed to provide undergraduate researchers with the knowledge and understanding of parallel computing using MPI (Message Passing Interface). The workshop was organized via Zoom. The workshop had a two-hour session each day, which included brief lectures explaining the MPI basics and tutorials on implementing MPI algorithms with C++. The topics covered were: Introduction to MPI programming, learning basic MPI terminologies, writing and running parallel programs in C++, Performance analysis of a few serial vs. parallel programs, Study a one-dimensional physical system Harmonic Oscillator using Monte Carlo MPI.

2. **Title:** (Hybrid) Shivalik HEPCATS Meeting - Winter 2021
   Name of the Organizers: Anosh Joseph; Co-Organizers - Jasjeet Singh Bagla, Harvinder Kaur Jassal, Kinjalk Lochan, Ambresh Shivaji, and K.P. Yogendran

   Brief description of the meeting: The Shivalik HEPCATS Meeting series are intended to foster discussions and collaborations among researchers in and around the Shivalik range of the Himalayas. These meetings take place, ideally once every six months, at various institutes located in the region. The acronym HEPCATS stands for High Energy Physics, Cosmology, Astrophysics, Theory and Simulations. The organizers of the Shivalik HEPCATS Meeting — Winter 2020 were Jasjeet Singh Bagla, Harvinder Kaur Jassal, Anosh Joseph, Kinjalk Lochan, Ambresh Shivaji, and K.P. Yogendran. The speakers of the meeting were Hemant Rathi (IIT Roorkee), Swati Gavas (IISER Mohali), Vamika (IISER Mohali), Ayan Chatterjee (Central University of Himachal Pradesh), Pinaki Roy (IISER Mohali), Gopal Yadav (IIT Roorkee), Suraj Chopra (IISER Mohali), Misba Afrin (Jamia Millia Islamia), Sanjay Pant (IIT Ropar), Nisha Chahal (NIT Jalandhar), Jasjeet Bagla (IISER Mohali), and K.P. Yogendran (IISER Mohali).

Harvinder Kaur Jassal

Title: Public Engagement in Astronomy in the Pandemic Era, August 1-2, 2021.
Name of the Organizers: Harvinder Kaur Jassal with co-organisers Dr. Aniket Sule, HBCSE-TIFR, Mumabi, iruj Mohun Ramanujam, Indian Institute of Astrophysics, Bengaluru, Dr. Ravindrer Banyal, Indian Institute of Astrophysics, Bengaluru, Dr Chrisphin Karthick, Indian Institute of Astrophysics, Bengaluru,

Brief description of the meeting: This workshop was meant to bring together the outreach community in astronomy and related fields, to share ideas on possible ways of engagement, as well as have a discussion on the path ahead.

8. Research Activities

8.1. Department of Biological Sciences

8.1.1. Summary of the research work

Anand Kumar Bachhawat

In the present period our lab has continued our focus on two different aspects: Glutathione degradation & redox and Isoprenoid pathway. Under the first theme we have been trying to identify inhibitors of a glutathione degrading enzyme, Chac1, the structure of which is not known. We have carried out in silico screens on a model that we created (and also one that came out from Alphafold). In addition, we have developed two new assays for the screening of compound libraries. Putative hits need to be evaluated further. Under the second theme we have tried to take new approaches to increasing the flux in the isoprenoid pathway. The approach taken by us was to try and improve the NADPH levels in the cell by identifying the key enzymes responsible for NADPH and then subjecting them to a gene fusion approach (with the next enzyme in the pathway) and also using rational mutagenesis based on evolutionary and structural insights. We have also now identified a new set of enzymes for making an important diterpenoid, Sclareol, which are now being pursued.

Arunika Mukhopadhaya

Our lab is interested in looking at how enteric-bacterial ligand modulate host cellular responses. Towards it we have used outer-membrane proteins and toxins to study receptor co-operation in induction of inflammatory signalling. Further, we have also tried to understand mechanism of cell-death pathways induced by bacterial ligands to the target host cells.

Indranil Banerjee

In our laboratory, we aim to advance our understanding of the infection mechanisms of medically-important viruses such as influenza A virus, SARS-CoV-2, and dengue. Employing variety of techniques including cell and molecular biology, high-content, confocal and super-resolution imaging, RNAi, biochemistry, CRISPR/Cas9-based genome editing etc., we investigate the molecular underpinnings of viral infection processes in the host cells. In our current research, we have identified a new class of broad-spectrum antiviral agents i.e., 1,3-diphenylurea derivatives (DPUDs) through high-content screening of small molecules against influenza A virus (IAV) and SARS-CoV-2 infections. Next, we synthesized 22 additional DPUD-1 analogues and tested them against IAV and SARS-CoV-2. In addition to DPUD-1, we found four more DPUDs (DPUD-2, -16, -20, and -23) that blocked IAV and SARS-CoV-2 infections by 95-99% without inducing cytotoxicity. Of the five DPUDs, three showed potent inhibition against all the tested strains of IAV (X-31, WSN, Udorn, and NYMC) and SARS-CoV-2 (D614G, Delta, and Omicron), highlighting broad-spectrum antiviral activity. We also confirmed the anti-influenza and anti-SARS-CoV-2 activity of the DPUDs in animal models. Using IAV entry assays and pseudotyped SARS-CoV-2 (harbouring the S proteins of D614G, Delta and Omicron strains), we found that DPUDs blocked cellular entry of both the viruses. Further, we addressed whether DPUDs target host endocytic processes, which would consequently inhibit virus entry. We found that DPUDs perturbed endocytic uptake of general cargoes such as EGF, transferrin and cholera toxin B, and blocked vesicular acidification. Cell biological analyses revealed, DPUD treatment caused dispersal of late endosomes/lysosomes and upregulated the early endosome marker protein, EAA1, suggestive of dysfunction in endocytic machinery. Our in vitro experiments with large unilamellar vesicles showed, DPUDs transported chloride ions across lipid membrane. This indicated that the observed endocytic defects in the DPUD-treated cells could be due to altered ion homeostasis, known to play a critical role in vesicular trafficking. In addition to targeting virus entry, which majorly accounted for the inhibition of infection by DPUDs, our study showed that the compounds also blocked viral replication/transcription. This indicates that although DPUDs primarily block virus entry, they can further restrict the virus at post-entry steps, inhibiting the infections process at multiple stages. Taken together, this research highlights the potential of DPUDs as a new

class of host-directed antiviral agents that can efficiently supress infection by acting at multiple steps, and provide protection against broad range of existing and emerging viruses. In addition to antiviral discovery, we also investigated the role of several host factors in IAV infection. Also, to identify the host gene variants that contribute to COVID-19 susceptibility and severity, we embarked on a systematic search of all possible reports of genetic association with COVID-19, and found 84 eligible studies that investigated the association of 130 polymorphisms in 61 genes. Meta-analyses of 7 genetic polymorphisms involving 15550 cases and 444007 controls revealed statistically significant association of ACE1 I/D rs4646994/rs1799752, APOE rs429358, CCR5 rs333, and IFITM3 rs12252 with increased COVID-19 risk. Also, evaluation of 11 genetic variants involving 6702 patients with severe COVID-19 and 8640 infected individuals with non-severe disease, indicated higher risk of progression to severe COVID-19 in individuals with ACE2 rs2285666, ACE2 rs2106809, ACE2 rs2074192, AGTR1 rs5186, and TNFA rs1800629 polymorphisms. To the best of our knowledge, this is the most extensive systematic review till date and the first meta-analysis that synthesized all the evidence available and statistically assessed for correlation between all the possible genetic variants and COVID-19 susceptibility and severity.

J. Gowrishankar

In *Escherichia coli,* three isoforms of the essential translation initiation factor IF2 (IF2-1, IF2-2, and IF2-3) are generated from separate in-frame initiation codons of the infB gene. The isoforms exist in approximately equimolar amounts within the cells, and any one of them is sufficient to fulfil the essential function needed for translation initiation. Our group has identified for the first time that IF2 isoforms unexpectedly also participates in the DNA-related transactions of homologous recombination and DNA damage repair, and that the different IF2 isoforms perform differentially for these functions. Thus, loss of isoform IF2-1 is associated with reduced efficiency of homologous recombination and with marked sensitivity to two-ended DNA double-strand breaks (DSBs) in the genome, such as those occurring upon exposure to phleomycin or bleomycin or cleavage by endonuclease I-SceI. On the other hand, these derivatives remain as tolerant as the wild-type strain to one-ended DSBs in the chromosome. We have proposed a model that, in absence of IF2-1, it is the synapsis of a RecA nucleoprotein filament to its homologous target that is weakened, which in turn leads to a specific failure of two-ended DSB repair.

Jogender Singh

We have been studying host-drug-diet interactions using the nematode model *Caenorhabditis elegans*. We studied the effects of diet on the toxic effects of the redox reagent dithiothreitol (DTT), which is known to cause stress in the endoplasmic reticulum (ER) by disrupting its oxidative protein folding environment. We observed that DTT toxicity in *C. elegans* is modulated by its bacterial diet. Specifically, the dietary component vitamin B12 alleviates DTT toxicity in a methionine synthase-dependent manner. Using a forward genetic screen, we discover that loss-of-function of R08E5.3, an S-adenosylmethionine (SAM)-dependent methyltransferase, confers DTT resistance. DTT upregulates R08E5.3 expression and modulates the activity of the methionine–homocysteine cycle. Employing genetic and biochemical studies, we establish that DTT toxicity is a result of the depletion of SAM. Another commonly used antioxidant, N-acetyl cysteine (NAC), exhibits toxicity in a bacterial diet-dependent manner; however, by a mechanism different than that of DTT. Our ongoing studies using a genome-wide knockout library of *E. coli* are directed at finding the bacterial metabolite(s) that modulate NAC toxicity.

Kausik Chattopadhyay

Pore-forming toxins (PFTs) are the unique class of membrane-damaging proteins that are implicated in the diverse biological processes ranging from bacterial pathogenesis to the execution of the immune functions. PFTs are documented in the diverse life forms, and they share an overall general mode of action. PFTs kill their target cells by forming oligomeric pore in the plasma membranes. Oligomeric pore-formation processes of the diverse PFTs display distinct regulatory mechanisms that

remain obscure in most of the cases. For the past thirteen years or so, we have been studying the structure-function mechanisms of distinct class of bacterial PFTs. In the past year, we have continued our research in the same directoion. Our studies have elucidated some of the unique mechanistic aspects of the mode of actions of some of the prominent bacterial PFTs that include *Vibrio cholerae* cytolysin and *Vibrio parahaemolyticus* Thermostable Direct Hemolysin.

Kuljeet Singh Sandhu

Dr. Kuljeet Sandhu's group has been engaged in exploring the genomic basis of cancer resistance in mammals. A large scale computational analysis of several mammalian genomes was carried out in order to delineate the structural changes that may alter the species' susceptibility to cancer. Preliminary observations suggested that certain lineage specific changes in linear genome order may endow cancer resistance to a species.

Lolitika Mandal

Our research group has been working on several projects that intends to unravel the signaling and metabolic requirement of stem cells/ progenitors and their niches. Using molecular genetic approaches we have been striving to decipher the signaling crosstalk between different stem cell compartments during development and disease.

Mahak Sharma

The primary focus of my research group is to understand mechanisms regulating intracellular vesicular transport and fusion of an incoming vesicle with a subcellular compartment like Golgi, lysosomes etc. delivers the cargo to their correct destination. In my laboratory, we are working to understand how cellular cargo like a receptor is delivered to lysosomes, organelles that degrade cellular macromolecules and recycle their constituents to build new proteins and membranes. Indeed, lysosomes play a vital role to our survival, as reflected by more than 50 lysosomal storage diseases caused due to defects in functioning of this organelle. Our previous research has uncovered the role of small GTP-binding (G) proteins of the Rab and Arf-like family and their protein partners in mediating cargo transport and membrane fusion with lysosomes in human cells. In the past one year, we have made progress in identifying a novel role for a recycling endosomal protein RUFY1 in lysosome function. We have found that RUFY1 interacts with small G protein Arl8b and facilitate normal distribution of receptors that mediate trafficking of lysosomal hydrolases. In RUFY1 depleted cells, we find that lysosome function is impaired.

Our research work will contribute to understanding of how lysosome transport and function is regulated in various cell types, which can lead to better understanding of the diseases resulting from lysosome dysfunction.

Manjari Jain

A major focus of our lab is to understand the evolution of acoustic signals, and the various drivers of signal complexity. Sociality has been proposed to be a major driver of vocal complexity. Towards this we worked on vocal complexity in a social passerine, Jungle Babbler (*Argya striata*) and have unravelled the vocal repertoire of the species and the related behavioural contexts of vocalization. We find that Jungle Babblers have 15 different context-specific vocalization. We also analysed various aspects of vocal complexity in this species and have found support for the predictions of the social complexity hypothesis that social animals have higher vocal complexity.

Another focus of our research is to document insect biodiversity in India. Being home to four biodiversity hotspots, India is among the 17 megadiverse countries of the world. Insects are the most diverse taxa in the animal kingdom, yet much remains to be done with respect to exploring the insect diversity of the Indian subcontinent. Towards this, our lab has been monitoring the diversity of Indian insects, especially crickets, using bioacoustics as a tool (in addition to classical taxonomy). We have discovered a new species of cricket from Kasargod, Kerala, belonging to the genus *Teleogryllus*. The genus *Teleogryllus* is known from 52 species worldwide, and India was known to have 11 species,

wherein the last species of *Teleogryllus* from India was described 50 years ago. We have updated this list to 12 *Teleogryllus* species from India, with *Teleogryllus rohinae* Jaiswara & Jain sp. nov. being the newest discovery.

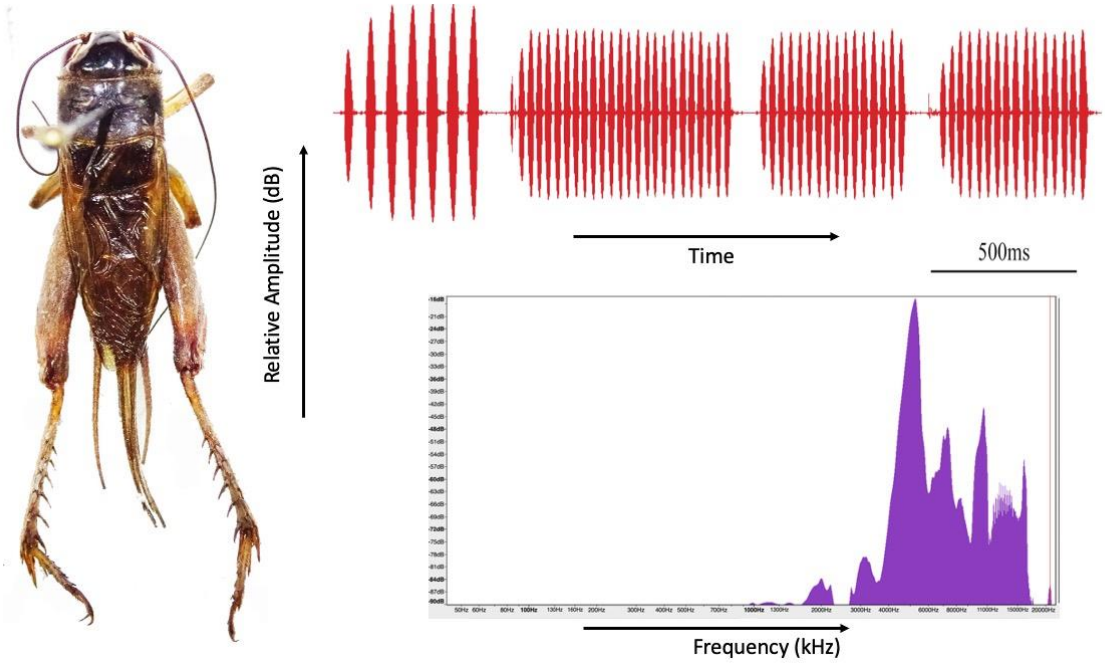


Figure: Left panel: *Teleogryllus rohinae* (male); Top right: Oscillogram of mating call of *T. rohinae*; Bottom right: Power spectrum of mating call of *T. rohinae*

N. G. Prasad

Our lab continues to work on intersexual conflict, life-history evolution, and evolutionary ecology of immune response. A series of papers from our lab in this period have answered a number of interesting questions. For example, or studies have found that sexual selection affects innate abilities to distinguish between receptive and non-receptive females, and that evolution of a large number of stress-resistance related traits are likely to be sex-specific.

Purnananda Guptasarma

During the said period, work proceeded in the laboratory in several areas

(1) Nucleoid-associated DNA-binding proteins in bacteria. We are interested in how nucleoid-associated proteins (NAPs) organize DNA in bacteria. During this year, we published a detailed report showing that the NAP known as HU binds to lipopolysaccharide (LPS), as a proxy for nucleotides, with this determining the ability of bacteria to form biofilms. This discovery, showing that HU is the glue that causes bacteria to attach to each other, was published. We also concluded a study of the formation of dimers by HU, and showed how the homo- or hetero-dimerization of HU-A and HU-B tend to be affected by the molecule's N-terminus, as well as by the dissociation or non-dissociation of subunits, which is significantly influenced by the persistence of hydrophobic interactions between two beta hairpin structures lying at the dimer's core. This seminal work resolving confusion in the literature about the mechanisms of dimerization of HU was published. Furthermore, we also published a piece of work about a simulacrum of the heterodimer of HU-A and HU-B which we created through genetic fusion of the two isoforms of HU. In addition, work proceeded on the novel discovery that HU-B, Dps and HU-A (in that order) elicit the accretion and compaction of nucleic acids into liquid-liquid phase-separated condensates. This work is of great importance to our understanding of the final phase of compaction of DNA in

bacterial genomes, beyond the compaction wrought by DNA bending, looping and bunching, and beyond the compaction wrought by DNA supercoiling.

(2) Enzymatic degradation of solid plastic. We addressed this important environmental issue by designing a new route for the effective degradation of solid plastic (especially polyethylene terephthalate, or PET) involving synergy between thermostable carboxylesterase (CE) enzymes. Briefly, we argued, and demonstrated, that a single enzyme that is both PET-binding and PET-degrading, must become entirely titrated onto the surface of solid PET and, therefore, also become unavailable to degrade the intermediate products of PET degradation which get discharged into the solution surrounding PET during its degradation. Therefore, we argued, and also demonstrated, that the yield and purity of the final product of PET degradation (known as terephthalic acid) can be greatly improved by deploying two enzymes instead of a single enzyme, with one enzyme remaining entirely focused on hydrolysing ester bonds in PET chains in solid plastic, and a different enzyme (designed to bind to PET's degradation intermediates, but not to PET itself) remaining in solution and remaining focused on hydrolysing ester bonds in PET's degradation intermediates. Using this philosophy, two different PET-binding enzymes and several (designer) forms of non-PET-binding CE enzymes, and some exhaustive characterization of the process and its products, we have two papers provisionally accepted and being revised for final publication, and two other papers that are communicated and under review, in this important applied area involving enzymes.

(3) Mechanism of function of a newly-discovered amylase-cum-glucanotransferase. Some preliminary work on this group of enzymes, hinting at possible mechanisms of function through collaboration between two active sites, has already been published in a previous year. During this year, we worked out the detail of the two active sites, and the mechanism of their collaboration, through protein engineering and mutagenesis, combined with characterization of activity. This work is being readied for publication.

(4) Study of cohesion-dockerin interactions in *C. thermocellum* proteins. During the year, we have cloned and studied several dockerins and cohesins and discovered the boundary conditions that apply to the use of these domains as 'fusion agents' which can be genetically fused to enzymes, and then coupled in solution through dockerin-cohesin interactions. This work is approaching maturity for publication.

(5) Study of thermophile and hyperthermophile enzyme hydrolases in the context of biomass-degradation applications. Under a sponsored project, we are trying to find the best thermophile and hyperthermophile enzymes that improve existing systems for biomass degradation, e.g., certain beta-glucosidases, cellulases, and the like.

(6) A hypothesis explaining vulnerability to severe Covid. During the year, we developed and published a detailed hypothesis defending the novel proposal that chronic inflammation acts as the ground in which acute inflammation due to a viral infection spirals into hyper-inflammation associated with high morbidity and mortality, linking the potential for acute inflammation with dietary habits.

Rachna Chaba

My research group at IISER-Mohali is interested in identifying and characterizing new players and networks in bacterial metabolism, with a special focus on the metabolism of long-chain fatty acids (LCFAs) and sugar acids, carbon sources implicated in host-bacterial interactions.

LCFAs, carboxylic acids with a linear aliphatic chain of 12-20 carbon atoms, are an energy-rich nutrient source for several bacteria. Although LCFA metabolic pathway has been extensively studied, especially in *E. coli*, how LCFA metabolism affects bacterial physiology had not been investigated. We previously showed that LCFA degradation generates elevated levels of reactive oxygen species in *E. coli* and ubiquinone, an electron carrier in the electron transport chain (ETC), is a key antioxidant that mitigates LCFA-induced oxidative stress. More recently, we showed that an increased electron flow in the ETC during LCFA metabolism titrates ubiquinone, limiting its availability for disulfide

bond formation in secreted proteins, thereby compromising envelope redox homeostasis. However, the Cpx envelope stress response pathway is activated which helps restore redox balance. Our work suggests that one of the mechanisms by which Cpx restores cellular homeostasis is by increasing the oxidizing power of ETC; whereas ubiquinone accumulates in LCFA-utilizing cells, this upregulation is prevented in a strain unable to induce Cpx response. We are currently investigating the molecular signals that activate Cpx response during LCFA metabolism, the mechanism by which Cpx regulates ubiquinone levels and additional mechanisms by which this pathway maintains envelope redox homeostasis during LCFA metabolism.

E. coli uses a variety of sugar acids (oxidized derivatives of sugar) as carbon and energy source. Genome-scale studies in the last couple of decades have emphasized the importance of the metabolic pathway of a sugar acid, D-galactonate, in the interaction of enteric bacteria with their host. The transcriptional repressor, DgoR, negatively regulates the expression of the transporter and enzymes involved in D-galactonate metabolism. We established DgoR as a GntR/FadR family transcriptional regulator and identified its promoter, operator, effector and effector-binding cavity in a laboratory strain of *E. coli*. These fundamental studies have provided the basis to examine the influence of genetic variations in DgoR in natural enterobacterial isolates on host-bacterial interactions. Till now, we have identified four genetic variations amongst natural *E. coli* isolates which alter the sensitivity of the repressor to D-galactonate. We are currently investigating the effect of these variations on the growth of *E. coli* isolates in D-galactonate. Further, our work suggests that D-galactonate metabolism is under complex regulation; it is regulated by players besides DgoR. We are interested in investigating the interplay between these regulatory components in governing D-galactonate metabolism and understanding their physiological relevance.

Rajesh Ramachandran

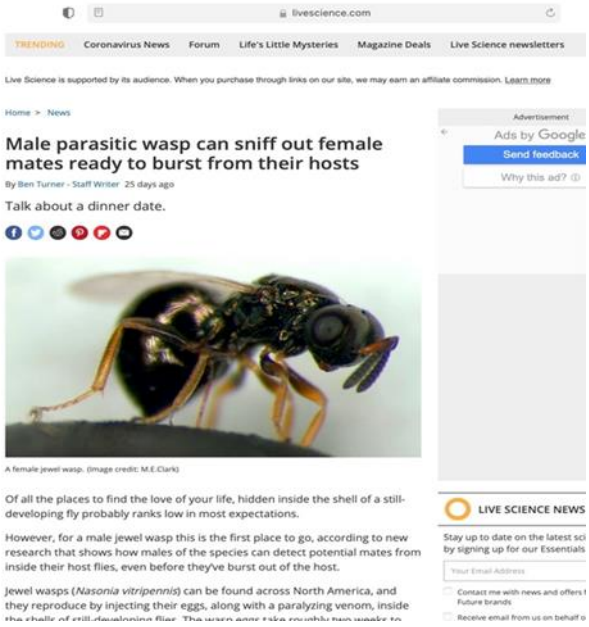
We have established the well-known amphibian model Axolotl (*Ambystoma mexicanum*), its breeding and application in limb/tail regeneration studies. Four BS-MS students have done different experiments using Axolotl and zebrafish models during this time. Our research is show cased in different seminars/conferences during this period. We also obtained research fund approval from DBT (INR 93 lakhs) during this period.

Ram Yadav

We have made progress in understanding the function of HDG12 in the past one year. Ectopic expression of HDG12 using ß-estradiol inducible system revealed that HDG12 is involved in epidermal cell fate specification in the inner tissues of leaf mesophyll. Apart from this, we have established the regulation of CK signalling in the shoot apex by cold mediated activation of NAC062.

Rhitoban Ray Choudhury

1) Work on *Nasonia:* My lab has now successfully established *Nasonia* as a model system in India. We not only are working with strains from around the world but have also been successful in getting Indian strains of *Nasonia vitripennis*. A PhD student in the lab, Ms. Garima Prazapati, has successfully shown a hitherto unidentified mate finding strategy in *N. vitripennis*. I am happy to report that the manuscript has been accepted by Royal Society Open Science. This is an extremely commendable achievement by Garima as *Nasonia* remains one of the best studied organisms, as far as their sexual communication is concerned, and finding anything new is very difficult. This particular work was a collaboration with Dr. Anoop Ambili of the EES department. I am also happy to report that this work has generated substantial media interest with many popular science outlets having profile these findings. Below, I present two of these from Livescience and New Scientist.


livescience.com

TRENDING Coronavirus News Forum Life's Little Mysteries Magazine Deals Live Science newsletters

Live Science is supported by its audience. When you purchase through links on our site, we may earn an affiliate commission. Learn more

Home > News

Male parasitic wasp can sniff out female mates ready to burst from their hosts

By Ben Turner - Staff Writer 25 days ago

Talk about a dinner date.

A female jewel wasp. (Image credit: M.E.Clark)

Of all the places to find the love of your life, hidden inside the shell of a still-developing fly probably ranks low in most expectations.

However, for a male jewel wasp this is the first place to go, according to new research that shows how males of the species can detect potential mates from inside their host flies, even before they've burst out of the host.

Jewel wasps (*Nasonia vitripennis*) can be found across North America, and they reproduce by injecting their eggs, along with a paralyzing venom, inside

Advertisement

Ads by Google

Send feedback

Why this ad?

LIVE SCIENCE NEWS

Stay up to date on the latest sci by signing up for our Essentials

Your Email Address

Contact me with news and offers f Future brands

Receive email from us on behalf o


newscientist.com

ACI Worldwide

ACI SECURE eCOMMERCE

Reduce costs, increase sales

NEWSLETTERS

Sign up to read our regular email newsletters

NewScientist

News Podcasts Video Technology Space Physics Health More Shop Courses Events

Male parasitic wasps can detect females inside an infected host fly

LIFE 27 April 2021

By Ibrahim Sawal

A false-colour image of a male parasitic wasp, Nasonia vitripennis

2) Work on fungus-growing termites: A PhD student in the lab, Ms. Renuka Agarwal, has established the first pan-microbiome and pan-mycobiome of any fungus-growing termite in the world and had her paper accepted in microbial ecology. The study establishes *Pseudomonas,* as a major player in this symbiosis. I am also happy to report that as a part of this study we have now established the Nanopore platform in our lab. The other studies ongoing on this model system includes fungus-bacteria interactions, behavioral changes in the termites and metagenomics profiling of many components of the symbiosis.
3) Work on arthropod symbionts: A major unanswered question in arthropod endosymbiont field is their seat of spread. The reason behind the remarkable diversity seen in their distributions across arthropod communities of the world had remained unanswered. This was a question tackled by Ms. Manisha Gupta, a PhD student in the lab with soil arthropod communities obtained from the campus. Using high-throughput sequencing techniques, barcoding, statistical modelling and traditional ecological data she was successful in showing that this spread happens in the native communities of arthropod hosts. I am happy to report that this paper was accepted in Ecology and Evolution. Mr. Alok Tiwary, another PhD student in the lab, has just submitted another study which details the negative effects of maintain Wolbachia endosymbionts in *N. vitripennis*. Other studies that are ongoing include metagenomic profiling of gut-dwelling symbionts in lower termites, effects of symbionts on arthropod hosts, discovery of other reproductive endosymbionts of arthropods and genome sequencing of some of these symbionts.

Sadhan Das

Mechanistic insights into epigenetic layers involved in an impaired wound healing and cardiovascular diseases in diabetes.

Diabetic wound healing is highly prevalent in our community and a major cause of morbidity and mortality. Accelerated diabetes can lead to chronic wounds and amputation of the foot due to impaired diabetic wound healing. Furthermore, currently available drugs for these disorders are not fully efficacious in many patients. Macrophage dysfunction is an important feature of diabetic wound healing characterized by altered M1 and M2 populations through the action of TNF-α and TGF-β1 respectively. Although biochemical mechanisms involved in diabetic wound healing have been studied, contributing epigenetic mechanisms are not well known especially the role of long non-coding RNAs (lncRNAs) and enhancers. We first focused on establishing whether we can produce M1 and M2 macrophage populations ex vivo from mouse splenic monocytes. Splenic monocytes are deployed to the site of an injury, and we wanted to recapitulate the process of M1 and M2 macrophage differentiation that occurs in the process of normal wound repair. We isolated splenic monocytes, differentiated into macrophages and used various stimulants to induce M1 and M2 macrophage populations. Our preliminary data shows that TNF-α treatment induces the M1 phenotype and TGF-β1 induces the M2 phenotype respectively in the splenic macrophages isolated

from the Type 2 diabetes (db/db mice) and control db/+ mice. Moreover, treatment with M1 stimulants (IFN γ + LPS) leads to a higher expression of M1 marker iNOS in db/db mice compared to the control (db/+). Whereas M2 stimulant (TGF β + IL4) treatment leads to decreased expression of M2 marker Ym1. These results suggest that splenic macrophages isolated from diabetic mice exhibit the pro-inflammatory M1 phenotype. This interesting observation indicates that hyperglycemia-mediated macrophage dysfunction plays a vital role in impaired wound healing observed in diabetes. Therefore, to identify whole macrophage transcriptome (novel as well as known transcripts), we are analyzing RNA-sequencing (RNA-seq) data obtained from splenic M1 and M2 macrophages as well as publicly available RNA-seq data related to wound healing. We found differential expression of M1 and M2 marker genes in the wound tissues derived from C57/BL6 mice at time interval of 2 hrs, 6 hrs and 24 hrs as compared to control. Our analysis revealed that wound-derived from 2 hrs time point showed proinflammatory phenotype (M1 marker Il1 β)) whereas 24 hrs time point showed an anti-inflammatory phenotype (M2 marker Ym1). This data clearly suggests that there is a transition from M1 to M2 phenotype in normal wound healing. Previous work showed the crucial role of lncRNAs in diabetes and macrophage dysfunction. Interestingly our RNA-seq analyses revealed upregulation of lncRNA Dnm3os in the wound tissues compared to the control, suggesting its role in wound-healing. Based on these exciting observations we are characterizing the role of lncRNA Dnm3os in diabetic wound healing. In addition, we are investigating the functional roles of enhancers/super-enhancers in diabetic wound healing-associated gene expression and phenotypes in macrophages.

Samarjit Bhattacharyya

Cellular and molecular mechanisms of glutamate receptor trafficking in the central nervous system and its physiological implications

An essential requirement for maintenance of homeostasis in any living organism is the ability of cells to sense the external environment and, in the case of multicellular organisms, for cells to communicate with each other via mediators released into the extracellular milieu. In the brain, a variety of neurotransmitters and neuromodulators act on target receptors to activate cellular signaling events which transfer information from one cell to the next. Normal signaling depends on accurate localization of such receptors in specific regions of the cell, and the process of receptor trafficking plays a critical role in controlling this localization. Despite the obvious significance of this process, we still know very little about the protein machineries that mediate trafficking of neurotransmitter receptors in the brain, the regulatory events that control these protein machineries, and the functional consequences of these regulatory events. At this point research in our laboratory is directed to elucidate the cellular and molecular mechanisms that regulate the trafficking of (a) ionotropic glutamate receptors and (b) G-protein coupled receptors (GPCRs) in the central nervous system. These trafficking events are thought to be critical for various physiological processes. For example, glutamate receptor trafficking is believed to be involved in virtually all forms of experience-dependent plasticity including learning and memory. On the other hand, GPCR trafficking is believed to play crucial role in various physiological processes as well as in various neuropsychiatric disorders. Our laboratory employs multi-disciplinary approaches ranging from biochemistry and molecular biology to cell biology, imaging, and mouse genetics to address these questions.

Samrat Mukhopadhyay

Prof. Samrat Mukhopadhyay's recent work unveils the innerworkings of phase-separated liquid-like condensates that can mature into pathological aggregates. His laboratory discovered that a pathological amber stop codon mutant (Y145Stop) of the prion protein comprising the highly disordered N-terminal domain and devoid of the C-terminal folded domain spontaneously phase-separates into liquid droplets under physiological conditions. This intriguing stop codon mutant of the prion protein exhibits the disease phenotype of Gerstmann-Straussler-Scheinker and familial cerebral amyloid angiopathy. Prof. Mukhopadhyay's lab showed that this prion protein fragment, within

highly concentrated liquid droplets, slowly converts into solid-like, conformationally self-replicable amyloid fibrils reminiscent of misfolded aggregates involved in fatal prion diseases. Such a phase separation-mediated aggregation is also implicated in other neurological diseases such as Alzheimer's, Parkinson's disease, and dementias. This work was published in PNAS (Proceedings of the National Academy of Sciences of the United States of America) in November 2021. His subsequent findings published in Nature Communications in March 2022 also demonstrated the role of domain-specific electrostatic coacervation of the prion protein and α -synuclein in heterotypic condensation that can explain the overlapping neuropathological features of Creutzfeldt-Jakob disease and Parkinson's disease. His highly innovating recent work on single-droplet vibrational Raman spectroscopy decodes the molecular language of multicomponent phase separation of protein and RNA. In addition to these studies, Prof. Mukhopadhyay's lab has been involved in unveiling some of the fundamental and intriguing aspects of IDPs including protein dynamics, solvation, and internal friction that play important role in the pathological conversion of these proteins. A recent paper published in the Journal of the American Chemical Society in January 2022 deals with the fascinating aspect of internal friction of IDPs. His lab is also involved in developing and adapting ultrasensitive vibrational Raman spectroscopy tools to study IDPs and their phase separation and aggregation. One of the papers published in the Journal of Physical Chemistry Letters in 2021 described ultrasensitive detection of the prion protein using surface-enhanced Raman scattering. His recent research endeavors provide novel mechanistic underpinnings involving an intriguing interplay of the key molecular determinants that promote and regulate the biological phase transition and can have broad implications in a wide range of condensates involved in cell physiology and disease

Santosh B. Satbhai
How plant root development and growth is influenced and regulated by environmental signals is a major research question of our group. In particular, we focus on the effects of nutrient starvation, high temperature, cold temperature, salinity and drought on root system architecture (RSA) using Arabidopsis plants. We are applying forward/reverse genetics approach, transcriptomics approach, biochemical techniques, high-throughput phenotyping, Genome-Wide Association Studies (GWAS) and live imaging approaches to answer this question. As stress signalling pathways are evolutionary conserved, we also aim to translate knowledge gained from Arabidopsis to crop plants such as wheat, tomato and rice.

Sharvan Sehrawat
We have selected and characterised single domain antibodies (anti-cleavage site and anti-receptor binding domain) against SARS-CoV2 S protein and host molecules such as galectin-3 and an adhesion G protein coupled receptor gpr114 from an in-house generated phage display library. The neutralization of SARS-CoV2 S protein expressing pseudoviruses as well as several other viruses that contained polybasic site in the entry mediators was demonstrated by the anti-CSP single domain antibody. Furthermore, we have developed an animal model to investigate the pathogenesis of pestis de petits ruminants virus (PPRV) and identified its immunogenic epitope using a throughput class I MHC tetramer technology.

Shashi Bhushan Pandit
Enzyme promiscuity is defined as the ability of enzymes to catalyze alternate reactions or non-cognate substrates. These have huge potential application in the area of enzyme engineering and biotechnological use for degradation of harmful chemicals. Insights into the structural basis of substrate promiscuity would greatly benefit the design and engineering of enzymes. Previously, anecdotal evidences suggest flexibility, hydrophobicity, and active site protonation state are important for enzyme promiscuity. However, it is unknown whether these enzymes have discerning structural characteristics. To decipher the underlying common mechanistic basis of enzyme promiscuity, we have performed systematic structural analyses of promiscuous/non-promiscuous enzymes. Primarily, we have carefully constructed a dataset (46 enzymes) of substrate promiscuous (27) and specialist

(19) enzymes having experimentally determined tertiary structures. We compared various structural features of substrate binding and catalytic site residues promiscuous with specialist enzymes. The careful analyses showed that almost all structural features such as flexibility, hydrophobicity, surface area, depth and secondary structures are surprisingly, similar between promiscuous and specialist enzymes. Based on these, we proposed that promiscuity could be a continuum feature and specialist or the ability of an enzyme to catalyze a substrate is one end of the spectrum and other end being multi-specific enzymes. We have developed the interfacial potential to dock domain-domain interfaces and have used TASSER to model multidomain protein by assembling individual modeled domains. In collaboration with Dr. Kausik, we have determined the potential binding site of curcumin on VCC protein using multiple prediction methods. We proposed two curcumin potential binding sites on VCC that may potentially affects the hemolytic function of VCC.

Shravan Kumar Mishra
Function and regulation of ubiquitin-like proteins: The conserved ubiquitin-like protein Hub1/UBL5 functions in RNA splicing, DNA repair and mitochondrial unfolding responses. It binds proteins specific to these pathways and modifies their functional properties. However, the identities of other Hub1 substrates remain unknown. We have found unreported interactors of Saccharomyces cerevisiae Hub1 from a yeast two-hybrid screen. Proteins containing SIMs (small ubiquitin-like modifier SUMO-interaction motifs) and ferulic acid decarboxylase Fdc1 are identified as potential Hub1 interactors. Further experiments are required to establish these interactions and their physiological relevance, nevertheless, data presented here point towards larger and intriguing roles of Hub1.

Sudip Mandal
Our laboratory aims to understand the metabolic control of fundamental cell biological processes during mormal and pathophysiological conditions. We employ advanced genetic and molecular tools available in the model organism, *Drosophila melanogaster* to address our questions. In one of the projects we have been succesful in unraveling how the metabolic states of different peripheral organs, that inclued the glial cells, pericardial cells and the gut microbiota trigger an interorgan communictaion ciruitry to modulate cardiac function in adult Drosophila by regulating the expression of fat cell specific cardiac ECM protein, Pericardin. The other projects are poised to undertsand how altered metabolic conditions resulting from diet-induced type 2 diabetic conditions impact the cardiac function and behaviour of adult cells. Specifically, we are analysing the efects on intestinal stem cells and female germline stem cells. In a separate project, we are investigating whether the differentiating blood cells of the developing lymph gland (the larval hematopoietic organ of flies) have any metabolic control on the state of the hematopoietic niche under normal developmental conditions as well as during leukemic conditions. This project is funded by SERB, DST.

Vidya Devi Negi
The area of research lab focus is Host-pathogen interaction and immune modulation, microbial evolution and bacterial infection and its impact of host development by using *Salmonella* and *Caenorhabditis elegans* as model organism, and the regulation of the infection mediated developmental alteration and its impact.

8.1.2. Visits of the faculty members

J. Gowrishankar
— Centre for DNA Fingerprinting and Diagnostics, Hyderabad - six visits (1 to 11 April 2021; 4-13 June 2021; 30 July to 8 August 2021; 9 to 13 October 2021; 27 January to 6 February 2022 & 17 to 27 March 2022)

Kuljeet Singh Sandhu

— Sandhu KS. Introduction to the meeting. Perspectives in Computational Biology, IISER-Mohali. Apr 01,

— Jain Y. Genome organization and the evolution of cancer resistance. Perspectives in Computational, IISER-Mohali. Apr 03, 2021

Lolitika Mandal

— Department of Life Sciences at Shiv Nadar University, Delhi-NCR. 21st March 2022

Samrat Mukhopadhyay

— St. Jude Children's Research Hospital, Memphis, USA (February 2022)

— UT Health, University of Texas, Houston, USA (February 2022)

— The Scripps Research Institute, California USA (February 2022)

Santosh B. Satbhai

— Bhabha Atomic Research Centre (BARC), Mumbai, 03/02/2022 Plaksha University, Mohali, 30/03/2022

8.1.3. Talks delivered

Anand K Bachhawat

— Anand K Bachhawat : Glutathione: New Discoveries on an old molecule, Sri Venkateshwara college, New Delhi, Biochemistry Dept Seminar series, Nov 9, 2021

Arunika Mukhopadhaya

— Arunika Mukhopadhaya: Cell death mechanism induced by gram-negative bacterial ligand *Vibrio cholerae* OmpU': SERB High-End Workshop 'KARYASHALA' on 'FLOW CYTOMETRY-CELL DEATH AND DRUG DISCOVERY'. Department of Biotechnology, National Institute of Pharmaceutical Education and Research, S.A.S. Nagar. Date: 22.10.2021

Indranil Banerjee

— Indranil Banerjee: Interactions of SARS-CoV-2 with host cells: decoding the insider information for antiviral development, Kishinchand Chellaram College, Mumbai, 02/07/2021

Kausik Chattopadhyay

— Kausik Chattopadhyay. Curious Case of a Membrane-Damaging Pore-Forming Toxin: the W(Hole) Story. 1st Annual Meeting of the School of Chemical Biology at the Institute of Nano Science and Technology, Mohali, held on 24th and 25th September, 2021.

— Kausik Chattopadhyay. The (w)hole story of the β-barrel pore-formation mechanism of *Vibrio cholerae* cytolysin. C. R. Krishna Murti Award Lecture during the 90th Annual Meeting of SBC (I) organized by Amity University Haryana. December 19, 2021.

Lolitika Mandal

— Lolitika Mandal: Blood cell development: Lessons learned from Drosophila, Department of Life Sciences at Shiv Nadar University, Delhi, 21st March, 2022.

— Lolitika Mandal: Blood cell development: Lessons learned from Drosophila, Biological Engineering at IIT Gandhinagar, 30th March, 2022.

Mahak Sharma and lab members

— Shalini Rawat. Rabip4 isoforms bind Arl8b and regulate retrograde transport of CI-M6PR to maintain lysosomal homeostasis. Cell Bio 2021, the joint meeting of the American Society for Cell Biology (ASCB) and European Molecular Biology Organization (EMBO), December 1-10th 2022.

Manjari Jain

— Manjari Jain. Acoustic communication in animals: complexity in form and function. Keynote Lecture: Singularity, IISER Bhopal October10, 2021.

— Manjari Jain. Making sense of animal sounds. National Science day Celebration, TIFR-NCBS (Fieldstation). February 28, 2022.

N G Prasad and lab members

— Tsering Choton- 48 hrs of solitude, InDRC Kolkata 2021,15 Dec, 2021.

— Rohit Kapila.-Evolution of stress tolerance traits in populations of *Drosophila melanogaster* adapted to a crowded larval environment. Evolution 2021 Online (July-14-2021).
— Evolution of stress tolerance traits in populations of *Drosophila melanogaster* adapted to a crowded larval environment. Empseb (virtual) (March-1-2021).
— What doesn't kill you, makes you stronger: A study of the evolution of adult traits in the populations of *Drosophila melanogaster* adapted to stressful larval crowding environment. Evolution 2022 (in-person, Cleveland, Ohio); July 23-2022
— Aabeer Basu- Trans-generational effect of pathogen infection: Improved offspring survival due to increase in resistance against pathogen. ISEB3: International Conference on Insect Systematics and Evolutionary Biology, 16-18 February 2022, India

Rachna Chaba and lab members

— Garima Arya. Effector Binding in DgoR, a GntR/FadR family regulator of D-galactonate metabolism in *Escherichia coli.* World Microbe Forum [An American society for Microbiology (ASM) and Federation of European Microbiological Societies (FEMS) collaboration] (virtual platform). 20th-24th June 2021
— Rachna Chaba. Elucidating the interconnection between long-chain fatty acid metabolism and envelope homeostasis in *Escherichia coli*. 90th Annual Meeting of the Society of Biological Chemists- India (virtual platform), Amity University Haryana, India. 16th-19th December, 2021

Ram Yadav

— Cellular stress responsive NAC transcription factor maintains CK signalling and shoot growth under chilling stress. Plant Developmental Plasticity – A Molecular Perspective 27-29 September 2021.

Rhitoban Ray Choudhury

— Rhitoban Ray Choudhury, What Darwin did not Know? Invited talk for Darwin Day, by the PG Department Zoology, Sri Guru Gobind Singh College, Sector 26, Chandigarh, 2022

Samarjit Bhattacharyya

— Samarjit Bhattacharyya-How do we learn and remember? The rapidly changing brain Invited talk at GGNIMT, Ludhiana on August 14, 2021.
— Samarjit Bhattacharyya -Trafficking of glutamate receptors: Implications in the brain Invited talk at 5th IBRO/APRC Chandigarh Associate School on Neuropsychiatric and Neurodegenerative diseases held at Panjab University, Chandigarh, India from August 23 - 27, 2021.
— Samarjit Bhattacharyya -The Nobel prize in physiology or medicine – 2021 Invited lecture at Cogito137, IISER Kolkata on November 12, 2021.
— Samarjit Bhattacharyya -Trafficking of glutamate receptors: Implications in the brain Invited talk at the satellite symposium of the annual meeting of the Indian Academy of Neurosciences (IAN) on "Neurological Disorders: From Molecule to Mechanism" at Indian Institute of Chemical Biology (IICB), Kolkata on November 16, 2021.
— Prachi Ojha-Dual role of Norbin as a regulator of mGluR trafficking and as a modulator of mGluR-mediated AMPAR endocytosis. Society for Neuroscience meeting, USA on November 9, 2021.

Samrat Mukhopadhyay

— Samrat Mukhopadhyay- Delivered the prestigious "New and Notable" lecture (Biophysical Society meeting, San Francisco, February 2022)
— Samrat Mukhopadhyay-Invited seminar at St. Jude Children's Research Hospital, Memphis, USA (February 2022)
— Samrat Mukhopadhyay-Invited seminar at UT Health, University of Texas, Houston, USA (February 2022)
— Samrat Mukhopadhyay-Invited seminar at the Scripps Research Institute, California USA (February 2022).

Sharvan Sehrawat

— Sharvan Sehrawat, Single domain antibodies to probe and modulate anti-viral immunity. Bilateral meeting of IISER Mohali and Institute of Nanoscience and Technology Mohali. Held on March 14-15, 2022

Vidya Devi Negi

— Vidya Devi Negi, Title One pathogen many consequences: a challenge to deal INST-IISER Bilateral meet at INST Mohali Date: 14th and 15th March 2022

8.1.4. Conferences attended by the researchers

Indranil Banerjee

— Urea-derivative compounds as novel inhibitors against influenza A virus and SARS-CoV-2 infection, IIT Kanpur, 28/09/2021

Lolitika Mandal

— Drosophila Fly Meet 2021, Organized by IISER Kolkata, 11-17th December.

Mahak Sharma and lab members

— Shalini Rawat. Rabip4 isoforms bind Arl8b and regulate retrograde transport of CI-M6PR to maintain lysosomal homeostasis. Cell Bio 2021, the joint meeting of the American Society for Cell Biology (ASCB) and European Molecular Biology Organization (EMBO), December 1-10th 2022.Shalini Rawat, "Cell Bio Virtual 2020: An Online ASCB/EMBO Meeting", 05th – 9th December, 2020.

Manjari Jain

— Sonam Chorol. Heterospecific eavesdropping on non-alarm signals in two cooperatively breeding avian species in sympatric and allopatric conditions. Animal Behaviour Live: Annual online conference. November 18-19, 2021.

— Soniya Yambem. Examining communicative complexity and Morton's motivational structure rule in the vocalization of Jungle Babbler. Animal Behaviour Live: Annual online conference. November 18-19, 2021.

N G Prasad and lab members

— Aparajita Singh

— (a) poster titled "Life-history alterations associated with experimental evolution of defence against bacterium Enterococcus faecalis in *Drosophila melanogaster*", ISEB 3: International Conference on Insect Systematics and Evolutionary Biology, 16-18 Feb. 2022 (online).

— (b) poster titled "Evolution of generalized defence helps Drosophila flies counter co-infections by bacterial pathogens", Indian Drosophila Research Conference (InDRC), 13-17 Dec. 2021 (online).

— (c) Aparajita, poster titled "Generalized immune defense: Fly populations evolved for improved immunity survive better against novel and co-pathogenic encounters", Research Frontiers in Animal Behavior and Parasitism, Centre for the Ecology of Infectious Diseases (CEID), 20-21 May 2021 (online).

Rachna Chaba and lab members

— Garima Arya. Talk: Effector Binding in DgoR, a GntR/FadR family regulator of D-galactonate metabolism in *Escherichia coli*. World Microbe Forum [An American society for Microbiology (ASM) and Federation of European Microbiological Societies (FEMS) collaboration] (virtual platform). 20th-24th June 2021

— Garima Arya. Poster: Molecular details of effector binding by a GntR/FadR family regulator, DgoR, a transcriptional repressor of D-galactonate metabolism in *Escherichia coli.* EMBO/EMBL Symposium: New Approaches and Concepts in Microbiology (virtual platform). 7th-9th July 2021

— Megha Shrivastava. Poster: Regulation of long-chain fatty acid metabolism by an envelope stress response pathway in *Escherichia coli*. EMBO/EMBL Symposium: New Approaches and Concepts in Microbiology (virtual platform). 7th-9th July 2021

— Rachna Chaba. Talk: Elucidating the interconnection between long-chain fatty acid metabolism and envelope homeostasis in *Escherichia coli*. 90th Annual Meeting of the Society of Biological Chemists- India (virtual platform), Amity University Haryana, India. 16th-19th December, 2021

Ram Yadav

— Plant Developmental Plasticity – A Molecular Perspective 27-29 September 2021 jointly organized by Department of Botany and Microbiology, Acharya Nagarjuna University and IISER Tirupathi.

Sadhan Das and lab members

— Ankita Priyadarshini. Functional characterization of long non-coding RNAs in diabetic wound healing. Current Trends in Drug Discovery Research. 12th March, 2022.
— Vikas Gupta. Role of enhancers in impaired diabetic wound healing. Current Trends in Drug Discovery Research. 12th March, 2022.
— Sadhan Das. Participated. Current Trends in Drug Discovery Research. 12th-14th March, 2022.

Samarjit Bhattacharyya and lab members

— Trafficking of glutamate receptors: Implications in the brain Invited talk at the satellite symposium of the annual meeting of the Indian Academy of Neurosciences (IAN) on "Neurological Disorders: From Molecule to Mechanism" at Indian Institute of Chemical Biology (IICB), Kolkata on November 16, 2021.
— Prachi Ojha. Dual role of Norbin as a regulator of mGluR trafficking and as a modulator of mGluR-mediated AMPAR endocytosis. Society for Neuroscience meeting, USA on November 8-11, 2021.

Samrat Mukhopadhyay

— Samrat Mukhopadhyay delivered the "New and Notable" lecture entitled "Prion Protein Biophysics Through the Lens of Liquid-Liquid Phase Separation: A Tale of an Intrinsically Disordered Tail" at the Biophysical Society meeting in San Francisco, USA (February 2022)

Shravan Kumar Mishra and lab members

— Anupa T. Anil. Splicing control of Schizosaccharomyces pombe Rap1. CSHL December Virtual Meeting – Telomeres and Telomerase. December 14-17, 2021.
— Anupa T. Anil. Screening for biomolecules that affect conserved biochemical pathways in budding and fission yeast. INST-IISERM Bilateral Meeting. March 14-15, 2022.
— Amjadudheen Varikkapulakkal. Screening for biomolecules that affect conserved biochemical pathways in budding and fission yeast. INST-IISERM Bilateral Meeting. March 14-15, 2022.

Sudip Mandal and lab members

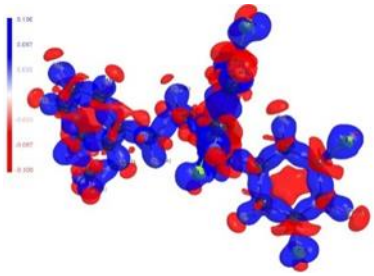
— Conference: Drosophila Fly Meet 2021, Organized by IISER Kolkata, 11-17th December.

8.2. Department of Chemical Sciences

8.2.1. Summary of the research work

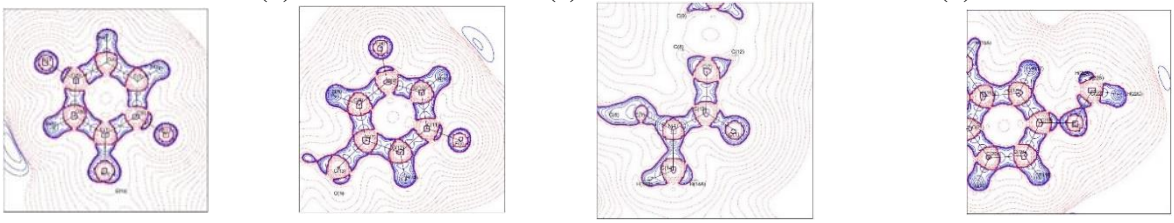
Angshuman Roy Choudhury

Our group works on crystal engineering, polymorphism, drugs and pharmaceuticals, study of weak intermolecular interactions and charge density analysis, synthesis, characterization and property studies of metal organic framework materials. In the year 2021-22, our group member has made significant progress in the area of the study of weak interactions involving organic fluorine utilizing the high resolution charge density data collected at the Department of Chemistry, University of Liverpool, UK using their rotating anode based single crystal X-ray diffractometer. Following are some of the useful plots related to the analysis of weak interactions involving organic fluorine using high resolution X-ray diffraction data.



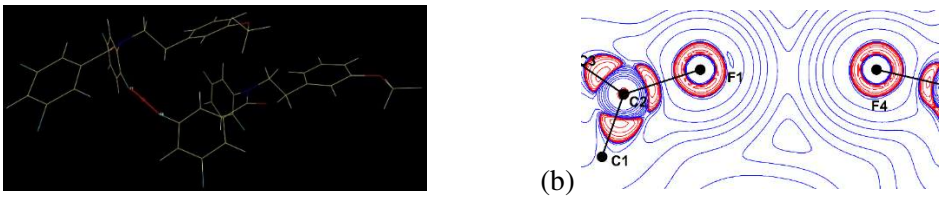
The 3D static deformation density maps with positive (blue surface) and negative (red surface) contours starting at ±0.05 e Å-3 with an interval of ±0.1 e Å-3.

(a) (b) (c) (d)



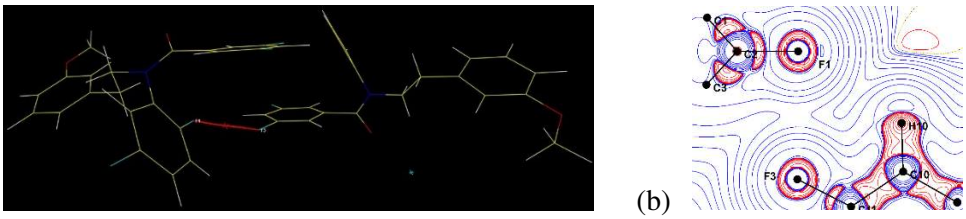
The 2D Laplacian maps, drawn in the molecular plane containing (a) C1F1F2, (b) C7F3F4, (c) C7N1O1 and (d) C18O2C22 atoms using positive (blue, solid line) and negative (red, dotted line) with contour intervals at ± 0.05 e Å-3.

(a) (b)



(a) The BCP and bond path for the interaction C2−F1···F4−C9. (b) Laplacian maps for the interaction C2−F1···F4−C9 drawn at the logarithmic interval of -□2□b e Å-5

(a) (b)



(a) The BCP and the bond path for the interaction C2−F1···F3−C11. (b) Laplacian maps for the interaction C2−F1···F3−C11 drawn at the logarithmic interval of -□2□b e Å-5
These plots indicate the strength, nature and directionality of intermolecular C−F···F−C interactions. The manuscript on this is in preparation.

Arijit K. De

The central theme of research in the Condensed Phase Dynamics Group led by Dr. Arijit K. De is to explore, through a combination of theory and experiments, a wide range of problems in condensed phase dynamics with applications in chemistry, biophysics and condensed matter physics. For this, the group has developed some cutting-edge spectroscopic tools and his group is the first (and so far, the only group) in India to develop and implement these novel techniques (for example, sub-20 fs broadband pump-probe spectroscopy, two-dimensional electronic spectroscopy, time-resolved impulsive stimulated Raman spectroscopy, multimodal optical tweezers, etc).

One of the significant achievements by the group was to develop new methodologies of impulsive stimulated Raman spectroscopy (ISRS) to track coherent vibrational motions in the electronic ground and excited states (published in The Journal of Physical Chemistry A). Another key achievement was to decipher optical trapping dynamics under femtosecond pulsed excitation using simultaneous spatial and temporal resolution (published in Scientific Reports).

Debashis Adhikari

We have discovered earlier an inexpensive, bench-stable, molecularly well-defined nickel catalyst that is very much efficient in (de)hydrogenation reactions. We have also assembled an array of heterocycles starting from primary and secondary alcohols under homogeneous catalytic conditions. In the designated timeframe we have utilized the catalyst for C-alkylation reactions. In such reactions, both primary and secondary alcohols are dehydrogenated that result in an aldehyde and ketone respectively. Under basic reaction conditions, the resulting carbonyl-containing groups undergo aldol

condensation, so that en enone forms. A selective hydrogenation of the olefinic motif in the enone will result in installing an alkyl group to the α-position of the keto carbonyl. For this reason, this is also known as α-alkylation of ketone. Later, we discovered that this well-defined and bench-stable nickel catalyst was also capable to conduct double alkylation of a methyl ketone to realize a wide variety of cycloalkanes. The source of the bis electrophile in this double alkylation is a 1,n-diol, so that (n+1)-membered cycloalkanes can be furnished in a stereoselective manner. The reaction follows a cascade of dehydrogenation/hydrogenation reactions and adopts a borrowing hydrogen (BH) method. Following this protocol, a series of cyclopentane, cyclohexane and cycloheptane have been synthesized in good yields. A thorough mechanistic analysis proves the ligand radical-mediated dehydrogenation and hydrogenations reactions which is quite rare in BH chemistry. Ring-opening of a radical-probe substrate, and the interception of a key radical intermediate combiningly provide compelling evidence for this proposal. Furthermore, high-level DFT calculations delineate a crucial hydrogen atom transfer step which is consistent with such a rare radical-mediated hydrogenation reaction, as a part of complete reaction sequence.

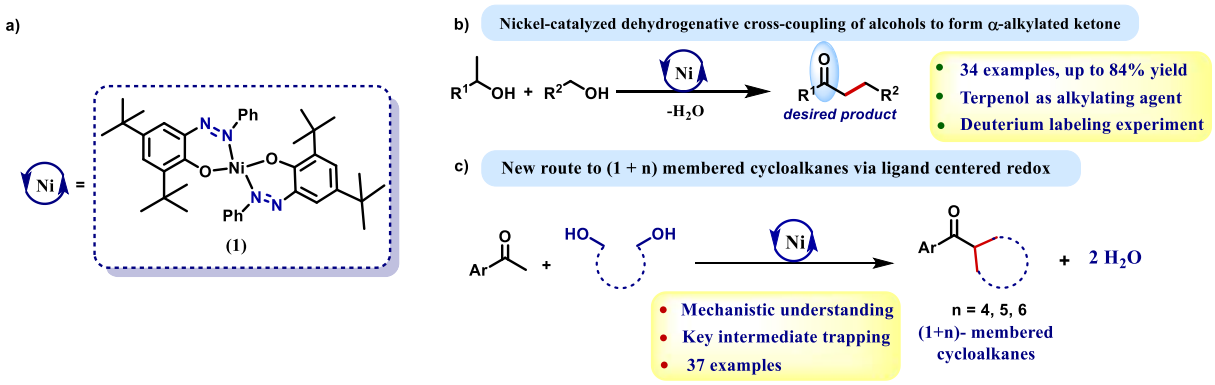


Figure 1. (a) Ni-(azophenolate)$_2$ catalyst, (b) Nickel-catalyzed dehydrogenative cross-coupling of alcohols to form α-alkylated ketone, (c) New route to (1 + n) membered cycloalkanes via ligand centered redox.

A photoactive Zinc β-diketiminate complex spans a wide redox window of 3.97 V at its excited state. Having a highly reducing excited-state potential, it generates electrophilic trifluoromethyl radical by the reductive cleavage of triflyl chloride. This leads to trifluoromethylation of a set of arene and heteroarenes. During the oxidative quenching of the photocatalyst, a ligand-centered radical cation is formed, which has been detected by spectroelectrochemical EPR measurement.

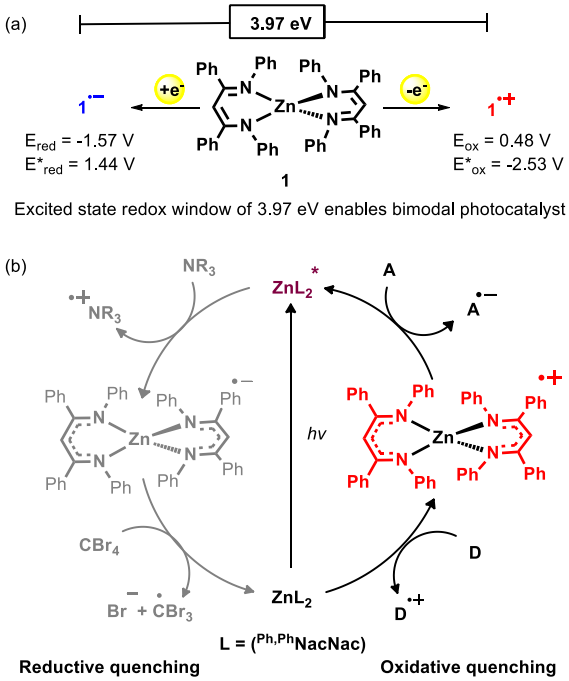


Figure 2. (a) Potentials of **1** in its excited state representing a broad redox window. (b) Bimodal photocatalytic approach for **1**, showing both photo-oxidation and photo-reduction.

In another project we strive to discover inexpensive organic molecules that can perform single electron transfer (SET) reactions. Along these directions, we have introduced a transition-metal-free protocol that involves a commercially available, inexpensive pyrazole molecule to conduct C–C cross-coupling reactions at room temperature via a radical pathway. Using this method, an aryldiazonium salt has been coupled to a wide range of arenes and heteroarenes including benzene, mesitylene, thiophene, furan, benzoxazole to result the corresponding biaryl products. The full reaction mechanism is elucidated along with the crystallographic probation of an active initiator species. A potassium-stabilized deprotonated pyrazole steers single-electron transfer to the substrate and behaves as an initiator for the reaction.

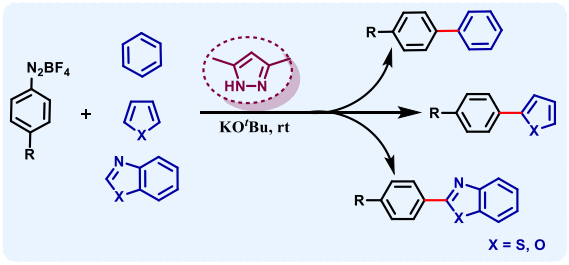


Figure 3. Transition metal-free C-C cross-coupling reaction using 3,5-dimethyl pyrazole as an additive.

Jino George
Molecular Strong Coupling (MSC) Group:

Jino George's group (molecular strong coupling group) mainly focuses on the study of strong light-matter interactions and their implications in controlling the chemical and physical properties of the associated system. MSC group mainly works on two trust areas: polaritonic chemistry and polaritronics.

Polaritonic Chemistry: Precisely controlling chemical reactions by light is the dream of spectroscopists. This will help to unravel the beauty of a complex chemical reaction process. Here, we use advanced spectroscopic techniques to probe a chemical reaction process by coupling them to a confined electromagnetic field. This process can be used to selectively excite vibrational states, and thereby affecting the reaction dynamics. For example, we tried strong coupling carbonyl stretching band of a simple ester with IR photons and precisely channeled the (vibrational) energy that modified the reaction rate. These are state-of-art experiments done at IISER Mohali and are the first of its kind as the process is done at room temperature and without external stimuli (Chemical Science 2022, 13, 195-202). Our investigations are in the early stage of development, and we hope the new finding will serve the community, especially the spectroscopic community at large.
Polaritronics: Controlling optoelectronic properties of materials is another attraction of strong coupling. Here, we study FET devices made of atomically thin 2D materials and couple the electronic states with a cavity photon. Strong coupling of the exciton and the photon generate new states, and we utilize these hybrid states to study electron transport. Strong coupling can modify the electron transport of such materials; experimentally, we achieved up to two orders of change in electron mobility at room temperature (ACS Nano 2021, 15, 13616-13622). Currently, we are targeting better systems to improve transport behavior and eventually achieve ballistic transport in strongly coupled systems.

K. R. Shamasundar
During this period, we focused on successful completion of two collaboratory research works which were initiated in last two years and also initiated a new line of research work. One work involved an approach for the computation of potential energy curves of molecular states with one or more core and valence holes. It was found that variational collapse and convergence problems can be avoided by an iterative two-step approach to optimize CASSCF orbitals and this has been applied for the N2 molecule. Another work involved using computational chemistry to help underexplaining the experimentally observed photochemistry of a didehyropyridazine in matrix conditions. We have started new work on developing a new multi-reference coupled-cluster method based on density matrix cumulants. The plan over the next one year is to complete an automated derivation of spin-adapted cumulant-based coupled-cluster method and apply it to for high-spin cases.

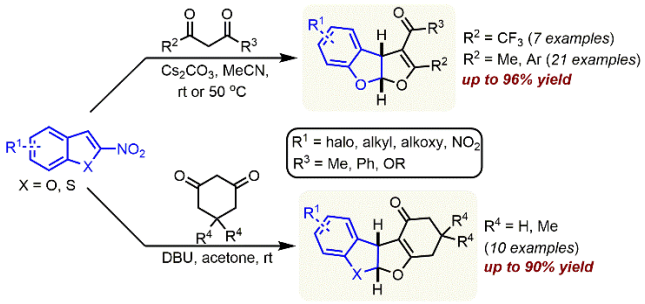
N. Sathyamurthy
Utilisation of AI/ML tools for fitting potential energy surfaces and scattering dynamics of elementary systems of astrophysical interest

P. Balanarayan
The development of a suite of programs to calculate properties of atoms and molecules in the [presence of strong laser fields is under way. The initial part of this is ready and several other methodologies to improve upon the zeroeth order mean field approximation implemented has been done which involve a methodology for multi-configurational time dependent wave functions, a semi-classical methodology for incorporation of nuclear motion of these driven systems etc. have been done. The implementation of these will happen after the mean field version has been thoroughly tested and published (in an article as well as online free to all academic users). The necessity of such a program stems from the fact such packages dealing with molecules in time varying fields in a non-perturbation regime are simply not available. With optics picking up fast these days such a package for computational understanding is necessary.

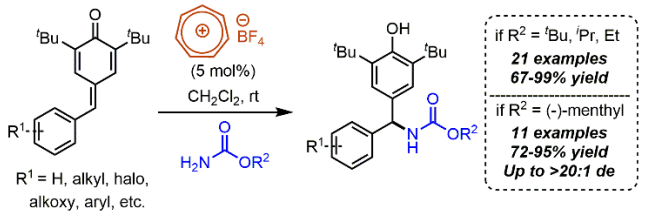
Meanwhile a standalone package for molecular properties of driven systems has almost reached its final stage. The uniqueness of our group here is the combined analysis of experimentally measurable densities in conjugate position and momentum spaces.

R. Vijaya Anand
Dr. Anand's research group is working on the development of synthetic methods pertaining to biologically active natural products and other useful organic molecules. Recently, his group developed a straight-forward approach for the synthesis of a dihydrofuro[2,3-*b*]benzofuran derivatives

through a base-mediated Michael addition of 1,3-dicarbonyls to 2-nitrobenzofurans followed by intramolecular cyclization. A variety of 1,3-dicarbonyls, including cyclic as well as trifluoromethylated ones, have been subjected to react with 2-nitrobenzofurans under optimal conditions, and the respective dihydrofuro[2,3-*b*]benzofurans could be accessed in moderate to excellent yields (*Chem. Asian J*. **2021**, *16*, 1271).



In recent years, carbocation catalysis has been emerging as one of the subareas of Lewis acid catalysis. We have recently developed a tropylium salt-promoted vinylogous aza-Michael addition of carbamates to para-quinone methides (QMs) to access a wide range of unsymmetrical α,α′-diarylmethyl carbamates. This mild protocol was effective for the vinylogous conjugate addition of (−)-menthyl carbamate to *p*-QMs, and the respective diastereomerically pure α,α′-diarylmethyl carbamate derivatives could be obtained in excellent yields and diastereoselectivities (up to >20:1 de) [*ACS Org. Inorg. Au* **2022**, *2*, 186].



We have also described a convenient method to access 9-aryl fluorene derivatives through a TfOH-catalyzed intramolecular 1,6-conjugate arylation of 2-(aryl)-phenyl-substituted *p*-quinone methides (QMs) under continuous flow using the microreaction technique. This protocol was further elaborated to the first total syntheses of selaginpulvilin I and isoselagintamarlin A (*J. Org. Chem*. **2022**, *87*, 3363).

Raj Kumar Roy

Folding of Periodically-grafted amphiphilic Polyamides: Aromatic oligoamides have previously shown to adopt various secondary structures, such as helical structures, linear strands, etc., but rarely fold into a β-sheet. We have recently demonstrated the intrachain β-sheet like folded structure of aromatic polyamide. A precise placement of H-bonding and π-stacking motifs along the polymer chain was necessary for the folding process. The control polymer without intramolecular H-bonding motifs assumed a random-coil structure. Unfolding of the polymer was observed at higher temperatures, however, the presence of π-surface containing guest molecules improved the thermal stability of the folded structure through co-facial host-guest π-stacking interactions. Subsequently, we have also found the remarkable selectivity in guest encapsulation. For example, among competing binding between Naphthalene, Anthracene and Pyrene, the polymer shows its selectivity towards pyrene. We are currently exploring the possibility of through-space charge transfer across those β-sheet folded polymer chains.

Self-assembly propensity of randomly-grafted amphiphilic linear and hyperbranched polyesters:
In this objective, we have been prepared an amphiphilic hyperbranched polyesters and their linear analogue by using melt-transesterification along with click chemistry. Both of the amphiphilic

polymers self-assembled to micellar nano-aggregates in water as characterized by using DLS, TEM and dye encapsulation studies. Although they are architecturally different, both of the hyperbranched and linear polymer show remarkable similarity in their self-assembled structure.

Organic Piezoelectric materials: To design organic piezoelectric materials, it is essential that the intrinsically polar molecule must reside in a non-centrosymmetric environment and assemble in such a way that molecular dipoles are transformed into macrodipoles. In this regard, the recent advancement of supramolecular chemistry played an important role to assembled the functional motifs (dipole in this case) into the desired structure while controlling the orientational order. Among various supramolecular motifs, the C3-symmetric 1,3,5-benzene tricarboxamides (BTAs) derivatives have attracted a great deal of attention due to their ability for supramolecular polymerizations and self-assembled columnar structure formations. A high degree of directionality involved with the self-assembly process makes them attractive scaffolds for linking additional polar segments whose dipole moment is parallel to the columnar axis. However, one must address the following concerns in order to design a desired supramolecular scaffold: (a) attachment of additional polar segments must not affect the native self-assembled structure of the BTA-core (b) the dipole moment of the polar motif must be aligned with the columnar axis. In view of these concerns, we envisioned a BTA-based scaffold embedded with a charge-transfer (C-T) complexing motif through its three arms. For instance, the C-T complexation may further stabilize the BTA-based columnar assembly due to the inherent tendency of 1-D pleated structure formation by the former. Additionally, the C-T complexed motifs residing in a non-centrosymmetric environment of BTA-based columnar assembly may also increase the overall polarity of the self-assembled structure. Indeed our recent findings indicates that dipoles originated from amides and C-T complexations were parallel and shows a highly polar structure for their applications as novel ferroelectric and piezoelectric materials.

Ramesh Ramachandran

Our research group here in Mohali is primarily focused on developing theoretical methods based on time-dependent quantum mechanics for both designing new SSNMR experiments and building models for quantifying NMR experimental data. Besides its implications in chemistry and structural biology, SSNMR also serves as a test-bed to investigate/understand some of the founding principles of quantum physics.

S. Arulananda Babu

The primary goal of Dr. Babu's lab is the development of Pd(II)-catalyzed stereoselective C-H activation reactions, C-H functionalization of small organic molecules toward the synthesis of libraries of medicinally relevant molecules. Along this line, the group has published several papers, which include the synthesis of functionalized cyclopropane, cyclobutane, norlignan-type tetrahydrofuran and neolignan-type 1,4-benzodioxane, Z-cinnamamide, Z-cinnamylamines and various aliphatic carboxamide scaffolds. We also reported a Pd (II)-catalyzed C-H activation route-based synthesis of arylheteroarylmethane and pyrrolidone ring annulated furan/thiophene scaffolds. Recently, we reported a synthetic method involving direct lactamization of β-arylated δ-aminopentanoic acid carboxamides. This method enables the synthesis of 4-aryl-2-piperidones, piperidines, and antituberculosis molecule Q203 (Telacebec) and its analogues (Asian J. Org. Chem. 2022, 11, e202100736). We have summarized the overall developments that occurred in the research area concerning diastereoselective palladium-catalyzed functionalization of prochiral C(sp3)-H bonds of aliphatic and alicyclic compounds (Chem. Commun. 2022, 58, 2612, This feature article was published as an invited article and it is a part of the themed collection: Functionalization of unreactive C-H bonds). We reported the construction of racemic and enantiopure biaryl unnatural amino acid derivatives via the palladium-catalyzed stereoselective sp3 C−H activation and arylation of amino acid derivatives with iodobiaryls (Eur. J. Org. Chem. 2021, 3641). We also demonstrated a Pd (II)-catalyzed directing group-aided C-H arylation and alkylation of pyrene core. Synthesis of C1, C2- and C1,C10-disubstituted pyrene motifs. This work was published as an invited article (Synthesis, 2021, 53, 3307), published as a special topic article and as a contribution as part of the Special Topic Bond Activation – in Honor of Prof. Shinji Murai.

Suman K. Barman

My research group is actively involved in designing and developing transition metal complexes that can effectively reduce protons to hydrogen in the context of alternate energy resources. To facilitate hydrogen evolution, we are designing 3d transition metal complexes, surrounded by redox-active non-innocent ligands. In this regard, we have analyzed the electrocatalytic behavior of neutral thiosemicarbazone ligand coordinated square-planar NiL complex (L is 2-((1H-pyrrol-2-yl) methylene)-N-methylhydrazine-1-carbothioamide) for proton reduction. The presence of soft donor ligands and π-accepting moiety in the ligand framework stabilizes the metal ion in its low oxidation state and potentially enhances the catalytic properties of the metal complex with maximum TOF of 2.73 x 104 s-1 using acetic acid as an external proton source in acetonitrile. We have also developed other catalysts for proton, and CO2 reductions.

Apart from electrocatalysis, we are also carrying out development of bioinspired metal complexes for biomimetic modelling of the enzyme Lytic polysaccharide monooxygenases (LPMOs). LPMOs are mononuclear copper containing enzyme which oxidize C-H bonds in polysaccharides to useful products for biofuel production. In this context we have developed mononuclear Cu(II) complexes which exhibits peroxidative cleavage of C-H bonds in polysaccharide model substrates.

Santanu Kumar Pal

Dr. Santanu Kumar's Lab is focused extensively on developing the luminescent room temperature discotic liquid crystalline (DLC) molecules that provide a viable platform for applications such as solid-state emitters in OLED devices, ambipolar Charge Transport properties in semiconducting devices. Lab is also focussed on designing of a series of bent-core Liquid crystal compounds and recently, his group has successfully synthesized bent-core compounds exhibiting "de Vries-like" smectic phases which may find applications in displays. Their group has also demonstrated the utility of the liquid crystal based systems as vehicles for encapsulation and triggered release. Apart from this, they have also reported a truxene-based ultrastable covalent organic framework for HCl Sensing, Visible-Light Heterogeneous Photocatalysis and luminescent Conjugated Microporous Polymers for Selective Sensing and Ultrafast Detection of Picric Acid.

S. S. V. Rama Sastry

Our group reported several new metal-catalyzed and metal-free strategies relevant to organic synthesis. We have demonstrated the utility of these methods in synthesizing bioactive natural products and their relevance in materials science. Some of the representative publications are listed here:

- 'Pd-catalyzed Nazarov-type cyclisation leading to its application in the total synthesis of β-Diasorane and other complex cyclopentanoids' in Org. Lett. 2022, 24, 1043-1048.
- 'Pd-catalyzed formal [3+3] heteroannulation of allylic gem-diacetates and subsequent synthesis of chromene-Based natural products along with the inspection of its photochromic properties' in ACS Catal. 2022, 12, 963-970.
- 'Catalytic enantioselective synthesis of axially chiral diarylmethylidene indanones' in Org. Lett. 2021, 23, 4909-4914.

Sabyasachi Rakshit

A. Development of magnetic tweezers with axial resolution of 5 nm and temporal resolution of 1kHz. A magnetic tweezer helps us to measure real-time protein folding-unfolding dynamics at the single molecule level.

   Force acting on force sensing proteins are actively involved in maintaining physiological activity. Inner-ear mechanotransduction is a well-known area in mechanobiology where single-molecule techniques have broaden the scope of discovery regarding force transduction mechanism. With the help of home-built magnetic tweezer we aim to elucidate the effect of correlated motion in one of the tip-link proteins at physiologically relevant force regime. This force regime wasn't possible to be attained as most of the previous studies on this particular topic were done using AFM. Here, for the first time we are trying to address the force

adaptation behaviour of Cadherin-23 at physiologically relevant low forces and how crankshaft motion is an integral part of this. Correlating low frequency motion in beta rich force sensing proteins with its structural as well as functional aspect, will answer many biologically relevant questions regarding force adaptation mechanism or origin of diseases. Despite of the current limitations of our instrument, computational setup and camera processing threshold, we have successfully shown transitions between different active states in physiologically relevant forces. The force response behaviour due to force adaptation using correlated motion between β-strand as the critical factor, will most definitely shed some new insight in inner ear mechanotransduction process during hearing.

B. Multibead magnetic tweezers to measure two-dimensional matrix stiffness. Matrix stiffness regulates the stem-cell property of the glioblastoma cells. We identified a cartilage family protein that is down-regulated in glioblastoma (GBM) whereas upregulated in low-growth glioma. Using multibead pulling geometry, we have been to able to quantify the matrix stiffness in the context of cartilage family protein. At the cell-biology front, we identified the stemness properties of GBM cells in spheroids at varying matrix stiffness.

C. Deciphering the evolutionary thirst to form tip-links as protein-protein complex.
Proteins as force-sensors respond to mechanical cues and regulate signaling in physiology. Proteins commonly connect the source and response points of mechanical cues in two conformations, independent proteins in end-to-end geometry and protein complexes in handshake geometry. The force-responsive property of independent proteins in end-to-end geometry is studied extensively using single-molecule force spectroscopy (SMFS). The physiological significance of the complex conformations in force-sensing is often disregarded as mere surge protectors. However, with the potential of force-steering, protein complexes possess a distinct mechano-responsive property over individual force-sensors. To decipher, we choose a force-sensing protein, cadherin-23, from tip-link complex and perform SMFS using end-to-end geometry and handshake complex geometry. We measure higher force-resilience of cadherin-23 with preferential shorter extensions in handshake mode of pulling over the direct mode. The handshake geometry drives the force-response of cadherin-23 through different potential-energy landscapes than direct pulling. Analysis of the dynamic network structure of cadherin-23 under tension indicates narrow force-distributions among residues in cadherin-23 in direct pulling, resulting in low force-dissipation paths and low resilience to force. Overall, the distinct and superior mechanical responses of cadherin-23 in handshake geometry than single protein geometry highlight a probable evolutionary drive of protein-protein complexes as force-conveyors over independent ones.

D. Interdomain linkers tailor the stability of immunoglobulin repeats in polyproteins. Random-coil linkers (-polyGly here) maintain the domain independence in polyproteins of Immunoglobulin repeats. Linkers (-RS here) that facilitate interdomain contacts may alter the energy landscape of individual domains cooperatively. A simple tripeptide-based modeling approach captures the inter-domain orientations across the IDLs.

Sanchita Sengupta

The research interest of my group involves design, synthesis and characterization of □-conjugated organic small molecules, dyes and pigments for optoelectronic applications. Furthermore, their optical and electronic properties and applications are intended to be explored. The work involves extensive organic synthesis and structural characterization of new molecules followed by optical spectroscopy such as UV/Vis, fluorescence, emission lifetimes, fluorescence anisotropy measurements. Along these lines, research in my group has been aimed at developing new light harvesting systems based on □-

conjugated molecules/dyes specifically in the last one year following results have been achieved in the last year:

1) A red-green-blue (RGB) multichromophoric antenna consisting of energy donors naphthalimides and perylenediimides and a central aza-BODIPY energy acceptor along with two subchromophoric red-blue (RB) and green-blue (GB) antennae was designed that showed efficient cascade Förster resonance energy transfer (FRET). RGB antenna showed pronounced temperature-dependent emission behaviour where emission intensities in green and red channels could be tuned in opposite directions by temperature giving rise to unique ratiometric sensing with a temperature sensitivity of 0.4% °C. RGB antenna showed reversible absorption modulation selectively in the blue region (RGB ↔ RG) upon acid/base addition giving rise to pH sensing behaviour. Furthermore, RGB antenna was utilized to selectively sense metal ions such as Co2+ and Fe3+ through a FRET turn-off mechanism induced by a redox process at the aza-BODIPY site that resulted in the selective spectral modulation of the red band (i.e., RGB → GB). Model antenna RB showed white light emission with chromaticity coordinates (0.32, 0.33) on acid addition. All antennae exhibited solution state electrochromic switching characterized by distinct colour changes upon changing the potential. Finally, all antennae served as reversible fluorescent inks in PMMA/antenna blends whereby the emission colours could be switched or tuned using different stimuli such as acid vapour, temperature and metal ions (Chem. Sci., 2021, 12, 15533-15542).

2) In another work, spectroscopic and metal ion sensing behavior of two sets of regioisomers of C10-(H)-arylated-N-(pyren-1yl)-picolinamide have been investigated. The compounds were classified into two series: I with methoxy group, and II with methyl group, at meta- and para- position of phenyl. All compounds exhibited characteristic absorption and emission responses only towards Cu2+ and Fe3+. While the methoxy-regioisomers displayed a fluorescence turn-off behaviour, those with methyl groups showed excimer formation at ~550 nm in presence of Cu2+ and Fe3+. Temperature dependent fluorescence could differentiate the type of excimers (static and dynamic) formed by two compounds in series II (ChemistrySelect, 2021, 6, 12022–12031).

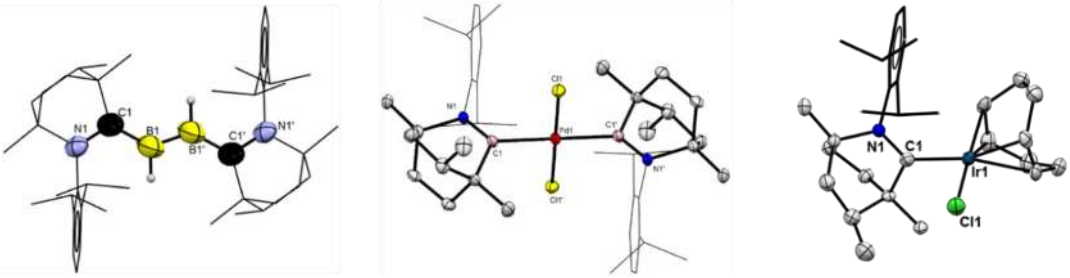
Sanjay Mandal

My group is engaged in developing diversified chemistry of elements across the periodic table through a variety of interdisciplinary projects that involve multi-step organic synthesis, coordination chemistry, heterogeneous catalysis, and materials science. Various spectroscopic techniques (UV-vis, FTIR, NMR, Raman, CD and Fluorescence), thermal analysis (TGA and DSC), electrochemistry, surface analysis (SEM/EDX, AFM and TEM), and X-ray crystallography (PXRD and SCXRD) are routinely used for establishing physicochemical properties of the new organic, inorganic and organometallic compounds. This has resulted in the strategic design of diverse coordination architectures with a special emphasis on Metal Organic Frameworks (MOFs) and Covalent Organic Frameworks (COFs) for their diverse structural aesthetics and for their possible roles in various applications, such as catalysis, luminescence, molecular separation, gas and liquid adsorption, magnetism, drug delivery, etc. Our research has been involved with some current issues in the fields of (a) energy and environments focused on (i) selective gas adsorption studies for storage of hydrogen and methane (next generation fuels), (ii) carbon dioxide capture and chemical fixation (lowering greenhouse effect) and (iii) chromogenic and/or fluorogenic sensing of the cations, anions and neutral small molecules (specifically nitroaromatic explosives) at the ppm or ppb level, (b) heterogeneous catalysis in the C-C and C-N bond forming transformations, (c) molecular recognition namely, (i) fluorescence based decoding strategies for solvents and VOCs and (ii) nanoscale drug delivery at physiological conditions, (d) metal-oxide and metal-sulphide nanomaterials for their applications in luminescence, photocatalysis and quantum dots, and (e) crystal engineering for guest encapsulation and exploring rare hydrogen bonding synthons (amide-pseudo amide, for example).

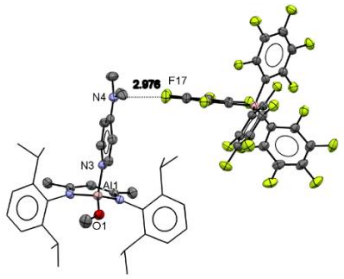
Sanjay Singh

Our research activities involve the synthesis, characterization and reactivities of the main group and transition elements (Ni, Cu, Pd, Au, Ir and Ru) and Zn based compounds featured with cyclic (Alkyl)(Amino) Carbene (cAAC), bicyclic(Alkyl)(Amino) carbene (BICAAC), bis(phosphinimino)amide and β-diketiminate ligand frameworks. The synthesized complexes are further developed as catalysts for activating small molecules and functionalizing and transforming taxing substrates into value-added chemicals. The detailed mechanistic insights for catalytic activities are carried out to address some fundamental questions in this area. In addition, we have also successfully explored the synthesis and properties of inorganic macrocycles, pyridinophanes and cryptands.

We have successfully synthesized and characterised BICAAC-borane adducts and further used to prepare a series of >B-B< and >B=B< molecules with single and double bond between two B atoms. Further, we have synthesized BICAAC stabilized boron cations [BICAAC-(BH2)-(μ-H)-(BH2)-BICAAC]+[H-B(C6F5)3]- and [BICAAC-(BH2)-(μ-H)-(BH2)-BICAAC]+[B(C6F5)4]- and utilized them as a catalyst in hydrosilylation reaction of carbonyls. We have prepared a series of complexes with different metals in the area of transition elements. The BICAAC-supported palladium [(BICAAC)2PdCl2] and iridium [Ir(BICAAC)Cl(COD)] complexes were synthesized and employed as a catalyst for cross-coupling reactions (Heck-Mizoroki and Suzuki-Miyaura) and transfer hydrogenation of different functionalities (aldehydes, ketones and imines), respectively. Further, another set of BICAAC stabilized nickel complexes [(BICAAC)2Ni(X)2] [X = Cl, Br and I] were introduced and their potential was explored in Negishi cross-coupling reactions. The zero-valent transition metal (BICAAC)2M(0) complexes (M = Mn, Ni, Cu, Zn, Pd, Au etc.) have also been synthesized. The figure below shows the single-crystal X-ray structures of a diborene, [(BICAAC)2PdCl2] and Ir(BICAAC)Cl(COD) complexes stabilized by BICAAC.

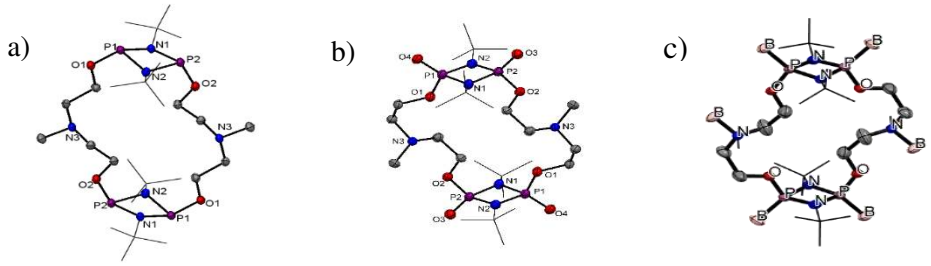


Lewis acidic aluminium complexes and catalytic activity: Additionally, in the domain of main group chemistry, we have also devoted efforts to synthesizing highly Lewis acidic aluminium cations and their utilization as environmentally benign catalysts. In this direction, we have successfully synthesized the structurally diverse low coordinated cationic aluminium complexes featured with bis(phosphinimino)amide and β-diketiminate ligand frameworks. Further, these complexes were utilized to develop catalytic reduction chemistry using borane and silane as reducing agents and successfully established these complexes as an efficient catalyst for hydroboration and hydrosilylation of unsaturated molecules such as aldehyde, imine, alkyne, amide, and esters.



Inorganic macrocycles and cryptands: In order to be able to use the ion-dipole interaction in synthetic hosts, the host must be perfectly preorganized for ion binding. We have synthesized a robust phosphazane based macrocycle (a) and its oxidized derivative (b) as well as borane-adduct (c) as a

permanent dipole host without any charged species with Lewis's character in main backbone and investigated its binding capability towards different ions. In this adduct the dative boron-nitrogen and boron-phosphorous bonds converge with the positive dipole terminals towards the centre of the molecular cavity.



Subhabrata Maiti

Biological functions typically involve a series of interlinked temporal events having specific spatial coordination among the interacting components so that the temporal events occur at specific locations or in specific compartments in the organism. Thus, continued efforts towards development of programmable matter on both temporal and spatial scales would be vital to creating biomimetic, dissipative materials with controllable functionality.

We showed a self-assembled modular catalytic system based on the multivalent interaction between a cationic gold nanoparticle surface and nucleotides. It is shown that the catalytic preference and activity of the nanoparticle can be directed in a controllable manner toward either hydrazone formation or a proton transfer reaction only by creating a differential local microenvironment around the nanoparticle surface, simply by changing or converting the multivalent scaffold around it. The temporal control of the system in governing the reaction preference and catalytic activity will enable designing a system of higher complexity with a pre-programmed reaction networking property.

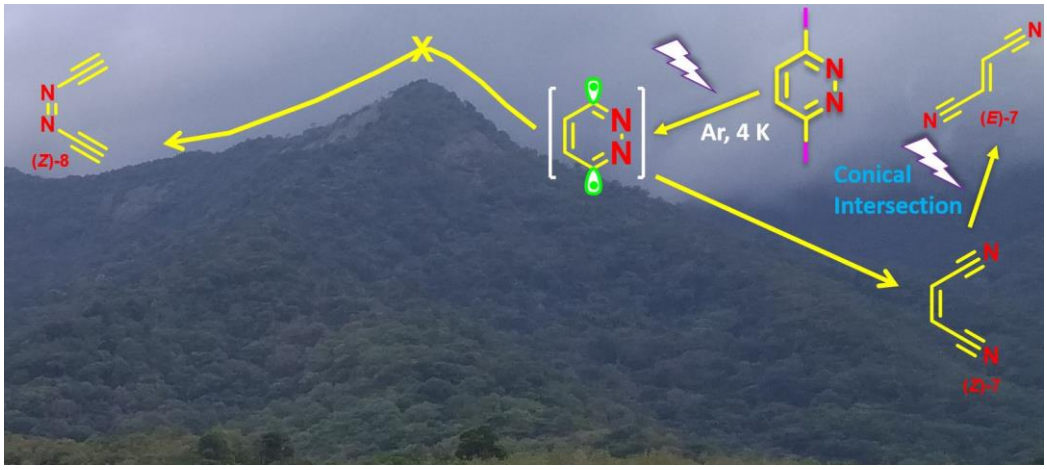
Until now, reports of spatiotemporal surface pattern or self-organization have been restricted with oscillatory reaction-diffusion processes. Also, self-organization of synthetic systems under dissipative conditions or under agonistic-antagonistic relationship among multiple components has been limited in mostly solution phase materialistic study. We have shown how the later approach can be used to generate a template-driven self-organization at specific location of a two-dimensional (2D) space in temporal manner. In particular, we have used two enzymes, namely alkaline phosphatase (ALP) and hexokinase (HK) to show that it is possible to dissipate or sustain an ATP-driven assembly of a surfactant having dipicolylamine (DPA)•Zn2+ as the headgroup. Furthermore, we have borrowed this approach to create a spatiotemporally distinct patterns of organized assemblies when surfactant and enzymes (ALP or HK) are operating in gradients from different locations, where the template has been distributed uniformly through the entire space. We have used both theory (Python for numerical modelling and MATLAB for diffusion-dependent spatiotemporal assembly) and experiments to complement our findings.

Reflecting on this work on biopatterning, we note that it strongly evolved from patterning receptors on surfaces towards fast, multiplexed detection of infectious diseases and related biomarkers using portable diagnostics. In this regard, recently we have also demonstrated enzymatic micropumping from clinically relevant sample human plasma (here plasma was immobilized on a portable glass surface) by showing nucleotide-modulated acetylcholine esterase actuated fluid flow which paved the way for designing future lab-on-a-chip diagnosis procedure (low cost technology without using any external power source) in complex biological environment..

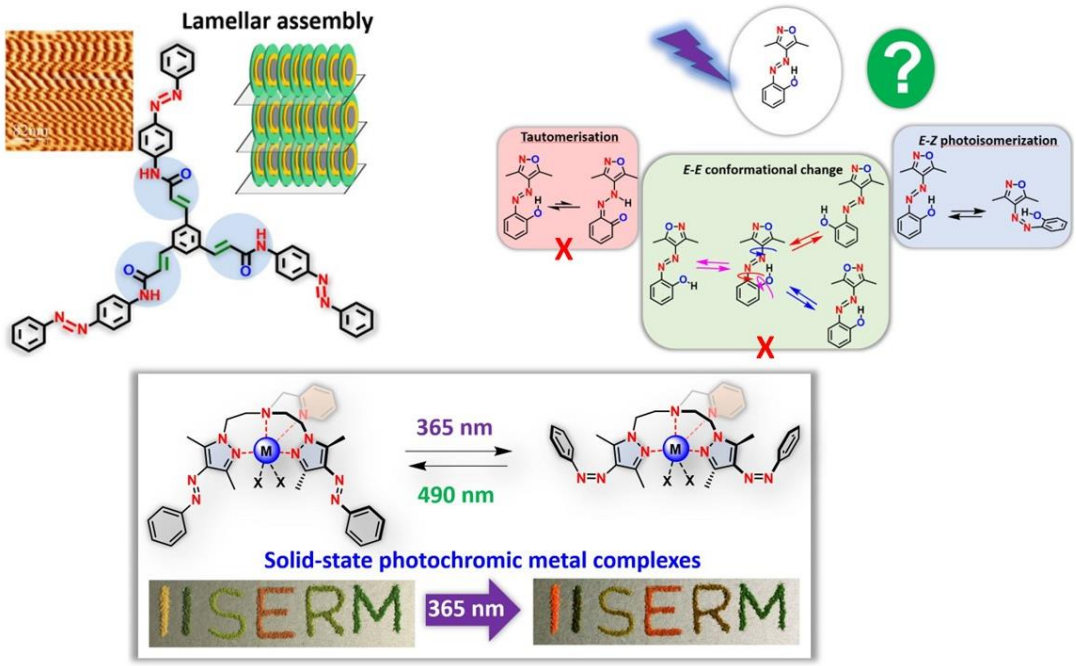
Overall, our work represents an important advance in understanding how molecular systems adapt and function abiotically to the environment. Environmental conditions control reaction types to varying degrees in complex abiotic reaction networks, leading to well-defined reaction pathways and product compositions. It also emphasized the fundamental reasoning and substrate gradient sensing and motility behavior of catalytic particle or enzymes or catalyst which still remain elusive. Overall, such translation of information from the environment into embedded chemical reaction networks hints at how reaction networks of biological importance may be the result of the abiotic self-organisation of systems of reactions and catalytic materials and thus it contains great potential to the advancement of dynamic micro- and nanotechnology.

Sugumar Venkataramani

Heterocyclic Radicals: Matrix isolation infrared spectroscopic and computations have been carried out to characterization of hetercyclic radicals. In this regard, we attempted to characterize 3,6-didehydropyridazine, a heterocyclic analogue of para benzyne, using 3,6-diiodopyridazine as a photolytic precursor. The experiments were carried out in argon and nitrogen matrices at 4 K. Instead of the elusive biradical, we have observed a ring-opening product maleonitrile upon irradiation at 254 nm. In contrast, prolonged irradiation at 254 nm leads only to Z-E isomerization, forming fumaronitrile. The mechanistic aspects of ring-opening, product selectivity, and Z-E photoisomerization steps have been investigated in detail using high-level ab initio computations in collaboration with Dr. Shamasundar and Dr. Satyam Ravi. These studies have found that 3,6-didehydropyridazine is an untraceable intermediate, and the ring-opening step leading to maleonitrile is barrierless. In addition, we have proposed the involvement of the S1 (π–π*) state via conical intersection in the Z-E photoisomerization of maleonitrile. (J. Phys. Chem. A 2022, 126, 4, 557–567)



Photoswitchable Functional Molecules: Azo(hetero)arenes are one of the important targets in our group for quite sometime due to their versatility, robustness, tunability and several light controlled application prospects. In addition, we were investigating startegies to widen the horizons in bringing additional properties by functionalizing the simple photoswitches and metal coordination. One such investigation in extending □-conjugation provided us insights towards making molecular materials in supramolecular assembly and gelation (Chem. Eur. J., 2022, 28, e202104602). Whereas the metal coordination led to make photochromic materials (Inorg. Chem. Front., 2022, 9, 2315-2327). Many additional functions of such systems are currently underway in our laboratories. Apart from that, investigations on the azoheteroarenes to answer fundamental questions were also done using matrix isolation infrared spectroscopy (Phys. Chem. Chem. Phys., 2022, 24, 7848-7855).



Ujjal K Gautam

The central theme of research in the Nanoscale Energy Lab led by Dr. Ujjal K. Gautam during 2021-22 is to explore new avenues and address environmental challenges leading to fast-growing scientific breakthroughs and market opportunities. Our research work was focused on developing functional nanomaterials and their applications in energy harvesting and environmental remediation. Such work requires involvement in photocatalysis, electrocatalysis, in-situ investigations of reaction kinetics, excitons dynamics, surface characterization techniques, and high-resolution structural analysis using electron and atomic force microscope.

Our group is interested in developing chemical routes for highly monodisperse, shape-controlled nanocrystalline semiconducting and metallic catalytic materials that can either (a) split water with the help of sun-light to obtain hydrogen that stores solar energy in the form of chemical energy or conversely, (b) reduce oxygen efficiently enabling it to form oxide ion and hence combine easily with hydrogen even at room temperature, leading to the release of stored solar energy on demand. We have got certain important breakthrough as refected in the publication list.

8.2.2. Visits of the faculty members

S. S. V. Ramasastry`

— 11-Mar-2022: Department of Chemistry, Central University of Punjab (CUP) Bhatinda.
— 14-Mar-2022: Sir P. T. Sarvajanik Science College, Surat.

Sanjay Mandal

— BITS Pilani, Pilani Campus, 28 February, 2022.

Ujjal K. Gautam

— Pandit Deendayal Energy University, Gandhinagar, March 10, 2022.

8.2.3. Talks delivered

Angshuman Roy Choudhury

— Angshuman Roy Choudhury, In-situ crystallization and co-crystallization of small organic molecules: Techniques and Applications, 48th National Seminar on Crystallography, 25-28th November, 2021, IIT Roorkee.

Arijit K. De and lab members

— Arijit K. De. Optical trapping dynamics under femtosecond pulsed excitation: A comparative study with particles of different sizes. Optical Manipulation and Its Applications. OSA Biophotonics Congress: Optics in the Life Sciences 2021, 14 April 2021.
— Arijit K.De. Confinement-driven ultrafast singlet fission dynamics in TIPS-Pentacene. International Conference on Photochemistry 2021 (ICP) (Webinar), Geneva Switzerland. 21 July, 2021.
— Anita Yadav. Ultrafast Solvation Dynamics of Deep Eutectic Solvents using Spectrally resolved Degenerate Pump-Probe Spectroscopy. International Conference on Photochemistry 2021 (ICP) (Webinar), Geneva, Switzerland. 23 July, 2021.
— Arijit K. De. Optical trapping with femtosecond pulses: Excitements, challenges and opportunities. School of Physics (SPS) (Webinar), JNU, New Delhi, India. 28 July, 2021.
— Sumit Yadav. Nonlinear Optical Trapping Dynamics Studied with Simultaneous Spatial and Temporal Resolution. OSA Nonlinear Optics Topical Meeting 2021 (Webinar). 11 August, 2021.
— Arijit K. De. New Insights into Ultrafast Excited State Relaxation Dynamics in Tricarbocyanine Dyes: Two-Dimensional Electronic Spectroscopy and Time-Resolved 'Spectrally Dispersed' Impulsive Stimulated Raman Scattering. Physical Chemistry Physical Biology 2021 (PCPB) (Webinar), India. 26 September, 2021.
— Garima Bhutani. Deciphering the role of local environment on reverse protonation mechanism involved in conformational change and excited state dynamics in mKeima. Physical Chemistry Physical Biology 2021 (PCPB) (Webinar), India. 26 September, 2021.
— Arijit K. De. A systematic method to disentangle vibrational coherences in ground and excited electronic states followed by non-resonant/resonant impulsive excitation. Spectroscopy and Dynamics of Molecules and Clusters 2021 (SDMC) (Webinar), India. 09 October, 2021.
— Arijit K. De. A tutorial on coherent multidimensional spectroscopy. Saturday seminar series. Light as a Reagent and Product. India. 06 November, 2021.
— Arijit K. De. Tracking origin of ultrafast vibrational coherences in condensed phase by 'spectrally dispersed' impulsive stimulated Raman scattering. 7th Theme Meeting on Ultrafast Science-2021 (UFS-2021), India. 13 November, 2021.
— Shaina Dhamija. Real-time tracking of coherent vibrational motion in ground and excited electronic states: Implications in biology. Light-matter Interactions from scratch: Theory and Experiments at the Border with Biology, Trieste (Italy). 23rd November 2021.
— Sumit Yadav. Generalized Lorenz-Mie theory of nonlinear optical trapping of core/shell hybrid nanoparticles. SPIE Photonics West, 2022, Complex Light and Optical Forces XVI, San Francisco, USA, January, 2022.
— Garima Bhutani. Unravelling the mechanism of reverse protonation in mKeima: Multiple conformers and their ultrafast excited-state dynamics. ACS Spring 2022: Bonding through Chemistry, San Diego, USA. 24 March, 2022.

Debashis Adhikari

— Debashis Adhikari-Ni-catalysed N-Alkylation Reactions via Hydrogen Atom Transfer (HAT)-Invited lecture at IISER Tirupati, Telengana, Dates - Octobor, 2021
— Debashis Adhikari– Bioinspired Transition Metal-free synthesis of heterocycles under visible light photoredox catalysis– RSC- IISER desktop seminar-Dates – November, 2021
— Debashis Adhikari – Ni-catalysed N-Alkylation Reactions via Hydrogen Atom Transfer (HAT)– Young Scientist Conclave-Dates – December, 2021
— Debashis Adhikari– Bioinspired Transition Metal-free synthesis of heterocycles under visible light photoredox catalysis "(Chemistry) Meet in Manali"-Dates –22nd March, 2022
— Kirti Singh–National Seminar on Women Empowerment through Science and Technology: Power to Transform the World-Dates – Oct, 2021.
— Kirti Singh–Multifunction Zinc Based Photosensitizers:An approach towards Green and Sustainable Chemistry –International Conference (Virtual) on Recent Advancement in Chemical Sciences-Dates –14 July,2021

Jino George

— Jino George. Invited talk, 3rd International Conference, EFCS-2021, Farook College, Kerala, October 29-31, 2021.
— Jino George. Student Enrichment Program, St. Joseph's College (Autonomous), Devagiri, Calicut, Kerala, November 1-5, 2021.
— Jino George. Award lecture, APC 2021, 11th Asian Photochemistry Conference Korea, ONLINE, November 1-4th 2021.
— Jino George. Invited talk, Chem Sci 2021, Leaders in the Field Symposium, JNCASR Bangalore, December 12-13th 2021.
— Jino George. Invited talk, Photonic Materials" during 32nd Annual General Meeting of Materials Research Society of India (MRSI) and Third Indian Materials Conclave, IIT Madras, December 20-23rd 2021.
— Jino George. Plenary talk, Young Scientists Conclave, RTCS-YSC 2021: a yearly event of Indian Chemical Society, ONLINE, December 24th 2021.
— Jino George. Invited talk, Neoteric Advances in Chemical Sciences (NACS 2021), Kerala University, December 30-31st 2021.

R. Vijaya Anand

— R Vijaya Anand. Delivered the CRSI Bronze Medal Lecture on "Organocatalysis by Cyclopropene- and Cyclopropenium-based Small Molecules" during the 28th CRSI-NSC meeting organized at IIT Guwahati during March 25-27, 2022.
— R Vijaya Anand. Delivered an online lecture on "Nobel Prize in Chemistry 2021" in "Popular Science Lecture Series – 43" organized by Tamil Nadu Science Forum (TNSF) on November 06, 2021.
— R Vijaya Anand. Delivered an online lecture on "Microreaction Technology: Basic Principles & Applications" in a UGC-HRDC workshop conducted by the University of Hyderabad on November 20, 2021.
— Rajat Pandey delivered a talk during the Junior National Organic Symposium Trust (J-NOST) conference organized at the University of Hyderabad on January 06, 2022.
— The group members Gurdeep Singh, Feroz Ahmad and Rekha presented posters in the "International Symposium on Recent Advances in Self Assembled Materials and Supramolecular Chemistry" organized by the Department of Chemistry at Guru Nanak Dev University, Amritsar on March 19, 2022.

Raj Kumar Roy

— Raj Kumar Roy "Folding of aromatic polyamides into a rare intrachain β-sheet type structure" IISER-INST meet at INST-Dates: 15th March 2022

S. Arulananda Babu

— Babu, S. A. Pd-catalyzed Diastereoselective C-H activation of inactive prochiral C(sp3)-H bonds of aliphatic compounds. National Organic Symposium Trust (NOST) conference held at The Leela Palace, Chennai. November 25-28, 2021.
— Tomar, R.; Bhattacharya, D.; Babu, S. A.* Assembling of 4-aryl-2-piperidone, 4-arylpiperidine scaffolds and antituberculosis molecule via Pd(II)-catalyzed sp3 β-C-H activation/arylation. National Virtual NITT Organic Chemistry Conference (NITTOCC-2021), Chemistry Department, National Institute of Technology Tiruchirappalli (NITT). 16th to 18th December 2021.

S. K. Pal and lab members

— Vidhika Punjani- Multi-Stimuli Responsive Chiral Bent-Shaped Liquid Crystals Exhibiting Wide Temperature Range of Blue Liquid Crystalline Phase, 48th German Liquid Crystal Conference, University of Würzburg, Würzburg, Germany, March 28-30, 2022.
— Vidhika Punjani- Chiral Bent-Shaped Liquid Crystals Exhibiting a Wide Range of Blue Liquid Crystalline Phase and Mechanochromic Behavior, 28th National Conference on Liquid Crystals, Department of Chemistry, Assam University, Silchar, Assam, December 21-23, 2021.
— Varsha Jain- Design, Synthesis and Characterization of Achiral Unsymmetrical Four-ring based Hockey-stick Shaped Liquid Crystals: Structure-Property relationship, International conference

on Recent Trends in Chemistry of Materials (ICRTCM) 2021, ICFAI University Tripura, September 20-24, 2021.

— Ipsita Pani- Probing Nanoscale Lipid-Protein Interactions at the Interface of Liquid Crystal Droplets, International Conference on Complex Fluids and Soft Matter 2021 organized by the Indian Society of Rheology, December 13-15, 2021

— Ipsita Pani- Probing Nanoscale Lipid-Protein Interactions at the Interface of Liquid Crystal Droplets, 28th National Conference on Liquid Crystals, December 21-23, 2021.

— Ipsita Pani- Differentiating Conformationally Distinct Alzheimer's Aβ Oligomers Using Liquid Crystals at Aqueous Interfaces, Research Conclave 2022 organized by IIT Indore, February 10-12, 2022.

S. S. V. Rama Sastry

— S.S.V. Ramasastry. Title of the talk: The Nobel Prize in Chemistry 2021. Name of the institute: Cogito 137 at IISER Kolkata. Date: 13-Nov-2021

— S.S.V. Ramasastry. Title of the talk: The Nobel Prize in Chemistry 2021 and the Science behind. Name of the institute: Society for Promotion of Science & Technology in India. Date: 02-Dec-2021

— S.S.V. Ramasastry. Title of the talk: New strategies for the synthesis of privileged scaffolds. Name of the institute: Central University of Himachal Pradesh (CUHP) Dharamsala. Date: 31-Jan-2022

— S.S.V. Ramasastry. Title of the talk: The Nobel Prize in Chemistry 2021. Name of the institute: Sir P. T. Sarvajanik Science College, Surat. Date: 14-Mar-2022

Sabyasachi Rakshit

— Nisha Arora-Title of the talk:Slip-Catch-Slip bond characteristics form the basis of force dissemination by inner-ear tip-limk during hearing, Name of the Conference: MechanoChemBio 2021 organized by MPIKG, MPG, Dates: 25-08-2021 .

— Sabyasachi Rakshit-Title of the talk: Slip-Catch-Slip bond characteristics form the basis of force dissemination by inner-ear tip-limk during hearing, Name of the Conference: Webinar organized by BSBE,IISc, Benagluru

Sanchita Sengupta

— Sanchita Sengupta - Multi-Stimuli Programmable FRET Light Harvesting Antenna Towards Ratiometric Temperature, pH and Multiple Metal Ion Sensing. “Recent Advances in Self-assembled Materials and Supramolecular Chemistry” March 19, 2022, Guru Nanak Dev University, Amritsar.

Sanjay Mandal

— Sanjay Mandal. Invited Talk. Multifunctional Emerging Nanomaterials for Environment Applications. National Science Day Mini Symposium. BITS Pilani, Pilani Campus, 28 February, 2022.

— Sanjay Mandal. Expert Talk. Single Crystal and Powder X-ray Diffraction XRD) and Their Applications, BITS Pilani, P ilani Campus, 28 February, 2022.

— Sanjay Mandal. Guest of Honour Talk (online). Multifunctional Emerging Nanomaterials for Environment Applications. International Conference on Functional Materials and Simulation Techniques (ICFMST-2022). Chandigarh University, Gharuan, Punjab, 11 January, 2022.

— Sanjay Mandal. Plenary Lecture (online). Smart Nanomaterials for Energy and Environment Applications. Indian Chemical Society, IIT Ropar, 22 December, 2021.

— Sanjay Mandal. Invited Talk (online). An Exploration into the Amide-Pseudo Amide Hydrogen Bonding Synthon Involving Theophylline. National Crystallographic, IIT Roorkee. 27 November, 2021.

— Sanjay Mandal. Invited Talk (online). Smart Nanomaterials for Energy and Environment Applications. International Conference on Materials Science and Spectroscopy, Maharishi University of Information Technology, Lucknow. 22 September, 2021.

— Sanjay Mandal. Expert Talk (online). X-ray Diffraction (XRD): Single Crystal and Powder and Their Applications, Short Term Course on Analytical Techniques in the realm of Molecules and Materials (ATRAMM-2021), SLIET, Longowal, 26 July, 2021.

— Sanjay Mandal. Expert Talk (online). Diverse Metal-Organic Heterogeneous Catalysts for Organic Transformations., Short Term Course on Analytical Techniques in the realm of Molecules and Materials (ATRAMM-2021), SLIET, Longowal, 26 July, 2021.
— Sanjay Mandal. Expert talk on Catalysis (online). Diverse Metal-Organic Heterogeneous Catalysts for Organic Transformations. Department of Chemistry, Indira Gandhi National Tribal University (Central University), Amarkantak, M.P., 2 June, 2021.
— Sanjay Mandal. Invited talk (online). Engineering Smart Nanomaterials for Energy and Environment Applications. National Conference on Modern Emerging Trends: Future of Chemical Sciences (MET-FCS-2021), Chandigarh University, Gharuan, Punjab. 23 April, 2021.

Subhabrata Maiti

— Subhabrata Maiti. Deconvoluting Transient Intermediates in a Fuel-Driven Transient Assembly. Systems Chemistry Virtual Symposium/ University of Strasbourg. 7-9 July, 2021.
— Subhabrata Maiti. Dynamic Modulation of Surface pH of a Catalytic Nanoparticle. 20th National Conference on Surfactants, Emulsions and Biocolloids NATCOSEB-XX. IIT Guwahati. 9 - 11 December 2021.
— Subhabrata Maiti. Spatiotemporal Regulation in (Bio)molecular Assembly. Origin of Life and Evolving Chemical Systems. NCBS, Bangalore, 18-19 February, 2022.
— Subhabrata Maiti. Spatiotemporal Regulation in (Bio)molecular Assembly and catalysis. IISER-INST Bilateral meeting. INST Mohali, 14-15 March, 2022.
— Ekta Shandilya. Synergistic interaction driven micropatterning of alkaline phosphatase and nanoparticle surface bound ATP. Origin of Life and Evolving Chemical Systems. NCBS, Bangalore, 18-19 February, 2022.

Sugumar Venkataramani

— Sugumar Venkataramani. Reactive intermediates and unstable compounds in chemistry. Rashtriya Avishkaar Abhiyaan - One Day Brain Storming Workshop (Online) February 18, 2022.
— Sugumar Venkataramani. Azoheteroarene Photoswitches: The Challenges, Structure-Property Relationships and Applications Prospects. 58th Annual Convention of Chemists (ACC), Indian Chemical Society (ICS) Organic & Bio-Chemistry Section, Jointly Organized by Dept. of Chemistry, IIT Kharagpur & Dept. of Chemical Sciences, IISER Kolkata. 22-24 December, 2020.

Ujjal K. Gautam

— Ujjal K. Gautam, Pandit Deendayal Energy University Gandhinagar, March 11, 2022.
— Ujjal K. Gautam, Physics and Chemistry of Advanced Materials (PCAM), October 24-27, 2021
— Ujjal K. Gautam, National Conference "Sustainability, Medicine and Clean Energy" March 1, 2022.
— Ujjal K. Gautam, INST-IISERM bilateral meeting, March 16, 2022
— Maqsuma Banoo, ACS Spring 2022

8.2.4. Conferences attended by the researchers

Angshuman Roy Choudhury and lab members

— Angshuman Roy Choudhury, In-situ crystallization and co-crystallization of small organic molecules: Techniques and Applications, 48th National Seminar on Crystallography, 25-28th November, 2021, IIT Roorkee.

Arijit K. De and lab members

— Arijit K. De. OSA Biophotonics Congress: Optics in the Life Sciences 2021, 14 April 2021.
— Anita Yadav, Yogita Silori, Shaina Dhamija, Samita Mishra, Garima Bhutani, Sumit Yadav, Sakshi Chawla, Subho Mitra. International conference on Time Resolved Vibrational Spectroscopy (TRVS 2021) (Virtual event), June 13-18, 2021.
— Arijit K. De, Shaina Dhamija. International Conference on Photochemistry 2021 (ICP) (Webinar), Geneva Switzerland: 21 July, 2021.
— Arijit K. De. School of Physics (SPS) (Webinar), JNU, New Delhi, India. 28 July, 2021.
— Sumit Yadav. OSA Nonlinear Optics Topical Meeting 2021 (Webinar). 11 August, 2021.

— Arijit K. De, Anita Yadav, Garima Bhutani, Samita Mishra, Sakshi Chawla, Subho Mitra, Amit. Physical Chemistry Physical Biology (PCPB) 2021 (Virtual conference), September 24-28, 2021.
— Arijit Kumar De. Spectroscopy and Dynamics of Molecules and Clusters 2021 (SDMC) (Webinar), India. 09 October, 2021.
— Shaina Dhamija, Frontiers in Optics + Laser Science (FiO + LS) virtual web conference. November 1-4, 2021.
— Arijit K. De. Saturday seminar series. Light as a Reagent and Product. India. 06 November, 2021.
— Arijit K. De, Shaina Dhamija, Samita Mishra, Garima Bhutani, Sumit Yadav, Sakshi Chawla, Amit. 7th Theme Meeting on Ultrafast Sciences-2021 (UFS-2021) Virtual conference, November 12-14, 2021.
— Shaina Dhamija. Light-matter Interactions from scratch: Theory and Experiments at the Border with Biology, Trieste (Italy). 23rd November 2021.
— Garima Bhutani. ACS Spring 2022: Bonding through Chemistry, San Diego, USA. 24 March, 2022.
— Garima Bhutani. 44th Indian Biophysical Society Meeting (IBS-2022), ACTREC, Tata Memorial Centre, Navi Mumbai, India. March 30-31 and April 1, 2022.

Jino George

— Akhila Kadyan. ACS-CRSI Joint Poster Session hosted by SciMeetings: 27th CRSI National Symposium in Chemistry organized by IISER Kolkata, September 26-30th 2021.
— Jyoti Lather. Oral presentation, Controlling Chemical Reactions by Cooperative Vibrational Strong Coupling, APC 2021, 11th Asian Photochemistry Conference Korea, ONLINE, November 1-4th 2021.
— Pooja Bhatt. Oral presentation, Enhanced Charge Transport in 2D materials through Light-matter Strong Coupling, APC 2021, 11th Asian Photochemistry Conference Korea, ONLINE, November 1-4th 2021.
— Akhila Kadyan. Poster presentation, Boosting Self-interactions of Molecular Vibrations under Ultra-strong Coupling Condition, APC 2021, 11th Asian Photochemistry Conference Korea, ONLINE, November 1-4th 2021.
— Jaibir Singh. Poster presentation, Chem Sci 2021, Leaders in the Field Symposium, JNCASR Bangalore, December 12-13th 2021.

R. Vijaya Anand

— R Vijaya Anand. Attended the 27th CRSI-NSC Symposium conducted by IISER Kolkata during September 26-29, 2021.
— R Vijaya Anand. Attended the 28th CRSI-NSC meeting organized at IIT Guwahati during March 25-27, 2022.

S. Arulananda Babu

— Dalal, A. Pd(II)-catalyzed C-H arylation and alkylation of pyrene core. Synthesis of C1,C2- and C1,C10-disubstituted pyrene motifs (Poster presentation). National Organic Symposium Trust (NOST) conference held at The Leela Palace, Chennai. November 25-28, 2021.
— Tomar, R.; Bhattacharya, D.; Babu, S. A.* Assembling of 4-aryl-2-piperidone, 4-arylpiperidine scaffolds and antituberculosis molecule via Pd(II)-catalyzed sp3 β-C-H activation/arylation. National Virtual NITT Organic Chemistry Conference (NITTOCC-2021), Chemistry Department, National Institute of Technology Tiruchirappalli (NITT). 16th to 18th December 2021.
— Babu, S. A. Pd-catalyzed Diastereoselective C-H activation of inactive prochiral C(sp3)-H bonds of aliphatic compounds. National Organic Symposium Trust (NOST) conference held at The Leela Palace, Chennai. November 25-28, 2021.

S. K. Pal and lab members

— Vidhika Punjani- Chiral Bent Shaped Liquid Crystals for Stabilization of Wide Range of Blue Liquid-Crystalline Phase and Multi-Stimuli Responsive Properties, International Conference on Complex Fluids and Soft Matter, IIT Gandhinagar and The Indian Society of Rheology, Complex Fluids 2021., December 13-15, 2021

— Vidhika Punjani- Multi-Stimuli Responsive Chiral Bent Shaped Liquid Crystals Exhibiting Wide Range of Blue Liquid-Crystalline Phase, Recent Perspectives on Liquid Crystalline Materials: Chemistry, Physics and Biological Applications (RPLCM-2021), October 4-5, 2021.
— Varsha Jain- Design, Synthesis and Characterization of Achiral Unsymmetrical Four-ring based Hockey-stick Shaped Liquid Crystals: Structure-Property relationship, International Webinar on Recent Perspectives On Liquid Crystalline Materials: Chemistry, Physics And Biological Applications (RPLCM) 2021 Silchar,, October 4-5, 2021
— Varsha Jain- Design, Synthesis and Characterization of Achiral Unsymmetrical Four-ring based Hockey-stick Shaped Liquid Crystals: Structure-Property relationship, International Conference on Recent Trends in Chemical Sciences Organic & Bio-Chemistry (RTCS-OBC) 2021., December 22-24, 2021.
— Varsha Jain- Design, Synthesis and Characterization of Achiral Unsymmetrical Four-ring based Hockey-stick Shaped Liquid Crystals: Structure-Property relationship,28th National Conference on Liquid Crystals (NCLC) held at Assam University, Silchar from, December 21-23, 2021.
— Varsha Jain- Hydrogen bond assisted anchoring transitions in nematic liquid crystals at the aqueous interface, International Conference on Complex Fluids and Soft Matter, IIT Gandhinagar and The Indian Society of Rheology, Complex Fluids 2021. (Compflu 2021), December 13-15, 2021.
— Manisha Devi- Label-Free Detection of Ochratoxin A Using Aptamer as recognition Probe at Liquid Crystal-Aqueous Interfaces, International Symposium on Recent Advances in Self assembled materials and Supramolecular Chemistry (issamsupra 2022), March 19, 2022.
— Ipsita Pani- Differentiating Conformationally Distinct Alzheimer's Aβ Oligomers Using Liquid Crystals at Aqueous Interfaces, International Webinar on Recent Perspectives on Liquid Crystalline Materials: Chemistry, Physics, and Biological Applications (RPLCM 2021), October 4-5, 2021.
— Ipsita Pani- Probing Nanoscale Lipid-Protein Interactions at the Interface of Liquid Crystal Droplets, ChemSci2021: Leaders in The Field Symposium organized by Royal Society of Chemistry in association with JNCASR, Dec 11-13, 2021,
— INST-IISERM Bilateral Meeting 2022, March 14-15, 2022,
— International Symposium on Recent Advances in Self assembled materials and Supramolecular Chemistry, March 19, 2022.
— Supreet Kaur- Observation of “de Vries-like” properties in bent-core molecules”, International Conference on Emerging Trends in Science and Technology (ICETST 2022) organized by Punjab Engineering College (Deemed to be University), Chandigarh, June 10-11, 2022.
— Supreet Kaur- Observation of “de Vries-like” properties in bent-core molecules”, INST-IISERM bilateral meeting organized by INST Mohali, March 14-15, 2022,
— Supreet Kaur- Observation of Ferroelectric-like Switching in a Four-Ring Unsymmetrical Bent-Core Nematic Material, 28th National Conference on Liquid Crystals (NCLC-2021) organized by Assam University, Silchar, December 21-23, 2021.
— Supreet Kaur- Photo-Responsive Behavior and Molecular Self-Assembly of Azobenzene Based, Complex Fluids and Soft Matter 2021 (CompFlu 2021) organized by IIT Gandhinagar and The Indian Society of Rheology, December 13-15, 2021.
— Supreet Kaur- Bent-Shaped Liquid Crystals, Recent Perspectives on Liquid Crystalline Materials: Chemistry, Physics and Biological applications (RPLCM 2021) organized by Department of Chemistry, Assam University, Silchar, October 4-5, 2021.
— Shallu Dhingra- An Electron-Deficient Tris(triazole)-based Discotic Liquid Crystal that exhibit Fast Electron Transport, International Conference on Complex Fluids and Soft Matter, IIT Gandhinagar and The Indian Society of Rheology, Complex Fluids 2021. (Compflu 2021), December 13-15, 2021.
— Shallu Dhingra- An Electron-Deficient Tris(triazole)-based Discotic Liquid Crystal that exhibit Fast Electron Transport, 28th National Conference on liquid crystals (NCLC 2021), December 21-23, 2021.

— Shallu Dhingra- An Electron-Deficient Tris(triazole)-based Discotic Liquid Crystal that exhibit Fast Electron Transport, 48th German Liquid Crystal Conference 2022 (GLCC 2022), March 28-30, 2022
— Shallu Dhingra- An Electron-Deficient Tris(triazole)-based Discotic Liquid Crystal that exhibit Fast Electron Transport, International Webinar on Recent Perspectives on Liquid Crystalline Materials: Chemistry, Physics, and Biological Applications (RPLCM 2021), Oct 4-5, 2021.

S. S. V. Rama Sastry and lab members

— Name of the presenter: Prashant Kumar. Title of the talk: Palladium catalyzed [3+3] hetero-annulation of gem-diacetates. Name of the institute: JNOST conference organized by Central University Hyderabad. Date: 07-Jan-2022

Sabyasachi Rakshit

— Jagadish P Hazra (Final year PhD) and Sabyasachi Rakshit, Entire session, Annual Meeting of the Biophysical Society, USA, Feb 22-26, 2021
— GRC on single-molecule spectroscopy: got invitation to present our work, hwoever, the meeting is postponed for 2022.

Sanchita Sengupta

— Sanchita Sengupta- Multi-Stimuli Programmable FRET Light Harvesting Antenna Towards Ratiometric Temperature, pH and Multiple Metal Ion Sensing."Recent Advances in Self-assembled Materials and Supramolecular Chemistry" March 19, 2022, Guru Nanak Dev University, Amritsar.
— Poster presentation was given by PhD student Kavita Rani in the same conference.

Sanjay Singh

— Mamta Bhandari, Sandeep Rawat, Mandeep Kaur and Sanjay Singh. Hydrosilylation of carbonyls and imines catalysed by cationic boron and aluminium complexes. Main group molecules to materials – II. 13th-15th December 2021. (Poster presentation)
— Sandeep Rawat, Mamta Bhandari and Sanjay Singh. Aluminium cations as potential substituent for nobel metals catalysts. RSC-IISER TVM Desktop seminar. 9th-12th May 2022. (Poster presentation)
— Mandeep Kaur, Sandeep Rawat and Sanjay Singh. Magnesium-catalysed chemo-selective reduction of secondary amides and alkynes via hydroboration approach. RSC-IISER TVM Desktop seminar. 9th-12th May 2022. (Poster presentation)

Subhabrata Maiti

— Subhabrata Maiti. Deconvoluting Transient Intermediates in a Fuel-Driven Transient Assembly. Systems Chemistry Virtual Symposium/ University of Strasbourg. 7-9 July, 2021.
— Subhabrata Maiti. Dynamic Modulation of Surface pH of a Catalytic Nanoparticle. 20th National Conference on Surfactants, Emulsions and Biocolloids NATCOSEB-XX. IIT Guwahati. 9 - 11 December 2021.
— Subhabrata Maiti. Spatiotemporal Regulation in (Bio)molecular Assembly. Origin of Life and Evolving Chemical Systems. NCBS, Bangalore, 18-19 February, 2022.
— Subhabrata Maiti. Spatiotemporal Regulation in (Bio)molecular Assembly and catalysis. IISER-INST Bilateral meeting. INST Mohali, 14-15 March, 2022.
— Ekta Shandilya. Synergistic interaction driven micropatterning of alkaline phosphatase and nanoparticle surface bound ATP. Origin of Life and Evolving Chemical Systems. NCBS, Bangalore, 18-19 February, 2022.

Sugumar Venkataramani

— Sapna Singh. Shaping the Energy Future-Challenges and Opportunities (Webinar), CSIR-IIP, Dehradun. 27th August, 2021.
— Sapna Singh, Surbhi Grewal, Debapriya Gupta. Poster Presented in National Virtual NIIT organic Chemistry Conference-2021 (NITTOCC-2021), NIT Tiruchirappalli, 16th -18th December, 2021.
— Surbhi Grewal, Pravesh Kumar. IPR Awareness Programme (Webinar), Govt. of India, 2nd February, 2022.
— Sapna Singh. Poster Presented in INST-IISERM meet, INST Mohali, 14 th -15 th March, 2022.

— Surbhi Grewal, Debapriya Gupta, Ankit Kumar. Poster Presented in International Symposium on "Recent Advances in Self Assembled Material and Supramolecular Chemistry", GNDU, Amristar, 19th March, 2022.

Ujjal K. Gautam

— Komalpreet Kaur, SEFCO (Shaping the energy future: Challenges and opportunities) 2021
— Komalpreet Kaur, FIMTA (Frontiers in Materials for Technological Applications) 2021

8.3. Department of Earth and Environmental Sciences

8.3.1. Summary of the research work

Anoop Ambili

My research group focussed on understanding of the long-term history of eutrophication and their trends in aquatic systems in Indian Himalayas to provide an opportunity for developing relevant management strategies. We examined the natural versus anthropogenic impacts on Ahansar Lake using a multiproxy approach (total organic carbon (TOC), total nitrogen (TN), amino acid composition, δ15N, grain size and pollen data) on a 210Pb/137Cs dated sediment core spanning the last 200 years. The amino acid datasets clearly show that the organic matter in Ahansar sediment core is less degraded, and can be utilized to understand the paleoproductivity changes. Organic matter (OM) within this core is mostly derived from aquatic sources as deduced from C/N (6–11) and δ15N (0–3.2‰) values. The aquatic productivity gradually increases from 1880s, becoming accelerated after the 1930s, and peaked between 1970 and 2016 AD. This enhancement of primary productivity in the lake indicating the increased eutrophication through time due to anthropogenic activities in the recent decades. The results provide baseline information for policymakers and environmentalists to develop strategical framework for future environmental changes in an aquatic system subjected to anthropogenic stressors

Baerbel Sinha

Our research in 2020-2021 focus quantifying the sources of ozone precursors and aerosol sources over the North West Indo Gangetic plain using various source receptor modelling tools and in-situ observations. We characterized different low-cost particulate matter sensors and evaluated whether the same can be used to substitute research grade equipment. We also work towards improving VOC emission inventories over South Asia and quantify the impact of air pollution on crops and natural vegetation using in-situ measurements and stomatal flux-based approaches.

Chandrakanta Ojha

Our research involves developing cutting-edge algorithms and advanced software for multi-temporal interferometric processing of the Synthetic Aperture Radar (SAR) datasets from various space agencies' satellites to obtain regional to global scale millimetric (mm) level of observation for the ground surface movements caused by any natural and anthropogenic phenomena. We established a Satellite Remote Sensing Laboratory (SRSLab), a dedicated data center offering the tools and techniques for high-quality and efficient analysis to process multi-year global data sets at a fine spatial resolution to measure Earth's surface dynamics. We conduct interdisciplinary research covering a broad spectrum of satellite remote sensing technology, hydrological and geophysical processes involving land subsidence, groundwater monitoring, flood mapping, infrastructure monitoring, etc.

Raju Attada

During last one year, we have investigated the aerosol and climate interactions at spatio-temporal scales. The first project is investigated the extreme dust storm over the northwest Indo-Gangetic Plain (NW-IGP) using the WRF-Chem model and observations (Shukla et al., 2022a). In the second project, we attempted to understand the characteristic dissimilarities during high aerosol loading days between western and eastern Indo-Gangetic Plain (Shukla et al., 2022b). Finally, we looked into aerosol optical

depth trends and their influencing factors over Indo-Gangetic Plain. In addition, the increased thermal stress on societal populations due to the frequent occurrence of heat waves over northwest India is one of the serious concerns in the present scenario due to global warming, which adversely impacts human health, well-being, work capacity, agriculture, ecosystems, and the economy. Thermal stress has numerous detrimental impacts on human health, such as heat strokes, heat rashes, heat-syncope, dehydration, and urinogenital symptom.

Ms. Nischal Sharma- The first project, titled "Evaluating Winter Precipitation over the Western Himalayas in a High-Resolution Indian Regional Reanalysis using multi-source climate datasets," was submitted to the Journal of Applied Meteorology and Climatology (AMS Journal) in August 2021 and is currently under second revision (minor). The given study evaluates winter precipitation variability and associated high-resolution features over the western Himalayan region in the recently released high-resolution reanalysis framework IMDAA using multi-source climate datasets including gauge-based, satellite, and reanalysis products from the period 1979 to 2018. In continuation of the work mentioned above, the second project titled "Underlying Physical Mechanisms for Winter Extreme Precipitation Events over Western Himalayas" aims to understand the dynamics and conducive conditions developed during precipitation extremes over the western Himalayas. The manuscript for the given work is under preparation and will soon be communicated to the Journal of Geophysical Research: Atmospheres.

Mr. Rohtash- The project title as "Analysis of Himalayan Summer Monsoon Rainfall Characteristics Using Indian High-Resolution Regional Climate Data" aims to evaluate the India's first high resolution datasets (i.e., Indian Monsoon Data Assimilation and Analysis (IMDAA)) along with various in-situ, space-based and reanalysis to understand the characteristics of Indian summer monsoon over Himalayan region. The present project is under review in "International Journal of Climatology".

Sourabh Bhattacharya

Our research focused on identifying the supra-solidus factors responsible for forming tungsten deposits affiliated with granitic magmatism. We attempt to model the anatectic and fractional crystallization processes for the tungsteniferous Balda granite (near Sirohi, Rajasthan) through open-system phase equilibria calculations. We used an R-language script as a tool for forward-modeling through Perple_X Gibbs free energy minimization routines. As a starting protolith material for the S-type Balda granite, supracrustal rocks in proximities of the ore deposit were chosen. In conjunction with modeling, the amount of W in the evolving melt was estimated at different points on the P-T-X path. For this, we used - the relative proportions of minerals and melt volume (available through modeling), and experiment-based mineral-melt partitioning coefficients for W. The W budget of the evolving melt on the cooling path was evaluated following the Rayleigh fractionation model. This was the first study worldwide to fingerprint the supra-solidus factors (through open-system phase equilibria simulations) affecting the metal budget of the modelled anatectic melt of peraluminous (and S-type) affinity. The results of this study will be communicated for publication.

Sunil A. Patil

Our current research activities focus on (i) understanding extracellular electron transfer (EET)-based anaerobic metabolisms and microorganisms from the extreme saline-alkaline environment and (ii) developing integrated microbial electrochemical technologies for electricity-driven bioproduction of chemicals from industrial CO2 and wastewater management at the point sources. Last year, we characterized a novel EET-capable haloalkaliphilic bacterium named Geoalkalibacter halelectricus SAP-1 in detail through biochemical, microscopic, genomic, and electrochemical techniques. It can respire on sulfate and insoluble Mn4+ and Fe3+ minerals as terminal electron acceptors under anoxic conditions suggesting its role in cycling these elements in haloalkaline environments. SAP-1 possesses membrane redox components with high formal potentials, putatively involved in the direct mode of EET. These are distinct from the membrane components reported for any known EET-

capable microorganisms, including well-studied Geobacter and Shewanella spp. We are currently working on understanding the redox-active components of G. halelectricus besides EET-based metabolisms of haloalkaliphilic sulfide-oxidizing and nitrate-reducing microorganisms.
Our group continued working on optimizing reactor design for electricity-driven bioproduction of acetic acid from brewery CO2 and biogas via microbial electrosynthesis. We also demonstrated a two-stage bioprocess approach linking microbial electrosynthesis with yeast cultivation to produce multi-carbon high-value products such as terpenes and yeast biomass from CO2 and electricity. In addition, we optimized reactor components and operational parameters of the iHYDROMET system (integrated hydroponics-microbial electrochemical technology) for domestic wastewater management. It is a low-cost technology for wastewater management in households. We have now undertaken work on its long-term performance assessment at the field sites and understanding microbial groups involved in removing various wastewater constituents.

Vinayak Sinha
Our current research is focused on improving fundamental process based understanding of reactive gaseous emissions-atmospheric chemistry-air quality and climate and their bi-directional feedbacks over South Asia. The experimental studies are combined with relevant modeling tools (chemical box models and chemical transport models) to accurately assess air pollution and climate change effects on atmospheric chemistry for proposing mitigation strategies and policies.
In the past one year our group has worked to develop and compile India's first speciated volatile organic compounds and air pollutant emissions over India using measured emission factors for the transport sector and from paddy stubble burning over north-west India. These have helped the missing reactive emissions from these important air pollution sources which will now enable more accurate air quality forecasting as air quality models use these emission inventories as a basic input. A key highlight study was one where we quantified the impacts of various fuel and fleet replacement strategies including increase in E-vehicles over India to bring down the air pollution from traffic by/in 2030, a source which is one of the major contributors to air pollution in our megacities. All these emission inventories have been made publicly accessible for download further community outreach and some have been covered by public outreach magazines like Down to Earth.

Yunus Ali Pulpadan
During this period, our research mainly focused one two diverse themes:

(i) Analysing the imminent threat of rock-ice avalanches in High Mountain Asia; In this work we investigated the causes of the Chamoli rock-ice avalanche of 2021 and build a deeper understanding on the implications of climate change on rock ice-avalanches in the foothills of HMA. We also mapped potential site of interest for future hazards in this region by analysing multi-temporal satellite images. We could able to establish the relation of global warming-induced glacier retreat and thermomechanical effects in enhancing the weakening of fractured rock masses in tectonically active mountain belts.

(ii) Decadal changes in suspended sediment concentration in major river mouths of Asia: Due to the lack of field observations and incompatibility of regional model in monitoring global sediment concentration, we employed multiple models and investigated to understand that at what extent changes in the hydrological regime and anthropogenic changes have impacted long-term trends in suspended sediment flux in coastal waters of Indian and Pacific Ocean. We identified spatially distinct trends, with SSC decreasing at the mouths of the Yellow, Pearl, and Indus rivers, and increasing trends at the mouths of the Narmada and Ganges-Brahmaputra rivers in the last twenty years; and concluded that anthropogenic activities threaten the marine ecosystem more than climate forcing on Asian coasts.

.

8.3.2. Visits of the faculty members

Raju Attada

— Indian Institute of Technology (IIT), Delhi-Dates: March 14-16, 2022

Vinayak Sinha

— Indian Meteorological Department, New Delhi in March 2022

8.3.3. Talks delivered

Baerbel Sinha

— Baerbel Sinha gave an invited talk on "The impacts of climate change and air pollution on arable agriculture", on 15th of June during the session on Air pollution and Sustainable and Resilient Food production at the Sustainability Research & Innovation Congress 2021 June 12-15, 2021, conducted Online and onsite in Brisbane, Australia

— Baerbel Sinha gave an invited talk on "Effects of ozone on agriculture in India", on 6th of July during the Side Event on "Risk to agriculture from air pollution" during the United Nations Food Systems Summit Science Day's 7-8th July 2021.

— Baerbel Sinha gave a talk on an Indian perspective on climate change and climate change mitigation during the Short-Term Course on Climate Change being organized by the UGC-HRDC-Pondicherry University from August 27, 2021, to September 2, 2021.

— Pooja Chaudhary (PhD scholar) gave a talk on "Underreporting and Open Burning – The Two Largest Challenges for Sustainable Waste Management in India" in the IGAC 2021 Virtual Conference from 12th to 17th September 2021.

— Savita Datta (PhD scholar) gave a talk on "A new air quality index to measure the impact of urban trees on air quality, human health and secondary pollutant formation", in the IGAC 2021 Virtual Conference from 12th to 17th September 2021.

— Baerbel Sinha participated in a panel discussion on "Opportunities and challenges related to research on COVID-19 and Air Pollution" in the "Workshop on Air Pollution and Health Effects Research in India" held on virtual mode from 21st to 23rd October,2021, organized by CAPHER India and IIT Delhi.

— Baerbel Sinha gave an invited talk on "Paddy burning in Punjab facts and challenges", on 3rd of December during the International Workshop on "International Workshop on Fires in South Asia: Current Status and Future Challenges in Monitoring, Modelling, Predictions and Mitigation" organized by IITM Pune and supported by WMO-GAW, IGAC-Mango and Map-AQ, 3-4th December 2021.

— Pooja Chaudhary (PhD scholar) gave a talk on "Underreporting and Open Burning – The Two Largest Challenges for Sustainable Waste Management in India" at the AGU Fall meeting 13th to 17th December in New Orleans.

— Savita Datta (PhD scholar) gave a talk on "A new index to assess the air quality impact of urban tree plantation", in the IGAC 2021 Virtual Conference from 12th to 17th September 2021.

Chandrakanta Ojha

— Chandrakanta Ojha, SBAS-based Multi-temporal InSAR processing, Geographic Information (GIS) Cell, Motilal Nehru National Institute of Technology (MNNIT) Allahabad, March 30, 2022

— Chandrakanta Ojha, Advancement of InSAR technique for Earth's surface deformation monitoring, Ramrao Adik Institute of Technology (RAIT), D.Y. Patil University, Navi Mumbai, Maharashtra, December 10, 2021

— Chandrakanta Ojha, Scope and career aspects in the field of Satellite Remote Sensing, IEEE-GRSS Bombay Chapter in collaboration with Kolkata Chapter, December 4, 2021

— Chandrakanta Ojha, Radar Remote Sensing technique for Earth's surface deformation monitoring, Centurion University of Technology and Management (CUTM), Odisha, June 11, 2021

— Chandrakanta Ojha, Analyzing groundwater dynamics using Satellite Remote Sensing: a case study of Central Valley of California, National Center for Geodesy (NCG), IIT Kanpur, May 14, 2021

Raju Attada

— Nischal Sharma: Investigating Winter Extreme Precipitation Events and associated Dynamics over North India, International Symposium on Tropical Meteorology (INTROMET-2021), 25-11-2021

Sunil A. Patil and lab members

— Sunil A. Patil, "Electricity-driven bioproduction from CO2 using microorganisms: current status, challenges and future perspectives" at ATAL-FDP on 'Carbon Capture Utilization and Storage: Opportunities and Challenges" organized by Government Engineering College Kozhikode, Kerala, Dec 13-17, 2021.

— Sunil A. Patil, "Wastewater management technologies based on the innovative integration of biological and bioelectrochemical processes" at the International Conference on Advances in Sustainable Research for Energy and Environmental Management (ASREEM-2021) organized by Chemical Engineering Department, SVNIT, Surat, Gujarat, Aug 6-8, 2021.

— Sunil A. Patil, "Electromicrobiology of the extreme environments" at the 5th Asia-Pacific International Society of Microbial Electrochemistry and Technology (ISMET) conference, held at the Harbin Institute of Technology, Harbin, China, Jul 16-18, 2021.

— Srishti Chaudhary, Ramandeep Singh, Sukrampal Yadav, and Sunil A. Patil, "Haloalkaliphilic nitrate-reducing electroactive microbial biofilm enriched from the Lonar Lake sediments" at the 5th European Meeting of the International Society for Microbial Electrochemistry and Technology (2021 EU-ISMET) organized at Universitat de Girona, Girona, Spain, Sept 13-15, 2021.

— Moumita Roy and Sunil A Patil, "Biogas upgradation through CO2 conversion into acetic acid via microbial electrosynthesis." at the International Conference on 5th European Meeting of the International Society for Microbial Electrochemistry and Technology (EU-ISMET-2021) organized at Universitat de Girona, Girona, Spain, Sept 13-15, 2021.

— Ravi K. Yadav, Siddhant Sahoo, Asheesh K. Yadav and Sunil A. Patil, "Assessment of Epipremnum aureum aka Golden pothos as a plant candidate for ecologically engineered systems for wastewaters management" at the International Conference on Advances in Sustainable Research for Energy and Environmental Management (ASREEM-2021) organized by Chemical Engineering Department, SVNIT, Surat, Gujarat, Aug 6-8, 2021.

— Moumita Roy and Sunil A Patil, "Enrichment of methane content in biogas through CO2 conversion into acetic acid in bioelectrochemical systems" at the International Conference on Advances in Sustainable Research for Energy and Environmental Management (ASREEM-2021) organized by Chemical Engineering Department, SVNIT, Surat, Gujarat, Aug 6-8, 2021.

— Moumita Roy, Ravineet Yadav, P. Chiranjeevi and Sunil A, Patil, "Production of multicarbon chemicals from unpurified industrial CO2 via microbial electrosynthesis" at the 5th Asia-Pacific International Society of Microbial Electrochemistry and Technology (ISMET) conference, held at the Harbin Institute of Technology, Harbin, China, Jul 16-18, 2021.

— Sukrampal Yadav, Ramandeep Singh, Srishti, Shiva S. Sundharam, Srinivasan Krishnamurthi and Sunil A. Patil, "Novel Geoalkalibacter spp. possessing electroactivity from a haloalkaline environment" at the 5th Asia-Pacific International Society of Microbial Electrochemistry and Technology (ISMET) conference, held at the Harbin Institute of Technology, Harbin, China, Jul 16-18, 2021.

Vinayak Sinha

— Vinayak Sinha. Invited Colloquium Talk delivered online at ARIES Nainital on Atmospheric Chemistry Research on "Selected research highlights from the IISER Mohali Central Atmospheric Chemistry Facility" on 26 Oct, 2021.

— Vinayak Sinha. Invited lecture on Atmospheric Chemistry at UGC-HRDC, Pondicherry University's Online short-term course (STC) on Climate Change for University and College teachers on 28.08.2021.
— Vinayak Sinha. Invited Public Lecture on Earth Day for school children across Punjab organized by Pushpa Gujral Science City, Punjab on April 22, 2021.

8.3.4. Conferences attended by the researchers

Baerbel Sinha

— Baerbel Sinha participated in the annual European Geophysical Union meeting from 19–30 April 2021, conducted in Online mode.
— Baerbel Sinha participated in the Sustainability Research & Innovation Congress 2021 June 12-15, 2021, conducted Online and onsite in Brisbane, Australia
— Baerbel Sinha participated in the United Nations Food Systems Summit Science Day's 7-8th July 2021 conducted Online mode.
— Baerbel Sinha chaired the TOAR session in the IGAC 2021 Virtual Conference from 12th to 17th September 2021.
— Savita Datta (PhD scholar) participated in the IGAC 2021 Virtual Conference from 12th to 17th September 2021.
— Baerbel Sinha participated in the Workshop on Air Pollution and Health Effects Research in India" held on virtual mode from 21st to 23rd October,2021, organized by CAPHER India and IIT Delhi.
— Baerbel Sinha participated in the "International Workshop on Fires in South Asia: Current Status and Future Challenges in Monitoring, Modelling, Predictions and Mitigation" organized by IITM Pune and supported by WMO-GAW, IGAC-Mango and Map-AQ, 3-4th December 2021.
— Baerbel Sinha International Workshop on "International Workshop on Fires in South Asia" 3-4th December 2021.
— Savita Datta (PhD scholar) attended the AGU Fall meeting 13th to 17th December in New Orleans.
— Pooja Chaudhary (PhD scholar) attended the AGU Fall meeting 13th to 17th December in New Orleans.

Chandrakanta Ojha

— C. Ojha, M. Shirzaei, & D. Argus, Monitoring Coastal Subsidence along the US Gulf Coast Using Satellite Remote Sensing, American Geophysical Union (AGU), New Orleans, LA (USA), 13-17 Dec. 2021
— S. Werth, M. Shirzaei, & C. Ojha, Predicting and Validating Precipitable Water Vapor from SAR Interferometric Analysis of Sentinel-1 Data over Kerala, India, American Geophysical Union (AGU), New Orleans, LA (USA), 13-17 Dec. 2021
— L.Ohenhen, M. Shirzaei, & C. Ojha, Measurements of Vertical Land Motion and underlying mechanisms along the US East Coast, American Geophysical Union (AGU), New Orleans, LA (USA), 13-17 Dec. 2021
— S.F. Sherpa, M. Shirzaei, & C. Ojha, Sea-Level Rise, and Flooding Hazard Assessment in the Chesapeake Bay of the United States: Analysis of Subsidence and Sea-Level Rise Scenarios, American Geophysical Union (AGU), New Orleans, LA (USA), 13-17 Dec. 2021
— S. Tung, M. Shirzaei, C. Ojha, A. Pepe, & Z. Liu, Structural Controls Over the 2019 Ridgecrest Earthquake Sequence Investigated by High-Fidelity Elastic Models of 3D Velocity Structures, Southern California Earthquake Center (SCEC) Annual Meeting, 16 August 2021, SCEC Contribution 11599
— S. Werth, C. Ojha, M. Shirzaei, S.F. Sherpa, InSAR Based Water Vapor Mapping During Monsoon Related Flood Events, Asia Oceania Geoscience Society (AOGS), 01-06 August 2021 (Invited talk)

— D.S. Vaka, Y.S. Rao, C. Ojha, V. Kumar, Mapping Land Subsidence in Mumbai by Sentinel-1 InSAR time-series, Fringe 2021, 31 May - 04 June 2021

Raju Attada

— Krishna Kumar Shukla: Investigation of AOD trends and its influencing factors over IGP : International Symposium on Tropical Meteorology (INTROMET-2021), November 23-26th , 2021

— Nischal Sharma: Investigating Winter Extreme Precipitation Events and associated Dynamics over North India: International Symposium on Tropical Meteorology (INTROMET) “Changing Climate: Consequences and Challenges": 23-26th November, 2021

— Rohtash: Synoptic Features Responsible for Leh Flash Flood in High-Resolution IMDAA Reanalysis Data. International Symposium on Tropical Meteorology (INTROMET-2021), November 23-26th, 2021

— Nischal Sharma: Investigating the Sensitivity of North Indian Winter Precipitation to different Cumulus Parameterization Schemes using a High Resolution WRF Model, American Geophysical Union (AGU) Fall Meeting 2021 ,14-17th December, 2021

Sunil A. Patil

— Sunil A. Patil, International Conference on Advances in Sustainable Research for Energy and Environmental Management (ASREEM-2021) organized by Chemical Engineering Department, SVNIT, Surat, Gujarat, August 6-8, 2021.

— Sunil A. Patil, “Electromicrobiology of the extreme environments” at the 5th Asia-Pacific International Society of Microbial Electrochemistry and Technology (ISMET) conference, held at the Harbin Institute of Technology, Harbin, China, July 16-18, 2021.

— Sunil A. Patil, 5th European Meeting of the International Society for Microbial Electrochemistry and Technology (2021 EU-ISMET) organized at Universitat de Girona, Girona, Spain, September 13-15, 2021.

— Srishti Chaudhary, 5th European Meeting of the International Society for Microbial Electrochemistry and Technology (2021 EU-ISMET) organized at Universitat de Girona, Girona, Spain, September 13-15, 2021.

— Moumita Roy, " 5th European Meeting of the International Society for Microbial Electrochemistry and Technology (EU-ISMET-2021) organized at Universitat de Girona, Girona, Spain, September 13-15, 2021.

— Ravi K. Yadav, International Conference on Advances in Sustainable Research for Energy and Environmental Management (ASREEM-2021) organized by Chemical Engineering Department, SVNIT, Surat, Gujarat, August 6-8, 2021.

— Moumita Roy, International Conference on Advances in Sustainable Research for Energy and Environmental Management (ASREEM-2021) organized by Chemical Engineering Department, SVNIT, Surat, Gujarat, August 6-8, 2021.

— Moumita Roy, 5th Asia-Pacific International Society of Microbial Electrochemistry and Technology (ISMET) conference, held at the Harbin Institute of Technology, Harbin, China, July 16-18, 2021.

— Sukrampal Yadav, 5th Asia-Pacific International Society of Microbial Electrochemistry and Technology (ISMET) conference, held at the Harbin Institute of Technology, Harbin, China, July 16-18, 2021.

Vinayak Sinha

— Ashish K Sharma, Gridded 1 km × 1 km emission inventory for paddy stubble burning emissions over north-west India constrained by measured emission factors of 77 VOCs and district-wise crop yield data, International Global Atmospheric Chemistry (IGAC), Manchester, UK. 12-17 September, 2021.

— Haseeb Hakkim, RTEII: A new high-resolution (0.1° × 0.1°) road transport emission inventory over India of 74 VOCs, CO, NOx, NH3, SO2, CH4, CO2 , PM2.5 constrained by measured emission factors and regional vehicular activity data, International Global Atmospheric Chemistry (IGAC), Manchester, UK. 12-17 September, 2021.

8.4. Department of Humanities and Social Sciences

8.4.1. Summary of the research work

Adrene Freeda Dcruz

I completed writing a full length article and I will be sending it out for publication soon. The title of the article is "Performative Science: Carl Djerassi and Roald Hoffmann's Oxygen and Shelagh Stephenson's An Experiment with an Air Pump"

An article titled Silence and Sound in Fritz Lang's M and Chaplin's City Lights will be completed soon and will be sent for publication.

Vaibhav Pathak (PhD Student) and I co-authored a paper titled Chemistry in Theatre – Carl Djerassi's Swansong. We had worked on this paper and had submitted for possible publication to Current Science. We are yet to hear back from the journal.

On behalf of the Department of Humanities and Social Sciences (HSS), I invited Dr. Manali Karmakar (Vellore Institute of Technology, Chennai) for a webinar on 21 February 2022. The title of the talk was "What does it mean to be human? Biocapitalism and Disposable Lives in Fictional Narratives."

I have been working on Emily Dickinson, an American poet. I intend to open up this research area to the students by floating a course on this author.

Anu Sabhlok

Anu Sabhlok carried out research on urban transformations in Abohar with a view to poposing design interventions for a sustainable and inclusive urban future for the small border town in Punjab. In collaboration with Jitesh Malik from Studio Aureole, she mentored a team of 6 urban fellows, 1 IISER post doc and 1 BS-MS thesis student to document urban histories, map urban transformations while emphasizing the fluidity and unevenness of urban processes. The team collectively produced documentation and proposed urban interventions that are currently being built in Abohar. For more on this project see https://sheharstudio.wordpress.com/

The project integrated research, practice and pedagogy

Debdulal Saha

I have been working on the issues related to labour markets and urban informality. I have prepared the following two policy papers.

1. Legislating Street Vending in India: Issues and Challenges (15 June 2021). Submitted to Self-Employed Women's Association (SEWA), Ahmedabad for the national study on "Future of Work for the Informal Workers".
2. COVID-19 and its Impact on Tea Plantation Workers in India (8 July 2021). Submitted to International Labour Organization (ILO), Geneva.

Parth R. Chauhan and group

Explorations and data collections for PhD fieldwork by Rajesh Poojari at various rock art sites in Sehore and Hoshangabad district, MP, March & April 2021: This visit aimed to collect the data in a continuum, which was done in March 2020 from sites Digambar, Hoda, Chandla Kalan, Khidiya Kurmi and Mandikhoh before the Covid pandemic. Different soil, stone and plant samples for scientific and experimental studies were collected to comprehend its elemental characteristics and applications. Geological fieldwork was also carried out in Damoh region of Madhya Pradesh by Yezad Pardiwalla to understand the paleoanthropological record and vertebrate paleontological fieldwork was carried out in the Siwalik region of Punjab by Anubhav Preet Kaur including collection of fossil specimens. All PhD students including Akash Srinivas, Jayashree Mazumder, Shashi Mehra, Vivek Singh and Nupur Tiwari continued with labwork on their respective archaeological specimens,

fossil collections, processing scientific data collected from the field, and/or completing/preparing their thesis chapters for submission. In addition to assisting/guiding the PhD students with their respective work, P.R. Chauhan also guided a BS-MS student (Martina Narzary) with her 5th year project thesis on the analysis of stone tools from Mahadeo Piparia (M.P.). Bahadur Singh (Postdoctoral researcher) continued working on the compilation and synthesis of global fossil human footprint data in relation to his research project.

Ritajyoti Bandyopadhyay

I have finished my first monograph during this time—the research for this book covered the last ten years. The book came out from Cambridge, Cambridge University Press in June 2022: https://www.cambridge.org/core/books/streets-in-motion/2D42F4BF0D2086A1DBB254A5120ACB42

I have also co-edited a book on the current pandemic and its impacts on the migrant workers. The book was published by Routledge: https://www.routledge.com/Indias-Migrant-Workers-and-the-Pandemic/Bandyopadhyay-Banerjee-Samaddar/p/book/9781032158921

V. Rajesh

I have been investigating the history of progressive literary movement and the intellectual history of the Left in Tamil Nadu. An essay titled 'The Making of Classical Tamil Literature: Multiple Sources in its Construction' was published in an edited volume recently where I revisited my book Manuscripts, Memory and History: Classical Tamil Literature in Colonial India (2014) in the light of recent developments in historiography. In this essay, I presented a critical review of various historiographical perspectives on the reproduction of Tamil classics and situated the recent emerging trends following the 'manuscript turn' in literary historical studies in the light of my own intervention in the historiographical debate. I also submitted an essay 'Progressivism in Tamil Literature' for review for an edited book proposal to be published by Routledge on modernity and Indian literatures.

8.4.2. Visits of the faculty members

V. Rajesh

— Visited The School of Social Sciences, Punjabi University, Patiala, 28/7/2021
— Visited The School of Social Sciences, Punjabi University, Patiala, 3/9/2021
— Visited The School of Social Sciences, Punjabi University, Patiala, 8/9/2021

8.4.3. Talks delivered

Adrene Freeda Dcruz

— Adrene Freeda Dcruz . Charlie Chaplin's Tramp: A Journey from Silent to Sound 11th episode of the IISER Mohali Public Engagement Series, 30th October 2021

Anu Sabhlok

— Anu Sabhlok gave a plenary talk at the 42nd IIG Annual Meet and International E-Conference on "Geography for People, Planet, Prosperity and Peace" jointly organised by the Department of Geography, Savitribai Phule Pune University (SPPU), Pune and Institute of Indian Geographers (IIG) from 4th to 6th October, 2021.
— Anu Sabhlok delivered a plenary talk at the two-Day National Conclave-cum-Seminar on November 25-26, 2021, titled "Shifting Trajectories of Research in Cultural Studies" hosted by Punjab University Department of English and Cultural Studies.
— Anu Sabhlok gave an invited lecture at Avani Institute of Design, Kozhikode, Kerala, as part of Avani Lecture and Workshop Series - Building Voices Building Alliances in March 2022
— Talks delivered by my PhD students/post doc:

— Kanchan Gandhi delivered an invited lecture titled "The State of the Peri-Urban" at Center for Habitat, Urban and Regional Studies (CHURS), Impact and Policy Research Institute (IMPRI), New Delhi on November 16, 2021
— Kushwaha, M.. Gender, Caste and Occupational in the City of Lucknow, India at 34 th International Geographical Congress (Virtual) on Geography: Bridging the Continents, Istanbul, Turkey (16 th to 20 th August, 2021).

Debdulal Saha

— Debdulal Saha. Labour Market Reforms in India since 1991. Seminar on 'Indian Economy: Post Reforms Structural Transformation'. UGC Human Resource Development Center, University of Mumbai. 17 November 2021.
— Debdulal Saha. Labour and Social Security Issues in North East India. Seminar on 'Mapping Labour and Employment Issues in North East India'. Centre for North East India, V. V. Giri National Labour Institute, Noida. March 30, 2022.
— Debdulal Saha. COVID-19 and Indian Economy: The Labour Market Responses. 8th Faculty Induction Programme (FIP-08). UGC Human Resource Development Center. University of North Bengal. 23 February 2022.
— Debdulal Saha. Development Trajectory in Northeast India: Understanding from the Perspectives of SDGs. Seminar on 'Society, Culture and Development in North-Eastern States of India'. UGC Human Resource Development Center, University of North Bengal. 05 March 2022.

Parth R. Chauhan and group members

— P.R. Chauhan and P. Sukumaran. Prehistoric landscapes, humans and ostriches: exploring geoarchaeological issues in the Tapi Basin. 8th Annual workshop on explorations on Maharashtra (EiM8). Online. Centre of Archaeology, Centre for Extra Mural Studies. University of Mumbai. August, 8, 2021.
— P.R. Chauhan. Paleoanthropology of the Siwalik Hills. Seminar Series on Siwalik Geology (US-Pakistan hosted, (online). May 19, 2021.
— P.R. Chauhan. Scientific approaches to understanding the past. International Centre for Theoretical Sciences, TIFR, Bangalore (online). April 25, 2021.
— P.R. Chauhan. Weaponry from the Stone Age. Sophia College, Mumbai (online). April 10, 2021.

V. Rajesh and group members

— V. Rajesh, From Literature as a Source of History to Literary Historical Process: Historiographical Trends in the Study of Classical Tamil Literature, Refresher Course in History, Human Resource Development Centre, Madurai Kamaraj University, 10/11/2021.
— V. Rajesh, Eighteenth Century in Indian History, Refresher Course in Social Sciences, UGC-Human Resource Development Centre, Punjabi University, Patiala, 2/2/2022.
— V. Rajesh, Classical Tamil Literature in Modern India: Contending Interpretations and Historiographical Possibilities, Refresher Course on Locating the Contours of Indian Modernities: Challenges and Possibilities, Human Resource Development Centre, Panjab University, Chandigarh, 14/3/2022.

8.4.4. Conferences attended by the researchers

Debdulal Saha

— Debdulal Saha. Democratic Participation in Negotiating Urban Public Space in India: Coexistence of Collectivism and Individualism among Street Vendors. International conference on 'Smart Regions – Opportunities for Sustainable Development in the Digital Era' organised by the 13th World Congress of Regional Science Association International (RSAI). 25-28 May 2021.

Parth R. Chauhan and group members

— Rajesh Poojari (PhD student): "Conservation-Restoration of Stone Sculptures and Objects: Himalayan Society for Heritage and Art Conservation (HIMSHACO), under the Tata Trusts Art Conservation Initiative. Scientific practical Training Course in the "Conservation-Restoration of Stone Sculptures and Objects" organised and hosted by Himalayan Society for Heritage and Art Conservation (HIMSHACO), under the Tata Trusts Art Conservation Initiative at Ranibagh, Nainital district, Uttarakhand from 4th October to 31st December 2021.

— Rajesh Poojari (PhD student):
— The Italian Art History lecture series Chhatrapati Shivaji Maharaj Vastu Sangrahalaya (CSMVS Museum) in collaboration with Italian Cultural Centre, Mumbai on Zoom platform online (6 lectures) from April 2021 to July 2021:
— CoSTAR Public Talk: ARCHES Getty Conservation Institute on Zoom platform online on 12th May 2021.
— Talk on 'Career in Art Conservation' session organised by MoCA, Goa and GHAG on Zoom platform online on 29th May 2021.
— Successfully completed e-Training "Refresher Training on Concepts of Quaternary Mapping" conducted by RTD, CR, GSITI, Nagpur from 31st May to 04th June 2021.
— Student colloquium conducted by Association of Quaternary Researchers (AOQR) on 2nd & 3rd July 2021.
— Talk on "Rang Rasayan: Colours in Manuscripts and Miniatures of the Indian Subcontinent" conducted by CSMVS Museum Art Conservation Centre, Mumbai on 7th July 2021.
— Talk on 'Museum of India: Challenges and Solutions - The Allahabad Museum as a Model Research and Education Museum' organised by INTACH Conservation Institutes (ICI) on 17th July 2021.
— Talk on Museums of India: Challenges and Solutions- 'The City Palace Museum, Udaipur: Activities and Community Engagement' organised by INTACH Conservation Institutes (ICI) on 31st July 2021.

V. Rajesh and group members

— V. Rajesh, The Life and Times of a Dalit Writer in Communist Movement in Tamil Nadu, The Quest for Emancipation: Intellectual Traditions Among the Dalits and Tribes in India, ICSSR Sponsored National Seminar, Tetsto College, Dimapur, 10th-11th February, 2022.
— Amitoj Kaur, Historiography of Punjabi Translation, Punjabi University, Patiala, Guru Kashi Campus, March 31, 2022.
— Ansad C, Making of Hindu Fishermen: An Ethno-Historical Study of 'RSS' in the Coastal Regions of Kerala, 10th Singapore-International Conference on Social Science & Humanities (ICSSH), Singapore, 23-24 March 2022.
— Swapnil Chaudhary, Caste and Sexuality in Nagar-Shobha, Asiatic Society for Social Science Research, 8-9 January 2022.
— Swapnil Chaudhary, Atheism in Uttar Pradesh: Ideology of Arjak Sangh, Young Scholars Conference, Society for Social and Economic Research, 15-16 January 2022.
— Nilkantha Pal, Rabindranath Tagore and the Politics of Aesthetic Engagement, Tagore Program on Literature, Culture, and Philosophy, University of California, Berkeley, 7 February 2022.

8.5. Department of Mathematical Sciences

8.5.1. Summary of the research work

Abhik Ganguli

(i) Jointly with Shalini Bhattacharya, we determined when p is unramified in F, the mod p Galois representation at inertia over a place dividing p and the possible modular local Serre weights, where the representation comes from certain mod p Hilbert eigenforms of small slope depending on f (the residue field degree), and with weights satisfying certain conditions. (Preprint: Shalini Bhattacharya and Abhik Ganguli, "Weights for mod p quaternionic forms in the unramified case.")

(ii) Jointly with Mr. Suneel Kumar, we are further investigating the problem of local constancy of mod p reduction of certain crystalline representations using the mod p local Langlands correspondence. We are looking for local constancy in the regime of relatively small weights, outside of what could be called the "BLZ range".

Alok Maharana

In a joint work with Prof. R.V. Gurjar, I have investigated the invariants of algebraic varieties of degree d in the n-dimensional complex projective space. We prove that such an irreducible normal variety which is possibly singular and whose resolution of singularities is simply connected, has the first integral homology bounded by a function of degree d. This has various interesting consequences. Boundedness by a function of degree is also true for various invariants viz. the number of singular points, first integral homology of smooth locus, first integral homology of a resolution of singularities and the second Betti number.

Amit Kulshrestha

My research interests are broadly in the field of algebra. Following a work of Lubotzky on images of word maps, in a collaboration with Harish Kishnani and Dilpreet Kaur, we have described that in a large class of groups most of the automorphism imvariant subsets containing identity may not be a word image. This is in contrast to the case of simple groups studies by Lubotzky. On the way, we have also defined the notion of a minimal set of equivalent words. We are further studying these results in context of endomorphisms in collaboration with William Cocke.

Chanchal Kumar

The study of algebraic properties of combinatorially interesting monomial ideals has been the main focus of my current research. We have obtained many interesting results about the skeleton ideals of complete graphs. We have shown that the spherical parking functions of simple graphs are in one to one correspondence with a subset of uprooted spanning trees of the graphs. We are trying to extend these results to some more general classes of graphs.

Chandrakant S. Aribam

We have made progress on some cases of the Main conjecture for certain elliptic curves with prescribed conditions on the representation. This needs us to rework the theory of certain Euler systems by Mazur and Rubin

Chetan Balwe

My current research area is motivic homotopy theory, which explores the motivic homotopy category which was introduced by Morel and Voevodsky. The following research activities were conducted:

- (joint work with Amit Hogadi and Rakesh Pawar) Rost's theory of cycle modules for Milnor K-theory has been adapted to the context of Milnor-Witt K-theory through the work of Morel and Feld. Feld has developed the theory of Milnor-Witt cycle modules when the base scheme is a field. We have extended this theory to the case when the base scheme is the spectrum of a DVR. The novelty in this work is that an extra axiom has to be imposed to ensure that Gersten's conjecture holds for Milnor-Witt cycle modules over a DVR.
- (joint work with Amit Hogadi and Anand Sawant) We have explored properties of the sheaf of A^1-connected components of an algebraic group. The following results were obtained:
    a. Let k be an arbitrary field and let G be a semisimple, simply connected, absolutely almost simple, anisotropic group over k. Then, for any finitely generated field extension F/k, the set F-sections of the sheaf of A^1 connected components of G is in bijection with the set of R-equivalence classes of the F-valued points of G. This result was previously proved only in the case when k is perfect. This restriction has now been removed.
    b. Let G be a semisimple, simply connected group over a perfect field k. Then the sheaf of A^1-connected components of G is a birational sheaf.
    c. Let G be a reductive algebraic group over a perfect field k. Then the sheaf of A^1-connected components of G is strongly A^1-invariant.

Jotsaroop Kaur
In an ongoing project with Saurabh Shrivastava we have initiated the study of Stein's square function for the bilinear Bochner-Riesz operator. We prove some sufficient and necessary conditions of Lp boundedness of square function for the bilinear Bochner -Riesz operator.

Kapil Hari Paranjape
In collaboration with Alok Maharana, a study of locales, frames and other algebraic formulations of topology was undertaken. Combining the results of Stone, Hochster and a number of category-theorists, we were able to show that every topological space is a locally closed subspace of an affine scheme over an arbitrary pre-determined field. A talk on this topic was presented in a conference in Washington University, St Louis, USA and a paper is under preparation.

Krishnendu Gongopadhyay
An element g in a group G is called real or reversible if it is conjugate to its inverse in G, and g is strongly real or strongly reversible if it can be expressed in G as a product of at most two order elements. It is a problem of potential interest in several disciples of Mathematics to classify real and strongly real elements in a group G. Recently, I have contributed to this problem and have obtained many results in this direction. Some of the highlights are given below.

- We have classified unipotent real elements and unipotent strongly real elements in simple Lie groups of classical type. The classification has been obtained by introducing infinitesimal notions of real and strongly real elements in Lie algebras.

- The infinitesimal reality Lie algebras is a completely new notion in the literature and is a problem of its own interest to classify such elements in a Lie algebra over the reals or complex numbers. We have classified infinitesimal real and strongly real elements in the Lie algebra sl_n(k) where k is the (skew) field of the complex numbers or the quaternions.

- Completely classified real and strongly real isometries of the Hermitian spaces over the complex numbers and the quaternions. Recall that the Hermitian isometries over reals are the isometries of the classical Euclidean space and such classification was known in the literature. We have generalized these results and observed some subtlety over the complex numbers and the quaternions

Lingaraj Sahu
I continued analysis of the spectrum of self-adjoint operators on Hilbert spaces. The class of operators of interest are Schrodinger type operators: perturbation of Laplacian by a suitable multiplication operator. The mathematical understanding of discrete eigenvalues are relatively simple. Some questions of our interest are distribution of these eigenvalues, their gaps and nodal structure of the eigenfunctions. On the other hand, studying the eigenvalues embedded in the continuous spectrum are more complicated. One interesting approach is through complex deformation. With Alok and Hemant we are exploring these embedded eigenvalues and looking for a better mathematical framework.

With Murugan I have investigated Arveson's hyper rigidity conjecture in approximately finite dimensional c*-algebras.

Mahender Singh
We worked on various aspects of surface knot theory and quandle theory during the past one year. We developed the idea of Dehn quandles of groups and proved that these quandles are precisely the ones that embed naturally into their enveloping groups. We proved that the enveloping group of the Dehn quandle of a given group with respect to its generating set is a central extension of that group. Specialising to surfaces, we gave generating sets for Dehn quandles of mapping class groups of

orientable surfaces with punctures and computed their automorphism groups. As applications, we recovered a result of Niebrzydowski and Przytycki proving that the knot quandle of the trefoil knot is isomorphic to the Dehn quandle of the torus and also extended a result of Yetter on epimorphisms of Dehn quandles of orientable surfaces onto certain involutory homological quandles. Developing this work further, we gave two approaches to write explicit presentations for Dehn quandles using presentations of their underlying groups. Several examples including Dehn quandles of spherical Artin groups, surface groups and mapping class groups of orientable surfaces were given to illustrate the results.

Twin groups and virtual twin groups are planar analogues of braid groups and virtual braid groups, respectively. These groups play the role of Artin braid groups in the Alexander-Markov correspondence for the theory of stable isotopy classes of immersed circles on surfaces. We showed that there exists an irreducible right-angled Coxeter group KT_n inside the virtual twin group VT_n on more than two strands and that KT_n contains the twin group T_n. The group KT_n was further used to obtain a complete description of homomorphisms between virtual twin groups and symmetric groups. As an application, we obtained the precise structure of the automorphism group of VT_n, which is a planar analogue of a recent result of Bellingeri and Paris.

Neeraja Sahasrabudhe

The work on Interacting Urn Model on Finite Graphs with Gursharn Kaur was accepted for publication in Journal of Applied Probability. We are currently working on a generalization of the problem to study vertex-dependent reinforcement. The manuscript on SLLN and annealed CLT for random walks in I.I.D. random environment on Cayley trees (joint work with Siva Athreya, Antar Bandyopadhyay and Amites Dasgupta) was accepted for publication in Stochastic Processes and their Applications. The work on Influencing Opinion Dynamics was extended to growing population models and the manuscript is currently under preparation.

Pranab Sardar

(i) We give a different proof of the famous Bestvina-Feighn combination theorem. Also we extend Mahan Mitra's previous work on Cannon-Thurston maps using the new proof. Finally we derive a number of interesting consequences. The results are written in a book form and submitted to the Lecture Notes in Mathematics, Springer publication.

(ii) We prove a combination theorem for acylindrical complexes of hyperbolic groups with student Ravi Tomar in the special case where the edge groups are finite. In the same paper we prove a new result on Cannon-Thurston (CT) maps for subcomplexes of groups.

(iii) In an ongoing work we are on the way to generalize all the results on the existence of CT maps known for complexes of groups. This is joint with students Rakesh Halder and Ravi Tomar. So far wre are able to do it for some special situations.

Santhosh Kumar Pamula

As I have joined on **1st Feb, 2022**, my research activities at IISER are all dated after March 2022. However, I would like to provide information about my research interests and ongoing research work.

I work on problems related to local completely positive maps on locally C*-algebra and Hilbert locally C*-modules. Also some open problems in the area of numerical range of linear operators defined on quaternionic Hilbert spaces. Currently, I am working on the following research problems:

1. "Pseudo S-spectrum of quaternionic operators" in collaboration with Dr. K. Dhara (a postdoctoral at Israel). This work is expected to be submitted to the journal soon.

2. “The algebra descent S-spectrum of operators” in collaboration with the summer intern Mr. G. Kulkarni (during June-July, 2022). This work is in the finishing stage.
3. “Quaternionic numerical range attaining problem” this is converse of my earlier result that is published in 2019. This work is a part of my independent work.
4. “Structure of local block CP-maps” in collaboration with Dr. Vijaya Kumar from IISc Bangalore. This work is in a discussion stage.

Shane D’Mello
Study of properties of affine glued knots and some results in the classification of real rational knots of low degrees in a quadric.

Soma Maity
In case of open manifolds it is an important problem in differential geometry to study their topology when they admit a Riemannian metric with bounded geometry. Recently Gilles Carron proved that an open manifold with Euclidean growth of volume has finitely many ends. L. Saloff-Coste studied geometric analysis on manifolds on these type of manifolds. I am studying results in this topic and trying to understand restrictions on the topology of an open manifold when it admits a complete Riemannian metric with a certain growth of volume.
In my last paper I studied Poincare inequality on Gromov hyperbolic metric spaces. I am continuing my work in this direction. I am trying to understand geometric analysis on them when they have a notion of a lower bound on Ricci curvature.

Sudesh Kaur Khanduja
We have found a formula for the discriminant of all those quintic fields $Q(\theta)$ where θ is the root of an irreducible trinomial x^5+ax+b belonging to $Z[x]$. We also construct a p-integral basis of $Q(\theta)$ for all primes p; these p-integral bases for all primes p quickly lead to the construction of an integral basis of $Q(\theta)$. Our results are illustrated with examples.
The book written by me is more or less self-contained. It is a comprehensive textbook of Algebraic Number Theory. The book discusses proofs of almost all basic significant theorems of Algebraic Number Theory including Dedekind’s theorem on splitting of primes, Dirichlet’s unit theorem, Minkowski’s convex body theorem, Dedekind’s discriminant theorem, Hermite’s theorem on discriminant, Dirichlet’s class number formula, and Dirichlet’s theorem on primes in arithmetic progressions. A few research problems arising out of these results are mentioned together with the progress made in the direction of each problem. Following the classical approach of Dedekind’s theory of ideals, the book is written with the aim of arousing the reader’s interest in the current research being held in the subject area. It not only proves basic results but pairs them with recent developments, making the book relevant. Historical notes are given at various places. Featured with numerous related exercises and examples, the book is suitable for independent study. The only prerequisite is basic knowledge of abstract algebra and elementary number theory.

Sugandha Maheshwary
Continued investigation on cut-groups and worked on its extension, namely e-cut groups.

Tanusree Khandai
I have continued my study of the finite-dimensional integrable representations of the affine Kac-Moody Lie algebras and the associated current algebras. Along with my Phd Student, Ms Shushma Rani, we have proved results on the fusion products of irreducible modules for affine Kac-Moody Lie algebras of type A_2 which give a new proof of a conjecture in
[B. Feigin, S. Loktev in On generalized Kostka polynomials and the quantum Verlinde rule, Differential topology, infinite-dimensional Lie algebras, and applications, 61–79, Amer. Math. Soc. Transl. Ser. 2, 194, Adv. Math. Sci., 44, Amer. Math. Soc., Providence, RI, 1999,] on the structure and graded character of the fusion modules. Using the methods developed, we have now began the study of the tensor products of a class of Demazure modules along with another Phd Student, Ms

Divya Setia. These studies are motivated by the fact that the character formula of the fusion product of certain finite-dimensional representations of the current algebras have been shown to be equal to specialized Macdonald polynomials and obtaining "good filtrations" of the tensor product modules which will help give a positive formula for products of specialized Macdonald polynomials.

Vaibhav Vaish
My primary research revolves around exploring motives relevant to Shimura varieties, and in the process I have also constructed general objects of broader mathematical interests. This year, I made partial, incremental, progress towards constructing Intersection Complexes of a few more specific Shimura varieties using the "symmetrically distinguished cycles" of Lie Fu-Charles Vial.
Additionally, this year, with my master's students Mr. Kripa Nath, I collaborated with Dr. Manjari Jain of Dept. of Biological Sciences, and helped produce methods and tools which can be used for automating (parts of the process of) bird song recognition using AI/ML techniques.

Varadharaj R. Srinivasan
A. In a joint work with Yashpreet Kaur, we extended the theorem of Liouville on integration in finite terms to include dilogarithmic integrals. Our result provide a necessary and sufficient condition for an element of the base field to have an antiderivative in a field extension generated by transcendental elementary functions and dilogarithmic integrals.

B. In a joint work with Amit Kulshrestha, we studied derivations on quaternion algebras that stabilize quadratic subfields. We provided an explicit construction of a differential splitting field for a given differential quaternion algebra. We also examined the presence and impact of those derivations on quaternion algebras that admit new constants.

Yashonidhi Pandey
I published an article:
Title: Brauer group of moduli of torsors under Bruhat-Tits group scheme $\mathcal{G}$ over a curve
Journal: Proceedings of Indian Academy of Sciences

In collaboration with Professor Vikraman Balaji, I have written two preprints:
Title: On Bruhat-Tits theory over a higher dimensional base
Title: On homomorphisms of $\mathbb{P}^1 \setminus \mathcal{R}$ into compact semisimiple groups

8.5.2. Visits of the faculty members

Krishnendu Gongopadhyay
— Institut de Recherche Mathématique Avancée (Universite de Strasbourg et CNRS), March 9–15, 2022.
— Kalna College, Burdwan (W.B.), March 25, 2022.

Mahender Singh
— University of South Florida, USA. Dates: 01-31 March 2022.

Neeraja Sahasrabudhe
— IIT Bombay. 7-17 March 2022

Yashonidhi Pandey
— Indian Statistical Institute, Delhi 29th-31st March 2021

8.5.3. Talks delivered

Amit Kulshrestha
— Amit Kulshrestha: *Life and Work of Srinivasa Ramanujan*: Punjab University, Chandigarh / ARSD College, Delhi University, December 22, 2021.

— Amit Kulshrestha: *Quaternion Algebras with Derivations,* Indian Statistical Institute, Delhi, December 01, 2021.
— Amit Kulshrestha: *Images of word maps and chirality*: NCM Workshop on Finite Groups of Lie Type, August 2021.
— Amit Kulshrestha: *Abstraction in Mathematics: Is it really needed?* : St. Stephen's College, Delhi, April 10, 2021.

Chanchal Kumar

— Chanchal Kumar. Skeleton ideals of Graphs. 36th Annual Conference of the Ramanujan Mathematical Society held at Amrita Vishwa Vidyapeetham (online mode). 06 August 2021.

Chandrakant S Aribam

— Chandrakant Aribam Title of the talk: Trivial eigen-component of local units modulo elliptic units over certain Z_p-extensions, Indian Statistical Institute Delhi, Dates: 09 December 2021

Jotsaroop Kaur

— Jotsaroop Kaur: Maximal Bilinear Bochner Riesz means and some applications (Inter IISER NISER meet, IISER Kolkata, 31 May, 2022- 2June, 2022)
— Fourier series: Classical and Modern Aspects (Science day at Punjabi University, Patiala 25 Feb, 2022)

Krishnendu Gongopadhyay

— Krishnendu Gongopadhyay, Real Unipotent Elements in Classical Lie Groups, Conference on Algebra, Analysis and Applications, Ambedkar University, Delhi, April 24, 2021. (online)
— Krishnendu Gongopadhyay, Invited Seminar: Real Unipotent Elements in Classical Lie Groups. Kerala School of Mathematics, April 8, 2021. (online)
— Krishnendu Gongopadhyay, Reversibility of Hermitian Isometries, 4th International Conference Groups and Quandles in Low Dimensional Topology, July 5—7, 2021. (online)
— Krishnendu Gongopadhyay, Reversibility of Hermitian isometries, Geometric Group Theory in East Asia Seminar, 18th June, 2021. (online)
— Krishnendu Gongopadhyay, Invited Seminar: Reversibility of Hermitian Isometries, BITS Goa, 16th September, 2021. (online)
— Krishnendu Gongopadhyay, Reversible symmetries on isometries, International Webinar on Innovative Researches in Emerging Areas of Pure Mathematics, Kazi Nazrul University Asansol (W. B.), Nov 11--12, 2021. (online)
— Krishnendu Gongopadhyay, Reversibility in groups and geometry, National Symposium on Mathematics and Applications (NSMA), December 22, 2022, IIT Madras. (online)
— Krishnendu Gongopadhyay, Infinitesimal reversibility of quaternionic motions, Complex hyperbolic geometry workshop, January 18—19, 2022, Chungnam National University, South Korea. (online)
— Krishnendu Gongopadhyay, Reversibility of isometries. Euler Seminar at Konkuk University, Seoul, South Korea, February 24, 2022. (online)
— Reversibility of isometries, Séminaire GT3, Institut de Recherche Mathématique Avancée (Universite de Strasbourg et CNRS), March 14, 2022.
— Krishnendu Gongopadhyay, An Introduction to non-Euclidean Geometry, Math Clinic, Math4All Initiative, July 9, 2021. (online)
— Krishnendu Gongopadhyay, 2 Lectures: Groups and Geometry, Workshop on Emerging Areas in Mathematics (WEAM-2021), One Week Faculty Development Programme, Calcutta Mathematical Society, Kolkata, July 13 & 16, 2021. (online)
— Krishnendu Gongopadhyay, 2 Lectures: Hyperbolic surfaces and Teichmuller space, Pre-CIMPA school, DST-CIMS, Banaras Hindu University, Varanasi, December 7--8, 2021. (online)
— Krishnendu Gongopadhyay, 6 Lectures (4 lectures, 2 tutorials): Geometry of the hyperbolic space, CIMPA Research School: Groups and Geometry, Calcutta Mathematical Society, Kolkata, January 18--29, 2022. (online)
— Krishnendu Gongopadhyay, General Lecture: Why one does Mathematics, ``Sarbapratham Charcha Ganit Ki, Dwitiya Satra'', organised by The Dissemination of Amazing Knowledge:

Vedic and Modern Mathematics, Central University of Himachal Pradesh, 19th December, 2022. (online)

— Krishnendu Gongopadhyay, Groups in Geometry, Kalna College-TIMC workshop: Linear algebra and Geometry, Kalna college, Burdwan, West Bengal, March 25, 2022.

— Krishnendu Gongopadhyay, Reversibility in Unipotent Lie Groups, Annual Math Symposium, March 25, IISER Bhopal (online).

Mahender Singh

— Mahender Singh: Yang-Baxter equation: algebra and knots, Novosibirsk State University, Russia, August 2021

Neeraja Sahasrabudhe

— Neeraja Sahasrabudhe. Opinion formation and manipulation over a finite time horizon. COMSNETS (Conference on COMmunication Systems & NETworkS). 3-9 Jan 2022

Pranab Sardar

— Pranab Sardar- On some results about quasiconvex subgroups of Gromov hyperbolic groups Name of the Conference/Institute. 87th Annual conference of the Indian Mathematical Society, December 4-7, 2021.

Soma Maity

— Soma Maity, "Uniform Poincare inequalities on measured metric spaces". Inter IISER-NISER Math Meet 2021 at IISER Tirupati. 12th July 2021.

— Soma Maity. "Uniform Poincare inequalities on measured metric spaces". NASI-TMC Summer school on Differential geometry at Central University of Punjab, 20th July, 2021.

— Soma Maity, "Uniform Poincare inequalities on measured metric spaces" IISc Geometry topology seminar, 15th September, 2021.

Sudesh Kaur Khanduja

— Sudesh Kaur Khanduja: Fascination of Prime Numbers: Guru Nanak Dev University, Amritsar: February 2, 2022.

— Sudesh Kaur Khanduja : A walk through monogenic trinomials: Fifth International conferences on Monogenity and power integral bases: February 17, 2022.

— Sudesh Kaur Khanduja : When is Z[θ] the ring of integers?: OSU-OU Ring Theory Seminar, Ohio State University, Columbus: March 11, 2022.

Sugandha Maheshwary

— Invited speaker to give a talk (webinar) on "Mathematics as career: Motivation and awareness" for an event named "Women In Maths:Progress And Challenges", to motivate college girls and make them aware for various opportunities in Mathematics, on May 08, 2022.

— Invited speaker (in person), Women in STEM, to motivate college girls, on the occasion of International Women's day, i.e., March 08, 2022.

— Gave a talk (online) on "How prime are prime numbers?" for students of High school, on February 25, 2022.

— Invited Speaker for a webinar entitled " Using Softwares in Mathematics" conducted by PU Maths Club, Panjab University Chandigarh, on December 15, 2021.

— Shushma Rani, Combinatorial view point of root spaces of Borcherds Kac-Moody Lie superalgebra, CUP-IISERM Mathematics Graduate Student Workshop, Dates: 15 December, 2020

Tanusree Khandai

— Tanusree Khandai, An Introduction to Representation of finite groups, Virtual Math Talk Series, MTTS Dates : 24.10.2021

Vaibhav Vaish

— Vaish Four lectures on an introduction to algebraic Geometry Madhava Lectures December 2022 (Online)

8.5.4. Conferences attended by the researchers

Abhik Ganguli

— ICTS program on Elliptic curves and the special values of L-functions (online), (08/2021).

Chanchal Kumar

— Chanchal Kumar. Skeleton ideals of Graphs. 36th Annual Conference of the Ramanujan Mathematical Society held at Amrita Vishwa Vidyapeetham (online mode). 06 August 2021.

Chandrakant Aribam

— Heegner Points: Francesc Castella (University of California, Santa Barbara) Galois Representations: Shaunak Deo (IISc, Bengaluru)
— On the Gross-Stark conjecture: Mahesh Kakde (IISc, Bengaluru)
— Beilinson-Kato elements: Chan-Ho Kim (Korea Institute of Advanced Studies, Seoul)
— Elliptic curves and Selmer groups: Anupam Saikia (IIT Guwahati) & Sudhanshu Shekhar (IIT Kanpur)
— Conference: Elliptic Curves and the special values of their L-functions Dates: 02 August 2021 to 07 August 2021

Krishnendu Gongopadhyay

— Krishnendu Gongopadhyay, Real Unipotent Elements in Classical Lie Groups, Conference on Algebra, Analysis and Applications, Ambedkar University, Delhi, April 24, 2021. (online)
— Krishnendu Gongopadhyay, Reversibility of Hermitian Isometries, 4th International Conference Groups and Quandles in Low Dimensional Topology, July 5—7, 2021. (online)
— Krishnendu Gongopadhyay, 2 Lectures: Groups and Geometry, Workshop on Emerging Areas in Mathematics (WEAM-2021), One Week Faculty Development Programme, Calcutta Mathematical Society, Kolkata, July 13 & 16, 2021. (online)
— Krishnendu Gongopadhyay, Reversible symmetries on isometries, International Webinar on Innovative Researches in Emerging Areas of Pure Mathematics, Kazi Nazrul University Asansol (W. B.), Nov 11--12, 2021. (online)
— Krishnendu Gongopadhyay, Reversibility in groups and geometry, National Symposium on Mathematics and Applications (NSMA), December 22, 2022, IIT Madras. (online)
— Krishnendu Gongopadhyay, 2 Lectures: Hyperbolic surfaces and Teichmuller space, Pre-CIMPA school, DST-CIMS, Banaras Hindu University, Varanasi, December 7--8, 2021. (online)
— Krishnendu Gongopadhyay, 6 Lectures (4 lectures, 2 tutorials): Geometry of the hyperbolic space, CIMPA Research School: Groups and Geometry, Calcutta Mathematical Society, Kolkata, January 18--29, 2022. (online)
— Krishnendu Gongopadhyay, Groups in Geometry, Kalna College-TIMC workshop: Linear algebra and Geometry, Kalna college, Burdwan, West Bengal, March 25, 2022.

Mahender Singh

— Neeraj Dhanwani (Postdoc of Dr. Mahender Singh) Title of the talk: Dehn quandles: A bridge between quandle and surfaces, IISER Bhopal Math Symposium, IISER Bhopal Dates: March 2022
— Tushar Naik (Postdoc of Dr. Mahender Singh) Title of the talk: Breadth type of (nilpotent) Lie algebras: Workshop on Group Theory 2022 Dates: 04th February 2022
— Mahender Singh-Surface knot theory and related groups: First International Congress on Topology and Related Topics, Lima, Peru Dates: October 2021
— Mahender Singh Title of the talk: Orderability in quandle theory: Recent Advances in Differential Geometry and Topology, Central University of Punjab: October 2021
— Mahender Singh: A Wells type exact sequence for solutions of the Yang-Baxter equation Name of the Conference: 4th International Conference on Groups and Quandles in Low Dimensional Topology, Tomsk State University, Russia: July 2021
— Tushar Naik (Postdoc of Dr. Mahender Singh):Automorphisms of three canonical extensions of symmetric groups Name of the Conference: World of GroupCraft 2021: 26th August 2021

Pranab Sardar

— Pranab Sardar- On some results about quasiconvex subgroups of Gromov hyperbolic groups Name of the Conference/Institute. 87th Annual conference of the Indian Mathematical Society , December 4-7, 2021.

Soma Maity

— Soma Maity, "Uniform Poincare inequalities on measured metric spaces". Inter IISER-NISER Math Meet 2021 at IISER Tirupati. 12th July 2021.
— Soma Maity. "Uniform Poincare inequalities on measured metric spaces". NASI-TMC Summer school on Differential geometry at Central University of Punjab, 20th July, 2021.

Sudesh Kaur Khanduja

— Participated in the Third International Conferences on "Monogenity and power integral bases" held on May 13 (2021) organised by Lajos Kossuth University of Debrecen, Hungary.
— Participated in the Fourth International Conferences on "Monogenity and power integral bases" held on September 16 (2021) organised by Lajos Kossuth University of Debrecen, Hungary.
— Participated in the Fifth International Conferences on "Monogenity and power integral bases" held on February 17 (2022) organised by Lajos Kossuth University of Debrecen, Hungary.
— Chaired a session and participated in the Annual Conference of Indian Woman and Mathematics (IWM) during January 28-30, 2022 organised by Banasthali Vidyapith, Rajasthan.
— Was Guest of Honour and attended the National Workshop on Ancient Indian Mathematics organised by the department of Mathematics and Statistics, Central University of Punjab, Bhatinda during March 14 -16, 2022.

Tanusree Khandai

— Workshop on Macdonald polynomials, April-June, 2021 (Zoom) (No Talk)
— Conference on applications of Macdonald polynomials, (July 19-23, 2021). (No Talk)

Vaibhav Vaish

— Attended Bhaskaracharya Pratisthan's Trimester program on Triangle Groups, Belyi Uniformization, and Modularity (online) from 1st September 2021 to 31st September 2021.

8.6. Department of Physical Sciences

8.6.1. Summary of the research work

Abhishek Chaudhuri

In a recent work (accepted for publication in Biophysical Journal) we have addressed the role of myosin motors in cellular migration. Experiments have observed force fluctuations in focal adhesions which form the connection of the cell to the extracellular environment. We have shown that myosin motors play a significant role in sustaining force fluctuations which could be a way of possible molecular mechanism for the cell to tightly control cellular movement based on any environmental cues. Using a theoretical model, we found that as the myosin contractility is reduced, effected both by changing the motor velocity and the rate of attachment/detachment, the system goes from decaying oscillations to stable limit cycle oscillations through a supercritical Hopf bifurcation. As a function of the motor activity and the number of clutches, the system exhibits a rich array of dynamical states. We corroborate our analytical results with stochastic simulations of the motor-clutch system. We obtain limit cycle oscillations in the parameter regime as predicted by our model. The frequency range of oscillations in the average clutch and motor deformation compares well with experimental results.

In another work, we look at an active walker model to understand the evolution of trail formation in biology which ranges from ant trails to pedestrian trails. We propose a model of a radom walker which modifies its local environment and is in turn influenced by it. Using extensive computations, we show that the walker trajectories indicate structural transitions which we quantify using radius of gyration for finite time walks. The extension over a definite time-window shows a non-monotonic change with the deposition rate of the chemical by the walker, characteristic of a coil-globule transition. At certain regions of the parameter space of the chemical deposition and evaporation rates, the extensions of the walker shows a re-entrant behavior. The dynamics, characterised by the mean-squared displacement, shows deviation from diffusive scaling at intermediate time scales, returning to

diffusive behavior asymptotically. A mean field theory captures the variation of the asymptotic diffusivity.

Ambresh Shivaji

a) *Precise prediction for $H \to 4\ell$ decay*

Under this project we have computed 41 two-loop master integrals analytically relevant to the QCD corrections to $H \to Z\,Z^*$ using the method of differential equations. Earlier we had computed them numerically. The result obtained will be useful in making precice QCD prediction in the $H \to 4\ell$ decay channel which is the main goal of the project. We have made the result of our analytic calculation public so that it can be incorporated in event generators for studying Higgs decay at particle colliders.

b) Probing anomalous VVH couplings at eP collider

Continuing our work under this project, we have studied the effect of anomalous W^+W^-H coupling in single Higgs production via $e^- P \to e^- H \nu_e + X$. We did an analysis similar to $e^- P \to e^- H j + X$ study for *ZZH* coupling. Earlier, we had carried out a signal-background study at the parton level. For a realistic analysis, we have considered the effect of smearing in the energies of electron and the jet. For each process we have four anomalous parameters out of which three are CP-even and one is CP-odd. We have performed χ^2-analysis using the cross section and azimuthal angle correlation between the electron and the jet (for $e^- H$ j) or neutrino (for $e^- H \nu_e$) as experimental observables. In the standard model hypothesis, we derived constraints on the anomalous parameters. We also looked into other angular observables which can distinguish CP-even and CP-odd parameters.

c) CP-odd observables in single Higgs production at muon collider

We studied the single Higgs production via $\mu^+ \mu^- \to \mu^+ \mu^- H$ which allows us to probe anomalous *ZZH* couplings. We have identified observables which receive contribution only from CP-odd couplings thus allowing a better constraint that can be placed on them using the experimental data. At parton level, we used it to find allowed region for the CP-odd parameter expecting the standard model as true theory.

d) WWV production via gluon fusion at Hadron colliders

We have started a new project where the aim is to study rare processes at Hadron colliders which can be potentially sensitive to any new physics effect beyond the standard model. In this direction, we have explored the possibility of studying $g\,g \to W^+W^-V$ *(V=Z,* γ*).* Using the publicly available tools and in-house codes, we have estimated the cross section for this process as a function of center-of-mass energy at *pp* collider. We have also compared it with $q\,q \to W^+W^-V$ which has a much larger cross section. We would like to identify kinematic distributions which can help in enhancing the *gluon-gluon* contribution over the *quark-quark* contribution.

e) Two-loop QCD correction in Gluphilic DM models

The presence of dark matter in the universe is an unsolved mystery. Numerous dark matter models with dark matter candidates have been proposed which can be verified at particle colliders. Our aim is to study dark matter production which carries a missing energy signature in gluphilic dark matter models. In such models the dark matter (χ) interacts with the standard model particle via colored mediators. We have considered $p\,p \to \chi\,\chi\,j$ production process which is a loop-induced process. The cross section predictions for this process have been obtained in the past. The predictions suffer from large scale uncertainties which can be taken care of by considering higher order QCD corrections. As a first step, we have obtained the analytic results for the one-loop amplitude and verified the singularity structure. We are in the process of verifying the amplitude numerically with public tools. We have produced all the relevant two-loop diagrams which appear in the QCD correction of $p\,p \to \chi\,\chi\,j$ process and classified them based on their topologies. The next step would be to reduce these diagrams in terms of master integrals.

Ananth Venkatesan

Our group made a transparent quasi 2D electron system on an ABO3. We have obtained a provisional Indian patent for the process. Due to high mobility we see quantum oscillations in transport. We have been able to tune a Kondo phenomena with process parameters. We also observed novel magneto-electric effects possibly due to PT symmetries broken in the system under showing a transverse voltage in parallel magnetic fields. This is unique as it is like a Hall voltage in a parallel magnetic field without sign change. We are in the process of communicating these results after several cross checks in the middle of the following year as 2 papers one on the methods and applications. A second paper on the physics is also being written and expected to be completed in the middle of the following year.

We also made some etched devices for a joint project with INST Mohali.

We are also working on another process patent after repair of some equipment is done.

The FIST Microwave facility is being setup with few Microwave test and measurement equipment working. Once the RF-PCB manufacturing unit is set up we will be in a position to do some circuits in house.

Anosh Joseph

Our group mainly focused on the non-perturbative studies of matrix models relevant to the holographic duality conjecture during this period. We used numerical tools such as Monte Carlo calculations and complex Langevin dynamics to investigate these theories.

Large-N Limit of Two-dimensional Yang-Mills Theory with Four Supercharges

We studied the two-dimensional Yang-Mills theory with four supercharges in the large-N limit. Using thermal boundary conditions, we analyzed the internal energy and the distribution of the scalars. We compared their behavior to the maximally supersymmetric case with sixteen supercharges, which was known to admit a holographic interpretation. Our lattice results for the scalar distribution showed no visible dependence on N, and the energy at strong coupling appeared independent of temperature.

Thermal Phase Structure of Dimensionally Reduced Super Yang-Mills

We continued our ongoing lattice investigations of the Berenstein--Maldacena--Nastase (BMN) deformation of maximally supersymmetric Yang-Mills quantum mechanics. We focused on the thermal phase structure of this theory, which depended on the temperature and a deformation parameter. We determined the critical temperature of the confinement transition for couplings that span three orders of magnitude to connect weak-coupling perturbative calculations and large-N dual supergravity predictions in the strong-coupling limit. Analyzing multiple lattice sizes up to 24 lattice sites and numbers of colors up to 16 allowed initial checks of the large-N continuum limit.

Non-perturbative Phase Structure of the Bosonic BMN Matrix Model

We studied the bosonic part of the BMN matrix model for wide ranges of temperatures, values of the deformation parameter, and numbers of colors N spanning from 16 to 48. Using lattice computations, we analyzed the phase transitions in the model, observing a single first-order transition from a uniform to a gapped phase for all values of the deformation parameter. We studied the functional form of the dependence of the critical temperature on the deformation parameter to describe how our results smoothly interpolated between the limits of the bosonic BFSS model and the gauged Gaussian model.

Complex Langevin Simulations for PT-Symmetric Models

Self-interacting scalar quantum field theories possessing PT-symmetry are physically admissible since their energy spectrum is real and bounded below. However, models with PT-invariant potentials can have complex actions in general. A non-perturbative study of such systems using methods based on traditional Monte Carlo is hindered due to numerical sign problem. We employed complex Langevin based on stochastic quantization to study two-dimensional scalar field theories, including the ones exhibiting PT-symmetry. We studied the simplest supersymmetric version of these systems and addressed the question of dynamical supersymmetry breaking.

Aru Beri

With SRF Mr. Pinaki Roy, appointed against ISRO research grant, I have been involved in studying thermonuclear X-ray bursts (Type-I X-ray bursts) observed in neutron star X-ray binary, 4U 1636-536 with AstroSat. These X-ray bursts are sudden eruption from the neutron star surface and offer a useful tool to measure neutron star parameters such as radius, spin and compactness. Using the AstroSat data we have found burst oscillations (BOs) at ~581 Hz were detected with 4-5 sigma confidence in three of the X-ray bursts during both hard and soft spectral states, during both rising and decay phase of bursts. BOs are considered to result from the stellar rotation induced modulation of a brightness asymmetry and are not straightforward to detect and constrain their properties.
This work was published in Monthly Notices of Royal Astronomical Society (MNRAS) Journal.

Pinaki Roy* , Aru Beri*, Sudip Bhattacharyya "Thermonuclear X-ray bursts as observed with AstroSat in LMXB, 4U 1636-536" MNRAS, 2021, 508, 2123-2133

This publication was also highlighted in The Wire - Science (link below)

https://science.thewire.in/the-sciences/astrosat-laxpc-thermonuclear-burst-spreading-across-neutron-star/

Our second work was based on the spectro-timing analysis of 4U 1636−536 observed with NuSTAR and AstroSat during its hard spectral state. In three observations of 225 ks total exposure, we identify 31 thermonuclear X-ray bursts including five doublets and a triplet. Recurrence time as short as 3.8 minutes is seen in one of the doublets. To the best of our knowledge, this is the shortest recurrence time known for this source. Our time-averaged spectroscopy during the bursts indicate the presence of an additional powerlaw or a blackbody component in a few cases, perhaps due to varying temperatures during bursts or plausible deviation from ideal blackbody behavior, however, it is difficult to probe this using the time-resolved spectroscopy owing to limited statistics. Time-resolved bursts are well fit using an absorbed blackbody model with temperatures varying between 1.7 and 2.2 keV. Burst oscillations around 581 Hz are detected with 3σ confidence during the decay phase in two of the X-ray bursts. One of the burst oscillations is seen at 582 Hz, a frequency observed during the 2001 superburst in this source.

This work entitled "NuSTAR and AstroSat observations of thermonuclear X-ray bursts with short-recurrence times in 4U 1636−536" has been published as a Special Issue of Journal of Astronomy and Astrophysics (JAA) "Astrophysical jets and observational facilities: National perspective"

I have also been involved in the multi-wavelength study of neutron star X-ray binary-4U 1820-30 with my international collaboration. The persistently bright ultra-compact neutron star low-mass X-ray binary 4U 1820−30 displays a ∼170 d accretion cycle, evolving between phases of high and low X-ray modes, where the 3-10 keV X-ray flux changes by a factor of up to ~8. The source is generally in a soft X-ray spectral state, but may transition to a harder state in the low X-ray mode. We published results from our new and archival radio observations of 4U 1820−30 during its high and low X-ray modes. For radio observations taken within a low mode, we observed a flat radio spectrum consistent

with 4U 1820−30 launching a compact radio jet. However, during the high X-ray modes the compact jet was quenched and the radio spectrum was steep, consistent with optically-thin synchrotron emission. The jet emission appeared to transition at an X-ray luminosity of Lx(3−10keV)∼3.5×1037(D/7.6kpc)2 erg s-1. We also find that the low-state radio spectrum appeared consistent regardless of X-ray hardness, implying a connection between jet quenching and mass accretion rate in 4U 1820−30, possibly related to the properties of the inner accretion disk or boundary layer. The details of our paper are as follows: "The evolving radio jet from the neutron star X-ray binary 4U 1820-30", MNRAS Letters, 2021, 508, L6-L11

I along with my scientific collaorators have proposed several AstroSat/NICER/radio/Swift observations of various X-ray transients whichmeans they undergo outbursts sporadically while spending most of their time in a quiescent state with X-ray luminositybelow ∼ 1034 erg s-1.

Some of our results have also been published as Astronomer Telegrams (ATels).

Aru Beri, B. E. Tetarenko, Eric C. Bellm, Gregory R. Sivakoff, Arash Bahramian, J. Homan, Rudy Wijnands, Patrick Schmeer, A. J. Tetarenko, Payaswini Saikia, M. Cristina Baglio, D. M. Russell, Eleonora Caruso, John. A Paice, Diego Altamirano, Nathalie Degenaar, T. D. Russell, David Williams, Rob Fender, Matt. Middleton, A. W. Shaw, Richard Plotkin, J. V. Hernandez Santisteban "Swift J1357.2-0933 as observed with Swift during its 2021 outburst" ATel 14573

Pinaki Roy, Aru Beri, Sudip Bhattacharyya, "AstroSat observations of IGR J17091-3624 during its ongoing outburst" Atel 15298

I have also been regularly involved in scientific review process during this period. I served as a scientific Reviewer for the Monthly Notices of Royal Astronomical Society Journal (MNRAS), Journal of Astronomy and Astrophysics (JOAA). In addition, I was also a member of the time allocation committee of several space-based observing proposals.

Dipanjan Chakraborty

The research activities of the group focused on the three specific themes of active matter, non-equilibrium statistical mechanics, non-isothermal Brownian motion and a class of non-equilibrium driven systems called pump models. In active matter, the research focused on the single particle dynamics of heated Janus colloid trapped in an isotropic harmonic confinement. Of specific interest was the cross correlation between the displacement and the orientation vector. In the coarse grained modelling of an active system, the hydrodynamic flow field is completely ignored. The long-ranged spatial and temporal correlation resulting from the hydrodynamic flow field gives extremely interesting result that has been known for a passive Brownian particle. Our studies have revealed a strong correlation between the symmetry axis along which the propulsion occurs and the displacement vector at shorter time scales and a strong anti-correlation at times scales of the order of the rotational diffusion time, after which the two vectors decouple. The power spectral density of the displacement vector is also calculated and measured from simulation to compare with direct experimental results.

On a similar but different topic, we revisited the problem of non-isothermal Brownian motion, where a metal colloidal particle is kept at an elevated temperature compared to the ambient fluid. Such a scenario occurs naturally in various experimental conditions, in particular on Photo-Correlation Spectroscopy, a promising candidate for single molecule tracking. In such a non-equilibrium steady state system, due to the time scale separation between heat diffusion and particle motion, a stationary halo of hot fluid is carried along with the particle resulting in a spatially varying comoving temperature and viscosity profile. The resultant Brownian motion in the overdamped limit is well described by a Langevin equation with effective parameters. The more general picture of the motion is that of a generalized Langevin equation where the viscous dissipation is strongly correlated over

time due to the hydrodynamic effect and the spatially inhomogeneous temperature field. The effective description of the overdamped Langevin equation was extended to incorporate a frequency dependent effective temperature and exact analytical expressions were obtained for a better comparison of experimental data with that from theoretical calculations.
The other direction of research in the field of non-equilibrium statistical mechanics is the investigation of first passage properties of stochastic variables. Of particular interest is the persistence probability in non-equilibrium systems. Persistence conveys the meaning of survival. The persistence probability is simply the probability that a stochastic process has not changed its sign up to time t. The significance of this quantity is that it can probe the non-stationary dynamics which is otherwise difficult to measure. In our recent communicated work we have extended our earlier methodology to an active an-isotropic Brownian particle and have shown that this persistence probability can not only distinguish between an isotropic and an an-isotropic particle, but also between a passive and an active particle.

Finally, the group was actively involved in investigating a class of non-equilibrium driven systems, called pump models which are particularly intriguing due to the property that they involve periodic forces that vanish on an average but still drives an averaged directed current. The model system was that of repulsively interacting two dimensional colloidal that was a driven by flashing ratchet potential which is commensurate with the underlying lattice. The "flashing" was implemented by stochastically switching "On" and switching "Off" the potential with a prescribed switching rate which we denote as the frequency of the drive. The directed current in the system shows a resonance behaviour as opposed to lower dimensional systems where the particle current saturates. The most promising finding was the structural changes in the system as function of the frequency of the drive. The system exhibits a re-entrant transition from soft-solid to a modulated liquid to again a solid as the frequency of the drive was increased. With such a feature, where the structure and the current can be controlled with an external parameter, the system has possible application in template assisted drug delivery. The complete characterization of the non-equilibrium phase diagram required large scale simulations

Goutam Sheet
Unconventional superconductivity at LaVO3/SrTiO3 interfaces: We performed bulk electrical transport and magneto-transport measurements at temperature down to 28mK in our Dilution refrigerator on conducting two-dimensional electron gas formed at the interface of LaVO3 and SrTiO3. Four terminal connections were made underneath insulating oxide using ultrasonic wire bonding with Aluminium wires. We discovered that the interfaces between the Mott-insulator LaVO3 and the band-insulator SrTiO3 host two-dimensional superconductivity below Tc ~ 250 mK. Our band structure calculations indicate that for these interfaces, multiple bands (the V and the Ti d bands) cross the Fermi energy where the V d electrons also carry magnetic moment thereby raising the possibility of an unconventional order parameter (OP) of the superconducting phase. We have fabricated sub-surface soft metallic point-contacts at the LaVO3/SrTiO3 interfaces to probe the OP symmetry spectroscopically through the measurement of Andreev reflection. The spectroscopic features strongly deviate from the expectations within the conventional Bardeen-Cooper-Schriefer frame-work and supports the existence of an unconventional order parameter. For detailed analysis of this unconventional superconducting state, we are performing electrostatic back gating dependence on longitudinal and transverse transport features on same sample as well. We are getting signatures of Bose metallic state. Further measurements are in progress.

Spin Polarised transport on van der Waals Kondo lattice ferromagnet Fe3GeTe2: The van der Waals system Fe3GeTe2 recently emerged as a novel 2D material system that behaves like a Kondo lattice and hosts spin-polarized conduction electrons. The Kondo-lattice behaviour also leads to a large effective carrier mass attributing a heavy fermionic character to the system. The origin of heavy fermionic nature in f-electron systems is well probed and understood but the origin of heavy fermionic states due to 3d electrons is not well understood. This makes van der Waals Fe3GeTe2, a promising

model system to study the origin of heavy fermionic states in non f-electron systems and its coexistence with itinerant ferromagnetism in detail. On the other hand, such unique coexistence of itinerant ferromagnetism and heavy Fermionic behaviour, Fe3GeTe2 have the potential to give rise to novel emergent quantum phenomena when the physical properties of the system are allowed to mix/interplay with other quantum orders through heterostructuring of materials. In the present work, we have measured spin-polarized supercurrent through mesoscopic junctions between a conventional superconductor (Nb) and the complex magnetic system Fe3GeTe2. We have presented a detailed account of an interplay between Andreev reflection and Kondo resonance, leading to anomalously high value of transport spin polarisation that cannot be explained by density of states of the spin-split bands at the Fermi surface alone. The unique physical attributes of the material system allowed us to probe the supercurrent transport characteristics within an extreme limit where Andreev reflection in presence of multiple complexity in terms of spin polarization and strong, non-trivial electron correlations co-exist.

Tunneling through Majorana wire array: It had earlier been theoretically proposed and experimentally investigated that the zero bias conductance peak (ZBCP) in the tunneling experiments could be a "smoking gun'' signature of Majorana bound states (MBS). However, it turned out that such measurements are ambiguous in nature as the zero bias peak in the conductance could also originate from reasons other than MBS (such as Andreev Bound states, weak antilocalisation or Kondo effect). Consequently, as far as experimental detection is concerned, the Majorana fermion remained elusive. We proposed a unique tunneling setup that would lead to an unambiguous detection of the MBS. In our scheme, controlling the number of transport active nanowires (in a multiwire Majorana array), through local top gating or mechanical switches, provides a provision of turning the ZBCP ON (when the number of nanowires are odd) and OFF (when the number of nanowires are even). If realised, such experiments provide a robust and unambiguous detection and control of Majorana zero modes.

In addition, ferroelectricity has been investigated in materials like organic self healed crystals bipyrazole, perovskites CsPbBr3 and Layered Perovskite oxyhalide using piezoresponse force microscopy (PFM). Further, the PFM measurements were done on bismuth selenide sample and nanosheets of Bi2O2S confirming the presence of spontaneous polarization and 180° polarization switching under an external field at room temperature. In order to further ascertain the local ferroelectric behaviour in BiSe, we imaged ferroelectric domains using DART (Dual AC Resonance Tracing) PFM imaging mode.

Harvinder Kaur Jassal

Currently, there is a large amount of data available, enabling cosmological paramteters to be fitted with better precision than before. The availability of data also leads to the requirement of developing methods to analyse the data efficiently. One of the model independent methods of constraining cosmological parameters id the principal Component Analysis (PCA). We reconstruct late-time cosmology using the technique of PCA. In particular, we have focussed on the reconstruction of the dark energy equation of state from two different observational data-sets, namely the Supernovae of type Ia data, and the Hubble parameter dataset. We do this analysis in two different approaches. One is a derived approach, where we reconstruct the observable quantity using PCA and subsequently construct the equation of state parameter. The other is a direct reconstruction of the equation of state from the data. A combination of PCA algorithm and calculation of correlation coefficients is used as prime tools of reconstruction. We carry out the analysis with simulated data to test the algorithm and then apply it to observational data. The derived approach is found to be statistically preferable over the direct approach. We show that the data prefers a slowly varying equation of state of dark energy.

Canonical and non-canonical scalar field models are viable descriptions of dark energy. A large number of different models can lead to the same background evolution of the Universe. To distinguish between these models, we study the structure formation in the Univserse. We use linear perturbation theory to study perturbations in dynamical dark energy models and compare quintessence and

tachyonic DE models with identical background evolution. We rewrite the perturbation equations for quintessence and tachyonic models in a form that makes it easier to see that these models are very hard to distinguish in the linear regime, especially when the equation of state is close to that of a cosmological constant. To constrain cosmological parameters, we use cosmic microwave background data and parametric representations of these two models to illustrate that the current observations are unable to distinguish between models with the same background evolution. We firther constrain tachyonic models with the Planck data. We do this analysis for twp dofferent scalar field potential and exponential and show that the intrinsic parameters of the potentials remain very weakly constrained. This is in particular true in the regime allowed by low redshift observations.

An alternate approach to study accelrated expansion of the Universe is through modified gravity. In this approach, we study the so called f(R) gravity models which can lead to an effective description of dark energy. We show that for certain class of viable quintessence models, the Jordan frame universe grows to a maximum finite size, after which it begins to collapse back. In the late time limit where the Einstein frame universe continues to expand, the Jordan frame universe begins to collapses. We then generalise the condition for this expansion-collapse duality for time varying equations of state models, This mapping between an expanding geometry and a collapsing geometry at the field equation level may have interesting potential implications on the large scale structure formation in the Universe.

Jasjeet Singh Bagla

Gravitational force of large mass concentrations like galaxies and clusters of galaxies bends the trajectory of light rays from distant sources. This phenomenon, known as gravitational lensing, has been used to estimate mass distribution in galaxies and clusters of galaxies. A large number of gravitational lens systems are known and the number is expected to increase dramatically in coming years with new observational instruments like Vera Rubin LSST, Euclid, etc. Further, the JWST is expected to provide exquisite high resolution maps that will facilitate construction of high resolution mass models and studies of rare image types. We have continued our studies of rare image types and we have demonstrated that the cross-section of these image types is much larger than estimated earlier. We predict that at least one such image should be seen in five rich clusters (Meena and Bagla, 2021). Indeed, this is the most conservative estimate. We have also studied uncertainties in modelling to demonstrate that this estimate is robust (Meena et al, 2021).

Gravitational lensing also affects gravitational waves from distant sources and we have pointed out in our earlier studies (Meena and Bagla, 2020) that microlensing of gravitational waves that can be detected by LIGO and other observatories cannot be studied in the ray optics regime and that wave effects are important. Further, the combination of strong lensing and microlensing makes it difficult to identify pairs of lensed signals. In a follow up study we have demonstrated that the combination of strong lensing and microlensing, as may be expected in realistic situations, leads to frequency dependent variations in amplification. The overall effect is an enhancement of magnification in strong lensing and frequency dependent variations in the same (Mishra et al, 2021).

We have studied gravitational lensing of signals from core collapse supernovae. This is a distinct class as compared to mergers of compact objects like black holes and neutron stars as the signal is broad band and is incoherent in that there is no set of templates with phase and amplitude variation of the signal as a function of time. We have proposed a diagnostic that can be used to infer microlensing if the lens has a mass greater than a few tens times the mass of the Sun. This inference is insensitive to the signal to noise ratio. Lastly, it is possible to achieve a limited reconstruction of the lens parameters from observations (Ramesh, Meena and Bagla, 2022).

Dark Energy is known to be the dominant constituent of the Universe. While observational evidence established its existence more than two decades ago, we still do not have a definitive model for dark

energy. Thus a question that needs to be asked is: can observations differentiate between different models of dark energy? Partial answer for this has been known for a long time: observations that allow us to probe expansion history cannot do so as any model can be tuned to produce a given expansion history. In our work in last few years, we have tried to explore whether clustering of matter can be used to constrain models of dark energy. We have shown that growth of clustering in two distinct models of dark energy is indistinguishable for the kind of expansion histories allowed by observations. These studies focussed on clustering at small scales where density fluctuations can be very large. We have now extended our analysis to clustering and associated observables at very large scales. We show that these observations too do not allow us to distinguish between different models of dark energy. We also provide an explanation where we show that this problem exists only for models with the equation of state parameter close to w=-1. Thus we are left with a depressing scenario that we may not be able to find the real model of dark energy using observational constraints (Rajvanshi et al, 2021).

K P Yogendran

- Arxiv submission: "The BTZ black hole spectrum and partition function"
  https://arxiv.org/abs/2112.11253
  with former MS Thesis students Omkar Nippanikar and Aditya Sharma
- Project on Holographic approach to QCD equations of state
  with PhD student, Akash Singh Manuscript under preparation.
- MS Thesis on the "Conformal Field theory of the BTZ black hole"
  with Roshan KaundinyaManuscript under preparation
- MS Thesis on "Hadron spectrum from Holographic Hard wall model"
  with Suraj Chopra and Akash Singh Work nearing completion
- MS Thesis on " QCD Equations of State at finite Density"
  with Dhruv Pathak and Akash Singh.
- MS Thesis on "Hydrodynamics" with Praneet Pathak.

Manuscript on Perturbation theory approach to Dissipation effects on Sound waves under preparation.

Kamal Priya Singh

We have been working on several mind boggling problems viz., on the mechanical, magnetic and optical properties of spider silk, on the connection of amino acid sequence of β-sheet nanocrystals to the nanomechanical properties of natural silk, on the demonstration of a universal Stokes' viscometer, design of delay lines for controlling and capturing attosecond resolved electron dynamics, high harmonic generation near plasmonic nanostructure and obituary on N. S. Kapani. Outcome of these works are briefly described below:

- Substantial progress on understanding whether the amino acid sequence of β-sheet nanocrystals, which is the key to rendering strength to silk fiber, is optimally chosen to mitigate molecular-scale failure mechanisms is made. To investigate this, we modelled β-sheet nanocrystals of various representative small/polar/hydrophobic amino acid repeats for determining the sequence motif having superior nanomechanical tensile strength and toughness. Further, we analyzed the variation in their rupture mechanisms and explore sequence-dependent mitigating factors contributing to their superior mechanical properties. Our analyses suggest that nanocrystals of pristine silk sequences most likely achieve superior mechanical strength by optimizing side-chain interaction, packing, and main-chain HB interactions. This study provides insight into the molecular design principle of silk with implications in the genetically modified artificial synthesis of silk-like biomaterials.
- We have demonstrated a simple yet universal viscometer, as proposed by Stokes more than a century ago, exploiting damping of capillary waves generated electrically and probed optically with sub-nanoscale precision. Our setup allows rapid measurement of viscosity of a wide variety of polar, non-polar, transparent, opaque, thin or thick fluids having viscosity values varying over four orders of magnitude from1−10000 mPas. Furthermore, we discuss two additional damping mechanisms for

nanomechanical capillary waves caused by bottom friction and top nano-layer appearing in micro-litre droplets. Such self-stabilized droplets when coupled with precision interferometers form interesting microscopic platform for picomechanical optofluidics for fundamental, industrial and medical applications.

- We have written a comprehensible review on attosecond-delay lines which is one of the main key to enable time-resolved measurements on atoms, molecules, plasma and solid-state materials. This presents the current status of a wide variety of attosecond delay lines operating from the infrared to the X-ray spectral region. Further, the designs differ as to whether they are based on amplitude division or wavefront division of the laser beam. We discuss the design ideas, compactness, calibration and stability of various attosecond delay lines and compare their performance in corresponding experiments. Applications of the delay lines to resolve selected attosecond phenomena are shown along with future perspectives towards achieving zeptosecond resolution.
- We have investigated two-color high harmonic generation (HHG) near a plasmonic nanostructure. We numerically solve the time-dependent Schrödinger equation to compute the HHG spectra for two different models: for a short-range potential, which supports a single-bound state, and for a long-range potential, which supports a Rydberg series, to show potential dependence on inhomogeneous two-color HHG. A substantial enhancement in the value of the cut-off resulting from inhomogeneity up to the ~600th order, extending beyond the water window, is found for both the models. The HHG spectra are highly sensitive to the relative phase of the two-color fields and this sensitivity increases with increasing inhomogeneity. Possibilities of efficiently generating and controlling attosecond pulse train and isolated attosecond pulse are discussed.
- Last but not least, we have made an obituary on N. S. Kapani, the Indian scientist and passionate entrepreneur responsible for pioneering work on optical fibres and biomedical optics has passed away aged 94. He is considered by many as the father of fibre optics, was one of the first scientists to start the field of fibre-optics with ground-breaking demonstrations of optical fibre-based imaging, sensing, and optical communication systems. We highlighted Kapany's ground-breaking innovations in pushing the frontiers of biology and medicine. We discuss the basics of these ideas and focus on how Kapany overcame many challenges to demonstrate ready-to-use prototypes from scratch. These innovations form precursors to many modern-day instruments, which are essential for current medical applications. Kapany's life journey is yet another embodiment of how curiosity-driven research can change the course of human history.

Kavita Dorai

Our efforts in NMR quantum information processing were in two different directions namely, quantum process tomography and exploring quantum contextuality. The experimental implementation of selective quantum process tomography (SQPT) involves computing individual elements of the process matrix with the help of a special set of states called quantum 2-design states. However, the number of experimental settings required to prepare input states from quantum 2-design states to selectively and precisely compute a desired element of the process matrix is still high, and hence constructing the corresponding unitary operations in the lab is a daunting task. In order to reduce the experimental complexity, we mathematically reformulated the standard SQPT problem, which we term the modified SQPT (MSQPT) method. We designed the generalized quantum circuit to prepare the required set of input states and formulated an efficient measurement strategy aimed at minimizing the experimental cost of SQPT and we experimentally demonstrated the MSQPT protocol and selectively characterized various two- and three-qubit quantum gates. The quantum no-disturbance principle imposes a fundamental monogamy relation on quantum contextuality and quantum nonlocality. We experimentally demonstrated the simulation of this monogamy relation on a ququart-qubit system using three NMR qubits. We constructed experimental tests of the violation of the Klyachko-Can- Binicioglu-Shumovski (KCBS) inequality and the Clauser-Horne-Shimony-Holt (CHSH) inequality. We presented a generalized quantum scattering circuit which can be used to perform a noninvasive quantum measurement and implemented it on NMR qubits. Such a

measurement is a key requirement for testing temporal noncontextual inequalities. We use this circuit to experimentally demonstrate the violation of the Peres-Mermin inequality on a three-qubit NMR quantum information processor.

Kinjalk Lochan

During this period, me and my research group were primarily involved in the analysis of various classical and quantum phenomena in gravitational back drop as well as study of cosomological models. Some salient findings from the research group are as follows

(i) In cosmological settings, a duality between quintessence models of late time acceleration of an expanding universe and f(R) gravity driven collapsing universe was established.

(ii) Decoherence effects in neutrino oscillations in curved space time was analysed and it was shown that the decoherence length in such settings contains the mass information of neutrino species.

(iii) In a quantum collapse model of dust, it was demonstrated the infrared outgoing modes are sensitive to the Planck scale physics near the classical singularity point and give an estimate of minimum size allowed by quantum gravity models in such a collapse.

Kulinder Pal Singh

I have continued my studies of UV and X-ray emission from stellar coronae, magnetic cataclysmic variables, novae, active galactic nuclei, and clusters of galaxies, based on data collected from my observations of such objects with AstroSat and other observatories. This has led to 14 publications in the refereed journals during the period being reported. Only some of the highlights of my research work (principally led by me or my graduate student) published during the year are given below. The highlights of the rest of my work can be found in my list of publications cited in this report.

My graduate student Ms. J. Tiwari and myself carried out a comprehensive study of X-ray and radio emission from a nearby galaxy cluster Abell 1569 at redshift of 0.0784, using observations with Chandra X-ray observatory and Very Large Array. We find that X-ray emission from its two unbound subclusters -- A1569N and A1569S has low luminosities and extends to a radius ~248 kpc and ~370 kpc, respectively, indicating that the two gas clumps are group-scale systems. We have measured average elemental abundances ~0.25 solar, low average temperatures (kT~2 keV), and lack of any resolvable cool cores associated with the intracluster gas. We have discovered a pair of cavities in X-ray emission that are coincident with the radio lobes of 1233+169 in the gas clump A1569N and find that the total mechanical power associated with the cavity pair is an order of magnitude larger than the X-ray radiative loss in the cavity-occupied region, providing corroborating evidence for cavity-induced heating of the intragroup gas in A1569N. The other gas clump, A1569S, exhibits possible evidence for a small-scale cluster-subcluster merger, due to its high central entropy, the presence elongation of local hot gas and a density discontinuity (indicating a weak merger shock) in between the bent radio tails of 1233+168. We suggest a possible scenario of an ongoing interaction due to a head-on merger occurring between A1569S and another subcluster falling in from the west along the line bisecting the wide-angled radio tails of 1233+168.

I analysed observations of four bright stars observed by me with the AstroSat Soft X-ray Telescope (SXT). The purpose of the study was to check the leakage of visible light from bright stars through the very thin filter mounted in front of the X-ray CCD to block the visible light. I demonstrated how to extract reliable X-ray events without any contamination. I studied two A spectral type stars (HIP 19265, HIP 88580), one G/K giant (Capella), and a nearby M-type dwarf (HIP 23309). Using the procedure described, no X-ray emission was observed from the A-type stars, as expected, setting the brightness limit. X-ray spectra of Capella and HIP 23309 were derived after eliminating the visible light leakage. Spectral modeling of Capella, and its comparison with the previous X-ray observations shows the reliability of the method used. In the process, we have presented the first X-ray spectrum of the star, HIP 23309.

I, alongwith my collaborators, studied soft X-ray observations of a uniquely variable accreting white dwarf in a binary star system, AR Sco, using AstroSat SXT and Chandra Observatories. The two

observatories took data only a week apart. We detected the orbital period of the binary and its harmonics but not the spin period of the white dwarf in the Chandra data. The X-ray flux obtained from both the observatories is found to be within a few percent. A two temperature thermal plasma models with the same spectral parameters fitted both the Chandra and SXT data, and required negligible absorption in the source. One of the temperature components had the same temperature (kT~1 keV) as reported earlier from previous observations with XMM-Newton but the other temperature component had a lower temperature, kT, of 4.9 (+0.7−0.6) keV as compared to 8.0 keV measured earlier. The XMM-Newton observations had also caught the star when it was 30% brighter.

I along with my collaborators, principally Dr. P. Kushwaha, studied soft X-ray, near-UV (NUV), and far-UV (FUV) emission from a unique blazar, OJ 287. The observations were carried out in 2017, 2018, and 2020 with the AstroSat. The near simultaneous observations with NuSTAR in 2017 provided data in hard X-rays, while the Fermi Observatory provided very high energy gamma-ray data. We found the source in three different broad-band spectral states in these observations. The X-ray spectrum was the hardest during 2018, while the high-energy-end of the simultaneous optical-FUV spectrum showed a steepening that required modelling with a broken power-law spectrum. The spectral energy distribution (SED) in 2017 showed a relatively flatter optical-FUV and soft X-ray spectra, implying an additional emission component. The 2020 optical-FUV spectrum was harder than in 2017 and 2018, with an extremely soft X-ray spectrum and a hardening above ~1 GeV, similar to the SEDs of High-energy-peaked BL Lac objects (HBL), thereby establishing that this additional emission component had HBL-like properties. The AstroSat multiwavelength observations, thus traced the spectral evolution from the end-phase of the HBL component in 2017 to its disappearance in 2018 followed by its revival in 2020. A single zone leptonic model reproduced the 2018 broad-band spectrum, while the 2017 and 2020 SEDs required an additional HBL-like emitting zone. The spectral evolution of the high-energy-end of optical-UV spectrum, revealed by the FUV observations in 2017 and 2018, strongly suggests that X-ray spectral changes in the normal broad-band spectral state of OJ 287 are primarily due to the evolution of the optical-UV synchrotron spectrum.

I have continued my collaborations with other members (Smriti Mahajan, Aru Beri, Harvinder Kaur and J.S. Bagla) of the Physics faculty on several different projects, and also continued my collaborations with people in IUCAA, IIA, ISRO and elsewhere in the country and abroad (ref: publications). I have continued to guide Ms. Juhi Tiwari, for her Ph.D. work based on clusters of galaxies. I have guided two students for their Master's thesis viz., Mr. Abhinna Sundar Samantray and Ms. Kala G Pratap for their projects based on AstroSat observations of Magnetic Cataclysmic Variables.

I continue to participate in the science working group of the AstroSat, and assist the Payload Operation Centre at TIFR, Mumbai to improve the calibration of the soft X-ray telescope on board AstroSat. I chaired the AstroSat Time Allocation Committee (2018-2021) set up by ISRO. I continue to serve as member of Editorial Board of the Current Science. I am member of the Science Working Group for AstroSat since its inception by ISRO over a decade ago, and that meets regularly once a month. I am member of the advisory committee on X-ray optics set up by ISRO HQ.

Manabendra Nath Bera

In our research group (Quantum Information and Quantum Physics group) we have carried out research in the field of quantum information and computation theory, involving quantum thermodynamics and heat engines, quantum a-causality and communications, quantum measurements and quantum Bayes' theorem, quasi-probabilities and metrology. In particular, we have:

Studied information theoretical implications of quantum a-causality, non-local superposition, and quantum signalling.

Explored the role of quantum quasi-probabilities and, based on them, derived bound for quantum advantages in post-selected multi-parameter metrologies.

Studied the quantum thermodynamics in open quantum systems and resource theory of quantum heat engines.

Explored the role of superposition in evolutions in quantum resetting and quantum search problems.

Studied the quantum paradoxes related to quantum measurement inferences and propose resolution to these paradoxes with the use of quantum Bayes' theorem.

Mandip Singh

My main research focus is on experimental and theoretical investigations of higher dimensional quantum entanglement, quantum imaging, Schrodinger cat states, quantum information processing with photons and relativistic quantum physics. In my lab, experiments are performed with quantum entangled photons. Quantum entanglement is a foundational concept of quantum mechanics by which an individual particle remains correlated with a distant particle even if they are separated by a large distance. Such correlations cannot be described by classical physics because quantum states defy notion of classical reality. Which says, existence means reality, if something is not real and not measurable then it cannot exist. This is not true in quantum mechanics at foundational level. I do experiments in my lab to see this effect beyond this point.

Last years, quantum imaging experiments are performed in my lab to image polarization sensitive transparent objects, which cannot be visualised with conventional methods. Quantum imaging is performed with single photon detection of a quantum entangled photon. This is a DST funded Quantum Enabled Science and Technology Theme-1 project. My group is the first one from this theme to achieve the project target along with a publication.

New ideas on quantum nonlocality acting in the past are developed. This effect says that a measurement on a quantum entangled system collapses quantum state in its past also. However, future is evolved from something different, but a measurement can change past from future.

Pankaj Kushwaha

- Submitted a revision of my already submitted work titled "Long Term Multi-band Near Infra-Red Variability of the Blazar OJ 287 during 2007--2021" in the journal: The Astrophysical Journal (now accepted and published)
- Worked on compiling all the data from Opitcal facilities for our on-going (international) collaborative work on "OJ 287" from different facilities across the globe
- Performed analysis of Ultra-violet Imaging Telescope (UVIT) data from AstroSat Observatory of a sample of blazars as a part another on-going work using AstroSat data.
- Worked on analysis, interpretation of multiple other projects led by my collaborators (abroad and India)

Prasenjit Das

My group is working on the dynamical properties of perturbed granular gases and the photo-induced reversal of segregation in binary mixtures. A summary of my research work is as follows:

A granular system is a collection of particles with sizes ranging from a few micrometers to a few centimeters. Example of granular systems is food grains, pebbles, ball bearings, etc. Typically granular particles interact via dissipative interactions like inelastic collision or frictional interaction. We currently focus on the decay of kinetic energy, the velocity distribution of gains, density and velocity fields, etc., as a function of friction coefficient for unperturbed systems. Next, we want to perturb the systems by applying homogeneous and inhomogeneous driving and study the steady-state properties using analytical tools.

A homogeneous AB binary mixture at high temperatures T segregates into A-rich and B-rich domains when quenched below the critical temperature T_c. Understanding phase segregation is essential because of the wide range of industrial applications, from metallurgy to material science to device applications. Theoretical models and computational simulations have been extensively used to study phase segregation in bulk binary mixtures in the past few decades. Currently, we are working on the photo-induced reversal of phase segregation in binary alloys on patterned substrates. Using the

Monte-Carlo method, we want to understand the domain kinetics. Further, we will characterize the domain morphology using numerical tools.

Rajeev Kapri

We study the hysteresis in unzipping of long double-stranded DNA by a periodic force using Langevin dynamics simulations. The DNA undergoes a dynamical phase transition either by changing the frequency of the force keeping the amplitude constant or by changing the amplitude keeping the frequency constant. The average extension between the two strands as a function of force shows hysteresis whose area depends on the frequency of the periodic force. We obtained the loop area as a function of frequency and found that the loop area shows different scalings at higher- and lower-frequency regimes. The scaling exponents were found to be the same as the exponents obtained in earlier Monte Carlo simulation studies of a directed self-avoiding walk model of a homopolymer DNA, and the block copolymer DNA on a square lattice, and differs from the values reported earlier using Langevin dyanamics simulation studies on a much shorter DNA hairpins. This solves the discrepency in the scaling exponents for the unzipping of DNA by a periodic force.

Ramandeep Singh Johal

We studied the performance of quantum heat engines based on complex working media using the methods of heuristics. These are short-cut techniques which aim to get insight into a complex problem by looking at special cases such as extreme case scenarios, thus trading accuracy for speed.
We also studied the performance of thermoelectric models of energy conversion using endoreversible approximation. Our analysis shed new light on the efficiency in these systems at optimal performance.

Samir K. Biswas

Last year, we were working to develop lens-free 2D/3D microscope, PVDF co-polymer based lead-free ultrasound sensors. We have tested a few sensors in the area of ultrasound imaging and photoacoustic imaging. Several high frequencies (>50MHz) ultrasound sensors are tested with optical fiber and laser. Since last year, we are developing a system for focusing light in scattering media for studying bio-system. We are also developing Nanofiber for advanced sensor and bio-membrane development. Our lab is extensively engaged with Electrical Engineering department of IIT Kanpur and department of Aerospace Engineering of IIT Kharagpur for a joint project where we are trying to detect and quantify the thermo-acoustic based shock wave formed by premixed air-gas combustion in an open chamber.

Sandeep K. Goyal

I focused on various problems in classical and qunautm optics and quantum information processing. In the classical optics, we developed a new gadget named ‘Polarization selective Dove prism’ which can couple the orbital angular momentum and polarization of light. We also developed the helicity sorter for the orbital angular momentum of light. In the quantum optics and information, we showed the persistence of quantum topological phase in quantum walks in the presence of noise. We also developed methods to store vector-vortex beams of light in Intra-atomic frequency comb based quanutm memory, and developed a method to perform discrete POVM on optical systems using linear optical setup.

Sanjeev Kumar

During the last year, my research group has focused mainly on the following topics: (i) topological superconductivity, (ii) skyrmion formation in magnets and (iii) cluster mean-field approach to quantum spin models.

Our theoretical and numerical work has provided a comprehensive understanding of the formation of topological spin-textures, such as skyrmions, anti-skyrmions and antiferromagnetic skyrmions, in a class of magnetic materials. Our approach applies to both metallic and insulating magnets, and therefore, provides a unified picture of skyrmion formation.

We uncovered the possibility of generating a finite density of Majorana fermions in a prototype model of interacting fermions. A general mechanism based on topological phase separation is put forward, and existence of a finite number of Majorana modes is explicitly demonstrated in the presence of disorder.

Using cluster mean field approach, we have investigated the role of xxz impurities in a Heisenberg spin chain. We have shown that the Neel antiferromagnetic order can be stabilied in the presence of xxz impurities.

Satyajit Jena

During this period, our group focused on the study of (a) characterization of quark-gluon plasma, (b) estimation of the tau neutrino flux, and study of sterile neutrinos, (c) Development of tomography techniques, and (d) the application of machine learning techniques.

(a) Characterization of quark-gluon plasma using thermal analysis of transverse momentum spectra in heavy ion collisions. (Two Ph.D. Students: Rohit Gupta and Bharat Sirsa; three BSMS Students: Manit Sharma, Ritoban Datta, and Deya Chatterjee): Quark-Gluon Plasma is a deconfined state of matter where quarks and gluons are free to move inside a nuclear volume rather than only in a nucleonic volume. The transition from hadronic to QGP state occurs at the phase boundary where the critical temperature is sufficient enough to support the change from hadronic to partonic degrees of freedom. This state of matter is created and studied by colliding ultra-relativistic heavy-ions in the collider experiments at RHIC and LHC. In order to quantify the confinement-deconfinement phase transition, and to search for the critical point of transition, the QCD phase diagram has been scanned by varying collision energies and studied the thermodynamical properties such as temperature and baryon chemical potential of the produced system of patrons. The estimation of the temperature of the fireball requires a proper parameterization of momentum spectra (the transverse component in particular). Although QCD, the theory of strong interactions, provides a satisfactory formulation of the particle produced in hard processes, it breaks to explain the particle production in a low-momentum regime due to the high coupling strength. Thus, a joint analysis of both soft and hard-particle production is essential to characterize the thermal behavior of QGP. We use a phenomenological approach along with hydrodynamical & statistical thermal models to study the combined spectra of the soft- and hard regime of transverse momentum spectra. We have developed a unified model and working on the application of this model, particularly in the photon and jet sector. A Ph.D. thesis and two BSMS theses have been submitted on the basis of this work.

(b) Investigation of sterile neutrino and estimation of the tau neutrino flux; (Two Ph.D. Students: Kartik Joshi and Nishat Fiza): Neutrino physics offers us the scope to investigate the physics Beyond Standard Model (BSM). The first and foremost signature of the non-zero mass of neutrinos is given by the theory of neutrino oscillation which has now been established by several pioneering experiments. Extensive studies have been done to understand the phenomenon of neutrino oscillation. The anomalies reported by short baseline neutrino experiments point to the possible existence of a fourth neutrino, essentially sterile in nature. We investigated the possible presence of interference terms due to sterile neutrino and its impacts on the long baseline neutrino oscillation experiments. At the same time, we are also investigating the theoretical flavor conversion mechanism to calculate the neutrino oscillation in deformed spaces and the estimation of tau-neutrino flux. We are also participating in the data analysis and software development in MINERvA Experiment at Fermilab, USA.

(c) Development of tomography techniques (Two Ph.D. Students: Bharat Sirswah and Supriya Nayak): We are also involved in the development of tomographic techniques for various applications. In this direction, our group has been working in both Muon and Positron-Electron tomography. We are looking at the details of the scattering again of incident particles mainly muons and electrons. The scattering angle mainly depends on the atomic number, the density of the target material, and the thickness of the target medium at a given energy. Scattering angles at different initial energies also provide the opportunity to classify the scattering angle. Once this classification is completed, one can easily find out the identity of the medium-material and target material. Currently, we are working on the modeling of material and its interaction and we will be implementing them into a prototype in the future.

(d) Finding QCD Critical Points with Quantum Machine Learning (One BSMS Student: Monit Sharma): The quarks and gluons that are typically bound to nucleons can travel freely in a state called Quark-Gluon Plasma (QGP) when temperatures and densities are incredibly high. We have worked on a quantum machine learning approach to the ramifications of the presence of a critical point on the QCD phase diagram. We built a family of state equations that matched lattice computations at low baryon density and included a critical point in the suitable universality class. The equation of state that is created is then used to investigate a probable critical point signature that can be observed experimentally at RHIC. And then, using the equation of state data for the heavy-ion collision, we made a fully quantum classifier to classify the transition order to check whether it's a zero-order phase transition, hinting at a smooth crossover or a first-order phase transition. We compared our results with many well-known classical classification algorithms. A BSMS thesis is submitted on this topic.

Smriti Mahajan (SERB Research Scientist)

During this period I have been working with the AstroSat UVIT data of the Coma cluster to study the properties of detected sources in the deepest UV image of the cluster. For this project we collated and analysed archival optical data at other wavelengths as well. In the paper (submitted for peer-review) we have studied the properties of various stars, galaxies and quasars observed in this very deep FUV image of a central field of the cluster. One of the three quasars found in this image is at a redshift of 2.31, which is likely the highest redshift object observed by the UVIT so far.

Sudeshna Sinha

A range of interesting and counter-intuitive results pertaining to the collective dynamics of complex systems were obtained. In particular we showed that ill-matched timescales in coupled systems can induce oscillation suppression. We also found that the competitive interplay of repulsive coupling and cross-correlated noises gave rise to phenomena ranging from the usual synchronized state, to the uncommon anti-synchronized state in bistable systems. Further, in a collaboration with experimentalists, we demonstrated the quenching of oscillations in a liquid metal via attenuated coupling. We also explored the emergence of extreme events in systems modelling population dynamics, and found the enhancement of extreme events through the Allee effect and its mitigation through noise in a three species system. Lastly, in another research direction, we have demonstrated, through numerical simulations as well as a proof-of-principle experimental realization, that one can successfully perform learning tasks using a single driven pendulum. The underlying idea is to utilize the rich intrinsic dynamical patterns of the driven pendulum, especially the transient dynamics which has so far been an untapped resource. This allows even a single system to serve as a suitable candidate for reservoir computing. Specifically, we analyze the performance of the single pendulum for two classes of tasks: temporal and nontemporal data processing. The accuracy and robustness of the performance exhibited by this minimal one-node reservoir in implementing these tasks strongly suggest an alternative direction in designing the reservoir layer from the point of view of efficient applications. So our results indicate the remarkable machine-learning potential of even a single simple nonlinear system.

Tripta Bhatia

- Preparation of synthetic biomembrane compartment and its characterization in the biophysics lab.
- 1 postdoc and 2 PhDs and 1 Master student are working is under supervision in various research projects with the aim of creating a synthetic plasma membrane in the lab.

Vishal Bhardwaj

I worked on correcting the bias in the up-down asymmetry measurement in the B^+→K^(+) π^- π^+ γ and B^0→K^+ π^- π^0 γ decay modes at Belle. I also worked on the rare D decays such as D→pe and D→pμ decays. We did the optimization and identify the possible background sources in these decay modes. Along with that we looked at the rare B to Ds decays, where we work on the searches of B^+ → 〖D_s〗 ^((*)+) η,B^+→ 〖D_s〗 ^((*)+) 〖K_s〗 ^0,B^+→D^+ η and B^+→D^+ 〖K_s 〗 ^0 decays using the full Belle data.

Yogesh Singh

1. Fully gapped type-II superconductivity in Pt-doped IrTe2 near critical doping: The Dirac point in Pt-doped IrTe2 is known to be tuned by controlling the doping concentration. For 10% Pt, it is seen that the Dirac point exists close to the Fermi energy of the system. This leads to the expectation that, for such doping, the system might host unconventional (topological) superconductivity. Here, we present a detailed microscopic and spectroscopic investigation of Pt-IrTe 2 under an ultrahigh vacuum, low-temperature scanning tunneling microscope. We find that, for the crystals of Ir0.9Pt0.1Te2, the surface shows patches of atomic scale over which defects are seen to be randomly distributed. Tunneling spectroscopy reveals that Ir0.9Pt0.1Te2 condenses into a fully gapped Bardeen-Cooper-Schrieffer-like (BCS) s-wave superconducting state. The superconducting gap was measured to be 460 μ eV at 310 mK. The value of $2\Delta/kBTc\sim$ 6 is consistent with a conventional BCS superconductor.
2. Rare-earth tuned magnetism and magnetocaloric effects in double perovskites R2NiMnO6: We made a comprehensive experimental study of magnetization ($2< T< 300$ K, $1< H< 8$ T) and magnetocaloric effect in double perovskite materials R2NiMnO6 with R = Pr, Nd, Sm, Gd, Tb, and Dy. While a paramagnetic to ferromagnetic transition, with TC in the range 100-200K, is a common feature that can be attributed to the ordering of Mn4+ and Ni2+ magnetic moments, qualitatively distinct behavior depending on the choice of R is observed at low temperatures. These low-temperature anomalies in magnetization are also manifest in the change in magnetic entropy,$-\Delta SM$, whose sign depends on the choice of R. In order to understand these results, we present theoretical analysis based on mean-field approximation and Monte Carlo simulations on a minimal spin model. The model correctly captures the key features of the experimental observations.
3. Pressure tuning of structure, magnetic frustration and carrier conduction in Kitaev spin liquid candidate Cu2IrO3 : The layered honeycomb lattice iridate Cu2IrO3 is the closest realization of the Kitaev quantum spin liquid, primarily due to the enhanced interlayer separation and nearly ideal honeycomb lattice. We report pressure-induced structural evolution of Cu2IrO3 by powder x-ray diffraction (PXRD) up to 17GPa and Raman scattering measurements up to 25GPa. A structural phase transition (monoclinic-triclinic) is observed with a broad mixed phase pressure range (4 to 15GPa). The triclinic phase consists of heavily distorted honeycomb lattice with Ir-Ir dimer formation and a collapsed interlayer separation. In the stability range of the low-pressure monoclinic phase, structural evolution maintains the Kitaev configuration up to 4GPa. This is supported by the observed enhanced magnetic frustration in dc susceptibility without emergence of any magnetic ordering and an enhanced dynamic Raman susceptibility. High-pressure resistance measurements up to 25 GPa in the temperature range 1.4--300K show resilient non-metallic behaviour. Using first-principles density functional theoretical (DFT) calculations, we find that at ambient pressure Cu2IrO3 exists in the monoclinic phase which is energetically lower than the triclinic phase (both the structures are consistent with experimental XRD pattern). DFT reveals a structural transition at 7 GPa involving dimerization of Ir-Ir.
4. 2D weak anti-localization in thin films of the topological semimetal Pd3Bi2S2 : Pd3Bi2Se2 has been proposed to be topologically non-trivial in nature. However, evidence of its non-trivial behaviour is

still unexplored. We report the growth and magneto-transport study of Pd3Bi2Se2 thin films, revealing for the first time the contribution of two-dimensional (2D) topological surface states. We observe exceptional non-saturated linear magnetoresistance which results from Dirac fermions inhabiting the lowest Landau level in the quantum limit. The transverse magnetoresistance changes from a semi-classical weak-field B2 dependence to a high-field B dependence at a critical field B⋆. It is found that B⋆∝ T2, which is expected from the Landau level splitting of a linear energy dispersion. In addition, the magnetoconductivity shows signatures of 2D weak anti-localization (WAL). These novel magneto transport signatures evince the presence of 2D Dirac fermions in Pd3Bi2Se2 thin films.

8.6.2. Visits of the faculty members

Aru Beri

— University of Southampton, United Kingdom (February 25, 2022- April 11, 2022)

K P Yogendran

— Indian Institute of Astrophysics, 25th December to 4th January, 2022 Ongoing collaboration with Prof. P. Chingangbam on

Mandip Singh

— Punjabi University Patiala. 1-2 April 2022.

Sanjeev Kumar

— IFW Dresden, Germany: Februaty 01 to May 22, 2022
— Aalto University, Finland: May 05 to 07, 2022

Satyajit Jena

— May – June 2021, MINERVA at Fermilab, USA

8.6.3. Talks delivered

Ambresh Shivaji

— Ambresh Shivaji; Higgs Self-coupling in EFT framework; IMEPNP, IOP Bhubaneswar (online); February 7-12, 2022
— Ambresh Shivaji; Status of theory Computations; WG2 meeting on κλ measurements in single-Higgs channels, CERN, Geneva (online); September 23, 2022
— Ambresh Shivaji; VVH couplings at ep colliders, MadGraph/FeynRules Meeting , Bethe Center for Theoretical Physics (online); November 15-17, 2021
— Pramod Sharma; Probing anomalous HVV couplings using Higgs production in electron-proton collisions; INTERNATIONAL CONFERENCE ON SUPERSYMMETRY AND UNIFICATION OF FUNDAMENTAL INTERACTIONS (SUSY 2021); ITP, CAS, China (online); August 23-28, 2021
— Mandeep Kaur; Two-loop master integrals for QCD corrections to H →4ℓ decay; Shivalik HEPCATS meeting-Summer 2021, IISER Mohali (online); July 30, 2021
— Pramod Sharma; Probing anomalous HVV couplings using Higgs production in electron-proton collisions (poster presentation); THE VIRTUAL HEP CONFERENCE ON RUN4@LHC (OFFSHELL-2021), CERN, Geneva (online); July 6-9, 2021

Ananth Venkatesan

— A. Venkatesan "Are Phonons lagging behind an oscillating beam? Non-linear damping Phenomena in Palladium Nanomechanical resonators, CENSE IISc July 28th 2021

Anosh Joseph and group members

— Minati Biswal, Confinement-Deconfinement transition, and Z_2 symmetry in Z_2 + Higgs theory, Shivalik HEPCATS Meeting -- Summer 2021, IIT Ropar, July 31 - August 1, 2021.
— Navdeep Singh Dhindsa, Large-N limit of two-dimensional Yang-Mills theory with four supercharges, (Online) The 38th International Symposium on Lattice Field Theory, Zoom/Gather@Massachusetts Institute of Technology, USA, July 26-30, 2021.
— Navdeep Singh Dhindsa, Non-perturbative study of two-dimensional Yang-Mills with four supercharges at large N, (Virtual) Shivalik HEPCATS Meeting -- Summer 2021, IIT Ropar, July 31 - August 1, 2021.
— Arpith Kumar, Complex Langevin simulations for PT-symmetric models, (Online) The 38th International Symposium on Lattice Field Theory, Zoom/Gather@Massachusetts Institute of Technology, USA, July 26-30, 2021.
— Arpith Kumar, Complex Langevin simulations for PT-symmetric models, (Online) Shivalik HEPCATS Meeting - Summer 2021, IIT Ropar, July 31 - August 1, 2021
— Vamika, 2D SU(2) Yang-Mills Theory using Tensor Networks, (Hybrid) Shivalik HEPCATS Meeting -- Winter 2021, IISER Mohali, India, December 18, 2021.

Aru Beri

— Invited Talk: Aru Beri, Fast timing with AstroSat and new light on X-ray binaries using the multiwavelength approach during the workshop on "Astrophysical jets and observational facilities: National perspective, organized by Aryabhatta Research Institute of Observational Sciences: ARIES, Nainital, India April 05-09, 2021
— Aru Beri, AstroSat Observations of the first Galactic Ultra-luminous X-ray Pulsar Swift J0243.6+6124 Poster+5 minutes oral Presentation during the online workshop BeXRB2021, Valencia, July, 2021
— Aru Beri, 4U 1901+03: Cyclotron Resonance Scattering Feature and its affect on the pulse profile formation mechanism Oral Presentation during the online workshop BeXRB2021, Valencia, July, 2021.
— Aru Beri, Delivered a public talk on ″Exploring stellar remnants in the multimessenger era″ during the YouTube live sessions organized by the Nehru Planetarium, Nehru Memorial Museum and Library, August, 2021
— Aru Beri, 4U 1901+03: Cyclotron Resonance Scattering Feature and its affect on the pulse profile formation mechanism Oral Presentation during the online HEASA2021, South Africa, September 2021.
— Invited talk: Aru Beri, Probing X-ray emission in different accretion modes of X-ray Pulsars, meeting on "Science with XSPECT onboard XPoSAT", organized by Indian Space Research Organization (ISRO) September 22, 2021.
— Invited talk: Aru Beri ″Accretion-powered X-ray Pulsars and their interaction with Environment″ during the outreach event ″Cosmic Tales: Astronomy Series-Session 3″ organized by the Astronomy Club at IISER Mohali. October, 2021
— Pinaki Roy, Short Waiting Time Thermonuclear X-rays Bursts in 4U 1636-536: Challenge to existing ignition models? Shivalik HEPCATS meetings-Winter 2021, organized by Department of Physics, IISER Mohali, December 18, 2021
— Invited Talk: Aru Beri, "Exploring Stellar remnants-Afterlives of Stars" on the occasion of International Day of Women in Science organized by the Physics Department of the Central University of Tamil Nadu. February 2022

Dipanjan Chakraborty

— Dipanjan Chakraborty, Brownian Motion: Past and Present. Faculty Development Program, Panjab University, August 7th, 2021.

Goutam Sheet

— Goutam Sheet. Superconductivity in materials with Dirac bands. International conference on the topology in Condensed Matter Systems (ICTCMS) organized by S.N Bose National Centre for Basic Sciences. February 2022.
— Goutam Sheet. Ballistic transport. S.N Bose National Centre for Basic Sciences. February 2022.
— Goutam Sheet. Superconductivity with re-writable magnetic memory at LaVO3/SrTiO3 interfaces Annual meeting 2021 at JNCASR Bangalore.
— Goutam Sheet. Superconductivity with re-writable magnetic memory at LaVO3/ SrTiO3 interfaces. IWPSD conference organized by IIT Delhi. December 2021.
— Goutam Sheet Superconductivity with re-writable magnetic memory at LaVO3/ SrTiO3 interfaces. 12th APCTP-IACS-KIAS Joint Conference on Emergent Phenomena in Novel Oxide Materials and Low Dimensional Systems organized by IACS Kolkata. November 2021.
— Goutam Sheet. Superconductivity with re-writable magnetic memory at LaVO3/ SrTiO3 interfaces. 3rd Indian Materials Conclave at IIT Madras. December 2021.
— Goutam Sheet. Where two insulators meet. QMat organized by TIFR Mumbai. December 2021.
— Goutam Sheet. Tip-induced superconductivity. International Vortex Workshop. 1st June 2021.
— Mona. Sub-surface Andreev reflection spectroscopy on conducting oxide interfaces. QMat organized by TIFR Mumbai. December 2021.
— Aastha Vasdev. Mixed Type I and type II superconductivity in PdTe2. QMat organized by TIFR Mumbai. December 2021.

Harvinder Kaur Jassal and group members

— Harvinder Kaur Jassal, Gender Survey of the ASI, 40th Meeting of the Astronomical Society of India, IIT Roorkee, 26-29 March, 2022.

Jasjeet Singh Bagla and group members

— Jasjeet Singh Bagla, SEDS-Celestia, VIT Vellore, April 13, 2021
— Jasjeet Singh Bagla, Colloquium, IUCAA Pune, July 1, 2021
— Jasjeet Singh Bagla, Online Learning, FDP on Usage of ICT in Education: Challenges and Opportunities during Covid-19, Hansraj College, Delhi University, July 13, 2021.
— Jasjeet Singh Bagla, Differentiating between classes of dark energy models: Can it be done?, 4th Shivalik HEPCATS meeting, IIT Ropar, August 1, 2021.
— Jasjeet Singh Bagla, Sky watching over zoom, Public engagement in astronomy in the pandemic era, August 4, 2021, IIA Bengaluru
— Jasjeet Singh Bagla, Perspectives and Biases, and how to account for them?, FDP on Science, Social Sciences and Humanities: A Quest for Interdisciplinary Understanding, Post Graduate Government College for Girls Sector 11, Chandigarh, August 10, 2021.
— Swati Gavas, Halo Mass Function in Scale Invariant Models, 5th Shivalik HEPCATS meeting, IISER Mohali, Dec.18, 2021.
— Jasjeet Singh Bagla, Gravitational lensing of core-collapse supernova gravitational wave signals, 5th Shivalik HEPCATS meeting, IISER Mohali, Dec.18, 2021.
— Jasjeet Singh Bagla, Radio Astronomy, CMB and Cosmology, Winter School in Radio Astronomy, TIFR-NCRA and IUCAA, Pune, December 31, 2021.
— Jasjeet Singh Bagla, Gravitational Waves and Gravitational Lensing, Sparks-Physics Society, SGTB Khalsa College, New Delhi, January 21, 2022
— Devang Haresh Liya, Complex modelling with many datasets within BXA, X-ray Spectral Fitting (XSF) 2022 winter school, February 10, 2022
— Jasjeet Singh Bagla, Gravitational Waves and Gravitational Lensing, Refresher Course in Physical Sciences, Panjab University, February 22, 2022.
— Jasjeet Singh Bagla, Modernity, Technology and Education, Locating the Contours of Indian Modernities: Challenges and Possibilities, March 17, 2022.
— Dipanweeta Bhattacharyya, Where can we find the merged Black hole in BH-BH mergers?, 40th Annual Meeting of the Astronomical Society of India, March 25-29, 2022, IIT Roorkee

Kamal P. Singh and lab members

— Sunil Dahiya. Ultrathin delay line for attosecond delay control in high harmonic generation. Student conference on Optics & photonics (SCOP 2021), PRL Ahmedabad (ONLINE MODE). November 24- 26, 2021.
— Ankur Mandal. Temporal Structure analysis of High Harmonic Generation: a short tutorial. 5th Workshop on Optics & Photonics: Theory & Computational techniques (OPTCT), IIT Delhi, (online). December 26-27, 2021.

Kavita Dorai

— Kavita Dorai, "Experimental demonstration of a monogamy relation between quantum contextuality and violation of the temporal Peres-Mermin inequality on an NMR quantum processor", Invited plenary lecture (online platform), NMRS 2022:NMR-Chemistry, Biology to Drug Discovery, IIT Gandhinagar, March 6-9, 2022.
— Kavita Dorai "NMR Spectroscopy and its Applications to Physics, Chemistry, Biology & Imaging" Invited lecture (online platform), UGC-HRDC short term course on "Spectroscopy and its Applications in Modern Science STC9-21", Dr Harisingh
— Gour Central University Sagar, February 23, 2022.
— Kavita Dorai, "NMR Quantum Computing", Invited lecture (online platform), ATAL-FDP Programme on Quantum Computing, ABV-IIITM Gwalior, October 6, 2021.
— Kavita Dorai, "Women in Quantum Science in India", Invited guest panelist (online platform), India Week of Quantum, IBM- Qiskit, August 25-27, 2021.
— Kavita Dorai, "Protecting Fragile Quantum States on an NMR Quantum Processor", Invited lecture (online platform), National Quantum Science & Technology Symposium, IIIT Hyderabad, July 26-August 3, 2021.
— Kavita Dorai, "Quantum Information Processing Using Nuclear Spins as Qubits and Qudits", Invited lecture (online platform), QIQT-2021 Summer School, IISER
Kolkata, 14 July, 2021.
— Kavita Dorai, "Using NMR spectroscopy to investigate the link between circadian rhythms and metabolism", Invited lecture (online platform), EUROMAR 2021 International Conference, Portoroz Slovenia, 5-8 July, 2021.
— Dileep Singh, Experimental demonstration of fully contextual quantum correlations on an NMR quantum information processor, NMRS- India Student Webinar Series August 18, 2021
— Sumit Mishra,NMR-based investigation of the altered metabolomic response of Bougainvillea spectabilis leaves exposed to air pollution stress during the circadian cycle, NMRS- India Student Webinar Series, October 13, 2021.

Kinjalk Lochan

— Kinjalk Lochan , " Observing acceleration induced radiation of Unruh-DeWitt Detector" 16th Marcel Grossmann meeting (online). ICRA, ICRANet, Italy. 5-10 July 2021.
— Ankit Dhanuka, "Stress energy correlator in de Sitter space-time: its conformal masking or growth in connectedFriedmann universes." 16th Marcel Grossmann meeting (online). ICRA, ICRANet, Italy. 5-10 July 2021.
— Dipayan Mukherjee. "f(R) Dual Theories of Quintessence: Expansion-Collapse Duality."
— 16th Marcel Grossmann meeting (online). ICRA, ICRANet, Italy. 5-10 July 2021.
— Harkirat Singh Sahota, "Infrared signature of quantum bounce in collapsing geometry," 16th Marcel Grossmann meeting (online). ICRA, ICRANet, Italy. 5-10 July 2021.
— Harkirat Singh Sahota, "Operator Ordering Ambiguity in Observables of Quantum Cosmology," 16th Marcel Grossmann meeting (online). ICRA, ICRANet, Italy. 5-10 July 2021.
— Himanshu Swami, "Aspects of neutrino mass hierarchy in gravitational lensing." 16th Marcel Grossmann meeting (online). ICRA, ICRANet, Italy. 5-10 July 2021.

Kulinder Pal Singh

— Kulinder Pal Singh. Jets from Active Galactic Nuclei. Invited Talk at the Workshop on Astrophysical jets and observational facilities: National perspective April 5-9, 2021, at ARIES, Nainital

Mandip Singh

— Mandip Singh, Talk Title: Quantum imaging and quantum information processing with photons. Workshop: Quantum Information Technologies with Photonic Devices, Quantum Enabled Science and Technology theme 1, Place: Punjabi University Patiala, Date: 1 April 2022.

— Mandip Singh Talk Title: Experiments of quantum with entangled photons. Place: IISc Bangalore (Webinar) Date: 9 March 2022

Rajeev Kapri

— Ramu Kumar Yadav. Unzipping of a double-stranded block copolymer DNA by a periodic force. Soft Matter Young Investigators Meet (e-SMYIM) 2021 held at IIT Bombay 14 – 16 October 2021.

— Andri Sharma. Polymer Translocation through Conical Channels. Soft Matter Young Investigators Meet (e-SMYIM) 2021 held at IIT Bombay 14 – 16 October 2021.

— Rajeev Kapri. Periodic forcing of adsorbed polymer and DNA. Statistical Physics: Recent advances and Future directions (ONLINE) 14 – 15 February 2022.

Samir K. Biswas

— N. A Hoque, DAE Solid State Physics Symposium -2021, 18- 22nd December, BARC Mumbai

— N. A Hoque, Material Research Society of India Conference MRSI– 2021, 20-23 December, IIT Madras

— Amit Kumar, IEEE Workshop on Recent Advances in Photonics, 2022, 4-6 Mach, IEEE Conference, IIT -Bombay,

Sandeep K. Goyal

— Sandeep K. Goyal. A linear optical scheme to implement arbitrary discrete POVM. Quantum Information and Computation: From Foundations to Applications – 2021. Oct 18-23, 2021.

— Navdeep Arya. Detecting modified Vacuum Fluctuations using geometric phase acquired by an accelerated atom. APS March Meeting 2022. March 14-18, 2022

— Chanchal. Storing vector-vortex states of light in an intra-atomic frequency-comb quantum memory. APS March Meeting 2022. March 14-18, 2022

— Vikash Mittal. Bloch sphere representation of geodesics and null-phase curves of higher-dimensional state space. APS March Meeting 2022. March 14-18, 2022

— G.P. Teja. Atomic state preparation using coherent feedback control. APS March Meeting 2022. March 14-18, 2022

Sanjeev Kumar

— "Skyrmions and antiferromagnetic skyrmions in metals and insulators" IFW Dresden (Germany) April 2022

— "Skyrmions and antiferromagnetic skyrmions in metals and insulators" Aalto University(Finland) May 2022

— "Skyrmion formation in Hund's metals and insulators" online talk in QMAT-2021 (TIFR Mumbai)

Smriti Mahajan (SERB Research Scientist)

— Smriti Mahajan. Our place in space. Periodic lecture organised by the department of Philosophy, MCM DAV College for Women, Chandigarh. March 21, 2022

Sudeshna Sinha

— Sudeshna Sinha. Exploiting Chaotic Dynamics. International Physics Webinar, Pabna University of Science and Technology, Bangladesh. 22 April 2021
— Sudeshna Sinha. Dynamics of Rewired Networks. ICTP-SAIFR Complex Systems & Statistical Mechanics Seminar, Brazil. 3 May 2021
— Sudeshna Sinha. Chaos and Noise in the aid of Logic. Western-Fields Seminar Series in Networks, Random Graphs, and Neuroscience, Canada. Jun 10, 2021
— Sudeshna Sinha. Harnessing Chaos. Statistical & Nonlinear Physics Lecture, SUNY, Buffalo, USA. July 24, 2021
— Sudeshna Sinha. CSIR-NPL Colloquium. 28 Jan 2022
— Sudeshna Sinha. Complex Systems: Surprises from the Interplay of Order and Disorder. Online Lecture Series in Nonlinear Dynamics, Trichy. 25 Feb 2022

Tripta Bhatia

— Tripta Bhatia, Life as a Matter of Fat, STATPHYS KOLKATA XI, 21-25 March 2022.
— Tripta Bhatia, INST – IISERM BILATERAL MEETING 2022, 14-15 March 2022.
— Tripta Bhatia, Origins of Life and Evolving Chemical Systems Meeting 2022, 18-19 February 2022.
— Tripta Bhatia, Micromechanics of Biomembranes, Soft Matter Young Investigator Meet, 14-16 October 2021

Vishal Bhardwaj

— Vishal Bhardwaj, Results of Belle and the perspectives for Belle-II, 19th International Conference on Hadron Spectroscopy and Structure (HADRON 2021)/UNAM Mexico, 26-31 July 2021.
— Vishal Bhardwaj, Quarkonium at Belle II, 22nd Particles and Nuclei International Conference (PANIC 2021)/ Laboratory of Instrumentation and Experimental Particle physics (LIP) Portugal, 5-10 September 2021.
— Soura Patra, New physics searches through tau decays at Belle, the 2021 European Physical Society conference for high energy physics (EPS-HEP 2021)/Universität Hamburg and DESY Germany July 26-30, 2021.

Yogesh Singh

— Yogesh Singh, Quantum Spin Liquids : phases with quantum entanglement and topological orders "Condensed Matter Physics Webinar", organized by IIT Goa, IIT Kanpur, IIT Delhi, Shiv Nadar Univ., NISER (2, July 2021).

8.6.4. Conferences attended by the researchers

Ambresh Shivaji

— KEK-IINS IWATE Collider school 2022, Iwate UniversityDate: March 21-26, 2022
— International Meeting on EFFECTIVE PATHWAYS TO NEW PHYSICS (IMEPNP), Institute of Physics, Bhubaneswar: February 7 -12, 2022
— (Virtual) Shivalik HEPCATS meeting-Winter 2021, IISER Mohali.: December 18, 2021.
— Higgs 2021, Stony Brook University: October 18-22, 2021
— (Virtual) Shivalik HEPCATS meeting-Summer 2021, IISER Mohali.: July 30-August 1, 2021.
— The XXVIII International Conference on Supersymmetry and Unification of Fundamental Interactions (SUSY 2021), Institute of theoretical physics, CAS: 23-28 August, 2021
— 5th International Symposium on Radiative Corrections (RADCOR) and the XIX Workshop on Radiative Corrections for the LHC and Future Colliders (LoopFest).(Online): May 17-21, 2021.

Ananth Venkatesan

— A Venkatesan "Non-linear damping phenomena in Palladium Nanomechanical resonators" Invited presentation in Nano-21 3rd Edition of Webinar on Nano-sciecnce by Edeavor Research Pvt ltd Aug 2nd 2021

Anosh Joseph and group members

— Raunok Basu, (Hybrid) Shivalik HEPCATS Meeting -- Winter 2021, IISER Mohali, India, December 18, 2021.
— Minati Biswal, (Online) The 38th International Symposium on Lattice Field Theory, Zoom / Gather @Massachusetts Institute of Technology, USA, July 26-30, 2021.
— Minati Biswal, (Hybrid) Shivalik HEPCATS Meeting -- Winter 2021, IISER Mohali, India, December 18, 2021.
— Navdeep Singh Dhindsa, (Hybrid) Shivalik HEPCATS Meeting -- Winter 2021, IISER Mohali, India, December 18, 2021.
— Navdeep Singh Dhindsa, (Online) Lattice Practices - 2021, The Cyprus Institute, Nicosia, Cyprus, October 6 - 12, 2021.
— Navdeep Singh Dhindsa, (Online) ECT* Doctoral Training Programme - 2021, ECT* Trento, Italy, June 28 - July 23, 2021.
— Navdeep Singh Dhindsa, (Online) The 38th International Symposium on Lattice Field Theory, Zoom / Gather @Massachusetts Institute of Technology, USA, July 26-30, 2021.
— Navdeep Singh Dhindsa, (Online) Shivalik HEPCATS Meeting -- Summer 2021, IIT Ropar, July 31 - August 1, 2021.
— Anosh Joseph, (Online) The 38th International Symposium on Lattice Field Theory, Zoom / Gather @Massachusetts Institute of Technology, USA, July 26-30, 2021.
— Anosh Joseph, (Online) Shivalik HEPCATS Meeting -- Summer 2021, IIT Ropar, July 31 - August 1, 2021.
— Anosh Joseph, (Hybrid) Shivalik HEPCATS Meeting -- Winter 2021, IISER Mohali, India, December 18, 2021.
— Arpith Kumar, (Online) The 38th International Symposium on Lattice Field Theory, Zoom / Gather @Massachusetts Institute of Technology, USA, July 26-30, 2021.
— Arpith Kumar, (Online) Shivalik HEPCATS Meeting -- Summer 2021, IIT Ropar, July 31 - August 1, 2021.
— Arpith Kumar, (Online) Topological aspects of strong correlations and gauge theories, ICTS-TIFR, Bangalore, India, September 6-10, 2021.
— Arpith Kumar, (Hybrid) Shivalik HEPCATS Meeting -- Winter 2021, IISER Mohali, India, December 18, 2021.
— Bana Singh Sangtan, (Online) Shivalik HEPCATS Meeting -- Summer 2021, IIT Ropar, July 31 - August 1, 2021.
— Bana Singh Sangtan, (Online) Lattice Practices - 2021, The Cyprus Institute, Nicosia, Cyprus, October 6 - 12, 2021.
— Bana Singh Sangtan, (Hybrid) Shivalik HEPCATS Meeting -- Winter 2021, IISER Mohali, India, December 18, 2021.
— Ashutosh Tripathi, (Online) National Quantum Science and Technology Symposium, IIIT Hyderabad, July 26 - August 3, 2021.
— Ashutosh Tripathi, (Online) Shivalik HEPCATS Meeting -- Summer 2021, IIT Ropar, July 31 - August 1, 2021.
— Ashutosh Tripathi, (Online) ICPS 2021, Niels Bohr Institute in Copenhagen, Denmark, August 5-8, 2021.
— Ashutosh Tripathi, (Hybrid) Shivalik HEPCATS Meeting -- Winter 2021, IISER Mohali, India, December 18, 2021.
— Vamika, (Online) Tensor Networks in Many Body and Quantum Field Theory, Institute of Nuclear Theory, University of Washington, Seattle, USA, May 17 - June 4, 2021.

— Vamika, (Online) INT Summer School on Problem Solving in Lattice QCD, Institute of Nuclear Theory, University of Washington, Seattle, USA, June 28 - July 16, 2021.
— Vamika, (Online) The 38th International Symposium on Lattice Field Theory, Zoom / Gather @Massachusetts Institute of Technology, USA, July 26-30, 2021.
— Vamika, (Online) Shivalik HEPCATS Meeting -- Summer 2021, IIT Ropar, July 31 - August 1, 2021.
— Vamika, (Hybrid) Shivalik HEPCATS Meeting -- Winter 2021, IISER Mohali, India, December 18, 2021.

Aru Beri

— Invited talk: Aru Beri, Probing X-ray emission in different accretion modes of X-ray Pulsars, meeting on "Science with XSPECT onboard XPoSAT", organized by Indian Space Research Organization (ISRO) September 22, 2021
— Pinaki Roy, Short Waiting Time Thermonuclear X-rays Bursts in 4U 1636-536: Challenge to existing ignition models? Shivalik HEPCATS meetings-Winter 2021, organized by Department of Physics, IISER Mohali, December 18, 2021
— Aru Beri, AstroSat Observations of the first Galactic Ultra-luminous X-ray Pulsar Swift J0243.6+6124 Poster+5 minutes oral Presentation during the online workshop BeXRB2021, Valencia, July, 2021
— Aru Beri, 4U 1901+03: Cyclotron Resonance Scattering Feature and its affect on the pulse profile formation mechanism Oral Presentation during the online workshop BeXRB2021, Valencia, July, 2021
— Aru Beri, 4U 1901+03: Cyclotron Resonance Scattering Feature and its affect on the pulse profile formation mechanism Oral Presentation during the online HEASA2021, South Africa, September 2021

Goutam Sheet

— Goutam Sheet. Superconductivity in materials with Dirac bands. International conference on the topology in Condensed Matter Systems (ICTCMS) organized by S.N Bose National Centre for Basic Sciences. February 2022.
— Goutam Sheet. Superconductivity with re-writable magnetic memory at LaVO3/ SrTiO3 interfaces. IWPSD conference organized by IIT Delhi. December 2021.
— Goutam Sheet Superconductivity with re-writable magnetic memory at LaVO3/ SrTiO3 interfaces. 12th APCTP-IACS-KIAS Joint Conference on Emergent Phenomena in Novel Oxide Materials and Low Dimensional Systems organized by IACS Kolkata. November 2021.
— Goutam Sheet. Where two insulators meet. QMat organized by TIFR Mumbai. December 2021.
— Mona. Sub-surface Andreev reflection spectroscopy on conducting oxide interfaces. QMat organized by TIFR Mumbai. December 2021.
— Aastha Vasdev. Mixed Type I and type II superconductivity in PdTe2. QMat organized by TIFR Mumbai. December 2021.
— Soumya Datta. Anisotropic superconductivity in ZrB12 near critical Bogomolnyi point. QMat organized by TIFR Mumbai. December 2021.(poster)
— Deepti Rana. Tunneling characteristics of weakly coupled Majorana wire array. QMat organized by TIFR Mumbai. December 2021.(poster)
— Aastha Vasdev. Fully gaped type II superconductivity in Pt doped IrTe2. International conference on the topology in Condensed Matter Systems (ICTCMS) organized by S.N Bose National Centre for Basic Sciences. February 2022.(poster)
— Soumya Datta. Spectroscopic evidence of multigap superconductivity in noncentrosymmetric AuBe. INST-IISERM Bilateral meeting. March 2022.(poster)
— Aastha Vasdev. Enhanced, homogeneous type II superconductivity in Cu intercalated PdTe2. INST-IISERM Bilateral meeting. March 2022.(poster)
— Monika Bhakar. Domain structures of arrays of shape anisotropic magnetic nanoislands. INST-IISERM Bilateral meeting. March 2022.(poster)

Harvinder Kaur Jassal and group members

— Harvinder Kaur Jassal, 4th Shivalik HEPCATS meeting, July 31 – August 1, 2021, IIT Ropar
— Harvinder Kaur Jassal, Public engagement in astronomy in the pandemic era, August 2-4, 2021, IIA Bengaluru
— Harvinder Kaur Jassal, 5th Shivalik HEPCATS meeting, December 18, 2021, IISER Mohali
— Harvinder Kaur Jassal, 40th Meeting of the Astronomical Society of India, March 25-29, 2022, IIT Roorkee.

Jasjeet Singh Bagla and group members

— Jasjeet Singh Bagla, 4th Shivalik HEPCATS meeting, July 31 – August 1, 2021, IIT Ropar
— Jasjeet Singh Bagla, Public engagement in astronomy in the pandemic era, August 2-4, 2021, IIA Bengaluru
— Sauraj Bharti, HPC in Astrophysics and Astronomy, September 20-23, 2021, NCRA-TIFR, IIT Kharagpur
— Swati Gavas, HPC in Astrophysics and Astronomy, September 20-23, 2021, NCRA-TIFR, IIT Kharagpur
— Jasjeet Singh Bagla, 5th Shivalik HEPCATS meeting, December 18, 2021, IISER Mohali
— Swati Gavas, 5th Shivalik HEPCATS meeting, December 18, 2021, IISER Mohali
— Jasjeet Singh Bagla, Annual meeting of the Astronomical Society of India, March 25-29, 2022, IIT Roorkee. I chaired one session.
— Dipanweeta Bhattacharyya, Where can we find the merged Black hole in BH-BH mergers?, 40th Annual Meeting of the Astronomical Society of India, March 25-29, 2022, IIT Roorkee
— Sauraj Bharti, Annual meeting of the Astronomical Society of India, March 25-29, 2022, IIT Roorkee. Poster paper: Upcoming SKA precursor surveys and sensitivity to the HI mass function

Kamal P. Singh and lab members

— Sunil Dahiya, Mehra S. Sidhu, AkanshaTyagi, Ankur Mandal, B. Nandi, Jan M. Rost, Thomas Pfeifer, Kamal P. Singh. In line ultrathin attosecond delayline with direct absolute zero time reference and high stability. 7TH THEME MEETING ON ULTRAFAST SCIENCES - 2021 (UFS-2021), organised by CEBS, Mumbai (ONLINE MODE). November 12 - 13, 2021. (Poster)
— Akansha Tyagi, Mehra S. Sidhu, Ankur Mandal and Kamal P. Singh. Dispersion-less all reflective delay line for ultrafast measurements. 7TH THEME MEETING ON ULTRAFAST SCIENCES - 2021 (UFS-2021), organised by CEBS, Mumbai (ONLINE MODE). November 12 - 13, 2021. (Poster)
— Akansha Tyagi, Mehra S. Sidhu, Ankur Mandal and Kamal P. Singh. All reflective delay line for dispersion-less ultrafast measurements. 739. WE-Heraeus Seminar on “Molecular Physics and Physical Chemistry with Advanced Photon Sources hybrid at the Physikzentrum Bad Honnef/Germany (ONLINE MODE). 30 January – 03 February 2022. (Poster)
— Varun Ranade, Kamal P. Singh. Exploring the magnetic properties of natural silk polymers. 13th European Biophysics Conference, Organized by European Biophysical Societies' Association, Vienna, Austria (Online). 24-28 July 2021. (Poster)
— Varun Ranade, R. J. Choudhary, Kamal P. Singh. Intrinsic Magnetic Properties of Spider Dragline Silks. Magnetism 2022, University of York, York, England (Online). March 28-29, 2022. (Poster)
— Akansha Tyagi Student conference on Optics & photonics (SCOP 2021), PRL Ahmedabad (ONLINE MODE). November 24- 26, 2021. (attend)

Kavita Dorai

— Kavita Dorai, “Experimental demonstration of a monogamy relation between quantum contextuality and violation of the temporal Peres-Mermin inequality on an NMR quantum processor”, Invited plenary lecture (online platform), NMRS 2022:NMR-Chemistry, Biology to Drug Discovery, IIT Gandhinagar, March 6-9, 2022.

— Kavita Dorai, “Protecting Fragile Quantum States on an NMR Quantum Processor”, Invited lecture (online platform), National Quantum Science & Technology Symposium, IIIT Hyderabad, July 26-August 3, 2021.
— Kavita Dorai, “Using NMR spectroscopy to investigate the link between circadian rhythms and metabolism”, Invited lecture (online platform), EUROMAR 2021 International Conference, Portoroz Slovenia, 5-8 July, 2021.

Kinjalk Lochan
— Kinjalk Lochan, " Observing acceleration induced radiation of Unruh-DeWitt Detector” 16th Marcel Grossmann meeting (online). ICRA, ICRANet, Italy. 5-10 July 2021.
— Ankit Dhanuka, "Stress energy correlator in de Sitter space-time: its conformal masking or growth in connected Friedmann universes." 16th Marcel Grossmann meeting (online). ICRA, ICRANet, Italy. 5-10 July 2021.
— Dipayan Mukherjee. "f(R) Dual Theories of Quintessence: Expansion-Collapse Duality." 16th Marcel Grossmann meeting (online). ICRA, ICRANet, Italy. 5-10 July 2021.
— Harkirat Singh Sahota, "Infrared signature of quantum bounce in collapsing geometry," 16th Marcel Grossmann meeting (online). ICRA, ICRANet, Italy. 5-10 July 2021.
— Harkirat Singh Sahota, "Operator Ordering Ambiguity in Observables of Quantum Cosmology," 16th Marcel Grossmann meeting (online). ICRA, ICRANet, Italy. 5-10 July 2021.
— Himanshu Swami, "Aspects of neutrino mass hierarchy in gravitational lensing." 16th Marcel Grossmann meeting (online). ICRA, ICRANet, Italy. 5-10 July 2021.

Kulinder Pal Singh
— Attended the annual Astronomical Society of India (ASI) meeting 2022, IIT Roorkee, March 2022, in person to receive an award (see below).
— Two Posters presented by the MS Project Students at this meeting are as follows: Abhinna Sundar Samantaray*, Kulinder Pal Singh, P. E. Barrett, D Buckley, S. Potter, E. M. Schlegel, G. C. Dewangan and V. Girish. “Multi-wavelength Study of AR UMa, QS Tel and 1RXSJ161935.7+524630 using AstroSat”.
— Kala.G.Pradeep*, Kulinder Pal Singh, P.E.Barrett, D.Buckley, S.Potter, E.M.Schlegel, G.C. Dewangan, and V.Girish. “Temporal and Spectral Studies of Magnetic Cataclysmic Variables: BL Hyi, SwiftJ0503.7-2819, and TV Col in the Near-UV, Far-UV and Soft X-ray, using AstroSat”.

Manabendra Nath Bera
— Manabendra Nath Bera: Title of the talk: Bounding Quantum Advantages in Postselected Metrology, on Quantum Information and Foundations (ICQIF-2022), organised by Indian Statistical Institute, Kolkata, India Dates: 14-24 February, 2022
— Manabendra Nath Bera: Title of the talk: Quantum Heat Engines with Carnot Efficiency at Maximum Power, National Quantum Science and Technology Symposium (NQSTS-2021), organised by IIIT Hyderabad, India, Dates: 26th July – 3rd August 2021
— Manabendra Nath Bera: Title of the talk: Quantum Heat Engines with Carnot Efficiency at Maximum Power, Name of the conference: Quantum Information and Quantum Technology 2022 (QIQT-22), organised by IISER Kolkata, India, Dates: 15th - 30th June 2021

Mandip Singh
— Mandip Singh, Talk Title: Quantum imaging and quantum information processing with photons. Workshop: Quantum Information Technologies with Photonic Devices, Quantum Enabled Science and Technology theme 1, Place: Punjabi University Patiala, Date: 1 April 2022.

Pankaj Kushwaha
— Pankaj Kushwaha, “AstroSat View of the Binary Black hole blazar OJ 287: Settling the issue of X-ray Spectral Changes” (Poster; virtual presentation), 34th Meeting of the Astronomical Society of India, 25 – 29 March 2022

Prasenjit Das

— A. Attended 'Mixed-gen Seson 2 – Session 5: Simulating glasses (Online)' organized by CECAM-HQ-EPFL, 24th February 2022.

Rajeev Kapri

— Ramu Kumar Yadav. Soft Matter Young Investigators Meet (e-SMYIM) 2021 held at IIT Bombay 14 – 16 October 2021.
— Andri Sharma. Soft Matter Young Investigators Meet (e-SMYIM) 2021 held at IIT Bombay 14 – 16 October 2021.
— Rajeev Kapri. Statistical Physics: Recent advances and Future directions (ONLINE) 14 – 15 February 2022.
— Andri Sharma. Statistical Physics: Recent advances and Future directions (ONLINE) 14 – 15 February 2022.
— Andri Sharma. Banglore School on Statistical Physics XII (Online) 28 June – 09 July 2021.
— Andri Sharma. Current Trends in Non-Equilibrium Physics (CTNEP) 22 - 26 Nov 2021.

Samir K. Biswas

— N. A Hoque, DAE Solid State Physics Symposium -2021, 18- 22nd December, BARC Mumbai
— N. A Hoque, Material Research Society of India Conference MRSI– 2021, 20-23 December, IIT Madras
— Amit Kumar, IEEE Workshop on Recent Advances in Photonics, 2022, 4-6 Mach, IEEE Conference, IIT –Bombay.

Sandeep K. Goyal

— Chanchal. Quantum Information and Computation: From Foundations to Applications – 2021. Oct 18-23,2021.
— Chanchal. APS March meeting 2022. 14-18 March 2022
— Vikash Mittal. Sixth International Conference for Young Quantum Information Scientists, YQIS 2021. April 12-16, 2021
— Vikash Mittal. Quantum Information and Computation: From Foundations to Applications – 2021. Oct 18-23,2021.
— Vikash Mittal. APS March Meeting 2022. March 14 - 18, 2022.
— Vikash Mittal. 25th Annual Conference on Quantum Information Processing. March 07 - 11, 2022
— G.P. Teja. Quantum information and computation: From foundations to Applications – 2021 (QFA – 2021). Oct 18-23, 2021
— K.S. Akhilesh. Workshop on Quantum foundations and the boundaries of quantum mechanics. 14th and 15th October 2021.
— K.S. Akhilesh. One-day national level webinar on 'The universal concept of emergence ranging from bird flocks to quantum materials'. 21 December 2021
— Navdeep Arya. APS March Meeting 2022. March 14-18, 2022

Sanjeev Kumar

— Young Investigators Meet on Quantum Condensed Matter, NISER Bhubaneswar (India) – November 2021
— QMAT-2021, TIFR Mumbai (India) – December 2021

Satyajit Jena

— The MINERvA Collaboration meeting, Fermilab, 12-16 July 2021,

Tripta Bhatia

— Tripta Bhatia, Life as a Matter of Fat, STATPHYS KOLKATA XI, 21-25 March 2022.
— Tripta Bhatia, INST – IISERM BILATERAL MEETING 2022, 14-15 March 2022.

— Tripta Bhatia, Origins of Life and Evolving Chemical Systems Meeting 2022, 18-19 February 2022.
— Tripta Bhatia, Micromechanics of Biomembranes, Soft Matter Young Investigator Meet, 14-16 October 2021.

9. Awards and Honours

9.1 Awards won by the faculty

Indranil Banerjee
— Editor (Virology) of Current Clinical Microbiology Reports
— Guest Editor of Frontiers in Microbiology

Kausik Chattopadhyay
— Prof. Kausik Chattopadhyay is the recipient of the "C. R. Krishna Murti Award" of Society of Biological Chemists (India) for the year 2021 for his contributions in the field of Biochemistry and Allied Sciences.

Mahak Sharma
— Selected as 2021 TWAS Young Affiliate for the period of 2021-2026

Rachna Chaba
— Department of Biotechnology (DBT)- Wellcome Trust India Alliance Senior Fellowship

Rhitoban Ray Choudhury
— Section editor-Microbiomes: Current Clinical Microbiology Reports, 2021-present.

Samrat Mukhopadhyay
— Samrat Mukhopadhyay was selected to give the prestigious "New and Notable" lecture at the Biophysical Society meeting in San Francisco, USA in February 2022.
— Samrat Mukhopadhyay has been invited to speak and chair at the Gordon Research Conference on Intrinsically Disordered Proteins that will be held in Les Diablerets, Switzerland in June 2022.

Jino George
— Jino George; Young Scientist Award 2021, Asian Oceanian Photochemistry Association (APA), Japan.

R. Vijaya Anand
— R Vijaya Anand received the prestigious "Bronze Medal" from the Chemical Research Society of India (CRSI) for the year 2022.

Santanu Kumar Pal
— Santanu Kumar Pal became a Fellow of the Royal Society of Chemistry (FRSC), UK.
— Santanu Kumar Pal became Associate Editor in Frontiers in Soft Matter journal.

S. S. V. Ramasastry
— Invited to become the 'Fellow of the Royal Society of Chemistry (FRSC)' under 'Leaders in the Field (LITF)' scheme (2022)
— CDRI Award for Excellence in Drug Research 2022
— Inducted as an Editorial Board member of Organic & Biomolecular Chemistry from February 2022

Baerbel Sinha

— Baerbel Sinha has been elected to the Editorial Advisory Board of Environmental Science and Technology (ES&T) an ACS journal

Chandrakanta Ojha

— Guest of honor in a symposium on Geospatial Intelligence, IEEE-GRSS Bombay Chapter in collaboration with Kolkata Chapter, December 4, 2021

— An active member of the joint working group "Understanding the monsoon phenomenon from a geodetic perspective" of the Inter-Commission Committee on "Geodesy for Climate Research" at the International Association of Geodesy (IAG).

Sunil A. Patil

— Best teacher award 2021, Indian Institute of Science Education and Research Mohali.

Vinayak Sinha

— Scientific Steering Committee Member of the World Meteorological Organization (WMO) Environmental Pollution and Atmospheric Chemistry (SSC-EPAC) under United Nations (2022-present)

— Scientific Steering Committee Member from India (2022-present) of the International Global Atmospheric Chemistry (IGAC) Project under Future Earth

— Scientific Steering Committee Member of the 65 year old International Commission on Global Atmospheric Chemistry and Air Pollution (iCACGP). The Commission functions within IAMAS (International Association of Meteorology and Atmospheric Sciences), within IUGG (International Union of Geodesy and Geophysics) under the non-governmental ICSU (International Council for Science) family

Anu Sabhlok

— Anu Sabhlok has been appointed as an editor for the international journal Dialogues in Human Geography (Sage) in January 2022 for a period of three years

Kapil Hari Paranjape

— Member, National Board for Higher Mathematics, DAE.

— Member of the Council of the Indian Academy of Sciences, Bangalore (till December 2021).

— Member of the Council of the Indian National Science Academy, New Delhi (till December 2021).

— Convenor, CSIR-NET Committee for Mathematics, CSIR.

Krishnendu Gongopadhyay

— Elected as: Member at large, Executive Committee of the Ramanujan Mathematical Society, April 1, 2022–March 31, 2025.

Mahender Singh

— Mahender Singh awarded the Fulbright-Nehru Academic and Professional Excellence Fellowship, 2021.

— Mahender Singh elected as a member of the Editorial board of the journal Proceedings of Mathematical Sciences (Indian Academy of Sciences, Springer), 2022-2024.

— Mahender Singh awarded the Chebyshev international travel grant for ICM at St. Petersburg, 2022.

Sudesh Kaur Khanduja

— Offered NSA Honorary Scientistship from April 01, 2022

Ambresh Shivaji

— Invited member, Vigyan Pratibha National Steering Committee; To dicuss and oversee the policies and implementation of the Vigyan Pratibha project at HBCSE and regional centers, partner S&T instituions, and schools.

Aru Beri

— International Women Young Researcher Award Winner Venus International Women Awards (VIWA) in March 2022

— Awarded Newton International Fellowships Alumni 2021 for the period of 2020-2022 (total grant money received 5561.73 GBP)

Harvinder Kaur Jassal

— Elected as member, International Astronomical Union.

— Elected to the Executive council of the Astronomical Society of India.

Kavita Dorai

— Elected Vice-President of National Magnetic Resonance Society (NMRS) of India (2022).

Kulinder Pal Singh

— Prof. Kulinder Pal Singh, received the ASI Zubin Kembhavi Award (Observational and instrumentation work in astronomy and allied fields) for the year 2021 given to "Team Astrosat" for the successful design, build, launch and operations of India's first multi-wavelength space observatory, as part of the Team AstroSat, leading the development of India's first X-ray focusing telescope. Award was presented on March 26, 2022 at the Astronomical Society of India meeting at IIT Roorkee.

Smriti Mahajan (SERB Research Scientist)

— First Prize in Hindi Essay writing competition, Hindi Pakhwada organised by the Inter-University Centre for Astronomy and Astrophysics, 2021-22

Sudeshna Sinha

— Editor of Chaos: An Interdisciplinary Journal of Nonlinear Science

— Associate Editor of Communications in Nonlinear Science and Numerical Simulation

— Member of the Board of Editors of Pramana -- Journal of Physics

— Member of the Board of Editors of the Indian Journal Physics

— Member of SERB Expert Committee in the area of Physical & Mathematical Sciences

— Member of the Sectional Committee (Physics), Indian Academy of Sciences, Bangalore

— Chair, Membership Advisory Committee (MAC) of The World Academy of Sciences (TWAS), Trieste

— Member of the Working Group of the Kerala State Planning Board

— Member of the Executive Committee of Haryana State Council for Science, Innovation and Technology (HSCSIT)

— Member of the Council of the Indian National Science Academy (INSA)

— International Advisory Committee of STATPHYS28, Tokyo, August 2022

9. 2. Awards won by the students, post-docs, and other group members

1. Indian Investigator Network has chosen three Ph.D. students for IIN Excellence Award 2022. Students will get prize money as well as citation. The name of the students: Dr Satish Tiwari, Ms Parvathy Ramesh and Ms Jayati Gera.
2. Sonam Chorol. Student Membership Award. American Ornithological Society. January 6, 2022.
3. Sonam Chorol. Best Popular Science Story Award. Department of Science and Technology, Augmenting Writing Skills for Articulating Research (AWSAR). February 28, 2022.
4. Sonam Chorol. Travel grant. International Society for Behavioural Ecology. March 11, 2022.
5. Soniya Devi Yambem. Travel grant. International Society for Behavioural Ecology. March 11, 2022.
6. Tsering Choton-ESEB travel grant.
7. Neetika Ahlawat-SSE International
8. Neetika Ahlawat -Travel Award for ESEB 2022 Conference going to be held in Prague, Czech Republic from 14th August to 19th August 2022.
9. Archit Gupta - EMBO Travel Award for 'Cellular Mechanisms driven by Phase Separation': Heidelberg, Germany, May 2022
10. Archit Gupta - EMBO Travel Award for 'Evo-Chromo: Evolutionary approaches to research in chromatin': Aarhus, Denmark, May 2022
11. Garima Arya, PhD student-Bill & Melinda Gates Foundation Travel Award
12. Alok Tiwary, PhD student, received the travel grant from the Ecological Society of America (ESA), ESA virtual meeting, for Applied Ecology.
13. Alok Tiwary, PhD student, received the Best Oral Presentation Award, National Post-Doctoral Symposium, Virtual Meeting (NPDS), India, conducted by IISc and NCBS.
14. Prachi Ojha received the 2021 Trainee Professional Development Award (TPDA) from Society for Neuroscience, USA.
15. Prachi Ojha received the IBRO-SFN travel award to attend the Society for Neuroscience meeting from November 8-11, 2021.
16. Anamika Avni received international travel award from the Biophysical Society, USA.
17. Ms. Labhini Singla received one of the best poster awards in 48th National Seminar on Crystallography, 25-28th November, 2021, IIT Roorkee.
18. Shradha Sapru (MS): Best academic performance in class of 2021.
19. Shradha Sapru (MS): Excellence award in Chemistry 2021.
20. Shaina Dhamija (PhD): "FiO + LS Incubic Milton Chang" travel grant from Optical Society of America (OSA) for attending "Frontiers in Optics/Laser Science" Conference.
21. Anita Yadav (Postdoc): Fulbright Nehru Post Doctoral Fellowship by United States-India Educational Foundation (USIEF)
22. Shaina Dhamija (PhD): International Travel Support (ITS), Science and Engineering Research Board, DST, India (Travel grant no. ITS/2021/000272) (Not availed).
23. Shaina Dhamija (PhD): International Travel Grant, Council of Scientific & Industrial Research, India (Travel grant no. TG/11385/21-HRD) (Not availed).
24. Sumit Yadav (PhD): International Travel Support (ITS), Science and Engineering Research Board, DST, India (Travel grant no. ITS/2021/000218) (Not availed).
25. Sumit Yadav (PhD): International Travel Grant, Council of Scientific & Industrial Research, India (Travel grant no TG/11374/21-HRD) (Not availed).
26. Sumit Yadav (PhD): "Student Conference Support" travel grant from SPIE for attending " SPIE Photonics West 2022" (Not availed).
27. Amreen K. Bains received award at the J-NOST conference organized by the School of Chemistry, University of Hyderabad.
28. Ms. Amreen K. Bains and Ms. Kirti Singh received first and second prize respectively in oral presentation at NSD-event organised by Chemical Research Society of India (CRSI) & CCOST.
29. Ms. Amreen K. Bains awarded with KVRSS Research Award (chemistry Winner)-2021

30. Ms. Amreen K. Bains awarded with Recipient of Indian Chemical Society Research Excellence Award (RTCS-2021)
31. Vikramjeet Singh Received Best poster award in ICRACS 2021.
32. Dr. Jhuma Dutta. DST Women Scientists Scheme (WOS-A) fellowship 2021.
33. Akhila Kadyan. Best poster award in the Spectroscopy session of the 27th CRSI National Symposium in Chemistry 2021 (ACS Physical Chemistry Au poster prize)
34. Gurdeep Singh received the Best Poster award in the "International Symposium on Recent Advances in Self Assembled Materials and Supramolecular Chemistry" organized by the Department of Chemistry at Guru Nanak Dev University, Amritsar on March 19, 2022.
35. Ms. Radha Tomar received the best oral presentation award in the National Virtual NITT Organic Chemistry Conference (NITTOCC-2021) at the National Institute of Technology Tiruchirappalli (NITT).
36. Mr. Arup Dalal received the best poster presentation award in the National Virtual NITT Organic Chemistry Conference (NITTOCC-2021) at the National Institute of Technology Tiruchirappalli (NITT).
37. Vidhika Punjani was awarded (International Liquid Crystal Society) ILCS Student Travel Grant 2021 for attending CLC, XXIII Conference on Liquid Crystals, CLC 2021, Karpacz, Poland, 18-21st October, 2021 (Declined).
38. Vidhika Punjani was awarded student fee waiver for the registration fee by Advanced Materials & Liquid Crystal Institute (AMLCI) for attending 28th International Liquid Crystal Conference (ILCC 2022) to be held in Lisbon, Portugal (24-29th July, 2022).
39. Anshika Baghla got selected for Prime Minister's Research Fellowship (PMRF) in the Dec 2021 cycle.
40. Varsha Jain's liquid crystal picture has been selected as the featured artwork of March 2022 in International Liquid Crystal Society (ILCS) art contest with image title - Nematic cybotactic phase to smectic A phase transformation point.
41. Varsha Jain was awarded the Dewan Jawahar Lal Nayar Memorial Prize for the year 2021 by Indian liquid Crystal Society for the best poster presentation at 28th NCLC December 21-23, 2021, held at Assam University, Silchar.
42. Varsha Jain was awarded the RTCS-OBC Award 2021, for the best "Flash Presentation" at International Conference on Recent Trends in Chemical Sciences Organic & Bio-Chemistry (RTCS-OBC) 2021, December 22-24, 2021, jointly organized by the Department of Chemical Sciences, IIT Kharagpur and Department of Chemical Sciences, IISER Kolkata.
43. Varsha Jain's publication got featured on Journal Cover page issue 2 of the year 2022- Design, Synthesis and Characterization of Achiral Unsymmetrical Four-ring based Hockey-stick Shaped Liquid Crystals: Structure-Property relationship. Liq. Cryst., 2022, 49, 162-171.
44. Ipsita Pani was awarded best oral presentation at Research Conclave 2022, IIT Indore
45. Ipsita Pani was awarded best Oral Presentation by American Chemical Society at Compflu 2021: International Conference on Complex Fluids and Soft Matter.
46. Supreet Kaur's publication got featured on Journal Cover art for "Observation of "de Vries-like" properties in bent-core molecules" was selected to grace the issue of Chemical Science [February 2022].
47. Prashant Kumar won the best oral presentation award at the J-NOST conference organized by the School of Chemistry, Univ. of Hyderabad.
48. Nirmal Malik was awarded the prestigious Prime Minister's Research Fellowship (PMRF).
49. Mamta Bhandari. Hydrosilylation of carbonyls and imines catalysed by cationic boron and aluminium complexes. Best poster presentation award by ASC Omega in international conference "Main group molecules to materials – II (13th-15th December 2021)".
50. Ankit Kumar Gaur. Wiley Best Poster Award. Poster Presented in International Symposium on "Recent Advances in Self Assembled Material and Supramolecular Chemistry", GNDU, Amristar, 19th March, 2022.
51. SRSLab group member Shivam Chawla, a Ph.D. scholar, received the travel grant for the InSAR workshop on 'Principles and Application of Satellite Radar Remote Sensing' organized by IIT Roorkee, India, in January 2022 (postponed to May 2022 for COVID).

52. Savita Datta (PhD scholar at IISER Mohali) received the AGU travel grant to attend the 2021 AGU conference
53. SRSLab group member Aparna, a 4th-year BS-MS student, was selected for an international training program on Mountain Geo Hazard Assessment and Management (MGAM-2022), March 2022, organized by Research & Development Centre (DGRE) and DRDO in Manali, India.
54. Shivam Chawla and Aparna were selected for the 13th International Summer School on Radar/SAR, July 2022, by Fraunhofer FHR, Germany.
55. Sukrampal (PhD scholar) received the EMBO Scientific Exchange Grant award (2022).
56. Ms. Moumita Roy (PhD scholar) received the SITARE-GYTI (Students Innovations for Translation & Advancement of Research Explorations-Gandhian Young Technological Innovation) Award 2021, which includes 15 lakhs research grant.
57. Mr. Chetan Sadhotra (Ph.D. scholar) received the DST-INSPIRE Fellowship (2021).
58. Ms. Moumita Roy received the Best Oral Presentation Award at the International Conference on Advances in Sustainable Research for Energy and Environmental Management (ASREEM-2021), organized by Sardar Valabhbhai National Institute of Technology (SV-NIT), Surat.
59. Sukrampal received the travel grant from the Federation of European Microbiological Societies (FEMS) to attend "Electromicrobiology conference – 2021" Centre for Electromicrobiology, Aarhus University, Aarhus, Denmark
60. Srishti, Ramandeep Singh and Sukrampal received the travel grants from the Centre for Electromicrobiology, Aarhus University, Denmark, to attend the Electro micro biology conference 2021.
61. Ashish K Sharma received the Early Career Scientist best poster award in the International Global Atmospheric Chemistry (IGAC) 2021 Conference. The award covers a free registration to the next IGAC Conference in September 2022, Manchester, UK along with travel funds.
62. The following doctoral and related research grants were awarded to PhD student, Anubhav Preet Kaur: June 2021: Emslie Horniman Scholarship Fund from the Royal Anthropological Institute, London, U.K. June 2021: Sepkoski Grant from the Palaeontological Society, U.S.A. December 2021: The Leakey Foundation Grant Fund, U.S.A. December 2021: Sylvester Bradley Award from the Palaeontological Association, U.K. March 2022: Deinje Kenyon fellowship from the Society for American Anthropologists, U.S.A.
63. Manisha Kushwaha and Ankur Prashar received the Writing Urban India Fellowship of the Centre for Policy Research New Delhi from Feb 2021-June 2021
64. Nidhi Gupta (MP18009) was awarded the Prime Minister's Research Fellowship during the 7th cycle of PMRF. Fellowship awarded during September 2021.
65. Dr. Manpreet Singh (recent PhD student of Dr. Mahender Singh) was awarded the Fulbright-Nehru Postdoctoral Fellowship for US for two years, 2022.
66. Dr. Manpreet Singh (recent PhD student of Dr. Mahender Singh) was awarded the postdoctoral fellowship at Institute Superior Tecnico in Lisbon, 2022.
67. Dr. Neha Nanda (recent PhD student of Dr. Mahender Singh) was awarded the French government postdoctoral fellowship for France for two years, 2022.
68. Dr. Divya Sharma (former MS Thesis student of Dr. Mahender Singh) joined UNESCO Headquarters in Paris as an education policy and research consultant, 2021.
69. Mr. Pravin Kumar (current PhD student of Dr. Mahender Singh) was awarded the Prime Minister Doctoral Fellowship, 2022.
70. Mr. Biswadeep Karmakar (current PhD student of Dr. Mahender Singh) was awarded the Shyama Prasad Mukherjee Fellowship, 2021.
71. Mr. Warsimakram I K received PMRF for his PhD thesis work.
72. Raunok Basu, Received the UGC-NET Fellowship for securing All India Rank 75 in the Joint CSIR-UGC NET Examination (2021).
73. Ashutosh Tripathi, Received the MEXT scholarship from the Japanese government to pursue Ph.D. at The Graduate University for Advanced Studies in Japan (2021).
74. Prime Minister fellowship for PhD. Student Name: Vipin Chand Devrari.

75. Indrajeet Tambe got PhD position at Malmö University, Sweden

10. Major facilities procured

Sadhan Das

— Renovating the common cell culture facility at AB2.

Samrat Mukhopadhyay

— Samrat Mukhopadhyay coordinated the procuring and setting up the DST-FIST-funded Super-resolution Microscopy facility.

Shravan Kumar Mishra

— Microscope for live-cell imaging.

P. Balanarayan

— Computing cluster from DST core-research grant funding.

Suman K. Barman

— Computer workstation from DST-Inspire Faculty Research grant (DST/INSPIRE/04/2020/002347)
— Electrochemical Analyzer and UV-Visible spectrophotometer from institute start-up grant received as a new faculty.

Sabyasachi Rakshit

— Temperature controlled table-top centrifuge
— Magnetic tweezers (IX73 microscope, high-precision objective piezo with controller, CMOS camera, high-throughput CPU system with 32 cores)
— Live cell-imaging software LAS X Time Lapse

Chandrakanta Ojha

— Procured high-end workstation of Intel Xenon Platinum processor
— Procured NAS storage server

Raju Attada

— We procured Network Attached Storage (NAS) for big data storage for the research group members and currently placed at Data centre.

Vinayak Sinha

— Set up the MOES sponsored RASAGAM project CHARON-PTR-TOF-MS facility at super site in New Delhi for source apportionment studies.

Kinjalk Lochan

— Computer Server Fusionstor - Invento i6081

Samir K. Biswas

— We have designed and developed indigenously nanofiber fabrication facility for our sensor film production.

11. Current Project and Fellowships

Sr. No.	Project No.	Name of project	Principal Investigator	Funding Agency	Duration	Total Sanctioned Cost
1	MAX-16-0108	INVESTIGATING SUB-FS ELECTRONIC PROCESS WITH SHAPED XUV AND IR PULSES	DR. KAMAL P SINGH	MAX PLANC/DST	2016-2021	20000 Euro
2	MEFC-16-0121	NATIONAL CARBONACEOUS AEROSOLS PROGRAMME (NCAP) WORKING GROUP-III PROJECT	DR BAERBEL SINHA	MOEF-CC	2016-2020	106,00,000.00
3	INSPIRE-16-0122	INSPIRE FACULTY AWARD	DR. KINJALK LOCHAN	DST	2016-2020	83,00,000.00
4	DST-17-0127	MODULAR WEIGHTS AND SERRE WEIGHTS OF CERTAIN MOD P GALOIS REPRESENTATIONS	DR. ABHIK GANGULI	DST-SERB	2017-2020	2,42,000.00
5	DBT-17-0128	UNDERSTANDING THE EVOLUTION OF IMMUNE RESPONSE: AN EXPERIMENTAL EVOLUTION APPROACH	DR. N. G. PRASAD	DBT	2017-2020	60,68,200.00
6	ICMR-17-0130	LIGHT BASED ULTRASOUND ARRAY DETECTOR DEVELOPMENT FOR DIAGNOSING RBC UNDER VARIOUS DISWASE MODEL IN INFANT	DR. SAMIR KUMAR BISWAS & DR. KAMAL P SINGH	ICMR	2017-2020	143,00,000.00
7	DST-17-0132	NOVEL QUANTUM GROUND STATES IN NORWSTRUTURED DEVICES (Swarnajayanti)	DR. GOUTAM SHEET	DST	2017-2021	356,79,600.00
8	INSPIRE-17-0133	INSPIRE FACULTY AWARD	DR. ANIRBAN BOSE	DST	2017-2021	83,00,000.00
9	DBT-17-0134	DEVELOPING A PLATFORM FOR GENERATING DIAGNOSTIC AND THERAPEUTIC SINGLE DOMAIN ANTIBODIES FOR VIRAL INFECTIONS EMPLOYING PHAGE DISPLAY TECHNOLOGY	DR. SHARVAN SEHRAWAT	DBT	2017-2020	64,52,200.00
10	INSPIRE-17-0135	INSPIRE FACULTY AWARD	DR. SANJIB DEY	DST	2017-2021	83,00,000.00

11	DBT-17-0136	EPIGENETICS OF GENS REGULATION IN MULLER GLIA DEDIFFERENTIATION AND STEM CELLS INDUCTION DURING RETINA REGENERATION IN ZEBRAFISH	DR. RAJESH RAMACHANDRAN/ DR. K S SANDHU	DBT	2017-2020	64,59,600.00
12	DBT-17-0141	DBT ALLIANCE	DR. LOLITIKA MANDAL	DBT ALL	2017-2022	441,32,492.00
13	INSPIRE-17-0144	INSPIRE FACULTY AWARD	DR. NEERAJA SAHASRABUDHE	DST	2017-2022	35,00,000.00
14	FIST-17-0147	FIST PROGRAM-2017	DR. ANAND K. BACHHAWAT	DST	2018-	460,00,000.00
15	INSPIRE-18-0149	INSPIRE FACULTY AWARD	DR. SHARMILA BHATTACHARYA	DST	2018-2023	83,00,000.00
16	UGC-18-0153	ASSESSING THE POSSIBLE ROLE OF CRIEGEE INTERMEDIATES (CI) AS ATMOSPHERIC OXIDANTS IN THE NORTHWEST INDO-GANGETIC PLAIN	DR. VINAYAK SINHA	UGC	2018-2021	141,93,380.00
17	DST-18-0155	DEFORMATION OF TORSORS UNDER PARAHORIC GROUP SCHEMES ON THE PROJECTIVE LINE	DR. YASHONIDHI PANDEY	DST-SERB	2018-2021	6,60,000.00
18	DST-18-0156	A1-HOMOTOPY AND BIRATIONAL GEOMETRY	DR. CHETAN TUKARAM BALWE	DST-SERB	2018-2021	6,60,000.00
19	INSPIRE-18-0158	INSPIRE FACULTY AWARD	DR. SOMA MAITY	DST	2018-2021	35,00,000.00
20	DST-18-0159	NEGATIVE CURVATURE IN GROUP AND COMBINATION THEOREMS	DR. PRANAB SARDAR	DST-SERB	2018-2021	6,60,000.00
21	DST-18-0160	CHEMISTRY UNDER STRONG COUPLING	DR. JINO GEORGE	DST-SERB	2018-2021	58,30,000.00
22	DST-18-0162	UNDERSTANDING THE TGF BETA/MMP REGULATORY NETWORK AND COMPARATIVE ANALYSIS OF THE PROTEOME DURING RETINA HEART AND FIN REGENERATION USING LESSONS FROM ZEBRAFISH	DR. RAJESH RAMACHANDRAN	DST-SERB	2018-2021	48,48,000.00

23	DST-18-0164	PHOTONIC QUANTUM INFORMATION PROCESSING CLASSICAL IMPLEMENTATION AND QUANTUM MEMORY	DR. SANDEEP KUMAR GOYAL	DST-SERB	2018-2021	24,08,807.00
24	DST-18-0165	ROLE OF HUMAN HOST FACTORS IN ENDOCYTIC UPTAKE OF INFLUENZA A VIRUS	DR. INDRANIL BANERJEE	DST-SERB	2018-2021	25,85,000.00
25	DST-18-0166	DEVELOPMENT OF A HYBRID APPROACH TO PREDICT TERTIARY STRUCTURE OF MULTI-DOMAIN PROTEINS	DR. SHASHI BHUSHAN PANDIT	DST-SERB	2018-2021	15,85,200.00
26	DST-18-0167	STUDIES ON THE CONSTRUCTION OF ENANTIOMERICALLY ENRICHED MEDIUM-SIZED RING BASED DIBENZOAZEPINE, DIBENZOAZOCINE AND ALLOCOLCHICINE BIARYL ALKALOID MOTIFS CONTAINING AMINO ACID AND AMINO ALCOHOL BACKBONE VIA C-H FUNCTIONALIZATION ROUTE AND THEIR BIOLOGICAL ACTIVITIES	DR. A S BABU	DST-SERB	2018-2021	38,69,668.00
27	NMHS-18-0168	DISTRIBUTION AND QUANTIFICATION OF ORGANIC CONTAMINANTS AND MICRO-PLASTIC CONCENTRATIONS IN LAKE SYSTEMS FROM HIMACHAL PRADESH INDIA	DR. ANOOP AMBILI	NMHS	2018-2021	38,50,000.00
28	DBT-18-0169	CO2 ELECTRO-BIOREFINERY: INDUSTRIAL CARBON DIOXIDE CONVERSION INTO MULTICARBON CHEMICALS THROUGH INTEGRATED BIOELECTROCHEMICAL AND BIOLOGICAL PROCESSES	DR. SUNIL ANIL PATIL	DBT	2018-2021	50,62,000.00
29	INSPIRE-18-0170	INSPIRE FACULTY AWARD	DR. ARU BERI	DST	2018-2023	83,00,000.00
30	DST-18-0171	UNDERSTANDING THE NEUROPROTECTIVE MECHANISM OF C. ELEGANS MANF MESENCEPHALIC, ASTROCYTE DERIVED NEUROTROPHIC FACTOR PROTEIN IN AN -IN-VIVO MODEL OF PARKINSON', DISEASE	DR. PRATIMA PANDEY	DST	2018-2021	31,60,000.00

31	DST-18-0172	ONE-POT CASCADE APPROACHES FOR THE SYNTHESIS OF CARBZOLES, INCLUDING ATROPSELECTIVE STRATEGIES	DR. S. S. V. RAMASASTRY	DST-SERB	2018-2021	39,18,200.00
32	DST-18-0173	NATURAL VARIATION OF PLANT ROOT DEVELOPMENT UNDER HIGH TEMPERATURE STRESS IN ARABIDOPSIS	DR. SANTOSH B. SATBHAI	DST-SERB	2018-2021	38,79,832.00
33	DST-19-0174	KNOT INVARIANTS ARISING FROM QUANDLES	DR. SHANE D'MELLO	DST-SERB	2019-2022	6,60,000.00
34	DST-19-0175	STUDY OF PORE FORMATION INDEPENDENT CELL DEATH MECHANISM ELICITED BY THE BACTERIAL PORE FORMING TOXIN VIBRIO CHOLERAE CYTOLYSIN	DR. KAUSIK CHATTOPADHYAY	DST-SERB	2019-2022	43,57,120.00
35	DBT-19-0176	CHARACTERIZING THE ROLE OF TBC- DOMAIN CONTAINING PROTEIN-TBC1D9A IN MEMBRANE TRAFFICKING	DR. MAHAK SHARMA	DBT	2019-2024	25,00,000.00
36	DST-19-0177	A RATIONAL DESIGN OF CHARGE-TRANSFER MEDIATED PLASTIC FERROELECTRIC POLYMERS	DR. RAJ KUMAR ROY	DST-SERB	2019-2022	33,22,000.00
37	DST-19-0178	QUANTUM INFORMATION TECHNOLOGIES WITH PHOTONIC DEVICES	PROF. ARVIND	DST	2019.2022	5864,63,000.00
38	DST-19-0179	A GENETIC SCREEN FOR THE IDENTIFICATION AND CHARACTERIZATION OF GENES THAT AFFECT NADPH HOMEOSTASIS IN YEAST	DR. ANAND K. BACHHAWAT	DST-SERB	2019-2022	54,37,360.00
39	DST-19-0180	UNDERSTANDING THE INTERCONNECTION BETWEEN LONG CHAIN FATTY ACID METABOLISM, REDUCTIVE STRESS AND ENVELOPE STRESS RESPONSES IN ESCHERICHIA COLI	DR. RACHNA CHABA	DST-SERB	2019-2022	62,06,288.00
40	QUST-19-0181	QUANTUM IMAGING AND QUANTUM PROCESSING WITH PHOTONICS	DR. MANDIP SINGH	DST	2019-2022	565,02,000.00

41	QUST-19-0182	HIGH TEMPUERATURE PHOTONIC QUANTUM MEMORY	DR. SANDEEP KUMAR GOYAL & PROF. ARVIND	DST	2019-2022	73,92,000.00
42	QUST-19-0183	QUANTUM CONTEXTUALITY ITS ROLE IN QUANTUM COMPUTATION AND Q & D PROTOCOLS	PROF. ARVIND & SANDEEP GOYAL	DST	2019-2022	72,52,000.00
43	DBT-19-0184	NATURAL VARIATION OF ROOT DEVELOPMENT UNDER ABIOTIC STRESS RESPONSES IN ARABIDOPSIS AND PIGEON PEA (TOOR DAL) (RAMALINGASWAMI FELLOSHIP)	DR. SANTOSH B. SATBHAI	DBT	2019-2024	42,50,000.00
44	BIRAC-19-0185	AN IMPROVED YEAST PROCESS FOR THE PRODUCTION OF SCLAREOL	DR. ANAND K. BACHHAWAT	DST-BIRAC	2019-2021	49,00,000.00
45	DST-19-0186	NEW HYPOTHESIS DRIVEN PHARMACEUTICALLY IMPORTANT COMPONDS	DR. S.S.V. RAMSASTRY	DST	2019-2020	203,00,000.00
46	DST-19-0187	GLOBAL KNOT THEORY INVARIANTS AND CLASSIFICATION	DR. K. GONGOPADHYAY	DST	2019-2022	37,79,400.00
47	DBT-19-0188	ROLE OF HUMAN LENS CRYSTALLINS IN THE DEVELOPMENT AND VASCULAR REMODELING OF THE EYE	DR. RAJESH RAMACHANDRAN	DBT	2019-2021	27,00,000.00
48	ISRO-19-0189	PROBING THE REGIONS OF STRONG GRAVITY AROUND NEUTRON STARS	DR. ARU BERI	ISRO	2019-2023	24,12,000.00
49	DBT-19-0190	HYPERTHERMOPHILE ENZYME HYDROLASE RESEARCH CENTRE (HEHRC): A MICRO CENTRE FOR RESEARCH AND DEVELOPMENT RELATING TO THERMOPHILE AND HYPERTHERMOPHILE MICROBE-DERIVED HYPER THERMOSTABLE HYDROLASE ENZYMES RELEVANT TO BIOFUELS AND THE ENERGY BIOSCIENCES	PROF. PURNANANDA GUPTASARMA	DBT	2019-2024	215,25,988.00

50	DBT-19-0191	GOLGI-TO-NUCLEUS COMMUNICATION VIA INTRON SPECIFIC PRE-MRNA SPLICING	DR. SHRAVAN K. MISHRA	DBT ALL	2019-2024	334,40,000.00
51	DST-19-0192	EXPLORING CHEMOTACTIC AND CATALYTIC PROPERTIES OF OLIGONUCLEOTIDES FOR DESIGNING OF SELF POWERED NANOMOTORS	DR. SUBHABRATA MAITI	DST-SERB	2019-2021	27,80,000.00
52	TIFR-19-0193	VIGYAN PRATIBHA	DR. AMBRESH SHIVAJI & DR. N G PRASAD	TIFR-HBCSE	2019-2020	11,50,000.00
53	DST-19-0194	ELECTROACTIVE HALOALKALIPHILES ENRICHMENT AND CHARACTERIZATION OF ELECTROCHEMICALLY ACTIVE MICROORGANISMS FROM THE EXTREME SALINE ALKALINE HABITAT	DR. SUNIL ANIL PATIL	DST-SERB	2019-2021	32,27,951.00
54	RSC-19-0195	RAPID VARIABILITY AS A PROBE OF ASSOCIATED ACCRETION FLOWS IN BLACK HOLE BINARIES	DR. ARU BERI	ROYAL SOCIETY	01/07/2019 TO 30/06/2020	4,71,123.00
55	INSPIRE-19-0196	INSPIRE FACULTY AWARD	DR. VAIBHAV VAISH	DST	UP 28/08/2019	17,68,208.00
56	DST-19-0197	ASPECTS OF QUANTUM INFORMATION IN QFT OVER CURVED GEOMETRIES: STUDY THROUGH QUANTUM DETECTORS AND ANALOGUE SYSTEMS	DR. KINJALK LOCHAN	DST-SERB	2019-2021	7,26,000.00
57	DST-19-0198	QUANTUM INFORMATION THEORETIC FORMULATIONS OF QUANTUM THERMODYNAMICS WITH MULTIPLE CONSERVED QUANTITIES, AND THEIR APPLICATIONS IN QUANTUM HEAT ENGINES AND QUANTUM TECHNOLOGIES	DR. M N BERA	DST-SERB	2019-2022	6,55,160.00
58	DST-19-0199	LATTICE SUPERSYMMETRY AND HOLOGRAPHY	DR. ANOSH JOSEPH	DST-SERB	2019-2022	19,44,488.00
59	DBT-19-0200	MECHANISMS REGULATING MEMBRANE FUSION WITH LYSOSOMES AND LYSOSOME REFORMATION	DR. MAHAK SHARMA	DBT ALL	2019-2024	445,50,000.00

60	DST-19-0201	PENTACARBOXYCYCLOPENTADIENE(PCCP) BASED CHIRAL BRONSTED ACID AND BIFUNCTIONAL ORGANOCATALYSTS FOR ENANTIOSELECTIVE TRANSFORMATIONS	DR. R VIJAYA ANAND	DST-SERB	2019-2022	43,08,150.00
61	DST-19-0202	RADICALS OF HETEROCYCLIC COMPOUNDS AND POLYCYCLIC AROMATIC HYDROCARBONS (PAHS) – PHOTOCHEMISTRY AND THERMOCHEMISTRY USING MATRIX ISOLATION IR AND UV-VIS SPECTROSCOPY AND COMPUTATIONS	DR. SUGUMAR VENKATARAMANI	DST-SERB	2019-2022	43,08,150.00
62	DST-19-0203	DESIGN AND SYNTHESIS OF NOVEL LUMINESCENT DISCOTIC LIQUID CRYSTALS FOR APPLICATION AS EMITTERS IN ORGANIC LIGHT EMITTING DIODES	DR. SANTANU KUMAR PAL	DST-SERB	2019-2022	39,24,470.00
63	STARS-19-0204	STUDY OF THE MECHANISMS OF CELL DEATH AND IMMUNOMODULATORY RESPONSES TRIGGERED BY THERMOSTABLE DIRECT HEMOLYSIN A MAJOR VIRULENCE FACTOR OF VIBRIO PARAHAEMOLYTICUS	DR. KAUSIK CHATTOPADHYAY	STARS-MHRD	2019-2022	78,09,000.00
64	STARS-19-0205	SINGLE DOMAIN ANTIBODIES AS NOVEL THERAPEUTICS FOR SNAKEBITES	DR SHARVAN SEHRAWAT	STARS-MHRD	2019-2022	49,57,000.00
65	STARS-19-0206	CAVITY CATALYSIS (CAVCAT) ACCELERATING CHEMICAL REACTIONS BY COUPLING TO VACUUM FIELD	DR. JINO GEORGE	STARS-MHRD	2019-2022	49,92,000.00
66	STARS-19-0207	A SYSTEMS APPROACH TO DECIPHER THE MECHANISMS OF ACTIVATION OF CPXAR TWO COMPONENT SYSTEM BY LONG CHAIN FATTY ACIDS, A PATHWAY IMPLICATED IN ANTIBIOTIC RESISTANCE AND VIRULENCE OF GRAM-NEGATIVE BACTERIA	DR. RACHNA CHABA	STARS-MHRD	2019-2022	49,97,000.00
67	DST-19-0208	KNOTS, GROUPS AND ACTIONS	DR. MAHENDER SINGH	SJF-SERB	2020-2024	55,36,128.00
68	DST-19-0209	SWARNAJAYANTI FELLOWSHIP	DR. MAHENDER SINGH	SJF-DST	2020-2024	40,00,000.00

69	DST-19-0210	INTERACTING URN PROCESSES AND THEIR APPLICATION TO OPINION DYNAMICS	DR. NEERAJA SAHASRABUDHE	DST-SERB	2019-2022	6,60,000.00
70	DST-20-0211	INVESTIGATING THE ROLE OF SHOOT CELL TYPE-SPECIFIC TRANSCRIPTION FACTORS IN REGULATION OF CYTOKININ BIOSYNTHESIS, SIGNALLING, AND HOMEOSTASIS IN APICAL MERISTEM OF ARABIDOPSIS THALIANA	DR. RAM KISHORE YADAV	DST-SERB	2020-2023	43,10,839.00
71	DST-20-0212	QUANTUM COMPUTING, CONTROLLING DECOHERENCE AND QUANTUM SIMULATIONS ON AN NMR QUANTUM COMPUTER	DR. KAVITA DORAI & PROF. ARVIND	DST	2020-2023	911,14,000.00
72	STARS-20-0213	SYSTEMATIC EVALUATION OF THE ROLE OF CELLULAR CATHEPSINS IN INFLEUNZA INFECTION AND IDENTIFICATION OF NOVAL ANTI-INFLUENZA DRUG TARGETS	DR. INDRANIL BANERJEE	STARS-MHRD	2020-2023	49,49,000.00
73	STARS-20-0214	STUDYING THE MARRIAGE OF QUANTUM SPIN LIQUIDS WITH OTHER NOVEL STATES OF ELECTRONIC MATTER TO DISCOVER NEW FUNCTIONALITIES	DR. YOGESH SINGH	STARS-MHRD	2020-2023	49,88,000.00
74	STARS-20-0215	FEMTOSECOND LASER PROCESSED SPIDER SILK AS N NOVEL 3D-SCAFFOLD AND BIOSENSOR	DR. KAMAL P SINGH	STARS-MHRD	2020-2023	49,97,080.00
75	STARS-20-0216	BIO-CATALYSIS DRIVEN MICROSCALE FLOW AT FUNCTIONAL ORGANIC INTERFACES FOR HEALTHCARE APPLICATIONS	DR SUBHABRATA MAITI & DR. SANTANU K. PAL	STARS-MHRD	2020-2023	77,00,000.00
76	STARS-20-0217	SUBSISTENCE AND SYMBOLISM IN PREHISTORIC INDIA UNDERSTANDING ENVIRONMENTAL CONTEXTS IN RELATION TO HOMO SAPIENS DISPERSALS AND ADAPTATIONS	DR. PARTH R CHAUHAN	STARS-MHRD	2020-2023	99,39,000.00
77	STARS-20-0218	BENCHMARKING HERBAL AYURVEDIC MEDICINES USING NMR METABOLOMICS TECHNIQUES	DR. KAVITA DORAI	STARS-MHRD	2020-2023	49,51,000.00
78	STARS-20-0219	UNDERSTANDING THE MOLECULAR DYNAMICS OF YING YANG1 (YY1) DURING RETINA REGENERATION	DR. RAJESH RAMACHANDRAN	STARS-MHRD	2020-2023	49,59,000.00

79	DST-20-0220	AWARD RESEARCH SCIENTIST SCHEME	DR. MONIKA SHARMA	DST-SERB	2020-2022	46,00,000.00
80	DST-20-0221	GENERATION OF ISOLATED ATTOSECOND PULSE OF LIGHT AND ITS APPLICATION INVESTIGATING ATTOSECOND DYNAMICS OF SMALL QUANTUM SYSTES	DR. KAMAL P SINGH	DST-SERB	2020-2023	73,67,800.00
81	DAE-20-0222	DEVELOPMENT OF A UREA DERIVATIVE COMPOUND (D27) AS A POTENTIAL DRUG AGAINST SARS-COV-2	DR. INDRANIL BANERJEE	DAE-BRNS	2020-2022	33,20,000.00
82	DST-20-0223	MECHANISMS FOR PREVENTION OF ABERRANT ORIC INDEPENDENT CHROMOSOMAL REPLICATION IN BACTERIA	PROF. J. GOWRISHANKAR	DST-SERB	2020-2023	56,18,080.00
83	DST-20-0224	SYNTHETIC RECONSTRUCTION OF AN ATTENUATED SARS-COV-2 VIRUS FOR VACCINE DEVELOPMENT AND A HIGH CONTENT INHIBITOR SCREEN	DR. ANAND K. BACHHAWAT, DR. SHARVAN SEHRAWAT, DR. INDRANIL BANERJEE, DR. SSV RAMASASTRY	DST-SERB	2020-2023	95,50,000.00
84	FIST-20-0225	FIST PROGRAM-2019	DR. S.A. BABU	DST FIST	2020	244,00,000.00
85	DST-20-0226	AN INNOVATIVE SPIN TO THE EXISTING WATER CHALLENGES: WASTEWATER TO ENERGY, CLEAN WATER AND FERTILIZER THROUGH THE INTEGRATION OF TRADITIONAL BIOLOGICAL AND ADVANCED BIOELECTROCHEMICAL APPROACHES	DR. SUNIL ANIL PATIL	DST	2020-2023	33,64,460.00
86	DST-20-0227	PHOTOSWITCHABLE AND MAGNETIC PHOTOSWITCHABLE IONIC LIQUIDS THEORY AND EXPERIMENTS	DR. SUGUMAR VENKATARAMANI	DST	2020-2023	27,25,150.00
87	DBT-20-0228	MECHANISTIC STUDY OF PLASMODIUM APICOPLAST REPLICATION	DR. INDRAJIT LAHIRI	DBT ALL	2020-2025	350,79,000.00

88	DST-20-0229	MOLECULAR GENETIC DISSECTION OF THE MECHANISM BY WHICH TRANSFORMED BLOOD CELLS INFLUENCE THE LARVAL HEMATOPOIETIC NICHE IN DROSOPHILA MELANOGASTER	DR. SUDIP MANDAL & LOLITIKA MANDAL	DST-SERB	2020-2023	50,83,516.00
89	DST-20-0230	ABELDYN: DEVELOPMENT OF AN AB-INITIO ELECTRONIC DYNAMICS (ABELDYN) PACKAGE FOR MOLECULAR PROPERTIES IN THE PRESENCE OF TIME VARYING STRONG FIELDS IN MULTIPLE TIME SCALES	DR. P. BALANARAYAN	DST-SERB	2020-2023	46,86,000.00
90	DST-20-0231	ANALYSIS OF WINTER SEASONAL MEANS AND EXTREME RAINFALL EVENTS OVER NORTHERN INDIA USING OBSERVATIONS AND HIGH RESOLUTION MODELLING FRAMEWORK	DR. RAJU ATTADA	DST-SERB	2020-2022	32,15,040.00
91	DST-20-0232	BICYCLIC (ALKYL) (AMINO) CARBENE AS LIGAND TO SUPPORTED LOW VALENT COMPLEXES FEOM MAIN GROUP AND TRANSITION ELEMENTS AND APPLICATION THEREOF IN CATALYSIS	DR. SANJAY SINGH	DST-SERB	2020-2023	27,62,100.00
92	DBT-20-0233	TRANSCRIPT FATES IN ESCHERICHIA COLI AND OTHER BACTERIA WITH RESPECT TO R-LOOPS AND TO RNASE E	PROF. J. GOWRISHANKAR	DBT	2020-2023	103,75,440.00
93	RSC-20-0234	ASYMMETRIC DESYMMETRIZATION VIA PHOSPHINE CATALYSIS	DR. S. S. V. RAMASASTRY	ROYAL SOCIETY	2021-22022	3,86,000.00
94	DST-20-0235	UNDERSTANDING THE IMPACT OF MICROBIAL GENETIC COMPOSITION ON HOST ENDOPLASMIC RETICULUM UNFOLDED PROTEIN RESPONSE	DR. JOGENDER SINGH	DST-SERB	2020-2022	19,84,276.00
95	DBT-20-0236	MOLECULAR AND FUNCTIONAL INSIGHTS INTO LIGAND BINDING BY DGOR, A TRANSCRIPTIONAL REPRESSOR OF D-GALACTONATE METABOLISM IN ESCHERICHIA COLI	DR. RACHNA CHABA	DBT	2020-2023	83,37,116.00
96	FIST-20-0237	FIST PROGRAM-2019	DR. SANJEEV KUMAR	DST FIST	2020-2025	270,00,000.00

97	DST-20-0238	DELINEATING THE MOLECULAR MECHANISM OF AGE-RELATED HEARING LOSS	DR. SABYASACHI RAKSHIT	DST-SERB	2020-2023	66,73,832.00
98	DST-21-0239	GUT ELECTROMICROBIOLOGY: UNDERSTANDING EXTRACELLULAR ELECTRON TRANSFER CAPABILITIES OF THE GUT MICROORGANISMS AND ITS IMPLICATIONS TO HUMAN HEALTH	DR. SUNIL ANIL PATIL	DST-SERB	2021-2024	79,29,850.00
99	DST-21-0240	MOLECULAR DRIVERS OF BIOMOLECULAR CONDENSATION: A SINGLE-MOLECULE VIEW OF LIQUID-LIQUID PHASE SEPARATION	DR. S. MUKHOPADHYAY	DST-SERB	2021-2024	251,02,000.00
100	DST-21-0241	RESEARCH SCIENTIST SCHEME (SRS)	DR. SMRITI MAHAJAN	DST-SERB		46,00,000.00
101	SERB-21-0242	J C Bose Fellowship	PROF. SUDESHNA SINHA	DST-SERB	2021-2026	95,00,000.00
102	FIST-21-0243	FIST PROGRAM-2019	DR. K. GONGOPADHYAY	FIST-DST	2021-2026	70,00,000.00
103	MES-21-0244	REALTIME AMBIENT SOURCE APPORTIONMENT OF GASES AND AEROSOL FOR MITIGATION (RASAGAM)	DR. VINAYAK SINHA, DR. BAREBEL SINHA,	MOES	2021-2026	628,57,160.00
104	SERB-21-0245	USING DROSOPHILA AS A PLATFORM TO UNDERSTAND THE EFFECT OF THE INHIBITORS OF ANGIOTENSIN CONVERTING ENZYME (ACE)ON MYELOID CELLS	DR. LOLITIKA MANDAL & SUDIP MANDAL	DST-SERB	2021-2024	53,54,360.00
105	DBT-21-0246	UNDERSTANDING THE CELLULAR REDUCTIVE STRESS RESPONSE	DR. JOGENDER SINGH	DBT	2021-2026	42,50,000.00
106	DBT-21-0247	EXPLORING LIPID INTERACTION OF NA+/K+ATPASE IN ACTIVE GIANT UNILAMELLAR VESICLES	DR. TRIPTA BHATIA	DBT	2021-2026	42,50,000.00
107	IFC-21-0248	ELUCIDATE THE INTERPLAY BETWEEN GLUTATHIONE AND CA++ TRAFFICKING AT THE ENDOPLASMIC RETICULUM (ER): ROLE IN REGULATING PROTEIN SECRETION AND ER STRESS-INDUCED CELL DEATH	DR. ANAND K. BACHHAWAT	CEFIPRA	2121-2024	64,82,434.00

108	SERB-21-0249	LOCAL ELCTROSTATIC INTERACTIONS FOR REACTIVITY CONTROL: SMALL MOLECULE ACTIVATION AND CATALYSIS	DR. SUMAN K. BARMAN	DST-SERB	2021-2023	31,94,976.00
109	SERB-21-0250	DEVELOPMENT OF PHOTOCATALYST/PHOTOSENSITIZERS BASED ON EARTH-ABUNDANT 3D-METALS TOWARDS PHOTOCATALYTIC REACTIONS	DR. DEBASHIS ADHIKARI	DST-SERB	2021-2024	31,02,000.00
110	SERB-21-0251	INVESTIGATING THE EFFECT OF LOCAL ENVIRONMENT ON ULTRAFAST DYNAMICS OF SINGLET FISSION AND SYMMETRY-BREAKING CHARGE TRANSFER MEDIATED VIA MULTIEXCITONIC STATES BY USING TWO-DIMENSIONAL ELECTRONIC SPECTROSCOPY	DR. ARIJIT KUMAR DE	DST-SERB	2021-2024	52,42,913.00
111	DBT-21-0252	MOLECULAR UNDERSTANDING OF THE DIVERSE FUNCTIONS OF TRIM62 IN INFLUENZE A VIRUS INFECTION CYCLE	DR. INDRANIL BANERJEE	DBT	2021-2024	84,00,000.00
112	INSPIRE-21-0253	INSPIRE FACULTY AWARD	DR. SUMAN K. BARMAN	DST	2021-2026	35,00,000.00
113	ICMR-21-0254	DEPLOYABLE 3D PHOTOACOUSTIC CT SYSTEM DEVELOPMENT FOR EARLY STAGE BREAST CANCER DETECTION AND THERAPEUTICS MONITORING	DR.SAMIR KUMAR BISWAS	ICMR	2021-2024	149,82,000.00
114	SERB-21-0255	GRAPHITIC CARBON MATERIALS FROM WAST-PLASTIC FOR AERIAL OXYGEN HARVESTING AND SUSTAINABILITY	DR. UJJAL K GAUTAM	DST-SERB	2021-2024	32,67,000.00
115	SERB-21-0256	THE ROLE OF GENETIC AND ECOLGICAL FACTORS IN NEST DOUNDING STRATEGIES OF THE PRIMITIVELY EUSOCIAL WASP POLISTES WATTII	DR. RHITOBAN ROY CHOUDHURY	DST-SERB	2021-2024	9,27,075.00
116	SERB-21-0257	CENTER OF ANTIBODY ENGINEERING: CENTER FOR IMMUNO-DIAGNOSTICS/ THERAPEUTICS VENEERING TECHNOLOGIES (CIVET)	DR. SHARVAN SEHRAWAT	DST-SERB	2021-2024	474,60,400.00
117	DST-21-0258	DEPLOYABLE PHOTOACOUSTIC CT SYSTEM DEVELOPMENT FOR 3D ANGIOGENESIS IMAGING AND ANATOMICAL STRUCTURE MONITORING FOR	DR.SAMIR KUMAR BISWAS	DST	2021-2024	98,46,862.00

		DIAGNOSING INFLAMMATION AND ARTHRITIS DISEASE IN HUMAN FINGER JOINTS				
118	SERB-21-0259	SALMONELLA INFECTION MEDIATED OBESITY AND DIABETES A NEW TALE OF STUDY USING CAENORHABDITIS ELEGANS	DR. VIDYA DEVI NEGI	DST-SERB	2021-2024	43,08,832.00
119	SERB-21-0260	THE PHASE BEHAVIOR OF TAU: FROM MOLECULAR TO MESOSCALE ARCHITECTURE OF TAU CONDENSATES	DR. S. MUKHOPADHYAY	DST-SERB	2021-2024	84,88,920.00
120	SERB-21-0261	PARTICLE CURRENT AND PHASE TRANSITIONS IN A TWO-DIMENSIONAL DRIVEN COLLOIDAL SUSPENSION	DR. DIPANJAN CHAKRABORTY	DST-SERB	2021-2024	13,86,000.00
121	SERB-21-0262	ULTRA-LOW TEMPERATURE INVESTIGATION OF NOVEL QUANTUM PHASES AND PHASE TRANSITIONS	DR. GOUTAM SHEET	DST-SERB	2021-2024	79,52,199.00

12. Academic Programs

The New Education Policy 2020 (NEP-2020) is a significant document that envisages major changes in the education landscape. The Senate of IISER Mohali set up a subcommittee to study the recommendations in the NEP-2020 document and propose a plan of action for IISER Mohali. This committee prepared a draft report and collected feedback from all faculty members. The final report was submitted to the Senate and has been adopted. The most significant point made in the report is that the academic programs at IISER Mohali are largely in compliance with the NEP-2020 document. There are some recommendations that can be adopted in future and these are being taken up by the Senate.

The curriculum for the BS-MS program, where ten batches have graduated is being reviewed. The review is being carried out in multiple stages where we consult all stakeholders. It is expected that the process will be completed and the new structure will apply to the batch that joins the institute in 2023. A similar review of the Integrated PhD program is also being taken up.

Implementation of NEP-2020 also requires preparing an institute development plan. The Senate of IISER Mohali has set up a committee to initiate the process.

In the spirit of NEP-2020, the Senate of IISER Mohali has allowed students to take some courses in NPTEL. This allows students a greater choice in terms of courses and subjects.

The Senate of IISER Mohali, in order to encourage collaborations has approved a set of rules for appointing external co-supervisors for PhD students. This option enables students working in collaborations to formally work with more than one mentor irrespective of institutional boundaries. A similar measure has been adopted to permit co-supervision of PhD students in other institutions by faculty members at IISER Mohali.

IISERs have had a direct PhD program for more than ten years. In the original plan students could apply to continue in the same institute for their PhD. The Senate of IISER Mohali has now approved extension of this channel to students from other IISERs and INIs.

Recognising that PhD is unlike any other degree program, the Senate has approved detailed guidelines that specify the expected roles of the supervisor(s), doctoral monitoring committee, the student and the institute. It is expected that once such expectations are set out, it will be easier for students and mentors to spot problems and rectify these at an early stage.

Teaching during 2021-2022 was affected by the Covid pandemic. While two full semesters during 2020-2021 were fully online with online evaluation, the two semesters during 2021-2022 were run in online or hybrid mode. The number of courses run in the hybrid mode increased from 15 in the Monsoon semester 2021-2022, to 35 in the spring semester 2021-2022. We typically offer 120 courses in each semester, of which close to half are elective courses. All end of semester evaluations were carried out in person for the academic year 2021-2022.

Students who live in regions with poor connectivity or who do not have devices for online classes were permitted to stay on campus and use computer labs to join classes.

The impact of the pandemic was most significant for laboratory courses. The institute ensured that the option of doing lab work during summer/winter break was available for students who were not on campus during the semester.

13. Institute Library

Situated in the Informatics Centre, IISER Mohali library epitomizes the spirit of the institute, i.e., the pursuit of knowledge. The library is a space for creative and innovative exchange of scholarly

information and also a place for peaceful learning and collective voice reading. The library houses electronic and print versions of books (general, text, and reference books), journals, databases from various fields of study, namely, Mathematics, Physics, Chemistry, Biology, Computer Science, Earth/Environmental Sciences and Humanities and Social Sciences. The library provides unfailing access to essential and specialized library resources which aid teaching, learning, and research activities. In tune with the recent advancement in the field of Information and Communication Technology (ICT), IISER Mohali has set up a library with state of the art technology and world class infrastructure. The library space of IISER Mohali is applauded not only for its aesthetic ambience but also for its astonishing infrastructure. This exemplary building implements the theme "Learning Commons" with the mission to provide effective, informal, and efficient use of the library resources. The user friendly space of the library helps the users to be creative and collaborative with their peers, and such an atmosphere inspires students to be industrious and efficacious. IISER Mohali is proud to introduce the first library in India to implement the theme, "Learning Commons."

MISSION:
The library's mission is to provide access to rich, relevant and high quality resources in all available formats to the IISERM community. In doing so, the library aligns itself to teaching, learning, and research missions of the institute which is committed to excellence and innovation.

Library Timings: Library works all 365 days except 3 National holidays and 4 Gazetted holidays.

Monday - Saturday:

Reference: 9.00 am - 6.00 am
Circulation (Check-In and Check-Out): 9.00 AM - 8.00 PM (Opens during LUNCH & DINNER)

Sunday:

Reference: 10.00 am - 6.00 pm on normal Sundays (No Circulation – Only Reference) and 10.00 AM to 6.00 AM before and during exams. Closes during LUNCH i.e 1.00 PM – 2.00 PM

However due to CoVID-19, the library timings were changed from time to time. The library opened for readers with strict compliance of CoVID-19 protocols

LIBRARY FACILITIES:
The inclusion of the Learning Commons theme as a vital element in the present library design offers an opportunity to transform the library's role on campus from a provider of information to a facilitator of learning. The new library space is now commonly repurposed to bring students together to work, study, and socialize. The Learning Commons throws open an arena of new learning practice to aid education and research: comfortable furniture for both individual and group study, modular furnishings that allow users to customize their learning ambience to suit their needs, access to wireless networks and electrical outlets, multimedia labs etc.

Under this Learning Commons concept, IISER Mohali provides the following facilities in the library:

- **Discussion Room(s):** Provides space for faculty to have discussion with his/her research group. Spaces are equipped with required infrastructure and multimedia accessories for making presentations. However, one needs to reserve the space in advance.
- **Group Study Room(s):** Provides space for students to carry out group study, voice reading and discussions with their research / academic peers. Spaces are equipped with required infrastructure and multimedia accessories for presentation purpose.
- **Seminar Rehearsal Room(s):** Before facing the actual seminar delivery, the students can make use of this room to reherse their presentations in the prescence of their supervisor/ instructor/research team. This helps in boosting up the students'confidence level.The room is equippedwith multi

interactive functionalities such as interactive/smart boards. An advance booking of the room is appreciated.

- **Smart /Interactive Room(s):** A space for readers to exchange academic and research dialogues with other group/institute/university through online interview/interactions. One needs to reserve the space in advance.
- **Podcast Room:** A Space for recordings of audio and video talks of faculty and students.
- **Lecure Recording Room:** Space for recording of Lectures by faculty and students.
- **Audio-Visual Zone:** A space for e-learning through installed documentary film on science and technology. The readers need to bring their headsets to use these resources
- **Research Scholar's Zones:** Study carrels with electrical outlets and Wi-Fi for research scholars
- **Knowledge Exchange:** A place where one can leave unsolved subject related questions. This gives an opportunity for others to exchange their knowledge by attempting to provide potential answers to the question.
- **Thought Provoking:** An opportunity to have offline debate on current affairs. This is an area where one can start a debate by leaving a topic. Other users can express their written opinion/views on the topic.
- **Sky Library:** A space on top of the building replete with pleasure reading materials (mostly fiction).One can enjoy reading in the presence of natural light with the panoramic view of the city at its backdrop.
- **Institute Publications Zone:** As soon as any research paper or book is published by faculty/students of IISER Mohali, it will be displayed in this zone. One can have a look at the full text of these documents.
- **Latest News on LED Screens:** Flashing news on the latest publications of IISER Mohali, regular scientific news, institute events with photographs, new arrivals with the book image etc.
- **Information Kiosks:** Online library catalogue with touch screen and multimedia effects
- **Digital Zone:** Computers with network in all floors for accessing digital content, i.e, e-journals and database
- **Faculty Corner, Student Corner, Alumini Corner:** The achievements, posters, projects, awards etc. of faculty/students/alumini of IISER Mohali will be displayed. Floor maps are available at the entrance of every floor
- **Walk-Through Institute**: Space for display of posters on Projects going on in the Institute from each department. One can view the general, academic, and research oriented activities of IISER Mohali in a single frame.
- **Showcasing Research:** Space for display of research output of Institutes in the form of Scientometrics- Projection of Institute Research, Publications-index, subject wise& departments wise contribution, National & International Collaboration, h-index of prolific authors of Institute and many more.
- **Institute Awards:** Space for display of Awards received by IISER Mohali.
- **Journey of IISER Mohali:** Depiction of Institute‘s Journey from 2006 (Foundation Cermoney) till date by potraying important events of Institute in the form of photographs, Videos etc.
- **Faculty Corner:** Space for display of faculty Profile- Thier achievements, posters, projects, etc from each department and also Awards / honours received by Researchers and faculty members of Institute.
- **Student’s Corner:** Space for display of students profile / Photos for those who have achieved Academic excellence, Awards or Sports activites etc.
- **Alumini Corner:** Space for Alumni to display photos of students who made achievements / brought laeurals to the Institute.
- **Institute News:** Space for display of News Clipping of Institute ie. Institute wise, Under-Gradutaes, Post-Graduates, Researchers, Faculty wise etc.
- **Wi-Fi Space:** Wi-Fi is available in all eight floors of the Informatics Building (library) for seamless access to e-resources of library
- **Cafe:** A space for relaxing and socializing with Coffee / Tea / drinks
- **Centralized Air-Conditioning:** Centralized AC is available in all floors of the library

LIBRARY SERVICES:

All housekeeping activities of the library, viz., cataloguing, circulation, renewal, reservation, Over Dues, etc. have been computerized and bar-coded using the library management software "Koha." The users can browse, retrieve, and cart the received information regarding books housed in the library. Information regarding the number of copies available, the shelf location of a book, virtual shelving with the image of the book, and link to the full text of books etc. are also available on the online catalogue. The profile of the borrower, borrowing capacity, borrowing history, due date of issued books, over dues, overdue amount etc. can be viewed on the online catalogue after the member logs in to his/her account.

The library creates and maintains the Repository of thesis, Dissertations, Institute articles, Institute Publications, Institute event images, News clipping and films published by ISER Mohali as well as published on IISER Mohali by using Open source digital Software 'DSpace".

The online catalogue (Web OPAC) services and resources of the library can be accessed through the library website. http://www.library.iisermohali.ac.in. It is library webpage or a hub of information services like Online catalogue (Web OPAC) of Print books, e-books, e-Journals, On-line Full text Databases, Online Bibliographic Service, Abstracting Databases, e-mail Alert Service, Anti-Plagiarism Software, "ORIGINAL", Grammarly Writing tool, Writeful writing tool, Current Awareness service, Document Delivery Service, Inter-Library Loan facility, DELNET Services, Photocopying facilities, Reference Service, New Paper Clipping, Personalized services, S&T News Services, Institutional Repository and soon.

LIBRARY RESOURCES:

Because Being IISER Mohali is one of the core members of e-Shodsindhu (MOE Project) and IISER Library Consortium, it has seamless access to thousands of renowned electronic journals in the field of basic and applied sciences. "paid by e-Shodhsindhu" such as APS,AIP, Annual Reviews, EPW, JSTOR, MathScinet, "OURIGINAL" anti-pliagarism software, OUP, Project MUSE, SIAM, SpringerNature and many more .

Library subscribed the following e-resources (Journals Packages) through various Consortia with maximum discounted prices. Some of the Online full text journals / databases available under the period report are Science On-line, American Chemical Society (ACS - Web Edition), American Physical Society (APS), American Institute of Physics (AIP), American Mathematical Sciences (AMS), American Meteorological Society, American Society for Cell Biology (ASCB), American Society for Microbiology (ASM),Canadian Science Publishing (NRC), Chemical Society of Japan ,Cold spring harbor press, Company of Biologists, Elsvier's Sciencedirect,Institute of Physics (IoP), oVE, MyLOFT-MyLibrary at Finger Tips app, National Academy of Sciences, Nature Publishing Group,Oxford University Press, Press Readers- Online News Papers, Magazines database, Project Euclid Prime, Rockefeller University Press, Royal Society London, Royal Society of Chemistry (RSC), SciFinder Scholar, Society of NeuroScience, Springer Lecture Notes Series Maths & Physics, Thieme Medical Publishers (IISER C), The Royal Soc. Publishing, Nature main title and 39 subtitles of Nature Publishing Group, Springer-online, Taylor & Francis , Wiley, WorldScientific etc., and Bibliographical & Abstracts Databases are MathSciNet and Scopus, e-News papers and Mgazines databse, "PressReader", Academic Writing Tools such Grammerly and WRITEFUL, and library app. "MyLOFT". INFLIBNET has provided access to anti-plagiarism software OURIGINAL.

Activites of Library as Nodal Centre of Institute for the following MOE Projects:

1. Indian Research Information Network System (IRINS): On behalf of Institute, the library has implemented Indian Research Information Network System (IRINS) in IISER Mohali successfully and Coordinated with INFLIBNET, the Project Coordinator, on regular basis for smooth functiong and up-gradation of project.

As a Nodal Centre of Institute, the library has created the profile of faculties, creating ORCIDs for some faculties, collecting, Compiling information from Institutes and their personal website, SCOPUS Id, ORCIDs, Google Scholar, Web of Science Id etc and also from various websites related to their Professional career, research works, Publications, Projects handled, Funds received etc and uploading to IRINS site.

IRINS is web-based Research Information Management (RIM) service developed by the Information and Library Network (INFLIBNET) Centre under aegis of MHRD. The portal facilitates the academic, R&D organizations and faculty members, scientists to collect, curate and showcase the scholarly communication activities and provide an opportunity to create the scholarly network.

2. National Digital Library of India (NDLI): On behalf of Institute, the library has updated the information on regular basis to National Digital Library of India (NDLI), being coordinated by Indian Institute of Technology (IIT), Khargpur. It also provided and updated the profiles of new faculty and students of IISER Mohali in NDLI for registering their Ids and also the metadata of BS-MS Thesis/ PhD Thesis of students passed out with Abstracts and giving access to full text of records on request etc.
   The National Digital library of India (NDLI) is a project under Ministry of Education Govt of India. The objective is to integrate several National and International digital libraries in one single web-portal. The NDLI provides free access to many books in English and the Indian languages.

3. E-Shodsindhu: Library, IISER Mohali has acted as coordinator between all seven IISERs and e-Shodsindhu (eSS), to meet information / e-Resources requirement of IISERs to get them funded by eSS and also best possible Terms & conditions and negotiated prices for the resources subscribed by IISERs.
   Based on the recommendation of an Expert Committee, the MOE has formed e-ShodhSindhu by merging three consortia initiatives, namely UGC-INFONET Digital Library Consortium, NLIST and INDEST-AICTE Consortium. The eSS will continue to provide current as well as archival access to more than 15,000 core and Peer-reviewed journals and a number of bibliographic, citation and factual databases in Different disciplines from a large number of publishers and Aggregators to its member Institutions including centrally-funded technical Institutions, universities and colleges that are covered under 12(B) and 2(f) Sections of the UGC Act.

4. Institutional Archives and Walk through Institute: Library as Archival Cell updated the data to preserve the knowledge generated by IISER Mohali research community to provide access to public for Academic and Research purpose. This Institutional Repository covers full-text of articles / links published by faculty and students, PhD Thesis, MS dissertations, Academic projects, Speeches delivered on important events, Films on IISER Mohali, Annual Reports, conference Reports, Reports on Foreign tours, audio and video clippings, events photographs, news paper clippings and many more.
   Now the Institutional Reposiotry of IISER Mohali is on public domain from 14th Feb 22 through the following URL http://210.212.36.82:8080/jspui/

5. Annual Report of IISER Mohali -2021-2022: Library collects, compiles, edits and organizes the Publications of Institute for Annual Report.

6. MyLOFT (My Library on Finger Tips"): A Remote Access tool: Due to COVID-19 pandemic, the country was under Lockdown and library readers were away from campus for longer period. Since the subscription of e-Resources is through Institute's IP address to access across the campus, the faculty, students and staff (Readers) who were away from campus were not able to access the subscribed e-Journals, e-Books and databases. So the Institute has subscribed a Remote Access Tool –"MyLOFT" to give Off Campus access to its readers with the following features :

   - Library readers can access on Mobile Web App Platform to library digital resources

- any time, from anywhere through Browser extension
- One time user login for through Mobile and Web App with Chrome Extension
- Using voice-command, user can search the content
- Save and Sync content between mobile and PC from Library e-Resources or favourite websites, blogs, news feeds
- Find saved articles and research papers by tagging and organizing them into collections
- The built-in article viewer allows clutter free text reading, highlighting, listening and more
- Changing font size of the articles and color theme for HTML articles for night mode viewing
- Offline Reading : Can read without Internet

Prof. J. Gowrishankar, Director, Indian Institute of Science Education and Research (IISER) Mohali launched this tool in 39th Senate Meeting held on 20.05.2020

THE BEST LIBRARY USER AWARD 2020 – 21: The Library has conceived an idea of giving a Best user of Library award and initiated the process to identify a student who has a good track record - highest user of library, no adverse record of his behaviour either with library users and staff etc. Accordingly Mr. Budaraju Sasank (MS 16143) was selected by Committee as winner of this Award for 2020-21. This award was given to him online by Chief Guest of Institute Foundation day on 27th Sept. 2021 with "THE BEST USER of LIBRARY (2020-21) AWARD".

OUTREACH PROGRAMMES: Library organized hands-on training programmes to its users every year after renewal subscription to e-Resources. But this year due to CoVID-19, library organized the following Online Webinars as follows:

A. User Orientation Programme:

1. Held Online library Orientation programs to BS-MS, Int & Ph.D. students.
2. Organized two webinars on "SCiFINDER", 15th June and 13th Aug 2021.
3. Regional / State level online awareness Programme on PDS- Shodshuddhi on 16th-July 2021
4. ACS India Webinar-Making the most out of your PhD journey, 14th July 2021.
5. Managing work life blend for Researchers- Self Actualiation, Work & Chouice by Springer nature on 16th July 2021.
7. Organized multiple webinars on "SCOPUS".
8. Organized webinar on "GRAMMARLY ".
9. Organized webinar on "Project MUSE ".
   Organized a webinar on "Empowering Research across IISERs" by Elsevier The webinar covers the following themes:

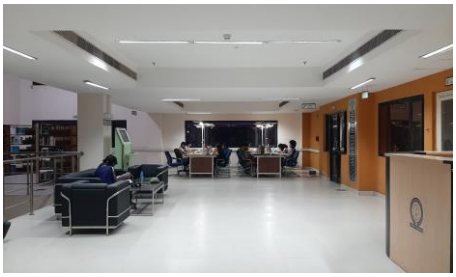
   -Mendley Research Management Tool
   -SCOPUS- Citation databse
   -Scimago- Journals and country ranking tool
   -Sciencedirect
   -Cell Press
10. Organized a webinar on "JoVE- Journal of Visualized Experiments"

B. Staff Training Programmes: Conducted training programmes on Koha and Dspace to library and Computer centre staff in the month of March 2022.

PUBLICATIONS

1. Neeraj Kumar Singh., Visakhi.P: (2021) Covid-19 and Neuroscience Research: A Scientometric Assessment of India's Publications during 2020-21. LIBRARY HERALD Vol 59 No 4 December 2021. DOI: 10.5958/0976-2469.2021.00043.9

2. Preeti Sharda and P. Visakhi. A move towards creation of Smart Libraries (2022): In : Neena Singh and Sewa Singh(Eds) :Smart Libraries and Information Management in Digital Environment - Volume I ., B.R. Publishing Corporation , New Delhi , ISBN 9789391123581 (Set of 2 Volumes): 03-18p.



14. Computer Centre

Computer center oversees several services such as network, computer labs, high-end computing requirements, ERP, Moodle, email, and also provide their related support services to the community. There are three computer labs dedicated for teaching. Of these, two also serve as a general computer lab for student and the third one is a center for NKN related activities for instance to conduct inter-institute courses. In semesters during 2021-22, the computer labs were not used extensively for teaching as semesters were conducted in either online or hybrid mode. However, these labs were kept open for students following proper social distance with appropriate covid-19 safety guidelines.

Computer center manages the campus wide WiFi network and connectivity to the Wide Area Network ('Internet') and provides seamless connectivity within institute intranet. During Covid-19 pandemic, the Internet became the most essential service and usage of the same was increased several folds as all teaching activities and meetings were held online. To cater these requirements, we have two concurrent 1Gbps network connections from BSNL and NKN. Recognizing the need to upgrade the network connectivity within hostels, the computer center has started providing dedicated Ethernet ports to individual rooms in all hostels.

The computer center continues to provide support for necessary ERP related services, regular updates on the Institution website, management of Moodle services for teachings. The email facility is provided through Google workspace with single-sign-on for multiple other services such as Moodle/CC-ticket. Apart from this Google workspace provides various teaching aids, which greatly helped in conducting online teachings during the pandemic. Moreover, during pandemic period computer center also provided off-campus students with software licences.

The computer center had provided necessary logistics and network support for the 10th convocation held online that was presided over by Prof. N. Sathyamurthy. A live webcasting was also made available through official Youtube channel.

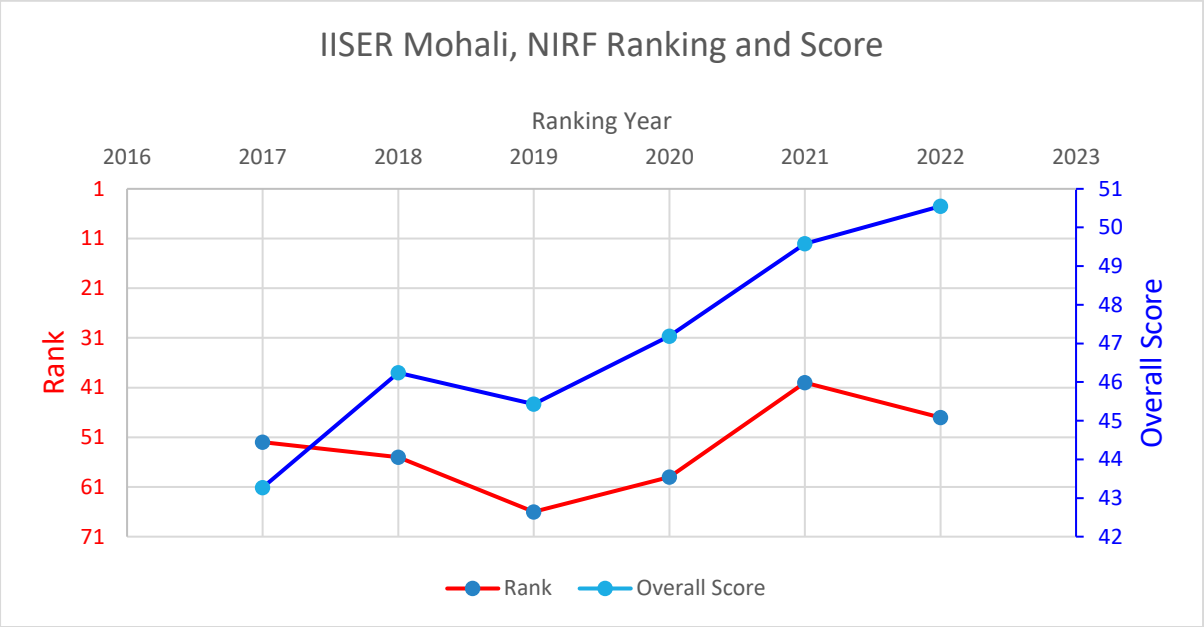
15. National Institutional Ranking Framework (NIRF) rank

In 2022, IISER Mohali participated in the Overall as well as the newly formulated Research category of NIRF. The institute was ranked 47 in the Overall category of the National Institutional Ranking Framework. The results were announced online at 11:00 AM on July 15, 2022. The ranking required the submission of an enormous amount of data that related to the faculty and student strength, expenditures on infrastructure, equipment and library and various other operational expenditures, external funding received placement of students, and fellowship drawn by students. The collation of the data from the different sections of the institute and its submission to the NIRF was done by Dr. Satyajit Jena, the Nodal Officer in consultation with the Director, Heads of the Departments, and the Deans of the institute.

The assessment process of ranking is heterogenous for different categories and considers different time frames for which we had to submit our data. For student strength, the data required was for the period of the last five years, whereas for the publication details, external funding, and financial resource utilization, the time frame was three years.

The NIRF ranks are the outcome of the National Ranking system established by the Ministry of Human Resource Development (MHRD) in September 2015. In 2016, during the first rounds of ranking, IISER Mohali was ranked 43 amongst institutes in the engineering category, along with other

institutes such as IISc, IITs, NITs, IISERs, and other Engineering Universities/Institutes/Colleges in the country. In 2017, IISER Mohali was considered under the overall category, which included all Universities/Institutes/Colleges, and was ranked 52. In 2018, IISER Mohali was ranked 55 in the overall category, in 2019 IISER Mohali was ranked 66 in the overall category, in 2020 IISER Mohali was ranked 59 in the overall category and in 2021 IISER Mohali was ranked 40 in the overall category.



16. COVID lab

The Institute has also contributed to the nation-wide quest to ameliorate the situation caused by the COVID-19 pandemic. In March, 2020, it decided that it will offer the extensive scientific expertise, available within its faculty members, to aid in testing for COVID-19. It set up a testing facility in the top floor of the Animal House by borrowing already existing instruments from the Department of Biological Sciences with an aim to test samples with qRT-PCR. Three faculty members, Dr. Sharvan Sehrawat, Dr. Indranil Banerjee and Dr. Rhitoban Ray Choudhury, volunteered to set up this facility and start testing. The lab was fashioned out in record time in spite of the ongoing lockdown. The three faculty members were trained at PGIMER which was the nodal agency of ICMR in the area. The Government of Punjab also deputed medical microbiologists and ICMR provided the kits required for testing. A separate qRT-PCR machine was generously provided to the testing facility by ICMR through UNICEF. Dr. Sharvan Sehrawat was appointed the Principal Investigator, Dr. Indranil Banerjee was appointed as the Nodal Officer while Dr. Rhitoban Ray Choudhury was made the Lab-in-Charge of the facility. The initial manpower consisted of several volunteers, mostly graduate students from the lab members of these three faculties as well as lab technicians from the departments of Biological sciences and Chemical Sciences. Testing was initially started with these volunteer students but was soon aided by hired manpower, made possible by funds from DBT and the institute. Testing continued till the 31st of March, 2022. The three faculty members would like to thank the following people for their time and effort in helping them establish and fulfil the testing:

The Director-Prof. Gowrishankar, The Registrar-Prof. Jagdeep Singh, Prof. Anand Bachhawat, Dr Rachna Chaba, Dr. Samarjit Bhattacharya, Dr. Kausik Chattopadhyay, Prof. Purnananda Guptasarma, Dr. Shiwani Sharma and Dr. Sonia Mehta (Medical Microbiologists), Institute Works Department, the office of Stores and Purchases, student volunteers (Alok Tiwary, Aanchal Panchal, Anjali Rana, Nirmal Kumar, Kajal Gupta, Gaganpreet Kaur, Tejal Pathak, Sudhakar Singh, Surbhi Dahiya and Azeez Tehseen).

17. TBI IISER Mohali

i-RISE- Technology Business Incubator IISER Mohali, supported by DST

IISER Mohali's Technology Business Incubator is working to transform and build deep impact across the start-up ecosystem through innovation knowledge and technology adoption, with support from the Department of Science and Technology.

TBI IISER has been renamed I-RISE (IISER-Raising Innovative & Sustainable Enterprises), which represents the incubator's mission. i-RISE has carefully tailored programmes for entrepreneurs based on their level and trajectory. Start-ups incubated at i-RISE benefit from unparalleled technological mentorship from the respected faculty of IISER Mohali, as well as business mentoring from a vast network of mentors. The overall growth of incubated startups benefits from this exceptional combination of deep domain experience and customer side intelligence. These programme features dramatically boost a startup's ability to develop product-market fit, market access, and other dynamic business dimensions, resulting in a substantial increase in the start-up's viability and market readiness.

Objectives

- Fostering the creation of a convergent innovation ecosystem that helps technology-based start-ups thrive while also benefiting other stakeholders such as customers, academics, industry, and investors.
- Have world-class business incubator and accelerator facilities to host and nurture the start-ups
- Facilitate commercialization of the technologies developed by various research institutes through the IISER platform

Infrastructure

Over a year, we have developed sophisticated research facilities as well as office and lab infrastructure for our incubates. The facility was inaugurated by Honorable Minister Dr. Jitendra Singh (Minister of State (Independent Charge) for the Ministry of Science and Technology and Ministry of Earth Science) on 2nd November 2021 virtually in presence of Directors of various institutes of the region.

- Dedicated Office Rooms- 11
- Open Workstation- 12
- Conference Room with LCD (for Video conferencing)- 1
- Seminar Hall-1
- Activity Hall-1
- Pantry Room-1
- Store Room (for consumables)-1
- Well-equipped laboratories- 6

Initiatives -Programs

1. **IISER Start-up Incubation Program**

IISER Startup Incubation Program at the TBI IISER Mohali strives to promote entrepreneurs in new technology & new application areas. It allows potential start-ups, existing start-ups, and investors to solve problems with venture potential, such as fostering innovation, conducting R&D activities, technologies, novel products, comprehensive solutions, and launching new projects. i-RISE launched the Incubation program to promote innovation led start-ups in the month of June 2021. Applications were invited and were scrutinized by Executive Board Members. The shortlisted start-ups participated in the three weeks workshop under IISER Mohali Start-up Incubator Incubation Program, 2021. The workshop was started on 13th September 2021 and ended on 01st October 2021.

A total of 15 start-ups participated out of the 18 start-ups incubated at the TBI; 4 from the 1st Cohort and 11 from the 2nd Cohort. Various online sessions were conducted to provide business and technical support to these start-ups. A total of 22 online sessions were held along with 17 and 15 one-on-one technical and business mentoring sessions respectively. Six sessions of one-on-one investor mentoring sessions were also conducted to educate the participants about fundraising and investor perspective for startups. The workshop was graced by a total of 32 experts, researchers, successful startup founders, and business gurus.

2. i-RISE-Open Knowledge Session Series

i-RISE, TBI IISER has initiated open knowledge series wherein the eminent speakers across different fields take sessions related to innovation and entrepreneurship. These online sessions are free and anyone can register for the session. First such session was organised on 1st July 2021 on technology commercialization and IP management. The speakers include Dr. Sudha Mysore (CEO, Agrinnovate India) and Ms. Divya Kaushik (Scientist PCI & TICS, Punjab State Council for Science & Technology). Around 115 participants registered for the session.

Second Open Knowledge session was organised with USPTO and PSCST on IP management, through offline mode at the IISER Mohali campus on 15th Sep 2021. Mr John Cabeca was one of the key speaker in the session.

Third Open Knowledge session was conducting on- 'Transforming Ideas into Successful Start-ups 'on 24th November 2021. The successful global start-up founders- Alexandre Monteiro (CEO & Co-founder DigiFarmz, Brazil) and Somveer Anand (Mission Director-Innovation Mission Punjab, Co-founder of Pindfresh) were the experts and key speakers of the session. Sixty plus participants including faculty, startup founders, students were physically present during the session.

A panel discussion was conducted under Open Knowledge Session on 'Digital Marketing for Start-ups', partnered with PSCST AND Innovation Mission Punjab on 25th February 2022. The panel comprised digital marketing domain experts- Amar Choudhary, Aditi Patankar Gupta, Simarpreet Singh, Sameer Gupta, Manpreet Ghuman, Somveer Anand and Satyendra Singh. The session was attended by 130 plus participants.

Our fifth Open Knowledge Session was on the Árt of Raising Funds' was held on 29th March 2022 in association with TiE Chandigarh and PSCST. The speakers of the session were Gaurav Mehta (CFO-Intello Labs) and Ankit Papriwal (Managing Partner- Accelero Advisors).

3. IdeaPhied -2021

i-RISE in association with IISER Mohali E- cell has conducted an event 'Idea-phied' on 22nd January 2022. The objective of the event is to provide a discussion platform for innovative ideas and to raise awareness regarding the start-up ecosystem on the campus. The event was partnered with Punjab State Council for Science and Technology, Innovation Mission Punjab, and Chandigarh Angels Network. The event was primarily IISER Mohali students-focused as it aimed to sensitize students to research-based innovation. Idea-phied was a blend of a series of sessions which includes the panel discussion with experts in the incubation/start-up ecosystem, followed by Idea-phied Final presentations and Alumna Talk.

4. Other activities in collaboration

TBI has coordinated with C-CAMP (Bengaluru) and Punjab State Council for Science & Technology in organising the Entrepreneurship Awareness Session on 21st May 2021. More than 300 participants registered for the session. TBI IISER Mohali is also coordinating with Innovation Mission-Punjab in their state-level Ideathon called ROAR. i-RISE TBI IISER Mohali showcased itself at Mega Science Technology and Industry Expo India from 10th December to 13th December 2021 at International Science Festival 2021 in Goa.

List of Start-ups got incubated with the incubator in the current year

S.No.	Start-up Name
1	Resnote
2	Fermentech Labs
3	GloAlgeus Innovation
4	Waste Wing
5	Advanced Research & Materials Solutions
6	Vurdhaan Research & Development
7	Agnext Technologies Pvt. Ltd.
8	Animal ICU
9	Manjha Technologies
10	Black Eye Technologies Private Ltd.
11	Rexsys Pvt. Ltd.
12	Amesys India
13	Agriyaan Technologies Private Ltd.
14	Brown Soil Agro Pvt. Ltd.
15	Aumsat Technologies LLP
16	Grainre
17	Hum Hain

Achievements of the incubated Start-ups

a) Waste Wing Pvt Ltd got featured as a YouthCoLab21 Climate Action Entrepreneur by UNDP in India (United Nations Development Program, co-created by Citi Foundation.

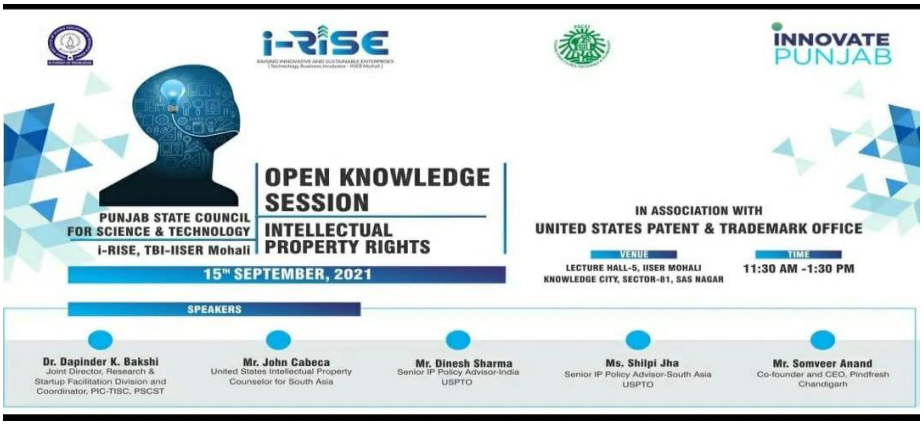
b) Animal.ICU signed an MoU with ICAR-CSWRI to promote the PM'S VISION of Doubling the income of farmers through various sources and creating employment opportunities for them. Animal ICU got selected for the BIRAC BioNest Grant of 50 Lakhs. Animal.ICU won Technofund organized by DoIT, Government of Rajasthan for Tech based startup.

c) AgNext Technologies **won the 'Most Innovative Agri Startup Award in** FICCI Summit & Awards for Innovations by Agri Startups. **AgNext Technologies has been awarded** the 'AI Game Changers' award in agriculture by NASSCOM in the second edition of their Xperience Virtual Summit.

d) BlackEye Technologies Pvt Ltd received Greenpreneur of the year 2021 by FICCI**.** They also received Emerging Startup of the year by MSME and STPI Punjab.

Inauguration

Open Knowledge Sessions- Topic- Intellectual Property Rights



Products developed by TBI IISER incubated startups, supported by DST

18. Lectures by Visitors

18.1 Public Lectures

1. 27 Sep 2021 - 03:05PM: How do plants ward off pathogens: Foundation Day Lecture of IISER Mohali by Professor Ramesh V. Sonti, IISER Tirupati
2. 28 Jun 2021 - 03:00PM: 10th Convocation of IISER Mohali on YouTube: Chief Guest - Professor N. Sathyamurthy (Honorary Professor, IISER Mohali), IISER Mohali Official Channel

18.2 Institute Colloquia: None

18.3 Institute Seminars

1. 31 Mar 2022 - 04:00PM: Evolving Exploring microalgae from carbonate dominated niches: Perspectives from biotechnology and geobiology, Jyoti Singh (Faculty candidate), Department of Earth Sciences, Pondicherry University, Puducherry, India.
2. 31 Mar 2022 - 04:00PM: The Langevin approach to nonequilibrium correlated systems, Prof. Pinaki Majumdar, HRI Allahabad, Zoom Link.
3. 30 Mar 2022 - 04:00PM: Towards Relativity: Einstein and His Compass, Dr. Sudipta Sarkar, IIT Gandhinagar
4. 30 Mar 2022 - 11:00AM: Light rings of stationary spacetimes, Dr. Sudipta Sarkar (IIT Gandhinagar)
5. 28 Mar 2022 - 03:30PM: Using Three Delay Model to Understand the Social Factors Responsible for Neonatal Deaths among Displaced Tribal Communities in India, Dr. Madhulika Sahoo (Faculty Candidate), Department of Anthropology, Kalahandi University, Odisha,

6. 25 Mar 2022 - 05:00PM: Genealogies of Science's Dissident imagination, Prof. Dhruv Raina, History & Philosophy of Science and Education, Zakir Husain Centre for Educational Studies, Jawaharlal Nehru University. Zoom Link
7. 25 Mar 2022 - 04:00PM: Toeplitz operators on quotient domains, Prof. E. K. Narayanan (IISc, Bangalore), Zoom Link
8. 25 Mar 2022 - 03:00PM: Of ridley riddles, leatherback voyages and greener pastures: unraveling the biology and conservation of sea turtles in India, Kartik Shanker, (Centre for Ecological Sciences, Indian Institute of Science, Bangalore),
9. 23 Mar 2022 - 04:00PM: Optical investigations of dark and bright three-particle states in 2D semiconductors, Dr. Ashish Arora, IISER Pune, Zoom Link.
10. 21 Mar 2022 - 03:30PM: Oiko-autobiographies, Toxic Fictions, and Extractivist Fictions: Exploring Contemporary Environmental Justice Narratives from Kerala, Dr. Sreejith Varma (Faculty Candidate), Department of English, School of Social Sciences and Languages, Vellore Institute of Technology Vellore
11. 14 Mar 2022 - 04:00PM: Technology facilitated harms against women - old wine in a new bottle?, Dr. Sreeparna Chattopadhyay, Associate Professor in Sociology, Flame University, Pune. Zoom Link
12. 11 Mar 2022 - 03:00PM: Evolving Physical Mechanisms and Global Climate Model Biases: Double Trouble for Unraveling Climate Change Impacts?, Dr. Dhrubajyoti Samanta (Faculty candidate), Asian School of the Environment, Nanyang Technological University,
13. 04 Mar 2022 - 04:00PM: Rigidity and tolerance in point processes, Prof. Manjunath Krishnapur (IISc, Bangalore), Zoom Link
14. 04 Mar 2022 - 04:00PM: Atomic mechanisms of charge density waves (CDW) in R2Ir3Si5, Dr. Sitaram Ramakrishnan, Laboratory of Crystallography, University of Bayreuth, Germany, Zoom Link
15. 28 Feb 2022 - 06:30PM: The Aryan Debate Revisited, Thomas R. Trautmann, Professor Emeritus of History and Anthropology, University of Michigan, Zoom Link
16. 25 Feb 2022 - 04:00PM: When Molecules Meet Materials: Heterogenised Molecular Systems for CO2 Reduction and H2 Evolution Reaction, Dr. Souvik Roy, School of Chemistry, University of Lincoln, Zoom Link
17. 24 Feb 2022 - 05:00PM: Fourier optimization and number theory, Prof. Emanuel Carneiro (ICTP, Italy and IMPA, Brazil), Zoom Link
18. 21 Feb 2022 - 03:00PM: What does it mean to be human? Biocapitalism and Disposable Lives in Fictional Narratives, Dr. Manali Karmakar, Vellore Institute of Technology, Chennai, Zoom Link
19. 20 Feb 2022 - 03:00PM: Women in Astronomy: Panel Discussion, Dr. H K Jassal, Dr. Aru Beri and Dr. Mamta Gulati as the panellists, Zoom Link
20. 11 Feb 2022 - 05:00PM: Understanding Tribal Development in India, Prof. Virginius Xaxa, Visiting Professor, Institute for Human Development, New Delhi. Zoom Link
21. 02 Feb 2022 - 06:00PM: Bureaucratic Archeology: State, Science, and Past in Postcolonial India, Dr. Ashish Avikunthak, Associate Professor in Film/Media at Harrington School of Communication, University of Rhode Island, Zoom Link
22. 21 Jan 2022 - 04:00PM: "Groups meet metric spaces", Michael Cowling, University of New South Wales (Australia), Zoom Link
23. 14 Jan 2022 - 05:00PM: First-principles investigation on quantum materials using beyond-DFT methods with chemical accuracy, Subhasish Mandal (Faculty Candidate), Rutgers University, New Jersey, USA, Zoom Link
24. 4 Jan 2022 - 05:00PM: First-principles investigation on quantum materials using beyond-DFT methods with chemical accuracy, Subhasish Mandal (Faculty Candidate), Rutgers University, New Jersey, USA
25. 13 Dec 2021 - 04:00PM: Applications and benchmarking of subtle quantum mechanical interactions using advance electron structure theories, Dr. Debashree Manna, Affiliation: DST Inspire Faculty, West Bengal Institute of Technology, Haringhata, West Bengal, Zoom Link

26. 02 Dec 2021 - 02:00PM: Geometric maximal functions, Prof. Jongchon Kim (City University of Hong Kong) Zoom Link
27. 01 Dec 2021 - 04:00PM: Nonlinearities in Ultrathin Suspended Structures, Dr. Akshay Naik, IISc Bangalore, Zoom Link
28. 30 Nov 2021 - 02:00PM: Investigating Cosmic string theories with Liquid Crystal Experiments, Prof. Ajit Mohan Srivastava, Institute of Physics, Bhubaneshwar, India, Zoom Link
29. 24 Nov 2021 - 04:00PM: Spin liquid behaviour in the candidate material Sr_3CuSb_2O_9, Dr. Sumiran Pujari, IIT Bombay, Zoom Link
30. 18 Nov 2021 - 05:00PM: POINTWISE FATOU THEOREMS AND THEIR CONVERSES, Prof. Swagato K. Ray (ISI, Kolkata), Zoom Link
31. 17 Nov 2021 - 05:00PM: Hyperbolic Groups and Non-Compact Real Algebraic Curves, Anna Pratoussevitch (University of Liverpool), Zoom Link
32. 17 Nov 2021 - 04:00PM: Periodically driven quantum systems: some interesting phenomena, Prof. Diptiman Sen, IISc Bangalore, Zoom Link
33. 16 Nov 2021 - 05:00PM: Interrogating Economy: Thinking Public Policy for India's Labouring Poor, Atul Sood, Professor, Centre for the Study of Regional Development, Jawaharlal Nehru University, New Delhi., Zoom Link
34. 10 Nov 2021 - 04:00PM: Belle II: flavour physics at the intensity frontier, Dr. Jim Libby, IIT Madras, Zoom Link
35. 27 Oct 2021 - 05:00PM: Making Postcolonial Biologies: Tales from an Other Enlightenment, Dr Banu Subramaniam, Professor & Chair, Department of Women, Gender, Sexuality Studies, University of Massachusetts, Amherst, Zoom Link
36. 27 Oct 2021 - 12:00PM: Resonant tunneling through twisted black phosphorus homostructures, Budhi Singh (Faculty Candidate), Sungkyunkwan University, Republic of Korea, Zoom Link
37. 26 Oct 2021 - 04:00PM: Microtubule Targeting Agents; Mechanisms and Implications for Cancer Chemotherapy, Dr. Ankit Rai (Faculty Candidate, Utrecht University, the Netherlands), Zoom Link
38. 22 Sep 2021 - 12:00PM: Some improvements on Stein's square function and local smoothing estimates for fractional Schrodinger equations. Dr. Shukun Wu (Caltech, USA), Zoom Link
39. 15 Sep 2021 - 12:00PM: First-principle Modelling of Next Generation Spintronics in 2D Quantum Materials, Kapildeb Dolui (Faculty Candidate), University of Delaware, USA, Zoom Link
40. 15 Sep 2021 - 11:30AM: Open Knowledge session on Intellectual Property Rights, IISER Mohali in association with Punjab State Council for Science & Technology and US Patent & Trademark Office
41. 08 Sep 2021 - 05:00PM: Tunable chirality of noncentrosymmetric magnetic Weyl semimetals, Rajyavardhan Ray, Leibniz IFW Dresden, Germany
42. 08 Sep 2021 - 03:00PM: A foray into non-associativity, Prof Jayanta Manoharmayum (University of Sheffield)
43. 07 Sep 2021 - 05:00PM: Exploring quantum phase tunability in unconventional superconductors, Debarchan Das, Paul Scherrer Institute, Villigen, Switzerland
44. 26 Aug 2021 - 03:00PM: Cholesterol and GPCR Function: A Molecular Sensor for Cholesterol in the Serotonin1A Receptor, Professor Amitabha Chattopadhyay, a SERB Distinguished Fellow at the Centre for Cellular and Molecular Biology (CCMB) in Hyderabad, India.
45. 18 Aug 2021 - 04:30PM: Explicit Reciprocity Laws in Number Theory, Prof Otmar Venjakob (Heidelberg University)
46. 13 Aug 2021 - 08:00AM: #Fit India Freedom Run 2.0 #Azadi Ka Amrit Mahotsav,
47. 05 Aug 2021 - 11:00AM: Bilinear Rough Singular Integrals, Bae Jun Park (KIAS, South Korea)
48. 02 Aug 2021 - 05:00PM: Unique Approach to Estimate and Understand Spatial and Dynamic Heterogeneity, Dr Pratik Sen, Professor, Dept of Chemistry, IIT Kanpur
49. 30 Jul 2021 - 03:00PM: Swarm Intelligence Guided Global Minima Search on Complex Potential Energy Surfaces, Dr R S Swathi, Associate Professor, School of Chemistry, IISER Thiruvananthapuram

50. 29 Jul 2021 - 04:30PM: PM address on completion of 1 year of Transformative Reforms under, National Educational Policy, 2020
51. 22 Jul 2021 - 05:00PM: Predictive sets, Nishant Chandgotia (TIFR Bangalore)
52. 15 Jul 2021 - 05:00PM: Ingham inequality and its application to control theory, Debanjana Mitra (IIT Bombay)
53. 08 Jul 2021 - 05:00PM: An uncertainty principle for certain eigenfunction expansions, Pritam Ganguly (IISc, Bangalore)
54. 05 Jul 2021 - 04:00PM: Infectious diseases: Epidemiology and pathogenesis, Dr. Taru Singh, Division of Epidemiology and Communicable Diseases (ECD), ICMR Headquarters, New Delhi, Zoom Link
55. 01 Jul 2021 - 05:00PM: Poincare meets Hardy, Prof. Debdip Ganguly (IIT Delhi), Zoom Link
56. 24 Jun 2021 - 05:00PM: Positivity aspects of Dirichlet series, Prof. Sameer Chavan (IIT Kanpur), Zoom Link
57. 17 Jun 2021 - 05:00PM: On Translation and Modulation invariant Hilbert spaces, Prof. P.K. Ratnakumar (HRI, Allahabad), Zoom Link
58. 11 Jun 2021 - 05:00PM: PERIODIC ULTRA-DISTRIBUTIONS AND PERIODIC ELEMENTS IN, MODULATION SPACES, Prof. Joachim Toft (Linnaeus University, Sweden), Zoom Link
59. 09 Jun 2021 - 04:00PM: Metal nanoparticles supported metal oxides synthesis and their catalytic application for small molecule activation reactions, Dr. Rajib Kumar Singha (Faculty Candidate), Trinity University, Texas, USA. Zoom Link
60. 03 Jun 2021 - 05:00PM: Bisynchronous Games and Positively Factorizable Maps, Prof. Mizanur Rahaman (BITS Pilani, Goa), Zoom Link
61. 28 May 2021 - 04:00PM: International Activism of Dalit Diaspora, Dr. Shailendra Kumar (Faculty Candidate), Central University of Gujarat, Gandhinagar,
62. 28 May 2021 - 03:45PM: Facilitating Hydrogen Evolution Maneuvering Anodic Processes, Dr. Biswajit Mondal, Scientist, CSIR-IIP,
63. 27 May 2021 - 05:00PM: Tomography bounds for the Fourier extension operator and applications, Prof. Jonathan Bennett, University of Birmingham, UK
64. 27 May 2021 - 03:45PM: Colloidal Semiconducting Nanocrystals: From Precise Atomic Control in II-VI Chalcogenide Heterostructures to Compositional Control in Lead Halide Perovskites, Dr. Abhijit Hazarika, Scientist, Polymers and Functional Materials Division, CSIR-Indian Institute of Chemical Technology, Hyderabad
65. 26 May 2021 - 03:45PM:'Antibiotic Discovery Strategies in the Era of Drug Resistance, Dr. Venkateswarlu Yarlagadda, Research Scientist, Dalriada Drug Discovery, Inc., Toronto, CANADA.
66. 22 May 2021 - 02:00PM: Numerical Experiment for Astrophysical Flows, Sudip K. Garain, GITAM Institute of Science, GITAM, Visakhapatnam
67. 21 May 2021 - 03:45PM: The Next Generation Sustainable Energy for All, Dr. Samuel Lalthazuala Rokhum, Assistant Professor, National Institute of Technology Silchar
68. 19 May 2021 - 04:00PM: DNA-based fluorescent reporters for in vivo imaging of second messengers, Dr. Nagarjun Narayanaswamy
69. 15 May 2021 - 03:30PM: Sound field imaging and multi-modal imaging techniques, Dr. Sudheesh K Rajput (Faculty Candidate), Kobe University, Kobe, Japan, Zoom Link
70. 15 May 2021 - 02:00PM: Light Manipulation in Metallic and Semiconductor Optical Systems, Dr. Danveer Singh (Faculty Candidate), Bar-Ilan Institute for Nanotechnology and Advanced Materials, Israel, Zoom Link
71. 13 May 2021 - 04:00PM: Enhancers and long noncoding RNAs in diabetes and diabetes, omplications Dr. Sadhan Chandra Das, CSIR-CDRI, Lucknow, Zoom Link
72. 13 May 2021 - 03:45PM: Stereoselective Construction of Organofluorine compounds and Selective Carbon-Fluorine Bond Functionalization, Dr. Balaraman Kaluvu, Georgetown University, Zoom Link

73. 12 May 2021 - 04:00PM: Wearable and Portable Biosensors for Healthcare/Agricultural/Security ApplicationsEnhancers and long noncoding RNAs in diabetes and diabetes complications, Dr. Yugender Goud Kotagiri, University of California San Diego - USA., Zoom Link
74. 12 May 2021 - 03:30PM: Black hole solutions in modified theories of gravity and its properties, Dr. Dharm Veer Singh (Faculty Candidate), GLA University, Mathura, Zoom Link
75. 12 May 2021 - 02:00PM: Probing Electronic Defects in Semiconductors, Dr. Sandip Mondal (Faculty Candidate), Purdue University, USA, Zoom Link
76. 08 May 2021 - 02:00PM: Probing Physics of Relativistic Jets and High Energy Emission Mechanisms through Multi-wavelength Data and Modeling, Dr. Pankaj Kushwaha (Faculty Candidate), ARIES, Nainital, India, Zoom Link
77. 07 May 2021 - 04:00PM: Quantitative experiments to understand Prokaryotic and Eukaryotic Chemotaxis, Dr. Richa Karmakar, University of California San Diego, USA, Zoom Link
78. 06 May 2021 - 05:00PM: IMPROVED BOUNDS FOR THE KAKEYA MAXIMAL CONJECTURE USING SEMIALGEBRAIC GEOMETRY, Dr. Keith Rogers, (ICMAT Madrid), Zoom Link
79. 06 May 2021 - 10:00AM: Tips and Tricks to the Isolation of Low-Valent p-Block Elements, Radicals and Multiply Bonded Compounds, Dr. Samir Kumar Sarkar (University of Göttingen), Zoom Link
80. 05 May 2021 - 04:00PM: New Generation Molecular Nanomagnets: Experiment and Theory, Dr. Vignesh Kuduva Radhakrishnan (Faculty candidate, IIT Bombay, Mumbai), Zoom Link
81. 05 May 2021 - 03:30PM: Nanotechnology Based Photovoltaic Thermal Solar Distillation Systems, Dr. Lovedeep Sahota (Faculty Candidate, Ramjas College, University of Delhi) Zoom Link
82. 05 May 2021 - 02:00PM: Computational Exploration of different 2D materials, Dr. Suman Chowdhury (Faculty Candidate, Indian Institute of Science (IISc), Bangalore), Zoom Link
83. 04 May 2021 - 04:00PM: Understanding ancient technology through an experimental approach, Dr. S.Udayakumar (Faculty Candidate), Zoom Link
84. 30 Apr 2021 - 06:30PM: Lp and Lp-improving bounds for spherical maximal operators, Prof. Andreas Seeger (University of Wisconsin, Madison), Zoom Link
85. 30 Apr 2021 - 05:00PM: Neoteric Solvents Assisted Sustainable Strategies for Enhanced Protein Packaging and Universal Water Purification, Dr. Dibyendu Mondal, Jain University, Bangalore, Zoom Link
86. 30 Apr 2021 - 05:00PM: Exploring a family of subgroups of SL (2,C) -- The Riley Slice of Schottky space. Prof. Caroline Series (University of Warwick), Zoom Link
87. 30 Apr 2021 - 04:00PM: Chemical, Biological and Ice Nucleating Properties of Ambient Aerosols in the North-Western Himalayan Region: Air quality, cloud formation, and climate perspective, Dr. Shweta Yadav (Faculty Candidate), Zoom Link
88. 29 Apr 2021 - 05:00PM: High Valent Nickel-Halide Complexes and Their Bioinspired Reactivity, Dr. Prasenjit Mondal, IISER Kolkata, Zoom Link
89. 29 Apr 2021 - 04:00PM: Proliferative Diabetic Retinopathy: Pathophysiology and Management, Strategy, Dr. Mohd Imtiaz Nawaz, King Saud University (KSU), Riyadh, KSA, Zoom Link
90. 28 Apr 2021 - 05:30PM: Bubbling and Gromov compactness: Mainak Podder (IISER Pune), Zoom Link
91. 28 Apr 2021 - 04:00PM: Periyar and the Women's Question, Dr. Karthick Ram Manoharan (Faculty Candidate), Zoom Link
92. 28 Apr 2021 - 04:00PM: An optimization-based stability and learning of a dynamical system, Dr. Lakshman Mahto (faculty candidate, IIT Dharwad), Zoom Link
93. 28 Apr 2021 - 04:00PM: A search for primary surface ruptures along the mountain front to characterize the recurrence behavior of the great earthquakes in the eastern Himalaya, Priyanka Singh Rao (Faculty Candidate, Assistant Professor, Department of Geology, Central University of Tamil Nadu, Thiruvarur), Zoom Link
94. 27 Apr 2021 - 04:00PM: Application of nanoparticle-contaminated wastewater and biosolids in soil: Fate and impacts on human health, Dr. Divya Singh (Faculty Candidate, National Postdoctoral fellow, Department of Civil Engineering, IIT Roorkee, India), Zoom Link

95. 27 Apr 2021 - 04:00PM: Dynamics of energy use pattern and its efficiency in agriculture of North India states, Dr. Hardeep Kumar (Faculty Candidate) Punjab Agricultural University, Zoom Link
96. 26 Apr 2021 - 04:00PM: Sources of Export Performance: A Comparative View of India and China Dr. Kulwinder Singh (Faculty Candidate, University Business School, Panjab University Chandigarh), Zoom Link
97. 26 Apr 2021 - 04:00PM: Study on some arithmetic properties of restricted partition functions. Dr. Shivaprasad Nayaka (Faculty Candidate, BMS Institute of Technology and Management, Bengaluru), Zoom Link
98. 26 Apr 2021 - 04:00PM: Elucidating the molecular details of pentameric Ligand Gated Ion Channels: lipid interactions, gating, and membrane models: Dr. Pramod Kumar, University of Illinois, Urbana-Champaign, USA, Zoom Link
99. 22 Apr 2021 - 05:00PM: Green Catalysis for Sustainable Organic Synthesis: Towards Development of Novel Catalytic Methodologies via Aerobic Oxidation Approach, Dr. Gangadhararao Golime, School of Chemistry, University of Hyderabad, Zoom Link
100. 22 Apr 2021 - 03:00PM: Non-abelian local root numbers and the Langlands' lambda functions. Dr. Sazzas Ali Biswas (University of Copenhagen, Denmark, Zoom Link
101. 21 Apr 2021 - 05:00PM: Contractible 3-manifold and Positive scalar curvature, Jian Wang (Augsburg University), Zoom Link
102. 16 Apr 2021 - 04:00PM: Modeling in groundwater resources with alternate data sources, Dr. Madhumita Sahoo (Faculty Candidate), Fulbright Kalam Postdoctoral Fellow, Bhubaneswar, INDIA, Zoom Link
103. 16 Apr 2021 - 04:00PM: Oncogenes and their role in shaping the tumor microenvironment, Dr. Sushil Kumar, University of Pennsylvania, USA, Zoom Link
104. 15 Apr 2021 - 05:00PM: About Schrödinger and Dirac operators with scaling critical potentials, Prof. Luca Fanelli (BCAM, Bilbao, Spain), Zoom Link
105. 15 Apr 2021 - 04:00PM: Imminent threat of climate warming in High Mountain Asia: Considerations from Chamoli landslide and other recent cases, Dr. Yunus Ali Pulpadan (Faculty Candidate), National institute for Environmental Studies, Tsukuba, Japan, Zoom Link
106. 14 Apr 2021 - 04:00PM: Experience with various low - cost waste treatment options, Dr. Rubia Gaur (Faculty Candidate), Visiting Scientist (ARO-PDF), Ministry of Agriculture & Rural Development, Israel, Zoom Link
107. 13 Apr 2021 - 04:00PM: Microtubule bundle formation during prometaphase: A theoretical approach. Dr. Subhadip Ghosh, University of Zagreb, Croatia, Zoom Link
108. 12 Apr 2021 - 04:00PM: Immunological memory in human chronic infectious diseases, Dr. Abhijit A. Ambegaonkar, National Institute of Allergy and Infectious Diseases (NIAID/NIH), Rockville, USA, Zoom Link
109. 10 Apr 2021 - 04:00PM: Farm Bills and Current State of Indian Agriculture, Prof. Prabhat Patnaik, Centre for Economic Studies & Planning, JNU, Zoom Link
110. 09 Apr 2021 - 05:00PM: Explicit isogenies of prime degree over quadratic fields, Dr. Barinder Banwait (HRI, Allahabad), Zoom Link
111. 08 Apr 2021 - 05:00PM: Fourier-Walsh coefficients, noise sensitivity and randomized algorithms, Prof. D. Yogeshwaran (ISI, Bangalore), Zoom Link
112. 08 Apr 2021 - 04:00PM: Data-driven drug target discovery, Dr. Bharat Panwar, Amgen Inc., California, USA, Zoom Link
113. 08 Apr 2021 - 04:00PM: Scheduled Caste Entrepreneurship in India: Status, Constraints and Future Prospects, Dr. Akhil Alha (Faculty Candidate), Council for Social Development, New Delhi, Zoom Link
114. 07 Apr 2021 - 04:00PM: Computational methods for identification of protein domains and their evolutionary studies, Dr. S. Muthu Krishnan, Institute of Microbial Technology (CSIR-IMTECH), Chandigarh, Zoom Link

115. 06 Apr 2021 - 04:00PM: ‘Taleem-yaftaladkiyan’ (Educated Girls): Schooling, Identity and Aspirations among Muslim women in Old Delhi, Dr. Madhulika Sonkar (Faculty Candidate), Delhi School of Economics, University of Delhi, Zoom Link
116. 05 Apr 2021 - 05:00PM: The Afflicted Fragile Self and Her Past: Exclusion, Body and Disease in Early India, Aloka Parasher-Sen, Professor Emerita, Department of Sanskrit Studies, School of Humanities & Former Head, Dept of History, University of Hyderabad, Zoom Link
117. 05 Apr 2021 - 04:00PM: Anti-Angiogenic VEGF-A isoforms in Peripheral Artery Disease, Dr. Vijay Chaitanya Ganta, Augusta University, USA, Zoom Link
118. 01 Apr 2021 - 04:00PM: Tax effort of Indian States: Implication for Fifteenth Finance Commission of India, Dr. Dinabandhu Sethi (Faculty Candidate), Centre of Excellence in Fiscal policy and Taxation (CEFT), Government of Odisha, Zoom Link

19. Postdoctoral fellows at the Institute

1. Anjali Yadav (Bology)
2. Ashish Jha (Bology)
3. Dhriti Singh (Bology)
4. Gagandeep Kaur (Bology)
5. Harash Goar (Bology)
6. Lavi Rani (Bology)
7. Parul Bai (Bology)
8. Sharad Kumar (Bology)
9. Vidushi khajuria (Bology)
10. Sharad Kumar (Bology)
11. Gagandeep Kaur (Bology)
12. Parul Bai (Bology)
13. Apuratha Pandiyan (Biology)
14. Banani Chattopadhyay (Biology)
15. Ishan Agarwal (Biology)
16. Poonam Sharma (Biology)
17. Pratima Pandey (Biology)
18. Rochishun Dutta (Biology)
19. Yogesh Dahiya (Biology)
20. Ab. Aayoom Mir (Chemistry)
21. Jhuma Dutta (Chemistry)
22. Mandeep Kaur (Chemistry)
23. Surinder Kaur Brar (Chemistry)
24. Vierandra Kumar (Chemistry)
25. Anita Sharma (EES)
26. Bhadur Singh (EES)
27. Krishna K Shukla (EES)
28. Deepasri Baul (HSS)
29. Shriya Bandyopadhyay (HSS)
30. Chandan Maity (Mathematics)
31. Damanvir Singh Binner (Mathematics)
32. Gurleen Kaur (Mathematics)
33. Kalachand Shuin (Mathematics)
34. Mainak Ghosh (Mathematics)
35. Mukund Madhav Mishra (Mathematics)
36. Neeraj Kumar Dhanwani (Mathematics)
37. Rakesh Pawar (Mathematics)
38. Rijubrata Kundu (Mathematics)
39. S P Murugen (Mathematics)
40. Sandipan Pandutta (Mathematics)
41. Sumit Chandra Mishra (Mathematics)
42. Sushil Bhunia (Mathematics)
43. Tushar Kanta Naik (Mathematics)
44. Akhilesh K.S (Physics)
45. Dipanweeta Bhattacharyya (Physics)
46. Gaurav Sharma (Physics)
47. Nur Amin Hoque (Physics)
48. Subhadip Ghosh (Physics)
49. Ankur Mandal (Physics)
50. Monkia Moun (Physics)
51. Bindiya Arora (Physics)

20. Graduates of 2021

20.1. BS Graduates

S. No.	Name	Reg. No.
1	Sumit Thakur	MS14005
2	Navjot Singh	MS14018
3	Somoshree Barik	MS15015
4	Vaibhav Kumar Singh	MS15077
5	Nitesh Bhatt	MS15085
6	Abhijit Pati	MS16056

20.2. BS-MS Graduates

S. No.	Name	Reg. No.	Subject
1	Saurav Shekhar	MS13138	Biology
2	Shubham A Singh	MS14025	Physics
3	Aman Dhiman	MS14079	Mathematics
4	Aritra Bhattacharya	MS14145	Mathematics
5	Chavan Aniket Laxman	MS14187	Physics
6	Shridhar Vinayak	MS15060	Physics
7	Thabassum Ahammad NK	MS15110	Chemistry
8	Hem lata	MS15138	Biology
9	Tamanna	MS15141	Mathematics
10	Sachin C S	MS15150	Mathematics
11	Shivansh	MS15198	Biology
12	Mohit Bansal	MS15207	Biology
13	Kartik Chhajed	MS16001	Physics
14	Pushpit	MS16003	Physics
15	Mamta	MS16004	Biology
16	Aritram Dhar	MS16005	Mathematics
17	Sahil Threja	MS16006	Biology
18	Rahul Singh Yadav	MS16008	Chemistry
19	Gummala Sreenivas	MS16009	Biology
20	Kausthub Keshava	MS16010	Mathematics
21	Bidisha Biswas	MS16011	Physics
22	Aman Sharma	MS16012	Physics
23	Neha Bajaj	MS16013	Chemistry
24	Celina Meena	MS16014	Biology
25	Sourav Das	MS16015	Physics
26	Saurabh Annadate	MS16016	Physics
27	Soumyadip Poddar	MS16018	Biology
28	Nandagopal S A	MS16019	Mathematics
29	Harshath Amal	MS16022	Biology

30	Nikita Singh	MS16024	Chemistry
31	Anubhav Kumar Srivastava	MS16025	Physics
32	Vishal Varma	MS16026	Physics
33	Yogesh Verma	MS16027	Physics
34	Dipannita Ghosh	MS16028	Biology
35	Pratibha Jadoun	MS16029	Mathematics
36	Subhajit Pal	MS16030	Biology
37	Kaustuv Ghosh	MS16031	Biology
38	Suman Chatterjee	MS16032	Physics
39	Asrith Krishna R	MS16033	Physics
40	Shradha Sapru	MS16034	Chemistry
41	Abhijit Bhalachandra	MS16035	Mathematics
42	Rahul Ramesh	MS16036	Physics
43	Gyana Lipsa Parida	MS16037	Biology
44	K Abhijeet	MS16038	Chemistry
45	Upayan Roy	MS16041	Physics
46	Reena	MS16042	Chemistry
47	Samyak Pratyush Prasad	MS16044	Physics
48	Kshitiz	MS16045	Biology
49	Ardra Nandakumar	MS16046	Biology
50	Vaishnav Dilip	MS16047	Mathematics
51	Utkarsh Pathak	MS16048	Physics
52	Bhavish Raj Gopal	MS16049	Mathematics
53	Yashika Gupta	MS16051	Chemistry
54	Amisha Yadav	MS16052	Chemistry
55	Parth Kapoor	MS16053	Physics
56	Abhishek Purohit	MS16054	Physics
57	Shikhar Arora	MS16055	Physics
58	Ajay Jayachandran	MS16057	Chemistry
59	Chahat Badhan	MS16058	Biology
60	Gautam Neelakantan M	MS16060	Mathematics
61	Tekade Kimaya Nitin	MS16063	Biology
62	Shashwat Kumar	MS16064	Physics
63	Somnath Mandal	MS16065	Physics
64	Sonell Malik	MS16066	Physics
65	Dinesh Kumar	MS16067	Mathematics
66	Saksham Mahajan	MS16068	Physics
67	Satender	MS16069	Mathematics
68	Abhimanyu Nowbagh	MS16070	Physics
69	Ruchira A Mishra	MS16071	Physics
70	Hiral Suresh Gandhi	MS16072	Biology
71	Vivek Shukla	MS16073	Physics
72	Shagun Puri	MS16074	Biology

73	Satvik Singh	MS16075	Physics
74	Nikhil C	MS16076	Biology
75	Ashley Chraya	MS16077	Physics
76	Vinod Gour	MS16078	Chemistry
77	Mohammad Ijaz Ahamed	MS16079	Physics
78	Anshuman Acharya	MS16080	Physics
79	Anuj Kaundal	MS16081	Chemistry
80	Soumya Panyam	MS16082	Biology
81	Saumya Sebastian	MS16083	Chemistry
82	Akhil Pratap	MS16087	Chemistry
83	Aman Singh Katariya	MS16088	Physics
84	Divya Suman	MS16090	Chemistry
85	Kirti Devi	MS16091	Chemistry
86	Tejendra	MS16092	Biology
87	Prerna Goel	MS16093	Biology
88	Pol Prathamesh Balasaheb	MS16094	Biology
89	Pandya Dhruv Jyotindra	MS16095	Physics
90	Manisha Kalsain	MS16096	Biology
91	R Bharathkumar	MS16097	Physics
92	Mayank Kashyap	MS16098	Biology
93	Satyapan Munshi	MS16099	Physics
94	Anima Angelina Lakra	MS16101	Biology
95	Sparsh Tyagi	MS16102	Chemistry
96	Bitra Jyothi Srinivas	MS16103	Biology
97	Anmol Arya	MS16105	Physics
98	Manisha Gaurav	MS16106	Chemistry
99	Liz Maria Luke	MS16107	Biology
100	Saswat Pattnaik	MS16109	Biology
101	Salman Faris K	MS16110	Chemistry
102	Arjun Chowdhury	MS16111	Chemistry
103	Swastika Anand	MS16115	Biology
104	Deepanshu Aggarwal	MS16116	Physics
105	Anuthariq A. V	MS16119	Biology
106	Deepraj Verma	MS16120	Chemistry
107	Priya Bhatt	MS16121	Biology
108	Arpit Omprakash	MS16124	Biology
109	Subhamoy Deb	MS16126	Physics
110	Rishi Gangadhar G	MS16127	Physics
111	Abhijeet Singh	MS16129	Physics
112	Aaditya Mishra	MS16131	Physics
113	Yuvraj Vaishnav	MS16132	Chemistry
114	Nandan Malhotra	MS16133	Mathematics
115	Shrestha Shaw	MS16135	Biology

116	Mubarak Jamal	MS16136	Biology
117	Siddhant Sahoo	MS16138	Biology
118	Pankaj Kumar Jangid	MS16140	Chemistry
119	Subhasis Behera	MS16141	Biology
120	Pranay Jaiswal	MS16142	Physics
121	Budaraju Sasank	MS16143	Physics
122	Pravin Kumar	MS16144	Chemistry
123	Sajan Chinnan	MS16149	Chemistry
124	Akhlesh Kumar Meena	MS16152	Chemistry
125	Shivam Kumar	MS16154	Chemistry
126	Mohak Sharma	MS16155	Physics
127	Umakant Gaurav	MS16156	Chemistry
128	Varghese Alapatt	MS16158	Physics
129	Amjadudheen V P	MS16160	Biology
130	Nishuta	MS16161	Biology
131	Hunarpreet Kaur	MS16162	Chemistry
132	Ankush Sharma	MS16163	Biology
133	Navya	MS16164	Biology
134	Nada. R. S.	MS16165	Biology
135	Harsh Kishor	MS16167	Chemistry
136	Cheshta Bhatia	MS16170	Biology
137	Harjasnoor Kakkar	MS16172	Chemistry
138	Shilauni Dadwal	MS16173	Biology
139	Vishal Gaur	MS16174	Physics
140	Vandana Gupta	MS16175	Biology
141	Dhanyaj N. Nampoothiry	MS16176	Chemistry
142	Sreelakshmi. V	MS16178	Chemistry
143	Jacob Siby	MS16179	Biology
144	Aljasil. C	MS16181	Chemistry
145	Adarsh S Kurup	MS16182	Chemistry
146	Rosmi Reji	MS16183	Chemistry
147	Puneeth Deraje	MS16184	Mathematics
148	Anshul Nagar	MS16185	Chemistry
149	Shubhangi Jain	MS16186	Physics
150	Parvathi Valsalan	MS16188	Physics
151	Broti Biswas	MS16189	Biology

20.3. PhD Graduates

S. No.	Name	Reg. No.	Dept.	Title of the Thesis
1	Poulami Choudhuri	MP12004	BIO	A conserved and essential motif in the pre- mRNA splicing factor Snu66; and SRC1 alternative splicing factors in S. cerevisiae
2	Reema Kathuria	MP12013	BIO	Exploring the implication of cholesterol in regulating the pore-formation mechanism of Vibrio cholerae cytolysin, a β-barrel pore- forming toxin
3	Jaskaran Singh Nirankari	MP13003	PHY	Studies of quantum contextuality, Bell non- locality and their role in quantum key distribution protocols
4	Joydip De	MP13005	CHM	Self-assembled Functional Discotic Liquid Crystals for Luminescence and Efficient Charge Transport
5	Mayank Saraswat	MP13007	CHM	Matrix-Isolation Infrared Spectroscopy and Computational Studies of Diazine Radicals
6	Indu Bala	MP13009	CHM	Functional Discotic Liquid Crystals Through Molecular Self-Assembly For Application In Organic Electronic Devices
7	Ayushi Singhania	MP13013	PHY	Cluster Mean Field Approach to Low Dimensional Quantum Magnets
8	Neha Nanda	MP15006	MTH	Structural aspects of planar braid groups
9	Manpreet Singh	MP15009	MTH	Algebraic structures in knot theory
10	Shiv Kumar Sharma	PH12101	BIO	Understanding the role of actomyosin complex in the developing lymph gland of Drosophila melanogaster
11	Rivi Verma	PH12107	BIO	A study on structural conservation of intra- chain domain-domain interfaces: learning for modeling interfaces
12	Chandan Kumar	PH12129	PHY	Continuous variable Gaussian and non-Gaussian states: Estimation, nonlocality and quantum key distribution
13	Shalini Yadav	PH13005	BIO	WUSCHEL dynamically regulates auxin biosynthesis to promote stemness and progenitor cell differentiation in the shoot apical meristem of Arabidopsis
14	Kanchan Jaswal	PH13023	BIO	Understanding the interconnection between carbon metabolism, electron transport chain and envelope redox homeostasis in Escherichia coli

15	Muskan Bhatia	PH13043	BIO	Studies on the regulatory domain of the yeast Methylene tetrahydrofolate reductase (MTHFR), a key enzyme in one-carbon metabolism
16	Deepinder Kaur	PH14005	BIO	Understanding the role of OmpV, an outer membrane protein of Salmonella typhimurium towards bacterial pathogenesis and host immune activation
17	Avinash Singh	PH14041	PHY	Aspects of Tachyon Field Cosmology
18	Amit Vashist	PH14042	PHY	Probing Topological Character and Fermi Surface of Topological Materials by Magnetotransport Measurements
19	Abhishek Kumar Mishra	PH14047	EES	Emissions, diurnal variability and modelling of biogenic volatile organic compounds
20	Shilpa Dahake	PH14049	HSS	Feral Ecologies of a River: Politics of Infrastructure, Pollution, and Water Flows of the Godavari River in Nashik, India
21	Priyanka Madhu	PH14050	CHM	Mechanistic Insights into the Interaction of Conformationally Distinct Amyloid-β Oligomers with the Prion Protein and Lipid Membranes
22	Shivangi Gupta	PH14064	BIO	Understanding the role of Pten and the molecular mechanisms underlying Pten/PI3K/Akt/mTOR pathway during zebrafish retina regeneration
23	Komal Maggu	PH14068	BIO	Role of sexual selection and conflict in the evolution of reproductive traits: A study using populations of Drosophila melanogaster evolving under different operational sex ratios
24	Amit Roy	PH15002	MTH	Combinatorial properties of some monomial ideals induced by graphs and permutations
25	Rayavarapu Padmavathi	PH15003	CHM	Studies on Pd(II)-catalyzed directing-group aided regioselective C-H functionalization of carboxamides
26	Uttam Kumar Mishra	PH15007	CHM	Synthesis of New Class of Cyclopropanes and Their Unusual Synthetic Transformations
27	Sanjit Mondal	PH15009	CHM	Metal-free heterogeneous photocatalysts for solar energy harvesting
28	Keerthivasan R C	PH15011	BIO	Insulated domain organization and regulation of metazoan genomes
29	Suman Kamboj	PH15012	PHY	Transport spectroscopy on novel quantum materials

30	Harshita Pawar	PH15022	EES	Quantifying the contribution of distant, regional, and local sources to Particulate Matter (PM) loadings in north-west India using a combination of statistical tools and low-cost PM Sensors
31	Ashish Kumar Meena	PH15036	PHY	Singularities in Gravitational Lensing
32	Anuradha Singh	PH15046	BIO	Understanding the role of DOP-2, a dopamine autoreceptor, in ethanol dependent locomotion of Caenorhabditis elegans
33	Manvendra Pratap Rajvanshi	PH16051	PHY	Dark Energy Perturbations beyond linear perturbation theory
34	Soumen Ash	PH14201	INS	Investigation Of Transition Metal Dichalcogenide Based Layered Superconductors
35	Ashmeet Singh	PH14207	INS	Peptide-based functional materials: From structural control to catalytic activities and inorganic-organic hybrids
36	Ankur Sharma	PH14208	INS	Pulmonary Delivery of Antimicrobial Peptides (AMP) using Porous Nanoparticles Aggregate (PNAPs) for Targeting Alveolar Macrophages against Pulmonary Tuberculosis
37	Munish Shorie	PH14213	INS	Aptamer Functionalized Nanobioprobe Based Sensing Platforms for Cardiovascular Diseases
38	Anirban Kundu	PH14217	INS	Structural and Opto-electronic Study of 2D Black Phosphorus: A Perspective from Raman Spectroscopy
39	Neha	PH14219	INS	Emergent phenomena at the conducting interface of insulating oxides with strong spin- orbit coupling
40	Atul Dev	PH14220	INS	Development of Nanotherapeutic platforms for the treatment and management of solid cancer
41	Renu Rani	PH14222	INS	Low power-focused laser irradiation induced controlled nanostructuring of MoS2 flakes for potential optical and electronic applications
42	Harmanjit Kaur	PH14223	INS	Aptamer functionalized nanostructured biosensing platforms for enteric pathogenic bacteria
43	Sandeep	PH14224	INS	Graphene Oxide-based Composites for Stimuli- responsive Agrochemicals Delivery and to Augment Plant Functions through Nanobionics Approach
44	Jojo P Joseph	PH15211	INS	Stimuli-responsive Supramolecular Materials for Self-healing, Compartmentalization and Strain-stiffening Applications

45	Krishna Kumar Yadav	PH15215	INS	Nanostructured Metal Borides: Synthesis and their Applications
46	Arif Hassan Dar	PH15216	INS	Design, Synthesis and Studies of Luminescent Organic Non-planar Push–pull Chromophores

20.4. MS Graduates

S. No.	Name	Reg. No.
1	Satpute Ganesh Ashok	MP17014
2	B Nivedha	MP18002
3	Ayush Jain	MP18004
4	Abhinil Ghosal	MP18005
5	Lakshita	MP18006
6	Saurav Goyal	MP18007
7	Mehak	MP18008
8	Koustav Ray	MP18014
9	Anshul Jain	MP18018
10	Bhim Sen	MP18019
11	Basundhara Dasgupta	MP18023
12	Sukanya Dutta	MP18025
13	Saswata Bhattacharyya	MP18026
14	Shabduli Sawant	MP18030
15	Pallavi Joshi	MP18031

21. Publications

21.1. Publication During the Calendar year 2021:

21.1.1 Department of Chemical Sciences

1. **A. R. Choudhury, M. Karanam, M. Joshi, I. Verma, A. Gulati,** C. Budhwar, S. Rani, A. Bhalla, P. Garg**, A. Mukhopadhyay,** K. Raza and D. Sagarika **(2021)**. Pharmaceutical cocrystallization: polymorphs, salts and co-crystals. ***Acta Crystallographica Section a Foundations and Advances***, *77*(a2), C878–C878. https://doi.org/10.1107/s0108767321088206
2. **Abhishek Kundu, Dhananjay Dey, Subhankar Pal** and **Debashis Adhikari (2021)**. Pyrazole-Mediated C–H Functionalization of Arene and Heteroarenes for Aryl–(Hetero)aryl Cross-Coupling Reactions. ***The Journal of Organic Chemistry***, *86*(21), 15665–15673. https://doi.org/10.1021/acs.joc.1c02234

3. Agastya P. Bhati, **S. Goyal, Ram Yadav** and **Narayanasami Sathyamurthy (2021)**. Pattern formation in Passiflora incarnata: An activator-inhibitor model. ***Journal of Biosciences***, *46*(3), 84. https://doi.org/10.1007/s12038-021-00202-1
4. **Ajay Kumar, Sharmilaa Bhattacharya, Diptimayeea Behera, Praveen K.Mishra, Ankit Yadav** and **Ambili Anoop (2021)**. Distribution and characteristics of microplastics and phthalate esters from a freshwater lake system in Lesser Himalayas. ***Chemosphere***, *283*, 131-132. https://doi.org/10.1016/j.chemosphere.2021.131132
5. Ajit Das, **Mrinal K.Adak**, Nagendranath Mahata, and Bhaskar Biswasd **(2021)**. Wastewater treatment with the advent of TiO2 endowed photocatalysts and their reaction kinetics with scavenger effect. ***Journal of Molecular Liquids***, *338*, 116479. https://doi.org/10.1016/j.molliq.2021.116479
6. **Akhila Kadyan, Anil Shaji** and **Jino George (2021)**. Boosting Self-interaction of Molecular Vibrations under Ultrastrong Coupling Condition. ***The Journal of Physical Chemistry Letters***, *12*(17), 4313–4318. https://doi.org/10.1021/acs.jpclett.1c00552
7. **Akshi Deshwal and Subhabrata Maiti (2021).** Macromolecular Crowding Effect on the Activity of Liposome-Bound Alkaline Phosphatase: A Paradoxical Inhibitory Action. ***Langmuir***, *37*(23), 7273–7284. https://doi.org/10.1021/acs.langmuir.1c01177
8. **Alokananda Chanda,** Sadhika Khullar and **Sanjay K. Mandal (2021)**. Luminescent, Helical and Highly Stable Zn(II) and Cd(II) Coordination Polymers: Structural Diversity and Selective Sensing of 4-Nitroaniline in Water. ***European Journal of Inorganic Chemistry***, *2021*(26), 2595–2605. https://doi.org/10.1002/ejic.202100262
9. **Amreen K Bains, Ayanangshu Biswas** and **Debashis Adhikari (2021)**. Nickel-Catalyzed Selective Synthesis of α-Alkylated Ketones via Dehydrogenative Cross-Coupling of Primary and Secondary Alcohols. ***Advanced Synthesis & Catalysis*****,** *364*(1), 47–52. https://doi.org/10.1002/adsc.202101077
10. **Amreen K. Bains, Abhishek Kundu,** Debabrata Maiti and **Debashis Adhikari (2021)**. Ligand-redox assisted nickel catalysis toward stereoselective synthesis of (*n*+1)-membered cycloalkanes from 1,*n*-diols with methyl ketones. ***Chemical Science*****,** *12*(42), 14217–14223. https://doi.org/10.1039/d1sc04261k
11. **Amreen K. Bains, Yadav Ankit** and **Debashis Adhikari (2021).** Pyrenedione-Catalyzed α-Olefination of Nitriles under Visible-Light Photoredox Conditions. ***Organic Letters*****,** *23*(6), 2019–2023. https://doi.org/10.1021/acs.orglett.1c00162
12. **Amreen K. Bains**, **Yadav Ankit** and **Debashis Adhikari** (**2021**). Bioinspired Radical-Mediated Transition-Metal-Free Synthesis of N-Heterocycles under Visible Light. ***ChemSusChem,*** 14(1), 324-329. https://doi.org/10.1002/cssc.202002161
13. Anamika Kumari, **Joydip De**, Sushanta Dattagupta, Hirendra N. Ghosh, **Santanu Kumar Pal** and S. Chakraverty **(2021)**. Probing conducting interfaces by combined photoluminescence and transport measurements: LaVO3 and SrTiO3 interface as a case study. ***Physical Review B***, 104(8), L081111. https://doi.org/10.1103/physrevb.104.l081111
14. **Anshu Singh, Ankur Maji, Mayank Joshi, Angshuman R. Choudhury** and **Kaushik Ghosh (2021)**. Designed pincer ligands supported Co(II)-based catalysts for dehydrogenative activation of alcohols: Studies on N-alkylation of amines, -alkylation of ketones and synthesis of quinolines. ***Dalton Transactions***, 50(24), 8567-8587. https://doi.org/10.1039/d0dt03748f
15. Arpan Das, Jasimuddin Ahmed, N. M. Rajendran, **Debashis Adhikari** and Swadhin K. Mondal (2021). A Bottlebale Imidazole-Based Radical as a Single Electron Transfer Reagent. ***The Journal of Organic Chemistry,*** 86(1), 1246-4252. *https://doi.org/10.1021/acs.joc.0c02465.*
16. Arumugam Kalaiselvan, **Shaina Dhamija**, Chakrapani Aswathi, **Arijit K. De** and Sabapathi Gokulnath **(2021).** Planar hexaphyrin-like macrocycles turning into bis-BODIPYs with box-shaped structures exhibiting excitonic coupling. ***Chemical Communications*****,** *57*(87), 11485–11488. https://doi.org/10.1039/d1cc04403f
17. **Arup Dalal** and **Srinivasarao Arulananda Babu (2021).** Pd(II)-Catalyzed Directing-Group-Aided C–H Arylation and Alkylation of Pyrene Core: Synthesis of C1,C2- and C1,C10-Disubstituted Pyrene Motifs. ***Synthesis***, *53*(18), 3307–3324. https://doi.org/10.1055/a-1472-0881
18. **Ashitha P. P, Mayank Joshi, Deepraj Verma, Sachin Jadhav, Angshuman Roy Choudhury** and **Debrina Jana (2021)**. Layered $Cs_4CuSb_2Cl_{12}$ Nanocrystals for Sunlight-Driven Photocatalytic

Degradation of Pollutants. ***ACS Applied Nano Materials*****,** *4*(2), 1305–1313. https://doi.org/10.1021/acsanm.0c02879

19. **Atanu Mondal, Bishnupada Satpathi** and **S. S. V. Ramasastry (2021).** Phosphine-Catalyzed Intramolecular Vinylogous Aldol Reaction of α-Substituted Enones. ***Organic Letters***, *24*(1), 256–261. https://doi.org/10.1021/acs.orglett.1c03913
20. **Atanu Mondal, Shivangi, Pinku Tung, Siddhant V. Waguldea** and **S. S. V. Ramasastry (2021)**. Annulative Morita–Baylis–Hillman reaction to synthesise chiral dibenzocycloheptanes. ***Chemical Communications***, *57*(73), 9260–9263. https://doi.org/10.1039/d1cc02765d
21. Brij Mohan, **Virender Sandeep Kumar**, Krunal Modi, Harish Kumar Sharma and Ashwani Kumar **(2021)**. 5-Bromo-1H-indol based flexible molecular receptor possessing spectroscopic characteristics for detection of Sm(III) and Dy(III) ions. ***Inorganica Chimica Acta***, *519*, 120275. https://doi.org/10.1016/j.ica.2021.120275
22. **Debapriya Das, Lishaa Arora** and **Samrat Mukhopadhyay (2021)**. Fluorescence Depolarization Kinetics Captures Short-Range Backbone Dihedral Rotations and Long-Range Correlated Dynamics of an Intrinsically Disordered Protein. ***The Journal of Physical Chemistry B***, *125*(34), 9708–9718. https://doi.org/10.1021/acs.jpcb.1c04426
23. **Debapriya Gupta, Ankit Kumar Gaur, Pravesh Kumar, Himanshu Kumar, Anjali Mahadevan, Sudha Devi, Saonli Roy** and **Sugumar Venkataramani (2021)**. Tuning of Bistability, Thermal Stability of the Metastable States, and Application Prospects in the C_3 -Symmetric Designs of Multiple Azo(hetero)arenes Systems. ***Chemistry – a European Journal***, *27*(10), 3463–3472. https://doi.org/10.1002/chem.202004620
24. Debarati Bhattacharya**, K. R. Shamasundar** and Agapi Emmanouilidou **(2021)**. Potential Energy Curves of Molecular Nitrogen for Singly and Doubly Ionized States with Core and Valence Holes. ***The Journal of Physical Chemistry A***, *125*(36), 7778–7787. https://doi.org/10.1021/acs.jpca.1c04613
25. Dipika Narula, Shamsher S. Bari, Pooja Yadav, Sadhika Khullar, **Sanjay K. Mandal**, Gurpreet Kaur, Ganga Ram Chaudhary and Aman Bhalla **(2021)**. Synthesis of α-Heterocycle Anchored Spirocyclic Azetidin-2-ones in a Minute by *p* -TSA Catalyzed Cyclocondensation of Azetidin-2,3-diones with Difunctionalized Substrates. ***ChemistrySelect***, *6*(16), 3932–3940. https://doi.org/10.1002/slct.202101104
26. **Ekta Shandilya, Basundhara Dasgupta and Subhabrata Maiti (2021).** Interconnectivity between Surface Reactivity and Self-Assembly of Kemp Elimination Catalyzing Nanorods. ***Chemistry – a European Journal***, *27*(29), 7831–7836. https://doi.org/10.1002/chem.202100450
27. F. A. Gianturco, K. Giri, L. González-Sánchez, E. Yurtsever, **Narayanasami Sathyamurthy** and R. Wester **(2021)**. Efficiency of rovibrational cooling of HeH^+ by collisions with He: Cross sections and rate coefficients from quantum dynamics. ***The Journal of Chemical Physics***, *155*(15), 154301. https://doi.org/10.1063/5.0062147
28. Franco Gianturco, Kousik Giri, Lola Gonzalez-Sanchez, Ersin Yurtsever, **Narayanasami Sathyamurthy** and Roland Wester **(2021)**. Energy-transfer quantum dynamics of HeH^+ with He atoms: Rotationally inelastic cross sections and rate coefficients. ***The Journal of Chemical Physics***, *154*(5), 054311. https://doi.org/10.1063/5.0040018
29. Gaurav Chasta, Himanshu, Shankar Lal Patel, **S.Chander**, M. D. Kannan and M. S. Dhaka **(2021)**. Analysis of different vacuum annealing levels for ZnSe thin films as potential buffer layer for solar cells. ***Journal of Materials Science: Materials in Electronics***, *33*(1), 139–157. https://doi.org/10.1007/s10854-021-07280-9
30. **Gouri Chakraborty, Prasenjit Das** and **Sanjay K. Mandal (2021).** Efficient and Highly Selective CO2 Capture, Separation, and Chemical Conversion under Ambient Conditions by a Polar-Group-Appended Copper(II) Metal–Organic Framework. ***Inorganic Chemistry***, *60*(7), 5071–5080. https://doi.org/10.1021/acs.inorgchem.1c00101
31. **Gouri Chakraborty, Prasenjit Das** and **Sanjay K. Mandal (2021)**. Quinoline-tagged fluorescent organic probes for sensing of nitro-phenolic compounds and Zn^{2+} ions at the ppb level. ***Materials Advances*****,** *2*(7), 2334–2346. https://doi.org/10.1039/d1ma00025j
32. **Gurdeep Singh, Rajat Pandey, Yogesh A. Pankhade, Shaheen Fatma** and **Ramasamy Vijaya Anand (2021)**. Construction of Oxygen- and Nitrogen-based Heterocycles from *p* -Quinone Methides. ***The Chemical Record***, *21*(12), 4150–4173. https://doi.org/10.1002/tcr.202100137

33. **Gurdeep Singh, Rajat Pandey, Adarsh S. Kurup** and **Ramasamy Vijaya Anand (2021)**. A Base-Mediated Approach Towards Dihydrofuro[2,3- *b*]Benzofurans from 2-Nitro Benzofurans and 1,3-Dicarbonyls. ***Chemistry – an Asian Journal*****,** *16*(10), 1271–1279. https://doi.org/10.1002/asia.202100184
34. **Indu Bala, Joydip De,** Santosh Prasad Gupta, Upendra Kumar Pandey and **Santanu Kumar Pal (2021)**. Enabling efficient ambipolar charge carrier mobility in a H-bonded heptazine–triphenylene system forming segregated donor–acceptor columnar assemblies. ***Journal of Materials Chemistry C***, *9*(27), 8552–8561. https://doi.org/10.1039/d1tc01898a
35. **Ipsita Pani, Fidha Nazreen K. M., Monika Sharma** and **Santanu Kumar Pal (2021)**. Probing Nanoscale Lipid–Protein Interactions at the Interface of Liquid Crystal Droplets. ***Nano Letters*****,** *21*(11), 4546–4553. https://doi.org/10.1021/acs.nanolett.0c05139
36. **Joydip De, Ishan Sarkar**, Rohit Ashok Kumar Yadav**, Indu Bala**, Santosh Prasad Gupta, Iram Siddiqui, Jwo-Huei Jou and **Santanu Kumar Pal (2021).** Luminescent columnar discotics as highly efficient emitters in pure deep-blue OLEDs with an external quantum efficiency of 4.7%. ***Soft Matter***, *18*(4), 4214–4219. https://doi.org/10.1039/D1SM01558C
37. **Joydip De**, Rohit Ashok Kumar Yadav, **Rahul Singh Yadav**, Santosh Prasad Gupta, **Mayank Joshi, Angshuman Roy Choudhury**, Jayachandran Jayakumar, Jwo-Huei Jou, Chien-Hong Cheng and **Santanu Kumar Pal (2021)**. Molecular Engineering for the Development of a Discotic Nematic Mesophase and Solid-State Emitter in Deep-Blue OLEDs. ***The Journal of Organic Chemistry***, *86*(10), 7256–7262. https://doi.org/10.1021/acs.joc.1c00742
38. **Kavita Rani, Upendra K. Pandey** and **Sanchita Sengupta (2021)**. Efficient electron transporting and panchromatic absorbing FRET cassettes based on aza-BODIPY and perylenediimide towards multiple metal FRET-Off sensing and ratiometric temperature sensing. ***Journal of Materials Chemistry C***, *9*(13), 4607–4618. https://doi.org/10.1039/d1tc00068c
39. **Kavita Rani** and **Sanchita Sengupta (2021)**. Multi-stimuli programmable FRET based RGB absorbing antennae towards ratiometric temperature, pH and multiple metal ion sensing. ***Chemical Science***, *12*(47), 15533–15542. https://doi.org/10.1039/d1sc05112a
40. **Ketan Kumar, Prashant Kumar, Bara Singh, Sonu Yadav, Uttam K. Mishra, Arshad J. Ansari** and **S.S.V. Ramasastry (2021)**. Hypothesis-Driven Palladium-Catalyzed Transformations for the Construction of New Molecular Architectures. ***The Chemical Record***, *21*(12), 3470–3482. https://doi.org/10.1002/tcr.202100095
41. **Ketan Kumar, T. Vivekanand, Bara Singh** and **S. S. V. Ramasastry (2021)**. C(sp3)–H Activation Enabled by (η3-Indolylmethyl)palladium Complexes: Synthesis of Monosubstituted Tetrahydrocarbazoles. ***Synthesis***, *54*(04), 943–952. https://doi.org/10.1055/a-1516-7960
42. **Kirti Singh, Iram Siddiqui, Vidhyalakshmi Sridharan, Rohit Ashok Kumar Yadav, Jwo-Huei Jou** and **Debashis Adhikari (2021)**. Aggregation-Induced Enhanced Emission-Active Zinc(II) β-Diketiminate Complexes Enabling High-Performance Solution-Processable OLEDs. ***Inorganic Chemistry***, *60*(24), 19128–19135. https://doi.org/10.1021/acs.inorgchem.1c02926
43. **Kirti Singh, Vidhyalakshmi S.** and **Debashis Adhikari (2021)**. Visible light photoredox by a $(^{ph,Ar}NacNac)_2Zn$ photocatalyst: photophysical properties and mechanistic understanding. ***Inorganic Chemistry Frontiers***, *8*(8), 2078–2087. https://doi.org/10.1039/d0qi01466d
44. Koushik Sarkar, Kuhali Das**, Abhishek Kundu, Debashis Adhikari** and Biplab Maji **(2021)**. Phosphine-Free Manganese Catalyst Enables Selective Transfer Hydrogenation of Nitriles to Primary and Secondary Amines Using Ammonia–Borane. ***ACS Catalysis***, *11*(5), 2786–2794. https://doi.org/10.1021/acscatal.0c05406
45. Kousik Giri, Brijesh K.Mishra and **Narayanasami Sathyamurthy (2021)**. Disruptive influence of the host cage C60 on the guest He–H+ bond and bonding in H3+. ***Journal of the Indian Chemical Society*****,** *98*(8), 100101. https://doi.org/10.1016/j.jics.2021.100101
46. **Lipipuspa Sahoo, Parmeet Kaur Dhindsa, Nihal C. P** and **Ujjal K. Gautam (2021)**. "Pre-optimization" of the solvent of nanoparticle synthesis for superior catalytic efficiency: a case study with Pd nanocrystals. ***Nanoscale Advances***, *3*(8), 2366–2376. https://doi.org/10.1039/d0na01006e
47. **Lipipuspa Sahoo, Sanjit Mondal, A. Gloskovskii, Arunabhiram Chutia** and **Ujjal K. Gautam (2021)**. Unravelling charge-transfer in Pd to pyrrolic-N bond for superior electrocatalytic performance. ***Journal of Materials Chemistry A***, *9*(17), 10966–10978. https://doi.org/10.1039/d0ta12618g

48. **Lipipuspa Sahoo, Sanjit Mondal, C.B. Nayana** and **Ujjal K. Gautam (2021)**. Facile d-band tailoring in Sub-10 nm Pd cubes by in-situ grafting on nitrogen-doped graphene for highly efficient organic transformations. ***Journal of Colloid and Interface Science***, *590*, 175–185. https://doi.org/10.1016/j.jcis.2020.12.118
49. **Lipipuspa Sahoo, Sanjit Mondal, Nayana Christudas Beena,** A. Gloskovskii, Unnikrishnan Manju, D. Topwal and **Ujjal K. Gautam (2021)**. 3D Porous Polymeric-Foam-Supported Pd Nanocrystal as a Highly Efficient and Recyclable Catalyst for Organic Transformations. ***ACS Applied Materials & Interfaces***, *13*(8), 10120–10130. https://doi.org/10.1021/acsami.1c00497
50. **Lipipuspa Sahoo, Sanjit Mondal, Reeya Garg,** Unnikrishnan Manju, D. Topwal**,** and **Ujjal K. Gautam (2021)**. Prospects in Engineering Congested Molecular Diffusion at the Stabilizer Layer of Metal Nanocrystals for Ultrahigh Catalytic Activity. ***The Journal of Physical Chemistry C***, *125*(18), 9827–9838. https://doi.org/10.1021/acs.jpcc.1c02313
51. **Lona Dutta, Atanu Mondal** and **S. S. V. Ramasastry (2021)**. Metal-Free Reductive Aldol Reactions. ***Asian Journal of Organic Chemistry***, *10*(4), 680–691. https://doi.org/10.1002/ajoc.202000693
52. **Manisha Devi, Indu Verma** and **Santanu Kumar Pal (2021)**. Distinct interfacial ordering of liquid crystals observed by protein–lipid interactions that enabled the label-free sensing of cytoplasmic protein at the liquid crystal-aqueous interface. ***The Analyst*****,** *146*(23), 7152–7159. https://doi.org/10.1039/d1an01444g
53. **Mayank Joshi, Indu Verma, Aakanksha Gulati,** Susmita Rani, Chesta Budhwar, Kaisar Raza**,** **Arunika Mukhopadhaya** and **Angshuman Roy Choudhury (2021)**. New salts of levofloxacin with physiochemical, structural and biological insights. ***Acta Crystallographica Section a Foundations and Advances***, *77*(a2), C877–C877. https://doi.org/10.1107/s0108767321088218
54. **Mrinal Kanti Adak** and **Ajit Das (2021)**. Algal Nanotechnology for Wastewater Treatment. ***Nanotechnology in the Life Sciences***, 160, 365–382. https://doi.org/10.1007/978-3-030-81557-8_15
55. **Narayanasami Sathyamurthy (2021)**. Atoms and molecules confined inside C60. ***Proceedings of the Indian National Science Academy***, *87*(2), 311–319. https://doi.org/10.1007/s43538-021-00003-y
56. **Narayanasami Sathyamurthy** and Susanta Mahapatra **(2021)**. Time-dependent quantum mechanical wave packet dynamics. ***Physical Chemistry Chemical Physics***, *23*(13), 7586–7614. https://doi.org/10.1039/d0cp03929b
57. Naveen Kumar Tailor, **Samita Mishra,** Tejasvini Sharma, **Arijit Kumar De** and Soumitra Satapathi **(2021)**. Cation-Dependent Hot Carrier Cooling in the Lead-Free Bismuth Halide $A_3Bi_2I_9$ (A = FA, MA, and Cs) Perovskite. ***The Journal of Physical Chemistry C***, *125*(18), 9891–9898. https://doi.org/10.1021/acs.jpcc.1c01509
58. **Navnita Kumar** and **Sanjay K. Mandal (2021)**. l-Tyrosine derived fluorescent molecular probes as solvent mediated flip-flop halide (iodide/fluoride) sensors and reversible chromogenic pH indicators. ***Materials Advances***, *2*(3), 942–947. https://doi.org/10.1039/d0ma00589d
59. Neha Rani Kumar, **Prasenjit Das**, Abhijeet R. Agrawal, **Sanjay K. Mandal** and Sanjio S. Zade **(2021)**. Thienyltriazine based conjugated porous organic polymers: tuning of the porosity and band gap, and CO_2 capture. ***Materials Advances***, *2*(22), 7473–7481. https://doi.org/10.1039/d1ma00621e
60. Nilaj Bandopadhyay, **Mayank Joshi**, Stevan Armaković, Sanja J. Armaković, Hari Sankar Das, **Angshuman Roy Choudhury** and Bhaskar Biswas **(2021)**. Unprecedented copper(ii) coordination induced nucleophilic cleavage of a quinoxaline heterocycle: structural and computational studies. ***CrystEngComm***, *23*(29), 5078–5086. https://doi.org/10.1039/d1ce00569c
61. Nipun P. Thekkeppat, **Labhini Singla**, Srinu Tothadi, Priyadip Das, **Angshuman Roy Choudhury** and Soumyajit Ghosh **(2021).** Structure-property correlation of halogen substituted benzothiazole crystals. ***Journal of Molecular Structure***, *1243*, 130765. https://doi.org/10.1016/j.molstruc.2021.130765
62. **Nisha Arora, Jagadish Prasad Hazra** and **Sabyasachi Rakshit (2021)**. Anisotropy in mechanical unfolding of protein upon partner-assisted pulling and handle-assisted pulling. ***Communications Biology***, *4*(1), 925. https://doi.org/10.1038/s42003-021-02445-y
63. **Omkar Charapale,** Swati Dhamija and Akhil Garg **(2021)**. A theoretical study of aluminium doping in silicon anode based lithium-ion batteries using ReaxFF molecular dynamics simulation. ***International Journal of Energy Research***, *46*(3), 3714–3724. https://doi.org/10.1002/er.7399
64. P. C. Ashly, Shreya Sarkar, Saurav Ch. Sarma, **Ujjal K Gautam, Komalpreet Kaur** and Sebastian C. Peter **(2021)**. Compressive strain induced by multiple phase distribution and atomic ordering in PdCu

nanoparticles to enhanced ethanol oxidation reaction performance. ***Journal of Power Sources***, *506*, 230168. https://doi.org/10.1016/j.jpowsour.2021.230168

65. **Pavit K. Ranga, Feroz Ahmad, Gurdeep Singh, Akshi Tyagi** and **Ramasamy Vijaya Anand (2021)**. Recent advances in the organocatalytic applications of cyclopropene- and cyclopropenium-based small molecules. ***Organic & Biomolecular Chemistry***, *19*(44), 9541–9564. https://doi.org/10.1039/d1ob01549d
66. **Pavit Kumar Ranga, Feroz Ahmad, Prashant Nager, Prabhat Singh Rana** and **Ramasamy Vijaya Anand (2021)**. Bis(amino)cyclopropenium Ion as a Hydrogen-Bond Donor Catalyst for 1,6-Conjugate Addition Reactions. ***The Journal of Organic Chemistry***, *86*(7), 4994–5010. https://doi.org/10.1021/acs.joc.0c02940
67. Pidiyara Karishma, Chikkagundagal K. Mahesha, **Sanjay K. Mandal** and Rajeev Sakhuja **(2021)**. Reducing-Agent-Free Convergent Synthesis of Hydroxyimino-Decorated Tetracyclic Fused Cinnolines via Rh^{III}-Catalyzed Annulation Using Nitroolefins. ***The Journal of Organic Chemistry***, *86*(3), 2734–2747. https://doi.org/10.1021/acs.joc.0c02729
68. Pidiyara Karishma, **Sanjay K. Mandal** and Rajeev Sakhuja **(2021)**. Rhodium-Catalyzed Spirocyclization of Maleimide with *N* -Aryl-2,3-dihydrophthalazine-1,4-dione to Access Pentacyclic Spiro-Succinimides. ***Asian Journal of Organic Chemistry***, *10*(10), 2580–2590. https://doi.org/10.1002/ajoc.202100384
69. **Pooja Bhatt, Jhuma Dutta** and **Jino George (2021)**. Electromagnetic Field Dependence of Strong Coupling in WS_2 Monolayers. ***Physica Status Solidi (RRL) – Rapid Research Letters***, *15*(4), 2000580. https://doi.org/10.1002/pssr.202000580
70. **Pooja Bhatt, Kuljeet Kaur, and Jino George (2021).** Enhanced Charge Transport in Two-Dimensional Materials through Light–Matter Strong Coupling. ***ACS Nano***, *15*(8), 13616–13622. https://doi.org/10.1021/acsnano.1c04544
71. Prafullya Kumar Mudi,Rajani Kanta Mahato, **Mayank Joshi**, Madhusudan Shit, **Angshuman Roy Choudhury,** Hari Sankar Das and Bhaskar Biswas **(2021)**. Copper(II) complexes with a benzimidazole functionalized Schiff base: Synthesis, crystal structures, and role of ancillary ions in phenoxazinone synthase activity. ***Applied Organometallic Chemistry***, *35*(6), 6211. https://doi.org/10.1002/aoc.6211
72. Preety Ghanghas, **Monika Sharma**, Dhimant Desai, Kaisar Raza, Aman Bhalla, Pramod Kumar, Dipika Narula, Shantu Amin, Sankar Nath Sanyal and Naveen_Kaushal **(2021)**. Selenium-Based Novel Epigenetic Regulators Offer Effective Chemotherapeutic Alternative with Wider Safety Margins in Experimental Colorectal Cancer. ***Biological Trace Element Research***, 202(2), 635-646. https://doi.org/10.1007/s12011-021-02659-5.
73. **Prasenjit Das** and **Sanjay K. Mandal (2021).** Flexible and Semi-flexible Amide-Hydrazide Decorated Fluorescent Covalent Organic Frameworks as On-Off pH Responsive Proton Scavengers. ***ACS Applied Materials & Interfaces***, *13*(12), 14160–14168. https://doi.org/10.1021/acsami.0c21823
74. **Prashant Kumar, Pravesh Kumar, Sugumar Venkataramani** and **S. S. V. Ramasastry (2021)**. Pd-Catalyzed Formal [3 + 3] Heteroannulation of Allylic *gem*-Diacetates: Synthesis of Chromene-Based Natural Products and Exploration of Photochromic Properties. ***ACS Catalysis***, *12*(2), 963–970. https://doi.org/10.1021/acscatal.1c05450
75. **Prashant Kumar, Rajendra P. Shirke, Sonu Yadav** and **S.S.V. Ramasastry (2021)**. Catalytic Enantioselective Synthesis of Axially Chiral Diarylmethylidene Indanones. ***Organic Letters***, *23*(12), 4909–4914. https://doi.org/10.1021/acs.orglett.1c01671
76. Prashant V. Kamat, Gerald J. Meyer, Hongwei Wu, **Krishna N. Ganesh,** Deqing Zhang, and Dinesh C. Soares **(2021)**. Energy Research at ACS in the Age of Open Access. ***ACS Omega*****,** *6*(12), 7967–7969. https://doi.org/10.1021/acsomega.1c01222
77. **Priyanka Madhu** and **Samrat Mukhopadhyay (2021)**. Distinct types of amyloid-β oligomers displaying diverse neurotoxicity mechanisms in Alzheimer's disease. ***Journal of Cellular Biochemistry***, *122*(11), 1594–1608. https://doi.org/10.1002/jcb.30141
78. **Priyanka Madhu, Debapriya Das** and **Samrat Mukhopadhyay (2021)**. Conformation-specific perturbation of membrane dynamics by structurally distinct oligomers of Alzheimer's amyloid-β peptide. ***Physical Chemistry Chemical Physics***, *23*(16), 9686–9694. https://doi.org/10.1039/d0cp06456d
79. Rahul Uttam, Neelam Yadav, **Sandeep Kumar** and Ravindra Dhar **(2021)**. Corrigendum/Addendum to "Strengthening of columnar hexagonal phase of a room temperature discotic liquid crystalline material

by using ferroelectric barium titanate nanoparticles" [J. Mol. Liq. 294 (2019) 111609]. ***Journal of Molecular Liquids***, *339*, 116807. https://doi.org/10.1016/j.molliq.2021.116807

80. Rahul Uttam, **Neelam Yadav,** Sandeep Kumar and Ravindra Dhara **(2021)**. Corrigendum/Addendum to "Strengthening of columnar hexagonal phase of a room temperature discotic liquid crystalline material by using ferroelectric barium titanate nanoparticles" [J. Mol. Liq. 294 (2019) 111609]. ***Journal of Molecular Liquids***, *339*, 116807. https://doi.org/10.1016/j.molliq.2021.116807
81. **Rajat Garg, Manoj Kumar Pandey** and **Ramesh Ramachandran (2021)**. Bimodal Floquet theory of phase-modulated heteronuclear decoupling experiments in solid-state NMR spectroscopy. ***The Journal of Chemical Physics***, *155*(10), 104102. https://doi.org/10.1063/5.0061883
82. **Rajat Pandey, Gurdeep Singh, Vinod Gour** and **Ramasamy Vijaya Anand (2021)**. Base-mediated sequential one-pot approach for the synthesis of 2,3-disubstituted indoles from 2-(tosylamino)aryl-substituted para-quinone methides. ***Tetrahedron***, *82*, 131950. https://doi.org/10.1016/j.tet.2021.131950
83. **Rajib Nandi, Varsha Jain, Manisha Devi, Tarang Gupta** and **Santanu Kumar Pal (2021)**. Hydrogen bond assisted anchoring transitions in nematic liquid crystals at the aqueous interface. ***Colloids and Surfaces A: Physicochemical and Engineering Aspects***, *625*, 126952. https://doi.org/10.1016/j.colsurfa.2021.126952
84. **Rathinam Sankar, Debabrata Bhattacharya, and Dr. Srinivasarao Arulananda Babu (2021)**. Synthesis of 1-Naphthol-based Unsymmetrical Triarylmethanes: Heck-type Desulfitative Reaction of Arylsulfonyl Chlorides with Tetralone-derived Chalcones. ***Asian Journal of Organic Chemistry***, *10*(3), 576–581. https://doi.org/10.1002/ajoc.202100016
85. Ratul Paul, Subhash Chandra Shit, Haraprasad Mandal, Jabor Rabeah, Siddhartha Shankar Kashyap,**Yogendra Nailwal**, Digambar Balaji Shinde, Zhiping Lai and John Mondal **(2021)**. Benzothiazole-Linked Metal-Free Covalent Organic Framework Nanostructures for Visible-Light-Driven Photocatalytic Conversion of Phenylboronic Acids to Phenols. ***ACS Applied Nano Materials***, *4*(11), 11732–11742. https://doi.org/10.1021/acsanm.1c02329
86. **Rishi Ram Mahato, Ekta Shandilya, Basundhara Dasgupta** and **Subhabrata Maiti (2021)**. Dictating Catalytic Preference and Activity of a Nanoparticle by Modulating Its Multivalent Engagement. ***ACS Catalysis***, *11*(14), 8504–8509. https://doi.org/10.1021/acscatal.1c01991
87. Rohit Singh Chauhan, Sandeep Nigam, Sana Ansari, Adish Tyagi, **Labhini Singla, Angshuman Roy Choudhury** and C. L. Prajapat **(2021)**. An interesting heterometallic complex [{Ni2(κ2-SeC5H4N)2(μ-OCH3)CdCl}2] as single source molecular precursor for NiSe/CdSe heterostructure: Consequence of similar Ni-Se and Cd-Se bond distances. ***Journal of Organometallic Chemistry***, *949*, 121955. https://doi.org/10.1016/j.jorganchem.2021.121955
88. **Rosmi Reji, Narendra Pratap Tripathi, Kavita Rani, Arup Dalal, Srinivasarao Arulananda Babu** and **Sanchita Sengupta (2021)**. Structure-Property Correlation of C10-(H)-Arylated-N-(pyren-1-yl)-picolinamide Regioisomers towards Cu^{2+} and Fe^{3+} Sensing. ***ChemistrySelect***, *6*(43), 12022–12031. https://doi.org/10.1002/slct.202103030
89. **Samita Mishra, Daimiota Takhellambam, Arijit K. De** and **Debrina Jana (2021)**. Stable $CsPbI_3$-Mesoporous Alumina Composite Thin Film at Ambient Condition: Preparation, Characterization, and Study of Ultrafast Charge-Transfer Dynamics. ***The Journal of Physical Chemistry C***, *125*(6), 3285–3294. https://doi.org/10.1021/acs.jpcc.0c10260
90. **Sandeep Kumar, Himanshi Bhambri** and **Sanjay K. Mandal (2021)**. Conformational isomerism involving the carboxylate groups of a linker in metal organic frameworks and its distinctive influence on the detection of ketones. ***New Journal of Chemistry***, *45*(43), 20219–20226. https://doi.org/10.1039/d1nj03865f
91. **Sangeeta Mahala, Senthil M. Arumugam, Sandeep Kumar, Dalwinder Singh, Shelja Sharma, Bhawana Devi, Sudesh K. Yadav** and **Sasikumar Elumalai (2021)**. Sn Doping on Ta_2O_5 Facilitates Glucose Isomerization for Enriched 5-Hydroxymethylfurfural Production and its True Response Prediction using a Neural Network Model. ***ChemCatChem***, *13*(22), 4787–4798. https://doi.org/10.1002/cctc.202101046
92. **Sanjit Mondal,** C.P. Vinod and **Ujjal K. Gautam (2021)**. "Autophagy" and unique aerial oxygen harvesting properties exhibited by highly photocatalytic carbon quantum dots. ***Carbon***, *181*, 16–27. https://doi.org/10.1016/j.carbon.2021.04.054

93. **Sanjit Mondal, Lipipuspa Sahoo,** C. P. Vinod and **Ujjal K. Gautam (2021)**. Facile transfer of excited electrons in Au/SnS2 nanosheets for efficient solar-driven selective organic transformations. ***Applied Catalysis B: Environmental***, *286*, 119927. https://doi.org/10.1016/j.apcatb.2021.119927
94. **Sanjit Mondal, Sandita Das** and **Ujjal K. Gautam (2021)**. Defect-rich, negatively-charged SnS2 nanosheets for efficient photocatalytic Cr(VI) reduction and organic dye adsorption in water. ***Journal of Colloid and Interface Science***, *603*, 110–119. https://doi.org/10.1016/j.jcis.2021.06.092
95. Santu Ruidas, Bishnupad Mohanty, Piyali Bhanja, E. S. Ernakulam, Ranjit Thapa, **Prasenjit Das**, Avik Chowdhury, **Sanjay K. Mandal**, Bikash Kumar Jena and Asim Bhaumik **(2021)**. Metal-Free Triazine-Based 2D Covalent Organic Framework for Efficient H_2 Evolution by Electrochemical Water Splitting. ***ChemSusChem***, *14*(22), 5057–5064. https://doi.org/10.1002/cssc.202101663
96. Seema Kirar, Neeraj Singh Thakur, Yeddula Nikhileshwar Reddy, **Uttam Chand Banerjee** and Jayeeta Bhaumik **(2021)**. Insights on the polypyrrole based nanoformulations for photodynamic therapy. ***Journal of Porphyrins and Phthalocyanines***, *25*(07n08), 605–622. https://doi.org/10.1142/s1088424621300032
97. **Shaina Dhamija** and **Arijit K. De (2021).** Elucidating Contributions from Multiple Species during Photoconversion of Enhanced Green Fluorescent Protein (EGFP) under Ultraviolet Illumination. ***Photochemistry and Photobiology***, *97*(5), 980–990. https://doi.org/10.1111/php.13409
98. **Shallu Dhingra, Indu Bala, Joydip De, Santosh Prasad Gupta, Upendra Kumar Pandey** and **Santanu Kumar Pal (2021)**. An electron-deficient tris(triazole)-based discotic liquid crystal that exhibits fast electron transport. ***Journal of Materials Chemistry C***, *9*(17), 5628–5632. https://doi.org/10.1039/d1tc00866h
99. Shatabdi Paul, Neeraj S. Thakur, Sanjam Chandna, **Y. Nikhileshwar Reddy** and Jayeeta Bhaumik **(2021)**. Development of a light activatable lignin nanosphere based spray coating for bioimaging and antimicrobial photodynamic therapy. ***Journal of Materials Chemistry B***, *9*(6), 1592–1603. https://doi.org/10.1039/d0tb02643c
100. **Sheeba Khan** and **Sanjay K. Mandal (2021)**. Luminescent 2D Pillared-Bilayer Metal–Organic Coordination Networks for Selective Sensing of ReO_4^- in Water. ***ACS Applied Materials & Interfaces***, *13*(38), 45465–45474. https://doi.org/10.1021/acsami.1c11606
101. **Shefali Banga, Ramandeep Kaur** and **Srinivasarao Arulananda Babu (2021)**. Construction of Racemic and Enantiopure Biaryl Unnatural Amino Acid Derivatives via Pd(II)-Catalyzed Arylation of Unactivated Csp^3 −H Bonds. ***European Journal of Organic Chemistry***, *2021*(25), 3641–3656. https://doi.org/10.1002/ejoc.202100683
102. Shreya Mahato, Nishith Meheta, Muddu Krishnaiah Kotakonda, **Mayank Joshi**, Madhusudan Shit, **Angshuman Roy Choudhury** and BhaskarBiswas **(2021)**. Synthesis, structure, polyphenol oxidase mimicking and bactericidal activity of a zinc-schiff base complex. ***Polyhedron***, *194*, 114933. https://doi.org/10.1016/j.poly.2020.114933
103. Siva Kumar Rokkam, Mamta Yadav, **Mayank Joshi, Angshuman Roy Choudhury,** Dinkar Sahal and Nageswara Rao Golakoti. **(2021)**. Synthesis, *in vitro* anti-plasmodial potency, *in-silico*-cum-SPR binding with inhibition of *Pf*Pyridoxal synthesis and rapid parasiticidal action by 3,5-bis{(*E*) arylidene}-*N*-methyl-4-piperidones. ***New Journal of Chemistry***, *45*(47), 22150–22165. https://doi.org/10.1039/d1nj04604g
104. **Smriti Thakur** and **Sanjay K. Mandal (2021).** Investigating the formation of diverse ZnO nanostructures based on solvent, temperature, and pH as adjustable parameters. ***Materials Advances***, *2*(1), 511–524. https://doi.org/10.1039/d0ma00781a
105. **Smriti Thakur, Rupinder Kaur** and **Sanjay K. Mandal (2021**). Size dependence of CdS nanoparticles on the precursor concentration and visible light driven photocatalytic degradation of methylene blue. ***New Journal of Chemistry***, *45*(27), 12227–12235. https://doi.org/10.1039/d1nj01588e
106. **Sonu Yadava** and **S. S. V. Ramasastry (2021).** Palladium-catalysed annulative allylic alkylation for the synthesis of benzannulated heteroarenes. ***Chemical Communications***, *57*(1), 77–80. https://doi.org/10.1039/d0cc06695h
107. **Soumyadeep Chakrabortty, Mandeep Kaur, Manu Adhikari, Krishna K. Manar** and **Sanjay Singh (2021)**. A Bis (BICAAC) Palladium(II) Complex: Synthesis and Implementation as Catalyst in Heck-Mizoroki and Suzuki-Miyaura Cross Coupling Reactions. ***Inorganic Chemistry***, *60*(9), 6209–6217. https://doi.org/10.1021/acs.inorgchem.0c03614

108. **Srinivasarao Arulananda Babu, Rayavarapu Padmavathi, Sonam Suwasia, Arup Dalal, Debabrata Bhattacharya, Prabhakar Singh** and **Radha Tomar (2021)**. Recent developments on the synthesis of functionalized carbohydrate/sugar derivatives involving the transition metal–catalyzed C–H activation/C–H functionalization. ***Studies in Natural Products Chemistry***, *71*, 311–399. https://doi.org/10.1016/b978-0-323-91095-8.00001-5
109. Subham Mukherjee, Chanchal Kumar Pal, Muddu Krishnaiah Kotakonda, **Mayank Joshi**, Madhusudan Shit, Prasanta Ghosh, **Angshuman Roy Choudhury** and Bhaskar Biswasa **(2021)**. Solvent induced distortion in a square planar copper(II) complex containing an azo-functionalized Schiff base: Synthesis, crystal structure, in-vitro fungicidal and anti-proliferative, and catecholase activity. ***Journal of Molecular Structure*****,** *1245*, 131057. https://doi.org/10.1016/j.molstruc.2021.131057

110. Subhasish Mallick, Brijesh Kumar Mishra, Pradeep Kumar and **Narayanasami Sathyamurthy (2021)**. Effect of confinement on ammonia inversion. ***The European Physical Journal D***, *75*(3) 113. https://doi.org/10.1140/epjd/s10053-021-00118-3
111. Sujith Sudheendran Swayamprabha, Gintare Krucaite, Deepak Kumar Dubey, Kiran Kishore Kesavan, **Joydip De**, Mangey Ram Nagar, Hsun Lee, Simona Sutkuviene, **Santanu Pal**, Sun-Zen Chen, Raminta Beresneviciute and Jwo-Huei Jou **(2021)**. Wet process feasible novel fluorene-based molecular hole transporting layer for phosphorescent organic light emitting diodes. ***Optical Materials***, *120*, 111410. https://doi.org/10.1016/j.optmat.2021.111410
112. Sumit Mukesh, Prachi Joshi, Arvind K. Bansal, Mahesh Chand Kashyap, **Sanjay K. Mandal,** Vasant Sathe and Abhay T. Sangamwar **(2021)**. Amorphous Salts Solid Dispersions of Celecoxib: Enhanced Biopharmaceutical Performance and Physical Stability. ***Molecular Pharmaceutics***, *18*(6), 2334–2348. https://doi.org/10.1021/acs.molpharmaceut.1c00144
113. **Sumit Yadav, Anita Devi** and **Arijit K. De (2021)**. Optical trapping forces on nanoparticles in nonlinear medium under femtosecond pulsed excitation. ***Optical Trapping and Optical Micromanipulation XVIII***, 11798, 117982P. https://doi.org/10.1117/12.2594991
114. **Supreet Kaur, Nazma Begum, Golam Mohiuddin** and **Santanu Kumar Pal (2021)**. Photo-Responsive Behaviour of Azobenzene Based Polar Hockey-Stick-Shaped Liquid Crystals. ***ChemPhysChem***, *22*(13), 1361–1370. https://doi.org/10.1002/cphc.202100215
115. **Surbhi Garg, Amin Sagar, Gayathri S Singaraju, Rahul Dani, Naimat K Bari, Athi N Naganathan** and **Sabyasachi Rakshit (2021)**. Weakening of interaction networks with aging in tip-link protein induces hearing loss. ***Biochemical Journal***, *478*(1), 121–134. https://doi.org/10.1042/bcj20200799
116. Suresh Rajamanickam, Mayank Saraswat, **Sugumar Venkataramani** and Bhisma K. Patel **(2021)**. Intermolecular CDC amination of remote and proximal unactivated C_{sp^3}–H bonds through intrinsic substrate reactivity – expanding towards a traceless directing group. ***Chemical Science***, *12*(46), 15318–15328. https://doi.org/10.1039/d1sc04365j
117. Sushil Kumar, Sk Riyajuddina, Kulvinder Singh, **Lalit Yadav,** Takahiro Maruyama, and Kaushik Ghosh **(2021)**. Strategy to improve the super-capacitive and hydrogen evolution performance of graphitic carbon nitrides via enrichment of carbon content. ***Journal of Alloys and Compounds***, *858*, 157671. https://doi.org/10.1016/j.jallcom.2020.157671
118. Suvojit Roy, Provakar Paul, Monaj Karar, **Mayank Joshi,** SuvenduPaul, **Angshuman Roy Choudhury** and Bhaskar Biswas **(2021)**. Cascade detection of fluoride and bisulphate ions by newly developed hydrazine functionalized Schiff bases. ***Journal of Molecular Liquids***, *326*, 115293. https://doi.org/10.1016/j.molliq.2021.115293
119. Swapnadip Roy, Tapashree Mondal, **Dhananjay Dey**, Manoj V. Mane and Sujit Sankar Panja **(2021)**. A New Thiophene-Appended Fluorescein-Hydrazone-Based Chromo-Fluorogenic Sensor for the Screening of Hg^{2+} Ions in Real Water Samples. ***ChemistrySelect***, *6*(38), 10464–10479. https://doi.org/10.1002/slct.202102692
120. Tanmoy Mandal, **Sudha Yadav** and Joyanta Choudhury **(2021)**. Steric effect of NHC ligands in Pd(II)–NHC-catalyzed non-directed C–H acetoxylation of simple arenes. ***Journal of Organometallic Chemistry***, *953*, 122047. https://doi.org/10.1016/j.jorganchem.2021.122047
121. **Tanuja Joshi, Surbhi Garg**, Alejandro Estaña, Juan Cortés, Pau Bernadó, **Sayan Das, Anjana R.Kammath, Amin Sagar** and **Sabyasachi Rakshit (2021).** Interdomain linkers tailor the stability of immunoglobulin repeats in polyproteins. ***Biochemical and Biophysical Research Communications***, *550*, 43–48. https://doi.org/10.1016/j.bbrc.2021.02.114

122. **Varsha Jain, Supreet Kaur, Golam Mohiuddin** and **Santanu Kumar Pal (2021)**. Design, Synthesis and Characterization of Achiral Unsymmetrical Four-ring based Hockey-stick Shaped Liquid Crystals: Structure-Property relationship. ***Liquid Crystals***, *49*(2), 162–171. https://doi.org/10.1080/02678292.2021.1949054
123. **Vijaya Gupta, Biswajit Laha, Sadhika Khullar** and **Sanjay K. Mandal (2021)**. Deciphering supramolecular isomerization in coordination polymers: connected molecular squares *vs.* fused hexagons. ***Dalton Transactions***, *50*(6), 2221–2232. https://doi.org/10.1039/d0dt04196c
124. Vincenzo Aquilanti, H. E. Montgomery, C. N. Ramachandran and **Narayanasami Sathyamurthy (2021)**. Atoms and molecules in a confined environment. ***The European Physical Journal D***, *75*(6), 187. https://doi.org/10.1140/epjd/s10053-021-00197-2
125. Vinod Kumar Vashistha, Anuj Kumar, Dipak Kumar Das, **Shiv Alwera**, Renu Vyas, Vivek Sharma, Sonika Sethi, Rajasekhar Pullabhotla and Hariom Nagar **(2021)**. Different approaches in thin-layer chromatography for enantioresolution of acebutolol using colistin sulfate as chiral selector. ***JPC – Journal of Planar Chromatography – Modern TLC***, *34*(3), 211–215. https://doi.org/10.1007/s00764-021-00109-5
126. **Yogendra Nailwal, A. D. Dinga Wonanke, Matthew A. Addicoat** and **Santanu Kumar Pal (2021)**. A Dual-Function Highly Crystalline Covalent Organic Framework for HCl Sensing and Visible-Light Heterogeneous Photocatalysis. ***Macromolecules***, *54*(13), 6595–6604. https://doi.org/10.1021/acs.macromol.1c00574
127. Zimu Wei, **Sushil Sharma**, Abbey M. Philip, **Sanchita Sengupta** and Ferdinand C. Grozema **(2021)**. Excited state dynamics of BODIPY-based acceptor–donor–acceptor systems: a combined experimental and computational study. ***Physical Chemistry Chemical Physics***, *23*(14), 8900–8907. https://doi.org/10.1039/d1cp00453k

21.1.2 Department of Mathematical Sciences

128. Adipta Pal, **Subhrajit Modak**, Aradhya Shukla, and Prasanta K. Panigrahi **(2021).** PT-symmetry and supersymmetry: interconnection of broken and unbroken phases. ***Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*****,** *477*(2254), 20210494 . https://doi.org/10.1098/rspa.2021.0494
129. **Amit Kulshrestha, Rijubrata Kundu** and **Anupam Singh (2021)**. Asymptotics of the powers in finite reductive groups. ***Journal of Group Theory***, 20200206. https://doi.org/10.1515/jgth-2020-0206
130. Andreas Bächle, **Sugandha Maheshwary** and Leo Margolis **(2021)**. Abelianization of the unit group of an integral group ring. ***Pacific Journal of Mathematics*****,** *312*(2), 309–334. https://doi.org/10.2140/pjm.2021.312.309
131. Anmol Gupta, Sharayu Moharir and **Neeraja Sahasrabudhe (2021)**. Influencing Opinion Dynamics in Networks with Limited Interaction. ***IFAC-PapersOnLine***, *54*(9), 684–689. https://doi.org/10.1016/j.ifacol.2021.06.130
132. **Arpan Dutta (2021)**. Minimal pairs, minimal fields and implicit constant fields. ***Journal of Algebra***, *588*, 479–514. https://doi.org/10.1016/j.jalgebra.2021.09.008
133. **Arpan Dutta (2021)**. On the non-uniqueness of maximal purely wild extensions. ***Communications in Algebra***, *50*(3), 1118–1139. https://doi.org/10.1080/00927872.2021.1978475
134. **Chanchal Kumar** and **Amit Roy (2021)**. Integer sequences and monomial ideals. ***Proceedings - Mathematical Sciences*****,** *131*(2) 33. https://doi.org/10.1007/s12044-021-00628-5
135. **Chanchal Kumar, Gargi Lather** and **Sonica (2021)**. Skeleton Ideals of Certain Graphs, Standard Monomials and Spherical Parking Functions. ***The Electronic Journal of Combinatorics***, *28*(1), P1.53. https://doi.org/10.37236/9874
136. **Chetan Balwe** and **Anand Sawant (2021)**. Naive $\mathbb{A}1$-Homotopies on Ruled Surfaces. ***International Mathematics Research Notices***, 1–21, rnab162. https://doi.org/10.1093/imrn/rnab162
137. **Deepa Jyoti Sen, Andrew Morozov, S. Ghorai** and **Malay Banerjee (2021)**. Bifurcation analysis of the predator–prey model with the Allee effect in the predator. ***Journal of Mathematical Biology***, *84*(2) 7. https://doi.org/10.1007/s00285-021-01707-x
138. **Dishari Chaudhuri (2021)**. The twisted derivation problem for group rings. ***Archiv Der Mathematik***, *116*(4), 391–401. https://doi.org/10.1007/s00013-020-01562-0

139. **Hitesh Raundal, Mahender Singh** and **Manpreet Singh (2021)**. Orderability of link quandles. ***Proceedings of the Edinburgh Mathematical Society***, *64*(3), 620–649. https://doi.org/10.1017/s0013091521000419
140. **Krishnendu Gongopadhyay** and **Sagar B. Kalane (2021).** Local Coordinates for Complex and Quaternionic Hyperbolic Pairs. ***Journal of the Australian Mathematical Society***,113(1) 57 - 78. https://doi.org/10.1017/s144678872100001x
141. **Krishnendu Gongopadhyay**, Abhishek Mukherjee and Devendra Tiwari **(2021)**. Discreteness Of Hyperbolic Isometries by Test Maps. ***Osaka J. Math,*** *58(3),* 697-710**.** https://doi.org/10.48550/arXiv.1812.07247
142. M. Saravanan, **S.P. Murugan** and G. Arunkumar **(2021)**. A generalization of Fiedler's lemma and the spectra of H-join of graphs**.** ***Linear Algebra and Its Applications***, *625*, 20–43. https://doi.org/10.1016/j.laa.2021.04.015
143. Mahan Mj and **Pranab Sardar (2021).** Propagating quasiconvexity from fibersi. ***Israel Journal of Mathematics***, *247*(2), 923–953. https://doi.org/10.1007/s11856-021-2285-z
144. N.V. Abrosimov, V.G. Gorbounov, S.K. Nechaev, **Mahender Singh** and A.Y. Vesnin **(2021)**. 4th International Conference ``Groups and quandles in low-dimensional topology'', Tomsk, July 5–8, 2021. ***Sibirskie Elektronnye Matematicheskie Izvestiya***, *18*(2), A.30–A.43. https://doi.org/10.33048/semi.2021.18.065
145. **Neeraj K. Dhanwani, Kashyap Rajeevsarathy** and **Apeksha Sanghi (2021).** Split metacyclic actions on surfaces. ***ArXiv:2007.08279 [Math]***, 1-31. https://arxiv.org/abs/2007.08279
146. Riddhi Shah and **Alok Kumar Yadav (2021)**. Distal Actions of Automorphisms of Lie Groups *G* on Sub $_G$. ***Mathematical Proceedings of the Cambridge Philosophical Society***, 1–22. https://doi.org/10.1017/s0305004121000694
147. Richard Southwell, **Naman Gupta (2021**). Categories and Toposes: Visualized and Explained. ***KDP Publishing***, 213. (ISBN-13 : 979-8749985566) https://www.amazon.com/gp/product/B0948LKZXX
148. Sonica Anand and **Amit Roy (2021)**. Graded Betti numbers of some families of circulant graphs. ***Rocky Mountain Journal of Mathematics***, *51*(6) 1919-1940. https://doi.org/10.1216/rmj.2021.51.1919
149. **Sugandha Maheshwary (2021).** I. B. S. Passi (1939-2021). ***Current Science***, 121(12),1629-1631. http://52.172.152.24/index.php/CURS/index
150. **Sugandha Maheshwary (2021)**. The lower central series of the unit group of an integral group ring. ***Indian Journal of Pure and Applied Mathematics***, *52*(3), 709–712. https://doi.org/10.1007/s13226-021-00184-8
151. **Sushil Bhunia** and **Anupam Singh (2021)**. $${\varvec{z}}$$-classes in groups: a survey. ***Indian Journal of Pure and Applied Mathematics***, *52*(3), 713–720. https://doi.org/10.1007/s13226-021-00186-6
152. **Tushar Kanta Naik** and **Mahender Singh (2021).** Automorphisms of odd Coxeter groups. ***Monatshefte Für Mathematik***, *195*(3), 501–521. https://doi.org/10.1007/s00605-020-01496-3
153. Valeriy Bardakov and **Mahender Singh (2021)**. Quandle cohomology, extensions and automorphisms. ***Journal of Algebra*****,** *585*, 558–591. https://doi.org/10.1016/j.jalgebra.2021.06.016
154. **Yashpreet Kaur** and **Varadharaj R. Srinivasan (2021)**. Integration in finite terms: dilogarithmic integrals. ***Applicable Algebra in Engineering, Communication and Computing***.93, 1-13. https://doi.org/10.1007/s00200-021-00518-3

20.1.3 Department of Humanities and Social Sciences

155. Bregje van Veelen, Ludovico Rella, Gerald Taylor Aiken, Emily Judson, Evelina Gambino, Alke Jenss, **Ankur Parashar** and Annabel Pinker **(2021)**. Interventions on Democratizing Infrastructure. ***Political Geography***, *87*, 102378. https://doi.org/10.1016/j.polgeo.2021.102378
156. **Jayashree Mazumde**r and **Stefano S. K. Kaburub (2021)**. First report of food sharing among nicobar long-tailed macaques. ***Quaternary International***, *603*, 31–39. https://doi.org/10.1016/j.quaint.2020.11.049
157. Sonika Sandhu, Vijay Sathe, Kalyan Sekhar Chakraborty, Supriyo Chakraborty and **Parth R. Chauhan (2021)**. Carbon and Oxygen Isotope Analysis of Modern Cattle (Bos indicus) Molars from the Central Narmada Valley, India. ***Ancient Asia***, 12, aa.210. https://doi.org/10.5334/aa.210

21.1.4 Department of Earth and Environmental Sciences

158. **A.K. Mishra, Baerbel Sinha,** R.Kumar, M.Barth, **H. Hakkim, V. Kumar, A. Kumar, S. Datta,** A. Guenther and **V. Sinha (2021)**. Cropland trees need to be included for accurate model simulations of land-atmosphere heat fluxes, temperature, boundary layer height, and ozone. ***Science of the Total Environment***, *751*, 141728. https://doi.org/10.1016/j.scitotenv.2020.141728
159. Abdur Rahman, Ajayeta Rathi, Romi Nambiar, Praveen K.Mishra, **Ambili Anoop**, Ravi Bhushan and Sanjeev Kumar **(2021)**. Signatures of natural to anthropogenic transition in lake sediments from the Central Himalaya using stable isotopes. ***Applied Geochemistry***, *134*, 105095. https://doi.org/10.1016/j.apgeochem.2021.105095
160. Anshika, Ravi Kumar Kunchal, **Raju Attada**, Ramesh K.Vellore, Vijay K.Soni, Manju Mohan and Nagaraju Chilukoti **(2021)**. On the understanding of surface ozone variability, its precursors and their associations with atmospheric conditions over the Delhi region. ***Atmospheric Research***, *258*, 105653. https://doi.org/10.1016/j.atmosres.2021.105653
161. **Ashish Kumar, Haseeb Hakkim, Baerbel Sinha** and **Vinayak Sinha (2021)**. Gridded 1 km × 1 km emission inventory for paddy stubble burning emissions over north-west India constrained by measured emission factors of 77 VOCs and district-wise crop yield data. ***Science of the Total Environment*****,** *789*, 148064. https://doi.org/10.1016/j.scitotenv.2021.148064
162. **Ashish Kumar, Haseeb Hakkim,** Sachin D.Ghude and **Vinayak Sinha (2021).** Probing wintertime air pollution sources in the Indo-Gangetic Plain through 52 hydrocarbons measured rarely at Delhi & Mohali. ***Science of the Total Environment*****,** *801*, 149711. https://doi.org/10.1016/j.scitotenv.2021.149711
163. Biyo Thomas, Yesubabu Viswanadhapalli, C.V.Srinivas, Hari Prasad Dasari, **Raju Attada** and SabiqueLangodand **(2021)**. Cloud resolving simulation of extremely heavy rainfall event over Kerala in August 2018 – Sensitivity to microphysics and aerosol feedback. ***Atmospheric Research***, *258*, 105613. https://doi.org/10.1016/j.atmosres.2021.105613
164. Christophe Lerot, François Hendrick, Michel Van Roozendael, and ,..., **Vinayak Sinha**, Ting Wang, Pucai Wang and Christian Retscher **(2021)**. Glyoxal tropospheric column retrievals from TROPOMI – multi-satellite intercomparison and ground-based validation. ***Atmospheric Measurement Techniques*****,** *14*(12), 7775–7807. https://doi.org/10.5194/amt-14-7775-2021
165. GD Puri, Shyam C Meena, **Vinayak Sinha**, Amarjyoti Hazarika, **Haseeb Hakkim, Ashish Sharma**, Kamal Kajal and Neeti Dogra **(2021)**. Quantitative assessment of nitrous oxide levels in room air of operation theatres and recovery area: An observational study. ***Indian Journal of Occupational and Environmental Medicine***, *25*(3), 147-151. https://doi.org/10.4103/ijoem.ijoem_44_19
166. Hari Prasad Dasari, Srinivas Desamsetti, Sabique Langodan, **Raju Attada**, Karumuri Ashok and Ibrahim Hoteit **(2021)**. Long-term changes in the Arabian Peninsula rainfall and their relationship with the ENSO signals in the tropical Indo-Pacific. ***Climate Dynamics***. 383, 1-17. https://doi.org/10.1007/s00382-021-06062-7
167. **Harshita Pawar** and **Baerbel Sinha (2021)**. Residential heating emissions (can) exceed paddy-residue burning emissions in rural northwest India. ***Atmospheric Environment*****,** *269*, 118846. https://doi.org/10.1016/j.atmosenv.2021.118846
168. **Haseeb Hakkim, Ashish Kumar, Saurabh Annadate, Baerbel Sinha** and **Vinayak Sinha (2021)**. RTEII: A new high-resolution (0.1° × 0.1°) road transport emission inventory for India of 74 speciated NMVOCs, CO, NOx, NH3, CH4, CO2, PM2.5 reveals massive overestimation of NOx and CO and missing nitromethane emissions by existing inventories. ***Atmospheric Environment****: X*, *11*, 100118. https://doi.org/10.1016/j.aeaoa.2021.100118
169. Isabelle De Smedt, Gaia Pinardi, Corinne Vigouroux1, Steven Compernolle, and ,..., **Vinayak Sinha**, Nicolas Theys, and ,..., et. al. **(2021)**. Comparative assessment of TROPOMI and OMI formaldehyde observations and validation against MAX-DOAS network column measurements. ***Atmospheric Chemistry and Physics***, *21*(16), 12561–12593. https://doi.org/10.5194/acp-21-12561-2021
170. Jasti S. Chowdary, Amol S. Vibhute, Patekar Darshana, Anant Parekh, C. Gnanaseelan and **Raju Attada (2021)**. Meridional displacement of the Asian jet and its impact on Indian summer monsoon rainfall in observations and CFSv2 hindcast. ***Climate Dynamics***, *58*, 811–829. https://doi.org/10.1007/s00382-021-05935-1

171. **K. K. Shukla, Raju Attada**, Aman W. Khan and Prashant Kumar **(2021).** Evaluation of extreme dust storms over the northwest Indo-Gangetic plain using the WRF-Chem model. ***Natural Hazards***, *110*, 1887–1910. https://doi.org/10.1007/s11069-021-05017-9
172. K.K.Shukla, D.V. Phanikumar, Kondapalli Niranjan Kumar, Ashish Kumar, M. Naja, Som Sharma and **Raju Attada (2021).** Micro-Pulse Lidar observations of elevated aerosol layers over the Himalayan region. ***Journal of Atmospheric and Solar-Terrestrial Physics*****,** *213*, 105526. https://doi.org/10.1016/j.jastp.2020.105526
173. Khaiwal Ravindra, Tanbir Singh, **Vinayak Sinha , Baerbel Sinha**, Surender Paul, S.D. Attri and Suman Mor **(2021)**. Appraisal of regional haze event and its relationship with PM2.5 concentration, crop residue burning and meteorology in Chandigarh, India. ***Chemosphere***, *273*, 128562. https://doi.org/10.1016/j.chemosphere.2020.128562
174. **K.K. Shukla**, D.V. Phanikumar, Kondapalli Niranjan Kumar, Ashish Kumar,M. Naja, Som Sharma, **RajuAttada (2021)**. Micro-Pulse Lidar observations of elevated aerosol layers over the Himalayan region. ***Journal of Atmospheric and Solar-Terrestrial Physics***, *213*, 105526. https://doi.org/10.1016/j.jastp.2020.105526
175. Manoochehr Shirzaei, Mostafa Khoshmanesh, **Chandrakanta Ojha**, Susanna Wertha, Hannah Kernerd, Grace Carlsona, Sonam Futi Sherpa, Guang Zhai and Jui-ChiLee **(2021)**. Persistent impact of spring floods on crop loss in the U.S. Midwest. ***Weather and Climate Extremes***, *34*, 100392. https://doi.org/10.1016/j.wace.2021.100392
176. **Mehta Bulbul, Yadav Ankit, Sayak Basu** and **Ambili Anoop (2021)**. Characterization of sedimentary organic matter and depositional processes in the Mandovi estuary, western India: An integrated lipid biomarker, sedimentological and stable isotope approach. ***Applied Geochemistry***, *131*, 105041. https://doi.org/10.1016/j.apgeochem.2021.105041
177. Minhua Jiang, Yizhao Gao, **Sunil A.Patil,** Haoqing Hou, Wei Feng and Shuiliang Chen **(2021)**. Reactive coating modification of metal material with strong bonding strength and enhanced corrosion resistance for high-performance bioelectrode of microbial electrochemical technologies. ***Journal of Power Sources***, *491*, 229595. https://doi.org/10.1016/j.jpowsour.2021.229595
178. Monalisa Mallick, Suryendu Dutta, Bhagwan D. Singh, **Sharmila Bhattacharya** and Alpana Singh **(2021)**. Petrographic and Organic Geochemical Characterizations of Early Eocene Lignites, Cambay Basin, Western India. ***Macromolecular Characterization of Hydrocarbons for Sustainable Future***, 143–171. https://doi.org/10.1007/978-981-33-6133-1_11
179. **Moumita Roy, Ravineet Yadav, P. Chiranjeevi** and **Sunil A. Patil (2021)**. Direct utilization of industrial carbon dioxide with low impurities for acetate production via microbial electrosynthesis. ***Bioresource Technology***, *320*, 124289. https://doi.org/10.1016/j.biortech.2020.124289
180. **Moumita Roy, Sukrampal Yadav** and **Sunil A. Patil (2021)**. Biogas Upgradation Through CO2 Conversion Into Acetic Acid via Microbial Electrosynthesis. ***Frontiers in Energy Research***, 9, 759678. https://doi.org/10.3389/fenrg.2021.759678
181. **Raju Attada, Ravi Kumar Kunchala, Hari Prasad Dasari, Sanikommu Sivareddy, Viswanadhapalli Yesubabu, Omar Knio** and **Ibrahim Hoteit (2021)**. Representation of Arabian Peninsula summer climate in a regional atmospheric model using spectral nudging. ***Theoretical and Applied Climatology***, *145*(1-2), 13–30. https://doi.org/10.1007/s00704-021-03617-w
182. Rama Krishna Karumuri, Ravi Kumar Kunchala, **Raju Attada**, Hari Prasad Dasari and Ibrahim Hoteit **(2021)**. Seasonal simulations of summer aerosol optical depth over the Arabian Peninsula using WRF-Chem : Validation, climatology, and variability. ***International Journal of Climatology***, *42*(5), 2901–2922. https://doi.org/10.1002/joc.7396
183. **Ravi K. Yadav, Siddhant Sahoo,** Asheesh K.Yadav and **Sunil A. Patil. (2021).** Epipremnum aureum is a promising plant candidate for developing nature-based technologies for nutrients removal from wastewaters. ***Journal of Environmental Chemical Engineering*****,** *9*(5), 106134. https://doi.org/10.1016/j.jece.2021.106134
184. Ravi Kumar Kunchala, Bhupendra Bahadur Singh, Rama Krishna Karumuri, **Raju Attada,** Vivek Seelanki and Kondapalli Niranjan Kumar **(2021)**. Understanding the spatiotemporal variability and trends of surface ozone over India. ***Environmental Science and Pollution Research***, *29*(4), 6219–6236. https://doi.org/10.1007/s11356-021-16011-w

185. **Savita Datta, Anita Sharma, Vidit Parkar, Haseeb Hakkim, Ashish Kumar, Astha Chauhan, Shubham SinghTomar** and **Baerbel Sinha (2021)**. A new index to assess the air quality impact of urban tree plantation. ***Urban Climate***, *40*, 100995. https://doi.org/10.1016/j.uclim.2021.100995
186. **Sharmila Bhattacharya, AnkitaYadav, SrikantaMurthy** and **Vasudev Kushwahaa (2021).** Biotic response to environmental shift during the Permian-Triassic transition: Assessment from organic geochemical proxies and palynomorphs in terrestrial sediments from Raniganj Sub-basin, India. ***Palaeogeography, Palaeoclimatology, Palaeoecology***, *576*, 110483. https://doi.org/10.1016/j.palaeo.2021.110483
187. **Sharmila Bhattacharya, Harsh Kishor, Yadav Ankit, Praveen K. Mishra** and **Pradeep Srivastava (2021)**. Vegetation History in a Peat Succession Over the Past 8,000 years in the ISM-Controlled Kedarnath Region, Garhwal Himalaya: Reconstruction Using Molecular Fossils. ***Frontiers in Earth Science***, *9*.703362. https://doi.org/10.3389/feart.2021.703362
188. **Sharmila Bhattacharya, Suryendu Dutta** and **Sumit Kumar (2021)**. Identification of lanostanes, A-ring methylated steranes and secosteranes in late Neoproterozoic crude oils by GC×GC-TOFMS: New insights into molecular taphonomy of steroids. ***Geobios***, *68*, 47–59. https://doi.org/10.1016/j.geobios.2021.04.003
189. **Srishti Chaudhary, Ramandeep Singh, Sukrampal Yadav** and **Sunil A. Patil (2021)**. Electrochemical enrichment of haloalkaliphilic nitrate-reducing microbial biofilm at the cathode of bioelectrochemical systems. ***IScience***, *24*(6), 102682. https://doi.org/10.1016/j.isci.2021.102682
190. Sui Tung, Manoochehr Shirzaei, **Chandrakanta Ojha**, Antonio Pepe and Zhen Liu **(2021).** Structural Controls Over the 2019 Ridgecrest Earthquake Sequence Investigated by High-Fidelity Elastic Models of 3D Velocity Structures. ***Journal of Geophysical Research: Solid Earth***, *126*(7), 2020JB021124. https://doi.org/10.1029/2020jb021124
191. Supriya Gupta, Pratiksha Srivastava, **Sunil A Patil** and Asheesh KumarYadav **(2021)**. A comprehensive review on emerging constructed wetland coupled microbial fuel cell technology: Potential applications and challenges. ***Bioresource Technology***, *320*, 124376. https://doi.org/10.1016/j.biortech.2020.124376
192. **Vinayak Sinha (2021).** Paul Josef Crutzen (1933-2021). ***Current Science***, 120(6), 1102-1106. https://www.nature.com/articles/d41586-021-00479-0
193. **Vinod Kumar** and **Vinayak Sinha** (2021). Season-wise analyses of VOCs, hydroxyl radicals and ozone formation chemistry over north-west India reveal isoprene and acetaldehyde as the most potent ozone precursors throughout the year. ***Chemosphere***, *283*, 131184. https://doi.org/10.1016/j.chemosphere.2021.131184
194. Wenjie Wang, Jipeng Qi, Jun Zhou, Bin Yuan, Yuwen Peng, Sihang Wang, Suxia Yang, Jonathan Williams**, Vinayak Sinha** and Min Shao **(2021)**. The improved comparative reactivity method (ICRM): measurements of OH reactivity under high-NOx conditions in ambient air. ***Atmospheric Measurement Techniques***, *14*(3), 2285–2298. https://doi.org/10.5194/amt-14-2285-2021
195. **Yadav Ankit, Wani Muneer, Niko Lahajnar, Birgit Gaye, Sandhya Misra, Arshid Jehangir, Ambili Anoop** and **Praveen K. Mishra (2021)**. Long term natural and anthropogenic forcing on aquatic system - evidence based on biogeochemical and pollen proxies from lake sediments in Kashmir Himalaya, India. ***Applied Geochemistry***, *131*, 105046. https://doi.org/10.1016/j.apgeochem.2021.105046

21.1.5 Department of Biological Sciences

196. Abel Szkalisity, Filippo Piccinini, Attila Beleon, Tamas Balassa, Istvan Gergely Varga, Ede Migh, Csaba Molnar, Lassi Paavolainen, Sanna Timonen, **Indranil Banerjee**, Elina Ikonen, Yohei Yamauchi, Istvan Ando, Jaakko Peltonen, Vilja Pietiäinen, Viktor Honti and Peter Horvath **(2021)**. Regression plane concept for analysing continuous cellular processes with machine learning. ***Nature Communications,*** 12(3), 2532 . https://doi.org/10.1038/s41467-021-22866-x
197. **Abhishek Kumar Singh** and Hsi-Hsien Lin **(2021).** The role of GPR56/ADGRG1 in health and disease. ***Biomedical Journal,*** *44*(5), 534-547. https://doi.org/10.1016/j.bj.2021.04.012
198. **Abhishek Meena, Arya M. V. Kumar, G. S. Balamurali** and **Hema Somanathan (2021).** Visual detection thresholds in the asian honeybee, apis cerana. ***Journal of Comparative Physiology A,*** *207*(4), 553-560. https://doi.org/10.1007/s00359-021-01496-0

199. Adipta Pal, **Subhrajit Modak**, Aradhya Shukla and Prasanta K. Panigrahi **(2021).** PT -symmetry and supersymmetry: Interconnection of broken and unbroken phases. ***Proceedings of the Royal Society,*** 477(2254), 1471-2946. https://doi.org/10.1098/rspa.2021.0494
200. **Aditya Kanwal, Pranav Vijay Joshi, Sudip Mandal** and **Lolitika Mandal (2021).** Ubx-collier signaling cascade maintains blood progenitors in the posterior lobes of the drosophila larval lymph gland. ***PLoS Genetics****, 17*(8) 1009709. https://doi.org/10.1371/journal.pgen.1009709
201. **Aishwarya Agarwal, Sandeep K. Rai, Anamika Avni** and **Samrat Mukhopadhyay (2021).** An intrinsically disordered pathological prion variant Y145Stop converts into self-seeding amyloids via liquid-liquid phase separation. ***Proceedings of the National Academy of Sciences of the United States of America****,* 118(45), 2100968118. https://doi.org/10.1073/pnas.2100968118
202. Akshay Khandekar, Dikansh Parmar, Nitin Sawant and **Ishan Agarwal (2021).** A new species of the genus hemiphyllodactylus bleeker, 1860 (squamata: Gekkonidae) from goa, india. ***Zootaxa****, 5027*(2), 254-268. https://doi.org/10.11646/zootaxa.5027.2.6
203. Akshay Khandekar, Tejas Thackeray and **Ishan Agarwal (2021).** A new small-bodied, polymorphic cnemaspis strauch, 1887 (squamata: Gekkonidae) allied to C. monticola manamendra-arachchi, batuwita & pethiyagoda, 2007 from the central western ghats of karnataka, india. ***Zootaxa****, 4950*(3), 501-527. https://doi.org/10.11646/zootaxa.4950.3.5
204. Alejandro Alonso-Díaz, **Santosh B Satbhai**, Roger de Pedro-Jové, Hannah M. Berry, Christian Göschl, Cristiana T. Argueso, Ondrej Novak, Wolfgang Busch, Marc Valls and Núria S. Coll **(2021).** A genome-wide association study reveals cytokinin as a major component in the root defense responses against Ralstonia solanacearum. ***Journal of Experimental Botany***, *72*(7), 2727-2740. https://doi.org/10.1093/jxb/eraa610
205. **Anish Kumar Mondal, Paras Verma, Nayanika Sengupta, Somnath Dutta, Shashi Bhushan Pandit** and **Kausik Chattopadhyay (2021).** Tyrosine in the hinge region of the pore-forming motif regulates oligomeric β-barrel pore formation by vibrio cholerae cytolysin. ***Molecular Microbiology,*** *115*(4), 508-525. https://doi.org/10.1111/mmi.14631
206. Ankita Mishra, **Vinita Sharma**, Mohammed Saba Rahim, Humira Sonah, Dharam Pal, Shrikant Mantri, Tilak Raj Sharma and Joy Roy **(2021)**. Genotyping-by-sequencing based QTL mapping identified a novel waxy allele contributing to high amylose starch in wheat. ***Euphytica****, 217*(6), 131. https://doi.org/10.1007/s10681-021-02861-5
207. **Anuradha Singh, Kavita Babu** and **Pandey Pratima (2021).** Ethanol-induced sedative behaviour: An assay to investigate increased dopamine signalling in caenorhabditis elegans. ***Bio-Protocol,*** 11(13)**.** 4083**.** https://doi.org/10.21769/bioprotoc.4083
208. **Ardra Nandakumar,** Jo-Ann Chuah and Kumar Sudesh **(2021).** Bioplastics: A boon or bane? ***Renewable and Sustainable Energy Reviews****,* 147, 111237. https://doi.org/10.1016/j.rser.2021.111237
209. **Avtar Singh,** Libin Mathew Varghese, Bindu Battan, Arun Kumar Patra, Rishi Pal Mandhan and Ritu Mahajan **(2021).** Environmental pollution reducing strategy for scouring of undegummed sisal fibers using xylanase and pectinase enzymes. ***Bioprocess and Biosystems Engineering****, 44*(3), 607-615. https://doi.org/10.1007/s00449-020-02455-w
210. **Bhishem Thakur, Archit Gupta** and **Purnananda Guptasarma (2021).** A novel protein-engineered dsDNA-binding protein (HU-simulacrum) inspired by HU, a nucleoid-associated DNABII protein. ***Biochemical and Biophysical Research Communications****, 534*, 47-52. https://doi.org/10.1016/j.bbrc.2020.11.088
211. **Bhishem Thakur, Kanika Arora, Archit Gupta** and **Purnananda Guptasarma (2021**). The DNA-binding protein HU is a molecular glue that attaches bacteria to extracellular DNA in biofilms. ***Journal of Biological Chemistry****, 296, 100532.* https://doi.org/10.1016/j.jbc.2021.100532
212. **Deepinder Kaur, Shraddha Gandhi** and **Arunika Mukhopadhaya (2021**). Salmonella typhimurium adhesin OmpV activates host immunity to confer protection against systemic and gastrointestinal infection in mice. ***Infection and Immunity,*** *89*(8), 00121-21. https://doi.org/10.1128/iai.00121-21
213. Erin L. Macartney, Valerian Zeender, **Abhishek Meena**, Alessio N. De Nardo, Russell Bonduriansky and Stefan Lupold **(2021)**. Sperm depletion in relation to developmental nutrition and genotype in drosophila melanogaster. ***Evolution****, 75*(11), 2830-2841. https://doi.org/10.1111/evo.14373
214. **Gaganpreet Kaur, Kajal Gupta, Anjali Singh, Nirmal Kumar** and **Indranil Banerjee (2021).** Effect of IFN-γ +874 T/A polymorphism on clinical manifestations of dengue: A meta-analysis. ***Journal of Genetics,*** *100*(2), 91. https://doi.org/10.1007/s12041-021-01344-9

215. **Garima Arya, Mohinder Pal, Monika Sharma, Bhupinder Singh, Swati Singh,** Vishal Agrawal and **Rachna Chaba (2021).** Molecular insights into effector binding by DgoR, a GntR/FadR family transcriptional repressor of D-galactonate metabolism in Escherichia coli. ***Molecular Microbiology***, *115*(4), 591-609. https://doi.org/10.1111/mmi.14625
216. Gurwattan S. Miranpuri, **Parul Bali,** Justyn Nguyen, Jason J Kim, Shweta Modgil, Priya Mehra, Seah Buttar, Greta Brown, Noemi Yutuc, Harpreet Singh, Aleksandar Wood, Jagtar Singh and Akshay Anand **(2021)**. Role of microglia and astrocytes in spinal cord injury induced neuropathic pain. ***Annals of Neurosciences,*** *28*(3-4), 219-228. https://doi.org/10.1177/09727531211046367
217. **Ishan Agarwal, Rachunliu G. Kamei** and **Stephen Mahony (2021).** The phylogenetic position of the enigmatic assam day gecko cnemaspis cf. assamensis (squamata: Gekkonidae) demonstrates a novel biogeographic connection between northeast india and south india-sri lanka. ***Amphibia Reptilia,*** *80*(5), 1-13. https://doi.org/10.1163/15685381-bja10062
218. J. Krishna Leela, Nalini Raghunathan and **J. Gowrishankar (2021).** Topoisomerase i essentiality, dnaa-independent chromosomal replication, and transcription-replication conflict in Escherichia coli. ***Journal of Bacteriology****, 203*(17), 00195-21. https://doi.org/10.1128/jb.00195-21
219. Jyoti Yadav, Yashwant Kumar, **Gayathri S. Singaraju** & Shivprasad Patil **(2021)**. Interaction of chloramphenicol with titin I27 probed using single-molecule force spectroscopy. ***Journal of Biological Physics***, *47*(2), 191–204. https://doi.org/10.1007/s10867-021-09573-w
220. **Kanchan Jaswal, Megha Shrivastava** and **Rachna Chaba (2021).** Revisiting long-chain fatty acid metabolism in Escherichia coli: Integration with stress responses. ***Current Genetics****, 67*(4), 573-582. https://doi.org/10.1007/s00294-021-01178-z
221. **Kanika Arora, Bhishem Thakur, Archit Gupta** and **Purnananda Guptasarma (2021).** HU-AB simulacrum: Fusion of HU-B and HU-A into HU-B-A, a functional analog of the Escherichia coli HU-AB heterodimer. ***Biochemical and Biophysical Research Communications,*** *560*, 27-31. https://doi.org/10.1016/j.bbrc.2021.04.107
222. **Kanika Arora, Bhishem Thakur, Arpita Mrigwani** and **Purnananda Guptasarma (2021).** N-Terminal Extensions Appear to Frustrate HU Heterodimer Formation by Strengthening Intersubunit Contacts and Blocking the Formation of a Heterotetrameric Intermediate. ***Biochemistry,*** *60*(23), 1836–1852. https://doi.org/10.1021/acs.biochem.1c00081
223. **Karan Singh, Ekta Kochar, Prakhar Gahlot, Karan Bhatt** and **Nagaraj Guru Prasad (2021).** Evolution of reproductive traits have no apparent life-history associated cost in populations of drosophila melanogaster selected for cold shock resistance**.** ***BMC Ecology and Evolution,*** *21*(1), 219. https://doi.org/10.1186/s12862-021-01934-2
224. **Komal Maggu, Nagaraj Guru Prasad, Neetika Ahlawat** and **Manas Geeta Arun (2021).** Enemies make you stronger: Coevolution between fruit fly host and bacterial pathogen increases postinfection survivorship in the host. *Ecology and Evolution, 11*(14), 9563-9574. https://doi.org/10.1002/ece3.7774
225. **Komal Maggu, Neetika Ahlawat, Manas Geeta Arun, Abhishek Meena** and **Nagaraj Guru Prasad (2021).** Divergence of responses to variable socio-sexual environments in laboratory populations of drosophila melanogaster evolving under altered operational sex ratios. ***Evolution,*** *75*(2), 414-426. https://doi.org/10.1111/evo.14138
226. **Manasa Geeta Arun, Amisha Agarwala, Zeeshan Alia Syed, Jigisha, Mayanka Kashyap, Saudaminia Venkatesan, Tejinder Singha Chechi, Vanika Gupta** and **Nagaraj Guru Prasad (2021).** Experimental evolution reveals sex-specific dominance for surviving bacterial infection in laboratory populations of drosophila melanogaster. ***Evolution Letters,*** *5*(6), 657-671. https://doi.org/10.1002/evl3.259
227. Manni Luthra-Guptasarma and **Purnananda Guptasarma (2021).** Does chronic inflammation cause acute inflammation to spiral into hyper-inflammation in a manner modulated by diet and the gut microbiome, in severe covid-19? ***BioEssays****, 43*(9) 202000211. https://doi.org/10.1002/bies.202000211
228. Michael S Engel, Luis M P Ceríaco, Gimo M Daniel, Pablo M Dellapé, Ivan Löbl, Milen Marinov, Roberto E Reis, Mark T Young, Alain Dubois, **Ishan Agarwal**, Pablo Lehmann A., …, et. al. **(2021).** The taxonomic impediment: A shortage of taxonomists, not the lack of technical approaches. ***Zoological Journal of the Linnean Society,*** *193*(2), 381-387. http://dx.doi.org/10.1093/zoolinnean/zlab072
229. Mukta Sharma, Anupama Mittal, Aarti Singh, **Ashwin K Jainarayanan**, Swapnil Sharma and Sarvesh Paliwal **(2021).** Pharmacophore-driven identification of N-methyl-D-receptor antagonists as potent

neuroprotective agents validated using in vivo studies. ***Biology Methods and Protocols,*** *5*(1), bpaa013. https://doi.org/10.1093/biomethods/bpaa013

230. **Nagesh Y Kadam, Sukanta Behera, Sandeep Kumar, Anindya Ghosh-Roy** and **Kavita Babu (2021).** The G-protein coupled receptor SRX-97 is required for concentration dependent sensing of benzaldehyde in Caenorhabditis elegans. ***Eneuro,*** *8*(1), 0011-20.2020. https://doi.org/10.1523/eneuro.0011-20.2020
231. Nayanika Sengupta, **Anish Kumar Mondal**, Suman Mishra, **Kausik Chattopadhyay** and Somnath Dutta **(2021)**. Single-particle cryo-EM reveals conformational variability of the oligomeric VCC beta-barrel pore in a lipid bilayer. ***Journal of Cell Biology****, 220*(12), 202102035. https://doi.org/10.1083/jcb.202102035
232. **Nirmal Kumar, Suchitra S. Prabhu, Isha Monga** and **Indranil Banerjee (2021).** Influence of IL28B gene polymorphisms on PegINF-RBV-mediated HCV clearance in HIV-HCV co-infected patients: A meta-analysis, ***Meta Gene*****,** 29, 100909.

https://doi.org/10.1016/j.mgene.2021.100909

233. **Paras Verma, Biswajit Panda, Kamal P. Singh** and **Shashi B. Pandit (2021).** Optimal Protein Sequence Design Mitigates Mechanical Failure in Silk β-Sheet Nanocrystals. ***ACS Biomaterials Science & Engineering*****,** *7*(7), 3156–3165. https://doi.org/10.1021/acsbiomaterials.1c00447
234. Parikshit Bagchi, **Indranil Banerjee** and Miguel A. Martín-Acebes **(2021).** Editorial: Cell organelle exploitation by viruses during infection. ***Frontiers in Microbiology****, 12*, 675152. https://doi.org/10.3389/fmicb.2021.675152
235. Parul Sarwalia, Mustafa Raza, Apoorva Soni, **Pratiksha Dubey,** Rajeev Chandel, Rakesh Kumar, A Kumaresan, Suneel Kumar Onteru, Ankit Pal, Kalpana Singh, Mir Asif Iquebal, Sarika Jaiswal, Dinesh Kumar and T. K. Datta **(2021).** Establishment of repertoire of placentome-associated MicroRNAs and their appearance in blood plasma could identify early establishment of pregnancy in buffalo (bubalus bubalis). ***Frontiers in Cell and Developmental Biology,*** *9*, 673765. https://doi.org/10.3389/fcell.2021.673765
236. **Parvathy Ramesh, Nidhi Sharma Dey, Aditya Kanwal, Sudip Mandal** and **Lolitika Mandal (2021).** Relish plays a dynamic role in the niche to modulate Drosophila blood progenitor homeostasis in development and infection. ***Elife.***67158. https://doi.org/10.7554/elife.67158
237. **Pooja Chaudhary, Saryu Garg, Tess George, Muhammed Shabin, Sneha Saha, Subodh Subodh** and **Baerbel Sinha (2021).** Underreporting and open burning – the two largest challenges for sustainable waste management in india. ***Resources, Conservation and Recycling****,* 175, 105865. https://doi.org/10.1016/j.resconrec.2021.105865
238. **Pratima Pandey, Anuradha Singh**, Harjot Kaur, Anindya Ghosh-Roy and **Kavita Babu (2021).** Increased dopaminergic neurotransmission results in ethanol dependent sedative behaviours in caenorhabditis elegans. ***PLoS Genetics,*** *17*(2), 1009346. https://doi.org/10.1371/journal.pgen.1009346
239. **Pratima Pandey, Umer S. Bhat, Anuradha Singh, Aiswarya Joy, Varun Birari, Nagesh Y. Kadam and Kavita Babu (2021)**. Dauer formation in c. Elegans is modulated through awc and asi-dependent chemosensation. ***eNeuro***, 8(2), 0473-20.2021. https://doi.org/10.1523/ENEURO.0473-20.2021.
240. **Pratima Verma** and **Kausik Chattopadhyay (2021).** Current Perspective on the Membrane-Damaging Action of Thermostable Direct Hemolysin, an Atypical Bacterial Pore-forming Toxin. ***Frontiers in Molecular Biosciences****,* 8, 717147. https://doi.org/10.3389/fmolb.2021.717147
241. **Pratima Verma, Shraddha Gandhi, Kusum Lata** and **Kausik Chattopadhyay (2021).** Pore-forming toxins in infection and immunity. ***Biochemical Society Transactions,*** *49*(1), 455-465. https://doi.org/10.1042/bst20200836
242. Priya Mehra, **Parul Bali,** Jagtar Singh, Pradip Kumar Saha and Akshay Anand **(2021).** Effect of retinal injury induced by laser photocoagulation on visuospatial memory in mouse model. ***Journal of Neurosciences in Rural Practice****, 12*(3), 586-591. https://doi.org/10.1055/s-0041-1730747
243. **R. Dutta, T.S. Chechi, A. Yadav** and **Prasad N.G. (2021)**. Indirect selection on cuticular hydrocarbon divergence in *Drosophila melanogaster* populations evolving under different operational sex ratios. ***Journal of Zoology***, *316*(3), 188–196. https://doi.org/10.1111/jzo.12943
244. **Ranjana Jaiswara, Laure Desutter-Grandcolas** and **Manjari Jain (2021)**. Taxonomic revision of teleogryllus mitratus (burmeister, 1838) and T. occipitalis (serville, 1838) in India, with the description of teleogryllus rohinae jaiswara & jain sp. nov. and a key for teleogryllus species from india (orthoptera: Gryllidae). ***Zootaxa****, 5016*(1), 81-106. https://doi.org/10.11646/zootaxa.5016.1.3

245. **Renuka Agarwal, Manisha Gupta, Abin Antony**, Ruchira Sen and Rhitoban Raychoudhury **(2021).** In vitro studies reveal that pseudomonas, from odontotermes obesus colonies, can function as a defensive mutualist as it prevents the weedy fungus while keeping the crop fungus unaffected. ***Microbial Ecology,*** 017985. https://doi.org/10.1007/s00248-021-01798-5
246. **Richa Singh** and **Manjari Jain (2021).** Variation in call types, calling activity patterns and relationship between call frequency and body size in a field cricket, acantho gryllus asiaticus. ***Bioacoustics****, 30*(3), 284-302. https://doi.org/10.1080/09524622.2020.1720817
247. **Rohit Kapila, Mayank Kashyap, Gulati Aakanksha, Aaditya Narasimhan, Soumyadip Poddar, Arunika Mukhopadhaya** and **Nagaraj Guru Prasad 2021).** Evolution of sex-specific heat stress tolerance and larval Hsp70 expression in populations of drosophila melanogaster adapted to larval crowding. ***Journal of Evolutionary Biology,*** *34*(9), 1376-1385. https://doi.org/10.1111/jeb.13897
248. **Rohit Kapila, Mayank Kashyap, Soumyadip Poddar, Shreya Gangwal** and **Nagaraj Guru Prasad (2021).** Evolution of pathogen-specific improved survivorship post-infection in populations of drosophila melanogaster adapted to larval crowding. ***PLoS ONE,*** *16*(4), 0250055. https://doi.org/10.1371/journal.pone.0250055
249. **Roman Sarkar, Yashu Sharma, Ayush Jain, Azeez Tehseen, Sudhakar Singh** and **Sharvan Sehrawat (2021).** A combinatorial in-silico, in-vitro and in-vivo approach to quantitatively study peptide induced MHC stability. ***Bio-Protocol****, 11*(24), 4255. https://doi.org/10.21769/bioprotoc.4255
250. **Samrat Mukhopadhyay (2021).** Catalytic coacervate crucibles. ***Nature Chemistry,*** *13*(11), 1028-1030. https://doi.org/10.1038/s41557-021-00815-x
251. **Smriti Mankotia, Jagannath Swain** and **Santosh B. Satbhai (2021).** Biotechnological approaches for generating iron-rich crops. ***Plant Nutrition and Food Security in the Era of Climate Change,*** 437-451. https://doi.org/10.1016/B978-0-12-822916-3.00011-1
252. **Sandeep K. Rai, Adriana Savastano, Priyanka Singh, Samrat Mukhopadhyay** and **Markus Zweckstetter (2021).** Liquid–liquid phase separation of tau: From molecular biophysics to physiology and disease. ***Protein Science****, 30*(7), 1294-1314. https://doi.org/10.1002/pro.4093
253. **Satish Kumar Tiwari** and **Sudip Mandal (2021).** Mitochondrial control of stem cell state and fate: Lessons from drosophila. ***Frontiers in Cell and Developmental Biology,*** 9(1), 606639. https://doi.org/10.3389/fcell.2021.606639
254. Sean P. Fagan , Purba Mukherjee , William J. Jaremko , Rachel Nelson-Rigg , Ryan C. Wilson , Tyler L. Dangerfield , Kenneth A. Johnson , **Indrajit Lahiri** and Janice D. Pata **(2021)**. Pyrophosphate release acts as a kinetic checkpoint during high-fidelity DNA replication by the Staphylococcus aureus replicative polymerase PolC**.** ***Nucleic Acids Research,*** *49*(14), 8324–8338. https://doi.org/10.1093/nar/gkab613
255. **Sharvan Sehrawat** and Barry T. Rouse **(2021).** COVID-19: Disease, or no disease? - that is the question. it's the dose stupid! ***Microbes and Infection****, 23*(1), 104779. https://doi.org/10.1016/j.micinf.2021.104779
256. **Sharvan Sehrawat** and **Manpreet Kaur (2021).** Galectin-3 as a modifier of anti-microbial immunity: Unravelling the unknowns. ***Glycobiology****, 30*(7), 418-426. https://doi.org/10.1093/glycob/cwaa005
257. **Shivani Bhatia, Harish Kumar, Monika Mahajan, Sonal Yadav, Prince Saini, Shalini Yadav, Sangram Keshari Sahu, Jayesh Kumar Sundaram** and **Ram Kishor Yadav (2021).** A cellular expression map of epidermal and subepidermal cell layer-enriched transcription factor genes integrated with the regulatory network in arabidopsis shoot apical meristem. ***Plant Direct****, 5*(3), 00306. https://doi.org/10.1002/pld3.306
258. Snigdha Rai, Prashant Kumar Singh, **Smriti Mankotia, Jagannath Swain** and **Santosh B. Satbhai (2021).** Iron homeostasis in plants and its crosstalk with copper, zinc, and manganese. ***Plant Stress****, 1,* 100008. https://doi.org/10.1016/j.stress.2021.100008
259. **Soniya Devi Yambem, Sonam Chorol** and **Manjari Jain (2021).** More than just babble: functional and structural complexity of vocalizations of Jungle Babbler. ***Behavioural Ecology and Sociobiology,*** *75*(18), 118. https://doi.org/10.1007/s00265-021-03018-z
260. **Swapnil Singh, Aishwarya Agarwal, Anamika Avni** and **Samrat Mukhopadhyay (2021).** Ultrasensitive characterization of the prion protein by surface-enhanced raman scattering: Selective enhancement via electrostatic tethering of the intrinsically disordered domain with functionalized silver nanoparticles. ***Journal of Physical Chemistry Letters****, 12*(12)*,* 3187-3194. https://doi.org/10.1021/acs.jpclett.1c00240

261. **Umer Saleem Bhat,** Navneet Shahi, Siju Surendran and Kavita Babu **(2021).** Neuropeptides and Behaviours: How Small Peptides Regulate Nervous System Function and Behavioural Outputs. ***Frontiers in Molecular Neuroscience*****,** *14*(1)*,* 786471. https://doi.org/10.3389/fnmol.2021.786471
262. Viney Gupta, Bindu I Somarajan, Gagandeep Kaur, Shikha Gupta, Renu Singh, Dibyabhaba Pradhan, Harpreet Singh, Punit Kaur, Anshul Sharma, **Bindia Chawla, Anisha Pahuja, Rajesh Ramachandran** and Arundhati Sharma **(2021).** Exome sequencing identifies procollagen-lysine 2-oxoglutarate 5-dioxygenase 2 mutations in primary congenital and juvenile glaucoma. ***Indian Journal of Ophthalmology,*** *69*(10), 2710-2716. https://doi.org/10.4103/ijo.ijo_1750_21
263. **Yachna Jain, Keerthivasan Raanin Chandradoss, A. V, Anjoom, Jui Bhattacharya, Mohan Lal, Meenakshi Bagadia, Harpreet Singh** and **Kuljeet Singh Sandhu (2021).** Convergent evolution of a genomic rearrangement may explain cancer resistance in hystrico- and sciuromorpha rodents. ***Npj Aging and Mechanisms of Disease****, 7*(1), 20. https://doi.org/10.1038/s41514-021-00072-9
264. **Yashu Sharma, Roman Sarkar, Ayush Jain, Sudhakar Singh, Chander Shekhar,** Chandrasekar Shanmugam, Muthuchelvan Dhanavelu, Prabhakar Tembhurne, Rajeev Kaul and **Sharvan Sehrawat (2021).** A mouse model of PPRV infection for elucidating protective and pathological roles of immune cells. ***Frontiers in Immunology****, 12*(1), 630307. https://doi.org/10.3389/fimmu.2021.630307
265. **Yogesh Saxena, Sanjeev Routh** and **Arunika Mukhopadhaya (2021).** Immunophoresis: Role of innate immune cells in osteoporosis. ***Frontiers in Immunology,*** *12*(1), 687037. https://doi.org/10.3389/fimmu.2021.687037
266. **Manisha Gupta**, **Rajbir Kaur**, Ankita Gupta and **Rhitoban Raychoudhury (2021)**. Are ecological communities the seat of endosymbiont horizontal transfer and diversification? A case study with soil arthropod community. ***Ecology and Evolution,*** 14490–14508. https://doi.org/10.1002/ece3.8108

21.1.6 Department of Physical Sciences

267. **Anshuman Acharya** and Vikram Khaire **(2021).** How robust are the inferred density and metallicity of the circumgalactic medium? ***Monthly Notices of the Royal Astronomical Soc.,*** *509*, 5559–5576*.* https://doi.org/10.1093/mnras/stab3316
268. A. Bashyal, D. Rimal, B. Messerly, Z. Ahmad Dar, F. Akbar, M. V. Ascencio, A. Bercellie, and ,..., **S. Jena**, D. Jena, and ,..., et. al. **(2021).** Use of neutrino scattering events with low hadronic recoil to inform neutrino flux and detector energy scale. ***Journal of Instrumentation,*** *16*(8), P08068. https://doi.org/10.1088/1748-0221/16/08/P08068
269. A. Ghosh, B. Yaeggy, R.Galindo, Z. Ahmad Dar, F. Akbar, M. V. Ascencio, A. Bashyal, A. Bercellie, J. L. Bonilla, G. Caceres, T. Cai, M.F. Carneiro, H. da Motta, G.A. Díaz, J. Felix, A. Filkins, R. Fine, A.M. Gago, T. Golan, R. Gran, D.A. Harris, S. Henry, **Satyajit Jena**, and ,..., et. al. **(2021).** Neutral pion reconstruction using machine learning in the MINERvA experiment at $\langle Ev \rangle \sim 6GeV$. ***Journal of Instrumentation****, 16*(7), P07060. https://doi.org/10.1088/1748-0221/16/07/P07060
270. A. Joshi, W. Wang, J. C. Pandey, **Kulinder Pal Singh,** S. Naik, A. Raj, G. C. Anupama and N. Rawat **(2021).** X-ray confirmation of the intermediate polar IGR J16547-1916x22c6. ***Astronomy & Astrophysics,*** *657*(1)*,* 1-12. https://doi.org/10.1051/0004-6361/202142193
271. **Aastha Vasdev**, Moinak Dutta, **Shivam Mishra, Veerpal Kaur**, Harleen Kaur, Kanishka Biswas and **Goutam Sheet (2021)**. Local ferroelectric polarization switching driven by nanoscale distortions in thermoelectric sn 0.7Ge 0.3Te. ***Scientific Reports****, 11*(1), 17190 . https://doi.org/10.1038/s41598-021-96299-3
272. **Aastha Vasdev, Suman Kamboj, Anshu Sirohi,** Manasi Mandal, Sourav Marik, Ravi Prakash Singh and **Goutam Sheet (2021).** Field induced hysteretic structural phase switching and possible CDW in re-doped MoTe2. ***Journal of Physics Condensed Matter,*** *33*(25), 255401. https://doi.org/10.1088/1361-648x/abf883
273. **Akshay Gaikwad, Arvind** and **Kavita Dorai (2021).** True experimental reconstruction of quantum states and processes via convex optimization. ***Quantum Information Processing,*** *20*(1), 19. https://doi.org/10.1007/s11128-020-02930-z
274. **Akshay Gaikwad, Krishna Shende** and **Kavita Dorai. (2021).** Experimental demonstration of optimized quantum process tomography on the IBM quantum experience. ***International Journal of Quantum Information,*** *19*(7), 2040004. https://doi.org/10.1142/S0219749920400043

275. **Amit Vashist, R. K. Gopal and Yogesh Singh (2021).** Anomalous negative longitudinal magnetoresistance and violation of ohm's law deep in the topological insulating regime in bi 1-x sb x. ***Scientific Reports****, 11(*1). https://doi.org/10.1038/s41598-021-87780-0
276. **Anita Devi** and **Arijit K. De (2021).** Unified treatment of nonlinear optical force in laser trapping of dielectric particles of varying sizes. ***Physical Review Research,*** 033074 (1-21)3(3). https://doi.org/10.1103/PhysRevResearch.3.033074
277. **Anita Devi, Shruthi S. Nair, Sumit Yadav** and **Arijit K. De (2021).** Controlling optical trapping of metal-dielectric hybrid nanoparticles under ultrafast pulsed excitation: a theoretical investigation. ***Nanoscale Advances,*** *3*(11), 3288 - 3297. https://doi.org/10.1039/D0NA01083A
278. **Anita Devi, Sumit Yadav** and **Arijit K.De (2021).** Nonlinear Optical Trapping Dynamics Studied with Simultaneous Spatial and Temporal Resolution. ***Optical Society of America,*** NW2B.5. https://doi.org/10.1364/NLO.2021.NW2B.5
279. **Anita Devi** and **Arijit K. De (2021).** A table-top compact multimodal nonlinear laser tweezer. ***Optics Communications,*** 126440 (1-12), 482. https://doi.org/10.1016/j.optcom.2020.126440
280. **Ankur Mandal, Mehra S. Sidhu,** Jan M. Rost, Thomas Pfeifer and **Kamal P. Singh (2021).** Attosecond delay lines: Design, characterization and applications. ***European Physical Journal: Special Topics****, 230*(23), 4195-4213. https://doi.org/10.1140/epjs/s11734-021-00261-3
281. **Ankur Mandal,** Pranawa C Deshmukh and **Kamal P. Singh (2021)**. Controlling high harmonic generation using inhomogeneous two-color driving laser pulse. ***Laser Physics****, 31*(7), 075302. https://doi.org/10.1088/1555-6611/abfe55
282. **Ankura** and **Sanjib Dey (2021**). Dynamic noncommutative BTZ black holes. ***Physics Letters, Section B: Nuclear, Elementary Particle and High-Energy Physics****,* 818, 136391. https://doi.org/10.1016/j.physletb.2021.136391
283. **Anosh Joseph** and **Arpith Kumar (2021).** Complex langevin dynamics and supersymmetric quantum mechanics. ***Journal of High Energy Physics****, 2021*(10), 186. https://doi.org/10.1007/JHEP10(2021)186
284. Anshu Gupta, **Deepak S. Kathyat, Arnob Mukherjee**, Anamika Kumari, Ruchi Tomar, **Yogesh Singh, Sanjeev Kumar**, and Suvankar Chakraverty **(2021)**. Unique Signatures of Rashba Effect in Angle Resolved Magnetoresistance. ***Advanced Quantum Technologies***, *5*(1), 2100105. https://doi.org/10.1002/qute.202100105
285. Anshul Choudhary, John F. Lindner, Elliott G. Holliday, Scott T. Miller, **Sudeshna Sinha** and William L. Ditto **(2021).** Forecasting hamiltonian dynamics without canonical coordinates. ***Nonlinear Dynamics****, 103*(2), 1553-1562. https://doi.org/10.1007/s11071-020-06185-2
286. Anuj Mishra, **Ashish Kumar Meena**, Anupreeta More, Sukanta Bose and **Jasjeet Singh Bagla (2021)**. Gravitational lensing of gravitational waves: Effect of microlens population in lensing galaxies. ***Monthly Notices of the Royal Astronomical Society****, 508*(4), 4869-4886. https://doi.org/10.1093/mnras/stab2875
287. Anuradha Purohit, Himanshu, S. L. Patel, **S. Chander** and M. S. Dhaka **(2021).** Substrate Evolution to Microstructural and Optoelectrical Properties of Evaporated CdS Thin Films Correlated with Elemental Composition. ***Acta Metallurgica Sinica (English Letters),*** *34*(9), 1307-1316. https://doi.org/10.1007/s40195-021-01266-6
288. **Anzar Ali, Kanika Pasrija, Gyaneshwar Sharma, Sanjeev Kumar, and Yogesh Singh (2021)**. Rare-earth tuned magnetism and magnetocaloric effects in double perovskitesR2NiMnO6. ***Journal of Physics. Condensed Matter:*** *34*(9), 095803. https://doi.org/10.1088/1361-648X/ac3e9e
289. Apurva Sinha, Pranay Ranjan, **Anzar Ali,** Jayakumar Balakrishnan and Ajay D Thakur **(2021).** Graphene oxide and its derivatives as potential ovchinnikov ferromagnets. ***Journal of Physics Condensed Matter,*** *33*(37), 375801. https://doi.org/10.1088/1361-648x/ac0d84
290. Arjun Bagchi, Shankhadeep Chakrabortty, Daniel Grumiller, **Bharathkumar Radhakrishnan**, Max Riegler and Aditya Sinha **(2021).** Non-lorentzian chaos and cosmological holography. ***Physical Review D****, 104*(10), L101901. https://doi.org/10.1103/PhysRevD.104.L101901
291. **Arnob Mukherjee, Deepak S. Kathyat and Sanjeev Kumar (2021).** Antiferromagnetic skyrmion crystals in the rashba Hund's insulator on a triangular lattice. ***Scientific Reports,*** *11*(1), 9566. https://doi.org/10.1038/s41598-021-88556-2
292. **Arnob Mukherjee, Deepak S. Kathyat** and **Sanjeev Kumar (2021).** Antiferromagnetic skyrmions and skyrmion density waves in a Rashba-coupled Hund insulator. ***Physical Review B****, 103*(13), 134424. https://doi.org/10.1103/PhysRevB.103.134424

293. **Aru Beri,** Sachindra Naik, **Kulinder Pal Singh,** Gaurava K Jaisawal, Sudip Bhattacharyya, Philip Charles, Wynn C G Ho, Chandreyee Maitra, Dipankar Bhattacharya, Gulab C Dewangan, Matthew Middleton, Diego Altamirano, Poshak Gandhi, Harsha Raichur **(2021).** AstroSat observations of the first Galactic ULX pulsar Swift J0243.6+6124. *500*(1), 565–575. https://doi.org/10.1093/mnras/staa3254
294. **Arvind, S. Chaturvedi** and **N. Mukunda (2021).** Properties of spin and orbital angular momenta of light. ***International Journal Of Modern Physics A,*** *36*(26), 2150180. https://doi.org/10.1142/S0217751X21501803
295. **Ashish Kumar Meena** and **Jasjeet Singh Bagla (2021)**. Exotic image formation in strong gravitational lensing by clusters of galaxies: I. cross-section. ***Monthly Notices of the Royal Astronomical Society,*** *503*(2), 2097-2107. https://doi.org/10.1093/mnras/stab577
296. **Ashish Kumar Meena,** Agniva Ghosh**, Jasjeet S Bagla** and Liliya L R Williams **(2021)**. Exotic image formation in strong gravitational lensing by clusters of galaxies - II. Uncertainties. ***Monthly Notices of the Royal Astronomical Society*****,** *506*(1),1526–1539. https://doi.org/10.1093/mnras/stab1807
297. Ashwin K Jainarayanan, Anastasios Galanis, **Athira Sreejith**, **Sourav Suresh**, Amatullah Mustafa Nakara, Guilherme E Kundlatsch and Roger Rubio-Sánchez **(2021)**. iGEM comes of age: Trends in its research output. ***Nature Biotechnology,*** *39*(12), 1599-1601. https://doi.org/10.1038/s41587-021-01152-7
298. **Ayushi Singhania, Masahiro Kadosawa, Yukinori Ohta, Sanjeev Kumar, and Satoshi Nishimoto (2021)**. Spin- S impurities with XXZ anisotropy in a spin- 12 heisenberg chain. ***Physical Review B,*** *104*(22), 224407. https://doi.org/10.1103/PhysRevB.104.224407
299. Behnam Pourhassan, Mohsen Dehghani, Mir Faizal and **Sanjib Dey (2021).** Non-perturbative quantum corrections to a Born–Infeld black hole and its information geometry. ***Classical and Quantum Gravity,*** *38*(10), 105001. https://doi.org/10.1088/1361-6382/abdf6f
300. **Biswajit Panda and Kamal P. Singh (2021)**. Pioneering works of N. S. kapany in biomedical optics: Live tissue imaging, retinal photocoagulation, and optical oximetry. ***Resonance,*** *26*(12), 1629-1641. https://doi.org/10.1007/s12045-021-1275-0
301. Branislav Avramov, Peter Berczik, Yohai Meiron, **Anshuman Acharya** and Andreas Just **(2021).** Properties of loss cone stars in a cosmological galaxy merger remnant. ***Astronomy and Astrophysics,*** *649*(1), 1-17. https://doi.org/10.1051/0004-6361%2F202039698
302. C. Beleño, A. Frey, I. Adachi, H. Aihara, D. M. Asner, H. Atmacan, T. Aushev, R. Ayad, P. Behera, J. Bennett, F. Bernlochner, **Vishal Bhardwaj**, T. Bilka, and ,..., **Sourav Patra**, T. K. Pedlar, and ,..., et. al. **(2021).** Measurement of the branching fraction of the decay $B^+ \to \pi^+\pi^-\ell^+\nu_\ell$ in fully reconstructed events at Belle. ***Physical Review D,*** *103*(11), 112001. https://doi.org/10.1103/PhysRevD.103.112001
303. **Chanchal, G. P. Teja, Christoph Simon** and **Sandeep K. Goyal (2021).** Storing vector-vortex states of light in an intra-atomic frequency-comb quantum memory. ***Physical Review A,*** *104*(4), 043713. https://doi.org/10.1103/PhysRevA.104.043713
304. **Chandana Kumar, Gaurav Saxena** and **Arvind (2021).** Continuous-variable clauser-horne bell-type inequality: A tool to unearth the nonlocality of continuous-variable quantum-optical systems. ***Physical Review A,*** *103*(4), 042224. https://doi.org/10.1103/PhysRevA.103.042224
305. Christina E. Antony, Gaana K., Praveen S. G., Adithya Jayakumar, Akshay Yadav**, Nikhil S. Sivakum**ar, Niranjan Kamath, Suma M. N., Vinayak B. Kamble and Deepshikha Jaiswal-Nagar **(2021).** Polyvinylpyrrolidone-Stabilized Palladium Nanocrystals as Chemiresistive Sensors for Low-Concentration Hydrogen Gas Detection. ***ACS Applied Nano Materials,*** *4*(2), 1643–1653. https://doi.org/10.1021/acsanm.0c03109
306. D R A Williams, M Pahari, R D Baldi, I M McHardy, S Mathur, R J Beswick, **A Beri,** P Boorman, and ,..., et. al. **(2021)**. LeMMINGs – IV. The X-ray properties of a statistically complete sample of the nuclei in active and inactive galaxies from the Palomar sample. ***Monthly Notices of the Royal Astronomical Society***, *510*(4), 4909–4928. https://doi.org/10.1093/mnras/stab3310
307. **D. Jaffino Stargen**, V. Sreenath and L. Sriramkumar **(2021).** Quantum-to-classical transition and imprints of continuous spontaneous localization in classical bouncing universes. ***International Journal of Modern Physics D,*** *30*(7), 21500498. http://dx.doi.org/10.1142/S0218271821500498
308. D. Mukherjee, **Harvinder Jassal** and **Kinjalk Lochan (2021)**. F(R) dual theories of quintessence: Expansion-collapse duality. ***Journal of Cosmology and Astroparticle Physics,*** *2021*(12), 016. https://doi.org/10.1088/1475-7516/2021/12/016

309. D. Ruterbories, A. Filkins, Z. Ahmad Dar, F. Akbar, D.A. Andrade, M. V. Ascencio, A. Bashyal, L. Bellantoni, and ,..., **Satyajit Jena**, J. Kleykamp, and ,..., et. al. **(2021).** Measurement of inclusive charged-current ?μ cross sections as a function of muon kinematics at E? ~6 GeV on hydrocarbons. ***Physical Review D,*** *104*(9), 092007. https://doi.org/10.1103/PhysRevD.104.092007
310. D. Ruterbories, Z. Ahmad Dar, F. Akbar, M. V. Ascencio, A. Bashyal, A. Bercellie, M. Betancourt, and ,..., **Satyajit Jena**, J. Kleykamp, and ,…, et. al. **(2021).** Constraining the NuMI neutrino flux using inverse muon decay reactions in MINERvA. ***Physical Review D,*** *104*(9), 092010. https://doi.org/10.1103/PhysRevD.104.092010
311. Debasis Mondal, **Jaskaran Singh** and Dagomir Kaszlikowski **(2021).** Quantum instrumentality uniquely singles out the non-local advantage of quantum coherence. ***Physical Review A,*** *104*(4), 042407. https://doi.org/10.1103/PhysRevA.104.042407
312. Debattam Sarkar, Subhajit Roychowdhury, Raagya Arora, Tanmoy Ghosh, **Aastha Vasdev**, Boby Joseph, **Goutam Sheet**, Umesh V. Waghmare and Kanishka Biswas **(2021).** Metavalent bonding in GeSe leads to high thermoelectric performance. ***Angewandte Chemie - International Edition,*** *60*(18), 10350-10358. https://doi.org/10.1002/anie.202101283
313. Debmalya Sarkar, Namrata Das, Md. Minarul Saikh, Prosenjit Biswas, Solanky Das, Sukhen Das, **Nur Amin Hoque** and Ruma Basu **(2021).** Development of a sustainable and biodegradable sonchus asper cotton pappus based piezoelectric nanogenerator for instrument vibration and human body motion sensing with mechanical energy harvesting applications. ***ACS Omega,*** *6*(43), 28710-28717. https://doi.org/10.1021/acsomega.1c03374
314. **Debottam Nandi (2021).** Inflationary magnetogenesis: Solving the strong coupling and its non-gaussian signatures. ***Journal of Cosmology and Astroparticle Physics,*** *2021*(8), 039.https://doi.org/10.1088/1475-7516/2021/08/039
315. **Debottam Nandi (2021)**. Stability of a Viable Non-Minimal Bounce. ***Universe***, *7*(3), 7030062. https://doi.org/10.3390/universe7030062
316. **Deepak S. Kathyat, Arnob Mukherjee** and **Sanjeev Kumar (2021).** Electronic mechanism for nanoscale skyrmions and topological metals. ***Physical Review B,*** *103*(3), 035111. https://doi.org/10.1103/PhysRevB.103.035111
317. **Deeptajyoti Sen, and Sudeshna Sinha (2021).** Enhancement of extreme events through the Allee effect and its mitigation through noise in a three species system. ***Scientific Reports***, *11*(1), 20913. https://doi.org/10.1038/s41598-021-00174-0
318. E. Kovalenko, A. Garmash, P. Krokovny, I. Adachi, H. Aihara, D. M. Asner, V. Aulchenko, T. Aushev, and ,..., **Sourav Patra**, S. Paul, and ,..., et. al. **(2021).** Study of e(+)e(-) -> Upsilon(1S, 2S)eta and e(+)e(-) -> Upsilon(1S)eta ' at root s=10.866 GeV with the Belle detector. ***Physical Review D,*** *104*(11), 112006. https://doi.org/10.1103/PhysRevD.104.112006
319. F. Abudinén, I. Adachi, K. Adamczyk, L. Aggarwal, H. Ahmed, H. Aihara, N. Akopov, A. Aloisio, N. Anh Ky, D. M. Asner, H. Atmacan, V. Aushev, V. Babu, S. Bacher, H. Bae, S. Baehr, S. Bahinipati, P. Bambade, Sw. Banerjee, S. Bansal, M. Barrett, J. Baudot, M. Bauer, A. Baur, J. Becker, P. K. Behera, J. V. Bennett, E. Bernieri, F. U. Bernlochner, M. Bertemes, E. Bertholet, M. Bessner, S. Bettarini**, Vishal Bhardwaj**, F. Bianchi, and ,..., **Sourav Patra**, S. Paul, and ,..., et. al. **(2021).** Precise Measurement of the D-0 and D+ Lifetimes at Belle II. ***Physical Review Letters,*** *127(*21), 211801. https://doi.org/10.1103/PhysRevLett.127.211801
320. F. Abudinén, I. Adachi, K. Adamczyk, P. Ahlburg, H. Aihara, N. Akopov, A. Aloisio, N. Anh Ky, D. M. Asner, and ,..., **Sourav Patra**, S. Paul, and ,..., et. al. **(2021).** Search for decays using an inclusive tagging method at belle II. ***Physical Review Letters,*** *127*(18), 181802. https://doi.org/10.1103/PhysRevLett.127.181802
321. **G. P. Teja** and **Sandeep K. Goyal (2021).** Studying the effect of a fluctuating environment on intra-atomic frequency comb based quantum memory. ***Scientific Reports,*** *11*(1), 11439. https://doi.org/10.1038/s41598-021-90945-6
322. **Gaurav Sharma,** Pooja Sahlot,Vivek Dwij, Shekhar Tyagi & Vasant Sathe **(2021).** Effect of spin reorientation on the dielectric and conductivity behaviour of Ca2FeCoO5. ***Journal of Materials Science: Materials in Electronics***, *32*(22), 26955–26966. https://doi.org/10.1007/s10854-021-07069-w
323. Gulab C Dewangan, P Tripathi, I E Papadakis and **Kulinder Pal Singh (2021).** AstroSat/UVIT observations of IC 4329A: Constraining the accretion disc inner radius. ***Monthly Notices of the Royal Astronomical Society,*** *504*(3), 4015-4023. https://doi.org/10.1093/mnras/stab1113

324. H. Atmacan, A. J. Schwartz, K. Kinoshita, I. Adachi, K. Adamczyk, H. Aihara, S. Al Said, D. M. Asner, V. Aulchenko, T. Aushev, R. Ayad, V. Babu, S. Bahinipati, M. Bauer, P. Behera, K. Belous, J. Bennett, F. Bernlochner, M. Bessner, **Vishal Bhardwaj**, B. Bhuyan, and ,..., et. al. **(2021)**. Search for B0 →τ±∓ (ℓ=e, μ) with a hadronic tagging method at belle SEARCH for B0 →τ±∓ (ℓ=e, μ) with A ... H. ATMACAN et al. ***Physical Review D,*** *104*(9), L091105. https://doi.org/10.1103/PhysRevD.104.L091105
325. **Harkirat Singh Sahota** and **Kinjalk Lochan (2021)**. Infrared signatures of a quantum bounce in a minisuperspace analysis of lemaître-tolman-bondi dust collapse. ***Physical Review D,*** *104*(12), 126027. https://doi.org/10.1103/PhysRevD.104.126027
326. **Himanshu Swami, Kinjalk Lochan** and Ketan M. Patel **(2021).** Aspects of gravitational decoherence in neutrino lensing. ***Physical Review D,*** *104*(9), 095007. https://doi.org/10.1103/PhysRevD.104.095007
327. Ion Nechita and **Satvik Singh (2021).** A graphical calculus for integration over random diagonal unitary matrices. ***Linear Algebra and its Applications,*** 613, 46-86. https://doi.org/10.1016/j.laa.2020.12.014
328. J. Y. Lee, K. Tanida, Y. Kato, S. K. Kim, S. B. Yang, I. Adachi, J. K. Ahn, H. Aihara, S. Al Said, D. M. Asner, T. Aushev, R. Ayad, V. Babu, S. Bahinipati, P. Behera, and ,..., **Sourav Patra**, S. Paul, and ,..., et. al. **(2021)**. Measurement of branching fractions of λc+ →η Λπ+, η ς0π+, Λ (1670)π+, and η ς (1385)+. ***Physical Review D,*** *103*(5), 052005. https://doi.org/10.1103/PhysRevD.103.052005
329. J. Yelton, I. Adachi, J. K. Ahn, H. Aihara, S. Al Said, D. M. Asner, H. Atmacan, V. Aulchenko, T. Aushev, R. Ayad, V. Babu, S. Bahinipati, P. Behera, K. Belous, J. Bennett, M. Bessner, **Vishal Bhardwaj**, B. Bhuyan, and ,..., et. al. **(2021).** Measurement of the masses and widths of the Σc(2455)+ and Σc(2520)+ baryons. ***Physical Review D,*** *104*(5), 052003. https://doi.org/10.1103/PhysRevD.104.052003
330. Jaikhomba Singha, Mayuresh P. Surnis, Bhal Chandra Joshi, Pratik Tarafdar, Prerna Rana, Abhimanyu Susobhanan, Raghav Girgaonkar, Neel Kolhe, Nikita Agarwal, Shantanu Desai, T. Prabu, **Adarsh Bathula**, Subhajit Dandapat, and ,..., et. al. **(2021).** Evidence for profile changes in PSR J1713+0747 using the uGMRT. ***Monthly Notices of the Royal Astronomical Society: Letters,*** *507*(1), L57-L61. https://doi.org/10.1093/mnrasl/slab098
331. Jan Steinkühler, Piermarco Fonda, **Tripta Bhatia**, Ziliang Zhao, Fernanda S. C. Leomil, Reinhard Lipowsky and Rumiana Dimova **(2021).** Superelasticity of Plasma- and Synthetic Membranes Resulting from Coupling of Membrane Asymmetry, Curvature, and Lipid Sorting. ***Advanced Science,*** *8*(21), 02109. https://doi.org/10.1002/advs.202102109
332. **Jasjeet Singh Bagla (2021).** Dr Thanu Padmanabhan (1957-2021): In Remembrance.***Current Science,*** 121(10), 1365-1369. https://www.currentscience.ac.in/Volumes/121/10/1367.pdf
333. **Jasjeet Singh Bagla (2021).** Editorial. ***Resonance,*** 26(7), 863-865. https://doi.org/10.1007/s12045-021-1188-y
334. **Jaskaran Singh and Soumya Kanti Bose (2021).** Non-gaussian operations in measurement-device-independent quantum key distribution. ***Physical Review A,*** *104*(5), 052605. https://doi.org/10.1103/PhysRevA.104.052605
335. **Jaskaran Singh,** Sibasish Ghosh**, Arvind** and **Sandeep K. Goyal (2021).** Role of Bell-CHSH violation and local filtering in quantum key distribution. ***Physics Letters A,*** 392, 127158. https://doi.org/10.1016/j.physleta.2021.127158
336. **Jasleen Kaur** and **Ramandeep S. Johal (2021)**. Irreversible thermodynamics of thermoelectric devices: From local framework to global description. ***Journal of Statistical Mechanics: Theory and Experiment,*** *2021*(7), 073204. https://doi.org/10.1088/1742-5468/ac0f68
337. Jeremy J. Drake, Jan-Uwe Ness, Kim L. Page, G. J. M. Luna, Andrew P. Beardmore, Marina Orio, Julian P. Osborne, Przemek Mróz, Sumner Starrfield, Dipankar P. K. Banerjee, Solen Balman, M. J. Darnley, Y. Bhargava, G. C. Dewangan, and **Kulinder Pal Singh (2021).** The Remarkable Spin-down and Ultrafast Outflows of the Highly Pulsed Supersoft Source of Nova Herculis 2021. ***Astrophysical Journal Letters,*** *922*(2), 1-9. http://dx.doi.org/10.3847/2041-8213/ac34fd
338. **Juhi Tiwari** and **Kulinder Pal Singh (2021).** The complex intracluster medium of Abell 1569 and its interaction with central radio galaxies. ***Monthly Notices of the Royal Astronomical Society,*** *509*(3), 3321–3338. https://doi.org/10.1093/mnras/stab3188

339. **Juhi Tiwari** and **Kulinder Pal Singh (2021).** The Hercules cluster in X-rays with XMM-Newton and Chandra. ***Monthly Notices of the Royal Astronomical Society,*** *500*(4), 5524–5542. https://doi.org/10.1093/mnras/staa3619
340. J. Y. Lee, K. Tanida, Y. Kato,.....,**V. Bhardwaj** and S. Patra et al. **(2021)**. Measurement of time-dependent CP violation parameters in B-0 -> (KSKSKS0)-K-0-K-0 decays at Belle. ***Physical Review D***, *103*(3), 32003. https://doi.org/10.1103/physrevd.103.032003
341. **Kulinder Pal Singh**, V Girish, M Pavana, Jan-Uwe Ness, G C Anupama and M Orio **(2021).** AstroSat soft X-ray observations of the symbiotic recurrent nova V3890 sgr during its 2019 outburst. ***Monthly Notices of the Royal Astronomical Society****, 501*(1), 36-49. https://doi.org/10.1093/mnras/staa3303
342. K. H. Kang, H. Park, T. Higuchi, K. Miyabayashi, K. Sumisawa, I. Adachi, J. K. Ahn, H. Aihara, S. Al Said, D. M. Asner, V. Aulchenko, T. Aushev, R. Ayad, V. Babu, S. Bahinipati, A. M. Bakich, P. Behera, C. Beleño, J. Bennett, **Vishal Bhardwaj**, T. Bilka, and ,..., **Sourav Patra**, S. Paul, and ,..., et. al. **(2021).** Measurement of time-dependent CP violation parameters in B-0 -> (KSKSKS0)-K-0-K-0 decays at Belle. ***Physical Review D,*** *103*(3), 032003. https://doi.org/10.1103/PhysRevD.103.032003
343. K. Murali, S. Rajasekar, Manaoj **V. Aravind,** Vivek Kohar, W. L. Ditto and **Sudeshna Sinha (2021)**. Construction of logic gates exploiting resonance phenomena in nonlinear systems. ***Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences****, 379*(2192), 1-21. https://doi.org/10.1098/rsta.2020.0238
344. K. Murali, **Sudeshna Sinha**, Vivek Kohar and William L. Ditto **(2021).** Harnessing tipping points for logic operations. ***European Physical Journal: Special Topics****, 230*(16-17), 3403-3409. https://doi.org/10.1140/epjs/s11734-021-00014-2
345. **Kulinder Pal Singh,** G. Stewart, S. Chandra, G. C. Dewangan, S. Bhattacharyya, N. S. Kamble, S. Vishwakarma and J. G. Koyande **(2021)**. Observations of bright stars with AstroSat soft X-ray telescope. ***Journal of Astrophysics and Astronomy****, 42*(2), 77. https://doi.org/10.1007/s12036-020-09677-0
346. **Kulinder Pal Singh,** P. Kushwaha, A. Sinha, Main Pal, G. Dewangan and A. Agarwal **(2021)**. Spectral States of OJ 287 blazar from Multi-wavelength Observations with *AstroSat*. ***Monthly Notices of the Royal Astronomical Society***, *509*(2), 2696–2706. https://doi.org/10.1093/mnras/stab3161
347. K. Uno, K. Hayasaka, K. Inami, I. Adachi, H. Aihara, D. M. Asner, H. Atmacan, T. Aushev, R. Ayad, V. Babu, J. Bennett, F. Bernlochner, M. Bessner, **Vishal Bhardwaj,** J. Biswal, and ,..., et. al. **(2021).** Search for lepton-flavor-violating tau-lepton decays to $\ell\gamma$ at belle. ***Journal of High Energy Physics****, 2021*(10), 19. https://doi.org/10.1007/JHEP10(2021)019
348. **K.P. Singh,** V. Girish, **J. Tiwari,** P.E. Barrett, D.A.H. Buckley, S.B. Potter, E. Schlegel, V. Rana and G. Stewart **(2021).** Observations of AR sco with chandra and AstroSat soft X-ray telescope. ***Journal of Astrophysics and Astronomy,*** *42*(2), 83. https://doi.org/10.1007/s12036-021-09756-w
349. **Kamal P. Singh (2021)**. In memory of narinder singh kapany. ***Nature Photonics****, 15*(6), 403-404. https://doi.org/10.1038/s41566-021-00812-z
350. **Kartik Chhajed (2021).** From ising model to kitaev chain: An introduction to topological phase transitions. ***Resonance,*** *26*(11), 1539-1558. https://doi.org/10.1007/s12045-021-1261-6
351. Kaushik Y. Bhagat, Baibhab Bose, Sayantan Choudhury, Satyaki Chowdhury, Rathindra N. Das, Saptarshhi G. Dastider, **Nitin Gupta**, Archana Maji, Gabriel D. Pasquino and Swaraj Paul **(2021).** The Generalized OTOC from Supersymmetric Quantum Mechanics-Study of Random Fluctuations from Eigenstate Representation of Correlation Functions. ***Symmetry-Basel,*** *13*(1), 13010044. http://dx.doi.org/10.20944/preprints202012.0153.v1
352. **Kavita Dorai (2021)**. Nmr spectroscopy and the plant metabolome. ***emagres***. *9*(4), emrstm1629. https://doi.org/10.1002/9780470034590.emrstm1629
353. **Kirandeep Kaur,** Varinder Singh, Jatin Ghai, **Satyajit Jena** and Özgür E. Müstecaplıoğlu **(2021).** Unified trade-off optimization of a three-level quantum refrigerator. ***Physica A: Statistical Mechanics and its Applications,*** 576, 125892. https://doi.org/10.1016/j.physa.2021.125892
354. **Komal Chaudhary, Pooja Munjal** and **Kamal P. Singh (2021).** Universal Stokes's nanomechanical viscometer. ***Scientific Reports,*** 11(1), 14365. https://doi.org/10.1038%2Fs41598-021-93729-0
355. L. Cao, W. Sutcliffe, R. Van Tonder, F. U. Bernlochner, I. Adachi, H. Aihara, D. M. Asner, T. Aushev, V. Babu, S. Bahinipati, P. Behera, and ,..., **Sourav Patra**, S. Paul, and ,..., et. al. **(2021).** Measurement of differential branching fractions of inclusive $B \to Xu\ell+\nu\ell$ decays. ***Physical Review Letters,*** *127*(26), 261801 . https://doi.org/10.1103/PhysRevLett.127.261801

356. L. Cao, W. Sutcliffe, R. Van Tonder, F. U. Bernlochner, I. Adachi, H. Aihara, S. Al Said, D. M. Asner, H. Atmacan, T. Aushev, R. Ayad, V. Babu, M. Bauer, P. Behera, K. Belous, J. Bennett, M. Bessner, **Vishal Bhardwaj**, T. Bilka, and ,...., **Sourav Patra**, S. Paul, and ,..., et. al. **(2021).** Measurements of partial branching fractions of inclusive B→Xuℓ+νℓ decays with hadronic tagging. ***Physical Review D,*** *104*(1), 012008 . https://doi.org/10.1103/PhysRevD.104.012008
357. Lokeswara Rao Potnurua, Nghia Tuan Duongb, **Budaraju Sasank**, Sreejith Raran-Kurussia, Yusuke Nishiyama and Vipin Agarwal **(2021)**. Selective 1H–1H recoupling via symmetry sequences in fully protonated samples at fast magic angle spinning. ***Journal of Magnetic Resonance,*** 328, 107004. https://doi.org/10.1016/j.jmr.2021.107004
358. **M.A. Nithishwer,** B. Anil Kumar and Lelitha Vanajakshi **(2021)**. Deep learning– just data or domain related knowledge adds value?: Bus travel time prediction as a case study. ***Transportation Letters,*** 1952042. https://doi.org/10.1080/19427867.2021.1952042
359. Main Pal, Neeraj Kumari, P. Kushwaha, **Kulinder Pal Singh**, Alok C. Gupta, Sachindra Naik, G. C. Dewangan, P. Tripathi, Rathin Adhikari, O. Adegoke and H. Nandan **(2021)**. Spectro-timing analysis of a highly variable narrow-line seyfert 1 galaxy NGC 4748 with AstroSat and XMM-newton. ***Journal of Astrophysics and Astronomy,*** *42*(2), 81. https://doi.org/10.1007/s12036-021-09719-1
360. Manaoj Aravind, P. Parmananda and **Sudeshna Sinha (2021).** Emergent noise-aided logic through synchronization. ***Physical Review E,*** *104*(6), 064207. https://doi.org/10.1103/PhysRevE.104.064207
361. Manaoj Aravind, **Sudeshna Sinha** and P. Parmananda **(2021)**. Competitive interplay of repulsive coupling and cross-correlated noises in bistable systems. ***Chaos.*** *31*(6), 061106. https://doi.org/10.1063/5.0056173
362. **Manpreet Kaur** and **Mandip Singh (2021).** Quantum imaging of a polarisation sensitive phase pattern with hyper-entangled photons. ***Scientific Reports***, *11*(1), 23636. https://doi.org/10.1038/s41598-021-02650-z
363. **Manvendra Pratap Rajvanshi, Avinash Singh, H K Jassal** and **J S Bagla (2021).** Tachyonic vs quintessence dark energy: linear perturbations and CMB data. ***Classical and Quantum Gravity,*** *38*(19), 195001. https://doi.org/10.1088/1361-6382/ac1b49
364. Matthias Gillig, Xiaochen Hong, **Piyush Sakrikar,** Gaël Bastien, A.U.B. Wolter, Leonie Heinze, Satoshi Nishimoto, Bernd Büchner and Christian Hess **(2021).** Thermal transport of the frustrated spin-chain mineral linarite: Magnetic heat transport and strong spin-phonon scattering. ***Physical Review B,*** *104*(23), 235129. https://doi.org/10.1103/PhysRevB.104.235129
365. Md. Sabir Ali, Sourav Bhattacharya and **Kinjalk Lochan (2021).** Unruh-DeWitt detector responses for complex scalar fields in de Sitter spacetime. ***Journal of High Energy Physics,*** (3), 220. https://doi.org/10.1007/JHEP03(2021)220
366. **Minati Biswal,** Sanatan Digal, Vinod Mamale and Sabiar Shaikh **(2021).** Confinement-deconfinement transition and Z2symmetry in Z2+ higgs theory. ***Modern Physics Letters A,*** *36*(30), 2150218. https://doi.org/10.1142/S0217732321502187
367. Mohit Lal Bera, Maciej Lewenstein and **Manabendra Nath Bera (2021)**. Attaining carnot efficiency with quantum and nanoscale heat engines. ***Npj Quantum Information,*** *7*(1), 31. https://doi.org/10.1038/s41534-021-00366-6
368. **Monika Moun, Anshu Sirohi** and **Goutam Sheet (2021).** Universality of Interfacial Superconductivity in Heavily Doped Silicon. ***ACS Applied Electronic Materials,*** *3*(4), 1594–1600. https://doi.org/10.1021/acsaelm.0c01097
369. **Monikaa Moun, Aasthaa Vasdev**, Rajashekhar Pujar, K. Priya Madhuri, U. Mogera, Neena S. John, G.U. Kulkarni and **Goutam Sheet (2021).** Enhanced electrical transport through wrinkles in turbostratic graphene films. ***Applied Physics Letters,*** *119*(3), 033102. https://doi.org/10.1063/5.0056212
370. N. K. Nisar, V. Savinov, I. Adachi, H. Aihara, S. Al Said, D. M. Asner, H. Atmacan, T. Aushev, R. Ayad, V. Babu, S. Bahinipati, P. Behera, J. Bennett, M. Bessner, **Vishal Bhardwaj**, B. Bhuyan, and ,..., **Sourav Patra,** S. Paul, and ,..., et. al. **(2021).** Search for the decay Bs0 →η′η. ***Physical Review D,*** *104*(3), L031101. https://doi.org/10.1103/PhysRevD.104.L031101
371. Nand Kumar, Neha Wadehra, Ruchi Tomar, **Shama**,Sanjeev Kumar, **Yogesh Singh**, Sushanta Dattagupta and Suvankar Chakraverty **(2021)**. Observation of Shubnikov–de haas oscillations, planar hall effect, and anisotropic magnetoresistance at the conducting interface of EuO–KTaO3. ***Advanced Quantum Technologies,*** *4*(1), 2000081. https://doi.org/10.1002/qute.202000081

372. Nicetu Tibau Vidal, Mohit Lal Bera, Arnau Riera, Maciej Lewenstein and **Manabendra Nath Bera (2021).** Quantum operations in an information theory for fermions. ***Physical Review A,*** *104*(3), 032411. https://doi.org/10.1103/PhysRevA.104.032411
373. **Nishat Fiza,** M. Masud and M. Mitra **(2021)**. Exploring the new physics phases in 3+1 scenario in neutrino oscillation experiments. ***Journal of High Energy Physics,*** *2021*(9), 162. https://doi.org/10.1007/JHEP09(2021)162
374. **Nithishwer Mouroug Anand, Devang Haresh Liya,** Arpit Kumar Pradhan, **Nitish Tayal, Abhinav Bansal,** Sainitin Donakonda and Ashwin Kumar Jainarayanan **(2021).** A comprehensive SARS-CoV-2 genomic analysis identifies potential targets for drug repurposing. ***PLoS ONE,*** *16*(3), 0248553. https://doi.org/10.1371/journal.pone.0248553
375. **P. A. Ameen Yasir (2021).** Realization of general first-order optical systems using thin lenses of arbitrary focal length and fixed free propagation distance. ***Journal of the Optical Society of America A,*** *38*(1), 42-51. https://doi.org/10.1364/JOSAA.404552
376. P. A. Ameen Yasir and **Sandeep K. Goyal (2021).** Polarization selective Dove prism. ***Optics Express,*** *29*(10), 14917-14930. https://doi.org/10.1364/OE.420891
377. P. C. Deshmukh , S. Banerjee, **A. Mandal** and S. T. Manson **(2021).** Eisenbud–Wigner–Smith time delay in atom–laser interactions. ***European Physical Journal: Special Topics****, 230*(23), 4151-4164. https://doi.org/10.1140/epjs/s11734-021-00225-7
378. P. P. Deka, G. C. Dewangan, **Kulinder Pal Singh** and J. Postma **(2021).** A pair of UV nuclei or a compact star-forming region near the active nucleus in Mrk 766? ***Journal of Astrophysics and Astronomy,*** *42*(2), 46. http://dx.doi.org/10.1007/s12036-021-09695-6
379. Pankaj Agrawal, Debashis Saha and **Shivaji Ambresh (2021).** Divector boson production in association with a higgs boson at hadron colliders. ***Physical Review D****, 103*(11), 116020. https://doi.org/10.1103/PhysRevD.103.116020
380. **Pinaki Roy, Aru Beri** and Sudip Bhattacharyya **(2021).** Thermonuclear X-ray bursts from 4U 1636 - 536 observed with AstroSat. ***Monthly Notices of the Royal Astronomical Society,*** *508*(2), 2123–2133. https://doi.org/10.1093/mnras/stab2680
381. Prakash Tripathi, Gulab Chand Dewangan, I. E. Papadakis and **Kulinder Pal Singh (2021).** Revealing Thermal Comptonization of Accretion Disk Photons in IC 4329A with AstroSat. ***The Astrophysical Journal***, *915*(1), 25. https://doi.org/10.3847/1538-4357/abfe70
382. Pranawa C Deshmukh, G. Aarthi, Sourav Banerjee and **Ankur Mandal (2021).** Accidental degeneracy of the hydrogen atom and its non-accidental solution in parabolic coordinates. ***Canadian Journal of Physics****, 99*(10), 853-860. https://doi.org/10.1139/cjp-2020-0258
383. Pravabati Chingangbam, Priya Goyal**, K. P. Yogendran** and Stephen Appleby **(2021).** Geometrical meaning of statistical isotropy of smooth random fields in two dimensions. ***Physical Review D,*** *104*(12), 123516 . https://doi.org/10.1103/PhysRevD.104.123516
384. **Preeti Bhandari,** Vikas Malik, Deepak Kumar and Moshe Schechter **(2021).** Relaxation dynamics of the three-dimensional Coulomb glass model. ***Physical Review E,*** *103*(3), 32150. https://doi.org/10.1103/PhysRevE.103.032150
385. Prince Sharma, **Rahul Sharma**, Chetana Jain, Gulab C. Dewangan and Anjan Dutta **(2021).** Broad-band spectral study of LMXB black hole candidate 4U 1957+11 with NuSTAR. ***Research in Astronomy and Astrophysics****, 21*(9), 214. https://doi.org/10.1088/1674-4527/21/9/214
386. R. Mizuk, A. Bondar, I. Adachi, H. Aihara, S. Al Said, D. M. Asner, H. Atmacan, V. Aulchenko, T. Aushev, R. Ayad, V. Babu, S. Bahinipati, P. Behera, and ,..., **Sourav Patra**, S. Paul, and ,..., et. al. **(2021).** Measurement of the energy dependence of the $e^+e^- \to B\bar{B}$, $B\bar{B}*$ and $B*\bar{B}*$ exclusive cross sections. ***Journal Of High Energy Physics,*** (6), 137. http://dx.doi.org/10.1007/JHEP06(2021)137
387. R. van Tonder, L. Cao, W. Sutcliffe, M. Welsch, F. U. Bernlochner, I. Adachi, H. Aihara, D. M. Asner, T. Aushev, R. Ayad, V. Babu, P. Behera, K. Belous, J. Bennett, M. Bessner, **Vishal Bhardwaj**, B. Bhuyan, and ,..., **Sourav Patra**, S. Paul, and ,..., et. al. **(2021).** Measurements of q(2) moments of inclusive B -> X(c)l(+)upsilon(l) decays with hadronic tagging. ***Physical Review D,*** *103*(7), 112011. https://doi.org/10.1103/PhysRevD.104.112011
388. **Rajeev Kapri (2021).** Hysteresis loop area scaling exponents in DNA unzipping by a periodic force: A langevin dynamics simulation study. ***Physical Review E,*** *104*(2), 024401. https://doi.org/10.1103/physreve.104.024401

389. **Ramandeep S. Johal** and Arun M. Jayannavar **(2021).** The Many Avatars of Curzon-Ahlborn Efficiency. ***Resonance,*** *26*(2), 211–225. https://doi.org/10.1007/S12045-021-1120-5
390. **Ramandeep S. Johal** and **Venu Mehta (2021).** Quantum Heat Engines with Complex Working Media, Complete Otto Cycles and Heuristics. ***Entropy,*** *23*(9), 1149. https://doi.org/10.3390/e23091149
391. **Ramu Kumar Yadav** and **Rajeev Kapri (2021).** Unzipping of a double-stranded block copolymer DNA by a periodic force. ***Physical Review E,*** *103*(1), 012413. https://doi.org/10.1103/PhysRevE.103.012413
392. Renu Garg, **Vishal Bhardwaj**, J.B. Singh (2021). Search for Y(4260) in B→ Y(4260) K decay mode at belle. ***Springer Proceedings in Physics,*** 261, 117-122. https://doi.org/10.1007/978-981-33-4408-2_17
393. **Ritesh Kumar and Goutam Sheet (2021**). Nonballistic transport characteristics of superconducting point contacts. ***Physical Review B,*** *104*(9), 094525. https://doi.org/10.1103/PhysRevB.104.094525
394. **Ritesh Kumar, Aastha Vasdev, Shekhar Das, Sandeep Howlader,** Karn S. Jat, Prakriti Neha, Satyabrata Patnaik and **Goutam Sheet (2021).** The pressure-enhanced superconducting phase of Sr x – Bi 2 Se 3 probed by hard point contact spectroscopy. ***Scientific Reports,*** *11*(1), 4090 https://doi.org/10.1038/s41598-021-83411-w
395. **Rohit Gupta, Aman Singh Katariya** and **Satyajit Jena (2021).** A unified formalism to study the pseudorapidity spectra in heavy-ion collision. ***European Physical Journal A,*** *57*(7), 224. https://doi.org/10.1140/epja/s10050-021-00529-1
396. S. Choudhury, S. Sandilya, K. Trabelsi, A. Giri, H. Aihara, S. Al Said, D. M. Asner, H. Atmacan, V. Aulchenko, T. Aushev, R. Ayad, V. Babu, S. Bahinipati, P. Behera, C. Beleño, K. Belous, J. Bennett, F. Bernlochner, M. Bessner, **Vishal Bhardwaj**, T. Bilka, and ,..., **S. Patra,** S. Paul, and ,..., et. al. **(2021).** Test of lepton flavor universality and search for lepton flavor violation in B ? Kll decays. ***Journal of High Energy Physics,*** *2021*(3), 105. https://dx.doi.org/10.1007/jhep03(2021)105
397. S. Jia, C. P. Shen, I. Adachi, H. Aihara, S. Al Said, D. M. Asner, T. Aushev, R. Ayad, V. Babu, P. Behera, K. Belous, J. Bennett, M. Bessner, **Vishal Bhardwaj**, B. Bhuyan, and ,..., et. al. **(2021)**. Search for the in at near 10.6 GeV at belle. ***Physical Review D,*** *104*(1), 012012. https://doi.org/10.1103/PhysRevD.104.012012
398. S. Jia, S. S. Tang, C. P. Shen, I. Adachi, H. Aihara, S. Al Said, D. M. Asner, V. Aulchenko, T. Aushev, R. Ayad, V. Babu, S. Bahinipati, P. Behera, and ,..., **Sourav Patra**, S. Paul, and ,..., et. al. **(2021).** Measurements of branching fractions and asymmetry parameters of Ξ0c → ΛK¯∗0, Ξc0→ΛK¯∗0, Ξ0c→Σ0K¯∗0Ξc0→Σ0K¯∗0, and Ξ0c→Σ+K∗−Ξc0→Σ+K∗− decays at Belle. ***Journal Of High Energy Physics,*** (6), 160. http://dx.doi.org/10.1007/JHEP06(2021)160
399. S. Mohanty, A. B. Kaliyar, V. Gaur, G. B. Mohanty, I. Adachi, K. Adamczyk, H. Aihara, S. Al Said, D. M. Asner, H. Atmacan, V. Aulchenko, T. Aushev, T. Aziz, V. Babu, S. Bahinipati, P. Behera, M. Bessner, **Vishal Bhardwaj**, T. Bilka, and, …, et. al. **(2021)**. Measurement of branching fraction and search for CP violation in B →φφK. ***Physical Review D,*** *103*(5), 052013. https://doi.org/10.1103/PhysRevD.103.052013
400. S. Wehle, I. Adachi, K. Adamczyk, H. Aihara, D. M. Asner, H. Atmacan, V. Aulchenko, T. Aushev, R. Ayad, V. Babu, P. Behera, M. Berger, **Vishal Bhardwaj,** J. Biswal, and ,..., et. al. **(2021).** Test of Lepton-Flavor Universality in B -> K*l(+)l(-) Decays at Belle. ***Physical Review Letters,*** *126*(16), 161801. https://doi.org/10.1103/PhysRevLett.126.161801
401. S. X. Li, L. K. Li, C. P. Shen, I. Adachi, H. Aihara, S. Al Said, D. M. Asner, T. Aushev, P. Behera, K. Belous, J. Bennett, M. Bessner, **Vishal Bhardwaj**, B. Bhuyan, and ,..., **Sourav Patra**, S. Paul, and ,..., et. al. **(2021).** Measurement of the branching fraction of Λ+c→pω decay at Belle. ***Physical Review D,*** *104*(7), 072008. https://doi.org/10.1103/PhysRevD.104.072008
402. S. X. Li, C. P. Shen, I. Adachi, J.K. Ahn, H. Aihara, D. M. Asner, T. Aushev, R. Ayad, V. Babu, S. Bahinipati, P. Behera, J. Bennett, F. Bernlochner, M. Bessner, **Vishal Bhardwaj**, B. Bhuyan, and ,..., **Sourav Patra**, S. Paul, and ,..., et. al. **(2021).** Measurements of the branching fractions of λc+ →pη and λc+ →pπ0 decays at belle. ***Physical Review D,*** *103*(7), 072004. https://doi.org/10.1103/PhysRevD.103.072004
403. S.-H. Park, Y.-J. Kwon, I. Adachi, H. Aihara, S. Al Said, D. M. Asner, H. Atmacan, T. Aushev, R. Ayad, V. Babu, P. Behera, J. Bennett, M. Bessner, **Vishal Bhardwaj**, B. Bhuyan, and ,..., **Sourav Patra**, S. Paul, and ,..., et. al. **(2021)**. Search for the dark photon in B 0 → A′A′, A′ → e + e −, μ + μ −, and π + π − decays at belle. ***Journal of High Energy Physics,*** 2021(4), 191. https://doi.org/10.1007/JHEP04(2021)191

404. **Sandeep Howlader** and **Goutam Sheet (2021).** Tip-induced superconductivity. ***Journal of Physics Condensed Matter,*** *33*(40), 403002. https://doi.org/10.1088/1361-648X/ac0850
405. **Sanjib Dey (2021).** An introductory review on resource theories of generalized nonclassical light. ***Journal of Physics: Conference Series,*** *2038*(1), 012008. https://doi.org/10.1088/1742-6596/2038/1/012008
406. Santhosh Kumar Jayanthinagar Urumarudappa, **Navdeep Gogna**, Steven G Newmaster , Krishna Venkatarangaiah, Ragupathy Subramanyam, Seethapathy Gopalakrishnan Saroja, Ravikanth Gudasalamani, **Kavita Dorai** and Uma Shaanker Ramanan **(2021).** Correction to: DNA barcoding and NMR spectroscopy-based assessment of species adulteration in the raw herbal trade of saraca asoca (roxb.) willd, an important medicinal plant (international journal of legal medicine (2016) 130 6 (1457-1470)). ***International Journal of Legal Medicine****, 135*(6), 2681-2681. https://doi.org/10.1007/s00414-021-02669-x
407. **Sarbani Chatterjee,** Arghadip Koner, Sohini Chatterjee and **Chandan Kumar (2021).** Temperature-dependent maximization of work and efficiency in a degeneracy-assisted quantum Stirling heat engine. ***Physical Review E,*** *103*(6), 062109. https://doi.org/10.1103/PhysRevE.103.062109
408. **Satvik Singh (2021)**. Entanglement detection in triangle-free quantum states. ***Physical Review A****, 103(3)*, 32436. https://doi.org/10.1103/PhysRevA.103.032436
409. **Satvik Singh** and Ion Nechita (**2021)**. Diagonal unitary and orthogonal symmetries in quantum theory. ***Quantum,*** 5. https://doi.org/10.22331/q-2021-08-09-519
410. Sayantan Choudhury, Satyaki Chowdhury, **Nitin Gupta**, Anurag Mishara, Sachin Panneer Selvam, Sudhakar Panda, Gabriel D.Pasquino, Chiranjeeb Singha and Abinash Swain **(2021).** Circuit complexity from cosmological islands. ***Symmetry,*** *13*(7), 1301. https://doi.org/10.3390/sym13071301
411. Shama Monga, Radha Krishna Gopal, **Goutam Sheet** and **Yogesh Singh (2021).** 2D weak anti-localization in thin films of the topological semimetal pd 3 bi 2 S 2. ***Scientific Reports****, 11*(1), 12618. https://doi.org/10.1038/s41598-021-91930-9
412. **Shelender Kumar, Shishram Rebari, Satyendra Prakash Pal, Shyam Sundar Yadav, Abhishek Kumar, Aaveg Aggarwal, Sagar Indrajeet** and **Ananth Venkatesan (2021).** Temperature-Dependent Nonlinear Damping in Palladium Nanomechanical Resonators. ***Nano Letters,*** *21*(7), 2975–2981. https://doi.org/10.1021/acs.nanolett.1c00109
413. **Shubhendu Shekhar Khali,** Dipanjan Chakraborty and Debasish Chaudhur **(2021).** Two-step melting of the Weeks-Chandler-Anderson system in two dimensions. ***Soft Matter,*** *17*(12), 3473-3485. https://doi.org/10.1039/D0SM01484B
414. Sk Riyajuddin, Jenifar Sultana, Shumile Ahmed Siddiqui, Sushil Kumar, Damini Badhwar, **Shyam Sundar Yadav**, Saveena Goyal, **Ananth Venkatesan**, Suvankar Chakravertya and Kaushik Ghosh **(2021).** Silicon nanowire-Ta2O5-NGQD heterostructure: an efficient photocathode for photoelectrochemical hydrogen evolution. ***Sustainable Energy and Fuels,*** *6*(1), 197-208. https://doi.org/10.1039/D1SE01280K
415. **Soumya Datta, Aastha Vasdev, Ranjani Ramachandran, Soumyadip Halder, Kapil Motla, Anshu Kataria, Arushi, Rajeswari Roy Chowdhury, Ravi Prakash Singh** and **Goutam Sheet (2021).** Spectroscopic evidence of mixed angular momentum symmetry in non-centrosymmetric ru 7 B 3. ***Scientific Reports,*** *11*(1), 21030. https://doi.org/10.1038/s41598-021-99878-6
416. **Soumyakanti Bose** and M. Sanjay Kumar **(2021).** Analysis of necessary and sufficient conditions for quantum teleportation with non-gaussian resources. ***Physical Review A****, 103*(3), 32432 https://doi.org/10.1103/PhysRevA.103.032432
417. **Sourav Patra, Rajesh K. Maiti** and **Vishal Bhardwaj (2021).** Study of X(3872) and X(3915) in B? (J/ ??) K at Belle. ***Springer Proceedings in Physics,*** 261, 155-159. https://doi.org/10.1007/978-981-33-4408-2_22
418. Sowmiyadevi Appusamy, **Krishnan Sriram**, M. Gopikrishna and Sujith Raman **(2021)**. Bio-based materials for microwave devices: A review. ***Journal of Electronic Materials,*** *50*(4), 1893-1921. https://doi.org/10.1007/s11664-020-08672-z
419. Sreetama Gayen, **Balaka Biswas** and Ayan Karmakar **(2021).** The quest for a miniaturized antenna in the wireless capsule endoscopy application: a review. ***International Journal of Microwave and Wireless Technologies,*** 1-11. https://doi.org/10.1017/S1759078721001458
420. Srishti Pal, Arnab Seth, **Piyush Sakrikar**, **Anzar Ali**, Subhro Bhattacharjee, D. V. S. Muthu, **Yogesh Singh** and A. K. Sood **(2021).** Probing signatures of fractionalization in the candidate quantum spin

liquid Cu2IrO3 via anomalous Raman scattering. ***Physical Review B,*** *104*(18), 184420. https://doi.org/10.1103/PhysRevB.104.184420

421. Sudhanshu Shekhar Chaurasia, Animesh Biswas, P. Parmananda and **Sudeshna Sinha (2021**). Ill-matched timescales in coupled systems can induce oscillation suppression. ***Chaos,*** *31*(10), 103104. https://doi.org/10.1063/5.0059170
422. Sudip Bhattacharyya, **Kulinder Pal Singh**, Gordon Stewart, Sunil Chandra, Gulab C. Dewangan, Nilima S. Kamble, Sandeep Vishwakarma, Jayprakash G. Koyande and Varsha Chitnis **(2021).** Science with the AstroSat Soft X-ray telescope: An overview. ***Journal of Astrophysics and Astronomy***, *42*(2), 17. https://doi.org/10.1007/s12036-020-09678-z
423. Sungwon Yoon , Wonjun Lee, S. Lee, J. Park, C. H. Lee, Y. S. Choi, S.-H. Do, Woo-Jae Choi, Wei-Tin Chen, Fangcheng Chou, D. I. Gorbunov, Yugo Oshima , Anzar Ali , **Yogesh Singh,** Adam Berlie, I. Watanabe and Kwang-Yong Choi **(2021).** Quantum disordered state in the J(1)-J(2) square-lattice antiferromagnet Sr2Cu(Te0.95W0.05)O-6. ***Physical Review Materials,*** *5*(1), 14411. https://doi.org/10.1103/PhysRevMaterials.5.014411
424. Sunil Chandra, Markus Boettcher, Pranjupriya Goswami, **Kulinder Pal Singh**, Michael Zacharias, Navpreet Kaur, Sudip Bhattacharyya, Shashikiran Ganesh and Daniela Dorne **(2021).** X-ray observations of 1ES 1959+650 in its high-activity state in 2016–2017 with AstroSat and Swift. ***Astrophysical Journal,*** *918*(2), 67. https://doi.org/10.3847/1538-4357/ac01d1
425. Sven Auschra, **Dipanjan Chakraborty**, Gianmaria Falasco, Richard Pfaller and Klaus Kroy **(2021)**. Coarse graining non isothermal microswimmer suspensions. ***Frontiers in Physics,*** 9, 655838. https://doi.org/10.3389/fphy.2021.655838
426. **Swagatam Nayak, Navketan Batra** and **Sanjeev Kumar (2021).** Pairing symmetries in the zeeman-coupled extended attractive hubbard model. ***Scientific Reports,*** *11*(1), 22724. https://doi.org/10.1038/s41598-021-02175-5
427. T. D. Russell, N. Degenaar, J. van den Eijnden, M. Del Santo, A. Segreto, D. Altamirano, **A. Beri**, M. Diaz Trigo and J. C. A. Miller-Jones **(2021).** The evolving radio jet from the neutron star X-ray binary 4U 1820-30. ***Monthly Notices of the Royal Astronomical Society,*** *508*(1), L6–L11. https://doi.org/10.1093/mnrasl/slab087
428. T. J. Moon, K. Tanida, Y. Kato, S. K. Kim, I. Adachi, J. K. Ahn, H. Aihara, S. Al Said, D. M. Asner, V. Aulchenko, T. Aushev, R. Ayad, V. Babu, S. Bahinipati, P. Behera, …, **Sourav Patra,** S. Paul, and ,..., et. al. **(2021).** First determination of the spin and parity of the charmed-strange baryon ξc (2970)+. ***Physical Review D,*** *103*(11), L111101. https://doi.org/10.1103/PhysRevD.103.L111101
429. Valerio Bertacchi, Tadeas Bilka, Nils Braun, Giulia Casarosa, Luigi Corona, Sam Cunliffe, and ,..., **Sourav Patra**, Leo Piilonen, and ,..., et. al. **(2021).** Track finding at Belle II. ***Computer Physics Communications,*** 259, 107610. https://doi.org/10.1016/j.cpc.2020.107610
430. **Vikash Mittal,** Aswathy Raj**, Sanjib Dey and Sandeep K. Goyal (2021**). Persistence of topological phases in non-hermitian quantum walks. ***Scientific Reports,*** *11*(1), 10262. https://doi.org/10.1038/s41598-021-89441-8
431. Vinita Navalkar, **Kulinder Pal Singh**, Harshit Shah, Vilas Mhatre and Vishwas Risbud **(2021).** Pre-flight evaluation of the soft X-ray telescope optics aboard AstroSat. ***Journal of Astrophysics and Astronomy,*** *42*(2), 103. https://doi.org/10.1007/s12036-021-09754-y
432. X.-G. Lu1a, Z. Ahmad Dar, F. Akbar, D. A. Andrade, M. V. Ascencio, G. D. Barr, A. Bashyal, L. Bellantoni, A. Bercellie, and ,..., D. Jena, **Satyajit Jena**, J. Kleykamp, and ,…, et. al. **(2021).** Exploring neutrino–nucleus interactions in the GeV regime using MINERvA. ***The European Physical Journal Special Topics***, *230*(24), 4243–4257. https://doi.org/10.1140/epjs/s11734-021-00296-6
433. Y Teramoto, S Uehara, M Masuda, I Adachi, H Aihara, S Al Said, D M Asner, H Atmacan, T Aushev, R Ayad, V Babu, P Behera, C Beleño, J Bennett, **Vishal Bhardwaj**, B Bhuyan, …, **Sourav Patra**, S Paul, and ,...et. al. **(2021)**. Evidence for X (3872) →j/ψ π+ π-produced in single-tag two-photon interactions. ***Physical Review Letters,*** *126*(12), 122001. https://doi.org/10.1103/PhysRevLett.126.122001
434. Y. Guan, A. J. Schwartz, K. Kinoshita, I. Adachi, H. Aihara, S. Al Said, D. M. Asner, H. Atmacan, V. Aulchenko, T. Aushev, R. Ayad, V. Babu, P. Behera, J. Bennett, M. Bessner, **Vishal Bhardwaj**, B. Bhuyan, and ,..., **Sourav Patra**, S. Paul, and ,..., et. al. **(2021)**. Measurement of branching fractions and CP asymmetries for ds+ →k+ (η,π0) and ds+ →π+ (η,π0) decays at belle. ***Physical Review D,*** *103*(11), 112005. https://doi.org/10.1103/PhysRevD.103.112005

435. Y. Li, J. X Cui, S. Jia, C. P Shen, I. Adachi, J. K Ahn, H. Aihara, S. Al Said, D. M Asner, H. Atmacan, T. Aushev, R. Ayad, V. Babu, S. Bahinipati, P. Behera, K. Belous, J. Bennett, M. Bessner, **Vishal Bhardwaj**, B. BhuyanShow lessT. Bilka and ,..., **Sourav Patra**, S. Paul, and ,...,et. al. **(2021)**. Measurements of branching fractions and asymmetry parameters of $\Xi^0_c\to \Lambda\bar K^{*0}$, $\Xi^0_c\to \Sigma^0\bar K^{*0}$, and $\Xi^0_c\to \Sigma^+K^{*-}$ decays at Belle. ***Journal of High Energy Physics***, *2021*(6), 160. https://doi.org/10.1007/JHEP06(2021)160
436. **Y. Pathania** and **Gaganpreet (2021).** Self-passivated nanoporous phosphorene as a membrane for water desalination. ***Desalination,*** 497, 114777. https://doi.org/10.1016/j.desal.2020.114777
437. Y.B. Li, C.P. Shen, I. Adachi, K. Adamczyk, H. Aihara, S. Al Said, D.M. Asner, T. Aushev, R. Ayad, V. Babu, P. Behera, J. Bennett, M. Bessner, **Vishal Bhardwaj,** B. Bhuyan, and ,..., **Sourav Patra,** S. Paul. and ,..., et. al. **(2021).** Measurements of the branching fractions of the semileptonic decays Ξc0 → Ξ-ℓ+νℓ and the asymmetry parameter of Ξc0 → Ξ-π+. ***Physical Review Letters****, 127*(12), 121803. https://doi.org/10.1103/PhysRevLett.127.121803
438. **Yogyataa Pathania, Dipanjan Chakraborty** and Felix Hofling **(2021)**.Continuous demixing transition of binary liquids: Finite-size scaling from the analysis of sub-systems. ***Advanced Theory and Simulations****, 4*(4), 2000235. https://doi.org/10.1002/adts.202000235

21.2. Publications in 2021 (Till March 31, 2021)

21.2.1 Department of Chemical Sciences

1. **Akshi Deshwal**, Arshdeep Kaur Gill, **Surajmal Nain**, Debabrata Patra and **Subhabrata Maiti (2022).** Inhibitory effect of nucleotides on acetylcholine esterase activity and its microflow-based actuation in blood plasma. ***Chemical Communications,*** *58*(21), 3501 - 3504. https://doi.org/10.1039/D2CC00029F
2. **Alisha Gogia and Sanjay K. Mandal (2022)**. Subtle Ligand Spacer Change in 2D Metal–Organic Framework Sheets for Dual Turn-On/Turn-Off Sensing of Acetylacetone and Turn-On Sensing of Water in Organic Solvents. ***ACS Applied Materials & Interfaces*****,** *14*(14), 16357–16368. https://doi.org/10.1021/acsami.2c02798
3. **Alokananda Chandaa** and **Sanjay K. Mandal (2022).** Naphthalene-tagged highly stable and reusable luminescent metal-organic probes for selective and fast detection of 4-nitroaniline in water. ***New Journal of Chemistry,*** *46*(13), 6068-6077. https://doi.org/10.1039/D2NJ00251E
4. Animesh Kundu, **Suman K. Barman** and Sukanta Mandal **(2022).** Dangling Carboxylic Group That Participates in O-O Bond Formation Reaction to Promote Water Oxidation Catalyzed by a Ruthenium Complex: Experimental Evidence of an Oxide Relay Pathway. ***Inorganic Chemistry,*** *61*(3), 1426-1437. https://doi.org/10.1021/acs.inorgchem.1c03105
5. **Bara Singh, Siddheshwar K. Bankar** and **S. S. V. Ramasastry (2022).** Pd-Catalyzed Nazarov-Type Cyclization: Application in the Total Synthesis of ß-Diasarone and Other Complex Cyclopentanoids. ***Organic Letters,*** *24*(4), 1043–1048. https://doi.org/10.1021/acs.orglett.1c04243
6. Chikkagundagal K. Mahesha, Sushma Naharwal, Narendra Dinkar Kharat, **Sanjay K. Mandal** and Rajeev Sakhuja **(2022).** Regiodivergent Synthesis of Cinnoline-Fused Indazolones through Pd-Catalyzed Annulation of 1-Arylindazolones with Allenoates. ***Journal of Organic Chemistry,*** *87*(5), 3701–3706. https://doi.org/10.1021/acs.joc.1c02629
7. **Chitranjan Sah, Anjali Mahadevan, Pravesh Kumara and Sugumar Venkataramani (2022)**. The curious case of the photochemistry of 2-hydroxyphenylazo-3,5-dimethylisoxazole: unravelling the process among tautomerization, photoisomerization, and conformational changes. ***Physical Chemistry Chemical Physics***, *24*(13), 7848–7855. https://doi.org/10.1039/d1cp05344b
8. **Debapriya Das, Lisha Arora, and Samrat Mukhopadhyay (2022)**. Short-Range Backbone Dihedral Rotations Modulate Internal Friction in Intrinsically Disordered Proteins. ***Journal of the American Chemical Society***, *144*(4), 1739–1747. https://doi.org/10.1021/jacs.1c11236
9. **Debapriya Gupta, Ankit Kumar Gaur,** Deepanshu Chauhan**, Sandeep Kumar Thakur, Vaitheesh Jeyapalan, Sanjay Singh ,** Gopalan Rajaraman **and Sugumar Venkataramani (2022)**. Solid-state photochromic arylazopyrazole-based transition metal complexes. ***Inorganic Chemistry Frontiers***, *9*(10), 2315–2327. https://doi.org/10.1039/d2qi00325b

10. **Dhananjay Dey, Abhishek Kundu, Monojit Roy, Subhankar Pala** and **Debashis Adhikari (2022).** Aromatization as the driving force for single electron transfer towards C-C cross-coupling reactions. ***Catalysis Science and Technology,*** *12*(6), 1934-1940. https://doi.org/10.1039/D1CY02229F
11. Divya Pandit, Renu Chadha, **Biswajit Laha**, Manoj Kumar Gautam, Maninder Karan and **Sanjay K. Mandal (2022).** Novel Pharmaceutical Cocrystals of Gefitinib: A Credible Upswing in Strategic Research to Ameliorate Its Biopharmaceutical Challenges. ***Crystal Growth and Design,*** *22*(4), 2218–2229. https://doi.org/10.1021/acs.cgd.1c01328
12. Gaurav Kumar, Naimat K. Bari, **Jagadish P. Hazra** and Sharmistha Sinha **(2022).** A Major Shell Protein of 1,2-Propanediol Utilization Microcompartment Conserves the Activity of Its Signature Enzyme at Higher Temperatures. ***ChemBioChem,*** *23*(9), 202100694. https://doi.org/10.1002/cbic.202100694
13. **Himanshi Bhambri,** Sadhika Khullar, Sakshi and **Sanjay K. Mandal (2022).** Nitrogen-rich covalent organic frameworks: A promising class of sensory materials. ***Materials Advances,*** *3*(1), 19-124. https://doi.org/10.1039/D1MA00506E
14. **Indu Bala, Harpreeta Kaur, Madhusudan Maity**, Rohit Ashok Kumar Yadav**, Joydip De**, Santosh Prasad Gupta, Jwo-Huei Jou, Upendra Kumar Pandey and **Santanu Kumar Pal (2022).** Electroluminescent Aggregation-Induced Emission-Active Discotic Liquid Crystals Based on Alkoxy Cyanostilbene-Functionalized Benzenetricarboxamide with Ambipolar Charge Transport. ***ACS Applied Electronic Materials,*** *4*(3), 1163-1174. https://doi.org/10.1021/acsaelm.1c01251
15. **Ipsita Pani, Yogendra Nailwal, Sukanya Dutta and Santanu Kumar Pal (2022)**. Tailoring liquid crystals as vehicles for encapsulation and enzyme-triggered release. ***Journal of Materials Chemistry B*****,** *10*(16), 3032–3038. https://doi.org/10.1039/d2tb00098a
16. **Joydip De, Ishan Sarkar**, Rohit Ashok Kumar Yadav**, Indu Bala**, Santosh Prasad Gupta, Iram Siddiqui, Jwo-Huei Jou and **Santanu Kumar Pal (2022).** Luminescent columnar discotics as highly efficient emitters in pure deep-blue OLEDs with an external quantum efficiency of 4.7%. ***Soft Matter,*** *18*(22), 4214-4219. https://doi.org/10.1039/D1SM01558C
17. **Jyoti Lather, Ahammad N. K. Thabassum, Jaibir Singh** and **Jino George (2022).** Cavity catalysis: modifying linear free-energy relationship under cooperative vibrational strong coupling. ***Chemical Science,*** *13*(1), 195-202. https://doi.org/10.1039/D1SC04707H
18. K. Giri, L. Gonzalez-Sanchez, Rupayan Biswas, E. Yurtsever, F. A. Gianturco, **Narayanasami Sathyamurthy**, U. Lourderaj and R. Wester **(2022).** HeH+Collisions with H2: Rotationally Inelastic Cross Sections and Rate Coefficients from Quantum Dynamics at Interstellar Temperatures. ***Journal of Physical Chemistry A,*** *126*(14), 2244 - 2261. https://doi.org/10.1021/acs.jpca.1c10309
19. Kanika Saini, Sahil Kumar, Hu Li, **Srinivasarao Arulananda Babu** and Shunmugavel Saravanamurugan **(2022).** Advances in the Catalytic Reductive Amination of Furfural to Furfural Amine: The Momentous Role of Active Metal Sites. ***ChemSusChem,*** *15*(7), 202200107. https://doi.org/10.1002/cssc.202200107
20. **Kirti Singh, Rahul Singh,** Arijit Singha Hazari and **Debashis Adhikari (2022).** Bimodal photocatalytic behaviour of a zinc beta-diketiminate: application to trifluoromethylation reactions. ***Chemical Communications,*** *58*(27), 4384-4387. https://doi.org/10.1039/D2CC00397J
21. **Labhini Singla, Hare Ram Yadav** and **Angshuman R. Choudhury (2022).** Structural and Computational Analysis of Organic Fluorine-Mediated Interactions in Controlling the Crystal Packing of Tetrafluorinated Secondary Amides in the Presence of Weak C–H···O═C Hydrogen Bonds. ***Crystal Growth & Design***, *22*(3), 1604–1622. https://doi.org/10.1021/acs.cgd.1c01121
22. **Lipipuspa Sahoo, Reeya Garg, Komalpreet Kaur, C. P. Vinod** and **Ujjal K. Gautam (2022).** Ultrathin Twisty PdNi Alloy Nanowires as Highly Active ORR Electrocatalysts Exhibiting Morphology-Induced Durability over 200 K Cycles. ***Nano Letters*****,** *22*(1), 246–254. https://doi.org/10.1021/acs.nanolett.1c03704
23. **Mayank Saraswat,** Satyam Ravi, **K. R. Shamasundar** and **Sugumar Venkataramani (2022).** Photochemistry of 3,6-Didehydropyridazine Biradical-An Untraceable Para Benzyne Analogue. ***Journal of Physical Chemistry A,*** *126*(4), 557–567. https://doi.org/10.1021/acs.jpca.1c09317
24. Miha Škarabot, Nigel J Mottram, **Supreet Kaur**, Corrie T Imrie, Ewan Forsyth, John M D Storey, Rafal Mazur, Wiktor Piecek and Lachezar Komitov **(2022)**. Flexoelectric Polarization in a Nematic Liquid Crystal Enhanced by Dopants with Different Molecular Shape Polarities. ***ACS Omega***, *7*(11), 9785–9795. https://doi.org/10.1021/acsomega.2c00023

25. Prafullya Kumar Mudi, **Labhini Singla**, Anil Chamuah, Sanjib Bhattacharya, **Angshuman Roy Choudhury** and Bhaskar Biswas **(2022).** Schiff base driven denticity-fluctuated structural assortment of zinc-pseudohalide complexes: synthesis, structures and electrical transport properties. *24*(13), 2418-2428. https://doi.org/10.1039/D1CE01646F
26. **Priyanka Dogra, Shruti Arya**, Avinash K. Singh, Anindya Datta and **Samrat Mukhopadhyay (2022).** Conformational and Solvation Dynamics of an Amyloidogenic Intrinsically Disordered Domain of a Melanosomal Protein. ***Journal Of Physical Chemistry B,*** *126*(2), 443–452. https://doi.org/10.1021/acs.jpcb.1c09304
27. **Priyanka, Ekta Shandilya, Surinder Kaur Brar, Rishi Ram Mahato** and **Subhabrata Maiti (2022).** Spatiotemporal dynamics of self-assembled structures in enzymatically induced agonistic and antagonistic conditions. ***Chemical Science,*** *13*(1), 274-282. https://doi.org/10.1039/D1SC05353A
28. **Priyanka, Surinder Kaur Brar** and **Subhabrata Maiti (2022).** Analyzing Catalytic Co-operativity and Membrane Parameters in a Substrate-driven Vesicular Assembly Modified by Nucleotides. ***ChemNanoMat,*** *8*(3), 202100498. https://doi.org/10.1002/cnma.202100498
29. **Radha Tomar, Debabrata Bhattacharya** and **Srinivasarao Arulananda Babu (2022).** Direct Lactamization of ß-Arylated d-Aminopentanoic Acid Carboxamides: En Route to 4-aryl-2-Piperidones, Piperidines, Antituberculosis Molecule Q203 (Telacebec) and its Analogues. ***Asian Journal of Organic Chemistry,*** *11*(2), 202100736. https://doi.org/10.1002/ajoc.202100736
30. Rajani Kanta Mahato, Soumik Das, **Mayank Joshi**, **Angshuman Roy Choudhury**, Anirban Misra and Bhaskar Biswas **(2022).** Biomimics of phenazine oxidase activity of a cobalt (III)-dipyridylamine complex: Spectroscopic, structural, and computational studies(dagger). ***Applied Organometallic Chemistry,*** *36*(1), 1-13. https://doi.org/10.1002/aoc.6483
31. Riu Riu Wary, Sanjib Baglari, Dulu Brahma, **Ujjal K. Gautam,** Pranjal Kalita & Manasi Buzar Baruah **(2022)**. Synthesis, characterization, and photocatalytic activity of ZnO nanoparticles using water extract of waste coconut husk. ***Environmental Science and Pollution Research***, *29*, 42837–42848. https://doi.org/10.1007/s11356-022-18832-9
32. S.R. Bireddy, T.R. Bantu, V. Alwera, V.K.Vashistha, **S. Alwera,** and S. Sehlangia **(2022)**. Synthesis of Levofloxacin based Chiral Reagent and its Application in Determination of Optical Purity of Essential Racemic Amino Acids using RP-HPLC. ***Research Journal of Chemistry and Environment***, *26*(2), 1–8. https://doi.org/10.25303/2602rjce0108
33. **Sanjit Mondal**, Soumya Ranjan Das, **Lipipuspa Sahoo**, Sudipta Dutta, and **Ujjal K. Gautam (2022)**. Light-Induced Hypoxia in Carbon Quantum Dots and Ultrahigh Photocatalytic Efficiency. ***Journal of the American Chemical Society*****,** *144*(6), 2580–2589. 2580–2589. https://doi.org/10.1021/jacs.1c10636
34. **S. Singh, M. Bhandari, S. Rawat,** and S. Nembenna (2022).Cationic Compounds of Group 13 Elements: Entry Point to p-block for Modern Lewis Acid Reagents In : ***Polar Organometallic Reagents: Synthesis, Structure, Properties and Applications , Chapter -5*** by Andrew E. H. Wheatley, Masanobu Uchiyama (Eds) : ISBN: 978-1-119-44882-2 **https://doi.org/10.1002/9781119448877.ch5**
35. Satrajit Adhikari, Michael Baer and **Narayanasami Sathyamurthy (2022).** HeH2 (+): structure and dynamics. ***International Reviews in Physical Chemistry,*** *41*(1), 49-93. https://doi.org/10.1080/0144235X.2022.2037883
36. Senthil M. Arumugam, Dalwinder Singh, **Sangeeta Mahala, Bhawana Devi**, Sandeep Kumar, Sunaina Jakhu and Sasikumar Elumalai **(2022).** MgO/CaO Nanocomposite Facilitates Economical Production of D-Fructose and D-Allulose Using Glucose and Its Response Prediction Using a DNN Model. ***Industrial and Engineering Chemistry Research***, *61*(6), 2524–2537. https://doi.org/10.1021/acs.iecr.1c04631
37. **Shaina Dhamija, Garima Bhutani, Ajay Jayachandran** and **Arijit K. De (2022).** A Revisit on Impulsive Stimulated Raman Spectroscopy: Importance of Spectral Dispersion of Chirped Broadband Probe. ***Journal of Physical Chemistry A ,*** *126*(7), 1019–1032. https://doi.org/10.1021/acs.jpca.1c10566
38. **Shaina Dhamija, Garima Bhutani, and Arijit K. De (2022)**. Excited state structural evolution in fluorescent proteins and their model chromophores. ***Biophysical Journal***, *121*(3), 416a. https://doi.org/10.1016/j.bpj.2021.11.698
39. **Shradha Gandhi, Rupinder Kaur, Vandana Sharma** and **Sanjay K. Mandal (2022).** Effect of calcination temperature on the morphology and catalytic properties of ZnO nanostructures fabricated from a chiral precursor for photodegradation of both cationic and anionic dyes. ***New Journal of Chemistry,*** *46*(8), 3645 - 3657. https://doi.org/10.1039/D1NJ05405H

40. Shreya Mahato, Amit Mondal, Mainak Das, **Mayank Joshi**, Partha Pratim Ray, **Angshuman Roy Choudhury**, C. Malla Reddy and Bhaskar Biswas **(2022).** De novo synthesis of hybrid d-f block metal complex salts for electronic charge transport applications. ***Dalton Transactions,*** *51*(4), 1561-1570. https://doi.org/10.1039/D1DT02722K
41. Shreya Mahato, Parveen Rawal, Ajitrao Kisan Devadkar, **Mayank Joshi, Angshuman Roy Choudhury**, Bhaskar Biswas, Puneet Gupta and Tarun K. Panda **(2022).** Hydroboration and reductive amination of ketones and aldehydes with HBpin by a bench stable Pd(ii)-catalyst. ***Organic & Biomolecular Chemistry***, *20*(5), 1103–1111. https://doi.org/10.1039/d1ob02339j
42. Sonika Chibh, **Komalpreet Kaur, Ujjal K. Gautam** and Jiban Jyoti Panda **(2022).** Dimension switchable auto-fluorescent peptide-based 1D and 2D nano-assemblies and their self-influence on intracellular fate and drug delivery. ***Nanoscale,*** *14*(3), 715 - 735. https://doi.org/10.1039/D1NR06768K
43. **Srinivasarao Arulananda Babu, Yashika Aggarwal, Pooja Patel** and **Radha Tomar (2022).** Diastereoselective palladium-catalyzed functionalization of prochiral C(sp(3))-H bonds of aliphatic and alicyclic compounds. ***Chemical Communications,*** *58*(16), 2612 - 2633. https://doi.org/10.1039/D1CC05649B
44. Subhankar Kundua, Subhajit Sahaa, Ajit Das, **Labhini Singla, Angshuman Roy Choudhury** and Bhaskar Biswas **(2022).** Methyl group: A potential building block for edge-to-face interlocking of benzimidazole scaffolds in developing blue light emitting molecular aggregates. ***Journal of Molecular Liquids,*** 347, 118340. https://doi.org/10.1016/j.molliq.2021.118340
45. **Sumit Yadav, Anita Devi, Arijit K. De**, (**2022**). Generalized Lorenz-Mie theory of nonlinear optical trapping of core/shell hybrid nanoparticles, ***Proc. SPIE 12017, Complex Light and Optical Forces XVI,*** 120170D. https://doi.org/10.1117/12.2610747
46. **Supreet Kaur**, Abinash Barthakur, **Golam Mohiuddin**, Santosh Prasad Gupta, Surajit Dhara and **Santanu Kumar Pal (2022).** Observation of de Vries-like properties in bent-core molecules. ***Chemical Science,*** *13*(8), 2249-2257. https://doi.org/10.1039/D1SC06629C
47. **Supreeta Kaur, Vidhikaa Punjani, Neelam Yadav,** Abinash Barthakur**, Anshika Baghla,** Surajit Dhara and **Santanu Kumar Pal (2022).** Chemical and physical aspects of recent bent-shaped liquid crystals exhibiting chiral and achiral mesophases. ***Liquid Crystals,*** 1-70. https://doi.org/10.1080/02678292.2022.2028313
48. **Surbhi Grewal, Pravesh Kumar, Saonli Roy, Indu Bala, Chitranjan Sah, Santanu Kumar Pal** and **Sugumar Venkataramani**. **(2022)**. Deciphering Internal and External π-Conjugation in C_3 -Symmetric Multiple Azobenzene Connected Systems in Self-Assembly. ***Chemistry – a European Journal*****,** *28*(19), 202104602. https://doi.org/10.1002/chem.202104602
49. **Veerpala Kaur, Surbhia Garg** and **Sabyasachi Rakshit (2022).** Instantaneous splicing and excision of inteins to synthesize polyproteins on a substrate with tunable linkers. ***Soft Matter,*** *18*(3), 602-608. https://doi.org/10.1039/D1SM01469B
50. **Vijay Gupta** and **Sanjay K. Mandal (2022).** Effect of Unsaturated Metal Site Modulation in Highly Stable Microporous Materials on CO2 Capture and Fixation. ***Inorganic Chemistry,*** *61*(7), 3086-3096. https://doi.org/10.1021/acs.inorgchem.1c03310
51. **Yogendra Nailwal, Manisha Devi, and Santanu Kumar Pal (2022**). Luminescent Conjugated Microporous Polymers for Selective Sensing and Ultrafast Detection of Picric Acid. ***ACS Applied Polymer Materials***, *4*(4), 2648–2655. https://doi.org/10.1021/acsapm.1c01905
52. **Yogesh A. Pankhade, Rajat Pandey, Shaheen Fatma, Feroz Ahmad** and **Ramasamy Vijaya Anand (2022).** TfOH-Catalyzed Intramolecular Annulation of 2-(Aryl)-Phenyl-Substituted *p*-Quinone Methides under Continuous Flow: Total Syntheses of Selaginpulvilin I and Isoselagintamarlin A. ***The Journal of Organic Chemistry*****,** *87*(5), 3363–3377. https://doi.org/10.1021/acs.joc.1c02980

21.2.2 Department of Mathematical Sciences

53. **Amit Kulshrestha** and **Varadharaj R. Srinivasan (2022).** Quaternion algebras with derivations. ***Journal of Pure and Applied Algebra,*** *226*(2), 106805. https://doi.org/10.1016/j.jpaa.2021.106805
54. Anuj Jakhar, **Sudesh K. Khanduja** and Neeraj Sangwan **(2022)**. On the discriminant of pure number fields. ***Colloquium Mathematicum,*** *167*(1), 149-157. https://doi.org/10.48550/arXiv.2005.01300

55. Anuj Jakhar, Sumandeep Kaur and **Sudesh K. Khanduja (2022).** Discriminant and integral basis of quintic fields defined by x5+ a x + b. ***Journal of Algebra and its Applications,*** 1-37. https://doi.org/10.1142/S0219498823501098
56. **Arpan Dutta (2022).** On the non-uniqueness of maximal purely wild extensions. ***Communications in Algebra,*** *50*(3), 1118-1139. https://doi.org/10.1080/00927872.2021.1978475
57. **Chanchal Kumar, Gargi Lather, and Amit Roy (2022).** Standard monomials of 1-skeleton ideals of graphs and generalized signless Laplacians. ***Linear Algebra and Its Applications***, *637*, 24–48. https://doi.org/10.1016/j.laa.2021.12.003
58. **Chetan T. Balwe** and Anand Sawant **(2022).** A(1)-connected components of ruled surfaces. ***Geometry & Topology,*** *26*(1), 321-376. https://doi.org/10.2140/gt.2022.26.321
59. Deepa Agashe, **Sugandha Maheshwary,** Jitendra Kumar Pattanaik, Jai Prakash, Pragya Bhatt, S S Arya, Sriparna Chatterjee, Pankaj Kumar, Paramdeep Singh, Nazia Abbas, Chandra Shekhar Sharma, Roy Chaudhuri and Dr Pooja Devi **(2022).** Career challenges for young independent researchers in India. ***Current Science,*** *122*(2), 135-143. http://dx.doi.org/10.18520/cs/v122/i2/135-143
60. Gurmeet K. Bakshi and **Gurleen Kaur (2022).** Connecting monomiality questions with the structure of rational group algebras. ***Journal Of Pure And Applied Algebra,*** *226*(5), 106931. https://doi.org/10.1016/j.jpaa.2021.106931
61. **Jotsaroop Kaur** and Saurabh Shrivastava **(2022).** Maximal estimates for bilinear Bochner-Riesz means. ***Advances in Mathematics,*** 395, 108100. https://doi.org/10.1016/j.aim.2021.108100
62. **Kapil Hari Paranjape (2022).** Learning to See the Elephant. ***Resonance,*** *27*(2), 177–184. https://doi.org/10.1007/s12045-022-1307-4
63. **Krishnendu Gongopadhyay** and **Tejbir Lohan (2022).** Reversibility of Hermitian isometries. ***Linear Algebra and its Applications,*** 639, 159-176. https://doi.org/10.1016/j.laa.2022.01.009
64. Pradeesh Ashok, Rathin Bhargava, **Naman Gupta,** Mohammad Khalid and Dolly Yadav **(2022)**. Structural parameterization for minimum conflict-free colouring. ***Discrete Applied Mathematics,*** 1-15. https://doi.org/10.1016/j.dam.2021.12.026
65. **Pranab Sardar (2022).** Corrigendum to "Graphs of hyperbolic groups and a limit set intersection theorem". ***Proceedings Of The American Mathematical Society***, *150*(5), 2271-2276. http://doi.org/10.1090/proc/15514
66. **Shane D'Mello and Vinay Gaba (2022).** Properties of glued knots. ***Bulletin des Sciences Mathématiques,*** 175, 103113. https://doi.org/10.1016/j.bulsci.2022.103113
67. Siva Athreya, Antar Bandyopadhyay, Amites Dasgupta and **Neeraja Sahasrabudhe (2022).** SLLN and annealed CLT for random walks in I.I.D. random environment on Cayley trees. ***Stochastic Processes and their Applications,*** 146, 80-97. https://doi.org/10.1016/j.spa.2021.12.009
68. Valeriy Bardakov, Timur Nasybullov and **Mahender Singh (2022).** General constructions of biquandles and their symmetries. ***Journal of Pure and Applied Algebra,*** *226*(7), 106936. https://doi.org/10.1016/j.jpaa.2021.106936
69. Valeriy G. Bardakov, Mikhail V. Neshchadim, and **Manpreet Singh (2022)**. Virtually symmetric representations and marked Gauss diagrams. ***Topology and Its Applications***, *306*, 107936. https://doi.org/10.1016/j.topol.2021.107936

21.2.3 Department of Earth and Environmental Sciences

70. **Ankit Yadav,** Wani Muneer, Birgit Gaye, Niko Lahajnar, **Sharmila Bhattacharya, Mehta Bulbul,** Arshid Jehangir, **Ambili Anoop** and **Praveen K. Mishra (2022)**. Apportioning sedimentary organic matter sources and its degradation state: Inferences based on aliphatic hydrocarbons, amino acids and δ15N. ***Environmental Research*****,** *205*, 112409. https://doi.org/10.1016/j.envres.2021.112409
71. Bhupendra Bahadur Singh, Kondapalli Niranjan Kumar, Vivek Seelanki, Rama Krishna Karumuri, **Raju Attada** and Ravi Kumar Kunchala **(2022).** How reliable are Coupled Model Intercomparison Project Phase 6 models in representing the Asian summer monsoon anticyclone? ***International Journal of Climatology***, 1–3, 7646. https://doi.org/10.1002/joc.7646
72. Daphne Meidan, S. S. Brown, **Vinayak Sinha** and Y. Rudich **(2022).** Nocturnal Atmospheric Oxidative Processes in the Indo-Gangetic Plain and Their Variation During the COVID-19 Lockdowns. ***Geophysical Research Letters***, *49*(7), 2021GL097472. https://doi.org/10.1029/2021gl097472

73. **Deepanshu Aggarwal, Raju Attada, K.K.Shukla**, Rohit Chakraborty and Ravi Kumar Kunchala **(2022)**. Monsoon precipitation characteristics and extreme precipitation events over Northwest India using Indian high resolution regional reanalysis. ***Atmospheric Research*****,** *267*, 105993. https://doi.org/10.1016/j.atmosres.2021.105993
74. **Gaurav Sharma, Saurabh Annadate** and **Baerbel Sinha (2022).** Will open waste burning become India's largest air pollution source? ***Environmental Pollution*****,** *292*, 118310. https://doi.org/10.1016/j.envpol.2021.118310
75. Hao Chen, **Ali P.Yunus**, Sravanthi Nukapothula and Ram Avtar **(2022).** Modelling Arctic coastal plain lake depths using machine learning and Google Earth Engine. ***Physics and Chemistry of the Earth, Parts A/B/C***, *126*, 103138. https://doi.org/10.1016/j.pce.2022.103138
76. **Haseeb Hakkim, Ashish Kumar, Baerbel Sinha** and **Vinayak Sinha (2022)**. Air pollution scenario analyses of fleet replacement strategies to accomplish reductions in criteria air pollutants and 74 VOCs over India. ***Atmospheric Environment: X*****,** *13*, 100150. https://doi.org/10.1016/j.aeaoa.2022.100150
77. **Jitendra Kumar Roy** and **Sourabh Bhattacharya (2022)**. Records of fluid-rock interactions in the Degana tungsten deposit, India: Inferences from mineral paragenesis, whole-rock and mineral chemistry, and fluid inclusions. ***Ore Geology Reviews*****,** *143*, 104804. https://doi.org/10.1016/j.oregeorev.2022.104804
78. **K.K. Shukla,** Chandan Sarangi**, Raju Attada** and Prashant Kumar **(2022).** Characteristic dissimilarities during high aerosol loading days between western and eastern Indo-Gangetic Plain. *Atmospheric Environment*, *269*, 118837. https://doi.org/10.1016/j.atmosenv.2021.118837
79. **Moumita Roy, Nabin Aryal, Yifeng Zhang, Sunil A. Patil** and **Deepak Pant (2022).** Technological progress and readiness level of microbial electrosynthesis and electro fermentation for carbon dioxide and organic wastes valorization. ***Current Opinion in Green and Sustainable Chemistry***, *35*, 100605. https://doi.org/10.1016/j.cogsc.2022.100605
80. Pallavi Gajanan Barhate, Thi-Cuc Le, **Krishna Kumar Shukla**, Zhou-YouLin, Te-HsienHsieh, Thi-Thuy-NghiemNguyen, Ziyi Li, David Y.H.Pui and Chuen-JinnTsai **(2022)**. Effect of aerosol sampling conditions on PM2.5 sampling accuracy. ***Journal of Aerosol Science***, *162*, 105968. https://doi.org/10.1016/j.jaerosci.2022.105968
81. Prem Maheshwarkar, Akarsh Ralhan, …, Binoy K Saikia, Ankur Bhardwaj, **Pooja Chaudhary, Baerbel Sinha,** & ,..., et. al. **(2022)**. Understanding the Influence of Meteorology and Emission Sources on PM $_{2.5}$ Mass Concentrations Across India: First Results From the COALESCE Network. ***Journal of Geophysical Research: Atmospheres***, *127*(4), 2021JD035663. https://doi.org/10.1029/2021jd035663
82. Prodip Acharja, Kaushar Ali, Sachin D.Ghude, **Vinayak Sinha**, **Baerbel Sinha**, Rachana Kulkarni, Ismail Gultepe and Madhavan Nair Rajeevan **(2022)**. Enhanced secondary aerosol formation driven by excess ammonia during fog episodes in Delhi, India. ***Chemosphere***, *289*, 133155. https://doi.org/10.1016/j.chemosphere.2021.133155
83. **Ramandeep Sing, Srishti Chaudhary, Sukrampal Yadav** and **Sunil A.Patil (2022)**. Protocol for bioelectrochemical enrichment, cultivation, and characterization of extreme electroactive microorganisms. ***STAR Protocols***, *3*(1), 101114. https://doi.org/10.1016/j.xpro.2021.101114
84. Raveena Raj, **Ali P. Yunus**, Padmini Pani and **Ram Avtar (2022)**. Towards evaluating the gully erosion volume and erosion rates of Chambal badlands, India. ***Land Degradation & Development***, *33*(9), 1495–1510. https://doi.org/10.1002/ldr.4250
85. **Ravi K.Yadav, Siddhant Sahoo** and **Sunil A.Patil (2022)**. Performance evaluation of the integrated hydroponics-microbial electrochemical technology (iHydroMET) for decentralized domestic wastewater treatment. ***Chemosphere*****,** *288*, 132514. https://doi.org/10.1016/j.chemosphere.2021.132514
86. Ravi Kumar Kunchala, Prabir K.Patra, Kondapalli Niranjan Kumar, Naveen Chandra. **Raju Attada** and Rama Krishna Karumuri **(2022)**. Spatio-temporal variability of XCO2 over Indian region inferred from Orbiting Carbon Observatory (OCO-2) satellite and Chemistry Transport Model. ***Atmospheric Research***, *269*, 106044. https://doi.org/10.1016/j.atmosres.2022.106044
87. Srinivas Desamsetti, Hari Prasad Dasari, Sabique Langodan, Yesubabu Viswanadhapalli, **Raju Attada**, Thang M. Luong, Omar Knio, Edriss S. Titi and Ibrahim Hoteit **(2022)**. Enhanced Simulation of the Indian Summer Monsoon Rainfall Using Regional Climate Modeling and Continuous Data Assimilation Item Type Article. ***Frontiers in Climate***, *4,* 817076. https://doi.org/10.3389/fclim.2022.817076

88. **Srishti Chaudhary, Sukrampal Yadav, Ramandeep Singh, Chetan Sadhotra** and **Sunil A. Patil (2022).** Extremophilic electroactive microorganisms: Promising biocatalysts for bioprocessing applications. ***Bioresource Technology*****,** *347*, 126663. https://doi.org/10.1016/j.biortech.2021.126663
89. Sushma Prasad, **Praveen K. Mishra**, P. Priya, A.R.Yousuf, Nils Andersen, **A.Anoop**, Arshid Jehangir, Tabasum Yaseen, Birgit Gaye and Martina Stebich **(2022)**. Impact of precipitation and temperature changes on limnology and sediment characteristics in NW Himalaya. ***Applied Geochemistry***, *137*, 105200. https://doi.org/10.1016/j.apgeochem.2022.105200

21.2.4 Department of Biological Sciences

90. **Aishwarya Agarwal** and **Samrat Mukhopadhyay (2022)**. Prion Protein Biology Through the Lens of Liquid-Liquid Phase Separation. ***Journal of Molecular Biology*****,** *434*(1), 167368. https://doi.org/10.1016/j.jmb.2021.167368
91. **Aishwarya Agarwal, Lisha Arora, Sandeep K. Rai, Anamika Avni** and **Samrat Mukhopadhyay (2022)**. Spatiotemporal modulations in heterotypic condensates of prion and α-synuclein control phase transitions and amyloid conversion. ***Nature Communications***, *13*(1), 1154. https://doi.org/10.1038/s41467-022-28797-5
92. **Amjadudheen Varikka Pulakkal, Anuraag Ghosh** and **Shravan Kumar Mishra (2022).** Broader roles of the ubiquitin-like protein Hub1 indicated by its yeast two-hybrid interactors. ***MicroPublication Biology***, 35098049. https://doi.org/10.17912/micropub.biology.000519
93. **Anamika Avni, Aishwarya Agarwal, Sandeep K.Rai, Ashish Joshi, Anuja Walimbe, Swastik G. Pattanashetty** and **Samrat Mukhopadhyay (2022).** Single-droplet vibrational raman spectroscopy illuminates the inner workings of phase-separated biomolecular condensates. ***Biophysical Journal,*** *121*(3), 307-308. https://doi.org/10.1016/j.bpj.2021.11.1216
94. **Anish Kumar Mondal** and **Kausik Chattopadhyay (2022).** Structures and functions of the membrane-damaging pore-forming proteins. 128, 241-288. https://doi.org/10.1016/bs.apcsb.2021.07.001
95. **Anupa Majumdar** and **Samrat Mukhopadhyay (2022)**. Excitation energy migration to study protein oligomerization and amyloid formation. ***Biophysical Chemistry***, 281, 106719. https://doi.org/10.1016/j.bpc.2021.106719
96. **Archit Gupta, Ashish Joshi, Samrat Mukhopadhyay** and **Purnananda Guptasarma (2022)**. The Escherichia coli nucleoid exists in a liquid-liquid phase separated state which seems to be responsive and tunable towards stresses. ***Biophysical Journal***, *121*(3), 357a. https://doi.org/10.1016/j.bpj.2021.11.971
97. **Arpita Mrigwani, Bhishem Thakur,** Harman Kaur and **Purnananda Guptasarma (2022)**. Synergistic action of different thermostable esterases in pet degradation: improvement of activity against intermediate degradation products by protein engineering. ***Biophysical Journal,*** *121*(3), 347a-348a. https://doi.org/10.1016/j.bpj.2021.11.1032
98. **Arpita Sarkar,** Pallavi kaila Sharma and **Purnananda Guptasarma (2022)**. Exploring the novel mechanistic aspects of function of a hyperthermophile two-site exo-amylase-cum-glucanotransferase displaying substrate versatility. ***Biophysical Journal***, *121*(3), 346a. https://doi.org/10.1016/j.bpj.2021.11.1025
99. **Arpita Sharma, Shashi Prakash Yadav, Dwipjyoti Sarma** and **Arunika Mukhopadhaya (2022).** Modulation of host cellular responses by gram-negative bacterial porins. ***Advances in Protein Chemistry and Structural Biology,*** 128, 35-77. https://doi.org/10.1016/bs.apcsb.2021.09.004

100. **Deeksha Thakur** and **Shashi Bhushan Pandit (2022)**. Unusual commonality in active site structural features of substrate promiscuous and specialist enzymes. ***Journal of Structural Biology***, *214*(1), 107835. https://doi.org/10.1016/j.jsb.2022.107835
101. **Garima Prazapati, Ankit Yadav, Anoop Ambili, Abhilasha Sharma** and **Rhitoban Raychoudhury (2022)**. Males of the parasitoid wasp, *Nasonia vitripennis* , can identify which fly hosts contain females. ***Royal Society Open Science***, *9*(1), 211865. https://doi.org/10.1098/rsos.211865
102. Gaurav Kumar, **Prateek Chawla, Neha Dhiman,** Sanya Chadha, Sheetal Sharma, Kanupriya Sethi, **Mahak Sharma** and Amit Tuli **(2022).** RUFY3 links Arl8b and JIP4-Dynein complexes to regulate lysosome size and positioning. ***Nature Communications,*** *13*(1), 1540 . https://doi.org/10.21203/rs.3.rs-345822/v1

103. **Jayati Gera, Prerna Budakoti, Meghna Suhag, Lolitika Mandal** and **Sudip Mandal (2022).** Physiological ROS controls Upd3-dependent modeling of ECM to support cardiac function in Drosophila. ***Science Advances,*** *8*(7), 1-15. https://doi.org/10.1126/sciadv.abj4991
104. **Jillella Mallikarjun** and **J. Gowrishankar (2022)**. Essential Role for an Isoform of Escherichia coli Translation Initiation Factor IF2 in Repair of Two-Ended DNA Double-Strand Breaks. ***Journal of Bacteriology***, *204*(4), 1-15. https://doi.org/10.1128/jb.00571-21
105. **Jillella Mallikarjun**, L. SaiSree, P. Himabindu, K. Anupama, Manjula Reddy and **J. Gowrishankar (2022).** Modulation of RecFORQ- and RecA-Mediated Homologous Recombination in Escherichia coli by Isoforms of Translation Initiation Factor IF2. ***Journal of Bacteriology,*** *204*(4), 1-12. http://doi.org/10.1128/jb.00569-21
106. John P. Gillies, Janice M. Reimer, Eva P. Karasmanis**, Indrajit Lahi**ri, Zaw Min Htet, Andres E. Leschziner and Samara L. Reck-Peterson **(2022).** Structural basis for cytoplasmic dynein-1 regulation by Lis1. ***Elife,*** *11,* 71229. https://doi.org/10.7554/elife.71229
107. **Komala Maggu**, SnehaKapse, **Neetika Ahlawat, Manasa Geeta Arun** and **Nagaraj Guru Prasad (2022)**. Finding love: fruit fly males evolving under higher sexual selection are inherently better at finding receptive females. ***Animal Behaviour***, 187, 15–33. https://doi.org/10.1016/j.anbehav.2022.02.010
108. **Kusum Lata, Mahendra Singh, Shamaita Chatterjee** and **Kausik Chattopadhyay (2022).** Membrane Dynamics and Remodelling in Response to the Action of the Membrane-Damaging Pore-Forming Toxins. ***The Journal of Membrane Biology***, *255*(2-3), 161–173. https://doi.org/10.1007/s00232-022-00227-z
109. **Mahendra Singh, N. Rupesh, Shashi Bhushan Pandit** and **Kausik Chattopadhyay (2022).** Curcumin Inhibits Membrane-Damaging Pore-Forming Function of the β-Barrel Pore-Forming Toxin Vibrio cholerae Cytolysin. ***Frontiers in Microbiology***, 12, 809782. https://doi.org/10.3389/fmicb.2021.809782
110. **Manas Geeta Arun, Tejinder Singh Chechi, Rakesh Meena,** Shradha Dattaraya Bhosle, **Srishti** and **Nagaraj Guru Prasad (2022)**. Investigating the interaction between inter-locus and intra-locus sexual conflict using hemiclonal analysis in Drosophila melanogaster. ***BMC Ecology and Evolution***, *22*(1), 38. https://doi.org/10.1186/s12862-022-01992-0
111. **Mondal, A.K. and Chattopadhyay, K**. (**2022**) Structures and functions of the membrane-damaging pore-forming proteins. ***Advances in Protein Chemistry and Structural Biology. 128: 241-288.*** https://www.sciencedirect.com/science/article/abs/pii/S1876162321000614
112. **Parvathy Ramesh, Sushmit Ghosh** and **Lolitika Mandal (2022)**. Combination of Immunofluorescence and Quantitative Fluorescence In-situ Hybridization for Analysing Differential Gene Expression in the Niche Cells of the Drosophila Lymph Gland. ***Bio-Protocol***, *12*(2), 4290. https://doi.org/10.21769/bioprotoc.4290
113. **Prachi Ojha, Subhajit Pal** and **Samarjit Bhattacharyya (2022).** Regulation of Metabotropic Glutamate Receptor Internalization and Synaptic AMPA Receptor Endocytosis by the Postsynaptic Protein Norbin. ***The Journal of neuroscience,*** *42*(5), 731–748. https://doi.org/10.1523/JNEUROSCI.1037-21.2021
114. **Priyanka Dogra, Shruti Arya**, Avinash K Singh, Anindya Datta and **Samrat Mukhopadhyay (2022).** Conformational and Solvation Dynamics of an Amyloidogenic Intrinsically Disordered Domain of a Melanosomal Protein. ***The Journal of Physical Chemistry B***, *126*(2), 443–452. https://doi.org/10.1021/acs.jpcb.1c09304
115. **Rohit Kapila, Soumyadip Poddar, Neeraj Meena** and **Nagaraj Guru Prasad (2022).** Investment in adult reproductive tissues is affected by larval growth conditions but not by evolution under poor larval growth conditions in Drosophila melanogaster. ***Current Research in Insect Science***, 2, 100027. https://doi.org/10.1016/j.cris.2021.100027
116. Rupam Paul, Sourav Banerjee, Samarpita Sen, **Pratiksha Dubey**, Saptarshi Maji, **Anand K.Bachhawat**, Rupak Datta and Arnab Gupta **(2022)**. A novel leishmanial copper P-type ATPase plays a vital role in parasite infection and intracellular survival. ***Journal of Biological Chemistry***, *298*(2), 101539. https://doi.org/10.1016/j.jbc.2021.101539
117. **Samrat Mukhopadhyay, Aishwarya Agarwal, Sandeep K.Rai, Anamika, Avni** and **Lisha Arora (2022)**. Aberrant phase transitions of a pathological Stop codon mutant of the prion protein. ***Biophysical Journal***, *121*(3), 473a. https://doi.org/10.1016/j.bpj.2021.11.420

118. **Sanjeev K.Bhardwaja,** Harpreet Singh, Madhu Khatri, Ki-Hyun Kim and Neha Bhardwaj **(2022).** Advances in MXenes-based optical biosensors: A review. ***Biosensors and Bioelectronics***, 202, 113995. https://doi.org/10.1016/j.bios.2022.113995
119. **Singh, M., Rupesh, N., Pandit, S. B., and Chattopadhyay K**. **(2022)** ***VCurcumin Inhibits Membrane-Damaging Pore-Forming Function of the ß-Barrel Pore-Forming Toxin Vibrio cholerae Cytolysin.*** *Frontiers in Microbiology. 12:809782.* ***doi: 10.3389/fmicb.2021.809782.***
120. Soon Zher Neoha, Min Fey Chek, HuaTiang Tan, Javier A. Linares-Pastén, **Ardra Nandakumar**, Toshio Hakoshima and Kumar Sudesh **(2022).** Polyhydroxyalkanoate synthase (PhaC): The key enzyme for biopolyester synthesis. ***Current Research in Biotechnology,*** 4, 87-101. https://doi.org/10.1016/j.crbiot.2022.01.002
121. **Vinita Sharma, Ankita Mishra, Himanshu Sharma, Pankaj Kumar** and **Joy K Roy (2022)**. Unravelling novel and rare mutations for alpha-amylase and key transcription factors in EMS-induced wheat mutants for amylose by TILLING. ***Molecular Biology Reports***, 35092561. https://doi.org/10.1007/s11033-022-07155-0
122. **Vinita Sharma**, Vikas Fandade, Prashant Kumar, Afsana Parveen, Akansha Madhawan, Manik Bathla, Ankita Mishra, Himanshu Sharma, Vikas Rishi, **Santosh B Satbhai** and Joy Roy **(2022).** Protein targeting to starch 1, a functional protein of starch biosynthesis in wheat (Triticum aestivum L.). ***Plant Mol Biol,*** 109, 101–113. https://doi.org/10.1007/s11103-022-01260-1

21.2.5 Department of Physical Sciences

123. **Aastha Vasdev, Deepti Rana, Amit Vashist, Yogesh Singh** and **Goutam Sheet (2022)**. Fully gapped type-II superconductivity in Pt-doped IrTe2 near critical doping. ***Physical Review B***, *105*(9), 094509. https://doi.org/10.1103/physrevb.105.094509
124. **Akshaya Gaikwad, Krishnaa Shende, Arvind** and **Kavita Dorai (2022)**. Implementing efficient selective quantum process tomography of superconducting quantum gates on IBM quantum experience. ***Scientific Reports***, *12(1),* 3688. https://doi.org/10.1038/s41598-022-07721-3
125. **Anita Devi, Sumit Yadav** and **Arijit K. De (2022)**. Deciphering single- and multi-particle trapping dynamics under femtosecond pulsed excitation with simultaneous spatial and temporal resolution. ***Scientific Reports,*** *12(1),* 5373. https://doi.org/10.1038/s41598-022-09251-4
126. **Arnob Mukherjee,** Deepak S. Kathyat and **Sanjeeva Kumar (2022).** Engineering antiferromagnetic skyrmions and antiskyrmions at metallic interfaces. ***Physical Review B***, *105(*7), 075102. https://doi.org/10.1103/physrevb.105.075102
127. B. Bhuyan, K. J. Nath, J. Borah, I. Adachi, H. Aihara, S. Al Said, D. M. Asner, H. Atmacan, V. Aulchenko, T. Aushev, R. Ayad, V. Babu, I. Badhrees, A. M. Bakich, P. Behera, J. Bennett, **Vishal Bhardwaj**, T. Bilka, and ,…, **Sourav Patra**, S. Paul, and ,..., et. al. **(2022)**. Search for the decay Bs0→ηη. ***Physical Review D***, *105*(1), 1-7. https://doi.org/10.1103/physrevd.105.012007
128. B. Wang, K. Kinoshita, H. Aihara, D. M. Asner, T. Aushev, R. Ayad, V. Babu, I. Badhrees, A. M. Bakich, P. Behera, C. Beleño, J. Bennett, M. Bessner, **Vishal Bhardwaj**, T. Bilka, and,…,et. al.**(2022)**. Measurement of B (Bs →dsX) with Bs semileptonic tagging. ***Physical Review D***, *105*(1), 012004. https://doi.org/10.1103/PhysRevD.105.012004
129. C. Hadjivasiliou, B. G. Fulsom, J. F. Strube, I. Adachi, H. Aihara, D. M. Asner, H. Atmacan, T. Aushev, V. Babu, K. Belous, J. Bennett, M. Bessner, **Vishal Bhardwaj**, B. Bhuyan, and ,..., et. al. **(2022)**. Search for B^0 meson decays into Λ and missing energy with a hadronic tagging method at Belle. ***Physical Review D,*** *105*(5), 1–8. https://doi.org/10.1103/PhysRevD.105.L051101
130. **Debsuvra Ghosh,** Subhadip Ghosh and **Abhishek Chaudhuri (2022)**. Deconstructing the role of myosin contractility in force fluctuations within focal adhesions. ***Biophysical Journal*****,** *121*(9), 1753–1764. https://doi.org/10.1016/j.bpj.2022.03.025
131. **Deepti Rana** and **Goutam Sheet (2022).** Tunnelling characteristics of weakly coupled Majorana wire arrays. ***Journal of Applied Physics***, *131*(8), 084301. https://doi.org/10.1063/5.0082083
132. **Dileep Singh, Arvind** and **Kavita Dorai (2022)**. Experimental demonstration of the violation of the temporal Peres-Mermin inequality using contextual temporal correlations and noninvasive measurements. ***Physical Review A***, *105*(2), 022216. https://doi.org/10.1103/physreva.105.022216

133. E. Waheed, P. Urquijo, I. Adachi, H. Aihara, S. Al Said, D. M. Asner, H. Atmacan, V. Aulchenko, T. Aushev, S. Bahinipati, P. Behera, K. Belous, J. Bennett, M. Bessner, **Vishal Bhardwaj**, B. Bhuyan, and ,…, **Sourav Patra**, S. Paul, and ,..., et. al. **(2022)**. Study of $B^0 \to D+h-(h=K/\pi)$ decays at Belle. ***Physical Review D***, *105*(1), 012003. https://doi.org/10.1103/physrevd.105.012003
134. **Esan Mouli Ghosh**, Sulistiyowati, Princess Tucio and Muhammad Fajrin **(2022)**. Membership and age determination of M67 open cluster using GAIA EDR3 data. ***Journal of Physics: Conference Series***, *2214(*1), 012009. https://doi.org/10.1088/1742-6596/2214/1/012009
135. F. Abudinén, L. Aggarwal, H. Ahmed, H. Aihara, N. Akopov, S. Al Said, A. Aloisio, N. Anh Ky, H. Atmacan, V. Aushev, R. Ayad, V. Babu, and …, **Sourav Patra**, and ,..., et. al. **(2022)**. Combined analysis of Belle and Belle II data to determine the CKM angle ϕ3 using B+ → D($$ {K}_S^0 $$h+h−)h+ decays. ***Journal of High Energy Physics***, *2022*(2), 63. https://doi.org/10.1007/jhep02(2022)063
136. Ishant Tiwari, Richa Phogat, Animesh Biswas, P. Parmananda and **Sudeshna Sinha (2022).** Quenching of oscillations in a liquid metal via attenuated coupling. ***Physical Review E***, *105*(3), L032201. https://doi.org/10.1103/physreve.105.l032201
137. J.-U. Ness, A.P. Beardmore, P. Bezak, A. Dobrotka, J.J. Drake, B. Vander Meulen, J.P. Osborne, M. Orio, K.L. Page, C. Pinto, **Kulinder Pal Singh** and S. Starrfield **(2022)**. The super-soft source phase of the recurrent nova V3890 Sgr. ***Astronomy & Astrophysics***, *658(1)*, A169. https://doi.org/10.1051/0004-6361/202142037
138. **Jaskaran Singh, Arvind** and **Sandeep K. Goyal (2022).** Implementation of discrete positive operator valued measures on linear optical systems using cosine-sine decomposition. ***Physical Review Research***, *4*(1), 013007. https://doi.org/10.1103/physrevresearch.4.013007
139. **Jasleen Kaur, Ramandeep S. Johal** and Michel Feidt **(2022).** Thermoelectric generator in endoreversible approximation: The effect of heat-transfer law under finite physical dimensions constraint. ***Physical Review E***, *105*(3), 034122. https://doi.org/10.1103/physreve.105.034122
140. Jenifar Sultana, Shumile Ahmed Siddiqui, Mohd Afshan, Rishita Ghosh, **Shyam Sundar Yadav**, Sk Riyajuddin, Mansi Pahuja, Firdaus Ali, Seema Rani, Daya Rani, Kehkashan Alam, Sushil Kumar, **Ananth Venkatesan** and Kaushik Ghosh **(2022)**. Strategy to Improve the Photovoltaic Performance of Si/CuO Heterojunction via Incorporation of Ta_2O_5 Hopping Layer and MXene as Transparent Electrode. ***ACS Applied Energy Materials***, *5*(4), 3941–3951. https://doi.org/10.1021/acsaem.2c00047
141. K Nobleson, Nikita Agarwal, Raghav Girgaonkar, Arul Pandian, Bhal Chandra Joshi, M A Krishnakumar, Abhimanyu Susobhanan, Shantanu Desai, T Prabu, **Adarsh Bathula,** Timothy T Pennucci, and ,...,et. al. **(2022).** Low-frequency wideband timing of InPTA pulsars observed with the uGMRT. ***Monthly Notices of the Royal Astronomical Society***, *512*(1), 1234–1243. https://doi.org/10.1093/mnras/stac532
142. Kalipada Koner, Shayan Karak, Sharath Kandambeth, Suvendu Karak, Neethu Thomas, Luigi Leanza, Claudio Perego, Luca Pesce, Riccardo Capelli, **Monika Moun**, **Monika Bhakar**, Thalasseril G. Ajithkumar, Giovanni M. Pavan and Rahul Banerjee **(2022)**. Publisher Correction: Porous covalent organic nanotubes and their assembly in loops and toroids. ***Nature Chemistry***, *14*(5), 582–582. https://doi.org/10.1038/s41557-022-00952-x
143. Kalipada Koner, Shayan Karak, Sharath Kandambeth, Suvendu Karak, Neethu Thomas, Luigi Leanza, Claudio Perego, Luca Pesce, Riccardo Capelli, **Monika Moun**, **Monika Bhakar,** Thalasseril G. Ajithkumar, Giovanni M. Pavan and Rahul Banerjee **(2022).** Porous covalent organic nanotubes and their assembly in loops and toroids. ***Nature Chemistry***, *14*(5), 507–514. https://doi.org/10.1038/s41557-022-00908-1
144. Mohit Lal Bera, Sergi Julià-Farré, Maciej Lewenstein and **Manabendra Nath Bera (2022)**. Quantum heat engines with Carnot efficiency at maximum power. ***Physical Review Research***, *4*(1), 013157. https://doi.org/10.1103/physrevresearch.4.013157
145. Pranjali Yadav, Shubhra Chaturvedi, **Samir Kumar Biswas**, Rohit Srivastava, Kamalakannan Kailasam, Anil Kumar Mishra and Asifkhan Shanavas **(2022).** Biodegradable Protein-Stabilized Inorganic Nanoassemblies for Photothermal Radiotherapy of Hepatoma Cells. ***ACS Omega***, *7*(10), 8928–8937. https://doi.org/10.1021/acsomega.1c07324
146. **Pravita Hallur,** Lia Medeiros, and Tod R. Lauer **(2022)**. A Red-noise Eigenbasis for the Reconstruction of Blobby Images. ***The Astrophysical Journal***, 927(1), 111. https://doi.org/10.3847/1538-4357/ac502a

147. **Rahul Ramesh, Ashish Kumar Meena** and **Jasjeet Singh Bagla (2022)**. Gravitational lensing of core-collapse supernova gravitational wave signals. ***Journal of Astrophysics and Astronomy***, *43*(1), 5. https://doi.org/10.1007/s12036-021-09787-3
148. **Rajendra Singh Bhati** and **Arvind (2022)**. Do weak values capture the complete truth about the past of a quantum particle? ***Physics Letters A***, 429, 1–9, 127955. https://doi.org/10.1016/j.physleta.2022.127955
149. **Ranbir Sharma, Ankan Mukherjee** and **H. K. Jassal (2022)**. Reconstruction of late-time cosmology using Principal Component Analysis. ***The European Physical Journal Plus***, *137*(2), 219. https://doi.org/10.1140/epjp/s13360-022-02397-0
150. **Rishabh, Chandan Kumar,** Geetu Narang and **Arvind (2022)**. Evolution of two-mode quantum states under a dissipative environment: Comparison of the robustness of squeezing and entanglement resources. ***Physical Review A***, *105*(4), 042405. https://doi.org/10.1103/physreva.105.042405
151. S. Jia, C. P. Shen, I. Adachi, H. Aihara, S. Al Said, D. M. Asner, H. Atmacan, T. Aushev, R. Ayad, V. Babu, P. Behera, K. Belous, J. Bennett, M. Bessner, **Vishal Bhardwaj**, B. Bhuyan, and ,..., **Sourav Patra**, and ,..., et. al. **(2022)**. Search for a light Higgs boson in single-photon decays of $\Upsilon(1S)$ using $\Upsilon(2S) \to \pi^+ \pi^- \Upsilon(1S)$ tagging method. ***Physical Review Letters***, *128*(8), 081804. https://doi.org/10.1103/PhysRevLett.128.081804
152. S. X. Li, J. X. Cui, C. P. Shen, I. Adachi, H. Aihara, S. Al Said, D. M. Asner, H. Atmacan, T. Aushev, R. Ayad, V. Babu, P. Behera, K. Belous, M. Bessner, **Vishal Bhardwaj,** and ,…, **Sourav Patra,** and ,…, et. al. **(2022)**. First measurement of the $$ {\Lambda}_c^{+} $$ → pη′ decay. ***Journal of High Energy Physics*****,** *2022*(3), 90. https://doi.org/10.1007/jhep03(2022)090
153. **Samyak Pratyush Prasad** and **Goutam Sheet (2022)**. Care For Some Anyons, Anyone? ***Resonance***, *27*(1), 93–122. https://doi.org/10.1007/s12045-022-1296-3
154. Simon P Driver, Sabine Bellstedt, Aaron S G Robotham, Ivan K Baldry, Luke J Davies, Jochen Liske, and ,…, **Smriti Mahajan**, Martin Meyer, and ,…, et. al. **(2022)**. Galaxy And Mass Assembly (GAMA): Data Release 4 and the $z < 0.1$ total and $z < 0.08$ morphological galaxy stellar mass functions. ***Monthly Notices of the Royal Astronomical Society***, *513*(1), 439–467. https://doi.org/10.1093/mnras/stac472
155. **Soumya Datta, Aastha Vasdev,** Partha Sarathi Rana, Kapil Motla, Anshu Kataria, Ravi Prakash Singh, Tanmoy Das and **Goutam Sheet**. **(2022).** Spectroscopic evidence of multigap superconductivity in noncentrosymmetric AuBe. ***Physical Review B***, *105*(10), 104505. https://doi.org/10.1103/physrevb.105.104505
156. **Soumya Datta, Sandeep Howlader,** Arushi, Ravi Prakash Singh and **Goutam Sheet (2022)**. Anisotropic superconductivity in ZrB12 near the critical Bogomolnyi point. ***Physical Review B***, *105*(9), 094504. https://doi.org/10.1103/physrevb.105.094504
157. **Sumit Mishra, Ankit, Rakesh Sharma, Navdeep Gogna** and **Kavita Dorai (2022).** NMR-based metabolomic profiling of the differential concentration of phytomedicinal compounds in pericarp, skin and seeds of Momordica charantia (bitter melon). ***Natural Product Research***, *36*(1), 390–395. https://doi.org/10.1080/14786419.2020.1762190
158. Surbhi Gupta, **Gaurav Sharma**, S. K. Deshpande, V. G. Sathe and V. Siruguri **(2022).** Insights into the conduction mechanism of magneto-dielectric BaFe10.5In1.5O19: an impedance spectroscopy and AC conductivity study. ***Journal of Materials Science: Materials in Electronics*****,** *33*(7), 4072–4080. https://doi.org/10.1007/s10854-021-07600-z
159. Suresh KumarVemuri, Sakshum Khanna, **Utsav**, Sagar Paneliya, Vishakha Takhar, Rupak Banerjee and Indrajit Mukhopadhyay **(2022)**. Fabrication of silver nanodome embedded zinc oxide nanorods for enhanced Raman spectroscopy. ***Colloids and Surfaces A: Physicochemical and Engineering Aspects*****,** 639, 128336. https://doi.org/10.1016/j.colsurfa.2022.128336
160. Tamaghna Chowdhury, Chetna Taneja, **Aastha Vasdev**, Prasenjit Ghosh, **Goutam Sheet**, G.V. Pavan Kumar and Atikur Rahman **(2022)**. Stacking Engineered Room Temperature Ferroelectricity in Twisted Germanium Sulfide Nanowires. ***Advanced Electronic Materials***, *8*(5), 2101158. https://doi.org/10.1002/aelm.202101158
161. X. Y. Gao, Y. Li, C. P. Shen, I. Adachi, H. Aihara, D. M. Asner, H. Atmacan, T. Aushev, R. Ayad, P. Behera, K. Belous, M. Bessner**, Vishal Bhardwaj**, B. Bhuyan, and ,..., **Sourav Patra**, S. Paul, and ,..., et. al. **(2022).** Search for tetraquark states $Xccs^{-}s^{-}$ in Ds+Ds+(Ds*+Ds. ***Physical Review D***, *105*(3), 032002. https://doi.org/10.1103/physrevd.105.032002

162. X. Y. Gao, Y. Li, C. P. Shen, I. Adachi, H. Aihara, D. M. Asner, H. Atmacan, T. Aushev, R. Ayad, P. Behera, K. Belous, M. Bessner**, Vishal Bhardwaj**, B. Bhuyan, and ,…, **Sourav Patra**, S. Paul, and ,...,et. al. **(2022)**. Search for tetraquark states Xccs$^-$s$^-$ in Ds+Ds+(Ds*+Ds. ***Physical Review D***, *105*(3), 032002. https://doi.org/10.1103/physrevd.105.032002

163. Y. Li, J. X. Cui, S. Jia, C. P. Shen, I. Adachi, J. K. Ahn, H. Aihara, S. Al Said, D. M. Asner, H. Atmacan, T. Aushev, R. Ayad, V. Babu, S. Bahinipati, P. Behera, K. Belous, J. Bennett, M. Bessner**, Vishal Bhardwaj**, B. Bhuyan, and ,…, and **Sourav Patra**, and ,..., et. al. **(2022)**. Measurements of the branching fractions of $\Xi_c^0 \to \Lambda K_S^0$, $\Xi_c^0 \to \Sigma^0 K_S^0$, and $\Xi_c^0 \to \Sigma^+ K^-$ decays at Belle. ***Physical Review D,*** *ArXiv:2111.08981 [Hep-Ex, Physics:hep-Ph]*, *105*(1), L011102. https://doi.org/10.1103/PhysRevD.105.L011102

21.2.6 Department of Humanities and Social Sciences

164**. Yezad Pardiwalla (2022)**. Scratching the surface(s): examining the complexity of geological contexts for the Palaeolithic of the Sonar Basin, Madhya Pradesh**.** ***Geological Society, London, Special Publications, 515.*** https://www.lyellcollection.org/doi/10.1144/SP515-2020-234

22. Patents

S. Arulananda Babu

- Srinivasarao Arulananda Babu and Vadla Rajkumar, Patent Application No. 1102/DEL/2013, Date: 12th April 2013, Patent No. 382972 (Granted on 29.11.2021). Title: Novel Nicotine Analogues/2-Pyridylpyrrolidine Derivatives and the Process of Preparation Thereof.
- Srinivasarao Arulananda Babu and Nayyar Ahmad Aslam, Patent Application No. 295/DEL/2013, Date: 2nd February 2013, Patent No. 374470 (Granted on 13.08.2021). Title: A stereoselective method for the preparation of beta-alkyl N-substituted aspartic acid derivatives.

Samrat Ghosh

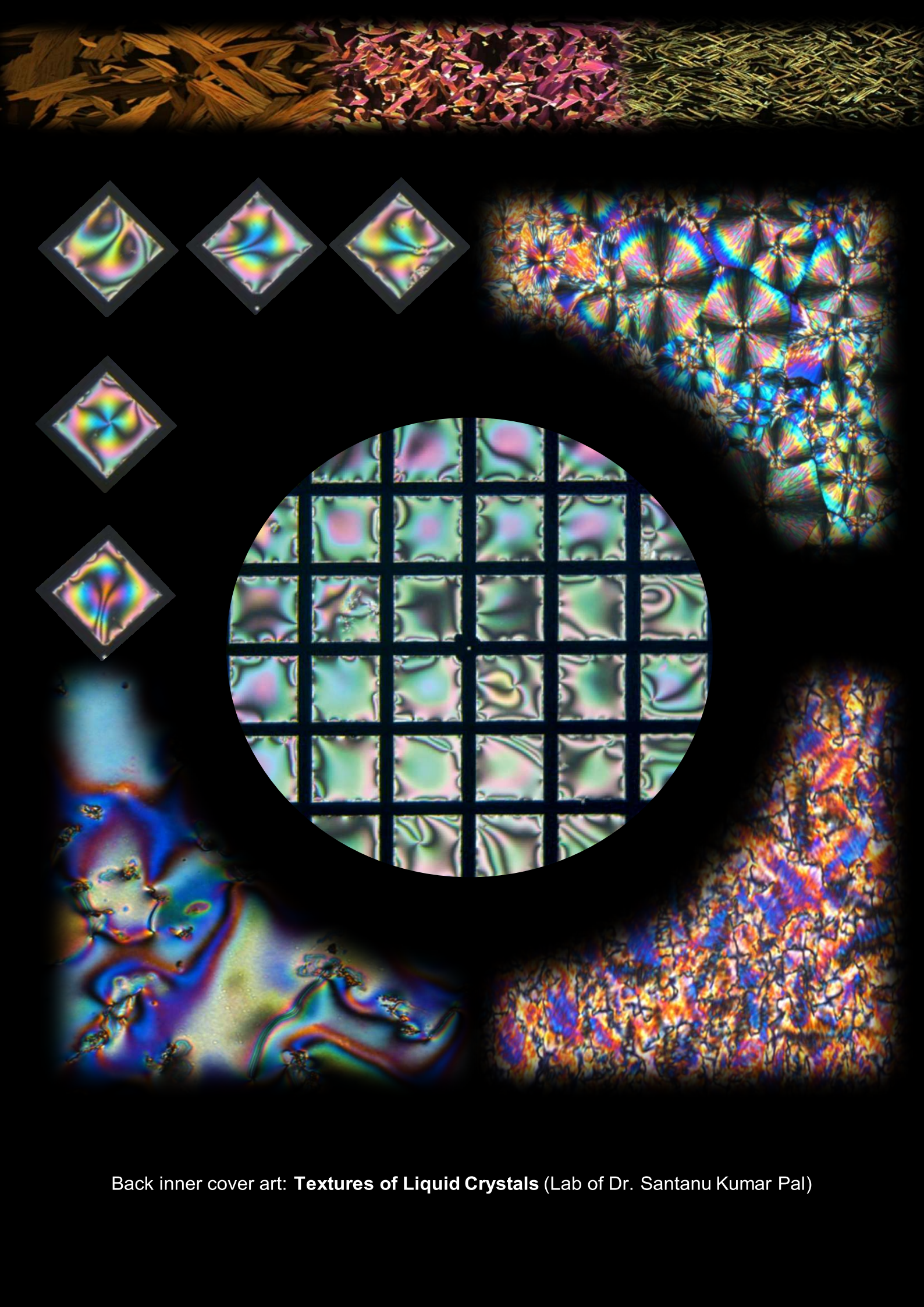
- Indian Patent Awarded on 12th August 2021 titled "A Semi-Automatic Burette Filler Device and a Modified Burette Devoid of Stop-Cock Valve"

  This innovation for which the above patent has been awarded, comes under an 'INCLUSION' category. This is to help/aid those who are wheel-chair bound and want to operate 50ml burette for use in Chemistry Laboratories.

  'INCLUSION' is a multifaceted practice that seeks to ensure that people of differing abilities are engaged in and are actively connected to the goals and objectives of the wider society.

Kamal Priya Singh

- Kamal Priya Singh, Mehra Singh Sidhu, and Biswajit Panda. System and method of transforming a protein to exhibit quantum properties and applications thereof. U.S. Patent Application17/219,108, filed October 7, 2021.



Back inner cover art: **Textures of Liquid Crystals** (Lab of Dr. Santanu Kumar Pal)

Indian Institute of Science Education and Research Mohali

Knowledge City, Sector 81, S.A.S. Nagar, PO Manauli (Punjab) 140306