IISER PUNE

# भारतीय विज्ञान शिक्षा एवं अनुसंधान संस्थान पुणे
## वार्षिक प्रतिवेदन 2024-25

# INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH PUNE
## Annual Report 2024-25

**On the Cover**

Transport inside living cells is driven by tiny nanometer-sized motors called molecular motors. These are proteins walking along long polymers, such as microtubules, that act as tracks. While studying the mechanics of such tiny motors inside the cell is important, in order to interpret it, researchers often work to assemble the machines outside of a cell, using purified components and microscopy. Such an approach has been used in Prof. Chaitanya Athale's research group at IISER Pune. The image on the cover shows the wave-like oscillations that were seen to spontaneously result from experiments where microtubules were assembled and engineered to be stuck at one end. The force generated by molecular motors seems to drive the free end's motion, with curvature resulting from bending and buckling. The colours indicate time, with movie frames superimposed to give a sense of the motion observed. By recreating such microscopic movements using minimal cellular components, the group studies how cells move and organise themselves within a living body.

**Image Credit**

Shivani Yadav and Chaitanya Athale

**Correct Citation**

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IISER PUNE

**भारतीय विज्ञान शिक्षा एवं अनुसंधान संस्थान** पुणे

भारत सरकार के शिक्षा मंत्रालय का स्वायत्त संस्थान

**INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH** PUNE

An Autonomous Institution of the Ministry of Education, Government of India

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IISER PUNE

## Fostering a culture of excellence and expanding the frontiers of knowledge, IISER Pune is at the forefront of training the next generation of scientists and informed citizens.

IISER Pune is an autonomous teaching and research organisation of the Ministry of Education, Government of India.

IISER Pune offers undergraduate and graduate programmes in Biology, Chemistry, Data Science, Earth and Climate Science, Humanities and Social Sciences, Mathematics, Physics, and Science Education. Researchers at the Institute investigate a wide spectrum of topics in the basic sciences as well as in applied areas of research.

The Institute is ranked 42 in the Overall Category and 29 in the Research Category in the 2024 India Rankings of the National Institutional Ranking Framework (NIRF); 1201-1500 in the 2025 Times Higher Education (THE) World University Rankings; and is listed 13th in India, 167th at the Asia-Pacific level, and 439th globally for research output by the 2024 Nature Index Tables.

# 2024-25 Highlights

**139** **Faculty Members**
+ 27 visiting, emeritus, guest, and adjunct faculty

**133** **Non-Teaching Staff Members**

**61** **Fellows, Project Scientists, and Post-doctoral Research Associates**

**1978** **Students**
520 PhD, 153 Integrated PhD, 73 Master of Science, and 1232 BS-MS

**31** **New Extramural Grants**

**64** crores (in ₹) **Extramural Funds received / assigned**

**174** crores (in ₹) **Funds Received from the Ministry of Education**

**601** **Publications in 2024**

**Patents in 2024** **17** Filed **14** Published **9** Granted

**47** **MoU and Agreements with industries and academic organisations**

Over **2** lakh **Teachers, students, and science enthusiasts reached out to by outreach teams on the campus**

*Numbers are as of March 31, 2025*
*Financial data rounded off to the nearest whole number*

# Director's Report

Prof. Sunil S. Bhagwat

It is with great pleasure that I present the 2024-25 annual report for the institute. In 2025, IISER Pune enters its 20th year of being established. After two decades of teaching and research, we can see we have come a long way and the future looks exciting with new challenges and opportunities.

As of March 31, 2025, the institute has 139 faculty members across our eight departments. This includes Dr. Buddhadeb Chattopadhyay and Dr. Bedartha Goswami, who joined the Chemistry and Data Science departments, respectively, during the year 2024-25. In addition to this, we have had the following faculty members join us newly in visiting, guest, and adjunct positions during the year: Visiting faculty members Dr. Aravind Chinchure (Chemistry), Prof. Kalpesh Kapoor (Data Science), and Dr. Subodh Mangesh Wagle (Humanities and Social Sciences); Guest faculty members Dr. Chaitanya Guttikar (Data Science) and Mr. Udayan Kanade (Data Science); Adjunct faculty members Prof. Sanjeev Galande (Biology), Prof. Parameswaran Ramanathan (Data Science), Prof. Gopal Krishna Basak (Data Science), Prof. Mihir Arjunwadkar (Data Science), and Prof. Aditya Mohite (Physics). The institute had 1232 BS-MS students, 673 PhD students—including 153 Integrated PhD students—and 73 Master of Science students as of March 31, 2025. Faculty members conduct research and engage in both classroom teaching as well as training and mentoring students on research projects.

During the 2024 calendar year, IISER Pune members have published a record number of 601 publications, which include research papers, books, book chapters, book reviews, and conference proceedings. Our faculty members have filed 17 patent applications, had 14 patents published, and 9 patents granted. In addition, 6 applications were filed and 3 published for PCT approval during the 2024 calendar year. The total number of patents granted so far has doubled in the last two years alone. In another first, two patented technologies from Prof. R. Vaidhyanathan's group's research on carbon dioxide capture were licensed to a Canadian company. Institute faculty members secured extramural funding for 31 new projects of a total sanctioned value of Rs. 12.32 crores during the 2024-25 financial year.

In the 2024 India Rankings of the National Institutional Rankings Framework (NIRF), IISER Pune was ranked 42 in the Overall Category and 29 in the Research category. On the 2024 Nature Index Tables, IISER Pune was listed 13th in India, 167th at the Asia-Pacific level, and 439th globally for research output.

Several of our faculty members have been recognised for their academic contributions during the 2024-25 reporting period: Prof. Sujit K. Ghosh received Dr. P.N. Pathak Memorial Award and the Society for Materials Chemistry's Silver Medal for the year 2024. In the 2025 round of awards from the Chemical Research Society of India (CRSI), Prof. Nirmalya Ballav received a CRSI Bronze Medal (2025); Prof. K.N. Ganesh (Founder Director of IISER Pune, presently at JNCASR, Bengaluru) received the CRSI Gold Medal (2025), and Prof. Pinaki Talukdar

received the C.N.R. Rao National Prize. Prof. Pinaki Talukdar and Prof. Anjan Banerjee were elected as Fellows of the Indian National Science Academy (INSA), New Delhi.

Prof. Jayant Udgaonkar was honoured with the Vigyan Shri Award (2024) and Prof. Srinivas Hotha with the National Teachers' Award (2024), both of which were presented by Honourable President of India Smt. Droupadi Murmu. In June 2024, the Governor of Maharashtra Shri Ramesh Bias released a book in which Dr. Pushkar Sohoni contributed a chapter on the connected histories of the Janjira Fort and Rajapuri Fort.

Prof. Angshuman Nag was awarded the National Prize for Research in Chemical Physics (2024) from C.N.R. Rao Education Foundation. Prof. Harinath Chakrapani and Dr. Siddhesh S. Kamat were elected as Fellows of the Royal Society of Chemistry, U.K. Dr. Venketeswara Pai received Satish Bhatnagar Award (2024). Prof. Kalika Prasad was elected as a Fellow of the National Academy of Sciences, India (NASI). Dr. Siddhesh Kamat was awarded the Infosys Prize (2024) in the Life Sciences category. Honorary member Dr. Arvind Natu was appointed as a member of the IISER Standing Committee. Prof. Satishchandra Ogale was selected to receive the TWAS Award (2026) in Physics, Astronomy, and Space Sciences from the World Academy of Sciences.

Dr. Krishanpal Karmodiya was selected for the prestigious EMBO Global Investigator Network (2024) and received Dr. B.N. Singh Memorial Oration Award (2024) from the Indian Society for Parasitology. Prof. R. Boomi Shankar received CRS Silver Star Award from the Chirantan Rasayan Sanstha and Annual Alumni Materials Lecture Award (2024) from JNCASR, Bengaluru.

Prof. Amit Hogadi and Prof. Angshuman Nag were elected as Fellows of the Indian Academy of Sciences (IASc), Bengaluru. Shri Anil Zankar was conferred with the Sudhir Nandgaonkar Memorial Award (2025). Dr. Jeetender Chugh received Prof. S. Subramanian 60th Birthday Lecture Award (2024). Dr. Sreejith G.J. received the APJ Abdul Kalam Young Researcher Award from Hewlett Packard Enterprise. Three faculty members, Prof. Anjan Banerjee, Prof. Srabanti Chaudhury, and Prof. Seema Sharma, were selected as Rahul Bajaj Chair Professors of IISER Pune for the period 2024-2027.

I would like to mention here the contribution at the national level by two of our faculty members. Dr. Mayurika Lahiri from the Biology department has been associated with the GenomeIndia project implemented by the Department of Biotechnology (DBT), Ministry of Science and Technology, Government of India. Launched in 2020, this project is a consortium of 20 academic and research institutions across India working towards cataloguing the genetic diversity of India. The data generated from the project along with the framework for data use was released by the DBT on January 1, 2025 for research purposes. Prof. Bhas Bapat from the Physics department, who has contributed to the Indian Space Research Organisation (ISRO)'s 2023 Aditya-L1 spacecraft mission, has been appointed as a member of a Standing Committee constituted by ISRO to look into the planning and implementation of the Venus Orbiter Mission.

Our researchers received unique visibility for their work when IISER Pune PhD alumnus Dr. Mansi Mungee (now at Azim Premji University) and faculty member Dr. Ramana Athreya were featured in an award-winning film titled *Nocturnes,* earlier in 2024. This film was screened at the Pune International Film Festival in February 2025. Through its portrayal of life in science and the excitement of discovery, the film offered an extraordinary platform to our researchers and brought research closer to the public.

In addition to the individual awards I listed, I would like to share that several of our faculty members serve on the editorial boards of journals through invitation, and are invited to give lectures in scientific conferences within and outside India.

The Institute hosts two section-8 companies on campus, the I-Hub Quantum Technology Foundation (QTF) and the AIC-IISER Pune SEED Foundation. During 2024-25, AIC-SEED Atal Incubation Centre provided incubation support to 15 new startups in the areas of biotech, healthcare, AI-based platforms, and sustainability. Among these, 2 startups were founded by IISER Pune students, 1 by IISER Pune faculty, 1 by IISER Pune alumnus, and 1 startup, whose service offering is based on IISER Pune's knowhow. The I-Hub is funded by the Department of Science and Technology and is working on developing quantum technologies and products. As a partner of a new initiative under the National Quantum Mission (NQM),

during 2024-25, the I-Hub selected 8 start-ups working on different quantum technologies for support. Towards building capacity in the country in this domain, the I-Hub awarded 130+ Chanakya fellowships to students in more than 40 institutions across India and hosted 29 scientific events engaging over 1,350 participants.

The following scientific conferences and workshops were held at the institute during the year: Frontiers in DNA-Chromatin Dynamics (June 7-8, 2024); Computational Approaches to Memory and Plasticity (CAMP) 2024 (July 1-17, 2024); Future Perspectives on QFT and Strings (July 24-27, 2024); Biophysics Paschim 16: Biophysics Across Scales & Festschrift for Sudipta Maiti (August 24, 2024); Conference on Integrated Earth (CITE)-2024 (September 1-2, 2024); Discussion Meeting in Spectral Theory (September 13-14, 2024); 32nd National Congress on Parasitology (October 3-5, 2024); Water Journalists Roundtable (November 7-9, 2024); fairSTREAM Project Workshop: Alternative Futures: The Water-Food-Biodiversity Nexus in the Upper Bhima Basin (November 12, 2024); International Conference on Engineered Chemical and Biochemical Systems (ECBS2024) (November 12-15, 2024); Industry-Academy Workshop (Franco Indian Campus for Health) (December 3-5, 2024); Celebrating Number Theory in India: A conference to celebrate the 70th birthday of Prof. M. Ram Murty (December 9-13, 2024); International Conference on Advanced Energy Materials and Interfaces - 2024 (AEMI-2024) (December 9-11, 2024); India BioImaging (IBI) Meeting 2024 (December 12-13, 2024); Young Investigators Meet on Quantum Condensed Matter Theory 2024 (December 16-18, 2024); Women in Numbers (WIN) Symposium (January 17-19, 2025); Workshop titled "From fundamental science to application in plants" (February 3-6, 2025); 10th Indian Peptide Symposium (February 26-28, 2025); Germ-Cell Stem-Cell (GCSC) Meeting (February 28 - March 2, 2025); Symposium on Mathematics in Academia and Industry (March 15, 2025); and Inter IISER - NISER Chemistry Meet IINCM'25 (March 20-22, 2025).

The institute hosted these scientific training and capacity building workshops: Training Workshop on Water-Resource Management using Geospatial Data Analysis (April 1-5, 2024); Microscopy and Image Analysis Training Course (May 20-24, 2024); DBT-sponsored Centre for Training Teachers in using *Drosophila melanogaster* for Biology Laboratories (December 23-30, 2024); and Hands-on Workshop on Cryopreservation and Rederivation of Mouse Sperm and Embryos (March 25-28, 2025).

The institute hosted two named lectures: Sixth Annual P.M. Mukhi Memorial Human Rights Lecture delivered by Justice Gautam Patel, a distinguished retired judge of the High Court of Bombay (October 21, 2024) and Eleventh Annual Homi Bhabha Memorial Public Lecture by Prof. Rama Govindarajan from ICTS-TIFR Bengaluru (November 8, 2024).

In addition to year-round research seminars by scientists visiting from across India and abroad, the institute hosted five public lectures as part of the Institute Colloquia series.

The institute campus hosted the Inter-IISER Sports Meet (IISM)-2024 during December 17-23, 2024. Teams from all seven IISERs, IISc Bengaluru, CEBS Mumbai, and NISER Bhubaneswar participated at this event. IISER Pune secured overall second position and our student teams were declared champions in Badminton (Mixed doubles), Lawn Tennis (Men), Chess, Carrom, Basketball (Women), and Kho-Kho (Women), along with several of our players winning medals in athletics events.

Sports tournaments organised through the year on campus included those in badminton, table tennis, cricket, football, basketball, volleyball, frisbee, and carrom, some of which were held under the banner of Kreedajung '25 sports fest for participants within the campus. In the 2024 edition of the Research Premiere League between research institutions of Pune (IISER Pune, CSIR-NCL, HEMRL, IITM, IMD, and ARAI), IISER Pune team secured the first position.

The 2024 International Day of Yoga (June 21) was observed under the theme of 'Vasudhaiva Kutumbakam' with a 10-day yoga workshop. Throughout the year, the student community organised several extra-curricular and cultural events making the campus atmosphere vibrant and cheerful.

During 2024-25, the institute received Rs. 6.61 crores from corporates and individuals towards outreach, R&D, and student development. The 2024 edition of IISER Pune-Industry Conclave held on September 14, 2024 saw participation of over 100 industry representatives. The institute signed 47 MoUs, Agreements, and Amendments

with partners from the industry and academia during 2024-25; of these, 27 were towards research collaborations and expertise; 16 were towards CSR and donations; and 4 were with international partners.

MoUs enabling academic and research collaboration with Sorbonne University, France and Friedrich-Schiller University, Jena, Germany, were renewed in 2024-25 for the next five years. An MoU to support academic and research collaborations was signed with the Faculty of Science and Technology of the University of Stavanger, Norway. An MoU between University of Buffalo, U.S.A. and all IISERs was signed in March 2025 to develop academic and research collaborations and exchanges.

IISER Pune hosted a Franco-Indian campus Industry-Academia workshop from December 3-4, 2024. This event was a congregation from various French companies, Universities from France and India to discuss Industry academia collaboration. IISER Pune also hosted EU Research Info Day on October 9, 2024, where representatives from various EU countries presented info sessions regarding funding and research opportunities in their respective countries.

Through educational outreach activities all-round the year, Smt. Indrani Balan Science Activity Centre (SAC) on campus has reached out to over 2 lakh students, teachers, and science enthusiasts through events such as in-person workshops, visits by schools, colleges, and delegates, and online lecture-demo series events during the year.

Kalpakghar, a Community STEM-Tinkering Centre was inaugurated on August 21, 2024 at Pimpri Chinchwad Science Park, Pune, expanding this reach to a second location in the city. Kalpakghar is a collaborative STEM-tinkering project between IISER Pune and Pimpri Chinchwad Science Park and is funded by Tata Technologies Ltd. under its Corporate Social Responsibilities initiative. Our SAC team members have been conducting public engagement events at Kalpakghar and reached out to close to 90,000 members of the public within the first year of being set up.

Through projects dedicated to capacity building among educators and researchers, our institute members engaged deeply with participants from across India. To support the scaling up of IISER Pune's education initiatives across the country, the National Programme on Teacher Educator Development (NPTED) was launched in 2024 through the shared vision and generous support of Dr. Shridhar Shukla, a professor turned tech entrepreneur turned philanthropist. An MoU towards this partnership was signed in June 2024.

The multi-partner Inspiring India in Research, Innovation, and STEM Education Programme (iRISE) conducted teacher training workshops in Maharashtra, Bihar, Uttarakhand, Jharkhand, and Karnataka and reached over 5427 teachers directly through 89 workshops during 2024-25. The capacity building programmes organised by the iRISE team for Early Career Researchers reached 781 PhD scholars and post-doctoral researchers during 2024-25.

Maharashtra State Development of Educators and Enhancement in Delivery (MS-DEED) Programme hosted at IISER Pune reached over 5500 teachers from 450 colleges across 36 districts of Maharashtra so far and developed over 40 master trainers. During 2024-25, the programme reached 1202 beneficiaries. The MS-DEED programme is a close collaboration between IISER Pune and the Maharashtra State Faculty Development Academy (MSFDA) - Centre for Multi-disciplinary Curriculum & Pedagogy under the Department of Higher and Technical Education, Government of Maharashtra. The team is focusing on action research and innovation activities to foster sustained pedagogical transformation and contributing to scholarly publications. Last year, the team presented its research at a national and an international conference.

The Molecular Biology for Everyone workshop series hosted at IISER Pune allow students to investigate biological phenomenon at the molecular level. A total of 40 workshops were organised during 2024-25 where 574 students were trained in molecular biology methods. They enhance theoretical understanding and are invaluable for students from institutions where lab facilities are lacking. They are offered at a subsidised cost, with support from Praj Industries Ltd. and K.K. Nag Pvt. Ltd.

In a new initiative in collaboration with the University Grants Commission (UGC) and the Ministry of Education, IISER Pune successfully organised a series of three 8-day online workshops in 2024-25 under the National Education Policy (NEP) 2020 Orientation and Sensitization Programme. The programme witnessed enthusiastic participation from 359 teachers across various institutions in India and received

excellent feedback, contributing meaningfully to the ongoing national education reforms.

The Science Media Centre (SMC) on campus initiated 'Alumni Stories', 'Aquamuse Dialogues', and 'Waterwaves Weekly' series on the SMC YouTube channel. The SMC hosted Journalists' Roundtable on Water Crisis (November 7-9, 2024) and annual conference of the Science Journalists Association of India (December 4-5, 2024) at IISER Pune. The SMC also produced an online course on quantum technology with our I-Hub Quantum Technology Foundation and documented various science education outreach programmes and institute activities during the year.

I express gratitude to all our statutory committees, the Senate, the Building and Works Committee, the Finance Committee, and the Board of Governors. I express my sincere thanks to the Chairperson of our Board of Governors Prof. (Dr.) J.S. Yadav and to all members for their contributions towards smooth functioning of the institute.

**Prof. Sunil S. Bhagwat**
Director, IISER Pune
September 23, 2025

# Governance

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# SENATE

*List is as of March 31, 2025; changes during the year are not shown here*

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| **Shri. Mohan Khemani** | *Chief Engineer - Electrical (Retd.), CPWD, New Delhi* |
| **Shri. P.M. Kanvinde** | *Architect and Former Principal, Abhinav K.M. & College of Architecture, Pune* |
| **Prof. Sudarshan Ananth** (BoG Nominee) | *Professor, IISER Pune* |
| **Prof. Bhas Bapat** (Special Invitee) (from May 21, 2024) | *Professor and Dean, Planning and Communications, IISER Pune* |
| **Col. G. Raja Sekhar** (Retd.) (till June 4, 2024) | *Registrar, IISER Pune* |
| **Prof. M.S. Santhanam** (from June 5, 2024) | *Registrar (In-charge), IISER Pune* |

### Secretary

| | |
|---|---|
| **Shri. Rajendra Patil** | *Superintending Engineer, IISER Pune* |

# Research Activities and Achievements

# Research Report

Research at IISER Pune aims to reach a fundamental understanding of how the physical world works. Research is carried out through the departments of biology, chemistry, data science, earth and climate science, humanities and social sciences, mathematics, physics, and science education.

With 601 papers during 2024, IISER Pune has performed consistently in terms of obtaining research publications from work carried out at the Institute. During the 2024 calendar year, IISER Pune filed 17 patent applications, had 14 patents published, and 9 patents granted. In addition, 6 applications were filed, and 3 published for PCT approval during this period. In a first for IISER Pune, two patented technologies from Prof. R. Vaidhyanathan's group's research on carbon dioxide capture were licensed to a Canadian company during the year.

Read through the pages of our research report for a glimpse of the diverse areas of work being pursued across our departments.

## DEPARTMENT-WISE NUMBER OF PUBLICATIONS DURING 2024

### Publications in 2024

### Total : 601

**101**
BIOLOGY

**157**
CHEMISTRY

**5**
DATA SCIENCE

**24**
EARTH AND CLIMATE SCIENCE

**21**
HUMANITIES AND SOCIAL SCIENCES

**50**
MATHEMATICS

**243**
PHYSICS

# 1. BIOLOGY

## 1.1 BIOCHEMISTRY AND BIOPHYSICS

### Self-organisation and cell morphogenesis

Microtubules are train tracks and molecular motors are the engines, of cells. This system together, in combination with actin-myosin is vital for cell physiology and transport. Prof. Chaitanya Athale's group works on understanding the mechano-chemical interactions, pattern formation and role in cell growth and shape determination. Another axis of the group is to employ synthetic biology to develop sensors for small RNA sequences from viruses. In this they have succeeded recently in re-engineering toehold RNA in a point-of-care diagnostic device. Combined with simulations of such motor-MT systems and image-analysis code development, the group completed the cycle of hypothesise, test, measure and insight to understand the underlying mechanics in determining cell shape.

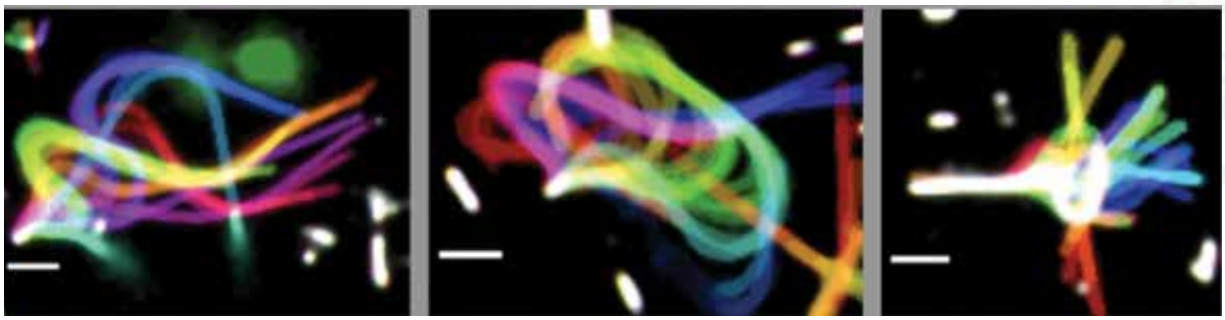


**Figure 1:** *Time-projected images of plus end clamped microtubules with oscillations visible. Colour: time. (Prof. Chaitanya Athale's Group)*

### Biological mechanisms of lipid signalling pathways

Dr. Siddhesh Kamat's group is interested in studying the biological mechanisms of lipid signaling pathways in the central nervous and immune systems. To achieve their goals, the group integrates aspects of chemical biology, immunology, animal, and/or cellular models, in conjunction with advanced mass spectrometry-based metabolomics (lipidomics) and (chemo)proteomics techniques. The long-term goal is to identify and characterise as-of-yet uncharacterised lipid signalling pathways in vivo, annotate enzymes and/or cognate receptors that regulate their biology, and provide new insights and therapeutic paradigms for orphan and/or emerging human diseases.

### Cell motility and bacterial cytoskeleton

Dr. Gayathri Pananghat's research focus is to understand the molecular mechanism of motility, cell shape determination and division based on the bacterial cytoskeleton using *Myxococcus xanthus* and *Spiroplasma* as model systems.

A few highlights of this year's achievements are listed below:

- *Myxococcus* FrzCD and FrzA is being characterised. Methylated state of FrzCD could be purified by coexpression with FrzF, for further experiments on the effect of methylation in its function.
- Characterisation of interaction between RomRX, RomY and MglAB components of *Myxococcus* polarity determinants is continued, and studies on two new components PixA and FrzZ have been initiated.
- A chimera of MglA and SofG has been designed and structural and biochemical studies are ongoing to understand the role of C-terminal extension of SofG.

- Further experiments with respect to visualisation of *Spiroplasma* MreB on the membrane, to understand the nucleotide dependence of membrane remodeling is in progress. Interaction studies between multiple MreBs is also ongoing.
- Study of FtsZ dynamics in the presence of FtsA and SepF have been initiated. The structure determination of FtsZ filaments in the GTP state has provided insights into the nucleotide dependence on filament dynamics.

## Understanding protein machines that catalyse membrane fission

The lipid membrane, formed by the spontaneous self-assembly of amphipathic lipids into a ~5 nanometer-thin bilayer, can adopt a continuum of shapes - from micron-sized planar assemblies to highly curved nanotubes, while retaining its semi-permeable barrier function so as to compartmentalize the cellular space into chemically distinct locales. Such resilience in material properties likely explains why the lipid membrane was selected over the course of evolution to encapsulate all forms of life. But living cells are rife with examples where the lipid membrane undergoes an extreme form of shape remodelling so as to cause its cutting or fission. Fission requires the local application of forces to constrict tubular membrane intermediates and is an energetically demanding process catalysed by specialised protein machines as well as transient changes in the composition of lipids in the membrane. Prof. Thomas Pucadyil's group focuses on discovering membrane remodelling proteins and understanding their mechanistic and regulatory aspects. They carry out biochemical screens to identify such proteins, employ reconstitution approaches to understand how they work and investigate their functions in living systems.

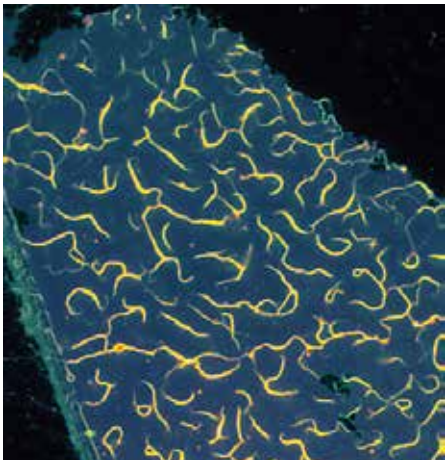


**Figure 2:** *Membrane tubulation is a widespread cellular phenomenon but methods to analyze this process with purified components have been lacking. Bhattacharyya and Pucadyil report a template consisting of planar lipid bilayer islands resting on a polymer cushion that are amenable to membrane tubulation. BIN1 is a protein that tubulates the plasma membrane of cardiac and muscle cells. The image shows membrane tubules formed upon flowing purified BIN1 on such a template and visualized using fluorescence microscopy (Image courtesy: Soumya Bhattacharyya) (Prof. Thomas Pucadyil's Group)*

## Emergence of information-containing polymers in prebiotic Earth

How did life come about on the early Earth and what are the geologically relevant niches that would have allowed for the transition from chemistry to biology? What were the geochemical, biochemical and biophysical processes that manifested in these settings? Prof. Sudha Rajamani's group is driven by the aforementioned questions that pertain to the events, processes and niches that are considered to have set the grand stage on the early Earth around 4 billion years ago, which allowed for life's emergence on our planet. Specifically, characterising these processes and their outcomes to better understand how they facilitated the emergence of the earliest cells or protocells, is an important focus in Prof. Rajamani's group. Delineating this has direct implications for not only understanding life's emergence and its early evolution on the prebiotic Earth, but also for dissecting fundamental biochemical principles underpinning extant biological processes. In addition to being a very exciting mystery, results from this work have ramifications for understanding how similar events could advent on habitable solar-system bodies and other Earth-like exoplanets. The following topics were pursued in the 2024-25 reporting period:

- Characterising prebiotic amphiphilic landscape and understanding how environmental constraints shaped early evolution of protocells; Delineating the physicochemical properties of protocell compartments under prebiotically relevant conditions and in pertinent geological settings.

- RNA World related phenomena including emergence of preRNA and RNA World molecules; Co-solute interactions in the prebiotic soup and its implications for emergence of complexity in prebiotic reactions.
- Characterising the crosstalk between prebiotically relevant monomers in various combinations that involve nucleotides, amino acids, amphiphiles.

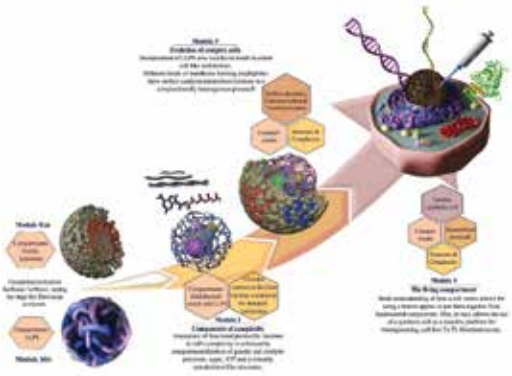


**Figure 3:** *Illustration showing a stepwise increase in complexity among distinct membrane-bound and membraneless compartments that can be achieved using a bottom-up approach. The final step is a consortium of different spatio-temporaly separated compartments working coherently in a synthetic biomimetic system.* Module1- *Represents the minimally complex liposome and liquid-liquid phase separated (LLPS) compartment systems,* Module 2- *Introduction of crowding and structural components (e.g. actin, ATP etc.1,2) to achieve a more defined tunable architecture.* Module 3- *LLPS in membrane bound structures resulting in a multilayerd hierarchical compartment module (HMC).* Module 4- *The crux of increasing complexity and organization to result in a controllable synthetic living system consisting of cell-like architecture that could be used as a tool for biomimetic and synthetic biology applications. (Image Credit: Souradeep Das) (Prof. Sudha Rajamani's Group)*

## 1.2 CELL, ORGANISMAL, AND DEVELOPMENTAL BIOLOGY

### Molecular principles underlying animal development and disease

Molecular mechanisms underlying the development of organisms are remarkably conserved. Many developmental paradigms and their underlying genetic networks were first elucidated in *Drosophila melanogaste*r and have provided insights into the development processes governing other organisms, including humans. Prof. Girish Ratnaparkhi's laboratory utilises Drosophila as a model organism to study the regulation of cellular signaling in the context of development and its misregulation in disease.

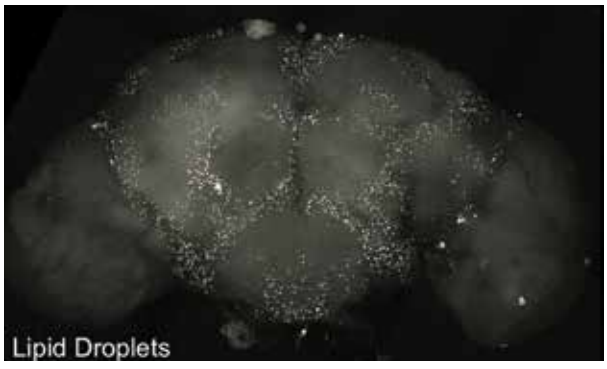



**Figure 4:** *The Drosophila adult brain contains fat deposits. Visualised in the image is a dissected whole-mount brain stained with BODIPY, a fluorescent neutral lipid dye that allows visualisation of Lipid Droplets (LDs, white puncta). Prof. Ratnaparkhi's laboratory is examining the age-dependant perturbation of these LDs in the context of a Drosophila ALS model. Image Credit - Lovleen Garg (Prof. Girish Ratnaparkhi's Group)*

- The lab is studying Neurodegeneration in Amyotrophic Lateral Sclerosis (ALS) using a *Drosophila* disease model and has measured the age-dependence of ALS8/VAPB(P58S) neuro-aggregate density. In the adult brains, the aggregates appear to be cleared by Autophagic mechanisms, with the ALS14/VCP/TER94 AAA-ATPase activity playing a key role in regulating aggregate dynamics (Thulasidharan et al., 2024).

- The Ratnaparkhi lab, in collaboration with the Kamat lab is investigating functions for orphan metabolic serine hydrolases (SH) in Drosophila. They find that the metabolic SH CG17192 is a secreted gut phospholipase that regulates signalling lipids (Kumar et al., 2024) in response to infection.
- Caspar, the fly ortholog of Fas-associated Factor 1, is maternally expressed in the early embryo and regulates the formation of embryonic Primordial Germ Cells, the precursors of adult sperm and eggs (Das et al., 2024, Deshpande et al., 2024).

## Regulation of self-organised morphogenesis in plant regeneration

Morphogenesis in multicellular organisms relies on mechanical forces, cell geometry, and biochemical cues such as hormones, and these elements must act in concert. Dr. Kalika Prasad's group investigated these aspects of morphogenesis and uncovered how they contribute to restoration of shape of a regenerating organ. They studied the acquisition of specific cell geometry and wound repair using root tip resection as an experimental system. The plant roots are tapering to support soil penetration and this tapering portion of the root tip is excised out during root tip regeneration. They examined how damaged plant roots regain their tapered shape and suggest a two-step process driving this restoration. The group discovered that the first step features the generation of a specific cell geometry, which are rhomboid-shaped, through uneven growth between neighboring cells. The second step uses this specific cell geometry as template to establish arrangements, such as a unique diagonal division plane and redirecting the vertical longitudinal cell files into inclined trajectories. This redirection narrows the root's diameter, re-establishing the tapering shape. The group found that a gradient-expressed transcription factor (TF) conditioned the cells for their deformation into rhomboid shapes. This previously unknown shape-forming mechanism highlights how local cell geometries trigger tapering, offering new insights into organ repair in plants. In summary, these studies highlight the fundamental role of cell geometry and mechano-chemical feedback as key regulators of tissue morphogenesis, offering new insights into the forces shaping developmental processes in plant regeneration.

## DNA damage and maintenance of genome integrity

Dr. Mayurika Lahiri's group has been investigating the process by which genome instability can lead to cellular transformation of breast epithelial cells using three-dimensional breast acini as a model system. Recent studies have shown deregulation of Api5, (anti-apoptotic protein) leads to cellular transformation in breast acini. Currently the molecular mechanism of such a transformation is being dissected out. Breast spheroids harbouring overexpression of Api5 show increased stemness properties and the current research in the laboratory is to understand the signalling cascade between Api5 and the stemness markers. This will reveal a novel and yet undiscovered function of Api5. The other project is investigating the role of Api5 in the DNA damage response signalling cascade. This signalling cascade is critical to maintain genome stability. Recent studies from the laboratory have demonstrated Api5 to play a role in the ATR checkpoint signalling cascade following UV damage and replication stress. Therefore, it is important to study how and where Api5 functions in the DNA damage response to prevent genome instability. Another project is studying the changes in microtubule dynamics following DNA damage.

## Chromosomal segregation during cell division

Dr. Mridula Nambiar's laboratory's research focuses on deciphering the roles of cohesins in maintaining genomic stability during cell division in the fission yeast *Schizosaccharomyces pombe.* The group studies the functional divergence of cohesin paralogs, regulation of their spatial separation on chromosomes and functional consequences of atypical cohesin complexes. Their work shows that meiotic paralogs have specific partner preferences and different affinities during cohesin complex formation and that determines their chromosomal loading. Moreover, proliferating cells with ectopic expression of meiotic paralogs show dramatic sensitivities to DNA damaging agents, potentially due to inability to recruit DNA repair factors at DNA damage sites. The group's data show that this cannot

be attributed to altered gene expression profiles leading to failure in mounting a DNA damage response. They also have evidence that increased crossovers at the centromeres (C-COs) result in improper separation of homologs leading to aneuploidy during meiosis. C-COs cause nondisjunction events and may also disrupt mono-orientation of sister chromatids in meiosis I (MI) leading to their premature separation. Their work provides evidence that the protected population of cohesins at centromeres during MI may interfere with timely resolution of C-COs causing homolog nondisjunction. These molecular insights will improve our understanding of infertility and aneuploidy-associated developmental disorders in humans.

## Cellular mechanisms underlying embryogenesis and stem cell differentiation

Prof. Richa Rikhy's research focuses on understanding the regulation of cellular remodeling events during embryogenesis and stem cell differentiation. Epithelial cell formation, remodelling and differentiation occurs routinely during metazoan embryogenesis. Drosophila embryogenesis begins as a syncytium and this is followed by formation of epithelial cells in a process called cellularisation. The group has found a role of BAR domain containing protein Missing in Metastasis (MIM) in regulating plasma membrane and actin dynamics in Drosophila embryogenesis. MIM triggers Arp2/3 complex formation and endocytosis in regulating villi remodelling in Drosophila embryos. In doing so, it restricts the function of the formin Diaphanous in the formation of villi. Loss of MIM leads to aberrant formation of epithelial architecture.

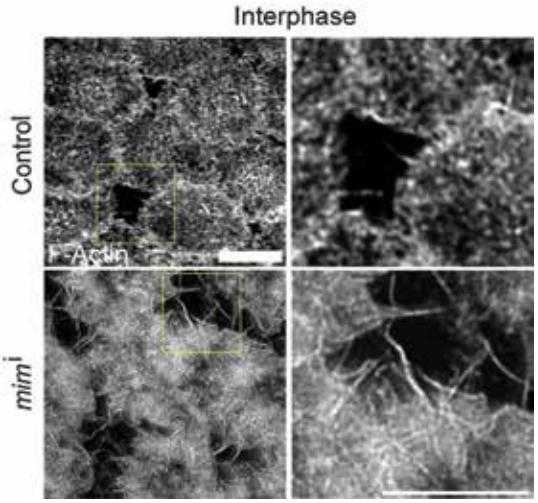



**Figure 5:** *Villi remodelling in control and Mim mutant Drosophila embryos (Prof. Richa Rikhy's Group)*

## Regulatory processes that govern growth and development in bacteria

The ability to sense and respond to nutrient availability is an inherent and essential property of all living cells. Growth, proliferation and dispersal of every cell need to be in tune with the availability of nutrients and their metabolism. The underlying mechanisms that help cells to integrate nutrient availability to the regulatory processes governing cell cycle, proliferation and dispersal is poorly understood. The research in Dr. Sunish Radhakrishnan's group is focused towards understanding the top-tier signalling mechanisms that helps cells perceive specific metabolic processes and relay it to the growth and developmental machinery, for successful proliferation. Towards this, the group uses the bacterial model *Caulobacter crescentus.* Their work, so far, has helped delineate an unusual cell cycle stage-specific metabolism, that influences the cytosolic redox, to regulate the activity of key cell cycle and developmental regulators in bacteria. Strikingly, interference in these redox-influencing metabolic pathways induces cell cycle and proliferation arrest, thereby opening up new therapeutic entry points that could be used against bacterial pathogens.and proliferation arrest, thereby opening up new therapeutic entry points that could be used against bacterial pathogens.

## 1.3 CHROMOSOME BIOLOGY AND EPIGENETIC REGULATION

### Epigenetics and transcriptional regulation in *Plasmodium falciparum*

One of the biggest challenges in malaria control is the emergence of resistance to most antimalarial drugs, including artemisinin-based combination therapy (ACT). Population genomics studies have identified mutations in the Kelch13 (K13) gene as a key molecular marker for artemisinin resistance. However, while K13 mutations are strongly associated with resistance, reports also suggest K13-independent mechanisms, driven by changes in the parasite's metabolome and transcriptome. Artemisinin-resistant parasites exhibit damaged cellular components, slow growth, heightened cellular stress responses, and reduced drug susceptibility in the ring stage. These parasites also show enhanced unfolded protein response (UPR) and elevated phosphatidylinositol-3-phosphate (PI3P) levels, both of which stimulate autophagy. Cell-to-cell variability plays a crucial role in adaptation, stress tolerance, and drug resistance, often regulated by transcriptional factors. Dr. Krishanpal Karmodiya's group has identified PfGCN5, a histone acetyltransferase, as a global regulator of stress-responsive genes central to artemisinin resistance. They also found that inhibiting PfGCN5 can restore parasite sensitivity to artemisinin. Additionally, their work has shown that the chromatin modifier PfHDAC1 acts as a cell cycle regulator contributing to resistance. These findings represent some of the first reports linking chromatin regulators to artemisinin resistance, highlighting the epigenetic and transcriptional basis of stress responses in *Plasmodium falciparum*.

### Chromosome biology

Research in Prof. Kundan Sengupta's group is centered on nuclear structure and function in cancer cells. Some of the observations from the group are described here: (1) Nucleolar protein (FBL - Fibrillarin) - Although Fibrillarin is a nucleolar protein which regulates protein synthesis, FBL depletion enhances migration of both breast and colorectal cancer cells; (2) Lamins & Cell migration - depletion of the nuclear envelope protein - Lamins, also enhances cell migration and Epithelial to Mesenchymal Transitions (EMT); (3) Lamins and DNA damage repair - Depletion of nuclear lamins showed a significant increase in gammaH2AX foci, during wound healing and cell invasion; (4) Nuclear envelope proteins and Mechanosignalling - SUN1 - a nuclear envelope protein, is differentially expressed in cancer cells that responds to changes in substrate stiffness, this is relayed to and perceived by histone marks and heterochromatin at the nuclear periphery; (5) Mechanobiology - cells cultured on softer matrices that mimic physiological tissue stiffness, not only perturb nuclear envelope proteins, but also activate DNA damage repair proteins, when cells were treated with chemotherapeutic agents. In summary, the nuclear envelope and chromatin perceive changes in mechanical forces and function as major hubs of mechanotransduction. How these mechanical signals initiate and promote carcinogenesis is a subject of the ongoing and future research.

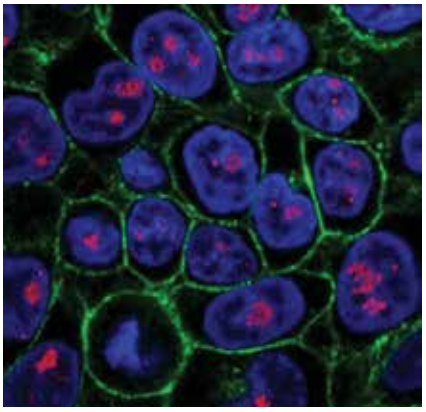


**Figure 6:** *Epithelial architecture of DLD1 colorectal cancer cells showing epithelial marker (E-cadherin (Green), and nucleus (blue, DAPI), nucleolus marked by Fibrillarin (Red) (Prof. Kundan Sengupta's Group)*

## 1.4 ECOLOGY AND EVOLUTION

### Formation and sustenance of faunal communities

Dr. Ramana Athreya's group focuses on the processes leading to the formation and sustenance of faunal communities over time. To this end, they explore the variation of biodiversity patterns of multiple taxa (birds, ants, moths and frogs) along an environmental gradient. The eastern Himalayas host the most biologically diverse communities in the Indian subcontinent and their steep montane landscapes provide as much environmental gradient as the entire north-south span of India (e.g. in terms of temperature).

The team completed the genus level identification of over 7000 ants along three transects spanning 900-2100 m in elevation. They are investigating the elevational dependence of generic composition of ant communities, their functional trait volume, and the relative abundance. Using a sample of 650 sphingid moths, the team is investigating the correspondence, if any, between taxonomic diversity, functional diversity and phylogenetic diversity at different elevations. Another line of research concerns the relative influence of dispersal ability and niche adaptation of bird species in determining the diversity pattern across the landscape. Finally, the group has evidence that populations of a single frog species occurring at different elevations differ in their genetic signature despite being separated from each other by just 1-2 km. This suggests strong adaptation of each population to the local conditions.

### Resource dynamics in tumour regrowth

In castration-resistant prostate cancer (CRPC), after systemic androgen deprivation therapy (ADT), a subset of drug-resistant cancer cells autonomously produce testosterone, thus enabling tumour regrowth. A previous theoretical study has shown that such a tumour relapse can be delayed by inhibiting the growth of drug-resistant cells using biotic competition from drug-sensitive cells. In this context, the centrality of resource dynamics to intra-tumour competition in the CRPC system indicates clear scope for the construction of theoretical models that can explicitly incorporate the underlying mechanisms of tumour ecology.

In the current study, Prof. Sutirth Dey's group used a modified logistic framework to model cell-cell interactions in terms of the production and consumption of resources. Results showed that steady state composition of CRPC can be understood as a composite function of the availability and utilisation efficiency of two resources — oxygen and testosterone. This work showed that the effect of changing resource availability or use efficiency is conditioned by their general abundance regimes. Testosterone typically functions in trace amounts and thus affects steady state behaviour of the CRPC system differently from oxygen, which is usually available at higher levels. These data thus indicate that explicit consideration of resource dynamics can produce novel and useful mechanistic understanding of CRPC. Furthermore, such a modelling approach also incorporates variables into the system's description that can be directly measured in a clinical context. This is therefore a promising avenue of research in cancer ecology that could lead to therapeutic approaches thatare more clearly rooted in the biology of CRPC.

## 1.5 NEUROBIOLOGY AND COMPUTATIONAL BIOLOGY

### Trying, making errors, and rZevising: A strategy of olfactory discrimination learning in mice

In nature, sensory inputs are often noisy and dynamic, affecting perceptual decision-making and reversals. Cognitive flexibility further adds to this complexity. Decision revision allows switching between available choices and/or cessation of already initiated, misconstrued responses. Dr. Nixon Abraham's laboratory aims to quantify such behavioral responses and the underlying neural mechanisms. Mice were trained on an olfactory Go/No-Go decision-making task to distinguish between rewarded and unrewarded stimuli. Despite reaching high performance level, they respond inappropriately for a few non-rewarded trials. These trials are defined by a disengaged licking behavior with a higher interlick interval that ceases prematurely within the stimulus window, connoting error awareness. Similar response latency towards the correct responses in an equiprobable Go/No-go stimuli distribution rules out the component of impulsivity in these trials. Therefore, the team interpreted this phenomenon as decision revision. Revision trials comprise 5-25% of the high-performance trial blocks. Further, reduced response latency and enhanced performance accuracy in trials following revision indicate rapid adaptation in their learning strategy. Upon enhancing the inhibitory synaptic signaling in the olfactory bulb by photoactivating ChR2-expressing GABA-ergic granule cells during a complex mixture discrimination task, the team observed faster odor discriminations and fewer revision trials, confirming the impact of perceptual load on revisions. In conclusion, the team reported a learning strategy exhibited by mice to achieve high-performance accuracy during decision-making by response reversals.

### Development and functional plasticity of nervous systems

Prof. Aurnab Ghose's group discovered a novel circuit modulating fear and anxiety-like responses vis-Ã -vis hunger and satiety. Beyond implications on the commonly comorbid presentation of deregulated stress responses and eating disorders, these circuits allow a window into mechanisms underlying behaviour selection. They are currently dissecting the intracellular signalling mechanisms underlying the modulation of this circuit.

Using in vitro approaches and zebrafish models, the team has been characterising novel cytoskeleton regulators involved in mediating axonal collateral branching, and have been able to associate hyperbranching with seizure susceptibility in animals. In other studies, they have been probing the mechanisms underlying the development of the membrane-associated periodic skeleton in axons, and ongoing work is exploring the function of this structure in the context of neurodegeneration.

Finally, using mouse models of chemotherapy and in vitro methods, the group has identified specific tubulin post-translational modifications associated with chemotherapy-induced neuropathy. Current work is probing the underlying cellular aetiology.

### Mathematical modelling to explore physiological systems

Dr. Pranay Goel's laboratory continued to make progress in mathematical modelling of diabetes pathophysiology and AI applications in healthcare. Focus areas include: (1) Dynamics of insulin resistance/hypersecretion using minimal models to reinterpret clinical data; (2) Analysis of continuous glucose monitoring (CGM) time series data for characterization of the diabetic state in patients; (3) Clinical studies on oxidative stress thresholds and glutathione supplementation in Indian diabetic cohorts; (4) AI-based tools for bone age assessment in children (DBT-funded project) and (5) computer vision for arthritis screening using smartphone photos. This interdisciplinary work bridges mathematical theory with clinical translation. Collaborations span clinicians, biologists, and physiologists to address biology, medicine and healthcare challenges, especially in Indian populations.

## Neural mechanisms underlying movement initiation in songbirds

A central role of the brain is to respond to stimuli with the appropriate movement. Two questions that Dr. Raghav Rajan's group addresses are (1) how are movements initiated and (2) how are simple movements chained together to form complex movements like human speech. The group uses the zebra finch, a songbird, as a model system to understand how the brain initiates and sequences movements. The song sequence of the adult male zebra finch consists of a stereotyped sequence of sounds interleaved by silent gaps and is about 0.5 to 1 second in duration. While the song sequence of the zebra finch is stereotyped, other related songbirds like the Bengalese finch produce sounds in variable orders. The group studies a few different songbird species to understand how the brain initiates and sequences movements.

Work in 2024-25 focused on the repetition of introductory notes that occur at the beginning of the zebra finch song bout. The group found that increased coordination between respiration and vocalization as introductory notes progress to song, suggesting that these notes represent a period when the vocal and respiratory circuity become coordinated before song can begin. In addition, they found that the learning of these introductory notes is mediated by brain pathways also involved in song learning.

## Computational neurobiology

Dr. Suhita Nadkarni's research investigates synaptic signaling through computational modeling, with a focus on hippocampal synapses. The aim is to elucidate the mechanisms of learning and memory, as well as the pathological disruptions that impair these processes. The group has built a novel interface between MCell4 and NEURON (8.2.6) to couple chemical signaling in synapses (e.g., neurotransmitter diffusion, receptor activation) with electrical signaling in neurons and neurites. This integration enables multiscale simulations of how molecular events shape cellular excitability and network function. A central application is modeling signaling in "compound spines" of hippocampal CA1 neurons using the MCell-NEURON framework. These complex spines, with multiple synaptic contacts, are critical for spatial navigation and episodic memory. The simulations explore how spatial organisation of receptors and signalling proteins in these structures regulates synaptic efficacy and dendritic computation.

The group developed a computational model to study short-term plasticity at the mossy fiber-CA3 synapse, a canonical hippocampal circuit essential for memory encoding. By simulating presynaptic vesicle dynamics, calcium-dependent signaling, and postsynaptic responses, they aim to decode how this synapse filters and transmits temporal patterns of activity. Finally, the group has developed kinetic models of M1/M4 acetylcholine receptor activity to dissect how neuromodulation gates synaptic plasticity and hippocampal microcircuit function. These models will integrate binding kinetics, and downstream signaling to predict cholinergic modulation of memory-related circuits in health and disease.

## Aggregation pathways in amyloid disease

Dr. Sarita Puri's research focuses on understanding the aggregation pathways of antibody light chains involved in AL amyloidosis, a systemic amyloid disease. Unlike neurodegenerative disorders, systemic amyloidoses involve the deposition of amyloid fibrils from various proteins across multiple organs-including the heart, kidneys, skin, and fat-leading to organ failure. As an INSPIRE Faculty Fellow at the Biology Department of IISER Pune, Dr. Puri investigates how patient-derived folded light chains and their truncated fragments contribute to this aggregation. Preliminary findings reveal that different fragments modulate aggregation in distinct ways, suggesting a complex, multi-step mechanism that cannot be captured by studying a single protein alone.

# 2. CHEMISTRY

## 2.1 ORGANIC CHEMISTRY AND CHEMICAL BIOLOGY

### Catalyst/Ligand engineering

Dr. Buddhadeb Chattopadhyay's research interest includes the catalyst/ligand engineering for the C-H bond activation/functionalization, especially C-H bond borylations of organic molecules and metal-nitrene/carbene chemistry via metalloradical catalysis by means of denitrogenative transformations to make high-valued nitrogen heterocycles.

### Macromolecular engineering

Dr. Britto Sandanaraj's group developed a new method named "Host-Guest Complex Assisted Protein Labeling Technology". They have employed this method to synthesize a variety of self-assembling artificial proteins.

### Synthesis of biologically important heterocycles and macrocycles

The primary goal of Dr. Boopathy Gnanaprakasam's research group is to develop sustainable synthetic approaches for the synthesis of biologically important heterocycles and macrocycles. In this direction, continuous flow catalysis (Ru-Zeolite or Ni-Zeolite) for the dehydration of diols and seco-acids to get macrocyclic ethers and macrocyclic lactones was achieved with diverse substrate scopes. This continuous dehydration strategy with amide-alcohol led to macrocyclic lactams. Further application was extended to the alkylation of naphthols, using alcohols and Zeolite to get various functionalized naphthol derivatives in a sustainable manner. Moreover, Dr. Gnanaprakasam's research group has also developed a novel solvent-free and catalyst-free thermolytic solid state melt rearrangement of azidofluorenes to phenanthridine derivatives. In addition, they have developed a novel and efficient method for the synthesis of a new class of 5-oxo-5,6-dihydro-[1,2,3]triazolo[1,5-c]quinazoline derivatives by copper-catalyzed reaction of α, β-unsaturated keto/ester methyleneindolinone with sodium azide in room temperature via an azide-alkene cyclization and ring expansion rearrangement.

Furthermore, Dr. Gnanaprakasam's research group also achieved a visible light-mediated sequential reaction involving in-situ generation of benzotriazole and concomitant cross-coupling with quinoxaline-2(1H)-ones via C-N bond formation under one pot-condition. A direct amidation of alcohols using readily available nitro compounds via a catalytic borrowing hydrogen method was also developed with a step economic advantage over the available techniques, tolerates various functionalities, and was demonstrated with broad substrate scope.

### Redox homeostasis

Hydrogen sulfide, superoxide radical anion, nitric oxide (NO) and related species regulate a plethora of physiological processes and are central players in redox biology. These species help with maintenance of redox homeostasis, and some are hubs to several antioxidant pathways. Altered levels of these species are associated with several disease states, including several chronic diseases and neurodegenerative disorders. Prof. Harinath Chakrapani's group works on controlled generation of these redox-active species, and development of tools to study cellular responses to specific species, with an overall goal of understanding disease and developing therapeutic interventions.

## Ion transport systems

Prof. Pinaki Talukdar's research centers on the development of supramolecular nanomaterials for functional applications in membrane transport, water purification, and fluorescent sensing. He has designed bisindole-based small-molecule anion transporters and explored their anticancer activity. These systems act as chloride carriers, disrupting ion homeostasis in cancer cells and inducing apoptosis. He further developed 2-hydroxyphenyl benzamides that self-assemble into anion channels and exhibit similar pro-apoptotic effects. His continued efforts include designing synthetic ion transport systems such as carbonohydrazonoyl dicyanide-linked indole carboxamides, which serve as scaffolds for transmembrane $H^+/Cl^-$ transport. His group has also investigated the chloride transport properties of double-walled trifluorophenyl/phthalimide-linked extended calix[4]pyrroles.

Recent research focuses on stimulus-activated ion carriers and channels. For instance, he developed an acylhydrazone-based reversibly photoswitchable ion-pair transporter that demonstrates efficient OFF-ON transport control. In another study, a bis(1,3-propanediol)-based channel containing an azobenzene moiety at an allosteric site enables light-regulated ion channel activity. Beyond photoswitching, he has also worked on photocleavage strategies, such as o-nitrobenzyl-linked tolane amides that, upon light activation, form self-assembled anion channels in lipid membranes. He has summarised these advances in a recent review on stimuli-responsive synthetic ionophores. Additionally, his group has developed hydrazide-based artificial water channels that exhibit efficient water translocation and salt rejection.

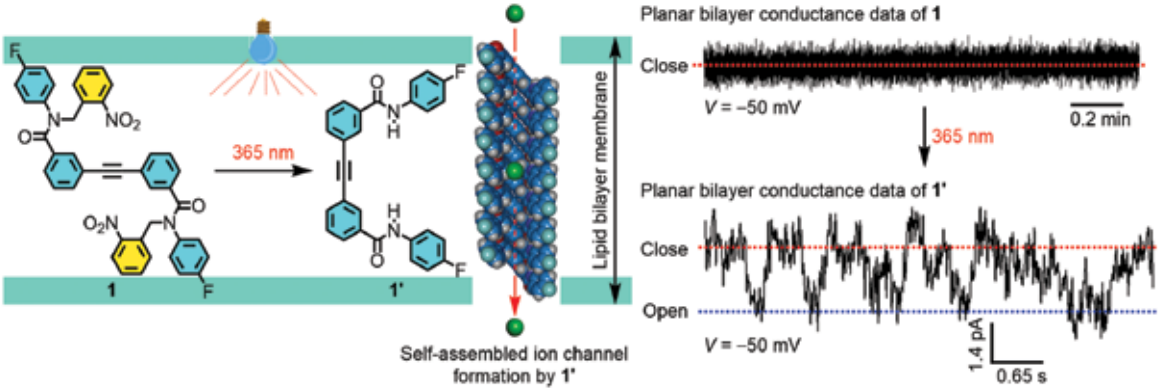



**Figure 7:** *Photocleavage of ortho-nitrobenzyl moieties from a tolane amide **1**, leading to the formation of a self-assembled anion channel by the generated free tolane amide **1'**. Planar bilayer conductance data of **1** and **1'** are also presented. (Prof. Pinaki Talukdar's Group)*

## Nucleic acid chemistry and biophysics

Prof. Seergazhi G. Srivatsan's group is developing biophysical platforms and nucleic acid labeling technologies to understand the structure-function relationship of nucleic acids in cell-free and cellular environments. His group has used an innovative probe design platform to study nucleic acid structures by developing conformation-sensitive multifunctional nucleoside analogs composed of a fluorophore, 19F NMR label and Se atom (anomalous X-ray scattering agent). Depending on the responsiveness of the individual nucleosides, respective phosphoramidite substrates are site-specifically incorporated into G-rich and C-rich oligonucleotide motifs of human oncogenes and viral genes by solid-phase synthesis method. These probes provide unprecedented insights into the structural polymorphism of different nucleic acids structures, their recognition properties and druggable chemical space. Further, using these probes the chemical space tolerance and incorporation mechanism of different DNA polymerases/terminal nucleotide transferases and viral polymerases were studied by using biochemical and biophysical methods (fluorescence, 19F NMR and X-ray crystallography). Collectively, these results are expected to advance nucleic acid based diagnostic and therapeutic strategies.

## 2.2 INORGANIC CHEMISTRY AND MATERIALS SCIENCE

### Interfacial materials chemistry

The primary research of Prof. Nirmalya Ballav focuses on interfacial materials chemistry, from fundamentals to applications, upon exploring various solid-solid and solid-liquid interfaces. Research platforms include thin films of coordination polymers, all-inorganic solids, organic-inorganic hybrid materials and magnetic semiconductors. The group observed an unusual metal-like conduction (thermally-deactivated) in a Pb-free all-inorganic halide double perovskite, $Cs_2AgSbCl_6$. This was studied using density functional theory studies, combined with molecular dynamics simulations and electron localization function calculations. The results indicated retention of the predominant ionicity of the Ag–Cl bond and an increase in the covalency of the Sb–Cl bond at an elevated temperature, which resulted in a significant change of the electronic band structure, including the density of states, thereby exhibiting an intricate balance of ionicity and covalency. A significant modulation of the electrical conductivity (more than 3 orders of magnitude) without any noticeable structural change will stimulate the investigation of hitherto unknown electronic phase transitions in halide double perovskites. Additionally, light-induced unidirectional rectification of current in $Cs_2AgSbCl_6$ was ascribed to a dynamic internal polarization effect. n-type $Ag_2Se$ is a promising thermoelectric material for low-temperature energy harvesting. A high zT of 1.57 at 398 K is reported for Cd(II)-doped $Ag_2Se$ due to improved charge carrier mobility, Seebeck coefficient, and thermal conductivity, while reducing electron effective mass – an optimization of charge carrier due to aliovalent doping.

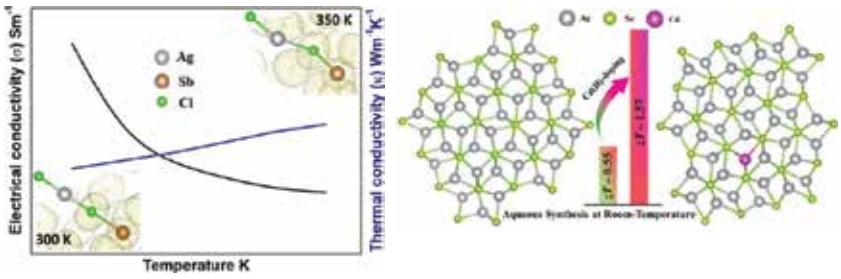



**Figure 8:** *(Left) An intricate balance of ionicity and covalency: metal-like conduction in all-inorganic halide double perovskite $Cs_2AgSbCl_6$: (Right) High-thermoelectric figure of merit (zT) in β-$Ag_2Se$ via aliovalent doping (Prof. Nirmalya Ballav's Group)*

### Synthetic inorganic chemistry: Materials applications

Prof. R. Boomi Shankar's group has been actively involved in the development of new molecular organic and hybrid materials. The applications of these materials in piezoelectric energy harvesting have been extensively studied by the group. They traditionally design new examples of molecular ferroelectrics, with the view of obtaining robust polarizations and pathways for new mechanisms. The group has shown that Lewis acid base adducts with hard-hard interactions are excellent materials to be classified as neutral single component ferroelectrics, which are very challenging to stabilise. In addition, new examples of ionic and neutral molecular co-crystals with ferroelectric properties were synthesised and shown to exhibit scaled-up applications via 3D-printing for piezoelectric energy harvesting applications. The group has recently begun to explore the utility of these new ferroelectric materials in electronic applications such as ferroelectric field effect transistors (FeFETs) and neuromorphic memory applications. In this regard, a neutral chiral naphthalene mono-imide based ferroelectric materials have been synthesised and shown to exhibit excellent FeFET and neutromorphic memtransistor properties. In a different project, they have also synthesised the first example of a chlro-bridged cubic cage assembly in a template driven reaction, which cannot be obtained in a direct reaction.

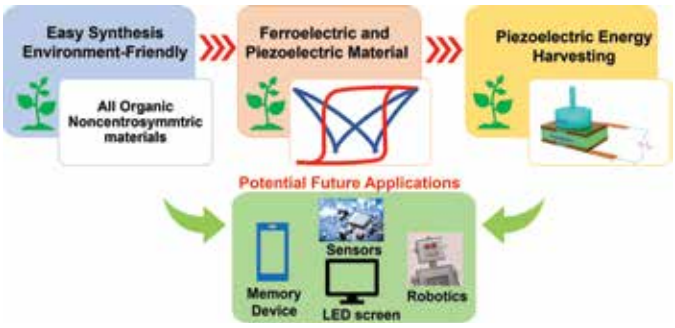



**Figure 9:** *Molecular ferroelectrics and their relevance for energy and electronic applications (Prof. R. Boomi Shankar's Group)*

## Main-Group and transition metal compounds for catalysis

Dr. Moumita Majumdar's ongoing research is much directed in the syntheses of heavier main-group compounds and their state-of-the-art applications. Three major research targets pursued during the last one year are: (1) Heavier Group 15 Ylidone; (2) Germanium-based Cationic Lewis Acids; (3) Heavier Group 15 Element-Element Tetra-cations.

- The group has reported the reactivity of Sb(I) cation 1 stabilized within a 5,6-bis(diisopropylphosphino) acenaphthene such as Lewis acid binding, metathesis reaction, oxidation etc. (Inorg. Chem. 2024)
- The group utilized phosphine oxides as donors to Ge(IV) di-cations. This led to localization of di-positive charges and acceptor orbitals on the Ge center and consequent Lewis super acidity. An expanded portfolio of catalytic reactions was possible. (J. Am. Chem. Soc. 2024, Chem. Commun. 2025)
- Stabilization of multiply charged ions have intrigued scientists for long as they are often key reactive intermediates in reactions, and in material science. The intramolecular Coulomb repulsion can be minimized either by long-range charge separations or utilizing strong donor ligands or ligands that can disperse the excessive charges. Recently, Dr. Majumdar's group has established a tetra-cationic distibane stabilized by bis(alpha-iminopyridine) ligand. The solution-state reactivity study reveals the homolytic cleavage of the Sb-Sb bond forming persistent Sb(II) radical di-cation. Such tetra-cationic dimer serves as a robust precursor for an on-site delivery of single electrons to the substrates for catalytic process. (J. Am. Chem Soc. 2025).

## Electrochemical activity

The main objective in Prof. Muhammed Musthafa's research group has been to explore various methods to integrate multiple key steps of the hydrogen economy and develop a novel hydrogen-based battery system using electrochemically active hydrogen storage materials. The fundamental principle involves transferring protons between the negative and positive electrodes during charging and discharging. The proposed hydrogen battery can convert chemical energy in the bonds to electricity when combined with electrochemically reversible hydrogen storage molecules.

This device offers numerous opportunities as it can be charged electrically and chemically using air. The electrochemical reversibility of hydrogen-storing redox molecules and their energy alignment between dioxygen and dihydrogen enable the battery to be charged even with air. The team completely eliminated the issues associated with molecular hydrogen storage by creating a negative electrode capable of electrochemically storing protons at a potential close to the hydrogen redox couple, leading to the development of an All Solid State Rechargeable Proton Battery. Finally, in the pursuit of a sustainable proton-based battery, a Reversible Atmospheric Water Battery

that integrates all three steps in the hydrogen economy-production, storage, and utilization-into a single device was fabricated. Integrating key elements of the hydrogen economy, including production, storage, transportation, and utilization, into batteries offers a promising approach to enhance overall system efficiency, reliability, and sustainability. This project explores the synergies between batteries and hydrogen technologies, addressing challenges and proposing novel strategies to advance the integration of these two essential components in the pursuit of a more sustainable energy future.

## Functional nanomaterials

Prof. Pramod Pillai's group is interested in understanding light-matter interactions in nanomaterials for various light-harnessing applications, including display, plasmonics, photocatalysis, and thermochemistry. Both the photoexcited charge carriers and the heat dissipated from photo-responsive nanomaterials are used for light-driven chemical reactions. In one of the recent works, the group achieved an efficient and selective synthesis of ammonia using visible light and indium phosphide quantum dots (InP QDs) at room temperature. The presence of catalytic indium sites and microenvironment modulation led to the formation of ammonia in >90% yield. The group showed the impact of rationally designed core and surface of photocatalysts in developing sustainable routes to produce ammonia beyond the Haber-Bosch process. Similar to semiconductor nanoparticles, they have also developed surface engineered plasmonic metal nanomaterials for visible-light-driven chemical and physical transformations. In one example, the group developed plasmonic gold-rhodium based antenna-reactor system in a core-satellite geometry. The presence of spatially separated rhodium nanoparticles separation, and extraction of photogenerated charge carriers. In another example, copper-based plasmonic-heaters were developed that could raise the surrounding temperature to ~170 ºC within ~30 s of irradiation, which was 'hot' enough to perform useful high-temperature photothermal processes. In summary, the ultimate goal of the group is to achieve more sustainability in chemical synthesis using sunlight.

## Synthesis of low-valent compounds

The advent of N-heterocyclic silylenes (NHSis) and their ability to activate small molecules led to envisage that they could be the alternative ligands to NHCs. However, the area of transition metal silylene complexes had been held back for many years especially because of the very low yield of silylenes. Since the high yield isolation of Si(II) compounds by dehydrohalogenation protocol, there is a significant paradigm shift in the chemistry of transition metal silylene complexes. Prof. Shabana Khan's group is exploring silylene as a ligand to prepare Cu(I), Ag(I), and Au(I) complexes which are being utilised further from catalytic applications to materials.


**Figure 10:** *Research paper on the use of cerium amide as a catalyst for the synthesis of methanol appeared on the cover page of the journal Chemistry – A European Journal in January 2025 (Prof. Shabana Khan's Group)*

## Hybrid aerogel

Current research interest in Prof. Sujit Ghosh's group is primarily focused upon the development of advanced functional porous materials (metal-organic frameworks (MOFs) and related porous materials) for, extraction/ recovery of precious metal ions from water, clean energy and safe-drinking-water. Recently, Prof. Sujit Ghosh's group published one work on recovery of gold from secondary sources like electronic waste (e-waste), which has become increasingly demanding owing to the gradual consumption of the precious metal in the natural mines. However, developing a highly efficient material for selective gold extraction still remains a great challenge. In this regard, the group introduced a novel ionic crystalline hybrid aerogel, rapidly synthesized under ambient conditions. This aerogel is engineered by covalently threading an amino-functionalized metal-organic polyhedral (MOP) with an imine-linked, chemically stable covalent organic framework (COF). Owing to its ultra-light nature, hierarchically porous structure, imine-rich backbone, high surface area, and cationic sites, the aerogel exhibits rapid gold removal achieving a high uptake capacity of 2349 mg/g, and superior selectivity. Moreover, the hybrid aerogel effectively extracts ultra-trace gold ions from various terrestrial water sources, contributing to safer drinking water. This research underscores the immense potential of hybrid porous materials in revolutionizing gold recovery from e-wastes and complex aqueous environments for safe drinking water. (Figure-1, Ref. Angew. Chem. Int. Ed. 2025, 64, e202419830 Web Link)

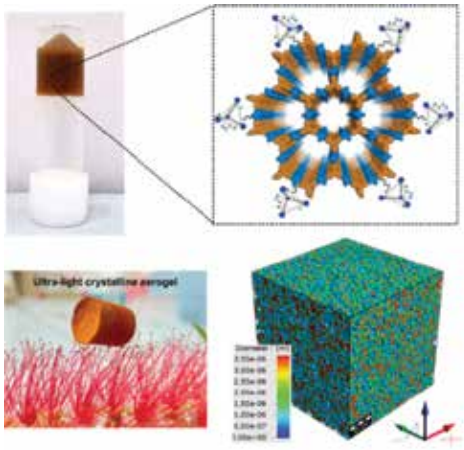


**Figure 11:** *Ultra-light hierarchically porous aerogel for selective sequestration of Gold from e-waste (Prof. Sujit Ghosh's Group)*

# 2.3 SPECTROSCOPY, THEORETICAL AND COMPUTATIONAL CHEMISTRY

## Spectroscopic studies of secondary structures of peptides

Prof. Aloke Das's research group focuses on a broad spectrum of weak non-covalent interactions that are crucial for the structural stability of biomolecules and functional materials. Their multidisciplinary approach integrates gas-phase laser spectroscopy, 2D NMR spectroscopy, and X-ray crystallography with quantum chemical calculations. Understanding these interactions in detail is vital for the rational design of effective drugs, catalysts, and supramolecular architectures.

A major recent focus of the group is to investigate the factors influencing peptide secondary structures. They have studied a series of tripeptides (Pro-Gly-X), where the Pro-Gly sequence is fixed and the X residue is varied. These peptides are capped at both termini, ensuring they mimic higher-order peptides. Pro-Gly generally favors a β-turn conformation, and this study examines how adjacent residues influence this structure. Their findings reveal that for specific X residues, Pro-Gly-X adopts a double β-turn in both gas and condensed phases, suggesting backbone

hydrogen bonding dominates over solvent effects. Conversely, a transition from β-turn to extended β-strand for other X residues in condensed phases highlights the significance of intrinsic residue properties. In a parallel project, the group is investigating how microhydration affects peptide secondary structures in the gas phase, aiming to understand the structural evolution with the sequential addition of water molecules.

## Dynamic catalysis

Prof. Srabanti Chaudhury's group utilises methods of statistical mechanics and stochastic modelling to study complex systems at the interface of physics, chemistry, biology and probability. The group studies dynamic catalysis where the catalytic activities fluctuate with time and the system makes a dynamic transition across surfaces to achieve maximum catalytic efficiency. Dynamic catalysis has recently emerged as a promising method for the acceleration of heterogeneously-catalyzed reactions. The role of temporal heterogeneity has also been explored in the context of catalytic communication within nanorods/nanoplates. Apart from discrete state approaches, the group also employs continuum state approaches to study transition events between metastable states in complex systems with rough potential landscapes which is an important subject in the fields of computational physics, chemistry and biology.

Using the Langevin dynamics and coarse-grained simulations, the group studied the conformational behaviour of hydrophobic polymers consisting of periodically placed zwitterion side groups in salt solutions where a competition between hydrophobic interactions and dipole-dipole interactions leads to a variety of self-assembled structures.

## Understanding properties of materials through simulation methods

Prof. Arun Venkatnathan's research group examines structure and ion transport in battery electrolytes using computer simulations. For example, the group investigated interatomic interactions and ion-transport in a polyoligomeric silsesquioxane-based multi-ionic salt electrolyte for lithium-ion batteries using classical molecular dynamics simulations. The simulations showed ion-ion and ion-solvent interactions via pair distribution functions, lifetime analysis, and species distribution. The ion dynamics is obtained from diffusion coefficients, ionic conductivities and transference numbers. The simulations provide a molecular understanding of the experimental work on such electrolytes.  Molecular Dynamics simulations have also been employed to investigate the effect of anion on conductivity and Lithium-Ion Transference Number in the Isomorphic Cocrystals $(Adpn)_2LiXF_6$ (Adpn = Adiponitrile, X = P, As, Sb) and the findings are used for validation of experimental data.

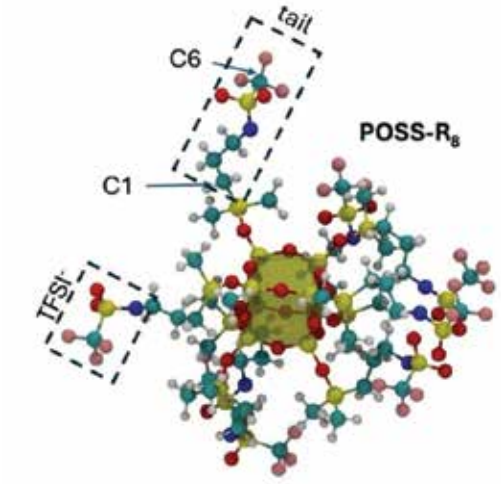



**Figure 12:** *Interatomic interactions and ion-transport in a polyoligomeric silsesquioxane (POSS)-based multi-ionic salt electrolyte for lithium-ion batteries using classical molecular dynamics simulations. Shown here is the structure of a POSS molecule (Prof. Arun Venkatnathan's Group)*

## Photophysics of biologically important molecules

Last few years, Prof. Partha Hazra's group is trying to provide new insights on thermally activated delayed fluorescence, which is a promising mechanism for harvesting triplet excitons in organic light-emitting diodes (OLEDs). They investigate both organic and inorganic based systems to achieve this goal.

In one of the projects, the group showcased a paradigm shift in the triplet harvesting pathways through structural transition from staircase-to-cubane in Cu(I)-iodide-based 1D polymers. In case of staircase-type 1D polymer, TADF property is activated, whereas cubane-type 1D polymer exhibits self-trapped excitonic (STE) emission originated from cluster-centered emission. The group also reported a novel approach where ligand engineering can activate thermally activated delayed fluorescence (TADF) in dinuclear Cu(I)-iodide complexes. These complexes exhibit excellent third-harmonic generation property.

The group worked on organic based TADF emitters, and investigated the aggregation-induced delayed fluorescence (AIDF) properties of three luminogens- based on triphenylamine as the donor. Their comprehensive theoretical analysis reveals a significant reduction in the ΔEST in their aggregated or solid-state, activating TADF, on a ~μs time-scale. Additionally, these luminogens demonstrate two-photon excited anti-Stokes photoluminescence emission and improved photocurrent generation, attributed to their strong charge transfer characteristics and longer singlet exciton lifetimes.

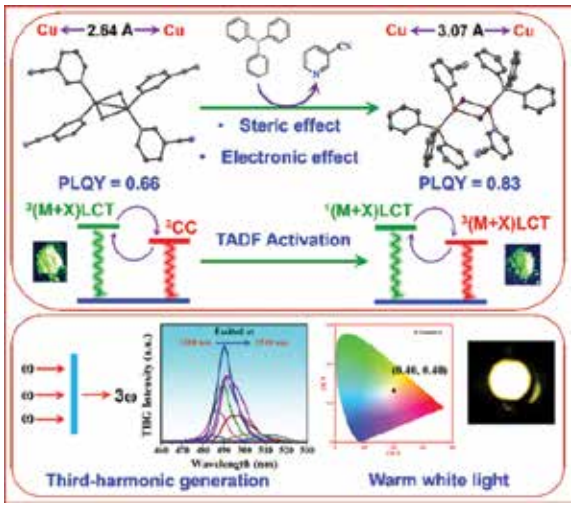



**Figure 13:** *(Top panel) Ligand engineering of Cu dinuclear complexes leads to the activation of TADF*
*(Bottom panel) Dinuclear complexes exhibit THG and white light generation properties (Prof. Partha Hazra's Group)*

# 3. DATA SCIENCE

The Data Science department faculty works on development and application of modern data science methods to questions from various scientific domains including earth science and biology.

The work of Prof. Amit Apte focuses on developing algorithms for data assimilation in earth systems and the dynamical aspects of these algorithms, in particular concentrating on theoretical and numerical investigations of their stability. The group of Dr. Leelavati Narlikar develops methods to gain biological insights from large-scale datasets including genome-level and healthcare data, in particular focusing on algorithms to infer the underlying

sequence components, and on models for the growth of fetal biometry, respectively. Dr. Bedartha Gowsami's group works on four interrelated themes: low dimensional representations of the climate system, Early warning signals of extreme rainfall, inductive biases of deep learning weather models, and foundation model for South Asian weather. Prof. Kalpesh Kapoor works on developing algorithms to overcome challenges facing the current blockchain technology, particularly addressing issues related to scalability, decentralization, security, and performance. The department has a strong PhD program with 5 students already and the faculty is involved in teaching several advanced courses in data science.

# 4. EARTH AND CLIMATE SCIENCE

## 4.1 EARTH STRUCTURE AND ITS EVOLUTION

### Geophysical studies of subsurface processes

The near-surface is a vital part of the critical zone, sustaining life and shaping ecosystems. Geophysical methods offer key insights into subsurface processes, which are essential for understanding this dynamic environment. Additionally, near-surface physical properties play a crucial role in constructing resilient infrastructure, particularly in rapidly expanding cities like Pune.

In this study, Dr. Rahul Dehiya's group investigated the top 50 meters of the subsurface using Multi-channel Analysis of Surface Waves (MASW) across various locations in Pune. The focus included geological features such as dykes and red bole layers. Shear wave velocities were estimated through inverse modelling and validated with nearby outcrops to develop a seismic characterization chart for different basalt facies. Subsurface images reveal intriguing connections between geological structures and vegetation patterns, shedding light on groundwater movement and moisture retention. These insights clarify why specific areas on hill slopes and in valleys retain moisture and support vegetation long after the monsoon. This research is part of work carried out by PhD student Rashi, in collaboration with IISER Pune faculty member and co-supervisor Dr. Sudipta Sarkar. Beyond scientific findings, the study underscores the importance of interdisciplinary collaboration in unravelling complex natural processes within the critical zone.

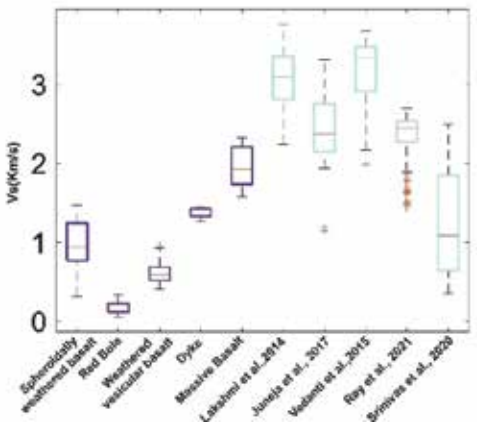



**Figure 14:** *Shear wave velocities classification chart for various basalt facies prepared using a co-analysis with the outcrop and the estimated velocities in this study (blue-colored box) along with the velocities reported in the literature (cyan-colored box) from the Deccan region. (Dr. Rahul Dehiya's Group)*

### Continental tectonics and obduction processes

Inception of obduction is a rare phenomenon in the Wilson cycle and requires specific prerequisites to transfer oceanic lithosphere over the continental lithosphere. In eastern Arabia, a mountain belt formed due to the Late Cretaceous obduction of the Semail ophiolite. Thus, for a complete understanding of the ophiolite emplacement and formation of the foreland basin, the determination of continental basement rheology is essential. Dr. Ismaiel and collaborators continued research on investigating the lateral variations in the flexural rigidity of the continental lithosphere beneath the eastern Arabian Peninsula and its role in shaping the Late Cretaceous foreland basin. Finite-element flexural modeling incorporating lateral variations in flexural rigidity, sediment loading, and lithospheric plate shortening decipher the high flexural rigidity in the western UAE basin and low flexural rigidity beneath the foreland basin and Semail ophiolite belt. The weakening of the continental lithosphere towards the orogenic belt is primarily due to obduction rather than the Jurassic rifting. In work with Ali, they explore the geological history of the Fujairah basin in the Gulf of Oman, which has undergone significant changes over millions of years. This region emerged after the closure of the Tethys Ocean during the Late Cretaceous period and tectonic activities in the area are influenced by the Zendan-Minab strike-slip fault system and the Makran subduction zone, which deforms the Sohar sedimentary basin. They used different methods, such as seismic profiles, gravity, and magnetic data, as well as information from wells, to understand how the basin formed and changed. This research helps us understand how the basin evolved due to movements of tectonic plates over time, such as the collision between the Arabian and Eurasian plates and the Makran subduction zone.

### Computational geodynamics

Dr. Ajay Kumar's group studies the dynamics and evolution of the lithosphere (solid thermal boundary layer). The group integrates multidisciplinary data-including gravity fields, passive seismology, petrology, and mineral physics-to determine the lithosphere's thermochemical and thermomechanical state. These insights inform dynamic numerical simulations to explore the fundamental forces driving lithosphere deformation across spatial-temporal scales.

Over the past year, they investigated the relationship between lithospheric strength and thickness at global scale. Their findings suggest that the continental lithosphere maintains a critical crustal thickness with optimal strength controlled by radiogenic heat production, which governs geologic time-scale deformation processes such as intraplate strain and mountain evolution. This group is now examining whether this critical thickness persisted throughout Earth's history, as part of a DST-funded project. On the infrastructure front, the group maintains and develops open-source software for the solid-earth community (https://sites.google.com/site/kumarajay6763/software?authuser=0) and implements state-of-the-art geodynamics modelling tools using the in-house PARAM Brahma high performance cluster.

## 4.2 EARTH SURFACE PROCESSES

### Giant fossil mass wasting off the coast of North Island, New Zealand: The Taranaki slide

Dr. Sudipta Sarkar's research group studied a giant underwater landslide in the Taranaki Basin, a region within the submerged continent of Zealandia, west of New Zealand's South Island. Underwater landslides, also known as Mass Transport Complexes (MTCs) can cause significant damage to seafloor infrastructure, but we do not fully understand what controls how far they travel. The group used seismic imaging, similar to ultrasound, to investigate a massive submarine landslide in the Taranaki Basin off New Zealand's North Island. They found that this actually

occurred in four separate sectors (MTC A-D). The largest MTC A, travelled 328 km and broke apart into blocks and debris. In comparison, in another failure sector, MTC D travelled only 55 km and stayed more intact. The MTC D shows an elongated shape, likely due to topographic restriction imposed by the Challenger Plateau on its western side. This restriction limited lateral spread and channeled the flow northwestward along the base of the plateau (please see Figure). This funnelling effect likely enhanced both its velocity and erosive power. The prominent basal erosional zone suggests no-slip conditions due to absence of hydroplaning. The extensive runout was probably driven by substrate entrainment, which contributes to flow bulking.

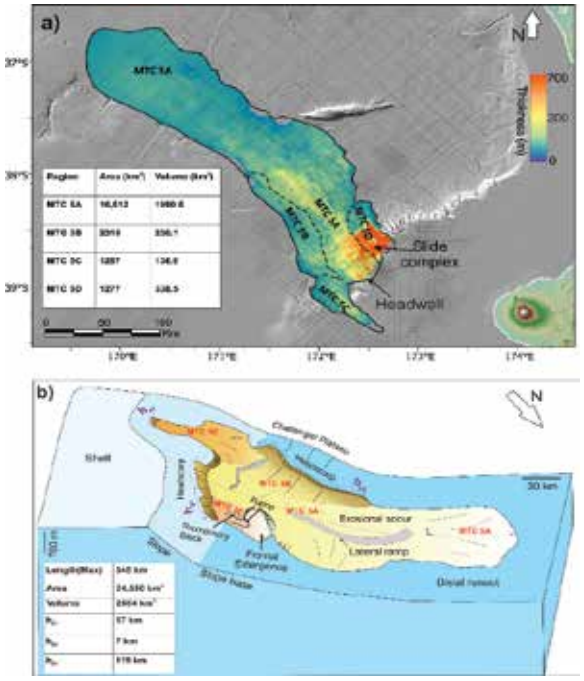



**Figure 15:** *A giant mass transport complex showing four separate failure sectors, labelled MTC 5A–5D. (a) Thickness map of MTC 5, with the dotted line outlining the extent of MTC 5A-5D. The head scarp on the north-eastern side shows a maximum thickness of approximately 700 m. (b) A schematic of MTC 5 illustrating its mid-slope origin, showing the four mass flow units (MTC 5A–5D) and head scarp regions with estimated length (L), area, volume, and headwall perimeter (Dr. Sudipta Sarkar's Group)*

## 4.3 PALEOENVIRONMENT AND PALEOCLIMTIC EVOLUTION

### Isotope biogeochemistry

The influence of abiotic factors-particularly slope and aspect-on tree cover and canopy height in the Western Ghats was clearly established. Dr. Shreyas Managave's group observed a consistent decreasing trend in tree cover and canopy height from west to east and north to south. These spatial patterns suggest that northwest-facing slopes generally support the highest tree cover and canopy height, while southeast-facing slopes exhibit the lowest values at the landscape scale. The group's findings also highlight the significant role of slope-aspect in shaping vegetation structure and composition, which, in turn, affects soil organic carbon (SOC) stocks, soil properties, and the mean residence time of SOC. Fieldwork focused on two main objectives: (i) assessing pre-monsoon tree growth, and (ii) evaluating pre-monsoon variability in the oxygen isotopic composition across the soil-xylem-leaf continuum. Stable isotope analyses of rainwater, leaf water, and xylem water were conducted. Tree growth measurements for 40 individuals were recorded both before and after the monsoon over two consecutive years. Laboratory analysis of the collected samples is currently in progress.

Stable isotopes of carbon, nitrogen, hydrogen, and sulfur are being utilised to investigate the diet and migratory patterns of shore and forest birds. Feather and blood samples from six wader species were collected during both return and forward migrations and are currently undergoing isotopic analysis. Additionally, soil, water, and microbenthic fauna samples were collected to establish baseline isotopic signatures within the estuarine food web. A subset of the microbenthic samples has already been analysed.

## 4.4 CLIMATE DYNAMICS

### Himalayan glaciers

Glacier lake outburst floods, glacier avalanches, and other glacial hazards are becoming more frequent in the Himalaya due to warming climate and glacial retreat. A better understanding of the underlying glacial, hydrological, meteorological process and their interactions is essential for adaptation and mitigation efforts.

Dr. Argha Banerjee's group initiated a field study of the relatively small retreating glaciers, the proglacial lakes at their termini and their microclimate in the high-altitude cold and arid Himalayan valley above Panikhar village in Kargil, Ladakh. The field observations, combined with the available remote-sensing data, are being utilised for numerical modelling of different processes that span different time scales. For instance, the slow ice-dynamics is modelled to investigate the driver of the decadal-scale glacier retreat-rate variability, which may yield insights into the formation and growth rate of proglacial lakes. In contrast, the simple model developed to capture the variation of wind speed and wind direction over a diurnal scale, will help in improving the estimates of ice melt in the valley. The flash flood propagation, which happens over faster timescales of minutes to hour, will help estimating the lead time for early-warning systems and will facilitate the planning of effective emergency response strategies.

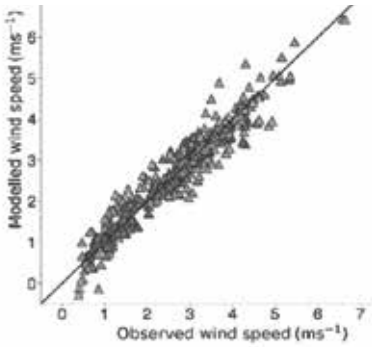



**Figure 16:** *An empirical model was developed that captures the observed daily variation of wind speed on glaciers well. Accurate windspeed estimates will improve ice melt prediction on glaciers without any weather station data. (Dr. Argha Banerjee's Group)*

### Monsoon variability

The Hadley circulation (HC) is a prominent feature of atmospheric general circulation. The strength of HC significantly influences the intensity of tropical precipitation as well as the temperature, energy and water vapor distribution across the tropics. Moist convection plays a pivotal role in regulating the strength of HC, and tropical eddies including convectively coupled equatorial waves which play a major role in modulating the patterns of organized convection in the tropics also influence the strength of HC.

Dr. Neena Joseph Mani's group's study focuses on the east Pacific (EP) and explores how tropical synoptic scale disturbances modulate the regional HC strength. The choice of the east Pacific domain is motivated by the prominence of synoptic-scale convective disturbances over the region, unlike other regions, where a wide range of scales, including intra-seasonal and quasi-biweekly oscillations, are also prevalent. While the SST background state over east Pacific is not favourable for thermally driven deep convection, deep convection can be triggered by low-level convergence induced by Mixed Rossby Gravity waves (MRG) the dominant synoptic-scale mode over the region. Composite analysis based on EPHC strength indicates that that MRG associated low-level wind convergence and convection is much stronger during years when the EPHC is strong, implying the dominant role of MRG in modulating the strength of EPHC. On the other hand, surface convergence driven by meridional SST gradients are not found to be significantly different during strong and weak EPHC seasons. The study also elucidates a new possible mechanism by which an El Niño phase over the Pacific can lead to a stronger EPHC. The oceanic and atmospheric background state during El Niño might be favourable for stronger MRG activity, which can lead to more low-level convergence, trigger deep convection and in turn strengthen the EPHC.

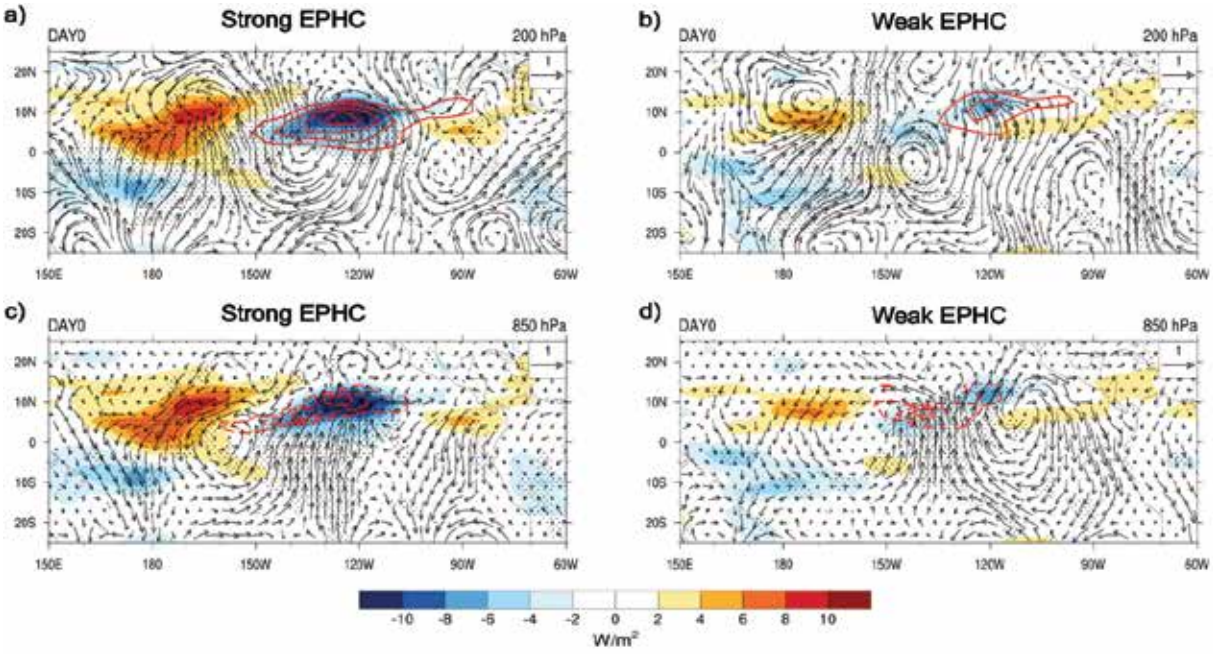



**Figure 17:** *Composites of 3-10 day filtered OLR (shading, Units: W/m2), and wind (vectors, Units: m/s) anomalies at 200 hPa (top panel) and 850 hPa (bottom panel) for the reference days (DAY0) of MRG activity identified based on the "circulation index" during (a,c) strong and (b,d) weak EPHC seasons. The solid (dotted) red contours represent MRG-associated divergence (convergence) in the upper (lower) levels (Units: 10-6 s-1). Stippled regions are statistically significant at the 95% confidence level. (Dr. Neena Joseph Mani's Group)*

## Tropical dynamics

Mixed Rossby-Gravity waves (MRGW) are a key component of tropical dynamics and extratropical forcing has been considered as an important factor in governing the growth of MRGW. Wave resonance (WR) theory, as proposed by previous theoretical studies, offers a compelling framework for understanding how extratropical forcing influences MRGW. Dr. Suhas Ettammal's group's study provides observational evidence supporting the intensification of MRGW by extratropical forcing using the WR framework. Analyses conducted using reanalysis data show that the interaction between MRGW and extratropical forcing generates eddy kinetic energy, which intensifies the MRGW during boreal winter. In contrast, this interaction leads to the attenuation of MRGW during boreal summer season, highlighting the seasonal variability in these dynamics. Interestingly, while Doppler-shifted eastward propagating MRGW are observed over the Western Hemisphere during boreal winter season, their presence cannot be attributed to extratropical forcing. Overall, this study underscores the importance of extratropical forcing as a crucial factor in modulating the MRGW.

# 5. HUMANITIES AND SOCIAL SCIENCES

## 5.1 HISTORY OF SCIENCE, ARCHITECTURE, MATERIAL CULTURE

### History of architecture

Dr. Pushkar Sohoni continued his research in the history of architecture, and with his colleagues, authored and edited two volumes in Marathi titled Maharashtratila vastukala, and two volumes in English titled Architecture in Maharashtra. All of them were published by the Maharashtra State Board for Literature and Culture. Along with several essays in research journals, he also authored a chapter 'Janjira Fort and Rajapuri Port: Connected Histories in a Coastal Complex' in Shefali Balsari-Shah and Sunita Nair (eds.), Gateways to the Sea: Historic Ports and Docks of Mumbai Region (New Delhi: Publications Division, Ministry of Information and Broadcasting, 2024). The book was launched by the Governor of Maharashtra. Dr. Sohoni also recorded several videos on Indian temple architecture for Jio Institute Digital Library exhibits. Dr. Sohoni, along with Dr. Sarah Melsens and Dr. Maya Dodd, launched the Pune Architectural History Archive (PAHA). An initiative dedicated to documenting and promoting Pune's architectural heritage, focusing on the twentieth-century architecture from 1920 to 1990, the project had been going on for three years. In 2024, two of his doctoral students received their PhD: Swapna Joshi for her thesis 'Celestial Impact: A Cultural Narrative of Lonar Crater through Architectural Forms', and Pallavee Gokhale for 'Signs of Harappan Culture: Contextual Narratives of Excavated Artefacts'.

**Figure 18:** *A screenshot from the website of Pune Architectural History Archive, a collaborative initiative to document the architectural heritage of Pune city (Dr. Pushkar Sohoni's Group)*

## 5.2 DEVELOPMENT STUDIES

### Environment and development

Dr. Bejoy K. Thomas and collaborators work on two interrelated areas, (a) water management, with a focus on adaptation, access and use in agricultural and domestic sectors, and (b) environmental sustainability and development, including normative implications of climate action. Dr. Thomas's research on food-water-biodiversity nexus in the Upper Bhima sub basin came to a close during the year. The team that includes Society for Promoting Participative Ecosystem Management (SOPPECOM), Pune and International Institute for Applied Systems Analysis (IIASA), Vienna organised a workshop, with invited members from academia, policy and civil society, to discuss the overall findings. A review that the team published in Environmental Science & Policy on food-water-biodiversity linkages in India identified biodiversity as the most connected across the system (137 linkages), followed by water (131) and food (120). Dr. Thomas continued his policy relevant work and involvement with various stakeholders on issues of water resources management and sustainable development. The focus during the last year was particularly on looking at progress in household water access using nationally representative data.

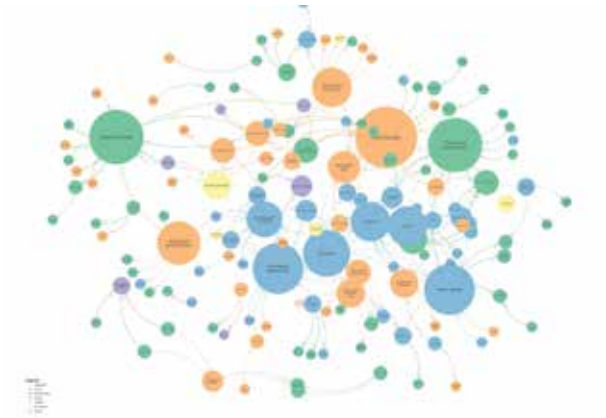


**Figure 19**: *Systems map of food, water and biodiversity nexus linkage in India, from Martin et al, 2024 (Dr. Bejoy Thomas's Group)*

## 5.3 HUMANITIES

### Social history of sugar

Dr. Chaitra Redkar's research focused on the social history of sugar manufacturing. Funded by ICSSR, this project studied Harigaon and surrounding 8 villages from the sugar belt in Ahilyanagar (Ahmednagar) district. Harigaon was the site where the very first colonial sugarcane plantation of Bombay province as well as the first sugar factory – The Belapur Sugar & Allied Industries was located. The research traces the transformations that occurred in since the establishment of this factory in 1921 to its closure in 1987 and after. It presents social history of this region of a100+ years in view of changing irrigation pattern, crop pattern, employment, migration and politics. By juxtaposing the historical - archival data with a more contemporary sociological data, this research provides a nuanced understanding for the transformation of the political economy of development in Maharashtra.


**Figure 20:** *(Left) Field investigator interviewing the farmer at a neighboring village; (Right) Advertisement of Sugar published by the Belapur Company in a Marathi periodical in 1930 assuring consumers that sugar manufacturing does not involve the use of bones and does not harm any religious sentiments (Dr. Chaitra Redkar's Group)*

### Literary and language studies

Dr. Pooja Sancheti's research is primarily in South Asian Anglophone literature, with a special interest in women's writing, contemporary explorations of identity in postcolonial and transnational frameworks, and translation. She is an active English/Hindi translator. She is also laterally interested in literature and critical theory at the juncture of medicine and society. In the last year, Dr. Sancheti published 3 translations, a book chapter broadly on interdisciplinary practices in learning, and have had one journal article and one book chapter on South Asian literature accepted for publication. She also presented papers at two international conferences and one national conference on various aspects of South Asian Anglophone literature and was invited to give a lecture on disease in the context of World Literature.

# 6. MATHEMATICS

## 6.1 ALGEBRA AND NUMBER THEORY

### Number theory

Dr. Baskar Balasubramaniam's research is in the area of number theory. One of the problems he is interested in is the study of special values of L-functions and its connection to congruences of automorphic representations. He is particularly interested in distinguishing the congruences between automorphic representations for GL3/imaginary quadratic fields with base change automorphic representations. He is also interested in computations in connection with number fields and modular forms.

### On Ext groups

We can associate an admissible unitary representation $\pi(\rho p)$ of $GL_2(Q_P)$ with every local Galois representation by the p-adic local Langlands correspondence. Considering $\rho p$ is ordinary, local and global vanishing results for Ext functors with respect to these representations have been proved. A finiteness result of Ext groups was also proved. This work was carried out by Dr. Debargha Banerjee jointly with Srijan Das.

### Algebraic K-theory over monoid rings

Dr. Rabeya Basu and team deduced a few results in classical algebraic K-theory over monoid rings, namely (1) Transitivity action of elementary subgroups of classical groups on unimodular rows over monoid rings; and (2) Stabilization bound for K_1-functor of classical groups over monoid rings. See this publication for more information: Rabeya Basu, Maria A. Mathew; Elementary action of classical groups on unimodular rows over monoid rings. Transformation Groups, October (2024).

### Langlands Program

Dr. Manish Mishra's research area is Representation theory of finite and p-adic groups and the local Langlands correspondence. Research achievements: (1) Hecke algebras: The team wrote two papers completing the long standing program in the subject area of describing the Hecke algebras associated to Bernstein blocks. (a) Structure of Hecke algebras arising from types, arXiv:2408.07801; and (b) Reduction to depth zero for tame p-adic groups via Hecke algebra isomorphisms, arXiv:2408.07805. In addition, Dr. Mishra completed two projects (c) Unique Jordan decomposition of characters; this is a joint work with P. Arote which resolved the open problem of constructing a canonical Jordan decomposition for an arbitrary finite group of Lie type. (d) Depth comparison and Close-Field Isomorphisms in the Local Langlands Correspondence; here they introduced a new notion of depth of a Langlands parameter and established that LLC in depth 0 implies LLC in positive characteristic. This resolves and extends all previously known results in this direction.

### Witt vector functors

Dr. Supriya Pisolkar works in the area of number theory. For a prime number the p-typical Witt vector functor W, which maps from the category of unital associative rings to the category of abelian groups, is a foundational tool in number theory. In the classical setting, it provides a bridge from characteristic p to characteristic zero. For a commutative ring R the set W(R) forms a ring with rich topological and arithmetic structure.

There are multiple constructions of the p-typical Witt vector functor on the category of associative rings, which agree with the classical construction when restricted to commutative rings. These functors, however, take values in the category of abelian groups, and hence it is natural to seek a group-theoretic characterization of W(R) that can be extended to the non-commutative setting. In a recent joint work, Dr. Pisolkar provided a universal group-theoretic characterization of the p-typical Witt vector functor in the commutative setting (see: Pisolkar, Supriya; Samanta, Biswanath. A universal group-theoretic characterization of p-typical Witt vectors, J. Algebra 677 (2025)). In a sequel to this work, she is currently extending these results to the non-commutative setting.

## Polynomial maps on central simple algebras

The Waring problem is naturally considered for an algebra $\mathcal{A}$ (not necessarily commutative) over a field $\mathcal{A}$, which is a generalisation of the classical problem in number theory for integers. A longstanding problem is the Matrix Waring Problem, where one asks for the smallest number m so that every element of the matrix algebra $\mathcal{A}$= M(n, $\mathcal{A}$) is a sum of m many k-th powers. Dr. Anupam Kumar Singh's group solved the asymptotic version of this problem over a finite field. Briefly speaking, if the finite field is large enough, we can write every element as a sum of TWO k-th powers. The group also extended this work to triangular matrix algebra. More generally, we can consider polynomial maps on $\mathcal{A}$. Some classic examples are the sum of powers, multilinear polynomials, commutators, etc. The main problem is understanding its image and, in particular, determining if such a map is surjective. This problem generalises the Matrix Waring problem where the algebra $\mathcal{A}$=M(n, $\mathbb{K}$) and the polynomial is a sum of k-powers. In this direction, the group studied images of diagonal polynomials over real, complex and finite fields. These results generalise the earlier work on the Matrix Waring problem to this polynomial and prove an analogous result to that of Richman about the subjectivity of the diagonal map on M(m, R). Another general problem is the Lovov-Kaplansky conjecture which asks if the image of a multilinear polynomial is always vector space over M(m, $\mathbb{K}$) when $\mathbb{K}$ is infinite. This conjecture is solved for small m, and some partial results for other cases are known. Along with this, they are also looking into more general problems as well, e.g., to determine the image of a polynomial with coefficients in the algebra itself and have obtained results in the case of M(2, C), Octonion etc, some of it is in the line of Lovo-Kaplansky conjecture.

## Analytic number theory and arithmetic of modular forms

Dr. Kaneenika Sinha's research focuses on explicit and probabilistic aspects of number theory. The explicit perspective is to derive important properties of arithmetic functions by focusing on the zero-free regions of corresponding L-functions. For example, a study of the zero-free regions of the Riemann zeta function helps us to derive distribution properties of the prime numbers; any improvement in specifying such a zero-free region leads us to refinements in our understanding of the distribution of primes. This template can be generalized to understand several arithmetic objects of interest; for example, the Fourier coefficients of Hecke (modular) cusp forms. Dr. Sinha's recent research work focuses on zero-free regions for modular L-functions; in ongoing joint work with Alia Hamieh, Steven Creech, Simran Khunger, Jakob Streipel and Kelvin Tsang, they derive a logarithmic zero-free region with explicit constants for a modular L-function. The constants in their results are a significant improvement over existing results. The team hopes to explore their applications to the distribution properties of the Fourier coefficients of Hecke (modular) cusp forms.

With the study of the distribution properties, we enter the realm of probabilistic methods in number theory. In contrast to the explicit perspective where the focus is on L-functions corresponding to these objects, the probabilistic approach is to interpret arithmetic quantities as sums of seemingly independent random variables on appropriate probability spaces. This can be applied to study properties such as equidistribution, discrepancy, fluctuations of discrepancies over appropriate families, and spacing statistics.

## 6.2 ANALYSIS, DIFFERENTIAL EQUATIONS, APPLICABLE MATHEMATICS

### Poincaré-Sobolev equation, hyperbolic space

In a joint project with PhD student Paramananda Das and Prof. Debdip Ganguly, Dr. Mousomi Bhakta studied the fractional Schrodinger equations with a vanishing parameter:

$$(-\Delta)^s u + u = |u|^{p-2}u + \lambda|u|^{q-2}u \text{ in } \mathbb{R}^N$$

where

$$s \in (0,1),\ N > 2s,\ 2 < q < p \leq 2^*_s = 2N/N-2s$$

are fixed parameters and $\lambda > 0$ is a vanishing parameter. The team investigated the asymptotic behaviour of positive ground state solutions for $\lambda$ small, when $p$ is subcritical, or critical Sobolev exponent $2^*_s$. For $p < 2^*_s$, the ground state solution asymptotically coincides with unique positive ground state solution of $(-\Delta)^s u + u = u^p$, whereas for $p = 2^*_s$ the asymptotic behaviour of the solutions, after a rescaling, is given by the unique positive solution of the nonlocal critical Emden-Fowler type equation. Additionally, for $\lambda > 0$ small, the team showed the uniqueness and nondegeneracy of the positive ground state solution using these asymptotic profiles of solutions. This paper is to appear in *Journal of Geometric Analysis*, 2025.

In a joint project with PhD student Paramananda Das and postdoc Nirjan Biswas, Dr. Bhakta studied existence and multiplicity of positive solutions for concave-convex critical problem driven by an operator of mixed order obtained by the sum of the classical $p$-Laplacian and of the fractional $p$-Laplacian in the spirit of Biagi and Vecchi (Nonlinear Anal., 2025), Azorero and Peral (Indiana Univ. Math. J., 1994), Ambrosetti-Brezis-Cerami (JFA, 1994). This paper is currently under review. In another joint project with student Paramananda Das and postdoc Nirjan Biswas, Dr. Bhakta is currently studying multiplicity of sign-changing solutions to Brezis-Nirenberg problem associated with mixed local-nonlocal operator.

### Harmonic analysis and dispersive PDEs

Dr. Divyang Bhimani's group's work is mainly on harmonic analysis and dispersive PDEs. Specifically, they establish fixed-time decay and Strichartz estimates for dispersive PDEs. They analyze short and long time behaviours for the solution of dispersive PDEs (e.g. nonlinear Schrodinger equations) with rough Cauchy data (e.g. data in modulation spaces). The group has also studied pointwise convergence problem for the heat equations.

### Nonlocal equations with gradient nonlinearity

Dr. Anup Biswas's work has mainly focused on solving some open problems in the area of nonlocal equations with gradient nonlinearity. In his latest work with Alex Quaas and Erwin Topp, Dr. Biswas has solved an open problem posed by Cirant and Goffi.

### Shape optimisation problems

Dr. Anisa Chorwadwala is studying an eigenvalue optimisation problem over a family of doubly connected domains $U := D \setminus \Omega$ in $\mathbb{R}^2$ where $\partial D$, one boundary component, is a circle while the other component, $\partial\Omega$, enjoys a dihedral symmetry. The Boundary Value Problem under consideration is $\Delta u = 0$ on $D \setminus \Omega$, $u = 0$ on $\partial D$ and $\partial u/\partial n = \sigma u$ on $\partial\Omega$. Dr. Chorwadwala studies the behaviour of the first nonzero eigenvalue of this problem as the domain $\Omega$ rotates about its own center by an angle $\theta$ in the anticlockwise direction. She also investigates if there is any symmetry, monotonicity in the behaviour of the eigenvalue as a function of $\theta$, and tries to find global maximisers and global minimisers of the eigenvalue with respect to $\theta$.

During 2024-25, Dr. Anisa Chorwadwala's group worked on the following articles: 1. Anisa Chorwadwala, "We are what we think we are!", Blackboard, *Bulletin of the Mathematics Teachers' Association* (India) Issue 7, August 2024,

pp. 109-114; Anisa Chorwadwala and Divya K Joseph, "One dimensional zero pressure gas dynamics systems with a variable coefficient damping term", Aug 2024, preprint; Anisa M.H. Chorwadwala and A.R. Aithal, "Convex polygons and the Isoperimetric Problem in simply connected space forms $M^2_K$ . arXiv:2408.13565

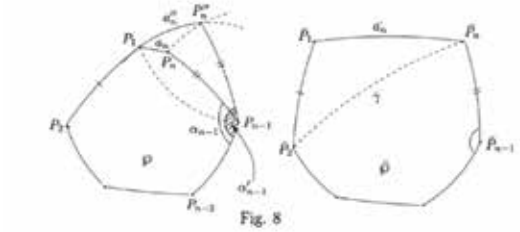


**Figure 21:** *This image is taken from the Proof of the Lemma of Cauchy from Dr. Anisa Chorwadwala's article jointly with A.R. Aithal (arXiv:2408.13565) (Dr. Anisa Chorwadwala's Group)*

### Bounded operators, dilation theory

Dr. Haripada Sau's group worked on the following three themes: (1) Unlike the case of Toeplitz operators, the boundedness of Hankel operators is a non-trivial question that interests both operator theorists and harmonic analysts. A classical theorem of Nehari states that a Hankel operator is bounded if and only if the corresponding symbol function has an "extension" to the L-infinity function. With Mainak Bhowmik (a PhD student at IISc) and Tirthankar Bhattacharyya, Dr. Sau investigated the boundedness of Hankel operators in the quotient domains of the polydisks. Several related problems have also been dealt with. (2) Prof. Joseph Ball and Dr. Sau undertook a thorough study of rational dilation for the bidisk. The main motivation is from a pioneering 1963 work of Ando and the classical dilation theory. This work is accepted in the book series Cambridge Tracts in Mathematics. (3) Two bounded operators A and B are said to be q-commuting if AB = qBA. This deformation of usual commutativity has received much attention in mathematical physics and operator algebra. The motivation comes from quantum mechanics. Prof. Joseph A. Ball (Virginia Tech) and Dr. Sau recently developed a functional model theory for q-commuting isometries. With student Sourav Ghosh, Dr. Sau is exploring applications of this work in both operator theory and operator algebra -- substantial progress is made.

## 6.3 GEOMETRY AND TOPOLOGY

### Low-dimensional topology

Low-dimensional Topology is the study of spaces that locally look like the Euclidean 3-dimensional space. In the past year, Dr. Tejas Kalelkar and team studied triangulations of 3-dimensional manifolds and spatial graphs. A triangulation of a 3-dimensional manifold is called essential if none of its edges is homotopically trivial. The group has shown that any two essential triangulations of a 3-manifold are related by a sequence of local combinatorial moves (bistellar moves) through essential triangulations, without introducing or removing any vertices. In particular, ideal essential triangulations of a cusped manifold are related by a sequence of bistellar moves through ideal essential triangulations. These results are proved in the more general setting of L-essential triangulations, i.e., triangulations that are essential with respect to a labelling on the lift of the cusps of the manifold to the universal cover. Given a representation, they also construct an ideal triangulation for which a solution to the Thurston's gluing equations recovers the representation. This leads to the invariance of the quantum 1-loop invariant. This is joint work with Saul Schleimer and Henry Segerman. There are no known efficient algorithms to determine when two spatial graphs are isomorphic. The team obtained a linear algebraic test that gives an obstruction to equivalence of 3-regular spatial graphs by using the writhes of the circuits in the graph. This is joint work with Stephan Friedl and Jose Pedro Quintanilha.

### Algebraic geometry and related areas

Derived categories and tt geometry: In a document under preparation, Dr. Vivek Mallick and team are studying the Balmer spectrum of an equivariant category of compact objects via the stratification of the big category. They further describe the K_0 of such categories. Toric Arakelov geometry: (Joint with Jose Ignacio Burgos Gil, Kiumars Kaveh and Ana Botero) Extending Burgos-Gil, Philipon and Sombra's work on describing metrized line bundles over toric varieties to equivariant vector bundles. An infinity-categorical interpretation of open embeddings in tt-geometry (Joint with student Kunal Arora): Here the team is studying tt-categories, which occur as homotopy categories of certain stable infinity categories. A result about étale morphisms between tt-categories has been interpreted in this set up.

### Complex manifolds and varieties

The research group of Prof. Mainak Poddar is engaged in the investigation of complex analytic manifolds and varieties and their interplay with smooth, algebraic, and symplectic counterparts. The group has been investigating phenomena in Generalized Complex Geometry, which is a framework that unifies complex and symplectic geometries. Group members have recently developed the foundations of a theory of strong generalized holomorphic principal bundles over regular generalized complex manifolds and are currently investigating if the regularity assumption may be relaxed. The purpose of these investigations is to extend the rich theory of holomorphic bundles over complex manifolds to the broader class of generalized complex manifolds. The group has studied the properties of L-Lie algebroids which have recently come up in geometry in many contexts. The group has introduced an algebraic counterpart to these, namely, A-Gerstenhaber algebras, and studied their inter-relationship. Prof. Poddar and his collaborators have also embarked on a study of b-symplectic manifolds using Lie algebroid techniques. The research group has also been working on several questions related to vector and principal bundles over smooth Deligne-Mumford stacks.

# 7. PHYSICS

## 7.1 ATOMIC AND MOLECULAR PHYSICS, OPTICS, AND QUANTUM INFORMATION

### Quantum transport properties

Dr. Bijay Agarwalla's main research interest is in the direction of understanding anomalous quantum transport in low-dimensional quantum systems. In particular, his group is focusing on how anomalous transport can emerge at the band-edges of the lattice and also for long-range lattice systems. They also investigate how lossy mechanism can lead to new transport regimes. In another research direction, they have explored phases of non-Hermitian random matrices via the singular values and observed remarkable scalings for the spacing ratios.

### Nanophotonics, thermoplasmonic systems

Key developments made by Prof. G.V. Pavan Kumar's group in optothermal manipulation of colloidal systems during 2024-25 are described below:

- Optothermally driven colloidal dynamics: Symmetric colloidal structures exhibit controlled propulsion and chiral rotation under broad-area optical illumination, enabled by temperature gradients and thermo-osmotic interactions. These findings provide a framework for directing self-assembly and studying active matter.

- Directional revolution in optical ring traps: Colloidal dimers/trimers undergo unidirectional revolution in ring-shaped optical traps, driven by optothermally generated fluid flows. This enables precise microfluidic manipulation without mechanical or chemical intervention.
- Polarization-dependent assembly: Silver nanowire plasmons facilitate optothermal pulling, trapping, and polarization-sensitive assembly of silica colloids via thermophoretic forces. Such assemblies serve as platforms for plasmon-driven active matter.
- Defocused trap dynamics: Active colloids in defocused optical traps exhibit thermophoresis-dominated regimes, with hydrodynamic interactions enabling collective behaviors like synchronization and clustering.
- Experimental validation: Systematic studies confirm optothermal fields modulate Brownian colloid behavior, with implications for targeted drug delivery, nanoscale engineering, and soft photonics.
- These advances underscore the versatility of optothermal methods in controlling colloidal dynamics, bridging fundamental non-equilibrium physics with applications in nanotechnology and lab-on-a-chip devices.

## Ultra cold dipolar gases and Rydberg atoms

The studies carried out by Dr. Rejish Nath's group mainly explored the dynamical features in Rydberg atoms, ions, and dipolar Bose-Einstein condensates. In particular, benchmarking was done for discrete truncated Wigner approximation and restricted Boltzmann neural networks with the exact dynamics in a Rydberg atomic chain. On the side of doubly dipolar Bose gases, exact QMC calculations are being carried out to examine the superfluid transition. Novel structures exploiting interlayer dipolar interactions are reported. In a completely different perspective, the influence of quantum dynamics on the conical intersections in a pair of atoms is reported.

## Quantum many body systems, Quantum Hall effect

Dr. Sreejith G.J. worked on various problems of interest in interacting quantum many body systems. One of the themes of the work involved utilizing the possibility of newer measurement techniques arising from quantum computing devices to infer features of quantum dynamics. The work involved calculation of full distribution of charge densities, properties of ensembles generated by large number of repeated measurements of quantum systems etc. Sreejith worked on newer tools for inferring quantum data from large number of measurements made possible by quantum computers. These involve techniques like shadow tomography. Shadow tomography coupled to ML techniques is a new direction of research that is being explored. Alongside these, he is working on using ML to understand quantum many body systems. During this period Sreejith also worked on conventional many body physics problems related quantum Hall effect and superconductivity.

## Low temperature complex plasma

Dr. Surabhi Jaiswal's research focuses on the complex (or dusty) plasma and nonequilibrium plasmas. Last year the group was trying to understand the phenomenon of phase coexistence in a complex plasma medium by incorporating a newly developed technique of changing the confinement potential thereby affecting the sheath structure in the plasma medium. Depending on various bias potentials the microparticles levitate in the plasma medium as a result of the balance between electrostatic and gravitational force changing its dynamics and become more energetic in the core of the cloud while maintaining the crystalline like structure at the periphery. The group has extended analysis to understand the role of microparticle interactions and instabilities arising due to changing confinement, specifically the role of dynamic interlayer particle pairing and non-reciprocal interactions. These calculations offer a more comprehensive understanding of phase behavior in bilayer complex plasma systems. The group has recently published a paper in *Physics Review Research.* They are now trying to understand this phenomenon by performing molecular dynamics simulations (the manuscript is in preparation).

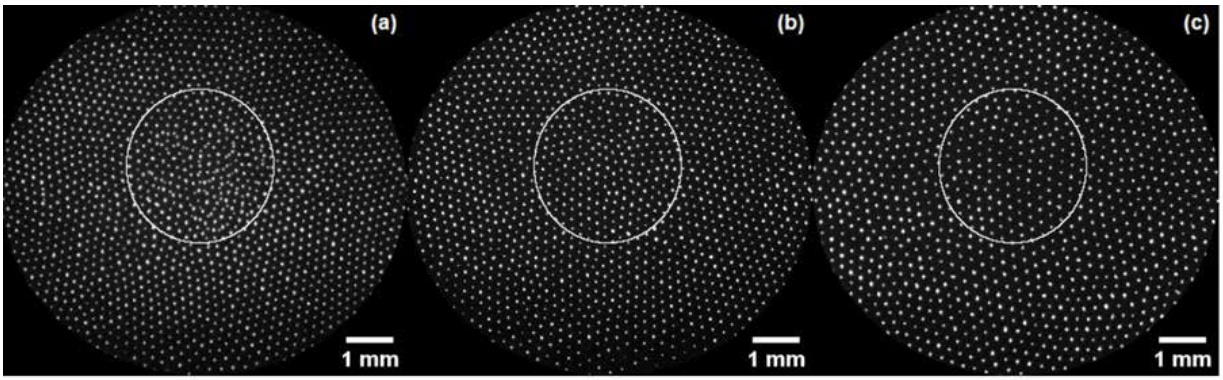



**Figure 22:** *Representative images for the top view of the dust cloud for bias voltage (a) 103 V, (b) 110 V, and (c) 140 V. The white circular section represents the region of structural transition (Dr. Surabhi Jaiswal's Group)*

## 7.2 CONDENSED MATTER, STATISTICAL PHYSICS, MATERIALS

### Fabrication of nanodevices

Dr. Atikur Rahman's research group investigates the electrical and optoelectronic properties of two-dimensional (2D) materials, focusing on transition metal dichalcogenides (TMDs) like monolayer MoS2 and WS2, to develop advanced photodetectors, flexible electronics, and memory devices. Through innovative approaches in dielectric, strain, and defect engineering, they have significantly enhanced the performance of these materials. In their dielectric engineering efforts, they achieved a nearly three-order-of-magnitude enhancement in photoresponse in 3D silicon-2D $MoS_2$ heterostructures, attributed to improved separation of photogenerated electron-hole pairs and reduced carrier scattering. The group also modulated excitonic contributions in $WS_2$ photoluminescence through substrate texturing, enabling precise optical control. Introducing double-sulfur vacancies in $MoS_2$, the team increased conductivity by elevating the density of states near the conduction band, offering insights into band structure modulation for high-mobility devices. Argon plasma-based defect engineering further enhanced $MoS_2$ memristor performance for neuromorphic applications by improving linearity, symmetry, and dynamic range while reducing variability and non-linearity. Additionally, they explored how strain activates and migrates defects in $MoS_2$, leading to enhanced photocurrent, persistent photoconductivity, reduced defect migration energy, and improved electron mobility, opening avenues for flexible and memory devices. The group also observed ferroelectricity in nanosheets of $CsPbBr_3$ and high mobility in bismuth oxychalcogenide nanoplatelets.

### Optoelectronics

Main research interests in Dr. Shouvik Datta's group are in quantum optical properties of light-matter interactions in mixed-dimensional (say 0D-2D) heterostructures of excitonic materials, specifically, the use of spatially indirect excitons (electron-hole pairs) having large dipole moments and longer life times for quantum computation and quantum communications. The group is exploring BEC-BCS crossovers and Rabi Oscillations of macroscopic quantum state of excitons for quantum device applications.

## 7.3 COSMOLOGY, PARTICLE PHYSICS, AND GRAVITY

### Complex networks, quantum systems

Prof. M.S. Santhanam's group broadly works in the areas of quantum computing, quantum machine learning (QML), quantum chaos, nonlinear dynamics and complex systems. On statistical physics of complex systems, the group analysed election data from 34 countries and through a combination of modelling and analytical results, they showed that election data displays a universal patterns, and it can be used to detect fraudulent elections. In the area of quantum computing and QML, the group's work is focused on two aspects; (a) novel algorithms based on quantum reservoir computing paradigm to solve problems such as binary classification to time series prediction, (b) understanding the many-body and nonlinear effects -- localisation and thermalisation properties -- in the context of quantum chaos and quantum computing, in particular with reference to cold atomic gases and coupled transmon systems. Further in this year, the group proposed a scheme for implementing quantum search algorithm using the quantum kicked rotor model, and showed that it helps in scaling up to larger database search. They had also showed how asymmetric dynamical localisation displayed by quantum kicked rotor can be used to measure micromotion of BEC. In another work, they showed that quantum entanglement can be enhanced due to quantum resonances.

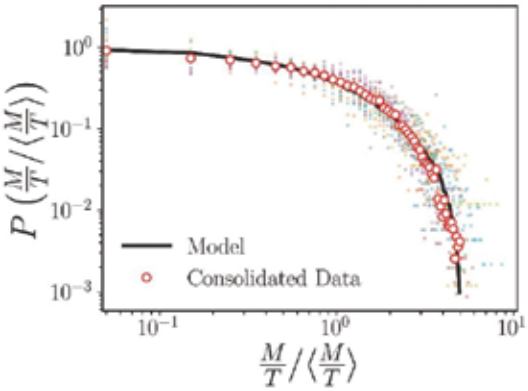



**Figure 23:** *Universal pattern in election data drawn from 32 countries for a large number of elections held over a time period of several decades to almost a century (Prof. M.S. Santhanam's Group)*

### Cell mechanics and single molecule force spectroscopy

The current focus of Dr. Shivprasad Patil's research is cell mechanics and single molecule force spectroscopy of proteins and other bio-macromolecules. For studying cell mechanics, the group uses a conventional atomic force microscope to apply stress on a cell in a time-dependent manner and measure the resulting response as deformation is produced in a cell. The data is further processed by applying a constitutive equation describing soft glasses, namely a power law. The group uses Ting's model to accommodate this mechanical behaviour and tease out the power-law exponent to report cell's fluidity. The team hopes that this becomes a potential bio-marker for reporting cell homeostasis. To study mechanics of single molecules, the group developed two versions of interferometer-based AFM, a technique unique to the group. Using this, they have measured viscoelasticity of single folded globular domains of proteins. The group is currently developing analysis tools and novel means to infer slow protein dynamics in the time scales of microseconds to milliseconds by simultaneously measuring the stiffness and friction coefficient of folded globular domains

### Supersymmetric theories of gravity

A striking feature of maximally supersymmetric theories of gravity in three, four and five dimensions is the appearance of global exceptional symmetries. Minimal supersymmetry in higher dimensions always induces extended supersymmetry in a dimensionally-reduced theory and these theories, all arise from the same progenitor,

d = 11 supergravity. While this parent theory partly explains the origins of large global symmetries in the reduced models, it does not do so completely, relegating them to the bucket of 'hidden' symmetries. Starting from maximal supergravity in d = 11, the model in (11 - n) dimensions exhibits a global E_n symmetry. A lot of the interest in these exceptional symmetries has stemmed from advances in scattering amplitude methods and with them, discoveries that N = 8 supergravity in d = 4 is far better behaved in the ultra-violet than previously believed. Whether the theory is ultra-violet finite to all orders remains an open question although the evidence suggests this is unlikely. The exact role of the exceptional symmetries in the improved finiteness properties remains unclear and this has been the primary focus of Prof. Sudarshan Ananth's research in the past year.

## Gravitation and mathematical physics

Dr. Suneeta Vardarajan works on aspects of black hole physics and gravitation. Her latest preprint, with student Mohd Ali, is on an analysis of causal properties in various higher curvature gravity theories. In this preprint, they did a complete characteristics surface analysis of generalized quadratic gravity (a fourth order theory) and theories cubic in curvature (Einsteinian cubic gravity). They found that in these theories, the Killing horizon of a black hole is a characteristic surface for all polarization modes of the graviton. These results on generalized quadratic gravity, together with earlier work, give a complete description of causal structure of leading stringy higher curvature corrections to Einstein gravity. Dr. Vardarajan has been interested in proofs of the Generalized second law (GSL) for black holes in semiclassical gravity. The GSL for Einstein gravity was proved by Wall under the assumption of a renormalization scheme rendering various quantities in the proof, such as the entanglement entropy and boost energy finite. Recent work by Chandrasekaran, Penington and Witten using the crossed product in von Neumann algebras was seen as providing such a renormalization scheme. However, a local GSL (the generalized entropy is nondecreasing in the future) was not obtained in these works. Mohd Ali and Vardarajan showed how to obtain a local GSL in crossed product constructions in a paper published in *Physical Review D.*

# Research Centres and Section-8 Companies

To foster advanced research and innovation in specific areas of study, IISER Pune hosts the following Research Centres and Section-8 companies on the campus. The Research Centres are developed around faculty members across departments working in a given related area and promote inter-disciplinary interactions and academic training to students. The Section-8 companies operate as independent units within the research ecosystem of the institute along with participation from institute faculty members.

## Centre for Water Research

The Centre for Water Research (CWR) is an interdisciplinary initiative at IISER Pune constituted in November 2020. It draws upon expertise from faculty across different departments at the institute. CWR aims to generate interdisciplinary knowledge about water systems, including their history and heritage, resource management and sustainable use, and to train the next generation of scholars to look at water from an integrated/multi-dimensional lens. CWR also provides a platform for IISER Pune to engage in socially relevant research that will have impact on public policy and action. An advisory group comprising of water scholars and practitioners based in Pune and elsewhere provides inputs to CWR in its research and outreach. The Living Waters Museum, a virtual repository launched in 2017 to curate visual narratives on our water heritage is part of the CWR. The Living Waters Museum initiated several projects during the year, and successfully curated new chapters. Across the county, from Goa to Kolkata, new initiatives engaged local communities.

The past year has seen several activities and research projects, community outreach events, and academic outputs from CWR. The fourth season of Water Talks was focused on urban environments, and the talks ranged from managing rivers to the economics of water distribution. The series of conversations that have been organised by CWR with the Living Waters Museum's AQUAMUSE project has seen several artists discuss their engagement with themes related to water. The Centre hosted several conferences, workshops, and roundtables, including one for journalists.

Faculty members of CWR have been regularly giving presentations and talks beyond the campus, at various venues, both academic and also community-based. Argha Banejee, Bejoy Thomas, Radhika Mulay, Sara Ahmed, and Shalini Sharma represented CWR at various conferences. The Centre embarked on a large-scale Water Audit of the IISER Pune campus with the aim of improving our institutional practices of water consumption, after the successful completion of a pilot project last year in collaboration with the Engineering section of the institute.

## Centre for Energy Science

Set up under the Department of Science and Technology's Nanomission in 2015, the Centre for Energy Science is comprised of a team of about 15-20 faculty members from the Physics and Chemistry Departments at IISER Pune who joined hands to perform cutting-edge research in this interdisciplinary field to develop applications with direct societal impact. Research pursued by the members is in the areas of energy harvesting, storage, and conservation, and in characterising special materials along with predictive modelling.

## Centre for Intelligent Solutions

The Centre for Intelligent Solutions was launched in September 2024 to address industry-focused problems lying broadly within the markers of data, algorithms, models, applied mathematics, computation/simulation, and digital transformations. The Centre brings together more than twenty researchers of IISER Pune and aims to promote technological innovation led by researchers of IISER Pune working on various computational and mathematical sciences. For the industry, this Centre provides opportunities for engaging in joint research projects, consultancy, student projects, placements, and many others with IISER Pune.

## Bioinformatics Centre

The Bioinformatics Centre at IISER Pune, funded by the Department of Biotechnology, was set up in 2023 with the aim to create a database of structures/models of molecular interactions that would include interactions between all biomolecules (proteins, peptides, DNA, RNA, metabolites, co-factors and drug like small molecules) and make use of software tools to integrate experimental data into the modeled interactions. The researchers at the centre are working to make this a one stop knowledge base for biological interactions. The combination of direct physical interactions with genetic interactions adds to the unique identity of this centre.

## National Facility for Gene Function in Health and Disease

National Facility for Gene Function in Health and Disease (NFGFHD) was established in 2016 and it is a world-class state-of-the-art high-barrier animal facility for generating, maintaining and supplying various transgenic mouse and zebrafish models to the research community. It acts as one of the national repositories for animal models to cater to the needs of various investigators from academic and industrial R&D centers across the nation.

The facility includes 53 clean rooms and 30 service rooms along with environmental control features. It houses mice (> 50 transgenic strains), rats, and rabbits, and provides animal experiment services and animal rooms on rental basis. The following facilities are housed at this location:

- Whole animal imaging facility providing pre-clinical, non-invasive, in vivo imaging of experimental animals.
- Genome engineering facility for generating knockout, knock-in, and transgenic mouse models, supporting research in gene function, disease mechanisms, and therapeutic development.
- Rodent Assisted Reproductive Facility equipped with state-of-the-art technologies for breeding, genetic manipulation, and reproductive techniques such as IVF and embryo transfer
- BSL-3 (Biosafety Level 3) and ABSL-3 (Animal Biosafety Level 3) facilities to safely handle and study potentially hazardous pathogens and their effects on animals
- Zebrafish facility for maintenance of various zebrafish strains and for the generation of new transgenic zebrafish models

## I-Hub Quantum Technology Foundation

The I-HUB Quantum Technology Foundation (I-HUB QTF) is a section-8 company hosted by Indian Institute of Science Education and Research (IISER) Pune, and is the first innovation hub in the country dedicated to Quantum Technologies funded by the Department of Science and Technology (DST), Government of India under the National Mission for Interdisciplinary Cyber-Physical Systems (NM-ICPS). I-HUB QTF has been developing quantum technology, developing skilled manpower and engaged in technology transfer activities. Representative activities pertaining to the reporting year April 2024 to March 2025 are described below.

- I-HUB QTF has so far awarded a total of 130+ Chanakya Fellowships to graduate, undergraduate, postgraduate, doctoral and postdoctoral students in more than 40 institutions across India.
- I-HUB QTF is funding 27 research projects in institutions across the country, successfully leveraging the Hub-Spoke and Spike model of DST missions.
- I-HUB QTF is offering a self-paced Introductory Online Certification Course on Quantum Computing taught by IISER Pune faculty members. The course is open throughout the year and is made for beginners and tech enthusiasts.
- Over the last two years, 11 quantum technology startups have been incubated and funded by I-HUB QTF. During 2024-25, I-HUB QTF organised a call for proposals and shortlisting of startups under National Quantum Mission (NQM). I-HUB QTF shortlisted 8 startups out of 100 plus applications, across India for funding, mentorship, and access to advanced equipment. These startups are working in different domains of quantum technologies including computing, communications, sensing, and materials.


*The NQM Startups Announcement Ceremony was held on 26th November 2024 at the India Habitat Centre, New Delhi, under the aegis of NQM and the NMICPS. This event was graced by the Hon'ble Minister of State (IC), Ministry of Science & Technology and Earth Sciences Dr. Jitendra Singh.*

- During the 2024-25 reporting year, I-HUB QTF also hosted 29 events including workshops and conferences towards capacity building in quantum technologies domain. These events include visits by students and faculty from state institutes, where the visitors get an opportunity to engage with quantum researchers as well as visit quantum labs. Their events initiative benefitted over 1350 participants.
- Notable among events are a series of events in close partnership with NVIDIA. These events have allowed Quantum research community in the country to learn and then engage hands-on with quantum simulators, as access to quantum computers is limited to the community. This has benefitted 95 participants across industry and academia.
- For most recent updates on the activities of the I-HUB please visit their webpage (QR Code to LinkedIn)

Follow I-HUB QTF

## Atal Incubation Centre - Society for Entrepreneurship Education and Development (AIC-SEED)

AIC-SEED is a technology business incubator supported by the Atal Innovation Mission, NITI Aayog, Government of India, and aims to nurture the spirit of entrepreneurship in the campus. It is a Section-8 company hosted by IISER Pune. During FY 24-25, AIC-SEED provided incubation support to 15 new startups. Among these, 2 startups were founded by IISER Pune students, 1 by IISER Pune faculty, 1 by IISER Pune alumnus, and 1 startup, whose service offering is based on IISER Pune's knowhow. AIC-SEED provided funding support under the Startup India Seed Fund Scheme (SISFS) to 6 startups working in the areas of solar applications, air purification, diagnostics, energy, and materials. AIC-SEED has supported over 50 startups since incorporation.

A new programme titled Plan-E(ntrepreneurship) was launched by AIC-SEED for teams of PhD researchers and guides, to spin off PhD research work into potential startups. In the first cohort, 31 teams from educational institutes across India participated in the pre-incubation program and a startup bootcamp was held in campus. Selected teams will be provided with incubation and seed funding up to Rs 10 lakhs. AIC-SEED startups participated in the IISER Pune Industry conclave held on 14th September 2024, showcasing their innovations to representatives from industry.

As an incubator selected by SARTHI (Chhatrapati Shahu Maharaj Research, Training and Human Development Institute), a Section 8 company under Maharashtra state government, AIC-SEED is currently providing incubation support to 10 innovators under the AIC-SEED - SARTHI Entrepreneur-in-Residence Programme.

AIC-SEED was selected as a MeitY Startup Hub – SAMRIDH Accelerator, by MeitY Startup Hub, an initiative of Ministry of Electronics and Information Technology for the second cohort of SAMRIDH programme. AIC-SEED has been selected to provide mentoring, product development and seed funding support for 8 startups, with seed funding on matching contribution basis of up to Rs 40 lakh per startup.

AIC-SEED was selected by Ministry of Education's Innovation Cell and AICTE to conduct a 5-day Faculty Development Programme on innovation and entrepreneurship for 50 faculties and incubation managers from academia, based in and around Pune. AIC-SEED was among the 50 organisations selected for conducting this programme and one among the four selected from Maharashtra. The programme was a huge success among the faculties who participated.

*At the 5-day Faculty Development Programme on innovation and entrepreneurship organised by AIC-SEED zduring March 24-28, 2025*

*Visit this page for more information on these initiatives*
*https://www.iiserpune.ac.in/research/research-centres-and-initiatives*

# Publications and Patents

IISER Pune has published a total of 5595 papers since its inception to the end of 2024. During the 2024 calendar year, institute members published 601 publications (as per Web of Science and information received from our faculty members): 564 research papers, 3 books, 14 book chapters, 1 book review, and 19 conference papers.

During the 2024 calendar year, IISER Pune filed 17 patent applications, had 14 patents published, and 9 patents granted. In addition, 6 applications were filed and 3 published for PCT approval during the 2024 calendar year. As of December 31, 2024, IISER Pune has filed 108 patent applications, and had 81 published patents, and 46 granted patents. In addition, a total of 18 PCT applications (filed/published) have been filed.

In a first for IISER Pune, two patented technologies from Prof. R. Vaidhyanathan's group's research on carbon dioxide capture were licensed to a Canadian company during the year.

## Publications

The list of publications from IISER Pune members in the 2024 calendar year is given in the *Appendix* section of this report.

### Total Publications during 2006-2024

*Publications in the 2024 calendar year are shown in parenthesis*

### Total : **5595** *(601)*

**986** *(101)*
BIOLOGY

**1653** *(157)*
CHEMISTRY

**14** *(5)*
DATA SCIENCE

**160** *(24)*
EARTH AND CLIMATE SCIENCE

**87** *(21)*
HUMANITIES AND SOCIAL SCIENCES


**405** *(50)*
MATHEMATICS

**2290** *(243)*
PHYSICS

## Patents

Here is the list of patents filed / published / granted during the 2024 calendar year.

Granted | Published | Filed & Published | Granted

| Sr. No. | Inventors | Title | Country and Patent Info |
|---|---|---|---|
| 1 | Britto, Sandanaraj Selvaraj; Bathla, Punita | Imaging of enzyme activity with exquisite specificity using Activity based Reporter Gene Technology (AbRGT) | **India** Application No.: 201821016607 Publication No.: IN201821016607A Granted No.: 519516 |
| 2 | Britto, Sandanaraj Selvaraj; Reddy, Mullapudi Mohan | Chemical method for synthesis of protein amphiphiles | **India** Application No.: 201821023023 Publication No.: IN201821023023A Granted No.: 493837 |
| 3 | Britto, Sandanaraj Selvaraj; Reddy, Mullapudi Mohan | Chemical method for synthesis of protein amphiphiles | **USA** Application No.: US(16/723,280) Publication No.: US20200199175A1 Granted No.: US11945838B2 |
| 4 | Galande, Sanjeev; Naik, Rutika | Combined expression pattern of SATB family chromatin organizers as improved biomarker tool for cancer prognosis | **India** Application No.: 201821029791 Publication No.: IN201821029791A Granted No.: 530323 |
| 5 | Galande, Sanjeev; Naik, Rutika | Combined expression pattern of SATB family chromatin organizers as improved biomarker tool for cancer prognosis | **Japan** Application No.: JP(2021-530331) Publication No.: JP2022502072A Granted No.: 7577061 |
| 6 | Pandit, S.B. Ravi; Kshatriya, Tejas; Kelkar, Sarika; Suryawanshi, Anil; Gawli, Yogesh; Ogale, Satishchandra; Puthhusseri, Dhanya | A high-power density sodium-ion battery | **India** Application No.: 201921007799 Publication No.: IN201921007799A Granted No.: 495415 |
| 7 | Ballav, Nirmalya; Prasoon, Anupam | Thin film metal-organic diodes with high electrical rectification ratio | **India** Application No.: 201921020782 Publication No.: IN201921020782A Granted No.: 552686 |
| 8 | Jose, Gregor; Pucadyil, Thomas | A novel bifunctional lipid probe for proximity labelling-based identification of membrane-associated proteins | **USA** Application No.: US (16/891373) Publication No.: US20200386764A1 Granted No.: US11879894B2 |
| 9 | Jakhar, Navita; Singh, Surjeet | Method for making high figure of merit nanostructured thermoelectric materials | **India** Application No.: 202221018408 Publication No.: IN202221018408A Granted No.: 535591 |
| 10 | Sidharth Chopra; Harinath Chakrapani; Grace Kaul; Pooja Kumari | Heterocylic iodonium compounds as broad-spectrum antibacterial agents | **India** Application No.: 202211005732 Publication No.: IN202211005732A |

| Sr. No. | Inventors | Title | Country and Patent Info |
|---|---|---|---|
| 11 | Vaidhyanathan, Ramanathan; Singh, Himan Dev | Three-Dimensional (3D) hydrophobic amine-rich metal organic framework with a high selectivity for humid $CO_2$ capture | **India**<br>Application No.: 202221061108<br>Publication No.: IN202221061108A |
| 12 | Venkatnathan, Arun; Dev, Rabin Siva | Quantum mechanical model simulator | **India**<br>Application No.: 202221064464<br>Publication No.: IN202221064464A |
| 13 | Chakrapani, Harinath; Kumar, T. Anand; Singh, Amit | Fluoroquinolone derivatives for treatment of active and latent tuberculosis | **India**<br>Application No.: 202221069131<br>Publication No.: IN202221069131A |
| 14 | Ogale, Satishchandra Balkrishna; Furquan, Mohammad; Kumar, Nikhil; Bobade, Richa Amod; Varma, Karikath Sukumar | A process for coating integrative patterning and functionalization of glass, and uses thereof | **India**<br>Application No.: 202221070801<br>Publication No.: IN202221070801A |
| 15 | Goel, Pranay; Phatak, Sanat | System and method to detect inflammatory arthritis of joint areas using artificial intelligence | **India**<br>Application No.: 202221074344<br>Publication No.: IN202221074344A |
| 16 | Kumar, Nikhil; Banerjee, Abhik; Ogale, Satishchandra | Separator assembly for anode-free metal battery | **India**<br>Application No.: 202331004828<br>Publication No.: IN202331004828A |
| 17 | Jakhar, Navita; Singh, Surjeet | Method for making high figure-of-merit nanostructured thermoelectric materials | **USA**<br>Application No.: US(18/127941)<br>Publication No.: US 2024/0109777 A1 |
| 18 | Datta, Shouvik; Bhunia, Amit; Singh, Mohit Kumar; Mohamed Henini; and Maryam Al huwayz | Excitonic Bose-Einstein Condensate (BEC) as qubits using semiconductor nanostructures for quantum technologies | **USA**<br>Application No.: US(18/258,691)<br>Publication No.: US 2024/0046133 A1 |
| 19 | Vaidhyanathan, Ramanathan; Singh, Himan Dev | A steam-stable three-dimensional (3D) zinc-adeninate metal organic framework with a high selectivity for industrial $CO_2$ capture | **India**<br>Application No.: 202321049364<br>Publication No.: IN202321049364A |
| 20 | Pramod Padmanabha Pillai; Radha Krishna Kashyap | Plasmonic solar thermoelectric generator | **India**<br>Application No.: 202321058513<br>Publication No.: IN202321058513A |
| 21 | Jain, Chitvan; Ramanathan, Vaidhyanathan | Knitting the layers of two-dimensional covalent organic framework with one-dimensional polymer to make conducting quasi-three-dimensional architecture | **India**<br>Application No.: 202321056536<br>Publication No.: IN202321056536A |
| 22 | Rahman, Ayesha; Bajpai, Ashna; Rahman, Atikur | A confined-dewetting method for synthesis of metal nanoparticles | **India**<br>Application No.: 202421034366<br>Publication No.: IN202421034366A |

| Sr. No. | Inventors | Title | Country and Patent Info |
|---|---|---|---|
| 23 | Gokul M.A.; Atikur Rahman | Process for synthesis of monolayer transition metal dichalocogenide | **Korea**<br>Application No.: KR 10-2024-7028291<br>Publication No.: KR2024142478A |
| 24 | Rapol, Umakant Damodar; Patel, Kushal; Biswas, Korak; Maurya, S. Sagar; Dutta, Pranab | Oven for generation and collimation of an atomic beam | **India**<br>Application No.: 202421000590 |
| 25 | Sandanaraj, Britto S.; Khyade, Ashwini Rajendra; Hati, Kshitish Chandra | Synthesis of self-assembling artificial proteins utilizing a catalytic host-guest system and uses thereof | **India**<br>Application No.: 202421007772 |
| 26 | Hotha, Srinivas; Sen, Sumit; Kundu, Suman; Pasari, Sandip | Molecular Surgery: Cut-Insert-Stitch Editing Reaction (CIStER) Technique | **India**<br>Application No.: 202421006807 |
| 27 | Gnanaprakasam, Boopathy; Ghosh, Somnath | Quinozoline derivatives and a method of synthesizing the same thereof | **India**<br>Application No.: 202421012341 |
| 28 | Chakrapani, Harinath; Agarwal, Rachit; Gupta, Simran Manoj | Persulfide/hydrogen sulfide releasing microparticles for the treatment of chronic inflammation | **India**<br>Application No.: 202421036480 |
| 29 | Ogale, Satishchandra; Bobade, Richa Amod; Hiwase, Shweta Sunil; Varma, Karikath Sukumar | A composite material, process for producing the same, and uses thereof | **India**<br>Application No.: 202421032486 |
| 30 | Pramod P. Pillai; Vanshika Jain; Shreya Tyagi; Pradyut Roy | Process for synthesizing ammonia with semiconductor nanoparticles and visible light | **India**<br>Application No.: 202421055371 |
| 31 | Gokul M.A.; Atikur Rahman | Process for synthesis of monolayer transition metal dichalocogenide | **Japan**<br>Application No.: 2024-541758 |
| 32 | Angshuman Nag; Saikia, Sajid | Ultrabroad near-infrared emitting perovskite materials | **India**<br>Application No.: 202421069681 |
| 33 | Gokul M.A.; Atikur Rahman | Process for synthesis of monolayer transition metal dichalocogenide | **USA**<br>Application No.: US 18/730,209 |
| 34 | Boopathy Gnanaprakasam; Sutar, Dashrat Vishambar; Jamdade, Akash Bandu | A continuous-flow catalytic dehydration process for the synthesis of macrocyclic compounds | **India**<br>Application No.: 202421079997 |
| 35 | Saikrishnan Kayarat; Nikki Dutt; Vishal Annasaheb Adhav; Akash Kailashprasad Singh | Nucleoside triphosphate-dependent endonuclease for DNA fragmentation, a composition and a kit comprising the same | **India**<br>Application No.: 202421091083 |
| 36 | Gnanaprakasam, Boopathy; Pandey, Akanksha M.; Mondal, Shankhajit | A continuous flow process for synthesis of organic azides | **USA**<br>Application No.: US 18/871,215 |
| 37 | Gnanaprakasam, Boopathy; Pandey, Akanksha M.; Mondal, Shankhajit | A continuous flow process for synthesis of organic azides | **Japan**<br>Application No.: 2024-571237 |

| Sr. No. | Inventors | Title | Country and Patent Info |
|---|---|---|---|
| 38 | Gnanaprakasam, Boopathy; Pandey, Akanksha M.; Mondal, Shankhajit | A continuous flow process for synthesis of organic azides | **Germany**<br>Application No.: 11 2023 002 540.1 |
| 39 | De, Avirup; Prabhakaran, Dharmalingam; Nair, Sunil | Device and method for measuring topologically protected surface magnon | Application No.: PCT/IB2023/057737<br>Publication No.: WO 2024/023807 A1 |
| 40 | Vaidhyanathan, Ramanathan; Singh, Himan Dev | Three-dimensional (3D) hydrophobic amine-rich metal organic framework with a high selectivity for humid CO2 capture | Application No.: PCT/IB2023/060803<br>Publication No.: WO 2024/089636 A1 |
| 41 | Ogale, Satishchandra Balkrishna; Furquan, Mohammad; Kumar, Nikhil; Bobade, Richa Amod; Varma, Karikath Sukumar | A process for coating integrative patterning and functionalization of glass, and uses thereof | Application No.: PCT/IB2023/062394<br>Publication No.: WO 2024/121803 A1 |
| 42 | Vaidhyanathan, Ramanathan; Singh, Himan Dev | A steam-stable three-dimensional (3D) zinc-adeninate metal organic framework with a high selectivity for industrial CO2 capture | Application No.: PCT/IB2024/057104 |
| 43 | Jain, Chitvan;<br>Ramanathan, Vaidhyanathan | Knitting the layers of two-dimensional covalent organic framework with one-dimensional polymer to make conducting quasi-three-dimensional architecture | Application No.: PCT/IB2024/058210 |
| 44 | Gokul M.A.; Atikur Rahman | A method for synthesis of metal halide perovskite ($CsPbBr_3$) nano/microcrystals | Application No.: PCT/IB2024/060200 |
| 45 | Rapol, Umakant Damodar; Patel, Kushal; Biswas, Korak; Maurya, S. Sagar; Dutta, Pranab | Oven for generation and collimation of an atomic beam | Application No.: PCT/IB2024/062985 |
| 46 | Hotha, Srinivas; Sen, Sumit; Kundu, Suman; Pasari, Sandip | Molecular surgery: Cut-Insert-Stitch Editing Reaction (CISTER) Technique | Application No.: PCT/IB2024/062990 |
| 47 | Gnanaprakasam, Boopathy; Prabu, Ammasi; Mishra, Nilima Priyadarshini; Mohanta, Nirmala; Mondkar, Hemant Sunanda Surendra; Tort, Frederic | Method of cross-etherification of at least one alkylated ether phenyl compound under continuous-flow condition | Application No.: PCT/EP2024/088463 |

# Extramural Grants

IISER Pune faculty members have been consistently securing competitive research funds from various government science and technology departments. In the 2024-25 financial year, ₹63.53 crores of research funds have been received by / assigned to the institute for 149 research projects.

The list of new extramural grants sanctioned during the 2024-25 financial year is given in the *Appendix* section of this report.

## New Projects Sanctioned in 2024-25

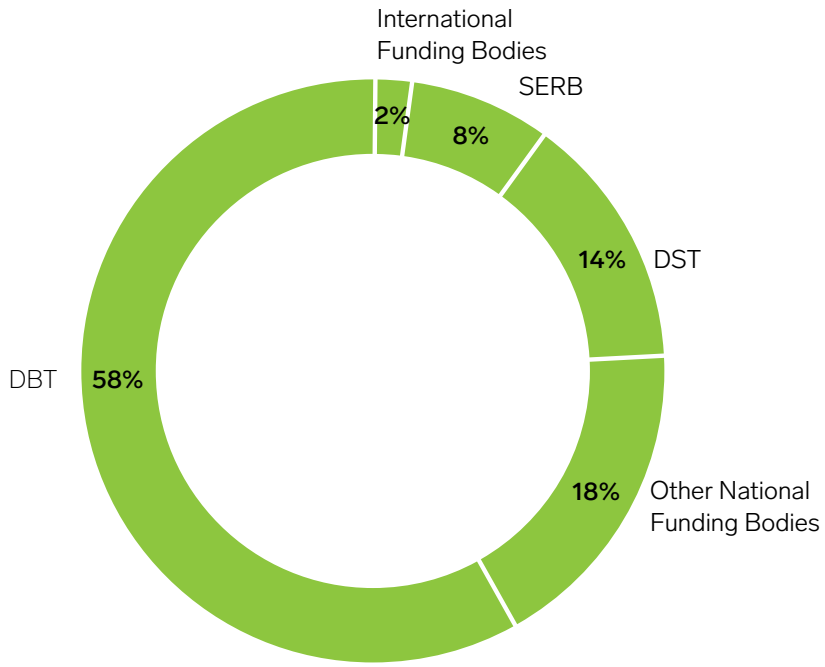
In the 2024-25 financial year, 31 new research projects of a total sanctioned value of Rs. 12.32 crores have been initiated. Some of the high-value projects initiated in the 2024-25 financial year are highlighted here:

- Funding from MoE-STARS for understanding the mechanism of SARS-CoV-2 RNA replication initiation and proofreading for therapeutics (to Prof. Saikrishnan Kayarat)
- Funding from IFCPAR for Fermi-edge singularities and magnetic proximity effects in van der Waals heterostructures (to Dr. Ashish Arora)
- Vaishvik Bharatiya Vaigyanik (VAIBHAV) Fellowship to Dr. Ashish Arora; INSPIRE Faculty Fellowships to Dr. Ajay Kumar and to Dr. Tresa Mary Thomas; INSA Senior Scientist Fellowship to Prof. Shyam Rai; and EMBO Global Investigator Award to Dr. Krishanpal Karmodiya were initiated during the year.
- For information on all new grants secured during the 2024-25 financial year, please see the full list in the Appendix section of the report.

## Sources of Extramural Grants in 2024-25

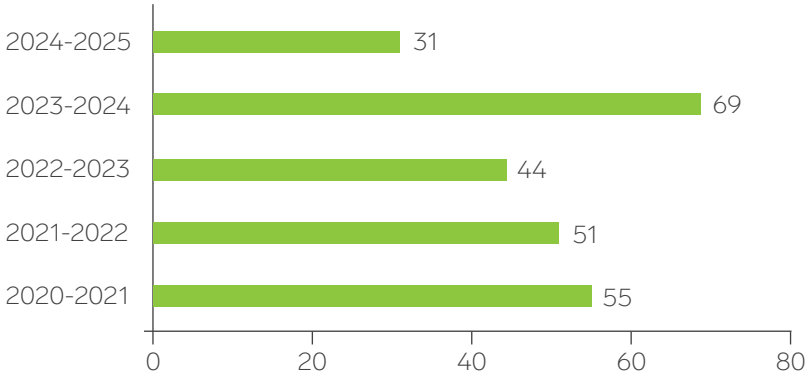
Majority of the funds received through extramural grants have been from government bodies, with research funds from DBT contributing to 58% of the research funds received in 2024-25, followed by DST at 14%, and SERB at 8% (in 102 projects). Funding from other Indian funding bodies (Wellcome Trust-DBT India Alliance, IFCPAR, MoES, MHRD, DAE, ICMR, CSIR, IUCAA, ICSSR, SPARC, UGC, etc) has contributed to 18% of funds for research in sectors such as education, defense, atomic energy, etc (in 41 projects). International funding bodies (AOARD, SIMON Foundation, etc) have contributed to 2% of the total research funds (in 6 projects).

## Sources of Extramural Grants in 2024-25



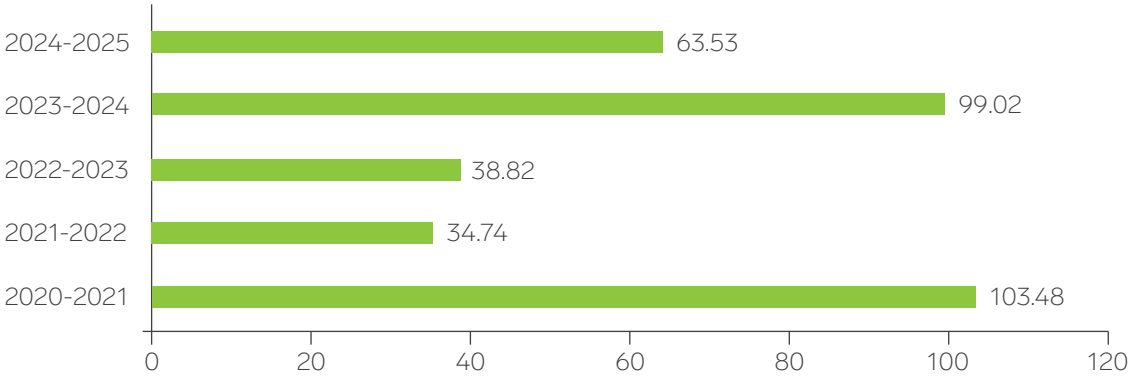

## Number of New Extramural Grants Sanctioned

*Data is as per the last 5 financial years*




## Extramural Funds Received / Assigned

*Data is as per the last 5 financial years; Amount is in crore rupees*



# Awards and Honours

**Prof. Jayant Udgaonkar** (Professor, Biology) was presented Vigyan Shri Award by Hon'ble President of India Smt. Droupadi Murmu for exceptional contributions to science and technology

**Prof. Srinivas Hotha** (Professor, Chemistry) received National Award to Teachers in Higher Educational Institutions from Hon'ble President of India Smt. Droupadi Murmu


**Dr. Pushkar Sohoni** (Associate Professor, Humanities and Social Sciences) is a contributing author in a book titled '*Gateways to the Sea: Historic Ports and Docks of Mumbai Region*' released in June 2024 by the Governor of Maharashtra Shri Ramesh Bias

**Prof. Nirmalya Ballav**
*Professor, Chemistry*
CRSI Bronze Medal 2025 from the Chemical Research Society of India

**Prof. K.N. Ganesh**
*Adjunct Faculty, Chemistry*
CRSI Gold Medal (2025), Chemical Research Society of India

**Prof. Anjan Banerjee**
*Professor, Biology*
Fellow of the Indian National Science Academy (INSA), New Delhi; Rahul Bajaj Chair Professorship (2024-27)

**Dr. Sreejith G.J.**
*Associate Professor, Physics*
APJ Abdul Kalam Young Researcher Award from Hewlett Packard Enterprise

**Prof. Harinath Chakrapani**
*Professor, Chemistry*
Fellow of the Royal Society of Chemistry, U.K.

**Prof. Sujit K. Ghosh**
*Professor, Chemistry*
Silver Medal by the Society for Materials Chemistry (SMC), India; Dr. P.N. Pathak Memorial Award by the Association of Separation Scientists and Technologists (ASSET), India

**Prof. Srabanti Chaudhury**
*Professor, Chemistry*
Rahul Bajaj Chair Professorship (2024-27)

**Prof. Amit Hogadi**
*Professor, Mathematics*
Fellow of the Indian Academy of Sciences, Bengaluru

**Dr. Jeetender Chugh**
*Associate Professor, Chemistry*
Prof. S. Subramanian 60th Birthday Lecture Award (2024) by the National Magnetic Resonance Society, India

**Dr. Siddhesh S. Kamat**
*Associate Professor, Biology*
Fellow of the Royal Society of Chemistry, U.K.; Infosys Prize (2024), Life Sciences category

**Dr. Krishanpal Karmodiya**
*Associate Professor, Biology*
EMBO Global Investigator Award 2024; Dr. B.N. Singh Memorial Oration Award by the Indian Society for Parasitology, 2024

**Prof. R. Boomi Shankar**
*Professor, Chemistry*
Silver Star Medal, Chirantan Rasayan Sanstha (CRS), 2024; Annual Alumni Materials Lecture Award, JNCASR, Bengaluru, 2024

**Prof. Angshuman Nag**
*Professor, Chemistry*
National Prize for Research in Chemical Physics from C.N.R. Rao Education Foundation; Fellow, Indian Academy of Sciences, Bengaluru

**Prof. Seema Sharma**
*Professor, Physics*
Rahul Bajaj Chair Professorship (2024-27)

**Prof. Satishchandra Ogale**
*Adjunct Faculty, Physics*
TWAS Award (2026) in Physics, Astronomy, and Space Sciences from The World Academy of Sciences (TWAS)

**Prof. Pinaki Talukdar**
*Professor, Chemistry*
JSPS Invitational Fellowship for Research in Japan, by Japan Society for the Promotion of Science; Fellow, West Bengal Academy of Science & Technology (WAST); C.N.R. Rao National Prize 2025 by CRSI; Fellow, Indian National Science Academy (INSA)

**Dr. Venketeswara Pai**
*Associate Professor, Humanities and Social Sciences*
Satish Bhatnagar Award (2024) from the Indian Mathematical Society

**Shri. Anil Zankar**
*Guest Faculty, Humanities and Social Sciences*
Sudhir Nandgaonkar Memorial Award (2025) for his work on writing on cinema

**Prof. Kalika Prasad**
*Professor, Biology*
Fellow, National Academy of Sciences, India (NASI)

# Memberships and Affiliations

**Dr. Nixon Abraham**
*Associate Professor, Biology*
Editor of *Mammalian Genome* (Springer)

**Dr. Bijay Agarwalla**
*Associate Professor, Physics*
Faculty Associate at the International Centre for Theoretical Sciences (ICTS), Bengaluru, from Feb 2025-Jan 2028

**Prof. Sudarshan Ananth**
*Professor, Physics*
Governing Council Member, Inter-University Accelerator Centre (IUAC), New Delhi

**Prof. Bhas Bapat**
*Professor, Physics*
Appointed as a member of the Standing Committee to look into the planning and implementation of the Venus Orbiter Mission by Indian Space Research Organisation

**Dr. Anup Biswas**
*Associate Professor, Mathematics*
CNPq Research Grant (Visitor's Program), Brazil, 2024

**Dr. Gnanaprakasam Boopathy**
*Associate Professor, Chemistry*
Regular member of Flow Chemistry Society, Switzerland (2024-25)

**Dr. Buddhadeb Chattopadhyay**
*Associate Professor, Chemistry*
Associate Editor, *Organic Chemistry Frontiers* (OCF), RSC, since Sept 2024; Core Member, Prime Minister Early Research Career Grant (PMECRG), ANRF, Government of India (since 2025)

**Prof. Aloke Das**
*Professor, Chemistry*
Fellowship from Université Paris-Saclay for collaborative research at Institut des Sciences Moléculaires d'Orsay, CNRS, France, June 16-July 16, 2024; Member, International Advisory Board, Horizons in Hydrogen Bond Research; Convener, Chemical Research Society of India (CRSI) Local Chapter, Pune (2023-26)

**Dr. Sreejith G.J.**
*Associate Professor, Physics*
Adjunct Faculty, TIFR Mumbai; Associate Member, ICTS Bengaluru; Visitor, Physics Department, Oxford University

**Dr. Siddhesh Kamat**
*Associate Professor, Biology*
Editorial Board Member, *British Journal of Pharmacology* (Dec 2022-Nov 2026); Editorial Board Member, *Journal of Biological Chemistry* (July 2023-June 2028)

**Prof. Aurnab Ghose**
*Professor, Biology*
Editorial Board Member, *Molecular Biology of the Cell;* Editorial Board Member, *Neuropeptides*

**Dr. Krishanpal Karmodiya**
*Associate Professor, Biology*
Academic Editor, Editorial Board of *PLOS Pathogens,* 2024; Member, International Research Network (IRN), a CNRS France-DBT India initiative on host-pathogen interactions, 2025; Executive Committee Member, Indian Society for Parasitology, 2025

**Prof. Sujit K. Ghosh**
*Professor, Chemistry*
Editorial Board Member, *Sustainable Chemistry for Energy Materials*

**Prof. G.V. Pavan Kumar**
*Professor, Physics*
Editorial Board (Physics & its History and Philosophy), *Current Science*

**Dr. Tejas Kalelkar**
*Associate Professor, Mathematics*
Visiting Associate Professor, Washington University, St Louis, U.S.A., Aug-Dec 2024; Visiting Scientist, Max Planck Institute for Mathematics, Germany, Feb-Apr, 2025

**Dr. Mayurika Lahiri**
*Associate Professor, Biology*
Associated with the Department of Biotechnology's GenomeIndia Project to catalogue the genetic diversity of India, the data for which was successfully released in Jan 2025

**Dr. Moumita Majumdar**

*Associate Professor, Chemistry*

Member of National Organizing Committee: 7th International Symposium on C-H Bond Activation 2024, and 30th International Conference on Organometallic Chemistry 2024; International Advisory Board Member of International Conference on Inorganic Ring Systems (since 2024)

**Dr. Supriya Pisolkar**

*Associate Professor, Mathematics*

Selected as one of only six mathematicians from Asia to serve on the International Travel Grant Committee of the American Mathematical Society for the upcoming International Congress of Mathematicians (ICM) 2026, Philadelphia, U.S.A. (Dec 2024-May 2025)

**Dr. Suhita Nadkarni**

*Associate Professor, Biology*

Editorial Board Member, *PLOS Computational Biology;* Editorial Board Member, *In Silico Pharmacology;* Member, Society For Neuroscience

**Prof. Sudha Rajamani**

*Professor, Biology*

Invited to be the moderator for a Splinter Group (SG) on Astrobiology, Space biology, Habitability and Analogue (ASHA) research areas, at the Brainstorming Session on a roadmap for space sciences at U.R. Rao Satellite Centre (URSC), ISRO, Apr 22-23, 2024 to formulate a roadmap for space sciences in India

**Dr. Arvind Natu**

*Honorary Member*

Member, IISER Standing Committee

**Prof. Boomi Shankar Ramamoorthy**

*Professor, Chemistry*

Member, American Chemical Society (ACS); Editorial Board Member, *ACS-Inorganic Chemistry* (since Jan 2023)

**Dr. Gayathri Pananghat**

*Associate Professor, Biology*

Guest Editor, Special Issue, *Cytoskeleton*

**Prof. Richa Rikhy**

*Professor, Biology*

Editor, *Journal of Cell Science;* Council Member, Human Frontiers Science Project

**Dr. Pooja Sancheti**

*Assistant Professor, Humanities and Social Sciences*

Elected Executive Committee Member, South Asian Literary Association, Jan 2025-27; Visiting Researcher, English Dept., Washington University in St. Louis, Oct-Dec 2024

**Dr. Pushkar Sohoni**

*Associate Professor, Humanities and Social Sciences*

Chair of Indian Studies (2025), University of Vienna, awarded by ICCR

**Prof. S.G. Srivatsan**

*Professor, Chemistry*

Editorial Board member of *Zeitschrift für Naturforschung C - A Journal of Biosciences,* since Jan 2025

**Prof. Pinaki Talukdar**

*Professor, Chemistry*

Editorial Advisory Board Member, *ACS Organic & Inorganic Au;* Editorial Board Member, *Journal of Inclusion Phenomena and Macrocyclic Chemistry;* Life Membership of the Indian Biophysical Society (IBS), India

**Prof. Kundan Sengupta**

*Professor, Biology*

Elected Member, Guha Research Conference (GRC2024); Associate Editor, Section: Chromatin and Chromosome Biology, *Frontiers in Cell and Developmental Biology*; Member, Global Cancer Consortium (GCC), South Asia Chapter, Youth Leadership Committee; Life Member, Indian Society of Human Genetics (ISHG)

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*Shown above are new memberships and affiliations obtained during 2024-25. Many other faculty members have ongoing editorial board memberships and other academic recognitions through which they contribute to the scientific community and the education sector. Every year, faculty members are invited to present their research work at conferences, workshops, and other events across India and elsewhere. Faculty members are also involved in organising scientific conferences in topics relevant to their research.*

*The list of invited lectures given by the faculty members and academic events they have organised during 2024-25 is given in the Appendix section of this report.*

# Academic Programmes

# PhD Programme

PhD students are the main driving force in the research programmes at the Institute. The PhD programme has a year-long coursework before the research work begins. Admission to PhD programmes at the Institute is through national-level tests followed by interviews conducted separately for each department.

During the August 2024 and January 2025 admission sessions, 115 (Men 67, Women 48) PhD students were admitted to the PhD programme: 29 (Men 11, Women 18) in Biology, 42 (Men 22, Women 20) in Chemistry, 2 (Men 2) in Data Science, 7 (Men 5, Women 2) in Earth and Climate Science, 4 (Men 2, Women 2) in Humanities and Social Sciences, 14 (Men 12, Women 2) in Mathematics, and 17 (Men 13, Women 4) in Physics.

The strength of PhD students at the Institute as of March 31, 2025 is 520 (Men 302, Women 218). Here is a break-up of the numbers across departments: 160 (Men 69, Women 91) students in Biology, 184 (Men 107, Women 77) in Chemistry, 3 (Men 3) in Data Science, 33 (Men 20, Women 13) in Earth and Climate Science, 19 (Men 8, Women 11) in Humanities and Social Sciences, 37 (Men 29, Women 8) in Mathematics, and 84 (Men 66, Women 18) in Physics.

## PhD student numbers across departments

as on March 31, 2025

**Total : 520**

**160**
BIOLOGY

**184**
CHEMISTRY

**3**
DATA SCIENCE

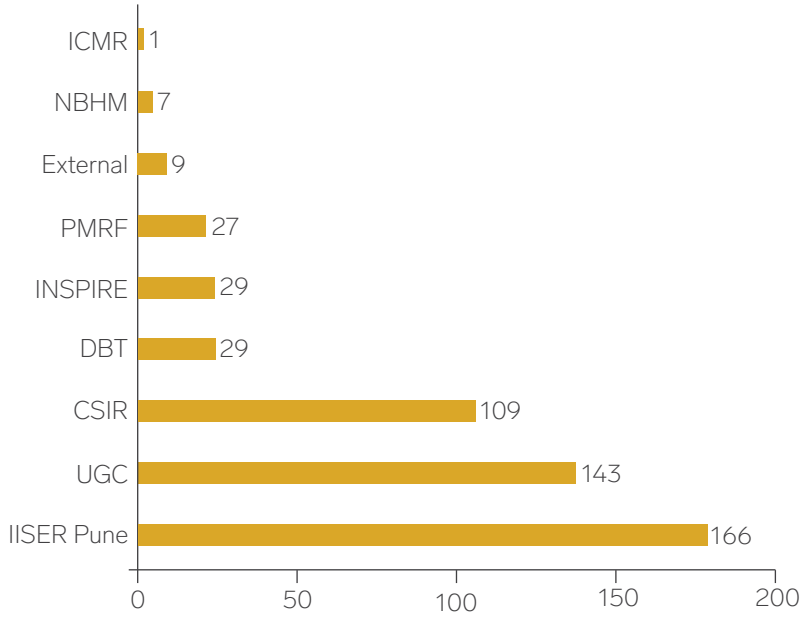
**33**
EARTH AND CLIMATE SCIENCE

**19**
HUMANITIES AND SOCIAL SCIENCES

**37**
MATHEMATICS

**84**
PHYSICS

## Sources of Fellowships for PhD Students




## Category-wise Numbers of PhD Students (as on March 31, 2025)

| Gender | GE | OBC | SC | ST | PD | EWS | Total |
|---|---|---|---|---|---|---|---|
| **Men** | 184 | 70 | 17 | 5 | 4 | 22 | 302 |
| **Women** | 139 | 41 | 16 | 4 | 0 | 18 | 218 |
| **Total** | **323** | **111** | **33** | **9** | **4** | **40** | **520** |

A total of 41 PhD students received one or more travel grants for participating in international conferences and for carrying out collaborative research work. The funding agencies that the students secured travel awards from include American Society of Plant Biology (ASPB), Science and Engineering Research Board (SERB), Gordon Research Conferences/Seminar (GRC/GRS), Council of Scientific & Industrial Research (CSIR), Department of Biotechnology's Conference, Travel, Exhibition and Popular Lectures (CTEP) Programme, Infosys Foundation, Indian Council of Social Science Research, DBT/Wellcome Trust India Alliance, and UGC Research Grant. In some cases, the travel was supported through the students' Prime Minister's Research Fellowship (PMRF) or by the host organisation.

**In the 11th convocation held on May 29, 2024, 72 students were conferred PhD degree.**

**The following 52 students have successfully completed their requirements for the award of PhD degree** (completed thesis defense between April 1, 2024 and March 31, 2025). Of these, 14 students have received their degrees in the 11th Convocation held on May 29, 2024.

| Sr. No. | Student | Department | Advisor | Thesis Title |
|---|---|---|---|---|
| 1 | **Akanksha Ojha** 20143321 | Biology | Sanjeev Galande & Milind Watve | Evaluating the need for a paradigm shift in the understanding of type 2 diabetes |
| 2 | **Sachin Ashokrao Nalawade** 20153374 | Chemistry | Hosahudya N. Gopi | Synthesis and utilization of non-ribosomal amino acids consisting of carbon-carbon double bonds in the design of hybrid peptide foldamers |
| 3 | **Ayush Madhok** 20163439 | Biology | Sanjeev Galande | To elucidate the functional role of Satb1 in T cell development and differentiation |
| 4 | **Korak Biswas** 20163487 | Physics | Umakant Rapol | Experiments on enhancement of inter-stage transfer efficiency in laser cooling of strontium atoms |
| 5 | **Marathe Shruti Dattatray** 20173514 | Biology | Nixon M. Abraham | Role of ionotropic glutamate receptors in odour information processing through mouse olfactory subsystems |
| 6 | **Dilsha C.** 20173517 | Biology | L.S. Shashidhara | Control of organ size and shape during the differential development of wing and Haltere in *Drosophila* |
| 7 | **Joshi Prachi Bhalchandra** 20173520 | Biology | Nagaraj Balasubramanian | Adhesion-dependent regulation of Golgi organization and function in normal vs cancer cells |
| 8 | **Salunke Swati Bansi** 20173532 | Chemistry | Pinaki Talukdar | Development of non-stimuli and stimuli-responsive ion carriers and their biological applications |
| 9 | **Surajit Metya** 20173536 | Chemistry | Aloke Das | Exploring the nature and strength of S-H···O hydrogen bond employing gas-phase laser spectroscopy and quantum chemistry calculations |
| 10 | **Neethu C.D.** 20173537 | Chemistry | Muhammed Musthafa O.T. | Design and development of rechargeable proton battery |
| 11 | **Uma Shankar** 20173561 | Physics | Aparna Deshpande | Unveiling the nature of 2D boron at atomic scale |
| 12 | **Pranab Dutta** 20173563 | Physics | Umakant D. Rapol | Atom interferometry with ultracold Rubidium atoms |

| Sr. No. | Student | Department | Advisor | Thesis Title |
|---|---|---|---|---|
| 13 | **Joshi Swapna Jayant Shraddha** 20173567 | HSS | Pushkar Sohoni | Celestial impact: A cultural narrative of lonar crater through architectural forms |
| 14 | **Vishnu Mishra** 20183572 | Chemistry | V.G. Anand | Synthesis, characterization and redox properties of hyper S-confused porphyrinoids and porphyrinoids with thiophenes and phenanthroline |
| 15 | **Pragati Shukla** 20183574 | Chemistry | V.G. Anand | Synthesis, structural characterization and tuning electronic properties in planar and large porphyrinoids |
| 16 | **Gavhane Utreshwar Arjun** 20183577 | Chemistry | M. Jayakannan | L-tyrosine based polymer brushes for drug delivery in-vitro and in-vivo |
| 17 | **Amrita Saishree** 20183580 | ECS | Shreyas Managave | Characterization of the plant-derived isotopic proxies for precipitation reconstruction in tropics |
| 18 | **Deepak Suryavanshi** 20183581 | ECS | Rahul Dehiya | 2D DC resistivity modeling for anisotropic subsurface with variable topography based on mimetic finite-difference method |
| 19 | **Akshay Sunil Malwade** 20183582 | Biology | Sutirth Dey | On the influence of gut bacteria on host biology: Insights from ecological and evolutionary studies on *Drosophila melanogaster* |
| 20 | **Sayantan Majumdar** 20183589 | Biology | Pranay Goel | Analysis of continuous glucose monitoring in relation to HbA1c and interstitial fluid glucose |
| 21 | **Souvik Roy** 20183592 | Chemistry | Hosahudya N. Gopi | Metal-mediated self-assembled architectures of structured peptides |
| 22 | **Raigawali Rakesh Bhaskar Suhasini** 20183593 | Chemistry | Raghavendra Kikkeri & H.N. Gopi | Synthetic approaches and biological functions of N-sulfated heparan sulfate oligosaccharides and proteoglycan mimetics |
| 23 | **Supriya Sahoo** 20183597 | Chemistry | R. Boomi Shankar | Organic and hybrid organic-inorganic two component ferroelectric materials and their energy harvesting applications |
| 24 | **Himan Dev Singh** 20183598 | Chemistry | R. Vaidhyanathan | Designed development of ultra-microporous, amine-rich and hydrophobic metal organic frameworks for humid $CO_2$ capture and natural gas purification |
| 25 | **Ardhra S.** 20183602 | Chemistry | Arun Venkatnathan | Molecular dynamics simulations of structure, ion transport and interphase stability in alkali metal-ion battery electrolytes |

| Sr. No. | Student | Department | Advisor | Thesis Title |
|---|---|---|---|---|
| 26 | **Sanchayita Mukhopadhyay** 20183605 | Chemistry | Muhammed Musthafa O. T. | Ligand assisted molecular electrocatalysis and molecular charge storage |
| 27 | **Akash Trivedi** 20183607 | ECS | Sudipta Sarkar | An improved Weichselian seismic stratigraphy, subsurface fluid migration patterns and methane hydrate dynamics offshore west svalbard |
| 28 | **Keshri Shreya Rajesh** 20183608 | ECS | Suhas Ettammal | Mixed Rossby-Gravity waves and their association with the intrusion of extra-tropical disturbances |
| 29 | **Tumpa Mahato** 20183612 | Mathematics | Rama Mishra | Parameterization of knotted surfaces arising from classical and welded knots |
| 30 | **Pragya Kushwaha** 20183623 | Physics | Vijayakumar Chikkadi | Non-equilibrium assembly and phase behavior of colloidal particles in active liquids |
| 31 | **Dhruv Khatri** 20193627 | Biology | Chaitanya A. Athale | Developing image analysis pipelines for quantitative microscopy of nematode embryos, cytoskeleton-motor mechanics, cell shape analysis and adhesion |
| 32 | **Amal Vijay** 20193628 | Chemistry | Arnab Mukherjee | Exploring molecular recognition of small molecule binding, protein-protein interactions, and RNA folding dynamics using enhanced sampling methods |
| 33 | **Iktesh Chauhan** 20193630 | ECS | Rahul Dehiya | 2D structurally-constrained CSEM inversion and seismic modelling for anisotropic media |
| 34 | **Suraj Lakhchaura** 20193631 | Physics | Atikur Rahman | Synthesis and optoelectronic properties of ultrathin $Bi_2O_2Se$ nanosheets |
| 35 | **Gourab Kumar Dam** 20193634 | Chemistry | Sujit K. Ghosh | Development of novel advanced functional porous materials for heterogeneous catalysis and arsenic remediation for safe drinking water |
| 36 | **Hiremath Ramesh Nagesh** 20193635 | Chemistry | V.G. Anand | Synthesis, structural characterization and redox properties of porphyrinoids with thiophene and thienothiophenes |
| 37 | **Atreyi Chakraborty** 20193639 | Biology | M.S. Madhusudhan | Insights into DNA-protein interactions and functional clustering by studying motif distributions in the genome |
| 38 | **Megha Ojha** 20193647 | Biology | Deepak Barua | Assessing the impact of invasive plants in the Northern Western Ghats and surrounding savannas |

| Sr. No. | Student | Department | Advisor | Thesis Title |
|---|---|---|---|---|
| 39 | **Jamdade Akash Bandu** 20193658 | Chemistry | Boopathy Gnanaprakasam | Studies on catalytic macrocyclization towards the synthesis of macrocyclic ketones, macrolactones and macrolactams |
| 40 | **Sharath S.V.** 20193663 | Chemistry | Raghavendra Kikkeri & H.N. Gopi | Multi-app of heparin mimetics derived from L-Idose |
| 41 | **Sutar Dashrat Vishambar** 20193665 | Chemistry | Boopathy Gnanaprakasam | Synthetic/catalytic studies towards construction of macrocycles under batch and continuous flow conditions |
| 42 | **Deepak Punjaji Rase** 20193671 | Chemistry | Ramanathan Vaidhyanathan | Strategic enhancement of ionic and electronic conductivities in organic frameworks for efficient energy storage devices |
| 43 | **Bhawakshi Punia** 20193674 | Chemistry | Srabanti Chaudhury | Exploring microscopic mechanisms of chemical and biological processes using discrete-state stochastic models |
| 44 | **Radha Krishna Kashyap** 20193678 | Chemistry | Pramod P. Pillai | Light-powered plasmonic heaters: Extracting the heat out of plasmons for photothermal applications |
| 45 | **Barnali Mondal** 20193681 | Chemistry | Angshuman Nag | Near-infrared emission in low dimensional halide perovskite derivatives: $Cs_2MX_6$ (M: Mo/W/Sn; X: Cl/Br) and $(C_8H_{12}N)_2PbBr_4$ with doping |
| 46 | **Parikshit Kumar Rajput** 20193682 | Chemistry | Angshuman Nag | Designing organic a-site cations for emerging optoelectronic properties of hybrid halide perovskites: Reversible melting, non-centrosymmetry, and chirality |
| 47 | **Shroff Anita Nikhil** 20193686 | HSS | Venketeswara R. Pai | Principle of suspension (*asiddhatva*) in *Astādhyāyī*: A critical study |
| 48 | **Debjit Pal** 20193689 | Mathematics | Mainak Poddar | Principal bundles in generalized complex geometry |
| 49 | **Nasit Darshan Prafulbhai** 20193690 | Mathematics | Chandrasheel Bhagwat & A. Raghuram | Cuspidal cohomology for GL(N) over number fields |
| 50 | **Dipanshu** 20193697 | Physics | Tarun Souradeep | Exploring statistical isotropy violations in the CMB sky: Real-space analysis |
| 51 | **Aanjaneya Kumar** 20193700 | Physics | M.S. Santhanam | Gated first-passage processes |
| 52 | **Mabel Maria Mathew** 20193711 | Biology | Kalika Prasad | Integrating mechanical, cell geometric and biochemical inputs for self-organized morphogenesis in plant regeneration |

# Integrated PhD Programme

The Integrated PhD programme offers students with a bachelor's degree in science a head-start in identifying an area of research leading to a PhD. Offered in the departments of Biology, Chemistry, Mathematics, and Physics, the programme begins with a 1.5-2 years of coursework followed by research. Admission is through national-level tests followed by interviews conducted separately for each department.

During the August 2024 session, three departments conducted admissions for the Integrated PhD programme, and a total of 27 (Men 14, Women 13) students took admission: 11 (Men 3, Women 8) in Biology, 5 (Men 4, Women 1) in Mathematics, and 11 (Men 7, Women 4) in Physics.

The strength of Integrated PhD students as of March 31, 2025 is 153 (Men 98, Women 55). Here is the break-up of the numbers across departments: 62 (Men 26, Women 36) students in Biology; 22 (Men 18, Women 4) in Chemistry; 17 (Men 14, Women 3) in Mathematics; and 52 (Men 40, Women 12) in Physics.

## Integrated PhD student numbers across departments

**Total : 153**

as on March 31, 2025

**62**
BIOLOGY

**22**
CHEMISTRY

**17**
MATHEMATICS

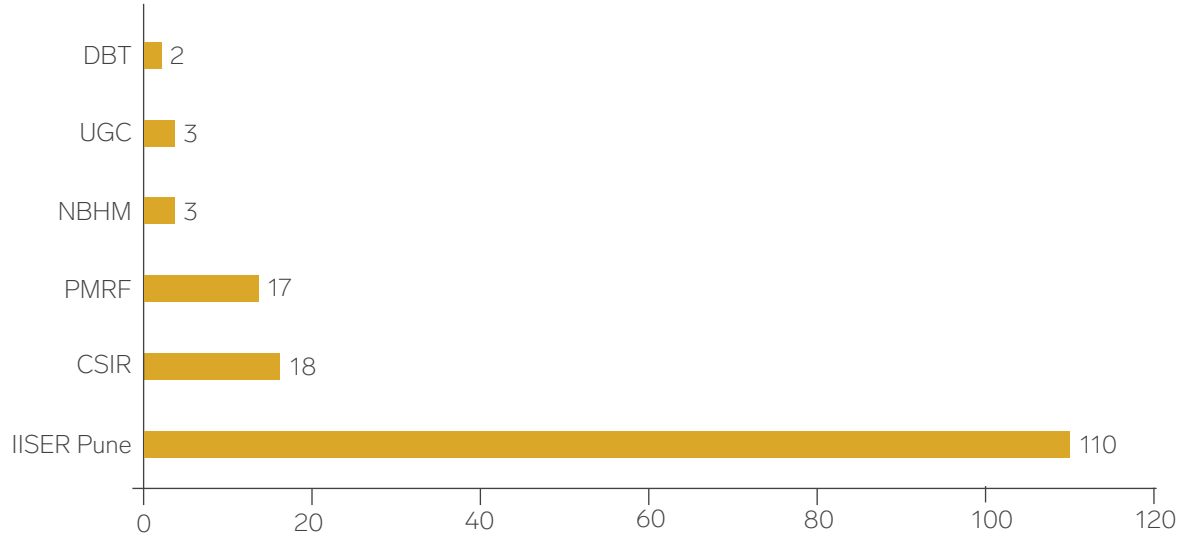
**52**
PHYSICS

## Category-wise Numbers of Integrated PhD Students (as on March 31, 2025)

| Gender | GE | OBC | SC | ST | EWS | Total |
|---|---|---|---|---|---|---|
| **Men** | 69 | 18 | 8 | 0 | 3 | 98 |
| **Women** | 42 | 10 | 0 | 0 | 3 | 55 |
| **Total** | **111** | **28** | **8** | **0** | **6** | **153** |

## Sources of Fellowships for Integrated PhD Students

*All Integrated PhD students are provided with fellowships, subject to fulfilling the prescribed academic criteria.*




A total of 16 Integrated PhD students received one or more travel grants for participating in international conferences. The funding agencies that the students secured travel awards from include Science and Engineering Research Board (SERB), Prime Minister's Research Fellowship (PMRF), and Infosys Foundation. In some cases, the travel was supported through the students' Prime Minister's Research Fellowship (PMRF) or by the host organisation.

**In the 11th convocation held on May 29, 2024, 28 Integrated PhD students were awarded dual Master's and PhD degrees and 9 students received MS degree.**

**The following 28 students have successfully completed their requirements for the award of MS and PhD degrees through the Integrated PhD programmme** (completed thesis defense between April 1, 2024 and March 31, 2025). Of these, 4 students have received their degrees as well in the 11th Convocation held on May 29, 2024.

| Sr. No. | Student | Department | Advisor | Thesis Title |
|---|---|---|---|---|
| 1 | **Bardapurkar Rutwik Vinay** 20152009 | Biology | Sagar Pandit | Cross-kingdom affairs: Can microRNAs of host plants regulate genes of their insect herbivores? |
| 2 | **Sneha Tripathi** 20152015 | Biology | Sanjeev Galande | Statin mediated regulation of SATB family of proteins and β-catenin in colorectal cancer |
| 3 | **Mishika Virmani** 20152024 | Chemistry | M. Jayakannan | Development of fluorescent polymeric nano-assemblies for studying organelle interactions in intracellular drug release and accumulation |

| Sr. No. | Student | Department | Advisor | Thesis Title |
|---|---|---|---|---|
| 4 | **Shruti Chakravarty** 20152041 | Physics | Sunil Nair | Investigating correlated charge, lattice and spin degrees of freedom in layered perovskite ruthenates |
| 5 | **Joy Chatterjee** 20162016 | Chemistry | Partha Hazra | Emission tunability, triplet state harvesting, and photon up-conversion properties in selected organic-inorganic hybrid Cu(I)-based frameworks |
| 6 | **Moushakhi Ghosh** 20162017 | Chemistry | Shabana Khan | N-heterocyclic tetrylenes: Potential platforms for multidimensional applications |
| 7 | **Pulak Ghosh** 20162018 | Chemistry | S.G. Srivatsan | Environment-sensitive nucleotide analogs serve as good substrates and probes to study the activity of nucleic acid processing enzymes |
| 8 | **Prakash Panwaria** 20162024 | Chemistry | Aloke Das | Intra and intermolecular modulation of n→π* non-covalent interaction: Gas-phase laser spectroscopy and quantum chemistry calculations |
| 9 | **Priya Batra** 20162032 | Physics | T.S. Mahesh | Characterization and control of quantum dynamics: Computational methodology developments and NMR demonstrations |
| 10 | **Kundan Kumar** 20172001 | Biology | Girish Ratnaparkhi & Siddhesh Kamat | The serine hydrolases of *Drosophila melanogaster*: Integrated chemoproteomics and genetics |
| 11 | **Debasmita Mitra** 20172009 | Biology | Richa Rikhy | Role of polarity and BAR domain proteins in plasma membrane re-modelling in syncytial *Drosophila* embryos |
| 12 | **Deshmukh Bhagyashree Dhanaji** 20172012 | Biology | Krishanpal Karmodiya | Multi-protein chimeric antigens, a novel combined approach for efficiently targeting and blocking the blood stage of plasmodium falciparum |
| 13 | **Souvik Panda Mahapatra** 20172015 | Chemistry | Hosahudya N. Gopi | Design, synthesis and study of hybrid cyclic peptides and peptide nucleic acids from delta amino acids |
| 14 | **Saurabh Anand** 20172016 | Chemistry | Raghavendra Kikeri | Synthesis of well-defined heparan sulfate proteoglycan mimics to study cell surface engineering and drug delivery |
| 15 | **Sumit Sen** 20172018 | Chemistry | Srinivas Hotha | Making and breaking of glycosidic bond: From glycosylation to glycan editing |
| 16 | **Pratim Kumar Das** 20172019 | Chemistry | Srinivas Hotha | [Au]/[Ag]-catalyzed synthesis of biologically important bacterial oligosaccharides |
| 17 | **Pradyut Roy** 20172022 | Chemistry | Pramod P. Pillai | Light-harvesting studies in electrostatically bonded all-quantum dot assemblies |
| 18 | **Ronit Debnath** 20172023 | Mathematics | Debargha Banerjee | Extra twists of siegel modular forms, the associated central simple algebra and dimensions of spaces of Siegel modular forms. |
| 19 | **Pranjal Vishwakarma** 20172024 | Mathematics | Debargha Banerjee | Eisenstein part of homology and cohomology groups of Bianchi 3-fold |
| 20 | **Shiv Sagar Maurya** 20172029 | Physics | Umakant Rapol | Floquet engineering in an atom-optics kicked rotor |

| Sr. No. | Student | Department | Advisor | Thesis Title |
|---|---|---|---|---|
| 21 | **Tamaghna Chowdhury** 20172031 | Physics | Atikur Rahman | Modulation of optoelectronic properties of layered two-dimensional materials by strain, twist and dielectric engineering |
| 22 | **Sayan Saha** 20172032 | Physics | Tarun Souradeep & Sourabh Dube | Novel bayesian inferences from the cosmic microwave background |
| 23 | **Patel Kushal Hiteshbhai** 20172034 | Physics | Umakant Rapol | Magneto-optical trapping of strontium atoms for optical atomic clock |
| 24 | **Karthik G. Shanbhag** 20182003 | Biology | Siddhesh S. Kamat | A photoaffinity-probe based chemical proteomics strategy for mapping novel protein interactors of signaling lipids |
| 25 | **Jaiswal Shubham Shravan** 20182006 | Mathematics | Chandrasheel Bhagwat | Inverse galois problem & root clusters |
| 26 | **Sajid Saikia** 20182011 | Chemistry | Angshuman Nag | Transition Metal (d-d) and Lanthanide (f-f) doped metal halide double perovskites for short-wave infrared phosphor-converted LED |
| 27 | **Ritwik Mondal** 20182012 | Chemistry | Muhammed Musthafa O.T. | An electrochemical neutralization cell to harvest the water formation energy |
| 28 | **Saurabh Pant** 20182016 | Physics | Sudarshan Ananth | Supersymmetric Yang-Mills theories without anti-commuting variables |

**The following 7 students admitted through the Integrated PhD programme have successfully completed their requirements for the award of MS degree** between April 1, 2024 to March 31, 2025. These are also among the students who received their degrees in the 11th Convocation held on May 29, 2024.

| Sr. No. | Student | Department | Advisor | Thesis Title |
|---|---|---|---|---|
| 1 | **Manasvi Balachandran** 20212003 | Biology | Nishad Matange | Genetic determinants of sensitivity to trimethoprim and other antibiotics in Escherichia coli |
| 2 | **Sundaravalli N.** 20212008 | Chemistry | Partha Hazra | Modulation of emission characteristics by donor substitution in charge transfer based thermally activated delayed fluorescent emitters |
| 3 | **Nikita Panchmukhi** 20212010 | Chemistry | V.G. Anand | Synthesis, characterization and redox properties of 28π structural isomers of expanded isophlorins |
| 4 | **Mahima Rana** 20212011 | Chemistry | Harinath Chakrapani | Investigating endogenous persulfide/ selenide as cellular antioxidants |
| 5 | **Mohini Burnwal** 20212013 | Chemistry | Raghavendra Kikkeri | Design and synthesis of BSA-Fondaparinux conjugate |
| 6 | **Suman Kundu** 20212015 | Chemistry | Srinivas Hotha | Utilising water as a medium for glycan modification starting from lactose |
| 7 | **Chaudhary Eksha Rani** 20212024 | Physics | Pavan Kumar G.V. | Colloidal dynamics in evanescent optical fields |

# Master of Science Programme

The two-year Master of Science (MSc) programme was first launched in the 2022-23 academic year, in three streams (Chemistry, Geology, and Mathematics). During the 2024-25 academic year, a new Master of Science (MS) programme in Quantum Technology has been launched. Aimed at highly motivated students with a bachelor's degree in any branch of science, the Master of Science programme has an increased emphasis on course-work with research experience gained through short semester credit projects, summer training and a major research project in the second year.

As of the 2024-25 academic year, Master of Science programmes are being offered in Chemistry, Geology, Mathematics, and Quantum Technology by the Departments of Chemistry, Earth and Climate Science, Mathematics, and Physics, respectively.

During the August 2024 session, 61 (Men 38, Women 23) students took admission to the Master of Science programme. This included 17 (Men 10, Women 7) students in the Chemistry department; 5 (Men 3, Women 2) in Earth and Climate Science; 4 (Men 2, Women 2) in Mathematics, and 35 (Men 23, Women 12) in Physics.

## Master of Science Student Numbers across Departments Total : 73

as on March 31, 2025

**24**
CHEMISTRY

**9**
EARTH AND CLIMATE SCIENCE

**9**
MATHEMATICS

**31**
PHYSICS

## Category-wise Distribution of Master of Science Students Enrolled in 2024

| Gender | EWS | GE | KM | OBC | PD | SC | ST | Total |
|---|---|---|---|---|---|---|---|---|
| **Men** | 3 | 22 | 0 | 8 | 3 | 2 | 0 | 38 |
| **Women** | 2 | 10 | 0 | 7 | 1 | 3 | 0 | 23 |
| **Total** | **5** | **32** | **0** | **15** | **4** | **5** | **0** | **61** |

Subsequent to admission, 6 students discontinued from the programme, as they got admission in other courses, making the final number of students enrolled in the 2024-25 academic year to 55.

The strength of Master of Science students as of March 31, 2025 is 73 (Men 44, Women 29). Here is the break-up of the numbers across departments: 24 (Men 13, Women 11) in Chemistry; 9 (Men 6, Women 3) in Earth and Climate Science; 9 (Men 5, Women 4) in Mathematics; and 31 (Men 20, Women 11) in Physics.

## Overall Category-wise Distribution of Existing Master of Science Students (as of March 31, 2025)

| Gender | EWS | GE | KM | OBC | PD | SC | ST | Total |
|---|---|---|---|---|---|---|---|---|
| **Men** | 3 | 23 | 0 | 8 | 2 | 8 | 0 | 44 |
| **Women** | 2 | 13 | 0 | 8 | 1 | 3 | 2 | 29 |
| **Total** | **5** | **36** | **0** | **16** | **3** | **11** | **2** | **73** |

Two of the Master of Science students are receiving DST-INSPIRE fellowship and one student is receiving NBHM fellowship.

**Prizes for Academic Excellence were awarded to the following Master of Science students** (during the 15th Foundation Day held on April 7, 2025). These prizes were given to Master of Science students who secured highest SGPA/CGPA at the end of second year.

- Kashish (Batch 2022, Chemistry)
- Martires Henriques Joson Josh Amaro Josephine (Batch 2022, Mathematics)

**In the 11th convocation held on May 29, 2024, 27 students were conferred Master of Science degree.**

## Details of the projects carried out by the outgoing batch of Master of Science students during 2024-25

### CHEMISTRY DEPARTMENT

*MSc in Chemistry; project carried out across both the semesters of the second year*

| Sr. No. | Student | Advisor | Project Title |
|---|---|---|---|
| 1 | **Pallob Jyoti Das** 20236201 | Boopathy Gnanaprakasam | Synthesis of engelhardione via sequential borrowing hydrogen concept and Ulmann coupling reactions |
| 2 | **Riddhi Saikia** 20236202 | Sujit Kumar Ghosh | Hydrophobicity modulation in chemically robust Troger's base Porous Organic Polymer (POP) for sequestration of PFAS |
| 3 | **Sanjay Kumar** 20236204 | Harinath Chakrapani | Design and development of 2-mercaptomalonamides as persulfide donors |
| 4 | **Therese Mariya Jose** 20236205 | Nirmalya Ballav | $[Fe(bpy)_3]_2Ag_6Br_{11}.NO_3$: Synthesis, crystal structure and unusual photo-conductance |
| 5 | **Abhinav Joshi** 20236206 | Ramakrishna G. Bhat | Exploration of the carbenoid and vinylogous reactivity of Diazo Arylidene Succinimides (DAS) with benzyl thioethers under rhodium catalysis |
| 6 | **Gede Kamda** 20236207 | Srinivas Hotha | Silver assisted gold catalysed synthesis of glyco-calix[4] arenes |
| 7 | **Sam Jeyasanth J.** 20236208 | Harinath Chakrapani | Synthesis and evaluation of persulfides-cleavable fluorogenic probes |

| Sr. No. | Student | Advisor | Project Title |
|---|---|---|---|
| 8 | **Shalu Rana** 20236209 | Sujit Kumar Ghosh | Total photocatalytic degradation of Chemical Warfare Agents (CWAs) by Zr-MOF@Imidazoline porous organic polymer composite |
| 9 | **A. Kirana** 20236210 | R. Boomi Shankar | A two-component ferroelectric containing amino-phosphonium cations and organo-phosphinate anions and its piezoelectric energy harvesting applications. |

## EARTH AND CLIMATE SCIENCE DEPARTMENT

*MSc in Geology; project carried out across both the semesters of the second year*

| Sr. No. | Student | Advisor | Project Title |
|---|---|---|---|
| 1 | **Debasish Maji** 20236401 | Gyana Ranjan Tripathy | Carbon sequestration by enhanced weathering of basalt and its applicability |
| 2 | **Nitin Panwar** 20236402 | Devapriya Chattopadhyay | Quaternary marine molluscan assemblage around Thoothukudi, India and its implications |
| 3 | **Kankan Roy** 20236403 | Gyana Ranjan Tripathy | Chemical weathering variability during last glacial-interglacial cycle: A geochemical study of Bay of Bengal sediments |
| 4 | **Akashi Baruah** 20236404 | Gyana Ranjan Tripathy | Organic carbon isotopic study of Bay of Bengal sediments: Reconstruction of vegetational changes during last 30 ka |

## MATHEMATICS DEPARTMENT

*MSc in Mathematics; project carried out during the final semester of the programme*

| Sr. No. | Student | Advisor | Project Title |
|---|---|---|---|
| 1 | **Isha Garg** 20226601 | Vivek Mohan Mallick | Commutative algebra and introduction to invariant theory |
| 2 | **Trishartadeb Mistri** 20236601 | Mainak Poddar | A study of persistent homology in topological data analysis |
| 3 | **Shinjini Paul** 20236602 | Moumanti Podder | Generalized and reinforced dependencies in the elephant random walk |
| 4 | **Drishti Sunder Phukon** 20236603 | Rabeya Basu | A survey of IBN property of Leavitt Path Algebras |
| 5 | **Nilay V. Nitnaware** 20236604 | Anindya Goswami | Teaching agents to understand cause and effect: A survey of causal reinforcement learning with applications |

# BS-MS Programme

The 5-year BS-MS programme gives students a well-rounded exposure to all areas of science by combining undergraduate level teaching with research. Basic training in Biology, Chemistry, Data Science, Earth and Climate Science, Humanities and Social Sciences, Mathematics, and Physics is imparted in the first two years. In the next two years, students can choose courses offered by one or more departments according to their liking and future career perspective. The fifth year is allocated to a research project or an internship, leading to a thesis.

The academic year 2024-25 saw 306 students (251 boys and 55 girls) taking admission to the BS-MS programme. Students were admitted through the state and central boards channel, via the IISER Aptitude Test.

## Category-wise Distribution of BS-MS Students Enrolled in 2024

| Gender | GE | OBC | SC | ST | EWS | KM | PD | Total |
|---|---|---|---|---|---|---|---|---|
| **Boys** | 95 | 63 | 30 | 26 | 29 | 2 | 6 | **251** |
| **Girls** | 14 | 11 | 12 | 4 | 7 | 1 | 6 | **55** |
| **Total** | **109** | **74** | **42** | **30** | **36** | **3** | **12** | **306** |

## Overall Category-wise Distribution of Existing BS-MS Students (as of March 31, 2025)

| Gender | GE | OBC | SC | ST | EWS | KM | PD | Total |
|---|---|---|---|---|---|---|---|---|
| **Boys** | 394 | 224 | 104 | 53 | 93 | 4 | 20 | **892** |
| **Girls** | 124 | 95 | 58 | 25 | 20 | 4 | 14 | **340** |
| **Total** | **518** | **319** | **162** | **78** | **113** | **8** | **34** | **1232** |

## Total BS-MS Student Strength During 2024-25

*Shown as per the enrollment year of students*

| Batch | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | Total |
|---|---|---|---|---|---|---|---|
| **Boys** | 21 | 166 | 150 | 138 | 174 | 243 | **892** |
| **Girls** | 6 | 85 | 66 | 62 | 71 | 50 | **340** |
| **Total** | **27** | **251** | **216** | **200** | **245** | **293** | **1232** |

Subsequent to admission of the 2024-25 batch, 13 students discontinued from the programme, due to their admission in other courses, changing the final number of students enrolled in 2024 from 306 to 293. In addition, from the previous batches, 10 students opted to discontinue the programme.

From the 2024 batch, 71 students were found eligible for receiving DST-INSPIRE scholarship. The total number of BS-MS students receiving DST-INSPIRE scholarships is 337.

## Fifth year projects carried out by the outgoing batch of BS-MS students during 2024-25

**Total : 242**

### Department-wise

**97**
BIOLOGY

**23**
CHEMISTRY

**12**
DATA SCIENCE

**7**
EARTH AND CLIMATE SCIENCE

**6**
HUMANITIES AND SOCIAL SCIENCES

**23**
MATHEMATICS

**73**
PHYSICS

**1**
SCIENCE EDUCATION

### Host-wise

**73**
IISER PUNE

**92**
NATIONAL

**77**
INTERNATIONAL

## Details of the fifth-year projects carried out by the outgoing batch of BS-MS students during 2024-25

| Sr. No. | Student | Supervisor | Project Title |
|---|---|---|---|
| BIOLOGY | | | |
| 1 | **Anish Pandey** 20191055 | Radha Chauhan, NCCS, Pune | Elucidation of the membrane and metal binding interface of Nup214/Nup88 sub complex of the nuclear pore complex |
| 2 | **Sable Sarvesh Sanjay** 20191124 | Mahesh Patil, CSIR-NCL, Pune | Enzyme engineering for the synthesis of industrially important chiral precursors |
| 3 | **Manish Kaswan** 20191137 | Mireille Lahoud, Monash University, Melbourne Australia | Elucidating the role of damage recognition pathways in dendritic cell processing of mRNA vaccines |

| Sr. No. | Student | Supervisor | Project Title |
|---|---|---|---|
| 4 | **Durge Sakshi Deepak** 20191147 | Madhura Kulkarni, Prashanti Cancer Care Mission, Pune | Tumour Infiltrating Lymphocytes (TILs) distribution in TNBC with respect to BRCA mutation status |
| 5 | **Hari Sunder N.P.** 20191149 | Gayathri Pananghat, IISER Pune | Megabody scaffold constructs as tools for cryo-electron microscopy structure determination and novel protein purification strategies |
| 6 | **Sadhu Pranav Anand** 20191152 | Tanmay Basu, IISER Bhopal | GeneNet transformer: A novel transformer-based architecture for gene network inference |
| 7 | **Afthab Saleem Poovalappil Arshad** 20191214 | Dileep Vasudevan, Rajiv Gandhi Centre for Biotechnology, Thiruvananthapuram | Preparation and characterization of Arabidopsis thaliana nucleosome core particles containing the histone variant H2A.Z |
| 8 | **Khushi Datri** 20201005 | Helge B. Bode, Max Planck Institute for Terrestrial Microbiology, Marburg, Germany | Investigation of the mechanism of xenoautoxin induced autolysis in bacteria |
| 9 | **Asita Singh** 20201007 | M.S. Madhusudhan, IISER Pune | Investigating structure and evolution of keratin intermediate filaments |
| 10 | **Prince Kumar Sah** 20201009 | Bruno Lemaitre, Lausanne, Switzerland | NimB2 enhances *Staphylococcus aureus* recognition by macrophages in *Drosophila* |
| 11 | **Taku Aammee** 20201012 | HariOm Singh, ICMR- National Aids Research Institute (NARI), Pune | Comparative analysis of expression pattern of IL-10, IL-6, IL1β and TNF-α genes and genetic variation of ACE2 gene among COVID-19 patients cohort from Western India |
| 12 | **Pooja Elizabeth Kuruvilla** 20201016 | Tatjana Piotrowski, Stowers Institute for Medical Research, U.S.A. | Phenotypic stability and plasticity of evolving genomes |
| 13 | **Anjali Pattathil** 20201018 | Alexandre Persat, École Polytechnique Fédérale de Lausanne (EPFL), Switzerland | Investigating mutants of the PilA helix in Pseudomonas aeruginosa |
| 14 | **Aditi Palo** 20201022 | Sudha Kumari, IISc, Bengaluru | Enhancing antigen presentation by dendritic cells in tumour microenvironment |
| 15 | **Vihang Viranchi Vaidya** 20201023 | Marc Guitart-Masip, Karolinska Institute, Sweden | The cognitive and neural impact of perceived uncontrollability on reward learning |
| 16 | **Nandeesh Sharma** 20201027 | Sarah E. Zanders, Stowers Institute for Medical Research, U.S.A. | What*s important for sex |
| 17 | **Gaikwad Asmi Atul** 20201028 | Dipen Soni, Serum Institute of India (SII), Pune | Development, optimisation and standardization of a method for the analysis of free polysaccharide content in the final multivalent pneumococcal vaccine |
| 18 | **Nikhil V.** 20201031 | Stephanie Panier, Max Planck Institute for the Biology of Ageing, Germany | Exploring the connection between YY1 and telomere biology |

| Sr. No. | Student | Supervisor | Project Title |
|---|---|---|---|
| 19 | **Krishna Belraj Menon** 20201032 | Tanmay P. Lele, Texas A&M University, College Station, Texas, U.S.A. | The role of excess nuclear laminar area in confined migration |
| 20 | **Ananya Joshi** 20201034 | Matthias Prigge, Leibniz Institute for Neurobiology, Germany | Linking attentional states and neuronal dynamics in the locus coeruleus during a decision-making task |
| 21 | **V. Vijay Subramanian** 20201035 | Anand Srivastava, IISc, Bengaluru | Morpheus: A fragment-based algorithm to predict metamorphic behaviour in proteins across proteomes |
| 22 | **Anish Murli Mulchandani** 20201036 | Patrick Daniel Barth, École Polytechnique Fédérale de Lausanne, Switzerland | Computational design of allosteric pathways in the CXCR3 receptor |
| 23 | **Oyindrila Samanta** 20201037 | Tobias Erb, Max Planck Institute for Terrestrial Microbiology, Germany | Multi-omics and in vitro characterisation of cyanobacterial biochemistry |
| 24 | **Anugraha S. Chandran** 20201038 | Pau Formosa-Jordan, Max Planck Institute for Plant Breeding Research, Germany | Quantitative analysis of the suberisation wavefront in the Arabidopsis thaliana root |
| 25 | **Baishali Das** 20201040 | Saikrishnan Kayarat, IISER Pune | Understanding the positional preference of simple sequence repeats in type III restriction modification system |
| 26 | **Manas Mahesh Raikar** 20201042 | Tatjana Sauka-Spengler, Stowers Institute for Medical Research, U.S.A. | Uncovering neuromesodermal progenitor contributions to neural crest derivatives in vivo |
| 27 | **Tapajeet Sarkar** 20201044 | Shreyas Managave, IISER Pune | Vegetation dynamics with respect to secondary factors in the Western Ghats: a case study |
| 28 | **Anantha Padmanabhan** 20201046 | Tobias Ackels, University of Bonn Medical Center, Germany | Development of a miniature odour sensor for implantation in mice |
| 29 | **Joanrose John Kattikaren** 20201047 | Deepa Agashe, NCBS, Bengaluru | Bacterial evolution under 3D physical confinement |
| 30 | **Vasave Bhavesh Sudhakar** 20201048 | Madhura Kulkarni, Prashanti Cancer Care Mission, Pune | Investigation of regulation of promoter proximal pausing in YAP-driven tumorigenesis |
| 31 | **Vikram Venugopal** 20201050 | Siva Sankari, Stowers Institute for Medical Research, U.S.A. | Investigating the interactions between nodule-specific cysteine rich peptides and bacterial proteins in legume-rhizobia symbiosis |
| 32 | **Nishant Kulshreshtha** 20201053 | Philippe Barthelemy, University of Bordeaux, France | The synthesis of modified and locked G quadruplexes from KRAS 32R as a novel therapeutic device |
| 33 | **Sukanya Bhat** 20201054 | Arjun Guha, Institute for Stem Cell Science and Regenerative Medicine, Bengaluru | Probing for the cellular identity of Bronchioalveolar Stem Cells (BASCs) derived from variant club cells post antibody-mediated notch inhibition |

| Sr. No. | Student | Supervisor | Project Title |
|---|---|---|---|
| 34 | **Doijad Shreya Jaywant** 20201055 | Ravi Muddashetty, IISc, Bengaluru | Deciphering the role of 2'O methylation in ribosome heterogeneity and synaptic translation |
| 35 | **Mehta Grishma Manish** 20201056 | Julia Zeitlinger, Stowers Institute for Medical Research, U.S.A. | Understanding the role of nucleosome positioning in gene regulation by leveraging deep learning models |
| 36 | **Akanksha K.** 20201057 | Vikram Saini, AIIMS Delhi | Exploring the role of sulfur metabolism machinery in host-pathogen interaction during mycobacterial infections |
| 37 | **Abhaykrishnan E.S.** 20201058 | Helge B. Bode, Max Planck Institute for Terrestrial Microbiology, Germany | NRPS engineering of epoxyketone proteasome inhibitors |
| 38 | **Ryth Dasgupta** 20201062 | Sven van Teeffelen, Université de Montréal, Canada | Exploring mechanisms for bacterial width change using coarse-grained simulations of the peptidoglycan cell wall |
| 39 | **Apurba Naik** 20201063 | Vikram Saini, AIIMS Delhi | Role of selenium and selenoproteins during mycobacterial infections |
| 40 | **Avanthika Prasad** 20201069 | Kartik Shanker, IISc, Bengaluru | Feeding ecology of Elasmobranch species along the Visakhapatnam Coast, India |
| 41 | **Krish Pandey** 20201075 | Neset Ozel, Stowers Institute for Medical Research, U.S.A. | Investigating the gene regulatory networks linking neuronal identity specification and differentiation |
| 42 | **Jogindh S.S.** 20201079 | Tobias Erb, Max Planck Institute for Terrestrial Microbiology, Germany | In vivo implementation of a synthetic $CO_2$ pathway in the soil bacterium Pseudomonas putida KT2440 |
| 43 | **Asutosh Routa** 20201080 | Aurnab Ghose, IISER Pune | Investigating collateral branch formation through light-induced tyrosine kinase receptors |
| 44 | **Shreya Kedar Kulkarni** 20201081 | Ming-Ru Wu, Dana Farber Cancer Institute, Harvard University. U.S.A. | Engineering reciprocal gene circuits to direct T-cell shuttling in cancer immunotherapy |
| 45 | **Samarth V. Herur** 20201084 | Leelavati Narlikar, IISER Pune | Sequence-to-function: Understanding the role of the CTCF binding sequence in chromatin organization |
| 46 | **Valecha Ayush Diwan** 20201086 | Sylvain Billiard, University of Lille, France and IBENS Paris, France | Evolution and transition of mating systems: Two case studies |
| 47 | **Aditi Krishnan** 20201095 | Miltos Tsiantis, Max Planck Institute for Plant Breeding Research, Germany | Quantifying leaf morphogenesis in 4D |
| 48 | **Gaurav Sinha** 20201099 | Raphael Mercier, Max Planck Institute for Plant Breeding Research, Germany | A search for novel genes involved in meiosis in Arabidopsis thaliana |
| 49 | **Abhilipsa Das** 20201106 | Raghav Rajan, IISER Pune | Monitoring respiration modulation during singing and investigating RA (Robust Nucleus of Arcopallium) contributions to respiration in Bengalese finch |
| 50 | **Kaustubh Vishram Kulkarni** 20201107 | Thomas Koffel, Laboratory of Biometry and Evolutionary Biology, France | From linking patches to linking theories: Cooperation in metapopulations |

| Sr. No. | Student | Supervisor | Project Title |
|---|---|---|---|
| 51 | **Namit Dwivedi** 20201108 | Annalisa Scimemi, State University of New York at Albany, U.S.A. | Modulation of synaptic strength at hippocampal synapses |
| 52 | **Paarth Dudani** 20201113 | Ruben Perez-Carrasco, Imperial College London, U.K. | Developing a neural network-based pipeline to improve Gene Regulatory Network (GRN) inference over the state-of-the-art algorithms |
| 53 | **Somdatta Naskar** 20201121 | Jochen Rink, Max Planck Institute for Multidisciplinary Sciences, Germany | Characterization of a novel DNA-sensing protein with links to innate immunity in planaria |
| 54 | **Uyyashrinila P.** 20201124 | Herwig Baier, Max Planck Institute of Biological Intelligence, Germany | Characterization of eomesa+ expressing retinal ganglion cells in zebrafish |
| 55 | **P. Pritha Reddy** 20201125 | Rajkamal Goswami, Ashoka Trust for Research in Ecology and the Environment, Bengaluru | Understanding carbon sequestration and its correlation with macronutrients and physical parameters in semi-arid ecosystems-A comparative study of Prosopis, forest and grassland soils |
| 56 | **Vasudeva K. Bhat** 20201127 | Hiroshi Ito, Max Planck Institute for Brain Research, Germany | Ensemble spatial coding in the retrosplenial cortex |
| 57 | **Sneha N.** 20201132 | Deepa Subramanyam, NCCS, Pune | Understanding the effects of hypo-osmolarity on mouse embryonic stem cells |
| 58 | **Sumanth Kumar Atreya** 20201134 | Dr. Moritz Helmstaedter, Max Planck Institute for Brain Research, Germany | Improving large-scale 3D EM data alignment for connectomics of sensory deprivation |
| 59 | **Priyesh Agrawal** 20201136 | Nagaraj Balasubramanian, IISER Pune | Investigating the role of AXL in the matrix stiffness-dependent regulation of Golgi organisation in anchorage-independent lung cancer cells |
| 60 | **Megha S.** 20201140 | Anjan Banerjee, IISER Pune | Exploring the role of potato trithorax proteins (StSDG4 and StATX1) in the *de novo* shoot regeneration in *Nicotiana benthamiana* and *Arabidopsis thaliana* |
| 61 | **Irene Biju** 20201142 | Anand Jeyasekharan, Cancer Science Institute - National University of Singapore | Investigating the prognostic implications of extrachromosomal DNA in diffuse large B-cell lymphoma |
| 62 | **Nandagopal K.S.** 20201143 | Gayathri Pananghat, IISER Pune | Designing a nucleotide-promiscuous FtsZ: An in vitro characterization |
| 63 | **Prashant Kumar** 20201146 | Medhavi Vishwakarma, IISc Bengaluru | Obtaining a mechanistic understanding of anti-cancer effects of medicinal mushrooms |
| 64 | **Parikh Richard Pareshkumar** 20201148 | Jahnavi Joshi, CSIR-CCMB, Hyderabad | Examining venom variation in a centipede species complex Scolopendra morsitans from Peninsular India |
| 65 | **Subhransu Shekhar Pattanayak** 20201149 | C. Ron Yu, Stowers Institute for Medical Research, U.S.A. | Development of innate odor encoding in the mouse brain |
| 66 | **Varuni Nagesh** 20201152 | Sudha Kumari, IISc, Bengaluru | Morpho-phenotypic characterisation of immune cells using an Ex vivo chronic inflammation model |

| Sr. No. | Student | Supervisor | Project Title |
|---|---|---|---|
| 67 | **Srivathsa S. Kurpad** 20201164 | Neeraj Dhar, Vaccine and Infectious Disease Organization (VIDO), Canada | Cyclic-AMP dynamics and heterogeneity in *Mycobacterium tuberculosis*: Insights into host-pathogen interactions |
| 68 | **Nakul Prashant Wewhare** 20201166 | Anand Krishnan, JNCASR, Bengaluru | Social network dynamics of budgerigars and their influence on vocal learning |
| 69 | **Tiyasa Bain** 20201169 | Gayathri Pananghat, IISER Pune | Structural characterization of components of the Frz chemoreceptor complex of *Myxococcus xanthus* |
| 70 | **Annapure Vinayak Uday** 20201170 | Vivek Naranbhai, Monash University, Australia | From conformation to signal: Structure-guided engineering of T-cell receptors for enhanced antigen-specific T-cell function |
| 71 | **Valanju Atharva Abhijit** 20201173 | Matt Gibson, Stowers Institute for Medical Research, U.S.A. | The role of Paraxis and integrins in the development of *Nematostella vectensis* |
| 72 | **Ajma D.J.** 20201174 | Pritha Ray, Advanced Centre for Treatment, Research & Education in Cancer (ACTREC), Navi Mumbai | Exploring the molecular landscape of Gastric Cancer (GC) patients to identify prospective targeted therapy options |
| 73 | **Siddharth Sharma** 20201177 | Girdhari Lal, NCCS, Pune | Investigating the immunomodulatory roles of tachykinin receptor 1 signaling in mucosal tissues |
| 74 | **Vinayak Patel** 20201178 | Denis Roze, Station Biologique de Roscoff, France | Differential selection between the sexes and the evolution of recombination in diploid and haplodiploid species |
| 75 | **Tangella Charan Raju** 20201182 | Shrish Tiwari, CSIR-CCMB, Hyderabad | Genotyping, characterization and preclinical studies in transgenic murine models of colorectal cancer |
| 76 | **Bhavya Sehara** 20201183 | Tatjana Piotrowski, Stowers Institute for Medical Research, U.S.A. | Characterization of Zebrafish lateral line cell type heterogeneity between development and regeneration |
| 77 | **Srirang Nabar** 20201185 | Collins Assisi, IISER Pune | Alzheimer's-induced changes in grid cell electrophysiology affect path integration in a network model of the medial entorhinal cortex |
| 78 | **Manojeet Pattanayak** 20201189 | Arnab Barik, IISc Bengaluru | Stress-activated lateral hypothalamic neurons suppress itch |
| 79 | **Orishma Parida** 20201197 | Kalika Prasad, IISER Pune | To investigate the interplay between Cortical Microtubule (CMT) and Reactive Oxygen Species (ROS) during vascular regeneration in leaf. |
| 80 | **Ingawale Vedant Chandrakant** 20201201 | Madhura Kulkarni, Prashanti Cancer Care Mission, Pune | Investigating the link between collagen deposition patterns in the TME and Indian triple-negative breast cancer patient outcomes |
| 81 | **Gaikwad Atharv Mahesh** 20201209 | Sabyasachi Sanyal, CSIR-Central Drug Research Institute (CDRI), Lucknow | Identification of novel small molecule Adiponectin receptor agonists and evaluation of their effects on skeletal muscle |

| Sr. No. | Student | Supervisor | Project Title |
|---|---|---|---|
| 82 | **Vidhyashree** 20201213 | Gayathri Pananghat, IISER Pune | Determination of the role of C-terminal extension of SofG in GEF activity |
| 83 | **Nandana A.S.** 20201215 | Annapoorni Rangarajan, IISc, Bengaluru | The effects of heat-humidity stress on mammary gland development |
| 84 | **Sampada Deepak Ghute** 20201217 | Madhura Kulkarni, Prashanti Cancer Care Mission, Pune | Prognostic association of immunoproteasome expression and its correlation with tumor-infiltrating lymphocytes in breast cancer |
| 85 | **Arkadeep Mandal** 20201231 | Jochen Rink, Max Planck Institute for Multidisciplinary Sciences, Germany | Understanding the size dependency of the reproductive system in *Schmidtea mediterranea* |
| 86 | **Ashmita Baruah** 20201235 | Yuko Ulrich, Max Planck Institute for Chemical Ecology, Germany | Novel Pathogen Infections in the Clonal Raider Ant |
| 87 | **Yangchen Lhamo** 20201237 | Krushnamegh Kunte, NCBS, Bengaluru | Mimetic resemblance in the butterfly mimicry rings of North East India |
| 88 | **Sakshi Anil Kharche** 20201241 | Pascale Vonaesch, University of Lausanne, Switzerland | The role of community interactions in shaping the evolution of antibiotic resistance in oligo-mouse-microbiota |
| 89 | **Gaikwad Vishakha Sanjay** 20201244 | Kundan Sengupta, IISER Pune | To characterize the effects of vitamin treatment on DNA damage response in cancer cells |
| 90 | **Agale Kunal Lomesh** 20201245 | Girdhari Lal, NCCS, Pune | Understanding the effect of chemokine signaling on immunometabolism of dendritic cells |
| 91 | **Mridusmita Das** 20201247 | Richa Rikhy, IISER Pune | Role of mitochondrial dynamics and activity in regulating epithelial cell remodeling |
| 92 | **Shubham Indoriya** 20201253 | Archana Singh, CSIR-Institute of Genomics and Integrative Biology, New Delhi | Understanding the DNA damage response in skin cells exposed to UVB radiation project code *MLP2008- regenerative experimental approaches for cell-based therapies* |
| 93 | **Shreya Mehra** 20201259 | Amit Singh, IISc, Bengaluru | Engineering redox sensitive biosensor for real time detection of reactive sulfur species (RSS) in *Mycobacterium tuberculosis* (Mtb) |
| 94 | **Anuj Chaturvedi** 20201260 | Ariel A. Bazzini, Stowers Institute for Medical Research, U.S.A. | Potential role of dORFs in human diseased phenotypes |
| 95 | **Ann Jewel Jude** 20201272 | Henna Tyynismaa, University of Helsinki, Finland | Interplay of CHCHD2 with mutant CHCHD10 in stem cell-based modeling of late-onset spinal muscular atrophy |
| 96 | **Khobragade Maitreyee Balraj** 20201273 | Mayurika Lahiri, IISER Pune | Studying the role of Apoptosis Inhibitor 5 (Api5) in replication stress |
| 97 | **Rahil Bhadoo** 20201277 | Syed Shams Yazdani, International Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi | Development of marker-free CRISPR/Cas9 system in Filamentous Fungi |

| Sr. No. | Student | Supervisor | Project Title |
|---|---|---|---|
| CHEMISTRY | | | |
| 1 | **Malavika Unni** 20201004 | Harinath Chakrapani, IISER Pune | Synthesis and evaluation of beta-galactosidase cleavable linkers for payload release |
| 2 | **Avaneesh Balasubramanian** 20201011 | Sai Gautam Gopalakrishnan, IISc, Bengaluru | Computational discovery of novel semiconductors for beyond-Si photovoltaics |
| 3 | **Ankit Jogdand** 20201020 | Manish Kumar, University of Texas, U.S.A. | Biomimetic artificial ion channels for recovering critical minerals |
| 4 | **Anju B. Modan** 20201029 | Jonathan De Roo, University of Basel, Switzerland | Study of energy transfer between lanthanide ions in zirconia nanocrystals |
| 5 | **Mufeeda Mohammed Ali** 20201043 | Harinath Chakrapani, IISER Pune | Design & synthesis of HNO donors and their NSAID hybrids |
| 6 | **Utthara M. Nair** 20201052 | Hosahudya N. Gopi, IISER Pune | Design of hybrid peptide foldamers as antimicrobial agents and Aβ aggregation inhibitors |
| 7 | **Shrivatsa Thulasiram** 20201060 | Yamuna Krishnan, University of Chicago, U.S.A. | Exploring structure activity relationships for the pharmacological inhibition of TWIK-2 |
| 8 | **Mridul K. Vinod** 20201061 | Pramod Pillai, IISER Pune | Visible-light-driven Newman-Kwart Rearrangement (NKR) by nanomaterials |
| 9 | **Sradha N.** 20201064 | R. Boomi Shankar, IISER Pune | An enantiopure cyclotriphosphazenium chloride salt for effective enantioselective recognition of organic molecules |
| 10 | **Avanthika L.S.** 20201066 | Mark Brönstrup, Helmholtz Centre for Infection Research (HZI), Germany | Synthesis and modification of phenolate-based artificial siderophores |
| 11 | **Akshay H.** 20201073 | Dr. Corina Andronescu, University of Duisburg-Essen, Germany | Tuning anion exchange membrane water electrolysis for efficient green hydrogen production |
| 12 | **Sachinkumar Laxmanbhai Chaudhary** 20201085 | Atanu Das, CSIR-NCL, Pune | Rationalizing the relative aggregability of alpha-synuclein variants via molecular simulations |
| 13 | **Satyabrata Das** 20201109 | Moumita Majumdar, IISER Pune | Investigation on tetra-cationic heavier di-pnictanes |
| 14 | **Anwesha Raychaudhuri** 20201110 | Jagannath Mondal, TIFR, Hyderabad | Investigating the regioselectivity and catalysis action of cytochrome P450 |
| 15 | **Mohite Pratiksha Sambhaji** 20201129 | Harinath Chakrapani, IISER Pune | Synthesis and evaluation of persulfide generating Non-Steroidal Anti-inflammatory Drugs (NSAIDs) |
| 16 | **Jewel Elsa Josan** 20201130 | M. Jayakannan, IISER Pune | Development of fluorescent Poly-L-Tyrosine for bio-medical applications |

| Sr. No. | Student | Supervisor | Project Title |
|---|---|---|---|
| 17 | **Kavan Nandaniya** 20201167 | Pinaki Talukdar, IISER Pune | Development of 3,5–diiodobenzoicacid-based halogen bond mediated barrel rosette anion channel |
| 18 | **Abhay N.** 20201171 | Bikramjit Basu, IISc, Bengaluru | Computational study of integrin interactions under an electric field |
| 19 | **Rafael Tayung** 20201208 | Sujit Kumar Ghosh, IISER Pune | Highly efficient sequestration of (Radio) iodine from water via isostructural ionic metal-organic frameworks |
| 20 | **Akanksha** 20201216 | Samir H. Chikkali, CSIR-NCL, Pune | Atom Transfer Radical (ATR) depolymerization of polystyrene |
| 21 | **Prabhav Kumar** 20201228 | Satish Patil, IISc, Bengaluru | Semi transparent organic solar cells for agrivoltaic application |
| 22 | **Ridham Oberoi** 20201232 | M. Jayakannan, IISER Pune | Development of L-Amino acid based polymer brushes |
| 23 | **Shashank Verma** 20201271 | Hidehiro Sakurai, Osaka University, Japan | Synthesis of sumanene hexatrifluoromethanesulfinate and exploring the extent of chemical reactivity of Hexakis(bromomethyl) sumanene |
| DATA SCIENCE | | | |
| 1 | **Durgaprasad C.** 20191030 | Anjula Gurtoo, IISc, Bengaluru | Mathematical formulation of data pricing models: Integrating economic and game-theoretic principles for a comprehensive pricing approach |
| 2 | **Phanse Somen Dhanaji** 20191134 | Manoj Deshpande, Zenworks Solutions Pvt. Ltd., Pune | Context-driven question generation using AI models |
| 3 | **Parth Gupte** 20201008 | Sangameshwar Patil, Tata Research Development & Design Centre, Pune | Knowledge extraction from cyber security incident reports |
| 4 | **T. Devadharshini** 20201024 | Aniruddha Pant, AlgoAnalytics Pvt. Ltd., Pune | Trading strategy for equity market and F&O |
| 5 | **Sumant Ravindra Chopde** 20201118 | Sanket Tilekar, Axio Digital Pvt. Ltd., Pune | Credit risk estimation using various graphs |
| 6 | **Ruchir Sahni** 20201123 | Gajendra Pal Singh Raghava, IIIT, New Delhi | Species-specific prediction of B cell epitopes |
| 7 | **Prarabdh Shivhare** 20201147 | Rosa Martinez Corral, Centre for Genomic Regulation, Barcelona, Spain | Developing a biophysically grounded deep learning model for gene expression prediction |
| 8 | **Shreshth Raj** 20201168 | Shripad Kulkarni, Forbes Marshall, Pune | IoT to efficiency: A data-driven approach to optimize Condensate Recovery Factor (CRF) |
| 9 | **Bhushan Mahesh Deshpande** 20201224 | Sudhir Kumar, Coriolis Technologies Pvt. Ltd., Pune | Retrieval-augmented large code generation and evaluation using large language models |
| 10 | **Barish Sarkhel** 20201242 | Sudhir Kumar, Coriolis Technologies Pvt. Ltd., Pune | Efficient finetuning of LLMs for domain-specific code generation |

| Sr. No. | Student | Supervisor | Project Title |
|---|---|---|---|
| 11 | **Shingare Yash Sandip** 20201266 | Shripad Kulkarni, Forbes Marshall, Pune | Efficiency optimization of industrial boiler |
| 12 | **Ansh Jay Kapadia** 20201268 | Chng Eng Siong, Nanyang Technological University, Singapore | TSVAD+ - A transformer based approach for speaker Diarization |
| EARTH AND CLIMATE SCIENCE | | | |
| 1 | **Punya Pratyusha Sethi** 20191162 | Raymond Duraiswami, SPPU, Pune | Lava tube system at Gunjale, Western Deccan Volcanic Province, India |
| 2 | **Shreyas S. Iyer** 20201010 | Claudia Timmreck, Max Planck Institute for Meteorology, Hamburg, Germany | The effect of volcanic eruptions on the life cycle of the Indian summer monsoon |
| 3 | **Shijil Amin P. Umer** 20201072 | Joy Merwin Monteiro, IISER Pune | Effects of surface roughness length on the atmospheric circulation in a tidally-locked planet |
| 4 | **Muhammed Mehafus Thannani** 20201076 | Amzad Hussain Laskar, Physical Research Laboratory (PRL), Ahmedabad | Depositional flux of cosmogenic 10Be in Southern India |
| 5 | **Kashika Singh** 20201180 | Joy Merwin Monteiro, IISER Pune | Investigation of ocean dynamics using Argo Float Data |
| 6 | **Rifa Medappil Pinatt** 20201229 | Georg Rümpker, Goethe University Frankfurt, Germany | Full-Waveform modeling and ML-based tomography of volcanic edifices |
| 7 | **Rinuragavi V.N.** 20201240 | Sunil D. Pawar, IITM, Pune | Evaluating microphysics, cumulus, and lightning parameterization schemes in WRF model for thunderstorm simulation over East India |
| HUMANITIES AND SOCIAL SCIENCES | | | |
| 1 | **Harsh Jinger** 20191022 | Shailesh Rastogi, Symbiosis Institute of Business Management (SIBM), Nagpur | Demonstrating a python-based cross-platform novel tool for panel data analysis in econometrics |
| 2 | **Lonkar Suyash Mohan** 20191177 | Rudrani Bhattacharya, National Institute of Public Finance and Policy (NIPFP), New Delhi | Financial contagion and its effects on the Indian economy |
| 3 | **Sneha Jain** 20201015 | Arvind Sahay, Management Development Institute (MDI), Haryana | Shaping sounds: The role of symbolism in Sonic Logos— An EEG and MIR study |
| 4 | **Shashwati H.** 20201090 | Abhinash Borah, Ashoka University | Understanding discrimination in large language models |
| 5 | **Avani P.** 20201219 | Rajesh Kumar, IIT Madras | Language, cognition, and teaching |
| 6 | **Shivani Avadhani M.A.** 20201221 | Venketeswara R. Pai, IISER Pune | Mathematical exploration of sections of Tantraratna and Tāladīpikā: Unraveling Tippa Gopendra Bhūpāla's contribution in astronomy and rhythm |

| Sr. No. | Student | Supervisor | Project Title |
|---|---|---|---|
| MATHEMATICS | | | |
| 1 | **Subham Kumar Samal** 20191095 | Michael Alexander Kouritzin, University of Alberta, Canada | Calibration of the Heston Model |
| 2 | **Augastya Srivastava** 20191201 | Amit Apte, IISER Pune | Spectral clustering of spatiotemporal datasets |
| 3 | **Gugulothu Ananda** 20191204 | Ayan Mahalanobis, IISER Pune | Lattice reduction algorithm and applications |
| 4 | **Malavika K.S.** 20201039 | Chandrasheel Bhagwat, IISER Pune | Spectral theory of Cayley graphs of finite groups |
| 5 | **Aditya Marodia** 20201082 | Vivek Mohan Mallick, IISER Pune | Tropical and algebraic geometry |
| 6 | **Ameya Abhijit Tilgul** 20201091 | Kaneenika Sinha, IISER Pune | Spacing statistics for sequences modulo 1 |
| 7 | **Prateek Dwivedi** 20201093 | Dr. Julia Lieb, TU Ilmenau, Germany | Convolutional codes: MacWIlliams identity and hulls |
| 8 | **Yash Sunil Karampuri** 20201105 | Arnab Kumar Laha, Indian Institute of Management, Ahmedabad | Graph representation learning for binding pocket prediction in proteins |
| 9 | **Bhagyalekshmy S.** 20201119 | Krishna Kaipa, IISER Pune | Topics in code-based cryptography |
| 10 | **Rik Sarkar** 20201122 | Victor Falgas-Ravry, Umeå University, Sweden | Extremal problems for multigraphs |
| 11 | **Prasanna N. Bhat** 20201128 | Supriya Pisolkar, IISER Pune | Class field theory and local global principle |
| 12 | **Emily Priyadarshini** 20201131 | Massimo Bartoletti, University of Cagliari, Italy | A quantitative security notion for assessing De-Fi composability |
| 13 | **Naren S. Narayanan** 20201144 | Divyang Bhimani, IISER Pune | Schrodinger operators and applications to evolution equations |
| 14 | **C. Surya Panchapakesan** 20201179 | Rohit Vaish, IIT, New Delhi | Randomized fair allocations for lexicographic valuations |
| 15 | **Joshi Varad Mahesh** 20201184 | Prakash Saivasan, Institute of Mathematical Sciences, Chennai | Exponential blowup in asynchronous automata |
| 16 | **Pritam Acharya** 20201198 | Arindam Khan, IISc, Bengaluru | Some results on the maker breaker triangle game |
| 17 | **Naman Pratap** 20201202 | Antonio Lei, University of Ottawa, Canada | Iwasawa invariants of Mazur--Tate elements of elliptic curves and modular forms |
| 18 | **Jagtap Hrishikesh Pratap** 20201212 | Moumanti Podder, IISER Pune | Maker breaker games on graphs |

| Sr. No. | Student | Supervisor | Project Title |
|---|---|---|---|
| 19 | **Aravind R.** 20201218 | Diganta Borah, IISER Pune | L2 methods in complex analysis |
| 20 | **Manjima Ghosh Hazra** 20201226 | Chandrasheel Bhagwat, IISER Pune | L-functions of Hecke characters and cohomology |
| 21 | **Priyanshu Chourasiya** 20201230 | Syed Abbas, IIT Mandi | Study of weighted pseudo compact almost automorphic function and its stability analysis |
| 22 | **Pranjal Jain** 20201257 | Steven Spallone, IISER Pune | Central extensions of topological groups and the cohomology of classifying spaces |
| 23 | **Ujwal Pandey** 20201258 | Vivek Mohan Mallick, IISER Pune | Almost Abelian Lie algebras admitting Astheno-Kähler and Balanced structures |
| PHYSICS | | | |
| 1 | **Trupti Mangesh Raut** 20191016 | Pradeep Sarin, IIT Bombay | Study of charged particle transport in a wide bandgap semiconductor with applications to ionizing radiation detection |
| 2 | **Indrakanty Surya Shashank** 20191031 | Srikanth Sastry, JNCASR, Bengaluru | Investigation of rheology and computation of viscosity of liquids at low temperatures |
| 3 | **Moshikkeeran S.** 20191037 | Prasad Subramanian, IISER Pune | Energetics and frequency of the flares of a young M-dwarf, and their potential impact on the habitability of possible planets around it |
| 4 | **Ashmi A.** 20191104 | Prasanta K. Panigrahi, IISER Kolkata | Machine learning assisted noise classification and mitigation in quantum key distribution protocol |
| 5 | **Ankan Nath** 20191118 | Gael De Paepe, CEA Grenoble, France | Investigation of ligand-surface interactions in perovskite nanomaterials using solid-state NMR spectroscopy and density functional theory |
| 6 | **Shantanu** 20191126 | Ashna Bajpai, IISER Pune | Design & fabrication of a high temperature AC - susceptometer |
| 7 | **Chayanka Kakati** 20191164 | Diptimoy Ghosh, IISER Pune | Spontaneous symmetry breaking & entanglement in QFT |
| 8 | **Shivansh Malviya** 20191175 | Vimal Bhatia, IIT Indore | Study and design of efficient and resilient QKD in communicaton networks |
| 9 | **Shashank Soni** 20191186 | Neeraj Gupta, IUCAA, Pune | Properties of gas in and around galaxies at z*0.6 using MALS |
| 10 | **Naman Kapoor** 20201001 | Diptimoy Ghosh, IISER Pune | Investigating unitarity and symmetry constraints on cosmological observables |
| 11 | **Aniruddha Trivedi** 20201002 | M.S. Santhanam, IISER Pune | Quantum reservoir computing using a spin-based kicked top system for classical and quantum machine learning tasks |
| 12 | **Harrsh Goyal** 20201006 | Philipp Schmidt-Wellenburg, Paul Scherrer Institute (PSI), Switzerland | Characterization of the 6D phase space of a muon beam for the measurement of the muon electric dipole moment |

| Sr. No. | Student | Supervisor | Project Title |
|---|---|---|---|
| 13 | **Garvit Bansal** 20201013 | Chandrajit Bajaj, University of Texas, Austin, U.S.A. | New material discovery using physics-inspired reinforcement learning techniques |
| 14 | **Krishna Iyer V.S.** 20201017 | Stefan Klumpp, Georg-August University, Goettingen, Germany | Viscoelasticity of in silico cytoskeletal networks |
| 15 | **Dhruv Chetan Satra** 20201021 | Susmita Adhikari, IISER Pune | Modeling splashback radius in redshift space |
| 16 | **Ritesh Srivastava** 20201026 | Sumati Surya, Raman Research Institute, Bengaluru | A study of quantum sequential growth dynamics, observables in causal sets and renormalization |
| 17 | **Harshit Raj** 20201033 | Sanjeev Dhurandhar, IUCAA, Pune | Fast search method for low frequency continuous gravitational wave signals |
| 18 | **Gadre Soham Aniruddha** 20201045 | Kaveh Delfanazari, University of Glasgow, U.K. | Reservoir neuromorphic computing with photonic superconducting circuits |
| 19 | **Gaurang Agrawal** 20201049 | Aditi Sen De, Harish-Chandra Research Institute, Prayagraj (Allahabad) | Applications of quantum operations with indefinite time direction |
| 20 | **C. Karthik** 20201051 | Peter Sollich, Institute for Theoretical Physics, University of Goettingen, Germany | Escape rate calculations for active Brownian particles with non-Gaussian noise |
| 21 | **Bisweswar Sen** 20201059 | Abhirup Datta, IIT Indore | Unlocking the early universe using HI 21cm Cosmology: Marginal neural ratio estimation for 21-cm power spectra analysis |
| 22 | **Dhruv Abhijit Hukkeri** 20201065 | Susmita Adhikari, IISER Pune | Gravothermal evolution of dark matter halos: Insights from self-interacting and dissipative models |
| 23 | **Amoghavarsha A.V.** 20201068 | Divya Oberoi, National Centre for Radio Astrophysics (NCRA), Pune | Analysis of archival wide-band radio spectrograph data from YAMAGAWA observatory |
| 24 | **Divya Yadav** 20201074 | Surjeet Singh, IISER Pune | Investigation of charge density wave ordering in intercalated ZrTe2 materials |
| 25 | **Patel Dhruv Vishal** 20201087 | Apratim Chatterji, IISER Pune | Anisotropy dependent relaxation of topologically-modified polymers |
| 26 | **Gupta Sparsh Harshvardhan** 20201088 | Émilien Chapon, CEA Paris-Saclay, France | Particle detection and measurement: From low-energy nuclear fusion with STELLA to high-energy muon momentum calibration with ATLAS |
| 27 | **Lakshmy Sajayan V.** 20201089 | P.S. Anil Kumar, IISc, Bengaluru | Magnetic transport studies on 2-D ferromagnet $Fe_5GeTe_2$ and thickness-dependent topological sharge simulations in van der Waals Heterostructures |
| 28 | **Vaishakh Chetan Kargudri** 20201092 | Rejish Nath, IISER Pune | Spin-10 Bose-Einstein Condensates |
| 29 | **Swayam Basu** 20201094 | Jef Poortmans, KU Leuven, Belgium | Bulk and surface modifications for achieving highly efficient perovskite-silicon tandem solar cells |

| Sr. No. | Student | Supervisor | Project Title |
|---|---|---|---|
| 30 | **Aniket Sengupta** 20201096 | T.S. Mahesh, IISER Pune | Partial quantum shadow tomography for structured operators |
| 31 | **Debarghya Basak** 20201097 | Hryhoriy Polshyn, Institute of Science and Technology, Austria | Quantum transport in graphene heterostructures |
| 32 | **Subiksha S.** 20201100 | Richard Tuffs, Max Plank Institute of Nuclear Physics, Heidelberg, Germany | Modeling emission lines from clouds irradiated by cosmic rays in the Solar neighborhood of Milky Way |
| 33 | **Vivek Gurunath Sabarad** 20201103 | T.S. Mahesh, IISER Pune | Experimental quantum kernels in NMR applied to machine learning with classical and quantum data |
| 34 | **Ritavash Debnath** 20201104 | Jayanta Roy, NCRA-TIFR, Pune | SPOTLIGHT: A realtime detection pipeline for FRBs and pulsars at uGMRT |
| 35 | **Paritosh Malik** 20201112 | Eliezer Estrecho, Australian National University, Canberra, Australia | Integration of 2D materials in tunable open microcavities for strong light-matter coupling |
| 36 | **Sarthak Tripathy** 20201115 | Raghunath Sahoo, IIT Indore | Event shape dependence of symmetry plane correlations in Pb-Pb collisions at the LHC energies using AMPT |
| 37 | **Priyanshu Khakha** 20201116 | Shouvik Datta, IISER Pune | Studying the excitonic phase transitions |
| 38 | **Ansari Mohd Elaf Mohd Bashir** 20201117 | Diptimoy Ghosh, IISER Pune | Exploring quantum effects in inflation |
| 39 | **Datar Aaditya Jitendra** 20201120 | Chethan Krishnan, IISc, Bengaluru | Virasoro blocks and the black hole information paradox |
| 40 | **Shriyansh Ranjan** 20201133 | Sourabh Dube, IISER Pune | Adapting the multilepton final states to complex models |
| 41 | **Balagopal R. Nair** 20201135 | Danny Raj M., IIT Madras | Characterizing heterogeneity in microscopic collectives |
| 42 | **Mohit Kumar** 20201137 | Bijay Kumar Agarwalla, IISER Pune | Understanding quantum synchronization of self-sustained oscillators through coherence |
| 43 | **Nandana V. Uday** 20201145 | Claus Ropers, Max Planck Institute for Multidisciplinary Science, Göttingen, Germany | Ultrafast Low energy electron diffraction on 2D-Materials |
| 44 | **Bhageerath Swaraj** 20201150 | Jure Demsar, Johannes Gutenberg-Universität Mainz, Germany | Collective modes in pressure-tuned charge density wave systems |
| 45 | **Shewale Krushna Dilip** 20201151 | Satishchandra Ogale, IISER Pune | Black phosphorus quantum dots as electrolyte additives for secondary batteries |
| 46 | **Gaurav Pundir** 20201153 | Aseem Paranjape, IUCAA, Pune | Predicting the neutral hydrogen distribution during reionisation using a GPR emulator on N-Body simulations |

| Sr. No. | Student | Supervisor | Project Title |
|---|---|---|---|
| 47 | **Shinde Rajat Vikas** 20201155 | Julia Djuvsland, Max Plank Institute for Nuclear Physics, Heidelberg, Germany | Inverse compton emission from heavy WIMP annihilations in the Galactic Centre |
| 48 | **Pratham H.P.** 20201158 | Ujjwal Sen, Harish-Chandra Research Institute, Allahabad | Distributed quantum dense coding with nonclassical routing |
| 49 | **Sayan Neogi** 20201160 | Sunil Mukhi, IISER Pune | Generalized gravity theories |
| 50 | **Kwanit Gangopadhyay** 20201162 | Arka Banerjee, IISER Pune | Geometric interpretations of the k-nearest neighbour distributions |
| 51 | **Somanko Saha** 20201163 | Seema Sharma, IISER Pune | Using GNNs for mass reconstruction of light pseudoscalars decaying to merged photon-pairs in the CMS ECAL endcaps |
| 52 | **Harsh Doshi** 20201187 | Apratim Chatterji, IISER Pune | Segregation kinetics of topologically-modified (DNA-) polymers in confinement |
| 53 | **Shalini Das** 20201188 | Shilpi Jain, TIFR Mumbai | Study of α_s in Z+1 Jet and Z+2 Jets Channels |
| 54 | **Joseph George** 20201190 | Sudhir Vempati, IISc, Bengaluru | Probing see-saw models at muon colliders |
| 55 | **Shreyas Sunil Bakare** 20201192 | Sourabh Dube, IISER Pune | Development of graph-based ML techniques for optimized particle analysis at LHC |
| 56 | **Khadse Anuja Bandu** 20201200 | Mathew Arun Thomas, IISER Thiruvananthapuram | Baryon number violation from extra- dimensions |
| 57 | **Satyam Sinha** 20201203 | Abhishek Dhar, International Centre for Theoretical Sciences (ICTS), Bengaluru | Open system study of conductance quantization in 2D chern insulators |
| 58 | **Jharnesh Verma** 20201204 | Anusha Bhasari, Indian Institute of Astrophysics, Bengaluru | Development of feature tracking code for analyzing solar spectropolarimetric observations |
| 59 | **Jasveer Singh** 20201205 | Suneeta Vardarajan, IISER Pune | Nonlinear ringdown of black holes |
| 60 | **Giridharan S.** 20201220 | Hsien Shang, Institute of Astronomy and Astrophysics, Taipei, Taiwan | Exploring the signatures of wind-envelope interactions in protostellar outflows |
| 61 | **Sumit Ghosh** 20201222 | Subhadeep De, IUCAA, Pune | Distributed acoustic sensing using an ultra-stable laser |
| 62 | **Subhasis Behera** 20201227 | Ashok Kumar Mohapatra, NISER, Bhubaneswar | Spectral and spatial modulation of optical pump beam for mirrorless optical parametric oscillation |
| 63 | **Lokesh Tater** 20201234 | Bijay Kumar Agarwalla, IISER Pune | Single and multi particle out-of-equilibrium quantum dynamics for dephased long-range hopping lattice systems |
| 64 | **Manav Koul** 20201238 | Christoph A. Weber, Universität Augsburg University, Germany | Sequence replication and selection in phase-separated systems |

| Sr. No. | Student | Supervisor | Project Title |
|---|---|---|---|
| 65 | **Keshav V.** 20201239 | Rejish Nath, IISER Pune | Quantum dynamics and control of reconfigurable Rydberg atoms arrays |
| 66 | **Sahil Satapathy** 20201249 | Arijit Bhattacharyay, IISER Pune | Study of phase diagrams for spin-1 bose-einstein condensate under harmonic confinement |
| 67 | **Haraprasad Nandi** 20201254 | Sanjit Mitra, IUCAA, Pune | Machine learning techniques for fabry-perot cavity alignment |
| 68 | **Mayank Shekhar Singh** 20201261 | Kanak Saha, IUCAA, Pune | Reconstructing AstroSat UV deep field images |
| 69 | **Ayush Sharma** 20201263 | Shouvik Datta, IISER Pune | Excitonic Quantum Devices |
| 70 | **Pranjal Panwar** 20201265 | Aparna Deshpande, IISER Pune | Understanding the local electronic properties of ZrTe2 |
| 71 | **Aditya Shukla** 20201267 | Sumit Pal, Dassault Systèmes Solutions Lab Private Limited, Pune | Applications of multiscale simulations to battery material modelling |
| 72 | **Dharmesh Yadav** 20201275 | M.S. Santhanam, IISER Pune | Quantum reservoir computing with many body systems |
| 73 | **Vijayalaxmi K Sankeshwar** 20201278 | Matthias Bode, University of Würzburg, Germany | Investigation of magnetic domain structure of Ho(0001)/W(110) |
| SCIENCE EDUCATION | | | |
| 1 | **Saransh Rakesh Agrawal** 20201236 | Varun Bhatta, IISER Bhopal | Philosophical analyses of ML modelling in science |

## Academic Achievements of BS-MS Students

Institute Prizes related to academic excellence (CNR Rao Education Foundation Prize and Prizes for Academic Excellence) are given every year to BS-MS, Masters' and Integrated PhD students.

**CNR Rao Education Foundation Prize** was awarded (during the 15th Foundation Day held on April 7, 2025) to the following BS-MS students. This prize is given to first year BS-MS students who have secured the highest SGPA in the first two semesters.

- Pranshu Nemani (Batch 2024, Semester I)
- Shruto Kalyan Dey (Batch 2024, Semester I)

**Prizes for Academic Excellence** were awarded (during the 15th Foundation Day held on April 7, 2025) to the following BS-MS students. These prizes are given to the BS-MS students who attained the highest SGPA/AGPA in Semesters 2 to 8.

- Eeshaan K.B. (Batch 2023, Semester II)
- Yash Dadhwal (Batch 2023, Semester III)
- Abhisek Saidarsan (Batch 2022, Semester IV)
- Shuban Ramesh Gupta (Batch 2022, Semester IV)
- Sujitha Suresh (Batch 2021, Semester V and VI)
- Rik Sarkar (Batch 2020, Semester VII and VIII)Pranjal Jain (Batch 2020, Semester VII and VIII)

**During the 11th Convocation of the Institute held on May 29, 2024, 195 students graduated with BS-MS dual degrees, and 15 students received BS degree.**

**Shah Varun Kaushal who secured a CGPA of 9.4 was awarded the Institute Gold Medal.**

**The following 14 students passed with Distinction (CGPA>9.0):**

- Shah Varun Kaushal
- Arjun Ranganathan
- Shah Neev Vinay
- Krishna Samkaran Girish
- Sanjana Vasanth
- Drishti Gupta
- Kshitij Verma
- Hritwik Haldar
- Rohan Thangaraj
- Bhide Atharva Vivek
- Neel Ajay Shah
- Aniketh Sivakumar
- Shivam Dosajh
- Soumya Sarkar

# List of Courses

## August 2024 Semester

*Note: Semesters 1, 3, 5, and 7 refer to BS-MS; Semesters 11 and 13 refer to iPhD; 31 and 33 refer to MSc; and 21 and 22 refer to PhD; Total of 158 courses, of which 7 are dual-coded courses across departments*

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 1 | **BI1113** | 3 | | | Introductory Biology - I | 1 | Nagaraj Balasubramanian, Kundan Sengupta |
| 2 | **BI1123** | 3 | | | Experimental Biology | 1 | Kalika Prasad, Richa Rikhy, Sagar Pandit, Krishanpal Karmodiya, Santosh Poddar and Vijay Vittal, Sunish Radhakrishnan, Mridula Nambiar, Thomas Pucadyil |
| 3 | **BI2113** | 3 | | | Ecology and Evolution | 3 | Sutirth Dey |
| 4 | **BI2123** | 3 | | | Introduction to Biological Systems (Elective) | 3 | Aurnab Ghose, Collins Assisi |
| 5 | **BI3124** | 4 | **BI6114** | 4 | Advanced Molecular Biology | 5,11,21 | Gayathri Pananghat, Mayurika Lahiri |
| 6 | **BI3134** | 4 | **BI6124** | 4 | Bioinformatics | 5,7,11,13,21 | M.S. Madhusudhan |
| 7 | **BI3144** | 4 | **BI6134** | 4 | Cellular Biophysics - I | 5,7,11,13,21 | Chaitanya Athale |
| 8 | **BI3154** | 4 | **BI6144** | 4 | Neurobiology - I | 5,7,11,13,21 | Nixon M. Abraham, Suhita Nadkarni |
| 9 | **BI3164** | 4 | **BI6154** | 4 | Plant Biology - I | 5,7,11,13,21 | Anjan Banerjee, Kalika Prasad |
| 10 | **BI3174** | 4 | **BI6184** | 4 | Advanced Biochemistry - I | 5,7,11,13,21 | Siddhesh Kamat, Sudha Rajamani |
| 11 | **BI3184** | 4 | **BI6194** | 4 | Ecology - I | 5,7,11,13,21 | Deepak Barua |

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 12 | **BI3194** | 4 | **BI6314** | 4 | Developmental Biology | 5,7,11,13,21 | Girish Ratnaparkhi, Richa Rikhy |
| 13 | **BI3313** | 3 | | | Semester Project | 5 | Sagar Pandit |
| 14 | **BI3323** | 3 | **BI6333** | 3 | Structural Biology | 5,7,11,13,21 | Saikrishnan Kayarat, Gayathri Pananghat |
| 15 | **BI3344** | 4 | **BI6374** | 4 | Microbial Genetics | 7,11,13,21 | Sunish Radhakrishnan, Mridula Nambiar |
| 16 | **BI4113** | 3 | **BI6163** | 3 | Animal Physiology - II | 7,11,13,21 | Raghav Rajan, Nishikant Subhedar |
| 17 | **BI4123** | 3 | **BI6173** | 3 | Advanced Immunology | 7,11,13,21 | Satyajit Rath, Vineeta Bal |
| 18 | **BI4153** | 3 | | | Undergraduate Research Experiments | 5 | Raghav Rajan, Girish Ratnaparkhi, Nishad Matange |
| 19 | **BI4164** | 4 | **BI6554** | 4 | Computational Functional Genomics | 7,21 | Leelavati Narlikar, Parameswaran Ramanathan |
| 20 | **BI4313** | 3 | | | Semester Project | 7 | Sagar Pandit |
| 21 | **BI5114** | 4 | **BI6344** | 4 | Biostatistics | 11,13,21 | Ramana Athreya |
| 22 | **BI5513** | 3 | | | Lab Training | 11 | Raghav Rajan |
| 23 | **BI5713** | 3 | | | Lab Training | 13 | Raghav Rajan |
| 24 | **BI5723** | 3 | | | Lab Training | 13 | Raghav Rajan |
| 25 | **BI5733** | 3 | | | Lab Training | 13 | Raghav Rajan |
| 26 | | | **BI6532** | 2 | Immunological Methods in Biology | 11,13,21 | Satyajit Rath |
| 27 | | | **BI6512** | 2 | Practical Programming | 11,13,21 | Pranay Goel |
| 28 | **CH1113** | 3 | | | Principles of Organic Chemistry | 1 | Amrita Hazra, Boopathy Gnanaprakasam |
| 29 | **CH2113** | 3 | | | Principles of Inorganic Chemistry | 3 | Nirmalya Ballav, R. Boomi Shankar |
| 30 | **CH2243** | 3 | | | General Chemistry Practicals - II (Elective) | 3 | Srinivas Hotha, Pinaki Talukdar, Harinath Chakrapani, Aloke Das, Arun Venkatnathan, Sujit Ghosh, Shabana Khan |

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 31 | **CH3114** | 4 | **CH6114** | 4 | Physical Organic Chemistry | 5,7,21,31,33,11,13 | Hosahudya N. Gopi |
| 32 | **CH3124** | 4 | **CH6124** | 4 | Main Group Chemistry | 5,7,21,31,33,11,13 | Moumita Majumdar |
| 33 | **CH3134** | 4 | **CH6134** | 4 | Symmetry and Group Theory | 5,7,21,31,33,11,13 | Arun Venkatnathan, Srabanti Chaudhury |
| 34 | **CH3143** | 3 | **CH6144** | 4 | Self-Assembly in Chemistry | 5,7,21,31,33,11,13 | Britto S. Sandanaraj |
| 35 | **CH3154** | 4 | **CH6154** | 4 | Chemical Equilibrium and Kinetics | 5,7,21,31,33,11,13 | Jeetender Chugh |
| 36 | **CH3163** | 3 | | | Advanced Organic Chemistry Laboratory | 5,7,31,11,13 | Pinaki Talukdar |
| 37 | **CH3313** | 3 | | | Semester Project | 5 | Muhammad Mustafa |
| 38 | **CH4114** | 4 | **CH6164** | 4 | Organic Synthesis - II | 7,21,31,33,11,13 | Srinivas Hotha |
| 39 | **CH4124** | 4 | **CH6174** | 4 | Bioinorganic Chemistry | 7,21,31,33,11,13 | Debangsu Sil |
| 40 | **CH4134** | 4 | **CH6184** | 4 | Polymer Chemistry | 7,21,31,33,11,13 | M. Jayakannan |
| 41 | **CH4144** | 4 | **CH6194** | 4 | Statistical Thermodynamics | 7,21,31,33,11,13 | Arnab Mukherjee |
| 42 | **CH4153** | 3 | | | Advanced Physical Chemistry Laboratory | 7,33 | Pramod Pillai, Pankaj Mandal, Muhammad Mustafa |
| 43 | **CH4164** | 4 | **CH6314** | 4 | Bioorganic Chemistry and Chemical Biology | 7,21,31,33,11,13 | S.G. Srivatsan |
| 44 | **CH4173** | 3 | **CH6324** | 4 | Solid State Chemistry | 7,21,31,33,11,13 | Angshuman Nag |
| 45 | **CH4184** | 4 | **CH6334** | 4 | Electrochemistry | 7,21,31,33,11,13 | Muhammad Mustafa, Nirmalya Ballav |
| 46 | **CH4194** | 4 | **CH6344** | 4 | Fundamentals of Solution-State NMR Spectroscopy: Principles and Applications (NKN) | 7,21,31,33,11,13 | Jeetender Chugh |
| 47 | **CH4313** | 3 | | | Semester Project | 7 | Muhammad Mustafa |

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 48 | **CH5516** | 6 | | | MSc Summer Project | 33 | Arnab Mukherjee |
| 49 | **CHM501** | | | | Project Part - 1 | | |
| 50 | **DS3114** | 4 | **DS6114** | 4 | Bioinformatics | 5,7,11,13,21 | M.S. Madhusudhan |
| 51 | **DS3124** | 4 | | | Statistical Inference | 5,7,31,33,11 | Chandrasheel Bhagwat |
| 52 | **DS3143** | 3 | **DS6124** | 4 | Parameter Estimation and Inverse Theory | 5,7,21 | M. Ismaiel, Rahul Dehiya |
| 53 | **DS3154** | 4 | **DS6134** | 4 | Applied Mathematical Methods | 5,21 | Joy Merwin Monteiro |
| 54 | **DS3184** | 4 | **DS6184** | 4 | Data Assimilation | 5,7,21 | Leelavati Narlikar |
| 55 | **DS3194** | 4 | **DS6314** | 4 | Systems and Databases | 5,21 | Leelavati Narlikar |
| 56 | **DS3313** | 3 | | | Semester Project | 5 | Leelavati Narlikar |
| 57 | **DS3324** | 4 | | | Markov Chain and its Application | 5,7,11,31,33 | Anindya Goswami, Taught by Dr. Somnath Pradhan, Assistant Professor, Mathematics, IISER Bhopal (via NKN) |
| 58 | **DS4124** | 4 | **DS6174** | 4 | Computational Functional Genomics | 7,21 | Leelavati Narlikar, Parameswaran Ramanathan |
| 59 | **DS4133** | 3 | **DS6193** | 3 | Deep Neural Networks | 7,21 | Leelavati Narlikar, Manasi Patwardhan |
| 60 | **DS4313** | 3 | | | Semester Project | 7 | Leelavati Narlikar |
| 61 | **DS6324** | | | | Statistical Inference | | Chandrasheel Bhagwat |
| 62 | **EC1213** | 3 | | | Evolution of Earth and Life | 1 | Devapriya Chattopadhyay |
| 63 | **EC2113** | 3 | | | Introduction to Climate Science | 3 | Neena Joseph Mani |
| 64 | **EC2123** | 3 | | | Landscapes and Their Evolution (Elective) | 3 | Argha Banerjee |
| 65 | **EC3114** | 4 | **EC6114** | 4 | Numerical Computation | 5,21 | Suhas Ettammal |
| 66 | **EC3124** | 4 | **EC6124** | 4 | Physics of the Atmosphere | 5,7,21 | Neena Joseph Mani |

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 67 | **EC3134** | 4 | **EC6144** | 4 | Applied Mathematical Methods | 5,21 | Joy Merwin Monteiro |
| 68 | **EC3154** | 4 | **EC6164** | 4 | Sedimentology and Stratigraphy | 5,21,31 | Sudipta Sarkar |
| 69 | **EC3164** | 4 | **EC6174** | 4 | Earth and Planetary Materials | 5,7,21,31 | Shreyas Managave |
| 70 | **EC3174** | 4 | **EC6324** | 4 | Structural Geology and Tectonics | 7,31 | Shreyas Managave, Durga Mohanty (SPPU) |
| 71 | **EC3183** | 3 | **EC6334** | 4 | Parameter Estimation and Inverse Theory | 5,7,21 | Mohammad Ismaiel, Rahul Dehiya |
| 72 | **EC3194** | 4 | **EC6354** | 4 | Paleobiology | 5,7,21,31 | Devapriya Chattopadhyay |
| 73 | **EC3313** | 3 | | | Semester Project | 5 | Ajay Kumar |
| 74 | **EC3323** | 3 | **EC6374** | 4 | Hydrology | 5,7,21,33 | Argha Banerjee |
| 75 | **EC3334** | 4 | **EC6534** | 4 | Introduction to Interactive Spheres | 21,31 | Ajay Kumar, Argha Banerjee |
| 76 | **EC3344** | 4 | **EC6544** | 4 | Data Assimilation | 5,7,21 | Amit Apte |
| 77 | **EC4114** | 4 | **EC6134** | 4 | Atmosphere and Ocean Dynamics | 7,21 | Suhas Ettammal |
| 78 | **EC4123** | 3 | **EC6364** | 4 | Sedimentology & Paleontology Lab | 7,31 | Alok Dave |
| 79 | **EC4134** | 4 | **EC6184** | 4 | Exploration Seismology | 5,7,21 | Rahul Dehiya |
| 80 | **EC4144** | 4 | **EC6194** | 4 | Tropical Meteorology | 7,21 | Suhas Ettammal, Sabin T.P. (IITM Pune) |
| 81 | **EC4153** | 3 | **EC6314** | 4 | Sequence Stratigraphy | 7,21,33 | Alok Dave |
| 82 | **EC4164** | 4 | **EC6344** | 4 | Igneous and Metamorphic Petrology | 7,21,33 | Shreyas Managave, Raymond Duraiswamy (SPPU) |
| 83 | **EC4173** | 3 | **EC6384** | 4 | Igneous and Metamorphic Petrology Lab | 7,21,33 | Shreyas Managave, Raymond Duraiswamy (SPPU) |
| 84 | **EC4313** | 3 | | | Semester Project | 7 | Ajay Kumar |
| 85 | **EC5516** | 6 | | | MSc Summer Project | 33 | Sudipta Sarkar |

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 86 | **ECS501** | | | | Project Part - 1 | | Sudipta Sarkar |
| 87 | **HS2123** | 3 | | | Introduction to HSS | 3 | Shalini Sharma, Pushkar Sohoni, Anil Zankar, Bejoy Thomas, Chaitra Redkar, Pooja Sancheti, Venketeswara R. Pai |
| 88 | **HS3144** | 4 | **HS6154** | 4 | Select Key Political Concepts | 5,7,11,13,21 | Chaitra Redkar |
| 89 | **HS3213** | 3 | **HS6214** | 4 | Introduction to Paninian Grammar | 5,7,11,13,21 | Venketeswara R. Pai |
| 90 | **HS3253** | 3 | **HS6354** | 4 | Introduction to Political Ecology | 5,7,11,13,21 | Shalini Sharma |
| 91 | **HS3313** | 3 | | | Semester Project | 5 | Pushkar Sohoni |
| 92 | **HS3343** | 3 | **HS6364** | 4 | Climate Adaptation and Development | 7,21 | Bejoy Thomas |
| 93 | **HS3353** | 3 | **HS6374** | 4 | History Beyond Texts | 5,7,11,13,21 | Pushkar Sohoni |
| 94 | **HS3364** | 4 | **HS6384** | 4 | City and Cinema | 7,13,21 | Anil Zankar |
| 95 | **HS4313** | 3 | | | Semester Project | 7 | Pushkar Sohoni |
| 96 | | | **HS6114** | 4 | PhD Reading Course | 21 | Pooja Sancheti |
| 97 | **MT1113** | 3 | | | Calculus - I | 1 | Divyang Bhimani, Amit Hogadi |
| 98 | **MT2113** | 3 | | | Introduction to Probability | 3 | Kaneenika Sinha, Moumanti Podder |
| 99 | **MT2123** | 3 | | | Advanced Linear Algebra (Elective) | 3 | Anupam Kumar Singh |
| 100 | **MT3114** | 4 | | | Rings and Modules | 5,7,31,33,11 | Baskar Balasubramanyam |
| 101 | **MT3124** | 4 | | | Real Analysis - II | 5,7,31,33,11 | Anisa Chorwadwala |
| 102 | **MT3134** | 4 | | | Point Set Topology | 5,7,31,33,11 | Ayan Mahalanobis |
| 103 | **MT3144** | 4 | | | Ordinary Differential Equations | 5,7,31,33,11 | Anup Biswas |
| 104 | **MT3154** | 4 | **MT6164** | 4 | Graph Theory | 5,7,31,33,21,22,11 | Soumen Maity |
| 105 | **MT3174** | 4 | | | Fields and Galois Theory | 5,7,31,33,11 | Debargha Banerjee |

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 106 | **MT3184** | 4 | | | Differential Geometry and Lie Groups | 7,31,33,11 | Mainak Poddar |
| 107 | **MT3194** | 4 | | | Statistical Inference | 5,7,31,33,11 | Chandrasheel Bhagwat |
| 108 | **MT3313** | 3 | | | Semester Project | 5 | Diganta Borah |
| 109 | **MT3324** | 4 | | | Markov Chain and its Application | 5,7,11,31,33 | Anindya Goswami, Taught by Dr. Somnath Pradhan, Assistant Professor, Mathematics, IISER Bhopal (via NKN) |
| 110 | **MT4114** | 4 | | | Algebraic Topology | 7,31,33 | Chandranandan Gangopadhyay |
| 111 | **MT4124** | 4 | | | Functional Analysis | 7,31,33,11 | Mousomi Bhakta |
| 112 | **MT4134** | 4 | **MT6124** | 4 | Probability | 7,31,33,21,22 | Anindya Goswami |
| 113 | **MT4144** | 4 | | | Representation theory of Finite Groups | 7,31,33,11 | Vivek Mohan Mallick |
| 114 | **MT4164** | 4 | | | Data Assimilation | 7,33 | Amit Apte |
| 115 | **MT4313** | 3 | | | Semester Project | 7 | Diganta Borah |
| 116 | **MT5516** | 6 | | | MSc Summer Project | 33 | Rabeya Basu |
| 117 | **MT5724** | 4 | | | Semester Project | 11,31 | Rabeya Basu |
| 118 | **MT5734** | 4 | | | Semester Project | 33 | Rabeya Basu |
| 119 | | 4 | **MT6134** | 4 | Algebra - I | 33,21,22 | Supriya Pisolkar |
| 120 | | 4 | **MT6144** | 4 | Analysis - I | 33,21,22 | Diganta Borah |
| 121 | | 4 | **MT6154** | 4 | Topology - I | 33,21,22 | Rama Mishra |
| 122 | | | **MT6184** | 4 | An Introduction to Operators on the Hardy Space | 21,22 | Haripada Sau |
| 123 | | 4 | **MT6414** | | Semester Project | 22 | Rama Mishra |
| 124 | **PH1113** | 3 | | | Introductory Mechanics | 1 | Diptimoy Ghosh |
| 125 | **PH1123** | 3 | | | Physics Lab - I | 1 | Vijayakumar Chikkadi, Bhas Bapat, Ramana Athreya, Shivprasad Patil, T.S. Mahesh |

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 126 | **PH2113** | 3 | | | Introductory Quantum Physics | 3 | Arka Banerjee, Sunil Mukhi |
| 127 | **PH2123** | 3 | | | Mathematical Methods for Physics (Elective) | 3 | Apratim Chatterji, Sudarshan Ananth |
| 128 | **PH3114** | 4 | **PH6114** | 4 | Electrodynamics - I | 5,11,21,31 | Ashish Arora |
| 129 | **PH3124** | 4 | | | Quantum Mechanics - I | 5,11,31 | M.S. Santhanam |
| 130 | **PH3134** | 4 | | | Optics | 5,11,31 | Pavan Kumar G.V. |
| 131 | **PH3144** | 4 | **PH6134** | 4 | Electronics - I with Lab | 5,11,21,31 | Shouvik Datta |
| 132 | **PH3153** | 3 | **PH6143** | 3 | Methods of Experimental Physics | 5,7,11,13,21,31 | Atikur Rahman |
| 133 | **PH3163** | 3 | **PH6733** | 3 | Mathematical Methods for Physics - II | 5,7,11,13,21,31 | Bijay Kumar Agarwalla |
| 134 | **PH3173** | 3 | | | Physics Lab - III | 5,11,31 | Umakant Rapol |
| 135 | **PH3313** | 3 | | | Semester Project | 5 | Aparna Deshpande |
| 136 | **PH4113** | 3 | **PH6363** | 3 | Condensed Matter Physics - II | 7,13,21 | Mukul Kabir |
| 137 | **PH4123** | 3 | **PH6163** | 3 | Statistical Mechanics - II | 7,13,21 | Sreejith G.J. |
| 138 | **PH4133** | 3 | **PH6373** | 3 | Quantum Field Theory - I | 7,13,21 | Arun M. Thalapillil |
| 139 | **PH4144** | 4 | | | Physics Lab - V | 7,13,31 | Sunil Nair, Srinivasan Ramakrishnan, Sourabh Dube |
| 140 | **PH4154** | 4 | **PH6384** | 4 | Nuclear and Particle Physics | 7,13,21 | Seema Sharma |
| 141 | **PH4163** | 3 | **PH6393** | 3 | Astronomy and Astrophysics - I | 7,13,21 | Susmita Adhikari |
| 142 | **PH4173** | 3 | **PH6513** | 3 | Fluid Dynamics | 7,13,21 | Sachin Jain |
| 143 | **PH4183** | 3 | **PH6523** | 3 | Gravitation | 5,7,13,21 | Suneeta Vardarajan |
| 144 | **PH4193** | 3 | **PH6533** | 3 | Physics at Nanoscales | 7,13,21 | Ashna Bajpai |
| 145 | **PH4273** | 3 | **PH6423** | 3 | Non-linear Dynamics | 5,7,13,21 | Rejish Nath |

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 146 | **PH4313** | 3 | | | Semester Project | 7 | Aparna Deshpande |
| 147 | **PH5513** | 3 | | | Semester Project | 11 | Aparna Deshpande |
| 148 | **PH5713** | 3 | | | Semester Project | 13 | Aparna Deshpande |
| 149 | | | **PH6712** | 2 | Space Weather | 13,21 | Prasad Subramanian |
| 150 | | | **PH6722** | 2 | Plasma Physics | 13,21 | Surabhi Jaiswal |
| 151 | **SE4113** | 3 | **SE6113** | 3 | The Cognitive Basis of Science | 7,11,13,21 | Aparna Deshpande, Nagarjuna G. |
| 152 | **SE4123** | 3 | **SE6123** | 3 | Science and the World | 7,11,13,21 | Bhas Bapat, Anirban Hazra, Joy Merwin Monteiro |
| 153 | **SE4313** | 3 | | | Semester Project | 7 | Aparna Deshpande |
| 154 | **TD1113** | 3 | | | Introduction to Computing | 1 | Suhita Nadkarni, Collins Assisi, Pranay Goel |
| 155 | **TD3113** | 3 | **TD6113** | 3 | Science and Technology Entrepreneurship (NKN) | 5,11,31,21 | S. Sivaram |
| 156 | **TD3122** | 2 | | | Summer Project | 5 | Neeraja Dashaputre |
| 157 | **NP3114** | 4 | | | Chemical Crystallography | 7 | Neeraja Dashaputre |
| 158 | **NP3124** | 4 | | | Classics in Total Synthesis - I | 7 | Neeraja Dashaputre |

## January 2025 Semester

*Note: 2, 4, 6 and 8 refer to BS-MS Semesters; 12 and 14 refer to iPhD Semesters 2 and 4; 22 refers to PhD Semester 2; 32 and 34 refer to MSc Semesters 2 and 4; Total of 159 courses, of which 6 are dual-coded courses across departments*

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 1 | **BI1213** | 3 | | | Introduction to Biomolecules | 2 | M.S. Madhusudhan, Kalika Prasad, Siddhesh Kamat |
| 2 | **BI2213** | 3 | | | Cell Biology (E) | 4 | Nagaraj Balasubramanian, Thomas Pucadyil |
| 3 | **BI2223** | 3 | | | Physiology (E) | 4 | Nishad Matange, Satyajit Rath, Nishikant Subhedar |
| 4 | **BI2233** | 3 | | | Genetics (E) | 4 | Mridula Nambiar, Richa Rikhy |

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 5 | **TD2223** | 3 | | | Data Analysis | 4 | Raghav Rajan, Pranay Goel |
| 6 | **BI3214** | 4 | **BI6214** | 4 | Animal Physiology - I | 6,8,12,14,22 | Nixon M. Abraham, Nishikant Subhedar |
| 7 | **BI3224** | 4 | **BI6224** | 4 | Introductory Immunology | 6,8,12,14,22 | Satyajit Rath, Vineeta Bal |
| 8 | **BI3234** | 4 | **BI6234** | 4 | Animal Behaviour | 6,8,12,14,22 | Raghav Rajan |
| 9 | **BI3254** | 4 | **BI6254** | 4 | Microbiology | 6,8,12,14,22 | Sunish Radhakrishnan, Gayathri Pananghat |
| 10 | **BI3264** | 4 | **BI6264** | 4 | Mathematical & Computational Biology | 6,8,12,14,22 | Collins Assisi, Suhita Nadkarni |
| 11 | **BI3274** | 4 | **BI6274** | 4 | Chemical Ecology | 6,8,12,14,22 | Sagar Pandit |
| 12 | **BI3284** | 4 | **BI6284** | 4 | Advanced Biochemistry - II | 6,8,12,14,22 | Thomas Pucadyil, Amrita Hazra |
| 13 | **BI3424** | 4 | **BI6424** | 4 | Statistical learning and data science | 6,8,12,14,22 | Pranay Goel |
| 14 | **BI3444** | 4 | **BI6444** | 4 | Genome Biology and Epigenetics | 8,12,14,22 | Kundan Sengupta, Krishanpal Karmodiya |
| 15 | **BI4213** | 3 | **BI6613** | 3 | Applied Plant Biology | 6,8,12,14,22 | Anjan Banerjee |
| 16 | **BI3413** | 3 | **BI6413** | 3 | Physical Biochemistry | 6,8,12,14,22 | Jayant B. Udgaonkar |
| 17 | **BI4233** | 3 | **BI6623** | 3 | Cellular Biophysics - II | 6,8,12,14,22 | Chaitanya Athale |
| 18 | **BI4223** | 3 | **BI6633** | 3 | Neurobiology - II | 6,8,12,14,22 | Suhita Nadkarni, Nixon M. Abraham |
| 19 | **BI5214** | 4 | **BI6464** | 4 | Literature Review | 12,14,22 | Saikrishnan Kayarat, Suhita Nadkarni, Nagaraj Balasubramanian, Sudha Rajamani |
| 20 | **BI5223** | 3 | | | Lab Training | 12 | Raghav Rajan |
| 21 | **BI5236** | 6 | | | Research Project | 14 | Raghav Rajan |
| 22 | **BI5245** | 5 | | | Research Seminar | 14 | Raghav Rajan |
| 23 | | | **BI6472** | 2 | Design Principles of Nervous Systems | 12,14,22 | Aurnab Ghose |

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 24 | **BI4153** | 3 | | | Undergraduate Research Experiments | 6 | Krishanpal Karmodiya, Nixon M. Abraham, Girish Ratnaparkhi |
| 25 | **BI3333** | 3 | | | Disease and Discourse | 6 | Nishad Matange, Pooja Sancheti |
| 26 | **BI4613** | 3 | | | Lab/Theory Project | 8 | Aurnab Ghose |
| 27 | **BI3613** | 3 | | | Lab/Theory Project | 6 | Aurnab Ghose |
| 28 | **CH1213** | 3 | | | Principles of Physical Chemistry | 2 | Pramod Pillai, Aloke Das |
| 29 | **CH1223** | 3 | | | General Chemistry Practicals - I | 2 | Pramod Pillai, Prasenjit Ghosh, Amrita Hazra, Pinaki Talukdar, Britto S. Sandanaraj, Moumita Majumdar, R. Boomi Shankar |
| 30 | **CH2213** | 3 | | | Analytical Chemistry (E) | 4 | M. Jayakannan |
| 31 | **CH2223** | 3 | | | Principles of Organic Chemistry - II (E) | 4 | Ramakrishna G. Bhat |
| 32 | **CH2233** | 3 | | | Fundamentals of Molecular Spectroscopy (E) | 4 | Partha Hazra |
| 33 | **TD2213** | 3 | | | Thermodynamics | 4 | Srabanti Chaudhury, Sunil S. Bhagwat |
| 34 | **CH3214** | 4 | **CH6214** | 4 | Quantum Chemistry | 6,8,12,22,32 | Anirban Hazra |
| 35 | **CH3224** | 4 | **CH6224** | 4 | Organic Synthesis - I | 6,8,12,22,32 | Boopathy Gnanaprakasam |
| 36 | **CH3234** | 4 | **CH6234** | 4 | Transition Metal Chemistry | 6,8,12,22,32 | Sujit Ghosh |
| 37 | **CH4254** | 4 | **CH6244** | 4 | Structural Methods and Analysis | 8,14,22,32 | Pinaki Talukdar, S.G. Srivatsan |
| 38 | **CH4264** | 4 | **CH6254** | 4 | Advanced Molecular Spectroscopy | 6,8,12,14,22, 32,34 | Pankaj Mandal |
| 39 | **CH4274** | 4 | **CH6264** | 4 | Medicinal Chemistry | 8,14,22,32,34 | Harinath Chakrapani |
| 40 | **CH4224** | 4 | **CH6284** | 4 | Advanced Material Science | 6,8,14,22,32,34 | R. Boomi Shankar, Seema Verma |
| 41 | **CH4243** | 3 | **CH6294** | 4 | Organometallic Chemistry | 8,14,22,32,34 | Ramakrishna G. Bhat, Buddhadeb Chattopadhyay |
| 42 | **CH3613** | 3 | | | Semester Project | 6 | Muhammad Mustafa |

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 43 | **CH4613** | 3 | | | Semester Project | 8 | Muhammad Mustafa |
| 44 | **CH4284** | 4 | **CH6414** | 4 | Chemistry for Alternative Energy | 8,12,14,22, 32,34 | Angshuman Nag, Muhammad Mustafa |
| 45 | **CH4214** | 4 | **CH6424** | 4 | Organotransition Metal Catalysis | 8,14,22,32,34 | Shabana Khan |
| 46 | **CH3253** | 3 | | | Advanced Inorganic Chemistry Laboratory | 6,8,32 | Debangsu Sil, V.G. Anand |
| 47 | **CH4233** | 3 | **CH6454** | 4 | Thermal Pericyclic and Photochemical Reactions | 8,14,22,32,34 | Hosahudya N. Gopi |
| 48 | **CH4294** | 4 | **CH6464** | 4 | Introduction to Machine Learning in Chemistry | 22,32,34 | Arnab Mukherjee |
| 49 | **CH4323** | 3 | **CH6363** | 3 | Environmental Chemistry and Sustainability | 8,12,14,22, 32,34 | V.G. Anand |
| 50 | **DS3613** | 3 | | | Semester Project | 6 | Leelavati Narlikar |
| 51 | **DS4613** | 3 | | | Semester Project | 8 | Leelavati Narlikar |
| 52 | **DS4213** | 3 | **DS6213** | 3 | Natural Language Processing | 8,12,14,22, 32,34 | Leelavati Narlikar, Manasi Patwardhan |
| 53 | **DS4244** | 4 | **DS6244** | 4 | Bayesian Theory and Practice | 6,8,12,14,22, 32,34 | Leelavati Narlikar |
| 54 | **DS3244** | 4 | **DS6294** | 4 | Numerical Linear Algebra | 6,8,12,14,22, 32,34 | Amit Apte |
| 55 | **DS3254** | 4 | **DS6414** | 4 | Systems and Implementation of Algorithms | 6,8,12,14,22, 32,34 | Kalpesh Kapoor |
| 56 | **DS3263** | 3 | **DS6423** | 3 | Signal Processing | 6,8,12,14,22, 32,34 | Amit Apte, Udayan Kanade |
| 57 | **DS3273** | 3 | **DS6433** | 3 | Image and Video Processing with Deep Learning | 6,8,12,14,22, 32,34 | Amit Apte, Chaitanya Guttikar |
| 58 | **DS3214** | 4 | **DS6264** | 4 | Statistical Learning and Data Science | 6,8,12,14,22 | Pranay Goel |
| 59 | **DS4254** | 4 | **DS6284** | 4 | Stochastic Processes | 8,22 | Anup Biswas |
| 60 | **DS3234** | 4 | **DS6144** | 4 | Algorithms | 6,8,32,34,22 | Soumen Maity |
| 61 | **DS3284** | 4 | | | Topics: Mathematical Finance | 6,8,32,34,12 | Anindya Goswami |

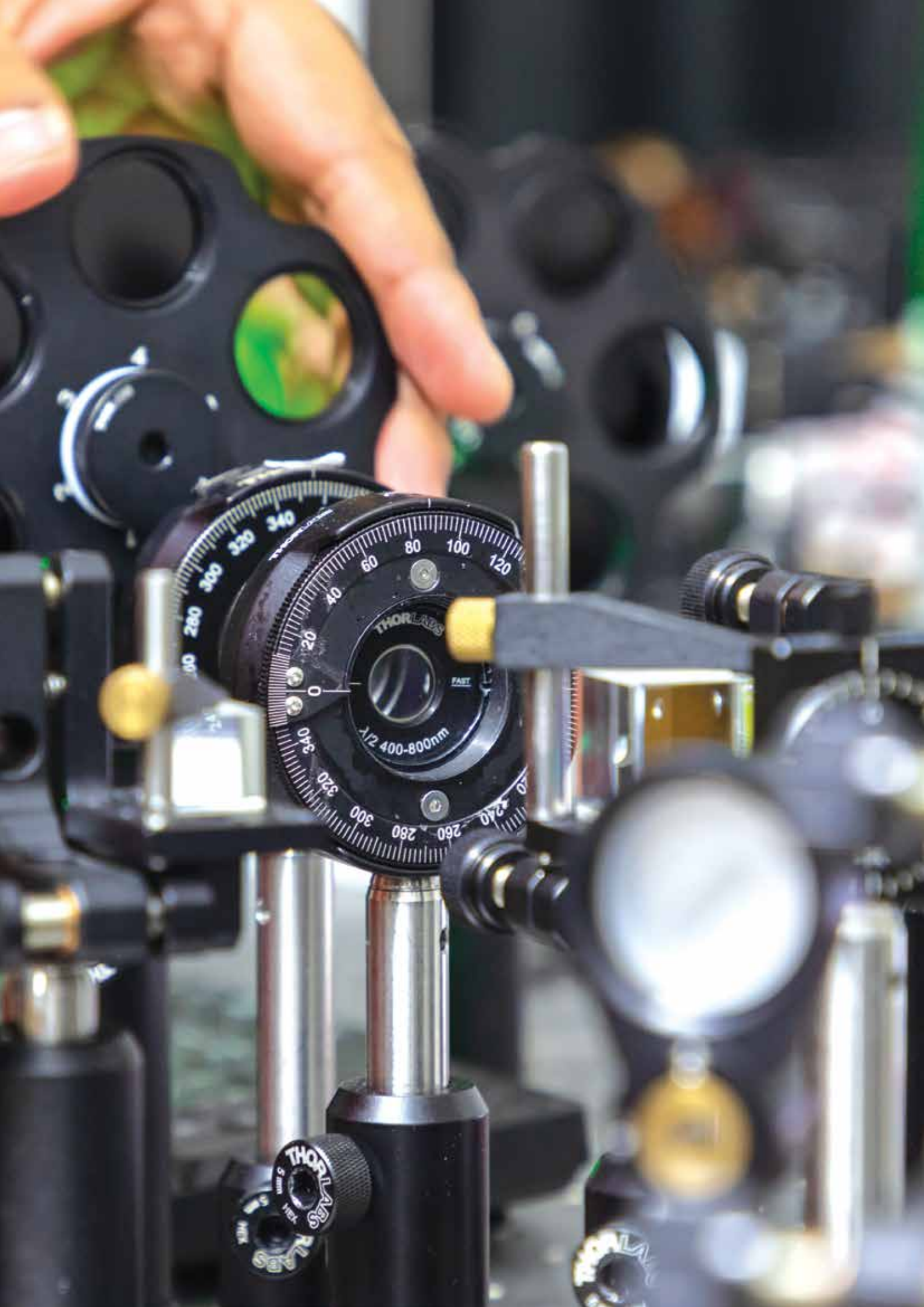
| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 62 | **EC1223** | 3 | | | The Solid Earth | 2 | Arjun Datta |
| 63 | **EC2213** | 3 | | | Principles of Planetary Climate (E) | 4 | Joy Merwin Monteiro |
| 64 | **EC2253** | 3 | | | Introductory Seismology (E) | 4 | Arjun Datta |
| 65 | **EC2243** | 3 | | | Atmosphere and Ocean Chemistry (E) | 4 | Gyana Ranjan Tripathy |
| 66 | **EC3214** | 4 | **EC6214** | 4 | Geo and Cosmochemistry | 6,8,22,32 | Shreyas Managave |
| 67 | **EC3224** | 4 | **EC6224** | 4 | Geophysical Fluid Dynamics | 6,8,22 | Suhas Ettammal |
| 68 | **EC3414** | 4 | **EC6294** | 4 | Geodynamics - 1 | 6,8,22 | Ajay Kumar |
| 69 | **EC3243** | 3 | | | Analytical Geochemistry Lab | 6,8,32 | Gyana Ranjan Tripathy |
| 70 | **EC3253** | 3 | | | Introduction to Field Techniques | 6,8,32 | Sudipta Sarkar, Shreyas Managave |
| 71 | **EC3264** | 4 | **EC6234** | 4 | Physical Oceanography | 6,8,22 | Joy Merwin Monteiro |
| 72 | **EC3284** | 4 | **EC6264** | 4 | Satellite Data Analysis & Image Processing | 8,32,22 | Sudipta Sarkar |
| 73 | **EC3293** | 3 | **EC6274** | 4 | Isotope Geochemistry | 6,8,32,22 | Gyana Ranjan Tripathy |
| 74 | **EC4224** | 4 | **EC6424** | 4 | Climate Modeling | 8,22 | Neena Joseph Mani, Vinu Valsala (IITM Pune) |
| 75 | **EC4243** | 3 | **EC6283** | 4 | Geological Field Training | 8,34,22 | Alok Dave, Shilpa Patil |
| 76 | **EC4254** | 4 | **EC6414** | 4 | Indian Geology and Resources | 8,32,22 | Alok Dave |
| 77 | **EC3613** | 3 | | | Semester Project | 6 | Rahul Dehiya |
| 78 | **EC4613** | 3 | | | Semester Project | 8 | Rahul Dehiya |
| 79 | **EC4262** | 2 | | | Research - 1 | 32 | Sudipta Sarkar |
| 80 | **EC3274** | 4 | **EC6244** | 4 | Geoelectromagnetic Exploration | 6,8,22 | Rahul Dehiya |
| 81 | **EC4283** | 3 | | | Geophysics Field Experiment and Data Analysis | 8 | Rahul Dehiya, Shyam Sundar Rai |

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 82 | **EC4274** | 4 | **EC6434** | 4 | Gravity and Magnetic Exploration | 8,22 | Mohammad Ismaiel |
| 83 | **HS3323** | 3 | **HS6324** | 4 | Philosophy of the Constitution of India | 6,8,14,22 | Chaitra Redkar |
| 84 | **HS3123** | 3 | **HS6134** | 4 | Evolution of Cinema | 6,8,14,22 | Anil Zankar |
| 85 | **HS3613** | 3 | | | Semester Project | 6 | Pushkar Sohoni |
| 86 | **HS4613** | 3 | | | Semester Project | 8 | Pushkar Sohoni |
| 87 | **HS3463** | 3 | **HS6564** | 4 | Introduction to Archaeological Science | 6,8,14,22 | Pushkar Sohoni |
| 88 | **HS3114** | 4 | **HS6124** | 4 | Disasters and Society | 6,8,14,22 | Shalini Sharma |
| 89 | | | **HS6264** | 4 | Research Methods, Fieldwork, and Ethics | 22 | Bejoy Thomas, Chaitra Redkar, Shalini Sharma, Pooja Sancheti, Pushkar Sohoni, Venketeswara R Pai |
| 90 | **HS3433** | 3 | **HS6424** | 4 | Introduction to Indian Writing in English: Prose and Poetry | 6,8,14,22 | Pooja Sancheti |
| 91 | **HS3173** | 3 | | 4 | Disease and Discourse | 6 | Nishad Matange, Pooja Sancheti |
| 92 | **HS3283** | 3 | **HS6294** | 4 | Development of Mathematical Astronomy in India | 6,8,14,22 | Venketeswara R. Pai |
| 93 | **HS1223** | 3 | | | Science and Society | 2 | Pushkar Sohoni |
| 94 | | | **HS6114** | 4 | PhD Reading Course | 22 | Pooja Sancheti |
| 95 | **HS3453** | 3 | **HS6454** | 4 | Public Policy - I | 6,8,22 | Bejoy Thomas, Subodh Wagle |
| 96 | **MT1213** | 3 | | | Calculus - II | 2 | Krishna Kaipa, Rama Mishra |
| 97 | **MT1223** | 3 | | | Linear Algebra | 2 | Chandrasheel Bhagwat |
| 98 | **MT2213** | 3 | | | Group Theory (E) | 4 | Ayan Mahalanobis |
| 99 | **MT2223** | 3 | | | Real Analysis - I (E) | 4 | Divyang Bhimani |
| 100 | **MT2233** | 3 | | | Discrete Structures (E) | 4 | Moumanti Podder |

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 101 | **MT3214** | 4 | | | Complex Analysis | 6,8,32,34,12 | Chandranandan Gangopadhyay |
| 102 | **MT3224** | 4 | | | Algebraic Number Theory | 6,8,32,34,12 | Anupam Kumar Singh |
| 103 | **MT3234** | 4 | | | Measure Theory and Integration | 6,8,32,34,12 | Haripada Sau |
| 104 | **MT3244** | 4 | | | Calculus on Manifolds | 6,8,32,34,12 | Diganta Borah |
| 105 | **MT4244** | 4 | **MT6314** | 4 | Cryptography | 8,22,12,32,34 | Steven Spallone |
| 106 | **MT3264** | 4 | **MT6214** | 4 | Algorithms | 6,8,32,34,22,12 | Soumen Maity |
| 107 | **MT4214** | 4 | **MT6174** | 4 | Algebraic Geometry | 8,32,34,12 | Manish Mishra |
| 108 | **MT4224** | 4 | **MT6184** | 4 | Fourier Analysis | 8,32,34,12 | Kaneenika Sinha |
| 109 | **MT4234** | 4 | **MT6194** | 4 | Riemannian Geometry | 8,32,34,12 | Mainak Poddar |
| 110 | **MT4254** | 4 | **MT6324** | 4 | Stochastic Processes | 8,32,34,22,12 | Anup Biswas |
| 111 | **MT4264** | 4 | **MT6334** | 4 | Partial Differential Equations | 8,32,34,12 | Mousomi Bhakta |
| 112 | **MT3284** | 4 | | 4 | Topics: Mathematical Finance | 6,8,32,34,12 | Anindya Goswami |
| 113 | **MT3294** | 4 | | | Topics: Computational number theory with Sage | 6,8,32,34,12 | Vivek Mohan Mallick, Baskar Balasubramanyam |
| 114 | **MT3413** | 3 | | | Topics: Symmetry and Lie Groups | 6,8,32,14,12 | Anupam Kumar Singh, Abhishek Sarkar, Navnath Daundkar |
| 115 | **MT5214** | 4 | **MT6234** | 4 | Algebra - II | 22,34 | Rabeya Basu |
| 116 | **MT5224** | 4 | **MT6244** | 4 | Analysis - II | 22,34 | Anisa Chorwadwala |
| 117 | **MT5234** | 4 | **MT6254** | 4 | Topology - II | 22,34 | Debargha Banerjee |
| 118 | **MT3613** | 3 | | | Semester Project | 6 | Baskar Balasubramanyam |
| 119 | **MT4613** | 3 | | | Semester Project | 8 | Baskar Balasubramanyam |
| 120 | **MT5614** | 4 | | 4 | Semester Project | 32 | Manish Mishra |
| 121 | **MT5814** | 4 | | 4 | Semester Project | 34 | Manish Mishra |
| 122 | | | **MT6414** | 4 | PhD Semester Project | 22 | Rama Mishra |

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 123 | **MT7218** | 8 | | | MSC Thesis | 34 | Krishna Kaipa |
| 124 | **MT4294** | 4 | **MT6434** | 4 | Bayesian Theory and Practice | 6,8,12,14, 22,32,34 | Leelavati Narlikar |
| 125 | **PH1213** | 3 | | | Introductory Electricity and Magnetism | 2 | Susmita Adhikari, Sachin Jain |
| 126 | **PH2213** | 3 | | | Classical Mechanics (E) | 4 | Arijit Bhattacharyay |
| 127 | **PH2223** | 3 | | | Thermal & Statistical Physics (E) | 4 | Mukul Kabir |
| 128 | **PH2233** | 3 | | | Physics Lab - II (E) | 4 | Sourabh Dube, Atikur Rahman, Rejish Nath |
| 129 | **PH3214** | 4 | **PH6214** | 4 | Quantum Mechanics - II | 6,12,22,32 | M.S. Santhanam |
| 130 | **PH3244** | 4 | | | Physics Lab - IV | 6,12 | Bhas Bapat, Surabhi Jaiswal |
| 131 | **PH3234** | 4 | **PH6264** | 4 | Statistical Mechanics - I | 6,12,22,32 | Ushasi Roy |
| 132 | **PH3224** | 4 | **PH6274** | 4 | Condensed Matter Physics - I | 6,12,22,32 | Prasenjit Ghosh |
| 133 | **PH3264** | 4 | **PH6234** | 4 | Computational Physics | 6,8,12,14,22,32 | Apratim Chatterji |
| 134 | **PH3273** | 3 | **PH6243** | 3 | Electronics & Instrumentation | 6,8,12,14,22,32 | Aparna Deshpande |
| 135 | **PH3253** | 3 | **PH6223** | 3 | Group Theory in Physics | 6,8,12,14,22 | Sudarshan Ananth |
| 136 | **PH3613** | 3 | | | BS-MS Semester Project | 6 | Ashna Bajpai |
| 137 | **PH5613** | 3 | | | iPhD Semester Project | 12 | Ashna Bajpai |
| 138 | **PH4224** | 4 | **PH6254** | 4 | Atomic and Molecular Physics | 8,14,22,32 | T.S. Mahesh |
| 139 | **PH4233** | 3 | | | Physics Lab - VI | 8,14 | Umakant Rapol, Sunil Nair |
| 140 | **PH4243** | 3 | **PH6283** | 3 | Advanced Gravitation | 8,14,22 | Suneeta Vardarajan |
| 141 | **PH4253** | 3 | **PH6293** | 3 | Quantum Optics | 8,14,22,32 | Shouvik Datta |
| 142 | **PH4263** | 3 | **PH6433** | 3 | Astronomy and Astrophysics - II | 8,14,22 | Prasad Subramanian |

| Sr. No. | Course Code BS-MS/ MSc/ iPhD | Credits BS-MS/ MSc/ iPhD | Course Code PhD | Credits PhD | Course Title | Open to Semester | Coordinator / Instructor |
|---|---|---|---|---|---|---|---|
| 143 | **PH4213** | 3 | **PH6443** | 3 | Cosmology | 8,14,22 | Arka Banerjee |
| 144 | **PH3293** | 3 | **PH6663** | 3 | Quantum Information and Quantum Computing | 6,8,12,14,22,32 | Sreejith G.J. |
| 145 | **PH4283** | 3 | **PH6453** | 3 | Advanced Particle Physics | 8,14,22 | Diptimoy Ghosh |
| 146 | **PH4293** | 3 | **PH6463** | 3 | Physics of Soft Matter | 8,14,22 | Vijayakumar Chikkadi |
| 147 | **PH4413** | 3 | **PH6473** | 3 | Quantum Field Theory - II | 8,14,22 | Arun M. Thalapillil |
| 148 | **PH4423** | 3 | **PH6673** | 3 | Experimental Techniques in High Energy Physics | 8,14,22 | Seema Sharma |
| 149 | **PH4613** | 3 | | | BS-MS Semester Project | 8 | Ashna Bajpai |
| 150 | **PH5213** | 3 | | | iPhD Semester Project | 14 | Ashna Bajpai |
| 151 | | | **PH6622** | 2 | Communicating Science | 14,22 | Satishchandra Ogale |
| 152 | | | **PH6632** | 2 | Light & Electron Microscopy: Physics & Applications | 14,22 | Pavan Kumar G.V. |
| 153 | | | **PH6642** | 2 | Optics and Magneto optics of Solids | 14,22 | Ashish Arora |
| 154 | | | **PH6652** | 2 | Superconductivity and Low Tempera-ture Techniques | 14,22 | Srinivasan Ramakrishnan |
| 155 | **SE4213** | 3 | | | Pedagogy of Science | 8 | Supriya Pisolkar, Shamin Padalkar |
| 156 | **SE4223** | 3 | | | Role of Media and Models in Science Education | 8 | Aparna Deshpande, G. Nagarjuna |
| 157 | **TD3113** | 3 | **TD6113** | 3 | Science and Technology Entrepreneurship | 6,8,12,32,22 | S. Sivaram |
| 158 | **CHM502** | | | | MSc Project | 34 | Arnab Mukherjee |
| 159 | **ECS502** | | | | MSc Project | 34 | Sudipta Sarkar |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# News, Events, and Initiatives

# Conferences, Symposia, and Workshops

Researchers at IISER Pune organise conferences and workshops that foster collaboration and academic exchange among the scientific community, both nationally and internationally.

## Scientific Conferences and Workshops

### Frontiers in DNA-Chromatin Dynamics

June 7-8, 2024

**Organisers:** Krishanpal Karmodiya, Kundan Sengupta

### Computational Approaches to Memory and Plasticity (CAMP) 2024

July 1-17, 2024

**Organisers:** Suhita Nadkarni, Collins Assisi, Rishikesh Narayanan, Upinder Bhalla, Arvind Kumar

### Future Perspectives on QFT and Strings

July 24-27, 2024

**Organisers:** Suneeta Vardarajan, Diptimoy Ghosh, Sachin Jain, Sunil Mukhi

### Biophysics Paschim 16: Biophysics Across Scales & Festschrift for Sudipta Maiti

August 24, 2024

**Organiser:** Chaitanya A. Athale

### Conference on Integrated Earth (CITE)-2024

September 1-2, 2024

**Organiser:** Earth and Climate Science Department, IISER Pune

**Organising Committee:** Anish Patil, Argha Banerjee, Joy Merwin Monteiro, Krishnanand J., Medha Murti, Ruby Soni, Shreyas Managave, Shuvashree Maity, Vibhas Shevde, Vaibhav Pachaulee

**Conveners:** Ajay Kumar, M. Ismaiel

### Discussion Meeting in Spectral Theory

September 13-14, 2024

**Organisers:** Anisa Chorwadwala (IISER Pune) and Sheela Verma (IIT-BHU)

### 32nd National Congress on Parasitology

October 3-5, 2024

**Organisers:** Krishanpal Karmodiya (IISER Pune), Dhanasekaran Shanmugam, (CSIR- National Chemical Laboratory, Pune), D.V. Desai (Savitribai Phule Pune University, Pune), in association with the Indian Society for Parasitology (ISP)

### Water Journalists Roundtable

November 7-9, 2024

**Organisers:** Shalini Sharma (Faculty In-charge, Science Media Centre, IISER Pune); Sara Ahmed (Founder, Living Water Museum); Namita Waikar (Co-founder, PARI)

### fairSTREAM Project Workshop: Alternative Futures: The Water-Food-Biodiversity Nexus in the Upper Bhima Basin

November 12, 2024

**Organiser:** Bejoy Thomas

### International Conference on Engineered Chemical and Biochemical Systems (ECBS2024)

November 12-15, 2024

**Organiser:** Chemistry Department, IISER Pune

**International Advisory Committee:** Sandeep Verma (IIT Kanpur); Alexander Heckel (Goethe-Universität Frankfurt); Nina Morgner (Goethe-Universität Frankfurt)

**Local Coordinator:** Prabhpreet Singh (Guru Nanak Dev University, Amritsar)

**Conveners:** R. Boomi Shankar and S.G. Srivatsan (IISER Pune)

### Industry-Academy Workshop (Franco Indian Campus for Health)

December 3-5, 2024

**Organisers:** Sudha Rajamani and Naresh Sharma

### Celebrating Number Theory in India: A conference to celebrate the 70th birthday of Prof. M. Ram Murty

December 9-13, 2024

**Organisers:** Tapas Chaterjee (IIT Ropar); Sanoli Gun (IMSc Chennai); Sudhir Pujahari (NISER Bhubaneswar); Kaneenika Sinha (IISER Pune)

### International Conference on Advanced Energy Materials and Interfaces - 2024 (AEMI-2024)

December 9-11, 2024

**Organisers:** IISER Pune, Wiley, and TCG CREST

### India BioImaging (IBI) Meeting 2024

December 12-13, 2024

**Organisers:** Richa Rikhy, Aurnab Ghose and Santosh Podder (IISER Pune); and Yara Reis (Global BioImaging)

### Young Investigators Meet on Quantum Condensed Matter Theory 2024

December 16-18, 2024

**Organisers:** Prasenjit Ghosh, Mukul Kabir, Bijay Agarwalla and Sreejith G.J.

### Women in Numbers (WIN) Symposium

January 17-19, 2025

**Organisers:** Sanoli Gun (IMSc, Chennai); Supriya Pisolkar (IISER Pune); Srimathy Srinivasan (TIFR, Mumbai)

### Workshop titled “From fundamental science to application in plants”

February 3-6, 2025

**Organiser:** Kalika Prasad

### 10th Indian Peptide Symposium

February 26-28, 2025

**Organiser:** H.N. Gopi (Organising Secretary)

### Germ-Cell Stem-Cell (GCSC) Meeting

February 28 - March 2, 2025

**Organisers:** Girish Ratnaparkhi and Girish Deshpande

### Symposium on Mathematics in Academia and Industry

March 15, 2025

**Organiser:** Anindya Goswami

### Inter IISER - NISER Chemistry Meet IINCM'25

March 20-22, 2025

**Convener:** Ramakrishna G. Bhat; **Co-convener**: Debangsu Sil

**Organising Committee**: Faculty Members and Research Scholars, Department of Chemistry, IISER Pune

## Training and Capacity Building Workshops

### Training Workshop on Water-Resource Management using Geospatial Data Analysis

April 1-5, 2024

**Organiser:** Argha Banerjee

### Microscopy and Image Analysis Training Course

May 20-24, 2024

**Organiser:** Santosh Poddar

### DBT-sponsored Centre for Training Teachers in using *Drosophila melanogaster* for Biology Laboratories

December 23-30, 2024

**Organisers:** S.C. Lakhotia, Richa Arya, and Bama Charan Mondal from Banaras Hindu University, Varanasi; Girish Ratnaparkhi and Richa Rikhy from IISER Pune; and Anuradha Ratnaparkhi from Agharkar Research Institute (ARI), Pune

### Hands-on Workshop on Cryopreservation and Rederivation of Mouse Sperm and Embryos

March 25-28, 2025

**Organiser:** Swapnil Bangar

## In-house Departmental Symposia

### Chemsymphoria 2024

December 2-3, 2024

**Organiser:** Chemistry Department and Chemphilic Club, IISER Pune

### BioConclave 2024-25

October 17-18, 2024

**Organiser:** Biology Department, IISER Pune

### In-house Math Symposium

January 10-11, 2025

**Organiser:** Mathematics Department, IISER Pune

### Physics Conclave 2025

March 6-7, 2025

**Organiser:** Physics Department, IISER Pune

## Named Lectures

### Sixth Annual P.M. Mukhi Memorial Human Rights Lecture

October 21, 2024

**Speaker:** Justice Gautam Patel (Former Judge, Bombay High Court)

**Title:** I spy with my little eye: Human rights in an age of pervasive surveillance

**Organiser:** Humanities and Social Science Department, IISER Pune

### Eleventh Annual Homi Bhabha Memorial Public Lecture

November 8, 2024

**Speaker:** Prof. Rama Govindarajan, International Centre for Theoretical Sciences, Bengaluru

**Title:** How dust talks to turbulence

**Organiser:** Physics Department, IISER Pune

## Institute Colloquia

### Swadeshi Steam: Economic Nationalism and Maritime Rivalry in Colonial South India

Prof. A.R. Venkatachalapathy, Madras Institute of Development Studies, Chennai

August 13, 2024

### Interdisciplinary Approaches to Public Policy and Business Strategy

Dr. Badri Narayanan Gopalakrishnan (NITI Aayog, Govt. of India & Infinite Sum Modelling, U.S.A.)

August 21, 2024

### Journey from a Risky Start to Launching India's First Private Rocket to Space

Pawan Kumar Chandana, Co-Founder & CEO of Skyroot Aerospace

January 16, 2025

### Space Research: Past Present and Future

Dr. S. Venkateswara Sharma, Former Deputy Director, Program Director, UR Rao Satellite Center, Bengaluru

February 1, 2025

### Darwin's Law in Action: Applying Digital Revolution for Research, Innovation, and Education

Prof. Robert Pennock, Michigan State University, U.S.A.

March 11, 2025

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*Research seminars hosted by the different departments of IISER Pune are not listed in this report. The institute also hosts several academic outreach events reaching out to external audiences such as students, teachers, and members of the public. These activities are described in the Outreach Activities chapter of this report.*

# News and Events

### Fourteenth Foundation Day

April 8, 2024

The 14th Foundation Day of IISER Pune was celebrated with a Foundation Day Lecture by Lt. Gen. Madhuri Kanitkar (Retd.), Vice-Chancellor, Maharashtra University of Health Sciences, Nashik. The title of her talk was “Make your research count”. Director Prof. Sunil S. Bhagwat shared updates and achievements from the institute with the IISER Pune community. Foundation Day Awards were presented to students, faculty, and staff in recognition of their excellence at work.

### New Master of Science Programme in Quantum Technology at IISER Pune

April 10, 2024

A two-year Master of Science programme in Quantum Technology was launched in an online meeting in the presence of Dr. Ajai Chowdhry, Chairman, Mission Governing Body, National Quantum Mission; Prof. Ajay Sood, Principal Scientific Adviser to Govt. of India; the DST Secretary Prof. Abhay Karandikar; and the Director of IISER Pune Prof. Sunil S. Bhagwat. The programme is anticipated to equip students with the skills to work in Quantum Technology and to include significant industry overlap.

### Eleventh Convocation of IISER Pune

May 29, 2024

A total of 346 students received their degrees in the 11th convocation of IISER Pune. This included 72 students graduating with PhD degree, 28 with Master of Science and PhD dual degrees, and 9 with Master of Science degree pursued via the Integrated PhD channel, 195 with BS and MS dual degrees and 15 with BS degree, and 27 students with a Master of Science degree from the new Master’s programme the institute had launched in 2022-23 academic year. The Chief Guest for the occasion Dr. Vijay Kumar Saraswat (Member, NITI Aayog, Government of India) gave the convocation address.

Fifteen BS-MS students received their degrees with Distinction (CGPA >9). BS-MS student Shah Varun Kaushal received the institute gold medal. PhD students Himani Khurana (Biology); Pooja Sindhu (Chemistry); and Mitesh Modasiya (Mathematics) received the Xytel Best PhD Thesis Awards; and BS-MS students Shweta Garg (Biology); Hritwik Haldar (Chemistry); Garvit A.

(Data Science); Devyani Jambhule (Earth and Climate Science); Varun (Humanities and Social Sciences); Shah Varun Kaushal (Mathematics); and Vedhanth S.V.U. (Physics) received the Xytel Best MS Thesis Awards.

### Alumni Connect Event

May 29, 2024

The charter of the alumni association was unveiled during the Alumni Connect event held in May 2024. The event brought together IISER Pune alumni, and current students and faculty members. Director Prof. Bhagwat addressed the gathering, and, along with Associate Dean for International Relations Prof. Kundan Sengupta, unveiled the charter of the alumni association.

### Inauguration of Kalpakghar Community STEM-Tinkering Centre

August 21, 2024

Kalpakghar is a collaborative STEM-tinkering project between IISER Pune and Pimpri Chinchwad Science Park and is funded by Tata Technologies Ltd. under its Corporate Social Responsibilities initiative. Housed within the Science Park, Kalpakghar has hands-on models and activities based on STEM subjects (Science, Technology, Engineering, Mathematics). Besides schools and colleges of PCMC area Kalpakghar is also open to all visitors of the Pimpri Chinchwad Science Park.

The inauguration ceremony was graced by Shri Shekhar Singh, Commissioner of Pimpri Chinchwad Municipal Corporation and Chairman of Pimpri Chinchwad Science Park, in the presence of Prof. S.S. Bhagwat, Director of IISER Pune; Dr. Arvind Natu, Board Member of Pimpri Chinchwad Science Park; Shri Pravin Tupe, Founder Director of Pimpri Chinchwad Science Park; Shri Sujit Dixit, Head of CSR & Internal Audit at Tata Technologies Ltd; and Mr. Siddharth Yawalkar, Assistant Manager - CSR, Tata Technologies Ltd.


### 2024 Industry Conclave

September 14, 2024

The 2024 Industry Conclave brought together professionals from the industry and IISER Pune faculty, postdocs, and students. Keynote address was delivered by Prof. Abhay Karandikar, (Secretary, Department of Science and Technology, Govt of India) who had joined online. The Conclave included talks by IISER Pune members and invitees from the industry and a panel discussion on how AI is changing the industry landscape. A new initiative, the Centre for Intelligent Solutions, which aims to address industry-focused problems in the areas of data, models, applied math, and computation, was inaugurated during the event. A teaching-learning kit CuriosityBox put together by the Science Activity Centre of IISER Pune was unveiled.

## Inauguration of the Centre for Intelligent Solutions

September 14, 2024

A new industry-academia collaboration initiative, the Centre for Intelligent Solutions, was inaugurated during the 2024 Industry Conclave event that took place on September 14, 2024. Since the event brought together professionals from the industry and IISER Pune faculty, postdocs, and students, it offered an apt platform for this announcement.

*At the inauguration of the Centre for Intelligent Solutions: IISER Pune faculty members and Coordinators of the Centre (from left to right) Dr. Anindya Goswami, Prof. M.S. Santhanam, Prof. Mukul Kabir, and Prof. Arnab Mukherjee with IISER Pune Director Prof. Sunil Bhagwat*

The Centre for Intelligent Solutions aims to address industry-focused problems in the areas of data, models, applied math, and computation. The Centre brings together more than twenty researchers of IISER Pune working in various computational and mathematical sciences from across the departments of Mathematics, Data Science, Physics, Biology, Chemistry, and Earth and Climate Science. For the industry, this Centre provides opportunities for engaging in joint research projects, consultancy, student projects, placements, and many others with IISER Pune.

## Hindi Fortnight Celebrations

September 12-27, 2024

As part of Hindi Fortnight, the following competitions were held at the institute: Hindi essay writing (Topic: Education in the digital age), poetry writing, solo singing, and knowledge of Hindi words and translation. Winners of the competitions were given prizes and certificates.

## Special Achievements by IISER Pune Members

**Film on research from Dr. Ramana Athreya's group**

*Nocturnes*, a film featuring research on moths by PhD student Mansi Mungee (now an IISER Pune alumnus and at Azim Premji University) and IISER Pune faculty member Dr. Ramana Athreya was screened at the Pune International Film Festival on February 4, 2025. In early 2024, Nocturnes had won the World Cinema Documentary Special Jury Award for Craft at the Sundance Film Festival. The film was directed by Anirban Dutta and Anupama Srinivasan.

**Dr. Mayurika Lahiri as a contributor to the DBT's GenomeIndia project**

Dr. Mayurika Lahiri from the Biology department has been associated with the GenomeIndia project implemented by the Department of Biotechnology (DBT), Ministry of Science and Technology, Government of India. Launched in 2020, this project is a consortium of 20 academic and research institutions across India working towards cataloguing the genetic diversity of India. The data generated from the project along with the framework for data use was released by the DBT on January 1, 2025 for research purposes.

### Inter-IISER Sports Meet (IISM) - 2024

December 17-23, 2024


The institute campus hosted the Inter-IISER Sports Meet (IISM)-2024 during December 17-23, 2024. Teams from all seven IISERs, IISc Bengaluru, CEBS Mumbai, and NISER Bhubaneswar participated at this event. IISER Pune secured overall second position and our student teams were declared champions in Badminton (Mixed doubles), Lawn Tennis (Men), Chess, Carrom, Basketball (Women), and Kho-Kho (Women), along with several of our players winning medals in athletics events.

### National Science Day 2025

February 28, 2025

IISER Pune celebrated National Science Day with an exciting celebration that drew around 9,000 visitors, including students, teachers, and science enthusiasts. The event featured thought-provoking talks, interactive demonstrations, and hands-on activities and Astronomy exhibits.

Visitors engaged with student and teacher projects, an interactive puzzle zone, astronomy observations, and live science demonstrations. The online quiz titled Mysteries of the Universe saw enthusiastic participation. In addition to events on the campus, Science Day was celebrated at Kalpakghar Community STEM Centre located at the Pimpri Chinchwad Science Park with various events spread over four days.

### International Women's Day 2025

March 5, 2025

The Women in Science Committee at IISER Pune organised a series of talks by women researchers of IISER Pune. A panel discussion on "Accelerating Gender Equity in Academia and Allied Fields" and a memorial talk on Prof. Rohini Godbole were also held as part of observing the 2025 International Women's Day.

### Theme-based Events

The Institute celebrated the following events during the year: International Day of Yoga (June 21, 2024); Independence Day (August 15, 2024); Swachhata Pakhwada (September 1-15, 2024); Swachhta Hi Seva Campaign (September 14-October 1, 2024); Vigilance Awareness Week (October 28 to November 3, 2024); Constitution Day (November 26, 2024); and Republic Day (January 26, 2025). These events were coordinated by the Administration section of the Institute with support from student club members and other members from the institute.

# International Relations

IISER Pune's international partnerships are centered on the institute's research and teaching mandate to foster the exchange of ideas across the globe. The institute hosts delegations, builds partnerships, and offers international student and scholar services through its International Relations Office.

A total of 28 collaborations at the international level were pursued during 2024-25. Among these, the following 4 Memoranda of Understanding (MoU) were signed / renewed during the year towards academic and research cooperation.

1. MoU with Sorbonne University, France was renewed for five years to collaborate in academic and research activities through student and staff mobility (May 29, 2024)

2. MoU with Friedrich-Schiller University, Jena, Germany was renewed (September 13, 2024)

3. MoU was signed with Faculty of Science and Technology of the University of Stavanger, Norway, to support collaborative academic and research activities (March 12, 2025)

4. MoU was signed between University of Buffalo, U.S.A., and all 7 IISERs to undertake joint-research and student training through student/staff exchange and to hold joint seminars (March 21, 2025)


*European Research Day was hosted at IISER Pune on October 9, 2024, in collaboration with the delegation of the European Union to India and EURAXESS India. Research funding opportunities in various countries in Europe were presented during the event by the representatives from the respective countries.*

*IISER Pune hosted Franco-Indian Campus for Life Sciences and Health Industry-Academia Workshop along with the Consulate General of France (Mumbai) during December 3-4, 2024. About 100 participants from 20 research and higher education institutions in India and France and industry representatives from both the countries participated in this workshop to discuss global health challenges.*

# Partnerships and Endowments

Through the Offices of the Dean for Research and Development and the Dean for International Relations and Outreach, the institute engages with the industry partners towards building collaborations, supporting young researchers, and nurturing capacity building programmes.

## Partnerships with Industries and Academic Organisations

IISER Pune signed 27 agreements / amendments / MoU during FY 2024-25 with industries and academic organisations through the R&D Office towards the purpose of research collaborations, data use, non-disclosure agreements, etc. Consultancy grants of ₹26.07 lakhs were received in FY 2024-25 for 3 new and 3 existing consultancy projects.

## Philanthropic Giving, Corporate Social Responsibility Contributions, and Endowments

Philanthropic giving, Corporate Social Responsibility (CSR) contributions, and endowments were vital in supporting IISER Pune's mission to excel in science education, research, infrastructure development, and community outreach during 2024–2025. IISER Pune signed 16 agreements / amendments / MoU during FY 2024-25 with corporate and individual donors through the Outreach and Endowments Office for these purposes. Generous support from corporate partners, foundations, and individual donors enabled a wide spectrum of projects advancing the Institute's strategic vision.

## Supporting Excellence in Research

The Rahul Bajaj Endowed Chair Professorships boosted pioneering research in Chemistry, Physics, and Biology under Professors Srabanti Chaudhury, Seema Sharma, and Anjan Banerjee. Their work spans analytical models of biological processes, fundamental particle physics at CERN's Large Hadron Collider, and gene-regulation mechanisms in moss, respectively. These researchers have published international papers and presented at major conferences, representing IISER Pune at a global stage for scientific investigation.

## Other Key research projects supported through CSR grants included:

- **Discovery of inhibitors targeting SARS-CoV-2 replication machinery,** supported by Rotary Club of Pune Sports City, leading to advances in COVID-19 therapeutic research.
- **Development of self-assembling antibody-drug conjugates for safer, next-generation cancer therapies,** supported by a point-of-care diagnostics company focused on expanding access to accurate, rapid, and cost-effective healthcare technologies to diagnose infectious and non-communicable diseases.
- **Creation of affordable vitamin bioassay kits for food nutrition estimation,** aimed at raising public health awareness, funded by Higher Education Finance Agency (HEFA).

## Enhancing Infrastructure

Upgrading academic labs formed a cornerstone of CSR support, transforming undergraduate learning environments:

- **Biology Lab upgrade supported by Alps Remedies Pvt Ltd:** Acquired high-end instruments like electrophoresis systems and thermomixers; replenished consumables enabling complex molecular biology experiments for over 300 students.
- **Chemistry Lab upgrade supported by Alps Remedies Pvt Ltd:** New pH and conductivity meters enhanced precision in quantitative analysis; consumables supported synthesis and titration experiments.
- **Physics Lab upgrade supported by Alps Remedies Pvt Ltd & Xytel India Ltd:** Comprehensive augmentation included new instruments and modules such as Microwave Experiment Setups, Zeeman Effect Apparatus, Nano-positioner Kits, and Radio JOVE Astronomy Kits; repaired equipment like Planck's Constant setups. These upgrades expanded hands-on experience for third and fourth-year students.
- **Earth and Climate Science Lab upgrade supported by Alps Remedies Pvt Ltd:** Added analytical equipment including centrifuges, dust samplers, flux preparation tools, and air quality monitors to deepen environmental and geological training.
- **Energy-efficient lighting upgrade in the CV Raman Auditorium** with the support of Alps Remedies Pvt Ltd reduced power consumption by over 77%, lowering carbon footprint and air conditioning load while improving ambiance and operational reliability.

## Supporting Students Through Financial Assistance and Scholarships

- Financial aid reached 165 students towards the purposes of covering tuition fee, travel, and subsistence, with contributions from Infosys Foundation, IDeaS, Shraman Foundation, and Alps Remedies Pvt Ltd.
- In addition, 18 meritorious BS-MS, Master of Science, and Integrated PhD students have been recognised by IISER Pune-IDeaS Ltd Scholarship for their academic excellence. Further, IISER Pune-Xytel Ltd Best Thesis Awards honoured 10 exceptional student researchers. TCS Research Scholars Program supported two PhD scholars in quantum computing and climate science respectively, enabling participation in international symposia and presenting award-winning research.

## Expanding STEM Outreach and Teacher Capacity

- **Mimamsa 2025:** Supported by Praj Industries Ltd, Mimamsa has emerged as India's largest undergraduate science contest attracting 6,800 students from 1,800 teams, including rural and North-eastern colleges, showcasing student-led organisation and vibrant science exhibitions.
- With the support from Praj Industries Ltd and KK Nag Pvt Ltd, **Molecular Biology workshops** engaged 872 students, including underrepresented groups, with hands-on training in advanced bio-techniques.
- The CSR support from Tata Technologies Ltd for the **STEM Ready** programme trained 688 teachers and nearly 3,000 students through in-person workshops, digital sessions, and the setup of 20 STEM labs in underserved schools. Under the aegis of STEM Ready programme, **Kalpakghar Community Tinkering Centre,** a public-private partnership of IISER Pune with Tata Technologies and Pimpri Chinchwad Science Park, acted as a nodal centre for national projects, and hosted visits by dignitaries and educators. STEM workshops for 5,372 students and 788 teachers were conducted at Kalpakghar during the reporting period.
- Dr. Shridhar Shukla's generous philanthropic support helped us establish the **National Programme on Teacher Educator Development (NPTED)** which supported our ongoing MS-DEED and iRISE programmes. Under the MS-DEED and iRISE programmes 89 workshops and training modules were delivered reaching over 5,400 teachers and 162,000 students across multiple states, promoting inquiry-based STEM education.
- **Hands-on STEM Education in Schools** supported by CSR funding from TM Automotive Seating Systems Pvt Ltd was involved in engaging 2,214 students and 192 teachers across 18 rural and semi-urban schools with curriculum-aligned hands-on sessions using low-cost materials.
- **STEM for Teachers Capacity Building** supported by MVP Alumni Ex-Staff and Well Wishers Association: workshops were organised for 177 rural science and math teachers, focusing on experiential learning aligned with NEP 2020.

The continued partnership with donors and corporate social responsibility initiatives drives IISER Pune's vision of nurturing scientific inquiry, innovation, and inclusive education. The Institute expresses sincere gratitude to all supporters whose generosity lays the foundation for India's future scientific leaders.

# Outreach Activities

IISER Pune believes that the benefits of high-quality science education and infrastructure should not be restricted to members of the institute. As an attempt to spread the excitement of science and to make the expertise and facilities at IISER Pune available to the science and education community, IISER Pune engages in several outreach activities. These encompass social outreach in the local community, capacity building for teachers, making and popularising simple science toys, and effectively communicating scientific research through various media.

The outreach activities are carried out via several channels at IISER Pune: These include Smt. Indrani Balan Science Activity Centre, Science Media Centre, and capacity building projects such as iRISE, MS-DEED, Molecular Biology Workshop series, and more. Together, these initiatives have reached over 2 lakh teachers, students, and science enthusiasts during 2024-25.

## Smt. Indrani Balan Science Activity Centre

The Science Activity Centre (SAC) was established as a part of a Center of Excellence in Science and Mathematics Education in August 2017. It aims to develop innovative science toys with easily available material, and thereby give students a hands-on flavour of the subject. Every year more than thirty-five thousand people including students, teachers, and other visitors visit the centre. The different engagements of SAC are described below.

## Regular Engagement with Students and Teachers

**Wednesday School Visits:** During Wednesday visits, the schedule includes a presentation and video related to information about ongoing research work, lab facilities, admission procedures, international collaborations, courses offered, future scope, and details about the campus. Then the students are shown demonstrations of hands-on science and math activities, STEM tinkering-related models, and puzzles, such as, T puzzles, balancing birds, Newton's disc, triangle puzzles, tangrams, etc. Students are given a campus tour at the end of the workshop, and they also visit a couple of research laboratories. From April 1, 2024 to March 31, 2025, around 10,140 students and teachers from 131 schools, colleges, and institutes visited the SAC.

**Sunday Online Session Series:** The SAC began a Sunday live talk and demonstration series during the COVID-19 pandemic. The emphasis was on students and instructors delving into topics from classes V to XII syllabus. During the lockdown, demonstrations of science and math concepts were conducted using materials that were easily accessible at home, including plastic bottles, glasses, tubes, balloons, straws, candles, matchsticks, and other everyday things from the kitchen. These live sessions have already completed 13 episodes in this academic year and received more than 56,000 views.
Playlist: https://www.youtube.com/watch?v=xyklHAAUoAQ

## Participation in National-Level Public Outreach Events

**Participation in DST – MANAK Exposure visit of Japanese School Students to India:** The Department of Science and Technology invited our SAC outreach team members to interact with school students from Japan. The purpose of this visit was to offer exposure to India's science and technology advancements through visits to India's academic and research institutes and industrial and cultural sites. SAC team members Dr. Chaitanya Mungi and Mr. Ankish Tirpude conducted engaging STEM hands-on activities and discussed our school outreach initiatives with the visiting student delegation.


*Workshop with school student delegation from Japan*

**Participation at India CSR & ESG Summit 2024 in New Delhi:** An outreach team including SAC members represented IISER Pune in the India CSR and ESG Summit 2024 held on October 17-18, 2024, in New Delhi. This event was organised by CSRBOX as part of the 11th Edition, and was inaugurated by Shri Haribhau Bagade, Hon'ble Governor of Rajasthan. The main purpose of this summit was to connect people working under various Corporate Social Responsibility (CSR) projects all over India. Over 200 people and educators visited our stall. Many industrialists and educators got an opportunity to try out some of the science activities displayed at the stall.

## Larger Public Outreach Events

**Zero Shadow Day:** Also known as Lahaina Noon or Transit Day, the Zero Shadow Day phenomenon occurs twice a year in places located between the Tropic of Cancer and the Tropic of Capricorn. On these special days, the Sun passes directly overhead at noon, casting no shadow on vertical objects. To observe this interesting phenomenon, in collaboration with the student-led Aakashganga Astro Club, the SAC team conducted an event on campus on May 14, 2024. Over 90 students and 20 parents participated in this event.

*Engaging with students on the occasion of Zero Shadow Day on May 14, 2024*

**Celebration of Teacher's Day:** Since 1962, Teacher's Day has been observed on September 5 all over India as a tribute to the contribution of teachers to society and the nation. It is also the birth anniversary of Dr. Sarvepalli Radhakrishnan, a distinguished philosopher, scholar, former President of India, and Bharat Ratna awardee. As is the yearly tradition, SAC and Kalpakghar (the footprint of SAC at the Pimpri Chinchwad Science Park) celebrated Teacher's Day by conducting various programmes, talks, demonstrations, and hands-on science and math activities. A total of 123 teachers from Rayat Shikshan Sanstha and a few other schools participated in the one-day in-person workshop, and 3,600 teachers participated in the online session by Mr. Arvind Gupta.

**Celebration of Children's Day:** Children's Day is celebrated in India to raise awareness about the rights, education, and welfare of children. It is celebrated on November 14 every year on the birthday of the first Prime Minister of India, Jawaharlal Nehru. Considering Diwali vacation for the schoolchildren, this occasion was celebrated online this year. Invited speaker Dr. Vidula Mhaiskar from Garware Balbhavan gave a talk on "Science Toys from Sustainable Materials" on November 14, 2024. She explained how we can design science toys at home using readily available sustainable materials, and how these toys can be used to explain the various concepts of science and mathematics. Over 16,000 students watched this online talk.

**Celebration of National Science Day:** National Science Day is celebrated in India on February 28 each year to mark the discovery of the Raman Effect by Indian physicist Sir C.V. Raman on February 28, 1928. For his discovery, Sir C.V. Raman was awarded the Nobel Prize in Physics in 1930. We celebrated Science Day in IISER Pune and Pimpri-Chinchwad Science Park on February 28, 2024, by conducting various events like talks, Hackathon, interactions with scientists, demonstrations of hands-on activities, experiments designed by doctoral students and IISER Pune staff, daytime astronomy, puzzle corner, science quiz, and many more for the general public. Over 9,000 people participated in this NSD celebration at IISER Pune, and over 4,500 people participated at Kalpakghar Community STEM Center.

## Outreach Activities with Other Organisations

**Summer Camps for School students:** A three-day STEM summer camp was hosted at the Science Activity Centre, IISER Pune, from May 6-7 for students in grades 5 to 7 and from May 15 to 17, 2024 for students in grades 8 to 10. The camp engaged students in a variety of activities, including hands-on Science & Math experiments, exploring a STEM Tinkering DIY Kit, a nature walk, an introduction to Virtual Reality, data gathering exercises, a Meet the Scientist session, and sci-art adventures. IISER Pune Director Prof. Sunil Bhagwat and Prof. M.S. Santhanam, Dean of International Relations & Outreach (IRO), engaged with the students during the camp, sharing their expertise and experiences in science, research, and the significance of understanding the history of science. The students posed insightful questions, leading to a conversation that went beyond traditional classroom learning.

**Science Promotion Activity Workshop for Jawahar Navodaya Vidyalaya students:** On September 19th and 20th, 2024, the SAC team hosted 100 girl students from Jawahar Navodaya Vidyalaya schools from four districts of Maharashtra (Pune, Ahmednagar, Sangali, and Raigad) for a 2-day science promotion activity at IISER Pune. Various sessions, such as interactions with scientists, lab sessions, and hands-on sessions, were held.


*Visit by students from Jawahar Navodaya Vidyalaya group of schools*

**Kaveri Inspire Camp (9 and 11 grade students):** Kaveri Inspire Internship Camp caters to students of higher abilities. The objective of the camp was to generate curiosity in the minds of the students concerning pure science and expose them to many other related fields. On March 5, 2025, over 50 students from Kaveri group of schools were invited to participate in this camp. Sessions on educational opportunities at IISER Pune, interaction with faculty, interactive sessions of hands-on activities, and research lab visits were conducted.

**Participation in the 2024 Industry Conclave at IISER Pune:** On September 14, 2024, the SAC team participated in the 2024 edition of the IISER Pune - Industry Conclave. During the event, the team demonstrated engaging STEM activities to delegates visiting the exhibit area. The event provided a platform to explore numerous engaging opportunities and collaborations with our industry partners.

**National Level Capacity Building Workshop for Teachers on STEM:** PM Shri State Project Samagra Shiksha, Chhattisgarh, Raipur, in collaboration with the Smt. Indrani Balan Science Activity Centre, IISER Pune, organised a three-day national-level capacity-building workshop for 103 teachers on STEM subjects at IISER Pune. The workshop featured thoughtfully designed programmes to encourage teachers to think creatively, develop innovative classroom teaching techniques, and enhance their problem-solving skills. The workshop included a nature walk to foster environmental awareness, a visit to a science park to explore the planetarium and 3D shows, and a tour of the Kalpakghar Community STEM Centre to learn about designing teaching aids. Additionally, hands-on sessions focused on Science, Technology, Engineering, and Mathematics (STEM) subjects enabled teachers to gain practical insights and create innovative school projects. At one of the sessions, the teachers expressed pride and inspiration, seeing students from their home state pursuing advanced research at IISER Pune. There were talks by Dr. Shalini Sharma and Dr. Ashish Arora. The teachers visited various labs at IISER Pune.

### Beneficiaries from Corporate Social Responsibility (CSR) Projects under SAC in 2024-25

**STEM Ready Project (with Tata Technologies):** The STEM Ready Project addresses critical gaps in STEM education by providing an innovative, scalable, and low-cost alternative to resource-intensive models like the Atal Tinkering Labs (ATLs). As of March 2025, over 10,000 Atal Tinkering Labs have been established across 722 districts in India, engaging more than 1.1 crore students. However, with over 14 lakh schools in India, this translates to roughly 0.67% of schools having ATLs. Designed to overcome systemic challenges such as high costs, infrastructure limitations, and teacher capacity gaps, the project empowers schools, especially government & govt. aided schools, to foster curiosity, creativity, and hands-on learning through multidisciplinary tinkering and project-based learning (PBL). A total of 7,987 students and 688 teachers benefited from the activities described below, under the STEM Ready Project. Key activities and innovations in this project are listed below.

**STEM workshop for teachers**

- Multidisciplinary Training: 600+ teachers trained in integrating STEM concepts across subjects (e.g., gamifying carbon cycles in biology, puzzles in math)
- Project-Based Learning (PBL) Focus: Workshops emphasise designing low-cost, student-driven projects (e.g., soilless farming, electronics prototyping)

**Student engagement**

- Hands-On Learning: 7,500+ (Wednesday visit + STEM lab setup) students engaged in activity-based education (e.g., puzzle- based mathematics, crafting simple machines etc.)
- Exposure to Real-World STEM: Visits to IISER Pune labs, interactions with scientists, and participation in celebration of national events
- Digital Outreach: Online sessions (56,000+ views) on various topics like STEM for all

**Low-cost, high-impact STEM labs**

- Cost Efficiency: Each lab costs ~₹80,000 (vs. ₹10+ lakh for ATLs), using affordable tools like breadboards, reusable materials, and modular activities
- Space Flexibility: Labs can operate in small classrooms or existing science labs, bypassing infrastructure barriers
- Activity-Driven Design: 20 established labs in various schools follow a structured annual calendar of activities aligned with the school curriculum

**Kalpakghar: Community STEM Tinkering Centre at Pimpri Chinchwad Science Park:** IISER Pune and Tata Technologies Ltd. (TTL) formalised their collaboration to extend the STEM Ready project on September 8, 2023. The initiative focused on training school teachers from the Pimpri Chinchwad Municipal Corporation (PCMC). As part of this collaboration, IISER Pune partnered with Pimpri Chinchwad Science Park (PCSP) and PCMC to establish and operate the "Community Tinkering Centre" at the Science Park premises. PCSP is a unique non-formal science learning centre located in the industrial twin township of Pimpri Chinchwad. PCSP was established jointly by the PCMC and the Government of India under the auspices of the National Council of Science Museums (NCSM).

Kalpakghar – Community Tinkering Centre was inaugurated on August 21, 2024 by Shri Shekhar Singh, Commissioner of Pimpri Chinchwad Municipal Corporation and Chairman of Pimpri Chinchwad Science Park, in the presence of Prof. S.S. Bhagwat, Director of IISER Pune; Dr. Arvind Natu, Board Member of Pimpri Chinchwad Science Park; Shri Pravin Tupe, Founder Director of Pimpri Chinchwad Science Park; Shri Sujit Dixit, Head of CSR & Internal Audit at Tata Technologies Ltd; and Mr. Siddharth Yawalkar, Assistant Manager - CSR, Tata Technologies Ltd. Our SAC team members have been conducting public engagement events at Kalpakghar and reached out to close to 90,000 members of the public within the first year of being set up.


**STEM for Teachers Project at Nashik:** A "STEM for Teachers" training workshop was conducted at Nashik in collaboration with the Maratha Vidya Prasarak Samaj (MVP) for teachers of the schools run by MVP. These teachers are from Marathi medium schools of 5th-10th grade. As of March 2025, three workshops were conducted and a total of 177 teachers were trained in this programme. Through these teachers and the activity kit provided to them, over 17,000 students would benefit from this project. The workshops aimed to empower teachers with the skills and tools to inspire students in STEM subjects. The first workshop was for Science teachers, the second for Mathematics teachers, and the third covered both subjects.

**Hands-on STEM Education Project (CSR - Tata AutoComp):** A new "Hands-on STEM Education in Schools" project has been initiated to introduce and integrate STEM education in government and government-aided schools across the Pune district. Activities included the following:

**Student sessions**

- Activity based learning from standard 5th to 9th aligning with the school curriculum
- Over 20+ activities conducted on concepts related to mathematics, light, sound, basic electricity and magnetism etc
- A total of 2214 students from 18 schools engaged in activity-based learning sessions in schools

**Capacity building workshops for teachers**

- Three capacity building workshops for teachers of standard 5 to 10
- Over 190+ teachers benefited through two 1-day workshops and one 2-day workshop
- School curriculum-based STEM activity conducted in teacher's workshop

**Lab setup**

- Five labs were set up; two are mini science and mathematics centers and three are curiosity corners
- Labs are equipped for a curriculum and tinkering based experiments for students

### Eminent Visitors During the Year

Dr. Sukanta Majumdar (Union Minister of State for Education & Development of North Eastern Region, Government of India); Lt. Gen. Madhuri Kanitkar, (Vice-Chancellor, Maharashtra University of Health Sciences, Nashik); Prof. Kirti Trivedi (IIT Indore); Vaishali Dabke (Max Mueller Bhavan); Sharwari Kulkarni (Co-founder and Director, Makeshift); Dr. Arun Kumar Sarma (Director General) and Simanta Das (Chief Radio Technologist), NECTAR, Shillong; Shri. Vikas Deshmukh (IAS, Retd.; Secretary, Rayat Shikshan Sanstha, Satara); Dr. Dhananjay Singh (IRS officer); Dr. Biju Dharmapalan (Garden City University); Madhusudhan Guragain (Vice-President, Nepal Forum of Science Journalists); Smt. Nayana Gunde (Commissioner, Tribal Development) and team; Monish Mishra and family (IPS - Police Officer New Delhi); Prof. Monica Adya and Prof. Jimmy Jung (Rutgers University, U.S.A); and Dr. Anja Hallacker (Director, International Office, Munich).

**Through a variety of events (in-person and online) held through the year, during 2024-25, the Science Activity Centre reached a total of 2,03,860 participants.**

## Science Media Centre

The Science Media Centre (SMC) at IISER Pune is actively involved in the activities of science communication to share science through innovative strategies. During 2024-25, the SMC has been involved in the following activities:

### Student Engagement Programme

SMC's Student Engagement Programme is set up to train and mentor IISER Pune students in multimedia science communication. This is a 3-stage program with a work-integrated learning approach. It requires registered students to undertake an orientation programme, followed by exposure workshops, and finally learning through engagement with professional assignments at SMC.

Four workshops were conducted on 3D Blender, Visual design, Augmented Reality, Documentary production using life history interviews for BS-MS and PhD students. Students made their own scientific illustrations, designs, and documentary scripts by the end of each workshop. Each workshop was attended by 30 students. Two students were selected as interns with SMC.

### Workshop at India Science Festival 2024

The SMC conducted a workshop during the Indian Science Festival 2024 called 'ARchitects of the Unknown,' exploring science communication through augmented reality. Around 50 participants from various age groups and professional backgrounds attended the event.

### Water Journalists' Round Table

SMC hosted a water journalists' roundtable, under the Aquamuse project, from November 7-9, 2024, at IISER Pune. The Aquamuse project, funded by the Water Development Program at IHE Delft, Netherlands, is co-led by Dr. Shalini Sharma and Dr. Sara Ahmed at IISER Pune. SMC, The Centre for Water Research, and The Living Waters Museum are partners in the

project. Around 40 journalists attended the roundtable and shared their reflections on water reportage, focusing on different regions, issues, and media formats. Both legacy media, as well as niche/specialised media such as The Hindu, Indian Express, Amar Ujala, PARI, Mongabay, India Spend, Reporters Collective, Gaon Connection, and News Potli, attended the roundtable. A range of activities were conducted, including thematic discussions and a keynote lecture on the water crisis by P. Sainath, founder of PARI. Nine BSMS, iPhD, and PhD students participated as live illustrators and volunteers. The initiative not only fostered dialogue among experts but also aimed to build the capacity of aspiring journalists and creatives.


### Science Journalists Association of India Conference

SMC partnered with SJAI for its annual conference at IISER Pune during December 3-5, 2024. The theme for the 2024 conference was "The Underreported: Bridging Gaps in Science Journalism" to highlight lesser-known and less-covered aspects of science. The conference was the largest annual gathering of peers, bringing together science journalists, communicators, public engagement professionals, scientists, technologists, policymakers, and academics with a shared purpose—to shape the future of science journalism and communication in India.

### Original Productions

- Water Waves Weekly: From Jan-March 2025, the SMC has released 7 episodes of Water Waves weekly based on the water journalists' roundtable, each spotlighting a journalist from different parts of India.
- Aquamuse Dialogues: From Jan-March 2025, the SMC has released 4 episodes of Aquamuse Dialogues, each featuring an artist and a scientist in conversation about the use of applied art and storytelling for water education.
- SMC released 4 episodes of Alumni Stories featuring IISER Pune alumni Dr. Surojit Sural, Dr. Debarshi Mitra, Dr. Vibha Singh, and Dr. Rohit Chikkaraddy. This series was produced in collaboration with the IISER Pune Alumni Association. Each episode features different alumni and their unique journeys.
- The production of a documentary on Dr. Bibha Chowdhuri is currently underway, in collaboration with faculty and students from IISER Pune. The project also includes two interns working on it, alongside experts in high-energy and particle physics. This collaborative effort aims to shed light on Dr. Chowdhuri's remarkable contributions to the field.



### Supporting Outreach Activities

The Science Media Centre offers comprehensive support to the Science Activity Centre for key events, such as the Sunday Live series, National Science Day, and Teacher's Day. This collaboration includes providing professional videography and photography services, ensuring high-quality documentation and visual coverage of these significant events to enhance their impact and preserve them for future use.

### NPTEL MOOC Course Production

SMC has produced 25 courses till now for the National Program on Technology Enhanced Learning (NPTEL). The following courses are currently under production with faculty members from IISER Pune. One course is from a faculty member from IIT Madras. (1) Evolutionary Biology by Prof. Sutirth Dey; Disasters and Society by Dr. Shalini Sharma; Enzyme Biochemistry by Dr. Siddhesh S. Kamat; Cognitive Basis of Science Education by Prof. G Nagarjuna; Polymathic Nature of Biology by Dr. Collins Assisi; and Web Design course by Prof. Bala Ramadurai, IIT Madras.

### Facilitation of Institute Activities

The Science Media Centre has documented over 141 institute events through photography, videography, work for faculty, and live broadcasting for the IISER Pune administration and various departments and centers in the institute. The Centre provided audio-visual documentation service to AIC SEED, I-HUB Quantum Technology, and Agharkar Research Institute. The Centre also produced 4 Research Communication videos and eight artworks/animations for various faculty members and departments within the institute.

## MS-DEED Project

The Maharashtra State Development of Educators and Enhancement in Delivery (MS-DEED) Programme is a close collaboration between IISER Pune and the Maharashtra State Faculty Development Academy (MSFDA) - Centre for Multi-disciplinary Curriculum & Pedagogy under the Department of Higher and Technical Education, Government of Maharashtra.

It aims to create a dynamic ecosystem of high-quality education through training and up-skilling UG/PG teachers from higher education institutes (HEIs) in Maharashtra under the Department of Higher and Technical Education. Workshops under this programme are conducted with a focus on in-service motivated, early career, and enthusiastic faculty members who teach Bachelors and Masters Courses in science (Natural and Physical) and mathematics subjects at universities or colleges affiliated with universities. The selected participants come from various government and government-aided universities and colleges across all 36 districts of Maharashtra.

Since inception in December 2021, the programme has reached over 5500 teachers from 450 colleges across 36 districts of Maharashtra and developed over 40 master trainers. During 2024-25, the programme reached 1202 beneficiaries in all.

**Modality of the Programme**

**Level 1 - Online/ In-person short workshop:** It includes general modules on topics related to effective teaching, subject-wise breakout sessions focusing on subject-specific pedagogies and activities, and sessions on assessment strategies and action planning. **Level 2 - In-person intensive training:** This 'training the trainer' (ToT) residential workshop is for developing a pool of Master Trainers (MT) that would engage nodal centres and train fellow teachers in a cascade model. In-house and external experts deliver the MT training modules from science, mathematics, research, and education fields. The in-person workshop involves training MTs in effective classroom engagement as well as laboratory-based research-oriented pedagogies.

**Level 1 - Student-Teacher Workshop:** Aimed at introducing inquiry and critical thinking to UG/PG students with teachers. Conducted in in-person mode. Student-Teacher workshops aims to enhance learners' skills in inquiry-based learning and critical thinking using active learning, group work and reflective-learning methods etc. Student centric open-ended labs and subject specific sessions focus on promoting construction of their own understanding of the subjects they learn in classrooms. There are pre-and post-workshop activities to engage the participants. These are conducted at various collaborating institutes in Maharashtra.

**Highlights of the MS-DEED Workshops**

- Integrating classroom-focused and lab-focused teaching is blended into training to have a holistic approach.
- More emphasis is given to the process of scientific inquiry, experiential learning and inclusivity aligned with the principles of National Education Policy 2020.
- Teacher participants experience inquiry-based activities by performing such experiments themselves in a Thematic-Lab Approach.
- The experiments are of the 'low threshold high ceiling' mode to promote scientific temper and hand-on skills in resource limiting environments.
- Computational Thinking and Simulation based teaching tools are incorporated in training to promote use of digital resources and critical thinking in students.
- The participants also work with some state-of-the-art instruments and techniques at IISER Pune.
- Teacher participants get hands-on- minds-on experience during the workshop and beyond via the community of practice.
- IISER Pune faculty members engage teachers during residential workshops.


## iRISE Project

Inspiring India in Research, Innovation, and STEM Education (iRISE) is a transformative programme to foster innovation among young minds, equip educators to inspire future generations, and strengthen industry-academia collaborations. It operates through four key interventions: the Teachers' Development Strand (TDS) to enhance school education, the Early Career Research Development Strand (ECR) to support STEM PhD scholars, the Thought Leadership Forum to facilitate policy discussions between academia and industry, and the CxO Forum to cultivate a culture of innovation in industries.

**Teachers' Development Strand (TDS)**

The TDS of iRISE focuses on empowering science and mathematics teachers with innovative, learner-centered pedagogies to enhance classroom engagement. By integrating experiential, hands-on learning with cost-effective, accessible materials, the programme nurtures students' creativity, critical thinking, and problem-solving skills. Currently active in the states of Maharashtra, Bihar, Uttarakhand, Jharkhand, and Karnataka, TDS is transforming grassroots education by equipping teachers with practical strategies to make STEM learning more relevant, interactive, and impactful. Additionally, an impact assessment of the programme was initiated a third-party assessor to evaluate the effectiveness of the programme.

Between April 2022 and March 2025, the TDS strand of iRISE Project conducted 209 workshops and reached 13,107 teachers. During 2024-25 specifically, the team conducted 89 workshops and reached 5427 teachers in the states of Maharashtra, Bihar, Uttarakhand, Jharkhand, and Karnataka.

The iRISE team is promoting DST's Inspire-MANAK programme for school students through awareness campaigns, collaboration with educational authorities, training programmes for school teachers, and competitions. These strategies have collectively enhanced the programme's visibility and participation. So far, over 12,000 students have been engaged via video campaigns, and more than 2,500 teachers have been trained in problem statement formulation and mentoring. In addition, IRA awardee Innovation Champions (ICs) from Maharashtra, Uttarakhand, and Bihar have actively contributed to mentoring students, further strengthening the programme's reach and impact.

*A collage demonstrating the topic 'Force' through a game of tug of war in two different workshops, one at the Phase 2 workshop at IISER Pune and the other at a cascade workshop at Nashik*

**Early Career Researcher (ECR) Development Strand**

The iRISE Early Career Researcher Capacity Building Program bridges academia and industry by equipping Ph.D. graduates and post-doctoral researchers with essential skills like critical thinking, problem-solving, and interdisciplinary collaboration. Aligning with the Anusandhan National Research Foundation Act 2023, it strengthens India's research ecosystem through three structured levels.

**Level 1 - Introductory Workshop (3 Days):** Onsite training at educational institutions, covering essential employability skills with access to online resources.
**Level 2 - Residential Workshop (10 Days):** Advanced hands-on training at IISER Pune, including industry and incubation center visits.
**Level 3 - Industry Internship:** Selected candidates gain real-world experience through internships in various industries.

Since inception, the team has conducted 14 workshops in 6 states with participants from 16 states across India, and together reached a total of 1035 participants as of March 2025. During 2024-25, the team reached 781 PhD students and postdoctoral fellows.

## Molecular Biology for Everyone Workshop Series

Molecular Biology is a vital and dynamic field in the 21st century, enhancing our understanding of life's processes and serving as the foundation for biotechnology applications in medicine and conservation. The motivation behind initiating this programme is that despite significant investments in research and education, expensive and time-consuming methods often limit bachelor's and master's students in India to mere observations of techniques like PCR and cloning, preventing them from connecting theory to practice. As a result, many first encounter these techniques during projects or jobs, typically with minimal supervision, leading to varying levels of success.

These workshops aim to bridge this gap by providing hands-on training in both basic and advanced molecular biology techniques. These are paid workshops that are conducted at two levels—at basic level for school and college students, and at advanced level, for third year BSc, MSc and PhD students. The workshops conducted in 2024-25 received funding support from Praj Industries Ltd and K.K. Nag Pvt. Ltd.

During the reporting period of 2024-25, the MolBio Workshop team conducted 62 workshops and catered to 574 students. Of these, three school workshops were conducted free of cost, thus training 30 students from economically weaker sections. The team also conducted 2 demonstration workshops that reached 298 students. Participants learned about an assortment of techniques including isolation of DNA and RNA, PCR, AGE, PAGE, Western Blotting, TA cloning, qPCR, Dot ELISA etc.

Skill-enhancement for Under Represented Groups in Education (SURGE): The team also organised a 7-day long, all expenses paid, hands-on workshop on Molecular Biology workshop for under-represented groups in education, enrolled in institutes in Type Y and Type Z cities. This was a pan-India workshop with 25 selected participants representing 12 states and 1 Union territory. It was conducted at the IISER Pune campus from 22nd-28th Dec 2024 as a hands-on and residential programme. This workshop was made possible by support from Praj Industries Limited and K.K. Nag Private Limited. E-content for the workshop was provided by Journal of Visualized Experiments (JoVE) and Praj Industries facilitated in-person visit to their R&D facility in Pune.

## Malaviya Mission Teacher Training Programme

In collaboration with the University Grants Commission (UGC) and the Ministry of Education, IISER Pune, as a designated Malaviya Mission Centre, organised a series of three online 8-day workshops in 2024-2025 under the National Education Policy (NEP) 2020 Orientation and Sensitization Programme. These workshops aimed to spread awareness and build capacity among educators, covering key themes such as Holistic and Multidisciplinary Education; Indian Knowledge Systems; Academic Leadership and Management; Research and Development; Skill Development; Student Diversity and Inclusive Education; Information and Communication Technology; and Curriculum, Pedagogy, and Assessments. The programme witnessed enthusiastic participation from 359 teachers across various institutions in India and received excellent feedback, contributing meaningfully to the ongoing national education reforms.

## Yusuf Hamied Chemistry Camp 2025

This three-day camp conducted at IISER Pune during February 27 to March 1, 2025 aimed to foster scientific curiosity among students through interactive sessions, experiments, and discussions. It offered a unique opportunity for participants to engage in hands-on science activities and learn fundamental concepts in an enjoyable and accessible way.

## Social Outreach

Social outreach activities are conducted by voluntary organisations at the institute run primarily by the IISER Pune student community in association with faculty coordinators and volunteers. Disha is a student run social outreach organisation at IISER Pune and works towards making education accessible for children from underprivileged and marginalised communities from nearby localities.

Prutha is a green initiative by IISER Pune students that works to create awareness about issues related to the environment and to promote a clean campus. The group is involved in organising nature walks, clothes donation drives, and activities around management of waste.

Information on these student-led social outreach activities, along with several other initiatives by the student community, is given in the *Student-led Activities* chapter of this report.

# Student-Led Activities

The large range of community activities on campus at IISER Pune are directed and driven by our energetic students. These activities engage not only the student community, but also staff, faculty and community members alike, and span a wide range, from art to quizzing to astronomy.

## Activities Conducted through Student Clubs

Clubs such as Aroha, Art, Astro, Dance, Disha, Hindi, Kaleidoscope, Karavaan, Marathi, Maths, Mimamsa, Quiz, Satrangi, Science, SPICMACAY, Sports, and Yoga clubs conducted activities in the year 2024-25. Some of these activities are described below.

**Aroha** is the music club of IISER Pune. The club caters to music enthusiasts of the IISER Pune community ranging from beginners to advanced level musicians and encourage interactions to foster a better understanding for music.

**Activities during the year:**

- Cultural programmes for Independence Day and Republic Day celebrations
- Open Mics as a platform for the IISER community to showcase their musical talents
- Music Room discussions on various types of music to gain a better understanding and appreciation for the various genres of music
- Let's Talk Music (LTMs) sessions aimed at introducing the audience to an expansive view of the facets of a particular aspect or type of music
- Handling of selections and contingent management for four musical events (Duet, Mehfil, Battle of Bands and Western Instrumental) of the Inter IISER-NISER-CEBS-IISc Cultural Meet (IICM) 2024 held at IISER Kolkata during December 26-29, 2024
- Collaboration with various clubs for musical performances
- Cultural showcase for Mimamsa 2025

**Aakashganga,** the IISER Pune Astro Club, caters to the astronomy and astrophysics enthusiasts and amateur astronomers at IISER Pune fostering a greater interest and understanding of the wonders of the universe.

Activities during the year:

- Learning sessions on astronomy; Talks on topics such as Gravitational waves, galaxy quenching, career in astrophysics; Cosmic Forums on Mondays, Friday Night Quiz sessions on Instagram
- Stargazing event in partnership with Gypsy Souls and ASXS during January 24-25, 2025 held at Panshet, Pune. Here, ~140 participants had the opportunity to observe various constellations and star clusters and ancient knowledge of navigation using night sky.
- On the occasion of the National Science Day (February 28, 2025), organised a day-time astronomy session in collaboration with the IISER Pune's Smt. Indrani Balan Science Activity Center. Activities included demonstration of how a telescope

works; viewing sunspots through solar viewer (projecting sun); horizontal and equatorial sundial

- On the occasion of SciCon 2025 (March 23, 2025) and in collaboration with LIGO India, set up multiple stalls explaining or/and demonstrating a miniature model of the GW detector, phases of star formation, identifying elements present in an exoplanet using spectroscopic data.
- Skywatch sessions on campus to observe craters of the moon and Jupiter

**Artha** is the student-led finance club on campus that provides information and resources related to academic aspects of finance and careers in finance.

**Activities during the year:**

- Organised the FinTalk series featuring eminent speakers from academia, industry, and public service, including Mr. Parikshit Thoudam (Indian Administrative Service Officer); Mr. Navin Kabra (Entrepreneur & Career Coach); Prof. Sandip Agarwal (IISER Bhopal); Mr. Vivek Singh (Former Officer on Special Duty, Ministry of Finance & Defence); Mr. Vikram Sampath (Author & Historian); Prof. Sankarshan Basu (IIM Bangalore); Dr. Anindya Goswami (IISER Pune); Dr. Biswajit Patra (IISER Bhopal); Mr. Apurv Mishra (Policy Analyst & Commentator); Dr. Gurendra Nath Bhardwaj (Academic & Researcher in Economics); Mr. Anshuman Rawat (Student at IISER Pune); and Dr. Niharika Singh (Symbiosis University).
- Workshop Series: BS-MS student Anshuman Rawat conducted workshops aimed at enhancing financial and analytical skills, understanding equity research, stock markets, investing frameworks, etc. Rawat also produced newsletters with informative content on related topics. A workshop was conducted by Ms. Neha Koppikar (Consultant, KPMG), providing insights into management consulting careers.
- Organised a five-day certificate course on the basics of finance, covering key principles of markets, valuation, and investment strategies.
- Conducted competitions designed to apply financial concepts and encourage practical learning, such as Bear Bull, an equity trading competition; Quantathon, a quantitative finance hackathon; Bidders Alley, an auction-based competition held during Karavaan 2025; and Stat De Casyno, a statistics and finance-themed contest.

**Art Club** aims to cultivate creativity, foster a sense of community, and provide a platform for artistic expression through workshops, exhibitions, and a vibrant exchange of ideas.

**Activities during the year:**

- Iristique, a weekly art event was conducted on these themes through the year: Science through Your Eyes, Aesthetica Medievale, Pixel Art, Monochrome, Halloween, Halloween 2.0, IICM Special, Flipbook, Henna Night, Pictures from a Different Era, Cupcakes and Rainbows, Skribbl.io, and Chromatic Kaleidoscope; also held an art event for schoolchildren in collaboration with the Disha Club on Disha Day (January 12, 2025)
- Organised Art Critique Sessions to discuss different art styles and techniques; Student-run workshops on Mandala art, Alpona workshop in collaboration with the Bengali community as part of Bijoya 2024, and imaginative drawing; Caricature workshop conducted by a professional artist and attended by 45 participants.

- Designed the logo for Inter IISER Sports Meet held on campus this year; held competitions on book cover design; design architect; wall painting; face painting; live sketching; canvas painting, and fashion show in collaboration with Satrangi club. IISER Pune team was judged the overall winners in Art events and won the title 'Champion of Colours'.
- Organised a face painting activity on Republic Day; set up a stall in collaboration with Maths Club for Pi Week on topics such as perspectives, diminution, ray casting, retro video games and live demonstration of some computer graphics, and also helped the Maths Club decorate the Lecture Hall Complex foyer
- During the SciCon 2025 event (Mimamsa), held presentations on these topics: the vision of different organisms, how different colours were made throughout history, making Lissajous Figures using sand, colour perception and colour blindness, which included an interactive colour perception test

**The Cubing Club** spreads the joy of solving the Rubik's Cube to everyone.

**Activities during the year:**

- Organised IISER Pune Autumn Open 2024, an official competition affiliated with the World Cube Association (WCA), on the campus (November 9, 2024)
- Organised a beginner level cubing workshop to teach IISER students how to solve a Rubik's cube.
- Participated in the Pi Week celebrations as well as SciCon 2025, where the club presented fun mathematics related to cubing

**Disha** is an independent voluntary social organisation of IISER Pune students. Through its programmes, it is involved in the education of children who belong to socio-economically disadvantaged communities.

**Activities during the year:**

- Disha team visited schools across Pune and conducted fun workshops filled with colourful experiments and tests to select children for the Science Nurture Programme
- Spread the Smile programme held in nearby villages with sessions on astronomy, the solar system and eclipses, microscopes, menstrual health, and vaccinations
- Abhyasika volunteers teach students from socio-economically disadvantaged backgrounds living in Lamanvasti. Volunteers spend an hour three times a week teaching children
- Mindspark sessions engaged students with fun activities and demonstrations such as Tower of Hanoi, Pictionary, hydraulics, and more

The **Hindi Club** aims to celebrate the cultural depth and linguistic beauty of the Hindi language and instil a profound appreciation for the Hindi language and its literature among the younger generation.

**Activities during the year:**

- Organised Hindi Diwas celebrations on September 14, 2024, with a series of programmes lined up for the entire evening.
- The celebrations included two theatrical performances by Swatantra Theatre: (1) "Krishna ki Chetavani", which is a dramatic adaptation, authored by Mr. Yogesh Tripathi, of the influential poem written by national poet Shri Ramdhari Singh Dinkar. (2) "Taj Mahal ka Tender", written by renowned playwright Ajay Shukla, produced by Yuvraj Shah, and directed by Abhijeet Choudhury.
- Actor, writer, and director Mr. Pankaj Jha, known for his role as "Vidhayak Ji" in the popular series "Panchayat", attended as a special guest at the event and interacted with the audience.
- Nitesh Verma Qawwali Party presented a ghazal performance

The **IPLUG Club** aims to foster interest in coding, gaming, and technology-related activities among students.

**Activities during the year:**

- Python Language Session conducted by BS-MS students Ajay Kasaudhan and Nawanshu Diwakar, focusing on coding skills for scientific computation and problem-solving (November 7, 2024)
- Talk on Machine Learning in AI by faculty member Prof. Sourabh Dube (November 14, 2024)
- Inter IISER E-Sports Meet (IIESM): IPLUG hosted this month-long pan-IISER event featuring online games like COD and Valorant, with participation from all IISERs and NISER. IISER Pune emerged as the winner (December 2024)

- Talk on Calorimetry in Particle Physics: Alpana Sirohi (PhD student, IISER Pune) spoke about her research in experimental particle physics and the use of Graph Neural Networks (GNNs) in calorimetry research (January 17, 2025)
- Arduino Workshops: IPLUG collaborated with the Science Activity Centre of IISER Pune to organise two sessions on Arduino. The first session was led by Ankish Tirpude (Science Activity Centre) and covered the basics of Arduino microcontrollers and their applications in building simple electronic projects. The second session was led by BS-MS students Nawanshu Diwakar and Uday Pratap and focused on advanced Arduino projects, on using 7-segment displays and focusing on an open source SevSeg Library, encouraging hands-on learning and experimentation (January 14, 2025 & February 1, 2025)
- Pi Week Stall: An interactive exhibition for school students showcasing the properties of π through engaging visual and hands-on activities (March 2025)
- SciCon Event (Mimamsa 2025): IPLUG presented "Human vs AI" (a Flappy Bird demo using NEAT) and demonstrated Arduino-based automation and robotics projects (binary counters, LED matrices, 7-segment displays) to school children, sparking interest in coding and hardware.

Kaleidoscope, the film club, celebrates cinema as an art form, a medium of storytelling, and a tool for social discourse. During the year, the club held short film competitions, multilingual screenings and collaborations across departments and communities, thereby fostering a vibrant space for film enthusiasts.

**Activities during the year:**

- The student-produced short film "South Side Window" secured third place at both the Inter IISER-NISER-CEBS-IISc Cultural Meet (IICM) 2024 and IIST Trivandrum's Dhanak'25 festival. Developed through the Kaleidoscope Film Club, the film stood out for its compelling cinematography and technical proficiency.
- Organised two special screenings in collaboration with the HSS department for the films: "Taang" (The Longing) and "Bhed Chal"; held multilingual film screenings with films made in different languages such as Lebanese, Korean, Turkish, German, Bengali, and Marathi.
- In collaboration with Satrangi club, held a screening of the film "Cobalt Blue" on the occasion of Pride March. A discussion session ensued with personal stories and reflections on how cinema can help us understand lives different from our own.
- As part of Muktiparv that celebrates Ambedkar Jayanti, held screenings of two movies with the theme of social justice: "Thangalaan" and "Lubber Pandhu"

The Marathi Club fosters appreciation for Marathi culture, language, and traditions through engaging events, literary activities, and cultural programmes. It serves as a platform for students to express their creativity and connect with their heritage.

**Activities during the year:**

- Club members conducted Marathi Classes with the aim to introduce the language to non-Marathi-speaking students, helping them learn and use it confidently in daily life.
- Omkarotsav: Ganeshotsav is a grand festival celebrating Lord Ganesha with devotion and cultural events like Antakshari, Idol-making workshop, and many other competitions followed by Visarjan of the idol in a procession accompanied by a Dhol-Tasha Pathak.
- Shivjayanti Utsav: Celebrating the birth anniversary of Chhatrapati Shivaji Maharaj and his valour, leadership, and contributions to Maratha history. It is observed with great enthusiasm through Lezim showcase, talk, and book distribution.
- Organised a book launch event (Vikram Sampath's book on Tipu Sultan) in collaboration with Pune Samvad and IISER Pune student clubs—Artha Club and Yogen Club.

The Maths Club aims to promote a deep regard for mathematics through various fun-filled activities.

**Activities during the year:**

- Organised the Math in Science Talk Series, which featured four talks showing how math pops up in all sorts of scientific contexts: Prof. Sudarshan Ananth spoke on symmetries in Physics, explaining how group theory plays a huge role in

understanding particles and forces; Prof. Srabanti Chaudhury talked about mathematical modelling of stochastic events describing how randomness is dealt with in real-world systems; Dr. Rahul Dehiya spoke on inverse modelling; and Dr. Sanu Shameer spoke on modelling metabolism in biological systems

- Organised Integration Bee, which is like a spelling bee, but with integrals. The winner was Gaurav Pundir (Batch of '25), and the runner-up was Siddhesh Sinha (Batch of '29)
- Throughout the year, the club also ran Polya Collective, a set of informal weekly sessions where we tackled interesting problems and discussed cool ideas from books and papers
- Hosted Desmosmeth, an event where participants used Desmos to make artistic graphs. It was a fun way to combine math and creativity, and it was hosted by Anurag Tamuli (November 2024); Two online contests Feluda's Faluda, a mystery-themed weekly puzzle series with a story woven in and Sudoku Contest (December 2024)
- Organised a talk by Prof. Siddharth Gadgil on Automated Theorem Proving and its Role in Mathematics on the occasion of National Mathematics Day (December 2024); Organised "Kolam: Where Art Meets Math", a session by Sindhuja T. on traditional kolam patterns and their underlying mathematical structures; and a Lean Workshop by Malhar Patel and Vivek Joshi, introducing a proof verification tool (January 2025)
- Axiomathica, an Olympiad-style competition, dove into advanced undergraduate math topics like real and complex analysis, group and ring theory, point-set topology, and more (March 2025)
- Pi-Week 2025 ran through the month of March 2025 and included talks by Dr. Anisa Chorwadwala, Dr. Chandrasheel Bhagwat, Dr. Rama Mishra, and Dr. Amartya Kumar Dutta; a treasure hunt, fun stalls, a math-themed CBT game show, and the Erdos Quiz (in collaboration with the Quiz Club), a movie screening, a Math in Music performance and a skit written by Dr. Steven Spallone
- Participated in SciCon 2025, teaming up with the Chess and Cubing Clubs to run interactive puzzle and logic stalls
- Organised the MS Thesis Talk Series in April 2024. Senior MSc and MS students presented their thesis work, giving juniors a window into what math research looks like across different fields. The speakers this year were Naren S Narayanan, Bhagyalekshmy S, Prasanna N Bhat, Aditya Marodia, Naman Pratap, Ameya Abhijit Tilgul, Manjima Ghosh Hazra, and Yash Karampuri

Navarasa Dance Club aims to spread joy and expression through dance — both to trained dancers and novices, as well as to the audience watching.

**Activities during the year:**

- Monthly Workshops: Club members held 9 workshops during the year on various dance styles and topics such as Garba, Kuthu, Indian classical, and Bollywood.
- Introduced NritTarang—Dance Week, where the club organised Holi DJ, Holi Flashmob, movie screening of Moulin Rouge (in collaboration with Kaleidoscope student club), Spotlight (an open-mic for dancers), a quiz on dance, an online reel competition, and a talk by Dr. Radhika Mulay on "Rights of Rivers through the Lens of Bharatanatyam"
- Put together Navarasa Showcase events during Republic Day, Independence Day, and Karavaan campus festival
- Organised Nupura, the Inter college Dance Competition bringing four 15-member teams to IISER Pune to compete on the Karavaan mainstage

Pixels is the photography club of IISER Pune.

**Activities during the year:**

- Photo of the Day and Photo of the Week series include discussions on photography techniques over WhatsApp and posting of selected photos on the club's Instagram handle. Pixels collaborated with the campus Maths club as a part of Pi Week events.
- Inter IISER-NISER-CEBS-IISc Cultural Meet (IICM) 2024: Participated at two events that involved constructing a story around a set of photographs of the city, and secured third place in "Stories in Clicks" event and second place in "Themed Photography" event.

- Organised a photo walk to Kasba Peth, known as the oldest part of Pune, to explore street style photography (January 19, 2025)
- Organised "Paint with Light" session at Mimamsa Scicon 2025 for participants to get a hands-on experience with light painting and an understanding of the physics behind exposure and shutter speed.

Prutha is the Nature and sustainability club that works to create awareness about issues related to the environment and to promote a clean and green campus.

**Activities during the year:**

- Collection Drives: Conducted an e-waste collection drive in collaboration with FixThis, a student-run initiative, to recycle and repair broken electrical appliances; and a clothes and stationery collection drive (December 1, 2024)
- Treks and Nature walks: Organised annual fresher's trek to Panchavati Hill in Pashan (September 1, 2024); a trek to Lohagad Fort and Bhaja Caves (November 15, 2024); Geology trip to Ghoradeshwar lava caves to learn about the region's volcanic past (February 8-9, 2025)
- River and Biodiversity Activities: Partnered with Jeevitnadi for a River Cleaning Drive (October 20, 2024); a Riparian Tree Mapping session (October 27, 2024); and an early morning bird-watching session at the Ram-Mula Confluence (January 11, 2025) on the Mula river bank
- Birding and Wildlife Trips: Organised a visit to Bhigwan Bird Sanctuary to observe migratory birds at Maharashtra's wetlands (January 14, 2025); participated in the Annual Campus Bird Count 2025 as part of the Great Backyard Bird Count (GBBC) (February 14-16, 2025), and led a trip to Velas village on the western coast of Maharashtra to witness the hatching of Olive Ridley turtles (March 8, 2025).
- Sustainability Initiatives: Set up TetraPak Collection Stations around campus to recycle used cartons into school benches for low-income schools and hosted a Republic Day Stall with ProEarth, ReCharkha, and Earthing Store to promote sustainable products (January 26, 2025)

The Science Club organises events and talks on the latest events in science and on the lives and careers of eminent personalities in academia.

**Activities during the year:**

- Interactive Talk titled "Darkness Glowing Softly: The Incredible Story of Black Holes" by Prof. Sunil Mukhi (August 29, 2024)
- Know Your Courses (KYC): Orientation and guidance sessions for the new batch of 2024-29 and for the 4th semester students of the 2023-28 batches (August 31 & December 8, 2024)
- Higgs Boson Talk Series: Talks by Dr. Diptimoy Ghosh and Dr. Seema Sharma (September 4-5, 2024)
- Nobel Evenings Series: A four-part discussion series where IISER Pune faculty members described and presented insights on the 2024 Nobel Prizes. Prof. MS Madhusudhan, Prof. Anjan Banerjee, Dr. Bedartha Goswami, Dr. Bejoy Thomas, and Dr. Pooja Sancheti spoke about the research in different areas that received recognition through the prizes.
- National Science Day: Interactive science models and demonstrations for visiting school and college students on topics in biology, physics, and mathematics, such as models on lipid membranes, DNA replication, Central Dogma, endosymbiotic theory, electromagnetic induction, optics, looping pendulum, Chinese Remainder Theorem and Queen's Problem (February 28, 2025)
- Pi Week Stalls: "Math Behind the Sciences" – Engaging exhibits for school students featuring mathematical ideas such as the Basel Problem, Fibonacci sequence, Golden Ratio, and Collatz conjecture (March 8, 2025)
- Talk by Dr. Radhika Mulay on "Rights of Rivers through the Lens of Bharatanatyam", organised in collaboration with Navarasa during NritTarang (March 19, 2025)
- SciCon 2025 during Mimamsa SciFest: Set up interactive stalls on QR codes, mimicry and evolution, quantum dots, and fun science games like Doodle Dash and Bad Ad Hoc Hypothesis (March 23, 2025)

The **Satrangi** student club stands for inclusivity, respect and compassion for all and promotes LGBTQ+ awareness and visibility on campus.

**Activities during the year:**

- Regular Socials (Monthly): Regular meetings to discuss relevant topics and engage in meaningful conversations; hosted an ice-breaker social for first-year students during their first month on campus
- Organised Open Mic & Mehendi Night; Movie Screening in collaboration with Kaleidoscope of the critically acclaimed film "Fire"
- Hosted awareness and interactive sessions during SciCon 2025 (Mimamsa)
- Organised Pride Week (April 3-6, 2025) with a movie screening, a poster making session, the Queer Mela, and the annual Pride March on campus

The **Sports Club** organises and coordinates sports activities throughout the year on campus. It plays a crucial role in promoting physical fitness, teamwork, and a healthy lifestyle among students, faculty, and staff.

**Activities during the year:**

- In the 2024 edition of the Research Premiere League between research institutions of Pune (IISER Pune, CSIR-NCL, HEMRL, IITM, IMD, and ARAI), IISER Pune team secured the first position (April 2024)
- In collaboration with the Yogen Club, celebrated the 2024 International Day of Yoga (June 21) under the theme of 'Vasudhaiva Kutumbakam' with a 10-day yoga workshop.
- Sports tournaments organised through the year on campus included those in badminton, table tennis, cricket, football, basketball, volleyball, frisbee, and carrom, some of which were held under the banner of Kreedajung '25 sports fest for participants within the campus.
- The institute campus hosted the Inter-IISER Sports Meet (IISM) 2024 during December 17-23, 2024. Teams from all seven IISERs, IISc Bengaluru, CEBS Mumbai, and NISER Bhubaneswar participated at this event. IISER Pune secured overall second position and our student teams were declared champions in Badminton (Mixed doubles), Lawn Tennis (Men), Chess, Carrom, Basketball (Women), and Kho-Kho (Women), along with several of our players winning medals in athletics events.

**SPIC MACAY IISER Pune** – The Society for the Promotion of Indian Classical Music And Culture Amongst Youth (SPIC MACAY) at IISER Pune is committed to bringing the best of Indian classical music, dance, and art to the campus. An organisation started in 1977 by Dr. Kiran Seth (IIT Delhi), SPIC MACAY has created opportunities for students across India to engage with artists. The IISER Pune chapter of SPICMACAY coordinated the following concerts during 2024-25.

**Activities during the year:**

- Organised Santoor recital by Pandit Satish Vyas (September 9, 2024)
- Parijat overnight music concert: Deen Mohammed and Group (Rajasthani Folk); Dr. Sumithra Vasudev (Carnatic Vocal); Vid. Bhimanna Jadhav (Sundri); Vid. D. Balakrishna (Veena); Vid. Ashwini Bhide-Deshpande (Hindustani Vocal) (November 9-10, 2024)
- Kathakali performance by Adv. Renjini Suresh and troupe (January 25, 2025)


The **Quiz Club's** mission is to preserve and share the hobby of quizzing within IISER Pune and with the rest of Pune.

**Activities during the year:**

- Organised Monday Night Quizzes (MNQs) on Mondays at 9 PM during the semester with a different theme each week: Fresher's Quiz, the Erdős Quiz as part of Pi Day in collaboration with the Maths Club, Women's Day Quiz on Women's Day in collaboration with WISC, Indian Food Cultures Quiz on Bijoya in collaboration with Bijoya organisers, The Dance Quiz in collaboration with Navarasa. A total of 23 MNQs across 2 semesters saw the participation of 679 IISER students, for an average of ~29 participants per MNQ. In Quizophrenia, the top 12 participants from MNQs compete against each other to be crowned the best quizzer at IISER Pune.
- Conducted MIMIR Night (September 30, 2024) to introduce new quizzers to more formal and competitive quizzing formats; and Chiaroscuro Open Quiz, as part of Karavaan in March 2025, which saw 17 external participants and 8 IISER students competing for the top spot.

### Mimamsa 2025

*Prelims: January 19, 2025; Mains: March 20-23, 2025*

Mimamsa is a national-level annual undergraduate science competition held with the objective of promoting critical thinking among students across colleges in India. The team, comprising of IISER Pune students, dedicates itself to year-long question-making sessions to create a remarkable experience for all participants. Since the year 2020, partnership with Praj Industries helped scale up the competition to greater heights.

Over 1800 teams across India registered for Mimamsa 2025, which is the 17th edition of the competition. The Prelims round was held online on January 19, 2025. A total of 31 zonal toppers, 5 subject toppers, and top 10 all-girl teams received recognition. The top four teams that made it to the final Mains round were IISc Bengaluru, IIT Bombay, IIT Delhi, and IISER Kolkata. The

grand Mains event took place from March 20-23, 2025 at IISER Pune campus. After all the challenging rounds, namely, Deep Thoughts, Brief Thought and Rapid Fire, IISc Bengaluru emerged victorious. IIT Bombay was the first runner-up and IISER Kolkata was the second runner-up. As part of the Mimamsa Mains programme, the team hosted a Sci-Con event (originally started by the Mimamsa 2023 team), which is an in-house science fest along with Inter-School Science Exhibition Competition (ISEC). This featured stalls and exhibits by IISER Pune's student clubs as well as student exhibits from schools in Pune.

### Karavaan Annual Festival

March 27-31, 2025

Karavaan is IISER Pune's annual socio-cultural festival, celebrating the vibrant spirit, creativity, and diversity of the campus community. Continuing the legacy of fostering unity and artistic expression, Karavaan 2025 was filled with performances and showcases of music, dance, art, and more.

The festival opened with a screening of the documentary film "The Sound Alchemists", exploring the rich heritage of the Veena. This was followed by a Saraswati Veena recital by renowned artists Ramana Balachandhran and Anantha R. Krishnan. Alongside these performances, the Auto Show and Prom Night returned with renewed energy. The next few days saw showcases from various student clubs across campus as well as a Zumba Finale and the Nupura Dance Battle, an inter-college dance competition. The Art Bazaar continued to provide a platform for students to display and sell their handcrafted works. Events by invited artists included a laughter-filled stand-up set by Piyush Sharma, a high-energy musical night featuring Sunburn DJs, and a live concert by Shreya Jain. By bringing together music, dance, art, and performance, Karavaan serves as a platform for connection and self-expression for the campus student community. As the festival grows each year, it strengthens the bonds within the institute and fosters a culture of inclusivity and shared joy.

# Support Structure

# Support Structure and Facilities

IISER Pune has set up institutional policies and procedures to facilitate smooth functioning of the institute and to coordinate activities on the campus.

Matters related to general administration, finance, human resource management, IT requirements, procurement of equipment and consumables, civil, electrical and other engineering infrastructure are all handled by qualified staff members in consultation with institutional committees. The institutional committees are comprised of teaching and non-teaching staff members with a dual purpose: to oversee all support systems and to develop and implement plans to support future needs of the institute.

The **Administration** section takes care of recruitment to regular positions and of personnel under various research projects; maintains personal records, service books, and Annual Performance Appraisal Reports; and facilitates security, housekeeping, and transport services.

The **Finance and Accounts** section handles preparation of budget estimates, monitoring of expenses under various account heads, internal audit of payments and disbursements, preparation of the Annual Accounts, and interaction with the audit team of CAG (Comptroller and Auditor General of India).

The **Purchase** section of the institute looks after the indigenous and import procurement required for the entire institute. The purchase section finalises the service contracts and maintenance contracts. The procurement process is managed through the Government eMarket (GeM) and Central Public Procurement Portal (CPPP).

The offices of the Dean Graduate Studies and Dean Doctoral Studies constitute the **Academic** section that handles all aspects pertaining to the student admission process, timetable and classroom requirements, conducting of exams, and maintaining of student records.

The campus is connected through a dedicated internet leased line of 10 Gbps National Knowledge Network and a 1 Gbps BSNL line for uninterrupted internet access. The institute has a centrally managed indoor and outdoor dual band campus wide Wi-Fi access network, high speed wired local area network along with perimeter IT security protection. The **Information Technology (IT)** section manages setting up, upgradation and operations of these facilities along with hosting critical infrastructure services such as IT security, email, website, DNS, Eduroam, iisERP, latest state of the art computer laboratories, virtual reality laboratory, facial recognition based attendance system, and recruitment as well as admissions software. The team also manages institute machines, local area network, voice over internet phones (VoIP), VPN services for users, audio-video equipment during on campus events, and supports the IT related operations at the auditorium, Guest House & Convention Center, classrooms, seminar halls, lecture halls and e-classrooms.

The IT section continues to provide system and scientific application support for the National Supercomputing Mission funded PARAM Brahma supercomputing facility of peak computing power 1.7 PF hosted at the institute on a 24x7 basis. This facility has helped many researchers of the institute as well as other institutes to successfully carry out their compute-intensive research in the areas of High Performance computing, Artificial Intelligence, Deep Learning, Machine Learning, and Big Data from a location of their choice. Advanced HPC users from other institutes across the country avail the services of the supercomputing facility on a pay-as-you-use model.

IT section has facilitated installation of a state of the art Artificial Intelligence facility of peak computing capacity of 1 PF along with 3 PB storage, especially for applications related to Data Science, AI, ML etc. IT team provides system as well as application level support for the high performance computing clusters and parallel file system based storage hosted in multiple data centers aggregating 3.1 PF along with 5 PB storage for various scientific and research applications in the areas of computational biology, particle physics, astrophysics, computation chemistry, materials modelling, molecular dynamics, nanoparticles, cryptography, seismology, climate science, etc.

The IISER Pune campus has world-class infrastructure for teaching, research, housing and recreational facilities for students and employees. IISER Pune campus is GRIHA 4 star rated green and energy efficient campus. The physical infrastructure consists of Main Laboratory Building, Lecture Hall Complex, Animal House Facility, Guest House-cum-Convention Centre, students' hostels with central dining facility and on-campus housing for employees. Further common amenities include outdoor sports facilities, an indoor sports complex, shopping facility, daycare facility, wellness clinic and pharmacy. The **Engineering** section handles all construction activities on the campus along with maintenance and upkeep.

Working at the interface of research and administration, the **Research Administration and Development Integration Office (RADIO)** is envisaged to further the research progress of IISER Pune through support in the following areas: garnering research funding; forging national and international partnerships; bringing in endowments; engagement through research communications via print and online media including annual report, institute website and social media portals; and actively engaging with various stakeholders in government and private bodies, alumni, and members of the public.

In addition, **various staff members** provide valuable technical and professional support within research departments, outreach centres, and various facilities on campus including those of sports, medical, dining, and guest house.

**Srinivasa Ramanujan Library** is an integral part of academic and research work on campus. It supports the teaching, learning, research, and other scholarly activities of the institute with over 33000 print documents, 13000 online journals, 5 online databases, over 6000 e-books and 2350 theses and dissertations in its collection. Library facilitates access to electronic, print, and multimedia resources and provides essential online information and research support services. Library has added 968 purchased books during 2024-25, out of which 167 are Hindi books. 198 gratis books have also been added to its collection in the last financial year. A large part of the journals and online resources' subscription is through the One Nation One Subscription (ONOS) formed by the Ministry of Education (MoE), Govt. of India, and 'IISER Library Consortium'. Library services are completely automated with all the required software tools and the circulation kiosk is integrated with RFID technology and a biometric user authentication system.

The library provides various research support services such as Faculty Research Profiles, Assistance to Open Access Publishing, Bibliometrics and Scientometrics Analysis, Plagiarism Checking Service, Current Awareness Service, Document Delivery Service, Inter Library Loan, Author Workshops, Orientation, Training, and Digital Literacy Programmes. The library also provides access to various essential research tools such as Scopus, Scifinder Scholar, MathScinet, Derwent Innovation, Grammarly, Turnitin, Cambridge Structural Database, and ChemDraw. The Library has been actively engaged in designing and delivering need-based information services. Library also supports user community with their academics by providing off-campus access to e-resources through 'Remote Access Portal'.

Digital Repository (DR) (http://dr.iiserpune.ac.in:8080/xmlui/) has been set up to preserve and provide instant access to the scholarly output of IISER Pune faculty, students, staff, and others associated with the institute. It serves as a platform for the IISER Pune community to share their research work with the wider community. Metadata of the PhD records available in the repository is also integrated with the National Digital Library of India. Library also deposits full-texts of PhD theses to Shodhganga national repository in addition to hosting them on DR. There are 2350 theses and dissertations, 5990 scholarly publications and over 550 other scholarly resources are available in DR. 218 full-text MS theses, 109 full-text PhD theses, metadata of 524 scholarly publications have been added to DR during the year.

Library enrolled as an institutional member of Jaykar Knowledge Resource Centre, Savitribai Phule Pune University to benefit our users with access to wider collections learning resources. Library has good number of braille books in its collection and also enrolled as an institutional member of Sugamya Pustakalaya, DAISY Forum of India, New Delhi to provide access to over 6 lakhs audio books to people with print disabilities. The library has been actively promoting reference and information services both in person and over the campus network using the library website and institute email. The total number of documents issued to our users during the year was 15662. Library has been taking an active part in availing benefit of resource sharing with other major libraries throughout India through Inter Library Loan and Document Delivery Services. We are also member of DELNET-Developing Library Network, New Delhi which is a major resource sharing library Network in India. Library receives a number of requests from faculty and students for getting books and non-subscribed research papers from other libraries. To meet these requests, library has managed to provide 327 publications. Also, delivered 119 papers to other libraries in reciprocation in the last financial year.

*Author Workshop organised on September 27, 2024*

Library has celebrated “Library Week” during November 4-8, 2024. As part of the celebration, Treasure Hunt, Online Quiz, Open Book Quiz, Book Exhibition and Author Workshop were organised for the user community. Book Talk in association with students-run Literary Club was also organised. Students, staff and faculty members have actively participated in all the events and won prizes. Highest user award based on number of print books checked-out during Jan-Dec 2023 was given to Mr. Naman Kapoor.


*Celebration of ‘Library Week’ during November 4-8, 2024*

The 17th IISER Library Consortium Meeting hosted at IISER Pune on January 16-17, 2025. The meeting brought together library professionals from all IISERs to discuss advancements in library services, digital resources, and academic support. Key topics included sharing best practices, exploring new technologies, and negotiating with different publishers for better pricing and access to educational content. This meeting reinforced the consortium's focus on collaboration and resource optimisation.

*The 17th IISER Library Consortium Meeting was hosted at IISER Pune on January 16-17, 2025*

**Living on campus:** Along with on-campus accommodation for students and employees, the IISER Pune campus houses a wellness clinic with a 24x7 ambulance service, a daycare facility, dining hall, gym, and indoor and outdoor sports facilities including basketball court and football field and cricket grounds. The campus is green with increasing tree cover each year. Student clubs such as Disha, Prutha, and SPICMACAY@IISER offer volunteering opportunities for engaging with the community within and beyond the campus through educational, cultural, and environment awareness programmes.

*The infrastructure and facilities on the campus cater to 139 regular faculty members; 27 visiting, emeritus, guest, and adjunct faculty; 61 fellows, project scientists, and post-doctoral research associates; 133 non-teaching staff members; 1978 students (520 PhD, 153 Integrated PhD, 73 Master of Science, and 1232 BS-MS); and 150 research and management staff recruited through extramural projects. The numbers are as of March 31, 2025.*

# Accounts at a Glance

# Accounts at a Glance

The Annual Accounts of the Institute were approved by the Finance Committee and the Board of Governors during its meeting held on May 28, 2025. The annual audit for the Financial Year 2024-25 was carried out during June 9, 2025 to July 25, 2025. The balance sheet and the income and expenditure statement for the Financial Year 2024-25 are given in the following pages.

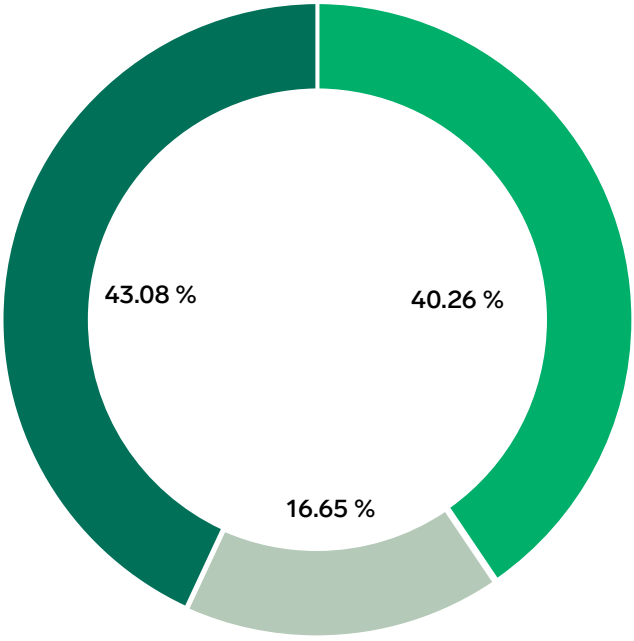
## FUNDS RECEIVED FROM THE MINISTRY OF EDUCATION

During the Financial Year 2024-25, IISER Pune received an amount of ₹174.37 crores from the Ministry of Education under the budget heads revenue, capital, and salary. The break-up across the three budget heads is as below.

**Revenue** ₹70.21 crores

**Capital** ₹29.04 crores

**Salary** ₹75.12 crores




## CORPUS

The cumulative corpus fund as on March 31, 2025 from the Internal Revenue generated is ₹128.58 crores. The Institute generated an amount of ₹23.1 crores during the Financial Year 2024-25 from internal receipts.

## EXTRAMURAL GRANTS

A number of research projects receive support from extramural grants through individual competitive research grants that faculty members have secured. During the Financial Year 2024-25, a total of ₹63.53 crores has been received by / assigned to the Institute via extramural grants. New grants initiated during the Financial Year 2024-25 are listed in the *Appendix* section of this report.

## ENDOWMENTS

Some of the activities at IISER Pune are supported through endowments from corporate organisations. During the financial year 2024-25, ₹6.61 crores was received via endowments. Details are given in the *Partnerships and Endowments* chapter of this report.

*The balance sheet and the income and expenditure statement for the Financial Year 2024-25 are given in the following pages. To view the complete annual accounts document, please visit Reports and Brochures Link under the About section of the Institute website.*

*https://www.iiserpune.ac.in/institute/about/reports-and-brochures/annual-accounts*

# Balance Sheet

**as on March 31, 2025**

Amount in ₹

| Sources of Funds | Schedule | Current Year 2024-25 | Previous Year 2023-24 |
|---|---|---|---|
| Corpus / Capital Fund | 1 | 747,11,18,675 | 731,24,45,488 |
| Designated / Earmarked / Endowment Funds | 2 | 42,04,19,373 | 39,44,13,197 |
| Current Liabilities & Provisions | 3 | 64,92,87,410 | 87,36,77,667 |
| Secured Loans - HEFA Loan | 3 D | 30,53,39,051 | 30,23,11,795 |
| **Total** | | **884,61,64,510** | **888,28,48,147** |

| Application of Funds | Schedule | Current Year 2024-25 | Previous Year 2023-24 |
|---|---|---|---|
| **Fixed Assets** | 4 | | |
| Tangible Assets | | 605,03,14,513 | 618,30,59,043 |
| Intangible Assets | | 5,19,06,969 | 6,73,66,208 |
| Capital Works-In-Progress | | 8,31,33,845 | 3,74,30,956 |
| **Investments From Earmarked / Endowment Funds** | 5 | | |
| Long Term | | | |
| Short Term | | 40,14,24,087 | 37,67,65,493 |
| **Investments - Others** | 6 | 203,12,20,617 | 182,17,93,460 |
| **Current Assets** | 7 | 4,32,53,994 | 25,85,19,005 |
| **Loans, Advances & Deposits** | 8 | 18,49,10,484 | 13,79,13,980 |
| **Total** | | **884,61,64,510** | **888,28,48,147** |

| | |
|---|---|
| Significant Accounting Policies | 23 |
| Contingent Liabilities and Notes to Accounts | 24 |

*For and on behalf of IISER Pune*

| | | |
|---|---|---|
| **sd/-** | **sd/-** | **sd/-** |
| **CA. Vasundhara Laad** | **Mr. Umeshkumar Mote** | **Prof. Sunil S. Bhagwat** |
| Jt. Registrar (F&A) | Registrar | Director |

**Place**: Pune | Date: May 1, 2025

# Income and Expenditure Statement

**For the year ended March 31, 2025**

Amount in ₹

| Particulars | Schedule | Current Year 2024-25 | Previous Year 2023-24 |
|---|---|---|---|
| **Income** | | | |
| Academic Receipts | 9 | 12,31,02,062 | 10,45,54,886 |
| Grants / Subsidies | 10 | 142,89,80,994 | 138,44,44,224 |
| Income from Investments | 11 | 3,17,76,145 | 2,03,02,756 |
| Interest Earned | 12 | 1,47,304 | - |
| Other Income | 13 | 7,60,24,959 | 6,50,99,787 |
| Prior Period Income | 14 | 4,70,233 | 6,38,077 |
| **Total (A)** | | **166,05,01,697** | **157,50,39,731** |
| **Expenditure** | | | |
| Staff Payments & Benefits *(Establishment Expenses)* | 15 | 75,62,54,754 | 68,21,82,328 |
| Academic Expenses | 16 | 16,80,58,422 | 16,46,83,160 |
| Administrative and General Expenses | 17 | 39,39,92,605 | 37,98,29,440 |
| Transportation Expenses | 18 | 50,44,209 | 54,36,650 |
| Repairs & Maintenance | 19 | 13,48,18,279 | 13,09,53,043 |
| Finance Costs | 20 | 1,63,63,052 | 1,20,18,110 |
| Depreciation | 4 | 46,03,32,956 | 47,09,93,544 |
| Other Expenses | 21 | 54,16,092 | 13,69,351 |
| Prior Period Expenses | 22 | 17,68,974 | 26,91,607 |
| **Total (B)** | | **194,20,49,343** | **185,01,57,234** |
| **Balance being excess of Income over Expenditure (A-B)** | | **(28,15,47,646)** | **(27,51,17,503)** |
| Transfer to Corpus Fund (9+11+12+13) | | (23,10,50,470) | (18,99,57,429) |
| Transfer to Capital Fund (Depreciation) | | 46,03,32,956 | 47,09,93,544 |
| Transfer to Capital Fund (Loss on Asset Disposal) | | (69,78,315) | (16,46,270) |
| Over Utilization of Grant in Aid for Revenue Exps (Schedule 3c) | | | |
| Under Utilization of Grant in Aid for Revenue Exps (Schedule 3c) | | | |
| **Balance being surplus/deficit carried to Institute Corpus Fund** | | **(4,52,86,846)** | **75,64,882** |
| Significant Accounting Policies | 23 | | |
| Contingent Liabilities and Notes to Accounts | 24 | | |

*For and on behalf of IISER Pune*

| | | |
|---|---|---|
| **sd/-** | **sd/-** | **sd/-** |
| **CA. Vasundhara Laad** | **Mr. Umeshkumar Mote** | **Prof. Sunil S. Bhagwat** |
| Jt. Registrar (F&A) | Registrar | Director |

**Place**: Pune | Date: May 1, 2025


WING A
LIBRARY
WING B
PHYSICS 1 2
MATHEMATICS 1
WING C
BIOLOGY
CHEMISTRY

# Appendix

# Publications in 2024

*The list has been generated from the information shared by institute members with our campus Library and, additionally, includes papers sourced from the Web of Science database with authors having IISER Pune as their primary affiliation. The names of authors with IISER Pune affiliation are in all-caps.*

## Biology

1. PANDEY, SANYUKTA; BAPAT, VIBHA; ABRAHAM, JANCY NIXON; ABRAHAM, NIXON M., 2024, Long COVID: From olfactory dysfunctions to viral Parkinsonism, World Journal of Otorhinolaryngology, 10(02), 137-147. https://doi.org/10.1002/wjo2.175

2. MALHOTRA, MEHAK; PARDASANI, MEENAKSHI; PATHAN, SHAHIDKHAN; SRIKANTH, PRIYADHARSHINI; SHAW, KARISHMA; ABRAHAM, NIXON M.; JAYAKANNAN, MANICKAM, 2024, Star-polymer unimolecular micelle nanoparticles to deliver a payload across the blood–brain barrier, Nanoscale 16(46), 21582-21593. https://doi.org/10.1039/D4NR02636E

3. ARYA, UPENDRA; Kumar, P. Ramesh; Pal, Arijit; Rao, Nitin Venkatesh Ranga; Kumara, Honnavalli N., 2024, Ecological determinants of occupancy of Grizzled Giant Squirrel Ratufa macroura dandolena, its activity pattern and habitat use in Cauvery Wildlife Sanctuary, Karnataka, India, Mammal Study, 49(04), 321-332. https://doi.org/10.3106/ms2023-0090

4. YADAV, SHIVANI A.; KHATRI, DHRUV; SONI, AMAN; KHETAN, NEHA; ATHALE, CHAITANYA A., 2024, Wave-like oscillations of clamped microtubules driven by collective dynein transport, Biophysical Journal, 123(04), 509-524. https://doi.org/10.1016/j.bpj.2024.01.016

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564. VARDARAJAN, SUNEETA, 2024, Generalized entropy in higher curvature gravity, General Relativity and Gravitation, 56, 96. https://doi.org/10.1007/s10714-024-03280-2

## Books

565. Ghosh, Pika; SOHONI, PUSHKAR (Eds.), 2024, Chakshudana or opening the eyes: Seeing South Asian art anew. http://dr.iiserpune.ac.in:8080/xmlui/handle/123456789/8316 Dept. of Humanities and Social Sciences

566. Dengle, Narendra; Sagare, Minal; Sahasrabudhe, Chetan; SOHONI, PUSHKAR (Eds.), 2024, Architecture in Maharashtra tradition and journey-Vol 1-2. http://dr.iiserpune.ac.in:8080/xmlui/handle/123456789/9801 Dept. of Humanities and Social Sciences

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## Book Chapters

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569. WARGHUDE, PRAKASH K.; BHOWMICK, ANINDITA; BHAT, RAMAKRISHNA G., 2024, Synthesis of hybrid spirooxindoles, Spirooxindole - Chemistry, synthesis, characterization and biological significance, 309-331. https://doi.org/10.1016/B978-0-443-22324-2.00012-6 Dept. of Chemistry

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## Book Review

582. SANCHETI, POOJA, 2024, Literature and the war on terror: Nation, democracy and liberalisation, Journal of Postcolonial Writing, 60(03). https://doi.org/10.1080/17449855.2024.2308990 Dept. of Humanities and Social Sciences

## Conference Papers

583. ACHARYA, PRITAM; Bhore, Sujoy; Gupta, Aaryan; Khan, Arindam; Mondal, Bratin; Wiese, Andreas, 2024, Approximation schemes for geometric knapsack for packing spheres and fat objects, In 51st International Colloquium on Automata, Languages, and Programming (ICALP 2024). Leibniz International Proceedings in Informatics (LIPIcs), Volume 297, pp. 8:1-8:20, Schloss Dagstuhl – Leibniz-Zentrum für Informatik, https://doi.org/10.4230/LIPIcs.ICALP.2024.8 Dept. of Mathematics

584. ALPANA on behalf of the CMS collaboration, 2024, Charged pion energy reconstruction in HGCAL TB prototype using graph neural networks, In: Jena, S., et al. Proceedings of the XXV DAE-BRNS High Energy Physics (HEP) Symposium 2022, 12–16 December, Mohali, India. HEPS 2022. Springer Proceedings in Physics, vol 304. Springer, Singapore. https://doi.org/10.1007/978-981-97-0289-3_163 Dept. of Physics

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586. Sreenivas, Manogna; CHAKRABARTY, GOIRIK; Biswas, Soma, 2024, pSTarC: Pseudo source guided target clustering for fully test-time adaptation, 2024 IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), Waikoloa, HI, USA, 2024, pp. 2690-2698, doi: 10.1109/WACV57701.2024.00268 Dept. of Data Science

587. GOKHALE, PALLAVEE; Ameri, Marta, 2024, Modelling the possible archaeological past(s): Agent-based modelling of Harappan seal use and survival, Computer Applications and Quantitative Methods in Archaeology (CAA) 2024 (CAA2024), Auckland, New Zealand. https://doi.org/10.5281/zenodo.13857833 Dept. of Humanities and Social Sciences

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589. Tejasmayee, Pracheta; Agarwal, Bhakti; Kashyap, Samiksha; Rastogi, Shailesh; Pushp, Aman; JINGER, HARSH, 2024, Subsidies and market borrowings: unraveling the fiscal dynamics in India's development expenditure, 2024 2nd International Conference on Signal Processing, Communication, Power and Embedded System (SCOPES), Paralakhemundi Campus, Centurion University of Technology and Management, Odisha, India, 2024, pp. 1-6. https://doi.org/10.1109/SCOPES64467.2024.10990619 Dept. of Humanities and Social Sciences

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591. JOJO, JEZER; Khandelwal, Ankit; Chandra, M. Girish, 2024, Quantum algorithms for tensor-SVD, 2024 IEEE International Conference on Quantum Computing and Engineering (QCE), Montreal, QC, Canada, 2024, pp. 67-75, https://doi.org/10.1109/QCE60285.2024.00018 Dept. of Physics

592. Shahapure, Arsheyee; Gupta, Rajat; Bhole, Prathamesh; Losu, Vethonulu; KULKARNI, MADHURA; Banerjee, Anindita, 2024, Detection of malignant cancerous nuclei using quantum hadamard edge detection algorithm, 2024 IEEE Pune Section International Conference (PuneCon), Pune, India, 2024, pp. 1-6, https://doi.org/10.1109/PuneCon63413.2024.10895216 Dept. of Biology

593. MAHESHWARI, PRANAV; Raina, Ankur, 2024, Fault-Tolerance of the [[8, 1, 3]] Non-CSS Code, 2024 IEEE International Symposium on Information Theory Workshops (ISIT-W), Athens, Greece, 2024, pp. 1-6, https://doi.org/10.1109/ISIT-W61686.2024.10591768 Dept. of Physics

594. MATHAI, ABY K.; Mathew, Alex; Lakshmanan, Gnanappazham; Prasad, K. Arun, 2024, Bhitarkanika mangrove species change detection using hyperspectral remote sensing and field survey, 2023 13th Workshop on Hyperspectral Imaging and Signal Processing: Evolution in Remote Sensing (WHISPERS), Athens, Greece, 2023, pp. 1-5, https://doi.org/10.1109/WHISPERS61460.2023.10430649 Dept. of Earth and Climate Science

595. PATIL, DURVESH; Shukla, Aarti, 2024, Computational study of electrochemical CO2 reduction on two-dimensional TiB2 monolayer, AIP Conference Proceedings, 3149(01), Proceedings of the 4th International Conference on Condensed Matter & Applied Physics AIP Conf. Proc. 3149, 020033-1–020033-5; https://doi.org/10.1063/5.0225796 Dept. of Chemistry

596. PODDAR, TANMAY KUMAR; GOSWAMI, SRUBABATI; MISHRA, ARVIND KUMAR, 2024, Constraints on light vector gauge boson from gamma ray burst observations, Proceedings of the XXV DAE-BRNS High Energy Physics (HEP) Symposium 2022, 12-16 December, Mohali, India. HEPS 2022. Springer Proceedings in Physics, vol 304. Springer, Singapore. https://doi.org/10.1007/978-981-97-0289-3_90 Dept. of Physics

597. SANKAR, NAMASI G.; Khandelwal, Ankit; Chandra, M Girish, 2024, Quantum-enhanced resilient reinforcement learning using causal inference, 2024 16th International Conference on COMmunication Systems & NETworkS (COMSNETS), Bengaluru, India, 2024, pp. 1058-1063, https://doi.org/10.1109/COMSNETS59351.2024.10427302 Dept. of Physics

598. PAUL, SUROJIT; ARUNBABU, K. P.; CHAKRABORTY, M.; GUPTA, S. K.; HARIHARAN, B.; HAYASHI, Y.; JAGADEESAN, P.; JAIN, A.;

KAWAKAMI, S.; KOJIMA, H.; MOHANTY, P. K.; MURAKI, Y.; NAYAK, P. K.; NONAKA, T.; OSHIMA, A.; PATTANAIK, D.; RAMEEZ, M.; RAMESH, K.; REDDY, L. V.; SHIBATA, S.; SUBRAMANIAN, PRASAD; ZUBERI, M., 2024, Monitoring the upper atmosphere and interplanetary magnetic field using atmospheric muons at GRAPES-3, Proceedings of the XXV DAE-BRNS High Energy Physics (HEP) Symposium 2022, 12-16 December, Mohali, India. HEPS 2022. Springer Proceedings in Physics, vol 304. Springer, Singapore. https://doi.org/10.1007/978-981-97-0289-3_267 Dept. of Physics

599. Zuberi, M.; SUBRAMANIAN, PRASAD et al., 2024, Cosmic ray diurnal variation over two decades measured by the GRAPES-3 muon telescope, Proceedings of the XXV DAE-BRNS High Energy Physics (HEP) Symposium 2022, 12-16 December, Mohali, India. HEPS 2022. Springer Proceedings in Physics, vol 304. Springer, Singapore. https://doi.org/10.1007/978-981-97-0289-3_81 Dept. of Physics

600. Gadgil, Siddhartha; TADIPATRI, ANAND RAO, 2024, Formalizing Giles Gardam's Disproof of Kaplansky's Unit Conjecture, CPP 2024: Proceedings of the 13th ACM SIGPLAN International Conference on Certified Programs and Proofs, 177-189. January 15–16, 2024, London, UK, https://doi.org/10.1145/3636501.3636947 Dept. of Mathematics

601. Foucaud, Florent; Galby, Esther; Khazaliya, Liana; Li, Shaohua; Inerney, Fionn Mc; Sharma, Roohani; TALE, PRAFULLKUMAR, 2024, Problems in NP can admit double-exponential lower bounds when parameterized by treewidth or vertex cover. Leibniz International Proceedings in Informatics, LIPICS, 297, 66. In 51st International Colloquium on Automata, Languages, and Programming (ICALP 2024). Leibniz International Proceedings in Informatics (LIPIcs), Volume 297, pp. 66:1-66:19, Schloss Dagstuhl – Leibniz-Zentrum für Informatik (2024) https://doi.org/10.4230/LIPIcs.ICALP.2024.66 Dept. of Mathematics

# Invited Lectures

*At conferences/workshops and at colleges/universities/institutes/outreach*

**Nixon Abraham**

Title: An interneuronal circuit mediates olfactory deficits associated with early life stress, 'Recent Trends in Biology' Conference, SPPU, Pune, March 22, 2025 • Title: Multimodal olfaction: Neural circuit mechanisms of dual modality sensing by the olfactory system, Massachusetts Institute of Technology (MIT), Cambridge, U.S.A., September 19, 2024 • Title: Neural mechanisms of dual modality sensing by the olfactory system, Computational approaches to memory and plasticity workshop, IISER Pune, July 15, 2024 • Title: Perceptual certainty quantified by olfactory matching in human subjects, International Symposium on Olfaction and Taste (ISOT) 2024, Reykjavik, Iceland, June 24, 2024 • Title: Probing neural circuit mechanisms in mouse models of brain dysfunctions, Cognition Workshop, IISc, Bengaluru, June 17, 2024 • Title: 'Multimodal' olfaction, Monell Chemical Senses Center, Philadelphia, U.S.A., April 24, 2024

**Bijay Agarwalla**

Workshop on Stochastic Thermodynamics (WOST V), May 13-17, 2024 • Discussion Meeting on Quantum Many-Body Physics in the Age of Quantum Computing', International Centre for Theoretical Sciences (ICTS-TIFR), Bengaluru, November 25-29, 2024 • 8th International Conference on Nanoscience and Nanotechnology (ICONN-2025), organised by SRM Institute of Science and Technology, March 24-26, 2025

**Sudarshan Ananth**

Title: Spacetime and Quantum Mechanics, MIT-WPU, Pune, September 28, 2024 • Title: High Energy Physics, CNRS presentation, December 18, 2024 • Title: Symmetries in Physics, IISER Math Club talk, August 3, 2024

**Chaitanya A. Athale**

Title: Spatio-temporal oscillations of microtubules driven by collective motor mechanics, International Conference in Systems Biology (ICSB), IIT Bombay, Mumbai, December 2, 2024 • Posters presented by 3 students from the lab Kajal Singh, Prachi Negi and Jashaswi Basu, IIT Jodhpur, February 17-19, 2025

**Argha Banerjee**

Women in Cryospheric Science, International Conference on Geospatial Technologies and Earth Sciences (InGARSS 2024), NIT Goa, December 4, 2024

**Debargha Banerjee**

Title: Extra twists of Siegel modular forms, IIMM, IISER Thiruvananthapuram, June 26, 2024; IIT, Hyderabad, December 30, 2024 • Ramanujan congruences and beyond, Ahmedabad University, Ahmedabad, October 28, 2024

**Rabeya Basu**

Title: On general linear group, Faculty Development Program (FDP), Galgotias University, January 20-25, 2025

**Mousomi Bhakta**

Recent Advances in Nonlinear PDEs, IIT Madras, March 2025 • 36th RMS Annual Conference, Bengaluru, 2024 • Two talks in two different special sessions in the 14th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Abu Dhabi, UEA, December 2024 • Inter IISER-NISER Math Meet, IISER Thiruvananthapuram, June 2024

**Divyang Bhimani**

Title: Integrating harmonic analysis, dispesive PDEs and probability, Mathematics Department Symposium, IIT Palakkad, January 19-20, 2024 • Title: Pointwise convergence for heat equations, Colloquium, HRI, Prayagraj, March 8, 2024 • Title: Inhomogenous nonlinear Schrodinger equations, IIT Bombay, Mumbai, 2024; RMS, Bengaluru, 2024 • Title: Fractional Hermite-Heat equations, Colloquium, BITS Pilani, Goa Campus, Goa, February 28, 2025

**Anup Biswas**

Title: On the solutions of nonlocal Hamilton-Jacobi equations with gradient nonlinearity (Plenary speaker), Probability and Analysis 2024, Bedlewo, Poland, April 22-26, RMS Meeting, Bengaluru, December 27, 2024

**Gnanaprakasam Boopathy**

Title: Sustainable macrocyclisation using continuous-flow catalysis, 2nd International conference on sustainable technologies, energies and materials, King Mongkut's University of Technology, Bangkok, Thailand, February 19-20, 2025 • Title: Catalytic dehydrogenation/dehydration strategy for heterocycles and macrocycles, Chulabhorn Research Institute, Bangkok, Thailand, February 20, 2025 • Title: Continuous-flow cyclopropanation and alkylation using heterogeneous catalysts, 5th Flow Chemistry and Natural Products Symposium, NIPER-Kolkata, Kolkata, November 7-8 2024 • Title: Safer and scalable chemical synthesis using continuous flow technology, Grasim Industries Ltd. - Advanced Materials (PMRC), Mumbai, July 29, 2024 • Title: Continuous-flow catalysis for macrocyclization, Department of Chemistry, Madurai Kamaraj University, Madurai, May 17, 2024

**Harinath Chakrapani**

Title: Chemical biology of bacterial cell components, IIT Bombay, Powai, Mumbai, June 25-26, 2024 • Department of Chemistry, IIT Kanpur, Kanpur, August 23, 2024 • FORCE IICS, Alappuzha, October 3-6, 2024 • Indo-German Meeting, Amritsar, Punjab, November 13-16, 2024 • Chem24, Indian Association for the Cultivation of Science, Kolkata, December 26-28,

2024 • Title: Nitric oxide and allied radicals: Impact on health and disease, IIT Roorkee, Roorkee, February 21-22, 2025

**Buddhadeb Chattopadhyay**

Recent Advances in Chemistry Research and Translation (ReACT-2025), IISER Kolkata, Mohanpur, January 31-February 1, 2025

**Srabanti Chaudhury**

Title: Exploring mechanisms of chemical and biological processes using discrete-state stochastic models, Max Planck Institute of Colloids and Interfaces, Potsdam, Germany, May 30, 2024 • Title: Discrete state stochastic approaches to probe reaction dynamics on individual nanocatalysts, Humboldt-University Berlin, Germany, June 19, 2024 • Title: Role of macromolecular crowding in biological processes - a discrete state stochastic approach, Department of Physics, Freie Universität Berlin, Germany, June 26, 2024 • Title: Stochastic dynamics of polymer growth and transport, Physical Chemistry Symposium-2024, IIT Bombay, Mumbai, October 23, 2024 • Title: Transition path dynamics across a rough potential barrier, Frontiers in Non-equilibrium Physics (FNEP), IMSc Chennai, January 8, 2025 • Title: Microscopic mechanism of dynamic catalysis, MLK@85: Celebrating Simulations in Chemistry & Biology, February 8, 2025

**Anisa Chorwadwala**

Title: Optimisation of a mixed steklov dirichlet eigenvalue, International Conference Recent Advances in Nonlinear PDEs, IIT Madras, March 13-15, 2025; IISER Pune Mathematics Symposium, January 10-11, 2025 • Title: Area and perimeter of some shapes and the story of Queen Dido, for school children of Pune as part of IISER Pune Maths Club's Pi-week celebrations, IISER Pune, Pune, March 8, 2025 • Title: Recent advances in local and non-local elliptic PDEs, 14th AIMS International conference on dynamical systems, differential equations, and applications in the special session, NYU Abu Dhabi, UAE, December 16-20, 2024 • Title: Why are soap bubbles approximately spherical?, for BSc Mathematics Students of Patkar-Varde College, Goregaon, Mumbai, IISER Pune, December 12-13, 2024 • Invited to be on National Center for Mathematics (NCM) panel on Women in Mathematics along with Prof. M.S. Raghunathan, R. Parimala, Dipendra Prasad and Radhika Gupta, IIT Bombay, Mumbai, December 9, 2024 • Title: How mathematical frameworks address real world optimisation challenges reinforcing the vital role of mathematics in practical engineering scenarios, The School of Engineering, NICMAR University, Pune, October 8, 2024 • Invited to be a resource person for the 2nd Vigyan Pratibha Teachers' Training Workshop 2024-25, NISER Bhubaneswar, September 17-20, 2024 • Title: Sharp bounds for higher steklov-dirichlet eigenvalue, Regularity theory and free boundary problems: From PDE to interfaces, Satellite Conference of the 9th European Congress of Mathematicians (ECM) 2024, Universidade D Coimbra, Portugal, July 22-26, 2024; 9th European Congress of Mathematicians (ECM) 2024, Sevilla, Spain, July 15-19, 2024; Title: Geometric and variational analysis, In memory of Jan Mal´y, Bedlewo, Poland, June 9-15, 2024 (online) • Invited to be a resource person for the 1st Vigyan Pratibha Teachers' Training Workshop 2024-25, NISER Bhubaneswar, April 1-5, 2024

**Aloke Das**

Title: Decoding the folding motifs of pro-gly peptides: Investigating the interplay of intrinsic properties of amino acid residues and solvent effect, Spectroscopy and Dynamics of Molecules and Clusters (SDMC 2025), Mussoorie, February 20-23, 2025 • Title: Sequence of protein alphabets prescribes the secondary structures of peptides: A comprehensive picture from condensed and gas-phase studies, 16th National Symposium on Radiation and Photochemistry (NSRP), National Institute of Science Education and Research (NISER) Bhubaneswar, January 23-25, 2025 • Title: Sequence of protein alphabets dictates the secondary structures of peptides, International Conference on Ultrafast Nonlinear Optics and Optical Spectroscopy (UNOOS), IISER Mohali, December 10-12, 2024 • Title: Secondary structures of peptides: A panoramic overview from condensed and gas phase studies, Engineered Chemical and Biochemical Systems (ECBS2024), Hotel Le Meridien, Amritsar, November 12-15, 2024 • Title: A comprehensive overview of the secondary structures of peptides from condensed and gas phase studies, Institut des Sciences Moléculaires d'Orsay, CNRS - Université Paris Saclay, France, July 4, 2024

**Shouvik Datta**

Title: How can a two-component Bose-Einstein Condensate 'bypass' the no-cloning theorem? Convergence of multifunctional materials, photonics, bioscience, and Artificial Intelligence, MPBA-2025, IISER Berhampur, March 21, 2025 • Title: Prospects of excitonic structures in quantum computation, Dept. of Electrical Engineering, University Alberta, Canada, July 25, 2024

**Sutirth Dey**

Title: Experimental evolution and medical practice: A potentially fruitful collaboration, SYNAPSE 2024: 5th International Conference on Mind Body Medicine in Endocrinology & Diabetes, Society for Prevention, Healthcare, Education and Research (SPHERE), Pune, April 28, 2024 • Title: General usage of LLMs for research, AI for Biologists Workshop, IISER Pune, March 15-16, 2025

**Sreejith G.J.**

Title: Efficient quantum Monte Carlo methods for finite temperature calculations in the quantum dimer model, University of Nottingham, U.K., June 2024 • Title: Bilayer exciton condensation - effect of dynamical screening, Emerging trends in Quantum Condensed Matter Physics (EQCMP), Institute of Physics, Bhubaneswar, August 2024 • Title: Full distribution of local observables in the NESS of an interacting quantum system, Seminar ICTS, October 2024; Seminar TIFR Hyderabad, October 2024; Seminar IIT Guwahati, December 2024 • Title: Projected ensembles in a system with local conserved charges, Quantum many body physics in the age of quantum information, ICTS, November 2024 • Title: New techniques and questions in the age of quantum computers and ML, Quantum Condensed Matter Perspectives, IIT Bombay, Mumbai, December 2024

**Aurnab Ghose**

Title: Branching out: A new cytoskeletal road, Company of Biologists workshop - The cytoskeletal road to neuronal function, Buxted Park, U.K., April 2024 • Title: Neuropeptides & stable innate states: Modulating the feeding drive, 90th Annual Meeting of the Indian Academy of Sciences, NISER Bhubaneswar, November 2024 • Hunger games: The ballad of CART and NPY, Indian Zebrafish Investigators Meeting (IZIM), ILS Bhubaneshwar, November 2024 • Title: Studying neurodevelopment using Zebrafish: A cytoskeleton-centric perspective, Biology workshop, MS University Baroda, Baroda, November 2024 • Title: Zebrafish in studying the neural basis of behaviour, Fundamental and Applied Research Using Zebrafish as a Model (FARZM), IIT Bombay, Mumbai, November 2024 • Title: Modulation of the feeding drive by peptidergic signalling-dependent tuning of neuronal activity, EMBO workshop on Neuropeptides and behavioural flexibility, NISER Bhubaneswar, December 2024 • Title: On growth and form: Cytoskeletal remodelling in shaping neural circuits, Cutting Edge Lecture Series, ACTREC, Navi Mumbai, January 2025 • Title: Neuropeptidergic circuits and innate behaviours, EMBO Neural circuits in health and disease, IISER Mohali, Mohali, March 14, 2025

**Sujit K. Ghosh**

International Conference on Emerging Materials for Energy and Sustainability (EMES-2025), VIT Chennai, February 6-8, 2025 • Recent

Advances in Chemistry Research and Translation (ReACT) Interdisciplinary Initiatives in Chemical Sciences, IISER Kolkata, Mohanpur, January 31-February 1, 2025 • 'Water for Life-2024', IIT Madras, December 12-14, 2024 • 43rd Annual National Conference of Indian Council of Chemists, Pune, December 26-28, 2024 • Hybrid Halide Perovskites (HyPe) 2024, NISER, Bhubaneswar, December 22, 2024 • 5th International Conference on "Emerging Smart Materials in Applied Chemistry (ESMAC-2024) & 2nd KIIT-CRSI Seminar on Modern Trends in Chemical Sciences, KIIT Deemed to be University, Bhubaneswar, December 20-22, 2024 • Modern Trends in Inorganic Chemistry (MTIC), IIT Kharagpur, December 14-17, 2024 (Keynote lecture) • 10th Interdisciplinary Symposium on Materials Chemistry (ISMC-2024), DAE Convention Centre, BARC, Mumbai, December 4-7, 2024 • Conference on Cooperation and Integration of Industry, Education, Research & Application and Conference on International Exchange of Professional, Nanjing and Shanghai, China, October 27-November 3, 2024 • ACS Fall 2024, Global Virtual Symposium in Chemistry of Defect-Rich Metal-Organic Framework (MOFs): Glasses, Gels and Crystals (Oral), August 18, 2024 • International Conference on Sustainable Catalysis: Synthesis, Theory, and Applications (SusCat-STA 2024), Udaipur, July 19-26, 2024 • SESTEC-2024: Xith DAE-BRNS Symposium on Emerging Trends in Separation Science and Technology, HSNC University, Mumbai • RSC Meet the Editors Session, IISER Pune, July 12, 2024 • 9th International Conference on Metal-Organic Frameworks and Open Framework Compounds (MOF2024), Singapore, July 15-19, 2024 (Keynote Speaker)

**Pranay Goel**

Title: What would you do when your AI disagrees with your doctor?, IISER Pune, May 17, 2024 • Title: The Isolated Liquid Meal Tolerance Test (ILMTT) using continuous glucose monitoring (CGM), ICSB, IIT Bombay, Mumbai, December 4, 2024 • Title: Mathematical and computational approaches in healthcare and medicine, Computational Systems Biology Meeting, IIT Madras, July 12-13, 2024

**Partha Hazra**

Title: Unravelling the anomalous nature of the aqueous nanochannels in self-assembled lyotropic liquid crystalline systems, 24th International Symposium on Surfactants in Solution (SIS2024), Goa, June 16-21, 2024 • Title: Development of a systematic strategy towards promotion of alpha-synuclein aggregation using 2-hydroxyisophthalamide-based systems, IIT Patna, December 3, 2024 • Title: Triplet exciton harvesting in novel luminogens for new generation OLED applications, VIT Chennai, February 14, 2025

**Mohammad Ismaiel**

Title: Structure of the continent-ocean transition along the East India passive margin: Weak evidence for strong conjecture, Challenges and opportunities in Marine Geo Sciences, CSIR-NIO Goa, March 12, 2025

**Surabhi Jaiswal**

Title: Understanding the phase coexistence in DC complex plasma, 4th conference on Plasma Simulation, Indian Institute of Geomagnetism, New Panvel, Navi Mumbai, November 12, 2024

**Tejas Kalelkar**

Title: Connecting essential triangulations, Inter IISER-NISER Mathematics Meet, IISER Thiruvananthapuram, June 26, 2024; Geometry and Topology Seminar series, City University of New York Graduate Center, U.S.A., December 10, 2024; Topology Seminar, University of Regensburg, Germany, March 4, 2025

**Siddhesh Kamat**

EMBO Sectoral Meeting for Indian YIP & GIN members, IIT Mandi, 2025 • Departmental Colloquium, School of Bioscience and Bioengineering, IIT Mandi, 2025 • Title: Research methods in big data analytics for healthcare: From basics to applications, Workshop, ICMR, 2025 • Recent trends in biology, SPPU, Pune, 2025 • Mentor Talk, 17th Young Investigator's Meeting, IndiaBioscience, Agra, 2025 • Title: Stable-isotope and metabolomics-based methods for nutrition & metabolism, Workshop, TIFR Hyderabad, Hyderabad, 2025 • Global Summit on Metabolomics and Lipidomics, IIT Bombay, Mumbai, 2025 • SBCI Mumbai Chapter Annual Meeting, NMIMS Mumbai, 2025 • Infosys Prize Symposium, Edition IV, Taj West End Bangalore, Bengaluru, 2025 • Infosys Award Function for the International Olympiad Medalists, HBCSE Mumbai, 2024 • ChemCareers iRISE, IISER Pune, 2024 • Proteomics Society of India 16th Annual Meeting, CSIR-NCL Pune, Pune, 2024 • EMBO 60th Anniversary Meeting, EMBO Heidelberg, Germany, 2024 • NIBMG Colloquium Talks, NIBMG Kalyani, Kolkata, 2024 • Metabolomics in Drug Discovery Symposium, NIPER-A, Ahmedabad, 2024 • Nencki Conference for Life Sciences - Focus on Lipid Metabolism, Warsaw, Poland, 2024 • EMBO Sectoral Meeting in Metabolism and Lipid Biology, Warsaw, Poland, 2024 • EMBO Global Investigator's Meeting, NTU Singapore City, Singapore, 2024 • Annual YIN PhD Course, EMBO Heidelberg, Germany, 2024 • ARUMDA Annual Meeting, TIFR Hyderabad, Hyderabad, 2024

**Krishanpal Karmodiya**

Title: Genomic and transcriptomic profiling of P. falciparum: Insights into variations, heterogeneity, and stress responses in artemisinin tolerance, World Malaria Day, OMICS: Malaria on the Move, Johns Hopkins Malaria Research Institute, Johns Hopkins School of Public Health, Baltimore, U.S.A., April 25, 2024 • Title: Transcriptional heterogeneity and artemisinin tolerance in Plasmodium falciparum, MBGU25: Advances in molecular biology and genetics, JNCASR, Bengaluru, May 22-25, 2024; Recent Trends in Biology, Department of Zoology, Savitribai Phule Pune University, Pune, March 21-22, 2025 • Title: Mechanisms of antigenic variations in P. falciparum, Frontiers in DNA-Chromatin Dyanmics, IISER Pune, June 7-8, 2024 • Title: Multi-protein chimeric antigens for efficiently targeting and blocking the blood stage of plasmodium falciparum, Indo-French Workshop on Host-pathogen metabolic interactions & malarial drug resistance, Institute for Advanced Biosciences (IAB), Grenoble, France, July 1-2, 2024 • Title: Transcriptional regulation in plasmodium, advanced malariology course, University of Hyderabad, Hyderabad, August 30, 2024 • HFSP Master class, Human Frontiers Science Program, National Institute of Immunology, New Delhi, November 26-29, 2024

**Shabana Khan**

Title: Tetrylenes: From bonding to materials, International conference MMM4-2025, IIT Bombay, Mumbai, February 9-12, 2025 • Title: Silylene metal complexes: Bonding to catalysis, GWDG lecture, University of Bielefeld, Germany, October 28, 2024 • Title: N-heterocyclic silylene supported copper(I) aryl complexes: Multitasking Cu(I) synthon, 30th ICOMC, Agra City, July 14-18, 2024 • Title: N-heterocyclic silylene-copper(I) aryl complex: Access to versatile Cu(I) synthons, 20th International Symposium on Silicon Chemistry (ISOS-20), Hiroshima, Japan, May 12-17, 2024; ACS-MEA Regional Conference, New York University Abu Dhabi, February 4-7, 2024 • Title: N-heterocyclic silylene supported copper(I) aryl complexes: Bond activation to catalysis, The 9th Asian Conference on Coordination Chemistry (ACCC9), Bangkok, Thailand, February 19-22, 2024

**Ajay Kumar**

Title: Orogenic lithosphere structure, deformation and future: Insights from Tibet and comparison with Alpine-Himalaya collision zone mountains, DEEP-2024 Symposium, Beijing, China, October 23, 2024

**G.V. Pavan Kumar**

Title: Hot Brownian dynamics driven by structured light, Conference/Event: Anil Kumar Memorial Lecture, IISc, Bengaluru, November 30, 2024 • Title: Optothermal tweezers, Conference/Event: Plenary presentation, Raman Memorial Conference, SPPU, Pune, January 2025; BRICS Online Workshop on Biophotonics, hosted online by the Department of Physics, Manipal University, August 8, 2024

**Moumita Majumdar**

Title: Ge(IV) Di-cations as Lewis acid catalysts, International Symposium on Main-Group-Element Chemistry, Tsukuba, Japan, May 11, 2024; 30th International Conference on Organometallic Chemistry, Agra, July 14-18, 2024; ACS Fall Meeting 2024, Colorado, U.S.A., August 18-22, 2024 (online presentation) • Title: Cationic main group compounds of the Heavier group 14 and 15 elements, 4th Spanish Workshop on Phosphorus Chemistry', online meeting, July 15-16, 2024 (Keynote Speaker); RSC Chem. Sci. Leaders in the Field Symposium, IISER Thiruvananthapuram, December 9-11, 2024; Advanced Energy Materials and Interfaces, IISER Pune, December 9-11, 2024 • Title: Polycationic heavier dipnictanes, International Symposium on Inorganic Ring Systems (IRIS-17), Halifax, Canada, July 21-26, 2024; 45th International Conference on Coordination Chemistry (ICCC 2024), Colorado, U.S.A., July 28 to August 3, 2024; 7th International Symposium on C-H Bond Activation, IIT Bombay, Mumbai, December 6-9, 2024; Modern Trends in Inorganic Chemistry, IIT Kharagpur, December 14-17, 2024; International Conference on Main Group Chemistry, IISER Thiruvananthapuram, February 13-16, 2025

**Shreyas Managave**

Title: Abiotic factors controlling vegetation distribution in the Western Ghats, International Tiger Day Conference, Sahyadri Tiger Reserve, Karad, August 2, 2024 • Title: Is it worth pursuing a career in Geology/Earth Sciences? Induction Program, Geology Department, SPPU, Pune, August 23, 2024 • Title: The δD records of n-alkane and n-alkanoic acid of tropical trees reflect δD of precipitation during the early stages of the leaf growth, Emerging trends in hydrology research - an Indian perspective, Physical Research Laboratory, Ahmedabad, September 20, 2024 • Title: **किरणोत्सर्गीता आणि पाषणाचे कालमापन**, INSPIRE Camp, Kudal, Maharashtra, February 6, 2025 • Title: The hydrogen isotope records of n-alkane and n-alkanoic acid of tropical trees reflect the hydrogen isotopic composition of precipitation during the early stages of the leaf growth, Institute Colloquium, Potsdam University, Germany, November 4, 2024 (online) • Title: Biogeography of tree structure at the landscape scale in the Western Ghats, Institute Talk, Ashoka Trust for Research in Ecology and the Environment (ATREE), Bengaluru, February 19, 2025; Ecology and Environmental Science, Pondicherry University, Puducherry, February 25, 2025; Golden Jubilee Year Talk Series, Kerala Forest Research Institute,Peechi, Kerala, February 27, 2025 • Title: What is an Earth scientist doing in the field of ecology? Colloquium, Center for Environmental Sciences, IISc, Bengaluru, February 20, 2025; Department of Environmental Science, SPPU, Pune, March 18, 2025 • Title: Interdisciplinary insights from Earth Science: Tracking bird migration and understanding tree structure in the Western Ghats, Nature Conservation Foundation, Bengaluru, February 21, 2025 • Title: The influence of abiotic factors on tree structure at the landscape scale in the Western Ghats, Institute Colloquium, French Institute Pondicherry, Pondicherry, February 24, 2025 • Title: Application of stable isotopes in avian ecology, National symposium on avian biology, 2025, IISER Mohali, March 11, 2025

**Suhita Nadkarni**

Title: Why should you do a PhD and pursue a career in research, Keynote Speaker for NaviClar NISER Bhubaneswar, March 1, 2025 • Title: All living cells possess a form of sentience, India Science Festival, Pune, Moderator for a debate on the statement, January 11, 2025 • Title: How to build a synapse from the ground up, Simula Research Laboratory, University of Oslo, Norway, October 3, 2024 • Title: What I cannot create, I do not understand, Rhetor 5.0, annualstudent-organised symposium, IISER Thiruvananthapuram, August 31, 2024 • Title: Building models of synaptic transmission and plasticity, 6th Bangalore Cognition Workshop - BCW2024, Centre for Neuroscience, IISc, Bengaluru, June 21, 2024

**Mridula Nambiar**

Title: Mechanisms of chromosome segregation during cell division, MMTTC Refresher Course (Online), Central University of Kerala, January 31, 2025; SURGE Workshop, IISER Pune, December 23, 2024 • Title: Centromere-proximal crossovers disrupt proper homologous chromosome disjunction during meiosis, Chromatin Stability Meeting, 2024, JNCASR, Bengaluru, December 13-17, 2024 • Title: A tale of two rings: How cohesin paralogs differentially regulate recombination and chromosomal segregation at interdisciplinary aspects of chromatin organization and gene regulation, ICTS, Bengaluru, September 16, 2024 • Title: A tale of two rings: How cohesin paralogs differentially regulate recombination and chromosomal segregation, Rhetor 5.0, IISER Thiruvananthapuram, August 24, 2024

**Rejish Nath**

Title: Commensurate supersolids and re-entrant transitions, in an extended Bose-Hubbard ladder, Conference QMAT-24, IIT Guwahati, December 23, 2024

**Muhammed Musthafa O.T.**

Title: Electrified interface: Challenges and opportunities, ECS-IIT Madras Students Chapter, July 29-30, 2024; One-day research facility training program (10 researchers) under Scientific Social Responsibility (SSR) of SERB-POWER grant (GOI-A-884), August 17, 2024 • Title: Electricity from acid base reaction, International Conference on Emerging Materials for Energy and Sustainability (EMES-2025), Vellore Institute of Technology University, Chennai, February 6-8, 2025; International Symposium on the Advancement of Emerging Technologies in Energy Storage, Atria University, Bengaluru, February 5, 2025

**Pramod P. Pillai**

Title: Plasmonic heaters for solar energy utilization, Photonics for Energy, Sensing, and Education (PESE-2025), IIT Gandhinagar, January 16-17, 2025; International Conference on Advanced Energy Materials and Interfaces 2024 (AEMI 24), IISER Pune, December 9-10, 2024 • Title: Harnessing light-matter interactions for sustainable chemical synthesis; National Seminar on Innovations in Chemistry: Light-Matter Dynamics, Computational Insights & Energy Solutions, RSN Arts and Science College, Kerala, January 10, 2025 • Title: Ligand-directed ammonia synthesis using visible light and quantum dots; Conference on Advances in Catalysis for Energy and Environment (CACEE -2024), TIFR Mumbai, December 16-20, 2024 • Title: Ligand-directed synthesis of ammonia using visible light and quantum dots; International Symposium on Dynamic Exciton (ISDyEx), IISER Thiruvananthapuram, Thiruvananthapuram, December 14-15, 2024 • Title: Ligands as gatekeepers in quantum dot photocatalysis; ChemSymphoria 2024, IISER Pune, December 2-3, 2024 • Title: Chemistry with thermoplasmonics; Advances in Functional Solids: Fundamental and Applications (AFS 2024), IIT Kharagpur, November 9-12, 2024 • Title: Visible light photocatalysis with quantum dots; Physical Chemistry Symposium: SoPhyC - 2024, IIT Bombay, October 22-25, 2024 • Title:

Light-matter interactions leading to chemical change; 21st International Conference on Laser Optics (ICLO 2024), St. Petersburg, Russia, July 1-5, 2024; Title: Catalysis and Renewable Energy Towards Meeting Sustainable Development Goals (SDG), CSIR-NCL, Pune, June 26, 2024

**Gayathri Pananghat**

National: Title: From small Ras-like GTPases to P-loop NTPases: Mechanistic insights into nucleotide hydrolysis and exchange, Horizons in Structural and Computational Biology (HSCB 2025), IIT Hyderabad, March 1, 2025; 51st National Seminar on Crystallography (NSC 51), Visvesvaraya National Institute of Technology, Nagpur, November 29, 2024; Kaleidoscope 2024: A Discussion Meeting in Chemistry, Udaipur, July 1, 2024 • Title: A minimal cell division machinery: Cell division in cell wall less bacteria, Microtubules, Motors, Transport and Traffic (M2T2) Meeting, IIT Jodhpur, February 19, 2025; National Centre for Biological Sciences, Bengaluru, November 5, 2024 • Title: Understanding bacterial shape, motility and cell division in a cell-wall less bacteria, 2nd Prof. M. Vijayan Memorial Annual Symposium on Structural biology and bioinformatics of infectious diseases, SASTRA Deemed University, Thanjavur, October 19, 2024 • Title: Understanding bacterial shape, division and motility in cell-wall less bacteria, Students' Symposium, National Centre for Cell Science, Pune, July 26, 2024 • Title: Understanding bacterial shape, division and motility, Structural Biology Awareness Workshop, MGMARI, Sree Balaji Vidyapeeth, Puducherry, June 19, 2024; International: Title: Understanding bacterial shape, motility and cell division in a cell-wall less bacteria, EMBO Practical course, CEM3DIP 2024, IISc, Bengaluru, July 6, 2024

**Shivprasad Patil**

Title: Soft glassy rheology of single cells with pathogenic aggregates, Linz Winter Workshop, Linz, Austria, January 31- February 3, 2025

**Supriya Pisolkar**

Title: A universal group theoretic characterisation of p-typical Witt vectors, IISER Thiruvananthapuram, Thiruvananthapuram, October 28-31, 2024• Title: Uniform version of Fontaine-Mazur conjecture for bi-quadratic extensions, International Conference on Class Groups of Number Fields and Related Topics (ICCGNFRT-24), IISER Berhampur, November 20-24, 2024 • Title: Fontaine-Mazur conjecture for bi-quadratic extensions, Ramanujan Mathematical Society (RMS) Conference, Christ University, Bengaluru, December 27-29, 2024

**Mainak Poddar**

Title: G-connections on complete G-varieties, Symposium on Algebraic Geometry, RMS annual conference 2024, Christ University, Bengaluru, December 28, 2024

**Kalika Prasad**

Annual Day Symposium, Department of Biological Sciences (DBS), TIFR, September 2024 • Cell Development and Regeneration Meeting, Shiv Nadar University (SNU), Greater Noida, February 2024 • InSDB Meeting, Bengaluru, February 2024 • New Phytologist UK Meeting, Bengaluru, October 2024 • Annual Meeting, Indian Academy of Sciences, Bengaluru, November 2024 • Guha Research Conference (GRC) Meeting, Kaziranga, November 2024 • Invited as guest speaker at International Symposium on Plant Photobiology (EMBO-ISPP), IISER Bhopal, January 2024

**Thomas Pucadyil**

Title: Membrane fission: Mechanisms, regulation and physiological relevance, 43rd Mahabaleshwar Conference, Alibaug, February 26, 2025; 2nd RGCB Research Conference, Kumarakom, September 25, 2024 • Title: Membrane fission screens and what they reveal about native protein functions, EMBO-IISERP Symposium, IISER Pune, February 8, 2025 • Title: Membrane-inserting loops as molecular gears that catalyse membrane fission in a mechanoenzyme, M2T2 Meeting, IIT Jodhpur, February 17, 2025

**Sarita Puri**

Title: The cryoEM structure of kidney extracted fibrils and role of variable domain in aggregation and soluble toxicity, Institute Visit, TIFR Hyderabad, December 30, 2024

**Sunish Radhakrishnan**

Title: Cell cycle checkpoints in bacteria: Metabolism leads the way, Dept. of Biochemistry, IISc, Bengaluru, July 18, 2024 • Title: Cell cycle checkpoints: Metabolism takes control, EMBO Workshop BACNET24 Bacterial Networks, Sant Feliu de Guixols, Spain, September 16, 2024 • Title: Membrane constriction dynamics during cytokinesis, Alluvia Cell Biology Meeting, Cape Town, South Africa, February 1, 2025 • Title: Cell cycle checkpoints in bacteria: Metabolism takes control, Transcription Assembly Meeting 2025, Bose Institute, Kolkata, March 20, 2025 • Title: RNA reserve-driven morphogenesis in bacteria, Molecular Biophysics Unit, IISc, Bengaluru, March 5, 2025

**Atikur Rahman**

Title: Effects of defects and strain on the optoelectronic properties of monolayer TMDs, QMAT 2024, IIT Guwahati, December 20-23, 2024 • Title: Growth and optoelectronic properties of ferroelectric CsPbBr3 nanoplatelets, International Union of Materials Research Society, International Conference in Asia, 2024 (IUMRS-ICA-2024), UGC-DAE Consortium for Scientific Research, Indore, December 3-6, 2024; International Conference on Photophysics and Photochemistry (ICOPP) 2024, IIT Bombay, October 14-16, 2024 • Title: Engineered low-dimensional materials for optoelectronic applications, Industry Conclave 2024, IISER Pune, September 14, 2024 • Title: Precision instrumentation for device fabrication and ultra-sensitive electronic measurement, Industry Meet on Quantum Technology Developments and Applications, IHUB Quantum Technology Foundation, IISER Pune, April 24, 2024

**Sudha Rajamani**

Title: The astrobiological narrative of life's origin on the 'Pale Blue Dot', 43rd Astronomical Society of India (ASI) annual meeting, NIT Rourkela, February 17, 2025; Space Café Tokyo, Earth-Life Science Institute (ELSI), Institute of Science, Tokyo, Japan, January 16, 2025 • Title: Role of prebiotic molecular heterogeneity in the emergence and evolution of biomolecules on the early earth, ELSI Seminar, Earth-Life Science Institute (ELSI), Institute of Science, Tokyo, Japan, January 22, 2025 • Title: Astrobiology research in India, what we do @COoL lab & then some more, SETI Goa Workshop, Breakthrough Listen and Oxford University U.K., Goa, December 13-14, 2024 • Title: Understanding the chemical origins of life through the lens of astrobiology, National Research Scholars Meet (NRSM) in Life Sciences 2024, Advanced Centre for Treatment, Research and Education in Cancer, Tata Memorial Centre (ACTREC-TMC), Navi Mumbai, December 11-12, 2024 • Title: Membrane 'evolution' in interacting protocellular populations in a prebiotic niche, IICRS-2024 Meeting, University of Hyderabad, Hyderabad, November 18-21, 2024 • Title: Introduction to astrobiology and search for life beyond earth, Workshop organised on occasion of 1st National Space Day celebrations, GITAM University, Bengaluru, August 23, 2024 • Title: The origins of life and its early evolution, Cutting Edge Lecture Series, Student Council at Advanced Centre for Treatment, Research and Education in Cancer, Tata Memorial Centre (ACTREC-TMC), Navi Mumbai, June 28, 2024 • Title: How life chemically originated on earth, Chief Guest and Speaker, Valedictory function of the Chemistry Olympiad Orientation Cum Selection Camp (OCSC), May 10, 2024 • Title: Brief review of

Astrobiology (Astrochemistry/Astrogeology/ Space biology as related to space sciences), Space Science Formulation Meeting, U R Rao Satellite Centre (URSC), the Indian Space Research Organisation (ISRO), April 22, 2024

**Raghav Rajan**

Title: Introductory notes before the zebra finch song, a feature, a bug or just a distraction!, NCBS Bengaluru, June 18, 2024 • Title: Understanding the initiation of natural movement sequences using songbirds as a model, 6th Bangalore Cognition Workshop, CNS IISc, Bengaluru, June 15-21, 2024 • Title: Introductory notes before zebra finch song are learned vocalizations like song, National Symposium on Avian Biology, IISER Mohali, March 10-12, 2025

**Boomi Shankar Ramamoorthy**

Title: Polyhedral cages supported by Tris(imido)phosphate anions: Host-guest chemistry and chiral separation: Department of Chemistry, IIT Bombay, Mumbai, June 24, 2024; Department of Chemistry, IIT Hyderabad, Hyderabad, August 9, 2024; Modern Trends in Inorganic Chemistry, IIT Kharagpur, Kharagpur, December 14-17, 2024 • Organic and hybrid ferroelectrics for piezoelectric energy harvesting applications: Annual Alumni Materials Lecture, Chemistry and Physics of Materials Unit (CPMU), Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru, September 14, 2024; Emerging Smart Materials in Applied Chemistry (ESMAC-2024), KIIT-CRSI, Bhubaneswar, December 20-22, 2024; Symposium titled Science Beyond Boundary: Invention, Discovery, Innovation and Society, Vidyasagar University, Midnapore, December 16-17, 2024; Virtual: Emerging Materials for Energy & Sustainability (EMES-2025), Vellore Institute of Technology University, Chennai, February 6-8, 2025; SPS-March Meeting, School of Physical Sciences, Jawaharlal Nehru University, New Delhi, March 21-22, 2025 • Molecular ferroelectrics and their polymer composites as piezoelectric energy harvesters, Virtual: Wiley-Aggregates Webinar Series, Polymers and Solid-State Materials from Around the Globe, December 5, 2024 • Ferro-and piezoelectric materials derived from P-N and B-N scaffolds, Main Group Molecules to Materials-4 (MMM-4), Plenary lecture, February 9-12, 2025 • A chiral organic ferroelectric exhibiting FeFET and neuromorphic applications, Inter IISER-NISER Chemistry Meet 2025, IISER Pune, March 20-22, 2025

**Girish Ratnaparkhi**

Title: The VAPB social network: (Mal)function at membrane contact sites, EMBO Workshop: Molecular and Developmental Biology of Drosophila, Crete, Greece, June 23-29, 2024 • Title: The making of a (remarkable) lineage: Primordial germ cells in the early embryo, NCCS Students Symposium, NCCS, Pune, July 25- 26, 2024 • Title: Caspar specifies primordial germ cell count and identity in Drosophila melanogaster, 47th All India Cell Biology Conference & International Symposium, NISER Bhubaneswar, December 16-18, 2024 • Title: The VAPB:FAF1:VCP axis in Amyotrophic Lateral Sclerosis 8, ProUPS Satellite Meeting, NCCS Pune, Pune, February 6, 2025

**Chaitra Redkar**

Participated in capacity of a resource person in the panel discussion on "History: Popular and Academic", organized by Watermark Club, Pune, February 2, 2025 • Participated in a panel discussion on "Electoral Process and Democracy", organised by Democracy Festival Committee, S M Joshi Socialist Foundation, Pune, January 28, 2025 • Participated in the Panel Discussion on "Philosopher Sane Guruji", National Convention on Sane Guruji's 125th Birth Year Commemoration, Pune, December 22, 2024 • Title: Gandhi for the Post-Truth World, National Centre for Cell Sciences (NCCS), Pune, November 13, 2024 • Title: Women in Indian Politics, by the Indian Students Council (State-level Forum of Teachers & Students) in an On-line Talk-Series (3rd Year), October 9, 2024 • Participated in the Panel Discussion on "Prospectus of Non-Party Democratic Politics", Gandhi Bhavan Pune, October 7, 2024 • Title: Relevance of Mahatma Gandhi, VIT-AP University, Hyderabad, October 7, 2024 • Title: Mahatma Gandhi, Lokniti ani Rajniti, Unique Academy, Pune, October 2, 2024 • Title: Relevance of Gandhi, Tata Institute of Social Sciences (Tulijapur Campus, talk was online), October 2, 2024 • Title: Sane Guruji and Democratic Values, Bhaskarrao Durve Pratishthan, Sangamner, August 30, 2024 • Conducted 3 Sessions on "Democracy, Political Obligation and Disobedience", Youth Camp, Sane Guruji National Memorial, Mangaon, May 3, 2024

**Richa Rikhy**

Title: Cellular mechanisms regulating embryogenesis and stem cell differentiation, Organelle Biology and Membrane trafficking, IISER Pune, October 28-29, 2024 • Title: Actin villi remodelling in embryogenesis, M2T2, IIT Jodhpur, February 18, 2025 • Title: BAR domain protein function in embryogenesis, EMBO Symposium, IISER Pune, February 8, 2025 • Title: Role of mitochondrial dynamics in gastrulation, GATC-West, NIRRH ICMR-National Institute for Research in Reproductive and Child Health (NIRRCH), Mumbai, October 2, 2024 • Title: Role of mitochondrial dynamics in neural stem cell differentiation, "Biology Beyond Boundaries" Mitochondrial Insights, Computational Breakthroughs, and Clinical Transformations, SPPU, Pune, January 30, 2025 • Title: Mitochondrial dynamics and function in Drosophila embryogenesis, Annual Talks, Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad, March 10, 2025

**Pooja Sancheti**

Title: Utopia and its failures in Salman Rushdie's Victory City, Urban Metamorphoses: Understanding the Dynamics and Diversity of South Asian Cities, HSS Department, IISER Bhopal (sponsored by ICSSR), February 27-March 1, 2025 • Title: The paradoxes of contemporary Bhutan in Kunzang Choden's fiction, Rethinking South Asia: Postcoloniality & Decolonial Frames and Praxis, South Asian Literary Association (SALA, U.S.A.), January 18-19, 2025 • Title: Teaching the experience of disease through literature, Workshop on World Literature, organised by Georg-August-Universitat Gottingen and hosted at JNU, New Delhi, October 4, 2024 • Title: Women and magical realism: Oppression and resistance in the novels of Mohammed Hanif, Ethics of Representation, Forms of Resistance, and Narratives of Discomfort, SALA, U.S.A., April 6-7, 2024; Invited General Interest Lectures/Workshops: Lecture-workshop (along with Nishad Matange) on "Designing and Visualizing Multidisciplinary Syllabi", Maharashtra State Faculty Development Academy (MSFDA), Pune (to college teachers as part of an FDP), July 24, 2024 • Title: Transmitting Research: Communication Skills in the Context of Conferences, IISER Thiruvananthapuram, Thiruvananthapuram, June 27, 2024

**Britto Sandanaraj**

Title: Development of converging biomedical technologies enable to decipher protein function in living systems in real time, Tathva24, National Institute of Technology Calicut, Kozhikode, October 2024; Dept. of Pharmaceutical Sciences, Northeastern University, Boston, U.S.A., October 2024; Department of Chemical Engg, North Carolina State University, U.S.A., October 2024; Chemistry Department, University of Lyon, France, September 2024; Chemistry Department, ENS de Lyon, France, September 2024; Chemistry Department, Bogazici University, Istanbul, Turkey, September 2024; Bioengineering Department, Northeastern University, Boston, U.S.A., June 2024 • Directed chemical evolution of protein nanoparticles, Aera Therpeutics, Boston, U.S.A., October 2024

**M.S. Santhanam**

Title: Elections as complex systems: Turnouts, margins and universality: Conference on Topics in Complex Systems, DA-IICT, Gandhinagar,

December 9-10, 2024; Conference on Nonlinear Systems and Dynamics – 2025, Bharathidasan University, Tiruchirapalli, March 10-13, 2025; NEXUS-2025, an international conference on complex systems, Mahidol University, Bangkok, March 17-19, 2025 • Given 3 pedagogical talks at "Spins, Games and Networks" on "Spectra of complex networks", The Institute of Mathematical Sciences, Chennai, December 16-17, 2024 • Title: Using quantum chaos for quantum search algorithm, Workshop of Quantum Technologies, FLAME University, Pune, January 11, 2025 • Title: Introduction to Quantum computing, Fergusson College, Pune, January 31, 2025 • Title: Glimpses of chaos and complexity: From dynamics to networks, MIT-WPU University, Pune, February 28, 2025 • Title: Introduction to Quantum Algorithms, Indian Institute of Information Technology, Surat, March 27, 2025

**Haripada Sau**

Title: Affine varieties as a complete spectral set, Advances in Operator Theory with Applications to Mathematical Physics, Chapman 2024, Chapman University, November 18-22, 2024

**S.G. Srivatsan**

Title: Probing nucleic acid architecture and function using responsive nucleoside probes, Oligonucleotide Therapeutics Society (OTS)-First Regional Meeting, JNCASR, Bengaluru, February 18-21, 2025

**Kundan Sengupta**

Title: Mechanical forces and its crosstalk with chromosome territories, Bioscience Division Seminar (Online), Brunel University of London, U.K., March 27, 2025 • Title: Regulatory role of the nuclear envelope in the maintenance of chromosomal stability and function in cancer cells, EMBO Workshop, Molecular Basis and Mechanisms of Therapy Personalisation in Paediatric Leukaemi, Kolkata, February 7, 2025 • Title: Mechanonuclear-epigenomics and its crosstalk with genome stability in cancer cells, Conference on Cancer Epigenetics: From Laboratory Studies to Precision Medicine, Manipal School of Life Sciences, Manipal Academy of Higher Education, Manipal, January 23, 2025 • Title: Molecular mechanisms that protect cells from chromosomal losses, Tübingen University Hospital, Liebermeisterstraße, Tübingen, Germany, December 4, 2024; Department of Bioscience and Bioengineering, IIT Bombay, July 22, 2024 • Title: Intra and Inter-cellular regulatory roles of nuclear lamins, International Conference on Intra and Inter Cellular Regulatory Systems (IICRS), School of Life Sciences, University of Hyderabad, Hyderabad, November 18, 2024 • Hacking the Nucleus: Understanding Cancer at its Core, resource person, Homi Bhabha Center for Science Education (HBCSE), National Initiative on Undergraduate Science (NIUS), November 11, 2024 • Chromosome Territories, Guha Research Conference, Kaziranga, Assam, November 6, 2024 • Title: How do cells organize their genomes?, Induction program for MS students, Institute of Bioinformatics and Biotechnology (IBB), SPPU University of Pune, Pune, August 30, 2024; Valedictory function of the Biology, Olympiad Orientation-cum-Selection Camp (OCSC), Homi Bhabha Center for Science Education-Tata Institute of Fundamental Research (HBCSE-TIFR), Mumbai, May 22, 2024 • Title: The diverse roles of lamins in the maintenance of chromosomal stability in cancer cells, Department of Biochemistry, IISc, Bengaluru, July 16, 2024 • Title: Lamin-telomere axis protects cells from chromosomal losses, 5th Genomics Analysis & Technology Conference (GATC), International Center for Genetic Engineering and Biotechnology (ICGEB), New Delhi, April 13, 2024

**Anupam Kumar Singh**

Title: Chirality in groups of Lie type, Representations of Groups and Algebras, IMSc, February 3-5, 2025; Colloquium, Harish-Chandra Research Institute, Prayagraj, Allahabad HRI Prayagraj, November 19, 2024 • Title: Polynomial maps on algebras, Colloquium, IIT Tirupati, January 10, 2025 • Title: Groups and Symmetry, Mathematics Day, SP Pune University, Pune, January 18, 2025 • Title: Breadth type of Nilpotent Lie Algebras, Inter IISER-NISER Math Meet 2024, IISER Thiruvananthapuram, Thiruvananthapuram, June 26-28, 2024 • Title: Classification of Nilpotent Lie Algebras, ICLANT, National Institute of Technology Calicut, June 10-14, 2024 • title: Power maps on Finite Reductive Groups, YoMath, IISER Mohali, May 8-10, 2024

**Kaneenika Sinha**

Title: A survey of some central limit theorems in number theory, SCHOLAR - II (A Scientific Celebration Highlighting Open Lines of Arithmetic Research), Fields Institute, Toronto, Canada, May 28-30, 2024 • Title: Local spacing statistics for Sato-Tate sequences, Automorphic Forms in Budapest, The Alfréd Rényi Institute of Mathematics, Budapest, Hungary, August 26-30, 2024 • Title: Explicit zero-free regions for modular L-functions, International Conference on Number Theory and Related Topics, Institute of Mathematical Sciences, Chennai, December 16-18, 2024

**Pushkar Sohoni**

Moderator for the round table discussion on Architectural Archives in India, Public launch event for Pune Architectural History Archive, March 22, 2025 • Chief Guest for the Valedictory Ceremony, Kaveri Inspire Camp 2025, Dr. Kalmadi Shamarao Junior College, Pune, March 10, 2025 • Title: Looking in the Past: Material Culture of Medieval Deccan, special lecture in the History Department, Savitribai Phule Pune University (SPPU), Pune, March 4, 2025 • Moderator for the panel 'Identity, Religion & Politics' with Vanya Vaidehi Bhargav and Govind Krishnan V., History Literature Festival, Christ University, Bengaluru, March 2, 2025 • Titles: Development of Twentieth Century Architecture in Pune and Deccan Sultanates, invited lectures, Sinhgad College of Architecture, Pune, February 24, 2025 • Title: Shivaji Market and Environs Walk, Heritage walk for the Indian National Trust for Art and Cultural Heritage (INTACH), Pune Chapter, February 22, 2025 • Title: 'Architectural materials for the intellectual history of Chhatrapati Shivaji Maharaj and Punyashlok Ahilyadevi Holkar, National Seminar organised by the Department of History, Savitribai Phule Pune University, Pune, February 1, 2025 • Title: Kant stop looking up: The philosophy of architectural wonder, Symposium titled Why Read Kant Now? organised by the Goethe-Institut Mumbai, November 30, 2024 • Title: Three capitals, one city, public lecture for Sahapedia and Inter-globe Foundation in Aurangabad, September 18, 2024 • Title: Architectural amalgam: Mughal-British fusion in colonial buildings at the National Seminar on Present Transitions in Indian History: Economy, Society and Culture organised by Maulana Azad National Urdu University (MANUU), Hyderabad, September 11, 2024 • Moderator for the discussion on 'Waters of Pune' at the First Annual General Meeting and Scientific Symposium of the ICOMOS International Scientific Committee on Water and Heritage, organised by Bharati Vidyapith University, Pune, August 7, 2024 • Discussant on panel 'Fortifications and Military Landscapes of Asia' organised by Directorate of Archaeology and Museums, Government of Maharashtra, Archeological Survey of India, ICOFORT with ICOMOS India, and NSC Fort at the 46th session of the UNESCO World Heritage Committee, Bharat Mandapam International Exhibition and Convention Centre (IECC), New Delhi, July 28, 2024 • Non-Official Expert nominated by the Tourism and Cultural Affairs Department, Government of Maharashtra, for the 46th session of the UNESCO World Heritage Committee, Bharat Mandapam International Exhibition and Convention Centre (IECC), New Delhi, July 26-28, 2024 • Title: Histories and contingencies: Narratives of small cities, for The Nasik Project: Conversation on India's Small Cities, organised by the Indian Institute of Architects, Nasik, July 19, 2024 • Title: British Indian market-halls: Local modernity in a universal guise' on the panel titled The South Asian Modern Subject: Historical, Ethnographic, and Literary Investigations at the AAS-in-Asia conference, organised by Association for Asian Studies (AAS) and Universitas Gadjah Mada, Yogyakarta, Indonesia, July 10, 2024

• Discussant for the public inauguration of the book Gateways to the Sea: Historic Ports and Docks of Mumbai Region (Publications Division, Ministry of Information and Broadcasting, Government of India), at Durbar Hall, Asiatic Society of Mumbai, June 22, 2024; Book launch for Gateways to the Sea: Historic Ports and Docks of Mumbai Region (Publications Division, Ministry of Information and Broadcasting, Government of India) at Raj Bhavan, Mumbai

**Steven Spallone**

Title: Symmetric polynomials of the weights of a Lie group representation, ICTS program "Combinatorial Methods in Enumerative Algebra", ICTS Bengaluru, December 12, 2024 • Title: Stiefel-Whitney classes of representations, Colloquium, Chennai Mathematical Institute, Chennai, April 17, 2024

**Pinaki Talukdar**

Title: Biomimicking channels: Innovations and applications in science, Departmental Talk, Chemistry Department, IIT Bombay, Mumbai, January 24, 2025 • Title: Development of artificial ion channels to combat cancer, 90th Anniversary General Meeting of Indian National Science Academy (INSA), SRM Institute of Science & Technology, Kattankulathur, Chennai, December 9-10, 2024 • Title: Photoport: Harnessing light for efficient ion transport across lipid membranes, Chemical Science 2024: Leaders in the Field Symposium, organised by Chemical Science Journal of Royal Society of Chemistry and IISER Thiruvananthapuram, December 9-11, 2024; Chemsymphoria 2024, IISER Pune, December 2-3, 2024 • Title: Creating artificial water channels through solid-state self-assembly, 51st edition of the National Seminar on Crystallography (NSC51), Visvesvaraya National Institute of Technology, Nagpur, November 27-29, 2024 • Title: Photoassembled ion channels: Applications of photoisomerization and photocleavage strategies for chloride channel formation, Nanopore Weekly Meeting, August 26, 2024 (Online) • Crafting small molecule-based engineered channels for selective and regulated ion transport and targeting diseases, CSIR-Institute of Genomics and Integrative Biology, New Delhi, July 17, 2024; Department of Chemistry, IIT Delhi, July 16, 2024; Shiv Nadar University, Greater Noida, July 15, 2024; Tokyo Institute of Technology (Suzukakedai Campus), Japan, June 4, 2024; Tokyo Institute of Technology (Ookayama Campus), Japan, June 4, 2024; Kyoto University, Japan, June 11, 2024; Osaka University, Japan, June 12, 2024; The University of Tokyo, Japan, June 13, 2024 • Title: Small molecules, big dreams: Crafting engineered channels for selective and regulated ion transport and targeting diseases, Department of Chemistry, Sambalpur University, Sambalpur, May 7, 2024

**Bejoy Thomas**

Panel on Sustainable Water Futures: Key Priorities at the Science-Policy-Practice Interface in Asia, The International Association for Society and Natural Resources 2024 conference (online), Cairns, Australia, June 27, 2024 • Title: From waste to resource: The circular economy of water, ATAL Academy Faculty Development Program, Rajagiri College of Management and Applied Sciences, September 7, 2024 • Title: Potentials and pitfalls of composite indices in development policy, K N Raj School of Economics, Mahatma Gandhi University, Kottayam, September 9, 2024 • Panel on Role of Riverscapes in Supporting River Sustainability: Research and Policy Concerns, The Indian Association of Social Science Institutions 2024 Conference, Ranchi, October 26, 2024 • Moderator for the panel on 'Participation Matters', National Conference on Operation and Maintenance of Rural Pipe Water Supply Systems, WaterAid, New Delhi, February 19, 2025 • Lectures on 'Urban Water Management' (March 18, 2025) and 'SDG 6' (March 19, 2025), Indian Institute of Forest Management, Bhopal, March 18-19, 2025

**Suneeta Vardarajan**

Tata Institute of Fundamental Research (TIFR), Mumbai, March 10-11, 2025 • Conference 'Black Hole Information in Holography and String Theory', IISc, Bengaluru, February 9, 2025 • Plenary talk, Indian Association for General Relativity and Gravitation (IAGRG) Conference, BITS Pilani, January 2, 2025 • Future perspectives on QFT and Strings, IISER Pune, July 24, 2024 • String seminar, ICTS Bengaluru, July 10, 2024

**Arun Venkatnathan**

Title: Unravelling thermal stability, structure and ion transport in battery electrolytes: A classical Molecular Dynamics simulation approach, IISc, Bengaluru, January 7, 2025; Caltech, U.S.A., August 5, 2024; Department of Chemistry, University of California, Los Angeles, U.S.A., August 7, 2024 • Title: Unravelling structure and ion transport in battery electrolytes via classical MD simulations, Emerging Frontiers in Computational Chemistry and Materials: Symposium, Asilomar, CA, U.S.A., August 2-4, 2024

# Academic Events Organised

**Bijay Agarwalla**
Co-organiser (with Mukul Kabir, Prasenjit Ghosh and G.J. Sreejith), Annual Meeting on Condensed Matter Physics: Young Investigator's Meet on Quantum Condensed Matter Theory, IISER Pune, December 16-18, 2024

**Chaitanya A. Athale**
Organiser, Biophysics Paschim 16 "Biophysics Across Scales & Festschrift for Sudipta Maiti", IISER Pune, August 24, 2024

**Mousomi Bhakta**
Co-organiser (with Debdip Ganguly (ISI Delhi)) Special Session titled "Recent developments in variational problems and geometric analysis" at the 14th AIMS conference in Abu Dhabi, December 16-20, 2024

**Srabanti Chaudhury**
Co-convenor, International Conference on Advanced Energy Materials and Interfaces - 2024 (AEMI-2024), jointly organised by IISER Pune, Wiley, and TCG CREST, held at IISER Pune, December 9-11, 2024

**Anisa Chorwadwala**
Co-organiser (with T.V. Anoop (IIT Madras); V. Bobkov (IMCC UFA, Russian Academy of Science, Russia); and S. Kesavan (IMSc, Chennai)), International Conference titled "Recent Advances in Non-linear PDEs and Applications", IIT Madras, March 13-15, 2025 • Co-organiser (with Sheela Verma (IIT-BHU)), International Conference titled "Discussion Meeting in Spectral Theory", IISER Pune, September 13-14, 2024

**Sreejith G.J.**
Co-organiser (with Prasenjit Ghosh, Mukul Kabir, Bijay Agarwalla), Young Investigator Meet on Quantum Condensed Matter Physics 2025, IISER Pune, December 16-18, 2024

**Aurnab Ghose**
Co-organiser, EMBO Workshop: Neuropeptides and behavioural flexibility, NISER Bhubaneshwar, December 5-8, 2024

**Pranay Goel**
Member, National Organising Committee, International Conference of Systems Biology (ICSB 2024) IIT Bombay, Mumbai, November 30 - December 5, 2024

**Mohammad Ismaiel**
Co-convenor (with Ajay Kumar), Conference on Integrated Earth (CITE-2024), IISER Pune, September 1-2, 2024

**Siddhesh Kamat**
Co-organiser, EMBO Young Investigator Network PhD Course, IISER Pune, February 3-14, 2025 • Lab Leadership Course, EMBO Solutions, IISER Pune, October 15-18, 2024

**Krishanpal Karmodiya**
Co-organiser (with Kundan Sengupta), Frontiers in DNA-Chromatin Dyanmics, IISER Pune, June 7-8, 2024 • Co-organiser (with Dhanasekaran Shanmugam (CSIR-NCL Pune), D.V. Desai (SPPU, Pune), 32nd National Congress of Parasitology, Pune, IISER Pune, October 3-5, 2024

**Ajay Kumar**
Co-convenor (with Mohammad Ismaiel), Conference on Integrated Earth (CITE), 2024, IISER Pune, September 1-2, 2024

**G.V. Pavan Kumar**
Physics Department Conclave, Physics Outreach committee, IISER Pune, March 6-7, 2025

**Vivek Mallick**
Co-organiser (with Vinayak M. Sholapurkar (Bhaskaracharya Pratishthana, Pune)), IST - Curves, Surfaces and Differential Forms, December 2-14, 2024 • Co-organiser (with Krishnendu Gongopadhyay, Alok Maharana, Vaibhav Vaish, Chetan Balwe, Aribam Chandrakant, Umesh Dubey, Sarbeswar Pal), Geometric Aspects of Algebraic Varieties, IISER Mohali, March 17-19, 2025

**Shreyas Managave**
Member, Organising Committee, Conference on Integrated Earth (CITE-2024), IISER Pune, September 1-2, 2024

**Suhita Nadkarni**
Co-organiser (with Collins Assisi (IISER Pune), Rishikesh Narayanan (IISc, Bengaluru), Upinder Bhalla (NCBS, Bengaluru), Arvind Kumar (Karolinska Institute, Sweden)), Computational Approaches to Memory and Plasticity (CAMP) 2024, IISER Pune, July 1-17, 2024 • Co-organiser (with Krishnaveni Mishra (University of Hyderabad), Radhika Nair (Centre for Human Genetics, Bengaluru), Rashna Bhandari BRIC - Centre for DNA Fingerprinting and Diagnostics, Hyderabad), Sreelaja Nair (IIT Bombay)), Leadership Roles for Women in Shaping Academia, IIT Bombay, February 5-6, 2025

**Rejish Nath**
Co-organiser (with Umakant Rapol, Weibin Li, and Filippo Gambetta), Workshop for PhD students and postdocs, IISER Pune, September 23-25, 2024

**Pramod P. Pillai**
Member, Organising Committee, ChemSymphoria 2024, IISER Pune, December 9-10, 2024

**Gayathri Pananghat**
Co-organiser (with Dr. Radha Chauhan, NCCS, Pune), Proteopedia Workshop conducted by Prof. Joel Sussman, Weissman Institute Rehevot, Israel, February 17, 2025

**Shivprasad Patil**

Member, Organising Committee, CONFORCE-24, Conference on Force Spectroscopy and Microscopy, Kurunji, Bhor, June 24, 2024

**Supriya Pisolkar**

Co-organiser (with Sanoli Gun (IMSc, Chennai), Srimathy Srinivasan (TIFR, Mumbai)), National Symposium titled Women in Numbers (WIN 2025), IISER Pune, January 17-19, 2025

**Kalika Prasad**

Organiser, Workshop titled "From fundamental science to application in plants", IISER Pune, February 3-6, 2025

**Sunish Radhakrishnan**

Co-organiser (with Anjana Badrinarayanan (NCBS, India), Bavesh Kana (University of Witwatersrand, South Africa), Patrick Viollier (University of Geneva, Switzerland)), Bacterial Morphogenesis, Survival and Virulence (BMSV '25): Molecules, Metabolism, Membranes, Monkey Valley, Cape Town, South Africa, February 2-7, 2025

**Sudha Rajamani**

Co-organiser (with Naresh Sharma, IRO office, IISER Pune, along with the Consulate General of France in Mumbai), Industry-Academy Workshop as part of the Franco Indian Campus for Health, December 3-5, 2024

**Raghav Rajan**

Co-organiser (with Carolyn Pytte (City University of New York, U.S.A.), Virtual BirdSong Satellite, Online on zoom, April 25, 2024; May 30, 2024; February 27, 2025; and March 27, 2025

**Boomi Shankar Ramamoorthy**

Co-convener (with S.G. Srivatsan), Indo-German International Conference on Engineered Chemical and Biochemical Systems (ECBS2024), Amritsar, November 12-15, 2024, IISER Pune • Member, National Organising Committee, Main Group Molecules to Materials-4 (MMM-4), IIT Bombay, February 9-12, 2025

**Girish Ratnaparkhi**

Co-organiser (with S.C. Lakhotia, Richa Arya, Bama Charan Mondal (Banaras Hindu University, Varanasi); Richa Rikhy (IISER Pune); Anuradha Ratnaparkhi (Agharkar Research Institute (ARI), Pune)), DBT-sponsored Centre for Training Teachers in using Drosophila melanogaster for Biology Laboratories, IISER Pune, December 23-30, 2024 • Co-organiser (with Girish Deshpande (IISER Pune)), Germ-Cell Stem-Cell (GCSC) Meeting, IISER Pune, February 28-March 2, 2025

**Richa Rikhy**

Co-organiser (with Santosh Podder, Vijay Vittal, Aurnab Ghose), India Bio-Imaging Meet, IISER Pune, December 12-13, 2024

**S.G. Srivatsan**

Co-convenor (with Boomi Shankar Ramamoorthy), International Conference on Engineered Chemical and Biochemical Systems (ECBS2024), Amritsar, November 12-15, 2024

**Kundan Sengupta**

Co-organiser (with Subhanjan Bhowmick, BENCOS Life Sciences, GATC), 6th Genomics Analysis & Technology Conference (GATC), IISER Pune, April 4-6, 2025

**Kaneenika Sinha**

Co-organiser (with Tapas Chaterjee (IIT Ropar), Sanoli Gun (IMSc Chennai), Sudhir Pujahari (NISER Bhubaneswar)), Celebrating Number Theory in India: A conference to celebrate the 70th birthday of Prof. M. Ram Murty, IISER Pune, December 9-13, 2024

**Bejoy Thomas**

Co-organiser (with SOPPECOM, Pune and IIASA, Austria), Workshop titled 'Alternative Futures: The Water-Food-Biodiversity Nexus in the Upper Bhima Basin', fairSTREAM project final workshop, IISER Pune, November 12, 2024

**Suneeta Vardarajan**

Co-organiser (with Diptimoy Ghosh, Sachin Jain, Sunil Mukhi), Future Perspectives on QFT and Strings, IISER Pune, July 24-27, 2024

# New Extramural Grants

*Funds shown in the last column represent the amount either received by and/or assigned to the project*

Amount in ₹

| Sr. No. | Name of the Project and Project Leader | Project Code | Funding Agency | Period From-To | Total Funds Sanctioned | Funds Received during the Year |
|---|---|---|---|---|---|---|
| 1 | Structural biology of macromolecular assemblies associated with cell division in a cell wall-less bacterium Spiroplasma; PI: Dr. Gayathri Pananghat | GAP/DBT/BIO-23-708 | DBT | 6.3.2024 5.3.2027 | 17,00,000 | 3,02,875 |
| 2 | Normative baseline characterization of body composition and metabolic parameters to assess growth and development in children: A multi-site study on the impact of malnutrition; PI: Dr. Siddhesh Kamat | GAP/ICMR/BIO-24-709 | ICMR | 29.4.2024 28.4.2027 | 18,53,440 | 18,53,440 |
| 3 | Developing affordable diagnostic tests to detect HER2/ERBB2 copy numbers in Indian breast cancer patients; PI: Prof. Kundan Sengupta | GAP/DBT/BIO-24-710 | DBT | 31.1.2024 30.7.2025 | 35,58,000 | 9,99,956 |
| 4 | Investigation of the MJO modulation of tropical synoptic scale variability and equatorial waves; PI: Dr. Suhas Ettammal | GAP/SERB/ECS-24-711 | SERB | 21.5.2024 20.5.2027 | 24,59,080 | 7,50,000 |
| 5 | Characterization of a novel α/β hydrolase protein in Plasmodium falciparum and understanding its role in artemisinin resistance; PI: Dr. Krishanpal Karmodiya | GAP/SERB/BIO-24-712 | SERB | 4.6.2024 3.6.2027 | 46,37,080 | 16,05,300 |
| 6 | Implications of membrane heterogeneity for the emergence and evolution of early cellular life; PI: Prof. Sudha Rajamani | GAP/DBT/BIO-24-713 | DBT | 17.5.2024 16.5.2027 | 57,01,760 | 13,13,374 |
| 7 | Deciphering the cosmological bootstrap; PI: Dr. Diptimoy Ghosh | GAP/SERB/PHY-24-714 | SERB | 10.6.2024 9.6.2027 | 37,74,298 | 14,75,500 |
| 8 | Mineralogy, geochemisry, depositional settings, and genesis of mesoproterozoic Fe formation IF from the Kaladgi Basin; PI: Dr. Shilpa Patil Pillai | GAP/DST-WISE-PDF/ECS-24-715 | DST (WISE KIRAN) | 12.6.2024 11.6.2027 | 41,35,982 | 9,93,476 |

Amount in ₹

| Sr. No. | Name of the Project and Project Leader | Project Code | Funding Agency | Period From-To | Total Funds Sanctioned | Funds Received during the Year |
|---|---|---|---|---|---|---|
| 9 | Study of non-equilibrium open quantum systems beyond Markovian and weak-coupling regime: Method development and application to quantum devices; PI: Dr. Bijay Kumar Agarwalla | GAP/SERB/PHY-24-716 | SERB | 11.6.2024 10.6.2027 | 27,80,790 | 12,41,600 |
| 10 | Development of β-Sheet polypeptide block copolymers for drug delivery in cancer; PI: Prof. M. Jayakannan | GAP/SERB/CHE-24-717 | SERB | 13.6.2024 12.6.2027 | 75,70,640 | 45,35,000 |
| 11 | Development of two-dimensional spintronic nanosheets using high-temperature antiferromagnetic oxides with honeycomb lattices; PI: Prof. Sunil Nair | GAP/DST/PHY-23-718 | DST | 4.3.2024 3.3.2026 | 9,42,000 | 1,72,145 |
| 12 | Understanding the mechanism of SARS-CoV-2 RNA replication initiation and proofreading for therapeutics; PI: Prof. Saikrishnan Kayarat | GAP/MoE-STARS/BIO-24-719 | MoE-STARS | 26.6.2024 25.6.2027 | 91,00,000 | 11,77,581 |
| 13 | Fermi-edge singularities and magnetic proximity effects in van der Waals heterostructures; PI: Dr. Ashish Arora | GAP/IFCEFIPRA/PHY-24-720 | IFCPAR-CEFIPRA | 1.8.2024 31.7.2027 | 82,71,347 | 22,03,063 |
| 14 | Molecular mechanism of resistance to PC190723 and targeting the essential cell division protein FTSZ of Helicobacter pylori and Pseudomonas aeruginosa; PI: Dr. Gayathri Pananghat; Co-PI: Prof. Saikrishnan Kayarat | GAP/DBT/BIO-24-721 | DBT | 24.5.2024 23.5.2027 | 32,33,083 | 6,89,861 |
| 15 | A data-driven machine learning approach to dynamical balance in the tropical and extra-tropical climate and extreme weather events; PI:Prof. Jai Suhas Sukhatme (IISc, Bengaluru); Co-PI: Dr. Joy Merwin Monterio | GAP/DST/ECS-24-722 | DST | 22.4.2024 21.4.2026 | 18,49,880 | 8,79,800 |
| 16 | Comprehensive analysis of homocysteine induced neutrophil extracellular traps: Implications in pathogenesis of sepsis; PI: Dr. Manjunath B. Joshi; Co-PI: Prof. Harinath Chakrapani | GAP/IFCEFIPRA/CHE-24-723 | IFCPAR-CEFIPRA | 2.8.2024 1.8.2027 | 21,52,832 | 6,75,646 |
| 17 | Bhopal living (digital) archive: The world's worst industrial disaster in history; PI: Dr. Shalini Sharma | GAP/IITI/HSS-24-724 | Indian Institute of Technology Indore (IITI) | 5.7.2024 4.7.2026 | 4,00,000 | 4,00,000 |
| 18 | INSA Senior Scientist Fellowship to Prof. Shyam Sundar Rai | GAP/INSA/ECS-24-725 | INSA | 1.8.2024 31.7.2027 | 21,00,000 | 7,00,000 |
| 19 | Vaishvik Bharatiya Vaigyanik (VAIBHAV) Fellowship to Dr. Ashish Arora | GAP/DST/PHY-24-726 | DST | 17.10.2024 16.10.2027 | 72,22,500 | 24,07,500 |
| 20 | Small-scale statistics for equidistributed sequences in mesoscopic regimes; PI: Dr. Kaneenika Sinha | GAP/SERB/ MATHS-24-727 | SERB | 22.10.2024 21.10.2027 | 31,45,032 | 11,28,344 |

Amount in ₹

| Sr. No. | Name of the Project and Project Leader | Project Code | Funding Agency | Period From-To | Total Funds Sanctioned | Funds Received during the Year |
|---|---|---|---|---|---|---|
| 21 | IACR - IISER Poster Awards; PI: Dr. Mayurika Lahiri | GAP/IACR/BIO-24-728 | IACR | 6.11.2024 As long as funds are available | 11,80,239 | 11,80,238.87 |
| 22 | INSPIRE Faculty Award to Dr. Tresa Mary Thomas | GAP/DST-INSPIRE/ECS-24-729 | DST INSPIRE | 14.6.2024 13.6.2029 | 1,12,40,000 | 10,70,833 |
| 23 | Decoding neural circuits coupling feeding states with anxiety and fear: Adaptive modulation by hypothalamic CART neurons; PI: Prof. Aurnab Ghose & Co-PI: Dr. Mayurika Lahiri | GAP/DBT/BIO-24-730 | DBT | 28.10.2024 27.10.2027 | 92,30,000 | - |
| 24 | INSPIRE Faculty Fellowship to Dr. Ajay Kumar | GAP/DST-INSPIRE/ECS-24-731 | DST INSPIRE | 10.6.2024 9.6.2029 | 35,00,000 | - |
| 25 | Parameterization of dynamical systems using data - a mathematical approach; PI: Prof. Amit Apte | GAP/SERB/DS-24-732 | SERB | 19.12.2024 18.12.2027 | 62,95,538 | 27,70,523 |
| 26 | Noncovalent catalysis and ligand design for borylation of small organic molecules; PI: Dr. Buddhadeb Chattopadhyay | GAP/SERB/CHE-24-733 | SERB | 1.1.2025 9.1.2026 | 79,62,537 | 6,21,153 |
| 27 | EMBO Global Investigator Award to Dr. Krishanpal Karmodiya | GAP/EMBO/BIO-24-734 | EMBO (The European Molecular Biology Organization) | 1.1.2025 31.12.2028 | EUR 28,000 (total amount in rupees to be known later) | 6,25,870 |
| 28 | Quantum materials & devices; PI: Dr. Ashish Arora | GAP/DST/PHY-24-735 | DST | 12.2.2025 31.3.2031 | 18,94,240 | 15,24,261 |
| 29 | Quantum Computing; PI: Prof. Umakant Rapol & Dr. Rejish Nath | GAP/DST/PHY-24-736 | DST | 3.3.2025 2.3.2031 | 4,88,600 | - |
| 30 | CARE: Communicating Action and Resilience for Environmental Health in India; PI: Dr. Shalini Sharma | GAP/HCWH/HSS-24-737 | HCWH (Health Care Without Harm) | 15.2.2025 31.12.2026 | USD 2,00,000 (total amount in rupees to be known later) | 42,83,909 |
| 31 | Water desalination during electricity production via electrochemical water formation; PI: Prof. Muhammed Musthafa O.T. | GAP/BBF/CHEM-25-738 | BITS BioCyTiH Foundation | 28.3.2025 27.9.2025 | 10,50,000 | 10,50,000 |

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