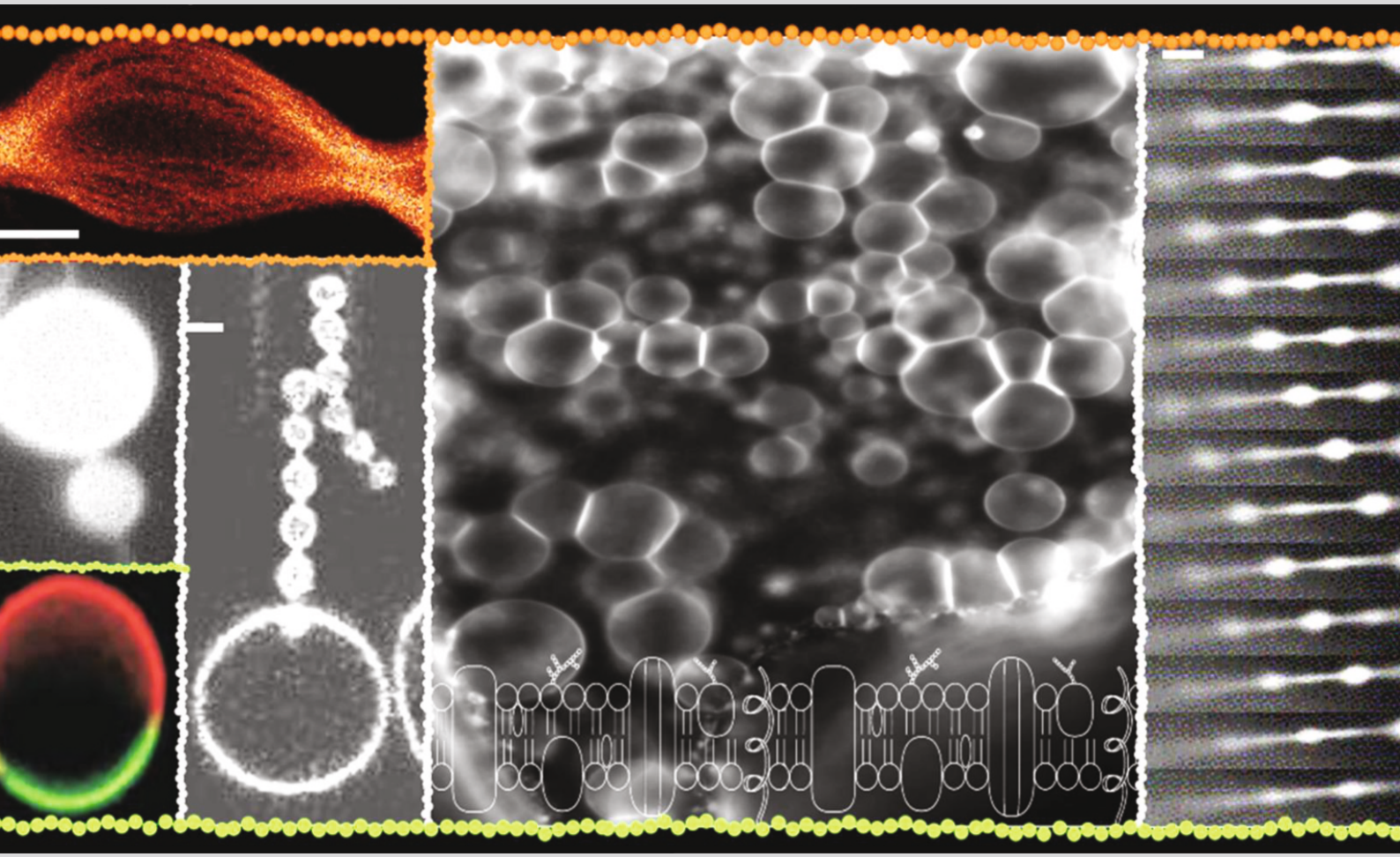
Annual Report

2022-2023



Azadi Ka Amrit Mahotsav

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH MOHALI
ज्ञानान्वेषणम्
IN PURSUIT OF KNOWLEDGE

G20 भारत 2023 INDIA

Indian Institute of Science Education and Research Mohali

In pursuit of knowledge

Ex-situ feeding and dispersal of Mahua (Madhuca indica) fruit by Cynopterus sphinx

Front page credits and information: Micro (Chandra) - yaan of life: Flexible microcontainers for biochemical reactions in confined space: Dr. Tripta Bhatia's Group. Refer to Page 127

Inner front page credits and information: Dr. Manjari Jain's Group. Refer to Page 44

Annual Report

2022-23

Indian Institute of Science Education and Research Mohali

Contents

Preface

On behalf of all my colleagues at IISER Mohali, I am happy to present the Annual Report for 2022-23. In the write-up below, I touch upon the highlights of research and academic achievements of the faculty in the different Departments during the year, which are then further elaborated elsewhere in this Report.

At the Department of Chemical Sciences, liquid crystal-aqueous interfaces have been employed for demonstrating the self-assembly of structurally different polymers as well as for the dynamic study of physiologically important pore forming toxins. Through research on tip-links, which is a tetrameric protein complex in the inner ear that acts as a force-sensor in hearing, its text-book structure has been redefined to demonstrate that the complex serves as a 'smart-seatbelt' to protect an animal from loud noise-induced hearing loss and to transduce soft sounds for uninterrupted hearing. A helical self-assembly was observed in cyclic triphosphazene-based columnar liquid crystals, alongside the efficient utilization of discotic columnar mesogens in solution-processable OLEDs (organic light-emitting diodes) and ambipolar semiconductors. Covalent metal-free energy transfer macrocycles of [1+1] and [2+2] type, consisting of perylenediimide (PDI) and aza-BODIPY chromophores, were synthesized that showed near-infrared absorption and responsiveness towards redox potentials, temperature, and metal ions. Conjugated acceptor-donor systems of type A-D-A'-D-A consisting of isatin, isatin-thiophene, and benzothiadiazole were synthesized that exhibited narrow optical bandgaps and charge carrier mobilities of up to 4.5 × 10─3 cm2/Vs. The chemotactic propensity of different biomolecules (enzymes, nucleic acids) in a gradient of metal ions or carbohydrate has been established using microfluidic method, and its application as biosensor through surface patterning has also been investigated. Nickel-carbene complexes as versatile C-C coupling agents were investigated to fill the mechanistic gaps in Ni-catalyzed C-C coupling chemistry and to find an alternative to expensive palladium catalysts. A pincer ligand motif that itself (without metal coordination) can elicit its super-reductive capability upon photoexcitation was discovered. A long-range energy transfer (beyond 500 Å) in strongly coupled systems was achieved as a step closer towards new quantum materials. In another study, the structure-activity relationship has been established for development of visible light-enabled bidirectional photoswitchable systems. Light modulation of supramolecular assembly exhibiting "On-Off" transformation of discotic in a nematic organization has also been demonstrated. A strategy to convert waste plastic to functional nanomaterials has been developed, and these materials were further used to harvest sunlight. In another study, palladium-based materials were developed as highly efficient electrocatalysts for alkaline fuel cells. Magnetic studies on a {Cr2Dy3} polynuclear complex have highlighted the importance of Cr(III) ion in d−f cluster aggregation to enhance the ferromagnetic exchange coupling and simultaneously to disclose the subtle toroidal behavior in this class of molecules.

Researchers in the Department of Earth and Environmental Sciences have identified a novel haloalkaliphilic bacterium Geoalkalibacter halelectricus SAP-1 with diverse metabolic capabilities, including iron cycling in highly saline-alkaline conditions and extracellular electron transfer through hitherto unknown membrane respiratory components. A study from the Department contributed to the understanding of microplastics and associated contaminant sources and profiles in freshwater environments in the Indian Himalayas, and provided valuable information for future management decisions. Researchers also developed several emission inventories for criteria air pollutants and volatile organic compounds from the transport and waste management sectors, which could aid in evaluating the efficacy of planned air pollution interventions before their implementation. Another study both showed that frequent large earthquakes, in combination with rainfall extremes, counterbalance the topographic uplift through erosion by landslides, and proposed a new set of coefficients for accurately estimating the volume of soil landslides in earthquake-affected regions. A neural network-based 'completely-automated' tool was developed for mineral identification and formula calculation from electron microprobe analyses. A study of land subsidence in the Mohali-Chandigarh region in Punjab, India, identified the hotspot zones in Kharar-Mohali and Chandigarh, with a high rate (> 10 cm/year) of surface deformation due to significant anthropogenic activities and over-exploitation of

groundwater resources. The climate modeling group has highlighted escalating human discomfort in northwest India due to climate change, potentially leading to various health issues.

In work from the Department of Mathematical Sciences, deep connections between idempotents of quandle algebras and quandle coverings have been identified, and complete sets of idempotents for algebras of free quandles have been computed. Surprising implications of these idempotents in knot theory have been elucidated, opening up new avenues for applications. The structure of the quandle of simple closed curves on surfaces has been explored in detail and it has been shown to be a complete invariant of closed oriented surfaces. Significant progress has been achieved in understanding the reversibility phenomenon of symmetries. Reversible transformations that preserve Hermitian distance on a space have been completely classified. Conjugation orbits of generic loxodromic pairs in three dimensional quaternionic hyperbolic space have been parameterized. Normal isometries of the open unit ball of a complex Banach space of certain bounded linear operators equipped with the Carathéodory metric have been characterised. A special class of linear operators over the quaternions that satisfy certain growth conditions has been investigated, and the pseudo-S-spectrum for those operators have been computed. Holomorphic automorphism groups of the sub-level sets of Green's functions have been explored. It has been shown that although the seb-level sets admit exhaustions by biholomorphic images of the unit ball, the automorphism groups cannot be too large. On the other hand, examples have been provided to show that these automorphism groups are non-trivial in general. There are simple examples in the literature to show that the Gersten complex fails to be exact for cycle modules in general if the base is not a field. It has been shown that for a restricted class of Milnor-Witt cycle modules over an excellent discrete valuation ring satisfying an extra axiom, the expected properties of exactness of Gersten complex and A^1- invariance hold. The work of (Fontaine) Herr has been extended by introducing a complex which is applied to compute cohomology over the Lubin-Tate extensions and compare it with the Galois cohomology groups. This complex is further extended to include certain non-abelian extensions.

In the Department of Physical Sciences, work has been conducted on first-order topological phase transitions and disorder-induced Majorana modes in interacting fermion chains. Faculty colleagues participated in a collaboration which conducted the world's first search for the Radiative Lepton Flavor Violating decay in Upsilon(1S) at Belle. They also provided the world's most precise results on the Lepton Flavor violation in Upsilon decay. Another group has demonstrated that, by use of precise cavity geometries, the requirement of extreme high accelerations can be alleviated in the experimental detection of the Unruh effect; this may facilitate experimental verification of one of the long chased theoretical predictions in modern physics. Researchers from the Department were also involved in the exploration of two very deep fields of clusters of galaxies in the far ultraviolet wavelength region with the Indian multi-wavelength observatory, Astrosat. Several galaxies with distorted morphology in the UV data were discovered. The presence of these galaxies is not just evidence in favor of galaxies experiencing the wrath of environmental effects in nearby clusters, but also provides insight into how mass assembles into galaxy clusters to explain the distribution of matter observed today.

At the Department of Humanities and Social Sciences, researchers in the archaeology lab have co-edited a book that highlights recent advances in quaternary geoarchaeology through diverse methods such as archaeology, geology, palaeoclimatology, sedimentology, GIS, remote sensing, and taphonomy to address various geoarchaeological aspects from different regions in India within the time frame of the early Pleistocene to Anthropocene. Researchers in the field of the social history of medicine have examined the representation of the public health system in early 20th century India from the literary narratives in Hindi, Urdu and English language publications in colonial North India, to provide a social perception of medicine and public health during that period.

Work from the Department of Biological Sciences has shown that Vibrio cholerae outer-membrane protein OmpU can activate dendritic cells by involving TLR2-mediated signalling and NLRP3 inflammasome activation. Vibrio cholerae has also been demonstrated to employ cytolysin to kill its target host cells by a novel, pore-formation-independent, programmed cell death mechanism. A novel function of HY5 (z) in the regulation of iron deficiency responses in Arabidopsis thaliana has been identified. A mechanistic role of the post-synaptic scaffolding protein PICK1 in differential regulation of metabotropic glutamate receptor

trafficking in the brain has been revealed. Factors that promote alternative splicing of precursor mRNAs harbouring branchpoint-distant exons in yeast have been discovered. In contrast to the current model that thiol reductive stress disrupts only the oxidative environment of the endoplasmic reticulum, it has been demonstrated that thiol reductive stress also modulates the methionine cycle to result in depletion of the methyl donor S-adenosylmethionine. The recycling endosomal protein RUFY1 has been shown to regulate lysosome function by facilitating the retrieval of lysosomal hydrolase receptors from endosomes to the trans-Golgi network. Another group has demonstrated (a) that enzymes can be used synergistically to degrade polyethylene terephthalate into pure and recyclable terephthalic acid, (b) that DNA binding proteins coacervate with nucleic acids into liquid-liquid phase separated condensates inside bacterial nucleoids, and (c) that DNA packaging proteins appear to have evolved to avoid use of the amino acid tryptophan to escape photo oxidative DNA damage. An ultrasensitive vibrational Raman spectroscopic tool has been developed to study protein phase transitions and aggregation associated with neurodegenerative diseases. A new role of RecBCD's DNA double strand end-resection activity in Escherichia coli has been proposed for the prevention of aberrant replication initiation at sites of merger of convergent replication forks.

Three major Conferences were organized at the Institute during the year: “Yeast India 2023: Fundamentals to Applications of Yeast and Fungi”; "29th CRSI National Symposium in Chemistry"; and "25th DAE-BRNS High Energy Physics Symposium".

In the following sections, I shall briefly mention the awards, honours and grants received by our faculty and students during the year. Amongst the major accolades, Prof. Samrat Mukhopadhyay and Dr. Lolitika Mandal were each elected to fellowship of the Indian Academy of Sciences; Dr. Jino George and Prof. Sudesh Kaur Khanduja were awarded, respectively, the Young Scientist Medal and the Srinivasa Ramanujan Medal of the Indian National Science Academy; and Shalini Rawat, a Ph.D. student, was selected for the SASTRA- Prof. Saroj Chandrasekhar Memorial Award 2023.

Further from the Department of Biological Sciences, Prof. Kausik Chattopadhyay has been appointed on the Editorial Board of Journal of Bacteriology and was selected to fellowship of the Royal Society of Biology, U.K. Prof. Samrat Mukhopadhyay is Chair-elect of the Intrinsically Disordered Proteins subgroup of the Biophysical Society, USA. Dr. Manjari Jain was invited to deliver a Plenary Lecture at the Full-stack Bioacoustics Workshop at Leiden, The Netherlands. Dr. Santosh Sathbai received an international travel grant from SERB, and was also selected for BIOSANTEXC Discovery Program to visit the Ecole Normale Superieure in Lyon, France.

In the Department of Chemical Sciences, Prof. Santanu Pal has been awarded the Silver Medal from The Indian Liquid Crystal Society (2022) and the Silver medal from Chirantan Rasayan Sanstha, Kolkata (2022). He also received the International Travel Support from SERB to attend the 2023 Gordon Research Conference on Liquid Crystals. Dr. Sanchita Sengupta has received a CRSI Young Scientist Award (July 2022). Prof. S. A. Babu received the bronze medal from CRSI. Dr. Ramasastry obtained a sponsorship of USD 8000 for Elsevier’s project on ‘Reaxys Retrosynthesis Evaluation’, and was inducted as a Council member of the 'National Organic Symposium Trust (NOST)' for the period 2023-2026. Three faculty members received the MoE STARS Grant in May 2023, Drs. Sanchita Sengupta and Debashis Adhikari, and Prof. Vijaya Anand. Dr. Suman Barman received the DST-SERB-EEQ grant. Prof. Sanjay Singh and Dr. Ramasastry were chosen for the SERB-TARE grant. Prof. Santanu Pal joined the editorial board of Bulletin of Materials Science. Dr. Debashis Adhikari was appointed as Guest Editor of Organometallics, ACS for the special forum issue on Photocatalysis. Dr. Sugumar Venkataramani was appointed as Associate Editor of the Journal of Photochemistry and Photobiology.

At the Department of Earth and Environmental Sciences, Drs. Raju Attada and Yunus Ali Pulpadan were awarded a STARS grant for the project entitled “Modelling and Predicting the Hydro-Meteorological Disasters in Indian Himalayas”. Dr. Yunus also was awarded the SERB Startup Research Grant for project entitled “Assessing glacier retreat and links between increasing landslides and channel erosion in High Mountain Asia”, and was appointed to the editorial board of the journal Natural Hazards Research. Dr Sunil Patil obtained a SERB core research grant and entered into a technical consultancy agreement with Kishore Pumps, Pune. In addition, Dr. Patil received the “CDC India – Prof. Ashok Pandey research excellence

award" of the Biotech Research Society, India (BRSI), in recognition of contributions to the Environmental Biotechnology area. A team led by him with his Ph.D. students Moumita Roy and Ravineet Yadav, is among the top 30 awardees at Carbon Zero Challenge 2022 – a flagship event organized by IIT Madras. Dr. Sourabh Bhattacharya received a grant from Polish Academy of Sciences for a visit to Institute of Geological Sciences Warsaw.

From the Department of Humanities and Social Sciences, Dr. Parth Chauhan received the DST Science & Heritage Research Initiative grant for the project "Imaging Ancient Images: Digital Preservation, risk assessment, spatial simulation & chronological interpretation of rock art heritage using multiple technologies". Dr. Debdulal Saha joined as a Member of the Research Advisory Committee (RAC) of the National Tea Research Foundation (NTRF) set up by the Tea Board of India and NABARD.

From the Department of Mathematical Sciences, Prof Sudesh Khanduja delivered the S Ramanujan Memorial Award Lecture of the Indian Mathematical Society; Dr Aru Beri was recipient of the Young Women Researcher Award presented by the independent Trust, Venus International Women Awards (VIWA); and Dr. Chandan Maity received the best poster prize in the SERB-ACS Online Research Poster Competition.

In the Department of Physical Sciences, Dr. Kinjalk Lochan received the N.R. Sen Young Scientist Award of the Indian Association of Gravitation and General Relativity. Prof. Sudeshna Sinha was appointed to the Academic Council of the Chennai Mathematical Institute, and serves on the Editorial Boards of Journals Pramana, Indian Journal of Physics, Communications in Nonlinear Science and Numerical Simulation, and Chaos. Prof. Jasjeet Bagla has been appointed to the editorial board of the journal New Astronomy, and is Chairperson of the Scientific Organization Committee of the Astronomical Society of India. Prof. Kavita Dorai was elected as Vice President of the NMR Society of India, and also has been appointed to the Editorial Advisory Board of the journal Magnetic Resonance in Chemistry. Dr. Anosh Joseph served as Guest Editor for an issue of European Physical Journal - Special Topics. Dr. Prasenjit Das delivered an invited lecture in a Discussion meeting on Statistical Physics and Complex Systems at IIT, Kharagpur.

Awards and recognitions received by students, postdocs and project staff have included the following:

- Samriti Mankotia, student of Dr Santosh Satbhai received international travel award from the organisers of 10th International Symposium on Root Development. She was also awarded an international travel grant from DBT.

- Mahendra Singh has received IUPAB (International Union for Pure and Applied Biophysics) travel award to attend the EBSA2023 Congress in Stockholm in July/Aug 2023.

- Swati Singh received award from EMBO for attending EMBO conference on Bacterial Morphogenesis, Survival and Virulence held in February 2023 in Goa, India.

- Neeladrita Kundu also received awards from EMBO, DBT, and CSIR to attend the EMBO Workshop on Bacterial Networks in Sant Feliu de Guixols, Spain.

- Sugata Chaudhuri and Amjadudheen V P received Best Poster awards at, respectively, the All India Cell Biology Conference, Srinagar and the Yeast India 2023 Symposium, Mohali.

- Riya Madan received the NS Dhalla and S C Tyagi Oral presentation award at the Advances in Cardiovascular Medicine and Research 2023 Conference held in PGIMER, Chandigarh.

- Dr. Jayati Gera and Parvathy Ramesh received the Indian Investigators' Network (IIN) Research Excellence Awards in 2022.

- Sri Harsha Adusumilli was awarded an IUBMB Travel Fellowship to present his research at the "Emerging Applications of Microbes (2nd edition)" meeting in December 2022 in Leuven, Belgium.

- Shruti Rani received the best poster award at the International Conference on Emerging Materials for Sustainable Development 2022.

- Ritobrata De received the best poster award at the 29th CRSI National Symposium in Chemistry, organized by IISER Mohali in July 2022.

- Shallu Dhingra was supported by the International Liquid Crystal Society Student Travel Fund 2023 to attend the 2023 Gordon Research Conference on Liquid Crystals.

- Dr. Surbhi Garg and Nisha Arora received international travel grants from IUBMB to attend 'The Biochemistry Global Summit' from July 9 to July 14, 2022, at Lisbon, Portugal.

- Monojit Roy, Rahul Singh, Nirmal Malik and Vidushi Gupta are recipients of the Prime Minister's research Fellowship in Chemistry.

- Dr. Kavita Rani has received an international travel grant from SERB to attend the conference "Macrocyclic and Supramolecular Chemistry (MASC)" at University of Nottingham, UK (Dec 2022).

- Prashant Kumar and Gayathri P won the best poster awards at the symposium on 'Recent Advances in Organic and Bioorganic Chemistry (RABMC)' held at NIPER Mohali on 19-Nov-2022; Prashant Kumar also and won the best oral presentation award at the J-NOST conference organized by the University of Hyderabad.

- Jay Prakash Maurya won the best oral presentation award at the International Conference on 'Emerging Trends in Science and Technology', organized by Punjab Engineering College, Chandigarh in June 2022.

- Debapriya Gupta received SERB-ITS Travel Grant and RSC Researcher Development Grant for attending the 28th PhotoIUPAC in Amsterdam, Netherlands.

- Subhendu Samanta received the best poster award at SPSI MACRO 2022.

- Ravi Kumar Yadav and Ravineet Yadav received the 2nd prize at the "Vishwakarma Awards for Engineering Innovation 2022" competition under the theme "Water & Sanitation" by the Maker Bhavan Foundation, WIN Foundation partnered with Kiran Patel Center for Sustainable Development at IIT Gandhinagar.

- Diptimayee Behera received travel grant for American Geosciences Union Fall Meeting 2022, Chicago and INQUA (International Union for Quaternary Research) Roma 2023 conference participation.

- Dr. Ankit Yadav has been appointed as Assistant Professor at Department Physical Geography, Faculty of Geoscience and Geography, Georg-August University Göttingen, Germany.

- Pooja Chaudhary secured the SERB Purdue Overseas visiting PhD student fellowship to work on a collaborative project with Prof. Alex Laskin.

- Ravi Kumar Yadav and Moumita Roy received, respectively, the CSIR International/Foreign travel grant and SERB International travel grant to participate and present research work at the Global ISMET (International Society of Microbial Electrochemistry and Technology) conference 2022 held at Chania, Greece.

- Shivam Chawla received the travel grant for the InSAR workshop on 'Principles and Application of Satellite Radar Remote Sensing,' IIT Roorkee.

- Aparna (BS-MS student) was selected for the 13th International Summer School on Radar/SAR, Fraunhofer FHR, Germany (July 2022). She also received the best oral paper presentation at the Indian Society of Remote Sensing (ISRS-ISG) symposium, Hyderabad.

- Sukrampal received the best poster presentation award at the Association of Microbiologists of India 2023 conference held at Maharshi Dayanand University (MDU), Rohtak.

- Ansad was awarded an international bursary by the British Association for South Asian Studies to present his research at the conference organised by the Association for South Asian Studies held at the University of Leeds in April 2023.

- Jayashree Mazumder was awarded the ASP Ruppenthal Student Travel Awards to attend the 2022 American Society of Primatologists meeting in Denver.

- Shashi Mehra, Yezad Pardiwalla and Rajesh Poojari were awarded Travel grants to attend the Indo-Pacific Prehistory Association Conference in Thailand.

- Anubhav Preet Kaur received the Jackson School of Geosciences award to attend the Society of Vertebrate Paleontology conference in Toronto, Canada.

- Ravindra Devra was awarded Nick Ryan travel bursary to attend the Computer Archaeology Association Conference in Amsterdam, Netherlands.

- Amitoj Kaur presented a paper in the ‘Radical Print: Work in Progress Workshop’ at the Nottingham Trent University 2023.

- Ashish Kumar Meena received the V V Narlikar Best Thesis award of the Indian Association for General Relativity and Gravitation.

- Dr. Amit Vashist has been appointed as Inspire faculty at INST Mohali.

- Sumit Mishra received an international travel grant from the NMR Society of India and from DST in June 2022 to attend the Ampere NMR School in Zakopene, Poland.

- Harkirat Singh Sahota is also recipient of an SERB International Travel Award (March 2023).

IISER Mohali also anchors a Technology Business Incubator (TBI), which was set up in 2016 with support from the Department of Science & Technology, Govt. of India. With a current portfolio of around 24 incubated startups that are working in biotechnology, healthcare, logistics, agritech, food tech and artificial intelligence - machine learning, the TBI is fostering an environment that encourages collaboration, innovation, and knowledge sharing for the concerned companies. Furthermore, its flagship event, 'Ideaphied’ has encouraged young innovators and students to develop their ideas into viable business ventures.The TBI has recently been funded under the Startup India Seed Fund Scheme, and was awarded the 'Best Startup Knowledge Provider' by the All India Council for Robotics & Automation and the Ministry of Electronics and Information Technology, Govt of India.

In the current year, the Institute had almost fully recovered from the disruptions caused by the Covid-19 pandemic, with the 2022 batch of students joining in October. In keeping with the proposals of the National Education Policy 2020, the Institute has adopted additional entry and exit options for its academic programmes, permitted some online courses to be claimed for credits by the students, and is in the process of curriculum revision that is to be implemented from the next academic year. The construction of two new hostels, with a capacity to accommodate an additional 800 students, is also expected to be completed in the coming year.

With these words, I take pleasure in commending this Annual Report 2022-23 to the reader.

Thank you.

31 March 2023

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
(April 2022-September 2022)

Professor J Gowrishankar
Chairperson, IISER Mohali
Sector 81, Mohali
Email: director@iisermohali.ac.in
(September 2022-March 2023)

Shri Sudhir Uttamlal Mehta
Chairperson IISER Mohali an Torrent
Pharmaceuticals Ltd.
(March 2023-August 2023)

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

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

The Secretary
Ministry of Micro, Small & Medium Enterprises
Udyog Bhawan, New Delhi
Email: Secretary-msme@nic.in
(April 2022-February2023)

The Secretary,
Department of Industrial Policy and Promotion
(March 2023 onwards)

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

The Secretary
Department of Agricultural Research & Education

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

Dr. Alka Rao
Principal Scientist
CSIR–Institute of Microbial Technology
(May 2022- March 2023)

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
(April 22-February 2023)

Professor Chanchal Kumar
Professor, IISER Mohali
Email: chanchal@iisermohali.ac.in
(April 22-February 2023)

Professor Samrat Mukhopadhyay
Professor, IISER Mohali
Email: mukhopadhyay@iisermohali.ac.in
(March 2023 onwards)

Professor N.G. Prasad
Professor, IISER Mohali
Email: prasad@iisermohali.ac.in
(March 2023 onwards)

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

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

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IISER Mohali, Sector 81, Mohali

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IISER Mohali, Sector 81, Mohali

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IISER Mohali, Sector 81, Mohali

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IISER Mohali, Sector 81, Mohali

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IISER Mohali, Sector 81, Mohali

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IISER Mohali, Sector 81, Mohali

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IISER Mohali, Sector 81, Mohali

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IISER Mohali, Sector 81, Mohali

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IISER Mohali, Sector 81, Mohali

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IISER Mohali, Sector 81, Mohali

Dr. Sudip Mandal
IISER Mohali, Sector 81, Mohali

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IISER Mohali, Sector 81, Mohali

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IISER Mohali, Sector 81, Mohali

Dr. Mahender Singh
IISER Mohali, Sector 81, Mohali

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

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IISER Mohali, Sector 81, Mohali

Dr. Raju Attada
IISER Mohali, Sector 81, Mohali

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IISER Mohali, Sector 81, Mohali

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IISER Mohali, Sector 81, Mohali

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IISER Mohali, Sector 81, Mohali

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IISER Mohali, Sector 81, Mohali

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IISER Mohali, Sector 81, Mohali

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

Dr. Abhishek Chaudhuri
IISER Mohali, Sector 81, Mohali

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

3. Research Advisory Committee

Professor Arun Grover, Chandigarh
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Associate Dean R&D, IISER Mohali

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Registrar	**Professor Jagdeep Singh**
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	Professor Anand K. Bachhawat (03.03.2022)
Dean Academics	**Professor Jasjeet Singh Bagla**
Associate Dean Academics	**Dr. Sugumar Venkataramani**
Dean Students	**Dr. Dipanjan Chakraborty**
Associate Dean Students	**Dr. Chandrakant S. Aribam**
Dean R&D	**Professor R. Vijaya Anand**
Associate Dean R&D	**Dr. Sharvan Sehrawat**
Dean International Relations and Outreach	**Dr. Amit Kulshrestha**
Librarian	**Dr. P. Visakhi**
Assistant Librarian	**Shri Sonam Rigzin (29.03.2023)**
Executive Engineer cum Estate Officer	**Shri Praveen Kumar Srivastava**
Chief Medical Officer	**Dr. Gurpreet Singh**
Medical Officer	**Dr. Harshdeep Kaur**
Assistant Registrars	**Shri Sandeep Ahlawat**
	Shri Mukesh Kumar
	Ms. Amandeep Saini
	Ms. Nancy Gupta
	Shri Sanjeev Kumar Yadav
Wardens	**Dr. Adrene Freeda D' cruz**
	Dr. Santosh B Satbhai
	Dr. Ambresh Shivaji
	Dr. Raju Attada
	Dr. Subhabrata Maity
	Dr. Ratna Pal
	Dr. Vidya Negi
Veterinarian (Animal House)	**Dr. Chander Shekhar**
Technical Officer/IT/Lab.	**Dr. Paramdeep Singh Chandi**
Technical Officer (IT/Lab.)	**Ms. Garima Kaushik**
Security Officer	**Shri Kamal Jeet**
Assistant Exe Engineer (Electrical)	**Shri Atul Kadwal**
Assistant Exe Engineer (Civil)	**Shri Rajiv Kumar**
P.S. (Director's Office)	**Ms. Yashoda**
Superintendent	**Shri Sachin Jain**
	Shri Mansa Ram Gupta

	Ms. Neena Kumari
	Ms. Poonam Rani
	Shri Gourav Bansal (20.01.2023)
	Shri Siddharth Dixit (30.01.2023)
	Shri Rahul Sharma (20.01.2023)
	Shri Sanjay Kumar (14.03.2023)
Office Superintendent	**Shri Arup Kumar Saha**
	Shri Prahlad Singh
Junior Library Superintendent	**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. Deepika
	Shri. Mohit Arora (01.02.2023)
	Shri. Shubham Pusadkar (24.01.2023)
	Shri. Vishal Verma (17.02.2023)
	Ms. Bhupali Sharma
Physical Education Instructor	**Shri Kirpal Singh**
Technical Assistant	**Shri Rakesh Kumar**
	Shri Ramesh Kumar
	Ms. Sangeetha Gurusamy
	Shri Mangat Ram
	Shri Anupam Pandey
	Shri Triveni Shanker Verma
	Shri Bhavin R. Kansara
	Shri Balbir Singh
	Shri Avtar Singh
Scientific Assistants	**Shri Jayaraju Battula**
Staff Nurse	**Shri C. Periyasamy**
Attendent	**Shri Bhopal Singh**
	Shri Amandeep Singh

5. Faculty

5.1 Faculty Members

1. **Debashis Adhikari** (Associate 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** (Professor, Chemistry)
Synthetic organic chemistry
4. **Chandrakant S. Aribam** (Associate 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** (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** (Associate 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** (Associate Professor, Humanities and Social Sciences)
Paleoanthropology & Archaeology
26. **Rhitoban Ray Choudhury** (Associate 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** (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** (Associate 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** (Associate 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** (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** (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** (Professor, Chemistry)
Liquid Crystals, Interfacial Phenomena, Colloid and Gel Chemistry, Chemical and Biological Sensing, Nanoscale Science and Engineering
68. **Ratna Pal** (Assistant Professor, Mathematics)
Several Complex Variables
69. **Yunus Ali Pulpadan** (Assistant Professor, Earth & Environmental Sciences)
Geomorphology, Remote Sensing and GIS, Disaster Mitigation
70. **Santhosh Kumar Pamula** (Assistant Professor, Mathematics)
Operator Theory, Functional Analysis
71. **Yashonidhi Pandey** (Assistant Professor, Mathematics)
Algebraic Geometry
72. **Shashi Bhushan Pandit** (Associate Professor, Biology)
Computational structural and systems biology, protein-ligand interactions, metabolomics
73. **Kapil Hari Paranjape** (Professor, Mathematics)
Geometry
74. **Sunil Anil Patil** (Assistant Professor, Earth & Environmental Science)
Environmental Microbiology and Biotechnology
75. **N. G. Prasad** (Professor, Biology)
Evolutionary genetics
76. **V. Rajesh** (Associate Professor, Humanities and Social Sciences)
History
77. **Vignesh Kuduva Radhakrishnan** (Assistant Professor, Chemistry)
Molecular Magnetism and Heterogeneous Catalysis
78. **Sabyasachi Rakshit** (Associate Professor, Chemistry)
Single Molecule Manipulation & Imaging and Nano biology
79. **Rajesh Ramachandran** (Associate Professor, Biology)
Cellular basis of tissue regeneration

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

107. **Sugumar Venkataramani** (Associate Professor, Chemistry)
Physical Organic Chemistry
108. **Ananth Venkatesan** (Associate Professor, Physics)
Mesoscopic Electronic & Electromechanical systems
109. **Ram Kishor Yadav** (Associate Professor, Biology)
Plant Developmental Genetics
110. **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)

5.3 Visiting Faculty
1. **Charanjeet Singh Aulakh** Visiting Faculty, Physics
2. **Kulinder Pal Singh**, 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)
15. **RSimon** (Physics)
16. **Sudesh Kaur Khanduja** (Professor, Mathematics & INSA Honorary Scientist)

5.5 INSPIRE Faculty Fellows
1. **Aru Beri** (Physics)
2. **Sanjib Dey** (Physics)
3. **Sharmila Bhattacharya** (Earth & Environmental Sciences, till05.11.2022) & (Visiting Faculty-06.11.222 to 31.05.2023)

6 Events and activities: 2022-23

6.1 Meetings of Institute Bodies

During 2022–23, various administrative bodies of the Institute met for deliberations.

Board of Governors Meetings	**48th Meeting of the BOG**	**26.05.2022**
	49th Meeting of the BOG	**30.07.2022**
	50th Meeting of the BOG	**10.11.2022**
	51st Meeting of the BOG	**24.03.2023**

Finance Committee Meetings	**39th Meeting of the Finance Committee**	**25.05.2022**
	40th Meeting of the Finance Committee	**09.11.2022**
	41st Meeting of the Finance Committee	**28.12.2022**
	42nd Meeting of the Finance Committee	**23.03.2023**

Academic Senate Meetings	**51st Meeting of the Academic Senate** (LH-6)	**18.05.2022**
	52nd Meeting of the Academic Senate (LH-6)	**18.08.2022**
	53rd Meeting of the Academic Senate (LH-4)	**22.12.2022**
	54th Meeting of the Academic Senate (LH-6)	**09.03.2023**

6.2 Convocation 2022

The eleventh convocation at IISER Mohali was held on May 26, 2022. The 11th batch graduated from IISER Mohali. Amongst a total of 278 students who received their degrees, 61 were PhD students. Programs where students graduated are: PhD, MS-PhD, MS, BS-MS, and BS. The Chairperson, Board of Governors, Prof. Ajay Sood. Prof. Rohini M. Godbole, currently Honorary Professor at the Indian Institute of Science, Bangalore was the Chief Guest.

Prof. Rohini M. Godbole, currently Honorary Professor at the Indian Institute of Science, Bangalore, is a theoretical particle physicist. She retired from the Centre for High-Energy Physics of the IISc after serving as Professor for over 25 years. She was earlier at the Mumbai University, the Tata Institute of Fundamental Research, and has also worked at a number of universities in India, Europe and the USA including at CERN, Geneva. Two century old Universities, the S.N.D.T. Women's University and the Tilak Maharashtra Vidyapeeth have conferred D.Litt. on her. IIT (Kanpur) and VTU (Karnataka) have honoured her with a D.Sc.

Her research over the past four decades, on exploring the Standard Model of particle physics and physics beyond the standard model, has resulted in over 300 publications in refereed journals/arXived preprints as well as a graduate textbook. Her pioneering work on probing hadronic interactions of photons provided important insights for the design of electron-positron colliders, and her suggestions to probe standard model (and beyond standard model) physics have been used in experiments at different colliders.

A Fellow of The World Academy of Science (TWAS), she has been elected to the three science academies of India. She has served as Vice President of the Indian National Academy of Sciences, Allahabad and is currently serving as the Vice President of the Indian Academy of Sciences. She is and has been a member different national and international advisory bodies such as Scientific Advisory Body to the Cabinet (SAC-C), the High Energy Physics Advisory Panel of the USA, the International Detector Advisory Group for the International Linear Collider etc. She has been a member of the CERN-India Task Force and now a member of the steering committee. She has been the chief editor of Pramana, journal of Physics of the Indian Academy of Sciences, a member of various editorial boards of national and international journals, and is serving on the Advisory Board of the Oxford Research Encyclopaedia for Physics.

Professor Godbole has been an avid supporter of the cause of women in science, working over the past decades to facilitate more effective participation of women in the scientific workforce. Among

her lasting contributions is the (co-edited) book Lilavati's Daughters: The women scientists of India comprising of autobiographical sketches of Indian women scientists, as well as landmark surveys on the status of women in science. She chaired the Committee on Equity and Inclusion for India's Science, Technology and Innovation policy of 2020 (STIP 2020).

Rohini Godbole's extensive contributions to science and society have been recognised by the Government of India through the conferment of the Padmashri in 2019, by the French Government through the honour Ordre National du Mérite in 2021. Further, the Karnataka Academy of Science has honoured her through the Lifetime Achievement award in 2021. Among her recent awards, is also the Birla Award of the Indian Physics Association as well as the Goyal Award of the Kurukhsetra University.

6.3 Foundation Day 2022

IISER Mohali celebrated its 16th Foundation Day on September 27, 2022. Every year IISER Mohali celebrates its foundation day with enthusias and invite school children to come to our campus and explore and learn about science. It provides them with the opportunity to learn basic science while having fun at the same time. There were scientific demonstrations and quiz programs, etc. for school kids.

The foundation day lecture was delivered by Professor Deepak Dhar, NASI-Senior Scientist at IISER Pune. The title of the lecture was on "200 Years of Studies of Phase Transitions". Prof. Deepak Dhar is an Indian theoretical physicist Known for his research on statistical physics and stochastic processes and is an elected fellow of all the three major Indian science academies-Indian Academy of Sciences, Indian National Science Academy and National Academy of Sciences, India-as well as of The World Academy of Sciences. He has worked in the areas of fractals, self organized criticality, percolation and animal problems and slow relaxation in magnets and glasses. Deepak Dhar obtained his BSc degree from the University of Allahabad, Masters from IIT Kanpur, and PhD in Physics from California Institute of Technology. He is a recipient of many prestigious national and international awards such as INSA Young Scientist (1983), S. S. Bhatnagar award (1991), J.R. Schrieffer Prize in Condensed Matter Physics (1993) and S. N. Bose Medal (2001). He was a J. C. Bose Fellow during 2007-2017. He also served as a member of International Union of Pure and Applied Physics (IUPAP) Commission on Statistical Physics during 1992-95. Recently, he has been awarded the Boltzmann Medal along with John J. Hoefield of Princeton University by the Commission on Statistical Physics of the IUPAP. Professor Dhar is the first Indian to bag this prestigious award. From 1978-2016, he was in the Department of Theoretical Physics at TIFR Mumbai, and has been at IISER Pune since November 2016 as NASI Senior Scientist and Distinguished Emeritus Professor.




6.4 Independence Day 2022

Independence Day 2022 was celebrated at IISER Mohali Campus. The 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
MS21076	Amitesh Gupta	MS21080	Kaustubh Purohit

Certificate of Academic Excellence for the Best performing students (2nd, 3rd & 4th year of BS-MS) in the 2021-22, 2nd semester

		Reg. No	**Name**
MS20		MS19170	Rupkatha Chand
Reg. No	**Name**	**MS19 Physics**	
MS20017	Aditya Raj	**Reg. No**	**Name**
MS20018	Anikeet Patel	MS19011	Utkarsh Bajpai
MS20178	Sapna Krishnakumar	MS19085	Anish Koley
MS19 Biology			
Reg. No	**Name**	MS19099	Nikhil Bansal
MS19018	Ridhi	**MS18 Biology**	
MS19094	Priyansha Verma	**Reg. No**	**Name**
MS19096	Soumyadev Paul	MS18023	Abhilasha Jakhar
MS19154	Akanksha Singh	MS18060	Vishnu Soman
MS19 Chemistry		MS18153	Divyanshu Sahu
Reg. No	**Name**	MS18194	Mirudula E
MS19042	Vaibhav Gehlot	MS18203	Kartikey Awasthi
MS19 Mathematics		MS18219	Maithily Somesh Hingmire

MS18 Chemistry

Reg. No	Name
MS18180	Aastha

MS18 Mathematics

Reg. No	Name
MS18046	Mayukh Chakrabarty

MS18 Physics

Reg. No	Name
MS18085	Prasad Padhye
MS18140	Dheer Mankad
MS18197	Amlan Nayak

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

MP21 Biology

Reg. No	Name
MP21012	Snehasis Sarkar

MP21 Chemistry

Reg. No	Name
MP21011	Ramanpreet Kaur

MP21 Physics

Reg. No	Name
MP21019	Kunal Banerje

MP20 Biology

Reg. No	Name
MP20001	Roopali Khanna

MP20 Chemistry

Reg. No	Name
MP20002	Neetu

MP20 Mathematics

Reg. No	Name
MP20008	Biplab Das

6.5 Republic Day 2023

Republic Day of the Nation was celebrated in the Institute on 26th January 2023. 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 (2022-23, 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 (2022-23, 1st semester)

MS21

Reg. No	Name
MS21076	Amitesh Gupta
MS21124	Nikita

MS20 Biology

Reg. No	Name
MS20009	Prerna
MS20033	Avleen Singh
MS20060	Mansinar Kaur
MS20106	Prerna Swarnim
MS20108	P B Nishaant Kumar
MS20118	Dhanuush B
MS20142	B Rakshana
MS20145	Ravale Sanket Sudam
MS20178	Sapna Krishnakumar
MS20183	Aditya Sharma

MS20 Chemistry

Reg. No	Name
MS20025	Aman Saini
MS19114	Anubhav Rajyan
MS20174	Aritrika Paul

MS20 Mathematics

Reg. No	Name
MS20006	Joshua J Abraham

MS20 Physics

Reg. No	Name
MS20024	Rabsan Galib Ahmed
MS20175	Apramey Desikan

MS19 Biology

Reg. No	Name
MS19127	Harshitha V

MS19 Chemistry

Reg. No	Name
MS19114	Soumyadev Das

MS19Mathematics

MS19170	Rupkatha Chand

MS19 Physics

Reg. No	Name
MS19117	James Watt

Certificate of Academic Excellence for the Best Performing Students (first & second year of Integrated PhD program) in the first semester of the academic session 2022-23

MP21 Chemistry2

Reg. No	Name
MP22001	Himanshi Mittal

MP22 Physics

Reg. No	Name
MP22009	Vansh Narang

MP21 Biology

Reg. No	Name
MP21003	Riya Madan
MP21012	Snehasis Sarkar

MP21 Chemistry

Reg. No	Name
MP21011	Ramanpreet Kaur

MP21 Mathematics

Reg. No	Name
MP21013	Vyshnav P T

6.6 Outreach Activities at IISER Mohali

The Outreach program of IISER Mohali reaches out to students at all levels from schools and colleges, in urban and rural environments, giving them an exposure to laboratories, conducting seminars on the latest developments in science, organising Science Camps to get students excited about science and to develop their abilities.
As part of outreach, IISER Mohali also conducts Science Communication workshops called "How to tell your science story" organised for students of IISER Mohali and organised several teachers training sessions as part of the Vigyan Pratibha Program.

Visits to IISER Mohali by School, College,University Student s and Teachers

This is a recurring annual event where students and teachers from all over India come to IISER Mohali to learn about the organisation and to get a glimpse of its numerous research areas, cutting-edge labs, and top-notch research tools. The visitors are given a brief overview about admission policies, programmes and Central Analytical facilities at IISER Mohali and then shown around the research laboratories.




Students and teachers get interested in science and research and express their desire to consider science as one of their career options. Postgraduate students from colleges are given exposure to the use of specific research equipment of their interest and are encouraged to apply for our Summer Internship programmes.

In 2022 - 2023, School, college and University students visit the IISER Mohali Campus along with their teachers. A few are listed below:

S.No.	Visiting Institution	Visit Date
1	Sugni Devi Arya Girls Sr. Sec. School	24-Aug-22
2	Gurukul Global School, Chandigarh.	26-Aug-22
3	Khalsa College , Amritsar.	09-Sep-22
4	JNV Chandigarh (Vigyan Jyoti).	13-Oct-22
5	Govt. School, Sec 22 (CRIKC)	31-Oct-22
6	Mata Gujri College, Fatehgarh Sahib.	01-Nov-22
7	Meritorious School Teachers, Mohali.	04-Nov-22
8	GMSSS 33D (CRC CLUSTER7).	15-Dec-22
9	GMSSS Karsan.	02-Feb-23
10	CEC Landran, Mohali.	10-Feb-23
11	GSSS Samgouli	14-Feb-23
12	S.D College, Barnala	21-Feb-23
13	GMSSS, 47D, Chandigarh.	27-Feb-23
14	GMHS, 48D, Chandigarh	27-Feb-23
15	GHSSS, 21A, Chandigarh.	13-Mar-23
16	Govt. College Ropar	15-Mar-23
17	S.R Govt. College, Amritsar.	17-Mar-23
18	CGC, Landran	29-Mar-23

VIGYAN PRATIBHA

Vigyan Pratibha is an effort, supported by the Government of India, to bring some learnings to the student and teacher community. This effort involves bringing together researchers and scientists from different disciplines who, through interactions with the teachers, are preparing materials that can be used by students and teachers in schools. Vigyan Pratibha is expected to contribute to preparing a population of students in the country who would have a deeper understanding of content in the curriculum and of the natural, technological and social changes around them. The target schools for the project are the roughly 1600 schools of the Kendriya Vidyalaya Sangathan (KVS), the Navodaya Vidyalaya Samiti (NVS) and the Atomic Energy Education Society (AEES). Currently, as part of the Vigyan Pratibha project, we are working with middle and high school teachers and students of KVs and JNVs of Haryana, Punjab, HP Chandigarh UT region.

The Indian Institute of Science Education and Research (IISER) Mohali, organised -

- Two training workshops in the 2022-23 year with participation of school teachers from several KV and JNV of Chandigarh, Punjab, Haryana and Himachal Pradesh regions.

The two workshops were held during the weeks of 01 Aug-05 Aug, 2022 and 20 Dec-23 Dec, 2022 respectively at IISER, Mohali under Vigyan Pratibha project of HBCSE – TIFR Mumbai.

The Indian Institute of Science Education and Research (IISER) Mohali, organised a three days Vigyan Pratibha Science Camp for school children of Government schools from the nearby regions during February, 2023 under Vigyan Pratibha project of HBCSE - TIFR Mumbai.

6.7 Teachers' Day 2022

The Best Teacher Award of IISER Mohali for the year 2022 was awarded to Dr. Vaibhav Vaish (Dept. of Mathematics) on Teachers Day, September 5, 2022 for their contributions to teaching. Prof. J. Gowrishankar, Director IISER Mohali presided over the function.

6.8 Students' Activities

- Arkish Chakraborty won two college-level online chess events
- Tirutsava '22 Blitz Chess Tournament - Organised by IIT Tirupati as part of their Tirutsava 2022 fest 'Chaal e Chaal e Baajimat' by IISER Bpr as part of their Agomoni cultural fest
- Ashutosh Banerjee came fourth in Chattisgarh Senior State 2023

Participation in All India University Games

In the session 2022-2023 the students of IISER Mohali have participated in All India university games. The list of the tournaments listed below:

a) North Zone Lawn Tennis (Men & Women) Tournament 2022-23 at Murthal, Sonipat from (10-09.2022

to 15-09.2023) https://www.youtube.com/watch?v=CFkeG6QR0lA

b) All India Inter University Yogasana (Men & Women) Championship 2022-2023 at KIIT Bhubaneswar from 26th to 29th December 2022. Bhubaneswar

All India Inter University Yogasana (Men & Women) Championship 2022-2023

c) All India Inter University Power Lifting Women Championships 2022-23 at Central University of Himachal Pradesh, Dharamshala, HP from 09th–12th March 2023

All India Inter University Power Lifting Women Championships 2022-23

International Yoga Day 2022 celebration

On 21st June 2022, IISER Mohali has celebrated International Day of Yoga 2022 with great enthusiasm. Approx. 170 IISERM students and staff members have participated in this event.

Staff Participation in non-competitive sports events

Women colleagues and employee of IISER Mohali, Ms. Garima Kaushik, Software Engineer, Computer Centre & Ms. Savitri Meher, Physical Education Instructor, has participated in the National level women's cycling expedition which is 75 km long, started from Baramulla (Srinagar) to Kaman- Aman Setu, URI, International Border and completed the trek in 2.45 hours and 3.5 hours respectively. It was remarkable to see IISER Mohali's name on their T-shirts and a photograph of their flag being raised at Kaman- Aman Setu, URI, International Border.

This event was organized by the Dagger division of the Indian Army to grace Azadi ka Amrit Mahotsav from 10th to 12th September 2022. This event was of national importance and was purely devoted to empowering Kashmiri local girls/women. Contribution through Ms.Garima Kaushik & Ms. Savitri Meher was greatly appreciated and praised by the Dagger division, the Indian army.

Link: https://www.youtube.com/watch?v=Gk1IRUSE5Jw

IISM 2022

IISM 2022 was conducted in IISER Bhopal from 21st-26th December 2022, and IISER Mohali had 143 students participating across all sporting events. The enthusiastic involvement of the students yielded multiple accolades in this event. IISER Mohali is ranked fifth overall despite facing multiple disagreements from various participating institutes regarding the conduct of the events and allegations of biased refereeing in favor of IISER Bhopal.We congratulate all the winners and every other student who has shown great Enthusiasm to participate.

Gold - Women's Football (Ruchika, Nikita, Sonia, Nitu, Nisha, Gayatri, Ladida, Binsha, Aparna and Fathima)

Gold - Women's Kho-Kho (Aparna R, Krishna Dhanawat, Shruti Gangadhar Garthe, Shirisha Pathloth, Mahima, Ritika, Sonia, Pooja Dhayal, Sargam Saini, Rahiba, Shivali Sinhmar and Sakshi Pannu)

Gold - Women's Lawn Tennis (Sapna, Akshi, Bhavani and Ananya)

Gold - Chess (Pruthu, Sourav, Bharath, Vyshnav, Nishant Raj and Athira)

Silver - Women's Table Tennis (Anushree, Priya, Sakshi and Rupali)

Bronze - Men's Basketball (Sankalp, Hari, Sunil, Ajay Kumar, Vaibhav Kaushik, Vinayak, Vaibhav Gaur, Arun, Prateek, Kaustav, Shantanu and Kshitiz)

Bronze - Men's Volleyball (Narayan, Muluk, Navdeep, Akhil, Kunal, Munish, Alok, Pankaj, Anshul, Swapnil, Shivendra and Sahil Kaushal)

Fourth Place - Men's Football (Sadananda, Raja, Musfr, Harsh, Adin, Amitabha, Arastu, Hemant, Abhijit, Adarsh, Abhishek, Juan, Akshit, Vikram, Mulukma and Amjad)

Fourth place - Mixed doubles badminton (Munish and Sneha)

Fourth place - Women's badminton (Sneha, Anjali, Aakansha, Shubangi, Rishita)
Athletics winners:

3000m (G)- Gold- Aarju

1500m (G) - Gold- Aarju

10000m (B) - Bronze- Ritik

100m (B) - Bronze- Atharva

800m (B) - Bronze- Mayur

4x100m (B relay) - Bronze- Atharva, Himanshu, Pushpendra, Basil

1500m- 4th place- Nitin

Intra IISER Sports Tournament 2022

Every year the sports department of IISER Mohali organises the Intra IISER Sports Tournament. This time also the tournament was organised with 16 different games and approx 800 students participated in the tournament.

IISM 2022 Participants from IISER Mohali's

Closing ceremony of Intra IISER Sports Tournament 2022

Participation in Republic Day Celebration 2023

IISER Mohali NSS and The Bharat Scout & Guide units have participated in the Republic Day Celebration 2023

NSS Volunteers

Rangers & Rovers from The Bharat Scouts & Guide

1st Inhouse NSS and BSG Camp

The Sports Department of IISER Mohali has organised an in-house NSS & BSG Camp in which the students have participated with great enthusiasm. They make all the preparation and arrangements for preparing dinner for approx. 60 students of NSS and BSG volunteer.

NSS & BSG camp Volunteers/Participants

7. Scientific Meetings/Conferences/Workshops

Mahak Sharma
Title: Autophagy India Network (AIN) meeting, CSIR IMTECH, Feb 17th-19th 2022
Name of the Organizers: Amit Tuli, Ashwini Kumar and Mahak Sharma
Brief description of the meeting: The Autophagy India network meeting is a meeting of principal investigators working in the area of autophagy, membrane trafficking, host-pathogen interactions etc. that has been held since 2017. This year it was the fourth meeting that was held in CSIR-IMTECH. The main goal of AIN is to promote research in autophagy and other related areas in India and to foster and promote collaborative research in the field. The meeting was held from Feb 17th-19th 2023 in CSIR-IMTECH campus and had talks by 19 speakers from different institutions of the country.

Shravan Kumar Mishra
Title: March 10-13, 2023: 12th International Conference on Yeast Biology "Yeast India 2023: Fundamentals to Applications of Yeast and Fungi".
Name of the Organizers: Dr. Shravan Kumar Mishra (Organising Secretary, IISER Mohali), Prof. Anand K Bachhawat (IISER Mohali), Dr. Santosh Satbhai (IISER Mohali), Dr. Sadhan Chandra Das (IISER Mohali), Dr. Deepak Sharma (CSIR-IMTECH Chandigarh), Prof. Ipsita Roy (NIPER Mohali), Dr. Jiban Jyoti Panda (INST Mohali), Dr. Ajay Pandey (NABI Mohali), Dr. Jagmohan Singh (Amity University Mohali)
Brief description of the meeting:
The international conference "Yeast India 2023: Fundamental to Applications of Yeast and Fungi" was held at IISER Mohali with support from other institutes in the Mohali-Chandigarh region. It was the 12th gathering of scientists working on yeast and fungi from more than 100 research groups in India. With 271 registered participants, a total of eleven scientific sessions had 51 oral presentations and 137 posters. Research talks were from group leaders studying cutting-edge topics in various institutes and universities across India. Six international scientists of high repute were also invited to the conference. They presented the research work being performed in their laboratories and interacted with the participants. Short talks by students were selected from abstracts and two sessions were dedicated to poster presentations. Division heads of three yeast industries (Reliance Industries, India; Praj Industries, India; and NovelYeast, Belgium) also participated and presented the research in their companies being carried out with yeast. The conference covered research subjects ranging from epigenetics, chromatin, cell cycle, evolution, pathogenesis and applications of yeast and fungi. It was an important platform for the assembly of faculty and students studying yeast and fungi.

K R Shamasundar
Title: Theoretical Chemistry and Biology (TCB-2022)
Name of the Organizers: Dr. Shamasundar K R (IISER), Dr. Balanarayan P (IISER), Prof. Bharatam (NIPER). P. V, Dr. Dhilip Kumar (IIT Ropar)
Brief description of the meeting: The meeting was jointly organized by IISER, NIPER and IIT Ropar and held on 15 Oct 2022 at NIPER. The meeting brought together about 150 participants in around the CRICKC region working on computational and theoretical problems related to both Chemistry and Biology. Apart from oral presentations from group leaders, every group presented a group poster as well as posters from individual group members.

Sanjay Singh,R. Vijaya Anand, Sanchita Sengupta
Title: 29th CRSI-NSC and CRSI-ACS Symposium Series in Chemistry
Name of the Organizers: IISER Mohali (Convener: Prof. Sanjay Singh and Co-convener: Prof. R. Vijaya Anand.
Brief description of the meeting: The "29th CRSI-NSC and CRSI-ACS Symposium Series in Chemistry" was organized at IISER Mohali between July 07-09, 2022 by the Department of Chemical Sciences under the aegis of The Chemical Research Society of India (CRSI) and with the support of the American Chemical Society (ACS). Around 350 student participants and 120 faculty colleagues from different parts of the

country attended the symposium. A total of 320 posters were presented during the symposium and 30 posters were selected for the best poster awards. The symposium included medal lectures, poster presentations and special lectures by eminent chemists and scientists working in the allied areas of chemistry from India and abroad.

S. S. V. Ramasastry
Title: Meet the Editors: ChemComm
Name of the Organizers: Dr. S. S. V. Ramasastry
Brief description of the meeting: On 07-Feb-2023, Editor-in-Chief of ChemComm, Dr. Richard Kelly, Associate Editor of ChemComm, Prof. Sandeep Verma, RSC Editorial Development Manager, Dr. Aparna Ganguly met with IISER Mohali faculty and students and explained the publishing policies of ChemComm.

Ujjal K. Gautam
Co-Chairs: MRSI Conclave 2021, December 20-23, 2021. (Organizer: IIT M)

Vinayak Sinha
Title: Indo-Israel UGC project meeting
Name of the Organizers: Prof. Vinayak Sinha (IISER Mohali)
Brief description of the meeting:
The meeting was held in person at IISER Mohali from October 11-14, 2022 at IISER Mohali to review the work of early career scientists involved in the international project and strengthen existing activities. Faculty and students from the region participated in the lecture delivered by Prof. Yinon Rudich on October 12, 2022. Prof. Rudich's lecture was entitled: "Connecting aerosol composition to health effects". After reviewing how primary emissions of soot particles and tar balls from biomass burning substantially contribute to human exposure as well as to the burden of disease, he described works that investigated the

differential toxicity of freshly emitted soot particles, aged soot particles, and soot particles coated by fresh and aged SOA material from biogenic and anthropogenic sources as well as detailed chemical and biological characterization of aerosols for assessment of health effects of toxic aerosols.

Anu Sabhlok

Title: Pushing Boundaries: 4th International Feminist Geography Conference (in multiple locations and online)

Name of the Organizers: Anu Sabhlok (co-organizer)

Brief description of the meeting: The international conference, Pushing Boundaries, acknowledged the ways physical, geopolitical, theoretical, imagined, emotional, biological and disciplinary boundaries inform and are informed by our research and feminist praxis. In some cases, these boundaries are prohibitive and reproduce exclusions. In others, feminist geography pushes against, critiques and traverses such boundaries, leading to greater insight driven by the imperative for social justice and inclusion at all scales.

The format of the conference also pushed against and extended geographical boundaries of time and space. The conference was hosted both in-person at University of Colorado Boulder, USA, with time zone-friendly programming for India, the UK, Canada, and at multiple sites including Uganda and Ecuador. In India, Anu Sabhlok co-organized (along with Prof. Anindita Datta from DU) a mentoring and writing workshop (titled Pushing boundaries: Holding space) for graduate scholars at the Sambhaavna Institute in Kandbari. (https://www.sambhaavnaa.org/programs/pushing-boundaries-holding-space-mentoring-and-writing-workshop-in-feminist-geography/)

Parth R. Chauhan

Title: 3rd Palaeoanthropology workshop & fieldschool. June 6 to 10, 2022.

Name of the Organizers: Parth R. Chauhan and Prabhin Sukumaran (CHARUSAT)

Brief description of the meeting: This event involved 14 student participants from all over India and began the distribution of pre-recorded lectures on specific topics in paleoanthropology. This was followed by field visits to multiple paleoanthropological sites in the central Narmada Valley, Madhya Pradesh. The students learned basic techniques in archaeological and paleontological surveys and observations as well as observing and describing Quaternary geological features. The work also involved methods in rock art documentation.

Title: Introduction to the Archaeology-Palaeontology-Anthropology. September 27, 2022.

Name of the organisers: Members of Paleoanthropology & Archaeology Lab (in absence of P.R. Chauhan)

Brief description of the meeting: Exhibit for Foundation Day. Collections of stone tools, fossils and posters were displayed for visiting students and public.

Title: 4th Paleoschool Field Workshop: Integrating field and lab results in Human-Climate interactions. December 30, 2022 to January 1, 2023

Name of the Organizers: Parth R. Chauhan and Prabhin Sukumaran (CHARUSAT)

Brief description of the meeting: This event involved three students and faculty from across India who had come to learn the basics of paleoanthropology and geochemistry. The field visit took place in the Tapi Valley of Maharashtra and also involved Prof. Stanely Ambrose as the guest-of-honor where he interacted with the participants and on-site discussions took place regarding methodology and interpretations in relation to prehistoric archaeology, vertebrate paleontology and Quaternary geochemistry.

Krishnendu Gongopadhyay

(i) **Title:** Knots, Algebra and Geometry

Name of the Organizers: Krishnendu Gongopadhyay (IISER Mohali), Mahender Singh (IISER Mohali), Madeti Prabhakar (IIT Ropar), Nikolay Abrosimov (Sobolev Institute of Mathematics), Tatyana Kozlovskaya (Tomsk State University), Timur Nasybullov (Sobolev Institute of Mathematics).

Brief description of the meeting: This international meeting took place in hybrid mode at the IISER Mohali during March 17–19, 2023, where the Indian participants meet together at IISER Mohali and international speakers delivered online lectures. The Indian participants include faculty and PhD students from IISER

Mohali and IIT Ropar, and most of the International participants were from Russia. The meeting took place in honour of Prof. Valeriy Bardakov and Prof. Andrei Vesnin for turning 60 this year. It also marked a special event to commemorate the ongoing Indo-Russian projects at the IISER Mohali. The meeting focused on interactions between topology, geometry and algebra, specifically, from the point of view of low-dimensional topology.
Two group photographs are given below.

(ii) **Title:** NCM Instructional School for Teachers (IST): Complex analysis from a geometric viewpoint
Name of the Organizers: Prof. Krishnendu Gongopadhyay (IISER Mohali), Prof. Sanjay Pant (DDU College Delhi), Dr. Rajender Singh Rana (USERC)
Brief description of the meeting: The meeting took place at the District Institute of Education and Training (DIET) New Tehri, Uttarakhanad, June 13–24, 2022. The ISTs were started by NBHM in 2006. It was realised that there is a need to have separate instructional schools for mathematics teachers in colleges and universities since their background and needs are somewhat different from those of research scholars. These workshops are meant for presenting teachers broader and different perspectives on a particular topic. In

this IST, complex analysis from geometric perspective was discussed over two weeks of time. Participants included college and university teachers, and a few advanced research scholars across the country. The IST was jointly organized with the Uttarakhand Science Education and Research Centre (USERC), Dehradun.

(iii) **Title:** Geometry, Groups and Mathematical Philosophy --- an international conference.
Name of the Organizers: Prof. Krishnendu Gongopadhyay (IISER Mohali), Prof. S. A. Katre (Pune University)
Brief description of the meeting: The conference took place at the Bhaskaracharya Pratishthana, Pune during May 21–25, 2022. The conference was organized in honor of Professor Ravi S. Kulkarni's 80th birthday. The main aim of the conference was to celebrate the influence of Ravi S. Kulkarni in Mathematics. Kulkarni's pioneer work from 1968 until 1998 falls in the broad area of differential geometry. From 2000 onwards, Kulkarni has influenced a few curious directions in group theory whose ideas came from geometry. Kulkarni has also been interested in general mathematics, mathematical philosophy, and Indian knowledge system.

In the conference, flavours from all these areas that intrigued Prof. Ravi Kulkarni over the years were discussed. The speakers include reputed mathematicians across the globe, and many of them are his friends, colleagues and former students who had interacted with him on these topics over the years. The conference was delivered in hybrid mode, where all international speakers came online and Indian speakers participated at the Bhaskaracharya Pratishthana, Pune. Proceedings of the conference are available online on the following YouTube page:
https://youtube.com/playlist?list=PL3BgBm7R1xppoC4JooDaygE98chGLpPZn

(iv**) Title:** Young Mathematicians' Symposium (YoMathS)- 2022
Name of the Organizers: Dr. Jotsaroop Kaur (IISER Mohali), Dr. Chandan Maity (IISER Mohali), on behalf of the Department of Mathematical Sciences.
Brief description of the meeting: The meeting took place at IISER Mohali during May 6–7, 2022. This in-house symposium was a platform where the Ph.D. students and postdocs of IISER Mohali presented their research with short (30 mins) talks. Professor Jugal Verma (IIT Bombay) and Professor C. S. Rajan (Ashoka University) delivered keynote lectures of one hour each and enriched the young mathematicians with their expert comments. A group photograph is given below.

Mahender Singh
Title: Knots, Algebra and Geometry (online), 17--19 March 2023.
Name of the Organizers:

Dr. Mahender Singh (IISER Mohali), Dr. Nikolay Abrosimov (Sobolev Institute of Mathematics), Dr. Krishnendu Gongopadhyay (IISER Mohali), Dr. Tatyana Kozlovskaya (Tomsk State University), Dr. Timur Nasybullov (Sobolev Institute of Mathematics), Dr. Madeti Prabahakar (IIT Ropar)

Brief description of the meeting:

The conference centered around the interplay of topology, geometry, and algebra, with a special emphasis on low-dimensional topology. It also served as a commemoration of the 60th birthdays of esteemed professors Valeriy Bardakov and Andrei Vesnin. The event featured a diverse program comprising 15 renowned plenary speakers hailing from 9 different countries.

Ambresh Shivaji, Harvinder Kaur Jassal
a) **Title:** Vigyan Pratibha Workshop I (August 2022)
Name of the Organizers: Ambresh Shivaji, Amit Kulashretha
Brief description of the meeting: About 76 TGT science and mathematics teachers from KV and JNV attended the training workshop. The workshop lasted five days during which the teachers attended talks and learning unit training sessions.

b**) Title:** Vigyan Pratibha Workshop II (December 2022)
Name of the Organizers: Ambresh Shivaji, Amit Kulashretha
Brief description of the meeting: This was a follow-up workshop for the same set of teachers. It was attended by 63 teachers. They were introduced to new learning units and informed how to conduct them with interested students in their schools.

c) **Title:** XXV DAE-BRNS HEP Symposium 2022
Name of the Organizers: Ambresh Shivaji, Vishal Bharadwaj, Satyajit Jena, Kinjalk Lochan, Anosh Joseph, H. K. Jassal, K. P. Yogendran
Brief description of the meeting: DAE-HEP Symposium is one of the most important High Energy Physics events that takes place once every two years in India. Being 25th in its series, this time the symposium was attended by eminent physicists, scientists, postdocs and students with more than 600 participants. The latest results covering both the theoretical and experimental aspects of the HEP research were presented under 10 broad topics ranging from Astroparticle and cosmology to Higgs and top quark physics.

Anosh Joseph
Title: Nonperturbative and Numerical Approaches to Quantum Gravity, String Theory, and Holography 2022 (NUMSTRINGS 2022)
Name of the Organizers: David Berenstein (University of California, Santa Barbara, USA), Simon Catterall (Syracuse University, USA), Masanori Hanada (University of Surrey, UK), Anosh Joseph (IISER Mohali, India), Jun Nishimura (KEK Japan), David Schaich (University of Liverpool, UK), and Toby Wiseman (Imperial College London, UK)

Brief description of the meeting: The second edition of the program "Nonperturbative and Numerical Approaches to Quantum Gravity, String Theory, and Holography" aims to bring together theorists working in the areas of lattice field theory, string theory, and quantum gravity to discuss the state of the art nonperturbative methods and numerical approaches to tackle current and relevant problems in string theory and holography. The program via its strong pedagogical component aims also to build and grow a community of theorists in India who would contribute to work connecting nonperturbative field theories, string theory, supersymmetric/superconformal field theories, quantum black holes, gravity, and holography.

Jasjeet Singh Bagla
Title: Discussion Meeting on Regional Cooperation in Astronomy
Name of the Organizers: Jasjeet Singh Bagla

Brief description of the meeting: A meeting of astronomers and scientists from affiliated research areas from institutions in the region was organized to discuss the possibility of cooperation in teaching, mentoring and organizing joint activities like schools, workshops, conferences, etc. The meeting was in the hybrid mode with participation from IISER Mohali, Panjab University (Chandigarh), Thapar University (Patiala), Delhi University, Ashoka University (Sonipat), Central University Haryana, Central University Himachal, Kashmir University, etc. The meeting was organized on February 11, 2023.

Kamal P. Singh
Title: Structured Light-Matter Interaction and its Applications, Global Initiative for Academic Networks (GIAN) course: 20 January to 31 January, 2023.
Name of the Organizers: Kamal P. Singh

Brief description of the meeting: Nowadays, light is at the heart of our modern technologies to observe, understand and manipulate Nature, while our information network strongly relies on optical communication links. It's known since more than one century that light may carry spin angular momentum associated with its polarization degree of freedom and since then another source of angular momentum emerged and bloomed during the last two decades. Indeed, the light field can also carry orbital angular momentum associated with the spatial degrees of freedom. More specifically, light beams carrying phase singularities possess a nonzero azimuthal energy flow and are known as optical vortices. Such vortex beams carry non-zero orbital angular momentum and promise many applications, which include micromanipulation, microscopy, quantum information, or astronomical imaging.

Optical vortices have already started to revolutionize our way to tame light from atomic to macroscopic scales. Interestingly, the polarization and the spatial structure of a light beam may dependent one from each other, which refers to optical spin-orbit interaction. Though being a subtle effect, spin-orbit interaction of light occurs in scattering, diffraction, focusing and propagation of electromagnetic waves and its study has become an intense research field in optics and photonics in the recent years, and fundamental phenomena have already become commercial applications.
The lectures and tutorials have covered
- recent developments in the field of structured light-matter interaction with a focus on a particular kind of prime choice optical materials, liquid crystals.
-an exposure to new emerging frontier on generation, formalism and applications of structure carrying spin and angular momentum.
-strengthening of the theoretical concepts by classroom demonstration in manipulating light using table-top setups.
- introduction to the advance photonic devices exploiting properties of structured light.
-fundamental of liquid crystals as an ideal test bed for interaction of matter with structured light.
Faculties
Prof. Etienne Brasselet, University of Bordeaux, France and Prof. Kamal P. Singh IISER Mohali, India
Target audience was final year Integrated BS-MS, B. Tech, M. Sc, M. Tech or equivalents, PhD students and Postdoctoral scholars, faculties, researchers and engineers from tech companies.

Total number of attendees: 40

Kinjalk Lochan
Title: Observables in Quantum Gravity (23-25 March 2023)
Name of the Organizers: Kinjalk Lochan, K. P. Yogendran

Brief description of the meeting: This workshop was focussed on discussing the modern ideas in Quantum Gravity and observables therein. There were 15 invited talks apart from 3 institute colloquia in this workshop. Senior researchers from 11 different institutes/universities participated in this workshop.

Satyajit Jena

– **Local organizer XXV DAE-BRNS High Energy Physics Symposium, 2022, IISER Mohali, India**
– Member of the organizing committee Workshop on Hadron Physics 2023, NIT Jalandhar

Vishal Bhardwaj
Title: Belle Analysis Workshop 2022, 17-18 December 2022.
Name of the Organizers: Vishal Bhardwaj, Kinjalk Lochan

Brief description of the meeting:
The aim of the Belle Analysis Workshop (BAW) series is to bring together PhD students, postdoctoral fellows and faculty working with the Belle (II) experiment at various institutes in India into a common platform. The underlying physics was discussed during morning lecture sessions, which were followed by discussions on analysis tools and techniques in the afternoons, where each student speaks about their analysis as well as hardware and software-related activities they are involved in.

Yogesh Singh
Title: Frustrated Metals and Insulators
Name of the Organizers: F. Becca, S. Bhattacharjee, B. Lake, Y. Iqbal, Yogesh Singh, R. Thomale
Brief description of the meeting: Frustration, i.e., the intertwining of competing physical state formation tendencies, is a ubiquitous theme in contemporary condensed matter physics. The perspective of frustration applied to correlated electron systems promises to deepen and elevate understanding of a broad set of principles such as competing orders, quantum state entanglement, and criticality. The workshop "Frustrated Metals and Insulators" held at ICTS Bangalore between 5^{th} to 16^{th} Sept. 2022, aims at bringing together a diverse community of condensed matter researchers to push the state of the art and extend understanding towards a synergetic foundation of frustration phenomena in metals as well as insulators. The workshop's main goal was to facilitate the development of analytical and numerical methods to address aspects of frustration in electronic systems, and to intensify the dialogue between theoretical conceptualization and experimental realization.

8. Research Activities

8.1. Department of Biological Sciences

8.1.1. Summary of the research work

Anand Kumar Bachhawat

During this period Bachhawat's research group continued our work on the glutathione degrading enzyme ChaC1. As an enzyme, ChaC1 has a relatively high Km (~2 mM) towards its natural substrate, and therefore finding its inhibitors becomes very difficult. Given this limitation, a careful mapping of the active site has become necessary. In the current study, the enzyme-substrate complex was generated by docking glutathione with the modeled hChaC1 structure. Using a combination of in silico and wet lab approaches, the active site residues forming direct interactions with the substrate glutathione were identified and validated. Furthermore, the role of residues exclusively conserved in the ChaC family and forming the surface of the active site were also explored for their putative role in active site stabilization. Mutants of these residues have been analysed for their structural stability and interaction with the substrate through MD simulations and MMGBSA binding energy calculations. These findings were experimentally validated by assessment of their function through in vivo assays in yeast. The experimental evidence, along with the molecular modeling, suggest that residues 38'YGSL'41, D68, R72, E115, and Y143 are responsible for high-affinity binding of hChaC1 with the substrate/inhibitor, whereas the residues exclusive to the ChaC family are required for the structural stability of the enzyme and its active site. Such a characterization of essential active site and conserved residues is significant as a key step toward the rational design of novel inhibitors of the ChaC1 enzyme.

Arunika Mukhopadhaya

Mukhopadhaya's research group is interested in looking at how enteric-bacterial ligand modulate host cellular responses. Towards it, they have used outer-membrane proteins and toxins to study receptor co-ordination in the induction of inflammatory signaling. Further, their group have also tried to understand the mechanism of cell-death pathways induced by bacterial ligands to the target host cells.

Indranil Banerjee

In Banerjee's laboratory, they aim to advance the understanding of the infection mechanisms of medically-important viruses such as influenza A virus, SARS-CoV-2, and dengue. Employing a variety of techniques, including cell and molecular biology, high-content, confocal and super-resolution imaging, RNAi, biochemistry, CRISPR/Cas9-based genome editing etc., Their group investigate the molecular underpinnings of viral infection processes in the host cells. In their current research, they 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, they synthesized 22 additional DPUD-1 analogues and tested them against IAV and SARS-CoV-2. In addition to DPUD-1, their group 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. They 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), their group found that DPUDs blocked cellular entry of both the viruses. Further, they addressed whether DPUDs target host endocytic processes, which would consequently inhibit virus entry. They 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. Their 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, their 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, they 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, their group 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 a 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 their 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.

Jogender Singh

Singh's laboratory studies the physiological consequences of different cellular stresses and the adaptation strategies of cells against these stresses. The focus of their laboratory in the past year has been on understanding the physiological effects of reductive stress. Reductive stress, caused by an excess of antioxidants, is linked with several pathological conditions, including cancer and neurodegenerative diseases. However, the effects of reductive stress on cellular physiology remain poorly characterized. Using the nematode model C. elegans, their laboratory showed that thiol antioxidants such as dithiothreitol (DTT) and β-mercaptoethanol modulate the methionine–homocysteine cycle by upregulating an S-adenosylmethionine (SAM)-dependent methyltransferase, rips-1 (Gokul and Singh, eLife, 2022). Their group carried out genetic screens to understand how thiol antioxidants resulted in the upregulation of rips-1. They discovered that rips-1 is highly upregulated in mutants that have constitutive activation of the hypoxia response pathway. On the other hand, thiol antioxidants-mediated upregulation of rips-1 was fully blocked in mutants defective in hypoxia response. Their group demonstrated that reductive stress caused by thiol antioxidants, DTT and β-mercaptoethanol, activates the hypoxia response pathway, and the SAM-dependent methyltransferase rips-1 is one of the hypoxia response pathway genes. Singh's group further demonstrated that the activation of the hypoxia response pathway by thiol reductive stress is conserved in human cells. Finally, they showed that enhanced cellular oxygen consumption by thiol reductive stress creates hypoxia. These studies reveal an intriguing interaction between thiol-mediated reductive stress and the hypoxia response pathway.

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 fourteen years or so, Chattopadhyay's research group have been studying the structure-function mechanisms of distinct classes of bacterial PFTs. In the past year, they have continued their research in the same director. Their 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, Vibrio parahaemolyticus Thermostable Direct Hemolysin, and Listeriolysin O from Listeria monocytogenes.

Kuljeet Sandhu
Kuljeet's group has been trying to decipher the evolutionary implications of genomic alterations in vertebrates. Their recent work highlighted: i) the adaptive significance of genomic rearrangements in acquiring cancer resistance in mammals; ii) the genetic basis of regressive phenotypes in blind cave-fishes.

Lolitika Mandal
Mandal's research group has been working on several projects that intends to unravel the signalling and metabolic requirement of stem cells/ progenitors and their niches. Using molecular genetic approaches their group have been striving to decipher the signaling crosstalk between different stem cell compartments during development and disease using Drosophila as well as human cell lines.

Mahak Sharma
The primary focus of Sharma's 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. Their group is 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 in our survival, as reflected by more than 50 lysosomal storage diseases caused due to defects in functioning of this organelle. Their 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, they have identified a new role of a recycling endosomal protein RUFY1 in lysosome function. Their group have found that RUFY1 interacts with small G protein Arl8b and facilitate normal distribution of receptors that mediate the trafficking of lysosomal hydrolases. In RUFY1-depleted cells, they find that lysosome function is impaired. Their 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. This research work was published in October 2022.

Manjari Jain
Time itself is a limited resource, as a result, in social animals, there is often a trade-off between the how much time is allocated to behaviour required for individual sustenance and those that are required for coordinating group-level activities as well as maintaining group stability. Jain's research group has been examining social behaviour in Jungle Babblers (*Argya striata*). Towards this they worked on how Jungle Babblers partition their time across various behaviours. Their findings from the long-term activity budget studies suggest that Jungle Babblers devote up to 30% of their time towards social behaviours. The proportion of time spent on various behaviours also varied across diel and seasonal scales highlighting the impact of environmental factors.

Another line of work focussed on bat-plant mutualism and the chemical ecology of foraging behaviour. Towards this their group examined the foraging behaviours of three species of fruit bats (*Pteropus giganteus, Cynopterus sphinx and Rousettus leschenaulti*). They also examined interspecies interactions and fruit dispersal mediated by these bats for an economically important plant species *Madhuca indica*. They found that the larger bats that are capable of flying large distance actually foraged *in-situ* thereby having a limited role in the seed dispersal of Mahua fruits. On the other hand, the smaller bats exhibited ex-situ feeding, thereby provided effective dispersal services to the plant. Their group also uncovered the chemical cues that mediate fruit extraction by bats (done in collaboration with Prof. Vinayak Sinha's group at the department of EES). They found that fruits in pre-dispersal and dispersal stage differed from each other in the concentration of Volatile Organic Compounds (VOC) but not in the composition of VOCs. These findings shed light on the sensory ecology of fruit bats.

Figure: *Ex-situ* feeding and dispersal of Mahua (*Madhuca indica*) fruit by *Cynopterus sphinx*

N G Prasad

Prasad's group continues to research on the core areas of life-history evolution, intersexual conflict and evolutionary ecology of immune response. Their group's work has yielded new insights into the effects of long term selection on the evolution of male mating rates and mate discerning ability. They have established the role of individual susceptibility on terminal investment decisions in fruit flies. Their work has established that the cost to coevolution with pathogens might not be very high and that at least in the short term, co-evolution may resemble an arms race rather than a red queen process.

Purnananda Guptasarma

Guptasarma's research group continued to research and engineer the enzymatic behaviour and mechanisms of (i) cutinases/esterases capable of degrading polyethylene terephthalate; (ii) amylases/glucanotransferases capable of transferring glucose between malto-oligosaccharides; (iii) beta-glucosidases capable of converting cellobiose into glucose; and (iv) various endoglucanases and cellulases. Further, their group continued to research and engineer the nature of interactions between dockerin and cohesion domains of proteins that assemble into cellulosomes. In addition, they also continued to research and engineer the nucleoid-associated proteins of bacteria; in particular, HU and Dps. Numerous important findings made during this time were published, including (A) a novel enzyme synergy-based mechanism for the conversion of polyethylene terephthalate into pure terephthalic acid, (B) a novel finding concerning how HU and Dps engage in liquid-liquid phase separation with DNA to cause compaction of DNA into condensates mimicking domains present within the nucleoids of bacteria, and (C) a study demonstrating that DNA packaging proteins have evolved to avoid the use of tryptophan in their amino acid sequences in order to avoid second-hand photooxidative damage to DNA that cannot be easily repaired in buried chromosomal locations that are inaccessible to protein turnover machinery.

Rachna Chaba

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

LCFAs are an energy-rich nutrient source for several bacteria. Although the LCFA metabolic pathway has been extensively studied, especially in E. coli, the interconnection of LCFA metabolism with other cellular processes remained unexplored. They 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. Further, their group 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. Their

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. They 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. Their group 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, they have identified four genetic variations amongst natural E. coli isolates which alter the sensitivity of the repressor to D-galactonate. Chaba's research group currently investigating the effect of these variations on the growth of E. coli isolates in D-galactonate. Further, their work suggests that D-galactonate metabolism is under complex regulation; it is regulated by players besides DgoR. Their group is investigating the interplay between these regulatory components in governing D-galactonate metabolism and understanding their physiological relevance.

Rajesh Ramachandran
Ramachandran's lab has identified common signatures of tissue regeneration in zebrafish and axolotl model with special focus on caudal fin of zebrafish and tail and limb of axolotl. They also characterized the involvement of tumour suppressor protein PTEN in guiding an injured retina to full recovery in zebrafish. Their group is characterizing the importance of long non-coding RNAs such as malat1, epigenetic factors such as Ezh2, CTCF and MBD3, Chromatin-associated factors such as Yy1 protein during retina regeneration. Ramachandran's group also developed a faster method of inducing hyperglycemia similar to Type-2 diabetes in zebrafish and axolotl models, which debilitates their tissue regeneration capabilities.
Their group have obtained 2 research grants in this financial year. One from DBT and another from ICMR. The first one is for exploring the NuRD complex functions during retina regeneration while the latter is for characterizing a human congenital glaucoma-associated protein in zebrafish and mice models.

Ram Yadav
Yadav's research group work on the NAC062 transcription factor revealed that it prefers to bind CTTTTGGTGTAAG cis-motif in vitro. In the 5' CTT is conserved in this cis-element, while in the 3' AAG is also conserved. Most of the targets their group has found in the RNAseq data carry this motif in their promoters. So far, Yadav's group have confirmed, based on the EMSA assays, that NAC062 binds to AHK4, DREB2A and DREB2B. Their work on auxin signalling revealed the synergistic role of auxin transport with biosynthesis in lateral organ formation.

Rhitoban Ray Choudhury
The Choudhury's lab has now successfully sequenced the genome of Nasonia oneida. This is the fourth species within the wasp genus Nasonia and is a model system on which several Ph.D. and MS students are working. A collaboration has been established with Auburn University and the University of Rochester, where several groups have now pooled their resources to finish annotating the genome for publication. Alok Tiwari, a Ph.D. student, has published a study showing that the widely prevalent endosymbiont, Wolbachia, elicits a fitness cost on their Nasonia vitripennis host. The collaborative project on the wasp, Polistes wattii, has now been awarded a CRG grant to study its behaviour and ecology.

Sadhan Das
Mechanistic insights into epigenetic layers involved in 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. In order to study the effect of diabetes on wound healing, Das's research group bred and characterized the Type 2 diabetes mouse model (db/db) and the littermate control mice (db/+) at IISER-Mohali. They genotyped the pups obtained after breeding and confirmed the db/db, db/+ and WT mice from the littermates. Their physiological data showed that diabetic mice have higher blood glucose levels and body weight as compared to the control mice. They used these well-characterized mice for further experiments. Their group performed FACS analysis of splenic cells from db/db mice and control (db/+ mice). Results showed a higher percentage of macrophages (F4/80), and pro-inflammatory monocytes (Ly-6C-low) and a lower percentage of anti-inflammatory (Ly-6C-high) monocytes in db/db mice as compared to the db/+ mice, suggesting the proinflammatory nature of the monocyte and macrophage populations in diabetic mice and their possible role in the delayed wound healing. Thir research group first focused on establishing whether they can produce M1 and M2 macrophage populations ex vivo from mouse splenic monocytes. Splenic monocytes are deployed to the site of an injury, and their group wanted to recapitulate the process of M1 and M2 macrophage differentiation that occurs during normal wound repair. They isolated splenic monocytes, differentiated into macrophages and used various stimulants to induce M1 and M2 macrophage populations. Their previous data (last year's progress report) showed that TNF-α treatment induced the M1 phenotype and TGF-β1 induced the M2 phenotype, respectively, in the splenic macrophages isolated from db/db and db/+ mice. Moreover, they observed a higher expression of M1 marker iNOS in db/db mice compared to the control (db/+) upon treatment with M1 stimulants (IFNγ + LPS). Whereas a lower expression of M2 marker Ym1 was observed in db/db compared to db/+ after treatment with M2 stimulant (TGFβ + IL4). These results suggest that splenic monocytes from diabetic mice differentiated into M1 macrophages *ex vivo* exhibit higher levels of pro-inflammatory markers. After the successful establishment of M1 and M2 stimulants and preliminary results from db/db mice indicating macrophage dysfunction in diabetes, their group wished to identify the full-spectrum of coding and non-coding genes. We performed stranded RNA-seq with splenic M1 and M2 macrophages isolated from diabetic (db/db) and control mice (db/+) (n=2). They confirmed that treatment with M1 stimulants (IFNγ + LPS) leads to a higher expression of M1 marker Arg2 in both control (db/+) and db/db mice. However, a stronger induction of Arg2 expression was observed in db/db mice compared to the control (db/+) upon treatment with M1 stimulants (IFNγ + LPS). They further confirmed that treatment with M2 stimulants (TGFβ + IL4) leads to higher expression of M2 marker Ym1 in both db/+ and in db/db mice compared to untreated macrophages. They also observed a lower induction of M2 marker Ym1 in in db/db mice compared to the control (db/+) macrophages upon treatment with M2 stimulants. Das group's RNA-seq analysis revealed that M1 and M2 macrophages isolated from both db/db and db/+ control mice correlated well with each other in the same treatment group. In order to find the phenotypes associated with macrophage dysfunction, they identified differentially regulated genes by comparing treatment groups as well as diabetic mice with controls for each macrophage phenotype. Their group performed GSEA analysis and found that a number of genes upregulated in M1 macrophages are associated with inflammation. They also observed differential expression of genes involved in the wound healing across the M1 and M2 phenotypes. In order to identify differentially expressed lncRNAs associated with impaired M1 and M2 phenotypes in db/db they performed in-depth transcriptomic analyses. Following this strategy, their group identified the top five differentially expressed wound-regulated lncRNAs. They found one such important novel lncRNA (MSTRG 21350) which is upregulated in db/dbM2 as compared to the db/db M1. The nearby gene Ccr5 (C-C Motif Chemokine Receptor 5) is also differentially regulated (db/db M2 vs db/db M1), suggesting possible cis-regulation by lncRNA MSTRG 21350. Moreover, MSTRG 21350 is also upregulated in the post-wound tissues compared to the control. Their group also found MSTRG 21350 lncRNA to be conserved in human PBMCS which is known as CCR5AS. They are currently characterizing these novel lncRNA and investigating their functional implications in normal and delayed wound-healing. In addition,

they are also investigating the functional roles of enhancers/super-enhancers and transcription factors in diabetic wound healing-associated gene expression and macrophage phenotypes.

Samarjit Bhattacharyya

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

An essential requirement for the 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 the 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 apparent significance of this process, we still know very little about the protein machineries that mediate the 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 Bhattacharyya's 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. Their laboratory employs multi-disciplinary approaches ranging from biochemistry and molecular biology to cell biology, imaging, and mouse genetics to address these questions.

Samrat Mukhopadhyay

Mukhopadhyay's work has intensely focused on a fascinating behavior of Intrinsically disordered proteins (IDPs), namely, liquid-liquid phase separation resulting in the formation of membrane-less organelles. Cells contain specialized (conventional) membrane-bound organelles that compartmentalize cellular constituents and regulate cellular biochemistry. A growing body of current research reveals there is also an alternate mechanism of intracellular compartmentalization and organization via liquid-liquid phase separation of highly flexible IDPs and nucleic acids into noncanonical membrane-less organelles. This process is akin to oil de-mixing from vinaigrette or atmospheric moisture condensing into dew drops. Highly dynamic intracellular liquid-like condensates act as on-demand organelles that are formed and dissipated depending on the cellular requirements. These functional liquid droplets can undergo aberrant irreversible phase transitions into solid-like amyloid aggregates associated with a range of debilitating neurogenerative diseases, including Alzheimer's disease, Amyotrophic Lateral Sclerosis (ALS), Frontotemporal Dementia (FTD), and so forth. These studies were published in prestigious journals such as PNAS (Proceedings of the National Academy of Sciences of the United States of America), Nature Communications, Journal of Biological Chemistry, and so forth.

Santosh B. Satbhai

How plant root development and growth is influenced and regulated by environmental signals is a major research question of Satbhai's research group. In particular, they focus on the effects of nutrient starvation, high temperature, cold temperature, salinity and drought on root system architecture (RSA) using Arabidopsis plants. Their group is 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 evolutionarily conserved, they also aim to translate knowledge gained from Arabidopsis to crop plants such as wheat, tomato and rice.

Sharvan Sehrawat

In continuation of Sehrawat research group's efforts in antibody engineering, they have selected single domain antibodies against DenV from an in-house generated phage display library. Their group then characterised and modified these antibodies for assessing their biophysical and immunological activities. Finally, they demonstrated the neutralizing potential of such antibodies against DenV in vitro as well as by using an animal model. Furthermore, their group have shown Rab8a, a small GTPase, as the key regulator of differentiation and functionality of dendritic cells (DCs) in the aging host and that Rab8a reconstituted DCs regained the lost functions associated with these cells. This study not only established the key role of Rab8a in aging DCs but also as a target for improving immunity in an aging host.

Shashi Bhushan Pandit

The process of Alternative Splicing (AS) generates variably spliced mRNAs encoding proteins of potentially variable function(s) and contributes to the proteome diversity in eukaryotes. About 95% of human genes are alternatively spliced with at least two alternatively spliced isoforms. Most knowledge of AS events from combined experimental and computational studies are documented in databases such as NCBI, Ensembl and UCSC genome browser. In addition, more AS events, such as cell/tissue specific, are being discovered from high-throughput RNAseq studies. In order to address the deluge of information on AS events and enable the systematic study of various organism/lineage-specific preponderance of splicing events and its consequences on protein sequence/structure necessitates an uniquely identifying exons and annotating them with protein-associated features. Pandit's research group have developed a novel nomenclature ENACT to annotate exon that embeds observed features of AS from known alternatively spliced transcripts. An exon is assigned a unique descriptor comprising of 6-character, where each of them characterizes exon features. The characters of exon descriptor in the order from left to right represents: a) amino acid coding status of exons in transcripts such as coding/non-coding, b) amino acid sequence variation of exons having same genomic coordinates c) inclusion frequency of exons categorized as constitute (present in all transcripts), or constitute like and alternate, d) the relative position of exon in a gene, e) 5', 3' or both splice site variations, and the last character encodes f) count of splice site variations observed in the previous position. Their group annotated exons from five model organisms and documented them in a database ENACTdb. At the level of isoforms, unique exon descriptor facilitates visualization or representation of each isoform as a combination of exon descriptors, easy alignment of transcripts using exons as anchors, and investigation into types of AS events within or across genomes. Most importantly, exon descriptors can be documented in relational databases, allowing fast and easy computational analyses to investigate alternative splicing variations within a genome or comparative analyses across genomes. Their group compares centrality measures of a protein contact network of wild-type and single residue mutant proteins and found that most of the network features remain unchanged in single residue mutant proteins.

Shravan Kumar Mishra

In surroundings with fluctuating nutrition, the cell must quickly adjust its ability to assimilate nutrients through its membranes. In nutrient-limiting conditions, transporters synthesized in the ER are trafficked to the plasma membrane through Golgi. Once nutrients are replenished, excess transporters get degraded in lysosomes. Deubiquitinating enzymes (DUB) controlling trafficking from the Golgi are likely to exist but remain unknown. Mishra's research group study one such DUB module operating from the Golgi.

The ubiquitin family of proteins (UBL) regulates most cellular activities by modifying the function of their targets. Sde2 is a recent inclusion to this family. It is synthesized as an inactive precursor containing a UBL and a C-terminal domain (Sde2-C). Two DUBs, Ubp5 and Ubp15, cleave the UBL thereby activating Sde2-C into a splicing factor. Sde2-C with Cactin and Tls1 enables spliceosomes to excise introns with branchpoint-distant 3'-splice sites. These splicing regulators promote gene expression and alternative splicing of targets functioning in intracellular trafficking and heterochromatin formation. Interestingly, a key splicing target Ftp105 is a Golgi-specific anchor for the DUB Ubp5. Ftp105-Ubp5 complex controls the trafficking and degradation of membrane transporters. Thus, cell nutrition is managed by the regulated expression of a Golgi-localised DUB anchor through intron-specific splicing in the nucleus.

Sudip Mandal
Mandal's laboratory aims to understand the metabolic control of fundamental cell biological processes during normal and pathophysiological conditions. Their group employ advanced genetic and molecular tools available in the model organism, *Drosophila melanogaster*, to address their questions. In one of the projects, their group have been successful in determining how altered metabolic conditions resulting from diet-induced type 2 diabetic conditions impact the cardiac function and behaviour of adult cells. In a separate project, they have unravelled the mechanistic basis of an otherwise unknown process by which the metabolic state of the differentiating blood cells defines the hematopoietic niche in the larval lymph gland of *Drosophila*.

Vidya Devi Negi
The area of Negi's research lab focuses on Host-pathogen interaction and immune modulation, microbial evolution and bacterial infection and its impact on host development by using Salmonella and Caenorhabditis elegans as model organism. Negi was able to set up the lab which is fully functional now with the help of the Institute and the students have started the research work in the lab.

8.1.2. Visits of the faculty members

Anand Kumar Bachhawat
- JNCASR Nov 2022
- Saha Institute Nov 2022

Manjari Jain
- Department of Environmental Studies, University of Delhi 23rd June 2022;
- National Brain Research Centre 18th October 2022;
- University of South Bihar 9th – 11th November 2022;
- IISER Kolkata 20th – 22nd January 2023;
- IISER Trivandrum 17th – 19th March 2023;

Samrat Mukhopadhyay
- Tokyo University of Science, Japan (March 2023)
- Nanyang Technological University, Singapore (March 2023)
- University of California San Diego, USA (February 2023)
- Scripps Research Institute, California, USA (February 2023)
- Federal University of Rio de Janeiro, Brazil (September 2022)
- EMBL (European Molecular Biology Laboratory), Heidelberg, Germany (July 2022)
- Gordon Research Conference on Intrinsically Disordered Proteins that was held in June 2022 in Les Diablerets, Switzerland

Sharvan Sehrawat
- Sharvan Sehrawat. National Workshop and brain storming session "Strategy on control and Eradication of Formidable Transboundary Viral diseases of Livestock- FMD, LSD and ASF". National Academy of Veterinary Sciences (India) and Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana. November 14-15, 2022.

Shravan Kumar Mishra
- Shravan Kumar Mishra visited IISER Bhopal, March 23-25, 2023

8.1.3. Talks delivered

Anand K Bachhawat
- Anand K Bachhawat: Glutathione: New Discoveries on an old molecule, JNCASR, November 17, 2022
- Anand K Bachhawat Glutathione degradation Frontiers in Modern Biology - 2023 (FIMB – 2023), IISER Kolkata, Jan 20-22
- Anand K Bachhawat Regulation of one carbon metabolism , BESCON, IIT Kharagpur Bose Institute , Nov 4-6, 2022

— Anand K Bachhawat Glutathione degradation Saha Institute Novemeber 2022
— Anand K Bachhawat Glutathione degradation: the search for new pathways and their inhibitors Recent trends in Biomolecules and therapeutics, Dept of Biophysics, PU March 23-24, 2023

Arunika Mukhopadhaya and lab members

— Arunika Mukhopadhaya: Modulation of Host Cellular Responses by Gram-negative Enteric Bacterial Ligand Vibrio cholerae Outer-membrane protein OmpU.: 91st Annual meeting of the Society of Biological Chemists (India). Dates- 8-11th December, 2022

Indranil Banerjee

— Indranil Banerjee: Diphenylurea derivatives broadly inhibit SARS-CoV-2 and influenza A virus by perturbing viral endocytic trafficking, IUBMB Focused Meeting on Biochemistry & Molecular Biology of RNA Viruses, RCB Faridabad, Date: 15/11/2022
— Indranil Banerjee: Blocking enemy at the gates: novel endocytosis inhibitors broadly restrict SARS-CoV-2 and influenza A virus, International Conference on Virus Evolution, Infection and Disease Control (ICVEIDC), University of Hyderabad, Date: 17/12/2022
— Indranil Banerjee: Role of autophagy in influenza A virus infection, Autophagy India Network Meeting, CSIR-IMTECH, Chandigarh, Date: 18/02/2023

Jogender Singh

— Jogender Singh. Dithiothreitol activates the hypoxia response pathway. 3rd India C. elegans meeting, Trivandrum, September 27-30, 2022.
— Jogender Singh. Inhibition of the UFD1-NPL4 complex triggers digestive inflammation in C. elegans. 6th International Conference on Model Hosts, Rhodes, Greece. October 01-06, 2022.
— Jogender Singh. Reductive stress by thiol antioxidants activates the hypoxia response pathway. BITS Pilani, Pilani Campus, Rajasthan. December 10, 2022.
— Jogender Singh. Thiol reductive stress activates a functional hypoxia response pathway. Young Investigator Meeting 2023 at Gandhinagar (Ahmedabad). February 13-17, 2023.

Kausik Chattopadhyay

— Kausik Chattopadhyay. Bacterial Pore-Forming Toxins: Structural Basis of Membrane-Damaging Virulence Mechanism. NIPER-PHARMACON2022, NIPER Mohali. November 10-12, 2022
— Kausik Chattopadhyay. Curious case of a membrane-damaging b-barrel pore-forming toxin: the w(hole) story. 91 Annual Meeting of Society of Biological Chemists (India), at Biswa Bangla Convention Centre, Kolkata, INDIA. December 8-11, 2022..

Lolitika Mandal and lab members

— Lolitika Mandal, Introduction to Drosophila. Workshop-organized by Aligarh Muslim University, UP, 6th Nov 2022.

Mahak Sharma and lab members

— Mahak Sharma. Mechanisms regulating Subcellular Location & Function of Lysosomes. Regional Center for Biotechnology (RCB), Faridabad. April 8th 2022
— Mahak Sharma. Regulation of lysosome positioning and cargo trafficking by small G protein Arl8b India Investigator Network online webinar. April 14th 2022
— Mahak Sharma. Mechanisms regulating Location and Function of Lysosomes. EMBO workshop on Birth and fission of cellular compartments. 25 – 29 July 2022
— Mahak Sharma. Understanding TECPR2 function in endocytic transport. Autophagy India Network (AIN) meeting, CSIR IMTECH, Feb 17-19 2022

Manjari Jain and lab members

— Manjari Jain. Decoding the babbling of Jungle Babblers: a study on vocal repertoire. International Society for Behavioural Ecology Congress, Stockholm, Sweden, July 2022
— Manjari Jain. Plenary lecture on Bioacoustics in ecology, behaviour and evolution. Full-Stack Bioacoustics. Lorentz Centre, Leiden, Netherlands, August 2022
— Manjari Jain. Understanding complex communication in avian vocalizations. National Brain Research Centre, October 2022.
— Manjari Jain. Behaviour and Bioacoustics as tools to study bird species ecology. National Symposium on Avian Biology, CUSB, Gaya, November 2022
— Manjari Jain. Usefulness of field studies. Vigyan Pratibha lecture, IISER Mohali, December 2022

— Manjari Jain. Understanding complex communication in avian vocalizations. Frontiers in Modern Biology 2023, IISER Kolkata, January 2023
— Manjari Jain. Vocal complexity and linguistic laws in avian vocalizations. Frontiers Symposium in Biology, IISER Thiruvananthapuram, March 2023
— Sonam Chorol (PhD scholar). Eavesdropping on social call in congeneric Babbler species. International Society for Behavioural Ecology Congress, Stockholm, Sweden, July 2022
— Kanika Rajput (PhD scholar). Spatial use in a cooperatively breeding passerine, Jungle Babbler. National Symposium on Avian Biology, CUSB, Gaya, November 2022
— Manjari Jain. Unravelling the biology of a social passerine. Ahmedabad University, April 2022
— Manjari Jain. Decoding animal behaviour. Early Bird, Nature Conservation Foundation, May 2022
— Manjari Jain. Chirping crickets and babbling babblers. IISER Behrampur, July 2022
— Manjari Jain. Bioacoustics in ecology. National workshop of ecological study design and faunal survey. Zoological Society of Kolkata, December 2022
— Manjari Jain. Communicative complexity in avian vocalizations. National Science Day lecture, IISER Bhopal, February 2023

N G Prasad and lab members

— Tsering Choton. 48 hours of solitude. European Society for Evolutionary Biology Conference 2022, Prague. 14- 19 August, 2022
— HArisankar Durga. Male mate choice evolves as a by-product of adaptation to larval crowding in Drosophila melanogaster. European Society for Evolutionary Biology Conference 2022, Prague. 14-19 August, 2022

Purnananda Guptasarma

— Purnananda Guptasarma. Newly-discovered behavior in the bacterial histone-like protein, HU. International conference on Celebrating proteins on the Birth Centenary of Dr. G. N. Ramachandran, MS University of Baroda, 3-4 March, 2023.

Rachna Chaba

— Rachna Chaba. Long-chain fatty acid metabolism is intricately interconnected to the Cpx envelope stress response. Microbial Stress Response, Gordon Research Conference, South Hadley, MA, USA. 17th-22nd July, 2022
— Rachna Chaba. Long-chain fatty acid metabolism is intricately interconnected to the envelope redox status in E. coli. Indian Institute of Science, Bangalore, India. 29th-30th November, 2022
— Rachna Chaba. Regulation of D-galactonate metabolism in Escherichia coli. Biological Transactions: From molecules to organisms (BTMO 2023), Indian Institute of Science, Bangalore, India. 17th-21st January, 2023.
— Rachna Chaba. Complex regulation of D-galactonate metabolism in Escherichia coli. EMBO conference on Bacterial Morphogenesis, Survival and Virulence, Goa, India. 6th-10th February, 2023.

Ram Yadav and lab members

— The transcription factor NAC062/NTL6 influences shoot growth by regulating cytokinin signal homeostasis. 20-24 June 2022 ICAR 2022

Rhitoban Ray Choudhury

— Rhitoban Ray Choudhury: The Nobel Prize in Physiology and Medicine, IISER Mohali, 25/03/2023
— Rhitoban Ray Choudhury: Roles of the mycobiota and microbiota in maintaining weed-free agriculture in Odontotermes obesus. 26th Punjab Science Congress. Sri Guru Granth Sahib World University, Fatehgarh Sahib, 9/02/2023
— Rhitoban Ray Choudhury: Darwin's Theory of Evolution: Importance and Implications. `History of Ideas' Series in IIT Gandhinagar. 10/09/2022.

Sadhan Das and lab members

— Sadhan Das, Title of the talk: Epigenetic regulators and their translational potential in vascular complications of diabetes, Name of the Conference/Institute: Advances in Cardiovascular Medicine and Research-2023 (ACMR-2023)/PGIMER, Chandigarh, Dates: 18/02/2023
— Riya Madan, Title of the talk: Role of enhancers in diabetic wound healing, Name of the Conference/Institute: Advances in Cardiovascular Medicine and Research-2023 (ACMR-023)/PGIMER, Chandigarh Dates: 16/02/2023

Samarjit Bhattacharyya

— Samarjit Bhattacharyya-Title of the talk: Glutamate receptor signaling and trafficking: Implications in the normal and diseased brain. Invited talk at the Asian-Pacific Society for Neurochemistry (APSN) 2nd online school on "Modelling Brain Disorders" on December 22, 2022.

Samrat Mukhopadhyay

Some of the selected talks given by Prof. Samrat Mukhopadhyay are given below:

— Invited lecture at the meeting of the Chemical Society of Japan, Tokyo University of Science (March 2023)
— Invited at talk at the meeting “Phase Separation Regulated Life, In and Outside of Cells” held at Nanyang Technological University, Singapore (March 2023)
— Invited seminar at the University of California San Diego (February 2023)
— Invited seminar at the Federal University of Rio de Janeiro, Brazil (September 2022)
— Invited talk at the Meeting of the Brazilian Society for Biochemistry and Molecular Biology in Águas de Lindóia, São Paulo, Brazil (September 2022)
— Invited seminar at the EMBL (European Molecular Biology Laboratory), Heidelberg, Germany (July 2022)
— Invited talk at the Gordon Research Conference on Intrinsically Disordered Proteins that was held in June 2022 in Les Diablerets, Switzerland

Santosh B. Satbhai

— Santosh B. Satbhai: Title: A bZIP transcription factor, HY5 is required for iron deficiency response in Arabidopsis thaliana. 20th International Symposium on Iron Nutrition and Interactions in Plants (ISINIP) 2022, Reims, France. July 4 to 8, 2022.
— Santosh B. Satbhai: Title: HY5: A Pivotal Regulator of Iron Deficiency Signaling in Plants International Conference on Food and Nutritional Security (iFANS) 2023, NABI, Mohali 9th January, 2023
— Santosh B. Satbhai: Title: HY5: A Pivotal Regulator of Iron Deficiency Signaling in Plants. Current Trends and Future Prospects of Plant Biology (CTFPPB-2023), University of Hyderabad. 23rd February, 2023.
— Samriti Mankotia: Title: Elongated Hypocotyl 5 (HY5) is required to maintain Iron homeostasis in Arabidopsis thaliana. International Conference on Food and Nutritional Security (iFANS) 2023, NABI, Mohali January 6-9, 2023..

Sharvan Sehrawat

— Sharvan Sehrawat. Robust anti-SARS-COV2 single domain antibodies. Invited lecture, Bharat Innovation, Research and Co-operative forum. At Department of Medical Biotechnology, Maharishi Dayanand University Rohtak. December 11, 2022.
— Sharvan Sehrawat. Neutralizing and diagnostic sdAbs : Viruses, toxins and beyond. Invited talk National Agribiotechnology Institute Mohali. Held on December 29, 2022.

Shashi Bhushan Pandit

— Shashi Bhushan Pandit-Title of the talk: Nature’s optimization of silk β-sheet nanocrystal sequence for optimal mechanical tensile strength and toughness, Name of the Conference/Institute: National Symposium cum workshop on Genome Informatics Dates: July 19-20 2022
— Shashi Bhushan Pandit- Title of the talk: Nature’s optimization of silk β-sheet nanocrystal sequence for optimal mechanical features Name of the Conference/Institute: CRICK Symposium on Theoretical Chemistry and Biology, Dates: 15 October 2022

Shravan Kumar Mishra

— Shravan Kumar Mishra. Ubiquitin-Like Regulators of Alternative Splicing. Panjab University Chandigarh. 11th November 2022.
— Shravan Kumar Mishra. Ubiquitin-Like Regulators of Alternative Splicing. IISER Bhopal. 11th November 2022. 24th March 2023.

Sudip Mandal

— Sudip Mandal. Metabolic regulation of cardiac ECM remodeling in Drosophila in health and disease. 2nd Subhas Mukhopadhyay e-Symposium - 30th West Bengal State Science & Technology Congress. January 15-17, 2023.

Vidya Devi Negi

— Invited talk at 3rd Worm Meeting Trivandrum, Kerala. Speaker Vidya Devi Negi, Title: Salmonella infection and C. elegans life cycle: an interesting perspective, Date: 27-30 September. 2022

8.1.4. Conferences attended by the researchers

Arunika Mukhopadhaya and lab members

— Yogesh Saxena : OmpU protein of Vibrio vulnificus engages various PRRs to induce heightened pro-inflammatory responses in murine macrophages, 44th All India Cell Biology Conference and International Symposium, Dates- 2-3, September, 2022

— Shashi Prakash Yadav: Modulation of intestinal epithelial cell responses and tight junction by Vibrio cholerae OmpU - 44th All India Cell Biology Conference and International Symposium, Dates 2-3 September 2022

— Sindhoora P:Vibrio cholerae cytolysin: potential connection between lipid metabolism, cell death and cell survival- 44th All India Cell Biology Conference and International Symposium Dates- 2-3, September, 2022

— Aakanksha Chauhan:Elucidating the mechanism of TDH-mediated immunological responses - 44th All India Cell Biology Conference and International Symposium, Dates- 2-3, September, 2022

— Shraddha Gandhi: Vibrio cholerae cytolysin activates dendritic cells through engagement of a novel assembly of pattern recognition receptors - 16th International Symposium on Dendritic Cells 2022 (DC2022), Cairns, Australia, Date - 9 to 13 October, 2022

— Sanjeev Routh:Understanding the role of LOX-1 in receptor signaling network induced by Vibrio cholerae OmpU in activation of macrophages - 91st Annual Meeting of the Society of Biological Chemists (India), Dates- 8-11 December, 2022

— Dwipjyoti Sarma: understanding the role of scavenger receptor CD36 in the modulation of dendritic cell responses upon activation with Vibrio cholerae OmpU - 91st Annual meeting of the Society of Biological Chemists (India), Dates- 8-11th December , 2022

Kausik Chattopadhyay

— Kausik Chattopadhyay. Bacterial Pore-Forming Toxins: Structural Basis of Membrane-Damaging Virulence Mechanism. NIPER-PHARMACON2022, NIPER Mohali. November 10-12, 2022

— Kausik Chattopadhyay. Curious case of a membrane-damaging b-barrel pore-forming toxin: the w(hole) story. 91 Annual Meeting of Society of Biological Chemists (India), at Biswa Bangla Convention Centre, Kolkata, INDIA. December 8-11, 2022.

Mahak Sharma and lab members

— Mahak Sharma. Mechanisms regulating Location and Function of Lysosomes. EMBO workshop on Birth and fission of cellular compartments. 25 – 29 July 2022.

— Shalini Rawat. RUFY1 interacts with Arl8b on recycling endosomes and acts as a dynein-dynactin adapter to regulate CI-M6PR retrograde trafficking. EMBO workshop on Birth and fission of cellular compartments. 25 – 29 July 2022.

Manjari Jain and lab members

— Title of the talk. Name of the Conference. Dates , Manjari Jain. Talk. Decoding the babbling of Jungle Babblers: a study on vocal repertoire. International Society for Behavioural Ecology Congress, Stockholm, Sweden 28th July – 2nd August 2022

— Manjari Jain. Plenary lecture on Bioacoustics in ecology, behaviour and evolution. Full-Stack Bioacoustics. Lorentz Centre, Leiden, Netherlands, 1st – 5th August 2022

— Manjari Jain: Behaviour and Bioacoustics as tools to study bird species ecology. National Symposium on Avian Biology, CUSB, Gaya, 9th – 11th November 2022

— Sonam Chorol (PhD scholar). Eavesdropping on social call in congeneric Babbler species. International Society for Behavioural Ecology Congress, Stockholm, Sweden, 28th July – 2nd August 2022

— Kanika Rajput (PhD scholar). Spatial use in a cooperatively breeding passerine, Jungle Babbler. National Symposium on Avian Biology, CUSB, Gaya, 9th – 11th November 2022

Purnananda Guptasarma and lab members

— Purnananda Guptasarma. Newly-discovered behavior in the bacterial histone-like protein, HU. International conference on Celebrating proteins on the Birth Centenary of Dr. G. N. Ramachandran, MS University of Baroda, 3-4 March, 2023.

— Arpita Sarkar. Exploring the novel mechanistic aspects of function of a hyperthermophile two-site exo-amylase-cum-glucanotransferase. 91st Annual meeting of the Society of Biological Chemists India, Kolkata, 8-11 December 2022.

— Snehal Waghmare. Study of cohesin-dockerin interactions and their use to make mini-cellulosomal simulacrums. 44th Indian Biophysical Society IBS 2022. 30 March- 1 April, 2022.

— Snehal Waghmare. Understanding cohesin-dockerin interactions forming minicellulomal complexes from Clostridium thermocellum and their implications in enzymatic biomass degradation. Molecular Biophysics Unit @ 50 Symposium. Indian Institute of Science, Bangalore. 23- 25 January, 2023.

— Arpita Mrigwani. Exploiting synergistic division of labor to create more efficient polyethylene terephthalate (PET) degradation systems using pairs of thermostable PET-hydrolases. 10th International Congress on Biocatalysis (Biocat2022). University of Technology (TUHH), Hamburg, Germany. 28 August -1 September, 2022.

— Arpita Mrigwani. 'Synergistic action of thermostable hydrolases for efficient Polyethylene terephthalate (PET) degradation. Molecular Biophysics Unit @ 50 Symposium. Indian Institute of Science, Bangalore 23- 25 January, 2023.

— Archit Gupta. Bacterial Nucleoid associated protein mediated Liquid-Liquid phase separation of the Nucleoid. EMBO | EMBL Symposium. Cellular mechanisms driven by phase separation. EMBL Heidelberg and Virtual. 9 - 12 May 2022.

— Archit Gupta. Buried chromosomal proteins lack Tryptophan to prevent photo-oxidative damage of DNA. EMBO Workshop. Evo-chromo: Evolutionary approaches to research in chromatin. Aarhus, Denmark. 11 – 14 May 2022

Archit Gupta. Bacterial Nucleoid associated protein mediated Liquid-Liquid phase separation of the Nucleoid. The 45th Indian Biophysical Society Meeting, NCBS, Bangalore. 27-29 March 2023.

Rachna Chaba and lab members

— Rachna Chaba. Talk: Long-chain fatty acid metabolism is intricately interconnected to the Cpx envelope stress response. Microbial Stress Response, Gordon Research Conference, South Hadley, MA, USA. 17th-22nd July, 2022

— Rachna Chaba. Talk: Long-chain fatty acid metabolism is intricately interconnected to the envelope redox status in E. coli. Indian Institute of Science, Bangalore, India. 29th-30th November, 2022

— Rachna Chaba. Talk: Regulation of D-galactonate metabolism in Escherichia coli. Biological Transactions: From molecules to organisms (BTMO 2023), Indian Institute of Science, Bangalore, India. 17th-21st January, 2023.

— Rachna Chaba. Talk: Complex regulation of D-galactonate metabolism in Escherichia coli. EMBO conference on Bacterial Morphogenesis, Survival and Virulence, Goa, India. 6th-10th February, 2023.

— Neeladrita Kundu, PhD student-Neeladrita Kundu. Poster: Understanding the regulation of D-galactonate operon (dgo) promoter by the stationary phase sigma factor σS in Escherichia coli. EMBO Workshop on Bacterial networks (BacNet22), Sant Feliu de Guixols, Spain. 4th-9th September, 2022.

— Swati Singh, PhD student-Swati Singh. Poster: Understanding the effect of natural genetic variations in dgoR among Escherichia coli isolates in D-galactonate metabolism. EMBO conference on Bacterial Morphogenesis, Survival and Virulence, Goa, India. 6th-10th February, 2023..

Ram Yadav and lab members

— Sonal Yadav from our group attended the Arabidopsis Research Conference in Belfast, Ireland and gave a talk entitled "The transcription factor NAC062/NTL6 influences shoot growth by regulating cytokinin signal homeostasis", 20-24 June 2022.

Sadhan Das and lab members

— Sadhan Das, Title of the talk: Epigenetic regulators and their translational potential in vascular complications of diabetes, Name of the Conference: Advances in Cardiovascular Medicine and Research-2023 (ACMR-2023)/PGIMER, Chandigarh, Dates: February 16-18, 2023

— Ankita Priyadarshini, Poster Presentation: Functional characterization of long non-coding RNAs in diabetic wound healing, Name of the Conference: Advances in Cardiovascular Medicine and Research-2023 (ACMR-2023)/PGIMER, Chandigarh, Dates: February 16-18, 2023
— Riya Madan-Title of the talk: Role of enhancers in diabetic wound healing Name of the Conference/Institute: Advances in Cardiovascular Medicine and Research-2023 (ACMR-023)/PGIMER, Chandigarh, Dates: 16/02/2023
— Sadhan Das, Ankita Priyadarshini and Riya Madan Title of the talk: N/A. Name of the Conference: Yeast India 2023: Fundamentals to Applications of Yeast and Fungi (12th International Conference on Yeast Biology), IISER-Mohali, Dates: March 10-13, 2023

Samarjit Bhattacharyya and lab members

— Samarjit Bhattacharyya- Title of the talk: Glutamate receptor signaling and trafficking: Implications in the normal and diseased brain. Invited talk at the Asian-Pacific Society for Neurochemistry (APSN) 2nd online school on "Modelling Brain Disorders" on December 22, 2022.
— K. Aruna- Attended 44th all India cell biology conference (AICBC) & international symposium organised by Department of Biochemistry, University of Kashmir during 2nd – 3rd September, 2022.
— Subhajit Pal- Attended 44th all India cell biology conference (AICBC) & international symposium organised by Department of Biochemistry, University of Kashmir during 2nd – 3rd September, 2022.
— Ayan Mandal-Attended 44th all India cell biology conference (AICBC) & international symposium organised by Department of Biochemistry, University of Kashmir during 2nd – 3rd September, 2022.
— Ankita Khanna- Attended 44th all India cell biology conference (AICBC) & international symposium organised by Department of Biochemistry, University of Kashmir during 2nd – 3rd September, 2022.
— Mitra Kulkarni- Attended 44th all India cell biology conference (AICBC) & international symposium organised by Department of Biochemistry, University of Kashmir during 2nd – 3rd September, 2022.

Samrat Mukhopadhyay

— Biophysical Society meeting, San Diego, California (February 2023)
— Meeting of the Chemical Society of Japan, Tokyo University of Science (March 2023)
— "Phase Separation Regulated Life, In and Outside of Cells" held at Nanyang Technological University, Singapore (March 2023)
— Meeting of the Brazilian Society for Biochemistry and Molecular Biology in Águas de Lindóia, São Paulo, Brazil (September 2022)
— Gordon Research Conference on Intrinsically Disordered Proteins that was held in Les Diablerets, Switzerland (June 2022)

Sharvan Sehrawat and lab members

— Kar S, Singh S, Tehseen A, Sehrawat S. Deciphering the role of an orphan adhesion GPCR GPR114 in the differentiation of murine CD8+ T lymphocytes. Immunocon Held at PGIMER Chandigarh Dec 2022.
— Singh S, Tehseen A, Dahiya A, Singh YJ and Sehrawat S. Rab8a restores function in dendritic cells of an aging host. Immunocon Held at PGIMER Chandigarh Dec 2022.
— Dahiya S, Singh S, Singh YJ, Beeton K, Jain A, Sarkar R, Tehseen A, Dubey A and Sehrawat S Robust anti-SARS-CoV2 specific single domain antibodies neutralize multiple viruses. Immunocon Held at PGIMER Chandigarh Dec 2022.

Shashi Bhushan Pandit and lab members

— Paras Verma-Name of the Conference: Biophysics at the Dawn of Exascale computers, Dates: May 16-20 2022.
— Deeksha Thakur-Name of the Conference: Biophysics at the Dawn of Exascale computers, Dates: May 16-20 2022.
— Paras Verma -Name of the Conference/Institute: CRICK Symposium on Theoretical Chemistry and Biology, Dates: October 15 2022
— Shashi Bhushan Pandit-Name of the Conference/Institute: Mutational Scanning Symposium 2022 (Virtual meeting), Dates: June13-14, 2022
— Rupesh N-Name of the Conference/Institute: CRICK Symposium on Theoretical Chemistry and Biology, Dates: October 15 2022

Shravan Kumar Mishra and lab members

— Shravan Kumar Mishra. Ubiquitin-Like Regulators of Alternative Splicing. RNA Group Meeting, NCCS Pune. 1-3 December 2022. Oral Presentation.

Vidya Devi Negi

— Poster presentation at 49th annual conference of IIS, Immunocon-2022, from 23-26 November 2022 at PGI Chandigarh: Vidya Devi Negi

8.2. Department of Chemical Sciences

8.2.1. Summary of the research work

Angshuman Roy Choudhury

Currently, Choudhury's group is working on Metal-Organic Frameworks (MOFs) materials based on carboxylate linkers that containing *acetylinic spacer. Sonogashira and other cross-coupling reaction are being used to synthesize the ligands for the formation of MOFs. For the metalation purpose various metal ions have been used including main group, lanthanides, and transition metal ions.* Choudhury has isolated some of MOFs with transition metal ions and varieties of multi-carboxylate based linkers for the synthesis of MOFs.

The understanding of weak interactions involving organic fluorine is best achieved by experimental and theoretical charge density analysis. Organic Fluorine exhibits unique characteristics due to high electronegativity and small size, making it an interesting element for studying weak interaction in various organic molecules. Through charge density analysis, Choudhury's group wish to elucidate the underlying principles governing the behaviour of fluorine in various weak interactions which includes hydrogen bonding, halogen bonding.

Photophysical properties of various organic compounds are also a contemporary area of interest. Currently, Choudhury's group is also working on the synthesis, characterization and photophysical properties of various organic moieties possessing imine-bond (C=N bond) and exploring their applications for the formation of 1,3-Diazetine derivative by employing UV radiation. Their group's main interest is due to the wide range of applications of 1,3-Diazetine derivatives in various fields such as the Polymer industry in manufacturing various kinds of advanced materials with improved properties, such as optical permeability, viscoelasticity, etc. Compounds bearing 1,3-Diazetidine groups are useful in forming stable compositions used in coatings, encapsulations, etc. It has applications in the MOFs field also.

Arijit K. De

The central theme of De's research 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).

More specifically, during the one year, the main focus of the group has been to investigate energy and charge (electron or proton) transfer dynamics, covering a wide range of timescales (few tens of femtoseconds to few tens of nanoseconds), within a variety of systems and the effect of local environment (for example, solvation, nanoscale confinement, etc) on it:

1) Molecular aggregates: Excitation energy transfer within multichromophoric light-harvesting systems
2)Photovoltaic systems: Exciton/charge (electron and hole) transfer within quantum dots and perovskites
3) Fluorescent proteins: Photocycle, photoconversion and photoswitching in fluorescent proteins
4) Structural dynamics: Structural evolution of chromophores in ground and excited electronic states
5) Solvation dynamics: Initial regime of polar solvation in bulk and confined medium

De's research group extensively uses ultrafast (<20 femtosecond resolution) broadband (400 nm to 1 μm) pump-probe (transient absorption) spectroscopy and constructed a two- dimensional electronic spectroscopy (2DES) set-up using an acousto-optic programmable dispersive filter (AOPDF) pulse shaper

for exquisite phase stability. Quite recently, their group have also started working on pump-dump-probe spectroscopy to capture dynamics involving transient ground states and built a time-resolved impulsive stimulated Raman spectroscopy (TR-ISRS) set-up to further explore structural dynamics in electronic excited state.

The group also pioneered in deciphering the nature of:

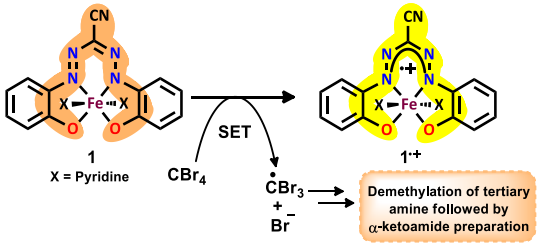
6) Nonlinear force in femtosecond optical trapping.

For this, their group members designed and built a versatile optical tweezer (OT) set-up having multimodal detection capabilities to explore non-linear optical effects in laser trapping under femtosecond pulsed excitation; for this, they have also developed analytic theoretical models to numerically simulate force/potential. Quite interestingly, the Nobel Prize in Physics in 2018 was awarded "for groundbreaking inventions in the field of laser physics" with one half for "optical tweezers and their application to biological systems", the other half for "method of generating high-intensity, ultra-short optical pulses." Dr De's group made the very first attempt to build a bridge between these two different areas. Recently, they have integrated laser beam shaping (using a 2D LC-SLM) to build a holographic optical tweezer (HOT) set-up for exploring long-range interaction between trapped particles in an array, leading to the emergence of collective phenomena.

Debashis Adhikari

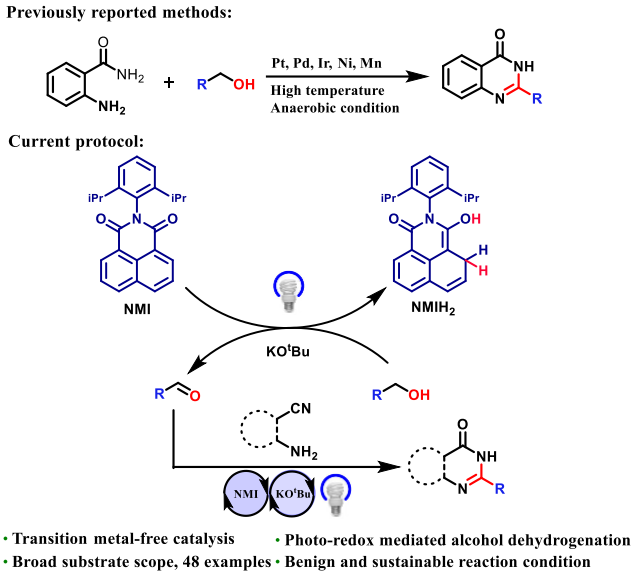
The Adhikari group has undertaken diverse research directions during this time period. The group has been engaged in exploring catalysis steered by ligand-based redox. In parallel, they have been engaged in identifying simple organic molecules that can be photochemically active and can perform valuable chemical transformations.

Formazan ligands have been investigated as redox noninnocent backbone for a long time. Despite its well-established behaviour as redox reservoir, demonstration of catalytic efficiency governed by redox noninnocence remains elusive. Adhikari's research group have reported an iron-formazanate molecule efficiently preparing α-keto amides, where a crucial reductive cleavage of the substrate molecule is tightly regulated by the electron donation from the formazanate, in a reversible manner.



As shown in the picture, the ligand motif itself is responsible for the electron transfer reaction (SET), rather than the Fe(III) center associated with it. This becomes possible because of the heavily delocalized backbone of the ligand and electron rich nature that essentially prompt its electron reservoir behavior.

In another project Adhikari's research group have explored the photochemical excitation of simple imide and investigated how that can lead to an important organic transformation under very mild reaction conditions. Naphthalene monoimide (NMI) molecules have recently been discovered to act as a strong reductant to trigger strong C-Cl bond cleavage reactions. In this report Adhikari's group explore its efficiency towards dehydrogenation reactions under photochemical conditions. Upon photoexcitation, the molecule can be easily reduced by KOtBu, and the monoreduced form is a potent hydrogen atom abstractor to lead to efficient dehydrogenation processes. Exploiting its dehydrogenating ability, they assemble the heterocyclic molecule quinazolinone starting from o-aminoaryl nitriles and alcohols under aerobic atmosphere. This sustainable, room-temperature protocol affords a broad substrate scope and rivals many transition metal- catalyzed methods which often require high temperature. Intermediate isolation, Stern-Volmer experiment, X-band EPR spectroscopic signature for a crucial radical intermediate leave valuable clue for the mechanistic course of the reaction and altogether demonstrates NMI molecule's great potential in steering dehydrogenating ability under photochemical conditions.



Jino George

The thrust area of research of George's research group is 'molecular strong coupling', and they used it for controlling the chemical and physical properties. Here, a new state of matter is formed by strongly coupling a molecular state with a confined cavity photon. The newly formed state is called polaritonic state. This state inherits both the properties of light and matter. This year, their group have developed a new technique to measure the energy transfer between a donor-acceptor pair by coupling them to the cavity field. They proposed that the photoconductivity can be used for measuring the energy migration in the coupled system. Very interestingly, energy transfer doesn't follow the conventional distance dependence of the Forster regime, and it becomes purely dependent on the mixing fraction of light and matter. Now, energy can be transferred as long as the coherence length of the cavity. The research group is e currently generalizing the idea of long-range energy transfer in strongly coupled molecular systems, which may have potential application in quantum information technology.

Further, they are also exploring the peculiar nature of polaritonic states and studying them using advanced spectroscopic and microscopic techniques. This includes controlling chemical reaction rate under vibrational strong coupling.

K R Shamasundar

During this period, two collaborative research works were successfully completed and communicated for publication by Shamasundar's research group. The first work which has already been published is on implementation and benchmarking of a variety of multi-reference coupled-cluster methods within an efficient tensor framework. The work has been a result of collaboration carried out over the last three years. The second work is a computational study on some triradicals based on the highly-stable Blatter's radical. In this work, they have developed and employed a computational protocol using high-level multi-reference methods to understand the triradical nature and to predict the energy doublet-quartet energy gaps. This work also predicts three novel triradicals which are interesting for their magnetic properties and is currently under review for publication. Apart from this, they have also made some further progress on a high-spin multi-reference coupled-cluster method based on density matrix cumulants. A new line of work has been initiated to develop a computational methodology to unambiguously compute magnetic exchange couplings for spin systems larger than 2 unpaired electrons.

Kuduva R. Vignesh

The majority of Vignesh's research group focuses on the synthesis and modeling of spin-Hamiltonian parameters (such as magnetic exchange coupling (J), zero-field splitting (D), and g–tensors) in transition metal and lanthanide metal complexes utilizing both experimental and computational approaches (DFT, ab initio methods) to understand their molecular magnetic behavior. Single-Molecule Magnets (SMMs) are metal complexes that can maintain their magnetization even in the absence of a magnetic field, leading to

magnetic hysteresis at the molecular level and the ability to function as magnets below their blocking temperature (TB). They also focus on Single-Molecule Toroics (SMTs), which are defined as molecules that display a toroidal magnetic state which can potentially be used in multiferroic materials. Both SMMs and SMTs have several exciting potential applications that have since been envisaged, such as high-density information storage devices, quantum computing, and spintronics devices.

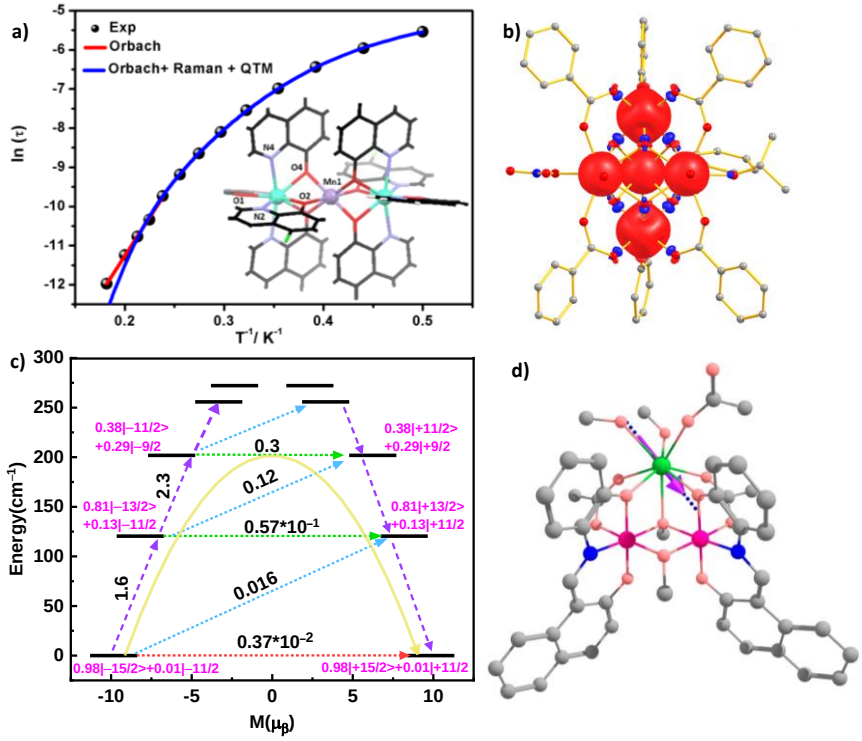


Figure. a) Plot of ln (τ, relaxation time) vs. T−1 with experimental points as circles and the color lines are fitted using various magnetic relaxation mechanisms for a {$Mn^{III}Dy^{III}2$} SMM; b) DFT computed spin density plot of a {$Cr^{III}2Dy^{III}3$} complex; Ab initio computed c) Magnetic relaxation pathway of a {$Co^{III}2Dy^{III}$} SMM and d) orientation of the magnetic anisotropy axis of the Dy site (dotted lines and purple arrows) in {$Co^{III}2Dy^{III}$} SMM.

In their noteworthy work, they discovered some heterobimetallic {$Dy^{III}2Mn^{III}$} species using quinoline-type ligands and found that the synthetic approach provides promising access to a variety of heterometallic quinolinolate complexes with intriguing SMM characteristics (Figure a). In other studies, on a {$Cr^{III}2Dy^{III}3$} complex, they highlighted the importance of Cr^{III} ion in d−f cluster aggregation to enhance the ferromagnetic exchange coupling and simultaneously disclose the subtle SMT behavior in such a class of molecules (Figure b). Their research group also proposed a hypothesis to increase the Ising-type anisotropy of Dy ions by utilizing diamagnetic Co^{III} ions which resulted in an increment in the energy barrier of {$Co^{III}2Dy^{III}$} SMM (Figures c and d).

N. Sathyamurthy

Quantum mechanical investigation of collisions between atomic/molecular/ionic species of astrophysical interest

Use of artificial neural network method to fit multi-dimensional potential energy surfaces

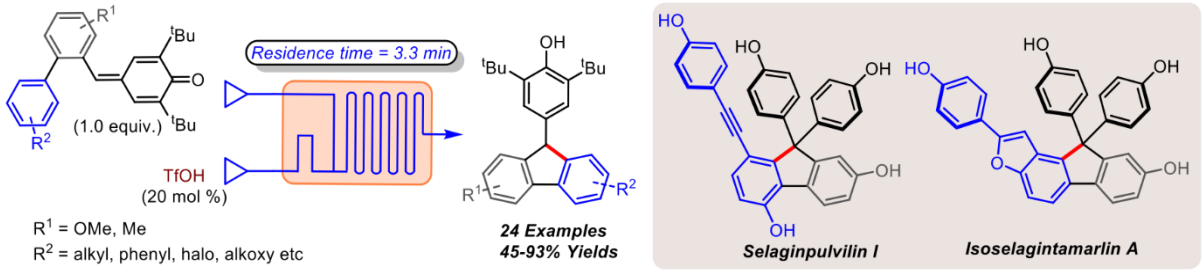
P. Balanarayan

The Balanarayan's research group has a focus on strong laser interactions with atoms and molecules. It includes three facets: a) Development of numerical methods and computational methodologies for solving the time-dependent Schrödinger equation for atoms, molecules and models where the Hamiltonian involves a semi-classical interaction of the system with the laser, beyond perturbation theory b) An implementation of the developed within three in-house built software packages called ABDYN, ABELDYN and ABELDYN-PROP, c) Envisaging new effects within strong field interactions of quantum systems.

New modules have been developed this year for ABELDYN and ABELDYN-PROP which involves molecular properties such as electron densities, electron momentum densities for driven molecules. A simple new and general procedure for selection rules for Higher Harmonic Generation spectra has been developed and published.

R. Vijaya Anand

Vijaya Anand's research group is actively involved in the synthetic applications of *p*-quinone methides (*p*-QMs) to the natural and unnatural biologically significant molecules. In the last year, they have described a 100% atom-economical and convenient protoco to access 9-aryl fluorene derivatives through a TfOH-catalyzed intramolecular 1,6-conjugate arylation of 2-(aryl)-phenyl-substituted (*p*-QMs) under continuous-flow using the microreaction technique. This method was found to be very effective for most of the *p*-QMs, and the corresponding 9-aryl fluorene derivatives were obtained in moderate to excellent yields. Moreover, this protocol was further elaborated to the first total syntheses of selaginpulvilin I and isoselagintamarlin A (*J. Org. Chem*. **2022**, *87*, 3363).

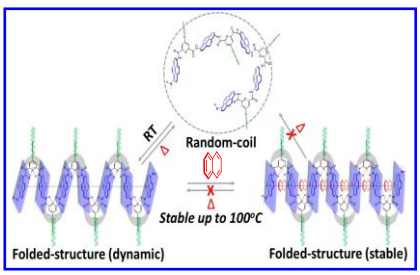


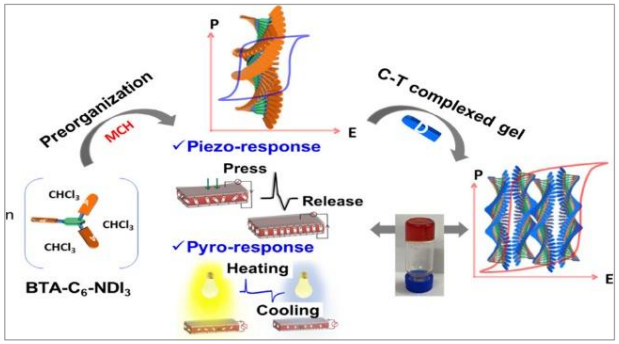
Their research group has also developed a practical method for the synthesis of 1,3-disubstituted indolizine derivatives through a Pd(II)-catalyzed regiospecific formal [3+2]-annulation of terminal alkynes with 2-pyridinyl substituted *p*-quinone methides. Most of the alkynes investigated reacted with 2-pyridinyl substituted *p*-quinone methides efficiently and provided the respective 1,3-disubstituted indolizines in good to excellent yields. The advantages of this method include 100% atom-economy and high regiospecificity (*Chem. Commun*. **2022**, *58*, 13238).

Raj Kumar Roy

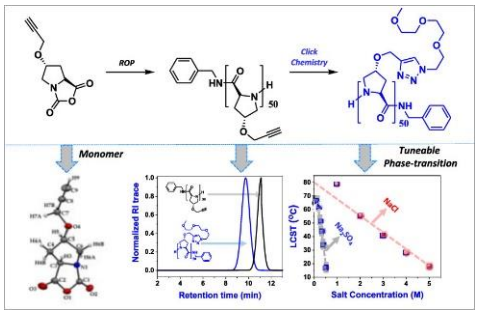
As part of Roy's research group, they designed and synthesized folding scaffolds whose bulk/solution properties were highly dependent on their folded structure, i.e., establishing a structure-property relationship. A second major objective of their research is to design and synthesize functionalizable polypeptides by using ring-opening polymerizations of suitable N-carboxyanhydride monomers. They used these polypeptides later as stimuli-responsive biomaterials and studied their solution-folding behavior.

<u>Intrachain β-sheet structure of Aromatic polyamides</u>: Aromatic oligoamides have been shown to adopt various secondary structures, such as helical structures, linear strands, etc., but synthetic β-sheet structures are not well known. Recently, we have demonstrated the intrachain β-sheet like folded structure of aromatic polyamides. 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.





Room-temperature organic Ferroelectrics: In this work, Roy's research group demonstrate a supramolecular strategy for aligning dipoles through the use of two noncovalent interactions, H-bonding and charge-transfer (C-T) complexations, working synergistically toward self-assembly. In nonpolar solvents, the supramolecular scaffold self-assembled into a columnar structure with three electron-deficient naphthalene diimide (NDI) arms around the benzene-tricarboximide core. The C-T complexation between the NDI arms and the guest molecule (pyrene) at their preorganized state results in the formation of a nanofibrous organogel network exhibiting ferroelectric (Tc ~ 47 °C) properties at room temperature. On the basis of the remnant polarization measurement before (0.10 μC cm^{-2}) and after the C-T complexation (0.21 μC cm^{-2}), it has been found that the C-T complexation was critical for dipole ordering.



Engineering thermoresponsive behavior of polyprolines through functionalization: Roy's research group designed a propargyloxy-functionalized proline-NCA monomer, so that the ring-opening polymerization (ROP) of the former provides a reactive propargyl group in each repeating unit to enable post-polymerization modifications. They then used azide-yne click chemistry to prepare polyproline chains that had been triethyleneoxy (TEG)-functionalized (periodically grafted). Later, functionalized polyprolines were compared with native polyprolines in terms of thermoresponsive behavior. Despite sharing similar polyproline backbones, these two polymers differ significantly in their thermoresponsive behavior. VT NMR and CD studies revealed that water-soluble TEG residues in combination with enhanced conformational stability of the functionalized polyproline could be the reason behind the different thermoresponsiveness between these two polymers.

Ramesh Ramachandran

Ramachandran's research group 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

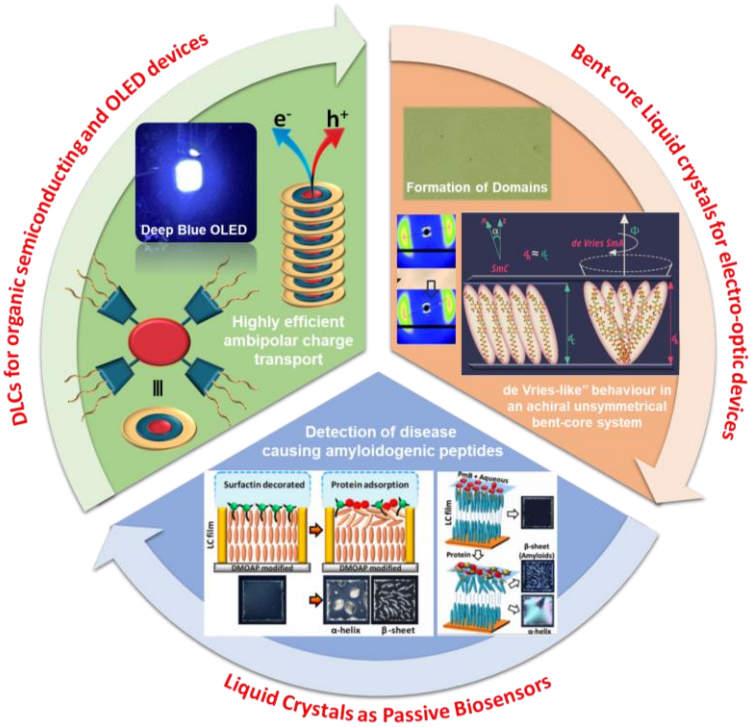
S. Arulananda Babu

The primary goal of Prof. 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. During last one year, we reported a synthetic protocol for the construction of biaryl motif-based or π-extended azobenzene and alkylated azobenzene derivatives via the Pd(II)-catalyzed bidentate directing group (DG)-aided C–H activation and functionalization strategy (Org. Biomol. Chem., 2023,21, 1793-1813). We reported a Pd(II)-catalyzed bidentate directing group 8-aminoquinoline-aided, site-selective β-C–H functionalization protocol for assembling modified azobenzene carboxamides (Org. Biomol. Chem., 2023,21, 2689-2694). Then, they reported the scope of the 4-amino-2,1,3-benzothiadiazole (ABTD) directing group in the Pd(II)-catalyzed arylation of remote sp2/sp3 γ-C−H bonds of carboxamides and sp3 β-C−H bonds of amino acid carboxamides (Asian J. Org. Chem. 2022, e202200589). Then, they reported the Pd(II)-catalyzed picolinamide DG-aided γ-C(sp2)-H alkoxylation of enantiopure α-alkylbenzylamine derivatives using alcohols and synthesis of enantiopure aryl alkyl ethers (Asian J. Org. Chem. 2022, 11, e202200327). Subsequently, their group reported the Pd(II)-catalyzed, picolinamide DG-aided sp2 γ-C–H functionalization and expansion of the library of enantiopure α-methylbenzylamine and phenylglycinol scaffolds (Synthesis 2022; 54(18): 4059-4094). They then reported the synthesis of carbazole-based unnatural α-amino acid and non-α-amino acid derivatives via a Pd(II)-catalyzed bidentate directing group

8-aminoquinoline-aided β-C(sp3)–H activation/functionalization method (Org. Biomol. Chem., 2022,20, 4391-4414). Their group developed a protocol for the synthesis of azobenzene-based unnatural amino acid via Pd(II)-catalyzed diastereoselective C(sp3)–H arylation of amino acid carboxamides with iodoacetanilides and Mills azo coupling (Chem. Commun., 2022,58, 12967-12970). Later they showed their work towards expanding the utility of inexpensive pyridine-N-oxide directing group for the site-selective sp2/sp3 γ-C−H and sp2 δ-C−H functionalization of carboxamides (Asian J. Org. Chem. 2022, 11, e202200311 and this paper was selected as very important paper).

Santanu Kumar Pal

Prof. Pal's group utilized core fragments such as heterocoronene with incorporated heterocycles to synthesize room-temperature discotic liquid crystals (DLCs), which demonstrate a remarkable balance between mobility and processability, revealing its ambipolar semiconducting nature in space-charge limited current devices. Also, the group has developed highly efficient deep-blue OLEDs using DLCs as emitters, taking a highly relevant leap in digital display, where the future envisions the dual technology of OLEDs and LCs. Recently their group has synthesized a series of fluoro-substituted bent-shaped molecules showing opposite chirality domains, inferred to be a type of dark-conglomerate phase which has been reported to exhibit interesting electro-optical properties like refractive index tunability, chiral separation, etc. Using aqueous-LC interfaces, Prof. Pal and his group demonstrated bio-sensing of pathologically significant proteins like EGFR, Cytochrome c and a range of amyloidogenic peptides for the biomimicking of the physiologically important phenomenon.



S. S. V. Rama Sastry

A**. Phosphine chemistry**

Sastry's research group developed a metal-free strategy to access various α-arylidene cyclopenta[b]indoles via phosphine-catalysed [3+2] annulation of α,β-ynones and 3-nitroindoles. For the first time, the rearomatisation of the indole nucleus was observed in such anannulative transformation. The method was extended to the synthesis of an antimalarial natural product, bruceollineE.

Their group described phosphine-mediated redox transformation of easily accessible 1-(2nitroaryl)prop-2-ynones to 3-hydroxyquinoline-4-ones (3HQs). Besides establishing a new entry to the synthesis of 3HQs under neutral conditions, this method is the first formal intramolecular oxyamination of α,β-ynones. The

synthetic utility of this method is demonstrated in the total synthesis of japonine, its analogs, and rare quinoline derivatives.

B. **Palladium chemistry**

Sastry and their group described the first palladium-catalyzed cascade annulative allylic alkylation of benzylic gem-diacetates to access complex analogues of (hetero)arene-fused benzo[f]chromenes, which find relevance in medicinal chemistry and materials science. This synthetic feat has been achieved through the formal [3+3] heterocyclization of easily accessible (hetero)aryl gem-diacetates and readily available 2-naphthols under neutral conditions.

Sabyasachi Rakshit

Hearing-loss disease models related research (Gaurav Kumar Bhati MP17005, Pritam Saha PH20024)-

Prologue: Noise pollution is a menace to humanity. With urbanization, loss of hearing at early-age has turned into a silent pandemic, worldwide. WHO predicted that by 2050, at least 1 out of 10 people will suffer from some form of hearing-diseases worldwide. According to WHO, in India, nearly 60 million people are currently suffering from partial deafness. Investigating the genetic causes responsible for hearing mechanotransduction will pave the way for understanding the molecular mechanism of hearing loss and possibly help find remedies in near future. Rakshit's research group , a small research group in IISER Mohali, have taken up this ambitious project of grand importance to society.

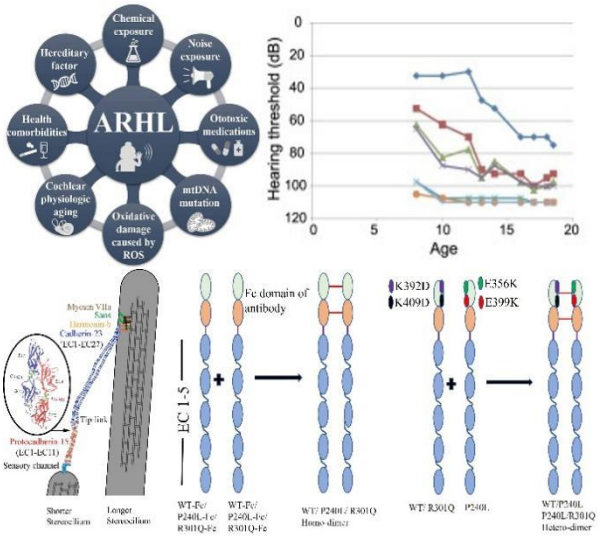
Objectives:

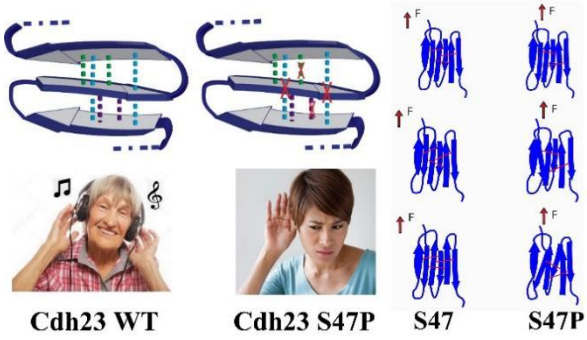
1. Delineating the molecular mechanism of age-related hearing loss (ARHL) from biophysical perspective.
2. Investigating altered mechanotransduction mechanisms in progressive hearing loss (PHL) models using single molecule force spectroscopy (magnetic tweezers).
3. Biochemical modification for mimicking the tip-link geometry at single-molecule level.

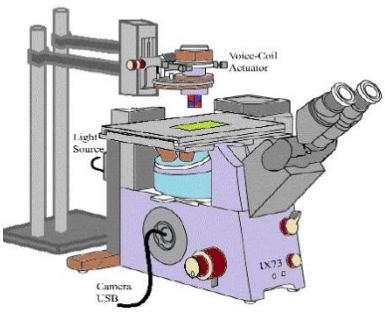
Research Outcome till date: Cadherin-23 and Protocadherin-15, two tip-link proteins that actively participates in the mechanotransduction of hearing. They receive force pulses of various intensities and frequencies during the lifetime of a host. Notably, cadherin-23 protein is also one of the loci for multifactorial age-induced and noise-induced hearing loss. This implicates that the temporal loss of protein viscoelasticity with aging will cause the loss of sensory abilities [Heterogeneity in conformational state space enhances the force-tolerance of mechanosensory proteins (Manuscript under review: https://doi.org/10.21203/rs.3.rs-2677234/v1)].

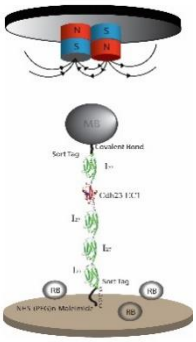
The factors responsible for ARHL in human. The audiogram of hearing-loss patients with different frequency (top to bottom 125-8000 Hz).

Tip-geometry at physiological condition responsible for normal hearing. Models of Cadherin-23 homo and heterodimer using Fc domain to mimic tip-link.









Mutations in the Cdh-23 are associated with hearing-loss. Correlated motions in β-strands allow the β-rich proteins to adapt to external perturbations. This is affected by disrupted H-bond network of mutant.

Ultra-sensitive (5 nm noise) home-built magnetic tweezers provides high temporal resolution (3.5 kHz) to perform single molecule force spectroscopy at physiologically relevant force (4-200 pN).

Transient interactions drive the lateral clustering of cadherin-23 on the membrane

Prologue: Cadherins predominantly maneuver the active cell-adhesion processes for both vertebrates and invertebrates. Stereographically, cadherins mediate two types of interactions at the intercellular junctions, a trans-interaction with cadherins from neighbouring cells and cis-interactions with nearest neighbours from the same cell surface. The trans mediate cell-cell adhesions, whereas cis is to strengthen the trans by clustering at the junction site. Interestingly, the existence of cis-dimer interactions was first envisioned from the highly resolved structures of cell-cell adhesion junctions. An extension of specific cis-dimer interactions to a linear array was also proposed. However, the molecular interactions that induce a

transition from linear array to a two-dimensional spread at the cell-cell junctions was elusive. Several models, counter argumentative to each other exist in justification. Very recently, a FRET based study reported that the combination of the specific and attractive nonspecific interactions induces the cis-clustering of classical E-cadherin on the lipid membrane. The nature of the non-specific interactions was not established from the FRET.

Objectives:

Solve the molecular mechanism of cis-clustering of Cdh23 and its functional benefits.

Results till date: Rakshit's research group performed a combination of photoinduced reactions and membrane biophysics to verify the existence of cis-dimers of Cdh23 in clusters. Modulating the clustering of Cdh23 using chemical spacers and blockers, they further deciphered the nature of interactions that drive the lateral clustering of cadherins. They further confirmed that transient, weak, and nonspecific interactions independently drive the clustering. Hydrophobic association dominates such transient lateral interactions. Free-standing cis-clustering of Cdh23 independent of trans-binding prompted us to decipher the functional role of cis-clustering on cell adhesion. Their research group measured a significant acceleration in the rate of cell-cell adhesions driven by cis-clustering. Disruption of cis-clusters by hydrophobic blockers drastically dropped the rate. Notably, while the toxicity of the phase-separated states has already been proposed for intrinsically disordered proteins, the fast-aggregation of cells is a demonstration of the functional implication of LLPS in cell adhesion. For more information, please refer to the article as it has been published. (https://doi.org/10.1038/s42003-023-04677-6).

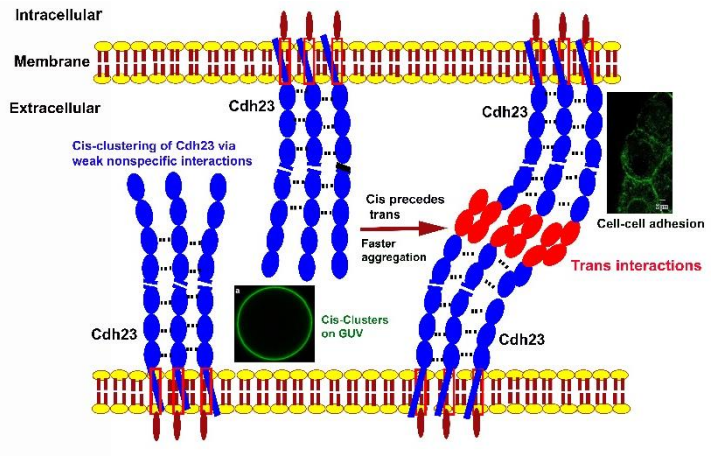


Figure showing Cdh23's cis-clustering at the cell-cell interface through weak, transitory, nonspecific, and spatially dispersed multivalent contact.

Redefining the structure of tip-links in hair-cells.

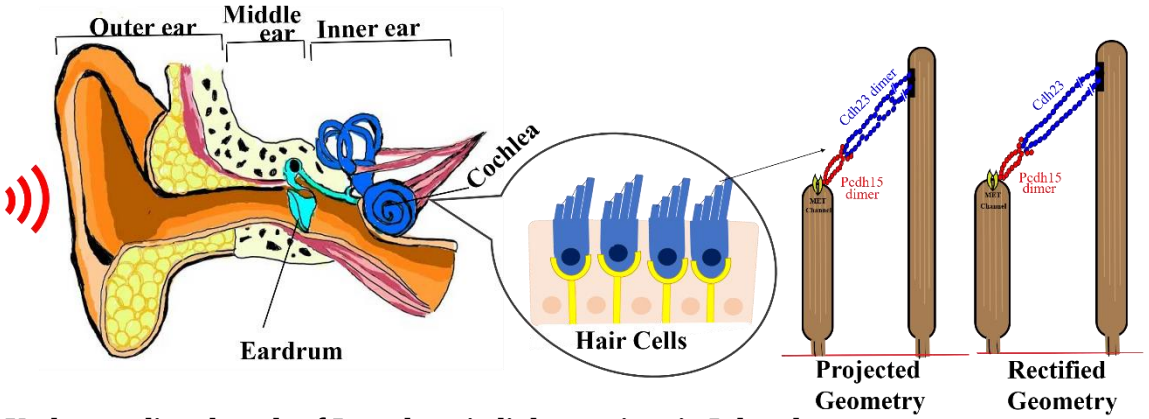
*Prologue: Have you noticed the beautiful double-helical arrangement of tip-links in hair cells?*Tip-links are basically made up of a pair of long cadherins, cadherin-23 and protocadherin-15, but exists as tetramer (see the figure below). It is believed that such a filamentous structure helps tip-links to regulate the mechanotransduction in hearing and balance. It conveys a threshold mechanical input from sound for signal transduction and dampens the overstimulation to protect the sensory machines.

Objective:

To understand the origin of this unusual structure and then the physiological significance.

Results till date: Rakshit's group is obviously not the only team to work on this. The design and operation of tip-links have long been a fascinating subject. Eric Gouaux and his group proposed from cryo-electron microscopy that the atypical helical coil structure of tip-links may be influenced by the similar helical thread geometry of protocadherin-15 lateral dimers (eLife, 2021). The molecular interactions that promote the double-helical geometry for Pcdh15 is also deciphered from crystal structures by Marcus Sotomayor and his group (PNAS, 2021). Similar lateral interaction for cadherin-23 is predicted (have a look at our recent paper in Commun. Biol. 6, 293, 2023), however, till today the search is on. Interestingly, cadherin-23 is the longer member in tip-links than the protocadherin-15. In search of cadherin-23 cis-dimers, their group performed photo-induced cross-linking of unmodified proteins in solution and on lipid membranes and observed no trace of cadherin-23 cis-dimers. Reportedly, tip-links are dynamic connections, assembling and disassembling in seconds. Using lipid vesicles, we measured significantly slower aggregations between cis-dimers of tip-link cadherins than via dimer–monomer interactions, indicating that the trans-interactions between two cis-dimers may possess steric restrains and defer re-associations. Re-connections of tip-links are thus kinetically most desired between protocadherin-15 cis-dimers and cadherin-23 monomers. Their group propose that the helical geometry of tip-links is induced by protocadherin-15 cis-dimers, while cadherin-23 stays single before tip-linking.

Please see the published version of this article for more information (https://doi.org/10.1021/acs.biochem.3c00161).



Understanding the role of Interdomain linker regions in I- band of Titin

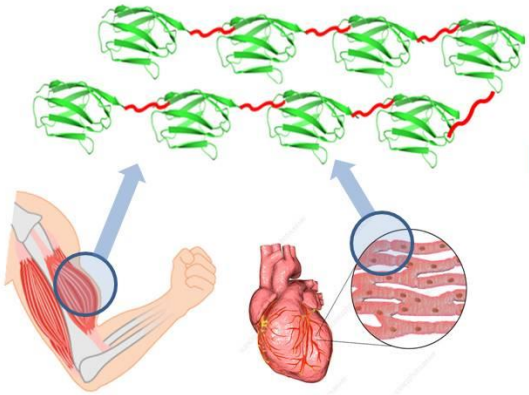
Figure illustrating the redefined and projected geometry of the tip connection in the inner ear hair cells.

(MDPs). The linkers in MDPs are crucial for many biological processes. Numerous pathogenic mutations in the linker region are known and associated with diseases like hearing loss and cardiomyopathy. While the structure-function of domains in MDPs is well- studied, the contribution of the inter-domain linkers (IDLs) in the physical properties and functions of MDPs is least explored.

Objective:

Sketch a relation between the structure of IDLs and the thermodynamic stability of domains in MDPs since this demands a thorough investigation.

Results till date: To fulfill this aim Rakshit's research group designed linkers of different size, composition, and secondary structures. The immunoglobulin like domain I27 of Titin was used as a model domain. Titin, a multi-domain protein in muscle sarcomere, possesses over a hundred immunoglobulin (Ig) domains in its I-band region. I-band section of Titin exhibits variations in length and stiffness among different isoforms. Using theoretical and experimental probes their group found that linkers of various conformations affect the kinetics of protein folding. These variations in the thermodynamic and kinetic properties of protein arising due to different topologies of linkers might be relevant to fulfilling their physiological roles in the muscle sarcomere.



I27 polyprotein in I-band of muscle protein Titin. Here we have shown the Interdomain linkers regions (in red) connected with model domain (I27). Mutations in linker region are associated with several diseases.

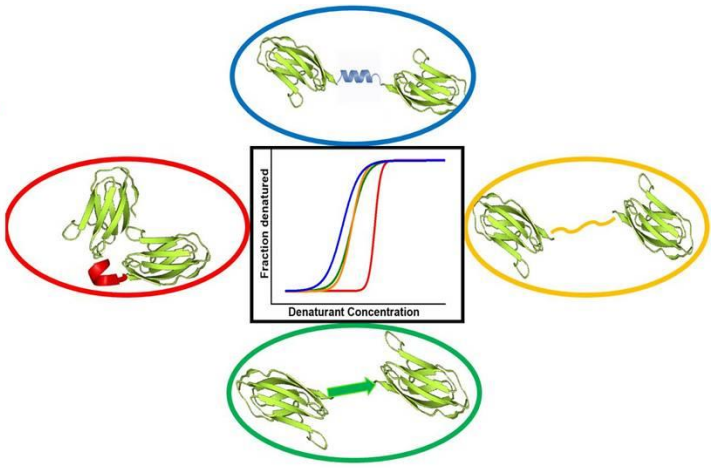


Figure shows the variations in thermodynamic stability of protein in presence of different linkers.

Understanding the mechanical properties of extracellular matrix in glioblastoma

Prologue: Gliomas are the primary tumors of the central nervous system and are known to cause more years of life loss than any other tumor. Tumors of the central nervous system account for around 2% of all cancers, with about 3 lakh new cases diagnosed worldwide in the year 2018 (Globocan 2018). The incidence of central nervous system (CNS) tumors in India ranges from 5 to 10 per 100,000, an increasing trend and accounts for 2% of malignancies. Most CNS tumors arise in glial cells that support and nourish the neurons and are known as Gliomas. The World Health Organization system (WHO) first classified gliomas into four grades – Grade I to IV. Grades I and II are known as Low-Grade Gliomas (LGG), Grade III is called High-Grade Glioma (HGG), and Grade IV, the malignant form of gliomas, are called Glioblastoma Multiforme (GBM). The GBMs are categorized into two types: primary and secondary GBMs. The primary GBMs develop rapidly de novo without any clinical evidence of lower stages, whereas secondary GBMs are transformed from lower stages (LGG to HGG) of gliomas. Primary GBMs account for 90% of GBMs and occur in elderly subjects (mean age 62 years). Secondary GBMs which account for less in number, however, appear at a younger age (mean age 45 years). Survival of both types of GBM is strikingly low than LGG. Genomic and morphological analysis of LGG and secondary GBM too have shown significant differences. While GBM features high proliferation, invasion, and lethality, the LGG is rather well-behaved with the least proliferation and invasion.

Objectives:

Deciphering the molecular factors that are differentially regulated during the passage of a least malignant (LGG) with better prognosis cancer to the most devastating one.

Results till date: A piece of in-depth knowledge on the tumorigenic process of LGGs and deciphering the key factors that trigger the conversion of LGG to GBM via HGG will undoubtedly open directions in the diagnosis and prognosis of GBM and may improve the overall survival of all GBM patients. Mechanical remodeling of extracellular matrix and its increase in stiffness in correlation with cancer progression is a very well-known phenomenon. Cartilage acidic protein-1 (CRTAC1) is an extracellular matrix (ECM)

protein of unknown function firstly identified in humans as a chondrocytes marker with the ability to distinguish human chondrocytes from osteoblasts and mesenchymal cells in culture. Interest in this protein has been linked to its localization in articular cartilage and related diseases and it has also been associated with multiple sclerosis, bone fracture, neurofibromatosis type 1-associated glomus tumors. However, CRTAC's relation to pathogenesis is unclear. By using their lab built magnetic tweezers they have determined the novel function of CRTAC1 in ECM of glioma.

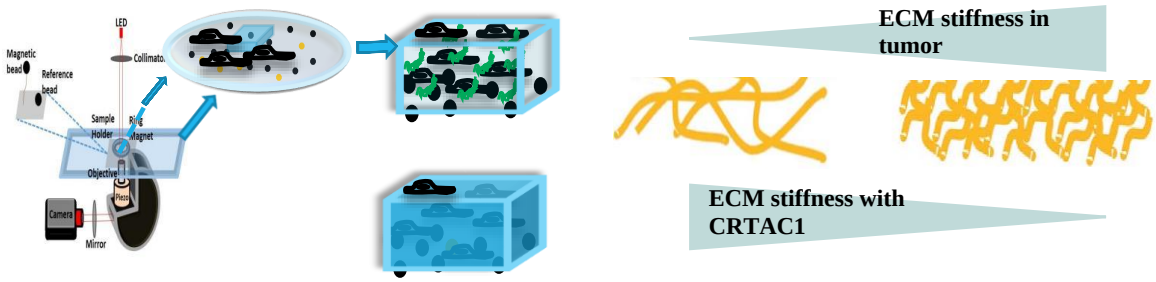


Figure represents Magnetic Tweezers setup to measure ECM stiffness and model of matrix stiffness in tumor

Sanchita Sengupta

Sengupta's research group designed and synthesized styrylBODIPY and perylenediimide dyads and their complex photoinduced electron and energy transfer dynamics consisting of PDIs and mono/di styryl-BODIPYs was unravelled by steady state and ultrafast spectroscopy (J. Mater. Chem. C 2022, 10, 10551–10561).

They designed and synthesized covalent metal-free FRET macrocycles of [1+1] and [2+2] type consisting of PDI and aza-BODIPY chromophores that showed responsiveness towards redox potentials, temperature and metal ions. These macrocycles were also utilized as FRET photocatalysts for the photooxidation of 1,5-dihydroxynaphthalene to juglone (Chem. Commun., 2023, 59, 1042–1045).

In another contribution, they designed and synthesized new molecular rotors based on imidazole and naphthalimide that showed charge transfer (CT) character, aggregate induced emission (AIE) and emission responsiveness towards temperature variation, solvent viscosity and pH of the solvent environment. Accordingly, these rotors were utilized for live imaging of Cancer cell line A549 and fibroblast cell line L929 (Org. Biomol. Chem., 2022, 20, 9422–9430).

Sengupta's group is also involved in synthesizing new conjugated D-A-D-A type molecules and explore their charge carrier mobilities and other applications. They designed and synthesized conjugated A-D-A'-D-A small molecules consisting of isatin, isatin-thiophene and benzothiadiazole that exhibited narrow optical bandgaps, charge carrier mobilities of up to 4.5 × 10−3 cm2/Vs and showed excellent photocatalytic behaviour towards selective oxidation of sulfides to sulfoxides (Chem. Eur. J. 2023, e202203951 (1–8)).

Sanjay Mandal

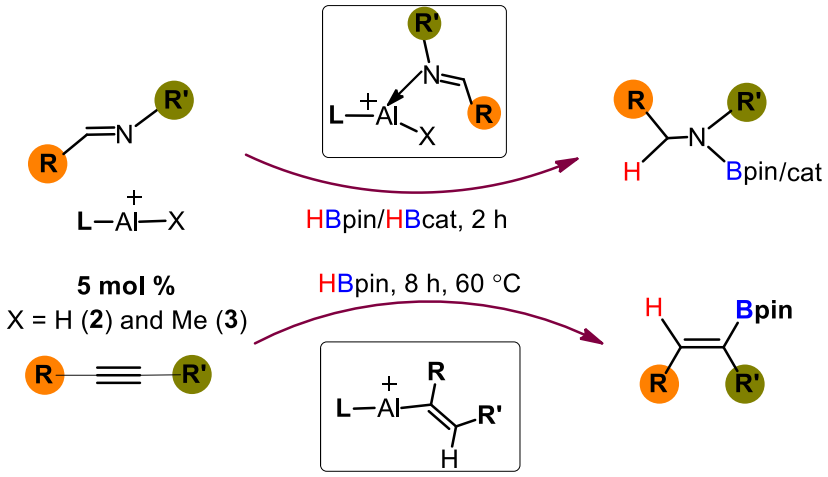
Professor Mandal's group is engaged in the strategic design of diverse coordination architectures with a special emphasis on Metal Organic Frameworks (MOFs) and Covalent Organic Frameworks (COFs) for their diverse structural aesthetics and for their possible roles in various applications, such as catalysis, luminescence, molecular separation, gas and liquid adsorption, magnetism, drug delivery, etc. 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. Professor Mandal's research has contributed to the fields of multi-step organic synthesis, coordination chemistry, heterogeneous catalysis, and materials science. The major projects that their group have worked on are: (i) design of bifunctional heterogeneous catalysts with

hydrogen-bond-donating (primary amide group) and/or hydrogen-bond-accepting (oxadiazole moiety) capabilities along with Lewis acid centers for a number of important organic transformations, and (ii) development of multifarious micro- and mesoporous nanomaterials for (a) sequestration and conversion of carbon dioxide, (b) ultrafast/selective sensing of metal ions and neutral small molecules (nitroaromatics and ketones) at ppb/ppt level, and (c) study of non-radioactive surrogates of nuclear wastes such as multimedia I_2 capture and selective sensing of ReO_4^- in water.

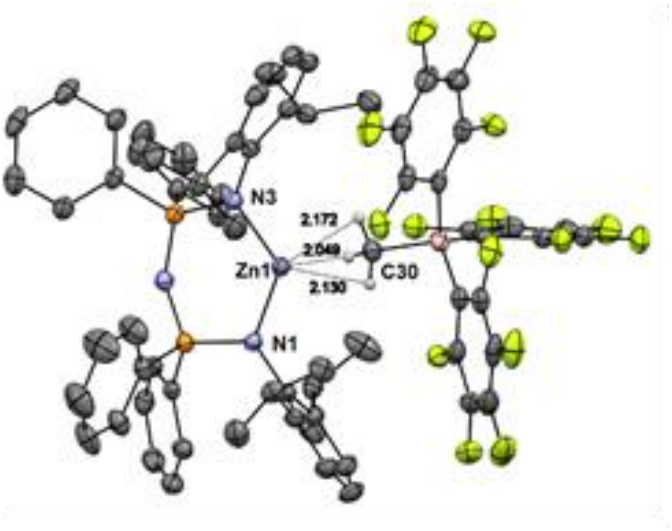
Sanjay Singh

Singh research group's activities focus on different aspects of the main group and transition element organometallic chemistry to address some fundamental questions and discover their catalytic applications. In this regard they use the modern carbenes (cyclic Alkyl Amino Carbene (cAAC), bicyclic Alkyl Amino Carbene (BICAAC)) as ligand scaffolds to stabilize various main group (B, Si, P and Sb) and transition metal (Ni, Cu, Pd, Au, Zn, Ir and Ru) complexes and perform intriguing reaction chemistry. In addition to this, they have also successfully explored synthesis and catalytic applications of cationic B and Al complexes for hydroelementation reactions. Their group is also interested in the syntheses and properties of inorganic macrocycles, pyridinophanes and cryptands.

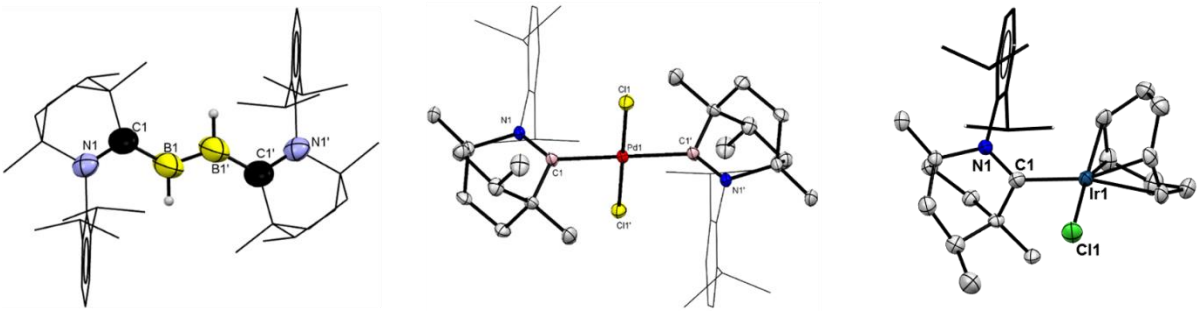
Highly Electrophilic Cationic Aluminum and Zinc Complexes: Synthesis, Reactivity and Catalytic Applications The high Lewis acidic nature of electronically unsaturated aluminum hydride cations $[\mathbf{L}AlH]^+[HB(C_6H_5)_3]^-$ & $[\mathbf{L}AlH]^+[B(C_6H_5)_4]^-$ and methyl aluminum cation $[\mathbf{L}AlMe]^+[B(C_6H_5)_4]^-$ have been exploited for hydroboration (using HBpin/HBcat) of several imines and alkynes under the mild reaction conditions with excellent yields of the respective final products. Control experiments have been conducted to investigate the most probable catalytic cycle. Further, the work has been extended to explore the catalytic activity of aforememntioned aluminum hydride cations, $[\mathbf{L}AlH]^+[HB(C_6H_5)_3]^-$ & $[\mathbf{L}AlH]^+[B(C_6H_5)_4]^-$ for the hydrosilylation of imine. A variety of organo-silanes such as Et_3SiH, $MePhSiH_2$, $PhSiH_3$, TMDSO, and PHMS have been inspected in this endeavour, and the outcomes dictated the increased efficiency of catalyst on lowering the steric bulk at the silicon centre.



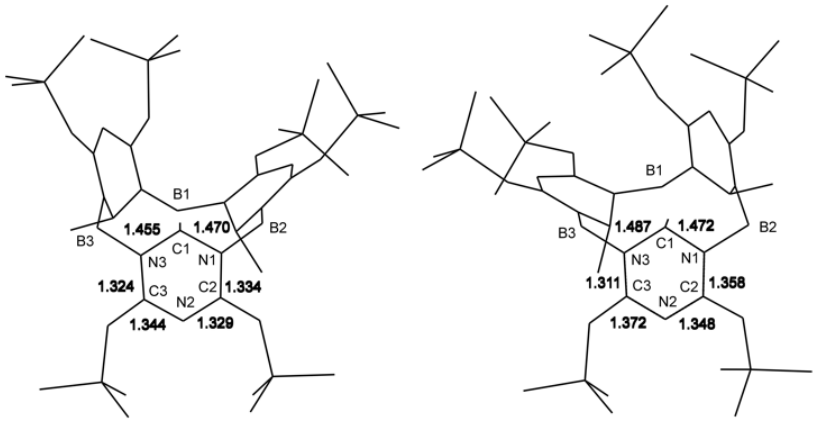
The Low coordinated neutral [**L**Zn-Me] and cationic zinc complex [**L**Zn] $[CH_3B(C_6F_5)_3]$ supported by (bis-phosphinimino) amide ligand (**L**H = $[\{(2,6\text{-}i\text{Pr}_2C_6H_3N)P(Ph_2)\}_2N]H$) has been synthesized. The compound was accessed by abstraction of the methyl group from [**L**Zn-CH_3] using $B(C_6F_5)_3$ in toluene at room temperature. The benefits of Lewis acidity of title complex [**L**Zn] $[CH_3B(C_6F_5)_3]$ is exploited for hydrosilylation and hydroboration of imines under milder reaction conditions.



Carbene complexes of group 13 and transition elements: Singh's research group have successfully synthesized and characterised BICAAC-borane adducts and using them prepared 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-(BH_2)-H-(BH_2)-BICAAC]$^+$[H-B(C_6F_5)$_3$]$^-$ and [BICAAC-(BH_2)-H-(BH_2)-BICAAC]$^+$[B(C_6F_5)$_4$]$^-$ and utilized them as a catalyst in hydrosilylation reactions of carbonyls. In the area of transition elements, their group have prepared a series of complexes with different metals. [(BICAAC)$_2$$PdCl_2$] complex has been synthesized and employed as a catalyst in Heck-Mizoroki and Suzuki-Miyaura Cross Coupling Reactions. Next, they synthesized and characterized iridium complex Ir(BICAAC)Cl(COD) and make use of it as a catalyst in transfer hydrogenation reactions of carbonyls (aldehyde and ketones) and imines. Further, they have synthesized and characterized a series of [(BICAAC)$_2$$Ni(X)_2$] complexes [X = Cl, Br and I] and explored it's potential as catalyst in Negishi cross coupling reactions. The zero-valent transition metal (BICAAC)$_2$M(0) complexes (M = Mn, Ni, Cu, Zn, Pd, Au etc.) have also been synthesized. The figure below shows the single crystal X-ray structures of diborene, [(BICAAC)$_2$$PdCl_2$] and Ir(BICAAC)Cl(COD) complexes stabilized by BICAAC.



Inorganic macrocycles and cryptands: Conformationally rigid boron containing pyridinophanes and the aluminum congeners are very novel molecules including the aluminum anchored bicyclic pyridinophane. More recently, Singh's group have developed a protocol to prepare boracalixarenes by exploiting the dearomative hydroboration route of pyridine moieties with different boron hydrides. The picture below shows a boracalixarene like macrocycle in a partial cone conformation assembled from dearomatized triazine moieties.



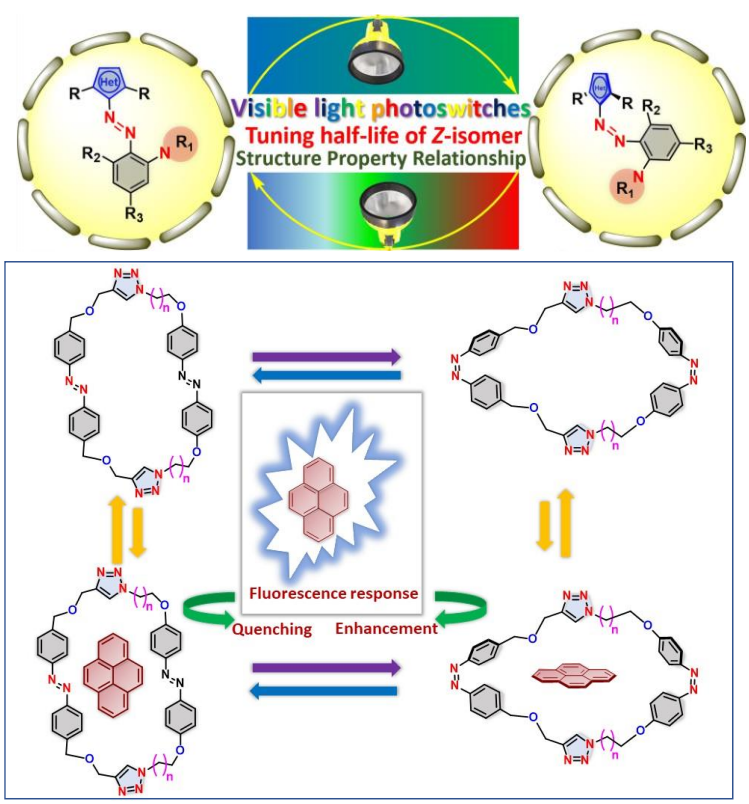
Subhabrata Maiti

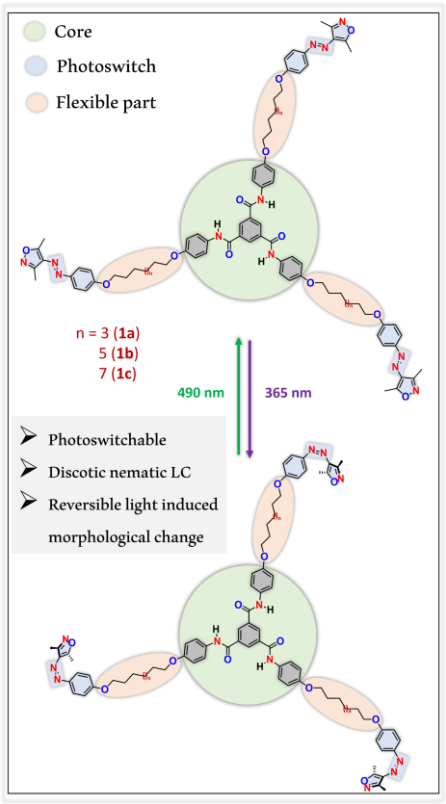
Biological functions typically involve a series of interlinked temporal events having specific spatial coordination among the interacting components so that the temporal events occur at specific locations or in specific compartments in the organism. Thus, continued efforts towards development of programmable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

Directional interactions and the precise assembly of colloids at specific locations are critical for applications such as patterning and microarrays. Multivalency-mediated interactions are essential in governing dynamicity and self-assembly in biological systems. Despite its significance in supramolecular chemistry to biomedicine, the role of multivalency in modulating spatiotemporally tunable assembly formation, colloidal transport, or phoresis remains unexplored. Singh' group studied the self- assembly of surfactant-functionalized cationic nanoparticles modulated by the binding of multivalent adenosine mono-,di- and trinucleotides (AM/D/TP) principally governed by - synergistic enzyme–substrate–nanoparticle affinity and the phoretic effect. They further demonstrated two autonomous aggregation patterns: modulation by enzyme gradients in microfluidic and macroscale conditions and surface deposition patterns via the coffee ring effect. Additionally, they exploited the coffee ring phenomenon by introducing ATP-loaded nanoparticles into blood serum, highlighting its potential in low-cost disease diagnostics. By harnessing the synergistic enzyme-substrate nanoparticle affinity and leveraging the phoretic effect, they further showcased the potential for achieving precise control over spatial patterning at different scales. These findings have implications for a wide range of biomedical applications, including biosensing, diagnostics, and advanced therapeutics.

In enzyme-generated flow generation work, Acetylcholinesterase was confined, which catalyzes the hydrolysis of the neurotransmitter acetylcholine. An enzyme-based micropump was developed through a layer-by-layer assembly process. Its catalytic action, along with inhibitors (ranging from paraoxon to adenine-based nucleotides) was also studied. The same study was also done by immobilizing Human Plasma which contains Acetylcholinesterase, resulting in a prototype model of a plasma-based micropump. Also, chemotaxis of alkaline phosphatase enzyme, DNAzyme and DNA in gradient of ions within a microfluidic channel has been studied. Also enzyme drifting behavior was studied in the presence of small crowders like sugar molecules, mainly sucrose, fructose and glucose which is pretty physiologically pertinent in purely non-catalytic conditions. Additionally, in a hydrogel matrix how the presence of nanoparticle can generate a prolonged pH gradient was demonstrated.

Sugumar Venkataramani





Photoswitchable functional molecules: Azo-photoswitches are interesting molecular systems that toggle between two or more states by light. The reversible E-Z isomerization process inherits bistability to the azo compounds, which can be useful in modulating the functions of molecular systems. Despite recent progress in this direction, several challenges remain open. One of the important challenges is to enable the system to switch under longer wavelengths, preferably in visible light. Towards this, a modular approach has been adopted to synthesize a wide range of visible-light-driven azoheteroarene photoswitches. In this regard, Venkataramani's research group considered ortho substitution of cyclic amines in the aryl ring and varied substitution patterns. Using detailed spectroscopic studies, they established a relationship between structure and photoswitching ability and also half-lives of the Z-isomers. We achieved tunable and bidirectional longer wavelength photoswitches (J. Org. Chem. 2022, 87, 10, 6541–6551). In yet another work, they reported the design, synthesis, and study of light-induced shape-changing azomacrocycles, incorporated with azobenzenes tethered with alkoxy groups and triazole units to afford flexibility and binding. They are expected to reversibly bind with the guest molecule. Through this investigation, Venkataramani's group successfully demonstrated light-controlled fluorescence quenching and enhancement in the monomeric emission of pyrene as a guest molecule through photoisomerization and, in turn, host–guest interactions (Org. Biomol. Chem., 2022, 20, 5284-5292). Also, three benzene-1,3,5-tricarboxamide (BTA) based molecular systems containing phenylazo-3,5-dimethylisoxazole photoswitches were designed and synthesized. Their liquid crystalline (LC) properties were studied in collaboration with Dr. Santanu Pal's group. Studies revealed the morphological changes in the self-assembly by light confirming discotic LC molecules with reversible"on and off states" modulated by light at ambient temperature (Chem. Eur. J., 2022, 29, e202202876). A review of multiple azoarenes-based systems was also contributed during this year (Chem. Record, 2022, 22, e202200074).

Heterocyclic radicals: Matrix isolation infrared spectroscopic studies on reactive intermediates, and computations especially on heterocyclic radicals were also investigated during this period. Some of the works are either at the analysis stage or as part of manuscripts that are under preparation.

Suman K. Barman

Barman's research group is actively involved in understanding the factors that can lead to enhanced electrocatalytic reduction of protons to hydrogen in the context of alternate energy resources. To facilitate hydrogen evolution, they are designing 3d transition metal complexes, surrounded by redox-active non-innocent ligands and basic moieties in the ligand which can attract the protons resulting in fast proton delivery to the active site. In this regard, their group have analyzed the electrocatalytic behavior of octahedral Ni(II)-phenolate complex for proton reduction. They have successfully structurally characterized the active intermediate where acid source is hydrogen bonded to the phenolate moiety. This resulted in maximum TOF of 3.73 x 104 s-1 using acetic acid as an external proton source in acetonitrile. This work is being drafted and will be communicated shortly. Their group have also developed other catalysts for proton, CO2 and O2 reductions.

Apart from electrocatalysis, they are also carrying out development of bioinspired Cu(II) complexes for biomimetic modelling of the enzyme nitrite reductase which reduces nitrite to nitric oxide. In this project Barman's group is studying the effect of second coordination sphere towards the reactivity of copper-nitrite complexes for oxygen atom transfer and electrocatalysis.

Ujjal K Gautam

The central theme of research in the Nanoscale Energy Lab led by Dr. Ujjal K. Gautam during 2022-23 is to explore new avenues and address environmental challenges leading to fast-growing scientific breakthroughs and market opportunities. Their 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.

Gautam's 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. Their group have got certain important breakthrough as refected in the publication list.

8.2.2. Visits of the faculty members

Debashis Adhikari

- IIT Mandi, 25th May, 2022
- IIT Indore, 20th February, 2023

Jino George

- IISER Trivandrum, January 6-11th, 2023
- NCL Pune, March 15-17th, 2023

P. Balanarayan

- Savitri Bhai Phule Pune University May 2022
- Savitri Bhai Phule Pune University August 2022
- Savitri Bhai Phule Pune University December2022

Santanu Kumar Pal

- DAV University, Jalandhar, 18-19 April, 2023
- IIT Bombay, 21 July, 2022

Sabyasachi Rakshit

- October, 2022: INST, Mohali to deliver a research talk at the 1st INST-IISER meet
- January 2023: IISER Thiruvananthapuram to teach in a workshop and also deliver a research talk at XIII FCS meeting

Sanchita Sengupta

- Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) Bangalore, 23-25 Jan, 2023.

— Institute of Nano Science and Technology (INST) Mohali, Sep 22-23, 2022.

Sanjay Singh

— Banaras Hindu University (BHU), Dates – December 15-17, 2022.
— IISER TVM, Dates – February 9-12, 2023.

Ujjal K Gautam

— DESY-Germany, 12-25 July, 2022
— INST Mohali, 2-3 September, 2022
— JNCASR, Bangalore, 19-23 October, 2022
— CSIR-NEIST Jorhat, 24-26 November, 2022
— National Physical Laboratory, 21-24 February, 2023
— Dibrugarh University, February 23 to March 03, 2023
— IIT Roorkee, 4-5 March, 2023.

8.2.3. Talks delivered

Angshuman Roy Choudhury

— Angshuman Roy Choudhury-Title of the talk. In-situ crystallizations: Technique to Applications, G G D S D College, Chandigarh, Dates 1st October 2022

Arijit K. De and lab members

— Arijit Kumar De, Unravelling Competing Twisting and Isomerization Pathways in a Push-Pull Stilbene, Chemical Science Symposium 2022, IIT Mandi, 23 to 25 May 2022.
— Shaina Dhamija, A Revisit on Impulsive Stimulated Raman Spectroscopy: Importance of Spectrally Dispersed Chirped Broadband Probe. Dr. K. V. Rao Scientific Society Research Awards 2021-2022, India, 18 June 2022.
— Arijit Kumar De, Elucidating Ultrafast Excited-State Dynamics of mKeima: Hidden Conformers and Stepwise Versus Concerted Isomerization and Proton Transfer, Future Oriented Research Conferences & Exhibitions: Interdisciplinary Initiatives in Chemical Sciences (FORCE-IICS-2022), Jaypee Palace, Agra., 28-31 July 2022.
— Arijit Kumar De, Elucidating excited-state dynamics of mKeima: Hidden conformers and stepwise versus concerted isomerization and proton transfer. Interdisciplinary Initiative in Chemical Sciences (IICS) 2022 Agra Uttar Pradesh India, July 28-31, 2022.
— Arijit Kumar De, Optical trapping with femtosecond pulses: Excitements, challenges and opportunities, 13th International Conference Series on Laser-light and Interactions with Particles (LIP-2022), Warsaw Poland, August 21-26, 2022.
— Arijit Kumar De, Optical Trapping with Femtosecond pulses: Excitements, Challenges and Opportunities ,7th Annual International Student Conference on Optics and Photonics (SCOP-2022), 28-30 September 2022, Physical Research Laboratory, Ahmedabad.
— Garima Bhutani, Impulsive Stimulated Raman Spectroscopy Reveals Synergistic Effects in Binary Mixture of Deep Eutectic Solvents and an Organic Co-solvent. Frontiers in Optics + Laser Science (FiO + LS), Rochester, New York, USA, 19 October 2022.
— Shaina Dhamija, Probing Intramolecular Energy and Charge Transfer using Broadband Pump-Probe Spectroscopy an Impulsive Stimulated Raman Spectroscopy. Conference on Optics, Photonics & Quantum Optics (COPaQ 2022), IIT Roorkee, India, 11 November 2022.
— Arijit Kumar De, Raman Spectroscopy with a Twist, Department of Chemical Sciences, IISER Kolkata, 5 January 2023.
— Arijit Kumar De, Optical Trapping with Femtosecond pulses: Excitements, Challenges and Opportunities, SPIE Student Chapter Talk, Department of Physical Sciences, IISER Kolkata, 6 January 2023.
— Arijit Kumar De, Freezing Molecules in Motion by Shedding Light on Them, Special Lecture to mark the celebration of Science Day, MCM DAV College for Women, Sector 36-A, Chandigarh, 24 February 2023.
— Arijit Kumar De, Samita Mishra and Amit Kumar, Mapping Hot Carrier Relaxation Mediated by Low-Frequency Phonon Modes in a Lead-Free Double-Perovskite, Perovskite Society of India Meet (PSIM-2023), IIT Roorkee, 1-3 March, 2023.

— Arijit Kumar De, A Cross-disciplinary Approach Toward Solving the ‘Global Energy Crisis’, One Day National Seminar on Advances in Interdisciplinary Sciences for Sustainable Future, Post Graduate Government College for Girls, Sector 11, Chandigarh, 22 March 2023.

Debashis Adhikari

— Debashis Adhikari, “Organophotocatalytic dehydrogenation reactions mimicking quinone cofactors” IIT Mandi, 25th May, 2022

— Debashis Adhikari, “Mechanistic elucidation of a single electron transfer reaction promoted by fluorene” Conference on sustainability. IIT Indore, 20th February, 2023.

Jino George

— Jino George, Invited talk, Let There Be Light 2023 conference held at Nagpur, February 19-22nd 2023.

— Jino George, Invited talk, national workshop on fluorescence and Raman spectroscopy (FCS and Raman) conference held at IISER Trivandrum, January 6-11th, 2023.

Shamasundar, K. R

— “Aspects of electron-correlation in Molecules”, INST Mohali, Dates; November 3-4, 2023

Kuduva R. Vignesh

— Kuduva R. Vignesh, Title of the talk: New Generation Molecular Nanomagnets: Experiment and Theory, Name of the Conference/Institute: DST-SERB funded workshop on "First Principle Designing of Functional Molecules and Materials" conducted by the Institute of Nano Science and Technology (INST) Mohali, India, on 04-11-2022.

— Kuduva R. Vignesh, Title of the talk: Mixed 3d-4f Single-Molecule Toroics, Name of the Conference/Institute: 2nd Asian Conference on Molecular Magnetism (ACMM-II) conference organized by the Department of Chemistry, IISER Bhopal, India. December 5-9, 2022.

— Kuduva R. Vignesh, Title of the talk: Mixed 3d-4f Single-Molecule Toroics, Name of the Conference/Institute: 3rd Modern Trends in Molecular Magnetism (MTMM-III)" conference organized by the Department of Chemistry, IIT Kharagpur, India. December 10-14, 2022.

N. Sathyamurthy

— N. Sathyamurthy, AI/ML Methods in Chemical Dynamics, IACS, Kolkata, May 26-28, 2022

— N. Sathyamurthy, AI/ML Methods in Chemical Dynamics, IISER Kolkata, August 24, 2022

— N. Sathyamurthy, Learning Science from the Kitchen Garden, NISER Bhubaneswar, Sep. 16, 2022

— N. Sathyamurthy, AI/ML Methods in Chemical Dynamics, CTTC-2022, BARC Mumbai, Sep. 22-24, 2022

— N. Sathyamurthy, Rotationally inelastic scattering in HeH+-He/H2 collisions, Spectroscopy and Dynamics of Molecules and Clusters, Malpe beach, Karnataka, Nov. 10-13, 2022

— N. Sathyamurthy, AI/ML Methods in Chemical Dynamics, RAC 2022, NIT Meghalaya, Shillong, Nov. 18-20, 2022

— N. Sathyamurthy, Synchronous pulsed flowering and pattern formation in individual flowers of Passiflora incarnata (Passion Flower), DCC 2022, IACS Kolkata, Dec. 3, 2022

— N. Sathyamurthy, Chemistry in the Early Universe, Annual Convention of Chemists, Indian Chemical Society, IIT(ISM) Dhanbad, Dec. 16, 2022

— N. Sathyamurthy, Chemistry in the Early Universe, SRM Univ. Chennai, January 9, 2023

— N. Sathyamurthy, AI/ML Methods in Chemical Dynamics, EESTER-2023, IIT Madras, January 11, 2023

— N. Sathyamurthy, AI/ML Methods in Chemical Dynamics, iCURE2023, Madurai Kamaraj University, February 6, 2023

— N. Sathyamurthy, Chemistry in the Early Universe, Department of Chemistry, IIT Bhilai, Feb. 28, 2023

— N. Sathyamurthy, Chemistry in the Early Universe, Department of Chemistry, IIT Patna, March 29, 2023

P. Balanarayan

— P. Balanarayan, Higher Harmonic Generation in an Oscillating frame of reference, IACS- Kolkata June 2022

— P. Balanarayan, Interesting effects of molecules driven by a strong laser, TIFR- Mumbai, Invited talk, January 2023.

R. Vijaya Anand

— Prof. R. Vijaya Anand delivered an invited lecture on “Synthesis of Carbocycles and Related Natural Products from Suitably Modified p-Quinone Methides” during the Organic Chemistry Symposium (OCS-2022) organized by IIT Kanpur during April 2-3, 2022.

Raj Kumar Roy

— Raj Kumar Roy; “Folding of aromatic polyamides into a rare intrachain β-sheet type structure and their remarkable selectivity in guest encapsulations”.

— Raj Kumar Roy; “A new framework for folding aromatic polyamides into intrachain β-sheet structures and their applications in organo-electronics and catalysis”;

S. Arulananda Babu

— Babu, S. A. Palladium(II)-catalyzed C(sp2)-H bond functionalization of carboxamides. RSC-CFOS-2022 conference at IIT Roorkee, during December 01-04, 2022.

— Babu, S. A. CRSI Bronze Medal 2023 award lecture. Palladium(II)-catalyzed C-H functionalization of diastereotopic C-H bonds. “30th CRSI-NSC at JNU from 3-5th February 2023.

S. K. Pal and lab members

— Santanu Kumar Pal- Charge Transport behaviour in Discotic Liquid Crystals, 29th national conference on liquid crystals, 8-10 Dec 2022

— Shruti Suthar- Observation of Helical Self-assembly in Cyclic Triphosphazene-based Columnar Liquid Crystals bearing Chiral Mesogenic Units, 29th national conference on liquid crystals, 8-10 Dec 2022

— Shallu Dhingra- Solution-processable Organic Light-Emitting Diodes Utilizing Electroluminescent Perylene Tetraesters-based Columnar Liquid Crystals, 29th national conference on liquid crystals, 8-10 Dec 2022

— Ritobrata De- Oxadiazole-adorned Heterocoronene Discotics as Ambipolar Organic Semiconductors, Frontiers in Chemical Science, 2-4 Dec 2022

S. S. V. Rama Sastry

— S. S. V. Ramasastry. Title: Name of the conference: Journey of Analytical Techniques in Chemical and Biological Sciences (JATCBS 2022) organised by the Department of Chemistry, SVNIT, Surat. Date: 18.04.2022.

— S. S. V. Ramasastry. Title: Name of the conference: Emerging Trends in Science and Technology, held at the Punjab Engineering College (PEC) Chandigarh. Date: 10.06.2022.

— S. S. V. Ramasastry. Title: Name of the conference: Teachers Training Program organized by the Govt. of Kerala and IISER Thiruvananthapuram. Date: 16.07.2022.

— S. S. V. Ramasastry. Title: Name of the conference: 22nd International Symposium on Homogenous Catalysis (ISHC) organised by the University of Lisbon, Portugal. Date: 28.07.2022.

— S. S. V. Ramasastry. Title: Name of the conference: Invited talk at the Department of Chemistry, IIT Bombay. Date: 10.08.2022.

— S. S. V. Ramasastry. Title: Name of the conference: Recent Approaches and Techniques in Drug Design and Drug Discovery. Date: 24.08.2022.

— S. S. V. Ramasastry. Title: Name of the conference: Invited talk at the Department of Chemistry, NIT Warangal. Date: 04.11.2022.

— S. S. V. Ramasastry. Title: Name of the conference: Trends in Organometallic Chemistry webinar organised by ACS India and hosted by the Editorial team of Organometallics. Date: 15.12.2022.

— S. S. V. Ramasastry. Title: Name of the conference: nvited talk during the workshop on 'Organo- & Electrocatalysis for Sustainable Synthesis (OECSS) 2022' conducted by the School of Basic Sciences, IIT Bhubaneswar. Date: 22.12.2022.

— S. S. V. Ramasastry. Title: Name of the conference: Organo- & Electrocatalysis for Sustainable Synthesis (OECSS) 2022 conducted by the School of Basic Sciences, IIT Bhubaneswar. Date: 26.12.2022.

— S. S. V. Ramasastry. Title: Name of the conference: International Seminar on Frontiers in Chemistry 2023 organised by the Department of Chemistry, University of North Bengal, Siliguri. Date: 14.03.2023.

— S. S. V. Ramasastry. Title: Name of the conference: National Seminar on Recent Advances in Chemical Sciences (RACS) 2023' organised by the Department of Chemistry, Dr. Harisingh Gour Vishwavidyalaya, Sagar. Date: 16.03.2023.
— S. S. V. Ramasastry. Title: Name of the conference: Invited lecture at the Department of Chemistry, IIT Delhi. Date: 14.04.2023.

Sabyasachi Rakshit

— 'Probing Mechano-elasticity in aging and cancer progression' – at INST Mohali during 1st INST-IISER Bilateral Meeting, 2022
— 'Tip-links in inner ear serve as band-stop-like filters of force' – at IISER Thiruvananthapuram during XIII FCS meeting, January 2023
— 'Enzyme kinetics in a vibrating platform' – at Pench, MP during 3rd Let There Be Light Meeting.

Sanchita Sengupta

— Talk on "Nobel Prize in Chemistry in 2022" organized by Dean R & D, IISER Mohali at IISER Mohali, March 25, 2023.
— Talk in "Let There Be Light (LTBL)" symposium 2023 (Discussion Meeting on Spectroscopy and Microscopy), Mayur Hospitality, Nagpur, Feb 19-22, 2023.
— Talk in "Chemical Science Leaders in the Field Symposium", Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) Bangalore, 23-25 Jan, 2023.
— Talk in "Chem@Nano22", Institute of Nano Science and Technology (INST) Mohali, Sep 22-23, 2022.
— Talk in 'Women in Chemical Sciences' session in "29th CRSI National Chemistry Symposium (NSC)", IISER Mohali, July 7-9, 2022.

Sanjay Mandal

— Sanjay Mandal. Invited Talk. Multifunctional Emerging Nanomaterials for Environment Applications. NIT Kurukshetra. 17 June, 2022.
— Sanjay Mandal. Plenary Talk. Multifunctional Emerging Nanomaterials for Environment Applications. Advanced Functional Materials: Future Perspectives (AFMFP-2022), NIT Jalandhar. 6 August, 2022.
— Sanjay Mandal. Invited Talk. Diverse Metal-Organic Heterogeneous Catalysts for Organic Transformations. NIT Kurukshetra. 11 October, 2022.
— Sanjay Mandal. Expert Talk. Single Crystal and Powder and Their Applications, Short Term Course on Analytical Techniques in the realm of Molecules and Materials (ATRAMM-2021), NIPER Mohali. 29 November, 2022.
— Sanjay Mandal. Expert Talk. Porous Nanomaterials for Energy, Environment and Healthcare. Guru Jambheshwar University of Science and Technology, Hisar, Haryana. Science Conclave organized on the theme 'Science for Socio-Economic Growth' and sponsored by Science and Technology Department, Govt. of Haryana. 5 December, 2022.
— Sanjay Mandal. Memorial Series Talk. Multifunctional Emerging Nanomaterials for Environment Applications. R.K. Mission R. College, Narendrapur, WB. 2 January, 2023.
— Sanjay Mandal. NASI Chandigarh Chapter/SPSTI Invited Talk, Invention & Innovation and Research Discovery in Chemistry, PG Govt College for Girls, Sector 11, Chandigarh. 20 January, 2023.

Subhabrata Maiti

— Subhabrata Maiti. Fundamentals and Applications of UV-vis Absorption and Fluorescence Spectroscopy. Two-Day Hands-On Workshop on Analytical Instrumentation on the theme, "Strengthening Education and Scientific Training" ACS AcSIR-CSIO, Chandigarh, 14th-15th July 2022
— Subhabrata Maiti. Catalytic Micropump: A Prospective Biosensing Technology. 1 st IEEE-NTC AcSIR-CSIO, International Conference on Emerging Materials for Sustainable Development (EMSD-2022). 9-11 October, 2022.
— Subhabrata Maiti. Chem Sci 2022 Leaders in the Field (LITF) Symposium-JNCASR Bangalore; 30 Nov to 02 Dec 2022.

Sugumar Venkataramani

— Sugumar Venkataramani. "Stories on Light Molecular Interactions" Kongunadu Arts and Science College, Coimbatore (Online) / January 03, 2023.

— Sugumar Venkataramani. “En-lightening azoheteroarenes” Recent Advances in Bioorganic and Medicinal Chemistry, NIPER Mohali, November 19, 2022.
— Sugumar Venkataramani. “Photoisomerization in rare gas matrices” SDMC Online Series, August 27, 2022.
— Sugumar Venkataramani. “IR Spectroscopy: Fundamentals, Instrumentation, Interpretation & Applications in Reactive Intermediates” Online Webinar, HLL Lifecare Limited, July 29, 2022.
— Debapriya Gupta. “Light-switchable’ metal complexes -Introducing phototunability through azoheteroarenes” Online Saturday seminar series – "Light as a Reagent and Product", March 4, 2023

Ujjal K Gautam

— Ujjal K. Gautam, Energy Conclave 2022, Institute of Nanoscience and Nanotechnology, September 2, 2022.
— Ujjal K. Gautam, Sixteenth JNC Research Conference on Chemistry of Materials, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, October 21, 2022.
— Ujjal K. Gautam, Environment, and Sustainability (SSES-2022), CSIR-NEIST Jorhat, November 23, 2022
— Ujjal K. Gautam, Indo-French Workshop on Clean and Sustainable Energy Technologies (INFINITE), NPL Delhi, February 22, 2023
— Ujjal K. Gautam, Recent Advances in Materials Chemistry and Catalysis, (RAMCC-2023)", Dibrigarh University, March 1, 2023
— Ujjal K. Gautam, Emergent material for energy and environment (EMEE-2023), March 5, IIT-Roorkee.
— Maqsuma Banoo, International Conference on Engineering Trends in Science and Technology (ICETST) held on 10-11 June 2022.
— Raj Sekhar Roy, International Conference on Emerging Materials for Sustainable Development (EMSD-2022) held at CRSI-CSIO Chandigarh on the 9- 11th of July 2022.

8.2.4. Conferences attended by the researchers

Angshuman Roy Choudhury

— Angshuman Roy Choudhury-Title of the talk. “Novel Salts of Ofloxacin and Levofloxacin: Structural and Biological Studies”, 49th National Seminar on Crystallography, Dates 28-30 November 2022, Jammu University
— Sakshi-“Experimental Charge Density Analysis to Understand the Nature of Weak Interactions Offered by Organic Fluorine”, 49th National Seminar on Crystallography, Dates 28-30 November 2022, Jammu University
— Angshuman Roy Choudhury-“Intermolecular interactions involving fluorine in small organic molecules: A structural, computational and charge density analysis”,One-day Conference on Crystal Engineering and Solid-state chemistry, Dates 23rd February 2023, IISER Thiruvananthapuram

Arijit K. De and lab members

— Arijit Kumar De, Chemical Science Symposium 2022, IIT Mandi, 23 to 25 May 2022.
— Arijit Kumar De, Nitin Yadav, Shaina Dhamija, Sakshi Chawla, Subho Mitra, Amit, Sasthi Paul. 29th Chemical Research Society of India: 29th National Symposium in Chemistry (CRSI-NCS-29), Indian Institute of Science Education and Research Mohali, India. July 7-9, 2022.
— Arijit Kumar De, Shaina Dhamija, Samita Mishra, Garima Bhutani, Sakshi Chawla, Subho Mitra. International Conference on Ultrafast Phenomena (online); Montréal, Quebec, Canada, July 18-22, 2022.
— Arijit Kumar De, International Conference on Ultrafast Phenomena (UP2022) (in person); Montréal, Quebec, Canada, July 18-22, 2022.
— Arijit Kumar De, Future Oriented Research Conferences & Exhibitions: Interdisciplinary Initiatives in Chemical Sciences (FORCE-IICS-2022), Jaypee Palace, Agra, 28-31 July 2022.
— Arijit Kumar De, 13th International Conference Series on Laser-light and Interactions with Particles (LIP-2022) (online), Warsaw Poland, August 21-26, 2022.
— Sumit Yadav, SPIE Optics+photonics 2022, San Diego, USA. 21-25 August, 2022.
— Arijit Kumar De, 7th Annual International Student Conference on Optics and Photonics (SCOP-2022), Physical Research Laboratory, Ahmedabad, 28-30 September 2022.

— Amit Kumar, International Conference on the theme of Emerging Materials for Sustainable Development (EMSD-2022), -CSIO, Sector 30 C, Chandigarh, India, 10-11 October 2022.
— Arijit Kumar De, Shaina Dhamija, Garima Bhutani, Sumit Yadav, Sakshi Chawla, Subho Mitra, Abdul Alim, Frontiers in Optics + Laser Science (FiO + LS) (online), 17-20 October, 2022.
— Sakshi Chawla, Ultrafast Sciences (UFS 2022) IISER Thiruvananthapuram, India 3-5 November 2022.
— Subho Mitra, Spectroscopy and Dynamics of Molecules and Clusters (SDMC), 2022, Malpe, Mangalore, 10-13 November, 2022.
— Shaina Dhamija, Sumit Yadav, Abdul Alim, XLV symposium of the optical society of India: Conference on Optics, Photonics and Quantum Optics (COPaQ 2022 IIT Roorkee, India), 10-13 November, 2022.
— Shaina Dhamija IX International Conference on Perspectives in Vibrational Spectroscopy (ICOPVS-2022), Indore India, 13-17 December 2022.
— Arijit Kumar De, Samita Mishra and Amit Kumar, Perovskite Society of India Meet (PSIM-2023), IIT Roorkee, 1-3 March, 2023.
— Sasthi Paul, the 45th Indian Biophysical Society Meeting (IBS-2023), Bangalore, India, 25-29 March 2023.

Debashis Adhikari and lab members

— Vikramjeet Singh- MTIC-XIX (2022), Redox noninnocence of the formazanate ligand applied to catalytic formation of a-ketoamides, Date = 15-17/12/2022
— Vikramjeet Singh- 29th CRSI National Symposium in Chemistry (CRSI-NSC-29), Redox noninnocence of the formazanate ligand applied to catalytic formation of a-ketoamides, Date = July 07-09, 2022
— Abhishek Kundu- MTIC-XIX (2022), First-row transition metal complexes in borrowing hydrogen catalysis: Ligand design leads to distinctly different pathways, Date = 15-17/12/2022
— Abhishek Kundu- 29th CRSI National Symposium in Chemistry (CRSI-NSC-29), Transition-metal free C-C cross-coupling reaction via single electron transfer from in situ generated anions: a close look into the initiation path, Date = July 07-09, 2022
— Abhishek Kundu- Chemical Science symposium 2022: Sustainable synthesis and catalysis, London, UK, Deciphering single electron transfer ability of fluorene under photoredox conditions, Date = 10-11 November 2022
— Abhishek Kundu- RSC Poster Twitter Conference 2023, First-row transition metal complexes in borrowing hydrogen catalysis: Ligand design leads to distinctly different athways, Date = 28 February, 2023
— Baishanal Mandal- 29th CRSI National Symposium in Chemistry (CRSI-NSC-29), Bioinspired radical-mediated transition-metal-free dehydrogenation of heteroarene towards N-heterocycles, Date = July 07-09, 2022
— Monojit Roy-Chemical Science symposium 2022: Sustainable synthesis and catalysis, London, UK, Aromatization as the driving force for single electron transfer towards C–C cross-coupling reactions, Date = 10-11 November 2022
— Ayanangshu Biswas-PMRF Annual Symposium 2023, Ligand Assisted Borrowing Hydrogen Reaction via “Hydrogen Atom Transfer Pathway” catapulated by Azo-Hydrazo redox couple.
— Date = 17-18 February, 2023.
— Ayanangshu Biswas-29 th CRSI National Symposium in Chemistry & CRSI-ACS Symposium Series in Chemistry.Ligand Assisted Nickel Catalysis Enabling sp3 C-H Alkylation of 9H-Fluorene with Alcohols via Hydrogen Atom Transfer (HAT) Pathway. Date = 07-09 July, 2022.

Kuduva R. Vignesh

— Kuduva R. Vignesh, Attended the "29th CRSI National Symposium in Chemistry" conference organized by the Department of Chemical Sciences, IISER Mohali, India. July 6-10, 2022.
— Kuduva R. Vignesh, Attended the "Theoretical Chemistry and Biology (TCB)" symposium organized by the IISER Mohali-NIPER Mohali, India held on 15-10-2022.
— Three Ph.D. students: Amit Gharu, Vikram Vipanchi, and Imon Jyoti Dutta attended the "Theoretical Chemistry and Biology (TCB)" symposium organized by the IISER Mohali-NIPER Mohali, India held on 15-10-2022.

— Three Ph.D. students: Amit Gharu, Vikram Vipanchi, and Imon Jyoti Dutta attended the 3rd Modern Trends in Molecular Magnetism (MTMM-III)" conference organized by the Department of Chemistry, IIT Kharagpur, India. December 10-14, 2022.

R. Vijaya Anand and lab members

— R. Vijaya Anand attended the FORCE-IICS conference organized at Agra during July 28-30, 2022.
— R. Vijaya Anand attended the first Industry-Academia-NOST Conclave organized by the Department of Chemistry at IIT Bombay during September 13-15, 2022.
— R. Vijaya Anand attended the "Recent trends in medicinal chemistry" conference organized by NIPER Mohali on November 19, 2022.
— Rajat Pandey attended the CRSI conference organized at IISER Mohali during July 7-9, 2022.
— Rekha presented a poster in the CRSI conference organized at IISER Mohali during July 7-9, 2022.
— Sonam Sharma presented a poster in the CRSI conference organized at IISER Mohali during July 7-9, 2022.
— Sonam Sharma presented a poster in the "Recent trends in medicinal chemistry" conference organized by NIPER Mohali on November 19, 2022.
— Shaheen Fatma presented a poster in the CRSI conference organized at IISER Mohali during July 7-9, 2022.
— Shaheen Fatma presented a poster in the "Recent trends in medicinal chemistry" conference organized by NIPER Mohali on November 19, 2022.
— Sruthy Vipin attended the CRSI conference organized at IISER Mohali during July 7-9, 2022.
— Sruthy Vipin attended the "Recent trends in medicinal chemistry" conference organized by NIPER Mohali on November 19, 2022.
— Akshay Wadhave attended the CRSI conference organized at IISER Mohali during July 7-9, 2022.
— Akshay Wadhave attended the "Recent trends in medicinal chemistry" conference organized by NIPER Mohali on November 19, 2022.
— Arun Kumar attended the CRSI conference organized at IISER Mohali during July 7-9, 2022.
— Arun Kumar attended the "Recent trends in medicinal chemistry" conference organized by NIPER Mohali on November 19, 2022.
— Athira attended the "Recent trends in medicinal chemistry" conference organized by NIPER Mohali on November 19, 2022.S.

Raj Kumar Roy

— Raj Kumar Roy; "Folding of aromatic polyamides into a rare intrachain β-sheet type structure and their remarkable selectivity in guest encapsulations"; FORCE-IICS 2022; 28-31st July
— Raj Kumar Roy; "A new framework for folding aromatic polyamides into intrachain β-sheet structures and their applications in organo-electronics and catalysis"; SPSI-MACRO 2022; 2-4th Nov.

Ramesh Ramachandran

— Ramesh Ramachandran- The role of "Analytic theory" in biomolecular solid-state NMR,. Symposium in "Theoretical Chemistry and Biology", Dates: Oct 15, 2022

S. Arulananda Babu

— Babu, S. A. Palladium (II)-catalyzed C(sp2)-H bond functionalization of carboxamides. RSC-CFOS-2022 conference at IIT Roorkee, during December 01-04, 2022.
— Babu, S. A. CRSI Bronze Medal 2023 award lecture. Palladium (II)-catalyzed C-H functionalization of diastereotopic C-H bonds. "30th CRSI-NSC at JNU from 3-5th February 2023.).

S. K. Pal and lab members

— Shallu Dhingra- An Electron-Deficient Tris(triazole)-based Discotic Liquid Crystal that exhibit Fast Electron Transport, 28th International Liquid Crystal Conference, 24-29 July 2022
— Ritobrata De- Two together: Room Temperature Nematic Discotic Mesophase in a Luminescent Organic Dyad, 29th CRSI National Symposium in Chemistry, 7-9 July 2022
— Soma Sil- Label-Free Detection of Ochratoxin A Using Aptamer as Recognition Probe at Liquid Crystal-Aqueous Interface, Frontiers in Chemical Science, 2-4 Dec 2022

S. S. V. Rama Sastry and lab members

— S. S. V. Ramasastry. Title: Name of the conference: 10th Prof. A. Srikrishna Memorial Lecture Series organised by the School of Chemistry, University of Hyderabad. Date: 20.01.2023.

— S. S. V. Ramasastry. Title: Name of the conference: 22nd NOST conference. Date: 17.02.2023-20.02.2023.

Sabyasachi Rakshit and lab members

— Sabyasachi Rakshit, 'Dynamics of the couple proteins in tip-links during hearing' - at The Biochemistry Global Summit' organized by the Portuguese Biochemical Society (SPB), in collaboration with IUBMB, FEBS and PABMB between July 9 to July 14, 2022 at Lisbon, Portugal.

— Sabyasachi Rakshit, 'Probing Mechano-elasticity in aging and cancer progression' – at INST Mohali during 1st INST-IISER Bilateral Meeting, 2022

— Sabyasachi Rakshit, 'Tip-links in inner ear serve as band-stop-like filters of force' – at IISER Thiruvananthapuram during XIII FCS meeting, January 2023

— Sabyasachi Rakshit, 'Enzyme kinetics in a vibrating platform' – at Pench, MP during 3rd Let There Be Light Meeting.

— Gaurav Kumar Bhati, Insight into the molecular mechanism of Age-Related Hearing Loss (ARHL). CRSI National Symposium in Chemistry/ IISER Mohali. July 07-09, 2022

— Pritam Saha, Loss of cross-correlations in β-strands adverse the force adaptation in β-rich proteins CRSI National Symposium in Chemistry/ IISER Mohali. July 07-09, 2022

— Pritam Saha, Elucidating the etiology of malleability during force adaptation in β-rich mechanosensors, MBU50, Biophysics Unit, IISC Bangalore, January 23-25, 2023

— Tanuja Joshi, Understanding the role of interdomain-linkers (IDLs) in Ig domains of Titin MBU50, Biophysics Unit, IISC Bangalore, January 23-25, 2023

Sanchita Sengupta

— Sanchita Sengupta, Thermally Activated Donor-Acceptor Systems for Energy Transfer and Electron Transfer Mediated Photocatalytic Transformations. Let There Be Light (LTBL) symposium 2023 (Discussion Meeting on Spectroscopy and Microscopy), Mayur Hospitality, Nagpur, Feb 19-22, 2023.

— Sanchita Sengupta, Multi-stimuli Responsive Light-Harvesting Antennae and Rotors as Multifunctional Sensors. Chemical Science Leaders in the Field Symposium, Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) Bangalore, 23-25 Jan, 2023.

— Sanchita Sengupta, Multi-Stimuli Programmable FRET Light Harvesting Antenna for Ratiometric Temperature, pH and Metal Sensing. Chem@Nano22, Institute of Nano Science and Technology (INST) Mohali, Sep 22-23, 2022.

— Sanchita Sengupta, Multi-Stimuli Programmable FRET Light Harvesting Antenna Towards Ratiometric Temperature, pH and Metal Sensing., 29th CRSI National Chemistry Symposium (NSC), IISER Mohali, July 7-9, 2022.

Sanjay Mandal and lab members

— Himanshi Bhambri. Poster presentation. Conformational Isomerism Involving Carboxylate Groups of a Linker in metal Organic Frameworks and its Distinctive Influence on Detection of Ketones. 29th CRSI-National Symposium in Chemistry and CSRI-ACS Symposium Series in Chemistry. 07th - 09th July 2022.

— Himanshi Bhambri. Poster presentation. A Dual-Functional Cobalt Metal-Organic Framework Decorated with an Oxadiazole Moiety for Ultra-sensitive Detection of Mesityl Oxide, and Iodine Capture. 8th International Conference On Metal-Organic Frameworks And Open Framework Compounds, MOF 2022. 4th-7th September 2022.

— Vandana Sharma. Poster presentation. Multifunctional Isostructural Ni(II) and Zn(II) Metal-organic Frameworks as Heterogeneous Catalysts for the Friedel-Crafts Alkylation Reaction and Size-selective CO2 Chemical Fixation. 29th CRSI-National Symposium in Chemistry and CSRI-ACS Symposium Series in Chemistry. 07th - 09th July 2022.

— Vandana Sharma. Poster presentation. Design of Multifunctional Zn(II)-Organic Frameworks based on an Amino acid Functionalized Tricarboxylate for the Henry reaction. MTIC-XIX (2022), International Conference on Modern Trends in Inorganic Chemistry. 15th - 17th December 2022.

— Ishfaq Shafi Koul. Poster presentation. Exploiting the Lewis Acidity of Diverse ZnO Nanostructures for the C-C and C-N Bond Forming Reactions. 29th CRSI-National Symposium in Chemistry and CSRI-ACS Symposium Series in Chemistry. 07th - 09th July 2022.

— Rupinder Kaur. Poster presentation. Solvent- and Precursor-Dependent Fabrication of CdS Nanostructures and Their Use as a Heterogeneous Catalyst in Making bis(indolyl)methanes. 29th CRSI-National Symposium in Chemistry and CSRI-ACS Symposium Series in Chemistry. 07th - 09th July 2022.
— Rupinder Kaur. Poster presentation. Solvent- and Precursor-Dependent Fabrication of CdS Nanostructures and Their Use as a Heterogeneous Catalyst in Making bis(indolyl)methanes. MTIC-XIX (2022), International Conference on Modern Trends in Inorganic Chemistry. 15th - 17th December 2022.
— Alokananda Chanda. Poster presentation. Recyclable Luminescent Metal-Organic Probes for Real-Time Fast and Selective Detection of 2,4,6-Trinitrophenol in Aqueous Media. 29th CRSI-National Symposium in Chemistry and CSRI-ACS Symposium Series in Chemistry. 07th - 09th July 2022.
— Alokananda Chanda. Poster presentation. Naphthalene-Tagged Highly Stable and Reusable Luminescent and Structurally Diverse Zn(II) and Cd(II) Based Metal-Organic Probes for Fast and Selective Detection of 4-Nitoaniline in water. MTIC-XIX (2022), International Conference on Modern Trends in Inorganic Chemistry. 15th - 17th December 2022.

Sanjay Singh and lab members

— Sanjay Singh - Synthesis and Catalytic Applications of Electronically Unsaturated Cationic Boron and Aluminum Complexes, Dates – Modern Trends in Inorganic Chemistry (MTIC-XIX, BHU, December 15-17, 2022.
— Sanjay Singh - Systematic Approaches to Assemble Macrocycles Containing Selected Main Group Elements, Dates – International Conference on Main Group Synthesis and Catalysis (ICMGSC), IISER Thiruvananthapuram, February 9-12, 2023.
— Sandeep Kumar Thakur- Well-defined Ni(0) and Ni(II) complexes of bicyclic (alkyl)(amino)carbene (BICAAC): Catalytic activity and mechanistic insights in Negishi cross-coupling reaction., Dates – 29th CRSI-NSC and CRSI-ACS Symposium Series in Chemistry (July 07-90, 2022).
— Manu Adhikari- Transfer hydrogenation of carbonyls and imines with iPrOH catalyzed by Ir(BICAAC)Cl(COD), Dates – 29th CRSI-NSC and CRSI-ACS Symposium Series in Chemistry (July 07-90, 2022).
— Mamta Bhandari- Electronically unsaturated aluminum hydride cation for catalytic hydroboration of imines and alkynes and mechanistic insights thereof, Dates – 29th CRSI-NSC and CRSI-ACS Symposium Series in Chemistry (July 07-90, 2022).
— Manu Goyal- A modular approach to synthesized inorganic macrocycles based on main group elements. Dates – 29th CRSI-NSC and CRSI-ACS Symposium Series in Chemistry (July 07-90, 2022).
— Mandeep Kaur- Complexes from Earth-abundant elements magnesium and aluminium as catalysts for selective hydroboration of amides and alkynes. Dates – 29th CRSI-NSC and CRSI-ACS Symposium Series in Chemistry July 07-90, 2022).
— Surbhi Bansal- Transcendence of bicyclic (alkyl)(amino) carbene (BICAAC) from a spectator ligand in transition metal-based catalyst to an organocatalyst: Scrutinizing two sides of the same coin. Dates – 29th CRSI-NSC and CRSI-ACS Symposium Series in Chemistry (July 07-90, 2022).
— Manu Goyal- A Modular approach to macrocycles containing phosphazane building blocks. Dates Modern Trends in Inorganic Chemistry (MTIC-XIX, BHU, December 15-17, 2022.
— Mamta Bhandari- Highly electrophilic mononuclear cationic aluminum alkoxide complexes: Synthesis, reactivity and catalytic applications, Dates – International Conference on Main Group Synthesis and Catalysis (ICMGSC), IISER Thiruvananthapuram, February 9-12, 2023.
— Sandeep Rawat - Ligand modulated stability of low coordinated zinc cations and catalytic applications. Dates – International Conference on Main Group Synthesis and Catalysis (ICMGSC), IISER Thiruvananthapuram, February 9-12, 2023.

Subhabrata Maiti and lab members

— Subhabrata Maiti. Catalytic Micropump: A Prospective Biosensing Technology. 1 st IEEE-NTC AcSIR-CSIO, International Conference on Emerging Materials for Sustainable Development (EMSD-2022). 9-11 October, 2022.
— Subhabrata Maiti. Catalytic Micropump: A Prospective Biosensing Technology. 1 st IEEE-NTC AcSIR-CSIO, International Conference on Emerging Materials for Sustainable Development (EMSD-2022). 9-11 October, 2022.

— Subhabrata Maiti. Chem Sci 2022 Leaders in the Field (LITF) Symposium-JNCASR Bangalore; 30 Nov to 02 Dec 2022.
— Shikha, Subhabrata Maiti. Directional migration propensity of calf thymus DNA in gradient of metal ions. Emerging materials for sustainable development" at CSIR-CSIO, Chandigarh. 9-11 October, 2022.
— Shikha, Subhabrata Maiti. Biomolecular chemotaxis in gradient of metal ions. Recent advances in bioorganic and medicinal chemistry" at NIPER, S.A.S Nagar. 19th November 2022.
— Priyanka. Chem Sci 2022 Leaders in the Field (LITF) Symposium-JNCASR Bangalore; 30 Nov to 02 Dec 2022.
— Akshi Deshwal. Acetylcholineesterase's microflow based actuation in blood plasma. 29th CSIR-NSC-IISER Mohali. 7th July-9th July, 2022.

Sugumar Venkataramani and lab members

— Sugumar Venkataramani. Debapriya Gupta. Gayathri Parthiban. Ramanpreet Kaur. Piyush Kumar.
— Navneet Kaur. 29th CRSI-National Symposium in Chemistry. IISER Mohali. 7 July 2022 to 9 July 2022.
— Anjali Mahadevan. Shabana Butt. TCB (Theoretical Chemistry and Biology) CRIKC Symposium. NIPER Mohali. 15 October 2022.
— Piyush Kumar. Electronic Structure, Stability and Reactivity of Imidazole Radicals and their Photochemistry Under Cryogenic Conditions in Inert Gas Matrices. TCB (Theoretical Chemistry and Biology) CRIKC Symposium. NIPER Mohali. 15 October 2022.
— Sapna Singh. iCAM2022 An Indo –Europe Joint Event. Sathyabhama Institute, Chennai. 2 November 2022 to 4 November 2022.
— Sapna Singh. Azobenzene based photoswitchable fluorescent sensor for selective metal ion. 29th CRSI-National Symposium in Chemistry. IISER Mohali 7 July 2022 to 9 July 2022.
— Ankit Kumar Gaur. Photophysical Studies of Extended π-Conjugated Azopyrazole and Azoisoxazole derivatives. 29th CRSI-National Symposium in Chemistry. IISER 7 July 2022 to 9 July 2022.
— Himanshu Kumar. Triazine-based photoswitchable C3 symmetric azobenzene and their photoresponsive behavior. 29th CRSI-National Symposium in Chemistry. IISER Mohali 7 July 2022 to 9 July 2022.
— Pravesh Kumar. Synthesis and Studies of Tripodal Arylazoisoxazole Based Photoswitchable Systems. 29th CRSI-National Symposium in Chemistry. IISER Mohali. 7 July 2022 to 9 July 2022.
— Surbhi Grewal. Photoswitchable Azobenzene Di-and Tetracarboxylamide Derivatives and their Structure-Property Relationship. 29th CRSI-National Symposium in Chemistry. IISER Mohali 7 July 2022 to 9 July 2022.
— Anjali Srivastava. Azobenzene based ligands exhibiting high Z stability and Supramolecular Assembly. 29th CRSI-National Symposium in Chemistry. IISER Mohali 7 July 2022 to 9 July 2022.
— Sapna Singh. Kshitesh Lingala. RAMBC CRIKC, NIPER Mohali. 19 November 2022.
— Ramanpreet Kaur. Photoswitchable Azoheteroarene systems: Fundamental, Sensors, photocromic and Supramolecular Materials. RAMBC CRIKC, NIPER Mohali. 19 November 2022.
— Gayathri Parthiban. Photoswitchable functional molecules. RAMBC CRIKC, NIPER Mohali. 19 November 2022.
— Sapna Singh. Azoheteroarene based probe for naked eye detection of arginine and lysine. FICS, IIT Guwahati. 2 December 2022 to 4 December 2022.
— Himanshu Kumar. Visible light Bidirectional Photoswitchable Azoheteroarenes. 28th IUPAC Symposium on Photochemistry, Amsterdam, Netherlands. 17 July 2022 to 22 July 2022.
— Debapriya Gupta. Arylazopyrazole incorporated photoswitchable metal complexes. 28th IUPAC Symposium on Photochemistry, Amsterdam, Netherlands. 17 July 2022 to 22 July 2022.
— Anjali Mahadevan. Photochemistry of 4-iodopyrazole and 4-iodoimidazole under cryogenic condition in an argon matrix. SDMC-2022, Malpe, Uduppi. 10 November 2022 to 13 November 2022.

Ujjal K Gautam and lab members

— International Conference on Engineering Trends in Science and Technology (ICETST) held on 10-11 June 2022, attended by Raj Shekhar Roy, Reeya Garg and Maqsuma Banoo.

— 29th CRSI-ACS symposium in chemistry held at IISER Mohali from 7th to 9th July 2022. Attended by Ujjal K. Gautam, Raj Shekhar Roy, Reeya Garg, Maqsuma Banoo.
— International Conference on Emerging Materials for Sustainable Development (EMSD-2022) held at CRSI-CSIO Chandigarh, held on 9-11 July, 2022, attended by Raj Shekhar Roy, Reeya Garg and Maqsuma Banoo.
— Indo-French Workshop on Clean and Sustainable Energy Technologies (INFINITE) – held on 21-24 February, 2023, attended by Ujjal K. Gautam and Maqsuma Banoo.
— Science for Society, Environment, and Sustainability (SSES-2022) held at CSIR-NEIST Jorhat during November 24-26, 2022, attended by Ujjal K. Gautam.
— Emergent material for energy and environment (EMEE-2023), held on 4-5 March, 2023, attended by Ujjal K. Gautam, Komalpreet Kaur and Maqsuma Banoo.
— International conference on nanomaterials for electrocatalysis technology (I-CONECT-2023), held on 20-22 March 2023, attended by Komalpreet Kaur, Mukul Nawani, Sahil Kamra.

8.3. Department of Earth and Environmental Sciences

8.3.1. Summary of the research work

Anoop Ambili

Ambili's research group worked on understanding the distribution and sources of organic matter (OM) in aquatic systems to comprehend the biogeochemical cycling of carbon in terrestrial environments. Their group evaluated quantitative contributions of OM sources and their distribution using bulk geochemical parameters (TOC and δ13Corg), n-alkane indices and source specific biomarkers (C20 highly branched isoprenoid (HBI)) in Renuka Lake in Lesser Himalaya. Their study shows that the principal sources of OM in the sediments were aquatic productivity with minor input from terrestrial plants, which varied from the littoral to central part of the lake. The microbial community in Renuka Lake was established using short-chain n-alkanes and C20 HBI, whereas pristane/phytane (Pr/Ph) depicts the depositional condition of the lake system. The land use/land cover changes and grain size analysis were used to investigate the multiple reasons and processes that govern the spatial heterogeneity of the distribution of sedimentary OM. The results show that human activities and alterations of the aquatic landscape can significantly affect the composition and distribution of OM in aquatic systems. Their work demonstrates that elucidating the sources and distribution of OM in an aquatic system is crucial for constraining the ecological status and aiding conservation measures.

Baerbel Sinha

Sinha's research in 2022-2023 focuses on quantifying the sources of ozone precursors and aerosol sources over the National Capital Region under the RASAGAM project with the help of source receptor modelling tools and in-situ observations. Their aerosol laboratory at IISER Mohali also characterized waste-burning emissions under different combustion conditions and proposed low-cost ways to reduce open waste-burning emissions in rural India by substituting traditional fuel with plastic waste in improved stoves. In addition, their group quantified the impact of nocturnal pollution uptake by plants on the total pollution uptake using in-situ measurements and stomatal flux-modelling-based approaches. Advanced chemical characterization of brown carbon aerosol collected in Mohali and Delhi, as well as brown carbon samples collected during controlled burns was carried out in collaboration with Prof. Laskin at Purdue University.

Chandrakanta Ojha

- Processed terabytes of long times-series Sentinel-1A/B SAR sensor data of European Space Agency (ESA) over the Chandigarh-Mohali region in Punjab; Jodhpur, Jaipur, and Sangrur districts of Rajasthan to characterize groundwater dynamics of aquifer-systems and land subsidence over the study regions using advanced MT-InSAR technique. Other ancillary and remote sensing data were processed and combined with the InSAR-derived data for groundwater potential mapping over the Rajasthan study areas.

- Processed and analyzed ascending and descending track of Sentinel-1 data over the Joshimath landslides region in the Chamoli district of Uttarakhand for understanding surface deformation velocity and displacement time series map generation.
- Kerala's coastal land was processed using long times-series Sentinel-1A/B data for flood mapping and coastal inundation over the coastal region.
- Prepared and submitted research proposals to various national funding agencies (e.g.,) CRG-SERB, STARS, etc.
- Submitted multiple international conference papers to AGU, EGU, IGARSS, and AOGS and attended and presented talks at those conferences.
- Attended different training programs and gave invited talks and guest lectures to various institutes and organizations.
- Submitted a project proposal for a primary convener of a session in the Asia Oceania Geosciences Society (AOGS)- symposium -2023, Singapore
- Setting up research laboratory facilities and procuring equipment for the Satellite Remote Sensing Lab (SRSLab) at IISER Mohali.

Raju Attada

Krishna Kumar Shukla (Post-Doctoral Fellow) investigated the climatology of thermal stress and its trends over northwest (NW) India during the summer using the Universal Thermal Climate Index (UTCI) derived from Human thermal comfort (ERA5-HEAT) dataset (1981–2019) and also CMIP6 UTCI data.

Amita Kumari (Post-Doctoral Fellow) showed a pronounced east-west gradient of monsoon precipitation changes in Northern India during recent decades.

Nischal Sharma (PH19061) investigated the trends and physical factors of hydrological extremes in the Western Himalayas. In addition, she utilized a Weather Research and Forecasting Model to conduct numerical simulations of winter precipitation in the region from 2001 to 2016. Furthermore, her research focused on elucidating the underlying physical mechanisms behind winter extreme precipitation events in the Western Himalayas.

Rohtash (PH20017) conducted an analysis of the characteristics of Himalayan summer monsoon rainfall using Indian High-Resolution Regional Reanalysis. Additionally, his research delved into investigating the characteristics and physical mechanisms behind summer monsoon extreme precipitation events over the Himalayas in recent decades.

Athira K S (PH20044) conducted a comprehensive exploration of the synoptic dynamics of cold waves over North India, focusing on the underlying mechanisms that contribute to distinct cold wave conditions.

Sreehari K (JRF) performed a detailed analysis of CMIP6 models to investigate the winter seasonal extremes over the North West Himalayas. The study revealed that models that accurately represent climatological conditions might encounter challenges in capturing the characteristics of extreme events.

Deepak P (JRF) focused on assessing the potential impact of moist and thermodynamic profiles in a cloud-resolving modeling framework, specifically regarding the prediction of extreme rainfall events

Amitabha Satyajeet Govande (BS-MS): The research study investigated the spatial-temporal variation and trends of the ventilation coefficient (VC) over the Indian subcontinent.

Sourabh Bhattacharya

Bhattacharya's research group focused on understanding the supra-solidus processes in W-granites of the Balda region through open-system phase equilibria modeling. They also examined the impact of anatectic regimes on the metal budget of S-type melts. The high-temperature anatexis of Sirohi Metapelites, combined with the cooling of the ascending anatectic melt at a maximum gradient of 45 °C/kbar, promotes the formation of tungstenifeous Balda Granite. Their study highlights the influence of protolith and anatectic history on the metal budget of S-type granites, while the role of anatectic temperature and W/Sn ratio in the formation of W-granites remains debatable. Additionally, their group developed MinNet, an open-source application that utilizes deep learning techniques to simplify and expedite the processing of

EPMA mineral-chemical data. MinNet enables mineral identification, cation calculation, and provides high-accuracy predictions for various mineral groups. Each classification is accompanied by a mapped predictive confidence. This tool streamlines and shortens the post-analytical stage of mineral prospecting campaigns and academic research that involve large volumes of EPMA data. The results of these studies will be communicated shortly for publication in international journals.

Sunil A. Patil

The key research activities of Patil's lab include studying extracellular electron transfer (EET)-based anaerobic metabolisms and microorganisms from the extreme saline-alkaline environment and developing integrated microbial electrochemical technologies for electricity-driven bioproduction of chemicals from industrial CO2 and wastewater management at the point sources. Last year, their group reported a novel EET-capable haloalkaliphilic bacterium named Geoalkalibacter halelectricus SAP-1 and its bi-directional EET capabilities and role in iron cycling in a highly saline-alkaline condition. Based on the annotation of its whole genome and electrochemical investigations, they selected a few membrane cytochromes putatively involved in the EET-based respiration of this microbial strain. A detailed understanding of these cytochromes is currently in progress. Considerable research progress was also achieved in enriching and isolating a few haloalkaliphilic sulfide-oxidizing and nitrate-reducing microorganisms. Detailed characterization of these isolates is in progress to confirm their identity/novelty and EET capabilities.

Patil's research group also conducted considerable research on microbial electrosynthesis technology for CO2 utilization. Besides reporting on a two-stage bioprocess approach involving microbial electrosynthesis and yeast cultivation to produce high-value products such as terpenes and yeast biomass from CO2 and electricity, they reported on the bioproduction of acetic acid from completely gaseous feedstocks (i.e., N2, CO2 and H2). Their group found out that a halophilic CO2-fixing lithotrophic microbial community improves the energetic efficiency of the microbial electrosynthesis process and thus can be explored further as alternative biocatalysts in such CO2 utilization systems. Another major research activity over the last year was testing the applicability of the semi-pilot scale iHYDROMET (integrated hydroponics-microbial electrochemical technology) system for domestic wastewater management in real field sites, further increasing its technology readiness level. It is a low-cost wastewater management technology developed by their lab for implementation at households and remote locations. Their group filed three Indian patents on the technologies mentioned above last year.

Vinayak Sinha

Sinha's 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, their group has contributed with new strategic knowledge for air pollution mitigation and set up a new super site consisting of new equipment for year-long measurements of gaseous and aerosol chemical constituents of ambient air in Delhi as part of the Ministry of Earth Science sponsored research project "RASAGAM", which is led by IISER Mohali in collaboration with the Indian Institute of Tropical Meteorology Pune and the Indian Meteorological Department. Their group successfully acquired the primary dataset that will provide the new process-based understanding and source apportionment concerning toxic air pollutants in Delhi. In addition,their group have contributed to studies on nocturnal atmospheric oxidants and emission inventories in collaboration with national and international colleagues.

Yunus Ali Pulpadan

During the assessment period, Pulpadan's research group mainly focused on understanding the topographic settings of post-earthquake induced landslide (EQIL) affected terrains: Major earthquakes can trigger widespread landsliding in steep orogens, resulting in long-lasting chains of geologic hazards. Their group investigated the pre and post event topographic changes in areas affected by EQIL, and showed that

frequent large earthquakes in combination with frequent rainfall extremes might counterbalance the topographic uplift through erosion by landslides. In the process, their research group also developed a new set of coefficients for accurately estimating the volume of soil landslides in earthquake affected regions. In addition, they investigated the uncertainties in existing scaling relationships for different volume models and their influence on total volume estimates. This study is important because it reveals how different magnitude earthquakes behave in different topographies in terms of erosion and uplift, and thus can contribute to the overall understanding on the mountain building processes. They also tracked the vegetation and topographic dynamics in the EQIL areas using high resolution digital elevation models and multi-temporal satellite imagery, to provide quantitative data for modeling and risk assessment. Their group observed that, in the areas that lack significant rainstorms and snow melt years following the earthquake, only a few debris remobilizations and new landslides occurred. Nevertheless, the slow recovery of vegetation suggests that we cannot rule-out the post-seismic debris activities and gully development in the region. Pulpadan's research group therefore recommended continued monitoring in EQIL areas to track the effects of rainfall and snowmelt in the subsequent years, as studies have shown that enhanced land sliding can persist for several years after a strong earthquake.

8.3.2. Visits of the faculty members

Anoop Ambili

— Resource person for National Training Workshop on "Paleoclimate Archives-Proxies and analysis/measurement techniques (NT-PALEO)" at Indian Institute of Tropical Meteorology, Pune (16th -20th January 2023).

Baerbel Sinha

— Baerbel Sinha visited the laboratory of Prof. Alexander Laskin in the Department of Chemical Sciences Purdue University from 28th November 2022 to 12th December 2022
— Baerbel Sinha attended the American Geophysical Union Fall Meeting 12 - 16 December 2022
— Baerbel Sinha attended Tropospheric Ozone Assessment Report workshop on 9th and 10th of March 2023 at the Institute of Geophysics and Meteorology (IGM), University of Cologne, Germany

Chandrakanta Ojha

— IEEE-GRASS, Bombay chapter, IIT Bombay, Mumbai, 21 April 2023
— Post Graduate Institute of Medical Education & Research (PGIMER), Chandigarh, 25 March 2023
— ISRO-SAC, Ahmadabad, Gujarat, 20-21 March 2023
— Chandigarh University, Punjab, 18 March 2023
— Vigyan Bhawan, Ministry of Home Affairs, New Delhi, 10-11 March 2023
— SAMEER, IIT Bombay, Mumbai, 24 Feb 2023
— Motilal Nehru National of Technology Allahabad (MNIT), Uttar Pradesh, 30 April 2022
— KL University, Andhra Pradesh, 13 April 2022

Raju Attada

— Visited King Abdullah University of Science and Technology (KAUST), Saudi Arabia from 01 to 31 July, 2022
— Indian Institute of Tropical Meteorology (IITM), Pune - 28-30 March 2023
— Indian Institute of Tropical Meteorology (IITM), Pune - 16-17 November 2023
— Indian Institute of Science Education and Research Bhopal, 29 November to 2 December 2022
— National Institute of Technology, Rourkela – 11-12 January 2023

Sunil A. Patil

— Maharshi Dayanand University, Rohtak, 2-4 Feb 2023.
— Indian Institute of Technology (IIT) Guwahati, Dec 7-11, 2022.
— Tata Institute of Fundamental Research (TIFR) Mumbai, Oct 31-Nov 4, 2022.
— Technical University of Crete, Chania, Greece, Sep 19-23, 2022.

Vinayak Sinha

— World Meteorological Organization, Geneva, Switzerland, October 6-7, 2022.
— University of Manchester, United Kingdom, September 8-17, 2022.
— Indian Institute of Science Education and Research, Thiruvananthapuram,
— Indian Institute of Technology Delhi, Oct 10, 2022
— Sri Sathya Sai Institute of Higher Learning Prashanti Nilayam, Andhra Pradesh, Nov14-15, 2022.
— Indian Meteorological Department, Delhi, Multiple visits in 2022 and March 2023

Yunus Ali Pulpadan

— Indian Institute of Technology, Roorkee 07-08, January 2023
— University of Rajasthan, Jaipur, 10-11, March 2023.
— Punjab Engineering College, Chandigarh, 12 December, 2022

8.3.3. Talks delivered

Anoop Ambili

— Anoop Ambili. Key note speaker at international conference titled "International Conference on Tropical Biodiversity and Geofactors" held at Department of Geology, University of Rajasthan, Jaipur (10th -11th March, 2023).

Baerbel Sinha

— Baerbel Sinha gave an invited talk entitled: "Open waste burning, urban air quality and health: status quo and way forward" at the Sustainability Research and Innovation Congress 2022 (SRI2022) June 20-24, 2022.
— Baerbel Sinha gave an invited talk entitled: "Source apportionment of particulate matter" at the ACS Environment and Sustainability Event November 6-8, 2022, INSA New Delhi, India
— Baerbel Sinha gave a talk entitled: "Small or big fires - which ones exert more influence on the atmospheric chemistry over the NW-IGP" at the Max Planck Institute for Chemistry, Mainz, on 6th of March 2023
— Baerbel Sinha gave a talk entitled: "Small or big fires - which ones exert more influence on the atmospheric chemistry over the NW-IGP" at the Institute for Atmospheric and Environmental Sciences Goethe University Frankfurt on 7th of March 2023

Chandrakanta Ojha

— C. Ojha, Satellite Radar Interferometry monitoring induced land subsidence due to groundwater over-extraction, IEEE GRASS Bombay Chapter, 21 April 2023
— C. Ojha, Interaction of EMR and Physical basis of Signature in RS Imagery, Chandigarh University, 18 March 2023.
— C. Ojha, Fundamentals of remote sensing and GIS techniques for analyzing the impact of the environment on public health, Department of Community Medicine & School of Public Health, PGIMER, Chandigarh, 25 March 2023.
— C. Ojha, InSAR-derived induced land subsidence due to over-exploitation of groundwater in Punjab, India, Space Application Centre (SAC), ISRO, Ahmadabad, March 20-21, 2023
— C. Ojha, Advancement of Microwave Remote Sensing Technique for Earth's Surface deformation monitoring, National workshop on Advance Observation Systems for Atmospheric & Space Weather Monitoring, Society of Applied Microwave Electronics Engineering & Research (SAMEER), IIT Bombay, 24 February 2023
— C. Ojha, Analysing groundwater dynamics using satellite remote sensing: a case study of Central Valley of California, Motilal Nehru National of Technology Allahabad (MNIT), Uttar Pradesh, 30 April 2022
— C. Ojha, Advancement of MT- InSAR Technique for Earth's Surface Deformation Monitoring, KL University, Andhra Pradesh, 13 April 2022

Raju Attada and lab members

— Raju Attada- Extreme Rainfall Events in Indian Himalayas, LAI-2023, 12 January 2022
— Raju Attada-Assimilation of Vertical Atmospheric Structures in a Regional Modeling Framework: Evaluation of Indian Summer Monsoon Features, TROPMET 2022, 29 November to 2 December 2022
— Nischal Sharma- Evaluation of winter mean precipitation over North India in CMIP6 models, EGU General Assembly 2022, 23–27 May 2022
— Nischal Sharma- Exploring the Physical Mechanisms of Winter Precipitation Extremes over India's High Mountain Region, AGU Fall Meeting 2022, 12-16 Dec 2022
— Rohtash- Investigation of extreme precipitation event over western Himalayas, TROPMET 2022, 29 November to 2 December 2022
— Rohtash- Indian Summer Monsoon Extreme Precipitation Events over the Himalayas, AGU Fall Meeting 2022, 12-16 Dec 2022
— Athira- Analysis of cold waves over north India, AGU Fall Meeting 2022, 12-16 Dec 2022

Sunil A. Patil

— Sunil A. Patil: Electrifying microbiology: Extracellular electron transfer-capable microorganisms for environmental sustainability. 63rd Annual International Conference of AMI (theme: Microbial Tech), organized by Department of Microbiology, Maharshi Dayanand University, Rohtak, 2-4 Feb 2023.
— Sunil A. Patil: Are integrated bioelectrochemical and biological wastewater treatment technologies feasible for real-world implementation? International Conference on Biotechnology, Sustainable Bioresources and Bioeconomy (BSBB-2022) organized by the Indian Institute of Technology and Biotech Research Society of India at Guwahati, Dec 7-11, 2022.
— Sunil A. Patil: Feasibility of integrated bioelectrochemical technologies for domestic wastewater management. Five-Day Online FDP on "Advances in Biological Wastewater Treatment Methods: Teaching and Learning Strategies" organized by the Department of Biotechnology in association with the Teaching Learning Centre (TLC), NIT Warangal, Dec 5, 2022.
— Sunil A. Patil: Carbon dioxide utilization through microbial electrosynthesis process. Conference on Advances in Catalysis for Energy and Environment (CACEE -2022) & CO2India Network 1st Annual Meet organized by at Tata Institute of Fundamental Research (TIFR), Mumbai, India, Oct 31-Nov 4, 2022.
— Sunil A. Patil: Industrial carbon dioxide utilization and biogas upgradation through the electro-acetogenesis process. 10th Biennial International Forum on Industrial Bioprocessing – the International Conference of the International Bioprocessing Association [IBA-IFIBiop 2022] organized by National Kaohsiung University of Science and Technology at Kaohsiung, Taiwan, Oct 27-30, 2022.
— Sunil A. Patil: Unravelling EET-based anaerobic metabolisms and microorganisms from the haloalkaline sediments. 8th Global International Society for Microbial Electrochemistry and Technology (ISMET8) conference organized by Technical University of Crete, Chania, Greece, Sep 19-23, 2022.

Vinayak Sinha

— Vinayak Sinha. On Smoke Emissions Firing Up Atmospheric Chemistry, Pummeling Air Quality and Confounding Molecular Tracers. Invited Speaker at Gordon research Conference of Biogenic Hydrocarbons and the Atmosphere (https://www.grc.org/biogenic-hydrocarbons-and-the-atmosphere-conference/2022/ held at Residence Inn at Oxnard River Ridge in Oxnard, California, United States from June 12, 2022 to June 17, 2022.
— Vinayak Sinha. What is atmospheric chemistry and how does it matter for our daily well being and as a technology and sustainability tracker on Earth?, Earth day Event , Sant Longowal Institute of Engineering and Technology, Punjab on April 22, 2022.
— Vinayak Sinha. Molecular fingerprinting for tracking sources of air pollution. American Chemical Society Environment and Sustainability Event, November 7, 2022, INSA New Delhi, India.
— Vinayak Sinha. Molecular fingerprinting for air pollution forensics and source apportionment, Sri Sathya Sai Institute of Higher Learning, Prashanti Nilayam, AP, India on Nov 15, 2022.

Yunus Ali Pulpadan

— Yunus Ali Pulpadan. Geological hazards and their remote sensing perspective (Invited Talk). FOREcaSting and Early warning of Extreme Events and Disasters (FORESEED 2022), CoEDMM, IIT Roorkee, 02-08, January 2023

— Yunus Ali Pulpadan, Topographic drivers of landslides in Western Ghats: a machine learning perspective (Invited Talk)), The 3rd International Conference on Geology: Emerging Methods and Applications (GEM-2023), Christ College, Kerala, 23-25, January2023

— Yunus Ali Pulpadan, Post seismic landslide evolution in tectonically active terrains (Invited Talk)) , Virtual Monthly Scientific Meeting, Geological Society of India, 09, November 2022, http://www.geosocindia.org/public/journals/253/docs/Monthly_lecture_09Nov22_Yunus_Ali.pdf

— Yunus Ali Pulpadan, Overview of free and open source software in geospatial applications (Invited), Workshop (Invited Talk): Basics of Remote Sensing & GIS, Punjab Engineering College, 12 December, 2022

8.3.4. Conferences attended by the researchers

Anoop Ambili and lab members

— Diptimayee Behera (PH18077). Molecular tracers for characterization and distribution of organic matter in a freshwater lake system from the Lesser Himalaya. Geochemistry Group Research in Progress (GGRiP) 2022, Cambridge University, 18th-20th April.

— Diptimayee Behera (PH18077). Distribution and characteristics of microplastics and phthalate esters from a freshwater lake system in Lesser Himalayas. Goldschmidt 2022, Honolulu, Hawaii, USA, 10th -15th July 2022.

— Diptimayee Behera (PH18077). Occurrence, distribution and sources of petroleum contamination in reef-associated sediments of Mandapam Group of Islands, Gulf of Mannar, India. Marine Pollution and Ecological degradation (MPAED) 2022, Malankara Catholic College, Tamil Nadu, 27th to 29th July 2022.

— Diptimayee Behera (PH18077). Investigating possible links between Holocene environmental changes and cultural transitions across India. Indo-Pacific Prehistory Association (IPPA) 2022, Thailand, 6th-12th November 2022.

— Diptimayee Behera (PH18077). Late Holocene climate variability and its impact on cultural dynamics in central India. Indo-Pacific Prehistory Association (IPPA) 2022, Thailand, 6th-12th November 2022.

— Diptimayee Behera (PH18077). Occurrence, distribution and sources of petroleum contamination in reef-associated sediments of Mandapam Group of Islands, Gulf of Mannar, India. AGU Fall Meeting 2022, Chicago, 12th-16th December 2022.

Baerbel Sinha and lab members

— Baerbel Sinha gave an invited talk entitled: “Open waste burning, urban air quality and health: status quo and way forward” at the Sustainability Research and Innovation Congress 2022 (SRI2022) June 20-24, 2022.

— Chaudhary, P. et al. presented a poster entitled: “Replacing the greater evil: Can legalizing decentralized waste burning in improved devices reduce waste burning emissions for improved air quality?” at the international Global Atmospheric Chemistry conference, 10-15 September 2022

— Datta, S., et al. presented a poster entitled: “Photosynthetic stomatal conductance models are better suited for modelling the pollution uptake of vegetation and reveal nocturnal pollution uptake contributes significantly to the total uptake” at the international Global Atmospheric Chemistry conference, 10-15 September 2022

— Chaudhary, P. et al. presented a poster entitled: “Chemical Characterization of Seasonal Brown Carbon in the Indo-Gangetic plain” at the American Association for Aerosol Research conference 3-7 October 2022

— Datta, S., et al. presented a poster entitled: “Nocturnal pollutant uptake contributes significantly to the total stomatal uptake of Mangifera indica, at the American Geophysical Union Fall Meeting 12 - 16 December 2022

— Chaudhary, P. et al. presented a poster entitled: “Replacing the greater evil: Can legalizing decentralized waste burning in improved devices reduce waste burning emissions for improved air quality?” at the American Geophysical Union Fall Meeting 12 - 16 December 2022
— Chaudhary, P. et al. presented a poster entitled “Chemical Characterization of Seasonal Brown Carbon in the Indo-Gangetic plain” at the American Geophysical Union Fall Meeting 12 - 16 December 2022
— Chaudhary, P. et al. presented a poster entitled “Chemical Characterization of Seasonal Brown Carbon from Biomass Burning in the Indo-Gangetic plain” at the American Chemical Society Spring Meeting 20–24 March 2023

Chandrakanta Ojha and lab members

— P. Dhayal, and C. Ojha “Sentinel-1 data monitoring Land Subsidence and Groundwater dynamics in the populous cities of Rajasthan, India,” European Geosciences Union (EGU) General Assembly, Vienna (Austria), 23-28 April 2023.
— S. Chawla, C. Ojha, and M. Shirzaei, “Subsidence due to groundwater exploitation using InSAR technique over Chandigarh-Mohali regions of northern India,” European Geosciences Union (EGU) General Assembly, Vienna (Austria), 23-28 April 2023.
— M. Ojha, C. Ojha, I. Nayak, S. Goswami, and P.C. Sahu, “Demarcation of lowered water table zones in a drought-affected area of western Odisha, India,” European Geosciences Union (EGU) General Assembly, Vienna (Austria), 23-28 April 2023.
— A. Sharma, N. Sagwal, and C. Ojha, “Investigating InSAR-derived land motion due to aquifer compaction in the northeast regions of Haryana, India,” European Geosciences Union (EGU) General Assembly, Vienna (Austria), 23-28 April 2023.
— A. Sharma, C. Ojha, and N. Sagwal, “Assessment of consequences due to over-exploitation of groundwater in Kurukshetra District, Haryana using InSAR,” American Geophysical Union (AGU), Chicago (USA), Dec. 2022
— Aparna R, and C. Ojha, “Mapping Flood Inundation and Coastal Subsidence over the Kerala region of India using Satellite Radar Sensing Technique,” American Geophysical Union (AGU), Chicago (USA), Dec. 2022
— P. Dhayal, and C. Ojha, “Detecting Surface Deformation and Groundwater Depletion using InSAR Technique over Sikar District, Rajasthan, India,” American Geophysical Union (AGU), Chicago (USA), Dec. 2022
— R. Kumar, C. Ojha, S. K. Mandal, “Investigating InSAR-based Land Subsidence due to Groundwater Extraction using Sentinel-1 data Over Lucknow City in India,” American Geophysical Union (AGU), Chicago (USA), Dec. 2022
— Y.S. Rao, D. S. Vaka, C. Ojha, “Monitoring Slow Landslide Movement along Northern Railway Track in Jammu & Kashmir using SAR Interferometry,” 15-17 November 2022.
— S. Chawla, C. Ojha, and M. Shirzaei, “Investigating Surface Deformation and Groundwater Dynamics using InSAR Observation over Southern part of Punjab, India,” IEEE International Geoscience and Remote Sensing Symposium (IGARSS), Kuala Lumpur, Malaysia, July 2022.
— M. Ojha, C. Ojha, I. Nayak, S. Goswami, and P.C. Sahu, “Potential groundwater recharge zone assessment in the Western part of Odisha, India,” IEEE International Geoscience and Remote Sensing Symposium (IGARSS), Kuala Lumpur, Malaysia, July 2022.
— M. Ojha, C. Ojha, S. Goswami, M. Shirzaei, I. Nayak, P.C. Sahu, “Attribution of Groundwater Recharge Structure Over Hard Rock Bearing Western Part of Odisha, India,” 6th National Geo-Research Scholars Meet (NGRSM), Ladakh, India, 7-10 June 2022

Raju Attada and lab members

— Nischal Sharma, Rohtash- EGU General Assembly 2022, –27 May 2022
— Dr. Raju Attada, Nischal Sharma, Rohtash, Athira KS, Sreehari K- TROPMET 2022, 29 November to 2 December 2022
— Nischal Sharma, Rohtash, Athira- AGU Fall Meeting 2022, 12-16 Dec 2022

Sunil A. Patil

— Sukrampal Yadav and Sunil A. Patil, “Geoalkalibacter halelectricus SAP-1: An extracellular electron transfer (EET)-capable haloalkaliphilic electroactive microorganism with diverse metabolic

capabilities" at the 63rd Annual International conference of AMI (theme: Microbial Tech), organized by Department of Microbiology, Maharshi Dayanand University, Rohtak, 2-4 Feb 2023.

— Chetan Sadhotra, Sukrampal Yadav and Sunil A. Patil, "Capabilities of Geoalkalibacter halelectricus to uptake and transfer electrons from or to solid-state donors and acceptors via bi-directional electron transfer processes" at the 63rd Annual International conference of AMI (theme: Microbial Tech), organized by Department of Microbiology, Maharshi Dayanand University, Rohtak, 2-4 Feb 2023.

— Ravi K. Yadav and Sunil A. Patil, "Integrated Hydroponics-Microbial Electrochemical Technology for efficient sewage management at households" at the 63rd Annual International Conference of AMI (theme: Microbial Tech), organized by Department of Microbiology, Maharshi Dayanand University, Rohtak, 2-4 Feb 2023.

— Mansi, Moumita Roy, Sunil A. Patil, "Benchtop (TRL4) validation of microbial electrosynthesis process for biogas upgradation through CO2 utilization" at the 63rd Annual International conference of AMI (theme: Microbial Tech), organized by Department of Microbiology, Maharshi Dayanand University, Rohtak, 2-4 Feb 2023.

— Ravineet Yadav, Banani Chattopadhyay, Rashmi Kiran, Ankit Yadav, Anand K. Bachhawat and Sunil A. Patil, "Power to terpenoids: a two-stage bioprocess approach linking microbial electrosynthesis and yeast cultivation processes for high- value chemical synthesis from CO2" at the "International Conference on Biotechnology, Sustainable Bioresources and Bioeconomy (BSBB-2022)" organized by Indian Institute of Technology, Guwahati, India, 7-11 Feb 2022.

— Ravi Kumar Yadav, Siddhant Sahoo, Asheesh K. Yadav and Sunil A. Patil, "Nature-based wall-mounted system for greywater management in households" at the "International Conference on Biotechnology, Sustainable Bioresources and Bioeconomy (BSBB-2022)" organized by Indian Institute of Technology, Guwahati, India, 7-11 Feb, 2022.

— Ravineet Yadav, Mohammed Qasim and Sunil A. Patil, "Bioproduction from gaseous N2 and CO2 feedstocks using Clostridium ljungdahlii via gas fermentation and microbial electrosynthesis processes" at 10th Biennial International Forum on Industrial Bioprocessing – the International Conference of the International Bioprocessing Association [IBA-IFIBiop 2022] organized by National Kaohsiung University of Science and Technology at Kaohsiung, Taiwan, 27-30 Oct 2022.

— Moumita Roy and Sunil A. Patil, "Brewery CO2 sequestration through continuous electricity-driven bioproduction of acetic acid" at the 8th Global International Society for Microbial Electrochemistry and Technology (ISMET8) conference organized by Technical University of Crete, Chania, Greece, 19-23 Sep 2022.

— Ravi Kumar Yadav and Sunil A. Patil, "Integrated hydroponics-microbial electrochemical technology for sewage management at households" at the 8th Global International Society for Microbial Electrochemistry and Technology (ISMET8) conference organized by Technical University of Crete, Chania, Greece, 19-23 Sep 2022.

— Rashmi Kiran, Devangi Sathe, Sukrampal and Sunil A. Patil, "CO2-fixing chemolithotrophic microbial communities from marine sediments" at the 18th International Symposium on Microbial Ecology (ISME18), Lausanne, Switzerland, 14-19 Aug 2022

Vinayak Sinha and lab members

— Haseeb Hakkim. Air pollution scenario analyses of fleet replacement strategies to accomplish reductions in criteria air pollutants and 74 VOCs over India. International Global Atmospheric Chemistry (IGAC) and International Commission on Atmospheric Composition and Global Pollution (iCACGP) Open Science Conference and SSC meeting in Manchester, UK from 10-15 September, 2022.

— Vinayak Sinha. On Smoke Emissions Firing Up Atmospheric Chemistry, Pummeling Air Quality and Confounding Molecular Tracers. Invited Speaker at Gordon research Conference of Biogenic Hydrocarbons and the Atmosphere (https://www.grc.org/biogenic-hydrocarbons-and-the-atmosphere-conference/2022/ held at Residence Inn at Oxnard River Ridge in Oxnard, California, United States from June 12, 2022 to June 17, 2022.

— Vinayak Sinha. International Global Atmospheric Chemistry (IGAC) and International Commission on Atmospheric Composition and Global Pollution (iCACGP) Open Science Conference and SSC meeting in Manchester, UK from 10-15 September, 2022.

— Vinayak Sinha. Molecular fingerprinting for tracking sources of air pollution. American Chemical Society Environment and Sustainability Event, November 7, 2022, INSA New Delhi, India.
— Vinayak Sinha. What pollutes the air of Punjab?.United nations Cleaner Air and Better Health Porject workshop by Clean Air Punjab, Chandigarh Press Club on Feb 8, 2023.

Yunus Ali Pulpadan

— Yunus Ali Pulpadan, Vegetation recovery patterns after post-seismic landslides in tectonically active terrains. International Sustainable Mountain Development Conference, Nepal, (attended online mode) 01-03, December 2022
— Yunus Ali Pulpadan, Impacts of Anthropocene hazards and sensitivity of mountain ecosystems (Invited talk). Session: "Resilience and risk management dialogue among stakeholders for science- informed resilience planning in the Himalayan mountains", IDRiM2022 Conference (online mode)., 21-23, September 2022;
— Yunus Ali Pulpadan. Cascading Chain of Geohazards: Understanding their Mechanisms from a Remote Sensing Perspective. International Conference on Tropical Biodiversity and Geofactors. (Keynote speaker). University of Rajasthan 10-11, March 2023.

8.4. Department of Humanities and Social Sciences

8.4.1. Summary of the research work

Adrene Freeda Dcruz

- A co-authored (with Vaibhav Pathak) research paper titled Chemistry in Theatre – Carl Djerassi's Swansong was prepared during this time period and submitted to Current Science. The paper is accepted for publication in 2023.
- A co-authored paper (with Ajay Kumar) titled "Laboratory Science: Representations of Reproductive Biology in Carl Djerassi's An Immaculate Misconception: Sex in an Age of Mechanical Reproduction" was prepared during this time period. The paper is in the review stage in the journal Current Science.
- Dcruz is working on the research paper titled "Translating the Dumpsters: A Scatological Reading of Gabriel Garcia Marquez's The Autumn of the Patriarch" (co-authored with Jayalakshmi R) and single authored paper titled "Sound and Silence in Chaplin's City Lights and Fritz Lang's M"

Anu Sabhlok

Sabhlok's research during this period dealt with bringing social reproduction theory into conversation with the emerging area of critical infrastructure studies. Sabhlok engaged with these two theoretical perspectives to make sense of data from my long-term ethnographic fieldwork on road construction in the upper Himalayas. In addition, she conducted field research on the socio-cultural and ecological impacts of the Atal Tunnel in Lahaul.

Another project that she have continued to work on is related to urban infrastructures in small to medium-sized cities in Punjab. So far, she have focussed on Abohar and the tri-city region of Chandigarh, Panchkula and Mohali (along with Zirakpur). In these urban areas, she conducted field research to understand gendered social relations, labour colonies, and infrastructural access.

Debdulal Saha

Saha is currently working on 'technology induced structural changes of labour markets and its impact' in urban India. Under this broad research theme, he have undertaken two projects. First, he is having an ongoing research project on "Employment, Digital Labour and Urban Precarity: Insights from Chandigarh, Kolkata, Hyderabad and Mumbai" funded by the Indian Council of Social Science Research (ICSSR), New Delhi. At present, fieldwork is being conducted across four cities. Based on the preliminary result, an abstract on "Digital slave as a new social class in the age of platform capitalism: Evidence from cities of India" for oral presentation in BSAWES - BSA Work, Employment and Society Conference 2023" to be held at Glasgow Caledonian University on 13-15 September 2023.

Second, to understand the impact of the technological transformation in labour market, he is working on research to develop 'Labour Precarity Index (LPI)' in platform economy and future of work supported by the Indian Institute of Science Education and Research (IISER), Mohali. In this study, he have considered urban labour markets in various cities, namely, Bengaluru, Chandigarh, Chennai, Delhi, Hyderabad, Jaipur,

Kolkata, Mumbai, Thiruvananthapuram in India. The index is being developed based on secondary and primary data collected from the above cities.

Parth R. Chauhan and group

- Analysed and photographed lithic assemblages from Koloshi cave excavations by Government of Maharashtra.
- Guided students to excavate a fossilised elephant skeleton from the Narmada Basin, M.P. This skeleton was later analysed by Ms. Aarya Joshi, a BS-MS student, for her dissertation.
- Visited the study area of his PhD student, Yezad Pardiwalla, in Damoh District, Madhya Pradesh, and resulted in the co-discovery of a new Acheulean site.
- Analysed lithic collections from central Narmada Basin and housed at Department of Archaeology & Ancient Indian History at The M.S. University of Baroda, Gujarat. Work is in collaboration with Prof. K. Krishnan.
- Worked on multiple paper drafts for future publication

Since October 2022, Parth R. Chauhan has been on sabbatical leave (ending in July 2023) for research purposes, during which he made field visits to colleagues' and students' study areas (e.g. Karnataka, Andhra Pradesh, Uttar Pradesh, Madhya Pradesh, Maharashtra, Odisha), attended national and international conferences and worked on various writings.

Philose Koshy

In 2022-23, Koshy supervised two MS students who completed their thesis on the topics 'Metaphysical analysis of Quantum mechanics' and 'Ethical analysis of abortion.'

V. Rajesh

Rajesh is investigating the history of the progressive literary movement in Tamil and the intellectual history of various strands of the Left in Tamilnadu. During the last year, he drafted an essay on the history of literary progressivism in Tamil from the 1940s to the 1970s. He sent the essay for publication in an edited volume on literary modernities in Indian languages to be published by Routledge in July 2023. He is currently invested in studying themes ranging from poetry, literary criticism, short stories, and research essays in the pages of progressive Tamil literary magazines such as Saraswati, Santhi and Aaraichi, published between the 1950s and 1980s in Tamilnadu. He communicated the research abstract on this theme for inclusion in another edited volume to be published by Routledge on the world of progressive poetry in South Asia and received a positive response. Simultaneously, he also started reading the works of Govindan Kesavan, one of the representative intellectuals in Tamilnadu of the radical Left. Kesavan's prolific intellectual output in the Tamil language and public activism has not received any scholarly attention thus far as indeed any serious study of the Left in the regional context of Tamil South. Rajesh aims to include the Sri Lankan Tamil element in the story of literary progressivism of the 20th century and the Tamil Left's critique of ethnic conflict in Sri Lanka and the Dravidian Movement in Tamilnadu.

8.4.2. Visits of the faculty members

Anu Sabhlok

— University of Manchester March 27, 2023
— Aston University, Birmingham March 28, 2023

Parth R. Chauhan

— Visited Acheulean site on Lesbos island, Greece; hosted by Dr. Nena Galanidou, University of Crete, Greece. June 25-30, 2022.
— Sambalpur University, Burla, Odisha. Interactions with Retired Professor. Pradeep K. Behera, Dr. Neena Thakur and Curator Kshirasindhu Barik. October 10 to 13, 2022.
— CHARUSAT. Changa, Gujarat. December 26-27, 2022. Interactions with Dr. Prabhin Sukumaran and other faculty.

— CEPT University, Ahmedabad, Gujarat. To discuss plans for DST-funded joint project on rock art of Maharashtra and Madhya Pradesh. Met with Dr. Jigna Desai and Ms. Mrudula Mane (both of CEPT) and D. Prabhin Sukumaran (CHARUST). November 3, 2022.
— National Centre for Earth Science Studies. Thiruvananthapuram, Kerala. January 4, 2023.
— Department of Archaeology, University of Kerala. Thiruvananthapuram. January 5, 2023.
— Benares Hindu University. Interacted with Prof. Ajay Pratap. January 30-31, 2023.
— Pandit Deendayal Upadhyaya Institute of Archaeology, Archaeological Survey of India, Greater Noida, Uttar Pradesh. February 17-19, 2023.
— Department of Geology. Sant Gadge Baba Amravati University, Amravati, Maharashtra. March 21, 2023.

8.4.3. Talks delivered

Anu Sabhlok

— Sabhlok, Anu. Talk delivered as part of a panel on the occasion of International Women's Day, Punjab University, March 22, 2022
— Sabhlok, Anu. Social theory for Architects. Organized jointly by Avani Institute of Design and Council of Architecture. Jan 16, 2023

Debdulal Saha

— Saha, Debdulal. Street venodrs in India. 11th Talk Series on Transitioning to Modern Energy for Cooking organised by Modern Energy Cooking Services (MECS) Programme through Finovista. 29 July 2022.
— Sustainable Development Goals and Position of Northeast India. Tata Institute of Social Sciences, Guwahati. 3 September 2022.
— Labour in North-East India: Tata Institute of Social Sciences, Guwahati. 10 September 2022.

Parth R. Chauhan and group members

— Chauhan, P.R. The story of our prehistoric past: A view from South Asia & the Siwalik Hills. coVeda, Chandigarh. April 2, 2022.
— Chauhan, P.R. An overview of Indian prehistory & addressing its symbolic behavior. For online rockart panel. April 9, 2022.
— Chauhan, P.R. Current issues and debates in Indian prehistory. Online talk for Talaash. April 15, 2022.
— Chauhan, P.R. The last 200,000 years of the Stone Age. Online talk for Pathways School, Noida. May 10, 2022.
— Chauhan, P.R. The role of the Indian subcontinent in human evolutionary studies. Online talk for PalQuat Seminar Series. Oxford University. May 19, 2022.
— Chauhan, P.R. African prehistory & external links. National Webinar on OUR DEEP PAST: WHAT & WHY? Department of Anthropology, Vidyasagar University. June 22, 2022.
— Chauhan, P.R. The Indian Ocean in Prehistory: Status, Connections & Regionalism. Online talk for India & Indian Ocean Cultural Heritage. Tamil University, Thanjavur. October 13-15, 2022.
— Chauhan, P.R. Human evolution in India: A multidisciplinary perspective in global context
— CHARUSAT, Changa, Anand, Gujarat. December 26-27, 2022.
— Chauhan, P.R. Paleoanthropology of India. National Centre for Earth Science Studies. Thiruvananthapuram, Kerala. January 4, 2023.
— Chauhan, P.R. Recent prehistoric discoveries from the Narmada Valley, M.P. Department of Archaeology. University of Kerala. January 5, 2023.
— Chauhan, P.R. Apes to Humans: Evolutions of Humans in India. Heritage Club, KLE Society's Law College, Bengaluru. March 2, 2023.
— Chauhan, P.R. Prehistory of the Narmada Basin. Department of Archaeology & Ancient Indian History. The M.S. University of Baroda. March 10, 2023.

V. Rajesh and group members

— Rajesh V. From Rediscovery to Reproduction: Classical Tamil Literature in Colonial India. Department of History Seminar Series. University of Delhi. 12/10/22
— Rajesh V. Battle over Chronology: Establishing Antiquity of Tamil Literature in Colonial India. Department of Humanities and Social Sciences Seminar Series. IISER Bhopal. 26/10/22

— Rajesh V. How to study the history of literature using methods from the discipline of history? History and Her Source. History for Peace. 31/10/22.

8.4.4. Conferences attended by the researchers

Anu Sabhlok and lab members

— Kushwaha, Manisha. Covid-19, Caste and the New Economic Order. International Geographic Union Centennial Congress, Paris, France. 18th to 22nd July 2022

— Subhashri Sarkar, She' the taxi driver, Feminist Labour Geographies and the Platform Economy at the 2023 annual meeting of the American Association of Geographers AAG Denver, Colorado, USA from March 23, 2023 to March 27, 2023

— Subhashri Sarkar, The Rise of the Gig Economy and the Quest for Decent Work: A qualitative study of app-based cab drivers in Chandigarh Tri-city region, India , 62nd Annual Conference of the Indian Society of Labour Economics being held at Indian Institute of Technology (IIT), Roorkee (11th -13th April 2022)

— Preetika Sharma, Kanchan Gandhi, Anu Sabhlok, Queering Utopia: pride walks in modernist Chandigarh. 4th international feminist geography conference. June 2022

Debdulal Saha and lab members

— Saha, Debdulal. Public Expenditure on Education in India. 15th Chandigarh Science Congress (CHASCON) 2022. 17 September 2022.

— Thangsiandong Guite and Debdulal Saha. Tribal labour market in North-East India: Does it exist?. Tribal development in India: Prospect and Retrospect, organised by Indian Institute of Technology, Roorkee. 3-4 February 2023.

— Bikash Padhan. Unemployment and labour force participation in India. International conference on 'India 2.0: Vision for India 2047: Challenges and Prospectus' supported by the Indian Council of Social Science Research (ICSSR) New Delhi at Kurukshetra University, Haryana. 14-15 February 2023.

Parth R. Chauhan and group members

— Chauhan, P.R. (with K. Garg, P. Sukumaran, V. Vidyarthi, A. Saini, Y. Pardiwalla, M. Narzary, S. Mehra and V. Singh. Investigating Palaeolithic population dispersal & inter-connectivity in India through GIS spatial analyses & computational modelling. Online talk for Session on hunter-gatherer mobility. Society for American Archaeology. March 30-April 3, 2022.

— Chauhan, P.R. The Acheulean of the Indian Subcontinent with a focus on its northern and central regions. Aegean Acheulean at the Eurasian crossroads Hominin settlement in Eurasia and Africa. An international conference organised by the University of Crete, Lesbos, Greece. June 25-30, 2022.

— Bhushan, S. The Palaeolithic assemblages of Lower Son Valley with special reference to Indian Upper Palaeolithic, Uttar Pradesh, India. Online talk for World Archaeological Congress, Prague. July 3-8, 2022.

— Bhushan, S. (with S. Agrawal and P.R. Chauhan). Stable isotope study of Pleistocene mammalian teeth from western and central India: Preliminary results and palaeoanthropological implications. Online talk for World Archaeological Congress, Prague. July 3-8, 2022.

— Poojari, R. Explorations and Documentation of Rock Art at Mandikhoh, Hoshangabad District, Madhya Pradesh. Online talk for World Archaeology Congress, Prague. July 3-8, 2022.

— Chauhan, P.R. Out-of-Africa or imposed identity? Deconstructing our current understanding of hominin dispersals and occupations across Eurasia (poster). Eighth biennial conference of Eastern Africa Association for Palaeoanthropology and Palaeontology (EAAPP). Arusha, Tanzania. July 31 to August 4, 2022.

— Chauhan, P.R. Several lectures on Himalayan geology, Indian archaeology and Himalayan prehistory. Workshop co-organised by Himalayan Institute of Cultural and Heritage Studies and International Field Research. August 15, 2022.

— Chauhan, P.R. (for P. Sukumaran, T. Garge, M. Mane and P.R. Chauhan) observations on geospatial attributes of the Ukshi geoglyphs, Konkan, Maharashtra. 25th national conference of the Rock Art Society of India. School of History, Gangadhar Meher University, Sambalpur, Odisha. October 14-16, 2022.

— Chauhan, P.R. Koloshi - A newly-discovered prehistoric cave site in Konkan, Maharashtra, western India. with Tejas Garge, Sudhir Risbud, Rutwij Apte, Snehali-Kulkarni Khadke. Online talk for Conference on Caves. Sardegna, Italy. October 21-23, 2022.
— Chauhan, P.R. The relevance of stone tools in archaeology. Resource person for workshop and lectures on lithic technology. Deccan College Post-graduate and Research Institute, Pune. October 29, 2022.
— Bhushan, S. Understanding Laminar Technology and Its Transition in the Indian Subcontinent Through the Palaeolithic Assemblages of the Lower Son Valley, Sonbhadra, Uttar Pradesh. 22nd Congress of the Indo-Pacific Prehistory Association. Chiang Mai, Thailand. November 6 to 12, 2022.
— Bhushan, S. (with S. Agrawal and P.R. Chauhan. Synthesising, Reconstructing, and Understanding Late Pleistocene Environments and Hominin adaptations in South Asia. 22nd Congress of the Indo-Pacific Prehistory Association, Chiang Mai, Thailand. November 6 to 12, 2022.
— Chauhan, P.R. (M.M. Mane, T.M. Garge, P. Sukumaran, J. Desai, P.R. Chauhan). Imaging Ancient Images: Challenges in Analogous and Digital Documentation of Geoglyphs on Lateritic Plateaus of Konkan, India. 22nd Congress of the Indo-Pacific Prehistory Association. Chiang Mai, Thailand. November 6 to 12, 2022.
— Deshpande, A., (with R. Poojari, P.R. Chauhan). Application of Machine Learning (ML) for Motif Extraction to Aid in Rock Art Research: Rock Art From Central Narmada Basin as a Case Study. 22nd Congress of the Indo-Pacific Prehistory Association. Chiang Mai, Thailand. November 6 to 12, 2022.
— Joshi, A. (with V. Sathe, R. Lal, T. Padhan, B. Jangra, P.R. Chauhan, S. Sahu, R. Patnaik) New Vertebrate Fossils and Associated Geological Contexts from the Narsinghpur Region of Narmada Valley, Central India. 22nd Congress of the Indo-Pacific Prehistory Association. Chiang Mai, Thailand. November 6 to 12, 2022.
— Pardiwalla, Y. Damoh. A 'Space' Odyssey: An Exploration of the Palaeolithic Landscape across an Archaeological Backwater of Central Madhya Pradesh, India. 22nd Congress of the Indo-Pacific Prehistory Association. Chiang Mai, Thailand. November 6 to 12, 2022.
— Poojari, R. The Vindhyan Hills of Madhya Pradesh: Exploration, Documentation, and Implications for Preservation of Newly Discovered Rock Art Sites (Central India). 22nd Congress of the Indo-Pacific Prehistory Association. Chiang Mai, Thailand. November 6 to 12, 2022.
— Kaur, A.P. The palaeoecological implications for hominin dispersal(s) in the Pinjore Formation (2.58-0.63 Ma) in the Siwalik Hills region north of Chandigarh. 82nd Annual Meeting of the Society of Vertebrate Paleontology Annual Meeting. Toronto, Canada. November 2-5, 2022.
— Chauhan, P.R. (with K.A. Parray). Challenges and potential solutions in preserving Quaternary fossil sites of the Karewas & Siwalik Hills. Conference on Sustainable geotourism to preserve geoheritage and biodiversity in the Himalayas. Organised by R.L.A. College (University of Delhi) at Almora, Uttarakhand. December 2-4, 2022.
— Poojari, R., Impact of climate change on archaeological sites with emphasis on rock art sites and vandalism'. Webinar on 'Effects of Climate Change on Cultural Heritage' hosted by National Institute of Disaster Management (NIDM), Ministry of Home Affairs in collaboration with Mirāsy Heritage Management. December 16, 2022.
— Bhushan, S. (with S. Agarwal). Palaeolithic assemblages, raw materials, palaeoenvironments and landscape adaptations in the Lower Son Valley, Uttar Pradesh, India. The Indian Archaeological Society and History and Culture Society. Pandit Deendayal Upadhyaya Institute of Archaeology, Archaeological Survey of India. Greater Noida, U.P. February 17-19, 2023.
— Chauhan, P.R. (for A. Joshi, M. Tanksale, R. Poojari, S. Chopra, A. Srinivas, R. Patnaik, P. Sukumaran, A. Preet Kaur, A. Deshpande, T. Padhan, V. Singh, P.R. Chauhan). A New Assemblage of Proboscidean Fossils from Central India and Associated Stratigraphic and Taphonomic Observations. Conference of Indian Society for Prehistoric and Quaternary Studies, The Indian Archaeological Society and History and Culture Society. Pandit Deendayal Upadhyaya Institute of Archaeology, Archaeological Survey of India. Greater Noida, U.P. February 17-19, 2023.
— Chauhan, P.R. Issues in (human) paleontology & prehistoric archaeology. Seventh Foundations of Biology Meeting, Coorg, Karnataka. February 23-26, 2023.
— Chauhan, P.R. Integrating archaeological evidence in Quaternary environmental studies. For Landuse-landcover mapping and modelling using pollen and isotopic data in different ecological regions of the monsoon (LEM). Amravati, Maharashtra. March 18-22, 2023.

V. Rajesh and group members

— Ansad C. Rashtriya Swayamsevak Sangh and the Making of Hindu 'Araya' Fishers in the Coastal Malabar Regions of Kerala, India. Association for Asian Studies (AAS) Annual Conference, 17-18 February 2023.
— Rajesh V. Monastery and Household: Sites of Reproduction and Transmission of Literary Cultures in Tamil South India. Revisiting the Situatedness of Knowledge: Sites of Knowledge in Asia. Kathmandu, Nepal. 26-29 September 2022.
— Swapnil C. The Politics of Ram Mandir and Muslim Rashtriya Manch. Graduate Research Meet. Department of HSS. Indian Institute of Technology Guwahati. 6–7 January 2023.
— Swapnil. C. Confined Within the Drapes: Moral and Social Values in the Writings of Yashoda Devi. National Conference on Health, Science and Technology in India. Manipal Centre for Humanities, Manipal Academy of Higher Education. 10th February 2023.
— Utkarsha N. Early Phule-Ambedkarite intellectual tradition in the newspaper Samata. Conference on Vernacular Periodicals and Dalit Writing: Production, Circulation and Reception. School of Humanities and Social Sciences, Gandhi Institute of Technology and Management, Hyderabad campus, India. 1-3 March 2023
— Utkarsha N. Dalit women speak and write differently: understanding orality and literacy. 8th Annual Conference of the Oral History Association of India on "Memory and Orality in a Textual World", International Institute of Information Technology, Hyderabad, 10-12 March 2023.
— Utkarsha N. British Orientalism and Thomas Macaulay: A study of the Minute on Education (1835). Second Annual Asia Conference by the History Department, Salt Lake Community College, UT, United States, 30 March 2023.

8.5. Department of Mathematical Sciences

8.5.1. Summary of the research work

Abhik Ganguli

1. Jointly with Mr. Suneel Kumar, Ganguli's group is further investigating the problem of local constancy of mod p reduction of certain crystalline representations using the mod p local Langlands correspondence. Their group is looking for local constancy in the regime of relatively small weights, outside of what could be called the "BLZ range".
2. Investigating connections between trianguline deformation theory relevant to the weight map and the local behaviour of crystalline representations in families lifting a fixed mod p Galois representation.

Alok Maharana

In collaboration with Prof. R.V. Gurjar, a new invariant of smooth projective algebraic surfaces was defined, which captures important biregular information about the surface in contrast to birational invariants like gonality for smooth projective curves or the degree of irrationality, which is defined for higher dimensional projective varieties. Maharana's group aim to show that for smooth projective complex algebraic surfaces with the first Betti number zero, the order of the first integral homology group is bounded by a function of this invariant. The value of the defined invariant for most minimal surfaces was calculated. A paper is under preparation.

In a different direction, with Lingaraj Sahu and Hemant Bansal, the study of embedded eigenvalues on the continuous spectrum of certain self-adjoint operators on a Hilbert space was continued.

Amit Kulshrestha

Continuing the work in the domain of word maps, in a collaboration with Harish Kishnani, Kulshrestha's research group is classifying an exhaustive set of word images for nilpotent groups of class 2, with an intention to address Amit-Ashurt conjecture. In a work with Kanika Singla, Kulshrestha's group have identified infinitely many chains of Faddeev inequivalent algebras which are differentially generated from a single derivation and a single scalar of the differential field. This generalizes their earlier work with Varadharaj Srinivasan. In another work with Gurleen Kaur and Anupam Singh, Kulshrestha have worked out representation degrees of various p-groups and its connections with other properties of groups.

Chanchal Kumar

The study of algebraic properties of combinatorially interesting monomial ideals has been the focus of Kumar's current research. They have obtained many interesting results about the skeleton ideals of complete graphs. They 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. Their group have studied 1-skeleton ideals of graphs and obtained an upper bound on the number of its standard monomials. They are trying to extend these results to some more general classes of graphs.

Chandrakant S. Aribam

Aribam's group have made progress on some cases of the Main conjecture for certain elliptic curves with prescribed conditions on the representation.

Chetan Balwe

Balwe's research area is motivic homotopy theory. The following results were obtained during the past year:

(1) (Joint work with Bandna Rani) Their group proved that smooth, proper, retract rational varieties over infinite fields are naively A1-connected. This improves on an earlier result which states that such varities are A1-connected (proved by Asok and Morel in characteristic 0 and by Kahn and Sujatha over fields of arbitrary characteristic).

(2) (Ongoing project with Rakesh Pawar and Amit Hogadi) A result of Morel states that the stable motivic homotopy groups of the sphere spectrum over a perfect field are given by Milnor-Witt K-theory. Their ongoing project is to prove the analogous result over a Dedekind domain.

Jotsaroop Kaur

Kaur's group is trying to prove sharp Lp estimates for the solution of wave equation corresponding to Hermite operator. She have proved localisation estimates for the solution of Schrodinger operator for the sub-Laplacian corresponding to the Heisenberg group.

Kapil Hari Paranjape

In collaboration with Mr Srihari Ramanujan (BS-MS student who graduated in 2022), Paranjape's group looked the problem of explicit construction of cyclotomic embeddings of abelian extensions (specifically cubic extensions).

In collaboration with Mr Prakash Joshi (Int PhD student co-guided with Dr Vaibhav Vaish), they looked at the problem of constructing non-torsion cycles on algebraic varieties. Specifically, the problem of constructing non-torsion points on Abelian varieties was the starting point.

In collaboration with Dr Alok Maharana, they studied the problem of embedding affine and Stein varieties in affine n-space. This began with an attempt to extend the work of Raghavan Narasimhan and Avinash Sathaye on this problem.

Examined the definitions of finite ordinals and other concepts from axiomatic foundations of set theory.

Examined the proofs of the adjoint functor theorem from various starting hypotheses.

Gave a categorical characterisation of subgroups of a group.

Krishnendu Gongopadhyay

1. An element g in a group G is called reversible (or real) if it is conjugate to g^{-1} in G, i.e., there exists h in G such that g^{-1}=hgh^{-1}. The element g is called strongly reversible if the conjugating element h is an involution (i.e., element of order at most two) in G. In a joint work with Tejbir, Gongopadhyay's group classify reversible and strongly reversible elements in the isometry groups of F-hermitian spaces, where F is the field of complex numbers or the division algebra of real quaternions. More precisely, we classify reversible and strongly reversible elements in the groups Sp(n) |X Hn, U(n) |X Cn and SU(n) |X Cn. Their group also give a new proof of the classification of strongly reversible elements in Sp(n).

2. In a joint work with Sagar B. Kalane, their group classify conjugation orbits of generic pairs of loxodromic elements in Sp(n,1) and SU(n,1). For n = 3, they give a subspace that can be parametrized using a set of coordinates whose local dimension equals the dimension of the underlying group. They further construct twist-bend parameters to glue such representations and obtain local parametrization for generic representations of compact surface groups.

3. In a joint work with Soumya Dey, Gongopadhyay's group investigate the commutator subgroups of the singular braid groups and generalized virtual braid groups. They found crucial information about finite generations of these groups.
4. In a joint work with Aggarwal and Mishra, they examine the group of isometries of the open unit ball of a complex Banach space of certain bounded linear operators equipped with the Carathéodory metric. Therein they obtain a characterization of the normal isometries in terms of their special type of fixed points.

Lingaraj Sahu

Sahu continued analysis of the spectrum of self-adjoint operators and their perturbations. When an eigenvalue b of an operator H disappears under a small perturbation H(t) = H+A(t), the spectral behaviour of H(t) shows spectral concentration near b as perturbation parameter t goes to 0. This phenomenon is studied extensively by many mathematicians qualitatively and quantitatively. However, there is much to understand. With Alok and Hemant, Sahu's group studied some concrete models available in the literature and they are looking for a better understanding of the spectral concentration phenomenon for eigenvalues embedded in the absolutely continuous spectrum.

Mahender Singh

Singh's research focused on the exploration of idempotents in quandle rings and their connection to quandle coverings. They showed that integral quandle rings of nontrivial coverings over base quandles, belonging to the finite type category, admit an infinite number of nontrivial idempotents. Their group provided a comprehensive description of these idempotents. Additionally, they investigated free products of quandles and established that integral quandle rings of free quandles solely exhibit trivial idempotents. This enabled us to present an infinite family of quandles admitting this property.

Expanding on the implications of their research to knot theory, they demonstrated that quandle rings and their idempotents yield enhanced versions of the well-known quandle coloring invariant for links in the 3-space. Notably, they provided explicit examples showcasing the superiority of these new invariants over the Hom quandle invariant, particularly when the coloring quandles are medial.
Additionally, their group utilized computer-assisted computations to determine the idempotents for all quandles of order less than six. The collected data strongly supports our conjecture regarding the triviality of idempotents in integral quandle rings of finite Latin quandles.

The study of stable isotopy classes of a finite collection of immersed circles without triple or higher intersections on closed-oriented surfaces is considered as a planar analogue of virtual knot theory, a far-reaching generalisation of classical knot theory. Recent works have established Alexander and Markov theorems in the planar setting. In the classical case, the role of groups is played by twin groups, a class of right-angled Coxeter groups. A new class of groups called virtual twin groups, that extends twin groups in a natural way, plays the role of groups in the virtual case. The virtual twin group contains the pure virtual twin group, a planar analogue of the pure Artin braid group. Singh's group proved that the pure virtual twin group is an irreducible right-angled Artin group and gave its precise presentation. Additionally, their group comprehensively described the automorphism group of the pure virtual twin group and demonstrated the splitting of natural, exact sequences of automorphism groups. As a result, they discovered infinitely many twisted conjugacy classes for each automorphism of this group.

Neeraja Sahasrabudhe

The work on "Interacting urn model on finite directed graphs" was generalized to interactive sampling and vertex-dependent reinforcement. This manuscript is under preparation. The manuscript titled "Urns with multiple drawings and graph-based interactions" is also under preparation. For both the interacting urn models, Sahasrabudhe's group proved convergence and fluctuation results for a fraction of balls of either colour under certain conditions on the reinforcement scheme and the underlying graph structure. The work on Influencing Opinion Dynamics was extended to growing population models and other kinds of population behaviour like lying were incorporated in the model. They submitted their manuscript on preferential attachment trees with fitness.

Pranab Sardar

(1) With student Ravi Tomar, Sardar's group proved the existence of Cannon-Thurston maps for subcomplex of groups of an acylindrical complex of hyperbolic groups with qi embedding condition under mild restriction.

(2) With student Rakesh Halder, Sardar's group proved existence of Cannon- Thurston maps for subgraph of subgroups of graph of hyperbolic groups with qi embedding condition where the for the subgraph of groups the vertex groups admit Cannon-Thurston map for their inclusion into the corresponding vertex group of the bigger graph of groups, and the edge of the subgraph of groups are finite index subgroups of the corresponding edge groups of the bigger graph of groups. This gives a slight generalization of their work with Kapovich.

Ratna Pal

a. Increasing union of bounded domains (joint project with Prof. J. E. Fornaess):
Let M be a complex manifold such that M is an increasing union of M_n's, where each M_n is biholomorphic to a fixed bounded domain in C^k. One could ask whether one can describe M in terms of the fixed domain? This problem is referred to as the union problem in literature and it has a long rich history. The above form of union problem was first taken up by Fornaess--Sibony. They attempted and partially succeeded to describe M taking into consideration the infinitesimal Kobayashi metric of M. It turned out that answering this question in full generality is extremely hard. Recently, some advancement in this direction has been made by Balakumar--Borah--Mahajan--Verma. Namely, they described M for some special fixed domains, provided M is Kobayashi hyperbolic. In Pal's ongoing work with Fornaess, they pursue to determine further classes of the above-mentioned fixed domain for which they can describe the final union M.

b. Geometric structure of Short C^k (joint project with Prof. J. E. Fornaess and Prof. E. Wold):
A domain D, which can be expressed as an increasing union of unit balls (up to biholomorphism) such that the Kobayashi metric vanishes identically in D, but allows a bounded (above) pluri-subharmonic function, is called Short C^k. The genesis of Short C^k is in the union problem and these domains were first described by Fornaess. They arise naturally in complex dynamics as non-autonomous basins of attraction, and these are essentially the only known class of examples of Short C^k. Now in this special class of examples there are at least uncountably many Short C^k which are mutually biholomorphically non-equivalent. This indicates up to biholomorphism Short C^k form a large class of domains and in general Short C^k could be very different from each other. This diversity across the class of Short C^k makes it very difficult to develop a general theory. Thus till date the theory of Short C^k is under developed. There are only a handful of articles available on this topic. In this joint project, Pal's group is trying to build a general theory of Short C^k. To do so, they bring in tools and techniques from several different areas of complex geometric analysis and holomorphic dynamics. It is noteworthy that all of their previous work on Short C^k revolves around the aforementioned class of examples and the present work is quite different in its spirit.

c. Dynamics of degenerate resonant maps (joint project with Prof. J. Raissy):
Let F be a germ of holomorphic map in C^k, which fixes the origin and has diagonalizable differential DF(0) of F at the origin. The asymptotic behaviour of the sequence of iterates of F near the origin is controlled to a great extent by the eigenvalues of DF(0). Roughly speaking F is called one-resonant with respect to the eigenvalues if these eigenvalues satisfy a special relation. The genesis of the present work

with Raissy goes back to work of Bracci--Zaitsev and of Bracci--Raissy--Zaitsev. In these articles they studied the dynamics of non-degenerate one resonant map and multi-resonant maps in C^k linking them to the tangent to the identity maps. They proved existence of attracting domains in these cases on a par with Leau-Fatou flower theorem for parabolic maps in one dimension. In the present joint project with Raissy, Pal's group study the dynamics of degenerate one-resonant and multi-resonant maps. In particular, they investigate the possibility of having attracting domains in these cases.

Sudesh Kaur Khanduja

Khanduja have written a book entitled A Textbook of Algebraic Number Theory which has been published by Springer in May 2022. 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. Khanduja have also written a paper jointly with her Ph.D. student Sumandeep Kaur entitled Discriminant and Integral basis of sextic fields defined by x 6 +ax+b. In this paper, they have found a formula for the discriminant of all those sextic fields Q(θ) where θ is the root of an irreducible trinomial x 6 +ax+b belonging to Z[x]. Their group also construct a
p-integral basis of Q(θ) for all primes p; these p-integral bases quickly lead to the construction of an integral basis of Q(θ). Their results are illustrated with examples.

Santhosh Kumar Pamula

- Pamula's recent work is related to the block operator representation of operator moment dilations and has been submitted to journal. (This is a joint work with B.V.R. Bhat and A. Ghatak)
- It is an operator generalization of the classical moment problem. The necessary and sufficient conditions for the existence of self-adjoint, isometric and unitary dilations is given.
- A tractable collection of a certain class of operators is identified for which isometric and unitary dilation can be written explicitly.
- Working on Quaternionic numerical range attainment problems. It is to characterize all axially symmetric set that are written as the closure of circularization of a complex numerical range.
- Descent spectra of some special operators is studied. Currently, Pamula is working on the characterization of class of operators for which the notion of descent spectrum and algebra descent spectrum coincide. This is a joint work with G. Kulkarni (Summer research fellow during summer 2022).

Shane D'Mello

In joint work with Ms. Priya Rani, D'Mello's research group is classifying real rational knots in the 3-dimensional real quadric other than the sphere up to rigid isotopy for low degrees, i.e. they are tying to find out the path connected components of the space of real rational knots of degree d in the real quadric when the degree is less than or equal to 5. Their group has completed the classification up to degree 4 and have made some progress in degree 5. They have found out the smooth isotopy classes up to degree 5.

Soma Maity

A non-compact complete Riemannian manifold without boundary is said to have bounded geometry if its sectional curvature is bounded and injectivity radius is bounded below by a positive constant. It is an interesting question to find the functions which are volume functions of Riemannian metrics with bounded geometry on a given non-compact manifold. Grimaldi and Pansu studied volume growth of one ended open manifold and showed how it depends on the topology of the manifold. Maity's group generalized their result for manifolds with finitely many ends. Presently ,their group is studying the volume growth of manifolds with countably many ends.

Tanusree Khandai

Khandai continued with her study of the finite-dimensional representations of current Lie algebras. Along with her Ph.D. Student, Ms Shushma Rani, their group proved that the structure of fusion products of two irreducible modules for current Lie algebras of type A2 is independent of the evaluation parameters used to define them. The methods developed in the paper showed that the Chari-Venkatesh modules prove to be effective tools to study the tensor product problems and establish the combinatorial identities associated with them. Her group is currently extending their work to study the fusion product modules for current Lie algebras of type An.

In a second project, along with Ms Divya Sethi, Khandai is studying the structure of the tensor products of local Weyl modules with special Chari-Venkatesh modules for Lie algebras of type A1. This study is motivated by the conjecture that the tensor product of Demazure modules of levels m and n respectively have filtration by Demazure modules of level m+n.

Vaibhav Vaish

Vaish's primary research revolves around exploring motives relevant to Shimura varieties, and in the process, Vaish have also constructed general objects of broader mathematical interests. More recently and specifically, their group has been interested in understanding symmetrically distinguished cycles and using the same towards constructing Intersection Complexes of some specific Shimura Varieties. This year, they began exploring the relationship of the same with Beauville's conjectures on Abelian Varieties.

As another project, Vaish began the exploration of weights in the context of (co)-homotopy groups. These questions arise naturally while considering the homotopy invariance of the dual complex associated to the boundary divisor in birational geometry, which is reminiscent of the invariance of weight zero and weight one graded of the (co)-homology of the boundary itself. Ideally, this should match with the weights on homotopy groups of nilpotent varieties as defined by Hain, but this connection seems unexplored at the moment.

Varadharaj Ravi Srinivasan

In a joint work with his PhD students, Srinivasan have extended the theorem of Liouville on integration in finite terms to include field extensions gotten by adjoining solutions of Weierstrass differential equations and second order linear differential equations whose differential Galois group is either isomorphic to the infinite dihedral group or the special linear group. Srinivasan have also provided a classification of nonlinear first-order differential equations and investigated the algebraic dependence of solutions of a given differential equation.

Yashonidhi Pandey

1. Pandey worked on the following papers:

a) On homomorphisms of $\pi{1}(\mathbb{P}^1 - \mathcal{R})$ into compact semisimple groups (joint work with Professor Vikraman Balaji)

b) On Bruhat-Tits theory over a higher dimensional base (joint work with Professor Vikraman Balaji)

c) Brauer group of Hilbert scheme of two points of a smooth projective surface and applications (joint work with Professor A.J.Parameswaran)

d) The \'Etale Fundamental group of moduli of parahoric group scheme torsors over a curve (joint work with Professor A.J.Parameswaran)

8.5.2. Visits of the faculty members

Abhik Ganguli

— ICTS, Bengaluru, August 2022.

— HRI, Prayagraj, September 2022
— IISc Bangalore, November 2022

Alok Maharana

— Harish-Chandra Research Institute, Prayagraj, December 11-17, 2022.
— International Centre for Theoretical Sciences, Bengaluru, February 19-25, 2023.

Amit Kulshrestha

— Indian Institute of Science Education and Research Pune, January 12-16, 2023.
— Indian Institute of Technology Jodhpur, December 19-23, 2022.

Chandrakant S. Aribam

— HRI Allahabad, Dates. 08/10/2022 to 10/10/2022
— Manipur University, Dates: 28/11/2022 to 04/12/2022
— Shiv Nadar University, Dates. 06/11/2022 to 04/12/2022

Jotsaroop Kaur

— IISC 25 July, 2022 till 30 July, 2022
— IISER Pune 14 Dec, 2022 till 18 Dec, 2022

Kapil Hari Paranjape

— Visited IIT Gandhinagar; August 2022.
— Visited Punjabi University, Patiala; September 2022.
— Travel to Washington University, St Louis MO, USA in May 2022 for conference on Algebraic Geometry and Algebraic K-Theory. (See above for talk presented at this conference.

Krishnendu Gongopadhyay

— NIT Srinagar, May 8–15, 2022.
— Bhaskaracharya Pratishthana, May 20–23, 2022.
— IIT Bombay, May 23–25, 2022.
— IISER Kolkata, May 31—June 2, 2022.
— USERC, Dehradun and D.I.E.T. New Tehri, June 13–17, 2022.
— Galatasaray University, Istanbul, Turkey. June 20–24, 2022.
— KREA University, Sri City, December 4–5, 2022.
— Sri Sivasubramaniya Nadar College of Engineering, Chennai, December 5–7, 2022.
— Presidency University, January 2–5, 2023.
— IISER Pune, January 12–15, 2023.
— Jammu University, Jammu, India. January 19–20, 2023.
— Prabhu Jagadbandhu College, Andul, Howrah, West Bengal, 24th February, 2023.

Mahender Singh

— University of South Florida, USA. 01 April—31 May 2022.

Neeraja Sahasrabudhe

— IIT Bombay. 3-12 March 2023.

Ratna Pal

— IISER Kolkata, May 31-June 2, 2022, Inter IISER-NISER Mathematics Meet
— Laboratoire de Mathématiques d'Orsay - Université Paris-Saclay, France, December 5-9, 2022, Conference on Complex Analysis, Complex Geometry and Dynamics
— Institut de Mathématiques de Bordeaux, Université de Bordeaux, France, December 12-17, 2022
— Kerala School of Mathematics, December 19 to 23, 2022, Interactions in Several Complex Variables
— IISER Pune, December 27-29, Indian Women in Mathematics (IWM) annual conference

S. K. Khanduja

— IIT Patna on 25th April, 2022.
— ISI Delhi Hybrid on 2nd September, 2022.
— IIT Delhi on 18th October, 2022.
— Manipur University from 2-6, December 2022.
— IIT Bombay from 18-21, January, 2023.
— NIT Jalandhar on 10th February, 2023.

Santhosh Kumar Pamula

— Visited Indian Statistical Institute (ISI) Bangalore during June 13 – 19, 2022. Purpose of the visit: research collaboration with Prof. B. V. Rajarama Bhat.

Yashonidhi Pandey

— Ashoka University 13-14th March 2023
— Harish-Chandra Research Institute 12-13th December 2022
— Chennai Mathematical Institute 17th-24th June 2022

8.5.3. Talks delivered

Abhik Ganguli

— A. Ganguli, "Trianguline (phi, gamma)-modules", North Indian Number Theory Meeting (p-adic aspects), HRI, Prayagraj, September 2022.
— A. Ganguli, "Work of J. Maynard", Fields Medal Symposium, IISER Mohali, September 2022.
— A. Ganguli, "Serre weights of certain mod p Hilbert modular forms", Number Theory Seminar, Dept. of Mathematics, IISc Bangalore, November 2022.
— A. Ganguli, "Reciprocity Laws", National Mathematics Day Celebration, Dept of Mathematics, IIT Ropar, March 2023.

Alok Maharana

— Alok Maharana, "Invariants of surfaces of degree d in P^n". Conference on Algebraic Geometry, HRI, Prayagraj, December 13, 2022.

Amit Kulshrestha and group members

— Amit Kulshrestha. Chirality and **γ**-chirality in groups, Workshop in Group Theory, Indian Institute of Science Education and Research Pune, January 14, 2023.
— Amit Kulshrestha. Linear Groups (a series of four lectures), Annual Foundation School-1, Indian Institute of Technology Jodhpur, December 19-22, 2022.
— Amit Kulshrestha. Pure, Applicable and Applied: Mathematics without borders, Cynosure 2022, Indian Institute of Technology Ropar, December 10, 2022.
— Amit Kulshrestha. Mathematization: Social and Technological Perspectives, Vigyan Utsav: Basic Sciences for Atmanirbharta under Azadi ka Amrit Mahotsav, Punjab State Council for Science and Technology, June 17, 2022.
— Rijubrata Kundu. Breadth and Breadth-type in Lie algebras, Group Theory and related topics conference 2023, NISER Bhubaneswar, February 27 – March 04, 2023.
— Rijubrata Kundu. Alternating groups as power of cycle-classes of the symmetric group, International Group Theory Conference (IGTC), Iran 2023 (online), February 09-10, 2023.
— Rijubrata Kundu. On Coprime commutators in finite simple groups, Workshop on Group Theory 2023, Indian Institute of Science Education and Research Pune, January 14 2023.
— Gurleen Kaur. On the embedding of finite solvable groups, Conference on Group theory and related topics, NISER Bhubaneswar during February 27-March 04, 2023.
— Gurleen Kaur. Emmy Noether: Her work and influence, Panjab University, Chandigarh, December 23, 2022
— Gurleen Kaur. Central units of integral group rings, Department of Mathematics, Indian Institute of Science Education and Research Pune, December 06, 2022.
— Gurleen Kaur. Group rings of finite groups: Wedderburn decomposition and central units, Indian Institute of Technology Kanpur, July 27, 2022.

Chandrakant Aribam

— Chandrakant Aribam, Anticyclotomic Main conjectures, HRI Allahabad, Dates: 08/11/2022 to 10/12/2022
— Chandrakant Aribam, Galois Theory, Instructional School for Teachers, Dates: 28/11/2022 to 04/12/2022
— Chandrakant Aribam, Bipartite Euler System for certain Galois representations, Ramanujan Math Society Meeting 2022, Dates: 06/12/22 to 08/12/2022

Kapil Hari Paranjape

— Gave a talk on “Algebraization of Point-Set Topology” at conference on Algebraic Geometry and Algebraic K-theory in honour of Professor N Mohan Kumar, at Washington University, St Louis MO, USA; May 2022.
— Gave a talk on “Algebraization of Point-Set Topology”, at IIT Gandhinagar; August 2022. This talk was at a more elementary level than the previous talk.
— Gave a talk on “Mukta Software and Data Analytics”, at Punjabi University, Patiala; September 2022.
— Gave a talk on “Cycles in Chennai” at IMSc 60, a conference for the sixtieth anniversary of the foundation of the Institute of Mathematical Sciences, Chennai; January 2023.

Krishnendu Gongopadhyay and group members

— Krishnendu Gongopadhyay- Reversibility of affine transformations, Workshop on Group Theory, IISER Pune. Dates: January 13, 2023.
— Krishnendu Gongopadhyay- Reversibility in groups and geometry. KREA University, Sri City.
— Dates: December 5, 2022.
— Krishnendu Gongopadhyay- Reversibility and Linking of loxodromic maps. Knot Theory and its application (ICM Satellite conference) (online) Dates: July 3, 2022.,YT Link: https://youtu.be/hD5rZJsUgOk
— Krishnendu Gongopadhyay- Reversibility of Linear and Affine Motions, Conference in Honor of 65th birthday of Athanase Papadopoulos, Galatasaray University, Istanbul, Turkey. Dates: June 23, 2022.
— Krishnendu Gongopadhyay- Reversibility and adjoint orbits in special linear groups. Inter IISER-NISER Math Meet (IINMM) 2022, Dates: June 1, 2022.
— Krishnendu Gongopadhyay- Reversibility and adjoint orbits in special linear groups, Math Colloquium, IIT Bombay, Mumbai, Dates: May 24, 2022.
— Krishnendu Gongopadhyay- Geometry and imagination, National workshop on Real Analysis, Linear Algebra and its Applications, (IQAC Cell-TIMC), Prabhu Jagadbandhu College, Andul, Howrah, West Bengal, Dates: February 24, 2023.
— Krishnendu Gongopadhyay- (Mini-course of two lectures) Geometric aspects of complex analysis
— Name of the Conference/Institute. Faculty Development Workshop on ‘Analysis and its pplications’, Jammu University, Jammu. Dates: January 19–20, 2023.
— Krishnendu Gongopadhyay- (Mini-course of six lectures) Geometric aspects of complex analysis
— Name of the Conference/Institute. NCM-IST: Complex analysis from a geometric viewpoint, USERC Centre, New Tehri, Uttarakhand. Dates: June 13–17, 2022.
— Krishnendu Gongopadhyay- Symmetry with a geometric viewpoint, ``Applications of Mathematics" (Workshop for BS-MS students), Bhaskaracharya Pratishthana, Pune. Dates: May 22, 2022.
— Krishnendu Gongopadhyay- On geometric aspects of group theory. NIT Srinagar, Srinagar. Dates: May 13, 2022.
— Krishnendu Gongopadhyay- The story of the ICM-2010 logo. Capacity building workshop, SGGS College, Chandigarh Dates: April 21, 2022.
— Tejbir- Reversibility of Hermitian isometries, Young Mathematician’s Symposium (YoMathS) 2022, IISER Mohali, Dates: May 6--7, 2022.
— Tejbir- Reversibility in geometry. World of GroupCraft II (online), Dates: September 2, 2022.
— Tejbir- Reversibility of affine transformations, Name of the Conference/Institute. Conference ``Group Theory and Related topics’’, NISER Bhubaneswar, Dates: February 27- March 04, 2023.

Mahender Singh and group members

— Mahender Singh. Residual and related finiteness properties of quandles. Inter-university Geometry Seminar, Morocco. 18 February 2023 (online).
— Neeraj Kumar Dhanwani (Postdoc of Dr. Mahender Singh). Quandles arising from surfaces. World of GroupCraft II (Online). 02 Sept 2022.
— Neeraj Kumar Dhanwani (Postdoc of Dr. Mahender Singh). Factoring periodic maps into Dehn twists. IIT Goa. 28 July 2022.
— Mahender Singh. Planar knots and related groups. Department of Mathematics, Ohio State University, USA. 10 May 2022 (online).

— Mahender Singh. Residual finiteness of quandles. Department of Mathematics, University of South Florida, USA. 15 April 2022.

Neeraja Sahasrabudhe and group members

— Neeraja Sahasrabudhe. Urns with Graph-based Interactions. A journey through complex systems: from interacting particles to games, L'Aquila. September 21-24, 2022.
— Neeraja Sahasrabudhe. Preferential Attachment Trees with Fitness. IIT Tirupati. October 28, 2022.
— Neeraja Sahasrabudhe. Interacting Urns on a Finite Graph. Bangalore Probability Seminar. October 31, 2022.
— Neeraja Sahasrabudhe. Interacting Urns with Multiple drawings. Internation Indian Statistical Association Annual Conference, IISc. Bangalore. December 26-30, 2022.
— Yogesh. Urns with multiple drawings and graph based interactions. YoMaths. May 6-7, 2022
— Yogesh. Urns with multiple drawings and graph based interactions. Inter IISER-NISER Mathematics Meet. May 31-June 2, 2022

Pranab Sardar

— Pranab Sardar-An invitation to Geometric Group Theory, NISER Bhubaneswar. Dates. 21/12/22.

Ratna Pal

— Ratna Pal, Short C^k's, Inter IISER-NISER Mathematics Meet, IISER Kolkata, May 31-June 2, 2022
— Ratna Pal, Short C^2's and their automorphism groups, Interactions in Several Complex Variables, December 19 to 23, 2022

S. K. Khanduja

— A journey through irreducible polynomials. Name of the Institute: IIT Patna, Date: 25th April, 2022.
— An interaction with number theory. Name of the Institute: IISER Mohali, Date: 31st August, 2022.
— Discriminant and Integral basis of algebraic number fields. Name of the Institute: ISI Delhi, Date: 2nd September, 2022.
— Glimpses of algebraic number theory. Name of the Institute: IIT Delhi, Date: 18th October, 2022.
— When is Z[θ] the ring of integers? Name of the Institute: IIT Bombay, Date: 18th January, 2023.
— An Interaction with Number Theory, Name of the Institute: NIT Jalandhar , Date: 10th February, 2023.
— History and development of algebraic number theory. Name of the Institute: IISER Mohali, Date: 21st March, 2023.

Santhosh Kumar Pamula

— Delivered a talk titled "Moment Dilations" at Indian Institute of Technology Hyderabad on June 28, 2022.

Tanusree Khandai and group members

— Tanusree Khandai-Fusion Modules for Current Algebra of sl3(C). Inter IISER-NISER Mathematics Meet, IISER, Kolkata Dates: 31 May- 2 June, 2022
— Shushma Rani -Filtration and Graded Decomposition of Fusion Product Modules for Current Algebra sl3(C [t]). Young Mathematician's Symposium, 2022 Dates: 7 May, 2022
— Shushma Rani -Free Root Spaces of Borcherds Kac-Moody Lie Superalgebras , : Algebraic-Combinatorics Seminar, Dept of Mathematics, IISc Bangalore Dates: 11 January, 2023
— Niranjan Nehra-F Image of multilinear Lie polynomial of degree 2 evaluated on nilpotent Lie algebra, Young Mathematician's Symposium, 2022 Dates: 7 May, 2022
— Niranjan Nehra-Image of multilinear Lie polynomial of degree 2 evaluated on nilpotent Lie algebra World of Group Craft II (Online) Dates: 2 September, 2022.
— Divya Sethi-Tensor Product of local Weyl modules. : Young Mathematician's Symposium, 2022, Dates: 6 May, 2022.

Varadharaj Ravi Srinivasan

— "Galois theory of matrix differential equations" , IISER Pune, 13-14 January 2023.

Yashonidhi Pandey

— Yashonidhi Pandey-Bruhat-Tits theory over a higher dimensional base, Chennai Mathematical Institute, Dates: 22 June 2023
— Yashonidhi Pandey-Bruhat-Tits theory over a higher dimensional base, Algebraic Geometry Dates: 12th December 2022
— Yashonidhi Pandey-Tits theory over a higher dimensional base, Ashoka University

Dates: 14th March 2023

— Yashonidhi Pandey-Bruhat-Tits theory over a higher dimensional base, (online) Quadratic Forms, Linear Algebraic Groups and Beyond, Dates: 14th March 2023

8.5.4. Conferences attended by the researchers

Abhik Ganguli

— North Indian Number theory meeting (p-adic aspects), HRI, Prayagraj, (09/2022).

— ICTS program on Elliptic curves and the special values of L-functions, (08/2022).

Alok Maharana

— Conference on Algebraic Geometry, HRI, Prayagraj, December 12-16, 2022.

— Topics in Hodge Theory, ICTS, Bengaluru, February 20-25, 2023.

Chandrakant Aribam

— Chandrakant Aribam, Galois Theory,Instructional School for Teachers, Dates: 28/11/2022 to 04/12/2022

— Chandrakant Aribam, Bipartite Euler System for certain Galois representations, Ramanujan Math Society Meeting 2022, Dates: 06/12/22 to 08/12/2022

Chetan Balwe

— Speaker: Chetan BalweTitle: Universal R-triviality of norm varieties Conference: 37th Annual Conference of the Ramanujan Mathematical Society, Algebraic Geometry Symposium at SSNCE, Kalavakkam, Chnnai. Dates: December 6-8, 2022

Jotsaroop Kaur

— Jotsaroop Kaur- Equiconvergence for perturbed Jacobi polynomial expansions, Analysis seminar, Dates Dec, 2022

— Jotsaroop Kaur-.Maximal bilinear Bochner Riesz means and some application Name of the Conference Thangavelu Fest Dates 25 July, 2022- 30 July, 2022

Kapil Hari Paranjape

— Participated in IMSc 60, a conference for the sixtieth anniversary of the foundation of the Institute of Mathematical Sciences, Chennai; January 2023.

— Participated in a Conference on Cycles and K-Theory in honour of Professor V Srinivas, at the TIFR, Mumbai; March 2023.

Krishnendu Gongopadhyay and group members

— Krishnendu Gongopadhyay-Reversibility of affine transformations, Workshop on Group Theory, IISER Pune, Dates: January 13–14, 2023.

— Krishnendu Gongopadhyay-Not available. (Attended as a EC member of the RMS), Annual conference of the Ramanujan Mathematical Society, SSN College of Engineering, Chennai. Dates: December 6–8, 2022.

— Krishnendu Gongopadhyay-Reversibility and Linking of loxodromic maps. Knot Theory and its application (ICM Satellite conference) (online), Dates: June 29–July 4, 2022.

— Krishnendu Gongopadhyay-Reversibility of Linear and Affine Motions, Honor of 65th birthday of Athanase Papadopoulos, Galatasaray University, Istanbul, Turkey. Dates: June 20–24, 2022.

— Krishnendu Gongopadhyay-Reversibility and adjoint orbits in special linear groups. Inter IISER-NISER Math Meet (IINMM) 2022, Dates: May 31--June 2, 2022.

— Krishnendu Gongopadhyay-Geometry and imagination, National workshop on Real Analysis, Linear Algebra and its Applications, (IQAC Cell-TIMC), Prabhu Jagadbandhu College, Andul, Howrah, West Bengal, Dates: February 24, 2023.

— Krishnendu Gongopadhyay-Geometric aspects of complex analysis, Faculty Development Workshop on ‘Analysis and its Applications’, Jammu University, Jammu, India, Dates: January 16–20, 2023.

— Krishnendu Gongopadhyay-Geometric aspects of complex analysis, NCM-IST: Complex analysis from a geometric viewpoint, USERC Centre, New Tehri, Uttarakhand, Dates: June 13–24, 2022.

— Krishnendu Gongopadhyay-The story of the ICM-2010 logo. Capacity building workshop, SGGS College, Chandigarh, Dates: April, 2022.

— Tejbir-Reversibility of affine transformations, Group Theory and Related topics’’, NISER Bhubaneswar, Dates: February 27- March 04, 2023.

— Tejbir-Reversibility of Hermitian isometries, Young Mathematician's Symposium (YoMathS) 2022, IISER Mohali. Dates: May 6–7, 2022.

Mahender Singh and group members

— Pravin Kumar (PhD student of Dr. Mahender Singh). Congruence subgroups of small Coxeter groups. Conference on group theory and related topics, NISER Bhubaneswar, India. 27 Feb—04 Mar 2023.

— Neeraj Kumar Dhanwani (Postdoc of Dr. Mahender Singh). Dehn quandles of surfaces. Conference on group theory and related topics, NISER Bhubaneswar, India. 27 Feb—04 Mar 2023.

— Apeksha Sanghi (Postdoc of Dr. Mahender Singh). Metacyclic actions on surfaces. Conference on group theory and related topics, NISER Bhubaneswar, India. 27 Feb—04 Mar 2023.

— Mahender Singh. Finiteness of canonical quotients of Dehn quandles of surfaces. International conference on Geometry and Topology of 3-Manifolds, Sochi, Russia. 17–21 September 2022 (online).

— Mahender Singh. Dehn quandles of groups and surfaces. ICM-2022 Satellite conference on Knot Theory and Applications, Tomsk, Russia. 29 June — 5 July 2022 (online).

— Pravin Kumar (PhD student of Dr. Mahender Singh). $K(\pi,1)$ conjecture for Artin groups. Young Mathematician's symposium 2022, IISER Mohali, India. 06-07 May 2022.

Neeraja Sahasrabudhe and group members

— Neeraja Sahasrabudhe. Urns with Graph-based Interactions. A journey through complex systems: from interacting particles to games, L'Aquila. September 21-24, 2022.

— Neeraja Sahasrabudhe. Interacting Urns with Multiple drawings. International Indian Statistical Association Annual Conference, IISc. Bangalore. December 26-30, 2022.

— Yogesh. Urns with multiple drawings and graph based interactions. YoMaths. May 6-7, 2022

— Yogesh. Urns with multiple drawings and graph based interactions. Inter IISER-NISER Mathematics Meet. May 31-June 2, 2022

Ratna Pal

— IISER Kolkata, May 31-June 2, 2022, Inter IISER-NISER Mathematics Meet

— Laboratoire de Mathématiques d'Orsay - Université Paris-Saclay, France, December 5-9, 2022, Conference on Complex Analysis, Complex Geometry and Dynamics

— Kerala School of Mathematics, December 19 to 23, 2022, Interactions in Several Complex Variables

S. K. Khanduja

— A journey through irreducible polynomials. Name of the conference: 35th Ohio State-Denison Mathematics conference, Date: May 13-15, 2022.

— When is Z[θ] integrally closed? Name of the conference: International Conference in honour of Prof. Ravi S. Kulkarni's 80th birthday, Date: May 21-25, 2022.

— Glimpses of algebraic number theory. Name of the conference: The International Conference on Evoluation in Pure and Applied Mathematics, Date: November 16-18, 2022.

— Fascination of numbers, Name of the conference: National Seminar on Advances in Mathematical and Applied Sciences, Date: November 19, 2022.

— Generalization of irreducibility criterion of Eisenstein-Schonemann and Dumas, Name of the conference: Instructional School for Teachers (IST), Dates; November 28 to December 10, 2022.

— A walk through irreducible polynomials, 88th Annual Conference of the Indian Mathematical Society, Dates: December 27-30, 2022.

Santhosh Kumar Pamula

— IFCAM (Indo French Centre for Applied Mathematics) Summer School "on Mathematical Aspects of Quantum Mechanics" held during the period June 01 - 12, 2022 at the Indian Institute of Science, Bangalore.

Tanusree Khandai

— Tanusree Khandai, Fusion Modules for Current Algebra of sl3(C) , Inter IISER-NISER Mathematics Meet, IISER, Kolkata, 31 May- 2 June, 2022,

Varadharaj Ravi Srinivasan

— Conference: Workshop on Group Theory, "Galois theory of matrix differential equations" , IISER Pune, 13-14 January 2023.

Yashonidhi Pandey

— Algebraic Geometry, Dates: 12-13th December 2022

8.6. Department of Physical Sciences

8.6.1. Summary of the research work

Abhishek Chaudhuri

Chaudhuri's research groups's focus during this period has been primarily on two broad research themes: active matter and biological physics. Their group have tried to address specific questions in each of these themes using both analytical approaches and coarse-grained simulations.

In active matter, they have proposed a model of a random walker which modifies its local environment and which in turn influences the motion of the walker at a later time. Active walker models have proved extremely effective in understanding evolution of large class of systems in biology like ant trail formation and pedestrian trails. A detailed study of the trajectory of the walker showed a coil to globule transition as the deposition rate of the chemical by the walker is varied. At certain regions of the parameter space of the chemical deposition and evaporation rates, the extensions of the walker shows a re-entrant behaviour. For large enough deposition rates, the mean-squared displacement of the random walker shows clear deviation from diffusive scaling over intermediate time scales, returning to diffusive behaviour asymptotically, albeit with a decreased diffusion constant.

In biological physics, one of research group's interests was in understanding the role of activity due to motor proteins in cell motility. The directional movement of a cell is critical for the development of an embryo, immune responses, wound healing and cancer metastasis. A wide range of forces are involved as a cell moves and questions about the regulation and transmission of such forces are important to characterise cell movement. In an earlier study, their group had developed an analytical model to understand the role of myosin motors in force fluctuations at focal adhesions, which are the protein complexes connecting the inner cytoskeleton machinery to the extracellular matrix. Recently, they have studied how the cell senses substrate rigidity. A rigorous study of the equations reveal 'load and fail' or 'stick-slip' behaviour in the traction force dynamics consistent with experiments. Further, their model successfully reproduces the biphasic relationship between rigidity and force: force first increases and then decreases with rigidity. As the parameters pertaining to molecular determinants are varied, they show that the system traverses between diverse states of stabilities - from decaying oscillations to self-sustaining limit cycles. Modulating myosin activity in their model via different pathways exhibits striking shifts in optimal stiffness. A reduction in the number of myosin motors leads to a shift of traction force maxima towards higher stiffness maxima. An equivalent trend has been observed in experiments where activity of myosin motors were inhibited.

The translocation of biopolymers through nanopores has been observed in various biological process, such as the transport of RNA through a nuclear membrane pore and the viral ejection of DNA into host cells. Polymer translocation has been extensively studied to develop efficient bio sequencing techniques like the rapid detection of a DNA sequence. In a recent work, their group have studied translocation of a semiflexible polymer through a conical channel with attractive surface interactions and a driving force which varies spatially inside the channel. Using the results of the translocation dynamics of a flexible polymer through an extended channel as control, their study first show that the asymmetric shape of the channel gives rise to non-monotonic features in the total translocation time as a function of the apex angle of the channel. The waiting time distributions of individual monomer beads inside the channel show unique features strongly dependent on the driving force and the surface interactions. Polymer stiffness results in longer translocation times for all angles of the channel. Further, non-monotonic features in the translocation time as a function of the channel angle changes substantially as the polymer becomes stiffer, which is reflected in the changing features of the waiting time distributions. Further, their research group have constructed a free energy description of the system incorporating entropic and energetic contributions in the low force regime to explain the simulation results.

Ambresh Shivaji
During last one year Shivaji's research group has continued its focus on precision calculations for collider observables, and new physics searches at colliders in effective field theory framework. Their group have obtained the most precise theoretical prediction for the partial decay width of H → e+e- μ+ μ- at O (ααs) in the standard model. In the gluphilic scalar dark matter model, they have obtained 120 master integrals which are relevant to the two-loop virtual QCD correction to p p→ χ χ j process. Several of these master integrals are not known in the literature, and their group aim to evaluate them. With the help of Unitarity method, they have obtained the one-loop triangle diagram which contribute to g g→ χ χ and cross-checked its result against the traditional method of one-loop tensor reduction.

In e- P →e- H j + X processes, their group have looked at new angular observables and classified them depending on their potential in constraining CP-even and CP-odd couplings of the anomalous ZZH coupling. We have further studied the effect of anomalous WW γ and WWZ in PT and η distributions in pp→W + W - V (V=Z, γ) processes via gluon-gluon and quark-quark channels.

Ananth Venkatesan
Venkatesan's research group is extending their work on 2D electrons on the surface of ABO3 ceramics. Theye have applied for grants to extend this work to mesoscopic devices like side gated quantum point contacts which are well studied on conventional GaAs based 2DEGS. They are also improving the process for a patternable transparent conductor which they patented last year.
Furthermore they have developed a new RF bridge system to measure quartz oscillators without a stray capacitance. This will be used to probe friction across superconducting transitions.
Their research group is actively working on new devices to probe the non-linear Akhjiezer damping which they discovered few years ago in Palladium nanomechanical resonators.
They are working on mesoscopic electro-mechanical superconducting devices made out of type -II superconducting films from collaborators.

Anosh Joseph
Joseph's research group' focused on strongly coupled quantum field theories, lattice field theory, and applications and numerical tests of the gauge-gravity duality conjecture. Recently, their group has been involved in the following projects.

Complex Langevin Simulations of Quantum Field Theories with Sign Problem: Their group have been investigating the possibility of dynamical supersymmetry breaking in the IKKT matrix model, which is conjectured to be a non-perturbative formulation of string theory. The effective action of this theory is inherently complex. Their group is e using complex Langevin dynamics to investigate symmetry breaking in this model. Group's initial simulations have successfully captured the details of dynamical symmetry breaking in this model. The preliminary results were presented at the LATTICE 2022 international symposium. (Complex Langevin Study of Spontaneous Symmetry Breaking in IKKT Matrix Model, PoS LATTICE 2022; DOI: https://doi.org/10.22323/1.430.0213.)

Thermal Phase Structure of BMN Matrix Model: Their group presented initial results from ongoing investigations into the thermal phase structure of the Berenstein--Maldacena--Nastase (BMN) matrix model. The phase diagram of the theory depends on both the temperature and the mass deformation parameter through their dimensionless ratios. Considering couplings spanning three orders of magnitude, their group reproduced the theory's weak-coupling perturbative prediction for the deconfinement phase transition. Group's simulation results give values closer to the recent large-N dual supergravity prediction in the strong-coupling limit. They are carrying out numerical calculations with larger lattice sizes and numbers of colors to allow initial checks of the large-N continuum limit. The phase structure of the bosonic BMN matrix model was investigated using simulations on PARAM SMRITI supercomputer and computer clusters at the University of Liverpool (UK) and IISER Mohali. Research group's results were published

in the Journal of High Energy Physics. (Non-perturbative Phase Structure of the Bosonic BMN Matrix Model, Journal of High Energy Physics, 05 (2022) 169, DOI: https://doi.org/10.1007/JHEP05 (2022)169.)

Aru Beri

Beri's research group is leading the pilot survey to study Accreting Millisecond X-ray pulsars (AMXPs) with AstroSat with a motivation to probe the connection between nuclear-powered X-ray millisecond pulsars and AMXPs. AMXPs are also believed to have a strong connection with radio millisecond pulsars. Millisecond radio pulsars spin rapidly, even though many are billions of years old. The most compelling explanation is that they have been "spun up" by the transfer of angular momentum during the accretion of material from a companion star in so-called LMXBs. (LMXBs consist of a NS or BH accreting from a companion less than one solar mass).

The scientific community also perceives AMXPs as astrophysical laboratories that could be essential to enhance our understanding of thermonuclear burst processes, as some of the AMXPs are also nuclear-powered X-ray pulsars. So far, only 25 such AMXPs have been detected. Their group searched for accretion-powered pulsations in narrow segments of 1 second, discovering a new intermittent AMXP, XTE J1739-285, with AstroSat, a valuable addition to this class. This source also showed the presence of nuclear-powered X-ray pulsations. The group's discovery paper on this source details "AstroSat and NuSTAR observations of XTE J1739-285 during the 2019-2020 outburst". This work is also highlighted in Phys.org (link below).

https://phys.org/news/2023-03-astronomers-x-ray-binary-xte-j1739285.html

In addition, they have also studied another source, SAX J1808.4-3658, using the AstroSat data during its 2019 outburst. They found coherent pulsations at ~ 401 Hz and an orbital solution consistent with previous studies. Their energy-resolved pulse profile evolution study indicates a strong energy dependence, and their paper published in MNRAS discusses the interpretation of our observational results.

Beri has studied thermonuclear X-ray bursts (or Type-I X-ray bursts) observed in neutron star X-ray binaries. These Type-I X-ray bursts are one of the very few ways which can allow neutron star radius, spin, and mass measurements. Based on the results from their observational studies, they are now probing the theoretical understanding of these systems. In collaboration with Prof. Nils Andersson and his team at the University of Southampton, they have raised concerns about calculations based on traditional approximation widely used by neutron star physicists to explain mechanisms such as thermonuclear burst oscillations. Their manuscript based on theoretical calculations has been recently published in Universe Journal.

Dipanjan Chakraborty

Chakraborty research group's activities focuses 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. Their 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, their group 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 their recent communicated work, they have extended their 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.

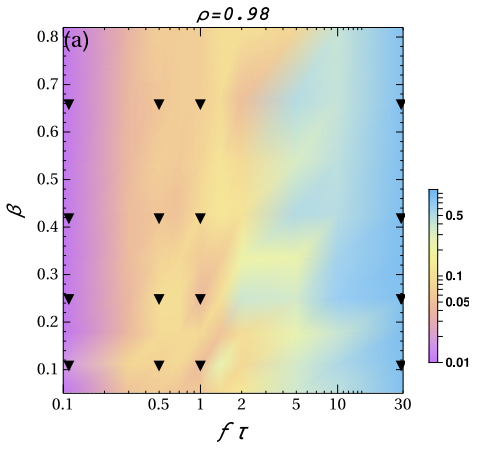


Figure: Phase diagram of a ratcheted two-dimensional colloidal suspension as a function of asymmetry and frequency.

Finally, their 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

2.1 Spin-polarized supercurrent through the van der Waals Kondo-lattice ferromagnet Fe_3GeTe_2 (*Physical Review B* **106,** 085120 (2022)**)**

The van der Waals system Fe_3GeTe_2 recently emerged as a novel 2D material system that behaves like a Kondo lattice and hosts spin-polarized conduction electrons. The Kondo lattice behavior also leads to a large effective carrier mass signifying heavy fermion character. Owing to the unique coexistence of itinerant ferromagnetism and heavy Fermionic behavior, Fe_3GeTe_2 has 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 hetero-structuring of materials. In the present work, their group have

measured spin-polarized supercurrent through mesoscopic junctions between a conventional superconductor (Nb) and the complex magnetic system Fe_3GeTe_2. They have presented a detailed account of an interplay between Andreev reflection and Kondo resonance, leading to an anomalously high value of transport spin polarisation that cannot be explained by the density of states of the spin-split bands at the Fermi surface alone. The unique physical attributes of the material system allowed them to probe the supercurrent transport characteristics within an extreme limit where Andreev reflection in the presence of multiple complexities in terms of spin polarization and strong, non-trivial electron correlations co-exist.

2.2 Weakly coupled Majorana wire arrays under tilted magnetic fields (*Journal of Applied Physics* **133,** 224301 (2023)**)**

Topological superconductors exhibit Majorana-bound states, known as Majorana zero-energy modes (MZMs), at their boundaries or vortex cores. MZMs follow non-Abelian braiding statistics, making them ideal for decoherence-free topological quantum computing. However, the experimental realization of these modes remains challenging due to ambiguity in tunneling experiments. In their recent work titled "Tunneling characteristics of weakly coupled Majorana wire arrays" (J. Appl. Phys. 131, 084301 (2022)), they proposed a unique tunneling setup that would lead to an unambiguous detection of the MBS. In their present work, they found that the magnetic field angle with respect to the direction of the length of each individual wire and the spin-orbit vector can be used as a powerful experimental tuning parameter to achieve this goal. They have investigated the impact of tilting of the external magnetic field on the transport signatures of a weakly coupled array of nanowires. Further, they found a rich phase diagram as a function of tilt angles and other relevant control parameters to investigate the tunneling characteristics arising from Majorana edge modes vis-a-vis that arising from non-topological origin.

2.3 High transport spin polarization in the van der Waals ferromagnet Fe_4GeTe_2 (*Physical Review B* **107,** 224422 (2023)**)**

By utilizing the spin degree of freedom of conduction electrons in van der Waals (vdW) spintronic architectures constructed with 2D materials, the challenging task of reducing the size of power-saving electronic devices can be successfully achieved. A crucial element for such devices is a 2-D ferromagnet that exhibits excellent metallicity at near-room temperature, enabling the generation of a highly spin-polarized electronic transport current. Unfortunately, most known 2-D ferromagnets suffer from either low-temperature ordering, poor conductivity, or limited spin polarization. However, the Fe_nGeTe_2 family of ferromagnets, particularly Fe_4GeTe_2 with a Curie temperature of approximately 273 K, stands out due to its near-room temperature ferromagnetism and favorable metallicity. They conducted spin-resolved Andreev reflection spectroscopy on Fe_4GeTe_2 and conclusively demonstrated its remarkable ability to generate a significantly high transport spin polarization, surpassing 50 %. This makes Fe_4GeTe_2 a strong candidate for application in all-vdW power-saving spintronic devices.

2.4 Electrically controlled quantum transition to an anomalous metal in 2D (Under review in *ACS Applied Electronic Materials***)**

Their group demonstrate a new in-situ mechanism to control the fraction of disorder in a 2D superconductor. By controlling an electric field V_G, they created an assembly of segregated superconducting nano-islands and varied the inter-island distance to accomplish a quantum phase transition from a superconducting phase to a strange quantum anomalous metallic (QAM) phase at $LaVO_3/SrTiO_3$ interfaces. In the QAM phase, the resistivity dropped below a critical temperature (T_{CM}) as if the system was approaching superconductivity, and then saturated, indicating the destruction of global phase coherence and the emergence of a new phase where metal-like transport of Bosons (a Bose metal) becomes a possibility. The unprecedented control over the island size is obtained through the control of nanometer

scale ferroelectric domains formed in the $SrTiO_3$ side of the interface due to a low-temperature structural phase transition. Their work provides an important insight into the mechanism of emergence of superconductivity in SrTiO3-based low-carrier density superconducting systems. Additionally, their work provides a new avenue of controlling disorder in low dimensions through in-situ ferroelectric domain engineering.

2.5 Laser-induced structural modulation and superconductivity in $SrTiO_3$ (Under review in *Applied Physics Letters***)**

Their group have created micron sized polygon shaped domains at room temperature on single crystals of $SrTiO_3$ (111) at room temperature. The high-power density laser pulses result in local ultrafast melting and re-crystallization and a spontaneous formation of topographic domain patterns. We find that the domain boundaries are dominantly conducting and the irradiated crystals undergo a superconducting phase transition below 180 mK, indicating that the superconducting phase appears at the domain boundaries. Further from local piezo-force microscopy and switching spectroscopy, the domain boundaries were found to be ferroelectric in nature. This concurrence of local ferroelectricity and superconductivity in lightly doped $SrTiO_3$ supports the idea of ferroelectric fluctuation mediated Cooper pairing in the system. The results also point out the possibility of controlling ferroelectricity and superconductivity in functional electronic devices through surface engineering.

2.6 Topological proximity drives multiple superconducting gaps in $YRuB_2$. (Manuscript under preparation)

While the possibility of topological superconductivity (TSC) in hybrid materials involving those with topologically nontrivial band structure and superconductors have been proposed, realization of TSC in a single stoichiometric material is most desired for fundamental experimental investigation of TSC and its device applications. In this context, $YRuB_2$ with a superconducting transition temperature of 7.8 K, has emerged recently as a candidate topological superconductor which also hosts special hourglass-type Dirac rings protected by symmetry. As per electronic structure calculations, $YRuB_2$ is a system that hosts a single superconducting energy gap in the bulk as well as special symmetry-protected topological surface states (TSS). Their group have performed point contact Andreev reflection spectroscopy on $YRuB_2$ by forming a mesoscopic contact between topological superconductor $YRuB_2$ and the normal metal Ag. They found experimental evidence of multiple superconducting energy gaps centering around two gaps in which the larger gap shows similar properties as reported in bulk-sensitive experiments. Their calculations indicate that the TSS in the system cross the Fermi energy indicating that the second superconducting gap is an induced gap on the TSS that exists in proximity to the bulk superconductor. Therefore, groups' experiments show that $YRuB_2$ is a potentially important superconductor where the interaction between topological surface states and bulk superconductivity leads to novel physical insights in understanding the candidate topological superconductors.

2.7 Spin-resolved Andreev reflection spectroscopy on topological chiral magnet Co7Zn8Mn5

They investigated the transport properties of one of the emerging ferromagnets, Co7Zn8Mn5- a topological chiral magnet. We carried out the investigation on single crystals of the material via spin-resolved Andreev reflection spectroscopy. Their investigation revealed a spin polarization of ~ 55 % along with a small particle-hole asymmetry. The material stabilizes into two chiral structures, both have the same crystallization energy. From their research group's investigation, they concluded that the spin polarization is similar for both of the chiral structures.

Harvinder Kaur Jassal

Constraining cosmological parameters to better precision is currently one of the main goals of cosmology. Due to unavailability of a large amount of data, it is important to develop methods to effectively constrain the parameters. Jassal's research group developed a method of determining cosmological parameters in a

model independent manner. The observable of a given dataset is determined by running PCA on the data. They proposed a variant of this method by introducing correlation tests which give a quantitative approach to choosing the best model. To determine derived quantities like the equation of state parameter of dark energy, they use the Markov Chain Monte Carlo method with No U Turn Sampler. This sampler is a variant of the Hamilton Monte Carlo and has the advantage that the algorithm checks for convergence on its own. Their group showed that the results are consistent with the traditional methods of parameter determination and is also suitable for datasets which are sparse.

Scalar-tensor theories of gravity are equivalen, alternativet descriptions of Einstein's gravity with a scalar field. In this paper, their group use the Jordan frame-Einstein frame correspondence to explore dual universes with contrasting cosmological evolutions. Jassal's group have studied the mapping between Einstein and Jordan frames where the Einstein frame universe describes the late-time evolution of the physical universe, which is driven by dark energy and non-relativistic matter. They show that an Einstein frame universe, with cosmological evolution of the cosmological constant model, always corresponds to a bouncing Jordan frame universe governed by a Brans-Dicke theory. On the other hand, quintessence models of dark energy with non-relativistic matter component are shown to be always dual to a Brans-Dicke Jordan frame with a turn-around. The evolution of the equation of state of the quintessence field determines whether the turn-around is a bounce or a collapse. Their group have also studied the stability of such conformal maps against linear perturbations.

Jasjeet Singh Bagla

There are two broad themes in the research work published by Bagla's group and collaborators during 2022-2023.

Gravitational lensing is clearly the dominant theme in their publications during this time. Ashish Meena and Jasjeet Singh Bagla managed to take their work on exotic image formation in strong lensing to a logical conclusion with a firm prediction that the occurrence of with a firm prediction that the expected frequency of umbilics in lensing by clusters of galaxies must be higher than once in five clusters. OTheir group arrived at this lower limit through an analysis of the simplest mass maps of the best studied clusters of galaxies, where the predicted number is lowest, with the Hubble Ultra Deep Field as a representation of the redshift distribution of source galaxies. Of course, the frequency may be higher as all other mass maps for the same clusters lead to a higher prediction. They also studied characteristics of time delay between images and find that the typical time delay in umbilics and swallow tail formations is one to two orders of magnitude smaller than for a typical five image configuration. This is of interest as in some cases the time delay is of the order of tens of days and this makes observational follow up less uncertain and time consuming.

Bagla's group have studied gravitational lensing of gravitational waves. With Rahul Ramesh and Ashish Meena, they studied microlensing of gravitational waves from core collapse supernovae. The main challenge here, unlike the signal from merging compact objects, is that the signal is broadband and stochastic. In this work they have demonstrated that a statistical measure that they have proposed is very efficient for testing whether lensing has happened, and for recovering parameters of the gravitational lens. This work was a part of Rahul Ramesh's MS thesis, as was the preliminary exploration of two plane lensing of gravitational waves. Multiple plane microlensing is highly likely for sources in the galactic plane and as the number of observed gravitational wave sources increases, their group expect to see some such events.

Their group's Ashish Meena led an inter-institutional team from IISER Mohali and IUCAA for a study of a combination of microlensing and strong lensing of gravitational wave signals using realistic simulations. They have shown here that low to moderate magnification in strong lensing when modulated by microlensing does not leave a very significant imprint in terms of frequency dependent magnification and phase offsets. This is reassuring from the prospective of observations as high magnification events are rare

and hence majority of lensed events will not suffer from a significant frequency dependant distortion and this should simplify the analysis and interpretation.

Sauraj Bharti and Jasjeet Singh Bagla have completed a preliminary set of predictions for upcoming surveys of atomic Hydrogen in galaxies. These predictions are based on simulations that incorporate expectations based on local observations and random orientations of galaxies. They are now building on this by incorporating galaxy properties in different wavebands.

Apurba Bera, Nissim Kanekar, Jayaram and Jasjeet Singh Bagla have completed the analysis of deep uGMRT (upgraded Giant Meterwave Radio Telescope) observations of the extended Groth Strip to make the first estimate of the mass function of atomic Hydrogen in galaxies at intermediate redshifts. This determination is obtained from more than 300 hours of observations taken over several years. Within the limitations of observations in a single field and the fact that we can only probe average properties, their group find that there is a deficit of galaxies with a very high mass in atomic Hydrogen as compared to the local Universe. Further, it appears that there is an excess of galaxies with an intermediate mass in atomic Hydrogen as compared to the local Universe. Their group is working further with the data to determine and understand properties of galaxies in this sample.

K P Yogendran

Yogendran research group's three main directions of research were being pursued over the past year. The members of group are Gaurav Dadwal, Praneet Pathak, Akash Singh, and K P Yogendran. A principal focus of research is the study of the properties of QCD type matter at high density such as expected in the core of compact stars. They aim to compute the equations of state using ideas motivated by the Holographic Gauge gravity correspondence and use those in a hydrodynamically consistent model of rotating compact stars. Another major topic of study is the spectrum of quantum gravity excitations over finite temperature black hole backgrounds. Apart from these, several other projects were taken up originating as part of summer research and also MS theses.

- As part of the Integrated Phd of Mr. Akash Singh, their group initiated the systematic exploration of a 10-D Holographic QCD model whose ultimate objective is to obtain equations of state for QCD matter in the interior of Neutron stars. A first project constructs a model that aims to subsume and simplify many existing models in the literature. This was explored with regards to the possible phases of strongly interacting matter as the temperature and quark mass are varied. In a second project, they have systematically studied the effects of running coupling and now aim to obtain the equations of state focusing on the baryon and isospin chemical potential dependence (at zero temperature).
- Concurrently, as part of the Phd thesis of Mr. Praneet Pathak, their group have been systematically studying superfluidity and its consequences for the interior structures of compact stars. Conventional literature on solutions of Einstein equations focuses on using Hydrodynamic models with a single variable equation of state. For superfluids, the equation of state will depend on the two variables at least and possibly three if we include rotation.They have understood how to solve Einstein equations in such circumstances. As a preliminary exploration, they are currently constructing compact star solutions using equations of state obtained for conformal superfluids. In the future, this work will employ the equations of state obtained by Mr. Akash Singh to construct more realistic models.
- The high density in the interior of a compact star is likely to lead to a complex internal structure with phases that involve both conventional s-wave and p-wave superfluids of neutron matter. The thesis project of Mr. Gaurav Dadwal aims to explore this transition from s-wave to p-wave superfluids of strongly interacting ultradense matter using a Holographic approach.
- Besides these projects, a major theme of study has been the quantum gravitational structure of the BTZ black hole. An open question for many years has been to obtain a consistent spectrum of quantum gravity excitations of the Lorentzian BTZ black hole. This was solved by their group in 2021 which was further studied in the MS Thesis of Roshan Kaundinya in which they showed the consistency of our result for the

BTZ partition function by comparing it with other closely related models. This study also involving Roshan Kaundinya, Omkar Nippanikar and Akash Singh has been posted on the arXiv and has been sent for publication.

- In a project involving MS students, Mr. James Watt and Mr. Suraj Chopra, their group have also studied the quantum dynamics of rigid bodies. This work explores constructions of quantum states that correspond to rotation states of rigid bodies such as the Dzhanibekov effect. This work is being prepared for publication.

Kamal P. Singh

Singh's group have been working on several interesting problems towards pushing the limit of time resolved measurement of ultrafast processes in attosecond temporal resolution and stability with much simplified design, white light interferometry using ultrathin delay line, noise cancellation using ilens, wide tuning of high order harmonics using double IR pulses, CEP sensitivity of HHG near nanostructure environment and on photomechanical detection of bioaerosol fluorescence free-from solar background. Outcome of these works are briefly described below:

- White light interferometry is a well established technique with diverse precision applications, however, the conventional interferometers such as Michelson, Mach-Zehnder or Linnik are large in size, demand tedious alignment for obtaining white light fringes, require noise-isolation techniques to achieve sub-nanometric stability and importantly, exhibit unbalanced dispersion causing uncertainty in absolute zero delay reference. They demonstrate an ultrathin white light interferometer enabling picometer resolution by exploiting the wavefront division of a broadband incoherent light beam after transmission through a pair of micrometer thin identical glass plates. Spatial overlap between the two diffracted split wavefronts readily produce high-contrast and stable white light fringes, with unambiguous reference to absolute zero path-delay position. The colored fringes evolve when one of the ultrathin plates is rotated to tune the interferometer with picometric resolution over tens of μm range. Their theoretical analysis validates formation of fringes and highlights self-calibration of the interferometer for picoscale measurements. They demonstrate measurement of coherence length of several broadband incoherent sources as small as a few micrometer with picoscale resolution.

- Singh's research group show a noise self-canceling real-time picometer scale interferometer by exploiting the unique spiral phase structure of twisted light. They use a single cylindrical interference-lens to implement the twisted interferometer and perform simultaneous measurement on N phase-orthogonal single-pixel intensity pairs chosen on the petal of the daisy-flower-like interference pattern. A cancellation of various noises by three orders of magnitude was achieved in our setup compared with a conventional single-pixel detection, enabling a sub-100 picometer resolution in measuring a non-repetitive intracavity dynamic event in real-time. Furthermore, the noise cancellation capability of the twisted interferometer scales up statistically for higher radial and azimuthal quantum numbers of the twisted light. The proposed scheme could find applications in precision metrology and in developing analogous ideas for twisted acoustic beam, electron beams, and matter waves.

- They demonstrate a dispersion-free wavefront splitting attosecond resolved interferometric delay line for easy ultrafast metrology of broadband femtosecond pulses. Using a pair of knife-edge prisms, they symmetrically split and later recombine the two wavefronts with a few tens of attosecond resolution and stability and employ a single-pixel analysis of interference fringes with good contrast using a phone camera without any iris or nonlinear detector. Our all-reflective delay line is theoretically analyzed and experimentally validated by measuring 1st and 2nd order autocorrelations and the SHG-FROG trace of a NIR femtosecond pulse. The group's setup is compact, offers attosecond stability with flexibility for independent beam-shaping of the two arms. Furthermore, they suggest that their compact and in-line setup can be employed for attosecond resolved pump-probe experiments of matter with few-cycle pulses.

- Tunable attosecond pulses are necessary for various attosecond resolved spectroscopic applications, which can potentially be obtained through the tuning of high harmonic generation. They show theoretically, using the time-dependent Schrödinger equation and strong field approximation, a continuously tunable spectral shift of high-order harmonics by exploiting the interaction of two delayed identical infrared (IR) pulses within the single-atom response. The tuning spans more than twice the driving frequency ($\sim 2\omega$) range, for several near-cutoff harmonics, with respect to only one control parameter: the change in delay between the two IR pulses. They show that two distinct mechanisms contribute to the spectral shift of the harmonic spectra. The dominant part of the spectral shift of the harmonics is due to the modulation of the central frequency of the composite IR-IR pulse with respect to delay. The second contribution comes from the non-adiabatic phase-shift of the recolliding electron wavepacket due to the change in amplitude of the subcycle electric field within the double pulse envelope. For optical few-cycle pulses this scheme can produce tunable attosecond pulse trains (APT), and in the single-cycle regime the same can be used for tuning isolated attosecond pulses (IAP). Their group quantify the dependence of tuning range and tuning rate on the laser pulse duration. They envision that the proposed scheme can be easily implemented with compact in-line setups for generating frequency tunable APT/IAP.

- High harmonic generation (HHG) from atoms near a plasmonic nanostructure interacting with a relatively low intensity driving laser field is a promising candidate for table top attosecond pulse source. The effect of carrier envelope phase (CEP) of the few cycle driving pulse on inhomogeneous high harmonics generation is well studied in literature, for example, the harmonic cut-off can be efficiently controlled by tuning the CEP. Here, their group show selective enhancements of harmonic spectra due to half-cycle cutoff (HCO) which is highly sensitive to the CEP, in both spatially homogeneous and inhomogeneous driving laser fields. Essentially the selective enhancement of spectral structures results from contributions of both short and long trajectories in certain HCO regions. Compared to the homogeneous HHG in the presence of inhomogeneity, these enhanced groups eventually merge to the background with the increase of the strength of inhomogeneity. This limits the maximum possible tunability of selective enhancement. Further, near cut-off harmonics can be a good candidate to produce isolated attosecond pulses, with substantial control via CEP of the driving laser pulse along with the strength of inhomogeneity.

- Detection of biological molecules in aerosol via fluorescence signature is well established. However, standoff detection of weak target fluorescence deeply submerged in the ambient bright solar background is challenging with conventional approaches (using photo-multiplier tubes, avalanche photodiodes or ICCD) due to saturation effects and overlapping spectral signatures. Here, they demonstrate a Quartz tuning fork (QTF) enhanced photomechanical detection of fluorescence spectra from bio-aerosols free from broadband solar light. The detection is based on resonant excitation of QTF at 32.78 kHz by on–off modulated laser-induced fluorescence from aerosol while the stray solar background is essentially suppressed by the QTF. A remote detection of fluorescence spectra of Bacillus Globbigi and Riboflavin aerosols was demonstrated at 5 m standoff distance using two near-UV excitation wavelengths with good signal-to-noise ratio. The fluorescence signal increases linearly with excitation power, concentration and quality factor of the QTF. Besides being low-cost and reliable, the detection range of the presented approach can be extended to large standoff distance free-from ambient sunlight noise.

Kavita Dorai

Dorai's research group's efforts in the area of NMR quantum information processing were focused in the subdomains of quantum contextuality, quantum correlations, quantum tomography, state protection against decoherence, and quantum entanglement. They demonstrated the efficacy of the universally robust dynamical decoupling (URDD) sequence to preserve multipartite maximally entangled quantum states on a cloud- based quantum computer via the IBM platform. URDD is a technique that can compensate for experimental errors and simultaneously protect the state against environmental noise. Their group studied the dynamics of quantum coherence (total coherence, global coherence and local coherence) evolving under

a local PT-symmetric Hamiltonian in maximally entangled bipartite and tripartite states. Their results indicate that quantum coherence in the bipartite state oscillates in the unbroken phase regime of the PT-symmetric Hamiltonian. They experimentally implemented the Sz.-Nagy dilation algorithm to simulate open quantum dynamics on a nuclear magnetic resonance quantum processor. The Sz.-Nagy algorithm enables the simulation of the dynamics of an n-qubit system using n+1 qubits. Theyexperimentally simulate the action of three nonunitary processes, namely, a phase damping channel acting independently on two qubits, a two-qubit correlated amplitude damping channel, and a magnetic-field-gradient pulse acting on an ensemble of two coupled nuclear spin-1/2 particles. They employed the compressed sensing (CS) algorithm and a heavily reduced data set to experimentally perform true quantum process tomography (QPT) on an NMR quan- tum processor. They obtain the estimate of the process matrix corresponding to various two- and three-qubit quantum gates with a high fidelity. Their group designed a quantum circuit to prepare a permutation-symmetric maximally entangled three-qubit state called the S state and experimentally created it on an NMR quantum processor. The presence of entanglement in the state was certified by computing two different entanglement measures, namely negativity and concurrence. They introduced a protocol to classify three-qubit pure states into different entanglement classes and implemented it on an NMR quantum processor. The protocol is designed in such a way that the experiments performed to classify the states can also measure the amount of entanglement present in the state. The classification requires the experimental reconstruction of the correlation matrices using 13 operators.

Kinjalk Lochan

During this period, Lochan's research group was primarily involved in the analysis of quantum correlations in non-inertial frames, gravitational back drop as well as studies in cosmological scenarios. Some salient findings from the Lochan's research group are as follows:

(i) In a cylindrical cavity, it was demonstrated that the abrupt rise in the density of modes at some critical geometries can facilitate a strong enhancement of non inertial quantum field theoretic effects, such as the Unruh effect for an atom accelerating along the axis of the cavity. In case of a rotating atom, geometric phase development was shown to be sensitive to very minute acceleration scales. Due to dipole coupling of an atom with quantum electromagnetic field, a statistical theory of radiation pressure was developed.

(ii) A late time revival in the correlators of massless non conformal fields - such as the gravitons, was proposed. Such revival can lead to observable graviton induced effects in the late time era of cosmology and might contribute to additional temperature anisotropy of the CMBR.

(iii) A duality between the quintessence accelerating universe in Einstein's theory and a collapsing universe in scalar tensor theory was developed. It was shown that such duality is stable under linear perturbation. Such a stable duality has a great potential in studying growth of perturbations and quantum effects in the dark energy era via these effects in a collapsing universe.

(iv) In canonical quantum gravity, the effects of geometric observables and operator ordering ambiguity was studied in the context of the early universe. It was shown that operator ordering parameter and quantum variance of geometric quantities remain significant when the universe expands out of the Planck scale regime and enters the inflationary era. Thus observables of semi classical analysis are prone to such fluctuations.

Kulinder Pal Singh

In a study led by my colleague at IISER Mohali, Smriti Mahajan and Kulinder Pal Singh have analysed and presented the "Deepest far ultraviolet view of a central field in the Coma cluster" leading to the detection of far-UV (FUV) emission from 1308 objects of which their group was e able to identify 969 objects: 114 as stars, 852 as galaxies and 3 as quasi-stellar objects (QSO) at redshift, z = 0.38, 0.51, 2.31, the last one being the farthest object observed by the AstroSat-UV Imaging Telescope (UVIT) until the end of 2022. Their groupstudied 23 sources with unusual FUV morphology in detail, and identified several new candidate galaxies having unusual FUV morphology, many of which could be members of the Coma cluster. They find that many of the distorted FUV sources may have recently entered the Coma cluster, and

hence undergoing stripping events and enhanced star formation under the influence of the cluster-related environmental mechanisms. This resulted in another publication entitled, "Dashing through the cluster: An X-ray to radio view of UGC 10420 undergoing ram-pressure stripping", where they used data from various ground based and space observatories- like XMM-Newton and AstroSat.

In collaboration with researchers in IUCAA and IISER, Kulinder Pal Singh is involved in studies of UV and X-ray emission from several Blazars and Seyfert galaxies observed with the AstroSat. A study carried out in collaboration with several researchers in India and abroad on the Timescale-dependent X-ray to UV time lags in the nucleus of a Seyfert galaxy, NGC 4593, based on data from XMM-Newton, Swift and AstroSat observatories has been published very recently. Another study based on contrasting X-ray/UV time–lags in Seyfert 1 galaxies NGC 4593 and NGC 7469 using AstroSat observations, has also been published.

Kulinder Pal Singh is studying the spectra and time variability in the X-ray UV emission of a variety of Magnetic Cataclysmic Variables using X-ray and UV data from the AstroSat observatory, which has also formed the basis of two MS theses of students in IISER Mohali. He has continued to be involved with one of my ex-MS thesis students from 2021, currently in the Max-Planck Institute, Germany, who finalized his study of X-ray Activity and coronal abundances of the Star-Planet Interaction Candidate HD 179949, which has now been accepted for publication. He has guided and carried out a study of Surface activity of rapidly rotating stars from simultaneous X-ray and UV observations with AstroSat, with his ex-MS thesis students of 2021 currently doing their Ph.D in IIT Bombay, and his ex-post-doc currently at the University of Birmingham, UK. They have obtained the emission measure distribution, temperature structures, and elemental abundances of these stars, and observed many flares in the FUV. Their analysis suggests that there may be a correlation between the rotation period and the measured X-ray and far-UV surface fluxes of our targets. A paper based on this study has been submitted for publication.

Kulinder Pal Singh contributed a chapter on "The AstroSat Observatory" published by Springer Nature Singapore Pte Ltd. 2022. C. Bambi, A. Santangelo (eds.) for a 4 volume Handbook of X-ray and Gamma-ray Astrophysics. A paper based his review talk "Jets from active galactic nuclei" and has been published in the special Issue on ''Astrophysical Jets and Observational Facilities: A National Perspective.'' He wrote two popular articles published by Resonance, Journal of Science Education by the Indian Academy of Sciences, Bangalore.
Kulinder Pal Singh delivered special lectures on high energy astrophysics and high energy detectors for X-ray and gamma-ray astronomy at IISER Mohali. He guided the summer projects of 3 MS students and final year MS projects of two MS students, and participated in the review of several project students. Kulinder Pal Singh continued to guide one Ph.D. student, Ms. J. Tiwari, who defended her thesis successfully.

Manabendra Nath Bera
Bera's research group (Quantum Information and Quantum Physics group) 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, they 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.
- Developed an information theoretic framework to quantify quantum non-Markovianity in quantum state.

Mandip Singh

Singh's research group have performed first experiment on quantum ghost imaging of transparent patterns. This experiment involves hyper-entangled photons. Photons are polarization entangled and Einstein-Podolsky-Rosen entangled separately in the form of a hyper-entangled state. In this setup, a photon which interacts with the transparent object is not imaged but its entangled partner, which never interacted with the pattern, is imaged. By making quantum measurements on both photons an image of a polarization sensitive transparent pattern is produced. Theory is also designed for this experiment.

In a second but completely different experiment, a polarization sensitive phase pattern is produced in the six dimensional phase space of rubidium atoms at room temperature by using state selective velocity selective hole burning in the Doppler broadened profile of atoms. Phase space localized patterns are the generalization of conventional position space objects, which we see around us. Human brain cannot visualize phase space localized patterns. The concept and experiment of phase space localized patterns and their imaging was first introduced by Dr. Mandip Singh in 2018. The project extended this concept for the transparent patterns localized in the phase space.

In addition, Singh is actively involved in experiments related to quantum information processing with photons and quantum computing protocols.

Pankaj Kushwaha

- Work on exploration of quasi-periodic oscillation in blazars and submitted the paper titled (led my postdoc Dr. Avik) "The detection of possible transient Quasi-Periodic Oscillations in the γ-ray light curve of PKS 0244-470 and 4C+38.41" in the journal: The Astrophysical Journal (now accepted and published)
- Worked on compiling and analysis of Photometric and Polarimetirc data from Optical facilities for our on-going (international) collaborative work on "OJ 287" from different facilities across the globe (draft writing is under progress)
- Contributed to the analysis, interpretation, writing, and referee revision of our collaborative work on blazar PKS1510-089 titled "Multiwavelength Temporal Variability of the Blazar PKS 1510–089" (now accepted and published)
- Perofrmed analysis of X-ray and optical-UV data of the blazar OJ 287from Swift Facility, completed writing the nearly final version of the manuscript (now submitted for publication in May 2023)
- Contributed to interpretation and writing of manuscript of our collaborative work on the optical behavior of blazar BL Lacertae during its most intese and bright phase (two works, now both accepted and published)
- Guided 3 MS-thesis student with work focusing on a detailed statistical study of optical-UV, X-ray, and gamma-ray properties of nine known Very High Energy (VHE) Flat Spectrum Radio Quasars (FSRQs)
- Revision of an already submitted work titled "Long Term Multi-band Near Infra-Red Variability of the Blazar OJ 287 during 2007--2021" after referee comments (now accepted and published)

Prasenjit Das

Das's research group was involved in several research project during that period.

Mr. Narayan Prasad Gupta, a BS-MS 2018 batch student, was involved in studying photo-indunced phase ordering reversal in critical binary alloys (50%A-50%B) in the presence of polarons. In the absence of light, the binary mixture orders into ABAB or BABA domains. But when we turn on the light, the ordered structures start melting. They studied the domain morphology of ordered domains under the on-off cycles of incident lights.

Mr. Rohan Awasthi, a BS-MS 2018 batch student, was involved in understanding the dynamics of a rod on a vibrating plate. They want to model the dynamics using the stochastic differential equation and compare the numerical data with analytical results.

Mr. Soham Kor, a BS-MS 2018 batch student, was involved in modeling stock prices using stochastic equations and econophysics.

Two Ph. D. students have passed their comprehensive exam under Das's supervision.

Mr. Sayantan Mandal is working of phase separation in multi-component active systems. They have studied motility-induced phase separation (MIPS) in critical and off-critical active binary mixtures. Their aim was to compare the spatio-temporal pattern formation in MIPS with Model B kinetics. Their group began with the master equation for the run-and-tumble model for active particles and coarse-grain that to derive the evolution equations for the density fields $\rho_i(\vec r, t)$. We numerically solve the evolution equations using the Euler discretization technique. Next, they characterize pattern formation by calculating the equal-time correlation function *C(r, t)* and the structure factor *S(k, t)*, which show dynamical scaling similar to Model B. For k→∞, the structure factor *S(k, t)* follows Porod's law: $S(k, t)\sim k^{-(d+1)}$. The average domain size *L(t)* obtained from the decay of *C(r, t)* shows a power-law growth as $L(t)\sim t^{\alpha}$. At early times, average domain size follows the Lifshitz-Slyozov law with α=1/3, which crosses over to α=1/4 at later times in contrast with Model B. Apart from this, they started woking on role of non-reciprocity on the domain kinetics of nonconserved order parameter field.
Mr. Subhanker Howlader is working on the dynamical properties of granular systems. They began by calculating the equation of state of a model granular system analytically as well as numerically by using molecular dynamics simulation.

Rajeev Kapri
Kapri study the stochastic resonance (SR) in the unzipping of a dsDNA by periodic force. We observe multiple peaks in SR in the output signal as the driving force frequency is varied for different force amplitudes, temperature, chain length and chain hetrogeneity. They obtained multiple peaks in the output signal which point to the existence of multiple stable and metastable states which corresponds to dynamical states of partially zipped and unzipped conformations and transitions between them. These transitions were quantified by looking at the time evolution of the fraction of bound base pairs and the phase diagrams in the force amplitude-temperature plane both in the resonance frequency of the primary peak and the output signal at the peak value were obtained.

They study the translocation of a semiflexible polymer through a conical channel with attractive surface interactions and a driving force which varies spatially inside the channel. Using the results of the translocation dynamics of a flexible polymer through an extended channel as control, they found that the asymmetric shape of the channel gives rise to non-monotonic features in the total translocation time as a function of the apex angle of the channel. They also obtained the waiting time distributions of individual monomer beads inside the channel which show unique features strongly dependent on the driving force and the surface interactions. Their group found that the polymer stiffness results in longer translocation times for all angles of the channel. Further, the non-monotonic features in the translocation time as a function of the channel angle changes substantially as the polymer becomes stiffer, which is reflected in the changing features of the waiting time distributions. To explain the simulation results, they construct a free energy description of the system incorporating entropic and energetic contributions in the low force regime.

Ramandeep Singh Johal
Johal's group studied the performance of Quantum Otto heat engines with spins-based working medium using the tools of majorization theory. A note was published in American Journal of Physics which described an elegant way to evaluate the entropy change in an adiabatic thermalization process. They also studied a model of coupled heat engines within classical linear-irreversible framework under broken time-reversal symmetry. A new universality class for the efficiency at maximum power was derived beyond the linear response regime.

Samir Kumar Biswas
Last year, Biswas's group was working to develop lens-free 2D/3D microscope, PVDF co-polymer based lead-free ultrasound sensors. They 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, their group is developing a system for focusing light in scattering media

for studying bio-system. They are also developing Nanofiber for advanced sensor and bio-membrane development. Biswas's group is extensively engaged with Electrical Engineering department of IIT Kanpur and department of Aerospace Engineering of IIT Kharagpur for a joint project where they are trying to detect and quantify the thermo-acoustic based shock wave formed by premixed air-gas combustion in an open chamber.

Sanjeev Kumar

During the last year, Kumar's research group has focused mainly on the following topics: (i) topological superconductivity, (ii) skyrmion formation in insulators and metals and (iii) Competition of Jahn-eller effect and spin-orbit coupling

Their 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. Their approach applies to both metallic and insulating magnets, and therefore, provides a unified picture of skyrmion formation. Their group also extended these ideas to triangular lattice magnets and presented a comparison with experimental observations.

Their group 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.

In a new project, they have started investigating the competition between Jahn-Teller physics and spin-orbit coupling. The main motivation for this project is to finally study the interplay of interactions and topology in a system where controlled calculations are possible.

Satyajit Jena

During this period, Jena's research group focused on the study of (a) the characterization of quark-gluon plasma, (b) the estimation of the tau neutrino flux, and the study of sterile neutrinos, and (c) the Development of tomography techniques.

(a) Characterization of quark-gluon plasma using thermal analysis of transverse momentum spectra in heavy ion collisions. (Two Ph.D. Students: Bharat Sirsa and Supriya Nayak; one BS-MS Student: Athira Srijith): Quark-Gluon Plasma, a deconfined state of matter, is created by colliding ultra-relativistic nuclei. 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. At the same time, 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. Jena's group 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. They have developed a unified model and working on the application of this model, particularly in the photon and jet sectors. A thesis is awarded for the same work to Dr. Rohit Gupta who successfully completed this work. At the same time, another analysis was carried out by two Ph.D. students and a BS-MS student to find out the fluctuation of conserved quantities to identify the nature of phase transition.

(b) Investigation in Neutrino Physics and Dark Mater; (Two Ph.D. Students: Kartik Joshi, and Chandrabhan Devangan, and One BSMS Student Pookhee): 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. Their

group is investigating the theoretical flavor conversion mechanism to calculate the neutrino oscillation in deformed spaces and the estimation of tau-neutrino flux. And they performed an analysis to understand the energy vs flux of neutrino through a BS-MS thesis project. At the same time one of the new PhD students started working on the dark matter search in the collider experiment. Their group is 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 Sirsva and Supriya Nayak): Jena's group is also involved in the development of tomographic techniques for various applications. In this direction, their group has been working in both Muon and Positron-Electron tomography. They 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, they are working on the modeling of material and its interaction, and they will be implementing them into a prototype in the future. A manuscript is submitted for publication.

(d) Apart from the above activities, their group were also involved in the development of gas detectors like Restive Plate Chamber and Gas Electron multipliers. Two new Ph.D. students (Himanshu Rajput and Abhishek Chauhan) have started working on these activities.

Smriti Mahajan

During this period, Mahajan's research group 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, they collated and analysed archival optical data at other wavelengths as well. In the papers they have studied the properties of various stars, galaxies and quasars observed in this very deep FUV image of a central field of the Coma 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.

Their group have also studied another cluster field observed by the UVIT in the cluster Abell2199. Their work analysing the multi-wavelength properties of a special galaxy, UGC 10420 is published, and they are now working on compiling and analysing data for the rest of this field.

Sudeshna Sinha

a) Sinha's research group revisited the simple, yet very influential Bak–Sneppen model of biological evolution known to yield a self-organized state exhibiting features of punctuated equilibrium. They consider a variant of the model with varying degrees of random links in the underlying connection network of biological niches, mimicking a scenario that is expected to be more typical than the strictly nearest neighbour interactions. First, they investigate the robustness of self-organized criticality under random links and demonstrate that the randomly rewired system also attains a self-organized critical state, for probability of random rewiring ranging from $p = 0$ (i.e. a ring, as in the Bak–Sneppen model) to $p = 1$ (where the underlying connection graph is almost completely random). The robustness of the self-organized state under random links is manifested in the emergent power-law scaling of the frequency of mutation distances as defined by the path length between mutating sites, irrespective of the extent of randomness in the network of niches. The critical fitness in the system is also found to decrease as a power-law with increasing random links. They then explore a new way to understand the activity of the system through the characteristics of the emergent network of active sites, which they denote as an "activity network". Their demonstrate how the structure of this activity network is significantly different from the network of the niches, thus lending a different understanding of the system's activity in general. Interestingly, the mean path length of the activity network has a weak dependence on the presence of random links, while in contradiction the network of niches changes sensitively with respect to the probability of random rewiring in the small-world limit. More importantly, the system evolves to an activity network whose mean path length is typically 2 orders of magnitude smaller than the network of niches. This implies that the system self-organizes to a network of active nodes where there is a very efficient transfer of information. The size of the activity network is also very weakly dependent on random

links and time of evolution. More surprisingly, it has a markedly small characteristic size, independent of the system size. This indicates that, counter-intuitively, the set of niches where mutation takes place is always very small, irrespective of system size, with most niches in evolutionary stasis over significantly long times, interspersed by small sub-sets of nodes that undergo repeated mutations.

b) Their group demonstrated the direct implementation of all basic logical operations utilizing a single bistable system driven by nonlinearly transformed input signals, in the presence of noise. Exploiting the hopping between the dynamical states of the bistable system, assisted by the noise floor, in response to the transformed inputs, allows the implementation of the full set of logic operations. So this idea can form the basis of the design of a dynamical computing element that can be rapidly morphed to yield any desired logic gate by varying just a single control parameter. Further, the results are verified in electronic circuit experiments, demonstrating the robustness of the concept and the potential of this idea to be realized in wide-ranging systems.

c) Sinha's group explored the behaviour of coupled chaotic oscillators where one unit has intrinsically dissimilar dynamics. They find that the presence of a single dissimilar chaotic system in the network manages to drive all the chaotic oscillators to regular limit cycles. Additionally the regular cycles that emerge are significantly smaller in size than the uncoupled chaotic attractors. Counterintuitively the more geometrically dissimilar the single distinct system is from the other chaotic oscillators, the stronger is the emergent control. Furthermore, the position of the dissimilar system in the network does not affect the control when the dissimilar element is markedly different. So surprisingly, enhanced heterogeneity in coupled systems leads to more pronounced and robust controllability. Their results can then potentially lead to the design of new control strategies in engineered systems, and also suggests mechanisms whereby naturally occurring complex systems can evolve to regular dynamics through coupling to heterogeneous sub-systems.

Tripta Bhatia

- Measurement of membrane asymmetry created by Invertase enzyme in cell-like compartments using microscopy. (published) In collaboration with a) Chemistry department, b) Max Planck Institute of Colloids and Interfaces, Germany.
- Measurement of diffusion of cadherin protein in membrane compartments using confocal microscopy. (published) In collaboration with Chemistry department.
- Epifluorescence and confocal images of cell-like membrane compartments that are used as templates for nanofluidic channels and for drug delivery.

About the cover page image:

- Left: An intricate embedded structure of a typical well-hydrated phospholipid in the lamellar phase. Some tubules have localized protrusions (beads) and that within them there are extra lamellar components. Membrane compartments can have two distinct phases (red and green) that exist together in a fluid-fluid state.
- Middle: Compartments with adhesion between adjacent membranes with distinct boundaries can be seen. In the lower panel, the schematic shows that the membrane is composed of lipids and proteins.
- Right: Tubules that have protrusions (beads) traveling from left to right.

Vishal Bhardwaj

Bhardwaj research group started working on the radiative decays of the X(3872), non-conventional state and a strong contender for tetra-quark state using the B-meson decay. Currently, there is a confusion in world related to the $X(3872) \rightarrow \psi(2S)\gamma$. They performed signal generation and cuts optimization. They also worked to improve the continuum suppression and search for new ways to improve the signal efficiency. Their group used deep neural network to separate merged π^0 from the γs using ECL crystal hits. They also started work on the search for the $D_s^{*+} \rightarrow D_s^+ A'(\rightarrow e^+e^-)$, where A' is the hypothetical dark matter candidate.

Their lab also estimated the low energy gamma correction and systematic in Belle II using η decays for the first time. This work was extension to our on-going precision measurement of $\frac{\mathcal{B}(D_s^{*+}\to D_s^+\pi^0)}{\mathcal{B}(D_s^{*+}\to D_s^+\gamma)}$ at Belle II. They looked at the data for B-L decays $D^0 \to \bar{p}e^+$ and $D^0 \to \bar{p}\mu^+$ and in absence of signal provided the world's most precise measurement. Along with this we also utilized our skills for the benefit of society. They applied their skills to solve the trivial issues such as: creating data base GUI for forensic department and currently identifying and using machine learning for the forensic studies.

Yogesh Singh

1. The metallic Kagome lattice is a platform for exploring the marriage of electron topology and strong correlation effects. Singh's research group synthesized and studied the electronic and magnetic properties of the material LaRh3B2 which crystallizes in a layered structure where Rh atoms form a perfect Kagome lattice. The material shows superconductivity at Tc ≈ 2.6 K. From first-principles calculations of the electronic band structure, they identify all features of Kagome bands predominantly formed by the Rh d orbitals: a flat band, Dirac cones, and van Hove singularities. The calculation of the phonon dispersions for LaRh3B2, matches quantitatively with the observed Tc, supporting a conventional phonon-mediated pairing mechanism. By the absence of any density wave anomalies, they conjecture that there is a reduced importance of electron correlations in LaRh3B2.
2. The layered honeycomb lattice iridate Cu_2IrO_3 is the closest realization of the Kitaev quantum spin liquid, primarily due to the enhanced interlayer separation and nearly ideal honeycomb lattice. Their group studied the pressure induced structural evolution of Cu2IrO3 by powder x-ray diffraction (PXRD) up to ∼17 GPa and Raman scattering measurements up to ∼25 GPa. A structural phase transition (monoclinic C2/c → triclinic P1) is observed with a broad mixed phase pressure range (∼4 to 15 GPa). 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 4 GPa. In this pressure range they observe enhanced magnetic frustration without emergence of any magnetic ordering. Additionally, an enhanced dynamic Raman susceptibility is also observed in this regime suggesting enhanced Kitaev correlations.

8.6.2. Visits of the faculty members

Anosh Joseph

- Asia Pacific Center for Theoretical Physics (APCTP), Pohang, South Korea (May 15-21, 2022).
- International Centre for Theoretical Sciences - Tata Institute of Fundamental Research (ICTS-TIFR), Bangalore, India (August 22 - September 2, 2022).
- Saha Institute of Nuclear Physics (SINP), Kolkata, India (November 15, 2022).
- IIT Mandi, Mandi, India (January 27, 2023).
- Ashoka University, Sonipat, India (April 2, 2023).
- IIT Ropar, Ropar, India (April 13, 2023).

Aru Beri

- University of Oxford, United Kingdom, April 8 - June 10, 2022
- Durham University, United Kingdom, June 11-August 8, 2022
- University of Oxford, United Kingdom, January 24-April 8, 2023

K P Yogendran

- Physics Department, IIT Gandhinagar, Gandhinagar, July 26th to Aug 9th, 2022
- Department of Physics and Astronomical Science, Central University of Himachal Pradesh, Shahpur, Kangra, HP, Sept 01-04, 2022
- Physics Department, IIT Mandi, Kamand campus, Mandi, January 27-28, 2023.
- Korea Institute of Advanced Study (KIAS), Seoul, Korea, Feb 02-06, 2023
- Asia Pacific Center for Theoretical Physics (APCTP), Pohang, Korea. Feb 07-17, 2023
- Center for Quantum Spacetime (CQueST), Sogang University, Seoul, Korea, Feb 24th 2023
- Physics Department, Hanyang University, Seoul, Korea., Feb 20-27, 2023

Kamal P. Singh

— Visited Max Planck Institute for Physics of Complex Systems, Dresden, Germany, 19, May to 17 July, 2022.
— Visited Max Planck Institute for Nuclear Physics, Heidelberg, Germany, 06, June to 09 June, 2022.
— Visited group of Prof. Wratchtrup, University of Stuttgart, Germany, 20, June to 22 June, 2022.

Kinjalk Lochan

— Himachal Central University, Dharamshala (01-02 September, 2022)
— IIT Gandhinagar (09-11 November 2022)
— GLA University, Mathura (24-26 Nov 2022)
— IISER Kolkata, (19-21 Dec 2022)
— IACS Kolkata, (22-24 Dec 2022)
— IIT Delhi (16-17 February 2023)
— BITS Mesra (17-20 March 2023)

Manabendra Nath Bera

— Indian Institute of Information Technology (IIIT) Hyderabad, Telangana. 8-14 May 2023.
— S N Bose National Centre for Basic Science, Kolkata, West Bengal. 19-30 June 2023.
— Indian Institute of Technology (IIT) Mumbai, Maharashtra. 1-9 July 2023.

Pankaj Kushwaha

— GLA Univeristy, Mathura. (Invited Popular Science talk)
— Aryabhatta Research Institute of Observational Sciences (ARIES), Nainital. 8 – 18 June 2022 (for on-going collaborative work)

Ramandeep Singh Johal

— Visited the Department of Physics, Kurukshetra University, Kurukshetra, on the occasion of National Science Day, Feb. 28, 2023.
— Visited the Physics Department, Punjabi University, Patiala, to attend the meeting of Board of Studies in Five-Year Integrated Program. July 15, 2022.

Samir Kumar Biswas

— IIT Kharagpur, department of Aerospace Engineering, date: 6th June 2022 to 21st June 2022

Sanjeev Kumar

— IFW Dresden, Germany: Februaty 01 to May 22, 2022 (short sabbatical leave)
— Aalto University, Finland: May 05 to 07, 2022

Sudeshna Sinha

— Sudeshna Sinha. NCSU, Raleigh, USA. 8-24 May 2022.

Tripta Bhatia

— Prof. John H Ipsen, University of Southern Denmark, Odense. May 2022 visited the Biophysics lab at IISER Mohali.
— Prof. P. B. Sunil Kumar, Director, IIT Palakkad. May 2022 visited the Biophysics lab at IISER Mohali.
— Dr. Kamlesh Saini, CSIO-CSIR Chandigarh. Jan 2023 visited the Biophysics lab at IISER Mohali.

8.6.3. Talks delivered

Abhishek Chaudhuri

— Abhishek Chaudhuri- A semiflexible polymer in a gliding assay: morphological and dynamical properties. Steady state phenomena in soft matter, active and biological systems, S. N. Bose National Centre for Basic Sciences, Kolkata, Dates. March 16-18, 2023.

Ambresh Shivaji and group members

— Ambresh Shivaji, Constraining WWH and ZZH couplings at future ep collider: Role of angular observables, International Meeting on High Energy Physics, Bhubaneswar, February 16-22, 2023
— Ambresh Shivaji, Theory and Phenomenology of the Satndard Model of Particle Physics: an overview, Guest lecture in the SERB-VRITIKA program at Amity University Noida, February 23, 2023
— Mandeep Kaur, Master integrals for O(ααs) corrections to H → ZZ*, IIT Hyderabad (online), June 17, 2022
— Mandeep Kaur, Numerical results for 2-loop QCD corrections to H → e+e- μ+ μ-, Shivalik HEPCATS, Central University of Himachal Pradesh, September 2, 2022

— Mandeep Kaur, Master integrals for O(ααs) corrections to H → ZZ*, University of Edinburg (online), September 28, 2022
— Mandeep Kaur, QCD corrections to golden decay channel (H → e+e- μ+ μ-) of Higgs boson, International Meeting on High Energy Physics, Bhubaneswar, February 16-22, 2023
— Pramod Sharma, Probing Anomalous Couplings in Single Higgs Production at ep Collider, Electrons for the LHC Workshop on the LHeC/FCC-eh and PERLE (online), IJCLab Orsay, France, October 26-28, 2022.
— Pramod Sharma, Role of angular obervables in probing anomalous HZZ couplings at an electron-proton collider, Shivalik HEPCATS, Central University of Himachal Pradesh, September 2, 2022
— Pramod Sharma, Probing anomalous couplings in single Higgs production at ep collider, XXV DAE-BRNS High Energy Physics Symposium 2022, Mohali, December 12-16, 2022
— Wasimakram I K, 2-Loop amplitudes for mono-jet production in GSDM, Shivalik HEPCATS meeting-IIT Mandi, January 27, 2023

Ananth Venkatesan

— Dr Ananth Venkatesan-Low temperature Dissipation Phenomena in Micro and Nanomechanical systems FINLAND-INDIA WORKSHOP ON CORRELATIONS IN TOPOLOGICAL QUANTUM MATTER, Dates Sept 9th 2022
— Dr Ananth Venkatesan- Nanomechanical systems, DST STUTI Hands-on Training Program on Semiconductor Device Fabrication and Characterisation" 21-27 November, 2022 Date : 22 Nov 22

Anosh Joseph and group members

— Navdeep Singh Dhindsa, Non-perturbative Study of Yang-Mills Theory with Four Supercharges in Two Dimensions, Contributed Talk (Online), The 39th International Symposium on Lattice Field Theory (LATTICE 2022), University of Bonn, Germany (August 8, 2022).
— Navdeep Singh Dhindsa, Supersymmetric Theories on Lattice and Holography, Physics Seminar (Online), Asia Pacific Center for Theoretical Physics (APCTP), Pohang, South Korea (November 23, 2022).
— Navdeep Singh Dhindsa, Deconfinement Phase Transition in Bosonic BMN Model at General Coupling, The 25th DAE-BRNS High Energy Physics (HEP) Symposium, IISER Mohali, India (December 12 - 16, 2022).
— Navdeep Singh Dhindsa, Non-perturbative Studies of Non-conformal Field Theories, PhD Thesis Defense Talk, IISER Mohali, India (March 20, 2023).
— Navdeep Singh Dhindsa, Large Matrices on Lattice and Holography, Physics Seminar, The Institute of Mathematical Sciences (IMSc), Chennai, India (March 30, 2023).
— Anosh Joseph, Contributed Talk, Numerical Methods in Theoretical Physics 2022, Asia Pacific Center for Theoretical Physics (APCTP), Pohang, South Korea (May 15-21, 2022).
— Anosh Joseph, Theory Seminar, Saha Institute of Nuclear Physics (SINP), Kolkata, India (November 15, 2022).
— Anosh Joseph, Summary Talk, Formal Theory Working Group Summary Report - The 25th DAE-BRNS High Energy Physics (HEP) Symposium, IISER Mohali, Mohali, India (December 12 - 16, 2022).
— Anosh Joseph, Contributed Talk, Shivalik HEPCATS Meeting - Winter 2023, IIT Mandi, Mandi, India (January 27, 2023).
— Anosh Joseph, Invited Talk, Workshop on Observables in Quantum Gravity, IISER Mohali, Mohali, India (March 24, 2023).
— Anosh Joseph, Invited Talk, CONDMAT@2023, Ashoka University, Sonipat, India (April 2, 2023).
— Anosh Joseph, High Energy Physics Seminar, Department of Physics, IIT Ropar, Ropar, India (April 13, 2023).
— Arpith Kumar, Investigating Spontaneous SO(10) Symmetry Breaking in Type IIB Matrix Model, The 25th DAE-BRNS High Energy Physics (HEP) Symposium, IISER Mohali, India (December 12 - 16, 2022).
— Arpith Kumar, Complex Langevin Study of Spontaneous SO(10) Symmetry Breaking in Euclidean IKKT Matrix Model, Nonperturbative and Numerical Approaches to Quantum Gravity, String Theory,

and Holography 2022 (NUMSTRINGS 2022), International Centre for Theoretical Sciences - Tata Institute of Fundamental Research (ICTS-TIFR), Bangalore, India (August 27, 2022).

— Arpith Kumar, Complex Langevin Study of Spontaneous Symmetry Breaking in IKKT Matrix Model, (Online) The 39th International Symposium on Lattice Field Theory (LATTICE 2022), , University of Bonn, Germany (August 10, 2022).

— Vamika Longia, Investigating the Two-Dimensional Generalized XY Model using Tensor Networks, The 25th DAE-BRNS High Energy Physics (HEP) Symposium, IISER Mohali, India (December 12 - 16, 2022).

— Bana Singh Sangtan, Maximally Supersymmetric Yang Mills Theory, Shivalik HEPCATS Meeting - Winter 2023, IIT Mandi, India (January 27, 2023).

Aru Beri

— Aru Beri "Fast Timing and multi-band look at X-ray Binaries," SPIMAX talk at the University of Oxford, United Kingdom, June 8, 2022

— Aru Beri "Multi-band Study of X-ray Binaries : Current Scenario," BIPAC talk at the University of Oxford, United Kingdom, June 8, 2022

— Aru Beri, "Neutron Star X-ray binaries as observed with AstroSat," COSPAR Assembly, Greece, July 16-24, 2022

— Aru Beri, "Fast timing and multi-band look at X-ray binaries," Timescales in Astrophysics, NYU Abu Dhabi, January 16-20, 2023.

— Aru Beri "XTE J1739-385 as observed with AstroSat and NuSTAR," BIPAC talk at the University of Oxford, United Kingdom, February 22, 2023

— Aru Beri, "Nuclear-powered and accretion-powered millisecond X-ray pulsations: do they have the same origin?," Pulsar Coffee talk at the University of Oxford, United Kingdom, March 28, 2023

Goutam Sheet

— Goutam Sheet was invited to CSIR-NPL, New Delhi to discuss the scientific collaboration on quantum materials on 1st June 2023

— Goutam Sheet visited SPS (School of Physical Science) JNU, New Delhi as an invited speaker to discuss "Principles of low temperature STM/AFM measurements and data analysis" on 30.04.2023

— Dr. Goutam Sheet visited Institute for Materials Research, Tohoku University, Japan as an invited speaker at Asia-Pacific Conference on condensed matter physics 2022 (AC2MP2022) on 22nd November 2022.

— Goutam Sheet visited Goa University as an invited speaker at National Conference on Electronic Structure (NCES 2022) on 13th November 2022.

— Goutam Sheet, appointed as an "Adjunct Fellow" for a period of three years in SN Bose Centre (SNBNCBS), Kolkata. He visited as an invited speaker on 7th October 2022.

Harvinder Kaur Jassal and group members

— Harvinder Kaur Jassal, Galaxies, coVeda Integral Learning School, December 10, 2022.

— Harvinder Kaur Jassal, The World of Galaxies, Pushpa Gujral Science City-Benjamin Franklin Birthday Celebration, January 17, 2023.

— Ranbir Sharma, Reconstruction and Inference of Cosmology Using Principal Component Analysis, IITB Cosmology Group Talk, January 28, 2023.

— Ranbir Sharma, Reconstruction Using Principal Component Analysis, Weekly online meeting on Cosmology (WOMC), IIT Madras, February 4, 2023.

Jasjeet Singh Bagla and group members

— Jasjeet Singh Bagla. Gravitational Lensing. NCERT: Listening to Learn. 20 May 2022.

— Jasjeet Singh Bagla. Black Holes and Observations. Nehru Planetarium (New Delhi). 10 August 2022.

— Jasjeet Singh Bagla. Gravitational Lensing and JWST. Nakshatra Astronomy Club (IIT Hyderabad). 15 September 2022.

— Jasjeet Singh Bagla. Gravitational Lensing in the JWST Era. Amity University Jharkhand (Ranchi). 7 December 2022.

— Jasjeet Singh Bagla. James Webb Space Telescope. Coveda, Chandigarh. 10 December 2022.

K P Yogendran

— K P Yogendran, "Quantum and Classical Rigid Bodies", IIT Gandhinagar, 29 July, 2022.

— K P Yogendran, “Spectrum and Partition functions of the BTZ black hole”, CQUEST, Sogang University, Korea , 24 Feb, 2023
— K P Yogendran, “A HardWall model in 10-D”, APCTP, Pohang, Korea, 7th Feb, 2023,
— K P Yogendran, “ BTZ Spectrum and partition function, APCTP, Pohang, Korea 16th Feb, 2023
— K P Yogendran, “10-D Hardwall model for QCD”, Hanyang University, Seoul, Korea 20th Feb, 2023.
— K P Yogendran,“ BTZ black hole partition function”, Observables in Quantum Gravity, 25th March, 2023.
— Akash Singh, “Phases of a 10-D hardwall model ”, Poster presentation, DAE-BRNS Symposium. , 12-16 Dec, 2022
— K P Yogendran, “Partition functions: BTZ vs AdS”, HEPCATS, IIT Mandi, 27 Jan 2023.
— Akash Singh, “Phases of a 10-D hardwall model ”, CUHP, (2 Sept 2022)

Kamal P. Singh and lab members

— Kamal P Singh,-Title: Ultrathin delay lines for attosecond spectroscopy with absolute zero time-delay reference, Bothe Colloquium, Max Planck Institute for Nuclear Physics, Heidelberg, Germany 08 June, 2022.
— Kamal P. Singh-Title: Processing, heterostructuring and transforming silk with light, Date: 21 June 2022, at University of Stuttgart, Germany
— Kamal P. Singh,-Title: Ultrafast lasers: need and potential applications, Date: 21 July, 2021 at NITTTR Chandigarh, India.
— Kamal P. Singh, -Title: Dimensional Metrology and application of laser Interferometers " during December 01-02, 2022, National Physical Laboratory, New Delhi.
— Kamal P. Singh-Title: IR-IR control of attosecond harmonics by ultrathin delay lines
— Students Conference on Optics and Photonics SCOP-2022, Sept. 28, 2022.
— Kamal P. Singh,-Title: Exploring magnetic properties of silk, CondMatt@2023, Ashoka University, 1 April, 2023.
— Akansha Tyagi (PhD student of Prof. Kamal P. Singh), Dispersion-less all reflective attosecond resolved delay line for ultrafast metrology, Student conference on Optics & photonics (SCOP), PRL Ahmedabad, India, September 28 - 30, 2022.
— Akansha Tyagi (PhD student of Prof. Kamal P. Singh), Wavefront splitting white light interferometer for determining coherence properties of ultrabroadband sources, Conference on Optics, Photonics & Quantum optics (COPAQ), IIT Roorkee, November 10 -13, 2022.
— Sunil Dahiya (PhD student of Prof. Kamal P. Singh), Ultrathin Autocorrelator (poster), Conference on Optics, Photonics & Quantum Optics (COPAQ), IIT Roorkee, November 10 -13, 2022.

Kavita Dorai and group members

— Kavita Dorai- Exploring quantum contextuality on an NMR quantum processor National Symposium on Quantum Information Science and, Technology, IIIT Hyderabad. Dates: April 11-13, 2022.
— Kavita Dorai- Applications of NMR in Physics & Biology: Quantum Computing and Brain Cognitive Functions Invited lecture (online platform), NASI Women in Science Lecture Series,
— NASI New Delhi Chapter. Dates: May 13, 2022.
— Kavita Dorai-Exploring foundational issues in quantum mechanics via experiments on an NMR quantum processor, Quantum Information and Quantum, Technology Summer School QIQT-2022, IISER Kolkata. Dates: June 26, 2022.
— Kavita Dorai- Novel schemes for simulation of open quantum dynamics & experimental characterization of quantum processes and states Progress in Quantum Science and Technologies, IIT-Madras Chennai. Dates: January 23-27, 2023.
— Kavita Dorai- Magnetic Resonance Quantum Computing, Technology: Achievements and Outlook Symposium on Quantum Computing Ecosystem: Basic Building Blocks, CDAC Pune.
— Dates: January 30-31, 2023.
— Kavita Dorai- Experimentally characterizing quantum states and processes on an NMR quantum processor, International Conference on Quantum Computing and Communications QCC2023, Baba Farid College Bhatinda., Dates: February 9-11, 2023.
— Kavita Dorai- Testing Quantum Mechanics on an NMR Quantum Processor, NMRS-2023: Magnetic Resonance in Biomolecules and Biomedicine, IISER Berhampur.Dates: February 24-27, 2023.

— Kavita Dorai- Quantum Mechanics, Quantum Information and Quantum Computing (Keynote Address), Workshop on Quantum Computing using QSIM, Centre for Development of Advanced Computing C-DAC Mohali, Dates: March 17 2023.
— Sumit Mishra-Title of the talk: METABOLIC PROFILING OF HELIANTHUS ANNUUS L. (SUNFLOWER) STEMS DURING CIRCADIAN CYCLE USING 1H NMR SPECTROSCOPY, Zakopane Ampere NMR School, Poland, Dates: June 19-25, 2022
— Vaishali Gulati-Title of the talk: Experimental Demonstration of Classification and Quantification of Entanglement in NMR Quantum Information Processor. International Conference on Quantum Computing and Communications, Bathinda. Dates: 9-11 February 2023

Kinjalk Lochan and group member

— Kinjalk Lochan. " Revival of Quantum Gravity in late time universe" at 12th FTAG meeting at BITS Mesra, 19th March 2023
— Kinjalk Lochan. "How long before we find particles in vacuum", Departmental Physics Seminar, IIT Delhi, 16th February 2023.
— Kinjalk Lochan. " Quantum Effects in Cosmology"at IAGRG conference at IISER Kolkata Dec 2022
— Kinjalk Lochan. "Planck scale shift : Implications for Black Hole Emission" at Gravity and Black Hole Meeting at IIT Gandhinagar, 10 Nov 2022
— Kinjalk Lochan. Lectures on General Relativity in a workshop on "General Relativity & Cosmology" sponsored by IUCAA at GLA University, Mathura, Nov 2022
— Kinjalk Lochan. "How long before we find particles in vacuum", Departmental Physics Seminar, IISER Mohali, 29 September 2022.
— Kinjalk Lochan. "Effects of Planck scale shift in nested Rindler frame", 6th HEPCATS meeting at Central University Himachal Pradesh, 02 September 2022
— Dipayan Mukherjee. "Bouncing universe dual to the concordance model: Scalar-tensor theories in the Jordan frame". 23rd International Conference on General Relativity and Gravitation (online). Organized by Chinese Academy of Sciences. July 2022.
— Dipayan Mukherjee. "Bouncing and collapsing universes dual to late-time cosmological models". 32nd Meeting of Indian Association for General Relativity and Gravitation. IISER Kolkata. December 2022.
— Harkirat Singh Sahota, Signatures of quantum gravity with perfect fluid, Departmental seminar, Institut d'Astrophysique de Paris, France. 24th Feb 2023
— Harkirat Singh Sahota, Quantum cosmology with fluid clock: Implications for the dressed metric-like approaches (Poster presentation), Time and clocks, WE-Heraeus-Seminar, Physikzentrum Bad Honnef, Germany. 27 Feb - 03 March 2023
— Harkirat Singh Sahota, Signatures of quantum gravity with perfect fluid, Departmental seminar, NCBJ Warsaw, Poland. 7th March 2023
— Harkirat Singh Sahota, Signatures of quantum gravity with perfect fluid, Workshop on "Observables in Quantum Gravity", IISER Mohali. 23 - 25 March 2023

Kulinder Pal Singh

— Kulinder Pal Singh. Active Galactic Nuclei and AstroSat. Conference on "High Energy Emission from Active Galactic Nuclei, Farook College, Calicut, Aug 12-14, 2022 (online).
— Kulinder Pal Singh. AstroSat: India's First Space Observatory: Development, Challenges and Performance. Janyu Tech Saturday Talk Series, Janyu Technologies Pvt. Ltd., Vasai, Sept. 3, 2022 (online).
— Kulinder Pal Singh. Recurrent Novae at the Young Astronomers Meet, at ARIES, Nainital, on Nov. 9, 2022 (online).
— Kulinder Pal Singh. Space Astronomy and Innovations. Punjabi University, Patiala. Key Note address on National Science Day, Feb 28, 2023.

Mandip Singh

— Mandip Singh, Quantum imaging and quantum information processing with pho- tons. Workshop: Quantum Information Technologies with Photonic Devices, Quantum Enabled Science and Technology theme-1, Punjabi University Patiala, 1st April 2022.

— Mandip Singh, Quantum imaging with hyper-entangled photons. Workshop: Futuristic Technology (Quantum Technology and THz) for defense applications, Solid State Physical Laboratory, New Delhi, 7-9 Dec 2022. (Delivered online)
— Mandip Singh, Photons entanglement and quantum imaging: Public lecture on celebration of International Day of Light, May 15 2023, IIT Ropar, India.

Pankaj Kushwaha

— Pankaj Kushwaha, Exploring the Most Powerful & Exotic Galaxies: Black holes and Relativistic Jets. GLA University, Mathura. 20th February 2023
— Pankaj Kushwaha, Exploring Relativistic Jets through study and modeling of Blazar's Emission. 7th Shivalik-HEPCATS, IIT-Mandi. 27 January 2023
— Pankaj Kushwaha, Exploring the Most Powerful Astrophysical Jets, Workshop on "Space Science & Technology" by Department of Physics, Punjab University, Chandigarh. 27 – 28 August 2022

Prasenjit Das

— Dr. Prasenjit Das, Universal density of low-frequency states in amorphous solids, Discussion Meeting On Statistical Physics and Complex Systems, IIT Kharagpur, 18th-20th July, 2022.

Rajeev Kapri and group members

— Rajeev Kapri. Tension Propagation (TP) Theory for Driven Polymer Translocation. Workshop On Soft Matter: From Physics to Biology (PhysToBio-2023). Department of Physics, Banaras Hindu University. March 22, 2023.
— Rajeev Kapri. Driven Polymer Translocation: Langevin Dynamics Simulations. Workshop On Soft Matter: From Physics to Biology (PhysToBio-2023). Department of Physics, Banaras Hindu University. March 23, 2023.
— Rajeev Kapri. Introduction to Monte Carlo Simulations. Adopting Computational Methodology as a Vital Research and Teaching Tool; Preparing the Future Generation of Teachers Faculty development Program for Assistant Professor. Panjab University Chandigarh. September 24, 2022.
— Rajeev Kapri. Introduction to Monte Carlo Simulations. Short Term Training Program on Computational Techniques for Physical Science & Engineering (CTPSE-2022) (Online). September 20, 2022.
— Andri Sharma. Polymer translocation through conical pores. Department of Material Science and Engineering, IIT Delhi. September, 29, 2022.
— Ramu Kumar Yadav. Study of Unzipping Transition of an Adsorbed Polymer and Block Copolymer DNA by a Periodic Force. Institute of Physics, Bhubaneswar. June 29, 2022.
— Ramu Kumar Yadav. Study of Unzipping Transition of an Adsorbed Polymer and Block Copolymer DNA by a Periodic Force. IIT Bombay, Mumbai. August 09, 2022.
— Ramu Kumar Yadav. Study of Unzipping Transition of an Adsorbed Polymer and Block Copolymer DNA by a Periodic Force. The Institute of Mathematical Sciences (IMSc.) Chennai. September 01, 2022.
— Ramu Kumar Yadav. Study of Unzipping Transition of an Adsorbed Polymer and Block Copolymer DNA by a Periodic Force. IIT Palakkad. September 27, 2022.
— Ramu Kumar Yadav. Study of Unzipping Transition of an Adsorbed Polymer and Block Copolymer DNA by a Periodic Force. IIT Roorkee. October 28, 2022.

Ramandeep Singh Johal and group members

— R.S. Johal. Basics of Quantum Mechanics. Online talk delivered at Refresher Course in Physics, organised by the UGC-Human Resource Development Centre, Punjabi University, Patiala. Nov. 01, 2023.
— R.S. Johal. Challenges of the Scientific Enterprise. Physics Department, Kurukshetra University, Kurukshetra. Lecture on National Science Day, Feb. 28, 2023.

Samir Kumar Biswas and group members

— S K Biswas, Conference on Optics, Photonics & Quantum Optics (COPaQ-2022) -2022, 10- 13th November, IIT Roorkee
— Amit Kumar, **SPIE Photonics West 2022,** San Francisco, California, USA– 28th January to 2nd February 2023

— Nagendra Singh **SPIE Photonics West 2022,** San Francisco, California, USA– 28th January to 2nd February 2023

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
— "Magnetic Skyrmions in metals and Insulators" CTS Bengaluru (Sept 2022)
— "Topological Phase Separation"IISc Bengaluru (Dec 2022)
— "Skyrmions and antiferromagnetic skyrmions in metals"Indo-Sweden conference, Goa (Feb 2023)

Satyajit Jena

— Study Of Muon Scattering Angle For Low to High - Z Material Via Geant4, B. Sirva, S. Jena at DAE-BRNS-HEP Symposium 2022

Smriti Mahajan

— Smriti Mahajan. Dashing through the cluster: A UVIT view of

Sudeshna Sinha

— Sudeshna Sinha. IMSc Diamond Jubilee Distinguished Lecture. 5 December 2022
— Sudeshna Sinha. Colloquium in Raman Research Institute. 8 March 2023

Tripta Bhatia and group members

— Tripta Bhatia- Biophysics and Synthetic Biology, Department of Biophysics, Punjab University, August 2022.
— Abhimanyu Nowbagh- Sugar-Cleaving Enzyme Invertase, 5th International Conference on Soft Materials, 11-16 Dec 2022
— Tripta Bhatia- Biomimetic Membranes, 5th International Conference on Soft Materials, 11-16 Dec 2022
— Tripta Bhatia- Generation of Bilayer Asymmetry and Membrane Curvature by the Sugar-Cleaving Enzyme Invertase, 8th Indian Statistical Physics Community Meeting, 1-3 Feb 2023
— Tripta Bhatia- Alpha-amylase and Lipid Membrane Interaction, Indian Biophysical Society Meeting, 25-29 March 2023
— Tripta Bhatia- Biophysics of the cell, Bangalore University, 30th March 2023

Vishal Bhardwaj and group members

— Vishal Bhardwaj, Search for LFV and a light Higgs boson in Y(nS) decays at Belle, QWG 2022: The 15th International workshop on Heavy Quarkonium/ GSI Germany, 26-30 September 2022.
— Sourav Patra, Study of Charmonia at Belle, The 13th International workshop on e+e- collisions from Phi to Psi (PhiPsi 2022), Fudan University, China 15 -19 August 2022..

Yogesh Singh

— Yogesh Singh, Quantum Spin Liquids: Concept and Realization, "Materials Physics Research Institute Seminar", University of Witwatersrand, Johannesburg, South Africa (9th, March 2023).
— Yogesh Singh, Quantum Spin Liquids: Concept and Realization, "Quantum Matter Seminar", Ohio State University (23, Jan. 2023).
— Yogesh Singh, Evidence for Fractionalization in the Kitaev QSL candidate Cu2IrO3, Indo-French workshop "Novel Phases of Matter in Frustrated Magnets" in Bordeaux, France (17th, Oct. 2022).
— Yogesh Singh, Quantum Spin Liquids: phases with quantum entanglement and topological orders, in the workshop "Correlated electrons in 2D", organized by IISER Kolkatta (11th, Aug. 2022).

8.6.4. Conferences attended by the researchers

Abhishek Chaudhuri and group members

— Abhishek Chaudhuri-A semiflexible polymer in a gliding assay: morphological and dynamical properties. Steady state phenomena in soft matter, active and biological systems, Dates. March 16-18, 2023.
— Anweshika Pattanayak- Active rods in a temperature gradient. Steady state phenomena in soft matter, active and biological systems, Dates. March 16-18, 2023.

— Subhashree S Khuntia- Activity driven by chemical environment. Steady state phenomena in soft matter, active and biological systems, Dates. March 16-18, 2023.

Ambresh Shivaji

— LHCP2022 (Virtual), May 16-20, 2022
— Celebrating a decade of the Higgs (Virtual), June 6-10, 2022
— Resummation, Evolution, Factorization 2022 (Virtual), October 31- November 1 ,2022
— Recent Advances in perturbative Quantum Chromodynamics, GIAN - Univ. of Mumbai, November 2-9, 2022
— DAE-BRNS High Energy Physics (HEP) Symposium- IISER Mohali, December 12-16, 2022
— Shivalik HEPCATS, IIT Mandi, January 27, 2023
— Electrons for the LHC Workshop on the LHeC/FCC-eh and PERLE (Virtual), IJCLab Orsay, France, October 26-28, 2022
— Shivalik HEPCATS, Central University of Himachal Pradesh, India, September 2, 2022
— XXV DAE-BRNS High Energy Physics Symposium 2022, IISER Mohali, India, December 12-16, 2022
— 10th Edition of the Large Hadron Collider Physics (Virtual), CERN and IUPAP May 16-20, 2022
— International Meeting on High Energy Physics, IOP Bhubaneswar, February 16-22, 2023
— Asian Physics Olympiad, Graphic Era Hill University, Dehradun, May 23-31, 2022
— Resource Generation Camp for Vigyan Pratibha, HBCSE-TIFR Mumbai, November 3-6, 2022

Anosh Joseph and group members

— Navdeep Singh Dhindsa, (Online) The 39th International Symposium on Lattice Field Theory (LATTICE 2022), University of Bonn, Germany (August 8 - 13, 2022).
— Navdeep Singh Dhindsa, Non-perturbative and Numerical Approaches to Quantum Gravity, String Theory, and Holography 2022 (NUMSTRINGS 2022), International Centre for Theoretical Sciences - Tata Institute of Fundamental Research (ICTS-TIFR), Bangalore, India (August 27, 2022).
— Navdeep Singh Dhindsa, The 25th DAE-BRNS High Energy Physics (HEP) Symposium, IISER Mohali, India (December 12 - 16, 2022).
— Navdeep Singh Dhindsa, Observables in Quantum Gravity, IISER Mohali, India (March 23 - March 25, 2023).
— Anosh Joseph, Non-perturbative and Numerical Approaches to Quantum Gravity, String Theory, and Holography 2022 (NUMSTRINGS 2022), International Centre for Theoretical Sciences - Tata Institute of Fundamental Research (ICTS-TIFR), Bangalore, India (August 27, 2022).
— Anosh Joseph, The 25th DAE-BRNS High Energy Physics (HEP) Symposium, IISER Mohali, India (December 12 - 16, 2022).
— Anosh Joseph, Shivalik HEPCATS Meeting - Winter 2023, IIT Mandi, India (January 27, 2023).
— Anosh Joseph, Observables in Quantum Gravity, IISER Mohali, India (March 23 - March 25, 2023).
— Arpith Kumar, (Online) The 39th International Symposium on Lattice Field Theory (LATTICE 2022), University of Bonn, Germany (August 8 - 13, 2022).
— Arpith Kumar, Non-perturbative and Numerical Approaches to Quantum Gravity, String Theory, and Holography 2022 (NUMSTRINGS 2022), International Centre for Theoretical Sciences - Tata Institute of Fundamental Research (ICTS-TIFR), Bangalore, India (August 27, 2022).
— Arpith Kumar, The 25th DAE-BRNS High Energy Physics (HEP) Symposium, IISER Mohali, India (December 12 - 16, 2022).
— Arpith Kumar, Observables in Quantum Gravity, IISER Mohali, India (March 23 - March 25, 2023).
— Bana Singh Sangtan, Non-perturbative and Numerical Approaches to Quantum Gravity, String Theory, and Holography 2022 (NUMSTRINGS 2022), International Centre for Theoretical Sciences - Tata Institute of Fundamental Research (ICTS-TIFR), Bangalore, India (August 27, 2022).
— Bana Singh Sangtan, The 25th DAE-BRNS High Energy Physics (HEP) Symposium, IISER Mohali, India (December 12 - 16, 2022).
— Bana Singh Sangtan, Shivalik HEPCATS Meeting - Winter 2023, IIT Mandi, India (January 27, 2023).
— Vamika Longia, Non-perturbative and Numerical Approaches to Quantum Gravity, String Theory, and Holography 2022 (NUMSTRINGS 2022), International Centre for Theoretical Sciences - Tata Institute of Fundamental Research (ICTS-TIFR), Bangalore, India (August 27, 2022).

— Vamika Longia, The 25th DAE-BRNS High Energy Physics (HEP) Symposium, IISER Mohali, India (December 12 - 16, 2022).
— Vamika Longia, Shivalik HEPCATS Meeting - Winter 2023, IIT Mandi, India (January 27, 2023).
— Vamika Longia, Observables in Quantum Gravity, IISER Mohali, India (March 23 - March 25, 2023)..

Aru Beri

— Aru Beri, "Fast timing and multi-band look at X-ray binaries" Timescales in Astrophysics, NYU Abu Dhabi, January 16-20, 2023.
— Aru Beri, "Neutron Star X-ray binaries as observed with AstroSat" COSPAR Assembly, Greece, July 16-24, 2022

Goutam Sheet and group members

— Mona Garg. Quantum phase transition to an anomalous metal by in-situ disorder engineering at superconducting LaVO3/SrTiO3 interfaces. Spectroscopies of Novel Superconductors (SNS). 12-16 December 2022.
— Deepti Rana. Andreev reflection at superconducting junctions on the van der Waals Kondo lattice ferromagnet Fe3GeTe2. Spectroscopies of Novel Superconductors (SNS)12-16 December 2022.
— Deepti Rana. Andreev reflection at superconducting junctions on the van der Waals Kondo lattice ferromagnet Fe3GeTe2. National conference on quantum condensed matter (QMAT) 18-22 September 2022.
— Nikhlesh Singh Mehta. Electric field control of superconductivity at LaVO3/SrTiO3 interfaces. National conference on quantum condensed matter (QMAT) 18-22 September 2022.

Harvinder Kaur Jassal and group members

— Harvinder Kaur Jassal, Model Independent Methods of Constraining Cosmological Parameters, Shivalik HEPCATS, 02-11-2022
— Harvinder Kaur Jassal, 32nd Annual Meeting of the Indian Association for General Relativity and Gravitation, as a member of Scientific Organising Committee, December 19-21, 2022.
— Harvinder Kaur Jassal, 41st Annual Meeting of the Astronomical Society of India, as a member of the Executive Council, March 1-5, 2022.
— Ranbir Sharma, Reconstruction of late-time cosmology Using Principal Component Analysis, Challenges and Innovations in Computational Astrophysics IV, Seoul South Korea, November 2022.
— Ranbir Sharma, Reconstructing Cosmology Using Principal Component Analysis, 10th KIAS Workshop on Cosmology and Structure Formation, 2022-KIAS, Seoul, South Korea, 28-10-2022
— Ranbir Sharma, Reconstruction of late-time cosmology Using Principal Component Analysis , XXV DAE-BARNS HEP Symposium, December 2022.

Jasjeet Singh Bagla and group members

— Dipanweeta Bhattacharyya. Cosmic spin and mass evolution of black holes and its impact. Growing black holes: accretion and mergers, Kathmandu, Nepal. 15 - 20 May 2022.
— Jasjeet Singh Bagla. Catastrophe theory, Gravitational Lensing and Higher order Singularities. 6th Shivalik HEPCATS Meeting. 2 September 2022.
— Dipanweeta Bhattacharyya. Where can we find the merged Black hole in BH-BH mergers? CHASCON 2022, Panjab University. 15 - 17 September 2022.
— Jasjeet Singh Bagla. Can the mass function of collapsed halos be described in a universal form? Conference on Current Status of Cosmology, The Thanu Padmanabhan Center for Cosmology and Science Popularization(CCSP), SGT University, Gurgaon, Haryana. 7-9 October 2022.
— Swati Gavas. Halo mass function in scale invariant models. The 10th KIAS Workshop on Cosmology and Structure Formation, Korea Institute for Advanced Study, Seoul, Korea. 24-28 October 2022.
— Jasjeet Singh Bagla. Gas in Galaxies: A Simple Model. Gas in Galaxies, Coorg (Indian Academy of Sciences, Bangalore). 28 November – 1 December 2022.
— Sauraj Bharti. Upcoming SKA precursor survey and Sensitivity to HI mass function. Gas in Galaxies, Coorg (Indian Academy of Sciences, Bangalore). 28 November – 1 December 2022.
— Jasjeet Singh Bagla, Astrophysical constraints on Dark Energy and Dark Matter. XXV DAE-BRNS HEP SYMPOSIUM, IISER Mohali. 12-16 December 2022.
— Jasjeet Singh Bagla. Population III Stars: Early Evolution and Long Term Scenarios. 7th Shivalik HEPCATS meeting, IIT Mandi. 27 January, 2023.

— Sauraj Bharti. Upcoming SKA precursor survey and Sensitivity to HI mass function. 7th Shivalik HEPCATS meeting, IIT Mandi. 27 January 2023.
— Komal Bali. Use of Sky Fiber to Correct for Solar Light Contamination in EPRV. 41st Meeting of the Astronomical Society of India (IIT Indore). 1-5 March 2023.
— Jasjeet Singh Bagla. Gravitational Lensing: From exotic images formations to modulation of gravitational waves. Centenary Celebrations of the Department of Physics and Astrophysics, University of Delhi. 13 March 2023.
— Komal Bali. Use of Sky Fiber to Correct for Solar Light Contamination in EPRV. Extreme Precision Radial Velocity (EPRV) 5 Conference (Santa Barbara, CA, USA). 27-30 March 2023.

K P Yogendran and group members

— Akash SIngh, Gaurav Dadwal, K P Yogendran: HEPCATS, IIT Mandi 26-28 Jan 2023
— Akash SIngh, K P Yogendran: HEPCATS, CUHP, Dharamshala Sept 01-04, 2022
— Akash Singh, K P Yogendran, Gaurav Dadwal: Observables in Quantum Gravity, IISER Mohali, 23-25 March, 2023.
— Akash Singh, K P Yogendran: DAE-BRNS Symposium. (12-16 Dec 2022)
— Gaurav Dadwal, "Nonperturbative and Numerical approaches to Quantum gravity, String theory and Holography" from 22nd August to 2nd September at ICTS, Bengaluru

Kamal P. Singh and group members

— Sidhu M.S. and K P. Singh (2020) Spin based magneto-mechanical coupling of nanoscale glass cantilevers for quantum sensing, Nanophotonics (STu3D), Optical Sensors and Sensing Congress, 22 – 26 June 2020 OSA, UBC Vancouver Canada. Invited Talk https://www.osapublishing.org/abstract.cfm?uri=sensors-2020-STu3D.3&origin=search
— Sidhu M. S. and K. P. Singh (2020) Nanoscale ultrathin glass cantilevers for quantum sensing, Invited Talk in Quantum Sensing and Enabling Instrumentation (AF3K), CLEO 2020, Laser Science to Photonics Applications, 11-15 May 2020 https://doi.org/10.1364/CLEO_AT.2020.AF3K.7
— P. Munjal. Poster on Noise self-cancellation twisted interferometer, International Conference on Nanoscience and Nanotechnology, 1-3 February 2021.
— P. Munjal. Talk on Universal single-lens interferometry unveils ultra-precise devices from scrap, SPIE Optics + Photonics 2020 Digital Forum, 24-28 August 2020.
— P. Munjal. Talk on Picometer-resolved universal single-lens interferometer unveiling ultraprecise frugal devices, Workshop on Interferometric Scattering Microscopy, 26-28 May 2020.
— P. Munjal. Talk on Picometer-resolved universal single-lens interferometer unveiling ultraprecise frugal devices, SPIE Photonics Europe Digital Forum 2020, 6-10 April 2020.
— Mandal. Impact of the bound state dynamics on the high harmonic generation with a bichromatic driver near plasmonic nanostructure. Time-resolved imaging of photo-induced dynamics Faraday Discussion, organized by the Royal Society of Chemistry on their online platform. February 01-03, 2021. (Poster)

Kavita Dorai

— Kavita Dorai-Exploring quantum contextuality on an NMR quantum processor National Symposium on Quantum Information Science and Technology, IIIT Hyderabad. Dates: April 11-13, 2022.
— Kavita Dorai- Novel schemes for simulation of open quantum dynamics & experimental characterization of quantum processes and states Progress in Quantum Science and Technologies, IIT-Madras Chennai. Dates: January 23-27, 2023.
— Kavita Dorai- Magnetic Resonance Quantum Computing Technology: Achievements and Outlook, Symposium on Quantum Computing Ecosystem: Basic Building Blocks, CDAC Pune. Dates: January 30-31, 2023.
— Kavita Dorai- Experimentally characterizing quantum states and processes on an NMR quantum processor, International Conference on Quantum Computing and Communications QCC2023, Baba Farid College Bhatinda. Dates: February 9-11, 2023.
— Kavita Dorai- Testing Quantum Mechanics on an NMR Quantum Processor NMRS-2023: Magnetic Resonance in Biomolecules and Biomedicine, IISER Berhampur. Dates: February 24-27, 2023.
— Vaishali Gulati- : Classification and Measurement of Multipartite Entanglement by econstruction of Correlation Tensors on NMR Quantum Processor. Young Quantum 2023, HRI AllahabadDates: 14-19 February 2023

— Gayatri Singh-Teleporting a single qubit state on a cycle with four vertices using coined quantum walk, NMRS Symposium 2023, IISER Berhampur. Dates: 24 Feb – 27 Feb 2023
— Gayatri Singh-International Conference on Quantum Computing and Communications (QCC), 2023. Dates: 9 Feb – 11 Feb 2023
— Akanksha Gautam- Protection of noisy multipartite entangled states of superconducting qubits via universally robust dynamical decoupling schemes. 22nd Asian Quantum Information Science Conference (AQIS) hosted by the University of Science and Technology, China (Online), Dates: December 17-18, 2022.
— Akanksha Gautam-Experimental demonstration of the dynamics of quantum coherence evolving under a PT-symmetric Hamiltonian on an NMR quantum processor Young Quantum 2023 hosted by Harish Chandra Research Institute, Prayagraj, India, Dates: February 15-18, 2023
— Akshay Gaikwad- Young Quantum 2023, Harish Chandra Research Institute, Prayagraj, India, Dates: February 15-18, 2023
— Akshay Gaikwad-International Conference on Quantum Computing and Communications (QCC), 2023. Dates: 9 Feb – 11 Feb 2023
— Krishna Shende-Young Quantum 2023, Harish Chandra Research Institute, Prayagraj, India, Dates: February 15-18, 2023

Kinjalk Lochan

— Kinjalk Lochan. “Revival of Quantum Gravity in late time universe” at 12th FTAG meeting at BITS Mesra, 19th March 2023
— Kinjalk Lochan. “Quantum Effects in Cosmology”at 32nd IAGRG conference at IISER Kolkata, Dec 2022
— Kinjalk Lochan. “Planck scale shift: Implications for Black Hole Emission” at Gravity and Black Hole Meeting at IIT Gandhinagar, 10 Nov 2022
— Kinjalk Lochan. Lectures on General Relativity in a workshop on "General Relativity & Cosmology" sponsored by IUCAA at GLA University, Mathura, 24-26 Nov 2022.
— Kinjalk Lochan. “Effects of Planck scale shift in nested Rindler frame”, 6th HEPCATS meeting at Central University Himachal Pradesh, 02 September 2022
— Dipayan Mukherjee. "Bouncing universe dual to the concordance model: Scalar-tensor theories in the Jordan frame". 23rd International Conference on General Relativity and Gravitation (online). Organized by Chinese Academy of Sciences. July 2022.
— Dipayan Mukherjee. "Bouncing and collapsing universes dual to late-time cosmological models". 32nd Meeting of Indian Association for General Relativity and Gravitation. IISER Kolkata. December 2022.
— Harkirat Singh Sahota, Signatures of quantum gravity with perfect fluid, Departmental seminar, Institut d'Astrophysique de Paris, France. 24th Feb 2023
— Harkirat Singh Sahota, Quantum cosmology with fluid clock: Implications for the dressed metric-like approaches (Poster presentation), Time and clocks, WE-Heraeus-Seminar, Physikzentrum Bad Honnef, Germany. 27 Feb - 03 March 2023
— Harkirat Singh Sahota, Signatures of quantum gravity with perfect fluid, Departmental seminar, NCBJ Warsaw, Poland. 7th March 2023
— Harkirat Singh Sahota, Signatures of quantum gravity with perfect fluid, Workshop on "Observables in Quantum Gravity", IISER Mohali. 23 - 25 March 2023

Kulinder Pal Singh

— Kulinder Pal Singh. Active Galactic Nuclei and AstroSat. Conference on “High Energy Emission from Active Galactic Nuclei, Farook College, Calicut, Aug 12-14, 2022 (online).

Pankaj Kushwaha

— Pankaj Kushwaha, Exploring Relativistic Jets through study and modeling of Blazar’s Emission. 7th Shivalik-HEPCATS. 27 January 2023
— Pankaj Kushwaha, Multi-wavelength View of Blazars with AstroSat: Spectral States and New Insights (Poster), 7-years-of-AstroSat Conference 2022, ISRO Headquarter, Bengaluru. 27-- 28 September 2022
— Pankaj Kushwaha, Workshop on “Space Science & Technology” Department of Physics, Punjab University, Chandigarh. 27 – 28 August 2022

Prasenjit Das

— Prasenjit Das, remotely attended Simons Workshop on Defects in Glasses, organized by University of Pensylvania, USA, 30th September-01st October 2022.
— Mr. Sayantan Mondal (PH21105) attended a Workshop on Soft Matter: from Physics to Biology, organized by Banaras Hindu University, Varanasi, India 17th - 23rd March 2023.

Rajeev Kapri

— Rajeev Kapri. Tension Propagation (TP) Theory for Driven Polymer Translocation. Workshop On Soft Matter: From Physics to Biology (PhysToBio-2023). Department of Physics, Banaras Hindu University. March 22, 2023.
— Rajeev Kapri. Driven Polymer Translocation: Langevin Dynamics Simulations. Workshop On Soft Matter: From Physics to Biology (PhysToBio-2023). Department of Physics, Banaras Hindu University. March 23, 2023.
— Rajeev Kapri. Introduction to Monte Carlo Simulations. Adopting Computational Methodology as a Vital Research and Teaching Tool; Preparing the Future Generation of Teachers Faculty development Program for Assistant Professor. Panjab University Chandigarh. September 24, 2022.
— Rajeev Kapri. Introduction to Monte Carlo Simulations. Short Term Training Program on Computational Techniques for Physical Science & Engineering (CTPSE-2022) (Online). September 20, 2022.

Samir Kumar Biswas

— S K Biswas , Conference on Optics, Photonics & Quantum Optics (COPaQ-2022) -2022, 10-13th November, IIT Roorkee
— Amit Kumar, **SPIE Photonics West 2022,** San Francisco, California, USA– 28th January to 2nd February 2023
— Nagendra Singh **SPIE Photonics West 2022,** San Francisco, California, USA– 28th January to 2nd February 2023
— Nagendra Singh , Conference on Optics, Photonics & Quantum Optics (COPaQ-2022) -2022, 10-13th November, IIT Roorkee
— Shivam R, Conference on Optics, Photonics & Quantum Optics (COPaQ-2022) -2022, 10- 13th November, IIT Roorkee
— Tejpraksh Sharma, Conference on Optics, Photonics & Quantum Optics (COPaQ-2022) -2022, 10- 13th November, IIT Roorkee
— Abhishek Paul, Conference on Optics, Photonics & Quantum Optics (COPaQ-2022) -2022, 10-13th November, IIT Roorkee

Sanjeev Kumar

— Frustrated Metals and Insulators, ICTS Bengaluru (Sept 2022)
— SNS 2022, IISc Bengaluru (Dec 2022)
— Indo-swedish meeting on Condensed Matter at Goa (Feb 2023)
— PSCES meeting at IISER Pune (March 2023)

Satyajit Jena

— The MINERvA Collaboration meeting, Fermilab, 12-16 July 2022,
— XXV DAE-BRNS High Energy Physics Symposium, 2022, IISER Mohali, India

Smriti Mahajan

— Smriti Mahajan. Dashing through the cluster: A UVIT view of star-forming cluster galaxies. Astronomical Society of India Meeting. 1-5 March, 2023

Sudeshna Sinha

— Sudeshna Sinha. Plenary talk in ‘National Assembly of Researchers In Physics’ (NARIPHY), IISER Bhopal. 25-26 August 2022
— Sudeshna Sinha. Plenary talk at CNSD 2022, Pune. 15-18 December 2022
— Sudeshna Sinha. Invited Speaker at IMSc60 Celebration. 2-5 January 2023
— Sudeshna Sinha. Invited Speaker at ‘Frontier Symposium in Physics’ (FS-PHY 2023), IISER Trivandrum. 24-25 February 2023
— Sudeshna Sinha. Keynote Speaker at ‘Nonlinear Data Analysis and Modeling: Advances, Applications, Perspectives’ (NDA23), Germany. 15-17 March 2023

Tripta Bhatia

— Tripta Bhatia- Alpha-amylase and Lipid Membrane Interaction, Indian Biophysical Society meeting, 25-29 March 2023
— Rajni Kudawla (PhD student)- Poster presentation by PhD student, Recent trends in Biomolecules and Therapeutics, 23-24 March 2023
— Tripta Bhatia- Generation of Bilayer Asymmetry and Membrane Curvature by the Sugar-Cleaving Enzyme Invertase, Stat-Physics meeting, 1-3 Feb 2023
— Tripta Bhatia- Biomimetic Membranes, International conference on Soft Matter, 11-16 Dec 2022
— Abhimanyu Nowbagh - Sugar-Cleaving Enzyme Invertase, International conference on Soft Matter, 11-16 Dec 2022
— Tripta Bhatia- Micromechanics of Biomembranes Chandigarh Science Congress (CHASCON), 11-16 Dec 2022
— PhD and Master theses students: Rajni, Abhimanyu, Sanat, Mayur, Harshit, Suhasi, Hemraj, Sushila- Poster presentation by PhD student, Chandigarh Science Congress (CHASCON), 11-16 Dec 2022

Vishal Bhardwaj

— Vishal Bhardwaj, QWG 2022: The 15th International workshop on Heavy Quarkonium/ GSI Germany, 26-30 September 2022.
— Sourav Patra, The 13th International workshop on e+e- collisions from Phi to Psi (PhiPsi 2022), Fudan University, China 15 -19 August 2022.
— Vishal Bhardwaj, Manish Kumar, Sourabh Chutia, Neetesh Mudgal, XXV DAE-BRNS HEP Symposium 2022, IISER Mohali, 12-16 Dec 2022,
— Sourabh Chutia and Neetesh Mudgal, XV ICFA School on instrumentation in elementary particle physics, TIFR, Mumbai 12-25 Feb 2023.

Yogesh Singh

— Yogesh Singh, Evidence for Fractionalization in the Kitaev QSL candidate Cu2IrO3, Indo-French workshop “Novel Phases of Matter in Frustrated Magnets” in Bordeaux, France (17th, Oct. 2022).

9. Awards and Honours

9.1 Awards won by the faculty

Indranil Banerjee

— Selected as Editor (Virology) of Current Clinical Microbiology Reports for the years 2022-2023

Kausik Chattopadhyay

— Appointed as a member of the Editorial Board of the Journal of Bacteriology (American Society for Microbiology)(January, 2023-December, 2025).
— Elected as Fellow of Royal Society of Biology, UK.

Lolitika Mandal

— Elected Fellow Indian Academy of Sciences, Bangalore 2023

Mahak Sharma

— Mahak Sharma’s profile was featured in Vigyan Vidushi – a book published by Vigyan Prasar (2023) that portrays the valuable contributions of Indian women scientists.

Sadhan Das

— Sadhan Das received grant from Science and Engineering Research Board, SERB, India (2022-2024). Epigenetic mechanisms underlying metabolic memory of diabetic state in vascular smooth muscle cells. Approximately 31,00,000 (INR). Role: PI

Samrat Mukhopadhyay

— Samrat Mukhopadhyay was elected to the fellowship of the Indian Academy of Sciences.

Santosh B. Satbhai

— Santosh Satbhai received International Travel Grant from DST-SERB to attend 20th International Symposium on Iron Nutrition and Interactions in Plants (ISINIP) 2022, Reims, France.
— Santosh Satbhai selected for BIOSANTEXC Discovery Program to visit ENS-Lyon in France.

Arijit Kumar De

— Arijit Kumar De, International Travel Support from INSA, India: 06/06/2022. (INSA travel grant No. SS/INSA/2022/60)

— Arijit Kumar De, Presider of the Session on "Dynamics of Complex Systems" at the International Conference on Ultrafast Phenomena-2022; Montréal, Quebec, Canada; 18-22 July, 2022.

Debashis Adhilari

— Debashis Adhikari has been selected as a guest editor for ‘Organometallics” for the special forum in Organometallics

N. Sathyamurthy

— N. Sathyamurthy, Lifetime Achievement Award 2022, Indian Chemical Society, Kolkata

Srinivasarao Arulananda Babu

— Babu, S.A. Received the CRSI Bronze Medal 2023.

S. S. V. Ramasastry

— Council member of the 'National Organic Symposium Trust (NOST)' for the period 2023-26

— Invited to become the 'Fellow of the Royal Society of Chemistry (FRSC)' under 'Leaders in the Field (LITF)' scheme (2022)

— Recipient of the CDRI Award for Excellence in Drug Research 2022

Sanchita Sengupta

— Chemical Research Society of India (CRSI) Young Scientist Award (July 2022).

— SERB-POWER grant 2022, Research funding for 3 years 2022-25.

Santanu Kumar Pal

— Santanu Kumar Pal became a Fellow of the Royal Society of Chemistry; FRSC, UK.

— Santanu Kumar Pal has been awarded the ILCS Silver Medal from The Indian Liquid Crystal Society.

— Santanu Kumar Pal received CRS Silver medal by Chirantan Rasayan Sanstha.

— Santanu Kumar Pal received the International Travel Support (ITS), SERB, to attend the 2023 Gordon research conference in Liquid Crystal.

Sugumar Venkataramani

— Sugumar Venkataramani- Associate Editor in Journal of Photochemistry and Photobiology.

Baerbel Sinha

— Baerbel Sinha was awarded a faculty travel grant under the SERB Overseas Visiting Doctoral Fellowship program to visit Purdue University from 28th November to 12th December 2022.

Chandrakanta Ojha

— Ojha is selected as a primary convener of a session in the Asia Oceania Geosciences Society (AOGS)-symposium -2023, Singapore

— Ojha was invited as a guest speaker to a national workshop on Advance Observation Systems for Atmospheric & Space Weather Monitoring by SAMEER, IIT Bombay, Feb 2023

— Ojha co-authored a work that received the best oral paper presentation at the International Conference on EMERGING TECHNOLOGY FOR ENVIRONMENTAL SUSTAINABILITY (ETES-2023), Odisha, on 24 -25 February 2023 (presented by Madhusmita Ojha, MSCB-North Orissa University, Odisha)

— Ojha was invited as Guest of Honor for a value-added certificate course on Applications of Remote Sensing and GIS in Civil Engineering by Chandigarh University, March 2023

— Invited guest speaker – PGIMER, Chandigarh, March 2023

— Invited guest speaker – IEEE-GRASS, Mumbai chapter, IIT Bombay, April 2023

— Invited guest speaker- KL University, Andhra Pradesh, April 2022

— Ojha co-authored a research work that received a travel grant to the 6th National Geo-Research Scholars Meet, organized by the University of Ladakh, Leh, and Wadia Institute of Himalayan Geology, Dehradun. (presented by Madhusmita Ojha, MSCB-North Orissa University, Odisha, June 2022)

— Ojha co-authored a work that received a travel grant at the IGARSS-2022, Kuala Lumpur, Malaysia (presented by Madhusmita Ojha, MSCB-North Orissa University, Odisha) (July 2022)

— Ojha co-authored a work that received a travel grant at AGU-2022, Chicago, USA (presented by Ravi Kumar, external MS thesis student, IISER Kolkata) (December 2022)

Sunil A. Patil

— Sunil A. Patil received the "CDC India – Prof. Ashok Pandey research excellence award for 2021" of the Biotech Research Society, India (BRSI), in recognition of contributions to the Environmental Biotechnology area (2022).

— A team led by Dr. Sunil A. Patil with his Ph.D. students Ms. Moumita Roy and Mr. Ravineet Yadav is among the top 30 teams at Carbon Zero Challenge 2022 – a flagship event organized by IIT Madras. The award carries Rs. 5 lakhs grant for the prototype development and demonstration (2023).

— Sunil Patil entered into a technical consultancy agreement with Kishore Pumps, Pune.

Vinayak Sinha

— Vinayak Sinha has been appointed expert member of the World Meteorological Organization' Environmental Pollution and Atmospheric Chemistry the Scientific Steering Committee.

— Vinayak Sinha was appointed to Editorial Advisory Board of the journal Environmental Science and Technology Letters published by the American Chemical Society.

— Vinayak Sinha has been reappointed for a second 4 term as member of the International Commission on Atmospheric Composition and Global Pollution (iCACGP) under IAMAS and the International Science Council.

— Vinayak Sinha was appointed a member of the National Advisory Committee for setting up School of Earth, Environment and Sustainability Sciences at IISER Thiruvananthapuram.

Yunus Ali Pulpadan

— Received SERB Startup Research Grant (32.47 Lakhs) for the project titled "Assessing glacier retreat and links between increasing landslides and channel erosion in High Mountain Asia".

Anu Sabhlok

— Anu Sabhlok serves as an editor (book review forums) for the international journal Dialogues in Human Geography

— Anu Sabhlok is on the editorial boards of the following international journals:

— Geoforum, Geopolitics

Parth R. Chauhan

— Parth R. Chauhan: DST Science & Heritage Research Initiative (SHRI) grant for 1-year project "Imaging Ancient Images: Digital Preservation, risk assessment, spatial simulation & chronological interpretation of rock art heritage using multiple technologies". (Rs. 44,05,763). In collaboration with Dr. Jigna Desai (CEPT University, Gujarat) and Dr. Prabhin Sukumaran (CHARUSAT, Gujarat)

— Travel grant to attend Indo-Pacific Prehistory Association conference in Chiang Mai, Thailand. November 6-12, 2022.

— Travel grant to attend INQUA conference in Rome, Italy (July, 2023)

Kapil Hari Paranjape

— Member, National Board for Higher Mathematics, DAE.

— Member of the Governing Council of the Indian Association for the Cultivation of Science, Kolkata.

— INSA nominee to the Council of the Indian Statistical Institute, Kolkata.

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

— Member, Editorial Board for Proceedings of the Indian Academy of Sciences (Mathematical Sciences).

Krishnendu Gongopadhyay

— Elected as a member of the Executive Committee of the Ramanujan Mathematical Society for three years, April 1, 2022 – March 31, 2025.

— Appointed as an external member in the Ad-hoc board of studies for the DST-Centre for Interdisciplinary Mathematical Sciences of the Banaras Hindu University (BHU)

— Appointed in the Board of Studies, Department of Mathematics, Sikkim University (SU).

— Nominated as a member of the NEP2020 Mathematics Syllabus Review Committee, Dept. of Mathematics, Sikkim University (SU).
— Awarded the SERB Core research grant: CRG/2022/003680.
— Appointed as a scientific committee member of the CIMPA school: Geometric structures on surfaces, Moduli spaces and Dynamics, December 12--22, 2022, at Banaras Hindu University, Varanasi.

Sudesh Kaur Khanduja

— Recipient of Srinivasa Ramanujan Medal (2022) of Indian National Science Academy.
— Delivered S. Ramanujan Memorial Award Lecture during the 88th Annual Conference of the Indian Mathematical Society held from December 27-30, 2022 at Ranchi.

Vaibhav Vaish

— Best Teacher Award (IISER Mohali), 2022

Ambresh Shivaji

— SERB Seminar/Symposia Grant for organizing XXV DAE-BRNS HEP Symposium 2022

Aru Beri

— Newton International Fellowship Alumni Award in September 2022

Harvinder Kaur Jassal

— Selected as Chairperson, Working Group for Gender, Indian Association for General Relatvity and Gravitation, March 8, 2023

Jasjeet Singh Bagla

— Appointed on the Editorial Board of the Journal New Astronomy.
— Appointed Chairperson of the Scientific Organizing Committee of the Astronomical Society of India for three years. The committee is expected to organize three annual meetings of the society (2023-2025) and contribute to other scientific meetings organized by the society during this period.

Kavita Dorai

— Elected Member, Editorial Advisory Board, Magnetic Resonance in Chemistry (John Wiley & Sons) February 2023-Present.

Kinjalk Lochan

— N. R. Sen Young Scientist award by Indian Association of Gravitation and General Relativity, Dec 2022

Prasenjit Das

— I have received SERB Start-up Research Grant. SERB File Number: SRG/2022/000105 and IISER Mohali File Number: SERB-22-0284.

Samir Kumar Biswas

— SERB project jointly with INST, project reference no CRG/2022/005909; IISER Mohali PI (SK Biswas) has financial share of 9.8 Lakhs

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 Executive Committee of Haryana State Council for Science, Innovation and Technology (HSCSIT)
— Member of the Council of Indian National Science Academy (INSA)
— Member of the Academic Council of Chennai Mathematical Institute (CMI)

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

1. Sriharsha Adusumilli won an IUBMB Travel award to present his work at "Emerging Applications of Microbes (2nd edition)" meeting which took place from 7-8 December 2022 in Leuven, BelgiumSubhash Chander, ACS Bridge Fellow by the American Chemical Society (ACS). October 27, 2020
2. Kajal Gupta (Ph.D. student) won the Best Poster Award at the IUBMB Focused Meeting on Biochemistry & Molecular Biology of RNA Viruses, RCB Faridabad (15-18 November, 2022)
3. PMRF fellowship: Deepak Jagra.
4. Ms. Shalini Rawat, was selected for "SASTRA-Prof. Saroj Chandrasekhar Memorial Award 2023 for her PhD research work. The award, which includes a certificate and 1 lakh rupees, is instituted by the Chandrasekhar Foundation for women doctoral scholars in their final years of Ph.D. in the fields of biosciences and biotechnology.
5. Neeladrita Kundu, Awarded EMBO travel grant to attend the EMBO Workshop on Bacterial networks (BacNet22), Sant Feliu de Guixols, Spain. 4th-9th September, 2022.
6. Neeladrita Kundu Awarded DBT travel grant to attend the EMBO Workshop on Bacterial networks (BacNet22), Sant Feliu de Guixols, Spain. 4th-9th September, 2022.
7. Neeladrita Kundu Awarded CSIR travel grant to attend the EMBO Workshop on Bacterial networks (BacNet22), Sant Feliu de Guixols, Spain. 4th-9th September, 2022.
8. Swati Singh, Award from EMBO for attending EMBO conference on Bacterial Morphogenesis, Survival and Virulence, Goa, India. 6th-10th February, 2023.
9. Best poster presentation award in an international conference on “Anti-Microbial Resistance and Microbiome under Changing Climate” held from 10 - 12 October, 2022, Pondicherry University, Puducherry, India.
10. Best poster presentation award in 26th Punjab Science Congress (National conference) on the theme “Environment, Food security and Health with respect to climate change”, held from 7-9 February, 2023, SGGSW University, Fatehgarh Sahib, Punjab, India.
11. Ms. Riya Madan won the NS Dhalla and S C Tyagi Oral presentation award at the Advances in Cardiovascular Medicine and Research 2023 Conference
12. Ms. Anamika Avni received the International Travel Scheme award from the SERB.
13. Ms. Samriti Mankotia received international travel award from the organisers of 10th International Symposium on Root Development.
14. Ms. Samriti Mankotia received international travel award from Department of Biotechnology (DBT) to attend the 10th International Symposium on Root Development, VIB-Ghent, Belgium.
15. Sramona Kar (2022) Deciphering the role of an orphan adhesion GPCR, GPR114 in the differentiation of murine $CD8^+$ T lymphocytes. First Prize in Poster presentation in Immunocon. Annual conference of Indian Association of Immunologists. Held at PGIMER Chandigarh Dec 2022.
16. Mr. Paras Verma received the best poster award in the CRICK Symposium on “Theoretical Chemistry and Biology
17. Sugata Chaudhuri, Best Poster Award, Name of the conference: 44^{th} All India Cell Biology Conference 2022, University of Kashmir, Date of the conference: 2-3 September 2022
18. Amjadudheen V P, Best Poster Award, Name of the conference: YEAST INDIA 2023: Fundamentals to Applications of Yeast and Fungi, IISER Mohali, Date of the conference: 10-13 March 2023
19. Chamjai Daimai was awarded with DST-INSPIRE fellowship but did not avail that.
20. Shaina Dhamija, ACS Journal of Physical Chemistry A Award for her poster at 29th CRSI-NSC conference 2022.
21. Sakshi Chawla, Honorable Mention Award at Ultrafast Sciences (UFS 2022), IISER Thiruvananthapuram
22. Abdul Alim, Best Poster Award at the XLV Symposium of the Optical Society of India Conference on Optics, Photonics & Quantum Optics (COPaQ 2022), IIT Roorkee, India.
23. Shaina Dhamija, Best Thesis Award at the XLV Symposium of the Optical Society of India Conference on Optics, Photonics & Quantum Optics (COPaQ 2022), IIT Roorkee, India.
24. Shaina Dhamija, Best Oral Presentation Award at the IX International Conference on Perspectives in Vibrational Spectroscopy (ICOPVS-2022), Indore, India.
25. Monojit Roy: PMRF
26. Rahul Singh: PMRF

27. Jay Prakash got best oral presentation award at Emerging Trends in Science and Technology, held at the Punjab Engineering College (PEC) Chandigarh. Date: 10.06.2022.
28. Prashant Kumar got best poster presentation award at Recent Advances in Bioorganic and Medicinal Chemistry (RABMC) at the National Institute of Pharmaceutical Education and Research (NIPER), Mohali, India. Date: 19.11.2022.
29. Nirmal for being awarded the prestigious Prime Minister's Research Fellowship (PMRF)
30. Prashant won the best oral presentation award at the J-NOST conference organized by the School of Chemistry, Univ. of Hyderabad.
31. Nisha Arora and Surbhi Garg were awarded the international travel grant from IUBMB to attend 'The Biochemistry Global Summit' from July 9 to July 14, 2022 at Lisbon, Portugal.
32. Ms. Vidushi Gupta (PH21108) awarded the Prime Minister's Research Fellowship (PMRF) in March 2023 through lateral entry mode.
33. Dr. Kavita Rani selected for a post-doctoral position in the group of Prof. Harry L. Anderson at the University of Oxford, UK (in March 2023).
34. SERB International travel grant awarded to Ms. Kavita Rani to attend a conference on Macrocyclic and Supramolecular Chemistry (MASC) at University of Nottingham, UK (Dec 2022).
35. DST-INSPIRE Ph.D. fellowship awarded to Ms. Vidushi Gupta (Sep 2022).
36. Shruti Rani received the best poster award at an International Conference on emerging materials for sustainable development in 2022.
37. Ritobrata De received the best poster at the 29th CRSI National Symposium in Chemistry, organized by IISER Mohali in July 2022.
38. Shallu Dhingra got the International Liquid Crystal Society Student Travel Fund 2023 to attend the 2023 Gordon research conference in Liquid Crystal.
39. Debapriya Gupta received SERB-ITS Travel Grant (ITS/2022/000969) for attending the 28th PhotoIUPAC in Amsterdam, Netherlands.
40. Debapriya Gupta received RSC Researcher Development Grant for attending the 28th Photo IUPAC in Amsterdam, Netherlands.
41. Gayathri P received best poster award at the RABMC-2022 (Recent Advances in Bioorganic and Medicinal Chemistry) Symposium organized by NIPER S.A.S. Nagar on November 19th, 2022.
42. Dr. Archana V. received National Postdoctoral Fellowship (NPDF) for 2022-2024.
43. Best poster award: Mr. Raj Sekhar Roy, International Conference on Engineering Trends in Science and Technology (ICETST), 10-11 June 2022.
44. Best poster award: Ms. Maqsuma Banoo, 29th CRSI-ACS symposium in chemistry held at IISER Mohali, 7-9 July 2022.
45. Best poster award: Ms. Maqsuma Banoo, International Conference on Emerging Materials for Sustainable Development (EMSD-2022) held at CRSI-CSIO Chandigarh, 9-11th July 2022.
46. Best poster award: Ms. Maqsuma Banoo, Indo-French Workshop on Clean and Sustainable Energy Technologies (INFINITE), 21-24 February, 2023.
47. Best oral presentation award: Mr. Raj Sejhar Roy, International Conference on Emerging Materials for Sustainable Development (EMSD-2022) held at CRSI-CSIO Chandigarh, 9- 11 July 2022.
48. Diptimayee Behera (PH18077). Travel grant for AGU Fall Meeting 2022 Chicago conference participation, and presentation on topic titled "Occurrence, distribution and sources of petroleum contamination in reef-associated sediments of Mandapam Group of Islands, Gulf of Mannar, India"
49. Diptimayee Behera (PH18077). Travel Grant for INQUA Roma 2023 and Co-Convenor on scientific session titled "How Absolute and How Relative: Challenges and resolutions associated with applying dating techniques in Quaternary period.
50. Shivam Chawla (Ph.D. student) receives the travel grant for the InSAR workshop on 'Principles and Application of Satellite Radar Remote Sensing,' IIT Roorkee, India (May 2022)
51. Aparna R (BS-MS student) was selected for the 13th International Summer School on Radar/SAR, Fraunhofer FHR, Germany (July 2022)
52. Aparna's (BS-MS student) collaborative work received the best oral paper presentation at the Indian Society of Remote Sensing (ISRS-ISG) symposium, Hyderabad (Nov 2022).
53. Shivam Chawala (Ph.D. scholar) received a travel grant to the IGARSS-2022, Kuala Lumpur, Malaysia (July 2022)

54. Mr. Ravi Kumar Yadav and Mr. Ravineet Yadav (Ph.D. students with Dr. Sunil Patil) received the 2nd prize at the “Vishwakarma Awards for Engineering Innovation 2022” competition under the theme “Water & Sanitation” by the Maker Bhavan Foundation, WIN Foundation partnered with Kiran Patel Center for Sustainable Development at IIT Gandhinagar. The award carries Rs. 1 lakh prize besides a certificate.
55. Ms. Moumita Roy (PhD student with Dr. Sunil Patil) received the second-best oral presentation award at the Global ISMET (International Society of Microbial Electrochemistry and Technology) Conference 2022 held at Chania, Greece.
56. Mr. Sukrampal (PhD student with Dr. Sunil Patil) received the first best poster presentation award at the AMI (Association of Microbiologists of India) 2023 conference held at Maharshi Dayanand University (MDU), Rohtak.
57. Mr. Ravi Kumar Yadav (PhD student with Dr. Sunil Patil) received the second-best poster presentation award at the AMI (Association of Microbiologists of India) 2023 conference held at Maharshi Dayanand University (MDU), Rohtak.
58. Mr. Ravi Kumar Yadav (PhD student with Dr. Sunil Patil) received the CSIR International/Foreign travel grant to participate and present research work at the Global ISMET (International Society of Microbial Electrochemistry and Technology) conference 2022 held at Chania, Greece.
59. Mr. Moumita Roy (PhD student with Dr. Sunil Patil) received the SERB International travel grant to participate and present research work at the Global ISMET (International Society of Microbial Electrochemistry and Technology) Conference 2022 held at Chania, Greece.
60. Haseeb Hakkim won international travel grant to attend IGAC Open Science Conference covering all expenses.
61. Subhashri Sarkar (PH19006) Awarded with visiting students fellowship (October to January 2023) to work on scholarly research related to the gig economy & helping behavior at Coller School of Management, Tel Aviv University, Israel. Data collected prior to arrival.
62. Subhashri Sarkar Awarded with Punjab Good Governance Fellowship in April 2023 from the Government of Punjab.
63. Shashi Mehra Travel grant to attend Indo-Pacific Prehistory Association conference in Thailand
64. Shashi Mehra, National Geographic writing and travel grant
65. Shashi Mehra, Travel grant to attend INQUA (Quaternary) conference in Italy, July, 2023
66. Yezad Pardiwalla, Travel grant to attend Indo-Pacific Prehistory Association conference in Thailand
67. Yezad Pardiwalla, Travel grant to attend INQUA (Quaternary) conference in Italy, July, 2023
68. Anubhav Preet Kaur, Travel grant to attend INQUA (Quaternary) conference in Italy, July, 2023
69. Anubhav Preet Kaur, Jackson School of Geosciences award to attend the Society of Vertebrate Paleontology conference in Toronto, November 2-5, 2022
70. Rajesh Poojari, Travel grant to attend Indo-Pacific Prehistory Association conference in Thailand
71. Ravindra Devra Nick Ryan travel bursary to attend Computer Archaeology Association conference in Amsterdam, Netherlands, April 2023
72. Atharva Deshpande (BS-MS student) Travel grant to attend Indo-Pacific Prehistory Association conference in Thailand
73. Aarya Joshi (BS-MS student), Travel grant to attend Indo-Pacific Prehistory Association conference in Thailand
74. Travel to Washington University, St Louis MO, USA in May 2022 for conference on *Algebraic Geometry and Algebraic K-Theory*. (See above for talk presented at this conference.)
75. Mr. Prakash Chandra Joshi was selected for PMRF fellowship.
76. Best presentation award to Abhimanyu Nowbagh (PhD student) at International Soft Matter Conference, Jaipur, December 2022.
77. Ashish Kumar Meena was a joint recipient of the V V Narlikar best thesis prize of the Indian Association for General Relativity and Gravitation (IAGRG).
78. SERB International Travel Support Grant awarded to Mr. Harkirat Singh Sahota; Jan 2023 for participating in "Time and Clocks, Bad Honnef, Germany (27 February, 2023 to 03 March, 2023)"
79. Dr. Amit Vashist received the Inspire Faculty award in 2023 and has joined INST, Mohali.
80. Deepti Rana has been awarded the "Best Poster Award" in SNS 2022 at IISc Bangalore.
81. Kanika Rajput: Travel Grant to attend National Symposium on Avian Biology, CUSB.

82. Ashish Jha: SERB-NPDF to work with Manjari Jain on a project titled “Stable-isotope analysis for understanding avian community dynamics and ecological niche”
83. Ashish Jha: Equipment Grant from Idea Wild Grant, Colorado, USA.
84. Mr. Amit got CSIR travel grant for presenting his work at SPIE Photonics West San Francisco, California, USA 2023.
85. Tsering Choton. 2022. European Society for Evolutionary Biology Travel Grant.

10. Major facilities procured

Mahak Sharma

— Spinning Disk Super Resolution Confocal Microscope

Sadhan Das

— Procured two Mili-Q water system for the Department of Biological Sciences.

Samrat Mukhopadhyay

— Single-Molecule Fluorescence Microscope (SUPRA grant awarded to Prof. Samrat Mukhopadhyay).

Vidya Devi Negi

— My lab, the infection immunology lab (2i-lab) was set up and is fully functional now in AB2-L2T2. The space is being shared with Dr Sadhan Das. The 2i lab was capable to host 6 summer intern also this summer.

Kuduva R. Vignesh

— Procured a Rotavapor and a Computing cluster from the institute start-up grant for my new lab.

Sabyasachi Rakshit

— We successfully set-up a multibead Magnetic Tweezer (MMT) in the lab and demonstrated experiments on extracellular matrices.

Sanchita Sengupta

— UV/Vis spectrophotometer with temperature controller (Cary 60)

— Solar Simulator with 300 W Xe Lamp and accessories (Newport Corp.) (purchase process in progress, PO generated).

Chandrakanta Ojha

— Procured High-Performance Computing (HPC) cluster for my research group (SRSLab)

Vinayak Sinha

— CHARON-PTR-TOF mass spectrometer for measurements of speciated volatile organic compounds and fine mode organic aerosol in ambient air.

Yunus Ali Pulpadan

— Procured UAV with LiDAR and Thermal sensor for geomorphic mapping studies, and a UV-VIS spectrophotometer for water quality analysis

Ananth Venkatesan

— DST FIST Facility has been set up. A RF-grade PCB prototyping system and a wire bonder are installed to make devices. A host of Test and Measurement equipment like Microwave AWG and Vector Network analyser have been installed.

Jasjeet Singh Bagla

— A radio astronomy facility consisting of 16 antennas and associated hardware has been received on a long term loan from the Raman Research Institute, Bangalore. This facility will be used for projects in astronomy and also as a facility for experiments associated with astronomy. This will also be linked up with similar facilities elsewhere in the country and used as a part of a pan Indian facility by students

Prasenjit Das

— I have purchased two workstations for high-performance computing. Each workstation has 16 cores, 64GB RAM, 4TB Hard-disk.

Samir Kumar Biswas

— We have designed and developed indigenously nanofiber fabrication facility, fabricated nano fibers, designed, fabricated sensor and tested it forreal world problem. Developed and functioning wave front shaping set up for focusing radiation inside biological system

11. Current Project and Fellowships

Sr. No.	Project No.	Name of project	Principal Investigator	Funding Agency	Duration	Total Sanctioned Cost
1	MEFC-16-0121	NATIONAL CARBONACEOUS AEROSOLS PROGRAMME (NCAP) WORKING GROUP-III PROJECT	DR BAERBEL SINHA	MOEF-CC	2016-2020	106,00,000.00
2	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
3	DBT-17-0128	UNDERSTANDING THE EVOLUTION OF IMMUNE RESPONSE: AN EXPERIMENTAL EVOLUTION APPROACH	DR. N. G. PRASAD	DBT	2017-2020	60,68,200.00
4	FIST-17-0147	FIST PROGRAM-2017	DR. ANAND K. BACHHAWAT	DST	2018-	460,00,000.00
5	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
6	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
7	DST-18-0156	A1-HOMOTOPY AND BIRATIONAL GEOMETRY	DR. CHETAN TUKARAM BALWE	DST-SERB	2018-2021	6,60,000.00
8	INSPIRE-18-0158	INSPIRE FACULTY AWARD	DR. SOMA MAITY	DST	2018-2021	35,00,000.00
9	DST-18-0159	NEGATIVE CURVATURE IN GROUP AND COMBINATION THEOREMS	DR. PRANAB SARDAR	DST-SERB	2018-2021	6,60,000.00
10	DBT-18-0169	CO2 ELECTRO-BIOREFINERY: INDUSTRIAL CARBON DIOXIDE CONVERSION INTO MULTICARBON CHEMICALS THROUGH INTEGRATED BIOELECTROCHEMICAL AND BIOLOGICAL PROCESSES	DR. SUNIL ANIL PATIL	DBT	2019-2022	50,62,000.00

11	DST-19-0174	KNOT INVARIANTS ARISING FROM QUANDLES	DR. SHANE D'MELLO	DST-SERB	2019-2022	6,60,000.00
12	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
13	DST-19-0178	QUANTUM INFORMATION TECHNOLOGIES WITH PHOTONIC DEVICES	PROF. ARVIND	DST	2019-2022	5864,63,000.00
14	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
15	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
16	QUST-19-0181	QUANTUM IMAGING AND QUANTUM PROCESSING WITH PHOTONICS	DR. MANDIP SINGH	DST	2019-2022	565,02,000.00
17	QUST-19-0182	HIGH TEMPUERATURE PHOTONIC QUANTUM MEMORY	DR. SANDEEP KUMAR GOYAL & PROF. ARVIND	DST	2019-2022	73,92,000.00
18	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
19	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
20	DST-19-0186	NEW HYPOTHESIS DRIVEN PHARMACEUTICALLY IMPORTANT COMPONDS	DR. S.S.V. RAMSASTRY	DST	2019-2020	203,00,000.00
21	DST-19-0187	GLOBAL KNOT THEORY INVARIANTS AND CLASSIFICATION	DR. K. GONGOPADHYAY	DST	2019-2022	37,79,400.00
22	DBT-19-0190	HYPERTHERMOPHILE ENZYME HYDROLASE RESEARCH CENTRE (HEHRC): A MICRO CENTRE FOR	PROF. PURNANANDA GUPTASARMA	DBT	2019-2024	215,25,988.00

		RESEARCH AND DEVELOPMENT RELATING TO THERMOPHILE AND HYPERTHERMOPHILE MICROBE-DERIVED HYPER THERMOSTABLE HYDROLASE ENZYMES RELEVANT TO BIOFUELS AND THE ENERGY BIOSCIENCES				
23	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
24	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
25	TIFR-19-0193	VIGYAN PRATIBHA	DR. AMBRESH SHIVAJI & DR. N G PRASAD	TIFR-HBCSE	2019-2020	11,50,000.00
26	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
27	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
28	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
29	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
30	DBT-19-0200	MECHANISMS REGULATING MEMBRANE FUSION WITH LYSOSOMES AND LYSOSOME REFORMATION	DR. MAHAK SHARMA	DBT ALL	2019-2024	445,50,000.00

31	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
32	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
33	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
34	STARS-19-0205	SINGLE DOMAIN ANTIBODIES AS NOVEL THERAPEUTICS FOR SNAKEBITES	DR SHARVAN SEHRAWAT	STARS-MHRD	2019-2022	49,57,000.00
35	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
36	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
37	DST-19-0208	KNOTS, GROUPS AND ACTIONS	DR. MAHENDER SINGH	SJF-SERB	2020-2024	55,36,128.00
38	DST-19-0209	SWARNAJAYANTI FELLOWSHIP	DR. MAHENDER SINGH	SJF-DST	2020-2024	40,00,000.00
39	DST-19-0210	INTERACTING URN PROCESSES AND THEIR APPLICATION TO OPINION DYNAMICS	DR. NEERAJA SAHASRABUDHE	DST-SERB	2019-2022	6,60,000.00

40	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
41	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
42	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
43	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
44	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
45	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
46	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
47	STARS-20-0218	BENCHMARKING HERBAL AYURVEDIC MEDICINES USING NMR METABOLOMICS TECHNIQUES	DR. KAVITA DORAI	STARS-MHRD	2020-2023	49,51,000.00
48	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
49	DST-20-0220	AWARD RESEARCH SCIENTIST SCHEME	DR. MONIKA SHARMA	DST-SERB	2020-2022	46,00,000.00

50	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
51	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
52	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
53	FIST-20-0225	FIST PROGRAM-2019	DR. S.A. BABU	DST FIST	2020	244,00,000.00
54	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
55	DST-20-0227	PHOTOSWITCHABLE AND MAGNETIC PHOTOSWITCHABLE IONIC LIQUIDS THEORY AND EXPERIMENTS	DR. SUGUMAR VENKATARAMANI	DST	2020-2023	27,25,150.00
56	DBT-20-0228	MECHANISTIC STUDY OF PLASMODIUM APICOPLAST REPLICATION	DR. INDRAJIT LAHIRI	DBT ALL	2020-2025	350,79,000.00
57	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

58	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
59	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
60	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
61	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
62	RSC-20-0234	ASYMMETRIC DESYMMETRIZATION VIA PHOSPHINE CATALYSIS	DR. S. S. V. RAMASASTRY	ROYAL SOCIETY	2021-22022	3,86,000.00
63	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
64	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
65	FIST-20-0237	FIST PROGRAM-2019	DR. SANJEEV KUMAR	DST FIST	2020-2025	270,00,000.00
66	DST-20-0238	DELINEATING THE MOLECULAR MECHANISM OF AGE-RELATED HEARING LOSS	DR. SABYASACHI RAKSHIT	DST-SERB	2020-2023	66,73,832.00

67	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
68	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
69	DST-21-0241	RESEARCH SCIENTIST SCHEME (SRS)	DR. SMRITI MAHAJAN	DST-SERB		46,00,000.00
70	SERB-21-0242	J C Bose Fellowship	PROF. SUDESHNA SINHA	DST-SERB	2021-2026	95,00,000.00
71	FIST-21-0243	FIST PROGRAM-2019	DR. K. GONGOPADHYAY	FIST-DST	2021-2026	70,00,000.00
72	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
73	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
74	DBT-21-0246	UNDERSTANDING THE CELLULAR REDUCTIVE STRESS RESPONSE	DR. JOGENDER SINGH	DBT	2021-2026	42,50,000.00
75	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
76	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
77	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

78	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
79	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
80	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
81	INSPIRE-21-0253	INSPIRE FACULTY AWARD	DR. SUMAN K. BARMAN	DST	2021-2026	35,00,000.00
82	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
83	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
84	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
85	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
86	DST-21-0258	DEPLOYABLE PHOTOACOUSTIC CT SYSTEM DEVELOPMENT FOR 3D ANGIOGENESIS IMAGING AND ANATOMICAL STRUCTURE MONITORING FOR DIAGNOSING INFLAMMATION AND ARTHRITIS DISEASE IN HUMAN FINGER JOINTS	DR.SAMIR KUMAR BISWAS	DST	2021-2024	98,46,862.00
87	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

88	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
89	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
90	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
91	DBT-22-0263	SPECIFIC SINGLE DOMAIN ANTIBODIES (SDABS) AGAINST ANTIMICROBIAL RESISTANT MASTITIS PATHOGENS FOR CLINICAL THERAPEUTIC USE IN DAIRY ANIMALS	DR. SHARVAN SEHRAWAT	DBT	2022-2025	52,35,542.00
92	DBT-22-0264	LARGE-SCALE GENOMIC AND PROTEOMIC DATA ANALYSIS-BIC AT INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH MOHALI	DR. SHASHI BHUSHAN PANDIT	DBT	2022-2027	195,30,864.00
93	DBT-22-0265	MECHANISTIC INSIGHTS INTO EPIGENETIC LAYERS INVOLVED IN IMPAIRED WOUND HEALING AND CARDIOVASCULAR DISEASES IN DIABETES	DR. SADHAN DAS	DBT ALL	2022-2026	354,37,821.00
94	INSPIRE-22-0266	INSPIRE FACULTY AWARD	DR. PANKAJ KUSHWAHA	DST	2022-2027	35,00,000.00
95	ISRO-22-0267	POTENTIAL IMPACT OF MOIST AND THERMODYNAMIC PROFILES ON THE PREDICTION OF EXTREME RAINFALL EVENTS OVER CENTRAL INDIA IN A CLOUD-RESOLVING MODELLING FRAMEWORK	DR. RAJU ATTADA	ISRO-IIRS	2022-2025	29,70,264.00
96	DBT-22-0268	TO STUDY AND GAIN MECHANISTIC INSIGHTS INTO THE REGULATION OF SALMONELLA PATHOGENESIS BY ENDOGENOUS CRISPR-CAS SYSTEM	DR. VIDYA DEVI NEGI	DBT	2022-2025	15,04,250.00
97	SERB-22-0269	MULTICHROMOPHORIC ANTENNA SYSTEMS BASED ON ENERGY TRANSFER AS DYE SENSITIZED PHOTOCATALYSTS FOR VISIBLE LIGHT DRIVEN H2 EVOLUTION : A COMPARATIVE STUDY	DR. SANCHITASEN GUPTA	DST-SERB	2022-2025	48,67,500.00

98	ICSSR-22-0270	EMPLOYMENT DIGITAL LABOUR AND URBAN PRECARITY INSIGHTS FROM CHANDIGARH KOLKATA HYDERABAD MUMBAI	DR. DEBDULAL SAHA	ICSSR	2022-2024	11,00,000.00
99	SERB-22-0271	ROLE OF RUN AND FYVE DOMAIN-CONTAINING PROTEIN RUFY1 IN CARGO SORTING AND TRANSPORT TO GOLGI AND GOLGI-DERIVED STORAGE VESICLES	DR. MAHAK SHARMA	DST-SERB	2022-2025	59,01,808.00
100	DST-22-0272	STRONG LIGHT MATTER INTERACTIONS IN TWO DIMENSIONAL MATERIALS COUPLED WITH PLASMONIC NANOSTRUCTURES	DR. JHUMA DUTTA	DST-WOS	2022-2025	33,52,181.00
101	SERB-22-0273	STUDY OF MODULATION OF HOST INFLAMMATORY RESPONSES VIA LOX-1 SCAVENGER RECEPTOR IN RESPONSE TO THE GRAM-NEGATIVE BACTERIAL LIGANDS	DR. ARUNIKA MUKHOPADHYAY	DST-SERB	2022-2025	58,21,332.00
102	DBT-22-0274	NATIONAL NETWORK PROJECT OF CSIR-IHBT	DR. KULJEET SINGH SANDHU	DBT		10,90,000.00
103	DBT-22-0275	EXPLORING THE MOLECULAR MECHANISMS OF NuRD COMPLEX FUNCTIONS DEURING RETINA REGENERATION	DR. RAJESH RAMACHANDRAN	DBT	2022-2025	86,01,640.00
104	DBT-22-0276	INVESTIGATION OF THE ROLE OF ANTAGONISTS IN GROUP I mGluR TRAFFICKING AND ……	DR. SAMARJIT BHATTACHARYYA	DBT	2022-2025	74,01,600.00
105	DBT-22-0277	UNDERSTANDING THE MECHNISITC BASIS OF SPECIFIC GLUTATHIONYLATION ……..	DR. ANAND K BACHHAWAT	DBT		
106	DBT-22-0278	SEXUAL SELECTION AND EVOLUTION OF IMMUNE FUNCTION	DR. MANJARI JAIN	DBT	2022-2025	62,40,240.00
107	SERB-22-0279	ASSESSING GLACIER RETREAT AND LINKS BETWEEN INCREASING LANDSLIDES AND CHANNEL EROSION IN HIGH MOUNTAIN ASIA	DR. YUNUS ALI POLPADAN	DST-SERB	2022-2024	32,47,920.00
108	SERB-22-0280	ZEPTO-NEWTON-METER SILK SENSORS: DESIGN, FABRICATION AND APPLICATIONS	DR. KAMAL P SINGH	DST-SERB	2022-2025	102,04,360.00

109	SERB-22-0281	EPIGENETIC MECHANISMS UNDERLYING METABOLIC MEMORY OF DIABETIC STATE IN VASCULAR SMOOTH MUSCLE CELLS	DR. SADHAN DAS	DST-SERB	2022-2024	31,08,238.00
110	DST-22-0282	DESIGN AND DEVELOPMENT OF AN AI-BASED PORTABLE ELECTRICAL IMPEDANCE TOMOGRAPHY (EIT) SYSTEM FOR RESPIRATORY FUNCTION STUDIES USING MACHINE LEARNING TECHNIQUES	DR. SAMIR KUMAR BISWAS	DST	2022-2025	1,50,041.00
111	MES-22-0283	EVALUATION OF THE IMPACT OF DWR OBSERVATION ON PREDICTION OF EXTREME RAIN FALL EVENTD OVER THE NORTHWESTERN INDIAN REGION USING WRF VARIATIONAL DATE ASSIMILATION SYSTEM	DR. RAJU ATTADA	MOES	2022-2025	31,79,037.00
112	SERB-22-0284	RHEOLOGY OF CHARGED AMORPHOUS SYSTEMS	DR. PRASENJIT DAS	DST-SERB	2022-2024	23,05,978.00
113	WEL-22-0285	MECHANISTIC INSIGHTS INTO THE REGULATION OF FATTY ACID METABOLISM BY ENVELOPE STRESS RESPONSE PATHWAYS IN BACTERIA	DR. RACHNA CHABA	DBT ALL	2022-2028	449,87,272.00
114	SERB-22-0286	UNCOVERING CHEMOTACTIC BEHAVIOUR AND SPATIOTEMPORAL ORGANIZATIONAL PATTERN OF BIOMOLECULAR CONDENSATES IN CATALYTICALLY HETEROGENEOUS MICROENVIRONMENT	DR. SUBHABRATA MAITI	DST-SERB	2022-2025	38,99,550.00
115	SERB-22-0287	CYCLOPROPENIUM AND TROPYLIUM CATIONS AS ORGANIC LEWIS ACID CATALYSTS IN ORGANIC TRANSFORMATIONS	DR. R VIJAYA ANAND	DST-SERB	2022-2025	50,73,992.00
116	SERB-22-0288	SERB RESEARCH SCIENTIST	DR. SANJBIB DEY	DST-SERB	2022-2024	46,00,000.00
117	SERB-22-0289	MOMENT DILATION AND LOCALLY COMPLETELY POSITIVE MAPS	DR. SANTHOSH KUMAR PAMULA	DST-SERB	2022-2024	13,23,872.00
118	SERB-22-0290	SEMICLASSICAL EFFECTS OF QUANTUM FLUCTUATIONS IN BOUNDARY CONDITIONS	DR. KINJALK LOCHAN	DST-SERB	2022-2025	6,60,000.00

119	SERB-22-0291	REALITY ADJIONT ORBITS AND DECOMPOSITION	DR. K. GONGOPADHYAY	DST-SERB	2022-2025	26,80,436.00
120	IFC-22-0292	CHARACTERIZATION OF ENTEROBACTER SP. SA187 BENEFICIAL EFFECT ON PLANT DEVELOPMENT UNDER LIMITED NITROGEN AVAILABILITY THROUGH OMICS ANALYSES AND GENETIC SCREEN	DR. SANTOSH B. SATBHAI	CEFIPRA	2022-2025	69,82,062.00
121	ICMR-22-0293	NOVEL GENES IN GLAUCOMA PATHOGENESIS: A VALIDATION IN GLAUCOMA PATIENTS AND ANIMAL MODEL	DR. RAJESH RAMACHANDRAN	ICMR	2022-2025	14,58,510.00
122	SERB-22-0294	REDUCTION OF NITROGEN OXYANIONS AND PROTONS: WATER REMEDIATION AND ENERGY RESOURCES	DR. SUMAN K. BARMAN	DST-SERB	2022-2025	32,89,000.00
123	SERB-22-0295	UNDERSTAND THE PROXY (IN) COHERENCE IN LAKE BASINS FROM VARIED CLIMATIC REGIMES-IMPLICATIONS FOR PALEOCLIMATE RECONSTRUCTION	DR. ANOOP AAMBILI	DST-SERB	2022-2025	20,62,000.00
124	DST-22-0296	PALAEOCLIMATIC CHANGES DURING HOLOCENE USING MULTIPROXY RECORDS FROM PEATLAKE DEPOSITS FROM CENTRAL GARHWAL HIMALAYA	DR. ARCHNA BOHRA	DST-WOS	2022-2025	31,06,512.00
125	BIRAC-22-0297	DEVELOPMENT OF DIPHENYL UREA DERIVATIVES AS A NEW CLASS OF ANTIVIRALS AGAINST DENGUE VIRUS INFECTION	DR. INDRANIL BANERJEE	BIRAC	2022-2028	38,68,000.00
126	SERB-22-0298	STUDY OF MAGNETIC AD TRANSPORT PROPERTIES OF QUANTUM SPIN LIQUIDS UNDER THE APPLICATION OF HIGH PRESSURE	DR. YOGESH SINGH	DST-SERB	2022-2025	25,39,240.00
127	DST-22-0299	IMAGING ANCIENT DIGITAL PRESERVATION RISK ASSESSMENT, SPATIAL SIMULATION AMP CHRONOLOGICAL INTERPRETATION OF ROCK ART HERITAGE USING MULTIPLE TECHNOLOGIES	DR. PARTH R CHAUHAN	DST	2023	44,05,763.00

12. Academic Programs

The academic year 2022-23 has seen gradual return to pre-Covid protocols. While there was a delay in the start of the session for the new batch, the delay was shorter than in the last two years and with a suitably tuned academic calendar we will enable these students to have a two month summer break. Batches joining in 2020 and 2021 did not have a summer break and they completed their second semester in this time to align their programs with the senior batches by their respective third semester. We also transitioned to in person classes and examinations. Online classes were used only occasionally to account for the offset semesters for the first year and senior students. It is expected that there will be no offset semesters from the next academic year.

The Senate of IISER Mohali has adopted guidelines pertaining to ethics in research and teaching. These guidelines cover many aspects of interactions in the institute and highlight the fact that ethical behavior is expected from everyone and coercion, bullying and harassment have no place in the institute. A committee to address violations of these guidelines has also been recommended by the Senate.

In the continued efforts to incorporate more aspects of NEP-2020 in the academic programs at IISER Mohali, the institute has now joined the academic bank of credits. Further, the institute has also approved the possibility of recruiting professors of practice to bring in experts who may not have the required academic qualifications. Students are now allowed to take some courses on the NPTEL-SWAYAM platform. With this as well as permission to take additional courses by students who are performing well, we have enabled such students to work for MS thesis in any institution in the world.

The BS-MS program offered at IISERs is intended to be highly interdisciplinary and students are encouraged to get involved with research projects and internships at an early stage. The Senate of IISER Mohali has now made at least one summer internship mandatory. This internship is a zero credit requirement for graduation and should be of at least eight weeks duration.

The institute is also progressing in its deliberations to revise the course structure in the BS-MS program in order to incorporate experience from the last fifteen years and also to make room for more majors like the Earth and Environmental Sciences. It is expected that the new course structure will be implemented starting with the next batch that will join the institute in August 2023.

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), e-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

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 equipped with 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 out put of Institutes in the form of Scientometrics-Projection of Institute Research, Publications,h-index, subjectwise& 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, 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 so on.

LIBRARY RESOURCES:

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-Shodsindhu) such as APS, AIP, Annual Reviews, EPW, JSTOR, MathScinet, OURIGINAL anti-pliagarism software , OUP,Project MUSE, SIAM , SpringerNature and many more .

- E-Journals: 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), American Society for Biochemistry and Molecular Biology (ASBMB), American Society of Hematology (ASH) , American Society of Plant Biologist (ASPB) ,Canadian Science Publishing (NRC), Cell Press, Chemical Society of Japan ,Cold Spring Harbor Press ,Company of Biologists ,Elsevier's Sciencedirect, Institute of Physics (IoP) ,JoVE, National Academy of Sciences ,Nature Publishing Group, Oxford University Press, Project Euclid Prime,Rockefeller University Press, Royal Society London, Royal Society of Chemistry (RSC),Society of NeuroScience , Springer Lecture Notes Series Maths & Physics, Thieme Medical Publishers (IISER C),The Royal Soc. Publishing, Taylor &Francis , Wiley, WorldScientific etc.

- e- Books : Springer Lecture Notes Series Maths & Physics series from Vol.1 to 2022, Cambridge University Press, AMS Memories, Current Developments in Mathematics book series rom 1995 to 2020 and World e-Book library and South Asian Archives through NDLI

- Bibliographical, Abstracts Databases and Citation Databases : MathSciNet, SciFinder Scholar and Scopus, J-STORE, Journal of Visualized Experiments (JoVE), Project MUSE, Project Euclid etc.,

-Research & Writing Tools: Academic Writing Tools such Grammerly and WRITEFUL, Library App MyLOFT“ (Remote Access Tool), anti-plagiarism software OURIGINAL, PressReaders-Online News Papers, Magazines database,

During the period, the library added the subscription to IndiaStat.com and CMIE's Consumer Pyramids Household Survey DX databases for 2023 and library has taken LIFETIME Subscription to print versions of CURRENT SCIENCE Journal. It also add new subscription to some of the journals from American Economic Association, SEG Millennium + Archive from GeoScience World, Chicago University Press etc.

- As Nodal Centre of Institute, the Library attended the following MOE Projects:

1. **Shodhganga**
2. **Indian Research Information Network System (IRINS)**
3. **National Digital Library of India (NDLI)**
4. **e-Shodsindhu**
5. **National Institutional Ranking Framework**: Provides Publications data, citation etc to the Institute Coordinator of NIRF

- Institutional Archives and Walk through Institute

- **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/

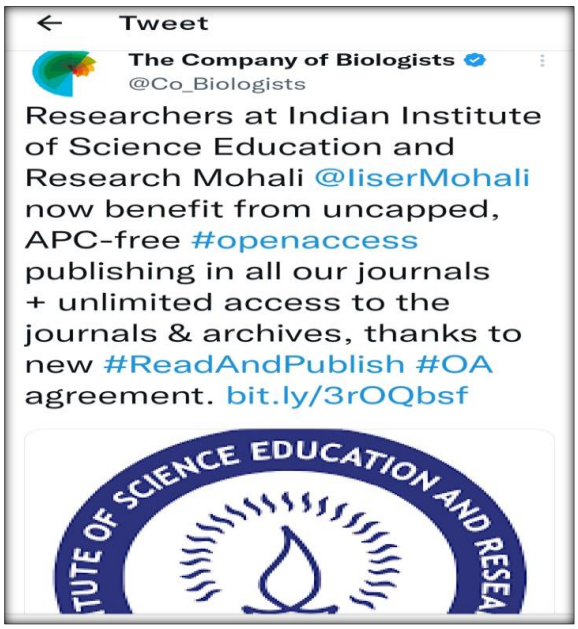
- **Annual Report of IISER Mohali:** Library collects, compiles, edit and organizes the Publications of Institute for Annual Report.

Open Access Publishing Intiative: Inorder to intiate and promote Open Access Publishing, the Library, IISER Mohali entered ' **Read & Publish**"agreement with various Publishers. It negotiated for either Discounted or free Article Processing Charges (APC) through„IISER Library Consortium" to publish in Hybrid or Open Access Journals by authors of IISER Mohali in 2023. As negotiated by IISER Library Consortium,

1. **American Association for the Advancement of Science (AAAS)** - Science Advances: The publisher offers a special discount of 15% on APC for publishing articles in the Science Advances (Gold OA Journal) for the corresponding authors from IISER Mohali
2. **Company of Biologists (CoB)**:Upon subscription to the follwoing three Journals , without any additional payment, the IISER Mohali will get the free unlimited article token to APC (Article Processing Charges) for publishing the article in OPEN ACCESS in the following three Hybrid Journals under CC BY Version 4.0 terms (see Creative Commons CC-BY Terms version 4.0 at https://creativecommons.org/licenses/by/4.0/).
    1) Development
    2) Journal of Cell Science (JCS)
    3) Journal of Experimental Biology (JEB).

However, the IISER Mohali author should be the corresponding author, and also the official email of the author (IISER Mohali email) has to be used while communicating with the publisher. The publisher also offers an APC fee waiver for India for the following gold open-access journals of CoB.

1. Biology Open
2. Disease Models and Mechanisms.



3. **Geological Society of America (GSA)** –Geology: The publisher offers two free Gold Open Access vouchers for corresponding authors from IISERs for publishing articles in Geology Journal on a first-come-first-serve basis.
4. **Rockefeller University Press:** Renewal cost of 3 titles package includes unlimited papers publishing in Open Access with no additional cost.

THE BEST LIBRARY USER AWARD 2021 – 22: 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 or staff etc**.** Accordingly, ***Mr. Shreyas Jain (MS20098)*** was winner of this Award for 2021-22. This award was given to him by Chief Guest of Institute Foundation Day on 27th Sept. 2022 with **"THE BEST USER of LIBRARY (2021-22)** AWARD". However, as Mr James Watt (MS19117) secured his position above Mr Shreyas Jain's position.

But since Mr James was already awarded in 2020 for 2019-20, the Committee felt that some recognition should be showered on him certificate in the form of "Appreciation".

OUTREACH PROGRAMMES: Library organized raining programmes to its users every year after renewal subscription to e-Resources.

A. User Orientation Programme:

1. Held library Orientation programs for Int & Ph.D. students on 17th Sept 2022 in the Library Committee Room.
2. Held library Orientation programs for MS22 batch students on 8th Nov 2022 in LHC
3. Annual Workshop & hands-on training on GRAMMRLY Writing Tool on 23rd July 2022
4. Annual workshop & hands-on training on MyLOFT on 21st Sept 2022
5. Webinar on -Preprints: A new way to publish your research results on 28th Sept 2022
6. MyLOFT user onboarding and training session on 14th May 2022
7. Training on SciFinder on 16th July 2022

14. Computer Centre

Computer center oversee 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 2022-23, the computer labs were used teaching various courses. Apart from these, labs were kept open for students and faculty to printing and other services.

Computer center manages the campus wide WiFi network and connectivity to Wide Area Network ('Internet') and provides seamless connectivity within institute intranet. 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 provided 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 and CC-ticket. The computer center had provided necessary logistics and network support for the 11th convocation live webcasting was also made available through official YouTube channel.

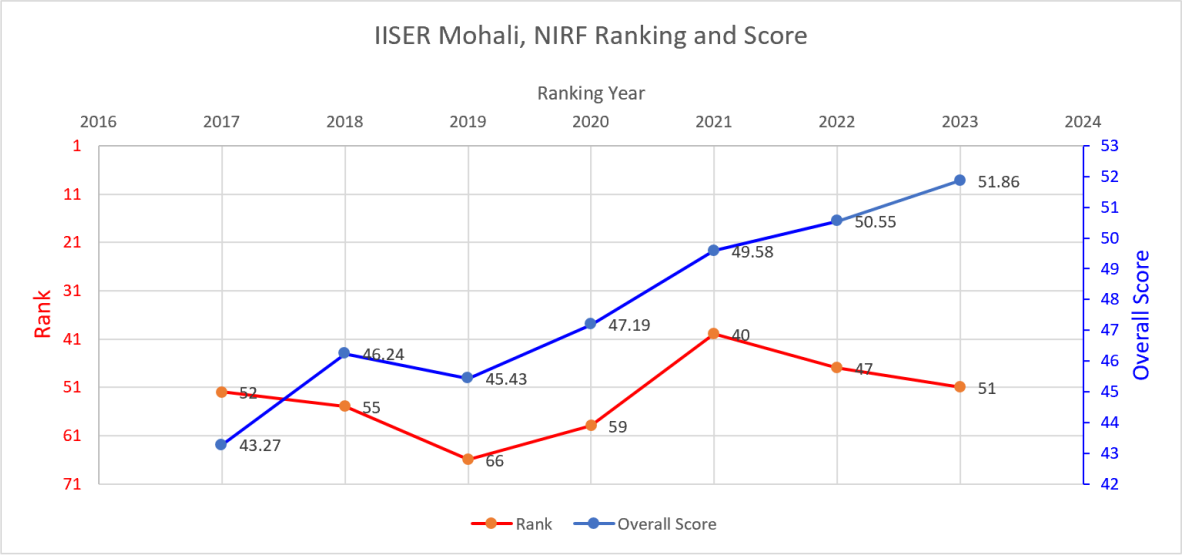
15. National Institutional Ranking Framework (NIRF) rank

In 2023, IISER Mohali participated in the Overall as well as in the Research category of NIRF. The institute was ranked 51 in the Overall category of the National Institutional Ranking Framework and ranked 50 in the Research category. The results were announced online at 11:00 AM on June 5, 2023. 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

1st April 2022 to 31st March 2023, whereas for the publication details, external funding, and financial resource utilization, the time frame was for the previous 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, in 2021 IISER Mohali was ranked 40 in the overall category, 2022 IISER Mohali was ranked 47 in the overall category and 2023 IISER Mohali was ranked 51 in the overall category

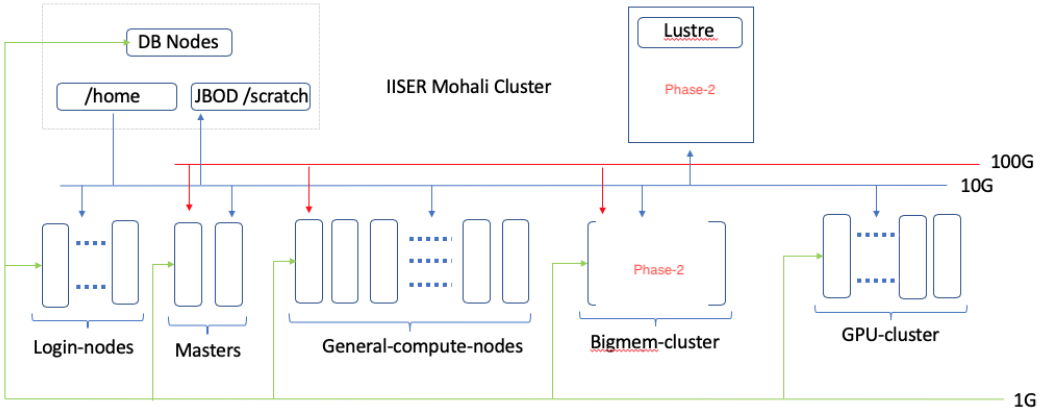


16. Establishment of High-Performance Computing

IISER Mohali has recently augmented its High-Performance Computing (HPC) resources, and this year, the Phase-I of this commissioning has been completed. The HPC facility fosters collaboration among researchers and data scientists within the IISER Mohali Community by providing an environment conducive to sharing knowledge, resources, and expertise to tackle complex scientific problems and perform large-scale simulations/modeling. The HPC facility at the institute is a heterogenous facility that plays a pivotal role in supporting the computational needs of researchers, faculty, and students across various departments & disciplines. Some of the ongoing activities include computational fluid dynamics (CFD), machine learning and artificial intelligence (ML/AI), Astro-dynamics, bio-molecular simulations, computational chemistry, computation biology, environmental and weather modeling simulations, and several other areas of science and technology. The HPC is established as a central facility coordinated by Dr. Satyajit Jena, the Convenor of the facility, in consultation with Prof. Vijaya Anand, the Dean of R&D, and Prof. J. Gowrishankar, the Director of the institute.

As one of the premier institutions in India, IISER Mohali's HPC facility is equipped with cutting-edge hardware and software technologies to cater to the diverse computational needs of its faculty, researchers, and students. Here's an overview of the facility:

1. Hardware: The HPC facility is equipped with a powerful cluster of computing 36 CPU-only nodes, each comprising high-performance CPUs, 2 x Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz (26c), fast-access memory, and local scratch. These nodes are interconnected through high-speed 10G-Base-T networks, and low-latency 100G FDR InfiniBand networks, enabling efficient parallel processing and data sharing among the computing resources.



2. Hardware Accelerators: The facility incorporates specialized hardware accelerators, 12 Nvidia Tesla T4 GPUs (320 Turing Tensor Cores, 2560 CUDA Cores, 130 TOPS of INT8, and 16 GB GDDR6 300 GB/sec GPU Memory), distributed in 3 host nodes with 2 x Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz (26c), large memory and highspeed local disks to handle ML/AI-related workloads. Each GPU is capable of 8.1 TFLOPS single precision calculation. These accelerators enable researchers to accelerate complex simulations, data analysis, and machine learning tasks.
3. Scalability and Performance: The computing cluster is designed for scalability, allowing easy expansion of computing resources to accommodate the growing demands of computational research in the future.
4. Software Stack: The HPC facility at IISER Mohali provides a comprehensive software stack tailored to meet the diverse needs of the research community. It includes a range of scientific computing libraries, parallel processing tools, and popular programming languages such as Python, C/C++, and Fortran. Additionally, it supports a wide range of scientific software packages and modeling tools such as ESPResSO, VASP, LAMMPS, SIESTA, CPMD, CP2K, ABNIT, NAMD, GROMACS, AMBER, Gaussian, Molpro, MATLAB, Mathematica, ANSYS etc.,).
5. Data Storage and Management: To support data-intensive research, the facility features a high-capacity 200TB JBOD as persistent storage for reliable access to large datasets, 30TB of global scratch, 7TB of local scratch, and high-speed storage systems (20TB flash storage) that seamlessly host all user data. Researchers can store and analyze their data securely within the HPC infrastructure. The entire system is managed and controlled by a dedicated master node, the database servers, and load balancers with all open source based software.

17.TBI IISER Mohali

17.1 About i-RISE

17.1.1 Introduction: IISER-Raising Innovative & Sustainable Enterprises (i-RISE)

IISER Mohali's Technology Business Incubator was founded in 2018 to encourage innovation and entrepreneurship in the field of science and technology. TBI IISER Mohali is working to transform and build a 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 programs for entrepreneurs based on their level and trajectory. Startups 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 program 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.

17.1.2 Incubator strengths

Deep domain expertise

Deep, hands-on support of research and technical domain experts from IISER Mohali.

Strong research Pedigree

An array of existing research to the incubated startups to learn and leverage from.

Industry partner network

Network industry partners across the country

Office and lab infrastructure

Dedicated and spacious office & and well-equipped lab infrastructure.

17.2 TBI IISER Mohali Team

17.2.1 Chairman

Prof. J Gowrishankar Director, IISER Mohali

17.2.2 Executive Board Members

1. Mr. Satyendra S. Choudhary CEO, TBI-IISER Mohali

2. Prof. Jagdeep Singh Registrar, IISER Mohali

3. Dr. Sharvan Sehrawat Faculty, Biological Sciences, IISER Mohali

4. Prof. R Vijaya Anand Dean R & D, Faculty, Chemical Sciences, IISER Mohali

5. Prof. Amit Kulshrestha Faculty, Mathematical Sciences, IISER Mohali

6. Prof. Kamal Priya Singh Faculty, Physical Sciences, IISER Mohali

7. Dr. Sunil Patil Faculty, Earth and Environmental Sciences, IISER Mohali

17.2.3 TBI Operational Staff

1.Mr. Satyendra S. Choudhary-CEO

2. Ms. Anshika Bansal - Laboratory Manager

17.3 Initiatives -Programs

17.3.1 IISER Startup 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.

17.3.1.1 PROGRAM STRUCTURE

Phase 1- A three-week workshop to train and direct start-ups in turning their ideas into profitable businesses.

Phase 2- Following the 3-week workshop (phase 1), the start-ups will be linked to i-RISE for long-term incubation as per the recommendation of the evaluation committee.

17.3.1.2 PROGRAM BENEFITS

1. Office Space

2. Product validation and testing

3. IP support/patent filing

4. Company registration and documentation

5. Business Plan document

6. Pitching document

7. Pilot testing linkage with the industry/university

8. Market research support (FGD/customer survey etc)

9. Market communication plan (social media, digital marketing, branding, positioning etc)

10. Investors Connect

17.3.1.3 Program USPs

•Business and Research Support IISER is the pioneer institute in science and technology, research and innovation. An international platform harboring cutting-edge technology and strong alumni networks.

•A seamless blend of Renowned faculty, a Strong network of industry experts, research institutes, management schools, and government agencies, world-class research la,bs and an effective funding platform.

•Prominent Location & Infrastructure World-class infrastructure - office space & residential complex Close to Government agencies being located in Mohali, multiple Biotech, Agri & food processing, and research institutes.

17.3.2 Technology, Research, Entrepreneurship, eXchange (TREX) 2022

i-RISE IISER Mohali TBI, in collaboration with Startup Punjab and the Punjab State Council of Science and Technology, hosted TREX 2022 - The Startup Conclave on September 24, 2022. The primary objective of this conclave was to provide a platform for startups to showcase their journeys and to foster connections among policymakers, industry leaders, academia, investors, startups, and various stakeholders from across the nation. The event featured a Startup Expo, kicking off with a panel discussion led by notable entrepreneurs like Shantanu Deshpandey (Founder of The Bombay Shaving Company), Abhinav Sinha (Founder of Gooddot), and Sameer Sharma (Founder of uEngage), who shared insights on building successful Indian brands. Another panel discussion gathered renowned investors and industry experts, including Rahul Navekar, Rajesh Sawhney, Munish Jauhar, and Nitika Khurana. The conclave covered crucial topics such as startup ecosystem support, technology commercialization, women entrepreneurs, and emerging startups. The event's highlight included a session with celebrity entrepreneurs Vanya Mishra and Aditi Gupta, discussing how to turn startup dreams into reality. It also featured business idea presentations, poster sessions, and closed-door startup pitching sessions. With a significant attendance of five hundred visitors, the conclave concluded with a valedictory ceremony and a note of gratitude.

17.3.3 Events in collaboration with other institutes

a) Partnered with Startup in a Box and SACC for ‘What Not to do while Fundraising’ session as an ecosystem partner 31st May 2022.

b) -RISE TBI IISER Mohali in association with Innovation Mission Punjab and Startup India conducted a session on Startup India Seed Fund Scheme for incubated startups, nearby incubators and other stakeholders.

c) i-RISE was the ecosystem partner of the Khoj'22 Venture Catalysts Bharat Startup Yatra, 2022. A panel discussion on 'Going Global, Building in Bharat' followed by an exciting startup pitching session were organized on June, 2023.

d) Knowledge Session on ‘Startups & Emerging Technologies,’ organized by i-RISE IISER Mohali in association with Punjabi Chamber of Commerce on August 6, 2022.

e) To nurture young and budding entrepreneurs to pave the path for entrepreneurship, IISER Mohali TBI in association with Fraser Valley India and the Consortium of Business Mentors and Advisors organized Entrepreneurship Awareness Session on 18th August 2022.

f) Got associated as ecosystem partner with TiE Chandigarh for 'The Israel-TiE Chandigarh Business Plan Competition in collaboration with The Embassy of Israel on 8th December 2022.

g) To promote entrepreneurship among students and young enthusiast, IISER TBI Mohali partnered with The Hindu Group Business line for organizing Campus Connect session on 25th November 2022.

h) IISER Mohali collaborated with Buddy Foundation as a Knowledge Partner for G20 Millet Mela, Chandigarh on 29th March 2023. Startups like Breww Therapeutics, AGNEXT, The Naturik Co, Mkelly Biotech, Kitchen Stories by us, Delicious Bytes, Pind B and Magic Creation by Rosy participated and exhibited at Mela in Rock Garden, Chandigarh.

17.4 i-RISE IISER Mohali TBI Activities-

a) IISER Mohali TBI participated in the 8th edition of India International Science Festival (IISF2022), which was organised from 21st-24th January 2023, at Maulana Azad National Institute of Technology (MANIT), Bhopal with a focus on Innovation and Startups. Our incubated startups- Fermentech Labs Pvt Ltd and Verdant Impact got a chance to showcase their products and services during the event.

b) i-RISE TBI IISER Mohali along with incubated startups AgNext Technologies Pvt Ltd, Black Eye Technologies Pvt. Ltd., Aiotize Pvt Ltd and Breww Therapeutics Pvt Ltd participate and showcased their products at the 5th Progressive Punjab Investors' Summit from 23rd & 24th Feb 2023. The two-day Summit aims to attract potential investment and business opportunities across the globe, build relationships and engage with Start-ups on innovative ideas and solutions.

c) On the occasion of National Science Day, i-RISE IISER Mohali TBI conducted a Firechat session on Innovation, Intellectual Property Creation, Contractual legal, and Commercialization on 28th February 2023. Pleased to host Mr. John Cabeca (US Intellectual Property Counselor for South Asia), Ms. Sasha Rao (Partner- Maynard Cooper & Gale) and Dr Jatin Talwar (Founder-Talwar Advocates, TT Consultants, XLSCOUT).

d) At G20 Summit, Amritsar from 15th-17th March 2023, IISER Mohali showcased its ongoing advanced Research and recent Innovations. i-RISE IISER TBI Mohali displayed the incubated Startup Portfolio and Incubation Facilities along with recent activities.

e) Fermentech Labs Pvt Ltd, Breww Therapeutics Pvt Ltd, Black Eye Technologies Pvt Ltd, Jvscan Pvt Ltd. and Besure Buddy Pvt Ltd were among the exhibited startups at the G20 Summit.

f) On 05th March, 2023 i-RISE conducted Investor- Startup Connect Session with Mr. Rahul Narvekar (Founder- The India Network) and Ms. Souniya Khurana (Founder- WYN Studio).

17.4.1 Promoting Women Entrepreneurship-

a) Open Knowledge Session on Women's Entrepreneurship in Association with TiE Women, Chandigarh was organized on 03-December 2022 .The key speaker- Ms. Aditi B Madan aka MoMo Mami, a Founder of BluePine Foods Pvt Ltd and Yangkiez & Shark Tank India contestant who established her brand in the World of Frozen Foods.

b) IISER Mohali TBI partnered with TIE Chandigarh for the TiE Women GPC Chapter Finale on 31st August, 2023.

c) i-RISE IISER Mohali organized Tech Startup Connect & Grow Event in partnership with Punjab State Council for Science & Technology under SHE initiative on 13th February 2023 to promote Women Entrepreneurship and to celebrate Women in Startup Ecosystem.

d) i-RISE IISER Mohali, in collaboration with various esteemed organizations, hosted a Women and Entrepreneurship Event on February 28, 2023. This event was graced by the presence of Ms. Hargunjit Kaur, IAS, serving as the Chief Guest. The event featured an enlightening session by Mr. Parul Soni, Founder Secretary General of Avenues for Trade and Investment for Women Entrepreneurs, offering valuable insights and enthusiasm. Lt Gen KJ Singh (PVSM, AVSM Retd. Army Commander Western Command) shared his wisdom on the topic of Building A Resilient Supply Chain. A stimulating Panel Discussion on Women in Agriculture included esteemed panelists such as Dr. Jatinder Kaur Arora, Dr. DINESH KUMAR KAPILA, Mrs. Sandeep Kaur, and Mrs. Sarabjeet Kaur, shedding light on the role of women in agriculture. Another engaging Panel Discussion on Women in Sustainable Living featured Ms. Sartaj Lamba, Ms. Ritu Singal, and Mrs. Aarti Bindra.

e) The Tech Startup Mentorship Workshop, conducted as part of the SHE initiative in collaboration with PSCST, commenced on February 21, 2023, and extended over two weeks, concluding on March 4, 2023. The workshop culminated in the exciting Final Pitch Fest held on March 7, 2023. This extensive mentorship program featured a diverse range of sessions, covering crucial aspects of startup development. Topics included government grants and funding schemes, cash flow, valuation assets, cost-effective marketing strategies, achieving product-market fit, digital marketing, equity allocation, MSME support, technology description, branding, B2B customer management, go-to-market strategy, pitch preparation, product designing, startup funding, business model canvas, company registration, taxation, term sheet agreements, and building effective teams. The Women Startup Pitch Fest, held on March 7, 2023, showcased the pitches of seventeen dynamic women tech startup founders, seeking funding and incubation support.

17.5 Our Startups Activities-

a) Our incubate Fermentech Labs Pvt Ltd is felicitated with the BEST YOUNG INNOVATIVE ENTREPRENEUR AWARD at Assam Biotech Conclave-2022, organized by Guwahati Biotech Park in collaboration with IIT Guwahati. The startup received a cash prize of 1 lakh with the opportunity of availing lab space at Guwahati Biotech Park at a subsidized rate. Fermentech Labs Pvt Ltd won AgLIVE 2022, organized by CII Food and Agriculture Centre of Excellence on 5th November 2022.

Fermentech Labs Pvt Ltd supported by TBI IISER Mohali participated and showcased their innovation in Startup Expo organized by IIIM (CSIR) at Jammu from 30th September to 1st October 22.Fermentech Labs is involved in the production of industrial enzymes of commercial interest through patented Solid State Fermentation bioreactor.

b) Our incubate Animal.ICU (now Verdant Impact) for receiving the "Techno Fund" from the Department of Information Technology & Communication, Government of Rajasthan. A financial benefit of 15 Lakhs will be granted to the startup.

Verdant Impact was felicitated as the Emerging Startup of the year 2022 by H.E. Dr. Roger Gopaul (High Commissioner) High Commission for the Republic of Trinidad and Tobago at the Business Excellence

Award Ceremony. Verdant Impact Pvt Ltd exhibited in the Agri Startup Conclave and Exhibition 2022 at the Indian Agricultural Research Institute (IARI) in New Delhi.

Verdant Impact is one stop solution for all animal husbandry need of a farm or Farmer. It provides variety of services from AI to Routine checkup, preventive survives, vaccination, Doctor/Medical institute mapping, on-call service, AI, Credit support, insurance, Certification and sale.

c) Vishwaaz.AI received 25 lakh Seed Grant under Chunauti 3.0 NextGen Startup Challenge. Vishwaaz is a no-code audio creation engine that helps publishers, authors and other content creators to create audio files. It claims to build a 30-minute audio file in just 45 seconds.

d) Two of our incubated startups- Black Eye Technologies Pvt and Manjha won the MANAGE - Samunnati Agri-Startup Award 2022 for their efforts to empower farmers through technological advancement.

Black Eye builds internet of things (IoT) products such as smart sensors and mobile-based user interfaces for agriculture, veterinary and healthcare sectors. It also develops products for environmental safety and reduction in global warming.

Manjha helps connect aquaculture farmers with all stakeholders of the industry. It assists farmers in having access to medicines, fish feed and financial capital. It is recognized by the central ministry of fisheries.

e) Anshaj Smart Waste Management Pvt Ltd got a wonderful platform to showcase its product and to interact with various dignitaries present during the Kashmir Expo.The startup is developing Smart Bin which can automatically segregate dry and wet waste from the source.

f) Our incubated startups- Aiotize Pvt Ltd., Neurox Brain Systems Pvt. Ltd. and Jvscan Pvt Ltd. participated in DST Startup Zone at '23rd edition of IndiaSoft' from 27th–29th March 2023 at Pragati Maidan, New Delhi.

Aiotize Pvt Ltd is building Indigenous and customized Drones using proprietary cloud-based, AI Engine Cognixa.

NeuroX Brain Systems is developing AI-ML-based framework consisting of multiple algorithms as software and IoT-powered medical devices comprising of Transdermal drug delivery, smart head cap, Impedance controlled monitoring and genetic probe.

Jvscan is in preventive Health care with Diagnosis using Voice Analysis and AI, in order to detect diseases in their Pre-illness stages.

j) Trishveda Naturals Pvt Ltd has just been honoured by Shri Bhagwant Singh Mann by being selected as one of the Best Early Ideation Stage Startup Category at ROAR-Punjab's biggest idea hunt held by Innovation Mission Punjab on September 5, 2022. The startup is involved in developing raw ingredients for Personal Care, food and Nutraceutical Industry.

17.6 Current Infrastructure at the TBI-

18. Lectures by Visitors

18.1 Public Lectures

1. 29 Mar 2023 - 04:00PM: Agrarian Institutions and Vulnerability of Agricultural Households in the period of Doubling Farmers' Income: A state level analysis of India, Dr. Chitrasen Bhue (PhD in Economics from University of Hyderabad) is Assistant Professor at the Department of Economics, Kalahandi University, Bhawanipatna, Odisha
2. 28 Mar 2023 - 04:00PM: Overlooked for the Nobel: Lise Meitner and the discovery of fission Prof. Amit Roy, YouTube live:
3. 25 Mar 2023 - 06:00PM: Black Holes: From classic results to current research, Suneeta Varadarajan (IISER Pune)
4. 25 Mar 2023 - 11:00AM: Biomolecular Condensation in Neurodegeneration, Prof. Dr. Markus Zweckstetter, Max Planck Institute for Biophysical Chemistry, Göttingen & University of Göttingen, Germany
5. 24 Mar 2023 - 06:00PM: Holography of information and the black-hole information paradox Suvrat Raju (ICTS, Bangalore)
6. 23 Mar 2023 - 06:00PM: From Newton to Einstein, Sumanta Chakraborty (IACS, Kolkata)
7. 28 Feb 2023 - 04:00PM: Gene regulatory networks orchestrating immune cell fate dynamics Prof. Harinder Singh, Professor and Director, Centre for Systems Immunology, University of Pittsburgh
8. 10 Dec 2022 - 0700PM: Kankan Bhattacharyya Memorial Lecture 2022, Professor Richard N. Zare, Department of Chemistry, Stanford University California, USA , Webinar Link
9. 17 Nov 2022 - 0600PM: Radiotags and color bands unravelling the highly complicated social lives of acorn woodpeckers (Melanerpes formicivorus), Dr. Sahas Barve
10. 11 Nov 2022 - 0500PM: Agent based models to study ecological dynamics(Agent based models of population dynamics, and in collective animal motion), Dr. Vishwesh Guttal, Associate Professor, Centre for Ecological Sciences., Associate Faculty, Centre for BioSystems Science and Engineering Associate Faculty, IISc Mathematics Initiative, Indian Institute of Science, Bengaluru, 560012, India Web- Click Here
11. 27 Sep 2022 - 0400PM: Foundation Day Lecture - 200 Years of Studies of Phase Transitions, Professor Deepak Dhar, IISER Pune, Foundation Day 2022 - Invitation
12. 27 Sep 2022 - 1100AM: Mate choice dynamics in Blackbuck, Dr. Hemal Naik, Max Planck Institute of Animal Behaviour, Konstanz.

18.2 Institute Colloquia:

1. 10 Nov 2022 - 0500PM: Reflections on Science in the Age of the Coronavirus, Prof. P. Balaram (National Centre for Biological Sciences, Bangalore and Former Director, Indian Institute of Science Bangalore) Institute Colloquium

18.3 Institute Seminars

1. 31 Mar 2023 - 05:00PM: Role of chromatin organizer SATB2 as regulator of tissue specification during early vertebrate embryogenesis, Prof. Sanjeev Galande, Laboratory of Chromatin Biology and Epigenetics, Department of Biology, Indian Institute of Science Education and Research, Pune, Maharashtra.
2. 31 Mar 2023 - 11:00AM: Using gravitational lensing to probe distribution of neutral hydrogen in the post-reionization Universe, Ms. Urvashi (IIIT Delhi), Zoom link
3. 31 Mar 2023 - 05:00AM: The heat semigroup associated with the Jacobi-Cherednik operator and its applications, Dr. Anirudha Poria (IIT Madras), Zoom link
4. 30 Mar 2023 - 02:30PM: Business Elite Moralities and Moral Boundaries, Dr. Suraj Beri (PhD in Sociology from Centre for the Study of Social Systems, Jawaharlal Nehru University) is Assistant Professor at the Department of Sociology, Nagaland University.
5. 30 Mar 2023 - 12:00PM: Oscillating states in periodically driven Langevin systems, Dr. Prof. Sreedhar Dutta, IISER Thiruvananthapuram
6. 29 Mar 2023 - 05:00PM: Powers of Ideals in Combinatorics., , Dr. S Selvaraja (CMI), Zoom link

7. 29 Mar 2023 - 04:00PM: Nature-based solutions for methane mitigation from rice farming to combat climate change , r. Sandeep K Malyan, Department of Environmental Studies, Dyal Singh Evening College, Lodi Road, University of Delhi-110003.
8. 29 Mar 2023 - 11:00AM: Structural and mechanistic investigation of the components of Nucleotide Excision Repair and Homologous Recombination in Mycobacterium tuberculosis, Dr. Manoj Thakur, Sri Venkateshwara College, University of Delhi, South Campus
9. 28 Mar 2023 - 04:00PM: Climate change and the response of the Himalayan glaciers: Past, present, and future, Dr. Vinit Kumar, Wadia Institute of Himalayan Geology, Dehradun
10. 28 Mar 2023 - 03:00PM: Spontaneous Symmetry Breaking, Linear Electrooptic Response and Dielectric Spectroscopy of the Achiral Ferronematic Compound Prof Jagdish K Vij, Department of Electronic and Electrical Engineering, Trinity College Dublin, The University of Dublin, Dublin, Ireland
11. 28 Mar 2023 - 03:00PM:The Post First World War Popular Protests and the Making of Bombay's Mill District, Dr. Robert Rahman Raman, Centre of Modern Indian Studies (CeMIS), University of Göttingen.
12. 27 Mar 2023 - 04:00PM: Understanding lightning propagation mechanism, characteristics and role of polarity asymmetry, Dr. Abhay Srivastava, North Eastern Space Applications Centre, Meghalaya
13. 27 Mar 2023 - 02:30PM: Cinema and the Production of a Popular Identity: Melodrama and the Left Developmental Aesthetic in Puthiya Akasam Puthiya Bhoomi, Dr. Muhammed Afzal P. (PhD in Cultural Studies, Department of Cultural Studies, The English and Foreign Languages University (EFLU), Hyderabad) is Assistant Professor at the Department of Humanities and Social Sciences (HSS), Birla Institute of Technology and Science (BITS), Pilani
14. 27 Mar 2023 - 11:00AM: Role of fly-by interactions in the kinematic and morphological evolution of galaxies, Dr. Ankit Kumar (IIA Bengaluru), Zoom link
15. 24 Mar 2023 - 06:30PM: Reconstructing modern and archaic human prehistory using genetics. Leonardo Iasi
16. 24 Mar 2023 - 04:00PM: The Captivating 2D Perovskite Family, Prof Sayan Bhattacharyya, Department of Chemical Sciences, Indian Institute of Science Education and Research Kolkata
17. 24 Mar 2023 - 03:00PM: Fiber-based optical phase sensitive amplifiers and their applications future communication technologies, Speaker: Dr. Debanuj Chatterjee, Post-doctoral researcher, Electrical Engineering Department, IIT Madras, India
18. 22 Mar 2023 - 11:00AM: Photonic Quantum Science and Technologies, Prof. Urbasi Sinha (RRI Bangalore)
19. 21 Mar 2023 - 06:15PM: Gender, Education and Empowerment, Prof. Mary E. John
20. 21 Mar 2023 - 05:00PM: History and Development of Algebraic Number Theory, Prof Sudesh Kaur Khanduja, INSA Honorary Scientist, IISER Mohali & Emeritus Prof Panjab University
21. 20 Mar 2023 - 05:00PM: Near Horizon Dynamics of Near-extremal Black Holes in Higher Curvature Gravity, Prof. Nabamita Banerjee (IISER Bhopal)
22. 17 Mar 2023 - 04:00PM: Economics of Caste System: Notions of 'Ritual Purity and Pollution' and the Value of Labour in India, Dr. C. Jerome Samraj (PhD in Economics from Madras Institute of Development Studies (MIDS), Chennai) is Assistant Professor at the Department of Economics, Pondicherry University
23. 17 Mar 2023 - 12:00PM: Reading the Pre-modern Society Through the Colonial Archives Dr. S. Jeevanandam (PhD in History from University of Hyderabad) is Assistant Professor, Department of History, Sikkim University
24. 16 Mar 2023 - 04:00PM: How to build a hippocampus, Prof Shubha Tole, Department of Biological Sciences, Tata Institute of Fundamental Research (TIFR), Mumbai
25. 16 Mar 2023 - 02:30PM: Public Administration & Public Policy Interface, Dr. Jaswinder Kaur (PhD in Public Administration from Panjab University, Chandigarh) is a faculty at Rajiv Gandhi National Institute of Youth Development (RGNIYD), Ministry of Youth Affairs, and Sports, Government of India, Regional Centre, Chandigarh.
26. 15 Mar 2023 - 05:00PM: Epigenetic genome control by RNA-based mechanisms, Dr. Shiv Grewal, NIH Distinguished Investigator, National Cancer Institute National Institutes of Health, Bethesda, Maryland, USA

27. 15 Mar 2023 - 05:00PM: Group actions in non-commutative geometry. Dr. Safdar Quddus (IISc Bangalore)
28. 10 Mar 2023 - 02:30PM: Latest development/ applications of Single Particle Aerosol TOF Mass Spectrometer and DRI OC/EC-TOFMS, Dr Ralf Zimmerman from Rostock University Germany
29. 06 Mar 2023 - 11:00AM: Exploring Cultural Heritage with Portable MRI ,Prof. Bernhard Bluemich
30. 03 Mar 2023 - 02:00PM: Symmetries in Montane Bird Ranges Elucidate the Functional Link Between Environment and Abundance, Dr. Ramana Athreya from IISER Pune.
31. 01 Mar 2023 - 05:00PM: Ramanujan-Petersson conjecture and its variants for Siegel modular forms., Dr. Biplab Paul (Chennai Mathematical Institute)
32. 01 Mar 2023 - 03:00PM: Mental Health among Unskilled Migrant Labourers in the Urban Indian Socio Context: A Multi Paradigmatic Approach, Dr. Sangeeta Yadav (PhD, IIT Kanpur) is assistant professor at the Department of Psychology, Faculty of Humanities and Social Sciences, Viswakarma University, PuneTalk_Poster_Prof_Scmitt-Kopplin.pdf
33. 01 Mar 2023 - 11:00AM: Krylov complexity for quantum Floquet dynamics, Prof. Amin Nizami, Ashoka University.
34. 01 Mar 2023 - 11:00AM: Life in a Nutshell: An analytical vision of chemical diversity and complexity of biomes and abiomes, Prof. Philippe Schmitt-Kopplin
35. 28 Feb 2023 - 04:00PM: Quantum Simulation of Neutrino oscillations, Professor Bindu Bambah (CU Hyderabad)
36. 28 Feb 2023 - 03:00PM: Transformation of medical services in colonial India: the case of Madras Presidency (1880-1935), Dr. Arnab Chakraborty, Postdoctoral Research Fellow, Shanghai University
37. 24 Feb 2023 - 04:00PM: Poisson statistics in random band matrices, Prof. Krishna Maddaly (Ashoka University, Delhi)
38. 23 Feb 2023 - 04:00PM: Testing the cosmological principle with Cosmic Microwave Background data through Topological Data Analysis, Pratyush Pranav (Centre de Recherche Astrophysique de Lyon, ENS de Lyon)
39. 22 Feb 2023 - 05:00PM: Orderability of quandles, Dr. Hitesh Raundal (IMSc Chennai)
40. 22 Feb 2023 - 04:00PM: Women in Physics in post Independent India, Prof. Bindu A. Bambah
41. 20 Feb 2023 - 11:30AM: From 1940 to Present: What Bacteria Tell Us About the Mechanisms of Phenotypic and Genotypic Changes, Prof. Jue D. (Jade) Wang, Department of Bacteriology, University of Wisconsin-Madison, USA
42. 20 Feb 2023 - 11:00AM: Functional dynamic biomedical tomographic imaging with optical fluorescence, Dr Naren Naik, Department of Electrical Engineering and Center for Lasers and Photonics, Indian Institute
43. 17 Feb 2023 - 05:00PM: SHARP QUANTITATIVE STABILITY OF POINCARE´-SOBOLEV INEQUALITY IN THE HYPERBOLIC SPACE, Dr. Debdip Ganguly(IIT Delhi)
44. 17 Feb 2023 - 03:00PM: Topological Transports in Weyl Semi-metals, Dr. Tanay Nag, Uppsala University
45. 17 Feb 2023 - 11:00AM: Intramolecular Hydrogen Bonded Systems with Outstanding Properties for Chemical Exchange Saturation Transfer MRI, Prof. Michael T. McMahon, Johns Hopkins and Kennedy Krieger Institute, Baltimore, MD, USA
46. 16 Feb 2023 - 05:00PM: On degenerations and order of graphs in finite abelian groups, Dr. Rameej Raja (NIT Srinagar)
47. 16 Feb 2023 - 04:00AM: From Lysosome Perturbation to Tissue Regeneration: A Story of Serendipitous Discovery, Dr. Santosh Chauhan, Senior Principal Scientist, DBT-Wellcome and EMBO GIN Fellow, CSIR-CCMB
48. 15 Feb 2023 - 03:00PM: Colonial Difference and the Discourse of Turbulent Punjab: Investigating the Non-Regulation Status of the Province after its Annexation, Dr. Sunny Kumar, Assistant Professor, Miranda House, University of Delhi
49. 15 Feb 2023 - 11:00AM: Quantum mean states are nicer than you think: fast algorithms to compute states maximizing average fidelity, A. Afham, Centre for Quantum Software and Information, University of Technology Sydney & Sydney Quantum Academy, Australia.
50. 15 Feb 2023 - 03:00AM: Adsorption of nitrate and fluoride from water using novel adsorbent hydrous bismuth oxide, Dr. Arun Lal Srivastav (Faculty candidate), Chitkara University, Himachal Pradesh -174103

51. 12 Feb 2023 - 12:00PM: What cost dispersal evolution? Lessons from the humble fruit fly., Prof Sutirth Dey, from IISER Pune.
52. 08 Feb 2023 - 04:00PM: Development of Novel Materials for Aerospace Applications, Professor Michael Gozin, School of Chemistry, Tel Aviv University, Israel
53. 07 Feb 2023 - 04:00PM: When immunity causes mischief :- Meeting the challenge of rebalancing the pattern of immunity to viral infection, Prof. Barry T Rouse
54. 03 Feb 2023 - 03:00PM: Sensory ataxia and cardiac hypertrophy caused by neurovascular oxidative stress., Dr. Shambhu Yadav, Department of Medicine, Harvard Medical School/Brigham and Women's Hospital, Boston, USA
55. 02 Feb 2023 - 11:50AM: Fe-S based biology and redox adaptation, Prof. Frédéric Barras, Director, Department of Microbiology, Pasteur Institute, France
56. 02 Feb 2023 - 10:30AM: Protecting Nascent Polypeptides from Premature Aging, Prof. Jean-François Collet, Welbio Investigator and Co-Director of the de Duve Institute, UCLouvian, Belgium
57. 01 Feb 2023 - 04:00PM: Anomalous collective diffusion of interacting self-propelled particles, Prof. Punyabrata Pradhan, SNBNCBS Kolkata
58. 30 Jan 2023 - 05:00PM: Novel Aspects of Many-body Localization, Prof. Arti Garg, SINP Kolkata
59. 27 Jan 2023 - 05:00PM: Weight-formulas for highest weight modules over Kac-Moody algebras., Dr G. Krishna Teja (HRI, Allahabad)
60. 25 Jan 2023 - 05:00PM: Weak faces of highest modules and root systems, Dr G. Krishna Teja (HRI, Allahabad)
61. 20 Jan 2023 - 04:00PM: Chasing the functions of Mycobacterium Tuberculosis Glycolipids during Infection using Chemical Proteomics and Membrane Biophysics,Prof Shobhna Kapoor, Department of Chemistry, Indian Institute of Technology Bombay
62. 12 Jan 2023 - 04:00PM: Explorations of the dark matter, Dr. Disha Bhatia, Universidade de São Paulo
63. 10 Jan 2023 - 02:00PM: Harvard's Computers: the legacy of the stellar women, Dr. Suchetana Chatterjee
64. 06 Jan 2023 - 03:00PM: Understanding Black Economy: Causes, Consequences and Remedies, Thomas R. Trautmann, Professor Emeritus of History and Anthropology, University of Michigan
65. 29 Dec 2022 - 0300PM: A systems-scale investigation of the impact of perturbed metal availability on the S. cerevisiae metabolic network, Dr Simran Aulakh, Post-doctoral Fellow, University of Oxford & Bioinformatician at Phycoworks
66. 21 Dec 2022 - 0400PM: Polariton chemistry modulating intramolecular vibrational energy flow ,athways, Prof K Srihari, Department of Chemistry, Indian Institute of Technology Kanpur
67. 20 Dec 2022 - 0300PM: Perturbative QCD -- A Pathway to Precision Physics at the LHC, Dr. Prasanna K Dhani, IFIC, University of Valencia5A-AB2
68. 14 Dec 2022 - 0400PM: ArT iN sCienCe, Prof Gautam Basu, Department of Biophysics, Bose Institute, Kolkata
69. 12 Dec 2022 - 0900AM: DAE-BRNS High Energy Physics Symposium 2022, Visit Website
70. 01 Dec 2022 - 0400PM: From Minerals to Futuristic Functional Materials, Prof T N Guru Row, Solid State and Structural Chemistry Unit Indian Institute of Science, Bangalore
71. 30 Nov 2022 - 0500PM: Can graphene be used to teach quantum mechanics, Prof. Sushanta Dattagupta (Former Director, IISER Kolkata, Former Vice-chancellor of Visva-Bharati, and currently at NIT Durgapur)
72. 30 Nov 2022 - 0400PM: Mechanobiology of cell-substrate interactions during adhesion and migration, Prof Namrata Gundiah, Department of Mechanical Engineering, Indian Institute of Science, Bangalore
73. 29 Nov 2022 - 0400PM: Tandem isomerization followed by c-oc-c bond forming reaction total synthesis of complex natural products, Prof Debendra K Mohapatra, CSIR-Indian Institute of Chemical Technology, Hyderabad
74. 25 Nov 2022 - 0500PM: Industry-Academia Lecture series, Mr. Hirdesh Madan, Director, Bullseya Poster Facebook Twitter LinkedIn Instagram
75. 23 Nov 2022 - 0500PM: Affine and Quantum Affine Algebras, Prof. Vyjayanthi Chari (University of California, Riverside, USA)

76. 23 Nov 2022 - 0300PM: Soft Organic-Nanocomposites Functional Liquid Crystals Aiding Dreamy Invisibility Technology, Prof C V Yelamaggad, Centre for Nano and Soft Matter Sciences, Bangalore
77. 22 Nov 2022 - 1130AM: Sub-Expanded Heterohelicenes as Stimuli-Controlled Soft Molecular Springs Prof Joyanta Choudhury, Organometallics & Smart Materials Laboratory, Department of Chemistry, IISER Bhopal
78. 21 Nov 2022 - 0300PM: Motherhood and Masculinities in Conflict Research Storytelling and Aesthetics, Dr. Amya Agarwal, Senior Researcher, Arnold Bergstraesser Institut at the University of Freiburg, Germany.
79. 15 Nov 2022 - 0600PM: Gramsci and Historicism, Sudipta Kaviraj, Professor, Department of Middle Eastern, South Asian and African Studies, Columbia University, New York
80. 15 Nov 2022 - 0400PM: The wonderful lab called home! (what the pandemic taught us about science education), Professor Arnab Bhattacharya (HBCSE-TIFR)
81. 11 Nov 2022 - 0500PM: Uncovering New Excited State Reactivity Through Rationale Design of Molecules, Prof Jayaraman Sivaguru, Center for Photochemical Sciences and Department of Chemistry, Bowling Green State University, USA
82. 11 Nov 2022 - 0400PM: Taylor spectrum approach to Brownian-type operators, Prof. Zenon jan Jablonski (Jagiellonian University, Karkow, Poland)
83. 11 Nov 2022 - 0300PM: Data and privacy Putting markets in (their) place, Reetika Khera, Professor (Economics), Indian Institute of Technology (IIT) Delhi
84. 11 Nov 2022 - 1100AM: Mass Spectrometry of Proteins and Peptides Probing Post-Translational Succinimide Formation and the Gas Phase Chemistry of Peptide Ions, Prof. P. Balaram (National Centre for Biological Sciences, Bangalore and Former Director, Indian Institute of Science Bangalore)
85. 10 Nov 2022 - 0900PM: Finding Hidden Gems in Virtual Libraries Uncovering Unknown Scientists Prof. P. Balaram (National Centre for Biological Sciences, Bangalore and Former Director, Indian Institute of Science Bangalore)
86. 10 Nov 2022 - 1200PM: Dynamical construction of Quadrupolar and Octupolar topological , superconductors, Speaker Dr. Tanay Nag, Uppsala University, Sweden
87. 27 Oct 2022 - 0400PM: Classifying and constraining local four photon and four graviton S-Matrices Dr. Lavneet Janagal, Korea Institute for Advanced Study, Seol
88. 25 Oct 2022 - 1200PM: Compatibility of quantum instruments Addressing a conceptual problem, quantification and characterization, Arindam Mitra, Institute of Mathematical Science, Chennai
89. 21 Oct 2022 - 0400PM: From deep mantle with micro-textures A new paradigm in ophiolite studies Dr. Souvik Das, Nanjing University, China
90. 20 Oct 2022 - 0300PM: The Curious Case of Interdisciplinary Social Sciences in the Contemporary Indian University, Dr. Debaditya Bhattacharya, Assistant Professor, Department of English, Kazi Nazrul University, West Bengal
91. 20 Oct 2022 - 1200PM: Zero modes and Scaling symmetry of quantum correlations in quadratic Hamiltonians, Prof. S. Shankaranarayanan, IIT Bombay
92. 19 Oct 2022 - 0400PM: Changing Dynamics of Indian Democracy Looking Beyond Elections, Zoya Hasan, Professor Emerita, Centre for Political Studies and the former Dean of the School of Social Sciences, Jawaharlal Nehru University (JNU).
93. 18 Oct 2022 - 0400PM: Evolutionary analysis of proteins and biological pathways, Dr Gurmeet Kaur, National Center for Biotechnology Information (NCBI), NLM, NIH, USA,
94. 17 Oct 2022 - 0300PM: Entangled Worlds Transdisciplinarity in a (Post) Human Age, Aditya Malik, Professor, Humanities and Social Sciences, Plaksha University, Mohali
95. 13 Oct 2022 - 0400PM: Is Hartle-Hawking wave function a sum over eventually-inflating universes, Dr Karthik Rajeev, IIT Bombay
96. 12 Oct 2022 - 0400PM: Connecting aerosol composition to health effects, Prof. Yinon Rudich, (Weizmann Institute of Science, Israel)
97. 24 Sep 2022 - 1200AM: TREX Startup Conclave 2022 by IISER Mohali TBI, Click on Link, Facebook Link Twitter Link Linkedin Link

98. 23 Sep 2022 - 0400PM: Development of L-Amino acid Polymers for Drug Delivery in Cancer Research, Prof Manickam Jayakannan, Department of Chemical Sciences, Indian Institute of Science Education and Research Pune
99. 23 Sep 2022 - 0300PM: ON-THE-JOB TRAINING IN INDIA ACCESS, DETERMINANTS, AND THE IMPACT ON EARNINGS, Anupam Sarkar, Deputy Director, National Institute of Labour Economics Research and Development, Delhi
100. 22 Sep 2022 - 0400PM: The Tale of Catalysts and Electrodes for Green Hydrogen, Prof Sayan Bhattacharyya, Department of Chemical Sciences, Indian Institute of Science Education and Research Kolkata
101. 21 Sep 2022 - 0400PM: Guanidinium Derivatives A Unique Molecular Platform for Material , Application, Prof Amitava Das, Department of Chemical Sciences, Indian Institute of Science Education and Research Kolkata
102. 19 Sep 2022 - 0200PM: Track Two Negotiations and Initiatives, Dr. Samir Ahmad, Gandhi Memorial College, Srinagar
103. 16 Sep 2022 - 0300PM: Transboundary Spaces as Corridor-Spaces Framing the Frontier in Northeast India, Dr. Mirza Zulfiqur Rahman, Institute of Chinese Studies, Delhi, India.
104. 15 Sep 2022 - 0330PM: Clocking the receptor entry through lipid modification – an example from the Drosophila olfactory cilia, Prof. Krishanu Ray, Chairman, Department of Biological Sciences, Tata Institute of Fundamental Research, Mumbai 400005, India.
105. 13 Sep 2022 - 0300PM: Women-led grassroots Alternative Dispute Resolution mechanisms in India ‘Alternative’ or Replication, Debdatta Chowdhury, Centre for Studies in Social Sciences, Calcutta
106. 09 Sep 2022 - 0500PM: A gentle introduction to Fourier restriction inequalities, Dr. Chandan Biswas (Raman Fellow, IISc, Bangalore), Fields Medal Symposium
107. 06 Sep 2022 - 0300PM: Geochemical evaluation and Bio-sedimentology of the Cambrian successions in the Zanskar region of Ladakh Himalaya and its implication on Cambro-Ordovician Kurgiakh , orogeny Dr. Garry Singla (Inspire Faculty candidate), Department of Geology, Punjab University
108. 31 Aug 2022 - 0500PM: An interaction with Number theory (Hybrid mode), Prof. Sudesh Kaur Khanduja (INSA Honorary Professor, IISER Mohali)
109. 26 Aug 2022 - 0230PM: Technoscience and the Transhumanist Technocultural Imaginary, Bijoy H. Boruah, Visiting Professor, Department of Humanities and Social Sciences, Indian Institute of Technology Jammu
110. 23 Aug 2022 - 1000AM: Complex Networks and Dynamics, Dr. Aradhana Singh, Postdoctoral Fellow (Bar-Ilan University, Ramat Gan, Israel), Zoom Link
111. 18 Aug 2022 - 0400PM: Spatio-temporal dynamics of cytoskeletal proteins, Dr. Saravanan Palani, Department of Biochemistry, IISc Bangalore
112. 13 Aug 2022 - 1000AM: Protein Charge Transfer Spectra (ProCharTS) A novel spectral probe to track protein unfolding and aggregation, Prof G. Rajaram Swaminathan, Department of Biosciences and Bioengineering, Indian Institute of Technology Guwahati
113. 10 Aug 2022 - 1000AM: , Understanding the role of CRISPR-Cas system in Salmonella, Dr. Sandhya, A. Marathe, Assistant Professor, Department of Biological Sciences, BITS Pilani
114. 08 Aug 2022 - 0400PM: Infinitesimal deformations of some Quot Schemes, Chandranandan Gangopadhyay (IIT Mumbai)
115. 04 Aug 2022 - 1130AM: Discovery of the Raman effect in Historical Context, Dr. Rajinder Singh, University of Oldenburg, Germany
116. 27 Jul 2022 - 0400PM: Molecular nanoparticles, Dr. M S Bootharaju
117. 22 Jul 2022 - 0400PM: Conditions for local transformations between sets of quantum states, Dr. Ritabrata Sengupta, IISER Berhampur
118. 22 Jul 2022 - 0400PM: Deeper Insights into Lymph Node Stromal cell subsets organization and function during gastrointestinal infection, Dr. Lalit Kumar, Dubey, Lecturer, Centre for Microvascular Research, William Harvey Research Institute (WHRI), Barts & The London School of Medicine & Dentistry, Queen Mary University of London, UK

119. 15 Jul 2022 - 0400PM: Why and How Does a Proton Move, Prof. G. Naresh Patwari, Department of Chemistry, Indian Institute of Technology Bombay, Research group website Click here
120. 13 Jul 2022 - 0415PM: Air quality early warning and decision support system for Delhi NCR Challenges, Success and Challenges, Dr. Sachin Ghude, Scientist F; Indian Institute of Tropical Meteorology, Pune, India
121. 07 Jul 2022 - 1200AM: The Department of Chemical Sciences at IISER Mohali, is organizing the 29th CRSI-NSC and CRSI-ACS Symposium Series in Chemistry at IISER Mohali Campus during July 07-09, 2022.
122. 05 Jul 2022 - 0400PM: Doubling Scattering Amplitudes, Shruti Paranjape (University of California, Davis)
123. 04 Jul 2022 - 0300PM: The Evolution and Genetics of Butterfly Wing Colour Patterns, Dr. Krushnamegh Kunte from NCBS, Bangalore
124. 28 Jun 2022 - 0400PM: Hairy Schwarzschild, Chethan Krishnan (Centre for High Energy Physics, IISc, Bangalore)
125. 27 Jun 2022 - 1200PM: Self-dual Yang-Mills amplitudes from Berends-Giele currents, Pratik Chattopadhyay, University of Nottingham, United Kingdom, Zoom Link
126. 09 Jun 2022 - 0500PM: Existence of strong solutions for a compressible viscous fluid and a wave equation interaction system, Dr. Arnab Roy, BCAM Bilbao, Spain
127. 09 Jun 2022 - 0300PM: Periyar A Study in Political Atheism, Dr. Karthick Ram Manoharan, Marie Sklodowska Curie Actions Individual Fellow at the University of Wolverhampton.
128. 08 Jun 2022 - 0400PM: Organic Conjugate Acid-Base Pairs Advances in Triplet Energy Harvesting Dr Debdas Ray, Advanced Photofunctional Materials Group, Department of Chemistry, School of Natural Sciences, Shiv Nadar University
129. 03 Jun 2022 - 0500PM: Rod like proteins on membranes patterns, shapes and flows, Prof. Anirban Sain (IIT Bombay)
130. 03 Jun 2022 - 0500PM: An Equational Criterion for Gluing semigroups of higher dimensions, Professor Hema Srinivasan, Department of Mathematics, University of Missouri, Columbia (USA)
131. 03 Jun 2022 - 0400PM: Amplitudes from Spinor Helicity formalism, Dr. Subramanya Hegde (HRI)
132. 01 Jun 2022 - 1100AM: Biomimetic Natural Products Synthesis to Overcome Drug Resistance, Dr. Rajesh Viswanathan, Departments of Chemistry and Biology, IISER Tirupati, More about the speaker Research group website
133. 01 Jun 2022 - 1000AM: Quantitative Imaging and Artificial Intelligence in Oncology, Dr Amita Shukla-Dave, Director Quantitative Imaging and Attending Physicist (Professor) Memorial Sloan-Kettering Cancer Center, New York USA
134. 27 May 2022 - 0500PM: Role of polynomials in Analysis and Quantum Entanglement, Professor Ajit Iqbal Singh, INSA Emeritus Scientist ISI Delhi
135. 26 May 2022 - 0300PM: 11th Convocation of IISER Mohali, Chief Guest - Professor Rohini Godbole, IISc, Bangalore
136. 26 May 2022 - 1130AM: Precision W mass measurement and its importance for the SMBSM, Professor Rohini Godbole (IISc Bengaluru)
137. 24 May 2022 - 0400PM: Sizing Up Gastrulation in Zebrafish Embryos, Dr Sreelaja Nair, Associate professor, Biosciences and Bioengineering, IIT Bombay
138. 23 May 2022 - 1100AM: Lactate and glycerol-3-phosphate metabolism cooperatively regulate larval growth in a tissue nonautonomous manner, Dr. Madhulika Rai, Department of Biology, Indiana University, Bloomington, IN 47405, USA.
139. 20 May 2022 - 0400PM: Factorization property of positive maps on C-algebras and its application. Prof. Hiroyuki Osaka (Ritsumeikan University, Japan) Zoom Link
140. 19 May 2022 - 0400PM: Somesh Chandra Ganguli, Aalto University, Finland, Somesh Chandra Ganguli, Aalto University, Finland
141. 19 May 2022 - 0300PM: Evolution of species recognition among very similar species, Prof. Trevor Price, University of Chicago

142. 19 May 2022 - 1100AM: Interactions between membrane proteins, effects of curvature and fluctuations. Prof. John. H. Ipsen (University of Southern Denmark), Local host Dr. Tripta Bhatia
143. 19 May 2022 - 1000AM: Understanding generation, evolution, and maintenance of plant biodiversity in India. Vinita Gowda, Tropical Ecology and Evolution Lab (TrEE lab), IISER Bhopal
144. 13 May 2022 - 0500PM: Quadratic forms over characteristic 2 fields., Dr. Diksha Mukhija (Artois University, Lens, France), Google meet link
145. 12 May 2022 - 0400PM: Ribozymes Chemical Reaction and Adaptability to High Pressures, Dr. Narendra Kumar, Scientist Chem - & Bioinformatics, BioNTech SE, Am Klopferspitz 19a, 82152 Planegg-Martinsried, Germany.
146. 10 May 2022 - 0400PM: α-Synuclein-induced disruption of pacemaker firing in dopamine neurons Dr. Poonam Thakur Assistant Professor, IISER Thiruvananthapuram
147. 06 May 2022 - 0400PM: The mood and food dynamics in the brain, Dr Hasan Mohammad, PhD, Institute of Molecular and Cell Biology (IMCB), Agency for Science, Technology and Research (ASTAR), Singapore
148. 06 May 2022 - 0900AM: Young Mathematician's Symposium 2022, Opening Remarks Prof. J. Gowrishankar at 9 am, Plenary Speaker Prof. Jugal Verma (0915 am – 1000 am) Day-1m, Plenary Speaker Prof. C S Rajan (0900 am – 0945 am) Day-2 Symposium Title & Abstract
149. 04 May 2022 - 0315PM: Semiconductor Nanostructures for Optoelectronics Applications, Professor C. Jagadish (Semiconductor Physicist)
150. 04 May 2022 - 1130AM: East meets West How globalization launched a honeybee disease epidemic Professor Alexander Mikheyev (Evolutionary Biologist)
151. 28 Apr 2022 - 0500PM: Supersymmetry on the lattice N=1 supersymmetric Yang-Mills theory and beyond, Georg Bergner, University of Jena, Institute for Theoretical Physics, Germany, Zoom Link
152. 28 Apr 2022 - 0400PM: Energy Materials Atomic-scale Insights from ab initio modelling, Dr. Dibyajyoti Ghosh, Assistant Professor, Department of Materials Science and Engineering, IIT Delhi, New Delhi
153. 26 Apr 2022 - 0400PM: Thermoelectricity in discovering new phenomena in two dimensions Arindam Ghosh, Indian Institute of Science
154. 20 Apr 2022 - 0500PM: The ozone layer, its science, and its policies., Prof. A.R. Ravishankara, University Distinguished Professor, Departments of Chemistry and Atmospheric Science, Colorado State University, Fort Collins, Colorado, USA.
155. 20 Apr 2022 - 0400PM: Fossils, Bones and humans A peep into the Quaternary of Peninsular India Prof. Vijay Sathe (vertebrate palaeontologist at Deccan College, Pune)
156. 20 Apr 2022 - 1100AM: World War II, Decolonization and the ‘Social Question’ Calcutta’s Dockworkers and Changing Labour Regime, c.1939-1950, Dr. Prerna Agarwal (Faculty Candidate), Instructor in Humanities, Indian Institute of Science (IISc) Bangalore
157. 16 Apr 2022 - 1100AM: ICAR, PAU and the Agricultural Research in India, Speaker PROF. B. S. DHILLON, FNA, FNAAS, FNASc, FPAS, Guest of Honour PROF. JAI RUP SINGH, FIMSA, FAMS, FPAS
158. 13 Apr 2022 - 0500PM: New Education Policy, 2020 and the Future of Secular Education in India Dr. Meera Nanda, Historian of Science, ,Zoom Register in advance for this meeting, After registering, you will receive a confirmation email containing information about joining the meeting.
159. 11 Apr 2022 - 0400PM: Hydrocarbon biomarkers in crude oils and sediments Applications of terpenoids to understand past biota, palaeoecosystems and present environmental conditions Dr. Sharmila Bhattacharya (Faculty candidate), Department of Earth and Environmental Sciences, IISER Mohali, India
160. 07 Apr 2022 - 0400PM: On weighted L^p-estimates for pseudo-multipliers associated to the Grushin operator. Riju Basak (IISER Bhopal)
161. 07 Apr 2022 - 0400PM: Active matter role of persistence, fluctuations, alignment, and trapping Dr. Debasish Chaudhuri, IOP Bhubaneswar
162. 06 Apr 2022 - 0300PM: Parents’ Strategic Investment in Children’s Education A Study of Structures and Concerns, Dr. Gayatri Panda (Faculty Candidate), Centre for Women’s Development Studies, New Delhi

163. 01 Apr 2022 - 0500PM: Secularism, Communalism and Indian Politics Today, Achin Vanaik, Retired Professor of International Relations and former Head of Department of Political Science at the University of Delhi, Zoom Register in advance for this meeting
164. 01 Apr 2022 - 0400PM: Fun and Games with Polymers, Prof. S. Ramakrishnan, Department of Inorganic and Physical Chemistry, Indian Institute of Science, Bangalore
165. 01 Apr 2022 - 0200PM: Mini-Symposium “PLANTS IN A CHANGING ENVIRONMENT”,

19. Postdoctoral fellows at the Institute

1. Ashish Jha (Bology)
2. Gagandeep Kaur (Bology)
3. Papri Basak (Bology)
4. Apuratha Pandiyan (Biology)
5. Manjula Ekka (Biology)
6. Banani Chattopadhyay (Biology)
7. Poonam Sharma (Biology)
8. Reena Thankur (Biology)
9. Yogesh Dahiya (Biology)
10. Dipankar Bhowmik (Biology)
11. Swarupa Mallick (Biology)
12. Kamlesh K Bajwa (Biology)
13. Nidhi Krishna (Biology)
14. Shikha Gupta (Biology)
15. Priya Battu (Biology)
16. Ashish Jha (Biology)
17. Vierandra Kumar (Chemistry)
18. Brahhaiah Kommula (Chemistry)
19. Anannya Saha (Chemistry)
20. Ben Johns (Chemistry)
21. Bikramaditya Mandal (Chemistry)
22. Kirtika Mishra (Chemistry)
23. Mithilesh Kumar Nayak(Chemistry)
24. Jhuma Dutta (Chemistry)
25. Srinatha .M.K (Chemisrty)
26. Nitin Yadav (Chemisrty)
27. Archana Velloth (Chemisrty)
28. Abhishek Swarnkar (Chemisrty)
29. Aditya Naik (EES)
30. Dibyojyoty Nath (EES)
31. Haseeb Hakkim (EES)
32. Hemantika Basu (HSS)
33. Shriya Bandyopadhyay (HSS)
34. Sumit Chandra Mishra (Mathematics)
35. Gurleen Kaur (Mathematics)
36. Mainak Ghosh (Mathematics)
37. Nishant (Mathematics)
38. Apeksha Sanghi (Mathematics)
39. Neeraj Kumar Dhanwani (Mathematics)
40. Sudipta Mukherjee (Mathematics)
41. Rijubrata Kundu (Mathematics)
42. Anupama Roy (Physics)
43. Avik Kumar Das (Physics)
44. Pooja (Physics)
45. Manish Kumar (Physics)
46. Komal Kumari (Physics)
47. Deena Nath (Physics)
48. Bhavesh Kumar Dadhich (Physics)
49. Indrajith V.S (Physics)
50. Rajbinder Kaur Virk (Physics)
51. Harsh Jain (Physics)
52. Brij Mohan (Physics)
53. Ankur Mandal (Physics)
54. Pratap Khuntia (Physics)
55. Chandan Kumar (Physics)
56. Komal Rajak (GATI Project)

20. Graduates of 2022

20.1. BS Graduates

S. No.	Name	Reg. No.
1	Alan Babu	MS15066
2	Anurag Jha	MS15134
3	Deep Hens	MS16039
4	Tejaswar Kumarmangalam Kamble	MS16059
5	Rajdeep Kiran	MS16112

20.2. BS-MS Graduates

S. No.	Name	Reg. No.	Subject
1	Amrutha Aji Kumar	MS14119	Physics
2	Abhijit Sahoo	MS15059	Biology
3	Ishan Chagainu	MS15072	Biology
4	Vishwas Kamal	MS15123	Biology
5	Khorwal Jetha Ram	MS16007	Biology
6	Somesh	MS16017	Chemistry
7	Abhishek Kumar	MS16021	Chemistry
8	Surajmal Nain	MS16043	Chemistry
9	Sneha Saha	MS16061	Biology
10	Ojas Singh	MS16084	Chemistry
11	Siddharth	MS16100	Biology
12	Prashans Darbari	MS16104	Mathematics
13	Chegondi Meher Sanjan	MS16114	Mathematics
14	Martina Narzary	MS16122	Biology
15	Vishnu P V	MS16128	Mathematics
16	Bhumija Gautam	MS16130	Chemistry
17	Sarthak Sekhar Sahoo	MS16134	Biology
18	Thakur Sarvesh Anil	MS16146	Physics
19	Chetan	MS16147	Chemistry
20	Rohit Kumar Naraniya	MS16150	Chemistry
21	Sudeep Kumar Meena	MS16151	Biology
22	Shivansh Kanojia	MS16157	Biology
23	Abhijith R	MS16159	Mathematics
24	Himanshu Meena	MS16166	Chemistry
25	Abhishek Dangi	MS16171	Chemistry
26	Ashirbad Mishra	MS16177	Mathematics
27	Jerin Saji	MS16180	Physics
28	Shivangini Jaryal	MS17001	Biology
29	Madhav Pitaliya	MS17002	Biology
30	Monu	MS17003	Chemistry
31	Sayan Chattopadhyay	MS17004	Mathematics

32	Aman Jaiswal	MS17005	Chemistry
33	Anjali Gupta	MS17006	Biology
34	Amit Kumar	MS17007	Chemistry
35	Kripa Nath	MS17008	Physics
36	Abhishek Roy	MS17009	Chemistry
37	Varun Gautam	MS17010	Physics
38	Abhinav	MS17011	Biology
39	Anwita Chattopadhyay	MS17013	Chemistry
40	Shuvajit Das	MS17016	Biology
41	Sajal Nawaria	MS17017	Chemistry
42	Kumari Monika	MS17018	Biology
43	Annant Bir Kaur	MS17019	Biology
44	Ajay Kumar	MS17021	Biology
45	Rutvik Urdhwareshe	MS17022	Physics
46	Kavyasree A	MS17025	Chemistry
47	Barsa Das	MS17026	Biology
48	Hrishikesh K	MS17027	Chemistry
49	Divyanshu Baranwal Shambhu Prasad	MS17028	Chemistry
50	Keshav Singhal	MS17029	Physics
51	Spatika Chakravarthi Jayaram	MS17030	Biology
52	Nasare Roshan Krushnaji	MS17031	Chemistry
53	Thommen Shaji	MS17032	Physics
54	Rajesh Kumar Sahu	MS17033	Biology
55	R. Achuthan	MS17034	Biology
56	Karan Joshi	MS17035	Biology
57	Kaustav Chatterjee	MS17036	Physics
58	Astha Karwa	MS17037	Biology
59	Prabhu Prasad Biswal	MS17038	Physics
60	Saurabh Bhatt	MS17039	Biology
61	Abhishek Dubey	MS17040	Biology
62	Nishant	MS17041	Chemistry
63	Sandeep Jakhar	MS17043	Physics
64	Amrendra Singh	MS17045	Mathematics
65	Arpan Akash Ray	MS17046	Physics
66	Shivangi Dhiman	MS17047	Physics
67	Kirti Taneja	MS17048	Mathematics
68	Geetika Aggarwal	MS17049	Biology
69	Rakesh Meena	MS17050	Biology
70	Piyush Kumar	MS17051	Physics
71	Sajal Lakhera	MS17052	Physics
72	Kaustubh Verma	MS17054	Biology
73	Choudhary Praveen Bheraram	MS17055	Chemistry
74	Ajeet Kumar Singh	MS17056	Physics

75	Deya Chatterjee	MS17057	Physics
76	Devangi Jayant Sathe	MS17058	Biology
77	Abhishek Samlodia	MS17059	Physics
78	Adarsh Kumar	MS17060	Mathematics
79	Gulshan Dilip Badole	MS17062	Physics
80	S Sundara Narasimhan	MS17063	Mathematics
81	Gawande Shreekant Shaligram	MS17064	Physics
82	Abhinav Bansal	MS17065	Chemistry
83	Bajrang. C	MS17066	Physics
84	Rajarshi Dasgupta	MS17067	Physics
85	Jayant Singh Devara	MS17068	Physics
86	Ramanujan Srihari	MS17069	Mathematics
87	Jasmine	MS17070	Biology
88	Ajay Jain	MS17071	Chemistry
89	Nithishwer M A	MS17072	Physics
90	Akash Deep	MS17073	Physics
91	Ritoban Datta	MS17074	Physics
92	Sahil Sharma	MS17075	Chemistry
93	Utkarsh Chauhan	MS17076	Chemistry
94	Dhruv Saini	MS17077	Mathematics
95	Narkhede Nikhil Pramod	MS17080	Physics
96	Arushi Agarwal	MS17081	Mathematics
97	Ayushi	MS17082	Biology
98	Vivek Yadav	MS17083	Chemistry
99	Jaspreet Kaur	MS17085	Chemistry
100	Aishwarya Kumar Priye	MS17086	Chemistry
101	Devang Haresh Liya	MS17087	Physics
102	Raunok Basu	MS17088	Physics
103	Suraj Chopra	MS17089	Physics
104	Dafada Vishal Danabhai	MS17090	Mathematics
105	Rashmi Prajapati	MS17095	Mathematics
106	Shruti Agrawal	MS17096	Physics
107	Ankita Chauhan	MS17097	Biology
108	Anshu	MS17098	Physics
109	Praneet Pathak	MS17100	Physics
110	Ashutosh Tripathi	MS17101	Physics
111	Irfan Kalam	MS17102	Biology
112	Vishal Kataria	MS17103	Chemistry
113	Paras Yadav	MS17104	Chemistry
114	Vidisha	MS17105	Biology
115	Abhimanyu Sharma	MS17106	Physics
116	Sanat Mishra	MS17107	Biology
117	Abhigyan Writwik Medhi	MS17108	Mathematics

118	K. S. Swaparjith	MS17109	Physics
119	Prateek Pranjal	MS17113	Chemistry
120	Vedang Abhijeet Puranik	MS17114	Chemistry
121	Rudranil Roy	MS17115	Physics
122	Ved Mandar Kunte	MS17117	Physics
123	Roshan S Kaundinya	MS17118	Physics
124	Aishwarya Ramya Viswamitra	MS17119	Biology
125	Malpath Kusha Sameeha	MS17120	Chemistry
126	Muhammed Anjad P P	MS17121	Chemistry
127	Jennifer John	MS17122	Biology
128	Nilendu Das	MS17123	Mathematics
129	Simranjit Kaur	MS17124	Biology
130	Sarita Yadav	MS17126	Physics
131	Ushnik Das	MS17128	Biology
132	Diksha Singh Gautam	MS17130	Biology
133	Prashanth S	MS17131	Biology
134	Bhavya Deepti Vadavalli	MS17132	Biology
135	Meesha Katyal	MS17133	Biology
136	Yashoda Singh	MS17134	Chemistry
137	Monit Sharma	MS17135	Physics
138	Radhika	MS17136	Biology
139	Aavani B S	MS17138	Biology
140	Nanu	MS17140	Biology
141	Prashant Kumar	MS17141	Physics
142	Dhruv Vansraj Rathore	MS17142	Mathematics
143	Neha Punia	MS17143	Biology
144	Tarunjeet Kumar	MS17144	Chemistry
145	Rupali Singh	MS17145	Chemistry
146	Nitin	MS17146	Biology
147	Vaibhav	MS17148	Biology
148	Anugraha Arun Puthenpura	MS17149	Physics
149	Adhil Aseem	MS17150	Biology
150	Pradosh Barun Das	MS17151	Physics
151	Ashwani Gurjar	MS17152	Chemistry
152	Shubham	MS17153	Chemistry
153	Drisha Sehgal	MS17154	Physics
154	Shivanshu Siyanwal	MS17155	Physics
155	Dhruv Pathak	MS17156	Physics
156	Ruchira Basu	MS17157	Biology
157	Mayank Pal	MS17158	Physics
158	Aakanksha Kumari	MS17159	Chemistry
159	Rajwant Kaur	MS17160	Chemistry
160	KM Sooraj Murali	MS17161	Biology

161	Yuvraj Yogesh	MS17162	Chemistry
162	Desai Omkar Mahadeo	MS17163	Biology
163	Sarvottam Sharma	MS17165	Biology
164	Parth Bhandari	MS17166	Physics
165	Kala G Pradeep	MS17168	Physics
166	Naman Gupta	MS17169	Mathematics
167	C. Afzal	MS17170	Biology
168	Anisha Pahuja	MS17171	Biology
169	Harshit Jain	MS17174	Chemistry
170	Sukrit Dubey	MS17175	Mathematics
171	Harshit Jain	MS17176	Biology
172	Parbhat Kumar	MS17178	Chemistry
173	Vishnu	MS17179	Physics
174	Ankita Meena	MS17180	Chemistry
175	Himani Meena	MS17181	Biology
176	Gaurav Dadwal	MS17182	Physics
177	Shreya Ajith	MS17183	Biology
178	Aswini R.	MS17184	Physics
179	Aditi Aggarwal	MS17185	Chemistry
180	Aiswarya Sajeevan	MS17186	Biology
181	Sneha Mehra	MS17187	Chemistry
182	Sachin Ishwarlal Jadhav	MS17188	Chemistry
183	Shinde Adesh Navanath	MS17190	Physics
184	Agrima Agarwal	MS17191	Physics
185	Abhishikta	MS17192	Physics
186	Srishti	MS17193	Biology
187	Vishal Kumar	MS17195	Physics
188	Ravi	MS17196	Biology
189	Kriti	MS17197	Biology
190	Anish Kumar Singh	MS17198	Chemistry
191	Ankit Yadav	MS17199	Physics
192	Dhotre Pranit Balaram	MS17200	Physics
193	Akhil Ratan Misra	MS17202	Biology
194	Abhinna Sundar Samantaray	MS17204	Physics
195	Vedula Sahithi	MS17206	Biology
196	Charapale Omkar Namdev	MS17208	Chemistry

20.3. PhD Graduates

S. No.	Name	Reg. No.	Dept.	Title of the Thesis
1	Chitranjan Sah	MP13012	CHM	Computational and Matrix Isolation Studies of Heterocyclic Radicals and Azoheteroarene Photoswitches

2	Naveen Kumar	MP13019	CHM	Light- induced spatio- temporal localization of molecular wave packets on saddle points of potential energy surfaces
3	Rohit Kapila	MP14006	BIO	What doesn't kill you makes you stronger: Correlated evolution of adult traits in populations of Drosophila melanogaster adapted to crowded larval environment
4	Komal Chaudhary	MP14015	PHY	Time-resolved sub-nanoscale opto mechanics of fluids using noninvasive ultra-precise techniques
5	Alisha Gogia	MP14016	CHM	Design and Synthesis Of Metal- Organic Frameworks Comprised of Nitrogen Rich Heterocyclic Moieties For Sensing, Sorption And Catalysis Applications
6	Gargi Lather	MP15003	MTH	Skeleton ideals of graphs and their associated invariants
7	Harleen Kaur	PH12138	BIO	UIntrinsic and Extrinsic regulation of hematopoietic niche development in Drosophila melanogaster
8	Deepak Singh Kathyat	PH13003	PHY	Skyrmions and Antiskyrmions in Spin-Orbit Modified Double Exchange Models
9	Rakesh Sharma	PH13006	PHY	Probing the dynamics and binding properties of fluorinated drugs, ionic liquids and biomolecules via NMR relaxation and diffusion experiments
10	Venu Mehta	PH13016	PHY	Quantum thermodynamic resources and bounds on the performance of quantum Otto engines
11	Gaurav Sharma	PH13044	EES	Quantification of open waste burning emissions over the Indian subcontinent: present and future projections
12	Namrata Ramsakha	PH14004	BIO	Role of post-synaptic scaffolding proteins PICK1 and Tamalin in group I metabotropic glutamate receptor trafficking
13	Arnob Mukherjee	PH14011	PHY	Antiferromagnetic Skyrmions in Spin-Orbit Coupled Hund's Insulators and Metals
14	Shradha Gandhi	PH14028	CHM	Porous Frameworks of Ni(II)/Zn(II)/In(III) with an Aspartate-derived Tricarboxylate and Their Metal Oxide Nanostructures for Gas/Vapor Sorption, Guest Encapsulation, Lewis Acid Catalysis, and Photodegradation of Dyes
15	Nupur Tiwari	PH14040	HSS	Technology, Chronology and Landscape Archeology of Microlithic Occurrences in the Central Narmada Basin, Madhya Pradesh, India

16	Shelender Kumar	PH14053	PHY	Low temperature dissipation studies in normal and superconducting electromechanical systems
17	Ritesh Kumar	PH14054	PHY	Electrical transport characteristics of superconducting point-contacts
18	Neetika Ahlawat	PH14059	BIO	A study in host-pathogen coevolution and immune priming using laboratory populations of Drosophila melanogaster
19	Garima Arya	PH14069	BIO	Molecular insights into effector binding by GntR/FadR family sugar acid transcriptional regulators
20	Pulkit Bindra	PH14215	INS	Porous particles for plant agronutrient delivery
21	Km Yogita Silori	PH15006	CHM	Deciphering the Role of Solvation and Confinement on Ultrafast Energy and Charge Transfer Dynamics within Light-Harvesting Molecular Aggregates using Pump-Probe Spectroscopy and Two- Dimensional Electronic Spectroscopy
22	Sheeba Khan	PH15014	CHM	Design and construction of multifunctional metal organic coordination networks and their application in sensing and heterogeneous catalysis
23	Ashish Kumar	PH15017	ESS	Detection and quantification of trace gases in ambient air and vehicular exhaust: decoding the urban atmosphere
24	Haseeb Hakkim	PH15018	EES	Detection and quantification of trace gases in ambient air and vehicular exhaust: decoding the urban atmosphere
25	Anish Kumar Mondal	PH15026	BIO	Elucidating the role of the pore-forming motif in the structure-function mechanism of Vibrio cholerae cytolysin (VCC), a β-barrel pore-forming toxin
26	Manisha Gupta	PH15040	BIO	Community diversity and functions of Arthropod associated symbionts
27	Sonu Yadav	PH15042	CHM	Metal catalysed approaches for the synthesis of carbazoles
28	Aishwarya Agarwal	PH15043	BIO	The Role of the N-terminal Intrinsically Disordered Domain of the Prion Protein in Liquid-Liquid Phase Separation, Membrane-Binding, Misfolding, and Oligomerization
29	Renuka Agarwal	PH15045	BIO	Multimodal Inhibition of the Weedy Fungi in the Gardens of Odontotermes obesus

30	Jagadish Prasad Hazra	PH15051	CHM	Deciphering how mutations at the calcium binding sites of tiplinks alter the elastic properties of inner ear gating-spring and contribute to congenital deafness
31	Lipipuspa Sahoo	PH15057	CHM	Shape controlled synthesis of Palladium based nanostructures for electrochemical energy harvesting and organic transformation reactions
32	Debapriya Das	PH15058	CHM	The Dynamic Personality of α-Synuclein: Intrinsic Disorder, Conformational Dynamics, Internal Friction, and Amyloid Formation
33	Pranjali Yadav	PH15205	INS	Photo - active carbon nitride and gold nanostructures as autonomous and magnetically augmented entities for therapeutic & imaging applications
34	Ankush Garg	PH15206	INS	Role of Internal and External Stimuli Towards Modulation Of p53 Structure-Function Activity
35	Harsimran Kaur	PH15208	INS	Development of highly tunable bioactive peptide hydrogel scaffolds for its applications in energy and healthcare
36	Anas Ahmad	PH15210	INS	Customized Polymeric Nanoparticles for Targeting Inflammatory Disorders
37	Pushpendra	PH15212	INS	Lanthanide Ion Doped Bismuth Basd Nanomaterials: Structural, Photoluminescent Properties and Applications
38	Taru Dube	PH15213	INS	Development of Self-Assembled and Blood-Brain Barrier Permeabilising Amino acid/Peptide-Metal Hybrid Nanostructures as Potent AntiGlioma Theranostics
39	Ravikumar Kunchala	PH15217	INS	Synthesis of Manganese and Cobalt Based Oxide Nanomaterials for Water Oxidation
40	Shabi Parvez	PH15219	INS	Development of Combinatorial Nanocarrier based Oral Nanomedicine for the Treatment of Visceral Leishmaniasis
41	Mayank Joshi	PH16019	CHM	Co-Crystallization, Structural and Physicochemical Analysis of Active Pharmaceutical Ingredients for Enhanced Properties
42	Prashant	PH16031	CHM	Electronic Quantum Dynamics of Molecules in Strong Laser fields: Novel Algorithms and Effects
43	Rajat Garg	PH16032	CHM	Theory of Coherent Averaging in Magnetic Resonance using Effective Hamiltonians
44	Aksh Srinivas	PH16069	HSS	Beyond the Biface: Investigating variability in the Mode 2 technology of

				the South Asian Palaeolithic through the holistic analysis of select lithic assemblages
45	Roman Sarkar	PH16082	BIO	Elucidating the role of Myeloid Derived Suppressor Cells in virus induced immunity and immunopathology
46	Ruby Gupta	PH16201	INS	Development of nano-magnetic transducers for traversing the blood-brain barrier and elucidation of their thermal response for glioblastoma therapy
47	Ashima Rawat	PH16203	INS	Energy Harvesting in selected semiconducting 2D materials: A theoretical perspective using DFT
48	Soumadri Samanta	PH16206	INS	Nanostructured graphitic carbon nitrides and their composites for photocatalytic hydrogen evolution and sensing applications
49	Babita Kaundal	PH16209	INS	Multimodal nanotherapy abrogating polycomb mediated epigenetic regulation of acute myeloid leukaemia
50	Km Arti Joshi	PH16210	INS	Functional Hybrid Solids for Energy and Medicinal Applications
51	Sushil Kumar	PH16212	INS	Design and Fabrication of Nano-architecture Carbon/Non-Carbon Hetero structures towards Flexible Energy Storage Device
52	Battula Venugopala Rao	PH16213	INS	Solar-driven fuel production integrated with biomass valorization over heptazine based photocatalytic systems: Could sunlight be the fossil fuel of the future?
53	Navneet Kaur	PH16215	INS	Chitosan derivative based colloidal nanomedicines and hydrogel nanocomposite for combination cancer therapy
54	Abdul Selim	PH16219	INS	Design and Synthesis of Biomass-derived Nanocomposites for Catalytic Applications
55	Aashish Bhatt	PH16221	INS	In Silico Studies of Structural and Biochemical Properties of Human Cystathionine β-Synthase (HCBS) Enzyme
56	Khalid Naim	PH16222	INS	Design and Synthesis of Boron-containing Organic Molecules: Exceptional Photophysical, Mechanical and Optical Properties
57	Prabhleen Kaur	PH16223	INS	Designing and Modulation of Long-Range Exchange Interactions through Conjugated Spacers
58	Saveena Goyal	PH16227	INS	Effect of light and electrostatic gating on the transport properties of oxide interfaces

59	Preeti Dagar	PH16230	INS	Design of photoanodes for photoelectrochemical water splitting
60	Sk Riyajuddin	PH16233	INS	Investigation of Nano-Carbon/Non-Carbon Material Interfaces for Electronics and Renewable Energy Conversion Applications
61	Nandan Ghorai	PH16236	INS	Ultrafast Plasmon Relaxation Dynamics in Metal (Au) and Near Infrared Active Non-Stoichiometric Semiconductor (Cu2-xS/Se) Nanocrystals
62	Rohit Varshney	PH16237	INS	Self-assembly of Supramolecular Nano-conjugates at Liquid-Liquid Interface
63	Sonika Chibh	PH16241	INS	Stimuli responsive amino-acid/peptide/peptide- metal hybrid nanostructures for site specific anti-cancer drug delivery
64	Anjali Purohit	PH16301	CIAB	Oligosaccharides production from lignocellulosic biomass through bioprocessing and synthetic biology approach
65	Ankit	PH17018	EES	Lake sediments as an archive of long-term climate– human-environmental interactions in Indian Himalayas
66	Manpreet Kaur	PH18057	PHY	Experiments on quantum interference and quantum imaging with quantum entangled photons
67	Manisha	PH18204	INS	Design and engineering of nanostructured multifunctional electrocatalyst for hydrogen evolution, oxygen evolution and oxygen reduction reactions: Towards the development of sustainable energy systems

20.4. MS Graduates

S. No.	Name	Reg. No.
1	Abhishek Ranna	MP19004
2	Anuraag Ghosh	MP19005
3	Sakil Mallick	MP19007
4	Supriya Chakraborty	MP19010
5	Ananya S Omanwar	MP19011
6	Aarushi Naskar	MP19013
7	Uttaran Dutta	MP19016
8	Nihal Khaitan	MP18020

21. Publications

21.1. Publication During the Calendar year 2022:

21.1.1 Department of Biological Sciences

1. **Aishwarya Agarwal** and **Samrat Mukhopadhyay (2022).** Prion Protein Biology Through the Lens of Liquid-Liquid Phase Separation: Liquid-liquid phase separation of prion protein. ***Journal of Molecular Biology***, *434*(1), 167368. https://doi.org/10.1016/j.jmb.2021.167368
2. **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
3. **Aiswarya Sajeevan, Rakesh Pandian,** and **Shravan Kumar Mishra (2022).** Vectors with a flexible multiple cloning site and modular epitope tags for gene expression studies in Schizosaccharomyces pombe. ***Gene Reports***, *29*(1), 101681. https://doi.org/10.1016/j.genrep.2022.101681
4. **Alok Tiwary, Rahul Babu,** Ruchira Sen, and **Rhitoban Ray choudhury (2022).** Bacterial supergroup-specific "cost" of Wolbachia infections in Nasoniavitripennis. ***Ecology and Evolution,*** *12*(9), 9219. https://doi.org/10.1002/ece3.9219
5. **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, 2022. https://doi.org/10.17912/micropub.biology.000519
6. **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
7. **Anamika Avni, Ashish Joshi, Anuja Walimbe, Swastik G. Pattanashetty,** and **Samrat Mukhopadhyay (2022).** Single-droplet surface-enhanced Raman scattering decodes the molecular determinants of liquid-liquid phase separation. ***Nature Communications***, *13*(1), 4378. https://doi.org/10.1038/s41467-022-32143-0
8. **Anamika Kumari, Anjali Yadav,** and **Indrajit Lahiri (2022).** Transient State Kinetics of Plasmodium falciparum Apicoplast DNA Polymerase Suggests the Involvement of Accessory Factors for Efficient and Accurate DNA Synthesis. ***Biochemistry***, *61*(21), 2319-2333. https://doi.org/10.1021/acs.biochem.2c00446
9. **Anish Kumar Mondal** and **Kausik Chattopadhyay (2022).** Structures and functions of the membrane-damaging pore-forming proteins. ***Advances in Protein Chemistry and Structural Biology,****128*(1), 241-288.https://doi.org/10.1016/bs.apcsb.2021.07.001
10. **Anish Kumar Mondal, Kusum Lata, Mahendra Singh, Shamaita Chatterjee, Aakanksha Chauhan, Sindhoora Puravankara** and **Kausik Chattopadhyay (2022).** Cryo-EM elucidates mechanism of action of bacterial pore-forming toxins. ***Biochimica et Biophysica Acta - Biomembranes,*** *1864*(11), 184013. https://doi.org/10.1016/j.bbamem.2022.184013
11. **Anish Kumar Mondal**, Nayanika Sengupta, **Mahendra Singh**, Rupam Biswas, **Kusum Lata, Indrajit Lahiri**, Somnath Dutta and **Kausik Chattopadhyay (2022).** Glu289 residue in the pore-forming motif of Vibrio cholerae cytolysin is important for efficient β-barrel pore formation. ***Journal of Biological Chemistry,*** *298*(10), 102441. https://doi.org/10.1016/j.jbc.2022.102441
12. **Anupa Majumdar** and **Samrat Mukhopadhyay (2022)**. Excitation energy migration to study protein oligomerization and amyloid formation. ***Biophysical Chemistry***, *281*(1), 106719. https://doi.org/10.1016/j.bpc.2021.106719
13. **Anupa T Anil, Karan Choudhary, Rakesh Pandian, Praver Gupta, Poonam Thakran, Arashdeep Singh,** Monika Sharma**,** and **Shravan Kumar Mishra (2022).** Splicing of branchpoint-distant exons is promoted by Cactin Tls1 and the ubiquitin-fold-activated Sde2. ***Nucleic Acids Research***, *50*(17), 10000-10014. https://doi.org/10.1093/nar/gkac769
14. Apoorva Pandey, **Riya Madan,** and Swati Singh **(2022)**. Immunology to Immunotherapeutics of SARS-CoV-2: Identification of Immunogenic Epitopes for Vaccine Development. ***Current Microbiology,*** *79*(10), 30033. https://doi.org/10.1007/s00284-022-03003-3
15. **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

16. **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
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18. **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
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20. **Deeksha Thakur** and **Shashi B. Pandit (2022).** Substrate promiscuity: a continuum feature of enzymes. ***Biophysical Journal,*** *121*(3), 344a. https://doi.org/10.1016/j.bpj.2021.11.1015
21. **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
22. **Deepinder Kaur, Pratima Verma, Mahendra Singh, Arpita Sharma, Kusum Lata, Arunika Mukhopadhaya,** and **Kausik Chattopadhyay (2022).** Pore formation-independent cell death induced by a β-barrel pore-forming toxin. ***FASEB Journal***, *36*(10), 2200788R. https://doi.org/10.1096/fj.202200788R
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25. **Garima Prazapati Ankit Yadav Anoop Ambili Abhilasha Sharma** and **RhitobanRaychoudhury (2022).** Males of the parasitoid wasp Nasoniavitripennis can identify which fly hosts contain females. ***Royal Society Open Science***, *9*(1), 211865. https://doi.org/10.1098/rsos.211865
26. **Garima Prazapati, Ankit Yadav, Anoop Ambili, Abhilasha Sharma** and **Rhitoban Raychoudhury (2022)**. Males of the parasitoid wasp, *Nasoniavitripennis* , can identify which fly hosts contain females. ***Royal Society Open Science***, *9*(1). https://doi.org/10.1098/rsos.211865
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28. Gaurav Kumar, **Prateek Chawla, Neha Dhiman,** Sanya Chadha, Sheetal Sharma, Kanupriya Sethi, **Mahak Sharma**, and Amit Tuli **(2022).** RUFY3 links Arl8b and JIP4-Dynein complex to regulate lysosome size and positioning. ***Nature Communications***, *13*(1), 1540 .https://doi.org/10.1038/s41467-022-29077-y
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31. Jasreen Kaur, **Sharvan Sehrawat,** Ikjot Singh Sohal, Harpreet Singh, Naveen Kumar Gupta, Sanjeev Puri, Dhimiter Bello, and D. Madhu Khatri **(2022).** Toxicity screening and ranking of diverse engineered nanomaterials using established hierarchical testing approaches with a complementary in vivo zebrafish model. ***Environmental Science: Nano***, *9*(8), 2726-2749. https://doi.org/10.1039/d2en00265e

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36. **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), 569-21. http://doi.org/10.1128/jb.00569-21
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21.2. Publications in 2023 (Till March 31, 2023)

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22. Patents

Indranil Banerjee

- A phone-based interface electrochemical sensor for detection of low concentration sars-cov-2 antibody". Inventors: Chansi A, Mani A, Banerjee I, Kapoor S, Basu T, Indian Patent Application No. 202211002259, Patent filed in 2022
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- ***Ionic liquid and copper nanocluster based anti-microbial and anti-viral formulation for surface disinfection***", Inventors: Paul IS, Paul Q, Singh N, Singh A, Mayank, **Banerjee I**, Kumar N, Indian Patent Application No. 202011032037, Date of filing: 27.07.2020 Status: **Granted in 2023**

Sharvan Sehrawat

- Sudhakar Singh, Surbhi Dahiya and Sharvan Sehrawat (2022) ANTI-VIRAL SINGLE DOMAIN ANTIBODIES AND METHOD OF PREPARATION THEREOF. Patent application number 202211016615.society.

Srinivasarao Arulananda Babu

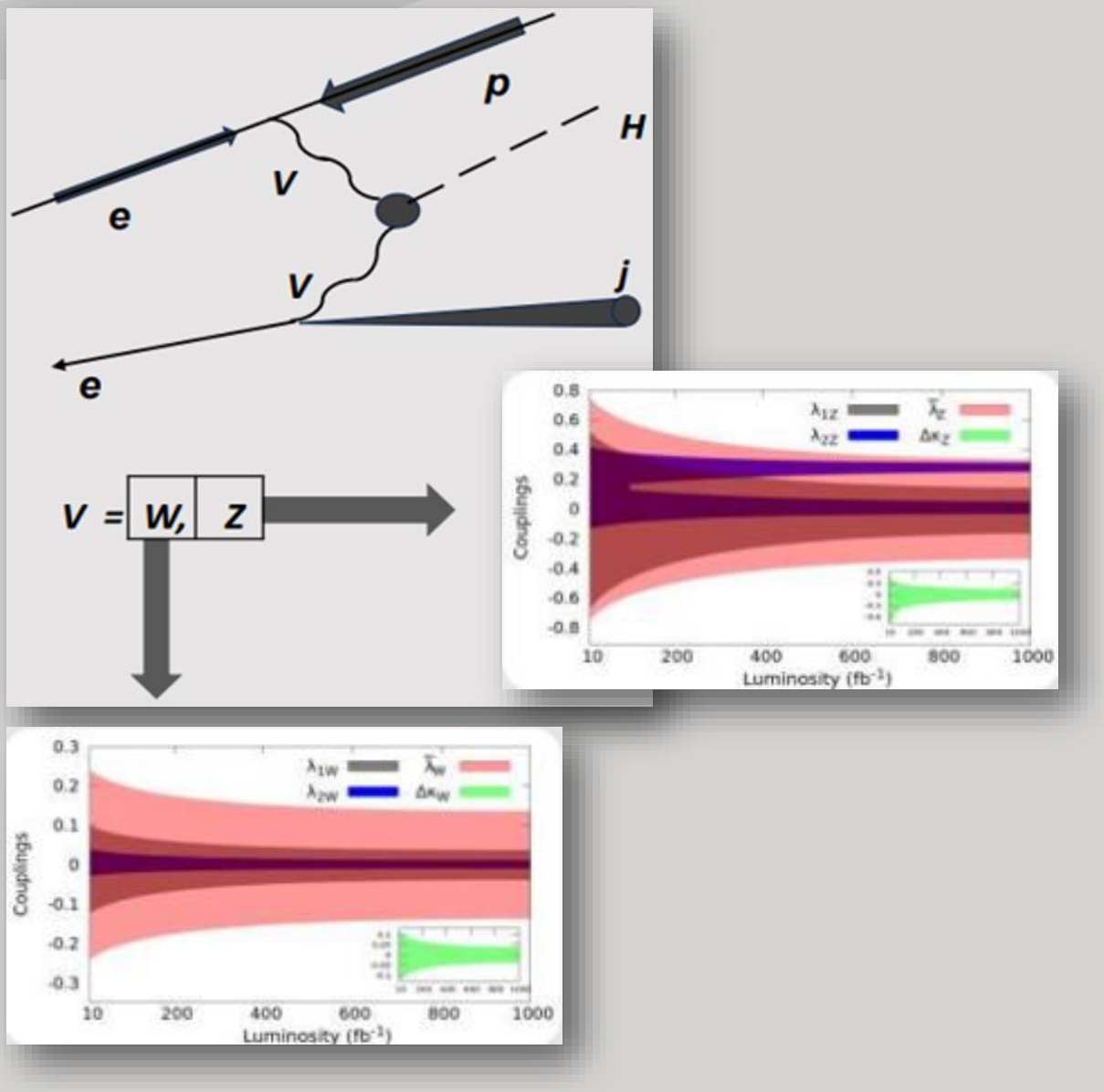
- Inventors: Srinivasarao Arulananda Babu and Nayyar Ahmad Aslam. Patent Application No. 3400/DEL/2013, Date: 20th November 2013. Patent No. 411834 (Granted on 18.11.2022). Title: Process for the Preparation of Homoserine Lactones Derivatives.
- Inventors: Srinivasarao Arulananda Babu and Naveen, Patent Application No. 3532/DEL/2012, Date: 16th November 2012. Patent No. 404710 (Granted on 26.08.2022). Title: Preparation of new crown ether/polyether macrocyclic systems.

Sunil Anil Patil

- Title: A process of increasing the calorific value of the biogas and system thereof.
  Inventors: Sunil Anil Patil and Moumita Roy;
  Ref/Application no. 202211025653 (Indian patent); Filing Date: 03/05/2022
- Title: A mountable apparatus for treating wastewater at point source.
  Inventors: Sunil Anil Patil, Ravi Kumar Yadav, Siddhant Sahoo and Asheesh Kumar Yadav;
  Ref/Application no. 202211026332 (Indian patent); Filing Date: 06/05/2022
- Title: A two-stage process for producing terpenes and yeast biomass from CO2 and system thereof; Inventors: Sunil Anil Patil, Anand Kumar Bachhawat, Ravineet Yadav and Banani Chattopadhyay; Ref/Application no. 202211028998 (Indian patent); Filing Date: 26/05/2022

Samir Kumar Biswas

- Patent application No. 202331012524 dated 23-02-2023 in India



The plots exhibit information on the potential of eP collider in probing the anomalous parameters of the Higgs-gauge Boson couplings.

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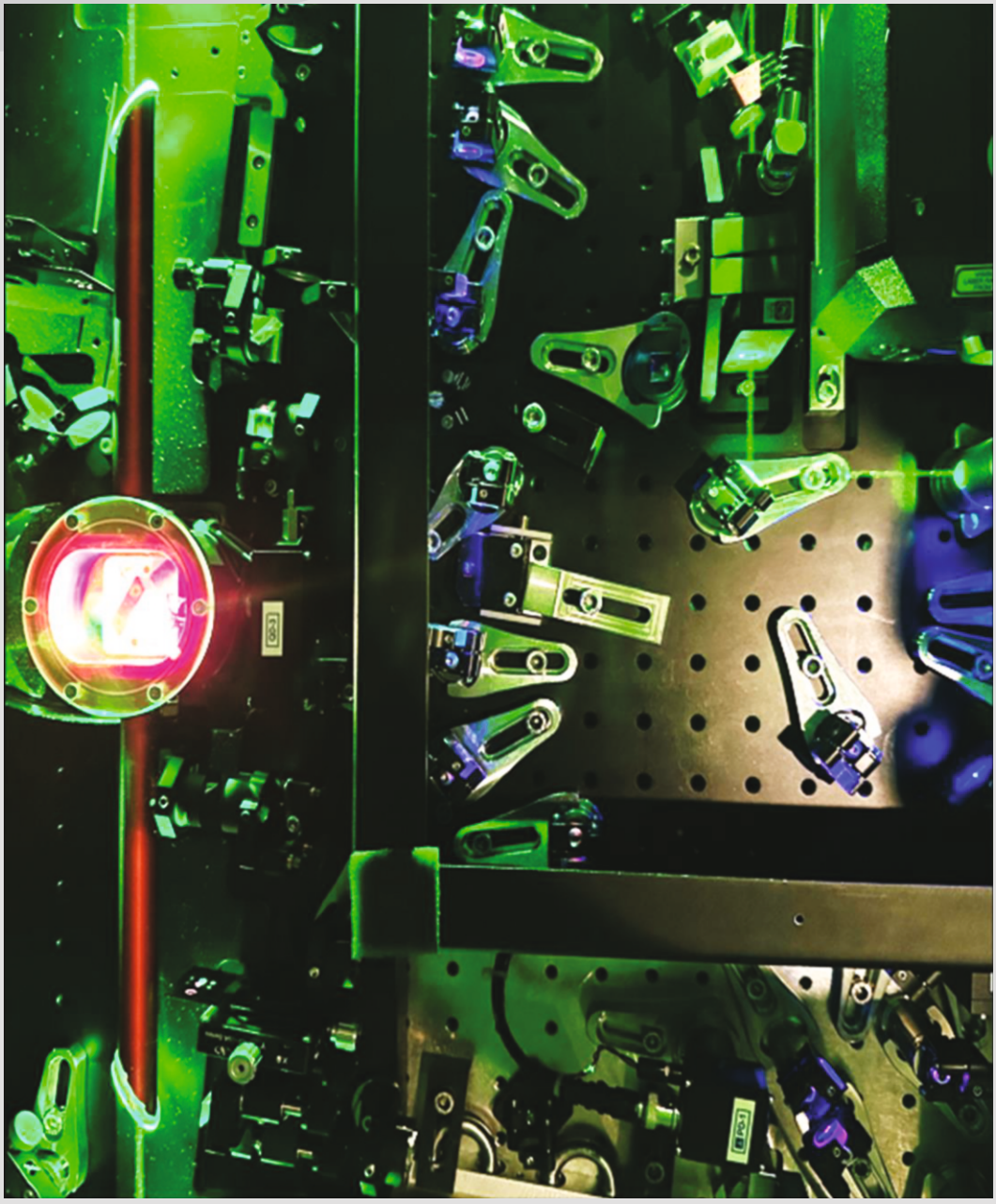

Nuts and bolts of the ultrafast femtosecond laser. The femtosecond laser pulses are generated in titanium sapphire crystal using green pump lasers with visible Non-linear production of blue light.

Indian Institute of Science Education and Research Mohali

Knowledge City, Sector 81, SAS Nagar, PO Manauli (Punjab) - 140306