



वार्षिक प्रतिवेदन
Annual Report 2016-17

भारतीय विज्ञान शिक्षा एवं अनुसंधान संस्थान पुणे
Indian Institute of Science Education and Research Pune



दूरदर्शिता एवं लक्ष्य

- ◆ उच्चतम क्षमता के एक ऐसे वैज्ञानिक संस्थान की स्थापना जिसमें अत्याधुनिक अनुसंधान सहित अध्यापन एवं शिक्षा पूर्णरूप से एकीकृत हो।
- ◆ जिज्ञासा और रचनात्मकता से युक्त उत्कृष्ट समाकलनात्मक अध्यापन के माध्यम से मौलिक विज्ञान के अध्ययन को रोचक बनाना।
- ◆ लचीले एवं असीम पाठ्यक्रम तथा अनुसंधान परियोजनाओं के माध्यम से छोटी आयु में ही अनुसंधान क्षेत्र में प्रवेश।

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- ◆ Establish scientific institution of the highest caliber where teaching and education are totally integrated with state-of-the-art research
- ◆ Make learning of basic sciences exciting through excellent integrative teaching driven by curiosity and creativity
- ◆ Entry into research at an early age through a flexible borderless curriculum and research projects





Annual Report 2016-17



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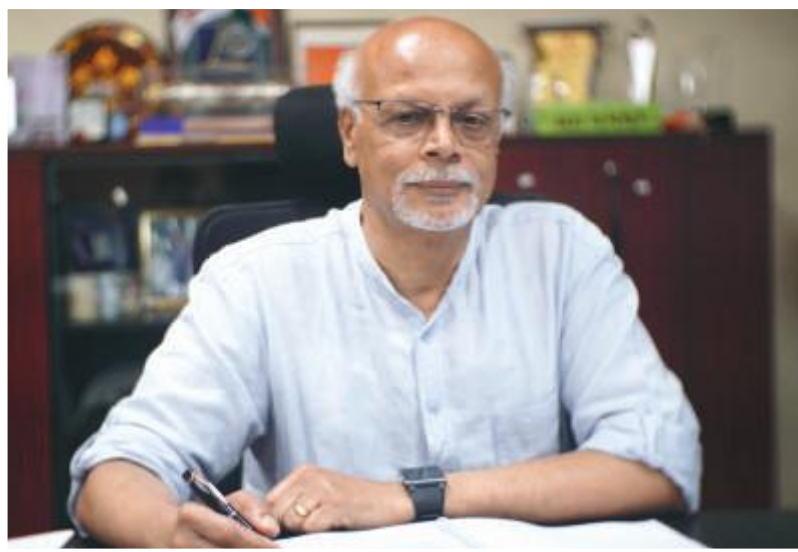
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Foreword



I am delighted to present the annual report of the Institute for the period April 2016–March 2017. This year has been a very special year for the Institute, which has seen a marked phase shift in its activities and has broken new grounds.

Our faculty members have received prestigious professional recognitions. Some of these are: Dr. Seema Sharma was elected as the Convener of JetMET Working Group of CERN Collaboration, Dr. V.G. Anand received Bronze Medal of Chemical Research Society of India, Prof. Shyam Rai received the National Award in Geoscience and Technology for 2016 by the Ministry of Earth

Sciences, Govt. of India, Dr. Nixon Abraham was bestowed with the 2017 Pfizer Research Prize of Switzerland which he shared with two other scientists for their work on neuronal networks involved in the sense of smell carried out at the University of Geneva. Our heartiest congratulations to them and other faculty members who have made the Institute proud by their achievements.

The present student strength of the Institute is close to 1300 with 771 BS–MS, 157 Integrated PhD and 325 PhD students. The UG academic program at IISER Pune has been strengthened by the creation of new disciplines in Earth and Climate Science, and Humanities and Social Sciences. Significantly, both the quality and quantity of research publications from the Institute have shown a remarkable upward trend this year.

Our students continue to bring laurels to the Institute, with 7 students selected for DAAD–WISE Fellowship and 2 students each selected for Charpak Research Internship, Mitacs Global Program and Khorana Fellowship. Tejal Agarwal was selected to participate in Lindau Meeting in 2016, while Abhishek Swarnakar has been selected for the same in 2017.

IISER Pune students bagged the overall championship in the Inter-IISER Sports Meet held at IISER Kolkata in December 2016, winning maximum number of medals. They broke the tradition of the host institute becoming the champions during the previous meets by winning the championship in individual and team games. The Institute organized student flagship events such as cultural festival *Karavaan*, inter-institutional pan-India science quiz event *Mimamsa*, in addition to regular institutional functions such as Foundation Day, Science Day, and Math Day.

IISER Pune is emerging as a favorite academic hub for hosting several national and international scientific conferences and workshops. This year saw the organization of 16 such meetings, some of the prominent ones being National

Seminar on Crystallography, International Conference on Oriental Astronomy, Indian Strings Meeting and National Conference on Library Innovations for Excellence. Institute also hosted 17 events related to science outreach, public engagement, and professional development. The first category of meetings were mainly oriented to creating new careers for women and included topics such as Science Journalism and Science Administration and Management; programs for teachers included School Teacher Training Workshops, School Teachers' Science Congress, Pedagogy Workshops for Undergraduate Science Teachers, Salters' Program supported by Dr. Yusuf Hameid for Chemistry teachers, and programs oriented toward science communication such as workshops on basics of audio / video production, 3D animation, etc. Other events were on professional networking – grant proposal writing, startups, and Indo-German Dialogue on Excellence in Research and Education. The Institute has also been very active in promoting various government initiatives such as Ishān Vikās for students from the north-east part of India, Rashtriya Avishkar Abhiyan for nurturing creativity, and INSPIRE Science Internship Camp. Organizing public lectures by scientific thought leaders has become a hallmark of the Institute. Some important ones under this category were (i) *Internal Dynamics of the Earth* by Prof. Yanick Ricard, ENS Lyon, Paris; (ii) *The world of the ultra-low temperatures* by Prof. Luis Santos from Institute of Theoretical Physics, Leibnitz University, Germany; (iii) *Exploring the New Frontier of Gravitational-Wave Astronomy* by Dr. Fred Raab, Head, LIGO Hanford Observatory; (iv) *From Matter to Life: Chemistry? Chemistry!* by Prof. Jean-Marie Lehn, Nobel Laureate in Chemistry (1987) from University of Strasbourg.

Internationalization activities at IISER Pune included signing MoU with Temple University, Philadelphia (U.S.A.), University of Michigan, Ann Arbor (U.S.A.), and School of Life Science, SOKENDAI (Japan) for exchange of students and faculty and research collaborations. A new joint research center to be established in the area of energy with University of Queensland and Australian industries in India is under consideration. The IISER Pune –ENS Lyon MoU signed by the two Directors last year in the presence of President of France and Prime Minister of India is now being implemented with exchange of students and faculty for teaching from both sides. The new tripartite Blended BSc course at SPPU supported by IISER Pune and University of Melbourne has been successfully initiated at Modern College, Pune.

Several delegations from different international universities and institutes visited IISER Pune for exploring collaborations. Some of these are from University of Glasgow, University of Tokyo, Notre Dame University and the Directors and Vice-Chancellors from the state of Baden-Wuerttemberg in Germany. A 3-week course on "Science and Culture in British India" conducted jointly with the British Council attracted participation of 20 students from the U.K. The Pune-Göttingen Outreach Centre was inaugurated at IISER Pune, with a pavilion erected on the campus.

The Institute continues to attract new research grants for both individual faculty and institutional facilities. The DST-Nanoscience mission group awarded ₹ 16 crore for applications of nanoscience in energy research. DBT sanctioned ₹ 32 crore for the newly established laboratory facility for gene research and just last month Department of Information Technology awarded ₹ 25 crore for setting up a 500 Teraflop HPC facility at IISER Pune in collaboration with CDAC.

The Institute has begun to attract significant endowments from prestigious organizations. Infosys Foundation gave a corpus of ₹ 5 crore, the interest from which is used for supporting economically weak meritorious students and to sponsor travel

grants for PhD students to present their research in international conferences. About 15-20 students have been supported this year from this fund. Mr. S. Balan's group has pledged to finance the creation of a Science Learning Centre of 6000 sq.mt. area on IISER Pune Campus and has already donated ₹ 2 crore for this purpose. The temporary facility for this is ready for functioning and the main Centre will come up by August 2018. Bajaj Auto Ltd has given a very generous support of ₹ 50 crore for the construction of a 800 capacity hostel for women research scholars and the construction has already begun. We must place on record the goodwill of Dr. Mashelkar that was important in securing this fund. In a first of its kind, Precision Wires India Ltd. gave a donation of ₹ 17 lakhs towards a research project on String Theory and Quantum Gravity. The 5th endowment of ₹ 12 crore secured by the Institute is from Cipla Foundation to build a modern UG teaching and Chemistry outreach laboratory. I would like to take this opportunity to express our most sincere gratitude to Infosys Foundation, Mr. S. Balan's group, Bajaj Auto Ltd, Precision Wires Ltd. and Cipla Foundation for their generous funds to IISER Pune to enhance our educational and research capabilities. We fully realize that this support from non-governmental sources is not only a recognition of what we have been able to achieve in a short time, but also the faith and confidence reposed in us by our stakeholders. In the just announced National Institutional Ranking Framework by MHRD that includes all Universities and National Institutes, IISER Pune has been ranked at 29th position. Institutes that are ahead of us are more than 25 years old, it is pretty good to be among the top institutes in just our 11th year. We are acutely aware of the real challenge to fulfil the trust of the Government and the public who have funded the creation of IISERs and that of the philanthropists who have bestowed generous support. To meet these challenges and sustain our R&D infrastructure and competency, Institute needs huge support from non-government and industry sources. Given the capability of our talented faculty, the creative enthusiasm of our young students and the ever-enabling administration and support systems, I am confident that IISER Pune will rise to meet the future academic and financial challenges and fulfil the high expectations of our stakeholders.

I wish to thank Chairperson and the Members of the Board of Governors, Finance and Building Committee, and the Senate and MHRD for their counsel and support to IISER Pune, without which we would not have been where we are today.



Krishna N. Ganesh
Director



Academic Activities and Achievements of Faculty Members

Awards and Honors

Publications in 2016

Invited Lectures

Contributed Talks and Poster Presentations

Academic Events Organized

Memberships and Affiliations

National and International Visits

Awards and Honors



Dr. V.G. Anand (Associate Professor, Chemistry) has won the Bronze Medal of Chemical Research Society of India (CRSI). CRSI is a professional body aimed to facilitate and promote research and education in all branches of chemistry.



Dr. Anjan Banerjee (Associate Professor) was elected as Treasurer, Plant Tissue Culture Association (PTCA) of India and honored with Best Scientist Award by Rotary Club of Pune Shivajinagar.



Dr. Atikur Rahman (Assistant Professor, Physics) received the R&D 100 Award for 2016 along with team at Brookhaven Lab's Center for Functional Nanomaterials for their work on nanostructured anti-reflecting and water-repellent surface coatings.



Dr. Aurnab Ghose (Associate Professor, Biology) was elected as Editorial Board Member of *Journal of Biosciences* published by Indian Academy of Sciences, Bengaluru with Springer.



Dr. Bhas Bapat (Associate Professor, Physics) was elected as the President of the Indian Society of Atomic and Molecular Physics for a 2-year term (2017-18).



The Department of Science & Technology, Government of India presented **Dr. Gayathri Pananghat** (Assistant Professor, Biology) the SERB Women Excellence Award.



Prof. K.N. Ganesh (Director, IISER Pune) was conferred honorary doctorate by Vidyasagar University named after 19th century social reformer and educationist Pandit Iswar Chandra Vidyasagar (Midnapore, West Bengal) at its 19th convocation.



Dr. Krishanpal Karmodiya (DST-INSPIRE Faculty Fellow, Biology) won the National Academy of Sciences, India (NASI)'s Young Scientist Platinum Jubilee Award in Biological Sciences for the year 2016.



Dr. Nixon Abraham (Assistant Professor, Biology), has received the 2017 Pfizer Research Prize. He shares this Prize with Dr. Olivier Gschwend and Prof. Alan Carleton for their work in the area of neurosciences carried out at the University of Geneva.



Dr. Seema Sharma (Assistant Professor, Physics) was selected as a CMC-LPC Distinguished Researcher for 2017 by the LHC Physics Centre, Fermi National Accelerator Laboratory, U.S.A.



The Ministry of Earth Sciences, Govt. of India during its celebration of 10th anniversary and Foundation Day has conferred **Prof. Shyam S. Rai** (Chair, Earth & Climate Science) with the National Award in Geoscience and Technology for 2016.



Dr. Siddhesh Kamat (Assistant Professor, Biology) was awarded Intermediate Fellowship by the Wellcome Trust/DBT India Alliance to support his research on lipid signaling networks and human disease.



Dr. S.G. Srivatsan (Assistant Professor, Biology) was awarded Senior Fellowship by the Wellcome Trust/DBT India Alliance to support the study of RNA structure, dynamics, and function.



Dr. Thomas Pucadyil (Associate Professor, Biology) was awarded Senior Fellowship by the Wellcome Trust/DBT India Alliance to support his research on vesicular transport.



Publications in 2016

Chemical Biology

1. Mandlik, V., Patil, S., Bopanna, R., **Basu, S.** and Singh, S. (2016). Biological activity of Coumarin derivatives as anti-Leishmanial agents. *PLoS One* 11(10):e0164585.
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5. Sawant, A.A., Mukherjee, P.P., Jangid, R.K., **Galande, S.** and **Srivatsan, S.G.** (2016). A clickable UTP analog for the post transcriptional chemical labeling and imaging of RNA. *Organic & Biomolecular Chemistry* 14(24):5832–5842.
6. Ellipilli, S., Vasudeva Murthy, R. and **Ganesh, K.N.** (2016). Perfluoroalkyl chain conjugation as a new tactic for enhancing cell permeability of peptide nucleic acids (PNAs) via reducing the nanoparticle size. *Chemical Communications* 52(3):521–524.
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13. Misra, R., Reja, R.M., Narendra, L.V., George, G., Raghothama, S. and **Gopi, H.N.** (2016). Exploring structural features of folded peptide architectures in the construction of nanomaterials. *Chemical Communications* 52(61):9597–9600.
14. Reja, R.M., Khan, M., Singh, S.K., Misra, R., Shiras, A. and **Gopi, H.N.** (2016). pH sensitive coiled coils: A strategy for enhanced liposomal drug delivery. *Nanoscale* 8(9):5139–5145.
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Materials Science, Nanoscience, Condensed Matter, Statistical Physics

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of *Trigonella* L. (Fabaceae) based on nuclear ribosomal ITS and chloroplast *trnL* intron sequences. *Genetic Resources and Crop Evolution* 63(1):79–96.

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Patents

Three Indian patent applications have been filed during 2016–17.



Invited Lectures

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

Nixon Abraham

Right and wrong decisions: Exploring the mechanisms Anna University, Chennai, August 23, 2016; University of Bordeaux, France, February 9, 2017 • *Grant Proposal Writing Seminar on Research in Germany and Proposal Writing Workshop*, IISER Pune, August 13, 2016 • *Right and wrong decisions: From circuits to behavior* Workshop on Neural Systems: From Circuits to Behavior, IIT Kanpur, December 17–18, 2016; University of Heidelberg, Germany February 22, 2017 • *Sniffing to decide: Exploring the mechanisms* Max Planck Institute for Psycholinguistics, Nijmegen, Netherlands, February 27, 2017 • *Neural circuits and behaviour: Controlling brain functions using light* Recent Trends in Biology, SPPU, Pune, March 16–17, 2017

G. Ambika

Recurrence-network analysis of chaotic and noisy time series PNLH Humboldt-University, Berlin, July 2016 • *Geometry of Nature* Modern College, Pune, August 13, 2016 • *Detecting dynamics from data* Maharaja's College, Cochin, August 30, 2016; Science Day Lecture, IISER Tirupati, February 28, 2017 • *Characterization and time series* 5th SERC School on Nonlinear Dynamics, PSG college of Technology, Coimbatore, December 1–21, 2016 • *Heterogeneity measure for recurrence networks from chaotic and noisy time series* CNSD, IISER Kolkata, December 16–19, 2016

Sudarshan Ananth

Relating the forces of Nature Conference in Honour of the 80th birthday of Prof. G. Rajasekaran, Chennai Mathematical Institute, Chennai, August 19–20, 2016 • *Plenary Lecture* Beyond the Standard Model in Okinawa 2017, Okinawa Institute of Science and Technology, Japan, March 5–9, 2017

Chaitanya Athale

Advances in Mathematical & Computational Biology (AMCB-2016), IIT Ropar, Punjab, May 21–22, 2016 • *Indo-UK Workshop on Mathematical Ecology*, Chail, May 23–25, 2016 • *Experimental and mathematical approaches to understanding the 'how' of bacterial shape and size* SPPU, Pune, October 21, 2016 • *Biophysical Society USA Satellite International Symposium on Computational and Experimental Studies of Microtubules and Microtubule-Based Motor Proteins*, IIT Bombay, December 14, 2016 • *Why we have five fingers on each hand and self organised morphogenesis* An App Called Math, March 4, 2017 • *National seminar on Recent Trends in Biology*, S.P. Pune University, Pune, March 16, 2017

Baskar Balasubramanyam

Special values of L-functions Mathematics Colloquium, IIT Madras, October 20, 2016 • *π -adic Asai transfer* Theoretical and Computational Aspects of the Birch and Swinnerton–Dyer Conjecture, ICTS Bengaluru, December 12–22, 2016

Anjan Banerjee

ABCDE of reproductive transition in plants Recent Advances in Plant Biotechnology, Ferguson College, Pune, August 22, 2016 • *Mobile RNAs and their implications in plant growth*,

development and in defense 108th Seminar Series of SPPU, Pune, September 17, 2016 • *StBEL11 and StBEL29- the new mobile RNAs that control potato development* All India Cell Biology Meeting, Gwalior, November 18–20, 2016 • *Multitple mobile RNAs are involved in tuber growth and development* Indian Society of Plant Physiology (ISPP), GKVK, Bengaluru, December 9, 2016 (chaired a session); National Symposium on Recent Advances in Modern Biotechnology Dr. D.Y. Patil Institute of Biotechnology, Pune, March 16–17, 2017 • *Mobile RNAs rlay antagonistic functions in potato development* Bose Institute, Kolkata, February 9, 2017 • *Novel role of micro RNAs in potato-Phytorhthora interaction* 38th Annual Meeting of Plant Tissue Culture Association of India, IICB, Kolkata, March 5, 2017 • *Plant cell tissue and organ culture- a powerful tool for plant science research* Gholap College, Pune, March 8, 2017

Argha Banerjee

Modeling Himalayan Cryosphere National Conference on Himalayan Cryosphere (NCHC–2017), IISc, Bengaluru, January 23, 2017 • *Shrinking glaciers in the Himalaya*, NCAOR, Goa, March 3, 2017

Debargha Banerjee

Self-intersection number of relative dualizing sheaves IISER Kolkata, August, 2016; Ramkrishna Mission and Vivekandanda University, Kolkata, December, 2016 • *Torsion points of $J_0(\pi^2)$ and non-holomorphic Eisenstein series* Conference on the Computational Aspects of BSD Conjecture, Bengaluru, December 12–22, 2016

Nabamita Banerjee

The offshell C-mart Stringy stuff workshop, ITF, Utrecht

Bhas Bapat

Orientation effects in ion–molecule collisions 21st National Conference on Atomic and Molecular Physics, Ahmedabad, January 3–6, 2017. *स्मार्ट फोनच्या मागे काय दडले आहे? (What lies behind the Smart Phone?)* Marathi Vidnyaan Parishad, February 17, 2017

Chandrasheel Bhagwat

Number theory SP College Summer School in Mathematics, June, 2016 • *Mathematics lectures* Exciting Science Group, NCL Innovation Park, September–October, 2016 • *Real analysis* Mathematics workshop, Fergusson College, Pune, December, 2016 • *Some interesting problems in mathematics* Ganeet Sarthi Fellowship Program for School Teachers, IISER Pune, December, 2016 • *Inverse and implicit function theorems* Lecture Series, Bhaskaracharya Pratishthan, Pune, February, 2017

Anup Biswas

A class of HJB equations with state constraints and reflection control Conference on Stochastic Control and Related Topics, IIT Bombay, March 11, 2017 • *Risk sensitive ergodic controls* Workshop on Applied Probability, TIFR Mumbai, March 30–April 2, 2017

R. Boomi Shankar

Polar and ferroelectric metal-organic materials supported by amino-P(V) ligands 1st South East Asia Conference on Crystal Engineering (SEACCE), Sri Jayewardenepura University, Colombo, Sri Lanka, September 5–7, 2016 • *Functional metal-organic materials derived from rigid and flexible P-N scaffolds* CSIR–NCL, Pune, October 5, 2016

Harinath Chakrapani

Redox regulation of antibiotic resistance Kaleidoscope: A Discussion Meeting in Chemistry, International Centre, Goa, July 13–17, 2016 • *Small molecule modulators of redox homeostasis to overcome drug resistance* 6th Indo Japanese International Symposium on Overcoming Intractable Diseases Prevalent in Asian Countries, Goa, September 23–24, 2016 • *Site-directed delivery of gasotransmitters* National Conference on Chemistry of Light and Medicine, IIT Gandhinagar, December 8–9, 2016 • *Small molecule tools to understand antibiotic resistance* International Conference on Organic Synthesis (ICOS 21), IIT Bombay, December 11–16, 2016

Apratim Chatterji

Basic notions of soft matter Outreach Talk at Maharashtra Institute of Technology, Pune, September 17, 2016 • *Introduction to microfluidics* GIAN Initiative: Recent Advances in Microfluidics, Biochemical & SAW Sensors For Human Healthcare, University of Mumbai, October 19–23, 2016 • *Origin of spatial organization of DNA-polymer in chromosomes* Comp flu-Hyderabad, Hyderabad, December 12–14, 2016; Soft Matter YIM, Goa, December 17–19, 2017; Mumbai-Pune Soft Matter Meet, BARC Mumbai, January 28, 2017; Stat-Phys-2017, ICTS, Bengaluru, February 17–19, 2017 • *Role of special cross-links in the spatial organization of DNA-polymer* DNA-Physics, BITS Pilani, March 9–11, 2017; Department talk, BHU-Varanasi, March 28, 2017

Srabanti Chaudhury

Probing randomness parameter to study single event statistics using a first passage time distribution Recent Advances in Theoretical Chemistry, IPC, IISc, Bengaluru, July 8–9, 2017 • *Understanding cooperativity and dynamic disorder in fluctuating enzymes at the single molecular level* Inter IISER Chemistry Meet, IISER Bhopal, January 20–22, 2017 • *Non-equilibrium dynamics of polymer translocation under a pulling force* Spectroscopy and Dynamics of Molecules and Clusters, Pondicherry, February 16–19, 2017

Anisa Chorwadwala

An eigenvalue optimisation problem over a family of planar punctured disks where the puncture has a dihedral symmetry Department of Mathematical Sciences, IISER Kolkata, December 12, 2016; The Indian Women and Mathematics Regional Workshop and Career Opportunities, IIT Gandhinagar, December 20–21, 2016; Mathematics and Statistics Department, IIT Kanpur, February 10, 2017 • *A glimpse of the isoperimetric problem* Summer School, IISER Pune, May 30–June 17, 2016; INSPIRE Science Internship Camp 2016, IISER Pune, July 18–22, 2016

Jeetender Chugh

Solution-state NMR Methods to study RNA motional modes critical for gene regulation ICGEB Course on NMR Spectroscopy: Role of NMR Spectroscopy in Structural Biology, Metabolomics and Drug Discovery, ICGEB New Delhi, November 15–26, 2016

Neelesh Dahanukar

Taxonomy matters and GIS based tools for freshwater conservation 7th Student Conference on Conservation Science and Satellite Workshop on Freshwater Fish Conservation: Concepts, Techniques and Strategies, IISc, Bengaluru, September 21–24, 2016 • *Multivariate analysis* Department of Biotechnology, Savitribai Phule Pune University, January 4–5, 2017 • *Games microbes play* Lecture Series on Evolution, Modern College of Arts, Science and Commerce, Shivajinagar, Pune, February 14, 2017

Aloke Das

Weak non-covalent interactions: Strong experimental evidence 9th Asian Photochemistry Conference (APC) 2016, Nanyang Technological University, Singapore, December 4–8, 2016 • *$n\pi^*$ non-covalent interaction: Weak in strength but strong in action* Indo-Japan Discussion Meeting on Frontiers in Molecular Spectroscopy: From Fundamentals to Applications on Material Science and Biology, IIT Kanpur, November 14–16, 2016 • *Probing non-covalent interactions at the molecular level: Gas phase laser spectroscopy and quantum chemistry calculations* Centre for Advanced Functional Materials, IISER Kolkata, December 15, 2016; Department of Biophysics, School of Life Sciences, Manipal University, January 24, 2017 • *Exploring $n\pi^*$ non-covalent interaction* Discussion Meeting on Spectroscopy and Dynamics of Molecules and Clusters, Pondicherry, February 16–19, 2017

Shouvik Datta

How particles team up! - many body physics of excitons in semiconductors National Seminar on Current Topics in Condensed Matter Physics, University of Karnataka, Karnataka, March 27–28, 2017

Sourabh Dube

The smallest pieces of our universe Exciting Science Group Sunday Talk, NCL Innovation Park, Pune, September 25, 2016 • *Experimental particle physics*, DST INSPIRE Camp, Late G.N. Sapkal College of Engineering, Nashik, December 8, 2016 • *Searches with unusual objects jets at LHC*, ICTS, Bengaluru, January 25, 2017

C.V.Dharmadhikari

Fundamentals of Scanning Probe Microscopy: An overview 1st National Workshop Scanning Probe Microscopy Techniques (1st NWSPM), CSIR-NCL, Pune, August 11–13, 2016 • LIGO–India: The road ahead: First Meeting (August 16–18, 2016); Second Meeting (December 19–21, 2016); Third Meeting (March 27–28, 2017), IUCAA, Pune • *Scanning Probe Microscopy in device characterization* UGC–DAE Consortium for Scientific Research, Indore (Faculty Seminar) February 22, 2017

Sanjeev Galande

Beyond human genome: A new perspective towards understanding complex diseases 'Meet A Scientist' Lecture Series as Part of Bharatiya Vidya Bhavan's –Muktangan Exploratory Science Centre (MESCC) Silver Jubilee Year Celebrations, July 24, 2016 • *The art of grantsmanship* Research in Germany –Proposal Writing Workshop, IISER Pune, August 13, 2016 • *Identifying key areas of collaboration and stumbling blocks for astrobiology research in India* Amity Institute of Aerospace Engineering & NASA Spaceward Bound India Program, Amity University, Uttar Pradesh, August 21, 2016 • *Signaling to chromatin: Tale of SATB family genome organizers* IISER Tirupati, September 16, 2016 • *Linking chromatin organization with gene regulation: Tale of a genome organizers* University of Tromsø, Tromsø, Norway, October 24, 2016 • *Functional evolution of SATB family homeodomain proteins* 2nd India Zebrafish Researchers Meeting, Fountainhead Centre, Alibaug, November 2–5, 2016 • *Hydra as a model system for teaching and research* Teacher's Workshop, IISER Pune, November 8, 2016 • *Evolutionary adaptation of transcription factors into Wnt signaling network: Insights into the head organizer in Hydra* XL All India Cell Biology Conference & International Symposium on Functional Genomics and Epigenomics, Jiwaji University, Gwalior, November 17–19, 2016 • *Science and society - Why we need to innovate* Kaveri Research and Innovation Centre, Kaveri College of Arts, Science and Commerce, Pune, October 1, 2016 • *Gene editing technologies - Opportunities & challenges* National Consultation on Genome Editing Technologies: Developing a Policy Framework for India Organized by XV Genetics Congress Trust, NAAS Building, NASC Complex, New Delhi, November 23, 2016 • *From Genome to Epigenome* INSPIRE workshop, Amity University Rajasthan, Jaipur, January 19, 2017 • *Quest for secrets of chromatin: A journey of over 20 years* Ramalingaswami Fellows Conclave (January 6, 2017) and INSPIRE Fellows Meeting (February 4, 2017) IISER Pune • *Gene regulatory networks and dynamic epigenetic regulation in determining eumetazoan body axis* Asian Chromatin, CCMB, Hyderabad, March 2–5, 2017

Aurnab Ghose

Optimising behaviour: Wiring neuronal circuits and functional modulation Indian Academy of Neuroscience (IAN) Lecture, Dept. of Neuroscience, University of Calcutta • *Behavioural modulation by internal states* IIT Kanpur • *Neuropeptides in internal representation of energy states and optimisation of behaviour* Annual Meeting of Society for Neurochemistry India (SNCI): National Conference on Recent Trends in Neurological and Psychiatric Research, CCMB Hyderabad, December 9–11, 2016 • *Cellular mechanics of neurons: A biologist's discovery of the inescapability of biophysics!* Workshop on Driven Soft Matter and Biological Systems, University of Pune, March 11, 2017

Prasenjit Ghosh

Selectivity and reactivity of Pd Rich PdGa surfaces towards selective hydrogenation of acetylene: Interplay of surface roughness and ensemble effect IUMRS–ICYRAM 2016, IISc, Bengaluru, December 11–15, 2016

Sujit Ghosh

Structure-property correlation studies of functional metal-organic frameworks (MOFs) 44th National Seminar on Crystallography, IISER Pune, July, 10–13, 2016 • *Crystalline microporous materials (CMMs) for energy and environmental applications* Frontiers of Organometallic Chemistry–2016 (FOMC 2016), Thiruvananthapuram, Kerala, December 3–6, 2016 • *Materials for energy, industry and environmental applications* Huntsman National Science Day, Huntsman International (India) Pvt. Limited, Mumbai, February 28, 2017

H.N. Gopi

Peptid foldamers: New tools for biomaterials design and medicinal chemistry IISER Kolkata, April 22, 2016; Symposium Nanobiocon, Science City, Kolkata, October 3–4, 2016; Inter-IISER–Chemistry Meet, IISER Bhopal, January 20–22, 2017 • *Circular dichroism spectroscopy of hybrid coiled-coil peptides* Fundamentals and Applications of Biomolecular Spectroscopy Workshop, NIT Patna, October 25–26, 2016 • *Metal mediated peptide synthesis, peptide assembly and water splitting* Symposium on Inorganic Chemical Biology, Madurai Kamraj University, March 17–18, 2017

Anindya Goswami

Pricing derivatives in a regime switching market with time inhomogeneous volatility Indo–UK workshop on Energy Management: Flexibility, Risk and Optimisation, ICMS, Edinburgh, June 9, 2016 • *Pricing derivatives in a regime switching market with time inhomogeneous volatility* Mathematical Finance and Stochastic Analysis Seminar, York University, June 10, 2016 • *Game of rational players* D.Y. Patil Institute of Management, Pune, October 3, 2016 • *Black-Scholes-Merton Theory of Option Pricing* National Workshop on Mathematics in the Arena of Statistics, Presidency University, Kolkata, December 12–16, 2016 • *Risk sensitive portfolio optimization in a jump diffusion model with regimes* Conference on Statistical Methods in Finance, CMI Chennai, December 18–22, 2016 • *Risk sensitive portfolio optimization in a jump diffusion model with regimes* Research seminar, TIFR–CAM Bengaluru, February 3, 2017 • *Recent development in analysis of regime switching market* Conference on Stochastic Control and Related Topics, IIT Bombay, March 11, 2017

Amrita Hazra

Discovery of the genes for the anaerobic biosynthesis of 5,6-dimethylbenzimidazole, the lower ligand of Vitamin B12 Joint BioEnergy Institute, Emeryville, California, May 25, 2016 • *Discovery and enzymology of the anaerobic biosynthesis pathway of the lower ligand of Vitamin B12* Indo–US Conference on Advances in Enzymology: Implications in Health, Diseases and Therapeutics, ACTREC, Navi Mumbai, January 15–19, 2017 • *The tale of two isomers: Regiospecificity in vitamin B12 biosynthesis, Organic molecules: Syntheses and applications* Department of Chemistry, IIT Kharagpur, February 17–18, 2017 • *The Millet Project* Thursday Seminar, Homi Bhabha Center for Science Education, TIFR Mumbai, February 23, 2017

Anirban Hazra

Mechanism of the chemiluminescent reaction between nitric oxide and ozone Symposium 100 years of Chemical Bonding CSIR–ICT, Hyderabad, August 4–5, 2016 • *The general rules governing chemistry* Modern College, Pune, September 17, 2016 • *Photochemicals of 5,6-dihydroxyindole, a building block of eumelanin* School of Chemistry, University of Hyderabad, February 27, 2017 • *The mathematics underlying a chemical reaction* An App Called Math, IISER Pune, March 4, 2017

Partha Hazra

Excited state proton transfer and solvation dynamics inside lipidic lyotropic liquid crystalline phases 12th National Symposium on Radiation and Photochemistry (NSRP–2017), Manipal University, Karnataka, March 2–4, 2016

Srinivas Hotha

Chemical synthesis of large oligosaccharides of mycobacterial origin CARBO–XXXI: An International Conference on New Frontiers in Carbohydrate Chemistry and Biology, University

of Delhi, New Delhi, November 14–16, 2016 • *Gold catalysis for the synthesis of giant mycobacterial oligosaccharides* 21st International Conference on Organic Synthesis (ICOS21), IIT Bombay, December 11–16, 2016; Celebrating 25 Years of Harmony with Organic Chemistry (CYHOC–2016), NIIST, Thiruvananthapuram, December 16–17, 2016

Tressa Jacob

Beauty of nature Ishan Vikas, IISER Pune, December 14, 2016

M. Jeganmohan

Redox-neutral Ruthenium(II) catalyzed C-H bond functionalization reaction Chemical Frontiers 2016, IIT Bombay & ICMS JNCASR, Goa, August 25–28, 2016; *Advances in Organic Synthesis*, Department of Chemistry, NCL Pune, February 14, 2017 • *Ruthenium catalyzed hydroarylation of substituted aromatics with alkynes: An efficient route to trisubstituted alkenes* 53rd ACC 2016, GITAM University, Visakhapatnam, December 28–29, 2016 • *Ruthenium-catalyzed C-H bond functionalization of organic molecules* National Conference on Emerging Trends in Chemistry, St. Joseph's College, Cuddalore, March 2–3, 2017

Mukul Kabir

Predictive materials modeling: Science and innovative technology First Brainstorming Meeting of the National Supercomputing Mission Group on Applications, CDAC Pune, April 28–29, 2016 • *Two-dimensional phosphorene with multi-dimensional promise* thematic Unit of Excellence seminar, S.N. Bose National Center for Basic Sciences, Kolkata, May 27, 2016 • *Phosphorene spintronics: Role of defect-transition metal complexes* IUMRS International Conference of Young Researchers on Advanced Materials, Bengaluru, December 11–15, 2016 • *Intriguing aspects of defect-TM complexes in phosphorene* National Conference of Electron Spectroscopy, Toshali Sands, Puri, December 22–24, 2016 • *DFT to multiscale modeling: understand, predict, and design* Tata Research Development and Design Centre on Materials Modeling, TRDDC Pune, February 6–10, 2017 • *Inducing spin in semiconducting 2D phosphorene* Deutsche Physikalische Gesellschaft Spring Meeting, Dresden, March 19–24, 2017

Tejas Kalelkar

Taut foliations of 3-manifolds Workshop on Geometric Analysis, Metric Geometry and Topology, Institut Fourier Grenoble, France, June 13–30, 2016 • *Taut foliations* International Conference of the Indian Mathematics Consortium and American Mathematical Society, BHU, Varanasi, December 14–17, 2016 • *Shapes of space* Delhi University, New Delhi, February 10, 2017

Siddhesh Kamat

A lipid signaling pathway that controls immune cell extravasation in a human neurological disease Department of Biochemistry, MSU Baroda, October, 2016; iCeMS-NCBS India Alliance Meeting, NCBS Bengaluru, February, 2017

Krishanpal Karmodiya

Plasmodium falciparum epigenome: A distinct dynamic epigenetic regulation of gene expression National Conference on Malaria Parasite Biology: Drug Designing and Vaccine Development, Nirma University, Ahmedabad, September 9–10, 2016 • *Cross-talk among epigenetic modifications, next generation sequencing and epigenomics* CME on Epigenetics – From Genome to Epigenome, Kasturba Medical College, Manipal, October 19, 2016

Saikrishnan Kayarat

Mechanism of a motor-driven endonuclease: Combining structural and single-molecule approaches Gordon Research Conference on Diffraction Methods in Structural Biology, Maine, USA, July 17–22, 2016 • *Mechanism of translocation-coupled endonucleolytic cleavage by restriction-modification enzymes* Annual Meeting of Society of Biological Chemists, CFTRI Mysore, November 21–24, 2016 • *Mechanism of double-strand DNA cleavage by an ATP-dependent endonuclease* Workshop on Structural Proteomics of Macromolecular Complexes

using X-ray crystallography and Mass-spectrophotometry, Regional Centre for Biotechnology, Faridabad, December 18–20, 2016

Raghavendra Kikkeri

Combinatorial glycol-collagen peptides exhibit phenotypic cell migration Carbo-XXXI: 2016 An International Conference on New Frontiers in Carbohydrate Chemistry and Biology, University of Delhi, New Delhi, November 14–16, 2016; Workshop on Recent Applications of Carbohydrates in Chemistry and Biology (RACCB-2017), IIT BHU, Varanasi, February 14–16, 2017

Mayurika Lahiri

N-methyl N-nitrosourea induces golgi dispersal via DNA-PK leading to transformation in breast epithelial cells BARC Mumbai, April 6, 2016 • *A central role for DNA-dependent protein kinases in transformation of breast epithelial cells following DNA damage* International Symposium on Breast Cancer Research, NCCS, Pune, February 27, 2017

Neena Joseph Mani

Predictability of MJO initiation and maritime crossing International Workshop on Intraseasonal Processes and Prediction in the Maritime Continent, Singapore, April 11–13, 2016

Pankaj Mandal

Carrier dynamics in CsPbBr₃ nanocrystals: time-resolved THz study, UFS 2016, BARC Mumbai, November 24–26, 2016 • *Carrier dynamics from time-resolved THz spectroscopy in CsPbBr₃ quantum dots* SDMC-2017, Pondicherry, February 16–19, 2017

Nishad Matange

Fitness, selection and antimicrobial resistance in bacteria Biowaves 2017, St. Xavier's College, Mumbai, January 7, 2017

Manish Mishra

The Bernstein center of supercuspidal blocks Mumbai-Pune Number Theory Seminar, TIFR, Mumbai, September 16–17, 2016

Sunil Mukhi

Extended supersymmetric BMS₃ algebras and their free field realisations TIFR, Mumbai, April, 2016 • *Finite temperature Rényi entropy and modular invariance* Workshop on Holography and Quantum Information, Yukawa Institute of Theoretical Physics, Kyoto, May 23–June 24, 2016 • *The classification of rational conformal field theory in two dimensions* Colloquium, Yukawa Institute of Theoretical Physics, Kyoto, July, 2016 • *Recent developments in rational conformal field theory* Rikkyo University, Tokyo, July, 2016; University of Tokyo, Tokyo, July, 2016; Institute for Physics and Mathematics of the Universe, Kashiwa, Tokyo, July, 2016; Harish-Chandra Research Institute, Allahabad, August, 2016 • *Gravitation, entanglement and correlation: A grand emerging confluence* IISER Pune Monday Seminar, August, 2016 • *String theory as a framework of fundamental physics* Ramakrishna Mission Vidya Mandir, Howrah, September, 2016; Kalyani University, Kalyani, January, 2017 • *The Nobel prize in Physics 2016* IISER Pune, October, 2017; NCCS Pune, December, 2017 • *Conference summary and perspectives* Indian Strings Meeting, IISER Pune, December, 2017 • *Cosets and analogue monsters in rational CFT* ICTS Bengaluru, January, 2017 • *Topology Matters!* Science Day, IUCAA Pune, February, 2017 • *When numbers get serious* An App Called Math, IISER Pune, March 2017 • *Entanglement, replicas and thetas* ICTS Bengaluru, March, 2017; TIFR, Mumbai, March, 2017

Muhammed Musthafa

New trends in rechargeable batteries and proton exchange membrane fuel cells SCION 16, International Conference on Advanced Materials, Amrita University, Coimbatore December 21, 2016 • *Light assisted batteries* National Conference on Light (Optics 17), NIT Calicut, January 9–11 2017 • *Next generation energy storage materials: Challenges and opportunities* Dayanandasagar University, Bengaluru, February 16, 2017 • *Electrochemistry from the*

interface and beyond Karnataka Science and Technology (KSTA) Conference, VSK University March 8–10, 2017 • *Characterization techniques for nanomaterials and lithium ion battery* Siddaganga Institute of Technology, Karnataka, March 11, 2017

Angshuman Nag

TEM for characterizing nanomaterials Refresher Course on Advanced Analytical Techniques, SPPU, Pune, July 11–3, 2016 • *Cesium lead halide perovskite nanocrystals: Beyond CdSe quantum dots* IUMRS–International Conference of Young Researchers on Advanced Materials 2016, IISc, Bengaluru, December 11–15, 2016 • *CsPbX₃ (X = Cl, Br, I) perovskite nanocrystals: Beyond CdSe quantum dots* Conference on Fundamental Processes in Semiconductor Nanocrystals (FQDots16), Berlin, Germany, September 4–6, 2016 • *Defect tolerant cesium lead halide perovskite nanocrystals* Inter-IISER Chemistry Meet 2017, IISER Bhopal, January 20–22, 2017; Mumbai–Pune Semiconductor Meeting, TIFR Mumbai, February 25, 2017

Uttara Naik-Nimbalkar

Load sharing systems: Kernel functions in statistical learning and high-dimensional data analysis UGC–DRS Program Lecture Series, Cochin University of Science & Technology, Kochi, February 1–5, 2017

Sunil Nair

Quantum Solid State Materials Group, National Institute for Material Science Tsukuba, Japan, June 13, 2016 • National Workshop on Condensed Matter Physics in the Last Decade, IIT Kharagpur, February 3–5, 2017 • National Symposium on Technologically Advanced Functional Materials, Central University of Rajasthan, March 16–18, 2017

Rejish Nath

Implementing frustrated magnetism using Rydberg ions/atoms Workshop of Coherent Control of Quantum Systems, OIST, Okinawa, Japan, April 17–21, 2016 • *Ditolar condensates with tilted dipoles* National Conference on Atomic and Molecular Physics–21 (NCAMP–21), Ahmedabad, January 3–6, 2017

A.A. Natu

Catalysis in organic chemistry Homi Bhabha Centre for Science Education, Mumbai, April 2, 2016 • Nature inspired technology Fergusson College, Pune, April 20, 2016 • *Teachers motivation* Orchid Junior College, Pune, June 7, 2017 • *Career guidance* Gaikwad Educational and Social Trust, June 26, 2016 • *How school science can be made attractive* District Science Teachers Association, Pune, July 10, 2016 • *Research proposal workshop* Wadia College, August 13, 2016 • *Applications of flow chemistry* Flow Chemistry of India, IISER Pune, August 27, 2016 • *How Science comes together* S.V. College, September 7, 2016 • *Olympiads* Yashwantrao Chavan Institute of Science, October 1, 2016 • *Satara*, • *Motivation* RMSA, IISER Pune, November 8, 2016; Teachers' Training Camp, November 24, 2016; Inspire Program, S N Joshi College, Pune, November 28, 2016 • *Face to face with scientist* Children's Science Congress, Baramati, December 27, 2016 • *Advances in drug discovery* S.H. Kelkar College, Devgad, December 23, 2017; Indira Institute of Pharmacy, Sadavali, December 27, 2016 • *Interdisciplinary research* Teacher's Academy, Bombay University, May 16, 2016; Baburaoji Gholap College, Pune, October 7, 2016; Homi Bhabha Centre for Science Education, Mumbai, December 22, 2016 • *Chemistry in drug discovery* Global College of Education, Gulbarga, December 18, 2016 • *Plagiarism* North Maharashtra University, Jalagaon, March 31, 2017 • *Opportunities in basic sciences* Wadia College, Pune, May 21, 2016; Orchid School, Pune, August 5, 2016; DST INSPIRE Camp, IISER Pune, November 2, 2016; Global College of Education, Gulbarga, December 18, 2016; S.H. Kelkar High School, Devgad, December 23, 2016; MM School, Wakad, January 12, 2017; Kalsulkar English School, Sawantwadi, January 28, 2017; A.S.D. Topiwala High School, Malvan, January 28, 2017; Kudal High School, Kudal, January 29, 2017; Narsee Monjee International School, Mumbai, March 6, 2017; Strawberry School, Sangamner, March 14, 2017 • *What we learn from nature* Salters Chemistry Camp, IISER Pune, Ishaan Vikas, December 16, 2016; Maharashtra State Teachers Association,

Akkalkot, January 27, 2017; Homi Bhabha Centre for Science Education (HBCSE), Mumbai, February 17, 2017 • *Vision of the new educational institute* organized by Mewar University in New Delhi, February 9, 2017 • *Novel experiments in education* JSPM Institutes, Pune, January 28, 2017 • *Enlarging the science horizon for sustainable future* H.B. Desai College, Pune, January 19, 2017 • *Sustainable growth in education* All India Radio, Pune, March, 2017 • *Score of research areas in India* OROS Radio Station, January, 2017 • *Basic Sciences* Vidya Vikas Academy, Pune, January 16, 2017 • *Learning from nature* Marathi Vidyan Parishad, Garware College, Pune, January 13, 2017

Satishchandra Ogale

Invited Lectures at Materials Chemistry Conference, Thiruvananthapuram, September, 2016; IIT Indore, November, 2016; IUC–CSR Conference November, 2016; Prof. S.N. Behra Memorial Lecture of Orissa Physical Society, December, 2016; DAE SSP Plenary Talk, December, 2016 • Indian Science Congress Keynote, January, 2017 • Shivaji University Conference Talk, February, 2017

Venketeswara Pai

Understanding vākyas through karaṇapaddhati National Seminar on School of Astronomy and Mathematics: Contributions and Contemporary Relevance, Amrita Vishwa Vidyapeetham, Kollam, November 4–5, 2016 • *Yogyādivākyas versus Bhūpādivākyas: Two different ways of obtaining the longitude of Sun* Conference on History Of Mathematical Science (CHMS) 2016, National Institute of Technology Manipur, Imphal, November 18–20, 2016 • *Data decryption and encryption using karaṇapayādi system* Catholicate College, Pathanamthitta, December 1, 2016 • *Development of place value system in India* Department of Physics, Cochin University of Science and Technology (CUSAT), Kochi, December 20, 2016 • *A journey from Pāṇini-sūtras to Mādhava-vākyas* Conference organised by Madhava Gaṇita Kendra, Tharananellur Arts and Science College, Irinjilakkuda, December 23–24, 2016 • *Vallyunasamhāra: A mathematical π used in Indian Astronomy* Mathematics Symposium – Math Day Celebrations, IISER Pune, March 4, 2017

Gayathri Pananghat

Motility driven by bacterial cytoskeleton and its interactors New Horizons in Biology, IISc, Bengaluru, June 16, 2016

Shivprasad Patil

Internal friction in Single molecules One day Workshop on Driven Soft Matter and Biological Systems, University of Pune, March 11, 2017 • *Viscosity of confined water* Complex Fluids, Hyderabad, December 12–14, 2016 • *Viscoelasticity of single proteins* Annual Symposium of Indian Biophysical Society, March 22–25 2017

G.V. Pavan Kumar

Nanowire photonics OSA Students Conference, Physical Research Laboratory, Ahmedabad, October, 2016; Indo–Japan Conference, JSPS, December, 2016 • 3rd International Conference on Emerging Electronics, IIT Bombay, December 27–30, 2016 • *Nanowire photonics: Plasmon- and exciton-polaritons* Asian Seminar Series 2016, University of Tokyo, Japan, December, 2016; Winter School on Advanced Materials, JNCASR, Bengaluru, December 5–9, 2016 • *Nanowire Emission Engineering: Frenkel exciton polaritons* IUMRS, IISc, Bengaluru, December 11–15, 2016 • *Fourier microscopy* SOMS2016, IISc, Bengaluru, July, 2016 • Summer Lecture, Physics Department, SP Pune University, May, 2016 • *Nanophotonics with exciton-polaritons* Physics Department Colloquium, IIT Kanpur, April, 2016

Pramod Pillai

Regulation of interparticle interactions: In search of advanced nanoparticle functions Radiation Laboratory, University of Notre Dame, USA, June 14, 2016; Department of Chemistry, University of North Carolina, USA, June 17, 2016 • *Crafting advanced nanoparticle functions by controlling interparticle interactions* International Conference of Young Researchers in Advanced Materials, IISc, Bengaluru, December 11–15, 2016

Supriya Pisolkar

Arithmetic aspects of locally symmetric spaces Indian Women and Mathematics (IWM) Conference, Hyderabad University, July 13–15, 2016

Shyam Rai

Exploring Indian Himalaya through scattered wave field Department of Earth Science, ETH Zurich, April 29, 2017

Raghav Rajan

Neurobiology of movements: Understanding how the brain controls and produces movements Flame University, Pune, March, 2017

Sudha Rajamani

Nonenzymatic oligomerization of RNA monomers under volcanic geothermal conditions ELSI–EON (ELSI Origins Network) Seminar Series, Earth Life Science Institute (ELSI), Tokyo Institute of Technology, Tokyo, Japan, January 6, 2017 • *What we have learnt from making protocells in the lab* International Biological Engineering Meeting (iBEM 1.0), JNU, New Delhi, March 26–28, 2017

Atikur Rahman

Block copolymer based nanostructures for energy harvesting Department of Physics, TIFR Mumbai, December 14, 2016 • *3D Nano patterning using block copolymer self-assembly* Mumbai–Pune Semiconductor Meeting, TIFR Mumbai, February 25, 2017 • *3D Nano patterning and applications of block copolymer* IIT Ropar, March 22, 2017; IISER Mohali, March 23, 2017 • *Block copolymer self-assembly: 3D nanopatterning and applications* Department of Physics, IISc, Bengaluru, April 7, 2017

B.S.M. Rao

Chaired Keynote Address Session at the 4th International Conference on Advanced Oxidation Processes (AOP–2016), BITS–Pilani, Goa Campus, December 17–20, 2016

Umakant Rapol

Experimental aspects of BEC and Experimental investigation of an atom-optic delta kicked rotor Discussion Meeting on Non–Equilibrium Quantum Many Body Physics, HRI, Allahabad, November 21–25, 2016 • *Subdiffusion and decoherence control in an atom-optic kicked rotator* 21st National Conference on Atomic and Molecular Physics, PRL Ahmedabad, January 3–6 2017 • *Non-exponential decoherence in atom-optic kicked rotor* International Conference on Complex Quantum Systems, BARC Mumbai, February 20–23, 2017 • *Non-exponential decoherence in a lévy kicked atom-optic delta kicked rotor* 10th Joint India–Singapore Physics Symposium, IISc, Bengaluru, February 24–26, 2017

Richa Rikhy

Mitochondria, where they came from and where they take us Biowaves 2017, St. Xavier's College, Mumbai, January 7, 2017; *Recent trends in Biology*, SPPU, Pune, March 16–17, 2017 • *Enlightening morphogenesis and onset of epithelial like architecture in *Drosophila* embryogenesis* Cell Biology and Physics of Morphogenesis, Alibaug, February 28–March 4, 2017

M.S. Santhanam

Introduction to linear and nonlinear time series analysis SERC School on Nonlinear Dynamics, PSG College of Technology, Coimbatore, December 10–14, 2016 • *Sub-diffusion, localisation and decoherence in kicked rotator* CNSD, IISER Kolkata, December 16–19, 2016 • *Sub-diffusion and localisation in a kicked rotor with non-KAM dynamics* International Conference on Complex Quantum Systems, BARC Mumbai, February 20–23, 2017

Kundan Sengupta

Spatial organization of acentric chromosome territories in the interphase nucleus Asia Chromatin Meeting, CCMB Hyderabad, March 2–5, 2017 • *The cell biology of our genomes* National Seminar on Recent Trends in Biology, SPPU, Pune, March 16–17, 2017

L.S. Shashidhara

Growth control in development and disease development: From limbs to miRNAs, EMBL, Heidelberg, Germany, November 3–4, 2016 • *Hox protein ultrabithorax and evolution of insect wing number and morphology* Genetics of Adaptation, NCBS, Bengaluru, November 28 – December 2, 2016 • *From neuroblasts to sensory organs* Conference on Neuroblasts to functional brain: Paving the way to fundamental concepts of neurogenesis, University of Mainz, Germany, March 17–18, 2017

Kaneenika Sinha

Fluctuations in the distribution of Hecke eigenvalues Number Theory Conference on Arithmetic Geometry and L-functions, Kerala School of Mathematics, Kozhikode, August 17–21, 2016

Surjeet Singh

The pyrochlore oxides: From geometrical frustration to interesting topological properties Contemporary Issues in Condensed Matter Systems, IISc, Bengaluru, June 13–15, 2016 • *Defects in quantum spin $\frac{1}{2}$ chains* DAE Solid State Physics Symposium, KIIT University, Bhubaneswar, December 26–30, 2016 • *Spin- $\frac{1}{2}$ impurities in quantum spin $\frac{1}{2}$ chains* Workshop on Physics and Chemistry of Materials, Indian Association for the Cultivation of Science, Kolkata, February 17–18, 2017

Pushkar Sohoni

Building archives: The architectural record Conference Archives in South Asia, Department of South Asia Studies, University of Pennsylvania, February, 2017 • *Non-issuance of coinage: Bahamani successor states and coinage and Temples and mosques: Reading regional construction practices* Deccan Heritage Foundation (India) Mirella Petteni Haggiag Annual Lecture, Hyderabad, January, 2017 • *Material culture in the early modern Deccan* A series of three lectures in Islamic Aesthetics [(i) Palaces and cities of the northern Deccan: Design and function (ii) Symbols and symbolism: Shapes, forms and fashions (iii) The scale of cultural production: From coins to cities] at Jnanapravaha, Mumbai • *Persian-Marathi bilingual inscriptions* 17th International Conference on Maharashtra: Language and Power, University of Chicago Center, New Delhi, January 2017 • *Collection, development and management: Physical collections in a digital world* LIFE 2017: National Conference on Library Innovations for Excellence, IISER Pune, February, 2017

S.G. Srivatsan

Switchable nucleolinid supramolecular assemblies based on fluorescent nucleoside analogs 8th Indo-German Frontiers of Engineering Symposium (INDOGFOE), Potsdam, Berlin, Germany, May 19–22, 2016 • *Functionalized nucleoside toolbox for studying nucleic acid structure and function* Goethe University Frankfurt, Germany, July 18, 2016; Georg-August-Universität Göttingen, Germany, July 21, 2016; Westfälische Wilhelms-Universität Münster, Germany, July 28, 2016 • *Fluorescent nucleoside probes for studying nucleic acid structure and function* Fundamentals and Application in Biomolecular Spectroscopy, NIT Patna, October 25–26, 2016 • *Multifunctional nucleoside analogs for probing nucleic acid structure and function* 21st International Conference on Organic Synthesis (ICOS 21), IIT Bombay, December 11–16, 2016

N.K. Subhedar

Introduction to neuroanatomy course, JNCASR, Bengaluru, September 11–15, 2016 • *How to apply for research funding*, AISSMS College of Pharmacy, Pune, January 31, 2017 • *Neuropeptide CART modulates reward seeking behaviour in rat* Indo-US Workshop &

International Symposium on Biological Timing and Health Issues in the 21st Century, University of Delhi, New Delhi, February 21–24, 2017

Prasad Subramanian

Living with our star, the Sun Colloquium at the Physics Department, IISc, Bengaluru, March 31, 2017

Gyana Ranjan Tripathy

Rise of atmospheric oxygen level Gandhi Public School, Gunupur, Odisha, April 7, 2016 (Popular Lecture)

Arun Venkatnathan

Computer simulations of soft materials for energy conversion and storage Temple University, Philadelphia, USA, August 25, 2016 • *Computational investigation of ionic liquids for CO₂ absorption* The Theoretical Chemistry Symposium (TCS) 2016, University of Hyderabad, December 14–17, 2016 • *Why and what is quantum mechanics?* Modern College of Arts, Science and Commerce Pune, February 18, 2017 • *Computational simulation of CO₂ absorption in ionic liquids* ICCON 2017, Sri Sathya Sai Institute of Higher Learning, Prasanthi Nilayam, Andhra Pradesh, March 10–12, 2017



Contributed Talks and Poster Presentations

G. Ambika

Kajari Gupta and G. Ambika *Dynamics of slow and fast systems on complex networks*; Kashyap G. and Ambika G. *Generation of directed scale-free networks with tunable clustering and degree correlations*; Sandip V. George, G. Ambika and R. Misra *Detecting dynamical states using bicoherence function* presented in CNSD, IISER Kolkata, December 16–19, 2016

Chaitanya Athale

Khetan N. and Athale C.A., EMBO Symposium Microtubules: From Atoms to Complex Systems, EMBL Heidelberg, Germany May 29– June 1, 2016 • Kunalika Jain and Neha Khetan, International Symposium: Computational and Experimental Studies of Microtubules and Microtubule based Motor Proteins, IIT Bombay, December 14, 2016 • Neha Khetan* *Collective motility of multiple asters in simulations* Emergence and evolution of biological complexity: From the Origins of Life to Multicellularity, NCBS, Bengaluru, February 4–6, 2017 • Chaphalkar A.R.* *Kymography*; Neha Khetan* *Diffusion search simulator*; and Kunalika Jain* *Dynein driven collective motility* TIFR Mumbai, March 28, 2017

Nirmalya Ballav

Shammi Rana, Ranguwar Rajendra, Barun Dhara, Plawan Kumar Jha, and Nirmalya Ballav *Highly hydrophobic and chemically rectifiable surface anchored metal-organic thin-film devices* National Conference on Material Science and Technology (NCMST)–NIIST Thiruvananthapuram, June 12–14, 2016 • Shammi Rana, Anupam Prasoon, Plawan Kumar Jha, and Nirmalya Ballav *Sacrificial liquid-phase heteroepitaxy: A new approach to grow semiconducting metal-organic thin-films* Mumbai–Pune Semiconductor Meeting, TIFR Mumbai, March 25, 2017

Anjan Banerjee

Amit Kumar*, Kirti Kumar Kondhare and Anjan K. Banerjee *Investigating the function of polycomb group proteins in potato development*; Boominathan M.*, Vyankatesh R., Sukanya J. and Anjan K. Banerjee *Molecular approaches to identify the factor regulating gametophore development in moss (*Physcomitrella patens*)*; Bhavani N*., Prajakta G., Harpreet S.K., Aarty, Sundaresan J., Thulasiram, H.V. and Anjan K. Banerjee *miRNA160 in systematic acquired resistance (SAR)*; and Devani Ravi S*., Sinha S. and Anjan K. Banerjee *De novo transcriptome assembly from *Coccinia grandis* flower buds and identification of sex-linked genes* Biologist's Conclave, IISER Pune, August 5–6, 2016

Argha Banerjee

Sourav Laha*, Reshma Kumari and Argha Banerjee *Study of thermal conductivity of surraglacial debris layer at Hamtah glacier* (Talk); Sunil Shah*, Tushar Sharma, Argha Banerjee, H.C. Nainwal and R. Shankar *Mass balance and flow studies on debris covered Satorpanth glacier central Himalaya, Uttarakhand* (Talk); Aditya Mishra*, B.D.S. Negi, Argha Banerjee, R. Shankar and H.C. Nainwal *Preliminary results on estimation of ice thickness of Satorpanth glacier, central garhwal Himalaya, Uttarakhand using ground penetrating radar* (Talk); and Reshama Kumari* and Argha Banerjee *Climate signal from recent moraines in the Chandra-Bhaga catchments, the western Himalaya* National Conference on Himalayan Cryosphere (NCHC–2017), IISc, Bengaluru, January 23, 2017

Nabamita Banerjee

Turmoli Neogi *Free field realisations of (super) BMS₃ algebras* ISM, 2017

Deepak Barua

Eco-Evo feedbacks in plant communities, foundations of evolutionary biology: The ongoing synthesis Coorg, February, 2017

R. Boomi Shankar

A.K. Srivastava* and R. Boomishankar *Effect of guest cations on the ferroelectric polarization attributes of supramolecular metal-organic cavitand* Inter-IISER Chemistry Meet, IISER Bhopal, January 20–22, 2017 (Talk) • A.K. Srivastava, P. Divya, B. Praveenkumar and R. Boomishankar *Tuning ferroelectric responses in 1D- and 2D- {Cu^{II}L₂}_n assemblies derived from ditopic phosphoramidate ligands* 2016 IEEE ISAF/ECAPD/PFM Conference, Technische Universität Darmstadt, Germany, August 21–25, 2016 • A. Yadav, P. Divya, A.K. Srivastava, A. Steiner, B. Praveenkumar, and R. Boomishankar *Anion induced potentially high ferroelectric polarization in a luminescent [Zn₆L₆]¹²⁺ octahedral cage*; A.K. Srivastava, P. Divya, B. Praveenkumar and R. Boomishankar *Potential ferroelectric response in {Cu^{II}L₂}_n assemblies derived from pyridyl-functionalized flexible amino-P(V) ligands* 44th National Seminar on Crystallography, IISER Pune, July 10–13, 2016 (Awarded the best poster prize)

Harinath Chakrapani

Small molecule modulators of hydrogen sulfide reveal a key role for this gas in bacterial drug resistance EMBO Conference on Bacterial Morphogenesis, Survival and Virulence: Regulation in 4D, Thiruvananthapuram, November 27–December 1, 2016

Apratim Chatterji

Sk. Mubeena* *Hierarchical self assembly: Self organization of nanoparticles in a matrix of self-assembled polymeric chains* International Conference on Soft Materials, Jaipur, December 12–16, 2016 • Tejal Agarwal* *Origin of spatial organization of DNA-polymer in chromosomes* International Conference on Soft Materials, Jaipur, December 12–16, 2016; Mumbai–Pune Soft Matter Meeting, BARC, January 28, 2017

Srabanti Chaudhury

Bappa Ghosh* and Srabanti Chaudhury *End-tipped polymer translocation through a pore*; and Divya Singh* and Srabanti Chaudhury *Quantification of size-dependent catalytic activity of metal nanoparticle at the single molecule level* Theoretical Chemistry Symposium, University of Hyderabad, December 14–17, 2016

Jeetender Chugh

Harshad Paithankar*, Pankaj Jadhav, Amit Naglekar, Shilpy Sharma and Jeetender Chugh *Dynamics of double stranded RNA binding domain1 (dsRBD1) of TRBP*; Saleem Yousef*, Arshad Rizvi, Sharmistha Banerjee and Jeetender Chugh *Mapping metabolic perturbations in Mycobacterium smegmatis in response to different stress conditions using NMR spectroscopy*; Sarita Tripathi*, Himani Rawat, Shilpy Sharma and Jeetender Chugh *Optimization of conditions of Smad3-MH1 protein preparation and purification for NMR Studies* Asia Pacific NMR Symposium, IISc, Bengaluru, February 16–19, 2017

Aloke Das

Singh S.K.* *Direct spectroscopic evidence for an n π μ * interaction*, ACS on Campus, IISER Pune, January 18, 2017 (Talk) • Mishra, K.K.*, Singh, S.K., Ghosh, P., Ghosh, D. and Das, A. *Why selenium forms strong hydrogen bond?* Discussion Meeting on Spectroscopy and Dynamics of Molecules and Clusters, Pondicherry, February 16–19, 2017

Shouvik Datta

Amit Bhunia*, Mohamed Henini and Shouvik Datta *Selective probing of photo generated, bias driven, spatially delocalized inverted dipoles of indirect excitons in GaAs/AlAs/GaAs single barrier π -i-n structure using photocapacitance at room temperature*; Dipti* and Shouvik Datta

Fabrication of optical microcavities to study the physics of polaritons; and Vineet Kumar Pandey*, Gautam Sharma*, Shouvik Datta and Prasenjit Ghosh *Structure and electronic properties of Pbl2 and Bil3 monolayers: A first principles investigations* 3rd Mumbai-Pune Semiconductor Meeting, TIFR Mumbai, February 25, 2017

Sourabh Dube

Kunal Kotheekar*, Shubhanshu Chauhan, Angira Rastogi, Anshul Kapoor and Sourabh Dube *Probing BSM physics with multileptons* CMS Week, TIFR Mumbai, November 14–18, 2016 • Shubhanshu Chauhan *BSM physics with leptons* Pune–Mumbai Collider Meet, IISER Pune, December 3–4, 2016 (Talk) • Anshul Kapoor*, Angira Rastogi, Sourabh Dube and Sezen Sekmen *Recent developments in FastSim at CMS DAE-HEP Symposium*, University of Delhi, New Delhi, December 12–16, 2016 (Talk) • Shubhanshu Chauhan *Standard model and beyond* Vardhman College, Bijnor, December 22, 2016 (Talk) • Anshul Kapoor, *Tracing charged particles* CMS Chai Pehle Charcha, IISER Pune, February 10, 2017 (Talk) • Anshul Kapoor *Recent developments in FastSim tracking* FastSim Days, Fermilab, USA, February 13–15, 2017 [presented over video] (Talk) • Kunal Kotheekar *Search for type III see-saw mechanism in multilepton final state* (Talk); and Shubhanshu Chauhan *Data driven backgrounds for multilepton final states* (Talk), India–CMS Meeting, IISER Pune, February 18–19, 2017 • Anshul Kapoor *Recent developments in FastSim tracking* India–CMS meeting, IISER Pune, February 18–19, 2017 (Talk) • Shubhanshu Chauhan *Search for type III seesaw mechanism in multilepton final states* Approval talk in CMS EXO meeting, CERN, Switzerland, March 8, 2017 [presented over video] (Talk). In addition, graduate student Kunal Kotheekar is an active contributor in the Exciting Science Group, and gave multiple outreach talks on “Introduction to HEP” to MNC schools in January 2017.

Sanjeev Galande

Indumathi Patta*, Girdhari Lal, Sanjeev Galande *Role of chromatin organizer SATB1 during development of regulatory T cells* 43rd Scandinavian Society for Immunology meeting, University of Turku, Turku, Finland, May 10–13, 2016 • Khare S.P. *, Patta I., Reddy P.C., Sathe A. and Sanjeev Galande *Role of cytokine signaling in regulation of Satb1 expression via alternative promoters during T-helper cell differentiation* 11th Asian Epigenomics Meeting, JNCASR, Bengaluru, September 30–October 1, 2016 • Reddy P.C. Ubhe S., Gungi A., Kolte A., Habib F., Pradhan S. and Sanjeev Galande* *Transcription factors and chromatin modifiers determining primitive eumetazoan body axis* Epigenetics in Development Conference, Institute of Molecular Biology, Mainz, Germany, October 20–22, 2016 • Saurabh J. Pradhan*, Michael Smutny, Keisuke Sako, Ojas Deshpande, Mahendra Sonawane, Carl-Phillip Heisenberg and Sanjeev Galande *Role of chromatin organizer SATB2 in cell fate determination during early embryogenesis in Danio rerio* 2nd India Zebrafish Reserachers Meeting, Fountainhead Centre, Alibaug, November 2–5, 2016 • P. Chandramouli Reddy, Suyog Ubhe, Akhila Gungi* Amol Kolte, Farhat Habib, Saurabh J. Pradhan and Sanjeev Galande *Transcription factors and chromatin modifiers determining primitive eumetazoan body axis*; and Suyash Naik, Manu K. Unni, P.C. Reddy, Arpita Roychoudhury, Shivprasad Patil and Sanjeev Galande *Evolution of directed movements in multicellular animals - Stiffness gradient helps hydra in taking the baby steps* (Talk), National Research Scholar's Meet (NRSM) 2016, ACTREC, Kharghar, December 15–16, 2016 • Khare S.P.*, Patta I., Shetty A., Sathe A.V, Reddy P.C., Chen Z.J., Lahesmaa R. and Sanjeev Galande *Regulation of chromatin organizer SATB1 via alternative promoter usage during T-cell differentiation* 6th Meeting of Asian Forum of Chromosome and Chromatin Biology, CCMB Hyderabad, March 3–5, 2017 (Talk)

Aurnab Ghose

Sampada Mutalik*, Ketakee Ghate, Abhishek Sahasrabudhe and Aurnab Ghose *Fmn2 in regulating filopodial contractility and traction forces in neuronal growth cones* Wilhelm and Else Heraeus Seminar of Neuronal Mechanics, Bad Honnef, Germany, August 17–19, 2016 • Sampada Mutalik*, Ketakee Ghate, Abhishek Sahasrabudhe and Aurnab Ghose *Fmn2 in regulating filopodial contractility and traction forces in neuronal growth cones* Mechanical Forces in Cell Biology: Information at the Cell and Tissue Scale, NCBS, Bengaluru, October 4–6, 2016 • Debia Wakhloo, Tarun Kaniganti, Devika Bodas*, Nishikant Subhedar and Aurnab

Ghose *Neuromodulatory inputs tune excitability of Dm neurons to maintain hunger-satiety bistable states* 2nd Indian Zebrafish Investigators' Meeting, Alibaug, November 2–5, 2016; and Dhriti Nagar* Ratnakar Mishra, Rajan Dasgupta and Aurnab Ghose *Role of Fmn2 in the development of neural circuits in zebrafish* (Talk), 2nd Indian Zebrafish Investigators' Meeting, Alibaug, November 2–5, 2016 • Dhriti Nagar*, Abhishek Sahasrabudhe, Ajesh Jacob, Ratnakar Mishra and Aurnab Ghose *The cytoskeleton regulator Fmn2 has an evolutionary conserved function in the development of midline crossing axonal tracts* 22nd International Congress of Zoology, Okinawa, Japan, November 14–19, 2016 • Sampada Mutalik*, Pramod Pullarkat and Aurnab Ghose *Active mechanics of axons* Biophysics Paschim Meeting, TIFR Mumbai, March 28, 2017 (Talk)

Prasenjit Ghosh

Subrahmanyam Sappati*, Ali Hassanali, Ralph Gebauer and Prasenjit Ghosh *Nuclear quantum effects in an HIV/cancer inhibitor: The case of ellipticine* (Talk); and Nandha Kumar*, Indu Kaul, Debabrata Chattaraj, Chiranjib Majumder and Prasenjit Ghosh *Adsorption, diffusion and growth mechanism of sub-nanometer PdGa clusters on MgO(100) surface* Theoretical Chemistry Symposium, University of Hyderabad, December 14–17, 2016 • Niharika Joshi* and Prasenjit Ghosh *Co-adsorption at the vacancy in graphene as promising single-atom magnetic bit: A density functional theory study*; Aswathi Mohan T. and Prasenjit Ghosh *Ferromagnetic metal to half metal transition in Ti₂C MXene*; Vineet Kumar Pandey*, Gautam Sharma*, Shouvik Datta and Prasenjit Ghosh *Structure and electronic properties of PbI₂ and BiI₃ monolayers: A first-principles investigation* Mumbai-Pune Semiconductor Meet, TIFR Mumbai, February 25, 2017

Sujith Ghosh

Soumya Mukherjee *Influence of tuned linker functionality on modulation of magnetic properties and relaxation dynamics in a family of six isostructural Ln₂ (Ln=Dy, Gd) complexes* Conference on Modern Trends in Molecular Magnets (MTMM-2016), IIT Bombay, May 19–21, 2016 • Soumya Mukherjee *An ultrahydrophobic fluorinated MOF derived recyclable composite as a promising platform to tackle marine oil spills*, 44th National Seminar on Crystallography (NSC-2016), IISER Pune, July 10–13, 2016 • Soumya Mukherjee *Harnessing Lewis acidic open metal sites of metal-organic frameworks: Foremost route to achieve highly selective benzene sorption over cyclohexane*, 6th European Association of Chemical and Materials Societies (EuCheMS) International Congress, FIBES-Seville Conference Centre, Seville, Spain, September 11–15, 2016

Boopathy Gnanaprakasam

Moreshwar B. Chaudhari*, Girish Singh Bisht, Pooja Kumari, and Boopathy Gnanaprakasam *Ruthenium-catalyzed direct α -alkylation of amides using alcohols* 21st International Conference in Organic Synthesis, IIT Bombay, December 11–16, 2016

Anindya Goswami

Milan Kumar Das* *Pricing Derivatives in a Regime Switching Market with Time Inhomogeneous Volatility* Conference on Statistical methods in Finance, CMI Chennai, December 18, 2016

Amrita Hazra

Yamini Mathur and Amrita Hazra* *Investigating anaerobic methylation mechanisms in vitamin B12 biosynthesis* Bacterial Origin, Survival and Virulence: Regulation in 4D, EMBO Conference, Thiruvananthapuram, November 27–December 1, 2016 • Yamini Mathur* and Amrita Hazra *Exploring the mechanistic enzymology of methylation in anaerobic vitamin B12 biosynthesis*; Rupali Sathe* and Amrita Hazra *No oxygen, no problem: Anaerobic hydroxylases in the biosynthesis of ubiquinone* Advances in Enzymology: Implications in Health, Diseases and Therapeutics, Indo-US Conference, ACTREC, Navi Mumbai, January 15–19, 2017

Anirban Hazra

Mahesh Gudem* *Mechanism of nitrogen dioxide chemiluminescence* (Talk); and Avdhoot Datar* *Pathways for nonradiative decay of 5,6-dihydroxyindole: a eumelanin building block* (Talk) at Chemsymphoria-2016, IISER Pune, July 21–22, 2016 (Talk) • Mahesh Gudem*

Theoretical study of the multi-channel mechanism of o-nitrotoluene photo-decay; Meghna Manae* *The unusual photophysics of thiothymines: Effects of site and extent of sulfur substitution*; and Avdhoot Datar* *Theoretical study of nonradiative decay of 5,6-dihydroxyindole, a key eumelanin building block* Theoretical Chemistry Symposium, University of Hyderabad, December 14–17, 2016 • Avdhoot Datar* *Mechanisms for nonradiative decay of 5,6-dihydroxyindole, a key eumelanin building block* Discussion Meeting on Structure and Dynamics of Molecules and Clusters 2017 (SDMC 2017), IISER Pune, February 16–19, 2017

Partha Hazra

Rajkumar Koninti* *Loading of an anti-cancer drug into mesoporous silica nano-channels and its subsequent release to DNA* Inter-IISER chemistry Meet-2017 (IICM 2017), IISER Bhopal, January 20–22, 2017 (Talk)

Srinivas Hotha

Bijoyananda Mishra* and Srinivas Hotha *Discovery and development of alkynyl glycosyl carbonates for the synthesis of glycoconjugates* XII-JNOST Meeting, CSIR-CDRI, Lucknow, November 24–27, 2016 • D.V.S. Datta*, Harsha Gowda* and Srinivas Hotha *Marginally protected alkynyl glycosyl carbonates as glycosyl donors*; Mahesh Neralkar*, Bijoyananda Mishra and Srinivas Hotha *Utility of 1-hydroxybenzotriazoles in the chemistry of saccharides*; Maidul Islam*, Ganesh P. Shinde*, and Srinivas Hotha *Expedient synthesis of heptentacontasaccharide of Mycobacterium tuberculosis cell wall*; Bijoyananda Mishra* and Srinivas Hotha *Discovery and development of alkynyl glycosyl carbonates for the synthesis of glycoconjugates*; and Sandip Pasari*, Sujit Manmode, Gulab Walke and Srinivas Hotha *Synthesis of a branched arabinogalactan motif of Mycobacterium tuberculosis cell surface through gold-catalyzed anomeric activation of stable alkynyl glycosyl carbonates* 21st International Conference on Organic Synthesis, IIT Bombay, December 11–16, 2016

Tressa Jacob

Wnt signalling in zebrafish scale development iZIM – Indian Zebrafish Investigators Meeting, Alibaug, November 2–5, 2016 • *Understanding the role of twist genes in zebrafish scale development* Cell Biology and Physics of Morphogenesis, Alibaug, February 28–March 4, 2017

Krishanpal Karmodiya

Plasmodium falciparum erigenome: A distinct dynamic erigenetic regulation of gene expression Pathogens and Host Response, National Institute of Immunology New Delhi, August 10–12, 2016

Raghavendra Kikkeri

Balamurugan Subramani* *Screening of Neu5Aca (2-6) gal isomer preferences of siglecs with sialic acid microarray* Indo-German Workshop on Recent Applications of Carbohydrates in Chemistry and Biology (RACCB-2017), IIT BHU, Varanasi, February 14–16, 2017 (Best Poster Award)

Saikrishnan Kayarat

80th Harden Conference: Machines on Genes IV, Manchester UK, July 31–August 5, 2016 (Talk)

Shabana Khan

Nasrina Parvin* and Shabana Khan *Comparing nucleophilicity of heavier heteroatomic amidinato-amido tetrelolynes: An experimental and theoretical study* CSIR-IICT 100 years of Chemical Bonding, IICT Hyderabad, August 4–5, 2016

Mayurika Lahiri

Ashiq K.A. and Mayurika Lahiri *PAF stimulation to breast epithelial cells disrupts cell polarity and upregulates EMT*; and Libi Anandi and Mayurika Lahiri *N-methyl N-nitrosourea induces Golgi dispersal via DNA-PK leading to transformation in breast epithelial cells* GRC Mammary Gland Biology: The Mammary Gland in Normal Development and Progression to Cancer, Lucca (Barga), Italy, May 28–June 03, 2016

Neena Joseph Mani

Advancing monsoon weather-climate fidelity in the ncert cfs through improved cloud-radiation-dynamical representation National Monsoon Mission Review meeting, IITM Pune, February 17–18, 2017

Pankaj Mandal

Sohini Sarkar *Carrier Dynamics in CsPbBr₃ perovskite quantum dots in presence of electron and hole acceptors: A time resolved terahertz spectroscopy study* (Talk); and Sohini Sarkar *Dielectric study of alcohols using broadband terahertz time domain spectroscopy (thz-tds)* (Talk), Symposium on Molecular Spectroscopy, University of Illinois campus in Urbana, Illinois, USA, June 20–24, 2016 • Y.G. Reddy *Ultrafast carrier dynamics in colloidal CsPbBr₃ nanocrystals studied by time resolved THz spectroscopy* ChemSymphoria 2016, IISER Pune, July 21–22, 2016 (Talk) • Sneha Banerjee*, Debasis Saha, Sohini Sarkar, Arnab Mukherjee and Pankaj Mandal *Investigating interactions in an azeotrope using ultrafast spectroscopy*; and Y.G. Reddy*, V.K. Ravi, Angshuman Nag and Pankaj Mandal *One and two photon pumped ultrafast carrier dynamics in CsPbBr₃NCs film studied by time resolved THz spectroscopy* UFS-2016, BARC, Mumbai, November 24–26, 2016 • Sneha Banerjee*, Debasis Saha, Sohini Sarkar, Arnab Mukherjee and Pankaj Mandal *Intermolecular interactions in an azeotrope*; and Y.G. Reddy*, V.K. Ravi, Angshuman Nag and Pankaj Mandal *Carrier dynamics in CsPbBr₃ quantum dot film: Comparison between single and two photon pumping* SDMC-2017, Puducherry, February 16–19, 2017

Nishad Matange

Nishad Matange*, Sushmitha Hegde, Aishwarya Venkataravi and Swapnil Bodkhe *Selective enrichment of high-level antibiotic resistance in Escherichia coli: Impact of fitness costs and drug pressure* Young Investigators Meeting, Goa, March 6–9, 2017 • Nishad Matange* *Fitness costs of antimicrobial resistance in bacteria: Linking mechanisms to selection dynamics* DST-INSPIRE Faculty Fellows Meeting, IISER Pune, February 3–4, 2017

Angshuman Nag

Abhishek Swarnkar*, Vikash Kumar Ravi, Ashley R. Marshall, Joseph M. Luther and Angshuman Nag *Colloidal CsPbX₃ perovskite nanocrystals: Excellent luminescence and photovoltaic cell* (Talk); G. Shiva Shanker*, Metikoti Jagadeeswararao, Ganesh B. Markad and Angshuman Nag *Colloidal N-doped Graphene (NG) - TiN nanocomposite for plasmonics and electrocatalytic applications*; and Metikoti Jagadeeswararao*, Kiran P. Kadlag, Padmashri Patil, Souvik Dutta and Angshuman Nag *Colloidal, ligand-free semiconductor nanocrystals for optoelectronics* Young Scientist Colloquium 2016, S.N. Bose National Centre For Basic Sciences, Kolkata, September 16, 2016 • Abhishek Swarnkar*, Vikash Kumar Ravi, Ashley R. Marshall, Joseph M. Luther and Angshuman Nag *Luminescence and solar cell from colloidal cesium lead halide perovskite nanocrystals* ACS on Campus, IISER Pune, January 18, 2017 (Talk) • G. Shiva Shanker*, Ganesh B. Markad, Metikoti Jagadeeswararao and Angshuman Nag *Colloidal nanocomposite of TiN and N-doped few-layer graphene for plasmonics and electrocatalysis*; and Metikoti Jagadeeswararao*, Abhishek Swarnkar, Ganesh B. Markad and Angshuman Nag *Defect-Mediated electron-hole separation in colloidal Ag₂S-AgInS₂ heterodimer nanocrystal tailoring luminescence and solar cell properties* Mumbai Pune Semiconductor Meeting-2017, TIFR Mumbai, February 25, 2017 • Abhishek Swarnkar*, Ashley R. Marshall, Erin M. Sanhira, Vikash Kumar Ravi, Joseph M. Luther and Angshuman Nag *Luminescence and solar cell from colloidal cesium lead halide perovskite nanocrystals* NanoIndia-2017, IIT Delhi, March 15–16, 2017

Sunil Nair

S. Panja, 9th ILL Annual Full Prof School, Grenoble, France, May 9–14, 2016 and 44th National Seminar on Crystallography, IISER Pune, July 10–13, 2016

Rejish Nath

Yashwant Chougale, Supriti Ghorui, Jugal Talukdar, Ankita Niranjani, Sagarika Basak and Rejish Nath *Rydberg gas*; and Chinmayee Mishra, Banibrata Chakrabarty, Kartik Maurya and

Rejish Nath *Dipolar Bose gas* Workshop on Recent Trends in Cold Atoms Physics, IISER Pune, May 16–17, 2016 • Sagarika Basak, Ankita Niranjana and Rejish Nath *Atomic Interactions in 4 levels Rydberg EIT scheme* Okinawa School in Physics: Coherent Quantum dynamics at OIST, Okinawa, Japan

Venketeswara Pai

Star catalogue from texts on Indian astronomy XXXIV Meeting of Astronomical Society of India, Kashmir University, Srinagar, May 10–13, 2016 • *Candravākyas: An intermediate numerical table to compute the longitude of moon* Pre-Conference Workshop, ICOA-9; *Yogyādivākyas: A simpler and interesting way to obtain the longitude of Sun* IX; B.S. Shylaja *Observational records of stars in Indian texts* IX International Conference on Oriental Astronomy (ICOA-9), IISER Pune, November 15–18, 2016

Gayathri Pananghat

Spatial positioning of Myxococcus xanthus motility complexes: Towards a molecular mechanism (Talk); Jyoti Baranwal*, Priyanka Rajendra Gade and Gayathri Pananghat, *Biochemical and structural characterization of Myxococcus xanthus MglA and MglB proteins involved in polarity determination and positioning of motility complexes*; and Shrikant Harne*, Mrinmayee Bapat, Rajnandani Kashyap and Gayathri Pananghat *Structural characterization of Fibril, a novel cytoskeletal protein from Striortlasma* EMBO Conference on Bacterial Morphogenesis, Survival and Virulence: Regulation in 3D, Thiruvananthapuram, November 27–December 1, 2016

Shivprasad Patil

Saurabh Talele*, Shatruhansingh Rajput and Shivprasad Patil *Small amplitude AFM: Understanding mechanical unfolding of proteins via direct linear measurements*; and Arpita Roychoudhury and Shivprasad Patil* *The direct and simultaneous measurement of local stiffness and damping in a single unfolding protein* International Symposium on Protein Folding and Dynamics, NCBS, Bengaluru, November 8–11, 2016 • *Complex Fluids*, Hyderabad, December 12–14, 2016 • *Amandeep Shear properties of water under nanoconfinement* Mumbai–Pune Soft Matter Meeting, BARC, January 28, 2017

G.V. Pavan Kumar

Plasmonic nanotriangle Photonics 2016, IIT Kanpur, December 4–8, 2016 • *Fourier plane imaging of nanowires* Complex Photonics 2017, TIFR Mumbai, January 20–22, 2017

Pramod Pillai

Anish Rao and Pramod Pillai* *Coding nanoparticle functionalities by tuning the nanoscale forces* Gordon Research Conference on Noble Metal Nanoparticles, Mount Holyoke College, Boston, USA, June 19–25, 2016 • Anish Rao, Gayathri Devatha and Pramod Pillai* *Controlling the nanoscale forces to improve and impart newer* Thomas Endowment International Symposium on New Trends in Applied Chemistry, Sacred Heart College, Kochi, February 9–11, 2017

Shyam Rai

Gokul Kumar Saha, Shyam S. Rai *3-D Shear velocity image of crust and uppermost mantle beneath the India-Tibet and the adjoining Indian ocean from ambient noise* EGU General Assembly Conference, Vienna, April 23–28, 2017

Sudha Rajamani

Chaitanya Mungi* and Sudha Rajamani *Synthesis of informational molecules under simple prebiotic conditions* Young Researcher's Day for Earth Life Science, Earth Life Science Institute (ELSI), Tokyo Institute of Technology, Tokyo, Japan, January 10, 2017; and 5th ELSI International Symposium, Kurumae Hall, Tokyo Institute of Technology, Tokyo, Japan, January 11–13, 2017 • Manesh Joshi* and Sudha Rajamani *Testing the formation and stability of protocellular vesicular systems in prebiotically relevant scenarios*; Niraja Bapat* and Sudha Rajamani *Effect of presence of co-solutes on enzyme-free copying reactions* (Talk); and Niraja

Bapat* and Sudha Rajamani *Effect of presence of co-solutes on enzyme-free template-directed primer extension reactions* Discussion Meeting on the Emergence and Evolution of Biological Complexity, NCBS, Bengaluru, February 4–6, 2017

Raghav Rajan

Introductory notes: A way to start up the songbird brain or just a reflection of the songbird brain starting up Computational Approaches to Memory and Plasticity (CAMP) 2017, NCBS, Bengaluru, July 2016 (Talk) • *How does the brain initiate learned motor sequences: Lessons from a songbird* Institute of Mathematical Sciences (IMSc), Chennai, December 2016 (Talk)

Richa Rikhy

Swati Sharma, *Role of Bar domain protein GRAF in contractile ring function in Drosophila embryogenesis*; and Bipasha Dey *Role of Bazooka, Peanut and Cadherin in mediating polarized protein distribution and architecture in the syncytial Drosophila embryo* Bengaluru Microscopy Course, NCBS, Bengaluru, September 18–25, 2016 • Bipasha Dey *Analysis of onset of polarity in syncytial Drosophila blastoderm embryo*; Sayali Chowdhary *Role of mitochondrial morphology and dynamics in Drosophila embryogenesis*; and Sameer Thukral *Probing cytoplasmic compartmentalization in Drosophila early embryo syncytium* Cell Biology and Physics of Morphogenesis, Alibaug, February 28–March 4, 2017 • Darshika Tomer *Ras/ERK dependent increase in mitochondrial membrane potential in fission deficient Drosophila follicle cells leads to loss of differentiation* Keystone Meeting on Mitochondrial Dynamics, Colorado USA, April 3–7, 2017

M.S. Santhanam

Sanku Paul, Sai Harshini Tekur* and Udaysinh Bhosale *Spectral Statistics for localized states with their nearest neighbours in Quantum Chaos* Conference on Nonlinear Dynamics, IISER Kolkata, December 16–19, 2016; and at International Conference on Complex Quantum Systems, BARC Mumbai, February 20–23, 2017 • Sanku Paul*, Sai Harshini Tekur and Udaysinh Bhosale *Classical subdiffusion and quantum localization in chaotic Hamiltonian system* Conference on Nonlinear Dynamics, IISER Kolkata, December 16–19, 2016 • Sanku Paul*, Sai Harshini Tekur and Udaysinh Bhosale *Classical subdiffusion and quantum localisation in non-KAM system* International Conference on Complex Quantum Systems, BARC Mumbai, February 20–23, 2017 (Talk) • Udaysinh Bhosale* *Signatures of bifurcation on quantum correlations: Case of quantum kicked top* Young Quantum 2017, Harishchandra Research Institute, Allahabad, February 27–March 1, 2017

Kundan Sengupta

Labade A.S., Karmodiya K. and Kundan Sengupta *Nurr93 sub-complex regulates HOXA gene expression*; Maithilee Khot and Kundan Sengupta *Nuclear structure-function relationships during epithelial to mesenchymal transitions (EMT)*; Gaurav Joshi, Ayantika Sengupta and Kundan Sengupta *Role of Lamin B2 in ribosomal DNA organization*; Ayantika Sengupta and Kundan Sengupta *Lamin B2 regulates nucleolar morphology & RNA expression levels in colorectal cancer cells*; Shalaka Patil and Kundan Sengupta *Role of Lamin B Receptor in establishment of genome organization*; Roopali Pradhan, Devika Ranade and Kundan Sengupta *Chromosome territories are repositioned on softer extracellular matrices in a lamin dependent manner*; and Devika Ranade, Shivsmriti Koul, Joyce Thompson, Kumar *Lamin B2 regulates spatial organization of aneuploid chromosome 6th* meeting of Asian forum of Chromosome and Chromatin Biology, CCMB Hyderabad, March 3–5, 2017

Seema Sharma

Aditee Rane *et al. Developments in fast simulation of hadronic showers and tracking at CMS*; Vinay Hedge *Ratio of short to long energy in hadron forward calorimeter*; Prachi Atmasiddha *Search for compressed scalar top quark pairs in $\pi\pi$ collisions at $\sqrt{s} = 13$ TeV using ISR tagging*; Irene Dutta *Search for vector-like T' quark in the dilepton and multi-jet final in $\pi\pi$ collisions at $\sqrt{s} = 13$ TeV CMS* International Collaboration Meeting, TIFR Mumbai, November 14–18, 2016 • Aditee Rane *Searching for SUSY with multijets and missing transverse momentum* XXII DAE–BRNS High Energy Physics Symposium 2016, University of Delhi, December 12–16, 2016 (Talk)

Surjeet Singh

Luminita Harnagea*, Giriz Mani, Prachi Telang and Surjeet Singh *Single Crystal growth, structural and physical characterization of novel superconductors and topological insulators*; and Prachi Telang*, Kshiti Mishra and Surjeet Singh *Anomalous volume collapse in pyrochlore iridates $\text{Eu}_2\text{Ir}_2\text{O}_7$, upon isovalent doping of Bi at the Eu site* 44th National Seminar on Crystallography, IISER Pune, July 10–13, 2016 • Rabindranath Bag*, Koushik Karmakar and Surjeet Singh *Single crystal growth and properties of spin ladders: A new class of low-dimensional magnets* International Conference of Young Researchers on Advanced Materials, International Union of Materials Research Society of India IISc, Bengaluru, December 11–15, 2016 • Rabindranath Bag* and Surjeet Singh *Magnetic phase transition in HoFeO_3 single crystal grown by optical floating-zone method* 61st DAE Solid State Physics Symposium, KIIT University, Bhubaneswar, December 26–30, 2016 • Rabindranath Bag*, Koushik Karmakar and Surjeet Singh *Single crystal growth and properties of spin ladders: A new class of low-dimensional magnets* Indo-US Bilateral Workshop on Physics and Chemistry of Oxides: Theory meets Experiment, S.N. Bose National Centre of Basic Sciences, Kolkata, January 3–5, 2017 • Luminita Harnagea*, Giriz Mani and Surjeet Singh *Doping effect of Mn impurities on the physical properties of optimally electron doped $\text{Sr}(\text{Fe}_{0.88}\text{Co}_{0.12})_2\text{As}_2$* Deutsche Physikalische Gesellschaft-Frühjahrstagung (Spring Meeting), Dresden, March 19–24, 2017

S.G. Srivatsan

Nuthanakanti A.,* Boerneke M.A., Hermann T. and Srivatsan S.G. *Structure of the ribosomal decoding site RNA containing a ^{35}S modified responsive fluorescent ribonucleoside probe* 44th National Seminar on Crystallography, IISER Pune, July 10–13, 2016 • Manna S. * and Srivatsan S.G. *Two-in-one nucleoside probe for studying the topology of human telomeric DNA in cell-free and cellular environment*; Nuthanakanti A. *, Boerneke M.A., Hermann T. and Srivatsan S.G. *Structure of the ribosomal decoding site RNA containing a ^{35}S modified responsive fluorescent ribonucleoside probe*; and Sabale P.M. * and Srivatsan S.G. *Synthesis of telomere targeting PNA oligomer probes by using bioorthogonal chemical reactions* 21st International Conference on Organic Synthesis (ICOS 21), IIT Bombay, December 11–16, 2016

Prasad Subramanian

Nishtha Sachdeva, Prasad Subramanian, Angelos Vourlidis and Volker Bothmer *CME dynamics: Relative importance of Lorentz forces and solar wind drag* (Best Poster Award); and Tomlin James, Prasad Subramanian and Eduard Kontar *Energetics of small electron acceleration episodes in the solar corona* (Talk), 35th Annual Meeting of the Astronomical Society of India, Jaipur, March 6–10, 2017

Pinaki Talukdar

Saha T.,* Hossain M.S., Saha D., Lahiri M. and Talukdar. P. *Chloride-mediated apoptosis-inducing activity of bis(sulfonamide) anionophores* Gordon Research Conference on Biointerface Science, Les Diablerets Conference Centre, Switzerland, June 12–17, 2016 • Shinde, S.V.*. and Talukdar P. *A dimeric bis(melamine)-Substituted bistidine for efficient transmembrane H^+/Cl^- cotransport* National Conference on Advanced Organic Synthesis (AOS 2016), CSIR-NCL, Pune, February 14, 2017

Arun Venkatanathan

Praveen Kumar* *Atomistic behavior of ionic liquid* ChemDay 2016, IISER Pune, July 7, 2016 (Talk) • Prabhat Prakash and Arun Venkatanathan *Molecular modeling of CO_2 absorption in amino acid ionic liquids* TCS 2016, University of Hyderabad, December 14–17, 2016 • Prabhat Prakash* *Molecular modeling of CO_2 absorption in Amino Acid Ionic Liquid* ACS on Campus, IISER Pune, January 18, 2017 (Talk) • Prabhat Prakash *Molecular Modeling of CO_2 capture in amino acid ionic liquids: Effect of hydration* Mumbai–Pune Soft Matter Meeting, BARC, January 28, 2017



Academic Events Organized

Chaitanya Athale

National Network on Mathematical and Computational Biology (NNMCB) Discussion Meeting on Mathematical Modeling of Natural and Synthetic Genetic Networks: Towards Predictive Engineering of Biological Systems, Lonavala, March 18–19, 2017

Anjan Banerjee

DST-INSPIRE Faculty Monitoring cum Interaction Meeting, IISER Pune, February 3–4, 2017

Debargha Banerjee

Pune–Mumbai Number Theory Seminar, TIFR, Mumbai, September 16–17, 2016

Sudipta Basu

6th Annual DBT–Ramalingaswami Fellows' Conclave, IISER Pune, January 4–6, 2017

Chandrasheel Bhagwat

Member of Organizing Committee, Automorphic Forms on Metaplectic Groups and Related Topics, IISER Pune, July 4–9, 2016 • Member of Organizing Committee, Mathematics Symposium, August 11–12, 2016

R. Boomi Shankar

National Program Committee Member and Local Organizing Committee Member, 44th National Seminar on Crystallography, IISER Pune, July 10–13, 2016

Sourabh Dube

Co-organizer, Pune–Mumbai Collider Meet, IISER Pune, December 3–4, 2016 • Co-organizer, India–CMS Collaboration Meeting, IISER Pune, February 18–19, 2017 • Co-organizer India–HGCAL Meeting, IISER Pune, March 22, 2017 • Coordinator, Kutuhall 2017, Pune, January 7, 2017

Anisa Chorwadwala

Convener and on the Scientific Committee for “Indian Women and Mathematics Regional Workshop and Career Opportunities” held at IIT Gandhinagar, December 20–21, 2016

Sanjeev Galande

Workshop on Genome Engineering in Model Organisms, IISER Pune, June 28–29, 2016

Prasenjit Ghosh

Co-organizer, Computational Material Science sub-topic of the IUMRS–ICYRAM 2016, IISc, Bengaluru, December 11–15, 2016

Boopathy Gnanaprakasam

Third Flow Chemistry Symposium and Workshop, IISER Pune, August 27, 2016

Anindya Goswami

Half-day Symposium on Applied Probability and Statistics, IISER Pune, November 23, 2016

Amrita Hazra

Co-organizer, 6th Annual DBT–Ramalingaswami Fellows' Conclave, IISER Pune, January 4–6, 2017

Mukul Kabir

Materials Modeling workshop, TRDDC Pune, February 6–10, 2017

Saikrishnan Kayarat

Co-organizer, 44th National Seminar on Crystallography, IISER Pune, July 10–13, 2016

Gyana Ranjan Tripathy

Samiksha-2016, IISER Pune, September 20, 2016

Sunil Mukhi

Indian Strings Meeting, IISER Pune, December 15–21, 2016

Rejish Nath

Co-organizer, Workshop on recent trends in cold atoms Physics, IISER Pune, May 16–17, 2016

A.A. Natu

International Chemistry Olympiad, Tbilisi, Georgia, July 20–29, 2016 • Falling Walls, November 8, 2016 • Research Dialogue, November 10, 2016 • Inauguration of the Goettingen Pune Outreach Centre, IISER Pune, November 25, 2016 • Discovery research in Germany –4 events in Pune • DAAD Network meeting, Industry meets Academy, November 30, 2016 • Visit of the delegation from Baden–Wuerttemberg, January 27, 2017

G.V. Pavan Kumar

Member of Organizing Committee and Co-chair – Sessions on Photonics Materials – IUMRS Conference, IISc, Bengaluru, December 11–15, 2016

Sudha Rajamani

Co-Organizer, Discussion Meeting on Emergence and Evolution of Biological Complexity, NCBS, Bengaluru, February 4–6, 2017 • Co-Organizer, 9th Young Investigators' Meeting (YIM), Goa, March 6–10, 2017

Umakant Rapol

Workshop on Recent Trends in Cold Atoms Physics, IISER Pune, May 16–17, 2016

Seema Sharma

38th International Conference in High Energy Physics (ICHEP), Chicago, August 3–10, 2016 (Chaired BSM sessions) • Mumbai–Pune Collider Meet, IISER Pune, December 3–4, 2016 • Jets @ LHC, International Centre for Theoretical Studies (ICTS), Bangalore, January 21–28, 2017 • India–CMS (National) Meeting, IISER Pune, February 18–19, 2017

Surjeet Singh

Member of Organizing Committee, 44th National Seminar on Crystallography, IISER Pune, July 10–13, 2016

S.G. Srivatsan

Co-chair and Organizing Member, 8th Indo–German Frontiers of Engineering Symposium (INDOGFOE), Potsdam, Germany, May 19–22, 2016

Arun Thalapillil

Pune Mumbai Collider Meet 2016, IISER Pune, December 3–4, 2016



Memberships and Affiliations

Shital Ahaley

Member, Indian Society for Developmental Biologists • Member, Society of Biological Chemists, India

G. Ambika

Member, Editorial board, Proceedings of Royal Society A, London • Visiting Associate, IUCAA, Pune • Senate Member, NIT Raipur • Subject Expert, Union Public Service Commission, Delhi • Member, Board of studies, G. H. Rasoni Institute of Engineering & Technology, Wagholi, Pune • Member, Board of studies, Maharajas College, Cochin

V.G. Anand

Life Member, Chemical Research Society of India (CRSI) • Member, International Advisory Board, Macroheterocycles

Sudarshan Ananth

Member, National Academy of Sciences India (NASI), Allahabad • Founder Member, Indian National Young Academy of Science (INAYAS)

Chaitanya Athale

Member, Biophysical Society of U.S.A.

Ramana Athreya

Member, Arunachal Pradesh State Wildlife Advisory Board • Trustee, EcoSystems-India, Guwahati, India (a conservation NGO)

Nagaraj Balasubramanian

Member, American Chemical Society (ACS)

Nirmalya Ballav

Member, American Vacuum Society

Anjan Banerjee

Member, Indian Society of Cell Biology (Executive Committee Member, 2015–17) • Member, Indian Society of Developmental Biology • Member, Plant Tissue Culture Association of India • Member, American Society of Plant Biologists (ASPB)

Argha Banerjee

Member, International Glaciological Society

Rabeya Basu

Departmental Research Committee, Department of Mathematics, Lady Brabourne College, Kolkata

Sudipta Basu

Member, Indian Science Congress Association

Ramakrishna Bhat

Life Member, Chemical Research Society of India • Member, Royal Society of Chemistry India (RSC)

Anup Biswas

Member, International Indian Statistical Association (IISA) • Invited Member of the Indian Society of Industrial and Applied Mathematics (ISIAM)

R. Boomi Shankar

Life Member, Chemical Research Society of India • Member, American Chemical Society

Harinath Chakrapani

Life Member, Chemical Research Society of India • Member, American Chemical Society

Srabanti Chaudhury

Member, The Society of Polymer Science, India

Anisa Chorwadwala

Executive Committee Member, Indian Women and Mathematics

Jeetender Chugh

Life Member, Nuclear Magnetic Resonance Society (NMRS) of India

Neelesh Dahanukar

Member, Editorial Board of *Journal of Threatened Taxa*

Aloke Das

Life Member, Chemical Research Society of India • Life Member, Indian Society for Radiation and Photochemical Sciences

Aditi Deo

Member, Society for Ethnomusicology, U.S.A. • Member, British Forum for Ethnomusicology, U.K.

Sutirth Dey

Member, Editorial Board, *Journal of Theoretical Biology*

Aparna Deshpande

Member, American Physical Society (APS) • Member, American Chemical Society (ACS)

Sourabh Dube

Member, India–CMS Collaboration • Member, CMS Collaboration, CERN, Geneva • Member of the Board of Studies, Fergusson College, Pune • Member of the Indian Association of Physics Teachers

Sanjeev Galande

Honorary Associate, Sydney Medical School, Sydney, Australia 2013–19 • Fellow of the Indian Academy of Sciences, Bengaluru • Fellow, Indian National Science Academy • Member of INSA Sectional Committee VIII: Animal Sciences • Life Member, Society of Biological Chemists, India • Member, Guha Research Conference

K.N. Ganesh

Vice–President, Indian Academy of Sciences, Bengaluru • Fellow, National Academy of Sciences, Allahabad • Fellow, Indian National Science Academy, New Delhi • Fellow, The World Academy of Sciences (TWAS), Trieste • Honorary Professor, JNCASR, Bengaluru

Committee Memberships: Member, FIST Advisory Board (FISTAB), DST, New Delhi • Honorary Professor, JNCASR, Bengaluru • Member, Board of Directors, Venture Centre, NCL

Innovation Park, Pune • Chairman, Indian Advisory Committee, Lady Tata Memorial Trust, Mumbai • Member, Research Council, CSIR–Institute of Genomics & Integrative Biology (IGIB), New Delhi • Member, Maharashtra State Innovation Council (MSInC) • Member, DBT–IISc Partnership Program's Scientific Advisory Committee • Chairman, DBT Task Force on Human Resource Development • Member, Oversight/Umbrella Committee for DBT's Bioenergy Centres and New Centre (Pan-IIT) • Member, Nano Mission Council (NMC), DST New Delhi • Chairman, Nano Science Advisory Group–Biological Sciences (NSAG-II) • Member, Governing Body of the GSFC University, Vadodara • Member, Board of Directors, Innovassynth Technologies (I) Ltd • Member, Board of Directors, Bharatiya Reserve Bank Note Mudran Private Limited (BRBNMPL), Bengaluru • Member, Centre for Materials for Electronics Technology [C–MET] Apex Bodies • Member, Board of Management, DIAT Pune • Member, Board of College & University Development (BCUD), Swami Ramanand Teerth Marathwada University, Nanded • Chairman, Research Council, High Energy Material Research Laboratory, DRDO, Pune • Member, Executive Council of Central University of Tamil Nadu, Thiruvavur • Chairman, Research and Academic Advisory Council (RAAC), Institute of Nano Science and Technology (INST), Mohali • Member, Planning & Monitoring Board (PMB), DIAT Pune • Member, Governing Council, Association of Indian Universities (AIU) • Member, Equivalence Committee, Association of Indian Universities (AIU)

Memberships of Editorial Boards of Journals: Journal of Organic Chemistry (ACS – International Editorial Advisory Board); Chemistry - An Asian Journal (Wiley, Germany) Member International Advisory Board; Beilstein Journal of Organic Chemistry (Germany); Artificial DNA: PNA, XNA (Landbiosciences, U.S.A.); Oligonucleotides (Mary Ann Liebert Inc, U.S.A.); Nature: Scientific Reports (Nature Publishing Group); Co-Editor, ACS Omega for India

Aurnab Ghose

Life Member, Indian Society of Cell Biology • Life Member, Indian Academy of Neurosciences • Executive Committee Member and Life Member, Society for Neurochemistry India • Member, Society for Neuroscience (U.S.A.) • Member, Indian Society of Developmental Biologists • Editorial Board Member, *Journal of Biosciences*

Prasenjit Ghosh

Regular Associate of the Abdus Salam International Centre for Theoretical Physics Jan 2012 to Dec 2017 • Member, Chemical Research Society of India

Sujit Ghosh

Life Member, Chemical Research Society of India • Life Member, Materials Research Society of India (MRSI) • Life Member, Society of Materials Chemistry (SMC), India

Boopathy Gnanaprakasam

Life Member, Chemical Research Society of India • Member, Flow Chemistry Society India, 2016–2017 • Life Member, Humboldt Academy, Pune Chapter

Anindya Goswami

Member, International Indian Statistical Association • Member, Indian Society of Industrial and Applied Mathematics

Amrita Hazra

Member, American Society for Microbiology • Sponsored Member, New York Academy of Sciences

Anirban Hazra

Member, Indian Society for Radiation and Photochemical Sciences

Partha Hazra

Editorial Board Member (in Chemistry) of *Scientific Reports* published by Nature Publishing Group • Life Member, Chemical Research Society of India • Life Member, American Chemical Society, U.S.A.

Tressa Jacob

Member, Indian Society of Developmental Biologists (InSDB)

M. Jayakannan

Life Member, Society for Polymer Science India (SPSI) • Life Member, Chemical Research Society of India (CRSI)

M. Jeganmohan

Life Member, Chemical Research Society of India

Mukul Kabir

Member, Materials Research Society, U.S.A. • Deutsche Physikalische Gesellschaft

Siddhesh Kamat

Member, UDCT Alumni Association • Member, American Chemical Society • Phi Lambda Upsilon (PLU), Chemistry Honor Society, TAMU

Krishanpal Karmodiya

Member, Malaria Research and Reference Reagent Resource Center (MR4) • Editorial Board Member of *Scientific Reports* (Nature Publishing Group)

Saikrishnan Kayarat

Member, Indian Crystallographic Association

Raghavendra Kikkeri

Life Member, Chemical Research Society of India

Shabana Khan

Life Member, Chemical Research Society of India (CRSI)

Mayurika Lahiri

Life Member, Indian Association for Cancer Research • Life Member, Indian Society of Cell Biology

Soumen Maity

Member, Institute of Electronics, Information and Communication Engineers (IEICE)

Moumita Majumdar

Life Member, Chemical Research Society of India (CRSI)

Pankaj Mandal

Member, Chemical Research Society of India • Member, Optical Society of America • Member, Optical Society of India

Rama Mishra

Member, Editorial Board for the *American Journal of Mathematical Analysis*, Science Education Publishing, U.S.A. • Member, *Mathematical Reviews*

Arnab Mukherjee

Life Member, Chemical Research Society of India (CRSI) • Member, American Chemical Society

Muhammed Musthafa

Life Member, Chemical Research Society of India

Angshuman Nag

Member, Chemical Research Society of India (CRSI) • Associate, Indian Academy of Science, Bengaluru

A.A. Natu

Board of Directors, Bakul Pharmaceutical Research Centre, Mumbai • Member, National Coordination Committee of Olympiads • Research Ambassador, DAAD • Visiting Professor, Bielefeld University, Germany • Member, PMC Scientists Awards Committee • Senate Member, SVNIT, Surat • Academic Council, DY Patil University, Pune • Scientific Advisory Committee, ICMR, Belgaum • Member, International Junior Science Olympiad • UGC-SAP Committee, Chemical Sciences • PMC of DRDO HEMRL Panel • Board of Directors, PCMC Science Park, Pune • Chairman, URDIP, Admission Committee • Editorial Board, *Indian Drugs* • Member, Scientific Advisory Board, Mewar University • Member, Advisory Committee, BNP, Pune

Satishchandra Ogale

Member Royal Society of Chemistry (RSC) • Member American Chemical Society (ACS)

Venketeswara Pai

Founding Member (selected by INSA Council), Indian National Young Academy of Science (INYAS), 2015 • Member, Commission for the History of Ancient and Medieval Astronomy (CHAMA), New York University • Life Member, Indian Society for History of Mathematics (ISHM), New Delhi

Shivprasad Patil

Member, Indian Biophysical Society

G.V. Pavan Kumar

Life Member, Optical Society of India • Member, Optical Society of America

Pramod Pillai

Life Member, Chemical Research Society of India (CRSI)

Shyam Rai

Member, European Geoscience Union • Member, American Geophysical Union

Atikur Rahman

Member, American Physical Society

Sudha Rajamani

Member, International Society for Astrobiology (previously known as ISSOL)

Raghav Rajan

Member, Society for Neuroscience

Girish Ratnaparkhi

Member, Society of Developmental Biology • Member, Genetics Society of America

Richa Rikhy

Member, Indian Society for Developmental Biology

M.S. Santhanam

Member, Editorial Board of *Physics Education* (India)

L.S. Shashidhara

Vice-President (Science and Society), Indian National Science Academy (INSA, New Delhi) (2016–2018) • Secretary-General, International Union of Biological Sciences (IUBS) (2016–2019)

Committee Memberships: Chair, Technical Review Group–Vector control, Indian Council of Medical Research, Govt. of India • Member, Committee to review 5-year performance of Biology program of NISER, Bhubaneswar (2017) • Chair, Research & Assessment Board (Life Sciences sub-committee), CSIR (2016)

Coordinator: Trans-disciplinary Research Oriented Pedagogy for Improving Climate Studies and Understanding: A Climate Change Education project funded by ICSU (2017–2019) • Multi-level workshops on Research-based pedagogical tools to improve undergraduate science

education in Indian Colleges and Universities: Funded by DBT (2016–19) • Workshops on Research-based pedagogical tools to improve undergraduate science education in Indian Colleges and Universities, Funded by DST (2016–19) • Pedagogy workshops for School Teachers, Funded by RMSA, Maharashtra • National Facility for Laboratory Model Organisms, Funded by DBT (2016–21)

Pushkar Sohoni

Associate Editor, South Asian Studies (Journal of the British Association of South Asian Studies) Life Member, Green College, University of British Columbia, Vancouver, Canada Life Member, Bhandarkar Oriental Research Institute (BORI), Pune, India Life Member, Council of Architecture (CA), India

S.G. Srivatsan

Life Member, Chemical Research Society of India • Member, AvH Foundation, Pune Chapter • Member, American Chemical Society

Prasad Subramanian

Life Member, Astronomical Society of India

Nishikant Subhedar

President, Indian Subcontinental branch of the International Neuropeptide Society

Pinaki Talukdar

Life Member, Chemical Research Society of India • Life Member, Materials Research Society of India

Gyana Ranjan Tripathy

Young Associate (2015–2018), Indian Academy of Sciences, Bengaluru

Sunil Mukhi

Fellow, Indian Academy of Sciences • Fellow, Indian National Science Academy • Fellow, The World Academy of Science

Sunil Nair

Member, Magnetics Society of India • Member, Neutron Scattering Society of India

Thomas Pucadyil

Member, Indian Society for Cell Biology • Member, Biophysical Society, U.S.A. • Member, American Society for Cell Biology • Member, Indian Biophysical Society

V.S. Rao

Adjunct Visiting Professor, University of Pune • Life Member, Indian Society of Genetics and Plant Breeding and Indian Society for Plant Biochemistry and Biotechnology • Member, Standing Committee of DST-INSPIRE Program

R. Vaidhyanathan

Member, American Chemical Society • Member, Chemical Research Society of India (CRSI) • Member, Canadian Chemical Society

Arun Venkatnathan

Member, Chemical Research Society of India • Member, Indian Society for Radiation and Photochemical Sciences • Member, American Chemical Society

Seema Verma

Member, Materials Research Society of India (MRSI)

Milind Watve

Founder Member, International Society for Evolutionary Medicine and Public Health • Technical Committee Member for Research wing, Forest Department, Maharashtra State • Member of INSA Sectional Committee VIII: Animal Sciences



National and International Visits

Nixon Abraham

Visited University of Geneva, Switzerland for collaboration (January–February, 2017) • Visited Max Planck Institute for Psycholinguistics, Nijmegen, The Netherlands; University of Heidelberg, Germany; University of Bordeaux, France for collaboration (February 2017) • Visited Anna University, Chennai, India for collaboration (August 2016)

Chaitanya Athale

Visited IISER Thiruvananthapuram to discuss potential collaboration (April 20–22, 2017)

Nirmalya Ballav

Visited the group of Prof. Thomas A. Jung at Paul Sherrer Institute (ETH Domain), Switzerland (April 2016)

Argha Banerjee

Visited NCAOR, Goa for collaboration (March 2–4, 2017)

Ashna Bajpai

Visited Photon factory, Tsukuba, Japan, for collaboration (June and November 2016)

Anjan Banerjee

Visited Shenzhen, China to attend International Plant Vascular Biology (IPVB–2016) Meeting, July 19–23, 2016

Sandanaraj Britto

Visited Novartis Institutes for BioMedical Research, Cambridge, USA for academic purpose (May 15, 2016 – July 15, 2016)

Apratim Chatterji

Visited, B.H.U, Varanasi for collaborative work on shear of a polymer chain in channel of disordered obstacles (March 23–28, 2017)

Sourabh Dube

Visited Saha Institute for Nuclear Physics (SINP) to attend India–CMS Collaboration meeting (August 2016) • Visited TIFR to attend the CMS Collaboration Week (November 2016)

Sanjeev Galande

Visited University of Tromsø, Tromsø, Norway for collaboration (October 24, 2016)

K.N. Ganesh

Visited Philadelphia, U.S.A. to attend ACS National Meeting (August 18–28, 2016) • Visited Russian Academy of Sciences, Ekaterinburg, Russia to attend XX Mendeleev Congress on General and Applied Chemistry (September 26–30, 2016) • Visited Ecole Normale Supérieure De Lyon, Lyon to discuss ways to implement the MoU signed between IISER Pune & ENS Lyon (October 4–8, 2016) • Visited Bordeaux, France to participate in the workshop entitled “SupraBio: New Technologies, new paradigms (October 6–7, 2016) • Visited Phoenix, USA to attend the 2017 Editors Conference, JACS Editors Meeting of ACS (January 5–10, 2017) • Visited San Francisco, U.S.A. to attend the 253rd ACS National Meeting & Exposition (March 29–April 4, 2017)

Aurnab Ghose

Visited EMBL Heidelberg, Germany to attend Global BioImaging – Exchange of Experience I, representing India BioImaging and IISER Pune (June 8–10, 2016)

Sujit Ghosh

Visited IIT Kanpur to Participate in a mini-symposium entitled Recent Trends in Inorganic and Supramolecular Chemistry (October 26, 2016)

Krishanpal Karmodiya

Visited National Institute of Technology, Rourkela, Orissa, for academic purpose (January 19–20, 2017) • Visited JNCASR, Bengaluru for collaboration (March 15–17, 2016)

Shabana Khan

Visited Goettingen University, Germany for collaboration (May 15–July 15, 2016)

Vivek Mohan Mallick

Visited IISER Mohali to attend CAAG 2016 (October 11–15, 2016)

Pankaj Mandal

Visited IISc, Bengaluru to attend a symposium on "Recent Advances in Theoretical Chemistry" (July 8–9, 2016)

Neena Joseph Mani

Visited IIT Madras for collaborations in studying "Ocean Mixing and Monsoon" with experts in the Indo-US programme in the Bay of Bengal (January 11–12, 2017)

Sunil Mukhi

Visited Yukawa Institute of Theoretical Physics Kyoto, Japan for academic purpose (May 1 – August 1, 2016) • Visited Kigali, Rwanda, to attend the annual Meeting of The World Academy of Sciences (November 2016)

Sunil Nair

Visited Indian Beamline at Photon Factory, KEK, Japan (June 11–18, 2016)

Pramod Pillai

Visited Goa to attend Chemical Frontiers–2016 meeting (August 25–28, 2016)

Sudha Rajamani

Visited Ladakh, India as part of Spaceward Bound India expedition (August 7–20, 2016) • Visited the Earth Life Science Institute (ELSI), Tokyo Institute of Technology, Tokyo, Japan as part of ELSI–EON's (ELSI Origins Network) Long Term Visitor (LTV) program for collaboration (November 15–29, 2016)

Seema Sharma

Visited IISc, Bengaluru, to attend Kick off Meeting of the first Indo–French Network Project in High Energy Physics (May 2–5, 2016) • Visited CERN, Geneva, Switzerland, to attend the CMS Collaboration meeting and coordinate the activities of performance studies group of Hadron Calorimeter (June 18–26, 2016) • Visited CERN, Geneva, Switzerland, to attend the CMS Collaboration meeting and coordinate the activities of Jets and Missing Transverse Energy physics object group of the CMS experiment (September 10–18, 2016) • Visited TIFR, Mumbai, to attend CMS International Collaboration Meeting and second meeting of experimentalists of the Indo–French Network Project in High Energy Physics (LIA THEP and CEFIPRAINFRE–HEPNET) (November 14–19, 2016)

S.G. Srivatsan

Visited Universität Bonn, Germany for renewed research stay sponsored by Alexander von Humboldt Foundation (May 15 – August 10, 2016)

Arun Venkatnathan

Visited Philadelphia, U.S.A. to attend American Chemical Society National Meeting (August 22–24, 2016) • Visited Temple University, Philadelphia, U.S.A., to attend IISER Pune–Temple University Meeting as a part of 3-member delegation (August 25–26, 2016)



Conferences, Events, and Initiatives

Conferences, Symposia, and Workshops

News and Events

International Relations

Outreach Activities

Colloquia and Public Lectures

Research Seminars

Conferences, Symposia, and Workshops

Workshop on Recent Trends in Cold Atoms' Physics

May 16-17, 2016

Organizers: Rejish Nath, Umakant Rapol, Sunil Mukhi

There were 12 speakers in the event, including people from Germany, France, and Japan. The aim of the workshop was to provide to students an overview on the diverse research works conducted in the field of cold atoms worldwide. There were more than 50 participants from Pune and outside. There have been a series of talks on the most rapidly growing field of ultra cold atoms covering major areas such as atom traps, precision measurements, atom chips, Bose Einstein condensates, dipolar gases, and gauge fields.



Workshop on Genome Engineering in Model Organisms

June 28-29, 2016

Organizer: Sanjeev Galande

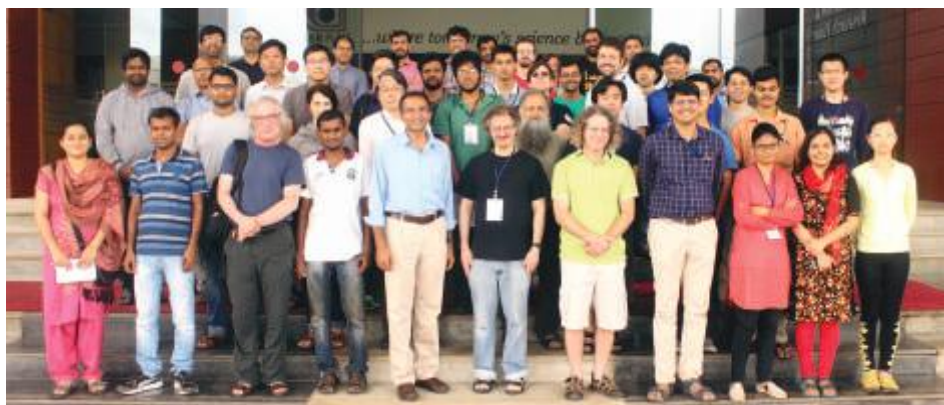
This 2-day workshop was organized jointly by IISER Pune and NCCS with Centre for Transgenic & Genetically Engineered Models (TGEMS), University of Alabama, U.S.A. and funded by Department of Biotechnology, Govt. of India. This workshop was primarily focused on mouse and zebrafish genome engineering for studies on health and disease. The aim of the workshop was to understand the expertise available in India and the areas in which IISER Pune and NCCS could collaborate with University of Alabama (UAB) for training as well as for generating model organisms for specific needs.

Automorphic Forms on Metaplectic Groups and Related Topics

July 4-9, 2016

Organizers: A. Raghuram (IISER Pune), Chandrasheel Bhagwat (IISER Pune), Solomon Friedberg (Boston College), Erez Lapid (Weizmann Institute of Science)

One of the most prestigious Mathematics events of its kind, this conference was organized jointly by IISER Pune and Boston College and was financially supported by NBHM and Boston College. Around 40 mathematicians including 17 speakers have participated in this conference. Eminent researchers from across India and elsewhere gave research talks. This conference was helpful in facilitating stimulating academic interactions among the participants and taking IISER Pune to the world map of mathematical research.



44th National Seminar on Crystallography

July 10-13, 2016

Organizers from IISER Pune: R. Boomi Shankar, Surjeet Singh, Saikrishnan Kayarat

The NSC44 held at the IISER Pune was organized jointly by National Centre for Cell Science (NCCS), IISER Pune, National Chemical Laboratory (NCL), and Savitribai Phule Pune University, Pune. The meeting covered diverse aspects of crystallographic research ranging from life sciences, drug development, small and macromolecular crystallography, crystal engineering and growth, powder diffraction, MOFs/COFs, and synchrotron.



Mathematics Symposium

August 11-12, 2016

Organizers: Anisa Chorwadwala, Chandrasheel Bhagwat, Kaneenika Sinha, Diganta Borah

IISER Pune Mathematics Symposium, an annual event, is a platform for the mathematicians at the institute, at all stages of careers, to showcase their research via short talks. The purpose of the symposium is to stimulate collaborations and to expose the younger mathematicians to the research being done in the department. Two eminent mathematicians from TIFR-CAM, Prof. M.S. Narasimhan and Prof. A. Adimurthi, were present as external experts during the event. Twenty-two talks on diverse topics from many broad areas of mathematics were given during this two-day event. The areas covered included number theory, representation theory, algebraic geometry, knot theory, differential equations, control theory, and cryptography. Nine graduate students gave an overview of their research.

Workshop on Scientific Achievements in Independent India

August 12-13, 2016

Organizers: L.S. Shashidhara, John Mathew

This workshop aimed to understand and analyze the journey of various science and technology related sectors in India with independence as an important starting point in effecting the formulation of future policies. This brought together a group of eminent scientists, social scientists, economists, historians, and science journalists for a serious exchange of views. The primary sectors discussed included education, space and aeronautics, healthcare, information technology, agriculture, and biological conservation. Fifty participants from 8 of India's premier research institutes and universities along with one representative from King's College London attended the workshop.

3rd Flow Chemistry Conference and Workshop

August 27-28, 2016

Organizers from IISER Pune: K.N. Ganesh, B. Gnanaprakasam

This event was jointly organized by IISER Pune, FCS-India, NCL-Pune and IIT Bombay and hosted by IISER Pune. The main objective of the workshop was to discuss different topics of flow chemistry along with challenges in the industry. The inaugural address was given by Prof. Ashwini Nangia (Director, CSIR-NCL, Pune). During the 2-day meeting, nine lectures were delivered in various aspects of flow chemistry spanning introduction to application in industry. The speakers included Dr. A.A. Natu (IISER Pune), Dr. Charlotte Wiles (Chemtrix Netherlands), Dr. Amol Kulkarni (CSIR-NCL), Prof. Anil Kumar (IIT Bombay), Mr. Manjinder Singh (CIPLA), Dr. Sunil S. Joshi (CSIR-NCL), Ms. Ildiko Kovacs (Thales Nano, Hungary), Mr. Vijay Kirpalani and Dr. Daniel Mink (Netherlands). About 80 participants from a wide pool of academics and industry attended the workshop. The participants included the 31 undergraduate

and PhD students from IISER Pune. Further, live demonstration on flow chemistry was conducted by various companies on the continuous flow reactor technologies. A panel discussion was organized on the second day of the conference on the current state and the future of flow chemistry.



Workshop on Clinical Research and Medical Regulation

September 27-29, 2016

Organizers: Clinical Development Services Agency (CDSA), Gurgaon; IISER Pune; NCL-Venture Centre; and Prashanti Cancer Care Mission, Pune

This 3-day workshop on Clinical Research and Medical Regulations was conducted around the themes of “Good Clinical Practices, Roles and Responsibilities of Institutional Ethics Committee Members; Medical Regulations for Biomedical Devices; and *In vitro* Diagnostics Kits”. Over 425 participants representing clinical investigators, ethics committee members, clinical researchers, bio-entrepreneurs, regulators, and students attended the workshop. Several stalwarts from ICMR, CDSCO, DCGI, NIB, academia, and biomedical industry participated as faculty in this workshop to mentor the participants.

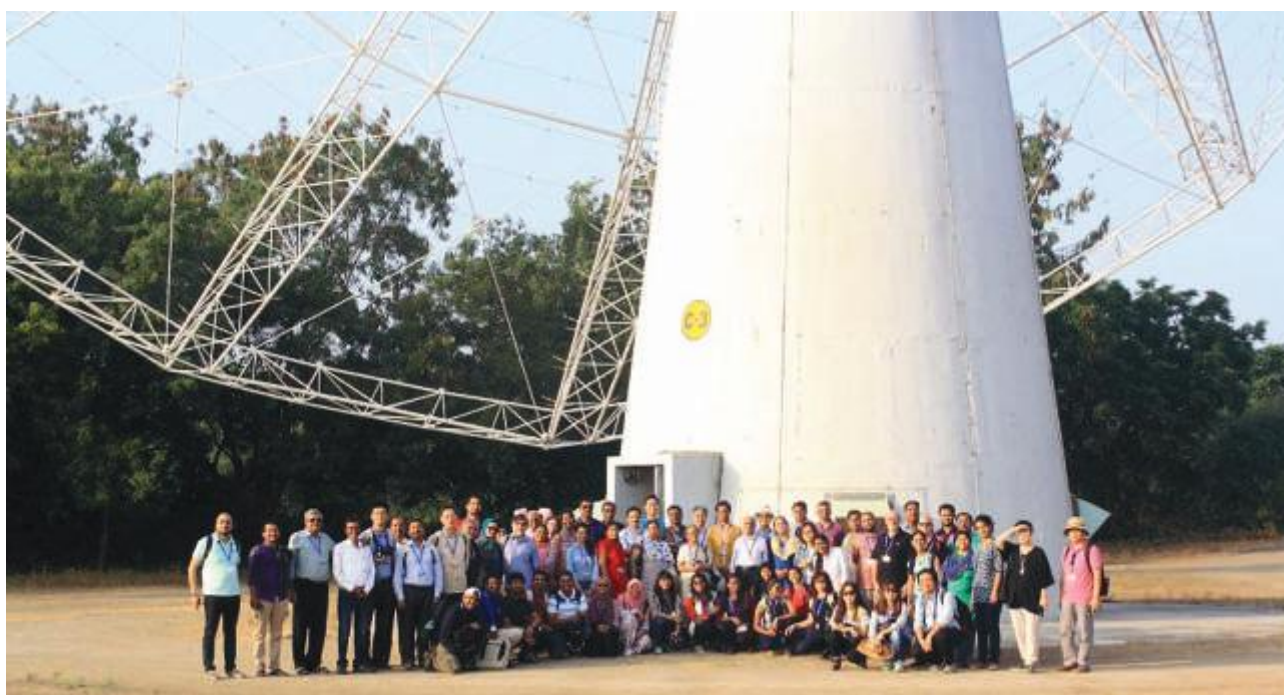


International Conference on Oriental Astronomy (ICOA9)

November 15-18, 2016

Local Coordinators: Sunil Mukhi, Prasad Subramanian

ICOA conferences are held once in 3 years and was organized in India for the first time this year. The conference was preceded by a 3-day workshop for young researchers from Nov 12 to 14, 2016 that served as the orientation program. The workshop had about 30 participants and included lectures and hands-on activities. A total of 73 participants, 30 young researchers and 43 conference participants attended the conference. Of these, 22 were from Thailand, Iran, China, Indonesia, Korea, Japan, Germany and U.S.A. Students and young researchers of IISER Pune and from nearby colleges of Pune also participated in the event. Participants were taken on a half-day tour to the Giant Meterwave Radio Telescope (GMRT) of the NCRA-TIFR. GMRT is the world's largest radio telescope in its bandwidth and is used by scientists from all over the world. Dr. Wayne Orchiston and Prof. Govind Swarup delivered a public lecture titled *Emergence of Radio Astronomy in Asia: Opening a New Window on the Universe*.



Half-Day Symposium on Applied Probability and Statistics

November 23, 2016

Organizers: Anindya Goswami

This symposium included talks by three speakers: Dr. Ludger Overbeck (Justus-Liebig-Universität Giessen); Dr. Sandeep Rakshit (D.Y. Patil Institute of Management); and Dr. Anindya Goswami (IISER Pune). Titles of the talks were *Feynman Kac representation of path dependent PDEs*; *Big Idea-Data and Analytics*; and *Recent Development in Analysis of Regime Switching Market*. All the talks were focused on opening up interdisciplinary research collaborations relevant for industry projects. There was also an intense research discussion following the symposium. All the talks were accessible for general academicians.

Pune Mumbai Collider Meet

December 3-4, 2016

Local Organizers: Sourabh Dube, Arun Thalapillil, Seema Sharma

This workshop was attended by 30 local and outstation participants which included faculty members, postdoctoral fellows, and advanced graduate students from four institutes in the Pune-Mumbai area: IISER Pune, TIFR Mumbai, IIT Bombay, and Savitribai Phule Pune University.

The agenda included brief talks with an emphasis on group discussions after each talk. Special attention was placed on trying to identify challenges in various topics, where there is an opportunity for theorists and experimentalists working together to break deadlocks. Some of the talks and topics of discussion initiated during the workshop were on top-polarization (Prof. Rohini Godbole; IISc, Bengaluru), low-scale right-handed symmetry (Prof. Urjit Yajnik; IIT Bombay), soft-tracks (Dr. Sabyasachi Chakraborty; TIFR Mumbai), physics using jets (Vinay Hegde; IISER Pune), and BSM physics with leptons (Shubanshu Chauhan; IISER Pune). One of the motivations for organizing this highly specialised workshop was to jump-start significant collaborations among high-energy theorists and experimentalists in the Mumbai-Pune area.



Indian Strings Meeting

December 15-21, 2016

Organizers: Sunil Mukhi, Nabamita Banerjee

This is a major international conference held once in two years in India covering all areas of string theory, modern quantum field theory and applications of techniques



from these areas to problems in gravitational, particle, and condensed matter systems. It has been running for over two decades, and came to IISER Pune for the first time.

Indian Women and Mathematics (IWM) Regional Workshop on Research and Career Opportunities in Mathematics held at IIT Gandhinagar

December 20-21, 2016

Local Organizing Committee: Surjeet Kour (IIT Gandhinagar), Neeldhara Misra (IIT Gandhinagar)

Convener: Anisa Chorwadwala (IISER Pune)

Scientific Committee: Riddhi Shah (JNU, Delhi), Anisa Chorwadwala (IISER Pune)

A collective of Indian mathematicians, Indian Women and Mathematics (IWM) works towards encouraging more women to pursue higher education in mathematics. The objective of this regional workshop was to make women in mathematics from Gujarat and its neighboring states more aware of the various opportunities in mathematics. Panel discussion, poster sessions, interactions with senior mathematicians were held as part of the workshop. In addition to women engaged in mathematics teaching or research, postgraduate mathematics students also benefited from this workshop.

6th Annual DBT-Ramalingaswami Fellows' Conclave

January 4-6, 2017

Local Organizer: Sudipta Basu

A total of 100 Ramalingaswami Fellows as well as nearly 20 mentors from different institutes of India attended this conclave. The opening session included welcome address by Prof. K. N. Ganesh (IISER Pune), talk on status of the Fellowship by Dr. Meenakshi Munshi (DBT); and Inaugural Address by Prof. R. Vijayalakshmi (IISc, Bengaluru). Fellows presented their research in 4 parallel sessions preceded by talks by Mentors. Keynote speakers at the Conclave were Dr. Rakesh Sharma (CCMB, Hyderabad); and Dr. S. Ramaswamy (InStem, Bangalore). An interactive session



moderated by Dr. S. Ramaswamy was organized where Dr. Meenakshi Munshi (DBT), Dr. Savitha Iyer (NCBS, Bengaluru) and Dr. Vandana Gambhir (IISER Pune) discussed the funding issues with the Fellows.

Discussion Meeting on Emergence and Evolution of Biological Complexity held at NCBS, Bengaluru

February 4-6, 2017

Organizers: Clement Nizak, Philippe Nghe, and Sandeep Ameta (ESPCI, Paris); Sudha Rajamani (IISER Pune), Sandeep Krishna (NCBS, Bengaluru)

This meeting aimed to brought together experimentalists, theorists and philosophers to discuss the physical principles underlying the emergence of complexity in biological systems, and how it is shaped by cooperative dynamical behavior and selective pressures. Speakers were drawn from a wide range of fields whose research encompassed aspects from the origins of life to the origins and emergence of multicellularity. The speakers probed events in the history of life on Earth which marked qualitative changes in the complexity of biological systems and also discussed the growing quantitative understanding of evolution at the molecular scale.

India-CMS Meeting

February 18-19, 2017

Organizers: Sourabh Dube, Seema Sharma

The India-CMS collaboration consists of 10 full member institutes and 7 associate member institutes in India, all of whom are members of the CMS collaboration at the Large Hadron Collider. There were a total of 60 attendees from across India. The CMS experimental collaboration is an international collaboration at CERN and Indian participation is fully supported by the DAE and the DST. The India-CMS meeting is an important forum for CMS physicists for periodic discussions about the physics goals, evaluations of the overall planning of various projects and related financial aspects, and share progress towards individual contributions.

In particular, many components of the CMS detector and electronics will suffer from continuous exposure to the radiation and need to be replaced to maintain the current performance as well as to cope up with the improved LHC operation at very high luminosity starting the year 2025. The upgraded detectors are foreseen be able to



sustain performance through 2035, collecting ten to fifteen times more data as compared to the ongoing run expected to go through 2022. The Indian groups plan to contribute significantly to the tracker, calorimeter and trigger upgrade projects.

The India-CMS meeting consisted of presentations from members describing the ongoing research involving the proton-proton collision data collected over the last two years, as well as the presentations describing the plans for institutes to contribute to the planned upgrades of the CMS detector over the next five years. A highlight of the meeting was presentations by 27 graduate students, including those by 5 IISER Pune students.

Symposium: An App called Math

March 4, 2017

Organizers: Anisa Chorwadwala, Diganta Borah

This symposium was organized as a prelude to the IISER Pune annual Math Day event. It consisted of the following talks on the application of mathematics across disciplines: *Why we have five fingers on each hand and self organized morphogenetic* by Dr. Chaitanya Athale; *The Mathematics underlying a chemical reaction* by Dr. Anirban Hazra; *Mathematical methods involved in numerical weather prediction* by Dr. Nina Joseph Mani; *Interesting uses of mathematics in astronomy in ancient India* by Dr. Venkateshwara Pai; and *When numbers get serious* by Prof. Sunil Mukhi.

National Network on Mathematical and Computational Biology

March 18-19, 2017

Organizers: Chaitanya Athale

NNMCB Discussion Meeting on “Mathematical Modeling of Natural and Synthetic Genetic Networks: Towards Predictive Engineering of Biological Systems” was held at Karla, Lonavala.

The aim of the symposium was to discuss the discovery and applied aspects of synthetic biology, understand the current scenario of synthetic biology in India, and involve theoreticians in the process of designing synthetic genetic systems. The speakers were from CSIR-NCL, Pune, IIT Bombay, IIT Delhi, IISER Pune, and IISER Mohali.



News and Events

RAA Session: Nurturing Creativity

April-June, 2016

In this 8-week program, 35-40 students from municipal schools in Pune city visited IISER Pune for a few hours each on Sundays to get well-versed with science experiments and learn from simple things illustrating scientific principles. Teachers also participated in the program with hands-on training on experiments. Dr. Natu along with Disha of IISER Pune organized this program.



Foundation Day 2016

April 21, 2016

The 6th Foundation day function was held with Dr. Yusuf K. Hamied as the Chief Guest. The Foundation Day Address was titled *Transition from Academia to Industry*.

On this occasion, the student annual magazine, *Kalpa*, fully edited and designed by a team of students, was released. In addition, various awards and recognitions were presented to students and staff for their outstanding performance and contributions to the Institute.



Endowment from Infosys Foundation

May 9, 2016

Infosys Foundation, the philanthropic arm of Infosys, signed a Memorandum of Understanding (MoU) with IISER Pune to provide opportunities for economically underprivileged students to pursue science degrees in a research-oriented environment through scholarships and fellowships. As part of this, 16 BS MS students and 2 Integrated PhD students have been awarded full tuition fee waiver for Spring 2017 and 12 students have been given the Infosys Foundation Travel Award for participation in national and international conferences.

Endowment from Balan Group

May 9, 2016

Mr. Balan, a leading builder and philanthropist of the city, gave a generous endowment for promoting science outreach at IISER Pune with a special focus on taking science to underprivileged sections of the society. A 40,000 sq ft state-of-the-art, hands-on science activity centre for school & college students and teachers will be built using this endowment. The building will be named "Smt. Indrani Balan Science Activity Centre" and will be used to impart pedagogical training to teachers and to excite students to learn science.

5th Convocation

May 28, 2016

During the fifth convocation of IISER Pune, 72 BS MS students and 33 PhD students were awarded degrees. Seventeen BS MS students passed with Distinction. Ms. Santpur Sai Neha, majoring in Physics, was awarded the Institute Gold Medal for academic excellence by Chief Guest, Dr. Selvin Christopher, Director General, DRDO and Secretary, Department of Defence R&D.

In his convocation address, Dr. Selvin spoke about DRDO's role in the country's defence capabilities and the organization's journey towards self-reliance. Prof. K.N.



Ganesh presented the Institute report that described IISER Pune's most recent achievements and activities. He pointed out that in a short span of 10 years IISER Pune that began in 2006 with 44 students and 5 faculty has reached several important milestones. He emphasized that celebration of ten years of the institute is also an occasion to remind oneself of the expectations of various stakeholders and prepare for the challenges ahead.

Dr. Venkataramanan, Chairperson of the Board of Governors commended the editors of the annual students' magazine *Kalpa*, which documented the early years of the institute. He also advised students to build on their communication skills and indicated that this can directly contribute to their research success.

In-House Communication Excellence (ICE) Award to *Kalpa*

June 6, 2016

The 2016 edition of IISER Pune's in-house student magazine, *Kalpa*, won the second runner-up prize in 'educational institutes' category at the 2016 In-House Communication Excellence (ICE) Awards instituted by the Shailaja Nair Foundation.

The 2016 edition of *Kalpa* was themed around the institute's 10-year journey, along with the regular *Kalpa* features like accounts of various academic and co-curricular activities of the year; stories, articles and poetry in various languages; and photo features welcoming new students/faculty and bidding farewell to the graduating ones.



Ishān Vikās Program

June 13-22, 2016; December 12-19, 2016

Ishān Vikās is a program initiated by MHRD to bring selected students from north eastern states of India to various national institutes like IISERs and IITs during their vacation period and give students an exposure to the various opportunities available for their further education. During 2016-17, two such camps were held at IISER Pune. In the camp held during June 13-22, 2016, 39 students and 4 teachers from 2 schools participated. In the camp held during December 12-19, 2016, 39 students and 6 teachers from 4 different schools participated.

During these visits, students were exposed to current level of understanding in different topics in basic sciences and its implications to the society. Students got an



opportunity to work in laboratories to get hands-on experience and were taken on field visits to science center and cultural sites in and around Pune. Students were also introduced to basic aspects of computer literacy, sports, and communication skills.

Science and Culture in British India

July 3-22, 2016

Science and Culture in British India was a 3-week course conducted by Dr. John Mathew in collaboration with the British Council. Twenty students from U.K. from diverse educational and regional backgrounds attended the course. Varied topics including music, military, medicine, food, films, and education system during the British Raj were covered during the course. Apart from field trips to locations in and around Pune, the course included a series of lectures: *Colonial culture* by Prof. Shashidhara; *Poetry in India* by Dr. Pooja Sancheti; *Late 19th and early 20th century science, medicine and technology in Crown Raj* by Dr. John Mathew; *The BBC and investigative reporting* by Mr. John Waite; *Chess in India* by Dr. Chandrasheel Bhagwat; and *Colonial food exchange in British India* by Dr. Apurva Barve. Students gave group presentations on the last day of the course.



DST-INSPIRE Science Internship Camp

July 18-22, 2016

A total of 143 students (74 girls and 69 boys) attended this DST-INSPIRE internship camp for 11th standard science students from junior colleges in Maharashtra state. Twelve talks/interaction sessions were scheduled with distinguished scientists from Pune and other parts of the country in physics, chemistry, biology, mathematics, and humanities. Understanding the importance of the process of science and its relevance in day-to-day life was emphasized. Hands-on experiment sessions were organized in physics, chemistry, and biology. Interactive sessions of students with the invited speakers provided the students a glimpse of a typical work day in the life of



scientists. A panel discussion on careers in science was organized; this was attended by ~120 parents in addition to students.

Little Scientists Conference

July 28-29, 2016

The 4th Little Scientists conference was jointly conducted by CoESME at IISER Pune and the Moving Academy of Medicine and Biomedicine. The conference was the culmination of a 2-month summer vacation program in which selected secondary school students, mostly from rural and tribal schools, conducted laboratory-based research on community related health issues.

Dr. Pramod Kale, Former Director, Vikram Sarabhai Space Centre, ISRO, Thiruvananthapuram gave keynote address on the Indian Space Program. During the conference, 25 students (11 - urban parts of Maharashtra, 9 - rural parts, and 5 - tribal areas of Maharashtra) presented their research work. A special feature of this year's conference was a separate session on students' innovative ideas for which 14 students were selected. Thus, in all, 39 students from 15 different schools participated in the conference. Platform presentations by the students were interspersed with highly interactive sessions some of which included an account of the first successful heart transplant in Western India by Dr. Sanjeev Jadhav, Chief Heart Surgeon Jehangir Hospital, Pune, and a talk on Indian Monsoon by Dr. Sulochana Gadgil, Meteorologist, Centre for Atmospheric and Oceanic Sciences, Bengaluru.



ChemSymphoria: Chemistry In-House Symposium

July 21-22, 2016

ChemSymphoria is a two day in-house symposium organized by the Chemistry discipline of IISER Pune. This was held for the first time this year and is planned to be held annually to display the scientific achievements and progress made by faculty members and students in various research areas in chemistry at the institute. The event started with inaugural address and lecture by Prof. K.N. Ganesh followed by 11 invited and 28 oral lectures by faculty members and students.

Spaceward Bound India Expedition to Ladakh

August 7-20, 2016

The 'Spaceward Bound (SB) Program' is an educational program developed at NASA Ames Research Center. The objective is for participating scientific researchers, educators, and students to visit remote and extreme environments in different parts of the world and conduct various astrogeological/biological experiments, make observations, and learn about the origin, sustenance and adaptation of living organisms within such biospheres. In August 2016, the spaceward bound expedition took place in India for the first time with Ladakh as the location mainly due to the presence of several astrobiologically/geologically interesting features. Biology faculty member Dr. Sudha Rajamani and PhD students Ms. Niraja Bapat and Mr. Chaitanya Mungi took part in this expedition.

Samiksha-2016

September 20, 2016

An in-house symposium "Samiksha-2016" was organized by the Earth and Climate Science discipline to present their on-going research projects and discuss with experts of relevant field. Two national experts, Prof. V.K. Gaur (CMMACCS, Bengaluru) and Prof. S. Bajpai (BSIP, Lucknow) attended this symposium and presented key research projects in the field of hydrology and paleobiology.

An informal discussion session was held where experts provided constructive suggestions on the ongoing research along with new valuable ideas to develop the department in both research as well as the academic aspects. Students and scientists from Fergusson College, Savitribai Phule Pune University and Indian Institute of Tropical Meteorology also attended the program.

Falling Walls Lab India

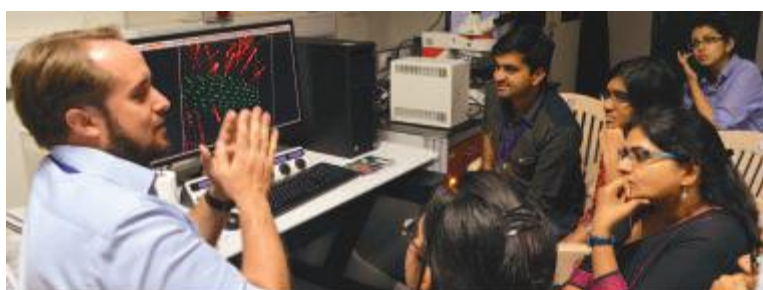
September 24, 2016

In this global talent search platform, participants presented within three minutes their research projects, entrepreneurial or social initiatives addressing topics such as shelter, water, health, and energy. The winner at this event would get an opportunity to participate at the finale in Berlin. Judges included representatives from academia and industry. The event was hosted by the German Academic Exchange Service (DAAD), the German House for Research and Innovation New Delhi and held at IISER Pune.



Inauguration of Centre of Excellence in Microscopy

October 25, 2016



A new microscopy Centre of Excellence set up in collaboration with Leica Microsystems was inaugurated at the institute. This Centre will provide scientists access to cutting-edge imaging tools to image cells and animal models at greater depth and higher resolution, in addition to providing technical and applications support.



On the occasion of the inauguration, the Biology discipline at IISER Pune has co-organised with Leica a 2-day workshop on STED microscopy, a super-resolution microscopy technique. This workshop included talks and training sessions on STED microscopy. In addition, guidance for sample preparation relevant for STED microscopy was offered.

Indo-German Dialogue on Excellence in Research and Education

November 10, 2016

This symposium saw a delegation of about 20 members from India and Germany in the education sector. Challenges and opportunities in teaching and research and industry-academia models in the two countries were discussed. Over 100 members comprising of academicians and professionals from engineering and pharma industry participated at this event.



5th Inter IISER Sports Meet held at Kolkata

December 8-13, 2016



The IISER Pune contingent won the maximum number of medals at the 5th Inter IISER Sports Meet (IISM)-2016 held at IISER Kolkata during December 8-13, 2016 and were declared the overall champions.

IISER Pune team won prizes and medals in several categories. They were the champions in Chess; Kabaddi (Men); Basketball (Women); Lawn Tennis (Women); Volleyball (Women); and Football (Women); and Runners-up in: Cricket (Men); Athletics (5 Gold, 6 Silver, 4 Bronze); Basketball (Men); Table Tennis (Men); and Badminton.



Salter's Chemistry Camp for School Children

December 14-16, 2016

A three-day residential camp for students of class IX from rural and municipal schools around Pune was organized at IISER Pune in association with the Royal Society of Chemistry (RSC)'s Yusuf Hameid Inspirational Chemistry Program. A total of 65 students (37 boys and 28 girls) from 26 schools from rural areas surrounding Pune attended the camp. The program was designed to infuse fun in learning chemistry and motivate students to develop an awareness of and a long-term interest in chemical science. Eight teachers trained by the RSC mentored the participants. The students



had an opportunity to carry out hands-on experiments in the IISER Pune undergraduate labs. In addition, a demonstration of chemistry experiments was conducted by Dr. Neeraja Dashaputre of IISER Pune. The camp also included activities such as science movie screenings and interactions with IISER Pune faculty members. A campus tour to showcase ongoing research activities at the institute was arranged.

Mimamsa National Science Quiz

January 8, 2017



Mimamsa is a national level annual science quiz for undergraduates organized by students of IISER Pune, co-sponsored by SciEx this year. The quiz tests conceptual understanding of the participating teams in the subjects of Physics, Chemistry, Biology, and Mathematics. The first round or the prelims of this two-stage event took place in twelve cities across India on January 8, 2017 in which more than 275 teams participated. The top four teams that made to the finals were IISc Bangalore, IIT Madras, IIT Bombay, and NISER Bhubaneswar. After two days of intense quizzing, the IIT Bombay team emerged as the winners breaking the 5-year winning streak of

IISc Bengaluru. Following them as the first runner-up was IIT Madras with NISER Bhubaneswar at a close third.

Film directed by the Science Media Centre screened at the 7th National Science Film Festival

February 14-18, 2017

The film *Nature, Nurture and Culture* directed by the Science Media Centre at IISER Pune and produced by Prof. Sanjeev Galande was shortlisted and screened at the 7th National Science Film Festival and Competition. The film narrated the story of a young woman and the effect of nourishment on her baby's health. The movie also discussed a recent study using rats that demonstrated how undernourishment over multiple generations could increase the chances of developing non-communicable disease. Link to the movie: <https://www.youtube.com/watch?v=RSPirWGeOMI>



Endowment from Bajaj Auto

February 20, 2017

Bajaj Auto announced an endowment to fund the construction of a hostel for women research scholars at the institute. The proposed hostel is planned as a 10-floor building with a total plinth area of ~ 20,000 sqmt that can accommodate up to 800 students. This facility would help IISER Pune take forward its commitment toward encouraging education of women and inducting them to research in a supportive environment.

FameLab India Master Class and Finals

February 20-22, 2017

The FameLab competition urges Science, Technology, Engineering, and Mathematics (STEM) students and scientists to engage an audience by explaining any aspect of their science in 3 minutes in a clear and charismatic manner without any digital aids. The FameLab India Master Class and Finals held in IISER Pune was a culmination of the zonal competitions which were conducted by the British Council across India. The finalists were selected from over 300 applicants from 4 zones and the finale was attended by more than 300 people, live streamed on YouTube.

The contestants were judged on the content, clarity, and charisma of their presentation. Mayur Bonkile of IIT Bombay was the winner and is to represent India at the FameLab International grand finale at the Cheltenham Science Festival, U.K. in June 2017. Runner-up Rini Sharon of IIT Madras and Sumeet Kulkarni of IISER Pune won an all-sponsored trip to the festival.

National Science Day 2017

February 28, 2017

On this day, IISER Pune's Quiz Club and Science Club held the 3rd edition of the Linus Pauling Memorial Inter-School Science Quiz. Students of classes 8-12 participated as 186 teams of 2 students each, from over 30 schools in Pune. There were two rounds; a written preliminary round open to all teams, and a final round between the 5 best scoring teams. Two students, Aditya Vasudevan and Mohit Deolankar of Class 12 from Vikhe Patil Memorial School won the final round. Prof. A. Raghuram, Chair of the Mathematics discipline of IISER Pune distributed prizes. A public lecture titled *Search for Extra-terrestrial Life* was delivered by Dr. Sujan Sengupta, Indian Institute of Astrophysics, Bengaluru.

New High Performance Computer

March 8, 2017

IISER Pune was selected by the Ministry of Electronics and Information Technology (MeitY), Govt. of India, for support and installation of a 500 TeraFLOP High Performance Computer system. The official announcement regarding this was made during the inaugural function of a conference of the Centre for Materials for Electronics Technology (C-MET) hosted at IISER Pune during March 2017.

Mathematics Day 2017

March 11, 2017

The annual Mathematics Day event started with the release of the Math profile booklet and inauguration of the Math profile display board and e-clock by Prof. Gadadhar Misra of IISc, Bengaluru. On this occasion, IISER Pune Library was renamed as Srinivasa Ramanujan Library, and Prof. K.N. Ganesh unveiled a portrait of Ramanujan, painted by Prof. G. Ambika. This was followed by activities like Math in action, Zome tools, Math-Pictionary, Rubik Mania, and Python contest by the Math Clubhouse. In Erdős Quiz preliminary round, 100 teams across Pune competed and 3 teams from IISER Pune and from Fergusson Colleg made it to the finals. Prof.



Gadadhar Misra gave a talk on Grothendieck inequality. Pranav Kappal, a class IV student of Sanskriti School, Bhukum showcased his extraordinary talent of solving 3×3 , pyraminx in 24.9 seconds and megaminx in 1.59 min. A play titled “Square Root of a Sonnet” based on the life of Dr. Subrahmanyan Chandrasekhar, the brilliant Indian-American astrophysicist who won the Nobel Prize in 1983, was enacted.

9th Young Investigators' Meeting (YIM) held at Goa

March 6-10, 2017

The annual Young Investigators' Meeting (YIM) brings together exceptional young scientists, senior scientists, heads of institutes, and representatives from funding agencies for 3 days of discussions and interactions focusing on science and careers in a broad range of disciplines of biology.

Along with members from NCCS, inStem, BITS Goa, and IndiaBioscience, Dr. Sudha Rajamani of IISER Pune was involved in organizing this event that included seminars by eminent researchers from India and abroad, poster presentations, and panel discussions. A wide variety of topics ranging from choosing the right research problem, lab and grant management, personnel management, mentorship, publishing, funding opportunities, and collaborations were discussed.

Events organized through Center of Excellence in Science and Mathematics Education (CoESME), IISER Pune

Events for Undergraduate Science Teachers

In a series held in collaboration with Newton Bhabha Fund of the British Council, workshops were conducted at three different levels to train teachers on the use of Research Based Pedagogical Tools (RBPTs) in their teaching: (1) Level 1: Three-day national workshops for up to 150 participants from across India to provide training in the core concepts of RBPTs; (2) Level 2: Three-day training for up to 50 selected participants from Level 1 workshops to train the participants to become trainers

themselves; and (3) Regional: Three-day workshops for up to 50 participants held in different parts of India to help disseminate skills for designing and using RBPTs amongst a wider range of teachers, across the country in smaller localized groups.

As of March 31, 2017, one Regional workshop, three Level 1 workshops, and one Level 2 workshop have been completed, and a total of 348 participants from all over the country participated in the workshops.

Level	Location	Dates	Number of Participants
Regional	Panjab University, Patiala	September 29 - October 1, 2016	28
Level 1	IISER Mohali	January 22-25, 2017	77
Level 1	Tezpur University	January 27 - February 1, 2017	76
Level 1	IISER Pune	February 26 - March 1, 2017	167
Level 2	IISER Pune	March 1-2, 2017	45 (selected from previously held Level 1)
Total			348

Regional Training Workshop for Undergraduate Science Teachers to develop Research Based Pedagogical Tools (RBPTs) at Panjab University, Patiala

September 29 - October 1, 2016

This regional workshop was held following the STEM workshop on RBPTs held at IISER Pune in March 2016. A team of 8 enthusiastic lecturers from various colleges in Delhi University who were trained in the workshop held at IISER Pune were chosen to create modules for the regional workshop, informally named as RAP a STEP (Research as Pedagogy a Science Teacher Education Program).

The workshop had 28 participants and held sessions on general aspects of RBPTs as well as discipline specific sessions for physics, chemistry, mathematics and biology. These were designed to train participants in designing and deploying RBPTs amongst students. Over three days, the participants worked in groups of 5-6 with the guidance of the trainers and developed customized RBPTs.

STEM Teachers Training Workshops on Research Based Pedagogical Tools (RBPTs)

Level 1 at IISER Mohali, January 23-25, 2017

Level 1 at Tezpur University, January 27-30, 2017

Level 1 at IISER Pune, February 26-March 1, 2017

Level 1 Workshop at IISER Pune

February 26-March 1, 2017



At the Level 1 workshop held at IISER Pune, a total of 167 undergraduate/postgraduate science teachers of government or government-aided colleges / universities from across India attended the 4-day workshop. A team of 5 experts from Sheffield Hallam University, U.K. provided training in physics, chemistry, biology and mathematics.

The workshop also had additional talks by Prof L.S. Shashidhara on leadership and funding opportunities for teachers. There was also an

information session by Dr. Apurva Barve explaining the larger vision of the RBPT workshops.

Similar workshops were held in IISER Mohali and in Tezpur University with 77 and 76 participants, respectively.

Level 2 RBPT Workshop at IISER Pune

March 1-4, 2017



The Level 2 workshop aimed to build on the principles of RBPTs already laid down in the Level 1 workshops held earlier. It was also designed to provide the participants with the skills necessary to become trainers for the regional workshops planned across the country. Forty-five participants across India covering all 4 core subjects of physics, chemistry, mathematics and biology participated in the workshop. A team of 5 experts from Sheffield Hallam University, U.K. provided training on all four days.

Events for School Teachers

Internships for Science Teachers

Summer 2016

Internship for School Science Teachers program was designed as a follow up to the National Science Teachers' Congress held in December 2015, in which about 250 teachers presented their innovations in the field of teaching. Among the 32 best paper and poster presenters, 12-13 teachers were offered 4 -6 week internships at IISER Pune. Each of the interns was assigned an IISER Pune faculty mentor, who would provide guidance and resources as necessary. They also got the opportunity to informally interact with the PhD students from the lab and attend various seminars to learn about ongoing research at the institute.

Teacher Training under RSC Yusuf Hameid Inspirational Chemistry Programme

April 20-21, 2016

A total of 71 school science teachers from various districts around western Maharashtra participated in this workshop jointly organized by CoESME and Royal Society of Chemistry. Dr. A.V. Ramarao, former Director, Indian Institute of Chemical Technology, Hyderabad delivered a talk during the inaugural session. The teaching modules in this program were all based on the existing curriculum and focused on primary and high school level chemistry syllabi. The practical sessions were held in the undergraduate chemistry laboratories in IISER Pune, where participants learnt to apply the training they had received and learnt to devise simple experiments to teach basic scientific concepts using commonly available chemicals and materials.

The importance of chemistry in daily life, and the need to teach it in an engaging manner was explained by Dr. A.A Natu, IISER Pune. This two-day program coincided with the visit of Dr. Yusuf Hameid who has provided an endowment for this program.



Video Production Workshop for School Teachers

May 30-31, 2016

This two-day workshop on video production aimed to give participants an orientation on how to prepare, plan, and execute video production for research or educational purpose. Around 15 high-school and college science teachers across Pune attended the workshop. Mr. Vivek Kannadi of IISER Pune Science Media Centre described the process and pre- and post-production stages of video production including topics such as script; handling camera, lights, and sound equipment; and audio/video editing.

Pedagogy Workshops for Maharashtra State High School Science Teachers (under Maharashtra Govt. RMSA Scheme)

4 batches: October–November, 2016

CoESME developed a 3-day module to introduce inquiry-based science teaching, suited to the needs of the high school (class VIII–X) science and mathematics teachers from government schools in Maharashtra State. The workshop was funded by the Rashtriya Madhyamik Shiksha Abhiyan for Maharashtra state and implemented in coordination with the State Institute of Science Education (SISE), Nagpur, Maharashtra.

Through the workshops, teachers were taught to pick topics from within the curriculum, and design small projects that would not only help the students learn the concept, but also help them to discover various scientific principles. Following the train-the-trainer approach, these teachers are now equipped to go on to train their peers through district-level workshops.

A total of 323 (Batch 1–72; Batch 2–81; Batch 3–91; Batch 4–79) high school science and mathematics teachers, from state government schools and representatives from the District Institutes of Education and Training (DIETs) covering all 36 districts in Maharashtra state were trained in four batches held in the months of October and November 2016 (October 4–8, 18–21; November 6–9, 22–25).

The workshop modules were developed by experts from the CoESME team and faculty members from IISER Pune, with inputs from other educationists and experts in the field. All talks were in Marathi. Invited speakers included Dr. A.A. Natu, Dr. Sanjeev Galande, and Dr. Milind Watve of IISER Pune and Dr. Satyajit Rath of National Institute of Immunology, Delhi.



State School Teachers' Science Congress

November 12, 2016

The 1st Maharashtra State Level Science and Mathematics Teachers Congress (MTSC) was held at IISER Pune in coordination with Marathi Vidnyan Parishad, a

science communication organization in Maharashtra. About 70 science teachers and communicators participated in this Congress.

The success of the 8th National Teachers' Science Congress held in IISER Pune in November 2015 acted as a motivating factor to initiate the 1st MTSC. The Congress aimed to provide a platform for Maharashtra state school science teachers and science communicators to showcase the innovative methods developed by them for teaching basic scientific concepts to students. Further, this platform would allow exchange of such methods among their peers and help improvize the pedagogical tools through peer review.

From the various papers presented, 5 participants were offered an opportunity to carry out an internship of 4 weeks to 5 weeks at IISER Pune during summer of 2017 to give them an exposure to research atmosphere and to help them incorporate research-based teaching methodologies while developing their own teaching resources.

Events for Undergraduate students

Camp for Students from G.S. Gawande College, Yavatmal

June 22-24, 2016



A 3-day camp for the students of the G.S. Gawande College, Yavatmal was conducted. A total of 31 second year BSc students attended the camp accompanied by 4 teachers. The program was specially designed to give the students exposure to the field of scientific research and also to motivate them towards taking up a career in science. It was also intended to provide them with knowledge regarding the career opportunities in their field. Lectures by IISER Pune faculty were arranged in Physics (Dr. Sourabh Dube), Chemistry (Dr. A.A. Natu) and Mathematics (Dr. Chandrasheel Bhagwat). Dr. Nitin Patil from NCL was invited as a guest speaker. In

addition, Dr. Jayant Narlikar, Emeritus Professor, IUCAA, Pune, gave a talk and interacted with the students.

Events for School Children

Workshop on Learning Science through Innovation

July 4-8, 2016



This 5-day workshop was organized in collaboration with Vigyan Ashram, Pabal. The course was designed to equip teachers with innovation as a pedagogical tool, and to help them develop new tools to foster inquiry-based learning in students. A team of experts from IISER Pune, Vigyan Ashram Pabal, and experts from industry were invited as resource persons for the workshop. Fifty participants (1 teacher mentor and 4 students each) were selected from 10 schools which have been running Vigyan Ashram's training programs, from different parts of rural Maharashtra.

Each student-teacher team was asked to identify a practical problem from their surroundings and find an innovative, scientific solution to it during the workshop, guided by discussions with resource persons. On the last day, students presented their projects and received feedback. One of the projects titled 'Fish Drying Machine' prepared by students of Lokamanya Tilak Vidyamandir, Chikhhalgaon, Konkan has been selected for state-level Inspire award competition from among 360 projects from Ratnagiri district.

Initiative for Research & Innovation in Science (IRIS) National Science Fair 2016

December 21-23, 2016

This 3-day fair for students from class 8 to 12 was organized in association with Department of Science and Technology, Government of India (DST), Indo-US Science and Technology Forum (IUSSTF), and Intel. One hundred research based science projects by 142 students in teams of one or two, across 17 subject categories were selected to participate at this Fair.

Projects were judged in their respective categories by a pool of 38 judges which included scientists from IISER Pune and other renowned institutes from India. The fair was open to public viewing and drew students and science enthusiasts from schools and colleges in Pune. Twenty projects were presented the IRIS Grand Awards and chosen to represent India at the Intel International Science and Engineering Fair at Los Angeles, U.S.A. in May 2017. Fourteen Special Awards were also presented, courtesy IRIS affiliation to Intel ISEF.



Mentorship Camp for Winners at the IRIS National Fair

January 16-18, 2017

IISER Pune hosted 11 of the 20 selected student teams of the IRIS National Fair to provide them expert guidance to fine-tune their projects for participation in the Intel International Science and Engineering Fair (IISEF) to be held at Los Angeles, California, U.S.A. in May 2017. This mentorship program was co-funded by IUSSTF and was organized by IISER Pune in cooperation with IRIS.

Each team was assigned a faculty mentor from IISER Pune, based on the subject area of the project. With the help of the mentor, students gained the opportunity to trouble-shoot their projects and get guidance both during and after the mentorship camp. Students presented their work (in the form of posters) before their peers and experts, who reviewed the presentations, provided feedback and gave them tips on improving their posters.

Events for Educators

ThinQ Annual Retreat

July 6-10, 2016

This week long workshop on the principles of inquiry-based learning aimed to help students develop the capacity to critically evaluate what is claimed as knowledge, and to integrate knowledge across domains and disciplines. This workshop was designed for a group of 10 trainers with a deep interest and commitment to Inquiry and Integration in Education, as a method to continue to learn the method of inquiry-based learning and to build their core abilities in a systematic manner. The Inquiry-based learning approach is based on the way researchers/academics construct and evaluate knowledge and has been used to develop a framework for trans-disciplinary inquiry and a comprehensive syllabus for the first time in India.

IEE-2016 Face to Face Workshop

December 10-13, 2016

The workshop was conducted by Prof. K.P. Mohanan, in association with ThinQ, an organization dedicated to inculcating inquiry-based learning among students. About 15 participants spanning school teachers, university professors, and educational activists were selected based on their performance in the web course on Inquiry and Integration in Education in 2016. The workshop aimed to train educationists in the art of developing inquiry-based learning amongst students. The workshop also taught the integration of trans-disciplinary educational methods, wherein concepts and abilities are not restricted to any particular discipline or discipline group, but transcend the barriers of disciplines of study.

Science Administration and Management Workshop for Women

February 15-17, 2017; March 16-17, 2017

In collaboration with CoESME and Newton Bhabha Fund of British Council, the Science Management and Communications Team of IISER Pune organized this workshop at two levels (Level 1: February 15 -17, 2017 and Level 2: and March 16-17, 2017). This workshop was conducted by a team of experienced faculty from Coventry University, U.K. A day-long orientation session that was open to all was organized one day prior to the workshop to provide a window to various careers in science administration and management.

The Level 1 of the workshop had 47 participants with a mixture of activities such as group discussions, posters, presentations and mock interviews. Tasks of science administrators and managers such as providing technical advice, managing research reports, formulating policy, etc. were discussed in detail. The Level 2 workshop had 20



participants selected from participants of Level 1 of the workshop. The project management simulation exercise in which the participants worked in teams to play the roles of administrators and managers helped them to get hands-on experience on the concepts learned.

Science Journalism Workshop for Women

March 5-7, 2017; March 24-25, 2017

In collaboration with CoESME and Newton Bhabha Fund of British Council, the Science Management and Communications Team of IISER Pune organized this workshop at two levels (Level 1 March 5-7, 2017 and Level 2 March 24-25, 2017). Sessions were conducted by a team of experienced faculty from Coventry University, U.K. At the orientation session that was open to all, Mr. Mukund Padmanabhan (Editor-in-Chief, The Hindu) delivered the keynote address followed by talks by six eminent speakers working in related areas across India.

The Level 1 of the workshop had 49 participants, in which the trainers provided insights into job market analysis for careers in science communication and the nuances of science writing and journalism, were discussed. The participants were introduced to the concept of elevator pitch to develop clear and concise communication. Level 2 workshop had 22 participants selected from the participants of the level 1 workshop. The focus of the Level 2 workshop was to generate a 1000 to 1500-word non-fiction article for the '*Asian Scientist Writing Prize 2017*' contest.





Swachh Bharat Pakhwada was observed through the following activities: Inspection of sanitary facilities and office premises; CCTV display of banners related to cleanliness; and clean-up drive to remove old files, broken furniture and unusable equipments. (September 1-15, 2016)



As a part of celebration of National Unity Week beginning with the birth anniversary of Sardar Patel, a photo exhibition on Sardar Patel was held at the institute's library. An essay writing competition on "Character and Contribution of Sardar Patel", and T-shirt / Caps designing competition on the theme of unification was organized for students, faculty, and staff. (October 31 - November 6, 2016)



Constitution Day was observed by a reading of the Preamble to the Constitution of India followed by reading of the fundamental duties as enshrined in Article 51 A of the Constitution. An essay competition on the theme of "Constitution" was held. (November 25, 2016)



Martyr's Day was observed in memory of those who gave their lives in the struggle for India's freedom. Lt. Gen. K. Surendranath (Retd.) gave a talk titled *Freedom and Nationalism*. (January 30, 2017)



As part of Matribhasha Diwas celebration, Mr. Shirish Sahasrabudhe, Director, Symbiosis Institute of Foreign and Indian Languages (SIFIL), gave a talk on *Linguistic Diversity*. (February 21, 2017)

Inauguration of Centre for Energy Science

July 10, 2016

A Centre for Energy Science was established to pursue fundamental and applied research in the field of clean and renewable energy. About ten faculty members from Physics and ten from Chemistry disciplines at IISER Pune are working towards the goals of the CES. The Centre has received funding of ~16 crores from DST Nanomission to establish different facilities for energy research. About 5 crores of additional funds have also come through individual projects. The CES faculty has published over 60 papers during the last year with this affiliation in addition to their departmental affiliation



Endowment from Cipla Foundation

March 28, 2017



Cipla Foundation announced an endowment towards building a state-of-the-art chemistry research laboratory for undergraduate students and to strengthen the outreach program at the institute. A Memorandum of Understanding to this effect was signed March 28, 2017 in the presence of Mr. S. Radhakrishnan (Whole-Time Director, Cipla Ltd. and Trustee, Cipla Foundation), Prof. K.N. Ganesh (Director, IISER Pune), Prof. A.A. Natu (Program Coordinator, IISER Pune) and Mr. Prashant Paleja (Program Coordinator, Cipla Foundation). The proposed building is planned to have 3 practical labs, 4 labs for industrial work, a modern demo hall, and allied facilities.

International Relations

Towards fostering academic relations with the international community, IISER Pune has been hosting delegations, establishing Memoranda of Understanding (MoU), and facilitating student exchange. The growing international dimension at IISER Pune enriches the institute's research and teaching mandate, and fosters the exchange of ideas around the globe.

Memoranda of Understanding (MoU) and Agreements

In the year 2016-17, IISER Pune formalized the following Memoranda of Understanding for academic cooperation and student/staff exchange.

1. MoU with School of Life Science, SOKENDAI (The Graduate University for Advanced Studies), Japan (April 17, 2016)

The MoU encompasses academic collaboration and student exchanges.

2. Letter of Intent between IISER Pune and University of Queensland, Australia (June 21, 2016)



The aim is to develop a "Joint Research Centre for Collaborative Impact". The Centre would promote industry-academia partnerships by identifying areas of mutual interest and providing students and postdocs mentored by University of Queensland and IISER Pune faculty, an opportunity to address research problems of relevance to industrial applications as part of their projects. Energy and materials; and genetics, epigenetics and infectious diseases are two broad areas that have been identified to be of interest to both IISER Pune and University of Queensland.

3. MoU with Temple University, U.S.A. (August 25, 2016)

Through this MoU both the organizations agreed to cooperate in providing an accelerated Dual Masters-Doctorate Degree (DMDD) program leading to a Masters degree from IISER Pune and a Doctoral degree from Temple University.

4. MoU with University of Michigan, Ann Arbor, U.S.A. (November 2, 2016)



As per terms of Michigan-IISER Science exchange program (MISE), the two organizations agreed to host up to 10 undergraduate students for up to 8-10 weeks on short-term research projects. In the accompanying photo are Prof. James Penner-Hahn and Dr. Farina Mir of University of Michigan with Prof. K.N. Ganesh and Dr. Naresh Sharma of IISER Pune.

International Delegations and Visitors

During 2016-17, the institute has welcomed the following international delegations in order to build a strong alliance and a spirit of collaboration between IISER Pune and institutions of higher education around the world.

1. University College London (UCL), U.K. (April 2, 2016)

A delegation of UCL headed by Prof. Marie Lall visited IISER Pune and conducted a 3-day workshop (March 31-April 2, 2016) to provide a foundational introduction to science policy for scientists at an early stage of their career. The delegation discussed strategies to further extend the collaboration through joint-courses and internships in the area of science policy.

2. University of Notre Dame, U.S.A. (May 2, 2016)

A delegation of University of Notre Dame, headed by Prof. Jonathan Noble, Assistant Provost for Internationalisation, Asia visited IISER Pune to explore possible collaborative activities of mutual interest between the two organizations. Some of the research areas of mutual interest were identified: neuropsychology, energy research, data science, biology, personalized genomics, epigenetics, population studies, and photonics.

3. University of Queensland, Australia (May 17, 2016)

Prof. Anton Middelberg (Pro VC-Research & Internationalisation, University of Queensland, Australia) visited the institute to explore possible research links and industrial collaboration.

4. Knowledge Economy Group for Foreign Commonwealth Office, U.K. (June 20, 2016)

Mr. Alok Srivastava from Knowledge Economy Group for Foreign Commonwealth Office visited IISER Pune to inform about various funding opportunities from U.K. in 2016.

- 5. Osaka University, Japan** (July 19, 2016)

Prof. Hidehiro Sakurai, Osaka University, Japan visited to interact with Chemistry faculty for the Sakurai Science Program. Dr. Vaidhyanathan was selected as SSP participant of 2016. He will visit Prof. Ken-ichi Nakayama's lab for a week to explore potential collaboration.
- 6. National University of Singapore (NUS), Singapore** (July 22, 2016)

Mr. Choy Yan, Associate Director, VP Office for University and Global Relations, National University Singapore, visited to identify collaborative programs of mutual interest.
- 7. Ontario India Network** (August 8, 2016)

Dr. Sukeshi Kamra, Academic Director, Ontario India Network, visited the institute on a fact finding mission to develop collaborations between Ontario region Universities and IISER Pune.
- 8. British Council, India** (August 17, 2016)

Mr. Alan Gemmell, Country Director, British Council visited the institute. It was an introductory visit of newly appointed Country Director and a fact-finding mission about the challenges being faced by the British Council partners such as IISER Pune.
- 9. Nanyang Technological University, Singapore** (August 29, 2016)

Prof. B.V.R. Chowdari, Nanyang Technological University, Singapore visited to identify research areas of mutual interest to develop collaborative programs with IISER Pune.
- 10. Dodd-Walls Centre for Photonic & Quantum Technologies, New Zealand** (September 1, 2016)

Prof. David Hutchinson, Director, Dodd-Walls Centre for Photonic & Quantum Technologies, Otago-New Zealand, presented a seminar on research opportunities at his organization and discussed possible research collaboration with IISER Pune.
- 11. Friedrich-Schiller University Jena, Germany** (September 24, 2016)

Dr. Claudia Hillinger from Friedrich-Schiller University Jena, International Office visited to identify research areas of mutual interest where collaborative research and joint-academic programs can be proposed for funding from DAAD, Erasmus, etc.
- 12. University Pierre Marie Curie, Paris** (November 10, 2016)

A delegation of scientists from University Pierre Marie Curie, Paris visited IISER Pune to interact with IISER Pune faculty specifically in the area of materials science and energy and discuss options for strengthening the existing collaborations through joint projects and student exchange.

13. University of Bradford, U.K. (November 11, 2016)

Prof. Brian Cantor, Vice-Chancellor, University of Bradford, U.K. visited IISER Pune. The main objectives of the visit were to explore collaboration opportunities in the area of chemistry, materials science, and biological sciences and to understand the innovative approaches in education and research at IISER Pune.

14. University of Tokyo, Japan (December 8, 2016)

A delegation of scientists from the University of Tokyo visited to promote their scholarship program for undergraduate and graduate students and to explore scientific collaborations in the field of chemistry, physics, and geoscience.

15. Notre Dame University, U.S.A. (January 12, 2017)

A delegation of scientists from Notre Dame University visited to interact with faculty in different disciplines and explore research areas of mutual interest and possibility of bilateral joint-programs.

16. Weizmann Institute of Science, Israel (January 16, 2017)

Prof. Irit Sagi from Weizmann Institute of Science, Israel visited her collaborator Dr. Kikkeri. Possibilities to explore institutional level collaborative programs were discussed.

17. Consulate-General of the Kingdom of the Netherlands (January 17, 2017)

Dr. Martijn Lammers, Liaison for Innovation, Technology en Science, Consulate-General of the Kingdom of the Netherlands made an exploratory visit to know more about IISER Pune and explore possibilities of collaborations.

18. Delegation of Directors and Vice Chancellors from the state of Baden-Wuerttemberg (January 23, 2017)

Discussions were held with this 14-member delegation to establish the background for collaborations.

19. University of Pennsylvania (January 23, 2017)

A delegation from University of Pennsylvania identified by MHRD visited IISER Pune. The delegation was conducting case studies for working on a paper on world class universities. As part of this, the delegation gathered information on procedures and institutional policies that have been crucial in the growth and functioning of IISER Pune.

20. International Technology Center-Pacific, Southern Asia (Singapore), U.S. Army Research, Development and Engineering Command (RDECOM), U.S. Embassy - Singapore (February 13, 2017)

Mr. David Scooler, Director, South East Asia Office (Singapore), International Technology Center-Pacific, Southern Asia (Singapore), U.S. Army Research, Development and Engineering Command (RDECOM), U.S. Embassy –

Singapore visited for an introductory meeting. The scope of the meeting was to promote cooperation with international researchers to advance science, engineering and technical capabilities in areas relevant to the overall U.S. Army mission.

21. Institut Français India based in New Delhi (February 15, 2017)

Dr. Bertrand de HARTINGH, Counsellor for Cooperation & Cultural Affairs and Country Director, Institut Français India based in New Delhi, visited IISER Pune. The aim of this visit was to get an overview of the collaborations currently in existence between IISER Pune and French Institutes, and to present Bonjour India, a series of events, conferences, and exhibitions in India celebrating Indo-French collaborations over the years in all spheres of life.

22. Newton Fund India, British High Commission (March 2, 2017)

Dr. Rita Sharma, Head, Newton Fund India, British High Commission, visited IISER Pune for an informational meeting on the overview of Newton Fund, Newton-Bhabha Fund, and British Council in the context of partnerships and activities of IISER Pune.

23. Korea Research Institute of Chemical Technology (KRICT), Republic of Korea (March 31, 2017)

A delegation from Korea Research Institute of Chemical Technology (KRICT) headed by Prof. Haiwon Lee visited IISER Pune to discuss (i) cooperative partnership between China, India, and Korea by launching trilateral convergent center for Game Changing Chemical Technology programs; (ii) trilateral cooperation to help the sustainable growth of Asian countries; and (iii) to build a platform leadership for Asia Chemical Technology Initiative by three global leaders in Asia (China, India, and Korea).

Activities carried out during the year under various MoUs:

1. Under the MoU with ENS Lyon

- a. BS-MS 3rd year student Ms. Isha Dhama carried out two-month (May 11-July 13, 2016) internship at ENS Lyon under supervision of Prof. Cyrille Monnereau.
- b. Prof. K.N. Ganesh, Director, IISER Pune, visited ENS Lyon (October 5, 2016) to discuss perspectives for collaboration.
- c. IISER Pune hosted Dr. Pradeep Das and Dr. Muriel Grammont from ENS Lyon from October 20, 2016 to November 2, 2016. They delivered 20 hours (14 hours of courses + 6 hours of tutorials) of lectures on “Mechanisms of development in plants and animals”. Target audience were 4th and 5th year BS-MS and PhD students.
- d. Prof. Shashidhara from IISER Pune travelled to ENS Lyon in November 2016. He delivered lectures in the topics of Modern Indian History – 20th and 21st century; Societal dynamics/Indian democracy/role of S&T in Indian growth in recent times; Traditional Indian art forms; and Environmental history of India.

2. BSc (Blended) Program at SPPU

BSc (Blended) Program at SPPU was launched to be run at Modern College with a batch of ~30 students. The program was launched on May 6, 2016 in the presence of Prof. Margaret Sheil, Provost, University of Melbourne and Prof. K.N. Ganesh, Director, IISER Pune. Prof. Sheil also visited IISER Pune to discuss research collaboration possibilities with IISER Pune. Conceptualization, planning, and implementation of this program have been closely monitored by Prof. B.S.M. Rao. A total of 9 seminars were organized during the first semester of the program with more to follow.

3. Under MoU with University of Glasgow

- a. Prof. William Cushley, Director International Relations, visited IISER Pune on May 20, 2016 to expand the collaborations in disciplines beyond Physics and Chemistry. The visit also aimed to explore possibility of any joint degree program.
- b. A delegation of scientists from University Glasgow visited IISER Pune on November 7, 2016 to interact with our faculty and discuss the options for strengthening the existing collaborations.
- c. Prof. Bill Cushley visited on January 12, 2017 to discuss proposals for Erasmus+ and joint programs with IISER Pune.

4. Under MoU with University of Göttingen

Göttingen-Pune Outreach Center was inaugurated on November 24, 2016. Prof. Uwe Muuss, Director, International Office and Dr. Ralf Ficner, Dean, Göttingen Graduate School of Neurosciences, along with other delegates from University of Göttingen attended the event. Activities to further the research collaboration between the two organizations were also discussed during the visit.



5. Delegation from Uppsala University, Sweden

Led by Prof. Lief Kirsebom (VC International, Director, Biology), a delegation from Sweden visited on January 9, 2017. IISER Pune is a partner with Uppsala in Erasmus Mundus Action 2 Program (active till July 2017). The aim of this visit was to identify research areas and explore potential collaborations.

Outgoing Students

A total of 71 students (BS MS, Integrated PhD, and PhD) from the institute have participated in international programs through internships and travel awards that they received. Details are given in the Academic Programs chapter of this Annual Report.

- 7 undergraduate students were selected for DAAD-WISE summer internship in German institutes/universities
- 2 undergraduate students were selected for Charpak Research Internship program to carry out summer internships in French institutes/universities
- 2 students went to Canada for research internship under Mitacs Global Program
- 2 undergraduate students were selected under the Khorana Program for summer internship in U.S.A.
- 26 undergraduate students went for summer internship/5th year project to various other foreign institutes/universities
- 10 Integrated PhD students and 22 PhD students went abroad under various programs; most of these visits were to carry out part of their research work

Incoming Students

A total of 9 students from abroad have visited IISER Pune as part of exchange programs to carry out short-term research projects.

- 2 students under Ohio State University exchange program
- 1 student from Canada funded by Ontario India Network program
- 2 students from UBC Canada under IISERP-IC IMPACTS MoU
- 1 student from Germany funded by DAAD- to carry out short-term research projects
- 3 students from US Universities

Outreach Activities

IISER Pune is engaged in educational and social outreach activities all through the year through various channels. The overall goal of these activities is three-fold: contributing to and improving primary education and teaching methods; informing the public about career and research opportunities in science; and spreading awareness about the impact of science on the society.



Visits by school and college students: As part of its outreach activities, the institute welcomes student groups from schools, junior and senior colleges, universities, and institutes from across India. Visitors are shown around IISER Pune campus equipped with lectures halls, teaching and research labs with state-of-the-art instruments, and library to provide a flavor of research and academic life on campus. Based on relevance and area of interest, the visiting groups are also given an opportunity to interact with IISER Pune faculty members from various fields. The visits are customised to suit the background and age-group of the students.



During 2016-17, over 3000 visitors from 48 institutes visited IISER Pune from different parts of the country. Of these, 2484 were visitors from Maharashtra state. The rest were from other parts of the country such as Delhi, Kerala, Andhra Pradesh, Tamil Nadu and Karnataka.

Among the visitors were 972 school students accompanied by 56 teachers and 1512 college students accompanied by 235 teachers. In addition, 598 other visitors participated in different training programs, workshops, and conferences.



Workshops on inquiry-based teaching and learning: Prof. K.P. Mohanan was involved in organizing the following workshops and interaction sessions towards incorporating inquiry-based methods in teaching. This process encourages learners arriving at answers through their own observation, thinking, reasoning, and judgment. Thus students would gain an understanding of concepts through inquiry and rational thinking as opposed to rote learning-based methods.

- 1) Two-day workshop on Achieving High Quality Education at the Tertiary Level for the faculty of Jindal Global University (October 22-23, 2016)
- 2) Nine-day workshop on Inquiry and Integration in Education (December 10-13, 2016): Organized in association with ThinQ; this is an annually run online course for which a face-to-face workshop was run for selected participants. The Workshop was attended by 15 participants and 8 facilitators.
- 3) *Workshop on Inquiry-based Learning* (December 31-January 1, 2016): This two-day workshop was held for a group of 30 school children from 9th grade from Kaveri Schools with the goal of demonstrating inquiry-based learning in a classroom setting.
- 4) Two-day workshop on Achieving High Quality Education at the Tertiary Level for the faculty of BITS Pilani in Pilani (January 9-10, 2017)
- 5) Two-day workshop on Critical Thinking and Inquiry for the faculty in University College for Women, Hyderabad (January 21-22, 2017)

Science Media Centre

Established in 2012, the Science Media Centre at the institute is involved in the conception and production of high quality media for scientific research as well as science popularization. In addition, a major activity is in human resource development in the field of science communication. The Centre conducts workshops for training personnel for science communication through various media and serves as an archive of scientific events and activities of the institute. The Centre has organized the following training workshops during 2016-17.

Weekend Workshop on Video Production

April 30- May 1, 2016



This workshop was held to address the growing need for expertise in the generation of video content. About 15 institute members, comprising mostly of students, attended the workshop. The workshop gave an orientation on how to prepare, plan, and execute videos. The participants were introduced to the tools and techniques of video production in the following stages: Pre-production: Script, plan, get ready to shoot; Production: Handling camera, lights, sound equipment, presentation and production; Post-production: Audio video editing and graphics. During the course of

the workshop, participants worked in groups and produced a high quality short film and a documentary.

Workshop on 3D Animation for Science Communication

May 23-24, 2016

The objective of the workshop was to introduce the participants to the basics of graphics and animation. Topics on 3D animation workflow and techniques to create science teaching and learning materials were discussed. About 15 IISER Pune members participated in this event to explore how graphics and animation can be used to communicate scientific ideas and concepts.

Workshop on Basics of Audio Video Production

June 18-23, 2016

The objective of this workshop was to familiarize the participants with video production tools and techniques and handling of cameras and microphones to record audio and video for various projects. About 20 participants attended the workshop; they were introduced to different video editing, graphics softwares and editing practices. Sudesh Balan of IDC, IIT Bombay introduced the techniques of scripting to the participants and Nita Beliappa, Science Media Consultant at IISER Pune, gave a talk on basics of audio production. Participants worked in teams to write, direct, shoot and edit a short science-based film/public service announcement.



Science Communication Workshop

December 20-23, 2016

This 4-day workshop dealt with challenges and methods of communicating science to the public. Twelve participants attended the workshop. Dr. T.V. Venkateswaran of Vigyan Prasar gave tips writing for print media.

Centre of Excellence in Science and Mathematics Education

As part of the Pandit Madan Mohan Malaviya National Mission for Teachers and Training (PMMMNMTT) scheme of MHRD, this centre has become functional at IISER Pune since October 2015. The Centre has organized several workshops related to pedagogical innovation by and for school/college teachers and educationists and science and mathematics educational camps for students.

Between April 2016 and March 2017, the Centre has implemented 25 different activities for a total of 1697 participants. Some of the activities were carried out at two levels, with selected participants from Level 1, getting advanced training in the Level 2 workshops. A total of 1610 people thus benefited from activities in the last financial year.

Details of the Centre's activities are included in the News and Events section of this report.

Social Outreach

Social outreach activities conducted by voluntary organizations at the institute run primarily by the IISER Pune student community in association with faculty coordinators are described here.

Disha is a student-run organization and a structured platform for IISER Pune members to interact with the society in meaningful ways. Majority of Disha's work involves increasing the quality and accessibility of education for the socio-economically marginalized. Disha runs three major programs throughout the year: Abhyasika, Science Nurture Program, and Mindspark; and three annual events: Jigyasa, Spread the Smile, and Vigyan Mela.



Abhyasika

Volunteers visit a vasti (locality) near IISER Pune weekday evenings for one hour a day to help students of the vasti with their school studies. Around 30 children studying classes I-VI attended these sessions held in a public room in the vasti.

Science Nurture Program

This program is funded by Rashtriya Avishkar Abhiyan, an MHRD initiative. Volunteers conducted science popularization activities to students from municipality schools along with a visit to Pimpri Chinchwad Science Park.

Mindspark

This program aims to prepare 8th standard students for state scholarship examination. Classes were held for ~30 students selected from two vidyaniketan schools at IISER Pune every Saturday and Sunday for three hours a day. Students were coached in mathematics, mental ability, and languages.

Jigyasa Science Camp

(July 21-24, 2016)

In this event organized in coordination with the NGO Bachpan Banao, 40 students of class VI to VIII from Dantewada district of Chattisgarh visited IISER Pune for about 3 days. Activities covering science, health and hygiene, education, etc., were organized. About 6-10 student volunteers and two faculty members were involved.

Spread the Smile

(January 21 - February 5, 2017, over 3 weekends)

In groups of 6-8, volunteers visited the following 6 villages in Maharashtra, over 3 weekends: Wada, Padali, Kolvan, Kashig, Asde, Kule. Around 60 students and a few faculty members participated. They carried out demonstrations of simple science experiments, stargazing, map-making, sextant making, etc., for class VI to VIII students from village schools. A total of 500 school children attended these sessions.



Prutha, the green initiative on the campus, has organized events to promote a clean campus and an awareness for issues related to the environment. A campus clean-up to collect plastic and other waste was organized in association with Karavaan'16 Social Initiatives. Regular sessions of paper sorting were held to segregate paper collected from baskets that Prutha arranged across the campus. Non-reusable paper was given away for recycling and reusable paper was given to Disha for their activities.

A clothes-donation drive, Vastrasamman, was run and the collected clothes were donated to Goodwill India, an NGO that collects used clothes and sells them to those in need at very low prices.

Bird watching sessions were organised in the months of October and November over 3 sessions on the Panchvati hills. This was followed by a short clean-up session.

Prutha carried out a campus waste management audit by interviewing those in-charge of taking care of the waste generated in the various buildings on campus. Using the information gathered, the team has prepared a plan and recommendations for improving the waste segregation and management on campus.



Colloquia and Public Lectures

April 11, 2016

Internal Dynamics of the Earth

Prof. Yanick Ricard

Vice-President in charge of Research of ENS de Lyon, France

April 12, 2016

So Many Dynamos

Prof. Jean-François Pinton

President of ENS de Lyon, France

May 18, 2016

The World of the Ultra-low Temperatures

Prof. Luis Santos

Director, Institute of Theoretical Physics, Leibnitz University of Hannover, Germany

September 15, 2016

Unpublished Patterns of Thought: Alan Turing's later work on Morphogenesis

Prof. Jonathan Dawes

University of Bath, U.K.

October 17, 2016

Digitised Democracy and how to reap Educational Benefits

Sujatha Ramdorai

University of British Columbia, Canada

November 9, 2016 | Third Annual Homi Bhabha Memorial Public Lecture

The Fascinating World of Ultra Cold Atoms in Optical Lattices

Prof. H.R. Krishnamurthy

Indian Institute of Science, Bengaluru

December 2, 2016

Learnt from Nature, Made in Lab

Dr. Pranesh Sengupta

Materials Science Division, BARC, Mumbai

December 9, 2016

Quantum Computing and Majorana Fermions

Louis Kauffman

University of Illinois, Chicago, U.S.A.

December 12, 2016

Climate Wars: Communicating Global Warming to the Public

Prof. Iain Stewart

University of Plymouth, U.K.

January 9, 2017

Exploring the New Frontier of Gravitational-Wave Astronomy

Dr. Fred Raab

Head, LIGO Hanford Observatory, U.S.A.

February 11, 2017

From Matter to Life: Chemistry? Chemistry!

Prof. Jean-Marie Lehn, Nobel Laureate in Chemistry (1987)

Institut de Science et d'Ingénierie Supramoléculaires (ISIS), Université de Strasbourg, France

February 14, 2017

Uniqueness of Indian Geology

Prof. K.S. Mishra

Petroleum University, Dehradun

February 15, 2017

Climate Change: Science and Society

Jagadish Shukla

George Mason University, Fairfax, Virginia, U.S.A.

March 9, 2017

Why Biomedical Research needs Discovery Research

Prof. Alejandro Sanchez Alvarado

Howard Hughes Medical Institute Investigator, Stowers Institute for Medical Research, U.S.A.

March 31, 2017

Women in Mathematics and Physics

Prof. Rohini Godbole

Centre for High Energy Physics, Indian Institute of Science, Bengaluru

Mini-Courses and Lecture Series

August 29-September 2, 2017 | Mini-Course

Inverse Theory and Seismic Data Processing

Mr. Rahul Dehiya

IIT Roorkee

September 5-7, 2016 | Mini-Course

Rough Path Theory

Dr. Atul Shekhar

Indian Statistical Institute, Bengaluru

March 2017 | Mini-Course

Dark Matter in the Universe

Prof. Probir Roy

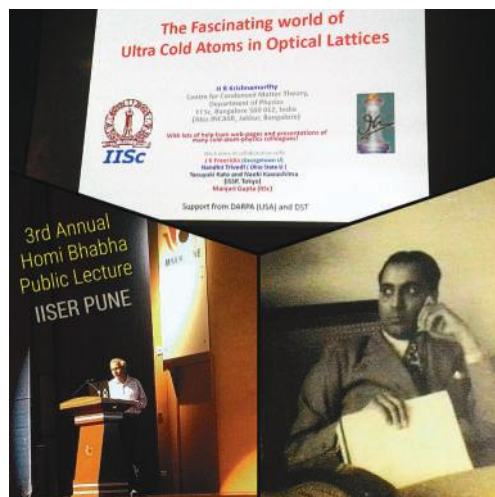
Centre for Astroparticle Physics and Space Science, Bose Institute, Kolkata

March 29-31, 2017 | Lecture Series

Understanding Earth's magnetic Field and Geodynamo

Prof. Vinod Gaur

Centre for Mathematical Modelling and Computer Simulation, Bengaluru



Prof. H.R. Krishnamurthy delivered the 3rd Homi Bhabha Public Lecture (November 9, 2016)



Nobel Laureate Prof. Jean-Marie Lehn at IISER Pune (February 11, 2017)



Research Seminars

April 2016

Speaker	Affiliation	Title	Date
R.I. Sujith	Indian Institute of Technology, Madras	Intermittency route to thermoacoustic instability in turbulent combustors	April 1, 2016
Banibrata Mukhopadhyay	Indian Institute of Science, Bengaluru	Recent exciting developments of astrophysics: Compact objects to astrophysical fluids	April 5, 2016
Roop Mallik	Tata Institute of Fundamental Research, Mumbai	Cholesterol, geometry and Kala-Azar	April 8, 2016
Mohit Kumar Jolly	Rice University, Houston, TX, U.S.A.	Decoding the principles of epithelial-hybrid-mesenchymal transitions	April 8, 2016
R. Ramesh	Indian Institute of Astrophysics, Bengaluru	Low frequency radio observations of the Sun	April 11, 2016
Arun Mangalam	Indian Institute of Astrophysics, Bengaluru	A global galactic dynamo with a corona constrained by relative helicity	April 13, 2016
Arpita Mitra	S.N. Bose National Centre for Basic Sciences, Kolkata	Non-relativistic fields and fluids on curved backgrounds	April 13, 2016
Indranil Banerjee	Frieich Miescher Institute for Biomedical Research, Basel, Switzerland	Influenza virus capsid disassembly: How a hard nut cracks itself to infect cells by carjacking molecular motors	April 13, 2016
Sadiqali Rangwala	Raman Research Institute, Bengaluru	Cooling ions with atoms	April 18, 2016
Gaurav Das	University of Oxford, U.K.	Of flies and food: Neural basis of food memories, deprivation states and food emesis in <i>Drosophila</i>	April 18, 2016
Hyung-il Lee	Department of Chemistry University of Ulsan, Korea	Water-soluble polymers for sensing applications	April 18, 2016
Senthil Arumugam	University of New South Wales, Sydney, Australia	Mechanisms of Shiga toxin clustering and entry into cells	April 18, 2016
Sankeerth Hebbar	University of Nottingham, U.K.	DNP followed by high resolution NMR: Two approaches	April 18, 2016
Anirban Bose	Institute of Mathematical Sciences, Chennai	Real elements in groups of type F4	April 18, 2016
Dilpreet Kaur	Symbiosis Institute of Technology, Pune	Real special 2-groups	April 19, 2016
Gitanjali Yadav	National Institute of Plant Genome Research (NIPGR), New Delhi	Measuring the invasive terpenome for genomic signatures that endow competitive superiority	April 20, 2016

Speaker	Affiliation	Title	Date
Jahnvi Joshi	National Centre for Biological Sciences, Bengaluru	Understanding speciation in Asian tropical forests: A case study each of centipedes and butterflies	April 21, 2016
Gugan Thoppe	Technion, Israel	Random d -complexes: Minimal spanning acycles and persistence diagrams	April 22, 2016
Tarun Sharma	Weizmann Institute of Science, Israel	Monopole operators in 3d N=2 Chen-Simons matter theories	April 25, 2016
Arnab Das	Indian Association for the Cultivation of Science, Kolkata	Periodically driven 'closed' quantum many-body system: From dynamical freezing to periodic Gibbs' ensemble	April 29, 2016
Partha Sarathi Mukherjee	Indian Institute of Science, Bengaluru	Functional molecular nano vessels and self-sorting	April 29, 2016

May 2016

Raghavan Varadarajan	Indian Institute of Science, Bengaluru	Immunogen design for HIV-1 and influenza	May 5, 2016
Ashokkumar Muthupandian	University of Melbourne, Australia	Ultrasonic technology for nanomaterial synthesis and food/bioprocessing	May 5, 2016
Tanweer Hussain	MRC Laboratory of Molecular Biology, Cambridge, U.K.	Structural insights into key events during translation initiation	May 11, 2016
Manjunatha Thondamal	University of Rochester Medical Center, Rochester NY	Molecular links between nutrition, reproduction, and lifespan	May 12, 2016
Bhuvanesh Awasthi	University of Glasgow, U.K.	Influence of low-level stimulus features on high-level stimulus categorization: Behavioral and neural evidence	May 13, 2016
Madhulika Dixit	Indian Institute of Technology, Madras	Dysfunctional endothelium and vascular progenitors: A legacy of impaired glucose metabolism	May 16, 2016
V.G. Narasimha Kumar Cheraku	Indian Institute of Technology, Hyderabad	On the gaps between non-zero Fourier coefficients of cusp forms of higher weight	May 20, 2016
Surajit Sinha	Indian Association for the Cultivation of Science, Kolkata	Internal oligoguanidinium-based cellular transporter enhances antisense efficacy of morpholinos in <i>in-vitro</i> and zebrafish model	May 25, 2016
Sambashiva Banala	Janelia Research Campus, Howard Hughes Medical Institute, U.S.A.	Development of novel chemical tools for biological applications	May 26, 2016

June 2016

Vilas Pol	Purdue University, West Lafayette, U.S.A.	Electrode materials synthesis, engineering and characterization for rechargeable batteries	June 6, 2016
P.I. Pradeepkumar	Indian Institute of Technology, Bombay	Structural and functional insights into translesion DNA synthesis and RNA interference	June 8, 2016
Neha Gupta	Shiv Nadar University, Greater Noida	Frobenius algebras and 2d - Topological Quantum Field Theories (TQFT)	June 14, 2016

Speaker	Affiliation	Title	Date
Arunangshu Biswas	Presidency University, Kolkata	Statistical simulation using Adaptive Markov chain Monte Carlo techniques	June 16, 2016
Kalpana Makhijani	University of California, San Francisco, U.S.A.	Neuron-produced Activin β supports hematopoiesis in the <i>Drosophila</i> larva	June 20, 2016
Amitabha Nandi	Indian Institute of Technology, Bombay	Collective cellular flows during morphogenesis	June 21, 2016
K.R. Vinothkumar	MRC-Laboratory of Molecular Biology, Cambridge, U.K.	Membrane protein structures without crystals, by single particle electron cryomicroscopy	June 23, 2016
Sougata Roy	EBI-Hinxton and EMBL, Heidelberg	Timing is the key to survival: Is <i>Lingulodinium</i> circadian system unique?	June 23, 2016
Aseem Ansari	University of Wisconsin-Madison, U.S.A.	Applying new design rules to create synthetic heterochromatin-targeted regulators of RNA polymerase II	June 23, 2016
Anand Krishnan	Johns Hopkins University, Maryland, U.S.A.	Multimodal sensing in the natural environment: A comparative perspective	June 25, 2016
Varun Bhalerao	Inter-University Centre for Astronomy and Astrophysics, Pune	The quest for astrophysical transients	June 29, 2016
G.J. Sreejith	Max Planck Institute for Physics of Complex Systems, Dresden, Germany	Anyon binding and fractional angular momenta of impurity particles in a quantum Hall liquid	June 30, 2016
Chandrashekhar Pasare	University of Texas South western Medical Center, Dallas, Texas, U.S.A.	Host defense pathways: Toll-like receptors and inflammatory responses	June 30, 2016

July 2016

Krishnendu Gongopadhyay	Indian Institute of Science Education and Research, Mohali	Reversible elements of complex hyperbolic isometries	July 1, 2016
Kana M. Sureshan	Indian Institute of Science Education and Research, Thiruvananthapuram	TAAC reaction for biopolymer synthesis	July 7, 2016
Shuvomoy Banerjee	Amity University, Noida Campus, New Delhi	Gamma herpesvirus-mediated deregulation of cell signaling & immune surveillance: Implications in host pathogenesis & cancers	July 8, 2016
Sudip Mondal	University of Texas at Austin, Texas, U.S.A.	High-resolution three-dimensional imaging of <i>C. elegans</i>	July 11, 2016
Sudhakaran Prabhakaran	University of Cambridge, U.K.	Dark matter of the human genome and complex proteome	July 19, 2016
Hidehiro Sakurai	Osaka University, Japan	Sumanene and its derivatives: C ₃ -symmetric buckybowls	July 19, 2016
Burkhard Fechner	Coherent GmbH, Goettingen, Germany	Direct excimer laser ablation for smaller features sizes in advanced chip packaging	July 21, 2016
Umesh Dubey	Indian Institute of Science, Bengaluru	Homological projective duality	July 22, 2016
Soumya Iyengar	National Brain Research Centre, Manesar	Mirror, mirror on the wall... and some other aspects of Corvid brain structure and cognition	July 25, 2016

Speaker	Affiliation	Title	Date
Mamta Balodi	Institute of Mathematical Sciences, Chennai	A dual version of Ore's theorem for Boolean intervals	July 28, 2016
Mike Zaworotko	University of Limerick, Ireland	Crystal engineering: Form to function	July 29, 2016

August 2016

Vivek M. Vyas	Institute of Mathematical Sciences, Chennai	Condensates, coherence and Dicke superradiance	August 3, 2016
Aditya D. Mohite	Los Alamos National Laboratory, New Mexico, U.S.A.	Hybrid perovskites solar cells: Opportunities and challenges	August 5, 2016
Shailesh Tipnis	Illinois State University, U.S.A.	A card trick: Protocol, Graph model and extensions	August 8, 2016
Sunish Radhakrishnan	Indian Institute of Science Education and Research, Thiruvananthapuram	Topoisomerase IV activity in bacteria gets a redox switch	August 9, 2016
Sachin Jain	Cornell University, U.S.A.	Quantum Field Theory beyond weak coupling perturbation theory	August 9, 2016
Anosh Joseph	University of Cambridge, Cambridge, U.K.	Lattice supersymmetry and applications to gauge/gravity duality	August 10, 2016
Syed Hussain Mubarak	University of Oregon, U.S.A.	Dual extrinsic cues generate temporal identity in neural stem cell lineages	August 10, 2016
Abhay Shukla	Pierre and Marie Curie University, Paris, France	Electronic phase transitions and vibrational modes in 2D materials	August 10, 2016
V. Aravindan	Nanyang Technological University, Singapore	Challenges and perspectives beyond Li-ion intercalation chemistry	August 11, 2016
Rekha Samuel	Christian Medical College, Vellore	Pathophysiology and molecular pathways regulating pericyte phenotype in type 2 Diabetes. The gestational <i>Diabetes Mellitus</i> placental model	August 16, 2016
Jeremy Eckhause	RAND Corporation	Using dynamic programming to solve sequential decision models	August 16, 2016
Samrat Mukhopadhyay	Indian Institute of Science Education and Research, Mohali	Biological water in amyloid proteins	August 18, 2016
Rajendra Bhatia	Indian Statistical Institute, Delhi	A brief history of Fourier series	August 18, 2016
Jitendra K. Bera	Indian Institute of Technology, Kanpur	Bifunctionality in organometallic catalysis	August 19, 2016
Rajendra Bhatia	Indian Statistical Institute, Delhi	Riemannian geometry and matrix means	August 19, 2016
Tuhin Roy	Tata Institute of Fundamental Research, Mumbai	Generalized supersoft supersymmetry	August 22, 2016
Mike Arnold	University of Georgia, Athens, Georgia, U.S.A.	The web-of-life - An evolutionary stimulus in changing environments?	August 25, 2016
Stephan Baier	Jawaharlal Nehru University, New Delhi	On gaps between zeros of Epstein's zeta function	August 26, 2016
Krishna B. Athreya	Iowa State University, U.S.A.	Wierstrass approximation thm for continuous functions on unit interval by polynomials via weak law for coin tossing and Stirlings formula via local clt for Poisson rv	August 26, 2016

Speaker	Affiliation	Title	Date
Krishna B. Athreya	Iowa State University, U.S.A.	General Glivenko Cantelli thms	August 26, 2016
Mainak Poddar	Middle East Technical University, Northern Cyprus Campus	Group actions and non-Kähler complex manifolds	August 26, 2016

September 2016

David Hutchinson	University of Otago, New Zealand	Quantum technology research in New Zealand	September 1, 2016
Akshaa Vatwani	University of Waterloo, Canada	Twin primes and the parity problem	September 2, 2016
Atul Shekhar	Indian Statistical Institute, Bengaluru	Minicourse on rough path theory Part-1	September 5, 2016
Prayag Murawala	DFG-Center for Regenerative Therapies, Dresden, Germany	Understanding cellular and molecular cues that drive axolotl limb regeneration	September 6, 2016
Atul Shekhar	Indian Statistical Institute, Bengaluru	Minicourse on rough path theory Part-2	September 6, 2016
Atul Shekhar	Indian Statistical Institute, Bengaluru	Minicourse on rough path theory Part-3	September 7, 2016
Syed Khadri	Amravati University, Maharashtra	Stratigraphic, geochemical, paleomagnetic and geochronological studies of Western Deccan Basalts with emphasis on proposed correlation of sub-surface basalts in KG Basin and their relation to end cretaceous mass extinctions	September 7, 2016
Valentin Reys	NIKHEF, Amsterdam	Localization in context: Exact results for quantum black hole entropy	September 9, 2016
Sourav Pal	Indian Institute of Technology, Bombay	Rational dilation and its connection with geometry of underlying complex domain	September 9, 2016
Mathew Joseph	University of Sheffield, U.K.	Longest increasing path within the critical strip	September 9, 2016
Amitabha Chattopadhyay	Centre for Cellular and Molecular Biology, Hyderabad	GPCR-cholesterol interaction: Novel insights in health & disease	September 16, 2016
Sanjay Puri	Jawaharlal Nehru University, New Delhi	Pattern formation in the kinetics of phase transitions	September 19, 2016
Nishita Desai	Institute for Theoretical Physics, Heidelberg, Germany	Searching for dark matter at the LHC and beyond	September 20, 2016
Brajesh Gupta	Penn State University, U.S.A.	Quantum gravity, very early universe and the cosmic microwave background	September 22, 2016
Ross McKenzie	University of Queensland, Brisbane, Australia	Emergent states of quantum matter	September 26, 2016
Angika Basant	University of Chicago, U.S.A.	Positioning the plane of cell division: The role of cortical central spindlin	September 26, 2016
Vineeta Bal	National Institute of Immunology, New Delhi	Learning from the diversity in CD4 T cell responses	September 29, 2016
Richard D. Morgan	New England Biolabs, Inc., Ipswich, U.S.A.	Bacterial epigenetics revealed by SMRT sequencing: A bonanza for characterizing restriction-modification systems	September 30, 2016

Speaker	Affiliation	Title	Date
Michael Smutny	Institute of Science and Technology, Austria	Friction forces at tissue boundaries drive tissue morphogenesis during embryonic development	September 30, 2016

October 2016

Jens Mueller	Institute of Physics, Goethe-University Frankfurt, Germany	Studying charge carrier dynamics by fluctuation spectroscopy - An overview	October 3, 2016
S.M. Shivaprasad	Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru	Some exotic properties of the GaN nanowall network	October 3, 2016
Subhamoy Maitra	Indian Statistical Institute, Kolkata	On Boolean functions with nonlinearity greater than bent concatenation bound	October 3, 2016
Bidya Binayak Karak	High Altitude Observatory, Boulder, CO, U.S.A.	Solar magnetic fields and cycles: Understanding the dynamo Mechanism	October 4, 2016
Sayantani Bhattacharyya	Indian Institute of Technology, Kanpur	New perturbative techniques to solve equations of gravity	October 6, 2016
Keshav M. Dani	Okinawa Institute of Science and Technology, Japan	Electrons go to Bollywood!	October 7, 2016
Sachin Ranade	Associate Editor, Nature Communications	How to get published in Nature titles!	October 12, 2016
Sushil Mujumdar	Tata Institute of Fundamental Research, Mumbai	Anderson localization and Levy sums in random lasers	October 17, 2016
Navjeevan Dadwal	Gurukula Kangri University, Haridwar	Singing patterns of pied bush chat (<i>Saxicola caprata</i>) across years and nesting cycles	October 17, 2016
Sayantan Majumdar	James Franck Institute, the University of Chicago, U.S.A.	Encoding mechano-memories in F-actin networks	October 18, 2016
Corinne Dejous	University of Bordeaux, France	IMS Bordeaux: Wave-based resonant microsensors for chemical and biological detection, examples of environmental and health related applications	October 18, 2016
Debdip Ganguly	Technion - Israel Institute of Technology, Haifa	Sharp functional inequalities of Hardy type and involving curvature on Riemannian manifolds	October 18, 2016
Pankaj Kumar	Korea Astronomy and Space Science Institute, Daejeon	Multiwavelength investigations of solar eruptions and associated physical processes	October 19, 2016
Amol Shivange	California Institute of Technology, Pasadena, U.S.A.	Spatio-temporal dynamics of signaling pathways altered by "undruggable proteins" in cancer using peptide discovery and protein engineering	October 19, 2016
Satyajit Rath	National Institute of Immunology, New Delhi	Argumentative biologies: Sources and consequences of immunological diversity	October 20, 2016
Giacomoni Jacques	University of Pau, France	Diaz-Saa inequality for variable exponent problems	October 20, 2016
Sonal Khanolkar	Indian Institute of Technology Bombay	Biotic response to Eocene climate change in India	October 20, 2016

Speaker	Affiliation	Title	Date
Peter Thomassen	Rutgers university, U.S.A.	Seesaw and multileptons at the LHC	October 21, 2016
Pradeep Das	École normale supérieure de Lyon, France	Patterning and morphogenesis during early flower development	October 21, 2016
Hari Sahasrabudde	Indian Institute of Technology Bombay	An overview of Artificial Intelligence	October 21, 2016
Govind Krishnaswami	Chennai Mathematical Institute, Chennai	Regularization of ideal flow	October 24, 2016
Kenton Swartz	National Institute of Neurological Disorders and Stroke (NIH), Bethesda, U.S.A.	Molecular structure and mechanism of activation for the heat-sensing capsaicin receptor	October 24, 2016
Sujoy Ghosh	Indian Institute of Technology, Kharagpur	Water in the deep Earth at 660-km: Mineral physics view; Water in the lower mantle	October 26, 2016
Muriel Grammont	École normale supérieure de Lyon, France	Deciphering the mechanics and the genetics of cell flattening in <i>Drosophila</i>	October 27, 2016
Swastik Bhattacharya	Indian Institute of Science Education and Research, Thiruvananthapuram	Fluctuations and transport phenomena in horizon-fluids for black holes	October 27, 2016

November 2016

Nitin S. Chouhan	Rudolf Virchow Centre, University of Wurzburg, Germany	Circadian clock facilitates memory formation in <i>Drosophila melanogaster</i>	November 3, 2016
Tulasi Parashar	University of Delaware, U.S.A.	Kinetic physics of turbulent collisionless astrophysical plasmas	November 4, 2016
Seshadri Sridhar	Raman Research Institute, Bengaluru	Stellar dynamics and statistical mechanics	November 7, 2016
Eduard Kontar	University of Glasgow, U.K.	Solar flares and energetic particles	November 8, 2016
Ashish Arora	University of Münster, Germany	Optical and high field magneto-optical investigations on atomically thin sheets of WS_2 , WSe_2 , $MoSe_2$ and $MoTe_2$: A new family of semiconductors	November 8, 2016
Janice Reid	Pacific Northwest Research Station, U.S.A.	The effects of habitat loss, barred owls, and climate on the long-term demography of the Northern Spotted Owl	November 9, 2016
Shambaditya Saha	Max Planck Institute of Molecular Cell Biology and Genetics, Dresden, Germany	A competition mechanism positions non-membrane-bound organelles in cells	November 11, 2016
Kalyan Chakraborty	Harish-Chandra Research Institute, Allahabad	Class numbers of certain number fields	November 11, 2016
Pradeep K. Mohanty	Saha Institute of Nuclear Physics, Kolkata	Zeroth law in non-equilibrium - a hot needle in water	November 15, 2016
Arghya Taraphder	Indian Institute of Technology, Kharagpur	Oxide hetero-interfaces: Emergent phenomena in "plane" view	November 16, 2016
K.N. Raghavan	Institute of Mathematical Sciences, Chennai	Singularities of Schubert varieties---a selective survey	November 16, 2016

Speaker	Affiliation	Title	Date
Maddika SubbaReddy	Centre for DNA Fingerprinting and Diagnostics, Hyderabad	Dissecting cell biology using proteomics	November 17, 2016
Shailesh Tipnis	Illinois State University, U.S.A.	Path decompositions of regular graphs and multigraphs	November 18, 2016
Jose Ignacio Burgos Gil	Instituto de Ciencias Matemáticas, Madrid, Spain	Where do little elliptic curves go?	November 18, 2016
Kartik Sunagar	Hebrew University of Jerusalem, Jerusalem	Deadly innovations. 'Venomics' for evolution, ecology, and snakebite management	November 21, 2016
Suchetan Pal	Center for Molecular Imaging and Nanotechnology (CMINT), Memorial Sloan Kettering Cancer Center, New York, U.S.A.	DNA nanostructures: From self-assembly to cancer imaging	November 21, 2016
Ankush Shrivastava	University of Delhi	Late Neogene - Quaternary Planktic foraminiferal biostratigraphy and paleoceanography of ODP Site 1085, southeast Atlantic	November 22, 2016
Sandeep Rakshit	D.Y. Patil Institute of Management, Pune	Big idea-Data and analytics	November 23, 2016
Matteo Longo	Universities of Padua, Italy	The Iwasawa main conjectures for elliptic curves	November 23, 2016
Ludger Overbeck	Justus Liebig University Giessen, Germany	Feynman Kac representation of path dependent PDEs	November 23, 2016
Ralf Ficner	Georg-August-University Goettingen, Germany	Structural insights into RNA-processing enzymes	November 24, 2016
Umesh Dubey	Harish-Chandra Research Institute, Allahabad	Tensor triangular Chow group	November 24, 2016
Deborah M. Power	Universidade do Algarve, Faro, Portugal	Mapping thyroid axis evolution through metamorphosis	November 25, 2016
Akhil Ranjan	Indian Institute of Technology, Bombay	Simultaneous bilinear equations and metric foliations of spheres	November 25, 2016
Matteo Longo	Universities of Padua, Italy	Variation of anticyclotomic Iwasawa invariants in Hida families	November 25, 2016
Sagarika Roy	Indian Institute of Science, Bengaluru	Geospatial & hydrologic modeling to earth, climate and environmental science: An integrated interdisciplinary approach	November 25, 2016
Mintu Porel	Cornell University, Ithaca, New York	Novel classes of supramolecules and macromolecules: Design, synthesis and applications	November 28, 2016
Srimonta Gayen	University of Michigan Medical School	Epigenetic regulation by long non-coding RNAs and histone modifiers through the lens of X-chromosome inactivation	November 28, 2016
Bijay Kumar Agarwalla	University of Toronto, Canada	Non-equilibrium statistical physics for small quantum systems	November 29, 2016
Priyavrat Deshpande	Chennai Mathematical Institute, Chennai	Moduli space of planar polygons: A topological study of mechanical linkages	November 29, 2016
Padmabati Mondal	University of Basel, Switzerland	Spectroscopy, dynamics and bindings of benzo nitrile in lysozyme: Implications for protein-ligand binding studies	November 30, 2016

Speaker	Affiliation	Title	Date
Sitindra Dirghangi	Indian Institute of Science Education and Research, Kolkata	An evaluation of the environmental and biological controlling factors of lipid-based climate proxies	November 30, 2016

December 2016

Rohinton Kamakaka	University of California, Santa Cruz California, U.S.A.	A silent looping journey has boundaries	December 1, 2016
Alik Sundar Majumdar	Indian Institute of Technology, Bombay	Re-investigating petrology fundamentals: Earlier material science approach to present-day mineralogy	December 2, 2016
H. Ananthnarayan	Indian Institute of Technology, Bombay	Idealizations and connected sums	December 5, 2016
Souvik Goswami	Instituto de Ciencias Matemáticas, Madrid, Spain	Story of height pairings	December 5, 2016
Bijilash Babu	Epika, Thiruvananthapuram	Smart machines: Driving the fourth industrial revolution?	December 8, 2016
Aditi Borkar	University of Cambridge, U.K.	Investigating low-population binding intermediates in protein-RNA recognition	December 9, 2016
Louis H. Kauffman	University of Illinois, Chicago	Introduction to knots, knotoids and detecting the unknot	December 9, 2016
Debraj Chakrabarti	Central Michigan University, U.S.A.	The overline{\partial}-problem in pseudoconcave annuli	December 12, 2016
Maria Moriel-Carretero	Institute of Human Genetics, Montpellier, France	The Fanconi anemia proteins FANCD2 and FANCI modulate the dynamic organization of splicing factors	December 14, 2016
Dinyar Patel	University of South Carolina, U.S.A.	Dadabhai Naoroji and the Genesis of Swaraj	December 15, 2016
Mani S. Mahadevan	University of Virginia, U.S.A.	RNA toxicity in disease	December 19, 2016
Sneha Bajpe	University of Oxford, U.K.	Defects by design	December 19, 2016
Ron Folman	Ben Gurion University, Beersheba, Israel	Matter waves exposed to the external world: From decoherence to gravity and back	December 20, 2016
Asilata Bapat	University of Georgia, Athens, U.S.A.	Towards compactifications of Calogero-Moser space	December 20, 2016
Bernard de Wit	Institute for Theoretical Physics, Utrecht University, the Netherlands	On conformal supergravities in four space-time dimensions	December 20, 2016
Pradip Chakraborty	University of Geneva, Switzerland	Strategy to tune cooperativity in spin-crossover compounds and equilibrium dopant composition in semiconductor nanocrystals	December 20, 2016
Anand Deopurkar	University of Georgia, Athens, U.S.A.	Vector bundles and finite covers	December 20, 2016
Christoph Schneider	Institut für Organische Chemie - Universität Leipzig, Germany	Catalytic, enantioselective multicomponent reactions for the rapid assembly of molecular complexity	December 20, 2016

Speaker	Affiliation	Title	Date
Shaon Chakraborty	Dana-Farber Cancer Institute, U.S.A.	Inferring drug effects on cancer evolution and heterogeneity: From bulk to single cells	December 21, 2016
Satya Majumdar	University of Paris-Sud, France	KPZ story	December 22, 2016
Madhura Kulkarni	Cancer Science Institute of Singapore, Centre for Translational Medicine, Singapore	Hippo signaling in breast cancer progression	December 22, 2016
Shivaprakash Ramakrishna	Laboratory for Surface Science and Technology, ETH Zurich, Switzerland	Tuning tribological and mechanical properties of surfaces by gradient and graded fabrication	December 22, 2016
Mahul Chakraborty	University of California Irvine, U.S.A.	Beyond the tip of the iceberg: Uncovering hidden genetic variants in <i>Drosophila</i> using long molecule sequencing	December 23, 2016
Nitin J. Karandikar	University of Iowa Carver College of Medicine, U.S.A.	Immune regulation of autoimmune demyelinating disease	December 23, 2016
Fan Baomin	Yunnan Minzu University, Kunming, China	Asymmetric reactions of norbornadiene derivatives	December 23, 2016
Sudipta Sarkar	GEOMAR-Helmholtz Centre for Ocean Research, Kiel, Germany	Down the rabbit hole: Toward understanding the causative link between ocean warming and hydrate dissociation from contemporary examples	December 23, 2016
Deepika Bhattu	Laboratory of Atmospheric Chemistry, Paul Scherrer Institut, Switzerland	Organic aerosols: Source, apportionment, cloud condensation nuclei and biomass combustion	December 26, 2016
Varun Chaudhary	Nanyang Technological University, Singapore	High performance iron based magnetocaloric nanomaterials	December 27, 2016
Randolf Dag Köhn	University of Bath, Bath, United Kingdom	Catalytic selective olefin trimerisation	December 28, 2016
Ritwick Sawarkar	Max Planck Institute of Immunobiology and Epigenetics, Freiburg, Germany	Linking epigenetics with evolution via molecular chaperones	December 29, 2016

January 2017

Vivek Venkataraman	Harvard University, Cambridge, U.S.A.	Nonlinear photonics in confined media	January 2, 2017
Jacob Matherne	University of Massachusetts Amherst, U.S.A.	A combinatorial Fourier transform for quiver representation varieties in type A	January 2, 2017
Abhijeet Pataskar	Institute of Molecular Biology Mainz, Germany	NeuroD1 reprograms transcription factor and chromatin landscape to induce neuronal differentiation program	January 2, 2017
Amod Agashe	Florida State University, U.S.A.	The cohomology of certain quotients of products of upper half planes and upper half spaces	January 3, 2017
Francois Iris	Bio-Modelling Systems, Paris, France	Integrative Analyses: How to utilise what is false to discover what could be true	January 3, 2017
Shruthi Viswanath	University of California San Francisco, U.S.A.	Integrative structure determination of the yeast centrosome	January 4, 2017

Speaker	Affiliation	Title	Date
Subhabrata Maiti	University of Padova, Italy	Transient and adaptive organization in nanosystems	January 5, 2017
Nikhil Koratkar	Rensselaer Polytechnic Institute, U.S.A.	Graphene draped silicon-films for high performance lithium-ion batteries	January 6, 2017
Anand Pratap Singh	Mechanobiology Institute, Singapore	Light sheet microscope: A quantitative bioimaging tool	January 6, 2017
Dinakar Ramakrishnan	California Institute of Technology, U.S.A.	Rational points	January 9, 2017
Frank Wuerthwein	University of California San Diego, U.S.A.	The quest for dark matter at the LHC - A supersymmetric perspective from CMS	January 9, 2017
Madhuresh Sumit	University of Michigan, Ann Arbor, U.S.A.	Scientific investigation using engineering principles and tools: Examples from cell signaling and culture process development	January 9, 2017
Kavita Dorai	Indian Institute of Science Education and Research, Mohali	NMR-based metabolomics: Perspectives and case studies	January 9, 2017
Ujjwal Sinha	GoLP/IPFN, Instituto Superior Tecnico, Lisbon, Portugal	Circularly polarized light from magnetized current filaments	January 10, 2017
N. Srinivasan	Indian Institute of Science, Bengaluru	Bridging the islands of protein families in sequence space using artificial sequences	January 10, 2017
Salil Bidaye	University of California, Berkeley, U.S.A.	Moonwalking flies: Neural basis for directed walking in <i>Drosophila</i>	January 10, 2017
Sukalyan Bhadra	Central Salt & Marine Chemicals Research Institute, Bhavnagar	New bimetallic catalysts in organic synthesis	January 10, 2017
Frank M. Raushel	Texas A&M University, College Station, Texas	Deciphering the substrate specificity of enzymes of unknown function	January 11, 2017
Aditya Karnataki	Tata Institute of Fundamental Research, Mumbai	p-adic uniformization of some locally symmetric spaces	January 11, 2017
Kasturi Haldar	University of Notre Dame, U.S.A.	Translating molecular therapy in infectious and genetic disease	January 12, 2017
Prashant V. Kamat	University of Notre Dame, U.S.A.	Nanostructure architectures for light energy conversion	January 12, 2017
Sourabh Kumar	University of Calgary, Canada	Quantum optics in different settings: Optomechanics and possibly the brain?	January 12, 2017
Suman Datta	University of Notre Dame, U.S.A.	Mimicking Nature's natural ways of computing	January 13, 2017
Anne-Marie Aubert	Institute of Mathematics at Jussieu, Paris, France	A view á la Harish-Chandra on enhanced local Langlands parameters	January 13, 2017
Sophie Morel	Princeton University, U.S.A.	Global Langlands parameters	January 13, 2017
Sreeja Nag	Research Engineer in Distributed Space Missions, NASA Goddard Space Flight Center & NASA Ames Research Center, U.S.A.	Small satellites, large numbers	January 13, 2017
Nikos Hadjichristidis	King Abdullah University of Science and Technology, Saudi Arabia	One-pot organocatalytic sequential polymerization of cyclic ethers/esters	January 16, 2017
Mehrab Modi	Cold Spring Harbor Laboratory/ Janelia, U.S.A.	Sustained odour responses in <i>Drosophila</i> Kenyon cells and their role in associative learning	January 16, 2017

Speaker	Affiliation	Title	Date
Bidraha Bagh	Van't Hoff Institute for Molecular Sciences, University of Amsterdam, Netherlands	Redox-active ligand mediated reactivity of ruthenium and iron complexes	January 16, 2017
Irit Sagi	Weizmann Institute of Science, Israel	Extracellular matrix proteolysis: A bystander or a partner in a crime?	January 16, 2017
Rina Arad-Yellin	Semorex Technologies Ltd, Rehovot, Israel	New, reliable routes to protein imprinted polymers	January 17, 2017
Arnab Gupta	SN Pradhan Centre for Neurosciences, University of Calcutta, Kolkata	Regulatory mechanism of human copper transporter ATP7B, the Wilson disease protein	January 17, 2017
Jose Sebastian	Carnegie Institution for Science, Stanford University, U.S.A.	Dealing with stress: Cereal roots enact austerity measures during drought to bank water	January 18, 2017
Luis Lomeli	Pontificia Universidad Catolica De Valparaiso, Chile	About L-functions	January 18, 2017
Sumiran Pujari	Tata Institute of Fundamental Research, Mumbai	Interaction induced Dirac fermions from quadratic band touching in bilayer graphene	January 19, 2017
B. Rajeev	Indian Statistical Institute Bengaluru	A re-look at Ito's Stochastic differential equations	January 19, 2017
Aniket Joglekar	University of Massachussets, Amherst, U.S.A.	Probing the electroweak phase transition at the LHC	January 19, 2017
Dhananjay Huilgol	Cold Spring Harbor Laboratory (CSHL), New York	Developmental mechanisms of projection neurons in the forebrain	January 20, 2017
Bhavana Muralidharan	Tata Institute of Fundamental Research, Mumbai	Molecular mechanisms regulating cell fate specification in the developing cerebral cortex	January 20, 2017
Denis Benois	University of Bordeaux, France	On the p -adic height pairing	January 20, 2017
Rajib Sarkar	Technical University of Dresden, Germany	Magnetic and superconducting properties of $\text{Ca}_{1-x}\text{NaxFe}_2\text{As}_2$ and FeSe as determined by μSR and NMR experiments	January 23, 2017
V. Ravindran	Institute of Mathematical Sciences, Chennai	QCD, infrared physics, LHC and all that	January 23, 2017
Shalin Mehta	University of Chicago and Marine Biological Laboratory, U.S.A.	Revealing molecular order across biological scales with computational microscopy	January 23, 2017
Luis Lomeli	Pontificia Universidad Catolica De Valparaiso, Chile	L-functions via the Langlands-Shahidi method	January 23, 2017
Saptarshi Dey	Institute for Earth and Environmental Sciences, University of Potsdam, Germany	Climate-driven erosional and depositional cycles since the late Pleistocene in the NW Himalaya and possible feedback on tectonic activity	January 23, 2017
K.M. Rangaswamy	University of Colorado, U.S.A.	On the ideal theory of Leavitt path algebras	January 24, 2017
Jean-Paul Blaizot	Saclay Nuclear Research Centre, France	Ultra-relativistic heavy-ion collisions and the quark-gluon plasma	January 24, 2017
Abhi Karkamkar	Pacific Northwest National Laboratory, U.S.A.	Amine boranes: Hydrogen storage to catalysis	January 24, 2017
Thomas Poisson	University of Rouen, France	Copper mediated difluoromethylation reaction	January 25, 2017

Speaker	Affiliation	Title	Date
Tatiana Besset	University of Rouen, France	New methodologies for the introduction of fluorinated groups on versatile scaffolds & design of original fluorinated reagents	January 25, 2017
Jayashree Nagesh	University of Toronto, Canada	Localized operator partitioning method for electronic energy transfer	January 25, 2017
T. Govindaraju	Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru	Towards developing inhibitors of multifaceted toxicity in Alzheimer's Disease	January 25, 2017
Luis Lomeli	Pontificia Universidad Catolica De Valparaiso, Chile	On globalization methods and a look at twisted symmetric square L-functions	January 25, 2017
Luis Lomeli	Pontificia Universidad Catolica De Valparaiso, Chile	On Langlands functoriality and the Ramanujan conjecture over function fields	January 27, 2017
Sudipta Sarkar	Indian Institute of Technology, Gandhinagar	Holography, second law and higher curvature gravity	January 27, 2017
Agnid Banerjee	TIFR Centre for Applicable Mathematics	Gradient bounds of Modica type and a symmetry type result for parabolic reaction diffusion equations	January 27, 2017
Koti Kamineni	Fachbereich Physik Universitat, Dortmund, Germany	Level anti-crossings of an NV center in diamond: Spin dynamics beyond the rotating-wave approximation and 3D sensors of MW field	January 31, 2017

February 2017

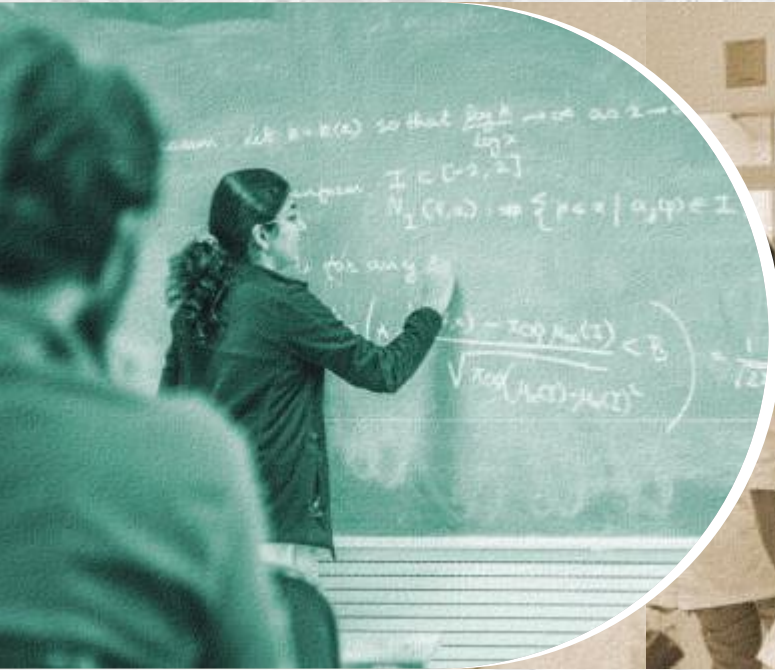
Amey Pathak	Indian Institute of Technology, Bombay	Land surface modeling and the role of land surface feedback in Indian summer monsoon rainfall	February 1, 2017
Arun Kumar Pati	Harish-Chandra Research Institute, Allahabad	Stronger uncertainty relations beyond Heisenberg's	February 6, 2017
Nirat Ray	Jawaharlal Nehru University, New Delhi	Transport studies in designer solids	February 6, 2017
Prabhas V. Moghe	Rutgers University, U.S.A.	Nanobiomaterials for brain therapeutics	February 7, 2017
Partha Ghose	S.N. Bose National Centre for Basic Sciences, Kolkata	Continuous transitions from quantum to classical motions	February 8, 2017
James Handerson Cleaves	Earth Life Science Institute, Tokyo Tech	Sideways? Problems with "bottom-up" and "top-down" approaches to understanding the origin of life	February 8, 2017
Julien Derr	University of Paris, Diderot, France	Emergence of complexity in the RNA world	February 8, 2017
Sheref Mansy	Centre for Integrative Biology, University of Trento, Italy	Quantifying artificial cellular life	February 8, 2017
Mladen Dimitrov	Lille University of Science and Technology, France	On the exceptional zeros of p-adic L-functions of Hilbert modular forms	February 8, 2017
Partha Ghose	S.N. Bose National Centre for Basic Sciences, Kolkata	The historical origins of quantum statistics	February 9, 2017
Suchi Goel	Indian Institute of Science, Bengaluru	Multigene families are central to severe malaria	February 9, 2017

Speaker	Affiliation	Title	Date
Dhiraj Bhatia	Institute Curie, France	DNA based emerging technologies for biological and bioengineering applications	February 10, 2017
Elliot R. Bernstein	Colorado State University, U.S.A.	EUV laser photoelectron spectroscopy of mass selected neutral clusters and molecules	February 10, 2017
K. Sandeep	TIFR Centre for Applicable Mathematics, Bengaluru	Moser-Trudinger and Adams inequalities	February 10, 2017
Ajaz ul H. Wani	University of Kashmir, Srinagar	Understanding principles of genome organization	February 11, 2017
Shreyas Gokhale	Massachusetts Institute of Technology, U.S.A.	Synchronization and survival of connected bacterial populations	February 13, 2017
Andrzej Jarynowski	Universitatea de Stat din Moldova, Poland	Modelling healthcare-associated infections in hospitals - epidemic intelligence in action	February 13, 2017
Subhash Rajpurohit	University of Pennsylvania, Philadelphia, U.S.A.	Understanding geographical clines: Seasonality and eco-evolutionary dynamics	February 14, 2017
Ashootosh Tripathi	University of Michigan, Ann Arbor, U.S.A.	Microbes to medicine: Development of a millennial drug discovery platform	February 15, 2017
Vijay Tiwari	Institute of Molecular Biology, Mainz, Germany	Deciphering the epigenetic code of brain development and function	February 20, 2017
Teresa Bautista Solans	International Centre for Theoretical Physics, Italy	Quantum cosmology from Weyl anomalies	February 20, 2017
Vikram Tripathi	Tata Institute of Fundamental Research, Mumbai	Strongly disordered superconductors	February 20, 2017
Aron Wall	Institute for Advanced Study - Princeton, U.S.A.	Entropic focussing	February 21, 2017
Aron Wall	Institute for Advanced Study - Princeton, U.S.A.	How to make a traversable wormhole	February 21, 2017
Sangeeta Bhatia	Western Sydney University, Australia	Algebraic models of large scale genome rearrangement events	February 21, 2017
Sanjay Premi	Yale University School of Medicine, U.S.A.	Shedding light on dark side of the melanin: UV-signature DNA damage without UV	February 22, 2017
Samir Merabet	École normale supérieure de Lyon, France	Hox proteins and short peptide motifs in development and evolution	February 24, 2017
Ritesh Kumar	Texas A&M Health Science Center, Houston, Texas, U.S.A.	Microbes meet cancer: Role of <i>Streptococcus gallolyticus</i> in colorectal tumor development	February 27, 2017
Wout Merbis	Vienna University of Technology, Vienna	Three dimensional Black Holes and the Heisenberg algebra	February 28, 2017
Prem Singh Kaushal	Wadsworth Center, Albany, U.S.A.	Cryo-electron microscopy (cryo-EM) studies of the ribonucleoprotein complexes: The group II intron and ribosomes	February 28, 2017

March 2017

Sujan K. Sengupta	Indian Institute of Astrophysics, Bengaluru	Detection and characterisation of extra-solar planets	March 1, 2017
Sudhir Krishna	National Centre for Biological Sciences, Bengaluru	The biology medicine/public health interphase: Learning from viruses	March 2, 2017

Speaker	Affiliation	Title	Date
Veena Srinivasan	Ashoka Trust for Research in Ecology and the Environment, Bengaluru	Socio-hydrologic regime change in the upper Arkavathy catchment	March 30, 2017
Sitabhra Sinha	Institute of Mathematical Sciences, Chennai	Patterns, broken symmetries and computation: Emergent complexity in collective dynamics of spatially extended dynamical systems	March 6, 2017
N. Arul Murugan	Royal Institute of Technology, Stockholm, Sweden	Smart materials and intelligent computing	March 10, 2017
Gadadhar Misra	Indian Institute of Science, Bengaluru	The Grothendieck inequality	March 11, 2017
Ramakrishnan Natesan	University of Pennsylvania, U.S.A.	Curvature remodelling of cell membranes and its implications in cellular biophysics	March 14, 2017
Ashesh Dhawale	Harvard University, U.S.A.	Long-term stability of behaviourally relevant dynamics in neural circuits	March 15, 2017
Anil U. Mane	Argonne National Laboratory, U.S.A.	Atomic layer deposition of nanostructure materials and their emerging applications	March 15, 2017
Sudha Kumari	Massachusetts Institute of Technology, Cambridge, U.S.A.	Good touch and bad touch: Direct immune cell-cell contacts in immune response and metastasis	March 16, 2017
Avinash Mahajan	Indian Institute of Technology, Bombay	wNMR: A local probe of magnetism in materials	March 20, 2017
Viji V. Subramanian	New York University, U.S.A.	Control of DNA breakage and repair during meiosis	March 21, 2017
A.K. Tyagi	Bhabha Atomic Research Centre, Mumbai	Rational design of functional materials based on crystallographic concepts and novel synthesis protocols	March 23, 2017
Prajval Shastri	Indian Institute of Astrophysics, Bengaluru	Growing black holes	March 30, 2017
Subhasish Mandal	Yale University, U.S.A.	First principles investigation on Quantum Materials	March 31, 2017



Academic Programs





PhD Program

During August 2016 and January 2017 admission sessions, 65 PhD students were admitted to the PhD program. The subject-wise distribution of the students admitted during the year is as follows:

Biology: 13; Chemistry: 30; Earth & Climate Science: 5; Mathematics: 7; Physics: 10

During this year, 13 students discontinued from the program. Thus, there are 325 (Men: 226; Women: 99) students working towards PhD at the institute as on March 31, 2017.

Students enrolled into PhD program in August 2016 and January 2017 sessions

Biology

Manesh Prakash Joshi

Abhijith K.

Ayush Madhok

Sarang Mahajan

Mehendale Neelay

Abinaya R.

Rohan Sharma

Indranil Sikder

Arpita Sundaria

Rintu M. Umesh

Uttekar Bhavin Dashrathrav

Vibishan B.

Alakananda Maitra

Chemistry

Puneeth Kumar D.R.

Subhajit Dutta

Ruma Ghosh

Jyoti

Khatik Saddam Husen Yusuf

Kanika Kohli

T. Anand Kumar

Mardhekar Sandhya Namdeo

Neetu

Dipayan Roy

Padmini Sahoo

Rashmi Sharma

Abdul Shiraj

Ankit Singh

S.K. Mujaffar Hossain

Aswathi Mohan T.

Tagad Nitin Baban

Warghude Prakash Kashinath

Patil Mahesh Nawal

Debashree Roy

Sumanta Let

Debasish Laha

Shaikh Minhaj Shamshoddin

Pawade Amol Vyenkatrao

Manzoor Ahmad

Rajput Jayashree Ramsing

Tariq Ahmad Sheikh

Kshetrimayum Borish

Shabnum Maqbool

Aslam Uddin

Earth & Climate Science

G. Jimmy Carter

Dipak Kumar Chaubey

Sourav Laha

Anupam Samanta

Seelanki Vivek

Mathematics

Souptik Chakraborty

Rijubrata Kundu

Sudipa Mondal

Nair Ramya Ravindran Jayashri

Basudev Pattanayak

Kartik Roy

Suraj Prakash Yadav

Physics

Bhagyashri Devaru Bhat

Korak Biswas

Arindam Laha

Amrit Kumar Mishra

Navneet Singh

Vineet Kumar Pandey

Dibyata Rout

Vandana Sharma

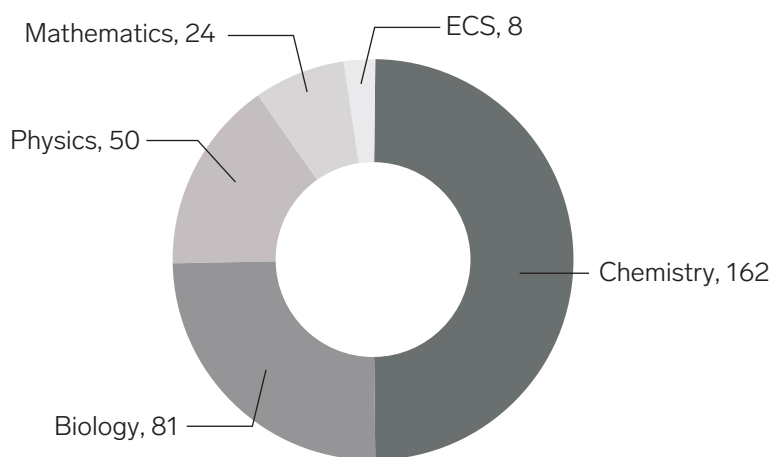
Viplove Tyagi

V.R. Krithika

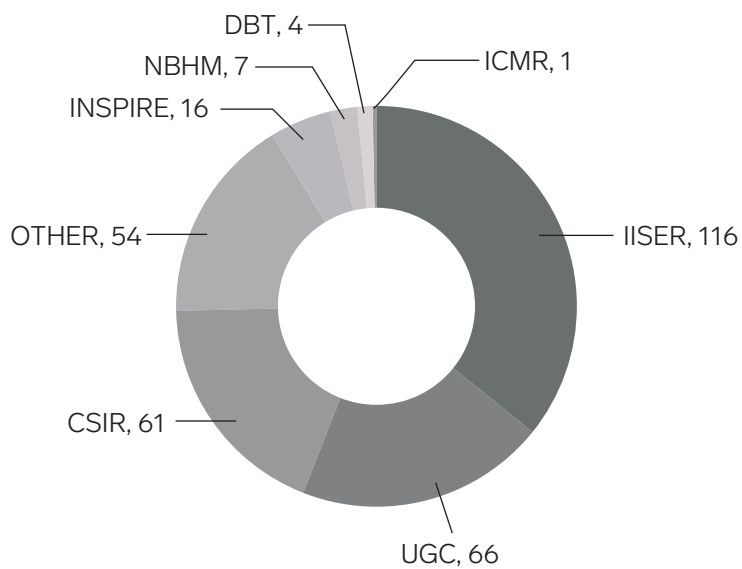
Category-wise Numbers of PhD Students

Gender	GE	OBC	SC	ST	PD	Total
MALE	156	53	16	1	1	226
FEMALE	87	8	4	0	1	99
TOTAL	243	61	20	1	2	325

PhD Student Numbers Across Disciplines



Sources of Fellowships of PhD Students



In the 5th convocation held on May 28, 2016, 33 students were conferred PhD degree. The details are as follows:

	Student	Discipline	Title of Thesis	Advisor
1	Mahajan Ameya Suhas	Biology	Identification and functional characterization of knotted-like homeobox genes in potato	Anjan Banerjee
2	Bhogale Sneha Dilip	Biology	Studying the role of micro RNAs in tuber development in potato (<i>Solanum tuberosum</i> ssp. <i>Andigena</i>)	Anjan Banerjee
3	Sahasrabuddhe Abhishek Shrikant	Biology	Formin-2 function in growth cone motility and substrate attachment	Aurnab Ghose
4	Pramod P.S.	Chemistry	Tailor-made polysaccharide vesicles for drug delivery to cancer cells	M. Jayakannan
5	Satheesh Ellipilli	Chemistry	Synthesis, biophysical and cellular uptake studies of fluorinated peptide nucleic acid analogs	K.N. Ganesh
6	Savita Singh	Biology	Functional and molecular characterization of targets of ultrabithorax in <i>Drosophila</i>	L.S. Shashidhara
7	Payal Arya	Biology	Role of TopBP1-Msh2 interaction in ATR-Chk1 pathway	Mayurika Lahiri
8	Visakha Karnawat	Chemistry	Recognition, distortion and allosteric control during purine catalysis	Mrinalini Puranik
9	Rafeeq Ahmad Mir	Biology	Role and regulation of SATB1 in colorectal tumorigenesis and progression	Sanjeev Galande
10	Tanpure Arun Ankush	Chemistry	Base-functionalized nucleoside analog probes: Design, synthesis and applications in nucleic acid labelling and diagnosis	S.G. Srivatsan
11	Abhishek Shukla	Physics	Ancilla assisted quantum information processing: General protocols and NMR implementations	T.S. Mahesh
12	Nitin Dattatraya Bansode	Chemistry	Peptides and polypeptides derived from 4S/R-(hyp/amp)-proline: Synthesis and characterization of β -structure	K.N. Ganesh
13	Gadekar Santosh Chandrakant	Chemistry	Synthesis and characterization of dyes and macrocycles derived from dipyrin and modified dipyrins	V.G. Anand
14	Arindam Dasgupta	Physics	Localized optical-fields and directional far-field emission from plasmonic nanojunction	G.V. Pavan Kumar
15	Ravi Kiran	Chemistry	Synthesis of annulated heterocycles via a ruthenium-catalyzed C-H bond activation	M. Jayakannan
16	Sharma Kavita Vinod	Chemistry	Synthesis and evaluation of bioactivable nitric oxide (NO) donors	Harinath Chakrapani
17	Ganesh Kumar Mothukuri	Chemistry	Exploring stereochemical constraints and chemical reactivity of vinyllogous amino acids in the design of foldamers	H.N. Gopi

	Student	Discipline	Title of Thesis	Advisor
18	Wilbee D.S.	Chemistry	Molecular mechanism of drug-DNA intercalation and the role of water entropy in molecular recognition	Arnab Mukherjee
19	Ingle Madhusudan Ganesh	Physics	Turbulent density fluctuations in the solar wind	Prasad Subramanian
20	Padala Kishor	Chemistry	Cationic ruthenium(II) complex catalyzed ortho alkenylation and benzylation of aromatics via C-H bond activation	M. Jeganmohan
21	Shekatkar Snehal Madhukar	Physics	Structure, dynamics and control of complex networks	G. Ambika
22	Smita	Chemistry	Thermo-responsive small and polymeric amphiphiles for drug delivery	M. Jayakannan
23	R.L. Praveena	Biology	Regulation of wnt/wg signaling pathway by chromatin organizer SATB1	Sanjeev Galande
24	Sawant Anupam Ashok	Chemistry	Post-transcriptional chemical labeling of RNA <i>in vitro</i> and in cells by using biorthogonal azide-alkyne cycloaddition reactions	S.G. Srivatsan
25	Anantraj S.	Chemistry	Development of melt polymerization route for amino acid based functional polymers and their self-assembled nanostructures	M. Jayakannan
26	Karve Shraddha Madhav	Biology	Investigating the effect of complex fluctuating environments on the evolution of laboratory populations of <i>Escherichia coli</i>	Sutirth Dey
27	Kiran Reddy Baddigam	Chemistry	Non-covalent and covalent interactions of antiaromatic isophlorinoids	V.G. Anand
28	Biplab Manna	Chemistry	Nitrogen-enriched ionic coordination polymers: Design, synthesis and functional studies	Sujit Ghosh
29	Jay Prakash Shukla	Biology	A2BP1: A novel component of notch pathway during nervous system development in <i>Drosophila</i>	L.S. Shashidhara
30	Kadam Vijay Narayanrao	Chemistry	Design, synthesis, metal complexation and self-assembly of peptide nucleic acids with modified and unnatural nucleobases	K.N. Ganesh
31	G. Krishna	Chemistry	Modulation of excited state photophysics of drugs and biologically important molecules inside the bio-mimetic nano-cavities	Partha Hazra
32	Rahul Kumar Jangid	Biology	Molecular mechanism(s) of regulation of bidirectional promoters	Sanjeev Galande
33	Sharad Chandra Deshmukh	Chemistry	Diastereoselective aldehyde-amine-alkyne(α^3) coupling reaction: Synthesis of biologically active molecules	Pinaki Talukdar

The following 23 students have successfully completed their requirements for the award of PhD degree (completed thesis defense on or before 31-3-17):

Sachin Sadashiv Holkar	Sudhir Kumar Pujahari	Sayan Mondal
Partha Pratim Patra	Pawar Archana Pratap Madhuri	Aparna Sunil Sherlekar
S. Bapu Rao	Soumya Mukherjee	Tanmoy Saha
Yasmeen Shameem Akhtar	Yadav Rohan Dattatray	Arundhati Roy
Srishti Dar	Abhijeet Sanjay Bayani	Chauhan Dineshsinha Pratasinha
Venkateswara Rao Boddu	Swati Shridhar Hegde	N. Bhavani
Khodade Vinayak Shahaji	Raundal Hitesh Ramesh	Vallari Shukla
Koushik Karmakar	Hari Krishna Bavireddi	

The following 19 students have submitted their thesis during the year with defense yet to be conducted:

Rini Mukeshbhai Shah	Kulkarni Manasi Vilas	Prabhat Kumar Kushwaha
Ranade Devika Ravindra	Avishek Karmakar	Ravi Prakash Nath Tripathi
Kulkarni Mandar Vinod	Minal Sachin Pednekar	Neha Prabhu
Sunil Kumar	Indu Kaul	Aniruddha Sastry
Rashmi Govind Kulkarni	Barun Dhara	Danveer Singh
Siva Koti Sangabathuni	Libi Anandi Vishwanathan	Manish Singh Kushwah
Abhinav Parivesh		

Following students received travel grants for participating in international conferences abroad and for internships:

Student	Conference/ Internship	Funding	Duration
Rabindranath Bag	2017 IEEE Magnetic Society Summer School, Universidad International Menendez Pelayo in Santander, Spain	IEEE Magnetic Society	June 19, 2017 to June 23, 2017
Debangana Mukherjee	Advanced School/Workshop on Nonlocal Partial Differential Equations and Applications to Geometry, Physics and Probability (ICTP) in Trieste, Italy	International Centre for Theoretical Physics (ICTP)	May 22, 2017 to June 02, 2017
Golla Shiva Shanker	Deutsches Elektronen-Synchrotron (DESY), To carry out research on PETRA III experiment	DST-DESY Project (Managed by JNCASR)	April 9, 2017 to April 21
Nandha Kumar V.	253 rd ACS National Meeting, San Francisco, California, U.S.A.	SERB and IISER Pune	April 02, 2017 to April 06, 2017
Turmoli Neogi	Spring School on Superstring Theory and Related Topics		March 16, 2017 to April 01, 2017
	New Developments in AdS3/CFT2 Holography	Hosts	March 27, 2017 to April 01, 2017

Student	Conference/ Internship	Funding	Duration
Suddhasattwa Mandal	Invited to participate in Project 20165468 at Sincrotrone Trieste, Italy	Elettra- DST Synchrotron program and International Centre for Theoretical Physics (ICTP)	February 24, 2017 to March 09 2017
Danveer Singh	XIN-Winter School 201 on Emerging Application of Optical Nanostructures, 2017 at Tel Aviv University Center for Nano Science and Nanotechnology, Israel	Host	February 19, 2017 to February 23, 2017
Sagar Satpathi	Institut Européen de Chimie et Biologie (IECB) Pessac, France	Raman - Charpak Fellowship	January 15, 2017 to April 15, 2017
Wasim Jeelani Mir	Visiting Scholar, Institute des Nanosciences de Paris (INSP) Université Pierre et Marie Curie (UPMC), Paris, France	Raman - Charpak Fellowship	January 12, 2017 to July 11, 2017
Adhav Vishal Annasaheb	CCP4/Diamond Light Source Data Collection & Structure Solution Workshop at Rutherford Appleton Laboratory, Didcot, U.K.	Host	December 13, 2016 to December 20, 2016
Saurabh Pradhan	2016 Gene Regulatory Networks for Development course at the Marine Biological Laboratory (MBL), Woods Hole, Massachusetts, U.S.A.	IISER Pune and MBL	09-10-2016 to 22-10-2016
Vinay Hegde	Visiting Scientist, Fermi National Accelerator Laboratory, Batavia, IL, U.S.A.	Host and IISER Pune	August 2016 -January 2017
Soumya Mukherjee	6 th European Association of Chemical and Material Societies (EuCheMS) International Congress	SERB and IISER Pune	September 10, 2016 to September 18, 2016
Anant Kumar Srivastava	2016 Joint IEEE ISAF/ECAPD/PFM Conference, Technische Universität Darmstadt, Darmstadt, Germany	SERB and INSA-CSIR-BRNS/DAE-CICS Travel Fellowship	August 21, 2016 to August 25, 2016
Sushil Bhunia	Workshop on Algorithmic problems in group theory and related areas, Novosibirsk, Russia	National Board of Higher Mathematics (NBHM) and Workshop Organizing Committee	July 25, 2016 to August 05, 2016
Pawar Archana Pratap	7 th EMBO meeting 2016, Mannheim, Germany	Organizers	September 10, 2016 to September 13, 2016
Tanmoy Saha	Biointerface Science Conference of Gordon Research Conferences, Les Diablerets, Switzerland	SERB	June 12, 2016 to June 17, 2016
Soumendra Nath Panja	FPSchool 2016 held at the Institute Laue-Langevin in Grenoble, France	FPSchool Organizers and IISER Pune	May 09, 2016 to May 14, 2016

Student	Conference/ Internship	Funding	Duration
Indumathi Patta	43 rd Scandinavian Society for Immunology meeting (SSI2016), Turku, Finland	DBT	May 10, 2016 to May 13, 2016
Neha Nirwan	Short-Term PhD Placement at University of Bristol in the Faculty of Biomedical Sciences	DBT and British Council, UK under Newton Bhabha PhD Placement Programme	Six months from June 06, 2016
Libi Anandi Viswanathan	2016 Mammary Gland Biology- Gordon Research Conference Lucca (Barga), Italy	Carl Storm International Diversity (CSID) Award and IISER Pune	May 29, 2016 to June 03, 2016
Tomer Darshika	Mitochondrial Dynamics Conference, Silverthorne, Colorado, U.S.A.	DBT and Keystone Symposia Future of Science Fund Scholarship	April 03, 2016 to April 07, 2016

Infosys Foundation Travel Award

Following 12 PhD students received Infosys Foundation Travel Award during 2016-17 enabling them to participate at national and international conferences.

Harne Shrikant R.

Aparna Sunil Sherlekar

Nishant Singh

Anant Kumar Srivastava

Chethan D.S.

Nishtha Sachdeva

Gunja Sachdeva

Nandha Kumar V.



Integrated PhD Program

During the August 2016 session, 33 students took admission to post-BSc Integrated PhD program: 13 in Biology, 13 in Chemistry, 3 in Mathematics and 4 in Physics.

Biology

Aparna Sundaresan
Gauri Binayak
Himani Khurana
Vaidya Kaveri Rajendra
Krishnendu Roy
Manish Kumar
Mir Nasir Ahmad
Rituparna Ghosh
Shridhar Shivananda Hegde
Shweta Gupta
Soumya Bhattacharyya
Sukanya Chakraborty
Vani Pande

Chemistry

Gaurav Beniwal
Indra Narayan Chakraborty
Joy Chatterjee
Moushaki Ghosh
Pulak Ghosh
Markose Joshy
Debanjan Mahato
Suman Manna
Abhishek Mondal
Saikat Pahan
Prakash Panwaria
Ateek Shah
Pranav U.

Mathematics

Garima Agrawal
Subham De
Shuvam Kant Tripathi

Physics

Priya Batra
Debarshi Mitra
Akash Mukherjee
Diptabrata Paul

The present strength of Integrated PhD students is 157 (Women: 63; Men: 94) with 55 students in Biology, 50 in Chemistry, 5 in Mathematics and 47 in Physics.

Prizes for Academic Excellence to Integrated PhD Students were awarded to the following students. These prizes are given to the students who attained the highest CGPA at the end of second year (Academic year 2014-16): Shalini Pandey (Chemistry), Nair Sanjana Santosh (Biology), Bhatkar Sayali Atul (Physics)

Integrated PhD students Arindam Bhattacharjee and Sunny Tiwari have been selected to receive Infosys Foundation Scholarship that allowed a full tuition fee waiver for Spring 2017.

These students received Infosys Foundation Travel Award during 2016-17 enabling them to participate at national and international conferences: Bhatkar Sayali Atul, Labade Ajay Shankar, Tomin K. James, Adarsh B. Vasista

Following students received travel grants for participating in international conferences abroad and for internships:

Student	Conference/ Internship	Funding	Duration
Vikash Kumar Ravi	Bhaskara Advanced Solar Energy (BASE) Internship Program	IUSSTF	November 2017 to May 2018
Neeladri Sen	To work in the group of Prof. Maya Topf at the Institute of Structural and Molecular Biology (ISMB), University of London, U.K.	DBT and British Council, India under Newton Bhabha PhD Placement Programme	September 18, 2017 to January 17, 2018
Mungi Chaitanya Vinayak	Invited to perform collaborative research at Earth-Life Science Institute (ELSI), Tokyo institute of Technology, Japan	Host	January 8, 2017 to February 18, 2017
Bhatkar Sayali	11 th Kavli Asian Winter School on Strings, Particles and Cosmology (KAWS) held at Sun Yat-Sen University, Zhuhai Campus, Guangdong Province, China	Organizing Committee of 11 th KAWS and IISER Pune	January 06, 2017 to January 16, 2017
Ankita Niranjana	Invited to participate in CQD (Coherent Quantum Dynamics) Summer School in Okinawa, Japan	Host	September 27, 2016 to October 6, 2016
Prachi Dhananjay Telang	To perform experiments at the Swiss Muon Source (SμS) facility of Paul Scherrer Institute (PSI), Switzerland	DST-Synchrotron-Neutron Project, managed by JNCASR	October 1, 2016 to October 6, 2016
Chetan Kumar Vishwakarma	European School on Nanoscience and Nanotechnology (ESONN)-Session 2016, Grenoble, France	CEFIPRA-ESONN Fellowship 2016	August 28, 2016 to September 17, 2016
Neha Khetan	EMBO-EMBL Symposium: Microtubules: From Atoms to Complex Systems held at Heidelberg, Germany	EMBO Travel Grant	May 29, 2016 to June 01
Tejal Agarwal	66 th Lindau Nobel Laureate Meeting to be held in Lindau, Germany	Lindau Nobel Laureate Meeting, German Research Foundation (DFG) and DST Govt. of India	June 26, 2016 to July 01, 2016
Shetty Ankitha Ramesh	Turku Centre for Biotechnology, University of Turku, Finland	Erasmus Fellowship and University of Turku	April 4, 2016 to July 7, 2017



BS MS Program

During the year 2016-17, 204 (150 boys and 54 girls) students have taken admissions into the BS MS program of the institute. Of these, 136 were from state and central boards, 52 from IIT JEE stream, and 16 from KVPY stream.

List of students registered for BS MS program in 2016

Rishabh Singhal	Shubham Choudhari	Dilsha Farheen P.M.
Nukulsinh Rajanikant Parmar	Paras Raju Wanjari	Adarsh Srinivasan
Mohit Kumar	Aniket Mohan	Manraj Singh Ghumman
Onkar Sadekar	Sanjay Golla	Jatin Suresh Patil
Venkata Sai Abhijit Duggirala	Avi Adlakha	Sayantani Choudhury
Sahil Pawar	S. Adithya	Pranay Pravin Ninawe
Sagnik Ghosh	Megha Madhusmita	Amruta Swaminathan
Suman Satish Kulkarni	Priti Goswami	P.B.S. Murthy Krishnan
Sahiti Chebolu	Shreeyesh Biswal	Aryan Ganvir
Vikash Kumar Himansu	Pranay Nayak	Goutham Dev C.R.
Kumar Gourav	Pawan Kumar Gupta	Thejas C.S.
Manish Kumar	Koustav Halder	Shashank Jangid
Suraj Yadav	Surya Narayan Banerjee	Rakshit Thaware
Shubham Kachhap	P. Balakrishna	Rishabh Sachan
Hasna H.S.	Nithun Raj V.	Roshni Rani Khamari
Avinash Roy	Saurav Kumar	Aditi Mankar
Manjima B.S.	Joypal Navaneeth Bhukya	Preeti Priyadarsini
Utkarsh Khandelwal	Gopagani Murali Krishna	Aleena M.J.
Gopal Chandra Santra	Anoop Raj	Prasad Rajendrarao Mahajan
Writam Sinha Roy Choudhuri	Natasha Yadav	Viraj Meruliya
Rakesh Kumar Meena	Sayan Dey	Ashutosh Suresh Jangle
Saurav Raj	Utpal Singh	Akash A.
Namit Abhishek	M. Harshanth Ram	Aadarsh Kumar
Shriya Shrikant Hirve	Debajoy Mukherjee	Sohan S.
Kasturi Lele	Shambhavi S.	Dinesh P.R.
Siddhant Sharma	Biswajit Marndi	Hassan Yazdani
Mrityunjay Samanta	Arkajit Guha	Bhatta Chandra Shekar

Gopika M.	Prasun Mishra	Harshit Madaan
Divya S.	Rakshitha T.	Duttatreya
Pallavi Vaidya	Wridhdhisom Karar	Mithil Kotak
Ashish Ranjan	Meenu Meena	Hitesh Vilas Wankhede
Yatharth Gandhi	Dayal Singh	Sounak Sinha
Salim Pradhan	Vighnesh Naik	Piyush Kumar
Adarsh Subash Pradhan	Krishna Kant Marskole	Rajdip Sarkar
Geet Mankar	Akash Gupta	Ananya Bandopadhyay
Pritesh Sutrakar	Bhavesht Deewan Valecha	Janhavi Milind Borkar
Sreejith A. Nair	Mekan Deep Gurvindersingh	Krutika Saha
Akhila Mudunuri	Vishal Ranjith	Manjul Yadav
Badeer Hassan U.	Namonarayan Meena	Aagam Parag Shah
Seemant Mishra	Sudheesh Surendranath	Aasim Khalid Saifee
Devadharsini S.	Arijit Chakraborty	Shreyash Kulsange
Snigdha Samantaray	Sharvani Shrinivas Shintre	Sudiksha Mishra
Yash Adiwai	Chitvan Chandolia	Ankit Bhaskar
Gurmail	Durgesh Raman Ajgaonkar	Ayush Bele
Himanshu A. Bhisikar	Muskan Shinde	Anik Patra
Harshavardhan B.V.	Yashoda Singh	Manish R. Ratan
Jitesh Seth	Dharavath Ashok	Abdul Hannan Faruqi
Manish Kumar	Krish Nilesh Desai	Vedanth Prasanna Kumar
Mansi Budamagunta	Rishav Kumar	Pandit Atharva Uday
Mohamed Hashim	Bharti Bansal	Kanwar Harmanpreet Singh
Mohan Mouli Karra	Subhashree Subhadarsini	Mansvani Sharma
Ishan Jaiswal	Mallavika Ganesh	Reshma Thampy
Divyansh Vardhan	Shubhalaxmi Mukherjee	Dharavath Vijay Naik
Snehash Kumar Behera	Moirangthem Bicky Singh	Kanneboyina Vignesh
Soumyadeep Datta	Viraj Bhagwan Bagal	Adithya Shetty
Appu S.	Omkar Prasanna Joshi	Jishnu C.V.
Rohit B. Raj	Akash Chavan	Chandana Chandran
Rounak Jha	Hitesh Kumar Panwar	Sankalp Choudhuri
Vishnupriya G. Kumar	Yasharth Bachubhai Yadav	Sneha Sarkar
Rubna P.R.	Ankit Kumar Yadav	Amit Kumar Jha
Sanjana M.	Jhelam Nitin Deshpande	Sarin T.S.
Sanak Mukherjee	Arya Samanta	Sanjay Sriraj
Kartik Nirbhavne	Bhavesht Kumar Verma	Deepshikha Sen
Praful Kailas Shirsath	Vaibhav Umakant Kumbhar	Arya R. Lal
Rahul Verma	Megha Roy	Janaani Sri R.
Gopi Madhav Reddy	Purva Chandrashekhar Joshi	Debiprasad Panda
Kabir Vinay Dabholkar	Ankur Rajendra Panchal	Preyosi Ghorui
Sujay Manoj Paranjape	Srishti Gupta	Gupte Vruta Suni

Subsequent to admission, 23 students have discontinued from the program, as they got admission in other courses, making the final number of students enrolled in 2016 to 181. In addition, from the previous batches, six students opted to discontinue the program.

Category-wise Distribution of Students Enrolled in 2016

	GE	OBC	SC	ST	PD	Total
Boys	63	42	16	11	3	135
Girls	27	11	4	3	1	46
Total	90	53	20	14	4	181

Overall Category-wise Distribution of Existing BS MS Students (as of March 31, 2017)

	GE	OBC	SC	ST	PD	Total
Boys	261	160	72	30	6	529
Girls	127	76	34	4	1	242
Total	388	236	106	34	7	771

Total BS MS Student Strength during 2016-17

Batch	Boys	Girls	Total
2010	4	0	4
2011	5	4	9
2012	69	36	105
2013	88	42	130
2014	113	57	170
2015	115	57	172
2016	135	46	181
Total	529	242	771

Details of Fifth Year Projects carried out by the outgoing batch of BS MS students during 2016-17

	Student	Host Institute	Supervisor	Project Title
Biology				
1	Rajmane Vyankatesh Babasaheb 20101090	IISER Pune	Anjan Banerjee	Generation of Tnt1 insertional mutants in moss (<i>P. patens</i>) and their molecular characterization
2	Wasnik Ruchi Rajakumar 20111003	IISER Pune	L.S. Shashidhara	Validating role of Bin3 and its mammalian ortholog MEPCE as a tumor suppressor that antagonizes the function of oncoprotein Yki/YAP
3	Anu S.R. 20111034	Rajiv Gandhi Centre for Biotechnology, Thiruvananthapuram	Suparna Sengupta Mayurika Lahiri	To check the status of Fodrin, a non-erythroid spectrin isoform, in cancer cells

	Student	Host Institute	Supervisor	Project Title
4	Rajarajeswari S. 20111039	IISER Pune	Sudha Rajamani	Combined role of amphiphiles and clay on nonenzymatic oligomerization reactions of nucleotides
5.	Athira D.P. 20111041	NCBS, Bengaluru	Hiyaa Ghosh	The role of E2-2 in brain functions
6	Suranse Vivek Premnath 20121001	IISER Pune	Neelesh Dahanukar	Molecular phylogeny and venom characterization of Indian Scorpions
7	Adithya E. Rajagopalan 20121018	IISER Pune	Collins Assisi	The effect of circuit structure on odour representation in the antennal lobe - mushroom body circuit
8	Abhishek Anand 20121019	Singapore Center for Environmental Life Sciences Engineering, Nanyang Technological University, Singapore	Sanjay Swarup	Plant growth promoting properties of root microbiome and multispecies interactions in plant holobionts at the level of microbial communities and metabolites
9	V.R. Shree Sruti 20121021	IISER Pune	Sutirth Dey	Behavioural traits correlated with evolution of increased dispersal in laboratory populations of <i>Drosophila melanogaster</i>
10.	Sahana Srivathsa 20121024	IISER Pune	Collins Assisi	Cellular and network mechanisms of grid cell firing patterns
11	Joge Shubham Dhananjay 20121028	IISc, Bengaluru	Varsha Singh	Identification of genes involved in swarming behavior of <i>Pseudomonas aeruginosa</i> PA14 strain using non redundant transposon insertion mutant library
12	Yaikhomba Mutum 20121029	IISER Pune	Gayathri Pananghat	Biochemical and biophysical characterisation of the non-methylated state of FrzCD, the cytoplasmic receptor of the Frz pathway
13	Vishak Sagar 20121030	Centre for Neuroscience, IISc, Bengaluru	Sridharan Devarajan	Behavioral mechanisms of exogenous cueing
14	Jogdand Sukanya Vasantrao 20121038	IISER Pune	Anjan Banerjee	Functional characterization of Arabidopsis orthologs of PAT1 gene in <i>Physcomitrella patens</i>
15	Nilima Walunjkar 20121040	NCBS, Bengaluru	Deepa Agashe	Fitness effects of changing codon bias of two genes - mauA and mtdA in <i>Methylobacterium extorquens</i> AM1
16.	Darshini Ravishankar 20121044	IISER Pune	Girish Ratnaparkhi	Understanding the role of SUMOylation in the function of Aac11/Api5 A
17	Bagde Saket Rahul 20121058	University of Texas, El Paso, U.S.A.	Chu-Young Kim	Purification and crystallization of modular polyketide synthase involved in Lasalocid A biosynthesis
18	Lavanya Lokhande 20121060	CSIR-Institute of Genomics and Integrative Biology, New Delhi	Chetana Sachidanandan	Developing DILI models in zebrafish for screening of hepatoprotective agents

	Student	Host Institute	Supervisor	Project Title
19	Nibrasul Haque K.M. 20121061	IISER Pune	Saikrishnan Kayarat	Biochemical analysis of chromatin remodelling activity of Type-ISP restriction modification enzyme LlabIII
20	Kavya Mohan N. 20121063	IISER Pune	Deepak Barua	Variation in thermotolerance of plants in a seasonally dry tropical forest
21	Prasanth P. 20121065	IISER Pune	Raghav Rajan	Understanding the characteristics of introductory notes in the presence and absence of HVC
22	Lagad Sonal Gulab 20121072	IISER Pune	Gayathri Pananghat	Structural and Biochemical studies of SofG, a GTPase involved in bacterial cell motility
23	Naik Suyash Ajay 20121075	Universite de Nice-Sophia Antipolis, Nice, France	Laurent Counillon	Cisplatin and Taxane side-effects: Kidney and neuronal systems
24	Sujay B. 20121083	NCBS, Bengaluru	Sanjay Sane	Visually guided landing behaviour in the housefly, <i>Musca domestica</i>
25	Shrinidhi Mahishi 20121085	Centre for Ecological Sciences, IISc, Bengaluru	Kavita Isvaran	Intrasexual signalling and aggression in male rock agama, <i>Psammophilus dorsalis</i>
26	Bhosale Aishwarya Deepak 20121086	Hindustan Lever Limited, Bengaluru	Amitabha Majumdar	Understanding the role of inflammasome pathway in AMP secretion from human skin keratinocytes
27	Neena Dhiman 20121093	IISER Pune	Anuradha Ratnaparkhi	Exploring the role of Mon1 in <i>Drosophila</i> ovary development
28	Mokashe Subhadra Satish 20121096	IISER Pune	Suhita Nadkarni	Effect of intrinsic and extrinsic noise on a network motif of mutually inhibiting neurons
29.	Bhagat Karishma Rajesh 20121097	IISER Pune	Saikrishnan Kayarat	Characterization of short sequence repeats of Type III restriction modification enzyme MbolII
30	Sawant Abhilash Arun 20121098	RIKEN Brain Science Institute, Japan	Yukiko Goda, Suhita Nadkarni	Understanding mechanisms responsible for the regulation of presynaptic strengths on a dendritic tree in rat hippocampal networks
31	P.M. Shreenidhi 20121099	IISER Pune	Sutirth Dey	Effect of dispersal evolution on pre-adult traits in laboratory populations of <i>Drosophila melanogaster</i>
32.	Gyana Gourab Mishra 20121101	IISER Pune	Saikrishnan Kayarat	Understanding the molecular basis of base-specific interaction of Type IV restriction system McrBC
33	Mohammed Aamir Sadiq 20121102	IISER Pune	Sutirth Dey	Costs and correlates of evolution of increased dispersal in <i>Drosophila melanogaster</i>
34	S. Harini 20121109	IISER Pune	Raghav Rajan	Understanding the variation in the adult male zebra finch song and behavior, during courtship, with distance of communication
35	Vaibhav Navnath Thakur 20121112	Centre for Neuroscience, IISc, Bengaluru	Aditya Murthy	Study of kinematic planning and initiation of hand movement using electroencephalography
36	Unkule Mithila Atul 20121113	NCBS, Bengaluru	Mahesh Sankaran	Effect of removal of an invasive species, <i>Acacia mearnsii</i> , on plant species diversity in a shola -grassland ecosystem

	Student	Host Institute	Supervisor	Project Title
Chemistry				
1	Santosh L. 20101069	CSIR-Central Electrochemical Research Institute (CECRI), Tamil Nadu	Ramesh Babu	Surface modifications of halloysite nanotubes by layered double hydroxide for efficient removal of dyes from wastewater
2	Jocinth Selvakumar N. 20101088	CSIR-Central Electrochemical Research Institute (CECRI), Tamil Nadu	Rakesh Chandra Barik	Corrosion behavior of mild steel in glycol solution
3	Sappa Sushma Tejasri 20121005	IISER Pune	Harinath Chakrapani	Synthesis and evaluation of small molecule hydrogen sulfide donors
4	A.R. Anandapadmanabhan 20121006	University of South Australia, Australia	Nico Voelcker	Sensing device for illicit drug detection
5	Anagha M.C. 20121007	IISER Pune	Seema Verma	Design of peptide hybrid nanostructures materials for biomedical applications
6	Anand Kumar 20121009	IISc, Bengaluru	Eluvathingal D. Jemmis	Understanding the chemical bonding representation and the effects of heteroatoms substitution in coronene
7	Neethu C.D. 20121014	IISER Pune	Muhammed Musthafa	A reversible hydrogen ion battery
8	Abhishek Kumar 20121016	IISER Pune	M. Jayakannan	Pyrene tagged functional polycaprolactone for bio-imaging
9	Nithinraj P.D. 20121017	IISER Pune	Seema Verma	Transition metal oxides suitable for supercapacitors
10	Lipi Jain 20121020	Shell Technology Centre, Bengaluru	Tarakanjan Gupta	Removal of selenium from industrial waste water by ferrous-ferric salt
11	Akhil N.B. 20121027	IISER Pune	Raghavendra Kikkeri	Synthesis of D-glucosamine building block as required for generating diverse sulfation patterns
12	Gajhans Kiran Dadasaheb 20121032	IISER Pune	Boomi Shankar	Metal organic materials derived from Amino P(V) ligands
13	Abhijith S.A. 20121033	IISER Pune	H.N. Gopi	Foldamer metallogels: Metal driven supramolecular assembly of peptide foldamers
14.	Vished 20121041	Northwestern University, U.S.A.	Teri W. Odom	Shape separation of gold nanostars using density gradient centrifugation
15	Tarmale Kaustubh Bhagwan 20121068	IISER Pune	Satish Ogale	Electrodeposition of nickel cobalt oxide for the application of asymmetric flexible microsupercapacitor
16	Anjana Raj R. 20121073	Graz University of Technology, Austria	Stefan A. Freunberger	Electrode concepts for high capacity conversion type battery electrodes
17	Surya R. 20121074	IISER Pune	Seema Verma	Morphology-controlled synthesis, magnetic properties and photoelectrochemical study of hematite nanocrystals
18	Abhishek Kumar Soni 20121084	Bioinformatics Institute (A*STAR), Singapore	Chandra Verma	Uncovering cryptic pockets in biologically relevant proteins: A novel methodology

	Student	Host Institute	Supervisor	Project Title
19	Amitosh Gautam 20121087	IISER Pune	Arnab Mukherjee	Mechanistic study of chorella virus DNA-ligase enzyme at atomistic level using QM/MM Method
20	Sereena Sunny 20121089	IISER Pune	H.N. Gopi	Selective orthogonal nitroalkane-alkyne 1, 3-dipolar cycloadditions on peptides: A versatile approach for biomolecular conjugation
21	Dinesh Kumar Bulani 20121095	IIT Bombay	Manoj Neergat	Synthesis and characterisation of shape-controlled platinum nanoparticles
22	Ashutosh Acharya 20121103	IISER Pune	Angshuman Nag	Synthesis and optical properties of colloidal BiI ₃ nanocrystals and bulk Cs ₂ AgBiBr ₆ : Analogues to lead halide perovskites
23	Anita Justin 20121106	IISER Pune	R. Vaidhyanathan	Developing ultra-microporous metal organic frameworks for selective sorption of CO ₂
Earth and Climate Science				
1	Ayush Nagar 20101076	IISER Pune	Gyan Ranjan Tripathy	Reconstruction of marine conditions in Precambrian - Cambrian (Pc-C) boundary using Shale Chemistry
2	Aswin Pradeep T. 20121013	IISER Pune	Gyana Ranjan Tripathy	Chemical erosion rates of peninsular Indian rivers: An inversion approach
Interdisciplinary				
1	Aditya Katti 20121092	National University of Singapore, Singapore	Cynthia He	Membrane dynamics of procyclin and effect of CC2D on plasma membrane of <i>Trypanosoma brucei</i> by z-scan FCS and FCS diffusion Laws
Mathematics				
1	Varun Prasad 20111028	IISER Pune	Amit Hogadi	Homotopy type theory and the univalent foundations of mathematics
2	Alla Dileep Kumar 20121002	IISER Pune	Kaneenika Sinha	Eigenvalue distribution of families of regular graphs
3	Debarun Ghosh 20121039	IISER Pune	Steven Spallone	Determinants of representations of hyperoctahedral groups
4	Shipra Kumar 20121046	IIT Kanpur	Amit Mitra	Exchange rate forecasting
5	Manjarekar Omkar Sanjay 20121055	IISER Pune	Anindya Goswami	Option pricing in a regime switching jump diffusion model
6	Sidharth S. 20121057	IISER Pune	Vivek Mallick	Introduction to toric varieties
7	Visakh Narayanan 20121064	IISER Pune	Rama Mishra	Functorial knot theory
8	Deeksha Adil 20121071	IMSc, Chennai	Saket Saurabh, Venkatesh Raman	Matching under preferences
9	Papia Bera 20121082	IISER Pune	A. Raghuram	Towards the Plancherel formula of GL(2) over a p-adic field

	Student	Host Institute	Supervisor	Project Title
10	Nair Ajith Anilkumar 20121090	IISER Pune	Chandrasheel Bhagwat	Harmonic analysis on locally symmetric spaces associated to discrete cocompact subgroups of $SL(2, \mathbb{R})$
11	Mohammad Munaif Iqbal Ahmed 20111018	Bhaskaracharya Pratishthana	Shrikant M. Bhatwadekar	On cancellation problems in affine geometry
Physics				
1	Tirpude Kapil Kedar 20111002	IUCAA, Pune	Gulab Chand Dewangan	The soft x-ray study of active galactic nuclei
2	Ajay Kumar Tiwari 20111009	Indian Institute of Astrophysics, Bengaluru	Dipankar Banerjee, Prasad Subramanian	Waves in magnetic structures in solar atmosphere
3	Dinesh Choudhary 20121003	IISER Pune	G. Ambika	Topology and cascade in power transmission network of India
4	Navathej P. Genesh 20121004	IISER Pune	Aparna Deshpande	Synthesis and atomic scale investigation of borophene on Au(111)
5	Sagarika Basak 20121008	IISER Pune	Rejish Nath	Quantum dynamics in ultra-cold Rydberg atomic gases
6	Nitesh Kumar Singh 20121012	IISER Pune	Ashna Bajpai	Synthesis of cobalt and cobalt oxide filled carbon nanotubes
7	Kumar Priyadarshi 20121015	Institute of Material Research & Engineering (IMRE), NUS, Singapore	Wong Swee Liang	2D materials: Growth, characterization and device fabrication
8	Saikat Bera 20121022	IISER Pune	Sunil Mukhi	Thermal corrections to entanglement entropy
9	Kunal Mozumdar 20121023	IISER Pune	G. Ambika	Emergent dynamics of neuronal networks with differing time scales and modular structure
10	Girish Lingadahalli Muralidhara 20121025	IISER Pune	Sunil Mukhi	2D CFT and four-point correlation function of the baby monster module
11	Varun Srivastava 20121026	IUCAA, Pune	Sukanta Bose	Parameter estimation and detection of gravitational waves using particle swarm algorithm
12	Shevate Sayali Ganesh 20121031	Raman Research Institute, Bengaluru	Andal Narayan	Saturation aided non-linear absorption in a double lambda system of EIT
13	Rajath Sawant 20121035	IISER Pune	G.V. Pavan Kumar	Study of single nanoparticle spectroscopy and exciton-plasmon coupling
14	G. Aniruddhan 20121043	IIT Madras	Arul Lakshminarayan	Relaxation to equilibrium of quantized chaotic systems
15	Akshay S. 20121045	NCRA - TIFR, Pune	Divya Oberoi	Investigation of small scale weak solar emission features at low radio frequencies
16	Subhendu Mondal 20121047	IISER Pune	M.S. Santhanam	Extreme events on complex networks and network robustness
17	Kavya S.S. 20121048	IISER Pune	G.V. Pavan Kumar	Light trapping using anisotropic plasmonic nanoparticles
18	Anirban Sharma 20121049	IMSc CIT Campus, Chennai	Mukul S. Laad	Topological phases on Lieb lattice

	Student	Host Institute	Supervisor	Project Title
19	Rikame Ketan Bhaskar 20121052	IUCAA, Pune	A.N. Ramaprakash	Software development for IUCAA SIDECAR Drive Electronic Controller (ISDEC) and development of scripts to automate ISDEC and detector tests
20	Kulkarni Sumeet Samir 20121054	IUCAA, Pune	Sukanta Bose	Exploring the use of random projections for gravitational wave data analysis
21	Fulkar Abhijit Gajanan 20121056	IISER Pune	G.V. Pavan Kumar	Study of plasmon-exciton interactions in metal-semiconductor nanoparticles
22	Divya Gadkari 20121062	IISER Pune	Sourabh Dube	Probing right-handed neutrinos at current and future colliders through displaced lepton jets
23	Harjot Kumar 20121066	IISER Pune	Surjeet Singh	Synthesis of nanocomposites of silica-gold core-shell nanoparticles and gold nanowires with conducting polymers
24	Thasneem A. 20121067	IISER Pune	Aparna Deshpande	Atomic scale investigation of tin selenide
25	Khairnar Gaurav Ramesh 20121070	IISER Pune	M.S. Santhanam	Dynamics of delta-kicked duffing oscillator
26	Irene Dutta 20121076	IISER Pune	Seema Sharma	Search for pair production of T' quarks in dileptons and multi-jet final states at $s = 13$ TeV
27	Homkar Suvidyakumar Vinod 20121077	IISER Pune	Ashna Bajpai	Synthesis and magneto-transport measurements in magnetoresistive core-shell material and 2-D magnetic oxides
28	Bhole Gaurav Vijay 20121078	IISER Pune	T.S. Mahesh	Novel strategies for quantum control: Applications in quantum information processing & spectroscopy
29	Talele Saurabh Vikas 20121079	IISER Pune	Shivprasad Patil	Viscoelastic properties of single proteins using small amplitude AFM
30	Pande Varad Rajaram 20121080	Bose Institute, Kolkata	Dipankar Home	Foundations and applications of finite strength quantum measurement and weak value
31	Atmasiddha Prachi Arvind 20121088	IISER Pune	Seema Sharma	Search for compressed scalar top quark pairs in p-p collisions at LHC at $s = 13$ TeV
32	Prashali Chauhan 20121094	IISER Pune	Prasad Subramanian	Viscous evolution of black hole accretion disks
33	Jog Harshvardhan Prasad 20121100	IISER Pune	G.V. Pavan Kumar	Study of Raman antenna effects of anisotropic plasmonic metal nanostructures
34	Kshirsagar Aseem Rajan 20121105	JNCASR, Bengaluru	Umesh Waghmare	First-principles investigation of MoS ₂ -MXene heterostructures as cathodes in magnesium-ion batteries
35	Bodas Arushi Ravindra 20121107	IISER Pune	Arijit Bhattacharyay	Study of effects of confinement on vortex structure in dilute Bose gas
36	Jugal Talukdar 20121108	IISER Pune	Rejish Nath	Quantum walk of Rydberg atoms embedded in photonic crystal

List of Courses

Fall 2016

Code	Course	Coordinator* / Instructor	Credits
Semester I			
BIO 101	Introductory Biology I	Kundan Sengupta*, Milind Watve, Thomas Pucadyil	3
CHM 101	Chemical Principles-I	Anirban Hazra*, Arnab Mukherjee	3
MTH 100	Introduction to Proofs	Supriya Pisolkar	2
MTH 101	Single Variable Calculus	Mousomi Bhakta	3
PHY 101	World of Physics I-Mechanics	Sudarshan Ananth	3
BIO 121	Practical: Basic Biology	Raghav Rajan *, Krishanpal Karmodiya, Tressa J.P. , Nixon Abraham, Anjan Banerjee	3
IDC101	Introduction to Computing	Pranay Goel	3
Semester III			
BIO 201	Introductory Biology III: Ecology and Evolution	Sutirth Dey*, Milind Watve	3
CHM 201	Principles of Inorganic Chemistry	Moumita Mojumdar*, N. Ballav	3
MTH 201	Linear Algebra	Raghuram A.	3
PHY 201	World of Physics III: Electricity & Magnetism	Seema Sharma*, Nabamita Banerjee	3
BIO 221	Biology Lab III	Neelesh Dahanukar*, Sutirth Dey	3
CHM 221	Chemistry Lab II	R. Vaidhyanathan*, Shabana Khan, Seema Verma, Sujit Ghosh	3
PHY 221	Physics Lab II	Sourabh Dube*, Satish Ogale, Ashna Bajpai, Rejish Nath	3
HSS 201	An Introduction to the History of Science, Technology, and Medicine	John Mathew	2
ECS 201	Earth System I	Neena Joseph Mani	2

Code	Course	Coordinator* / Instructor	Credits	Open in Semesters
Semester V & VII				
BIO 310	Biostatistics	Ramana Athreya	4	V&VII
BIO 311	Advanced Cell Biology	Nagaraj B.*, Thomas Pucadyil	4	V&VII
BIO 313	Advanced Molecular Biology	Mayurika Lahiri*, L.S. Shashidhara	4	V&VII
BIO 314	Bioinformatics	M.S. Madhusudhan	4	V&VII
BIO 320	Genetics	Richa Rikhy*, Girish Ratnaparkhi	4	V&VII
BIO 322	Biophysics-I	Chaitanya Athale	4	V&VII
BIO 410	Advanced Biochemistry I	Sudha Rajamani*, P. Gayathri	4	V&VII
BIO 411	Ecology I	Deepak Barua	4	V&VII
BIO 301	Lab Training/Theory Project	Collins Assisi	3	V
BIO 334	Neurobiology I	Suhita Nadkarni*, Nixon Abraham	3	V&VII

Code	Course	Coordinator* / Instructor	Credits	Open in Semesters
BIO 401	Lab Training/Theory Project	Collins Assisi	3	VII
BIO 431	Epigenetics	Sanjeev Galande	3	V & VII
BIO 454	Structural Biology	Saikrishnan Kayarat*, Jeetender Chugh, P. Gayathri	3	V&VII
BIO 452	Plant Biology II	Anjan Banerjee	3	VII
BIO 352	Animal Physiology II	Nishikant Subhedar	3	VII
BIO 353	Immunology II	Nishad Matange	3	VII
CHM 311	Physical Organic Chemistry	Harinath Chakrapani*, Jeet Kalia	4	V & VII
CHM 312	Main Group Chemistry	R. Boomishankar	4	V & VII
CHM 320	Symmetry and Group Theory	Srabanti Chaudhury*, Alope Das	4	V & VII
CHM 331	Self-Assembly in Chemistry	Pinaki Talukdar*, Raghavendra Kikkeri	3	V & VII
CHM 332	Separation Principles and Techniques	Srinivas Hotha	3	V & VII
CHM 340	Advanced Organic Chemistry Laboratory	H.N. Gopi*, Jeganmohan M.	3	V
CHM 410	Advanced Molecular Spectroscopy	Partha Hazra*, Pankaj Mandal, Nirmalya Ballav	4	VII
CHM 411	Organic Synthesis - II	Sudipta Basu*, B. Gnanaprakasam	4	VII
CHM 413	Bioinorganic Chemistry	V.G. Anand	4	VII
CHM 430	Advanced Physical Chemistry Laboratory	Jeetender Chugh*, Angshuman Nag, Pramod Pillai, M. Musthafa	3	VII
CHM 431	Chemical Biology	Britto Sandanaraj*, Amrita Hazra	3	VII
CHM 432	Solid State Chemistry	Angshuman Nag	3	VII
CHM 436	Molecular Modelling and Simulation	Arun Venkatnathan	3	VII
CHM 445	Electrochemistry	M. Musthafa	3	VII
CHM 301	Lab Training/Theory Project	M. Musthafa	3	V
CHM 401	Lab Training/Theory Project	M. Musthafa	3	VII
MTH 310	Group Theory	Rabeya Basu	4	V/VII
MTH 311	Analysis	Anup Biswas	4	V/VII
MTH 312	Point Set Topology	Rama Mishra	4	V/VII
MTH 318	Combinatorics	Krishna Kaipa	4	V/VII
MTH 314	Statistical Inference	Uttara Naik-Nimbalkar	4	V/VII
MTH 410	Galois Theory	Debargha Banerjee	4	VII
MTH 421	Measure Theory & Integration	Anisa Chorwadwala	4	VII
MTH 412	Algebraic Topology	Vivek Mallick	4	VII
MTH 413	Algorithms	Soumen Maity	4	VII
MTH 415	Probability	Chandrasheel Bhagwat	4	VII
MTH 417	Ordinary Differential Equations	Tejas Kalelkar	4	VII

Code	Course	Coordinator* / Instructor	Credits	Open in Semesters
MTH 334	Topics in Applicable Mathematics: Numerical Analysis	Anindya Goswami	3	V/VII
MTH 431	Topics in Analysis: Several Complex Variables	Diganta Borah	3	VII
MTH 301	Lab Training/Theory Project	Chandrasheel Bhagwat	3	V
MTH 401	Lab Training/Theory Project	Chandrasheel Bhagwat	3	V & VII
PHY 310	Mathematical Methods in Physics	Suneeta Vardarajan	4	V & VII
PHY 311	Classical Mechanics	M.S. Santhanam	4	V & VII
PHY 312	Electrodynamics	Arijit Bhattacharyay	4	V & VII
PHY 313	Quantum Mechanics I	T.S. Mahesh	4	V & VII
PHY 301	Lab Training/Theory Project	Sunil Nair	3	V
PHY 330	Physics Lab IV	Shouvik Datta*, Mukul Kabir	3	V
PHY 335	Electronics I	Umakant Rapol	3	V & VII
PHY 340	Methods of Experimental Physics	Shivprasad Patil	3	V & VII
PHY 410	Physics Lab VI	G.V. Pavan Kumar*, C.V. Dharmadhikari, Bhas Bapat	4	VII
PHY 411	Statistical Mechanics II	Anil D. Gangal	4	VII
PHY 412	Condensed Matter Physics I	Surjeet Singh	4	VII
PHY 401	Lab Training/Theory Project	Sunil Nair	3	VII
PHY 452	Fluid Dynamics	Prasad Subramanian	3	V & VII
PHY 453	Computational Physics	Prasenjit Ghosh*, Apratim Chatterji	3	VII
PHY 465	Physics of Soft Matter	Apratim Chatterji*, Guruswamy	3	VII
ECS 313	Palaeobiology	Jahnavi Punekar	4	V & VII
ECS 312	Isotope Geochemistry	Gyana Ranjan Tripathy	4	V & VII
HSS 431	Science Fiction: An Introduction	Pooja Sancheti	3	VII
HSS 311	Other Ways of Seeing: Introduction to Qualitative Research	Aditi Deo	3	V & VII
HSS 301	Lab Training/Theory Project	John Mathew	3	V
HSS 401	Lab Training/Theory Project	John Mathew	3	VII

Spring 2016

Code	Course	Coordinator* / Instructor	Credits
Semester II			
BIO 102	Introductory Biology II: Cellular and Molecular Biology	Nagaraj B.*, M.S. Madhusudhan	3
CHM 102	Chemical Principles II	Arnab Mukherjee*, Alope Das, K.N. Ganesh	3
MTH 102	Multi Variable Calculus	Anindya Goswami	3
PHY 102	World of Physics II- Waves and Matter	Arijit Bhattacharyay	3

Code	Course	Coordinator* / Instructor	Credits
CHM 121	Chemistry Lab I	Jeetender Chugh *, M. Musthafa M., B.S.M. Rao, Pramod Pillai	3
BIO 122	Biology Lab II	Neelesh Dahanukar*, Sanjeev Galande, Jeet Kalia, Tressa Jacob, Nishad Matange, Chaitanya Athale	3
PHY 121	Physics Lab I	Ramana Athreya*, Shivprasad Patil, Ashna Bajpai, M.S. Santhanam	3
IDC 102	Mathematical Methods	Prasad Subramanian	3
HSS 102	Critical Reading and Communication	Pushkar Sohoni*, Aditi Deo	2
Semester IV			
BIO 202	Introductory Biology IV: Biology of Systems	Aurnab Ghose*, Collins Assisi	3
CHM 202	Principles of Organic Chemistry	H.N. Gopi	3
MTH 202	Probability and Statistics	Uttara Naik Nimbalkar	3
PHY 202	World of Physics IV - Quantum Physics	Satish Ogale	3
MTH 204	Basic Structures of Mathematics	Amit Hogadi	2
PHY 222	Physics Lab III	Sunil Nair*, Seema Sharma, Atikur Rahman, Prasenjit Ghosh	3
CHM 222	Chemistry Lab III	Neeraja Dashaputre*, S.G. Srivatsan, M. Jayakannan, Amrita Hazra, R. Kikkeri, Sudipta Basu	3
IDC 202	Optics	Rejish Nath	2
ECS 202	Earth System II	Gyana Ranjan Tripathy*, Jahnvi Puneekar	2

Code	Course	Coordinator* / Instructor	Credits	Open in Semesters
Semester VI & VIII				
BIO 321	Plant Biology I	Anjan Banerjee*, Sagar Pandit	4	VI & VIII
BIO 323	Immunology I	Vineeta Bal*, Satyajit Rath	4	VI & VIII
BIO 312	Animal Physiology I	N. Subhedar*, Nixon Abraham	4	VI & VIII
BIO 412	Microbiology	Nishad Matange*, P. Gayathri	4	VI & VIII
BIO 417	Advanced Biochemistry II	Thomas Pucadyil*, Amrita Hazra	4	VI & VIII
BIO 422	Evolution	L.S. Shashidhara*, Milind Watve	4	VI & VIII
BIO 413	Mathematical Biology	Pranay Goel*, Chaitanya Athale	4	VI & VIII
BIO 302	Lab/Theory Project	P. Gayathri	3	VI
BIO 402	Lab/Theory Project	P. Gayathri	3	VIII
BIO 354	Neurobiology II	Suhita Nadkarni*, Raghav Rajan	3	VI & VIII
BIO 441	Genome Biology	Kundan Sengupta*, Krishanpal Karmodiya	3	VI & VIII
BIO 420	Developmental Biology	Girish R.*, Richa Rikhy	4	VIII
BIO 351	Biology and Disease	Mayurika Lahiri*, Siddesh Kamat	3	VIII
BIO 491	Literature Review	Saikrishnan Kayarat	3	VIII

Code	Course	Coordinator* / Instructor	Credits	Open in Semesters
CHM 310	Quantum Chemistry	Anirban Hazra*, Arun Venkatnathan	4	VI & VIII
CHM 321	Organic Synthesis-I	Ramakrishna G. Bhat	4	VI & VIII
CHM 322	Transition Metal Chemistry	S.K. Ghosh*, Shabana Khan	4	VI & VIII
CHM 302	Lab Training/Theory Project	M. Musthafa	3	VI
CHM 323	Fundamentals of Molecular Spectroscopy	Pramod Pillai*, Partha Hazra	4	VI & VIII
CHM 334	Physical Chemistry of Solutions	Seema Verma	3	VI & VIII
CHM 351	Bioorganic Chemistry	Raghavendra Kikkeri*, S.G. Srivatsan	3	VI & VIII
CHM 360	Advanced Inorganic Chemistry Lab	Shabana Khan*, Moumita Majumdar and R. Vaidhyathan	3	VI
CHM 420	Structural Methods and Analysis	Jeetender Chugh*, Pinaki Talukdar	4	VIII
CHM 421	Polymer Chemistry	M. Jayakannan*, Britto Sandanaraj	4	VIII
CHM 422	Statistical Thermodynamics	Srabanti Chaudhury	4	VIII
CHM 423	Medicinal Chemistry	Jeet Kalia*, Harinath Chakrapani	4	VIII
CHM 402	Lab Training/Theory Project	M. Musthafa	3	VIII
CHM 433	Photochemistry	Pankaj Mandal*, Sudipta Basu	3	VIII
CHM 441	Advanced Material Science	Nirmalya Ballav *, R. Vaidhyathan	3	VIII
CHM 442	Organometallic Chemistry	Gnanaprakasam*, Srinivas Hotha	3	VIII
MTH 320	Vector Spaces, Rings and Modules	Supriya Pisolkar	4	VI & VIII
MTH 326	Complex Analysis	Baskar Balasubramanyam	4	VI & VIII
MTH 327	Calculus on Manifolds	Anisa Chorwadwala	4	VI & VIII
MTH 323	Graph Theory	Krishna Kaipa	4	VI & VIII
MTH 329	Cryptography	Steven Spallone	4	VI & VIII
MTH 340	Topics in Algebra - Additive Number Theory	Kaneenika Sinha	3	VI & VIII
MTH 427	Mathematical Biology	Pranay Goel*, Chaitanya Athale	4	VI & VIII
MTH 302	Theory Project	Chandrasheel Bhagwat	3	VI
MTH 420	Algebraic Number Theory	A. Raghuram	4	VIII
MTH 411	Functional Analysis	Diganta Borah	4	VIII
MTH 425	Differential Geometry	Chandrasheel Bhagwat	4	VIII
MTH 416	Stochastic Processes	Anup Biswas	4	VIII
MTH 423	Commutative Algebra	Anupam Kumar Singh	4	VIII
MTH 424	Partial Differential Equations	Mousomi Bhakta	4	VIII
MTH 402	Theory Project	Chandrasheel Bhagwat	3	VIII
PHY 320	Physics Lab V	T.S. Mahesh*, Shouvik Datta	4	VI
PHY 322	Statistical Mechanics I	Deepak Dhar	4	VI & VIII
PHY 324	Quantum Mechanics II	Rajeev Bhalerao	4	VI & VIII
PHY 350	Electronics II	Aparna Deshpande	3	VI & VIII
PHY 351	Gravitation and Cosmology	Nabamita Banerjee	3	VI & VIII

Code	Course	Coordinator* / Instructor	Credits	Open in Semesters
PHY 356	Group Theory in Physics	Sudarshan Ananth	3	VI & VIII
PHY 302	Lab Training/Theory Project	Apratim Chatterji	3	VI
PHY 402	Lab Training/Theory Project	Apratim Chatterji	3	VIII
PHY 420	Atomic and Molecular Physics	Bhas Bapat	4	VIII
PHY 421	Classical and Quantum Optics	G.V. Pavan Kumar	4	VIII
PHY 422	Nuclear and Particle Physics	Arun Thalapillil	4	VIII
PHY 430	Physics Lab VII	Sourabh Dube*, C.V. Dharmadhikari	3	VIII
PHY 461	Quantum Field Theory	Suneeta Vardarajan	3	VIII
PHY 463	Advanced Condensed Matter Physics	Mukul Kabir	3	VIII
ECS 321	Weather & Climate	Neena Joseph Mani	4	VI & VIII
ECS 322	Landscapes & Earth surface processes	Argha Banerjee	4	VI & VIII
ECS 324	Introduction to Geophysics	Shyam S. Rai	4	VI & VIII
ECS 325	Numerical Computation using MATLAB	Suhas Ettammal*, Ritima Das	4	VI
ECS 302	Lab Training/Theory Project	Neena Joseph Mani	3	VI
ECS 402	Lab Training/Theory Project	Neena Joseph Mani	3	VIII
HSS 331	Development of Mathematical Astronomy in India	Venketeswara Pai	3	VI & VIII
HSS 321	Contemporary Indian Writing in English	Pooja Sancheti	4	VI & VIII
HSS 322	Science, History & Theatre	John Mathew	4	VI & VIII
HSS 302	Lab Training/Theory Project	John Mathew	3	VI
HSS 402	Lab Training/Theory Project	John Mathew	3	VIII

Academic Achievements of BSMS Students

CNR Rao Education Foundation Prize was awarded to the following students. This prize is given to first year BSMS students who have secured the highest CGPA in the first two semesters.

Suman Satish Kulkarni (Fall 2016)

Patki Raagini Abhay (Spring 2016)

Prizes for Academic Excellence were awarded to the following BS MS students. These prizes are given to the BS MS students who attained the highest CGPA in Semesters 5 to 8.

Sriram Raghunath (Semester III, Fall 2016)

Joshi Gaurav Shrikant (Semester IV, Spring 2016)

Nabha Shah (Semester V & VI, Academic Year 2015-16)

Akshay S. (Semester VII & VIII, Academic Year 2015-16)

International Programs Attended by Students

DAAD- WISE Summer Internship 2016, Germany		
1	Spandan Choudhury	Max Planck Institute for Radio Astronomy, Bonn
2	Shreeya Behera	University of Heidelberg
3	Bharath Krishnan	Potsdam Institute for Climate Impact Research, Potsdam
4	Parijat Banerjee	University of Oldenburg
5	Nandini Hazra	Max Planck Institute for Solar System Research, Göttingen
6	Divya Singh	Max Planck Institute for Gravitational Physics, Hannover
7	Chaitanya Erady	Leipzig University
Charpak- Research Internship Program, France		
1	Purva Bhumkar	Center for Research on Hetero-Epitaxy and its Applications, France
2	Mekhala Kumar	Paris Descartes University
Mitacs Global Program, Canada		
1	Navathej Genesh	Lakehead University - Thunder Bay, Ontario
2	Alla Dileep Kumar	University of Manitoba, Winnipeg
Khorana Scholarship		
1	Amruta Nayak	University of Wisconsin-Madison, U.S.A.
2	Chhaged Shubham S.	University of Georgia, Athens, U.S.A.
National University of Singapore		
1	Aditya Katti	Center for Bioluminescence Sciences
2	Abhishek Anand	Department of Biological Sciences
3	Abhishek Kumar Soni	NUS/A*STAR
4	Snehal Kadam	Mechanobiology Institute
Others		
1	A.R. Anandapadmanabhan	Hosei University, Tokyo, Japan
2	A.R. Anandapadmanabhan	Future Institute, University of South Australia
3	Anand Kumar	University of Girona, Spain
4	Vished	Northwestern University, Chicago, U.S.A.
5	Abhijit Fulkar	Laboratoire de Physique des Solides, Orsay, France
6	Bagade Saket Rahul	University of Texas, EL Paso, U.S.A.
7	Suyash Naik	University of Nice-Sophia Antipolis, France
8	Gaurav Bhole	University of Waterloo, Canada
9	Abhilash Sawant	RIKEN Brain Science Institute, Tokyo, Japan
10	Zilpelwar Sharvari Sudhir	Institute of Molecular Sciences of Orsay - University Paris-Sud, France
11	Vrushali Rao G.	German Primate Center in Göttingen, Germany
12	Datar Prathamesh Madhav	Ohio State University, U.S.A.
13	Mangesh Avinash Sonawane	Marseille Particle Physics Center, France
14	Isha Dhani	École normale supérieure de Lyon, France

15	Arpith Ramakrishna Shanbhag	University of Duisburg-Essen, Germany
16	Susmita Singh	Okinawa Institute of Science and Technology, Japan
17	Karthik Prabhu P.	Institute of Astrophysics and Space Sciences, University of Lisbon, Portugal
18	Prachiti Moghe	Max Planck Institute of Molecular Physiology, Dortmund, Germany
19	Ira Phadke	Ohio State University, U.S.A.
20	Anjana Raj R.	Institute for Chemistry and Technology of Materials, Austria
21	Abhishek Das	Centre for Genomic Regulation, Barcelona, Spain
22	Atharv Patil	National Central University, Taiwan

The following 16 BS MS students have been selected to receive Infosys Foundation Scholarship that allowed a full tuition fee waiver for Spring 2017.

Hasna H.S.	Saurav Raj	Sanjay Golla
Megha Roy	Sarin T.S.	Shivam Yadav
Sruthy J. Das	Pankaj Bhagwat	Ingale Vaibhav Vijay
Minal Pravin Wable	Sagar Gupta	Vikash Kumar
Sharafudheen P.C.	Jesil Jose	Priyanshu Chandra
Anand Kumar		

During the fifth Convocation of the Institute held on May 19, 2016, 72 students graduated with BS MS dual degrees. Santpur Sai Neha who secured a CGPA of 9.8 was awarded the Institute Gold Medal. The following 17 students passed with Distinction (CGPA>9.0): Khushboo Singh, Govind Unnikrishnan, Santpur Sai Neha, Radhika R., K. Arun Kumar, Patankar Tanmay Sanjay, Nivedita Rangarajan, Akilandeswari B., Syed Muhammed Muazzam Kamil, Shruti Paranjape, Harsha H.R., Rohit Krishnan H., Nihal S. Rao, Arjun Vijeta, Kaustav Dey, Abhishek Kumar Shukla, and K. Sriram.



Personnel



Personnel

Director & Professor

K.N. Ganesh

Professors

Sunil Mukhi
L.S. Shashidhara
Milind Watve
Sanjeev Galande
A. Raghuram
G. Ambika
Shyam Sundar Rai
Satishchandra Ogale
M. Jayakannan
Srinivas Hotha

Associate Professors

Rama Mishra
Ramana Athreya
Suneeta Vardarajan
Prasad Subramanian
M.S. Santhanam
Steven Spallone
Soumen Maity
R.G. Bhat
T.S. Mahesh
V.G. Anand
H.N. Gopi
Aloke Das
M.S. Madhusudhan
Sudarshan Ananth
Amit Hogadi
Shivprasad Patil
Bhas Bapat
Sutirth Dey
John Mathew
Partha Hazra
Girish Ratnaparkhi
Arijit Bhattacharyay
Anjan Banerjee
Arun Venkatnathan
S.G. Srivatsan
R. Boomishankar

Aurnab Ghose
Mayurika Lahiri
Shouvik Datta
Apratim Chatterji
Pranay Goel
Sujit Kumar Ghosh
Pinaki Talukdar
Harinath Chakrapani
Arnab Mukherjee
Chaitanya Athale
M. Jeganmohan Masilamani
Anupam Kumar Singh
Saikrishnan Kayarat
Prasenjit Ghosh
Nagaraj Balasubramanian
Thomas Pucadyil
Raghavendra Kikkeri
Surjeet Singh
Nirmalya Ballav
Ramanathan Vaidhyathan

Assistant Professors

Deepak Barua
Ayan Mahalanobis
Umakant Rapol
G.V. Pavan Kumar
Richa Rikhy
Kundan Sengupta
Rabeya Basu
Baskar Balasubramanyam
Pankaj Mandal
Sunil Nair
Anirban Hazra
Aparna Deshpande
Anindya Goswami
Sudha Rajamani
Collins Assisi
Vivek Mohan Mallick
Mohammad Mukul Kabir
Kaneenika Sinha
Akanksha Chaturvedi
Anisa Chorwadwala

Shabana Khan
Jeetender Chugh
Srabanti Chaudhury
Jeet Kalia
Sourabh Dube
Rejish Nath
Debargha Banerjee
Tejas Kalelkar
Diganta Borah
Supriya Pisolkar
Seema Sharma
Britto Sandanaraj
Pramod Pillai
Krishna Kaipa
B. Gnanaprakasam
Suhita Nadkarni
Nabamita Banerjee
Mousomi Bhakta
Anup Biswas
Muhammed Musthafa O.T.
Moumita Majumdar
Chandrasheel Bhagwat
Gyana Ranjan Tripathi
Nixon M. Abraham
Argha Banerjee
Angshuman Nag
Neena Joseph Mani
Amrita Hazra
Gayathri Pananghat
Arun Thallapillil
Atikur Rahman
Sagar Pandit
Venketeswara Pai R.
Siddhesh Kamat
Manish Kumar Mishra
Pushkar Sohoni
Suhas Ettammal
Sreejith G.J.

Assistant Professors (on contract)

Jahnvi Punekar
Neeraja Dashaputre

Professors 11

Associate Professors 46

Assistant Professors 60

Total 117

Non-Teaching Staff

Col. G. Raja Sekhar (Retd.), Registrar
 Vasundhara Laad, Joint Registrar (F & A)
 Santosh Nevse, Assistant Registrar (Admin)
 Salim Shaikh, Assistant Registrar (Stores & Purchase)
 Dipali Dalvi, Assistant Registrar (Academics)
 Umeshreddy Kacherki, Deputy Librarian
 Avinash Abhale, Chief Security Officer
 Suresh Nair, Office Superintendent
 Beena Subhash, Office Superintendent
 Sowmya Palimar, Office Superintendent
 Sreejit Marar, Office Superintendent (Dining Services)
 Ramesh Mohite, Private Secretary
 Manoj Chaudhari, Private Secretary
 Mahesh Rote, Personal Assistant
 Tanuja Sapre, Library and Information Assistant
 Namrata Shinde, Library and Information Assistant
 Snehal Batule, Accountant
 Prabhas Patankar, Accountant
 Shraddha Visal, Accountant
 Nayana Shirole, Office Assistant
 Mayuresh Kulkarni, Office Assistant
 Anil Jadhav, Office Assistant
 Prabhakar Anagare, Office Assistant
 Vrushali Birla, Office Assistant
 Sandeep Sankpal, Office Assistant
 Tushar Kurulkar, Office Assistant
 Suvarna Bharadwaj, Office Assistant
 Priyadarshini Tamhane, Office Assistant
 Smita Kondhalkar, Jr. Office Assistant
 Varsha Jain, Jr. Office Assistant
 John Albert, Jr. Office Assistant
 Deepa Jain, Nurse
 Swapnil Bule, Physical Education Instructor
 Roshan Mohite, Car Driver
 Sanjay Gomale, Attendant
 Vitthal Shejwal, Attendant

Engineering Section

Yogiraj Singh Rajput, Superintending Engineer
 (on deputation from CPWD)
 Ganesh Pingalkar, Assistant Engineer (Civil)
 Debendranth Behera, Assistant Engineer (Electrical)
 Manoj Mane, Junior Engineer (Electrical)
 Vijaykumar Shinde, Junior Engineer (Civil)

Technical Staff

Goldi Mishra, Chief Technology Officer
 Naresh Sharma, Principal Technical Officer
 (International Relations)
 Shanti Kalipatnapu, Principal Technical Officer
 (Research Communications)
 Neeta Deo, System Administrator
 Parveen Nasa, Sr. Technical Officer (Instrumentation)
 Nisha Kurkure, Sr. Technical Officer (HPC)

Nilesh Dumbre, Technical Officer
 Mrinalini Virkar, Technical Officer
 Mahesh Jadhav, Technical Officer
 Saurabh Butolia, Technical Officer (IT)
 Sureshchandra Prajapat, Scientific Assistant
 Prashant Kale, Technical Assistant
 Vijay Vittal, Technical Assistant
 Anil Prathamshetti, Technical Assistant
 Nitin Dalvi, Technical Assistant
 Rupali Jadhav, Technical Assistant
 S. Suresh Kumar, Technical Assistant (IT)
 Shabnam Patil, Laboratory Technician
 Devpalsingh Rajput, Laboratory Technician
 Sachin Behra, Technical Assistant
 Narendra Khandekar, Laboratory Technician
 T.S. Yatish, Laboratory Technician
 Tejal Vadgama, Laboratory Technician
 Santosh Khilare, Laboratory Assistant
 Megha Paygude, Laboratory Assistant
 Sudhir Lone, Laboratory Assistant
 Kalpesh Thakare, Laboratory Assistant
 Piyush Gaddekar, Laboratory Assistant
 Yashwant Pawar, Laboratory Assistant
 Ganesh Dimbar, Laboratory Assistant
 Sandeep Kanade, Laboratory Assistant

Registrar	1
Jt. Registrar	1
Dy. Librarian	1
Superintending Engineer	1
Assistant Registrar	3
Chief Security Officer	1
Office Superintendent	4
Assistant Engineer	2
Junior Engineer	2
Private Secretary	2
Personal Assistant	1
Library Information Assistant	2
Accountant	3
Office Assistant	9
Jr. Office Assistant	3
Chief Technology Officer	1
Principal Technical Officer	2
Sr. Technical Officer	2
System Administrator	1
Technical Officer	4
Scientific Assistant	1
Technical Assistant	7
Laboratory Technician	5
Laboratory Assistant	8
Attendant	2
Nurse	1
Physical Training Instructor	1
Driver	1
Total	72

Consultants and Support Staff on Contractual Basis

Vandana Gambhir, Grants and IPR Manager
 Vivek Kannadi, Senior Technical Officer (Swayam/MOOC)
 Gopalkrishnan Marar, Sr, Consultant (Accounts)
 Sarjerao Yadav, Consultant (Works)
 M.M. Jana, Consultant (Horticulture)
 Gursharn Singh Grover, Consultant (Safety)
 Chandrakant Bhojar, Executive Engineer (Civil)
 Varsha Hoshing, Executive Engineer (Electrical)

Visiting Faculty

A.A. Natu
 Nishikant Subhedar
 V.S. Rao
 B.S.M. Rao
 C.V. Dharmadhikari
 Uttara V. Naik-Nimbalkar
 Pooja Sancheti
 Girish Deshpande
 Deepak Dhar
 Vineeta Bal

Faculty Fellows

Seema Verma
 Aditi Deo

Externally Funded Fellows/Scientists

S. Sivaram, INSA Senior Scientist
 Rajeev Bhalerao, Raja Ramanna Fellow, DAE
 Ashna Bajpai, Ramanujan Fellow, SERB
 Sudipta Basu, Ramalingaswami Fellow, DBT
 Raghav Rajan, Ramalingaswami Fellow, DBT
 Shital Sarah S. Ahaley, WT-DBT IA Early Career Fellow
 Neelesh Dahanukar, INSPIRE Faculty
 Krishanpal Karmodiya, INSPIRE Faculty
 Nishad Matange, INSPIRE Faculty
 Soumi Chakravarty, INSPIRE Faculty
 Smita Chaturvedi, Project Scientist, WOS-B, DST
 Tressa Jacob, Project Scientist, BIOCaRE, DBT
 Madhuri Vangala, DST Fast Track Scientist
 Jayeeta Banerjee, Women Scientist
 Rajani Panchang, DST Young Scientist/Project Scientist
 Tarak Nath Mandal, DST Young Scientist/Project Scientist

Post-Doctoral Fellows/Research Associates in Projects

Srinu Meesala
 Ultaf Baig
 Sandip Pasari
 Rashmi Prabhu

Snehal Shekatkar
 Ivan Lodato
 Gaurang Mahajan
 Anupam Ashok Sawant
 Vishal Prabhakar Thakare
 Dhanashree Kelkar
 Vinila Chavan
 Ruby Singh
 Ravi Kumar
 Tilak Das
 Alok Bang
 Subas Kumar Muduli
 Shahid Pottachola Shafi
 Rahul P. Hardikar
 Ashwin Kelkar
 Ritima Das

NBHM Post-Doctoral Fellow

Dilpreet Kaur

DBT Research Associates

Priyanka Dutta
 Rutika Ramesh Naik
 Ameya Bhide

SERB National Post-Doctoral Fellows

Satish Badadhe
 N. Remya
 Pradip Kumar Singh
 Pradnya Jagtap
 Ameya Vishwas Sathe
 K. Sasikumar Raja
 Arup Ghosh
 Bhosale Udaysingh Tanajirao
 Brijesh Chandra
 Ganesh Babasaheb Markad
 Ashoka Bali
 Nayeem Ahmed
 U. Devarajan
 Santosh Kumar
 P. Dhanya
 Rohit Dilip Holkar
 Jitender Kumar
 Shruti
 Kaustav Bhattacharjee
 Sreenu Bhanoth
 Nancy Singhal
 Sujit Pratap Rao Chavan
 Imtiyaz Ahmad Bhat
 Rounak Ashok Naphade
 Vinayak Sontakke
 Dhruvajyoti Datta
 P.J. Gregor

IISER Post-Doctoral Fellows

Nitin Wadnerkar
Satyajit Khare
Anup Pillai
Chitrabhanu Chaudhuri
Keerthi Harikrishnan
T. Surrender
Jaya Pal
Shane D'Mello
Venkata Krishna Kishore
Luminita Harnagea
Prasad Ramesh Joshi
Preeti Gupta
Rupa Mishra
Ratna Pal
Kirtikumar Kondhare
Uday Bhaskar Sharma
Tian An Wong
Ankush Shrivastava

Part-time Medical Officers

V.S. Savaskar
Priti Chhajed
Aarti Rapol

Counsellors

Rebecca D'souza
Vrinda Walimbe

Project Staff

Sagar Tarate, Veterinary Scientist
Sachin Arjun Atole, Animal Facility In-charge
Aparva Barve, Coordinator, CoESME
Vijayshree Shinde, Technical Officer
Prajakta Kulkarni, Lab Technician
Anubha Vijay Pulwale, Lab Technician
Ashwini Balasaheb Kakade, Lab Technician
Kalyan Sachidanand Bhandare, Lab Technician
Swati Arvind Totad, Technical Assistant
Vijay Kumar Verma, Technical Assistant
Shalini Mishra, Technical Assistant
Sandeep Kumar Bejjanki, Technical Assistant
Anupama Madas, Office Assistant (Multi-skill)
Shital Boriwar, Office Assistant (Multi Skill)
Renuka Ambarkhane, Office Assistant (Multi Skill)
Madhura Joglekar, Senior Teaching Associate
Prachi Pasalkar, Senior Teaching Associate
Shanti Pise, Senior Teaching Associate

Project Fellows / Assistants

Ketki Holkar
Tejal Gujarati
R. Nevedha
Nelchi Prashali
Vaishali Chakravarty
Parichit Sharma
Supriti Ghorui
Avantika Ahiya
Sukruti Bansal
Pooja Vaid
Utpal Saikia
Srashti Jain
Meenu Mahesh Kuman
Pallavi Vijay Vetal
Aditi Sanjay Khatpe
Yamini Kotriwar
Nikhil Sen
Niyoti Tembulkar
Sarita Tripathi
Shital Sambhaji Madbhagat
Akash Bahai
Ankit Roy
Prachi Prasad Kour
Aparva Lohegaonkar Patrike
Vinita Ahuja
Yogesh Gawli
Kaustubh Khaire
Avantika Jakati
Mahesh Gajanan Sahare
Ojas Suneetee Vijay
Anagha Pund
Sunil Nahata
Pranava Shankar Mishra
Sheeba John
Punam Bala
Partha Pratim Chakraborty
Tejashree Kaniitkar
Uddhav Babaso Ambi
Rishiddh Jhaveri
Alaomy Joshi
Abhishek Rale
Vishnu K.N.
Arati Vasav
Vivek Wani
Anant Kumar Srivastava
Arjun Gontala
Harshada Vidwans
Sandip Agalave
Rasika Avatade
Shilpa Sonar

Appointments during the year 2015-16

Gayathri Pananghat	01-04-2016	Sreejit Ganesh Jaya	04-01-2017
Arun Thallapillil	17-05-2016	Shanti Kalipatnapu	07-10-2016
Atikur Rahman	29-06-2016	Naresh Sharma	07-10-2016
Sagar Pandit	08-07-2016	Goldi Mishra	24-10-2016
Venketeshwara Pai	11-07-2016	Vasundhara Laad	19-05-2016
Siddhesh Kamat	01-08-2016	Nisha Kurkure	18-05-2016
Neeraja Dashaputre	01-08-2016	Manoj Chaudhari	12-07-2016
Manish Kumar Mishra	23-08-2016	Smita Kondhalkar	28-12-2016
Pushkar Sohoni	28-10-2016	Varsha Jain	28-12-2016
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Suhas Ettammal	08-12-2016	Debendranath Behera	24-01-2017

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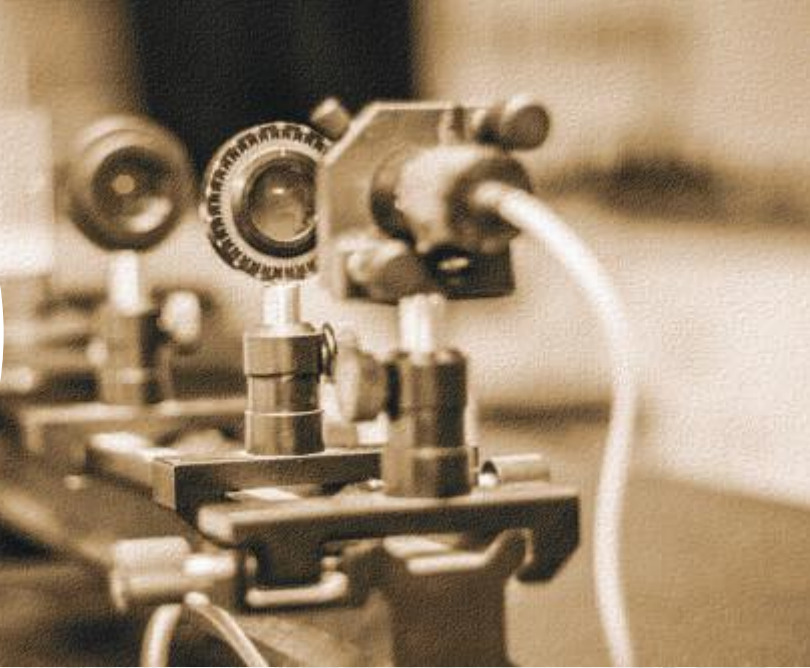
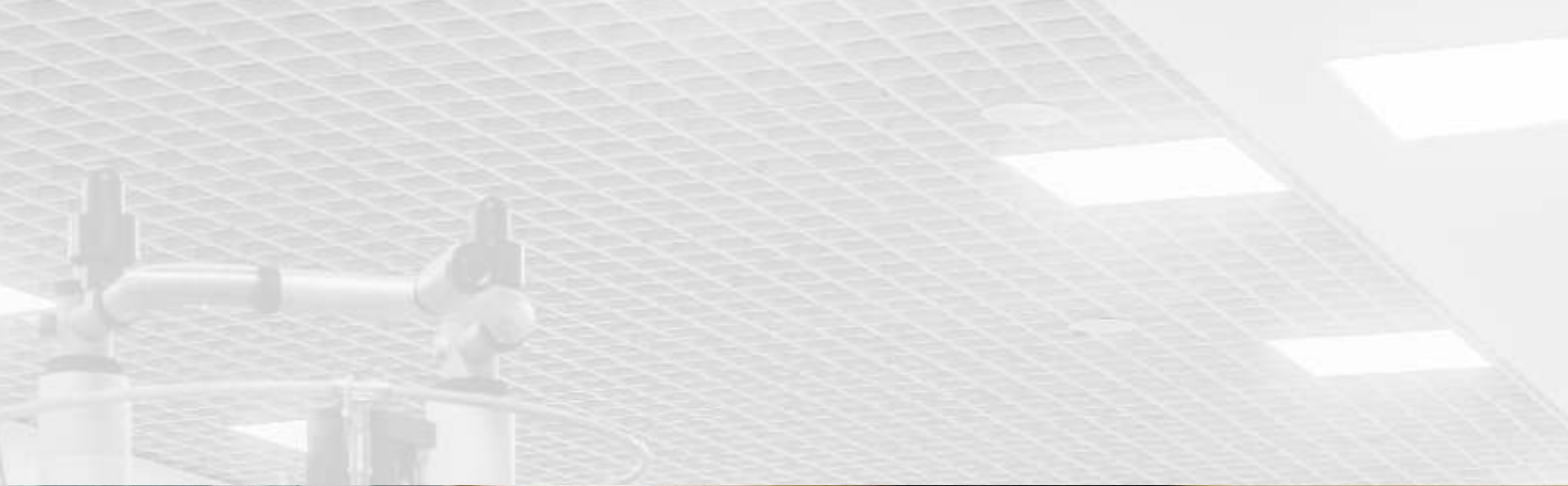
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Funding and Infrastructure

Sponsored Projects

New Equipment

Library



Sponsored Projects

Sr. No.	Name of the Project	Project Leader	Code	Funding Agency	Period From-To	Grants received during the year (in lakh rupees)
On-going Projects						
1	JC Bose Fellowship to Prof. L.S. Shashidhara	L.S. Shashidhara	GAP/DST/BIO-11/0048 31511048	DST-SERB	01.02.2010 31.01.2021	15.00
2	Carbohydrate capped nanoparticles as tumor specific drug delivery systems - Max Planck Partner Group	Raghavendra Kikkeri	GAP/DST-MPG/CHE-11/0055 30311055	DST / Max Planck Partner	19.12.2011 18.12.2016	0
3	Integrin-dependent regulation of anchorage independence in cancers	Nagaraj Balasubramanian	GAP/WT-DBT/BIO-11/0059 30711059	Wellcome Trust - DBT India Alliance	01.09.2011 31.08.2017	31.05
4	Chimeric nanoparticle: A novel nanoplatform for signaling pathway driven cancer chemotherapy - Ramalingaswami Fellowship	Sudipta Basu	GAP/DBT-RLF/BIO-12-0073 31312073	DBT	06.02.2012 05.02.2019	15.91
5	The role of SATB proteins in the structure and function of the inactive X	Ashwin Kelkar	GAP/WT-DBT/BIO-12/0076 30712076	Wellcome Trust - DBT India Alliance	01.05.2012 31.12.2016	4.44
6	INSPIRE Faculty Award to Chandrasheel Bhagwat	Chandrasheel Bhagwat	GAP/DST/INSPIRE-12-0077 31812077	DST	01.03.2012 28.02.2017	0
7	Ramanujan Fellowship to Ashna Bajpai	Ashna Bajpai	GAP/DST/PHY-12-0078 31112078	DST-SERB	10.09.2012 09.09.2017	16.00
8	Role of network topology in the generation of coordinated neuronal activity	Collins Assisi	GAP/WT-DBT/BIO-12/0084 30712084	Wellcome Trust - DBT India Alliance	01.09.2012 31.08.2017	11.52
9	Investigating the role of intracellular calcium signal remodeling in the pathogenesis of Alzheimer's disease	Suhita Nadkarni	GAP/WT-DBT/BIO-12/0085 30712085	Wellcome Trust - DBT India Alliance	01.08.2012 31.07.2017	11.47
10	Research Partnership and collaboration Agreement of IISER Pune with Novex Technology Ltd.	R. Vaidhyanathan	GAP/Novex-IISER/CHE-12-0087 31912087	Novex Technology Ltd., Canada	19.03.2012 18.03.2015	0
11	Ramanujan Fellowship to Angshuman Nag	Angshuman Nag	GAP/DST/CHE-13-0094 30113094	DST-SERB	29.10.2012 28.10.2017	4.00
12	INSPIRE Faculty Award to Neelesh Dahanukar	Neelesh Dahanukar	GAP/DST/INSPIRE-12-0096 31812096	DST	16.10.2012 15.10.2017	28.25

Sr. No.	Name of the Project	Project Leader	Code	Funding Agency	Period From-To	Grants received during the year (in lakh rupees)
13	FIST Program Support in Chemistry	K.N. Ganesh	GAP/DST/FIST/CHE-13-0098 30113098	DST	07.01.2013 06.01.2018	49.47
14	Structural descriptors of protein-protein and protein ligand binding sites and knowledge based design of new interfaces and ligands	M.S. Madhusudhan	GAP/WT-DBT/BIO-13-0100 30713100	Wellcome Trust - DBT India Alliance	01.04.2013 31.03.2018	20.34
15	JC Bose Fellowship to Prof. Sunil Mukhi	Sunil Mukhi	GAP/DST/PHY-13-0101 31513101	DST	09.06.2008 08.06.2018	16.00
16	INSPIRE Faculty Award to Gayathri Pananghat	Gayathri Pananghat	GAP/DST/INSPIRE-13-0102 31813102	DST	01.04.2013 31.03.2018	7.00
17	Role of RNA binding proteins in Hedgehog signalling	Shital Sarah Ahaley	GAP/WT-DBT/BIO-13-0104 30713104	Wellcome Trust - DBT India Alliance	01.05.2013 30.09.2017	28.95
18	INSPIRE Faculty Award to Ronnie Mani Sabastian	Ronnie Mani Sebastian	GAP/INSPIRE/PHY-13-105 31813105	DST	25.04.2013 24.04.2018 - transfer to IIT B 07.03.2017	0
19	Understanding the neural mechanisms underlying initiation of learned motor behaviours- Ramalingaswamy Fellowship	Raghav Rajan	GAP/DBT/BIO-13-0106 31313106	DBT	01.05.2013 30.04.2018	16.06
20	INSPIRE Faculty Award to Arjun Bagchi	Arjun Bagchi	GAP/INSPIRE/PHY-13-107 31813107	DST	04.06.2013 03.06.2018	0
21	Ramanujan Fellowship to Mukul Kabir	Mukul Kabir	GAP/DST/PHY-13-0109 31113109	DST	14.06.2013 13.06.2018	7.60
22	Dynamical effects in the mechanism of intercalation of anti-cancer drugs	Arnab Mukherjee	GAP/DST/CHE-13-0110 30113110	DST	14.06.2013 13.06.2016	0
23	Peripherally functionalized siloxane scaffolds for the assembly of multi-metallic cages, clusters and supramolecules	R. Boomi Shankar	GAP/DST/CHE/13-0111 30113111	DST-SERB	14.06.2013 13.06.2016	0
24	Design, synthesis and characterization of modified dipyrins and its complexes	V.G. Anand	GAP/DST/CHE/13-0112 30113112	DST-SERB	14.06.2013 13.06.2016	0

Sr. No.	Name of the Project	Project Leader	Code	Funding Agency	Period From-To	Grants received during the year (in lakh rupees)
25	Studies on non covalent modulation of gating and selectivity of synthetic ion channels	Pinaki Talukdar	GAP/DST/CHE-13-0114 30113114	DST-SERB	May 2013 Apr 2016	0
26	Crystal growth of the newly discovered high-temperature iron-arsenide superconductors AFe_2As_2 (A= Ba, Ca, Sr and Eu)	Surjeet Singh	GAP/DST/PHY-13-0116 30113116	DST-SERB	31.07.2013 17.01.2017	11.40
27	Dielectric response of a lasing medium in frequency domain	Showik Datta	GAP/DST/PHY-13-0117 30113117	DST-SERB	31.07.2013 30.07.2016	0
28	Optoelectronic and plasmonic properties of All Inorganic Sn Doped In_2O_3 (ITO) Nanocrystals	Angshuman Nag	GAP/DAE/CHE-13-0118 30913118	DAE	05.08.2013 04.08.2016	0
29	Origin of plasma membrane polarity during embryogenesis	Richa Rikhy	GAP/DBT/BIO-13-0119 30813119	DBT	23.08.2013 22.08.2016	0
30	INSPIRE Faculty Award to Diganta Borah	Diganta Borah	GAP/INSPIRE/MAT-13-120 31813120	DST	21.08.2013 20.08.2018	0
31	Molecular motor driven centrosomal microtubule mobility: mechanics and spatio-temporal organization (RGYI)	Chaitanya Athale / Sudipto Muhuri, SPPU	GAP/DBT/BIO-13-0121 30813121	DBT	03.09.2013 02.09.2016	10.55
32	Systems Modeling and Experimental Testing of Cytoskeletal Polarization in cellular pattern formation	Chaitanya Athale	GAP/DBT/BIO-13-0122 30813122	DBT	03.09.2013 02.09.2016	0
33	Developmental Control of Mitochondrial Morphology	Richa Rikhy	GAP/DBT/BIO-13-123 30813123	DBT	04.09.2013 03.09.2016	0
34	Molecular modeling and simulation of nanostructure and dynamics of ionic liquid doped polymer electrolyte membrane fuel cells	Arun Venkatnathan	GAP/SERB/CHE-13-124 30113124	DST-SERB	17.09.2013 16.09.2016	0
35	Engineering novel supramolecular nanoplatform for paclitaxel delivery in cancer	Sudipta Basu	GAP/DST/CHE-13-126 30113126	DST-SERB	18.09.2013 17.09.2016	4.00
36	INSPIRE Faculty Award to Krishanpal Karmodiya	Krishanpal Karmodiya	GAP/INSPIRE/BIO-13-127 31813127	DST	02.09.2013 01.09.2018	34.49
37	Learning and memory in aggression : identifying the neurogenetic substrates and memory traces of a complex social behaviour	Aurnab Ghose	GAP/DST/BIO-13-128 30113128	DST	17.10.2013 16.10.2016	11.00

Sr. No.	Name of the Project	Project Leader	Code	Funding Agency	Period From-To	Grants received during the year (in lakh rupees)
38	Women Scientist Scheme - Synthesis of BiFeO polyaniline core shell (C/s-BFO-PANI) nanoparticles and their magnetic dielectric characterization	Smita Chaturvedi	GAP/DST/PHY-13-129 30113129	DST	24.10.2013 23.10.2016	0
39	Understanding the functional relevance of twist paralogs and their interaction with developmental pathways during dermis formation using zebrafish as a model organism	Tressa Jacob	GAP/DBT/BIO-13-130 30813130	DBT	17.10.2013 17.01.2017	0
40	Stabilizing the dynamics of laboratory populations of <i>Drosophila melanogaster</i> using limiter control	Sutirth Dey	GAP/CSIR/BIO-13-131 30513131	CSIR	01.10.2013 10.10.2016	0.91
41	Optical effects in functionalized single walled carbon nanotubes	Harsh Chaturvedi	GAP/DST/PHY-13-132 30113132	DST-SERB	27.09.2013 26.09.2016	0
42	National network for mathematical and computational biology	L.S. Shashidhara/ G. Rangarajan, IISc Bengaluru	GAP/DST/BIO-13-133 30113133	DST-SERB	20.11.2014 19.11.2017	0
43	Role of neuropeptid Y in zebrafish olfaction	Aurnab Ghose	GAP/DST/BIO-13-134 30113134	DST-SERB	17.12.2013 16.12.2016	0
44	To set up Maharashtra gene bank in Maharashtra State	Milind Watve	GAP/GOM/BIO-14-0135 32214135	RGSTC, Maharashtra State	09.01.2014 08.01.2019	692.00
45	Capacity building among village youth for self study and self employment along western boundary of Tadoba - Andhari Tiger Reserve, Maharashtra	Milind Watve	GAP/DST/BIO-13-0136 30113136	DST	05.02.2014 04.02.2017	6.00
46	Ligand-free colloidal allinorganic semiconductor nanocrystals: synthesis, photophysics and optoelectronic application	Angshuman Nag	GAP/DST/CHE-14-137 30113137	DST-SERB	27.02.2014 26.02.2017	5.50
47	Understanding dioecy by exploring floral organ identify genes (OIGs) in <i>Coccinia grandis</i> - A New Model for study under DBT's Twinning Programme for NE	Anjan Banerjee	GAP/DBT/BIO-13/0138 30813138	DBT	01.03.2014 02.03.2018	8.31
48	Disk-B Denmark-India in vivo screen for cancer biomarkers	L.S. Shashidhara	GAP/DBT/BIO-13-0139 30813139	DBT	27.02.2014 26.02.2019	25.64

Sr. No.	Name of the Project	Project Leader	Code	Funding Agency	Period From-To	Grants received during the year (in lakh rupees)
49	Glycochemical studies of mycobacterial arabinomycolate	Srinivas Hotha	GAP/IFC/CHE-14-0140 31414140	IFC/CHE-14-0140	01.04.2014 31.03.2017	2.88
50	Synthesis of new fluorinated tumor-associated glycopeptide antigens and meningitis vaccine A analogues	Madhuri Vangala	GAP/DST/BIO-14-0141 30114141	DST-SERB	09.06.2014 08.06.2017	8.00
51	Development and functional studies of metal-organic polyhedras (MOPs) - INSA Young Scientist Project	Sujit Kumar Ghosh	GAP/INSA/CHE/14-142 32314142	INSA	19.09.2014 18.09.2017	5.00
52	Target gene identification, regulation and functional characterization of the shoot meristemless (STM) ortholog in Potato (<i>Solanum tuberosum L</i>)	Anjan Banerjee	GAP/DST/BIO-14-0143 30114143	DST-SERB	27.06.2014 26.06.2017	3.00
53	Structure and filament dynamics of the cytoskeletal protein fibril (Fib) involved in spiroplasma motility - IYBA-2013	Gayathri Pananghat	GAP/DBT/BIO-14-0144 30814144	DBT	30.06.2014 29.06.2017	8.9
54	Erasmus Mundus Action 2 lot 13, NAMASTE - Networking and Mobility Actions for sustainable and Environment in India	Naresh Sharma	GAP/EU/GEN-14-0145 32414145	George August University Göttingen, Germany	17.07.2014 16.07.2017	0
55	INSPIRE Faculty Award to Anup Biswas	Anup Biswas	GAP/DST/MTH-14-0146 31814146	DST	18.08.2014 17.08.2019	1.28
56	INSPIRE Faculty Award to Mousomi Bhakta	Mousomi Bhakta	GAP/DST/MTH-14-0147 31814147	DST	18.08.2014 17.08.2019	1.83
57	Design and development of amino acid based polymer scaffolds for drug delivery	M. Jayakannan	GAP/DST/CHE-14-0148 30114148	DST-SERB	10.09.2014 09.09.2017	12.00
58	Identification and characterization of the card neuropeptide receptor	Aurnab Ghose	GAP/LTMT/BIO-14-0149 32414149	Lady Tata Memorial Trust	11.09.2014 10.09.2016	5.00
59	MHRD-CoE-FAST Project - Research in energy and sustainable materials	K.N. Ganesh	GAP/MHRD/GEN-14-0150 32514150	MHRD	07.08.2014 06.08.2018	200.00
60	Quantum memory based on nitrogen vacancy centers in diamond-Swarnajayanti Fellowship	T.S. Mahesh	GAP/DST/PHY-14-151 31214151	DST	30.09.2014 29.09.2019	-
61	The MOR cryptosystem groups and galois action	Ayan Mahalanobis	GAP/DST/MHT-14-152 30114152	DST-SERB	04.09.2014 03.09.2017	4.00

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62	Porphyrin, chlorin and isophlorin based near-infrared dyes for high-efficiency dye-sensitized solar cells: An inspiration from the Nature - Indo-Singapore Project	V.G. Anand	GAP/DST/CHE-14-153 30114153	DST	30.09.2014 29.09.2017	0
63	Introduction of silylene in frustrated lewis pair chemistry and their reactivity towards small molecules	Shabana Khan	GAP/DST/CHE-14-154 30114154	DST-SERB	21.10.2014 20.10.2017	7.00
64	Ruthenium catalyzed meta selective C-H Bond functionalization of substituted aromatics	M. Jegannmohan	GAP/CSIR-CHE-14-155 30514155	CSIR	01.10.2014 30.09.2017	3.00
65	Novel electronic and magnetic states in 4d and 5d transition metal oxide	Sunil Nair	GAP/CSIR/PHY-14-156 30514156	CSIR	01.10.2014 30.09.2017	4.00
66	Evolution of evolvability in laboratory populations of <i>E.coli</i>	Sutirth Dey	GAP/DBT/BIO-14-157 30814157	DBT	01.11.2014 31.10.2017	8.13
67	DBT Programme support for Fetal Programming Research	Sanjeev Galande	GAP/DBT/BIO-14-158 30814158	DBT	10.11.2014 09.11.2019	0
68	Studying neoplastic transformation of mammosphere cultures in 3D using chemical carcinogens	Mayurika Lahiri	GAP/DBT/BIO-14-159 30814159	DBT	12.11.2014 11.11.2017	23.74
69	Ruthenium catalyzed highly regio and stereoselective oxidative coupling of n components: A versatile route to substitute alkenes, design and heterocycles - INSA-Young Scientist Project	M. Jegannmohan	GAP/INSA/CHE/14-160 32314160	INSA	01.11.2014 31.10.2017 - Shifted to IIT Madras	5.0
70	The quest for new multiferroics oxides	Sunil Nair	GAP/DST/PHY-14-161 30114161	DST-SERB	22.11.2014 21.11.2017	7.00
71	Design and synthesis of covalent and non covalent composites from aromatic and antiaromatic macrocycles for molecular diode - Swarnajayanti Fellowship	V.G. Anand	GAP/DST/CHE-14-162 30114162	DST	03.11.2014 02.11.2019	0
72	Ramanujan Fellowship to Dr. Nabamita Banerjee	Nabamita Banerjee	GAP/DST/RJ/PHY-14-164 31114164	DST-SERB	01.08.2014 16.09.2018	0

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73	Chemic nanoparticle for targeting signalling network as next generation cancer therapeutics	Sudipta Basu, Nirmalya Ballav	GAP/DBT/CHE-14-165 30814165	DBT	08.12.2014 07.12.2017	7.97
74	Non abelian bilinear cryptography	Ayan Mahalanobis	GAP/DAE/MTH-14-166 30914166	DAE - NBHM	25.01.2015 26.01.2018	0
75	Quantitative characterization of threshold behavior of oxidative stress towards development of insulin resistance	Pranay Goel / Saroj Ghaskadbi, SPPU	GAP/DBT/BIO-15-167 30815167	DBT	11.12.2014 10.12.2017	3.67
76	Elucidating the role of lipids in ion channel function	Jeet Kalia	GAP/WT-DBT/BIO-168 30715168	Wellcome Trust - DBT India Alliance	01.03.2015 28.02.2020	62.96
77	JC Bose Fellowship to Shyam Sundar Rai	Shyam Sundar Rai	GAP/DST/BIO-15-169 31515169	DST-SERB	01.09.2014 31.03.2019	17.00
78	INSPIRE Faculty Award to Gyana Ranjan Tripathy	Gyana Ranjan Tripathy	GAP/DST/ECS-15-170 31815170	DST	11.12.2014 24.04.2019	6.46
79	Development of functional "n" conjugated polymers for photonic applications	M. Jayakannan / G.V. Pavan Kumar	GAP/DST/CHE-15-171 30115171	DST-SERB	24.03.2015 23.03.2018	6.00
80	Tailoring glycosylphosphatidylinositol substrates and substrate mimetics to study the GPI biosynthetic pathway and modulate host-pathogen interactions	Srinivas Hotha & Sneha Komath, JNU	GAP/DST/CHE-15-172 30115172	DST-SERB	23.03.2015 22.03.2018	6.00
81	Direct assembly of sialic acid specific peptidomimics on cantilever array sensors for detecting cancer biomarkers	Raghavendra Kikkeri	GAP/DST/CHE-15-173 30115173	DST-SERB	20.03.2015 19.03.2018	5.00
82	Theoretical studies on ultra cold dipolar gases	Rejish Nath	GAP/CEFIPRA/PHY/154-174 31415174	IFCPAR-CEFIPRA	01.04.2015 31.03.2018	0
83	Exploring the complex energy landscapes in multiglasses (DST-DAAD)	Sunil Nair	GAP/DST/PHY-15-175 30115175	DST	10.04.2015 09.04.2017	0
84	British Council Division - Knowledge Economy Partnership 2015 - Public Lecture series on Science and Pedagogy workshops on Science Education	L.S. Shashidhara	GAP/BC/BIO-15-176 31715176	British Council	July 2015 April-2016	0
85	A <i>Drosophila</i> model to study adult epithelial stem cells and their role in cancer initiation	Sonam Mehrotra	GAP/DBT/BIO-15-177 30815177	DBT	18.04.2015 17.04.2018	3.2

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86	Development of multi-modal nonlinear plasma optical microscopy workstation to probe nanoarchitectures	G.V. Pavan Kumar	GAP/DBT/BIO-15-177 30115178	DST	22.05.2015 21.05.2018	5.00
87	Synaptic and molecular determinants controlling speed of olfactory information processing and decision making	Nixon Abraham	GAP/WT-DBT/BIO-15-0179 30715179	Wellcome Trust - DBT India Alliance	01.06.2015 31.05.2020	109.84
88	A proteomic investigation to understand sex expression and modification in dioecious <i>C. grandis</i> (WOS-A)	Jayeeta Banerjee	GAP/DST/BIO-15-0180 30115180	DST	04.06.2015 03.06.2018	0
89	Programme support on Biotechnology Approaches for conservation and sustainable utilization of plant wealth of western ghats	Deepak Barua	GAP/DBT/BIO-15-0181 30815181	DBT	14.05.2015 13.05.2018	3.22
90	INSPIRE Faculty Award to Nishad Matange	Nishad Matange	GAP/DST/BIO-15-182 31815182	DST	15.06.2015 14.06.2020	10.69
91	Role of chromatin organizer (SATB2) in gastrulation in <i>Danio rerio</i> - Indo Austrian (DST-BMWF) Joint Project	Sanjeev Galande Saurabh Pradhan Carl Philipp Heisenberg	GAP/DST/BIO-15-0183 30115183	DST	21.05.2015 20.05.2017	0
92	Modeling heterogeneity in nanoparticle catalysis at the single molecule level	Srabanti Chaudhury	GAP/DST/CHE-15-184 30115184	DST-SERB	12.08.2015 11.08.2018	2.00
93	Magneto optic trapping of Strontium atoms for experiments towards distributed quantum information processing	Umakant Rapol	GAP/DST/PHY-15-185 30115185	DST-SERB	12.08.2015 11.08.2018	0
94	Finding alternative crop strategies for farmers affected due to crop raiding by wild herbivores along western boundary of Tadoba-Andhari Tiger Reserve	Milind Watve	GAP/DEFRIES-BAJPAI/BIO-15-186 30115186	DeFries Bajpai Foundation	03.07.2015 02.07.2017	0
95	Quantum field theory and higher spin fields	Sudarshan Ananth	GAP/DST/PHY-15-187 30115187	DST-SERB	13.08.2015 12.08.2018	1.00
96	Multiproxy, high resolution paleoclimate reconstructions to separate anthropogenic signature from natural climate variability	Rajani Panchang	GAP/DST/ECS-15-189 30115189	DST-SERB	17.08.2015 16.08.2018	4
97	Functional studies of porous coordination polymers derived from amide based nitrogen donor ligands	Tarak Nath Mandal	GAP/DST/CHE-15-190 30115190	DST-SERB	21.08.2015 20.08.2018	8.10

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98	Complexity measures from multifractal analysis to characterize ECG data for diagnosis and therapy	G. Ambika	GAP/DST/PHY-15-191 30115191	DST-SERB	09.09.2015 08.09.2018	1.00
99	Exploring the potential of gamma-delta T Lymphocytes for Immunotherapy of cancer	Sanjeev Galande	GAP/DBT/BIO-15-192 30815192	DBT	31.07.2015 30.07.2018	26.05
100	Advancing the efficiency and production potential of excitonic solar cells (APEX Phase II)	Satishchandra Ogale	GAP/DST/CHE-15-193 30115193	DST	22.09.2015 21.09.2017	0
101	Measurements and modeling of supraglacial debris layer properties in Hamath Glacier	Argha Banerjee	GAP/DST/ECS-15-194 30115194	DST-SERB	24.09.2015 08.06.2016	1.50
102	Environment-responsive fluorescent peptide nucleic acid conjugates: Design, synthesis and applications in nucleic acid diagnosis	S.G. Srivatsan	GAP/DST/CHE-15-195 30115195	DST-SERB	05.10.2015 04.10.2018	9.00
103	Conformation specific electronic circular dichroism spectroscopy in isolated gas phase	Aloke Das	GAP/DST/CHE-15-196 30115196	DST-SERB	05.10.2015 04.10.2018	5.30
104	Studies on metal catalyzed stereoselective C-C, C-N and C-O bond formation via borrowing hydrogen methods using continuous flow techniques	B. Gnanaprakasam	GAP/DST/CHE-15-197 30115197	DST-SERB	05.10.2015 04.10.2018	7.67
105	Ruthenium catalyzed C-H Bond functionalization of aromatics, heteroaromatics and alkenes via chelation-assisted deprotonation metalation pathway	M. Jeganmohan	GAP/DST/CHE-15-198 30115198	DST-SERB	05.10.2015 04.10.2018	0.49
106	Site selective direct C-H bond functionalisation by early transition metal carbenoid insertion and its applications	R.G. Bhat	GAP/DST/CHE-15-199 30115199	DST-SERB	05.10.2015 04.10.2018	0
107	Solar wind turbulence, viscosity and implications for the propagation of solar coronal mass ejections	Prasad Subramanian	GAP/ISRO/PHY-15-200 30615200	ISRO-DoS	14.10.2015 13.10.2018	0
108	Exploring the antimicrobial activities of short ar hybrid lipopeptides	H.N. Gopi	GAP/CSIR/CHE-15-201 30515201	CSIR	01.10.2015 30.09.2018	2.96
109	Small molecule donors of reactive sulfur species	Harinath Chakrapani	GAP/DST/CHE-15-202 30115202	DST-SERB	09.10.2015 08.10.2018	8.42
110	Exploration of naturally occurring beta hydroxy gamma amino acids (statines) in the design of foldamers and biological active peptidomimetics	H.N. Gopi	GAP/DST/CHE-15-203 30115203	DST-SERB	14.10.2015 13.10.2018	0

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111	Jamming transitions and structure formation of model colloidal systems in extensional and shear flow	Apratim Chatterji	GAP/DST/PHY-15-204 30115204	DST-SERB	14.10.2015 13.10.2018	0
112	Centre of Excellence in Science and Mathematics Education under the Scheme PMMMNMTT	L.S. Shashidhara / K.N. Ganesh / Bhas Bapat / A. Raghuram	GAP/MHRD/GEN-15-0205 32515205	MHRD	08.10.2015 30.09.2017	137.08
113	Entropy, entanglement and flat space -Indo Austrian (DST-BMWF) Joint Project	Arjun Bagchi	GAP/DST/PHY-15-206 30115206	DST	21.05.2015 20.05.2017	0
114	Flexible gas sensors using surface area nanomaterials and composites	Satishchandra Ogale	GAP/DAE/PHY-15-207 30915207	DAE-BRNS	01.04.2015 31.03.2018	7.17
115	Development of advanced materials and device systems for green transportation involving energy storage and energy generation	Satishchandra Ogale	GAP/KPIT/PHY-15-208 32615208	KPIT	01.12.2015 30.11.2018	20.00
116	Structural studies on spatial positioning of <i>Myxococcus xanthus</i> motility complexes	Gayathri Pananghat	GAP/DST/BIO-15-209 30115209	DST-SERB	18.12.2015 17.12.2018	0
117	Evolution of dispersal in laboratory population of <i>Drosophila melanogaster</i>	Sutirth Dey	GAP/DST/BIO-15-210 30115210	DST-SERB	19.12.2015 18.12.2018	0
118	Mitochondrial morphology regulation of epidermal growth factor signaling	Richa Rikhy	GAP/DST/BIO-15-211 30115211	DST-SERB	18.12.2015 17.12.2018	0
119	Prolyl isomerases as modifiers of protein aggregation and disease progression in a <i>Drosophila</i> model of amyotrophic lateral of protein	Girish Ratnaparkhi	GAP/DST/BIO-15-212 30115212	DST-SERB	30.12.2015 29.12.2018	0
120	Sugar derived cyclic peptides as artificial ion channels and transporters	Pinaki Talukdar	GAP/DST/CHE-15-213 30115213	DST-SERB	30.12.2015 29.12.2018	0
121	Nanoholes in Graphene and hexagonal boron nitride as templates for two dimensional high spin magnetic arrays at a metal interface	Prasenjit Ghosh	GAP/DST/PHY-15-214 30115214	DST-SERB	06.01.2016 05.01.2019	0
122	Rechargeable CO ₂ /O ₂ electrode for air breathing energy storage devices	Muhammed Mustafa	GAP/DST/CHE-15-215 30115215	DST-SERB	07.01.2016 06.01.2019	2.00
123	Interdigitated metal semiconductor nanowires as a platform for plasmon sensitized light harvesting devices	Pramod Pillai	GAP/DST/CHE-16-216 30115216	DST-SERB	12.01.2016 11.01.2019	6.30

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124	From a tiny stolon tip to a large potato: Understanding the dynamics of miRNAs and their target genes in controlling tuber transitions	Anjan Banerjee	GAP/DBT/BIO-16-217 30815217	DBT	15.01.2016 14.01.2019	0
125	Characterization and comprehensive genome wide analysis of histone deacetylase, pfdad1 that may regulate expression of var genes involved in virulence and pathogenicity of <i>Plasmodium falciparum</i> - IYBA-2014 Award	Krishanpal Karmodiya	GAP/DBT/BIO-16-218 30815218	DBT	23.12.2015 22.12.2018	11.60
126	A whole genome RNAi screen to identify modifiers of neuroaggregation using automated computational image analysis	Girish Ratnaparkhi	GAP/DBT/BIO-15-219 30815219	DBT	22.12.2015 21.12.2018	0
127	Transcriptional regulation post gene duplication and evolution: Role of <i>Drosophila</i> MADF-BESS domain proteins	Girish Ratnaparkhi	GAP/DBT/BIO-15-220 30815220	DBT	19.02.2016 18.02.2019	20.10
128	Biochemical characterization of RNA-like oligomers from lipid assisted nonenzymatic synthesis	Sudha Rajamani	GAP/DST/BIO-15-221 30115221	DST-SERB	26.02.2016 25.02.2019	
129	INSPIRE Faculty Award to Argha Banerjee	Argha Banerjee	GAP/DST/ECS-15-222 31815222	DST	Transfer from IISER Kolkata 31.01.2018	13.23
130	Metallo-silicon hybrid systems for electronic applications	Moumita Majumdar	GAP/DST/CHE-15-223 30115223	DST-SERB	04.04.2016 03.04.2019	0
131	Development of advanced optical microscopy system for surface enhanced Raman scattering	G.V. Pavan Kumar	GAP/INSA/PHY-15-224 32315224	INSA	23.03.2016 22.03.2019	0
132	The quest for new and improved oxide thermoelectrics	Sunil Nair	GAP/DRDO/PHY-15-225 32715225	DRDO	23.03.2016 22.09.2017	0
133	National Facility for Gene Function in Health and Disease	L.S.Shashidhara, Nixon Abraham, Sanjeev Galande, Aurnab Ghose & Mohan R. Wani, NCCS Pune	GAP/DBT/BIO-15-226 30815226	DBT	18.03.2016 17.03.2021	400.54

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134	Structural delineation of smad mediated regulation of miRNA biogenesis pathway using smad3 and miRNA-21 as model system(s)	Jeetender Chugh	GAP/SERB/CHE-15-227 30115227	DST-SERB	01.04.2016 31.03.2019	0
135	Design, synthesis and self assembling studies of protein dendron amphiphilic macromolecules	Britto Sandanaraj	GAP/SERB/CHE-15-228 32815228	DST-SERB	23.03.2016 22.03.2019	0
136	Molecular analysis of a capacitor Hox protein motif	L.S. Shashidhara	GAP/CEFIPRA/BIO-15-229 31415229	IFCPAR-CEFIPRA	Changed to 01.05.2016 from 29.03.2016 28.03.2019	0
137	Electrical addressing and control of the plasmonic properties of coupled metal nanowire	G.V. Pavan Kumar	GAP/CEFIPRA/PHY-15-230 31415230	IFCPAR-CEFIPRA	01.06.2016 31.05.2019	49.36
138	INSPIRE Faculty Award to Soumi Chakravorty	Soumi Chakravorty	GAP/DST/ECS-16-231 31816231	DST	04.12.2015 03.12.2020	0
139	Doped semiconductor nanocrystals for plasmonic and electron spin based applications synthesis thin film and spectroscopy	Angshuman Nag	GAP/DST/CHE-16-232 30116232	DST-SERB	31.03.2016 30.03.2019	0
140	Metal oxide and sulfide based nanostructures for charge storage applications	Satishchandra Ogale	GAP/DST/PHY-16-233 30116233	DST-SERB	31.03.2016 30.03.2019	13.19
New Projects Sanctioned during the year						
141	Engineering self assembled graphene oxide nanoparticle for targeting mitochondria for next generation cancer therapy	Sudipta Basu / Nirmalya Ballav	GAP/DBT/CHE-16-234 30816234	DBT	04.05.2016 03.05.2019	7.70
142	IUSSTF/JC-Quantum Plasmonics of Hybrid Nano Assemblies/3-2014/2015-16 / Support for Travel	G.V. Pavan Kumar	GAP/IUSSTF/PHY-16-0235 31016235	IUSSTF	24.12.2015 23.12.2017	1.14
143	Exploring vitamins through chemical biology and enzymology: Discovery of new biosynthetic pathways and enzyme mechanisms - Ramalingaswami Fellowship	Amrita Hazra	GAP/DBT/CHE-16-236 31316236	DBT	01.04.2016 31.03.2021	10.00
144	FIST Program - 2015 - To strengthen the post graduate teaching and research facilities in the Dept - Maths	A. Raghuram	GAP/DST/MTH-16-237 30116237	DST	04.06.2016 03.06.2021	55.00

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145	FIST Program-support in Physics (2015)	Sunil Mukhi	GAP/DST/PHY-16-238 30116238	DST	07.06.2016 06.06.2021	250.00
146	Structural Biology of bacterial cytoskeleton based motility - INSA Young Scientist Project	Gayathri Pananghat	GAP/INSA/BIO-16-239 32316239	INSA	01.04.2016 31.03.2019	5.00
147	Advanced Energy storage system for hybrid and electric vehicles	Satishchandra Ogale	GAP/DST/PHY-16-240 30116240	DST	23.06.2016 22.06.2019	76.86
148	Hybrid perovskite films and nanoparticles for solar cell and optoelectronics applications	Satishchandra Ogale	GAP/DST/PHY-16-241 30116241	DST	30.06.2016 29.06.2019	40.5
149	<i>In vivo</i> imaging of enzyme activity with exquisite specificity using activity based reporter gene technology	Britto Sandanaraj	GAP/DBT/CHE-16-242 30816242	DBT	14.07.2016 13.07.2019	44.56
150	Hybrid algorithm for quantum control- applications in NMR spectroscopy, MRI and quantum computing	T.S. Mahesh	GAP/CSIR/PHY-16-243 30516243	CSIR	01.06.2016 31.05.2019	5.50
151	Spatiotemporal organisation of oncogenes and cancer associated genes in models of cancer initiation and progression	Kundan Sepgupta	GAP/DBT/BIO-16-244 30816244	DBT	06.08.2016 05.08.2019	15.23
152	Modeling transit times for translocation of polypeptides through a nanopore with attractive traps	Srabanti Chaudhury	GAP/DAE/CHE-16-245 30916245	DAE	04.08.2016 03.08.2019	17.28
153	Exploring the mechanistic enzymology of the anaerobic biosynthesis of 5,6-dimethyl benzimidazole, the lower ligand of vitamin B12	Amrita Hazra	GAP/SERB//CHE-16-246 30116246	DST-SERB	12.08.2016 11.08.2019	29.59
154	NMDA-R Signalling in cart mediated modulation of fear responses	Nishikant Subhedar / Aurnab Ghose	GAP/SERB/BIO-16-247 30116247	DST-SERB	30.08.2016 29.08.2019	30.70
155	Development and functional studies of neutral N donor ligand based water stable metal organic frameworks (MOFs)	Sujit Kumar Ghosh	GAP/SERB/CHE-16-248 30116248	DST-SERB	12.09.2016 11.09.2019	35.34
156	Defining the inputs and outputs of HVC and their role in song motif initiation in the adult male zebra finch	Raghav Rajan	GAP/SERB/BIO-16-249 30116249	DST-SERB	17.09.2016 16.09.2019	17.97

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157	Compact muon solenoid (CMS) upgrade, operation and utilisation	Seema Sharma / Sourabh Dube	GAP/DST/CHE-16-250 30116250	DST	22.09.2016 21.09.2019	207.00
158	De novo transcriptome assembly and standardization of VIGS system for functional analysis of key differentially expressed genes in sexual forms of <i>Coccinia grandis</i>	Anjan Banerjee / L.S. Shashidhara	GAP/DBT/BIO-16-251 30816251	DBT	07.09.2016 06.09.2019	14.3
159	Organo and amino phosphorus (V) derived polar ordered metal organic structures as ferroelectric materials	R. Boomi Shankar	GAP/SERB/CHE-16-252 30116252	DST-SERB	23.09.2016 22.09.2019	66.42
160	INSPIRE Faculty Award to Janhavi Puneekar	Janhavi Puneekar	GAP/DST/ECS-16-253 31816253	DST	01.02.2016 31.01.2021	7.00
161	Connecting the kinetics and Thermodynamics of solvation shell water at the local level: Effect of chemical and topographical heterogeneity	Arnab Mukherjee	GAP/SERB/CHE-16-254 30116254	DST-SERB	23.09.2016 22.09.2019	42.95
162	Innovative nucleoside probes as multifunctional toolbox to study RNA structure, dynamics and function	S.G. Srivatsan	GAP/WT-DBT/CHE-16-255 30716255	Wellcome Trust - DBT India Alliance	01.09.2016 31.08.2021	182.38
163	Thematic Project in Frontiers of Nano S&T on Nanoscience for clean energy	Satishchandra Ogale	GAP/DST/PHY-16-256 30116256	DST	28.09.2016 27.09.2019	1,313.20
164	Raja Ramanna Fellowship to Prof. Rajeev Bhalerao	Rajeev Bhalerao	GAP/DAE/PHY-16-257 30916257	DAE	01.09.2016 31.08.2019	6.30
165	AOARD 134057 Japan - Angle dependent optics of plasmonic core shell nanoparticles	G. V. Pavan Kumar	GAP/AOARD/PHY-16-0258 32116258	Asian Office of Aerospace R & D	19.09.2016 18.09.2017	39.96
166	A scoping proposal to build a two dimensional ice flow for basin scale glacier simulation in the Himalaya	Argha Banerjee	GAP/MoES/ECS-16-0259 33016259	MoES	29.10.2016 28.10.2018	5.53
167	Genome wide functional screen to identify susceptibility genes for idiopathic Parkinson's disease in <i>Drosophila</i> model	Girish Ratnaparkhi / L.S. Shashidhara	GAP/DBT/BIO-16-260 30816260	DBT	18.10.2016 17.10.2019	7.50
168	Functional characterization of a deregulated lysophospholipid pathway in a human neurological disease	Siddhesh Kamat	GAP/WT-DBT/BIO-16-261 30716261	Wellcome Trust - DBT India Alliance	01.11.2016 31.10.2021	140.18

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169	Star branched polymers and copolymers of poly (L-lactic acid)s: Synthesis, characterization and applications	S. Sivaram	GAP/INSA/CHE-16-262 32316262	INSA	16.08.2016 14.08.2019	4.60
170	Nanocomposites of rare earth orthoferrites RFeO ₃ : An approach towards multiferroicity (WOS-A)	Smita Chaturvedi	GAP/DST/PHY-16-263 30116263	DST	15.11.2016 14.11.2019	12.60
171	Eisenstein homology class inside the modular symbols and its analogue Beilinson Kato elements in the K-group	Debargha Banerjee	GAP/SERB/MTH-16-264 30116264	DST-SERB	25.11.2016 24.11.2019	2.12
172	Centre of Excellence in Epigenetics (Phase-II)-Role of SATB family chromatin organizer proteins in stem cell differentiation and wnt signaling	Sanjeev Galande	GAP/DBT/BIO-16-265 30116265	DBT	29.11.2016 28.11.2021	61.91
173	Centre of Excellence in Epigenetics (Phase-II)-Role of SATB Family Proteins in adult neurogenesis- Regulation of <i>wnt</i> and SHH developmental signaling pathways	Sanjeev Galande	GAP/DBT/BIO-16-266 30816266	DBT	29.11.2016 28.11.2021	30.65
174	Centre of Excellence in Epigenetics (Phase-II)-Role of epigenetic mechanisms in programming early adverse experience evoked vulnerability to psychopathology	Sanjeev Galande	GAP/DBT/BIO-16-267 30816267	DBT	29.11.2016 28.11.2021	20.11
175	Special values L-Functions and cohomology of arithmetic group	Baskar Balasubramanian	GAP/SERB/MTH-16-268 3011626830116268	DST-SERB	27.12.2016 26.12.2019	2.55
176	p-adic aspects of automorphic forms and their L functions	A. Raghuram / Dimitrova	GAP/IFCPAR/MTH-16-269 31416269	IFCPAR-CEFIPRA	27.01.2017 26.01.2020	0.48
177	J C Bose Fellowship for Prof. Deepak Dhar	Deepak Dhar	GAP/DST/PHY-16-270 31516270	DST-SERB	21.11.2016 09.05.2017	9.61
178	Multi Level workshop on research based pedagogical tools to improve undergraduate science education in Indian colleges and universities	L.S. Shashidhara	GAP/DBT/BIO-16-271 30816271	DBT	13.01.2017 12.01.2018	102.8
179	High resolution shallow earth imaging to map faults using seismic interferometry	Shyam S Rai	GAP/DAE/ECS-16-272 30916272	DAE-BRNS	07.02.2017 06.02.2020	67.5
180	Regional Workshops on research based pedagogical tools to improve science education and research in Indian colleges/universities	L.S. Shashidhara	GAP/DST/BIO-16-273 30116273	DST	14.02.2017 13.02.2020	15

Sr. No.	Name of the Project	Project Leader	Code	Funding Agency	Period From-To	Grants received during the year (in lakh rupees)
181	DST FIST Program support in Biology	L.S. Shashidhara	GAP/DST/BIO-16-274 30116274	DST	27.02.2017 26.02.2022	340.00
182	Publication of Physics Education Journal	M.S. Santhanam	GAP/DAE/PHY-16-275 30916275	DAE-BRNS	01.01.2016 31.12.2020	6.76
183	Galois Representation associated to siegel Modular forms - Indo Australia Early & Mid Career Researchers Fellowship Programme 2016-17	Debargha Banerjee	GAP/INSA/MTH-16-276 32316276	INSA	01.01.2017 31.03.2018	7.20
184	Understanding mechanisms of vesicle release at the endocytic recycling compartment	Thomas Pucadyil	GAP/WT-DBT/BIO-16-277 30716277	Wellcome Trust - DBT India Alliance	01.03.2017 28.02.2022	77.20
185	Vakyakarana and its commentary laghuprakasika by Sundararaja	R. Venketeswara Pai	GAP/INSA/BIO-16-278 32316278	INSA	04.07.2016 31.03.2017	1.77
186	Temperature dependent semiconductor properties and ultrafast magnetization dynamics of (Doped) metal-halide perovskite nanocrystals	Pankaj Mandal	GAP/SERB/CHE-16-279 30116279	DST-SERB	16.03.2017 15.03.2020	66.50
187	Predictability of intraseasonal convective initiation over equatorial Indian Ocean	Neena Joseph Mani	GAP/SERB/ECS-16-280 30116280	DST-SERB	16.03.2017 15.03.2020	23.07
188	Biogeochemical cycling of major and trace elements in brackish water lagoon system	Gyana Ranjan Tripathy	GAP/SERB/ECS-16-281 30116281	DST-SERB	17.03.2017 16.03.2020	34.84
189	Synthesis and magnetotransport of emergent dirac and weyl semimetals for spintronics	Surjeet Singh	GAP/SERB/PHY-16-282 30116282	DST-SERB	21.03.2017 20.03.2020	48.68
190	Multi scale of the deep geology of India-Eurasian region and the adjoining sea	Shyam Sundar Rai	GAP/MoES/ECS-16-0283 33016283	MoES	25.03.2017 24.03.2020	56.02
191	Analyzing conformational dynamics of dynammin during membrane fission	Thomas Pucadyil	GAP/SERB/BIO-16-284 30116284	DST-SERB	24.03.2017 23.03.2020	6.04
192	Spectroscopic and biological studies of drugs, fluorophores and biomolecules inside the biocompatible lyotropic liquid crystalline system	Partha Hazra	GAP/SERB/CHE-16-285 30116285	DST-SERB	24.03.2017 23.03.2020	14.70
193	Mapping oxidative stress pathways in mammalian cells by chemical proteomics and metabolomics	Siddhesh Kamat	GAP/SERB/BIO-16-286 30116286	DST-SERB	27.03.2017 26.03.2020	11.99

Sr. No.	Name of the Project	Project Leader	Code	Funding Agency	Period From-To	Grants received during the year (in lakh rupees)
194	SERB Women Excellence Award	Gayathri Pananghat	GAP/SERB/BIO-16-287 30116287	DST-SERB	22.03.2017 21.03.2020	1.00
195	Spectrum arithmetic analysis and geometry of locally symmetric spaces and graphs	Chandrasheel Bhagwat	GAP/SERB/MTH-16-288 30116288	DST-SERB	29.03.2017 28.03.2020	2.78
196	Azim Premji University - Aalok Khandekar	John Mathew	GAP/AZU/HSS-16-289 33116289	Azim Premji University	01.09.2016 31.01.2019	1.00
197	Investigation of Indian monsoon variability and drivers on decadal to centennial time scales	Neena Joseph Mani	GAP/DST/ECS-16-290 30116290	DST	29.03.2017 28.03.2020	37.10
198	Biochemical and structural studies of a Type III restriction modification enzyme from the pathogen <i>Mycoplasma bovis</i>	Saikrishnan Kayarat	GAP/SERB/BIO-16-291 30116291	DST-SERB	30.03.2017 29.03.2020	15.68
199	Open source image analysis platform of cellular and sub cellular microscopy data leveraging big data analysis tools from Astronomy	Chaitanya Athale	GAP/DBT/BIO-16-292 30816292	DBT	24.03.2017 23.03.2020	16.99
200	Supramolecular assembly of glyco-nanoparticles to target endothelial inflammation in brain	Raghavendra Kikkeri	GAP/DST/CHE-16-293 30116293	DST	31.03.2017 30.03.2020	16.69
201	Investigation of orientation effects and shell selectivity in molecular fragmentation under slow highly charged ion impact	Bhas Bapat	GAP/SERB/PHY-16-294 30116294	DST-SERB	30.03.2017 29.03.2020	490.62
202	Role of nuclear lamins in regulating DNA damage repair and chromatin dynamics during migration	Kundan Seggupta	GAP/SERB/BIO-16-295 30116295	DST-SERB	30.03.2017 29.03.2020	4.80
203	Covalent Organic Framework (COF) and COF supported metal based nanoparticles as photo/electrocatalyst for electrode and electrolyte applications	R. Vaidhyanathan	GAP/SERB/CHE-16-296 30116296	DST-SERB	30.03.2017 29.03.2020	20.00
204	ATP dependent and independent functions of 14-3-3 and active site determination	M.S. Madhusudhan	GAP/SERB/BIO-16-297 30116297	DST-SERB	28.03.2017 27.03.2020	0.45

In addition, 7 consultancy projects are being implemented by the faculty.

Equipment Purchased during the Year

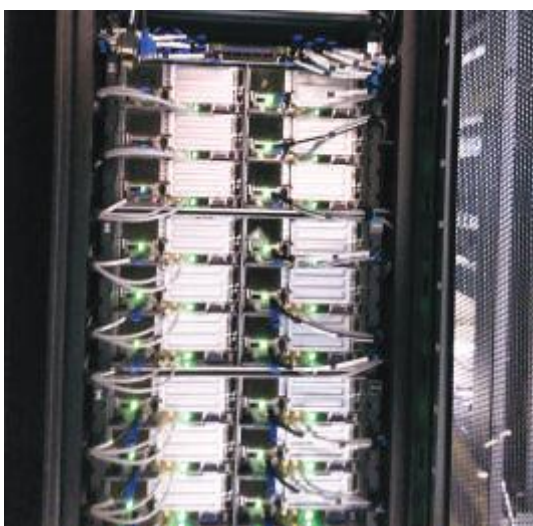
(costing more than 25 lakh rupees)

Equipment	Make	Cost (in Lakh Rupees)	Source of Funds
Semiconductor Parameter Analyzer	Tektronix Asia Ltd, OR, U.S.A.	29.65	IISER Pune
iCap Qc Quadrupole ICP-MS Spectrometer & Accessories	Thermo Fisher Scientific wissenschaftliche Geraete GmbH, Austria	58.28	IISER Pune
High Performance Cluster	Net Web Pte Ltd, Singapore	47.00	Project
Multiphoton Microscope with Accessories	Leica Mikrosysteme Vertrieb GmbH, Germany	825.00	Project
Liquid Chromatography Mass Spectrometry (LCMS)	AB Sciex Pte Ltd, Singapore	134.67	Project
Multicomponent Gas Mixture Breakthrough Set-up	Rubotherm GmbH, Germany	128.10	Project
Glove Box with Spin Coater	M. Braun Inertgas-Systeme GmbH, Germany	49.85	Project
Stand-alone Zebra Fish System	Tecniplast S.p.A, Italy	72.74	Project
EMCCD Camera	Andor Technology, U.K.	29.01	Project
Stereo Zoom Microscope Model SZX10	Olympus Corporation, Japan	31.36	Project
Autoclave Sterilizer System	Genist Technology Pvt Ltd, Chandigarh, India	38.00	Project
Plant Growth Chambers	Taiwan Hipoint Corporation, Taiwan	32.30	Project
Automated Bottle Cage and Rack Washer	IWT Srl, Italy	154.61	Project
Individually Ventilated Caging System	Techniplast S.p.A, Italy	289.47	Project
Ferroelectric Test System	aixACCT Systems GmbH, Germany	55.71	Project
Focussed Ultrasonicator	Premas Biotech Pvt Ltd, Gurgaon, India	25.96	Project
Agilent HPLC System	Agilent Technologies India Pvt Ltd, Bengaluru, India	26.00	Project
Laser Flash Set-up	Linseis Messgeraete GmbH, Germany	86.59	Project
UV Kerf Excimer Laser for PLD System	Coherent GmbH, Germany	58.68	Project
Inverted Fluorescence Microscope	Olympus Corporation, Tokyo	46.84	Project



Focused Ultrasonicator

Ameya Sathe, postdoctoral fellow working in Prof. Galande's lab is using Covaris M220, a high precision sonicator system used for shearing of chromatin and genomic DNA. It is capable of generating narrow, highly reproducible fragment distributions and is recommended by next generation sequencing platforms such as Illumina for library preparation.



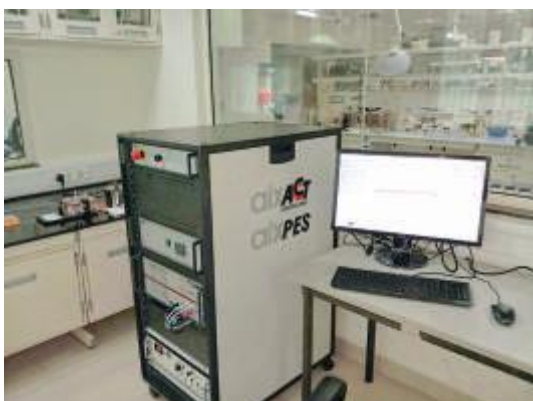
High Performance Cluster

The Fermi cluster provides computational resources to the Computational Materials Science Group. The theoretical peak performance of the cluster is 9.7 TeraFlops and it comprises of eight compute nodes and one master node. Each of the compute nodes comprises of two Xeon E5-2680v4 processor and 128 GB DDR4 RAM. The nodes are connected through an Infiniband FDR switch. It has an Intel Lustre based storage with a usable capacity of 40 TB.



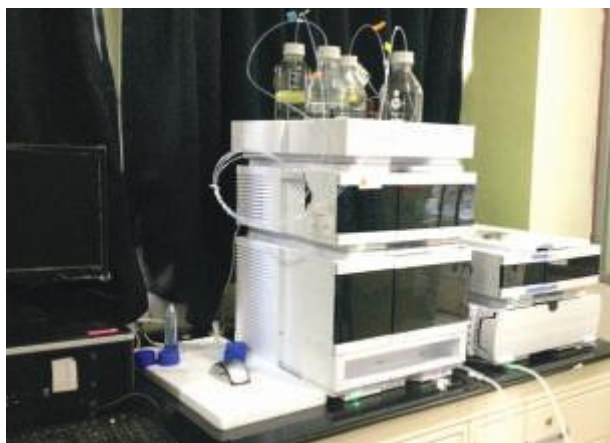
Semiconductor Parameter Analyzer with Probe Station

Keithley 4200-SCS is suitable for characterization of semiconducting materials. It delivers synchronizing current-voltage plots (0.1 A to 1 pA) and capacitance-voltage curve. This system is attached with Everbeing probe station which has thermal chuck, stereo zoom microscope, movable micro-positioner and suitable vacuum pump.



Ferroelectric Test System

The ferroelectric test system is traditionally called as a Sawyer-Tower P-E loop circuit. This equipment measures the polarization vs. electric field hysteresis loop at various sample temperatures in the temperature range of 173 to 600 K. Also, the proposed equipment will be capable of measuring the P-E loop on the single crystals which can give precise polarization along the three directions (X, Y and Z) of the crystal. In addition, this equipment can also study pyroelectric properties of various materials.



High Performance Liquid Chromatography (HPLC) instrument

The HPLC instrument is typically used to separate the constituents of complex chemical and biological samples based on properties such as polarity and size. Current applications of the HPLC in Dr. Amrita Hazra's lab include monitoring the progress of an enzymatic reaction by the disappearance of substrates and formation of intermediates and products, separating and purifying molecules, and analyzing the constituents of complex biological samples.

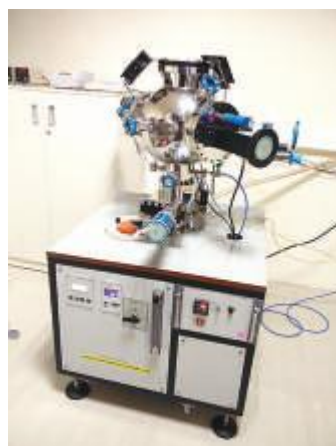


Multiphoton Microscope

The upright multi photon confocal microscope from Leica can be used for live animal imaging at increased depth and with speed. For example, zebra fish brains have been used to image calcium transients with induction of neuronal activity.

Pulsed Excimer Laser Deposition System

This photo shows pulsed KrF excimer laser deposition (PLD) system in the Energy Research Laboratory of Prof. Satishchandra Ogale. The laser yields 20 nanosecond UV pulses (248 nm) which ablate material generating a plasma and the material is deposited on a hot substrate in front. It can be used to grow highly crystalline thin film of several metal oxides and other materials.





Glove Box

The photo shows two glove boxes in use at the Energy Research Laboratory of Prof. Satishchandra Ogale. These glove boxes support highly controlled ambient (inert, humidity free, etc.) for highly sensitive materials. One of these glove boxes is being used for making Li and Na ion Batteries and the other one is being used for the new brand of Hybrid perovskite solar cells.



Individually Ventilated Caging System

Individually ventilated cage (IVC) systems are used to house rodents in a regulated environment with low levels of ammonia and CO₂ and optimal relative humidity. The individual maintenance of each cage also helps to reduce spread of infective agents. Seen here is Integrated PhD student Meenakshi Pardasani from Dr. Nixon Abraham's lab handling mice kept in the IVC system. The group studies neuronal circuits involved in the perception of smell.



Srinivasa Ramanujan Library

The IISER Pune Library has been renamed as 'Srinivasa Ramanujan Library' by Director Prof. K.N Ganesh and a portrait of Srinivasa Ramanujan painted by Prof. G. Ambika was unveiled on the occasion of Mathematics Day on March 11, 2017.

Srinivasa Ramanujan Library of IISER Pune (SRL-IISERP) provides essential and specialized information services to support teaching, learning, and research programs of the institute. Library adopts state-of-the-art technologies to facilitate access to electronic, print, and multimedia resources to its users.

Major international journals and online resources in the disciplines of basic sciences and its allied subjects have been subscribed. Library is a member of 'IISER Library Consortium' constituted jointly by all IISERs and e-Shodh Sindhu national consortium formed by the Ministry of Human Resource Development, Govt. of India. e-Journals and online databases from different publishers have been made available through these consortia.

An automated biometric and EM+RFID hybrid technology based kiosk has been installed in the Library for self-help circulation of print books, which enables users to check-out, check-in, and renew books by themselves. Circulation kiosk is operational from 8 am to 11 pm on all days including holidays.

Library subscribes to *iThenticate*, a plagiarism detecting web tool, which allows researchers compare content against a massive database before the publication or submission of thesis to ensure the work is original. Library generates similarity report for all the theses submitted towards partial fulfilment of the BS MS and PhD Programs of the Institute.

Library is currently providing a '*Monthly Table of Contents Service*' to inform the IISER Pune community of new publications of faculty members and students from the institute. A '*Monthly List of New Additions of Books Service*' is also offered to make the users aware of new reading materials added to the library collection in different subjects.

Over 1000 print books and many more online resources have been added to the Library's collection during the last financial year.

Collection Statistics of the Library as on March 31, 2017

Print Books	: 19518
Gratis Books	: 908
e-Books	: 6070
Print Journals / Magazines	: 50
e-Journals	: 3000

<i>Full-Text Databases</i>	: 10
<i>Bibliographic Databases</i>	: 3
<i>Records in IISER Digital Library (IDL)</i>	: 592
<i>Users of the Library</i>	: 1535

Important online full-text resources subscribed by the Library

ACS Web Edition + Legacy Archive
American Institute of Physics (AIP) + Archives
American Physical Society (APS)
Annual Reviews
Elsevier's Science Direct
Institute of Physics (IOP) + Archives
Journal of Visualized Experiments (All Sections)
JSTOR
Springer Nature + Archives
OSA's Optics Infobase
Project Euclid's Prime Collection
Royal Society of Chemistry (RSC) + Archives
SPIE: International Society for Optics and Photonics
Wiley Journals

Important online bibliographic resources subscribed by the Library

MathSciNet
SciFinder Scholar
Web of Science



IISER Pune Library was renamed as 'Srinivasa Ramanujan Library' and portrait of Srinivasa Ramanujan painted by Prof. G. Ambika was unveiled on the occasion of Mathematics Day on March 11, 2017

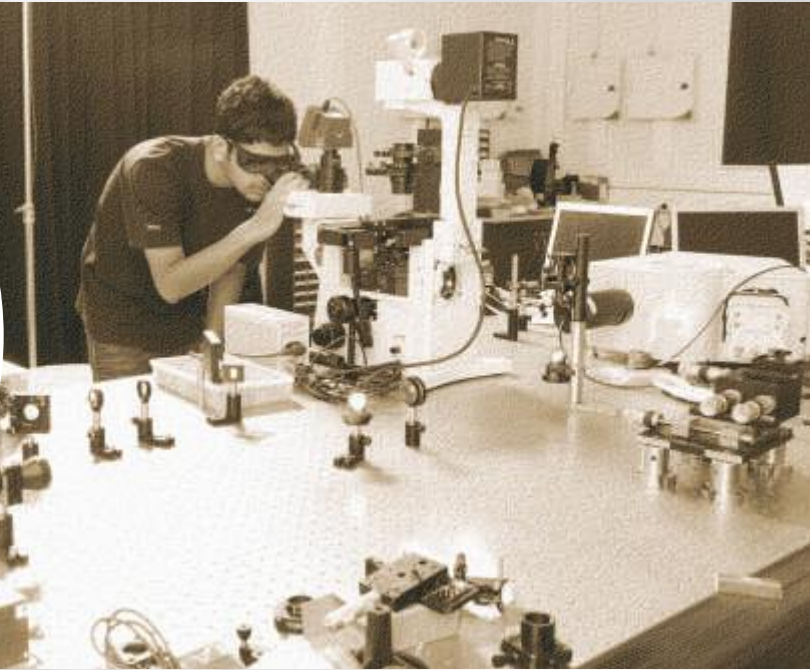
Srinivasa Ramanujan Library in collaboration with National Digital Library (NDL), IIT Kharagpur has organized a two-day workshop-cum-training program on Institutional Repository for National Digital Library during October 5-6, 2016 sponsored by MHRD under its NDL project of NMEICT Mission. The main objective of this workshop was to provide an advanced level hands-on training for the development of

Institutional Digital Repository (IDR) and to upgrade skills of the participating library and computer professionals so that the e-contents of individual institutions can be harvested and indexed by the National Digital Library server and made available for the public. Over 75 participants have actively participated in the workshop-cum-training program.



As part of celebrations of a decade of IISER Pune's existence, Srinivasa Ramanujan Library has organized a two-day National Conference on Library Innovations for Excellence (LIFE-2017) during February 16-17, 2017 with the primary objective of understanding how libraries are translating ideas into innovative services of excellence to create value for users and to the continuing success of libraries. The conference provided an opportunity to over 100 library and information science professionals from different universities and institutes across India to share their experiences, ideas, research, and knowledge for mutual benefit.





Scientific Report



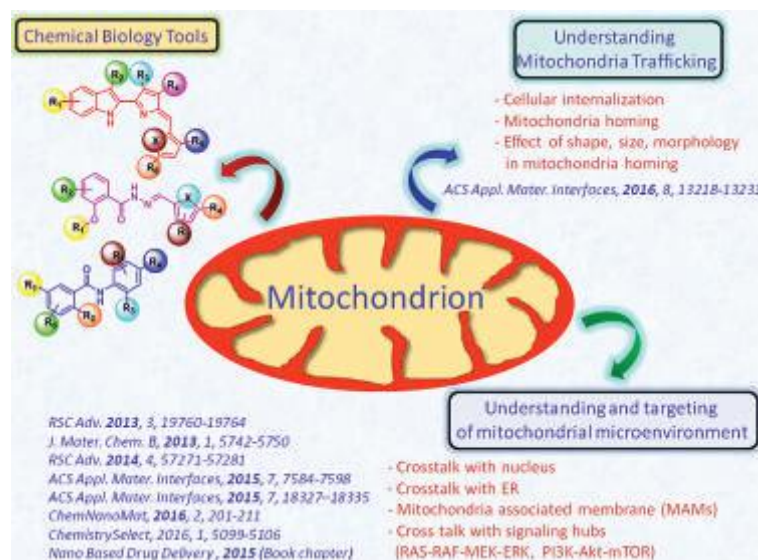
1. Chemical Biology

1.1 Targeting Mitochondria in Cancer

In recent years, mitochondrion, the powerhouse of the cell, has evolved as a signaling hub converging myriads of signaling cues. Mammalian mitochondria contain over 1500 proteins and mitochondrial circular DNA (mtDNA) as genome material. Consequently, mitochondrial dysfunctions are associated with an increasingly large number of human inherited diseases as well as conditions like neurodegenerative disorders, cardiomyopathies, metabolic syndromes, obesity, and cancer. Efforts to better understand mitochondrial biology have been limited due to lack of tools for manipulating and detecting processes occurring within the organelle. To address this challenge, **Dr. Sudipta Basu's** laboratory combines organic synthesis, chemical biology, and nano-scale based tools to understand mitochondrial biology in disease states such as cancer.

Dr. Basu's laboratory mainly focuses on three aspects of mitochondrial biology: (a) developing small molecule tools to perturb mitochondrial outer membrane permeabilization (MOMP); (b) developing tools to understand mitochondrial trafficking; and (c) developing tools to understand mitochondrial microenvironment (cross-talk with nucleus, endoplasmic reticulum and cytosolic signaling).

Figure 1: Tools to understand mitochondrial biology in cancer (Dr. Sudipta Basu's Group)



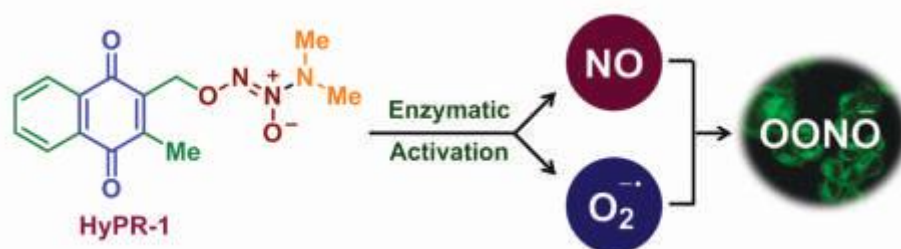
1.2 Controlled Generation of Reactive Species for Therapeutic Applications

Our immune system responds to infections in a multitude of ways. The recent emergence of peroxynitrite as a key signaling molecule in host-defense against pathogens has reinforced the importance of redox-mediated regulation of key

cellular processes. This transition of peroxynitrite from nontoxic, to signaling, to toxic peroxynitrite levels is, however, poorly characterized.

Dr. Harinath Chakrapani's group has designed and synthesized HyPR-1, a new small molecule donor of peroxynitrite. HyPR-1 generates fluxes of nitric oxide and superoxide radical anion. These reactive species are known to combine rapidly to produce peroxynitrite. Thus, HyPR-1 mimics the endogenous methodology for peroxynitrite generation. The group has validated the ability of this compound to enhance peroxynitrite within cells and demonstrated the suitability of this compound to study peroxynitrite's signaling. Using this tool, at sub-lethal concentrations, peroxynitrite-mediated cellular reprogramming such as epithelial to mesenchymal transitions (EMT)—a key process in tumor progression and metastasis was checked. The group demonstrated that peroxynitrite induced EMT and promoted migration of cancer cells—both novel findings that implicate redox regulation of cancer progression and metastasis. As cancer metastasis is disproportionately responsible for treatment failure, this study reinforces the urgent need for developing new methodologies to selectively inhibit peroxynitrite production in cancer cells.

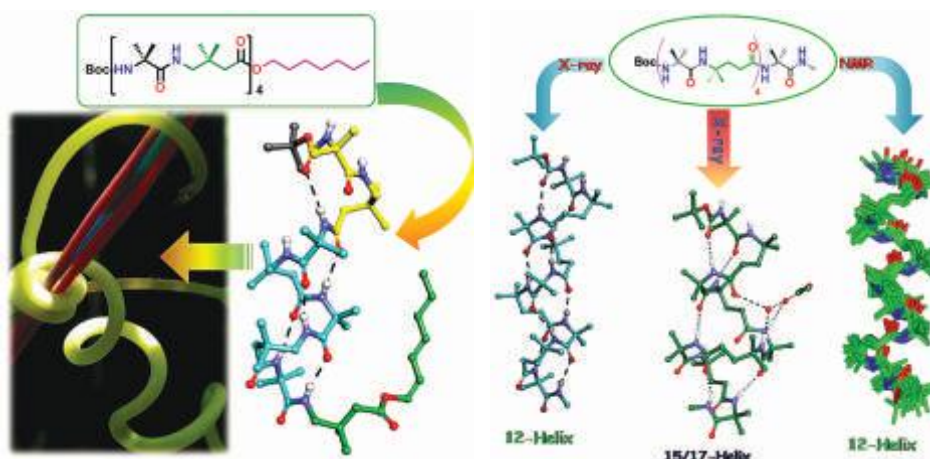
Figure 2: A small molecule for controlled generation of peroxynitrite within cells (Dr. Harinath Chakrapani's Group)



1.3 Hybrid Peptides: Synthesis, Structure, and Applications

Dr. H.N. Gopi's group works with naturally occurring non-ribosomal amino acids as well as novel synthetic γ -amino acids. The group designs proteolytically stable protein secondary structure mimetics and utilizes them in the structure-based drug design for protein-protein interactions, protease inhibitors, antibiotics (antimicrobials), self-assembled soft biomaterials such as hydrogels, vesicles and nanotubes. In addition, research in the group also involves development of new methodologies for the peptide synthesis, peptide ligation and novel amino acids synthesis. Dr. Gopi has recently demonstrated the synthesis of peptide nanotubes from supramolecular assembly of hybrid peptide 12-helices and their potential utility

Figure 3: (Left) Molecular level tendril perversion from achiral α,γ -hybrid peptide; (Right) Co-existence of 12- and 15/17-helices from achiral α,γ -hybrid peptides (Dr. H.N. Gopi's Group)



in casting silver nanowires using silver ions. He also showed the remarkable metal mediated supramolecular assembly of peptide foldamers and metallofoldamer gels. Thus, research in the group is a combination of organic chemistry, peptides, and chemical biology with the ultimate aim of designing inhibitors for protein-protein interactions of various diseases and infections, antibiotics and biomaterials.

1.4 Tumor Associated Carbohydrate Antigens

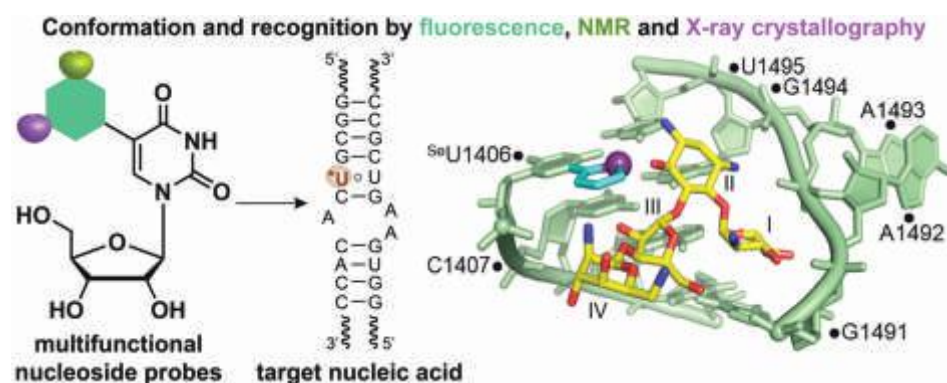
During the onset and progression of cancer, cells undergo dramatic changes in carbohydrate expression. Several tumor associated carbohydrate antigens (TACA) (carbohydrate epitopes that are highly over-expressed or uniquely expressed on tumors) have been identified, but due to their poor immunogenicity, TACA as such failed to induce T-cell mediated immunity. Efforts have been on in the field to devise methods to improve immunogenicity while retaining the specificity of antibodies.

Conjugation of antigens to polymers or nanoparticles is one such method. Among the different nanomaterials, gold nanoparticles have already been used as antigen carriers for vaccine development without the production of anti-gold nanoparticle antibodies. Moreover, gold nanoparticles are biocompatible, easy to fabricate in terms of size and shape to alter the immune responses. Bridging nanotechnology and immunology, **Dr. Raghavendra Kikkeri's** group is working on modulating the antigen presenting cells to uptake specific TACA glycopeptides and display them as MHC-I or II complexes, which would stimulate the cytotoxic T cells and B cells to produce high titre IgG antibody against specific TACA glycans. This approach could be used to develop markers or immunotherapy against specific cancers.

1.5 Functionalized Nucleobase Analogues for Studying Nucleic Acid Structure and Function

Dr. S.G. Srivatsan's group is interested in developing biophysical platforms to understand the structure-function relationship of nucleic acids in cell-free and cellular environments. His group is also developing multifunctional nucleolipid conjugates that could self-assemble into nanofibres, nanotubes and gels. Recently, his group has developed multifunctional nucleoside analogs that can be used to study nucleic acid structure and recognition properties in real time by fluorescence and NMR techniques and in 3D by X-ray crystallography. A dual-purpose selenophene-modified ribonucleoside have been implemented in devising assays to monitor the bacterial ribosomal decoding site RNA-antibiotic interaction by fluorescence and X-ray diffraction techniques (*Angew. Chem.* 2017). This probe has also been used in

Figure 4: Multifunctional nucleoside analogs have been developed to study nucleic acid structure and recognition properties in real time by fluorescence and NMR techniques and in 3D by X-ray crystallography (Dr. S.G. Srivatsan's Group)



investigating the structure and ligand-binding ability of non-canonical nucleic acid structure like G-quadruplexes.

A multifunctional nucleoside probe made of a fluorophore and NMR active label has been recently utilized in deducing the G-quadruplex structure adopted by human telomeric DNA repeat in a near cellular environment. His group has developed practical chemical labeling and imaging methods for cellular RNA by using chemo-selective reactions and environment sensitive fluorescent peptide nucleic acid probes (*ChemBioChem* 2016, *Org. Biomol. Chem.* 2016). Switchable nucleolipid supramolecular gels based on environment-sensitive fluorescent nucleoside analogs have also been developed. These nucleolipid gels retained or displayed aggregation-induced enhanced emission and their gelation behavior and photophysical properties could be reversibly switched by external stimuli such as temperature, ultrasound and chemicals (*Nanoscale* 2016).

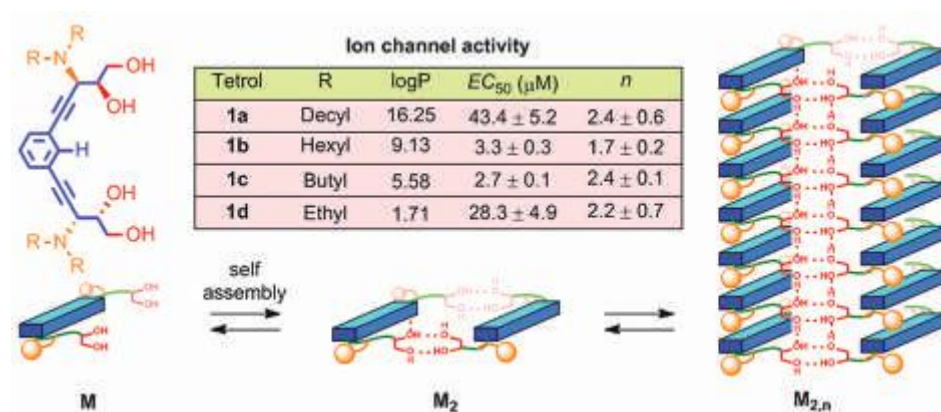
1.6 Synthesis, Self-Assembly, and Sensing

Dr. Pinaki Talukdar's group has developed new strategies for designing supramolecular chloride transporters. They applied the Lipinski's rule of permeability i.e. $\log P \sim 5$ to improve ion transport activity of self-assembled channels designed based on bis-diol systems.

The group showed that excess transport of chloride ions in cells via carriers or channels perturbs the chloride homeostasis of cells and induces apoptosis. Other ion channels and carriers have also been developed to study selective chloride transport across lipid membranes. These studies provide crucial understanding of chloride binding within transporting molecules in the lipid membrane.

In an innovative step to target cancer using ion transporters, his group has designed carriers which facilitate chloride transport only under the acidic environment (pH-gated chloride transport), considering the typical acidic extracellular environment of tumor tissues. Dr. Talukdar designed bispidine-melamine hybrid that transports both H^+ and Cl^- across lipid bilayer by forming a liplock-type complex involving multiple H^+ and Cl^- . These chloride transports can be significant in anticancer drug development without targeting cancer-causing proteins, receptors, enzymes, and genes. Also, the pH-gated chloride transporters and H^+/Cl^- transporters can be crucial for targeting solid cancers by exploring their micro environmental acidic pH and delivering chloride ions into these cells without affecting normal cells.

Figure 5: Structure of bis-diol molecules 1a–1d and their hydrogen-bonded self-assembly into ion channel. Inset: Structure-ion transport activity correlation of bis-diol molecules (Dr. Pinaki Talukdar's Group)



1.7 Chemical Physiology and Optical Molecular Imaging

The second half of 20th century has witnessed the prowess of chemists to design and engineer elegant complex molecules with defined function rather than defined structure. As the focus of chemistry changes from structure to function, the present challenge of chemical community is “Synthesis of New Function” through engineering of small molecule and biomacromolecules. Towards that goal, **Dr. Sandanaraj Britto**'s group is interested in designing new (macro) molecules for applications in the area of chemical biology/physiology and molecular imaging. The focus areas are developing new technologies for accurate and specific detection of “active enzymes” *in vivo*; activity-based protein profiling technology, and synthetic protein chemistry, specifically, molecular tinkering of proteins using chemical tools to synthesize new functions.

1.8 Natural Product Synthesis

Quaternary α -hydroxy carbonyl compounds are important scaffold in many natural products and pharmaceutically active small molecules. **Dr. Gnanaprakasam**'s research has developed an efficient and short route to produce quaternary hydroxyl compound, *viz.* donaxaridine alkaloid via Ru-catalyzed one-pot successive C–H alkylation and C–H hydroxylation approach. This methodology is also being used for the synthesis of Arundaphine alkaloid. Despite the success of transition metal-catalyzed α -hydroxylation of carbonyl compounds, transition metal free methods for α -hydroxylation are required in the pharmaceutical industry that can eliminate the heavy metals contamination in the final products. The group has developed a transition metal and reductant free, efficient method for C–H hydroxylation of various ketones and amides using inexpensive base and environmentally benign atmospheric air as an oxidant. His group has also developed continuous flow mediated C–C bond formation using alcohols in gram scale. Presently, his research group is developing catalytic processes that can be viable for the synthesis of bioactive natural products.



Figure 6: (Left) New approach for synthesis of quaternary α -hydroxy carbonyl compounds; (Right) Targeted biologically active natural products (Dr. Gnanaprakasam's Group)

1.9 Chemical Biology of Microbes

Current projects in **Dr. Amrita Hazra**'s laboratory focus on exploring interactions that exist in biological systems – enzyme–substrate, enzyme–enzyme and microbe–microbe interactions. The group explores systems in the area of microbial vitamin biosynthesis and utilize tools in mechanistic enzymology, microbial genetics, and analytical chemistry to address these questions.

a) Enzymology and alternate pathways of the anaerobic biosynthesis of Vitamin B12 and Coenzyme Q10

- I. The anaerobic biosynthesis of Vitamin B12 involves the *bza operon*, which contains three methyltransferases BzaC, BzaD, and BzaE, each with a unique function. The group is currently exploring the mechanisms of each of these three enzymes. They have cloned, expressed and purified two homologs of BzaC and

are reconstituting its activity. They have also created chimeric versions of the BzaC protein to explore the function of its domains. Purifying BzaD and BzaE proteins, both of which contain S-adenosylmethionine (SAM)-, B12- and Fe-S cluster binding domains, is ongoing. The mechanistic enzymology of BzaD and BzaE is unprecedented in biological chemistry.

- ii. The biosynthesis of Vitamin B12 involves several steps with high regiospecificity. The group is investigating a set of enzymes to determine the role of enzyme-enzyme interactions in the regiospecificity of attachment of DMB, the lower ligand of Vitamin B12.
- iii. The presence of two putative anaerobic hydroxylases in the biosynthesis of ubiquinone is being investigated. Candidate genes have been identified using bioinformatic analysis and their role in ubiquinone biosynthesis is being tested.

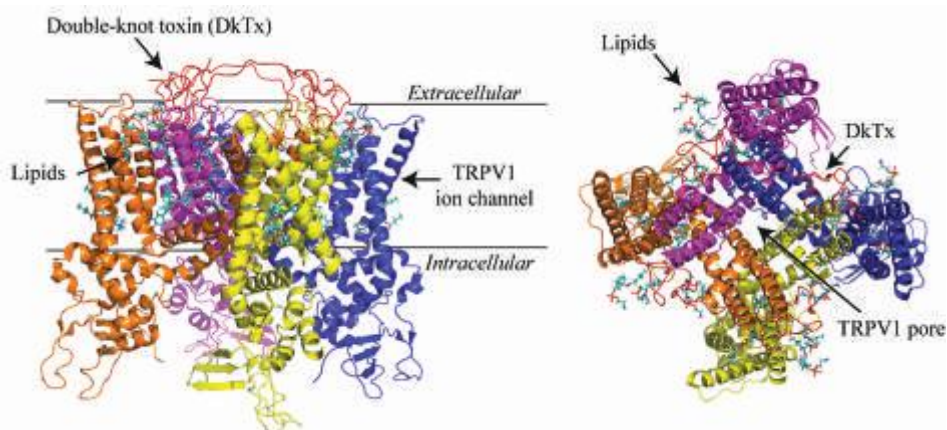
b) Phosphorylation reactions

Phosphorylation reactions in biological chemistry typically utilize a nucleotide triphosphate. For example, ATP is a commonly used substrate for kinase enzymes. However, the phosphorylation reaction involves only the use of the triphosphate part of the molecule – the role of the specific nucleobase, adenine in this case, is not apparent. Additionally, vitamins such as SAM, flavin adenine dinucleotide, and Coenzyme A contain the nucleobase adenine. Dr. Hazra's group is investigating the specificity of the nucleobase in enzyme catalysis and biological chemistry.

1.10 Ion Channels, Lipids, and Bioconjugation

Dr. Jeet Kalia's group is pursuing multidisciplinary research combining disciplines as diverse as synthetic chemistry, protein chemistry, lipidomics, and electrophysiology. Towards elucidating the role of lipids in membrane protein function, one of the projects in the group focuses on understanding the mechanistic basis of the activation of the TRPV1 ion channel by a spider toxin called the double-knot toxin which partitions into the plasma membrane to activate the channel. By performing extensive site-directed mutagenesis of the toxin followed by detailed electrophysiological characterization of the resulting toxin variants on TRPV1 expressed heterologously in *Xenopus laevis* oocytes, Dr. Kalia's laboratory has been able to tease apart the roles of protein-lipid interactions (involving the toxin, the channel and membrane lipids) and protein-protein interactions (between the toxin and channel residues) in toxin-mediated channel activation. In addition, Dr. Kalia's lab is developing chemical biology-based approaches for incorporating non-natural

Figure 7: The structure of the DkTx-TRPV1 complex: (Left) Viewed from within the membrane; (Right) from the extracellular region (PDB code: 5irx) (Dr. Jeet Kalia's Group)

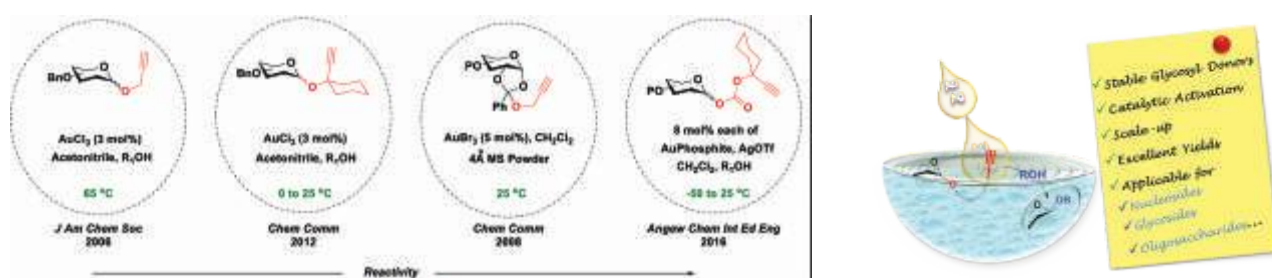


lipids into cells by employing metabolic labeling-based strategies followed by validation of metabolic labeling through lipidomics.

1.11 Gold Catalyzed Glycosylation for Glycoconjugates (3G)

Glycosidation is one of the fundamental but less investigated reactions. During the course of synthesis of natural product-like molecular scaffolds, **Dr. Srinivas Hotha's** group discovered the gold-catalyzed glycosidation reaction for the first time. A decade long research culminated into the identification of more general and high yielding yet mild glycosidation that is applicable for *O*-, *C*-, *N*- glycosides and oligosaccharides at ease. Alkynylglycosyl carbonates were found to be excellent for the synthesis of many oligosaccharides that are pharmaceutically or medically important. The utility of gold-catalyzed glycosidation was demonstrated by synthesizing a branched tridecasaccharide which is reminiscent of the mycobacterial cell surface.

Figure 8: Gold-catalyzed glycosidation reactions (Dr. Srinivas Hotha's Group)



2. Materials Science and Nanoscience

2.1 Inorganic, Supramolecular, and Nonlinear Materials Chemistry

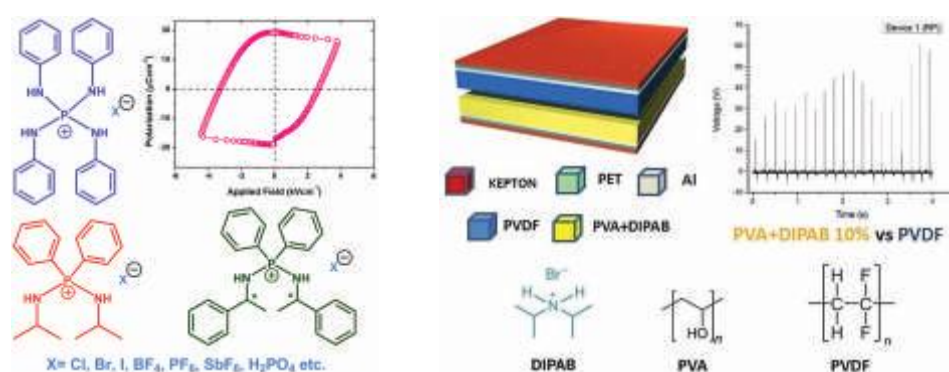
The research interests of **Dr. R. Boomishankar's** group are in the domain of synthetic main group chemistry with emphasis on materials and energy applications. Currently, his group is focused on three major topics: (a) molecular and supramolecular ferroelectrics, (b) neutral cluster cages supported by anionic cis-blocking phosphorus containing reagents, and (c) peripheral functionalization of organosilane and -siloxane scaffolds and their utility in materials development.

Molecular and metal-organic ferroelectric materials have recently gained attention owing to their ease of synthesis, tunable behavior and potential for low-temperature fabrication processes for device applications. These properties have facilitated the use of these new age materials in the frontiers of energy research such as solar-cells and nanogenerators in addition to their traditionally perceived utility as memory elements. Earlier work from the group showed that a family of cationic $[Cu^II L_2]_n$ based

frameworks derived from flexible and less symmetric dipodalphosphoramidate ligands of the type $[\text{PhPO}(\text{NHPy})_2]$, (Py = 3-pyridyl (${}^3\text{Py}$) or 4-pyridyl (${}^4\text{Py}$)), that contains uni- and multi-axial symmetries exhibit tuned ferroelectric responses depending upon the counter anions, dimensionality of the framework and other guest molecules present in them. This approach was extended to discrete metallo-cages and -cavitands based on these ligands in which the choice of hydrated alkali metal guest cations have an effect on altering the polarization attributes, viz. remnant polarization, coercive fields, and ferroelectric fatigue behavior. These findings prompted the group to use phosphorus-centred scaffolds as precursors for molecular ferroelectrics.

It has been shown that both symmetrically and asymmetrically substituted amino-phosphonium cations can aid in the formation of non-centrosymmetric H-bonded assemblies which show excellent ferroelectric responses. A tetra (phenylamino) phosphonium dihydrogen phosphate salt (PDP) has been synthesized that is analogous to the popular potassium dihydrogen phosphate (KDP). Ferroelectric measurements on PDP showed promising results with much improved polarization values than that of KDP. Also, certain charge transfer complexes and molecular rotators are being studied as potential supramolecular ferroelectrics. In addition, all-organic tribo- and piezo-electric nanogenerators are being developed based on organic and polymeric composite materials.

Figure 9: (Left) Molecular ferroelectrics supported by organo-phosphonium salts; (Right) Schematic of an all-organic flexible triboelectric nanogenerator (Dr. R. Boomishankar's Group)



In another project, the chemistry has been developed of neutral palladium containing cages towards building novel host-guest platforms for stabilizing reactive species, chiral recognition and separation and as molecular vessels for catalytic reaction. These assemblies were built from recently developed protocols for obtaining stable and highly basic tris(imido)phosphate trianions, $[(\text{RN})_3\text{PO}]^{3-}$ ($(\text{X})^{3-}$) (analogous to $[\text{PO}_4]^{3-}$ ion) and their role as novel cis-blocking agents for a trinuclear Pd(II) cluster.

2.2 Metal-Organic Frameworks

Dr. Sujit Ghosh's laboratory works in the field of advanced microporous materials like metal-organic frameworks (MOFs), covalent-organic frameworks (COFs), etc., and studies their functional behaviors for potential applications in different fields like energy and environmental issues. Two recent projects have been described here.

a) Novel materials for fuel cells

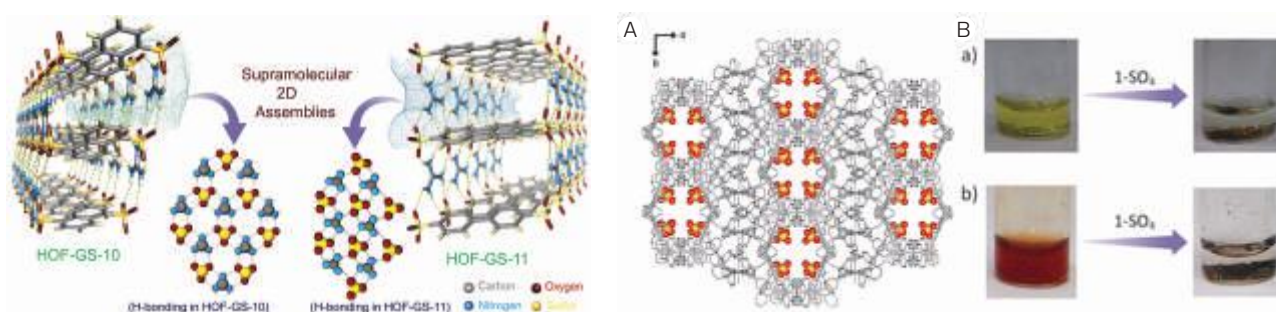
Development of materials exhibiting high proton conduction is crucial for use in proton exchange membrane fuel cell (PEFMC) technology. Dr. Sujit Ghosh's group has developed two porous hydrogen-bonded organic frameworks (HOFs) based materials named HOF-GS-10 and HOF-GS-1, based on charged moieties like arene

sulfonates and guanidinium ions. Owing to the ionic nature of backbone accompanied with protonic source, the compounds were found to exhibit ultrahigh proton conduction values (σ) $0.75 \times 10^{-2} \text{ S cm}^{-1}$ and $1.8 \times 10^{-2} \text{ S cm}^{-1}$ under humidified conditions. The compounds exhibited very low activation energy values accompanied with highest proton conductivity values among porous crystalline materials at ambient conditions (low humidity and at moderate temperature). This work introduces the usage of hydrogen bonded materials in the arena of solid-state proton conducting materials with the conductivity values comparable to the commercially available Nafion (*Angew. Chem. Int. Ed.* (2016) 55:10667–10671).

(b) *Materials to capture toxic contaminants like Cr(VI)*

Figure 10: (Left) Schematic representation showing hydrogen-bonded frameworks (HOFs) constructed with ionic motifs; (Right) (A) Packing diagram of the MOF (1-SO₄) showing uncoordinated SO₄²⁻ anions in the pores; (B) Figure showing capture of Cr₂O₇²⁻ and MnO₄⁻ anions from aqueous solution upon addition of the MOF materials (Dr. Sujit Ghosh's Group)

Due to extensive industrialization, toxic contaminants like Cr(VI) in the drinking water pose severe health risks. Thus, in quest for materials for selectively capturing of such ions, Dr. Ghosh's group has designed a MOF that exhibits highly selective capture via anion exchange process in aqueous medium. A three-dimensional water-stable cationic metal-organic framework (MOF) has been synthesized by utilizing a neutral ligand and Ni(II) metal nodes (MOF 1-SO₄). Due to the ordered arrangement of the uncoordinated tetrahedral sulfate (SO₄²⁻) ions within the channels, the compound was utilized for aqueous-phase ion-exchange applications. The compound showed rapid aqueous-phase capture of environmentally toxic oxoanions like dichromate (Cr₂O₇²⁻) and permanganate (MnO₄⁻) ions. The latter serves as a model for the radioactive contaminant pertechnetate (TcO₄⁻) that holds tremendous significance with respect to radioactive waste management (*Angew. Chem. Int. Ed.* (2016) 55:7811–7815).



2.3 Synthesis of Main Group Cations (e.g. R₃Si⁺, R₂Si₂⁺, RGe⁺, RSn⁺) and their Application in Catalysis

(a) *Synthesis of P/B based dipolar system and their reactivity towards activated alkynes*

Phosphine substituted amino-boranes (P-N-B) have recently drawn attention due to their significant bonding properties and various modes of reactivities. These compounds have interesting electronic properties as they simultaneously contain an electron-rich nucleophilic phosphorous center in their(+III) oxidation state along with an electron deficient lewis acidic, electrophilic boron center. Owing to the presence of both electrophilic and nucleophilic centers in a single molecule, they can act as a motif equivalent to a 1,3 di-polar system and can participate in cyclo-addition mode of reactions with various dienophiles. Cycloaddition reactions are one of the most important synthetic processes having both synthetic and mechanistic interest in

organic chemistry. The reactions of such dipolar systems with alkynes are being explored in **Dr. Shabana Khan's** group.

(b) *Gold (I) complexes, luminescence properties and catalysis*

In recent years, gold (I) complexes have shown excellent catalytic activity in many homogeneous transformations involving C–C- π systems towards the attack of a large variety of nucleophiles. In view of this, Dr. Shabana Khan's group is developing PNP and PNB based Au⁺ complexes which can be further used in catalytic reactions. With PNP system, a dimeric Au–monocation has been formed while with BNP system monomeric Au–monocation was achieved. The PNP-based cations were found to be luminescent due to the presence of strong intramolecular Au...Au interaction. These systems are being explored in catalytic reactions as well.

2.4 Metal-catalyzed C–H Bond Activation

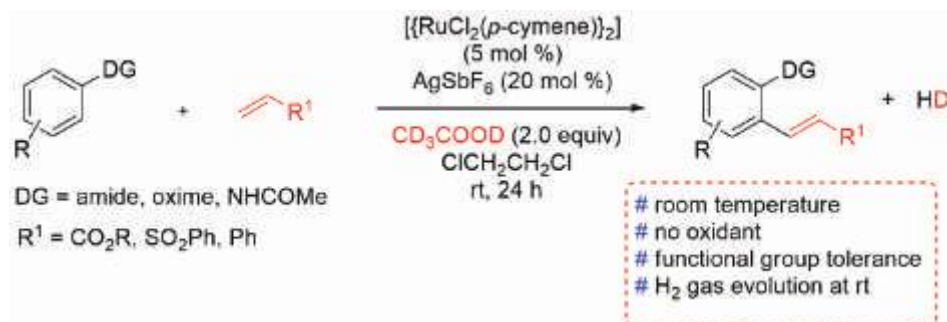
The C–H bond functionalization of substituted aromatics and heteroaromatics is a subject of intense interest in modern organic synthesis. **Dr. M. Jeganmohan's** group has reported a ruthenium-catalyzed oxidant free highly regioselective *ortho* alkenylation of substituted aromatics such as aromatic amides, aromatic ketoximes and anilides. The reaction with alkenes was carried out in the presence of AgSbF₆ and acetic acid in ClCH₂CH₂Cl at room temperature. This reaction produces *ortho* alkenylated aromatics along with evolution of H₂ gas. No oxidant was used and the whole catalytic reaction has occurred without changing the oxidation state of metal.

Allylarenes are widely used as key intermediates for synthesizing various natural products and medicinally relevant molecules. Substituted aromatic amides reacted efficiently with allylic acetates in the presence of a cationic ruthenium complex in ClCH₂CH₂Cl at room temperature providing *ortho* allylated benzamides in a highly regioselective manner without any oxidant and base. The whole catalytic reaction has occurred in a Ru(II) oxidation state and thus, oxidation step is avoided. By tuning the reaction temperature, *ortho* allyl and vinyl benzamides were prepared exclusively.

Further, *ortho* allyl and vinylated benzamides were converted into biologically useful six- and five-membered containing benzolactones in the presence of HCl. A ruthenium catalyzed highly regioselective C–H amidation of cyclic N-sulfonylketimines with organic sulfonyl azides is described. Later, an alkenylation at the C–H bond of cyclic N-sulfonylketimines with various alkenes was done. In the reaction, only a catalytic amount of oxidant Cu(OAc)₂ was used and the remaining amount of oxidant was regenerated under an air atmosphere.

Other areas in which Dr. Jeganmohan's group has provided new routes of synthesis include cobalt catalyzed C–H olefination of aromatic and heteroaromatic amides with

Figure 11: Ruthenium catalyzed orthoalkenylation of substituted aromatics (Dr. Jeganmohan's Group)



unactivated alkenes, allyl acetates and allyl alcohols. This method offers an efficient route for the synthesis of vinyl and allyl benzamides in a highly stereoselective manner. This is the first description of a typical Heck-type vinylation reaction without cleavage of OAc and OH.

Synthesis of isoquinolone derivatives and total synthesis of aristolactam alkaloids are two other projects that the group has successfully completed.

2.5 Interfacial Materials Chemistry

(a) Solid-Solid interface

Dr. Nirmalya Ballav's group has established two new concepts to modulate electrical conductivity in CPs and attributed as extrinsic and intrinsic approaches: (i) by filling-up the pores in CPs with chains of organic conducting polymers like polyaniline, polypyrrole and polythiophene (extrinsic); and (ii) by introducing 'bimetallic' concept (intrinsic), the electrical conductivity of CPs could be significantly enhanced. Extrinsicly, upon incorporating chains of conducting polypyrrole into the 1D nanochannels, a record billion-fold enhancement in the conductivity of a 3D Cd(II)-based MOF was achieved.

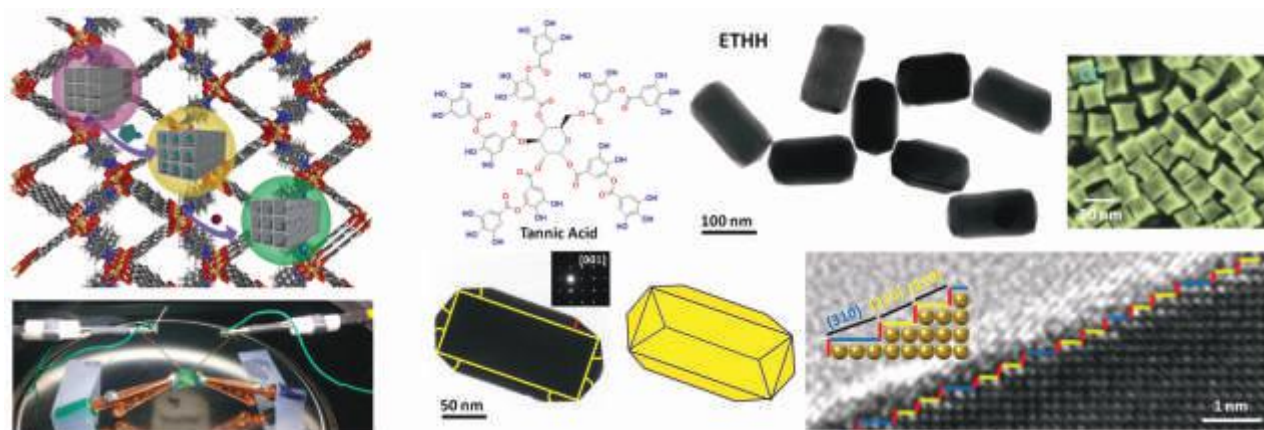
(b) Solid-Liquid interface

Usually, coordination polymers are known to be poor conductors of electricity, which not only restrict their applications in energy research such as fuel cells, supercapacitors, and battery, but also in electronic device applications. Dr. Ballav's group used a layer-by-layer (LbL) approach to grow highly-hydrophobic and surface-anchored thin-films of a semiconducting CP on metallic, transparent and flexible support substrates. Thin-film devices were fabricated by employing electron-beam lithography technique. Room-temperature measurements consistently showed non-Ohmic I-V characteristics. Thus a remarkable chemical-rectification in electrical conductance was achieved without affecting the surface hydrophobicity.

(c) Liquid-Liquid interface

To empower the seed-mediated growth method, the group has introduced Tannic Acid as the mild-reducing agent, in synthesizing at room-temperature elongated tetrahedral (ETHH) and concave cubic (CC) Au nanocrystals (NCs) enclosed with high-index facets having Miller indices (h, k and l) greater than 1.

Figure 12: (Left Top) Conducting polymers into MOF channels: Incorporation of monomers followed by polymerization with extraneous oxidant; (Left Bottom) thin-films of semiconducting CP on flexible plastic substrate; (Right) Schematic of TA. TEM image for the as synthesized ETHH Au NCs. TEM image of ETHH Au NC (yellow box) oriented at [001] zone axis (inset: SAED pattern for the same particle). An illustration of ETHH Au NC is presented. HRTEM image showing the atomic resolution steps in ETHH Au NC. FESEM (colored greenish) image of concave cube Au NCs (Dr. Nirmalya Ballav's Group)



2.6 Colloidal Nanocrystals: Optoelectronics, Surface Modification, and Photophysics

Defect tolerance signifies the tendency of a semiconductor to retain its electronic, optical and optoelectronic properties even in the presence of defects. Colloidal semiconductor nanocrystals like CdSe possess a notorious problem of surface defects that trap charge carriers, severely limiting their properties. To overcome this problem, **Dr. Angshuman Nag's** group developed colloidal lead halide based perovskite nanocrystals. Their results suggest defect tolerance behavior of cesium lead halide perovskite nanocrystals, where surface defects have minimal influence on the electronic, optical and optoelectronic properties.

Colloidal CsPbBr₃ nanocrystals (11 nm) exhibit ~90% photoluminescence (PL) quantum yield with reduced blinking along with very high (~4500 cm²V⁻¹S⁻¹) carrier mobility (measured using THz spectroscopy) within a nanocrystal. These results suggest a near absence mid-gap deep trap states in these nanocrystals. This interesting behavior of cesium lead halide nanocrystal, where surface defects do not form trap states, originates from its unique electronic band structure where anti-bonding interactions of Pb 6s orbital with halide p orbitals forms the valence band maximum, and the conduction band minimum gets stabilized by spin-orbit coupling of Pb6p states.

2.7 Main Group Chemistry - Catalysis and Materials Applications

Dr. Moumita Majumdar's group is involved in the designing of main-group ligands and their coordination to transition metals for their applications in homogeneous catalysis. The group has stabilized a Germanium(II) dication using bis(iminopyridine) ligand, [LGe:]²⁺ where the four N-donors form basal pyramidal plane and the Ge(II) is apically disposed. The dicationic Ge(II) lone pair is free from encumbrances and is stereochemically active. Despite the high positive charge on Ge(II) center, this lone pair coordinates readily to transition metals Ag(I) and Au(I) centers leading to pentacationic complexes. In the case of Au complex, DFT calculations reveal that in addition to sigma donation from dicationic Ge(II) center to sdz² Au(I) orbital, there is pi-back donation from Au(I) d orbitals to [LGe:]²⁺. This remarkably increases the Lewis acidity at the metal center and hence shows strong implications in Lewis Acid Catalysis (*Chem. Comm.* 2017). The work has been highlighted in back cover page of the journal and also in *Chemistry Views News*.

Figure 13: Formation of pentacationic coordination complex with Ag(I) and Au(I) (Dr. Moumita Majumdar's Group)



2.8 Energy Storage and Conversion

Dr. Musthafa's group has developed an aqueous sodium ion battery which can be cycled multiple times with selective insertion of sodium ions over H⁺ ions by modifying the interfacial chemistry. This is expected to pave the way for a suitable anode for Na-CO₂ battery.

The scheme of the sodium metal ion battery is shown in Figure 14a and it consists of hydrophobic few layer graphene as the anode and Fe (ii) hexacyanoferrate (iii) as the cathode in 3M NaNO₃ electrolyte.

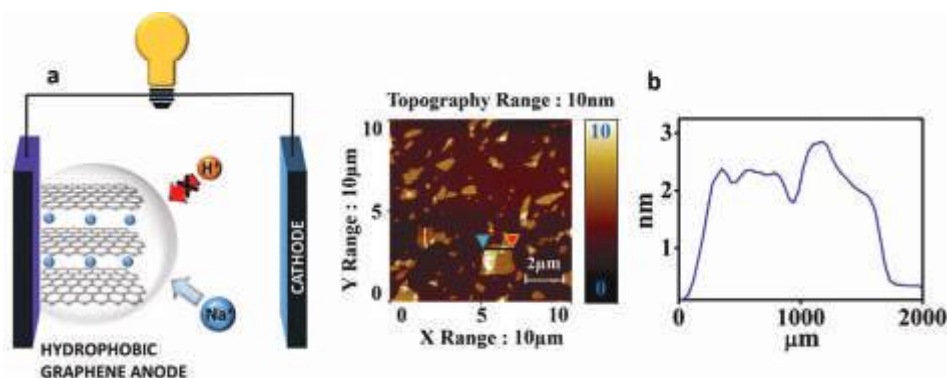
Cyclic voltammogram (CV) and UV-vis spectroelectrochemistry of the insertion cathode showed attenuation between green (Fe^{3+/Fe³⁺}) and blue (Fe^{3+/Fe²⁺}) state due to intervalence charge transfer, indicating the electrochemistry of transition metal ions as responsible for the redox transitions. The H₂ evolution potential at this pH is calculated to be -0.38 V vs. Standard Hydrogen Electrode (SHE) which is more negative than the single electrode potential of FLG anode making it a suitable candidate for metal ion insertion without the complexity of H₂ evolution.

When FLG and COMHF is coupled together, the resulting electrochemical device delivered an open circuit voltage (OCV) of 1.1 V. Few layer structure of graphene (formed by Fe powder reduction method) is evident in their atomic force microscopy images (Figure 14b) and the corresponding line profiles, Figure 14b indicates that each graphene layer approximately contains 3–4 graphene layers. The charge–discharge curves (Figure 15a) at a rate of 400 mA/g yielded a capacity of 83 mAh/g which is ~80% of theoretical capacity of MHF and the decrease in experimental discharge capacity is attributed to lower electronic conductivity of insertion cathodes. Charge–discharge profiles with the corresponding hydrophilic graphene anode (produced by borohydride method) was inferior, blue line (Figure 15a) indicating the advantage of hydrophobic FLG anode as an insertion anode.

The hydrophobic FLG–MHF cell delivered decent rate capability, cyclic stability, capacity retention and coulombic efficiency (Figure 15b). The discharge capacity demonstrated a slight decrease with the discharge rate possibly due to the electron and ion transport limitations at higher rates, yet 92% of capacity is maintained at higher rates (1A/g) suggesting the architect possess decent rate capability. Coulombic efficiencies are maintained at a value >98% at all assessed rates, indicating decent reversibility at the respective electrodes. The cyclic stability of the battery at a discharge rate of 400 mA/g (Figure 15c) demonstrated a decent response without much voltage hysteresis during the discharge and charge chemistry. The CV of the assembled battery with hydrophobic FLG (Figure 15d) showed a pair of peaks corresponding to the insertion and deinsertion chemistry at the respective electrode/electrolyte interfaces and the Faradaic chemistry becomes inferior with the corresponding hydrophilic FLG.

Taken together, these results demonstrate decent cyclic stability of the assembled aqueous battery and stability and sustainability in insertion and deinsertion chemistry at the respective electrode/electrolyte interfaces.

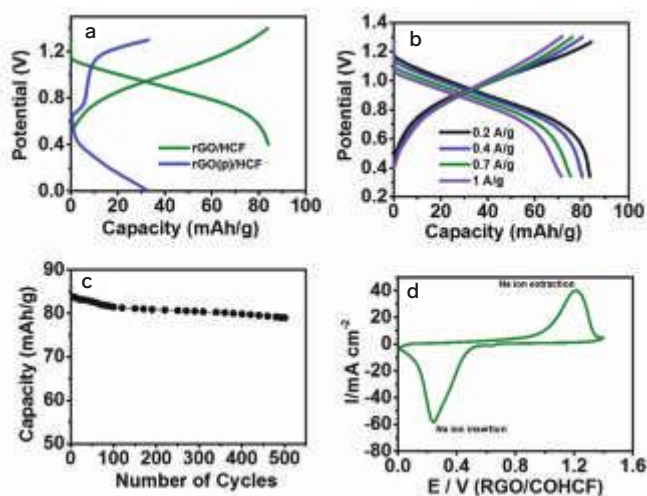
Figure 14: (a) Schematic of Na ion battery; and (b) AFM image of hydrophobic graphene layer with corresponding line profiles (Dr. Musthafa's Group)



Insertion and deinsertion chemistry at the respective interfaces were monitored by a variety of physicochemical techniques. The appearance of strong sodium signal in the

EDS pattern during charge chemistry and its diminishing during discharge chemistry demonstrated the insertion and deinsertion of sodium ions at the hydrophobic graphene electrode/electrolyte interfaces. This was also observed from the elemental mapping during discharge and charge chemistry of hydrophobic FLG anode.

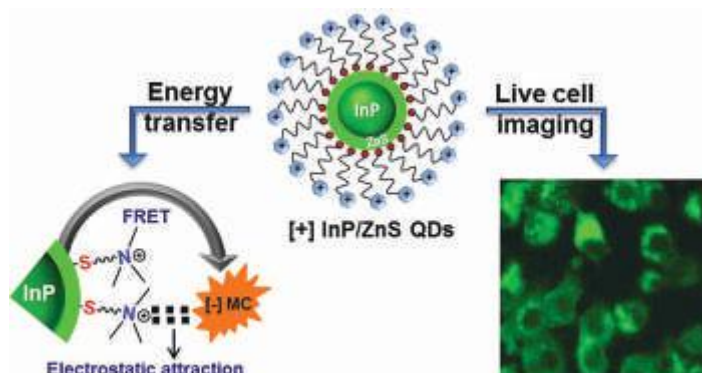
Figure 15: (a) Charge–discharge curves of Na ion battery in 3 M NaNO₃ solution at 400 mA/g; (b) discharge and charge chemistry at different discharge rates; (c) cycling performance of Na ion battery; and (d) cyclic voltammogram of the full cell (Dr. Musthafa's Group)



2.9 Regulation of Interparticle Forces at the Nanoscale

Dr. Pramod Pillai's research is focused on controlling the forces at nanoscale to improve the photophysical and biophysical properties of hybrid nanomaterials. In the group's recent effort, Indium Phosphide Quantum Dots (InP QDs) were introduced to the family of cationic nanoparticles as a practical alternative to toxic metal ion based QDs for biological applications. The two important properties of QDs, namely bioimaging and Förster resonance energy transfer (FRET), were successfully demonstrated in cationic [+] InP QDs. Low cytotoxicity and stable photoluminescence of [+] InP QDs inside cells make them ideal candidates as optical probes for cellular imaging applications. An electrostatically driven efficient resonance energy transfer was observed between [+] InP QDs and [-] MC dye. A large bimolecular quenching constant along with a linear Stern–Volmer plot confirms the formation of a strong ground state complex between [+] InP QDs and [-] dye. Control experiments proved the role of electrostatic attraction in driving the light induced processes, which can rightfully form the basis for future nanobio studies between cationic InP QDs and anionic biomolecules. The dissociation of [+] InP::[-] dye complex under physiological conditions has the potential to be thoughtfully translated into FRET-based signaling and targeting of biomolecular processes.

Figure 16: Electrostatically driven resonance energy transfer in cationic indium phosphide quantum dots (*Chem. Sci.* (2017)8:3879–3884) (Dr. Pramod Pillai's Group)



3. Spectroscopic Sciences

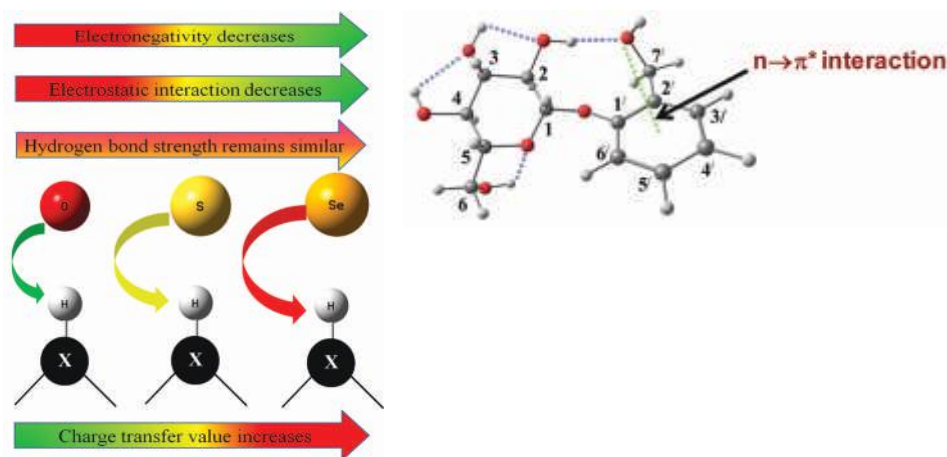
3.1 Gas Phase Laser Spectroscopy

Dr. Alope Das's group is focused on understanding the nature and strength of variety of unprecedented non-covalent interactions ($n \rightarrow \pi^*$ interaction, Se hydrogen bonding, chalcogen interaction, etc.) by using gas phase laser spectroscopy and quantum chemistry calculations. It is important to understand these weak interactions in detail because these are backbones of many materials, biomolecules, drugs, etc.

(a) *Unraveling the mystery behind the observation of strong selenium hydrogen bond*

Subsequent to the current re-definition of hydrogen bonding by the IUPAC committee, there has been augmenting quest for finding the presence of this important non-covalent interaction between a hydrogen atom in X-H group and any other atom in the periodic table. In recent gas phase experiments, it has been observed that hydrogen bonding interactions involving S and Se are of similar strength to those with O and N atoms. However, there is no clear explanation for the unusual strength of this interaction in the case of hydrogen bond acceptors which are not conventional electronegative atoms. Dr. Das's group has explored the nature of Se hydrogen bonding by studying indole...dimethyl selenide (Ind...Me₂Se) and phenol...dimethyl selenide (Ph...Me₂Se) complexes using gas phase IR spectroscopy and quantum chemistry calculations. It has been found that the significant strength of the Se/S hydrogen bonding cannot be explained by electrostatic interaction; rather, charge transfer interaction plays a decisive role for this type of hydrogen bonding interaction.

Figure 17: (Left) Charge transfer interaction governs the strength of the hydrogen bonding when poor electronegative atoms act as hydrogen bond acceptor. The strength of the hydrogen bond with O, S, and Se is similar; (Right) Most stable structure of salicin (Dr. Alope Das's Group)



(b) $n \rightarrow \pi^*$ interaction governs the conformational preference of a drug in the presence of strong hydrogen bonding interactions

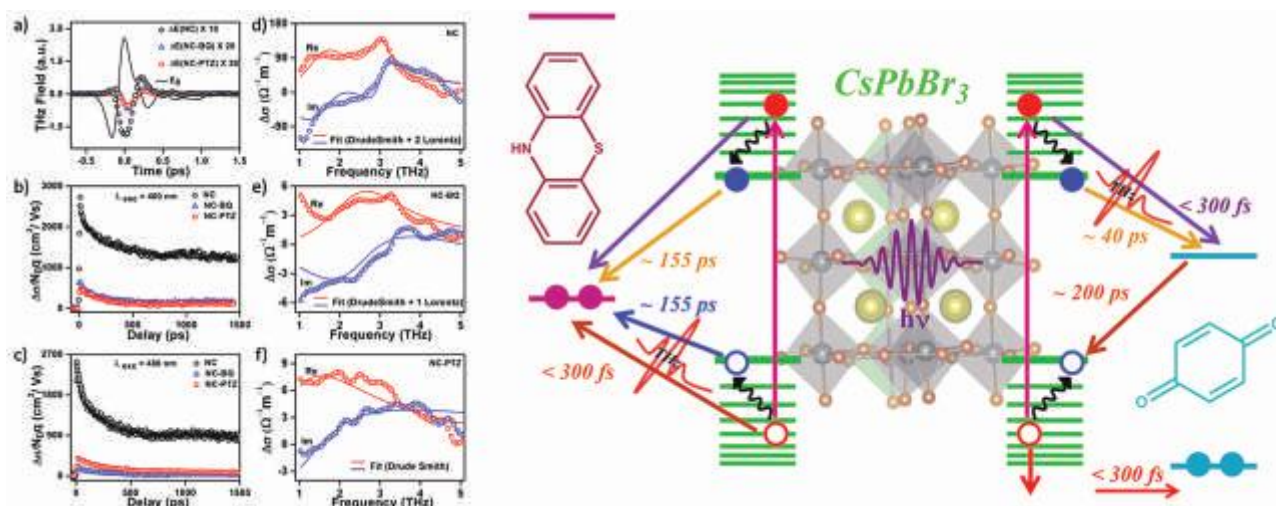
$n \rightarrow \pi^*$ non-covalent interaction is quite weak compared to hydrogen bonding interaction. However, it has been recently demonstrated by Das and coworkers that $n \rightarrow \pi^*$ interaction plays a crucial role to provide conformational preference of molecular systems in presence of multiple strong hydrogen bonding interactions. Dr. Das's group has studied the conformational landscape of salicin (salicyl alcohol glucoside), an inflammatory drug, using gas phase electronic, IR spectroscopy and density functional calculations. It has been found that three low energy conformations of salicin, which are observed in the experiment, are stabilized by multiple hydrogen bonding interactions and an $n \rightarrow \pi^*$ interaction. On the other hand, the structures which have relatively stronger hydrogen bonding interaction but no $n \rightarrow \pi^*$ interaction are higher in energy and not observed in the experiment. Thus, the most important finding of this work is that the interplay between the $n \rightarrow \pi^*$ interaction and relatively weaker hydrogen bonds is energetically more favorable than the exclusive presence of even stronger hydrogen bonds in the molecular systems.

3.2 Terahertz Spectroscopy and Ultrafast Dynamics

Dr. Pankaj Mandal's group is using time-resolved terahertz (THz) spectroscopy and other ultrafast pump-probe experiments to probe the carrier and spin dynamics in nanocrystals (quantum dots), hydrogen-bond dynamics in solvated biomolecules, and intermolecular interaction in liquid mixtures.

Colloidal all-inorganic CsPbX_3 ($X = \text{Cl}, \text{Br}, \text{I}$) nanocrystals (NCs) have emerged to be an excellent material for applications in light emission, photovoltaics, and photocatalysis. Efficient interfacial transfer of photo generated electrons and holes are essential for a good photovoltaic and photocatalytic material. Using time-resolved THz-spectroscopy (TRTS) the kinetics of photo generated electron and hole transfer processes in CsPbBr_3 NCs were measured in presence of benzoquinone (BQ) and phenothiazine (PTZ) molecules as electron and hole acceptors, respectively. Efficient hot electron/hole transfer with a sub-300 fs timescale is the major channel of carrier transfer, overcoming the problem related to Auger recombination. A secondary transfer of thermalized carriers also takes place with timescales of 20-50 ps for

Figure 18: (Left) (a) Typical THz waveforms in TRTS measurements at $\lambda_{\text{exc}} = 400$ nm. E_0 is the pump-off signal plotted in black solid line. Pump induced change of THz field is plotted as ΔE . THz conductivity of neat NCs, NC-BQ and NC-PTZ complexes normalized with respect to density of absorbed photons when (b) $\lambda_{\text{exc}} = 400$ nm and $\langle N \rangle = 1.31$, (c) $\lambda_{\text{exc}} = 480$ nm and $\langle N \rangle = 1.27$. Real (red symbols) and imaginary (blue symbols) conductivity spectra at $\lambda_{\text{exc}} = 480$ nm, $\sim 72 \mu\text{J}/\text{cm}^2$ fluence ($\langle N \rangle \sim 1.3$) for (d) neat NCs, (e) NC-BQ and (f) NC-PTZ complexes. Solid lines are the fits to the Drude-Smith (DS) plus two Lorentz (d), DS plus one Lorentz (e), and only DS (f). The Lorentz oscillator(s) is used to model the contribution of phonon vibrations to the conductivity spectra. (Right) Schematic representation of different carrier transfer mechanism in CsPbBr_3 nanocrystals (Dr. Pankaj Mandal's Group)



electrons and 137–166 ps for holes. This work suggests that suitable interfaces of CsPbX₃ NCs with electron and hole transport layers would harvest hot carriers, increasing the photovoltaic and photocatalytic efficiencies.

3.3 Structure and Dynamics of Nucleic Acids and Interacting Proteins by NMR Spectroscopy

With an aim to gain insights into the structural and mechanistic understanding of microRNA biogenesis pathway, **Dr. Jeetender Chugh's** group has been working on Smad3–MH1 (MH1 domain of SMAD3 protein involved in assisting Drosha in converting pri-miRNA to pre-miRNA in the nucleus) and TRBP (TAR RNA binding protein that assists Dicer in dicing pre-miRNA to ds-miRNA and further to mature miRNA) using NMR spectroscopy and other biophysical tools.

Initial purification of Smad3–MH1 was yielding soluble oligomers as seen by MALDI and NMR; however, purification conditions have now been optimized for Smad3–MH1 to remain as a monomer in solution so that efficient studies can be carried out using NMR spectroscopy.

Complete relaxation data on RNA binding domain 1 of TRBP has been recorded and analyzed using 600 MHz NMR spectrometer. Qualitative analysis shows dynamics present at ms– μ s timescale, supporting our hypothesis that dynamics is required in TRBP to target multiple target RNA structures.

Metabolomic measurements and analysis are being carried out in a variety of projects: 1) to understand stress response in *M. smegmatis* cells that might yield information on how *M. tuberculosis* survives during latent stage (in collaboration with Dr. Shekhar Mande, NCCS Pune and Dr. Sharmistha Banerjee, University of Hyderabad); 2) looking at yeast metabolomics of different mutants to identify a strain making efficient biodiesel (in collaboration with Dr. Ameeta Ravikumar, SP Pune University); 3) looking at effect of various toxic conditions to insulin producing cells and recovery using natural drugs to identify their roles in diabetes mellitus; and 4) studying human serum samples to identify early biomarkers in diabetic patients and controls (in collaboration with Dr. Shilpy Sharma, SP Pune University).

Dr. Chugh's group is also collaborating with Dr. Sudha Rajamani (Biology, IISER Pune) to characterize different RNA oligomers and RNA like monomers and oligomers of evolutionary importance.

3.4 Spectroscopic Studies of Biological Systems

Dr. Partha Hazra's group explores the excited state proton transfer dynamics of drugs/fluorophores in bio-mimicking liquid crystalline systems. A major goal is to find new stabilizing agents for unusual DNA structures (G–Quadruplex and i-motif, etc.) by fluorescence and other biophysical techniques. Furthermore, the group is involved in exploring the new drug delivery vehicles (mesoporous silica, etc.) for anti-cancer drugs.

(a) *Dynamics of different steps of the photopyrolytic cycle of an eminent anti-cancer drug topotecan inside biocompatible lyotropic liquid crystalline systems*

The dynamics of different steps of photopyrolytic processes of an anti-cancer drug topotecan (TPT) were explored inside the biocompatible reverse hexagonal (HII),

gyroid (Ia3d) cubic and diamond (Pn3m) cubic lyotropic liquid crystalline (LLC) phases. Using a kinetic model, Dr. Hazra's group has calculated the dynamics of different steps, namely, proton transfer, recombination and dissociation of photopyrolytic processes of TPT inside different LLC phases.

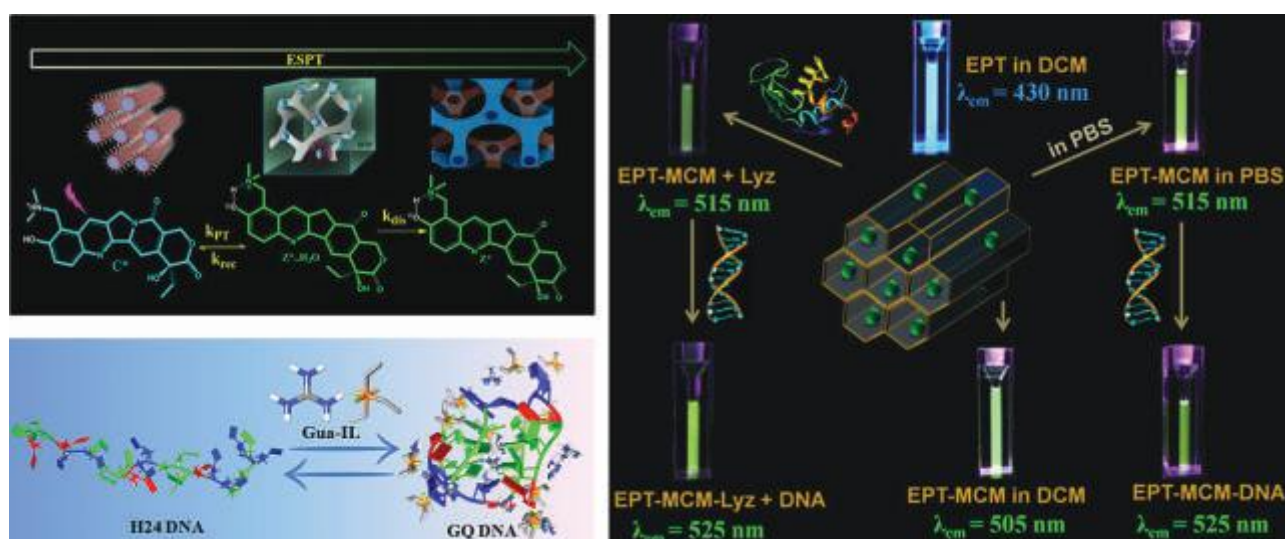
(b) *Liquid induced G-quadruplex formation and stabilization: spectroscopic and simulation studies*

It has been observed that a guanidinium based ionic liquid induces the formation of G-quadruplex (GQ) structure in the absence of any ion. Studies from Dr. Hazra group confirmed that one of the guanidinium cations mainly stays in the central core of G-tetrad and bulky anions prefer to reside near the GQ surface, which largely accounts for the formation and stabilization of GQ.

(c) *Loading of an anti-cancer drug into mesoporous silica nano-channels and its subsequent release to DNA*

The dual fluorescence property of an eminent anti-cancer drug, ellipticine, was successfully utilized to directly monitor its efficient loading into MCM-41. Ellipticine loaded into MCM-41 is successfully internalized into cancerous cells and localized into the nucleus. Moreover, it shows better *in vitro* cytotoxicity compared to free drug.

Figure 19: (Top Left) ESPT rate of TPT in different liquid crystalline phases; (Top Bottom) Pictorial representation of stabilization of human telomeric DNA into GQ-DNA in presence of ILs; (Right) Fluorescence-switching of ellipticine in the presence of MCM-41 and various biomolecules (Lyz/DNA) (Dr. Partha Hazra's Group)



4. Theoretical and Computational Chemistry

4.1 Stochastic Processes

(a) *Non-equilibrium effects of polymer translocation under a constant end pulling force*

Polymer translocation through a narrow pore is of fundamental importance in many biological and technological processes such as transport through membrane channels, virus injection, gene therapy, DNA sequencing, etc. Motivated by optical tweezers pulling experiments on single molecules, **Dr. Srabanti Chaudhury's** group studied the translocation of a polymer pulled through a narrow pore with strong driving force applied at the one end of the polymer using Langevin dynamics simulations. The translocation time distribution and waiting time distributions are calculated. The simulations on end-pulled polymer translocation are supported by theoretical model based on the tension propagation theory to capture the non-equilibrium effects of the translocation process. Also, the velocity profile of the monomer at different times shows that polymer translocation is accompanied by the propagation of tension front along the polymer chain. The waiting time distribution reaches a maximum when the tension front has propagated to the last monomer bead.

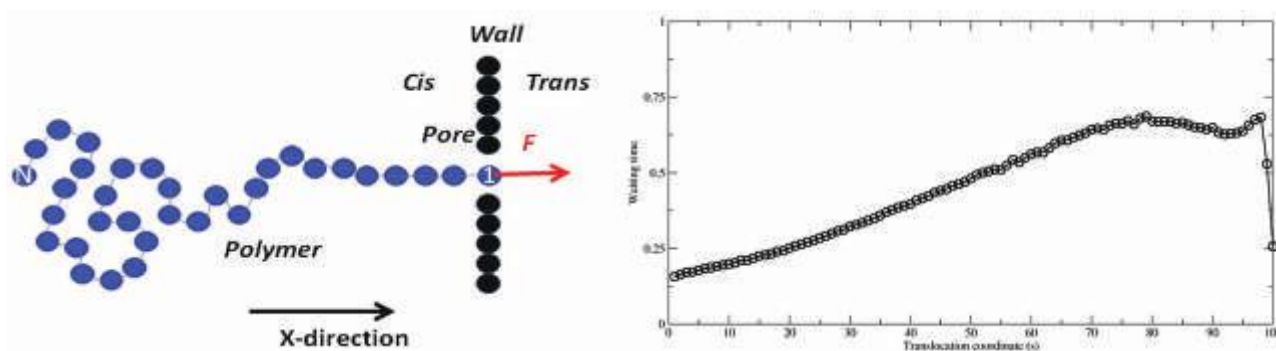


Figure 20: Waiting time distribution as a function of the translocation coordinate (Dr. Srabanti Chaudhury's Group)

(b) *Understanding dynamic disorder and cooperativity in fluctuating enzymes*

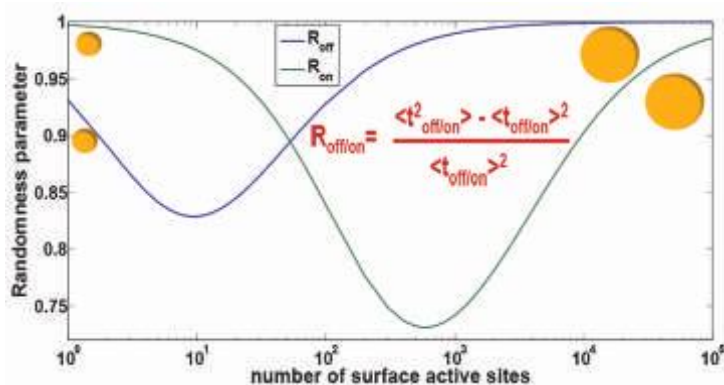
Dr. Chaudhury's group has also studied the temporal fluctuations in catalytic rates for single enzyme reactions undergoing slow transitions between two active states. A first passage time distribution formalism was used to obtain the closed-form analytical expressions of the mean reaction time and the randomness parameter for reaction schemes where conformational fluctuations are present between two free enzyme conformers. Their studies confirm that the sole presence of free enzyme fluctuations yields a non Michaelis–Menten equation and are responsible for the emergence of dynamic cooperativity in single enzymes. The randomness parameter, which is a measure of the dynamic disorder in the system, converges to unity at high

substrate concentration. Results confirm that the dynamic disorder at high substrate concentration is determined only by the slow fluctuations between the enzyme – substrate conformers.

(c) *Theoretical study of the size-dependent catalytic activity of metal nanoparticle at the single molecule level*

The catalytic activity of metal nanoparticles is intrinsically heterogeneous due to the heterogeneous distribution of surface catalytic sites and surface restructuring dynamics. Recent advances in single-molecule fluorescence spectroscopy reveal that the rate of product formation and dissociation exhibit size-dependent activities. A theoretical method is proposed to study the size-dependent catalytic activity of metal nanoparticle using the stochastic approach based on the superposition of renewal processes. It was observed that for a single nanoparticle with fewer surface-active catalytic sites, temporal fluctuations in the reaction rate, a phenomenon commonly known as dynamic disorder is present in both the product formation and product dissociation events. The increase in the number of surface catalytic sites suppresses the effect of dynamic restructuring of the surface, thereby leading to the decrease in dynamic disorder. The proposed formalism provides a theoretical foundation to understand the size-dependent catalytic activity of metal nanoparticles at the single molecule level.

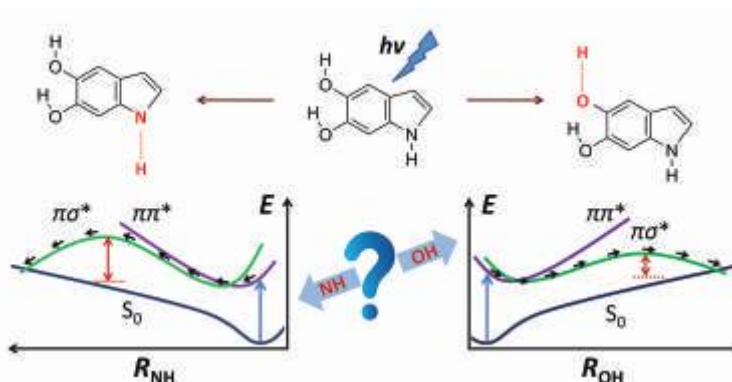
Figure 21: Randomness parameter as a function of the dimension of the single nanoparticle (Dr. Srabanti Chaudhury's Group)



4.2 Theoretical Studies of Ultrafast Photoinduced Molecular Processes

Research in **Dr. Anirban Hazra's** group is on mechanistic understanding of excited state phenomena in molecules. The tools used are electronic structure theory and mixed-quantum-classical nuclear dynamics. Excited state phenomena play critical roles in living organisms and in atmospheric processes, and moreover have important

Figure 22: Schematic figure showing two deactivation pathways for DHI. The barriers on them result in their inaccessibility leading to a relatively long lifetime of photo-excited DHI (Dr. Anirban Hazra's Group)



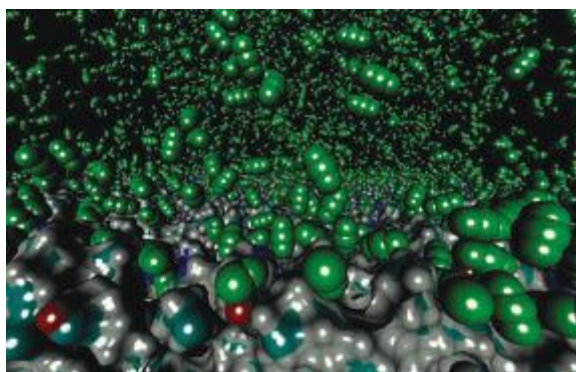
technological implications in solar-based renewable energy devices. Ongoing research in the group includes mechanistic investigation of photoisomerization, chemiluminescence, intersystem crossing rates, and radiationless decay.

Recently, the group has investigated the photophysics of 5,6-Dihydroxyindole (DHI) which is a building block of eumelanin, the biopolymer pigment that is present in humans and many other animals. Eumelanin, on photoexcitation, undergoes nonradiative relaxation on the ultrafast time scale with quantum yields close to unity, but the mechanism for this process is not well-understood. The study on DHI, an important monomer of eumelanin, provides a detailed mechanistic understanding of the energy transfer channels in this molecule after photoexcitation. It explains why this molecule has a relatively long excited state lifetime and thus suggests that DHI by itself cannot explain the ultrafast deactivation properties of eumelanin. Dimers and polymers of DHI, and their interactions with other building blocks of eumelanin need to be studied to understand such properties.

4.3 Modeling and Simulation of Materials

Research in **Dr. Arun Venkatnathan's** group focuses on modeling and simulation of CO₂ capture and proton transport in ionic liquids, polymer electrolyte fuel cell membranes and gas storage in clathrate hydrates. For example, the molecular mechanism of CO₂ absorption in tetra-butylphosphonium lysinate ionic liquid was examined using molecular dynamics simulations. The results showed the formation of a rich interface followed by CO₂ capture in the bulk liquid. Proton transfer pathways were also examined using quantum chemistry calculations in Imidazolium Methanesulfonate ionic liquid. The gas-phase calculations show that an optimum amount of imidazole added to the ionic liquid facilitates proton transport and supports experimental studies.

Figure 23: CO₂ molecules on the surface of tetra-butyl-phosphonium lysinate ionic liquid (Dr. Arun Venkatnathan's Group)



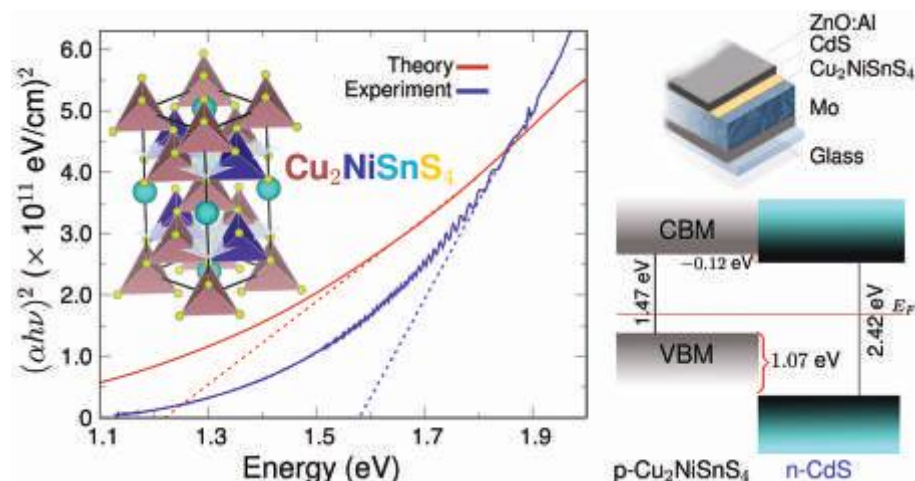
5. Condensed Matter, Statistical Physics, and Materials

5.1 Designing New Photovoltaic Materials: Theory and Experiment

Dr. Mukul Kabir's group focuses on electronic structure theory, two-dimensional materials, strongly correlated systems, magnetism, superconductivity, and materials design for energy applications.

Solar photovoltaic materials generate electron–hole pairs through light absorption and, in a device architecture, generate electricity without any carbon footprint. In this regard, earth–abundant quaternary chalcogenides are promising candidate materials. Recently, in collaboration with experimentalists from the S.P. Pune University, the group reported a new material $\text{Cu}_2\text{NiSnS}_4$ to be a good candidate material. The structural, electronic and optical properties were investigated using various complementary experimental and theoretical techniques. A 1.57 eV direct band gap and very high optical absorption coefficient $\sim 10^6 \text{ cm}^{-1}$ along with very small conduction band offset of -12 eV indicate potential application in low-cost thin-film solar cell. The group has also modelled carrier transport across the heterostructure device interface. It is anticipated that this new material will attract further studies to optimize the solar photovoltaic architecture. The results have been published recently in the journal *Chemistry of Materials*.

Figure 24: Encouraging electronic optical properties indicate a newly designed material $\text{Cu}_2\text{NiSnS}_4$ to be an efficient solar photovoltaic candidate (Dr. Mukul Kabir's Group)



5.2 Electronic Origin of Light Emission and Lasing

Dr. Shouvik Datta's group has worked on three aspects in the area of optoelectronics.

a) Properties of excitons

Mostly optical spectroscopies are used to investigate the physics of excitons,

whereas their electrical evidences are hardly explored. Dr. Datta's group examined forward bias activated differential capacitance response of GaInP/AlGaInP based multi-quantum well laser diodes to trace the presence of excitons using electrical measurements. Experimental correlation between electrical and optical properties of excitons can be used to advance the next generation excitonic devices.

b) Properties of CdTe/CdS PV cell

Numerical investigation of CdTe/CdS PV cell properties was carried out using SCAPS simulation. A simple structure of CdTe PV cell has been optimized to study the effect of temperature, absorber thickness and work function at very low incident power.

c) Using photocapitance to study indirect excitons

The group showed that inverted dipoles of two dimensional, indirect excitons in a GaAs/AlAs/GaAs single barrier p-i-n structure can be probed by photocapitance at room temperature. Photocapitance signal of resonantly sharp excitonic absorption peak follows the areal density of these indirect excitons which decrease with tunnelling at higher biases. Unlike DC-photocurrent spectra, photocapitance spectra red shift sharpen up with increasing applied electric field. Such dissimilarities could be used to selectively probe indirect excitons having large effective dipole moments.

5.3 Matter at the Atomic Scale

Dr. Aparna Deshpande's group investigates low dimensional systems like surfaces and thin films (two-dimensional), nanotubes and chains (one dimensional), and nanoparticles and quantum dots (zero dimensional) using scanning tunnelling microscopy (STM).

a) Molecular self-assembly

A comparative study of CuPc and CuPc(CN)₈ molecules on Au(111) substrate using UHV-LT-STM has given an insight into the hydrogen bonding and antiparallel dipolar coupling in the molecular self-assembly of these molecules. Structural chirality has been seen in both assemblies. In addition to this, orbital specific electronic chirality manifests only at the LUMO energy of CuPc(CN)₈. No such effect is seen in the LUMO energy of CuPc. The HOMO-LUMO band gap increases from CuPc to CuPc(CN)₈ as suggested by STM images and STS data taken at 100 pA. The addition of (CN)₈ groups to the CuPc structure is speculated to be the driving force for these changes.

b) Charge density waves in TiSe₂

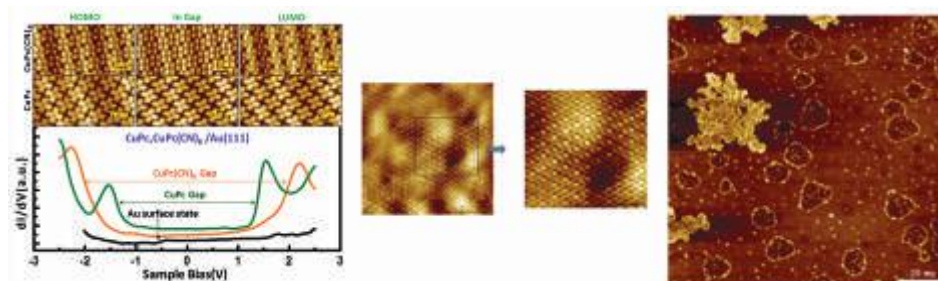
TiSe₂ is a transition metal dichalcogenide. This layered material consists of Se-Ti-Se layers stacked via van der Waal interaction. At room temperature it has a hexagonal lattice with (1x1) structure. At around 200K it undergoes a phase transition to CDW (charge density wave) with (2x2) superstructure. The CDW phase results in the distortion of lattice and the resulting 2x2 superstructure was observed in STM images with image parameters of 0.2V and 150 pA.

c) Borophene on Au(111)

With the discovery of graphene, the two dimensional (2D) form of carbon, the field of 2D materials research has seen a huge surge. Boron has been shown to form 2D sheets on Ag(111) surface. The STM image shown here shows a planar 2D assembly

of boron on evaporation of boron powder onto Au(111) surface. The herringbone reconstruction of Au(111) gets perturbed due to these planar structures of boron indicating very strong bonding with the Au substrate. The next goal is to obtain an atomic resolution of boron in these assemblies and explore their electronic properties using STS.

Figure 25: (Left) STM images and spectroscopy data for CuPc and CuPc(CN)₈. Images taken at 0.2 nA; (Middle) 15 nm x 15 nm image of TiSe₂ taken with V = 0.2 V, I = 150 pA, Inset of the figure in the middle, 5 nm x 5 nm zoomed image of TiSe₂ showing the 2x2 superstructure; (Right) STM image of boron islands and dark patches over Au(111), V = 2V, I = 50pA (Dr. Aparna Deshpande's Group)



5.4 Statistical Physics, Complex Systems

Dr. Arijit Bhattacharyay's group is pursuing research in two broad areas related to Bose Einstein condensates (BEC). In the area of analogue gravity using phonons in a Bose-Einstein condensate, the goal is to understand the trans-Planckian back actions on analogue Hawking radiation. With PhD student Mr. Supratik Sarkar, Dr. Bhattacharyay is working on an analogue canonical black hole configuration in a BEC.

On supersolid phase in BEC, the group is investigating thin vortex solutions in the same system. Thin vortex solutions or vortices with smaller core size are important in the context of atomic quantum Hall Effect which is yet to be experimentally realized. This work is being done with a PhD student Mr. Abhijit Pendse and fifth year project student Ms. Arushi Bodas. The structure of a single vortex in tightly confined BEC using variational methods and work on open BEC at a finite temperature are currently ongoing. Work is also being carried out on phase separation in confined spin or BEC with PhD student Mr. Projjwal Kanjilal.

Independent work from PhD student Mr. Abhijit Pendse showed an exact correspondence between truncated free energy and dynamics in Gross-Pitaevskii equation which is accepted for publication in *International Journal of Theoretical Physics* (DOI: 10.1007/s10773-017-3351-5).

5.5 Soft Matter Physics

Dr. Apratim Chatterji's group has focused on the following topics.

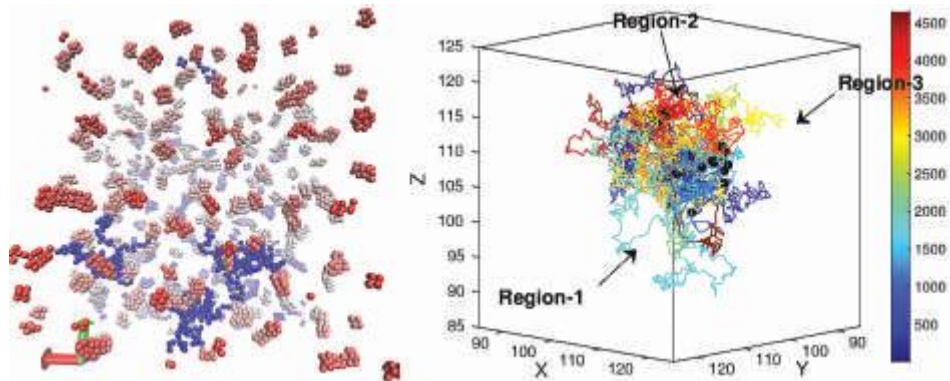
(a) *Network formation and gelation of star-polymers with telechelic ends*

Star polymers with telechelic ends are bead spring model star-polymers with 6 arms where the end monomers of each have been substituted by dipoles. The dipoles from different polymers aggregate to form dipole clusters. Thus each cluster is connected to many stars, and in turn each star is connected to many clusters. This leads to gelation of the stars and leads to huge increase in visco-elastic properties as seen in experiments (*J. Chem. Phys.* 146:084906).

(b) Origin of spatial organization of DNA-polymer in chromosomes

Dr. Chatterji's group showed that a few cross-links (CLs) at specific points in a ring polymer can lead to a spatial organization of the chain. The specific pairs of cross-linked monomers were obtained from contact maps of bacterial DNA. This work explains how the DNA organizes itself hierarchically above the 100 nm scale. The structure of two DNAs using Monte Carlo calculations of the bead-spring polymer with CLs at these special positions has been predicted. Simulations with CLs at random positions along the chain show that the organization of the polymer is different from the previous case.

Figure 26: (Left) Representative snapshots from simulations of star polymers with 6 arms; (Right) Representative snapshot from simulation of DNA-polymer with a set of cross-links (Dr. Apratim Chatterji's Group)

*(c) Dynamics of 2 parallel fluctuating surfaces, relaxation of an elastic fragment, and polymer chain conformations*

The dynamics of 2 parallel fluctuating surfaces (lipid membranes) in the presence and absence of explicit solvent molecules incorporating hydrodynamic interaction, as opposed to the dynamics when the presence of the fluid is modeled by Langevin simulations is being investigated.

Motivated by recent experiments performed at IISER Pune by Drs. Sanjeev Galande and Shivprasad Patil on the dynamics of hydra motion, Dr. Chatterji's group is modeling the relaxation of an elastic filament (representing hydra) in a viscous medium. The bending-rigidity/Young's-modulus of the filament varies along the length of the filament as seen in the case of hydra, and the effect of this bending-rigidity gradient of the dynamics of the filament is being investigated.

In another project, different conformations that a polymer chain takes when shear in channel full of obstacles which are placed in a random manner in space are being studied.

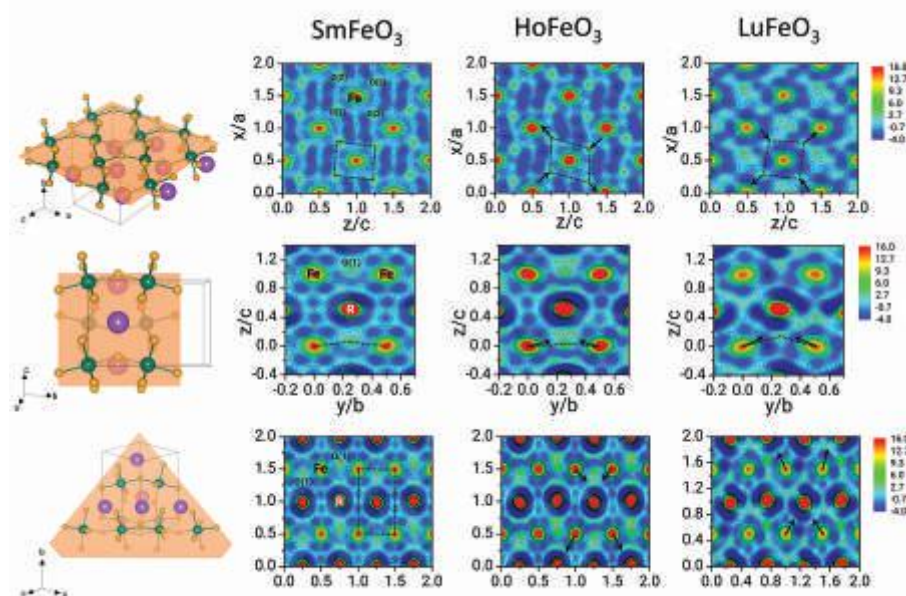
5.6 Synthesis and Analysis of Nanoparticles

Dr. Smita Chaturvedi's research focuses on syntheses, understanding the structure and electron density distribution in nanoparticles, nanofibers and heterostructures of rare earth orthoferrites, which are promising multiferroic materials. Analyzing changes in their physical properties and increased multifunctionality due to change in ionic radii, variation in size, morphology and dimensionality is main objective.

In the upcoming venture of Internet of Things (IoT), existing transistor-based RAMs are volatile, i.e., the data will eventually be lost when the memories are not powered leading to a significant amount of power consumption on retaining data memory units. One of the promising solutions for minimum amount of heat dissipation is to use multiferroic heterostructures, where the magnetization can be switched or even

reversed by applying an electric field to the insulating ferroelectric layer, with virtually zero leakage current during writing. Major advantage of using ferroic materials is that by applying low power electric field, reversible polarization is achieved and sustained without feeding continuous power.

Figure 27: Effect of change in ionic radii on structural parameters of rare earth ferrite nanoparticles visualized using electron density maps. (Dr. Smita Chaturvedi)



5.7 Nanostructures and Photo-Catalytic Water Splitting

Nuclear quantum effects (NQE) play a significant role in H-bonded systems, where the interactions between the light protons and heavy nuclei play an important role in determining the properties of the system. Hence, to predict properties of H-bonded systems, it is crucial to include NQE. One such biologically relevant system where H-bonding plays an important role is ellipticine solvated in water. The former is a natural plant product that is currently being actively investigated for its inhibitory properties against cancer and HIV.

Dr. Prasenjit Ghosh's group has used path-integral molecular dynamics coupled with excited state calculations to characterize the role of NQEs on the structural and electronic properties of ellipticine in water, a common biological solvent. Their calculations show that NQEs collectively enhance the fluctuations of both light and heavy nuclei of the covalent and hydrogen bonds in ellipticine. These structural fluctuations cause a significant red-shift in the absorption spectra and an increase in the broadening, bringing it into closer agreement with the experiments. This work shows that NQEs alter both qualitatively and quantitatively the optical properties of this biologically relevant system and highlights the importance of the inclusion of these effects in the microscopic understanding of their optical properties.

Figure 28: Snapshots from the path integral molecular dynamics trajectory where ellipticine is in its (a) normal form, (b) protonated form, and (c) in the deprotonated form (Dr. Prasenjit Ghosh's Group)



5.8 Nano-Mechanics of Biomaterials

(a) Viscoelasticity of single proteins

Dr. Shivprasad Patil's group reported an improved small amplitude atomic force microscopy technique with fibre-interferometer to measure the cantilever displacements with a precision of 5 pm. The technique allows for the measurement of dissipation in a single protein, which was claimed as impossible to measure experimentally with Atomic Force Microscopy. The measured dissipation is of the order of 10^{-9} kg/s, which compares well with other methods and is well below the upper bound that has been estimated from a non-observation in commercial Atomic Force Microscopy set-up.

(b) Nanoconfined water

The flow of water confined to nanometer-sized pores is central to a wide range of subjects from biology to nanofluidic devices. Despite its importance, a clear picture about nanoscale fluid dynamics is yet to emerge. Dr. Patil's group measured dissipation in less than 25 nm thick water films and it was found to decrease for both wetting and non-wetting confining surfaces. The fitting of Carreau-Yasuda model of shear thinning to the current measurements implies that flow is non-Newtonian and for wetting surfaces the no-slip boundary condition is largely valid. On the contrary, for non-wetting surfaces boundary slippage occurs with slip lengths of the order of 10 nm. The findings suggest that both wettability of the confining surfaces and nonlinear rheological response of water molecules under nano-confinement play a dominant role in transport properties.

5.9 Magnetism and Superconductivity

The structure of one-dimensional antiferromagnet SrCuO_2 contains weakly frustrated zigzag chains. **Dr. Surjeet Singh's** group investigated spin frustration on high-quality Co-doped single crystals using ac/dc susceptibility, muon spectroscopy and neutron scattering. In this work published in *Physical Review Letters*, the group used inelastic neutron scattering to show that in the analogous compound Sr_2CuO_3 comprising linear spin chains, Ni impurities are Kondo screened and consequently the ground state is gapped, as in the case of SrCuO_2 (PhD thesis, Koushik Karmakar). Dilute Co-doping in Sr_2CuO_3 results in a long-range ordered ground state (as opposed to quasi-long-range order in zigzag SrCuO_2). The chains exhibit an Ising-like anisotropy due to the doped Co. Under applied magnetic fields, the resulting phase diagram conforms to the theoretical predictions for Ising-like chains under longitudinal magnetic field (PhD thesis, Koushik Karmakar).

Having studied the finite-size effects in single-crystals of spin $\frac{1}{2}$ chain, the group investigated nanoparticles of CuSe_2O_5 where Cu^{2+} (spin $\frac{1}{2}$) ions form a spin chain. They demonstrated that in nanostructures the finite-size effects get magnified considerably due to large surface to volume ratio; however, the surface contribution cannot correctly be modeled using the finite-size susceptibility expression used for the crystals, where the finite size effect arises due to small concentration of dilute defects (*J. Mater. Chem. C* 4:611).

5.10 Strongly Correlated Electron Systems

Dr. Sunil Nair's group is investigating a number of known and new strongly correlated systems, with emphasis on their structure–property relationships, and potentially useful functionalities which some of them exhibit. In the past year, considerable advancement was made in the investigation of a number of new multiferroic and magneto–dielectric systems which span across various structural and material classes some of which are described here: the group demonstrated the existence of a Griffiths Phase in the geometrically frustrated Swedenborgite $\text{DyBaCo}_4\text{O}_7$, which is the first report of its kind in a purely antiferromagnetic magnetic oxide. In addition, they have also demonstrated that measurements of the thermoremanent magnetisation—a rather underutilized measurement protocol—can be used for the identification of the Griffiths Phase.

The group also reported the first observation of ultrasharp magnetization steps in a new Ludwigite Co_2AlBO_5 , along with signatures of a reentrant supersinglass state in that material. They have now extended this investigation to other unexplored members of the Ludwigite family, and see pronounced differences when the magnetic ion is changed. The magneto–electric and magneto–dielectric properties of a number of tantalate systems which harbor potential multiferroic states have also been investigated in detail.

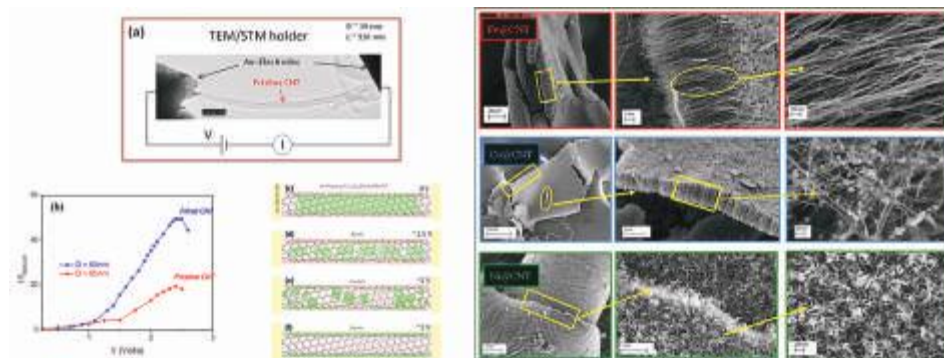
5.11 Magnetization and Transport in Systems with Strong Electronic Correlations

Research in **Dr. Ashna Bajpai's** group pertains to magnetic material for spintronic applications, with focus on multifunctional oxides and their hybrids suitable for practical applications. This includes ferromagnets with high spin polarization, magnetoelectric and piezomagnetic systems. These functional magnets are synthesized in her lab in length scales ranging from bulk, mesoscopic and nano scale. Whenever feasible, bulk single crystals are included in these studies. The systematic downscaling in these systems allows optimizing and enhancing functional properties.

(a) CNT as a nano furnace

This work shows that an insulating magnetic oxide, initially in the form of a polycrystalline nano wire inside a CNT, can be sequentially restructured to form beads, single crystals and sheets with a multiwall CNT, by proper utilization of Joule heating in suspended geometry (Carbon, 2017). Remarkably, this restructuring also leads to a substantial enhancement in the current carrying capacity of the CNT.

Figure 29: (Left) Sequential restructuring of functional magnets inside Carbon nanotubes (CNT): (a) schematic of I–V on a single CNT, along with a real time image of a typical pristine CNT; (b) the enhancement in the current carrying capacity when a nano scale magnet is restructured within the CNT during I–V scans in suspended geometry; c–f the schematic of the restructuring of the encapsulate during a typical I–V scan; (Right) Ferromagnets @CNT: Aligned carpets of Fe and Co @CNT: The metallic encapsulate can be converted to functional magnetic oxides within the CNT by suitable annealing (Dr. Ashna Bajpai's Group)



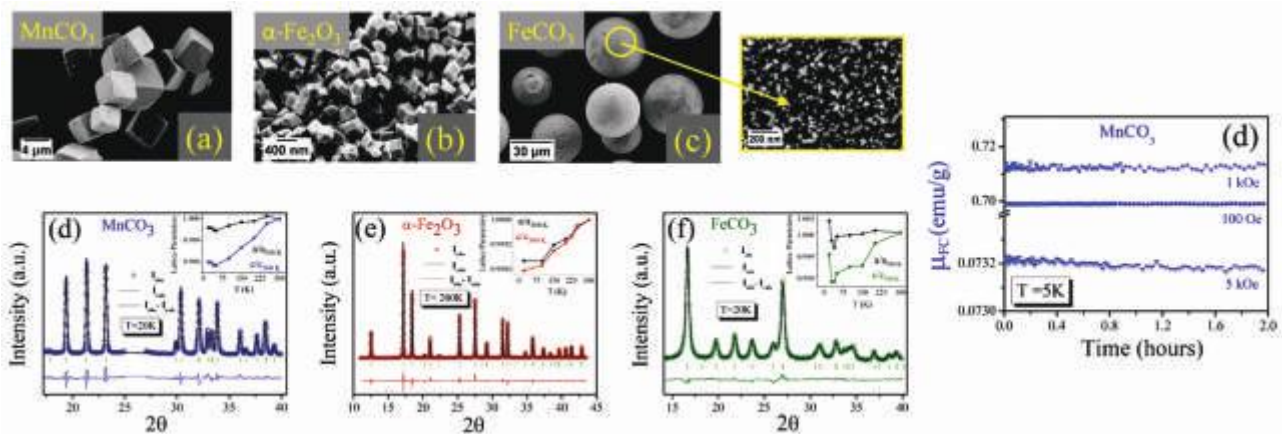
(b) *Magnets@CNT*

A variety of ferromagnetic oxides and their oxides are encapsulated inside CNT by using pyrolysis of metelloscene. While this method is well known for synthesis of Fe filled CNT, the Ni and Co filling (especially their aligned forest with narrow diameter distribution) is extremely hard to obtain. PhD student Ms. A. Kapoor and BS MS student Mr. Nitesh Singh have successfully obtained aligned forest Fe and Co filled tubes. Magnetization data on $\text{Fe}_2\text{O}_3\text{@CNT}$ also shows robust pinning mechanism along with a significant enhancement of the pinned moment in these nano wires of Fe_2O_3 inside CNT.

(c) *Piezomagnets and magnetic relaxation phenomenon*

Dr. Bajpai's group has explored a variety of symmetry allowed piezomagnets and the magnetization relaxation uncovers a very robust pinning mechanism, exclusive to these systems. This feature is seen to exist in nano and meoscopic crystals synthesized by group member Ms. N. Pattanayak, as well as single crystal.

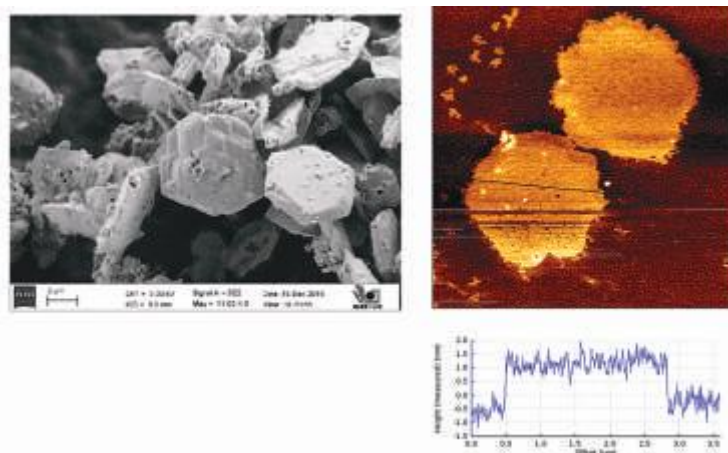
Figure 30: Some symmetry allowed piezomagnets: (a-c) show SEM images of some piezomagnetic oxides. Lower panel shows Rietveld Profile Refinement of synchrotron X-ray data; (d) shows the nature of robust pinning mechanism in a representative sample, MnCO_3 (Dr. Ashna Bajpai's Group)



(d) *Graphene-like layered magnetic oxides*

Functional magnetic oxides are important from both fundamental and technological point of view. The possibility of obtaining graphene like-2-D sheets of magnetic oxide is a pathway to uncover exotic magnetic and electronic states. BS MS student Mr. Suvidya Homkar has successfully synthesized a relatively unexplored layered oxide SrRu_2O_6 and obtained 2-D layers of this material.

Figure 31: (Left) Exfoliation of a layered TMO: Image shows the hexagonal crystals of layered magnetic oxide SrRu_2O_6 ; (Right) AFM image of exfoliated sheets along with the height profile indicating about 3 monolayers of SrRu_2O_6 (Dr. Ashna Bajpai's Group)



5.12 Electronic Transport Properties of Nanostructures and their Applications in Energy Harvesting and Sensing

Through self-assembly, block copolymers spontaneously form ordered phases having well-defined nanoscale periodicity and shapes. However, the inherent energy-minimization aspect of self-assembly yields a very limited set of morphologies, such as lamellae or hexagonally packed cylinders. **Dr. Atikur Rahman's** group has demonstrated a 'responsive layering' approach that leverages the adaptive nature of soft materials, with each layer responding in a controlled fashion to those underneath. This strategy generates an enormous variety of three-dimensional (3D) morphologies that are absent in the native block copolymer phase diagram.

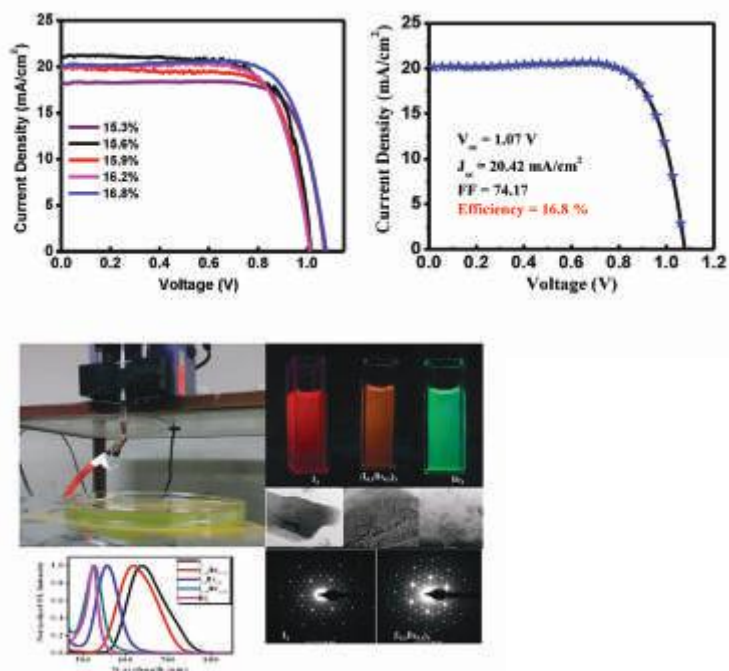
The group has also applied block copolymer based nanopatterning scheme for making antifogging structures. Combining self-assembly of block copolymer thin films and plasma-based etching, they developed a new approach for texturing silicon surfaces over arbitrarily large areas. This process creates densely packed arrays of sub-wavelength size nano-cones. Due to the narrow tip diameter (<10 nm), these structures show robust superhydrophobic and antifogging properties.

5.13 Advanced Functional Materials

(a) Hybrid perovskites

Dr. Satishchandra Ogale's group has fabricated a hybrid perovskite solar cell by optimizing various parameters and an efficiency above 16% was achieved. High quality hybrid perovskite films were fabricated by a new variant of pulsed excimer laser deposition dry process at room-temperature. Hybrid perovskite quantum nanostructures were also synthesized by electrospray antisolvent-solvent extraction and intercalation. The group has also performed a number of experiments to realize synthetic manipulation of hybrid perovskites in low dimensional forms via small molecule incorporation. Other interesting experiments on anion substitution using a molecular ion BF_4^- have also been successfully performed.

Figure 32: (Top) I-V characteristics of hybrid perovskite solar cells; (Bottom) Formation of hybrid perovskite quantum structures by electrospray process (Prof. Ogale's Group)



(b) Dye sensitized solar cells

A 10 X 10 cm² DSSC module was developed which delivered an efficiency of 4.5%. Smaller modules of 7 X 8 cm² were also developed rendering efficiency of about 6%. Phenothiazine-based D–A–p–A dyes were developed for dye sensitized solar cells which delivered an efficiency of 8%.

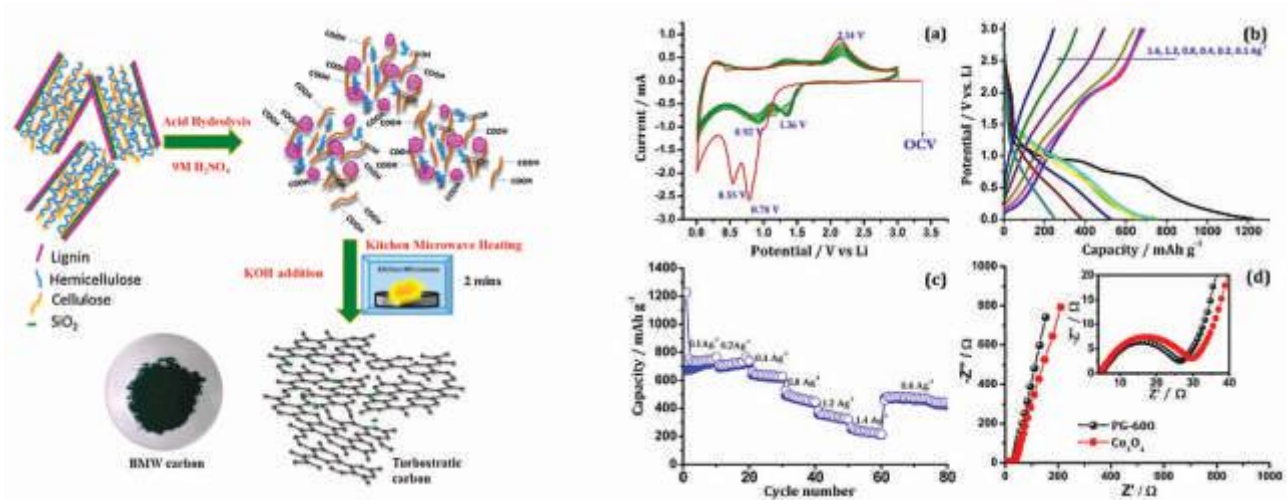


Figure 33: (Left) Microwave oven based process to synthesize mesoporous carbon for charge storage applications; (Right) Various charge storage properties of such carbon (Prof. Ogale's Group)

(c) Charge storage materials and devices

In this ongoing activity a number of different interesting experiments were performed. Metal-decorated and heteroatom-doped porous graphene was synthesized by CO₂ laser direct writing of MOF for flexible all-solid-state micro-supercapacitor which rendered extremely high cycling stability. Activated porous carbon was synthesized for Li ion battery application within minutes by microwave pyrolysis using agro waste. A mixed-valent ternary oxide CuCo₂O₄ was successfully used as anode for Li battery and also for flexible supercapacitor electrode. Magnetically extracted material from red mud was shown to be the most inexpensive earth abundant material for Li ion battery.

(d) Photocatalytic hydrogen generation

A dual interface g-C₃N₄ (2D)/ CdS (1D)/ rGO (2D) nano-composite was shown to yield an excellent and stable hydrogen generation under visible light.



6. Atomic and Molecular Physics, Optics, and Quantum Information

6.1 Plasmonics and Raman Spectroscopy

(a) *Nanophotonics based on plasmon-polaritons and exciton-polaritons*

In the context of exciton-polariton based nanophotonics, **Dr. G.V. Pavan Kumar's** group is working on organic nanowire waveguides and their linear and nonlinear optical emission characteristics. The group has recently shown directional excitonic emission from cavity-coupled organic waveguides (*Appl. Phys. Lett.*(2016) 108:031102) and their plasmon coupled variants (*Adv. Opt. Mat.* (2017) 5:1600873; *Nanoscale* (2016) 8:14803-14808). This work has direct implication in realizing hybrid polaritonic light sources and single-nanowire based optical devices, and can be harnessed to study exciton-plasmon interactions at sub-wavelength scale.

(b) *Design and development of multifunctional high-resolution optical microscopy methods to probe metallic and semiconducting nanostructures*

Optical microscopy with multi-modal spectroscopic capabilities is vital tool to study optical phenomena at mesoscale. It would be useful to integrate Raman microscopy with other spectroscopy methods such as two-photon luminescence spectroscopy, dark-field spectroscopy and Fourier plane imaging. Such multifunctional optical microscope has been custom-built in Dr. Pavan Kumar's laboratory to probe plasmonic and excitonic nanostructures.

6.2 Quantum Simulation of Condensed Matter Models

(a) *Hubbard parameters of Rydberg dressed atoms in optical lattice*

Dr. Rejish Nath's group has obtained ab initio Hubbard parameters for Rydberg-dressed atoms in a one-dimensional (1D) sinusoidal optical lattice on the basis of maximally-localized Wannier states. Finite range, soft-core interatomic interactions become the trait of Rydberg admixed atoms, which can be extended over many neighbouring lattice sites. In contrast to dipolar gases, the key feature of Rydberg-dressed interactions is the possibility of making neighbouring couplings to the same magnitude as that of the onsite ones. The group has provided realistic lattice parameters for the state-of-the-art experimental Rydberg-dressed rubidium setup.

(b) *Dipolar condensates with tilted dipoles in a pancake-shaped confinement*

The stability of a quasi-two-dimensional condensate, with respect to the tilting angle, is found to be different from a two-dimensional layer of dipoles, indicating the relevance of the transverse extension while characterizing two-dimensional dipolar

systems. An anisotropic excitation spectrum exhibiting a highly tunable, rotonlike minimum can arise entirely from the dipole-dipole interactions. The post-roton-instability dynamics, in contrast to phonon instability, in a uniform condensate, is featured by a transient, defect-free stripe pattern, which eventually undergoes local collapses. Hopping between stripes has been observed before it melts into a uniform state in the presence of dissipation. A class of solutions, in which a quasi-two-dimensional condensate is self-trapped in one direction, has been described.

Figure 34: Stripe patterns emerging from (Left) phonon instability and (Right) roton instability (Dr. Rejish Nath's Group)

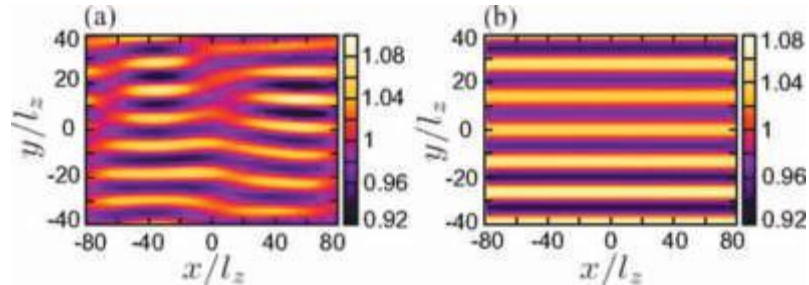
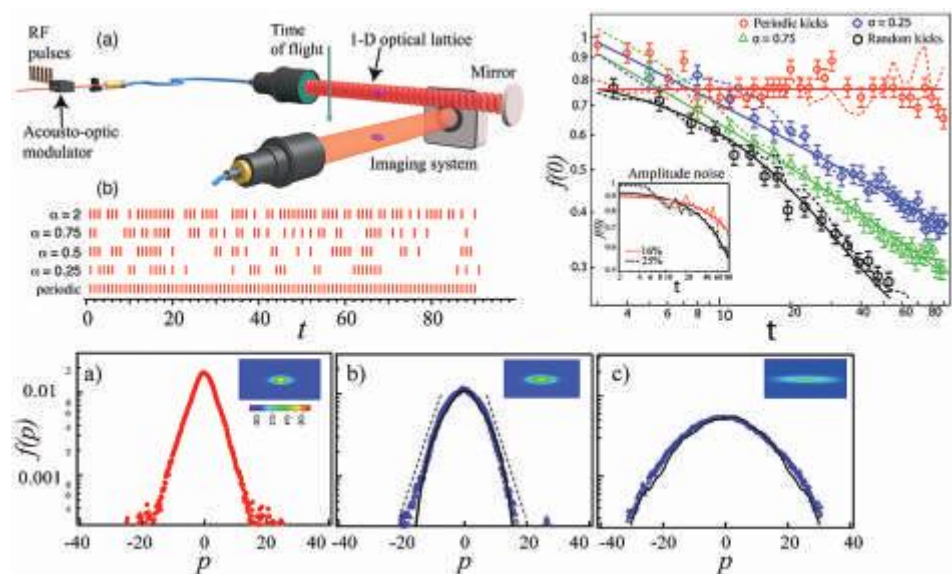


Figure 35: (Top Left) Schematic of the experimental setup: Ultracold atoms are released from a dipole trap and a 1-D optical lattice potential is periodically/aperiodically pulsed to simulate the 'kicking' for a kicked rotor. The final momentum distribution is measured by using the 'Time-of-Flight' technique. The kicking sequence is represented by red bars as a function of time; (Top Right) Measure of the coherence as a function of time. The delocalization of the momentum distribution is measured by monitoring the population of the 'p=0' momentum state of the kicked cloud. For a case of stationary timing noise case, the decoherence falls off exponentially (data shown in black). For the case of 'Levy' noise, the decoherence follows a power law; (Bottom) Momentum distribution of the cloud: C-i shows the localized momentum distribution for a periodically kicked rotor. C-ii and C-iii represents the evolution of the momentum distribution of the 'Levy' kicked rotor at two different times (Dr. Umakant Rapol's Group)

6.3 Engineering Decoherence in Quantum Systems

Quantum systems lose coherence upon interaction with the environment and tend towards classical states. Quantum coherence is known to exponentially decay in time so that macroscopic quantum superpositions are generally unsustainable. In this work from **Dr. Umakant Rapol's** group, slower than exponential decay of coherences is experimentally realized in an atom-optics kicked rotor system subjected to nonstationary Lévy noise in the applied kick sequence. The slower coherence decay manifests in the form of quantum subdiffusion that can be controlled through the Lévy exponent. In this work, decoherence is measured by looking at the loss of localization of the momentum distribution. Experimental results are in good agreement with the analytical estimates and numerical simulations for mean energy growth and momentum profiles of an atom-optics kicked rotor (*Phys. Rev. Lett.* (2017) 174:178101).



6.4 Atomic Collisions, Molecular Fragmentation, and Instrumentation for Space Missions

Dr. Bhas Bapat is developing an instrument to fly on the Aditya-L1 solar observation mission of ISRO in 2019 (being developed at Physical Research Laboratory, Ahmedabad). It consists of an ion spectrometer called SWIS, which is designed to obtain simultaneous species, kinetic energy and direction information of solar wind particles in the energy range 1 to 20keV, and a high energy proton analyser. SWIS is based on a variable voltage electrostatic energy analyser, a permanent magnetic mass analyser and a position sensitive detector. The data from this instrument will help model the behavior of particles emanating from the sun as they disperse into the solar system, and help resolve some riddles about the pattern of ejection of particles from the sun. The instrument functionality has been demonstrated in the laboratory, and a revised version with improved performance is being built.

Dr. Bapat's group also works on understanding reactions between single molecules and single ions (work done using low energy ion beams at the Inter-University Accelerator Centre, Delhi). Some of the experiments are aimed at answering a simple question: How does the orientation of a small linear molecule with respect to the incident particle affect the outcome of the collision? Results indicate that as long as the changes taking place in the molecule are not drastic, that is, when only one or two electrons are removed, it does not matter how the mutual orientation of the molecule and the incident particle is. However, when many electrons are removed, it does make a difference whether the molecule is lined up along the incident particle or is perpendicular to it.

7. Particle Physics and Gravity

7.1 Higher Spin Fields

Dr. Sudarshan Ananth's recent work involved the following two research themes.

(a) *Establishing a formalism to derive quantum field theory lagrangians, describing interacting fields of arbitrary spin*

The group used this symmetry-based approach to derive a number of lagrangians and performed checks of their formalism. Dr. Ananth presented their formalism at the Higher Spin Gauge Theories workshop hosted by IAS at Nanyang Technological University, Singapore [*Higher Spin Gauge Theories* (2016)].

(b) *Exceptional symmetries*

Four decades after its discovery, it is still not known whether N=8 supergravity, in four dimensions, is an ultra-violet finite model of gravity. Dr. Ananth believes that the role

of the exceptional symmetries in the theory will need to be quantified to answer this question. In a recent paper, Dr. Ananth proved that the exceptional symmetries are as important in determining a theory as supersymmetry (*J. High Energy Phys.* 2016:51).

7.2 Entanglement, Conformal Field Theory, Asymptotic Symmetries in Gravity

During this year, **Prof. Sunil Mukhi** carried out research in the areas of Rational Conformal Field Theory (RCFT), Quantum Entanglement, and Asymptotic Symmetries of Gravitational Theories. In the first area, new properties of RCFT were discovered using the differential equations method and a proposal was put forward for a dual pairing of RCFT's based on bilinear equations satisfied by their characters. The entanglement entropy of free conformal field theories at finite temperature in a finite space was re-examined and a conjecture was formulated to relate two different computational techniques for this quantity. Free-field realisations of BMS3 and extended chiral algebras were obtained, and extended supersymmetric analogues of the BMS3 algebra were discovered.

7.3 Black Hole, Holography

Dr. Nabamita Banerjee's group has worked on non-relativistic fluid dynamics and BMS symmetry. In the former area, the group has found a relativistic embedding of the system and studied non-relativistic charged and superfluids in this set up.

Regarding BMS symmetry (which is the symmetry of flat spacetime at its null infinity), her group found a free field realisation of such symmetry algebra and proposed their non-trivial N-extended supersymmetric versions in three dimensions. This study informs about all possible symmetry algebra that a generic three dimensional supergravity theory will have.

7.4 Experimental High Energy Physics

In the year 2016 the CMS experiment at the LHC, CERN, Geneva collected proton proton collision data at a centre-of-mass energy equivalent to a total integrated luminosity of 36.9 fb^{-1} . This is the highest energy ever achieved in any terrestrial experiments and is the largest amount of data collected. These data provide an unprecedented opportunity to search for new elementary particles which may exist in nature and are necessary to explain ever puzzling phenomena like presence of dark matter or matter-antimatter asymmetry observed in universe to the best of our current knowledge.

Dr. Sourabh Dube's group analyzed this data for signs of new physics in the multilepton final state. Their primary focus was a search for heavy fermions (Σ) predicted by models using the type-III seesaw mechanism. The seesaw mechanism considers the neutrinos to be a Majorana particle, and aims to account for the small observed neutrino masses.

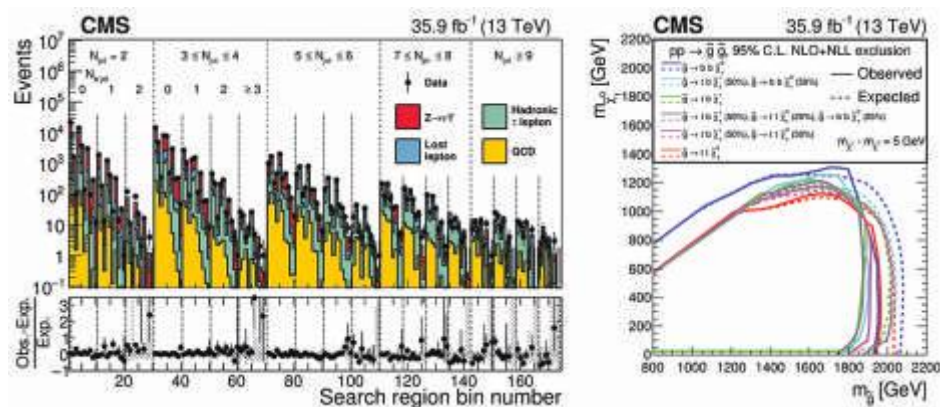
The search was conducted using a multi-prong approach, which probes three- and four-lepton final states consistently. In addition, all possible production and decay processes of the charged and neutral Σ 's were considered. Given the lack of evidence for Σ production in the data, Dr. Dube and his group were able to constrain the

parameter space for the production of these fermions, and ruled out Σ 's with masses less than 847 GeV at 95% confidence level in the flavor-democratic scenario.

Along with his Master's student, Dr. Dube also studied the production of sub-weak scale right-handed neutrinos. They outlined an optimal analysis strategy for the search using 13 TeV collision data, and also studied the expected sensitivity at a future 100 TeV hadron collider.

Dr. Seema Sharma's group is continuing their-efforts to search for Supersymmetry (SUSY). PhD student Ms. Aditee Rane has completed a generic analysis to search for pairs of gluiness (CMS-PAS-SUS-13-003). The key to be able to do these complex physics analysis is to understand the various experimental and detector components.

Figure 36: (Left) The observed numbers of events and standard model background predictions in the 174 search regions of the analysis. The hatching indicates the total uncertainty in the background predictions. The lower panel displays the fractional differences between the data and SM predictions; (Right) The corresponding 95% NLO+NLL exclusion curves for the mixed models of gluino decays to heavy squarks (Dr. Seema Sharma's Group)



PhD student Mr. Vinay Hegde has worked on understanding the forward and central Hadron calorimeter and is now focusing on searching for Supersymmetry with photons, jets and MET. Along with Integrated PhD student Mr. Shubham Pandey, Dr. Sharma is monitoring the energy response in forward detector, validation of weekly release of HCAL reconstruction workflow and improvement of parametrization of hadronic shower energy profile in fast simulation.

Other projects undertaken in Dr. Sharma's laboratory include searching for scalar top quarks predicted by Supersymmetry theory (with Ms. Prachi Atmasiddha). The group investigated two new techniques, tagging initial state radiation and RM variable, to search for low mass stop which is particularly interesting to cure divergent Higgs mass problem in standard model theory. An analysis to search for vector like top quarks, exploiting the boosted heavy objects like tops and W bosons has been designed (with Ms. Irene Dutta). A chi-square minimization technique was developed to reconstruct the masses of these massive new physics particles.

7.5 Probing New Physics

Dr. Arun Thalapillil's interests in the past year has mainly been in developing novel tools and techniques for probing new physics at the Large Hadron Collider (LHC) and other future colliders under consideration.

One powerful and promising method that has come of age in the past few years is the idea of jet-substructure, which attempts to leverage fine structures inside jets, produced from partons that subsequently undergo hadronization and showering. These techniques can help discriminate between signal and background events, as well as aid in searching for unique and difficult signal topologies. In this context, with Dr. Tuhin Roy (TIFR, Mumbai), Dr. Thalapillil has developed a novel set of techniques

that drastically improves event reconstruction and reduces contamination in hadron collision events (*Phys. Rev. D.* 95 (2017) 7:075002).

Dr. Thalapillil was also part of an international, multi-institutional study under the aegis of CERN and Fermilab, contributing to a report on the effectiveness of a future 100 TeV collider, in probing beyond Standard Model phenomena (Chapter 3 of the "Physics at the FCC-hh" Report; CERN-TH-2016-111, FERMILAB-PUB-16-296-T). Along with Drs. Nathaniel Craig (Univ. of California, Santa Barbara), Hou Keong Lu (Princeton) and Matthew McCullough (CERN), the group specifically looked at Higgs portal discovery prospects.

7.6 Ultrarelativistic Heavy-Ion Collisions

Prof. Rajeev Bhalerao's current research interests include the phenomenology of the ultrarelativistic heavy-ion collision experiments presently underway at the Large Hadron Collider, CERN. These collisions result in the formation of an exotic state of matter called quark-gluon plasma. This is the state in which the universe existed about a microsecond after the Big Bang. These experiments allow one to probe the QCD phase diagram and transport properties of the QCD matter, and thus address some fundamental questions regarding QCD. More specifically, this research deals with the collective flow of QCD matter, relativistic imperfect fluid dynamics, multiparticle correlations in the final state of the collision, etc.

In an ongoing work, a theoretical model which handles the initial state of the collision more carefully than has been the case in the literature is being developed. Effects of the initial-state fluctuations and preequilibrium dynamics on collective flow within a coupled transport and relativistic viscous hydrodynamic approach are being studied. The evolution of matter in the initial nonequilibrium phase is being simulated within A Multi Phase Transport (AMPT) model. The subsequent near-equilibrium evolution of the quark-gluon and hadronic matter is being modeled within (2+1)-dimensional relativistic viscous hydrodynamics.



8. Complex Systems

8.1 Non-Linear Dynamics, Multifractal Analysis

(a) *Complexity measures from time series*

Prof. G. Ambika and her group have investigated how gaps in observational can affect the computed values of various measures like correlation dimension of the system. This study introduces a method of checking the reliability of computed values by calculating the distribution of gaps with respect to its size and position and warns

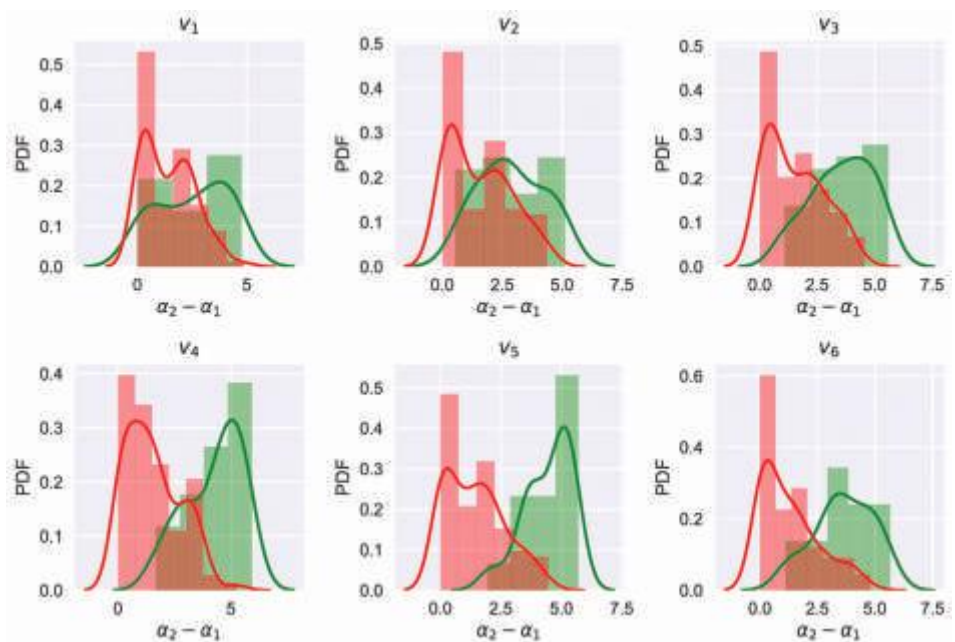
against possible misinterpretations if cubic spline interpolation is used to fill gaps. It is shown with data from light curves of variable stars that a careful choice of binning, in addition to reducing noise, can help in shifting the gap distribution to the reliable range for measures.

In addition, Prof. Ambika, along with collaborators, Drs. Ranjiv Misra, IUCAA and K.P. Harikrishnan, Cochin College, developed a general method for the construction and analysis of recurrence networks from chaotic time series. This provides a uniform framework for the nonsubjective comparison of the statistical measures of the recurrence networks constructed from various chaotic attractors. These measures are shown to be effective in identifying the nature of noise contamination in a real world data. This is applied effectively to two practical applications, detection of transition between two dynamical regimes in a time-delayed system and identification of the dimensionality of the underlying system. In this context her group introduced a new heterogeneity measure that can be used to compare the degree heterogeneity of recurrence networks constructed from the time series of several low dimensional chaotic attractors and provides a single index to compare the structural complexity of chaotic attractors.

(b) *Multifractal measures for characterizing ECG data*

A healthy heart is a complex system with fractal nature but its complexity related measures have not yet reached the clinics. For this, we have to develop a unique way of characterizing its complexity that will help to distinguish healthy and pathological cases. Under a DST-SERB project Prof. Ambika's group has derived measures from the multi fractal spectrum of ECG signals that can effectively be used as a promising tool in the diagnosis of abnormalities of the heart. In a study using ECG data of 97 unhealthy and 32 healthy subjects obtained from PhysioBank database, they could show that variations in the values of two parameters of multifractal spectrum help in grouping the healthy and unhealthy. This method could potentially lead to a quantitative way to analyze the ECG, both for diagnostics, therapy and continued monitoring of patients.

Figure 37: Distributions of the difference $\alpha_2 - \alpha_1$ for healthy (green) and unhealthy (red) groups for six different channels of ECG. This difference is a measure of the complexity of dynamics underlying the ECG; healthy hearts seem to be more complex than unhealthy ones. (Prof. G. Ambika's Group)



(c) *Coupled systems with differing time scales*

Study of emergent states of two interacting nonlinear systems with differing dynamical time scales by the group has led to identification of interesting new phenomena like a synchronized frequency suppressed state. As the mismatch in time scale increases, systems go to a state of no oscillations or amplitude death. Systems with differing time scales occur in many contexts, like coupled ocean–atmosphere system where the interaction between a fast oscillating atmosphere and slowly changing ocean could lead to multi–stable periodic states and steady states of convection coexisting in the system, with a complex basin structure.

8.2 Chaos and Extreme Events

Chaotic dynamics is the apparently irregular dynamics exhibited by a variety of physical systems. From weather to stock market evolution, chaos theory has found wide applications. Around the early 20th century, quantum physics was identified as the fundamental law of the universe. Then, naturally a question arises as to how chaos shows up in quantum dynamics and affects it. Research in **Dr. M.S. Santhanam's** group relates to answering this question for various physical systems. For instance, for particles trapped in quantum wells to particles with spin degrees of freedom, in all these cases, their results show that quantum dynamics is affected in myriad ways by the nature of classical dynamics, i.e., whether it is regular or chaotic. These questions are also important for the quantum computers to be built in the future. Depending on the circumstance, one might need to either take advantage of classical chaos or suppress it completely. In either case, an understanding of the quantum manifestations of chaotic systems would be important.



9. Astrophysics

9.1 Plasma Astrophysics

Dr. Prasad Subramanian's group is working on problems ranging from the solar progenitors of near–Earth space weather disturbances to the scattering of radio waves by turbulence in the solar wind. The group participated in analyzing a burst of muons at the GRAPES–3 telescope in Ooty on June 22, 2015, which signaled a short–lived chink in the Earth's magnetic shield arising from the impact of an Earth–directed solar coronal mass ejection. This work, which received wide publicity, heralds new possibilities for anticipating and mitigating the effects of space weather disturbances. The group has also obtained new results pertaining to the characteristics of very small electron acceleration episodes in the solar corona – this has the potential to provide one of the solutions to the long–standing problem of coronal heating.



10. Earth and Climate Science

10.1 Isotope Hydrology of the Ganga River System

Coastal lagoons receive huge amount of nutrient influx from the surface and groundwater runoffs, and exchange matter and energy with the open ocean. Water balance estimates of these highly-productive lagoons can help better understand the carbon cycling. The research group of **Dr. Gyana Ranjan Tripathy** focuses to quantitatively constrain the hydrological processes of the Chilika Lagoon, Asia's largest brackish water lagoon on the east coast of India. The pear-shaped lagoon receives seawater mainly at its central region, whereas most of freshwater influx is from northern part.

The group has carried out detailed and systematic investigation of stable isotopes of oxygen and hydrogen of surface and benthic waters throughout the lagoon and their possible source waters (rain, river and ground water). Spatial distribution of $\delta^{18}\text{O}$ and δD ratios indicated efficient mixing of seawater and fresh water in the central and northern part of the lagoon, which in turn drives the lagoon productivity. The $\delta^{18}\text{O}$ ratios (0.64-3.27‰) of the surface water were significantly enriched than the source waters, attributable to intense evaporative loss. Relatively lower slope of the δD - $\delta^{18}\text{O}$ regression line compared to local meteoric water line (7.4) also confirmed significant evaporation from the lagoon. Calculations based on Rayleigh fractionation involving $\delta^{18}\text{O}$ ratios show that about 15% of the total water volume evaporates during the non-monsoon season. Research is underway by the group to infer biogeochemical cycling of trace elements within this lagoon.

10.2 Himalayan Glaciers

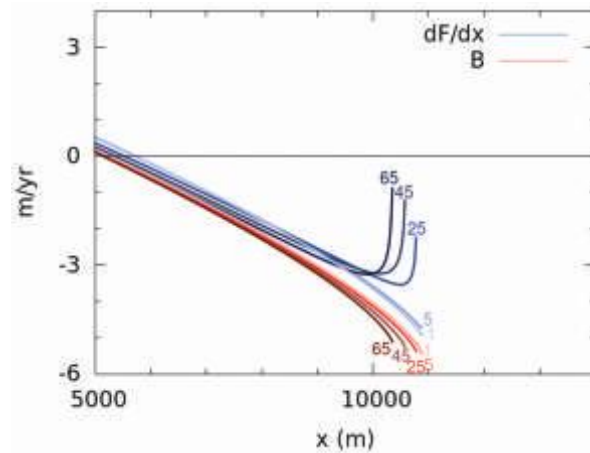
To predict the future trajectories of Himalayan glaciers and the hydrology of high-Himalayan catchments, understanding the behavior of debris-covered Himalayan glaciers is crucial. **Dr. Argha Banerjee's** research during the year has focused on this issue using both theoretical tools and field studies.

The group has undertaken two field trips to Hamtah glacier in the western Himalaya and Satopanth Glacier in the central Himalaya, collecting important data on glacier flow, mass balance, debris thickness distribution and thermal properties of the supraglacial debris layer. Model studies using these data is underway.

An intriguing recent observation from the glacierised Himalaya, one that lacked any clear explanation, is a similar thinning of debris-covered and debris-free glaciers over the past decades. Since the debris layer inhibits melting of ice beneath it, the debris-covered glaciers were expected to lose mass at a slower pace. Using some simple theoretical considerations and results from a one-dimensional glacier-model

simulations, we have provided an answer to this puzzle. The thinning rate is shown to be controlled by a fast-changing climate, forcing and a slow response of the viscous ice flow. As a result, a debris-covered glacier can have thinning rate that is larger than, similar to, or smaller than that of a corresponding debris-free glacier depending on the stage of response.

Figure 38: The evolution of thinning rate on a glacier is determined by the difference between 1) the mass balance profile that is controlled by climate (red curves), and 2) the emergence / submergence of ice due to a changing flow (Blue curves). The figure shows modeled longitudinal profile of these two quantities at 1, 5, 25, 45, and 65 years after an initial instantaneous warming of climate. The evolving ice-flux profile plays an important role in determining the long term thinning rate. (Dr. Argha Banerjee's Group)

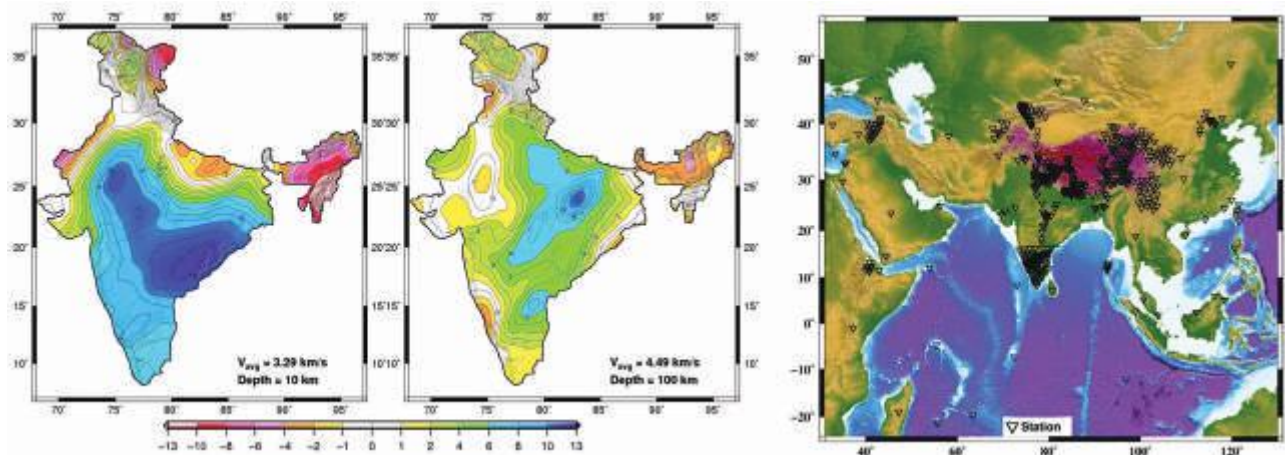


10.3 Geophysical Data Modeling in Deep Earth Exploration

Prof. Shyam Rai initiated a new research program to image at various scales the Earth structure beneath South Asia, and the adjoining regions to understand its rheological property, map Zones of weakness in deep Earth and the state of stress. Key parameter used here is the elastic property of the wave. Seismic Imaging—similar to the approach of medical tomography—is achieved combining noise interferometry and earthquake tomography approaches.

Figure 39: (Left) Location of over 600 earthquake recording stations used for analysis. Time series comprise of over 30TB of data; (Right) Shear wave velocity variation (%) at depths of 10 and 100 km beneath different segments of India. This reflects variation in material property and the temperature distribution (Prof. Shyam Rai's Group)

The group used a recently developed imaging approach using Ambient Earth noise—the diffusive wave generated by pressure fluctuation in the atmosphere, scattering of water waves in ocean or any other source. These diffusive waves are superposition of waves propagating in all directions, chaotic and random in nature and hence referred as noise. Whether noise is a nuisance or signal depends on the way it is processed. Being diffusive these waves carry information about the medium through which they travel. By cross-correlating the noise at two locations, we retrieve the wave travelling between them and the exact details about the media property. This helps retrieving surface wave data which is used for tomographic reconstruction. The group applied this method to study the elastic wave velocity and other structural property of the



Earth beneath the India–Eurasian region and adjoining ocean from near surface to a depth of over 150 km using a large number of available seismological data set. A typical shear velocity image beneath India is shown in the accompanying Figure.

10.4 Climate Dynamics, Tropical Variability, Monsoons, Numerical Weather Prediction, Predictability

Dr. Neena Joseph Mani pursued three research problems working with BS MS students.

- (a) Atmospheric waves are an important class of phenomena, understanding of which is very essential for better understanding of many weather and climate processes. They transfer energy and momentum from one region to another and exhibit specific structure and propagation features. The sensitivity of the equatorial atmospheric waves to warm and relatively cool background state was explored for El Nino and La Nina background conditions.
- (b) While the El Nino is often associated with a weaker than normal Indian summer monsoon (ISM), the way the teleconnection mechanisms between the Pacific region and the ISM region functions, depends on how well the sea surface temperature variations translate to atmospheric heating signals (convection). An alternative index using Outgoing Long wave radiation was used to identify such El Nino cases and the teleconnection patterns for such events are currently being explored.
- (c) The moisture transport associated with the low level monsoon winds are critical for the amount of precipitation happening over ISM domain. The vertically integrated moisture transport paths were explored during active and break episodes of ISM.



11. Ecology, Evolution, and Biodiversity

11.1 Plant Physiological Ecology

Dr. Deepak Barua's group examined variation in thermotolerance in tropical trees, and their results indicate that dry forest tropical trees may be highly vulnerable and will be differentially affected by global warming. Importantly, the variation in thermotolerance was not random, but was higher for evergreen than deciduous species, and positively related to the leaf functional traits: leaf mass per area (LMA) and leaf dry matter content. This implies that deciduous, and fast growing species with low LMA are more sensitive to high temperature extremes, and more likely to be more negatively affected by future global warming. This differential vulnerability may

lead to directional changes in species composition favoring slower growing evergreen species and such changes in species composition would alter vegetation–atmosphere feedbacks and could further exacerbate future global warming.

Other work in the lab has examined the responses of tropical trees to experimental drought stress, tested relationships between drought tolerance and leaf and stem anatomical, morphological and physiological traits. Work completed by PhD students in the group include ongoing studies of plant–pollinator interactions in the dry tropical forests in this region, and the reproduction ecology of *Jasminum* species in the Northern Western Ghats.

11.2 Evolutionary Biology in Behavior, Health, and Metabolism

- a) *A community operated damage assessment and compensation protocol for farmers with risk of crop damage by wild herbivores*

Based on a research paper published by **Prof. Milind Watve's** group in January 2016, a pilot implementation project has been under consideration by Vidarbha Development Board (VDB) and Forest Department of Maharashtra State. Approval from VDB has been received and a decision from the forest department is awaited. If successfully implemented, it will be the first example in India of a system designed on the principles of behavioral economics in actual operation.

- b) *Behavioral Intervention for Lifestyle Disorders (BILD) clinic*

A unit called Behavioral Intervention for Lifestyle Disorders (BILD) has been established at Deenanath Mangeshkar Hospital, a leading tertiary care hospital of Pune city. The clinic will run based on the principles developed in Dr. Watve's lab and Dr. Pramod Patil, a former post-doc from the lab will be the chief physician of this clinic. IISER Pune has signed a MoU with the hospital for ongoing research collaboration with the hospital. BILD clinic has been opened for admission and a behavioral exercise gym is fully operational.

Figure 40: Behavioral exercise gym at Deenanath Mangeshkar Hospital (Prof. Watve's Group)



11.3 Molecular Phylogeny and Phylogeography of Freshwater Fishes and Frogs

Freshwater ecosystems and organisms dependent on freshwaters are threatened due to increasing anthropogenic stressors. However, our understanding of the

freshwater dependent taxa is limited even at the basic level such as their diversity, which is hindering the conservation efforts directed towards these organisms.

Dr. Neelesh Dahanukar works on various aspects of freshwater taxa including understanding their diversity, biogeographic distribution, molecular phylogeny, ecology and conservation. In the year 2016, based on molecular phylogeny and integrated taxonomic approaches four new species of fishes were described, viz. *Amblyceps accari*, *Pethia sanjaymoluri*, *Hypselobarbus bicolor* and *Balitora chipkali*. A new genus, *Sallywalkerana*, and four new species, namely *Indirana tysoni*, *I. yadera*, *I. duboisi* and *I. sarojamma*, of frogs from the Western Ghats of India were also described. Out of these, description of *Amblyceps accari* is biogeographically significant as it is the first species in the genus described from Peninsular India while all other species are distributed in northeast India and southeast Asia. Based on these studies and current trends in conservation of freshwater taxa, three issues were raised to initiate debates. They are: (1) does the green certification of fishes for aquarium trade ensure conservation of unmanaged pet trade export of threatened fishes, (2) does religion and culture help in freshwater fish conservation in sacred areas; and (3) do terrestrial areas ensure conservation of freshwater dependent taxa

11.4 Antimicrobial Resistance

Dr. Nishad Matange is investigating how the fitness costs of antimicrobial resistant bacteria are influenced by magnitude of drug pressure that the bacteria experience. In order to address this question, laboratory selection of drug resistant bacteria was done using rifampicin as a representative antimicrobial agent. Results suggest that most resistant strains isolated at low drug pressure seem to have compensated for cost, while at higher drug pressures this does not appear to be the case. Fitness costs of resistance are thought to limit the spread of drug resistance. The present results suggest however, that drug resistant strains can easily compensate for the costs of resistance when they evolve under low drug pressure.

Additionally, the spectrum of mutations that drug resistant bacteria accumulate when subjected to discontinuous rifampicin exposure is different compared to steady rifampicin exposure. These differences cannot however be explained only on the basis of fitness costs associated with these mutations. Research is directed towards understanding what other phenotypic/genotypic changes accompany the evolution of resistance under various selection conditions. This will help in understanding the various forces that shape the evolution of antimicrobial resistance in bacteria.

12. Cell and Developmental Biology

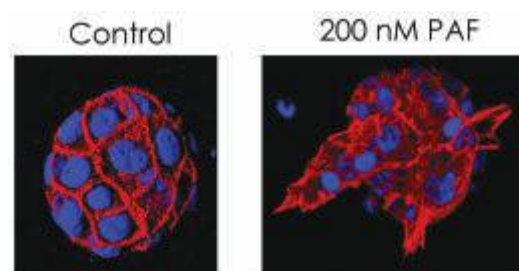
12.1 DNA Damage and Maintenance of Genome Integrity

Many harmful chemicals in the environment challenge human DNA. Cells have evolved exquisite surveillance mechanisms known as DNA damage response (DDR), which maintain genome integrity following DNA damage. The aberrant regulation of DDR leads to genome instability and various diseases including cancer. **Dr. Mayurika Lahiri's** group has been trying to dissect out the process by which DNA damage or lipid mediators in the micro-environment can lead to cellular transformation of breast epithelial cells using three-dimensional breast acini as a model system.

Exposure of mammary epithelial cells to a methylating agent that was shown to cause DNA damage was sufficient to cause disruption of apico-basal polarity as well as induce epithelial-mesenchymal transition (EMT)-like phenotype. Additionally, it was demonstrated that the dispersed Golgi morphology and impaired trafficking in methylation damaged breast acini was through activation of DNA-PK. Interestingly, inhibiting DNA-PK using a small molecule inhibitor was able to partially rescue the dispersed Golgi phenotype.

Microenvironment and tumor infiltrate have been shown to have a profound effect on different stages of cancer development ranging from cancer cell initiation, promotion and progression. The role of phospholipid mediators such as platelet activating factor (PAF) in breast cancer has not been studied extensively, particularly with respect to early events in breast cancer initiation. Dr. Lahiri's group is investigating the role of PAF in breast cancer initiation, progression and promotion. PAF treatment led to apico-basal polarity disruption and diffused cell-cell junction resembling EMT.

Figure 41: PAF induced formation of abnormal 3-dimensional acinar structures indicative of invasive/motile phenotype. DAPI stains the nucleus while Phalloidin stains the actin. (Dr. Mayurika Lahiri's Group)

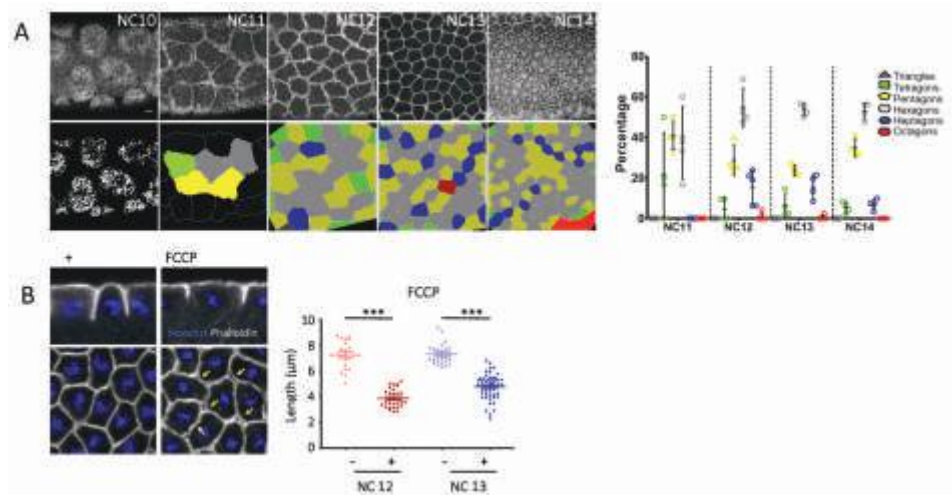


12.2 Cell Biology of Development and Differentiation

The first morphologically distinct cell type to form during metazoan embryo development is an epithelial cell. Epithelial cells are organized as polygons and typically divide in the vertical axis to form more cells. Epithelial cells across different organisms and tissue types show hexagon dominated polygonal organization. **Dr. Richa Rikhy's** group has been studying the mechanisms, which initiate polygonal

epithelial like cell formation in *Drosophila* blastoderm embryos. Experiments from the group have shown that the plasma membrane is organized in a polygonal epithelial like manner in nuclear cycle 11 and achieves hexagon dominance in nuclear cycle 12. This onset of polygonality appears to depend upon lateral membrane length. When the length crosses a threshold value of approximately 5 microns the membrane organization becomes polygonal. This polygonality depends upon the function of DE-cadherin and its interaction with actin regulatory proteins. Organelles such as mitochondria are also organized in a polarized manner in the blastoderm embryo. Mitochondria are enriched in the apico-basal axis, distributed in a lineage specific manner from mother to daughter cells and their function is required to lateral membrane extension in the blastoderm embryo.

Figure 42: (a) Organization of syncytial cells in nuclear cycle (NC) 10–14 in the *Drosophila* blastoderm embryo. Hexagons predominate from NC12 onwards. (b) The mitochondrial electron transport chain uncoupler FCCP, leads to shorter metaphase furrows and loose membranes (arrows). The length of the furrow reduces in NC12 and 13 on FCCP treatment. (Dr. Richa Rikhy's Group)



12.3 Functional Analysis of *twist* genes during Zebrafish Scale Development

In vertebrates, exoskeleton consisting of skin appendage began to evolve in fishes in the form of scales. While cartilaginous fishes like sharks have placoid scales, bony fishes such as zebrafish possess elasmoid scales. In birds integuments are covered by feathers whereas in mammals by hair. The development of all the skin appendages begins with placode formation followed by formation of the appendage; both the steps require extensive cross-talk between the two tissues of the skin, viz. epidermis and dermis. In mouse and chick, transcription factors such as *Twist2/dermo1* and *NfκB* and signaling pathways like *Wnt*, *Fgfr*, *Edar*, *BMP* and *Shh* are known to play essential role in appendage formation. However, it is not clear whether the functions of these pathways and transcription factors in skin appendage formation evolved in fishes wherein the skin appendages are seen for the first time during evolution. **Dr. Tressa Jacob** is addressing this broader question using zebrafish as a model organism and has found that the *twist* genes and the *Wnt* signalling are involved in scale formation (unpublished data). Mutants are being generated for the relevant genes or using chemical inhibitors against signaling pathways to unravel their function during scale development. Collectively, these analyses will allow elucidate which molecular components and signaling pathways are more ancestral when it comes to skin appendage formation.

12.4 Screen for Cancer Biomarkers

(a) *Evolution of insect hindwing morphology: A comparative genomic analysis of targets of Hox protein Ultrabithorax*

The major focus of this ongoing study is to understand molecular changes that are associated with the evolution of halteres in Dipterans such as the fruitfly *Drosophila melanogaster*. In the current year, **Prof. L.S. Shashidhara's** group has made several new observations by comparing the enhancer sequences of targets of Ubx across different species and identified potential cofactors that may shape evolution of Hox functions, even when the Hox protein itself has not changed in its sequence or DNA-binding dynamics.

(b) *Genetics of growth control in development and its implications to understand cancer*

Taking full advantages of the group's work of the past two decades on the mechanism of organ size control by EGFR and Hippo–Yki pathways in *Drosophila*, an ambitious genome-wide search for potential tumor suppressors in the context of Yki and EGFR pathways has been launched (in collaboration with Profs. Stephen Cohen at University of Copenhagen and T.S. Sridhar at St. John's Medical Hospital, Bengaluru). The group is studying the role of human orthologues of putative tumor suppressors identified in *Drosophila*.

To identify novel tumor suppressors that function in context of an oncogene, Yki and EGFR overexpression backgrounds expressed specifically in wing imaginal disc tissue (*ap-GAL4*) in temporally regulated manner (using *Gal80^{ts}*) were used. Individual genes were knocked down in these backgrounds separately, using RNAi lines for 9400 genes. Characteristic giant larval phenotype and GFP positive overgrowth of wing disc tissue was used to score for positive candidates. Crosses that yielded positive phenotypes, were repeated in respective backgrounds to confirm consistency of tumorigenic phenotype.

Screening was conducted for rescue of tumor phenotype of combination of EGFR overexpression and *SOCS36E* RNAi (referred to as SOCS, reported by Herranz et al, 2012) and several positive candidates for each of the backgrounds were found.

Summary of the screen (as on March 31, 2017)

	EGFR	Yki	SOCS
Total KK lines set up	9117	9083	9433
Confirmed positives	63	861	34

By a combination of experiments and intensive bioinformatics analyses of TCGA database, several potential tumor suppressors have been identified for detailed characterization. They are MePCE, NELF-A, NELF-B, PWP1 and PTPN11. Fly homologues of all these show enhanced tumors in the background where Yki/YAP are over-expressed. Amongst these, the group has confirmed that fly tumor models show all the hallmarks of cancer MePCE, NELF-A, NELF-B and PWP1. Similar studies are being conducted for PTPN11.

Work from the group has further shown that in the fly model, MePCE, NELF-A and NELF-B interact with CDK9 to enhance Yki/YAP mediated over-growth. TCGA database analysis suggests that loss of expression of these genes is associated with one or more of the following phenotypic classes: early age cancer, large tumor size, lymph node+ and increased aggressiveness of cancer.

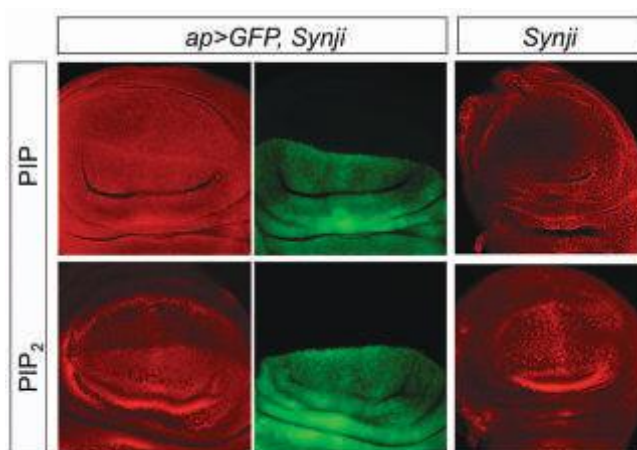
12.5 A Novel Regulator of Hedgehog Signaling Pathway

Development of an organism is complex and involves use of different cell signaling pathways like the Hedgehog signaling pathway. In humans, mutations in Hedgehog and related genes lead to congenital defects and abnormal signaling is associated with several types of cancer. Understanding signaling in normal tissues helps us in elucidating the defects caused in diseased conditions and also guides us for therapeutic innovations.

Regulation of Hh signal transduction at the level of the signal transducer Smoothed (Smo) is brought about by the lipid, phosphatidylinositol 4-phosphate (PI(4)P). Activation of Smo by high PI(4)P levels causes expression of Hh targets. Since Hh functions as a concentration-dependent morphogen, a precise regulation of PI(4)P levels is necessary.

Using *Drosophila* wing-discs, **Dr. Shital Ahaley** has shown that Synaptojanin (Synj), an inositol-polyphosphate 5-phosphatase, regulates Hh pathway by modulating PI(4)P levels. Synj downregulation augmented Hh signalling which was associated with elevated PI(4)P levels and Smo activation. Synj did not control the absolute pathway activity but rather fine-tuned the response since its downregulation affected only the low-threshold target of the pathway. This study demonstrates an additional level of pathway regulation that controls Smo activation via modulating PI(4)P levels.

Figure 43: Synj knockdown leads to increased PI(4)P levels. Synj was knocked down in wing-discs using apGal4, marked by GFP expression, and PI(4)P and PI(4,5)P₂ levels were assayed by immunohistochemistry. Synj wing-discs were used as a control. Both PI(4)P and PI(4,5)P₂ levels increased upon Synj knockdown (Dr. Shital Ahaley)



13. Biochemistry and Biophysics

13.1 Cell Motility and Bacterial Cytoskeleton

Dr. Gayathri Pananghat's research focus is to understand the molecular mechanism of motility based on the bacterial cytoskeleton using *Spiroplasma* and *Myxococcus xanthus* as model systems. Her group utilizes the techniques of structural biology

(mainly X-ray crystallography and electron microscopy) and single-molecule fluorescence microscopy to study the structure and dynamics of assembly of the macromolecular complexes involved in motility, thus capturing the assemblies at both spatial and temporal resolutions.

The group is working towards understanding the interaction between MglA and MglB proteins of *Myxococcus xanthus*, which are involved in spatial positioning of the motility complexes, and in structure determination of cytoskeletal proteins, Fib and MreBs of *Spiroplasma*. In vitro characterization of other proteins of *Myxococcus* motility such as MreB, FrzCd and SofG are also in progress.

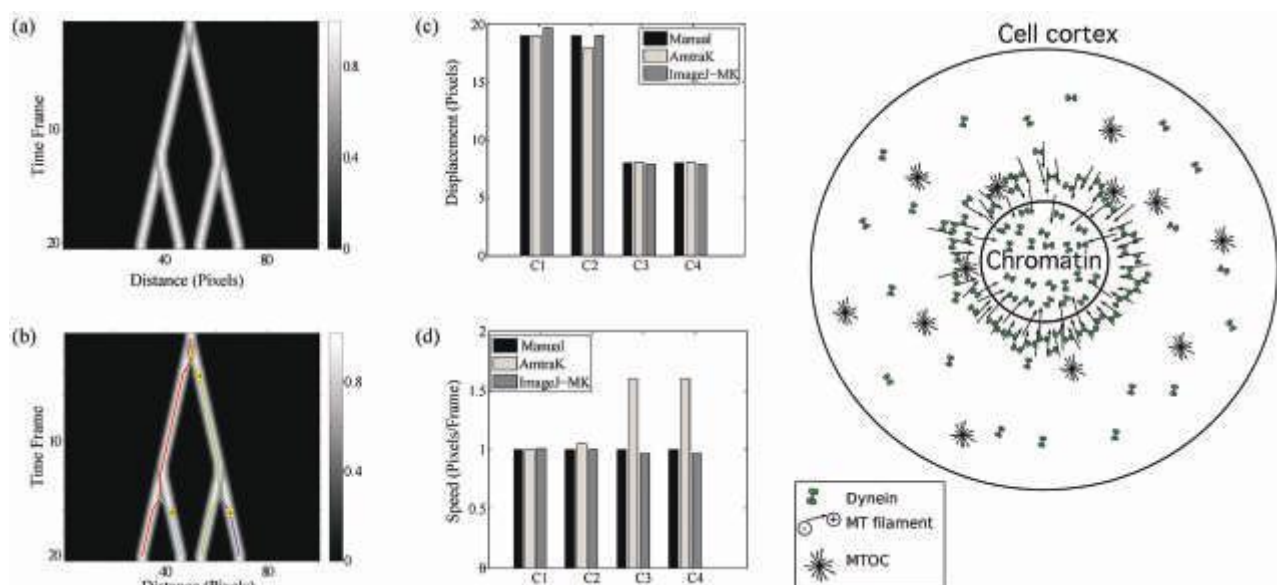
The long-term goal of this work is to obtain mechanistic insights on how structure and dynamics of macromolecular complexes effect biological function, through characterization of cell motility, and novel roles of the bacterial cytoskeleton and its interactors.

Figure 44: (Left) (a) The simulated separation of DNA representative of *E. coli* is tracked and (b) the tracks overlaid on the image. (c,d) Quantification using manual, ImageJ kymography and the program from Dr. Athale's group, AMTraK, are compared in terms of (c) displacement and (d) speed estimates; (Right) The schematic representation of the theoretical model developed in Khetan and Athale (2016) of the mechanisms by which microtubule (MT) asters converge to the centre of the cell by the interplay of pushing forces at the cortex, dynein based clustering and pulling forces in the center from the cell nucleus. (Dr. Chaitanya Athale's Group)

13.2 Self Organization and Cell Morphogenesis

Dr. Chaitanya Athale's group focuses on self-organized mechanisms of spatial patterns at a sub-cellular and cellular level. In the past year the group made progress on the following aspects: (a) successfully modeled the centering of multiple centrosomal asters in mouse meiosis I spindle assembly (Khetan and Athale, 2016), (b) evaluated the role of single-cell replication on whole cell morphology of *E. coli* (Gangan and Athale, 2017), (c) developed an automated tool for the tracking of kymography data (Chaphalkar, 2016) and (d) Developed a gliding assay to assess the role of collective behavior of molecular motors such as kinesin (Chaphalkar *et al.* 2016) and dynein (Jain *et al.* in preparation). The work in the latter project has involved optimization of microtubule isolation from goat brain extracts and purification of protein from recombinant sources in yeast.

In collaboration with the group of Dr. Solon in Barcelona, Dr. Athale's group has begun to theoretically model the role of whole cell mechanics on cell shape in tissues in *Drosophila* embryos. Additionally, they have started work on the role of molecular motors and microtubule lengths on spindle sizes in evolutionarily related worms of the family of *C. elegans* with a lab at ENS Lyon. A collaboration with the lab of



Prof. Padinhateeri at IIT Bombay involving experimental testing of microtubule dynamics at the single filament level to test aspects of non-linear dynamics is appearing to show some promising results.

13.3 Reconstitution of Cargo-Sorting during Coated-Vesicular Transport

Clathrin-mediated endocytosis (CME) manages the internalization of the bulk of membrane proteins from the plasma membrane. CME is vital to synaptic vesicle generation, pathogen recognition, and nutrient uptake and is initiated by specific adaptors recognizing membrane proteins and recruiting clathrin to the membrane. Clathrin self-assembly causes clustering of these adaptors and the budding-out of the membrane.

By comparing the rates of clathrin assembly on the membrane in real-time, **Dr. Thomas Pucadyil's** group found that adaptor clustering is determined not by the amount of clathrin recruited or the degree of clathrin clustered but instead by the rate of clathrin assembly (Pucadyil and Holkar, 2016; Holkar et al., 2015). Their results emphasize the need to analyze kinetics of protein interactions to better understand mechanisms that regulate CME.

The large GTPase dynamin catalyzes membrane fission to sever the necks of the budded membrane as clathrin-coated vesicles. Using a facile assay system of supported membrane tubes (SMrT) engineered to mimic the dimensions of necks of clathrin-coated pits (Dar et al., 2017), Dr. Pucadyil's group found that GTP hydrolysis by an intact helical scaffold of dynamin causes progressive constriction of the underlying membrane tube. On reaching a critical dimension of 7.3 nm in radius, the tube undergoes scission (Dar et al., 2015). Furthermore, dynamin interacts with the membrane via a pleckstrin-homology domain (PHD). Their analysis indicates that the PHD acts as a catalyst in dynamin-induced membrane fission and rationalizes its adoption to meet the physiologic requirement of a fast-acting membrane fission apparatus (Dar et al., 2017). This work provides resolution to a long-standing debate on the exact role of GTP hydrolysis in dynamin-catalyzed membrane fission.

13.4 Origins and Early Evolution of Life

How life would have chemically originated is one of the greatest scientific mysteries. In particular, the processes by which polymers capable of catalysis and replication emerged, propagated and evolved on the early Earth are still elusive. These specific aspects have been the primary focus of research that is being undertaken in **Dr. Sudha Rajamani's** group. This work has implications for discerning how chemistry transitioned to biology on the early Earth.

The group is working on delineating the possible sequence of events that might have led to the origin of a putative RNA World; a time when RNA molecules facilitated information processing and catalytic activity. Specifically, plausible prebiotic precursor molecules that are thought to have resulted in the formation of primitive informational molecules of a pre-RNA World, prior to the emergence of an RNA World are being characterized. The group has demonstrated (*Phys. Chem. Chem. Phys.* (2016) 18) the formation of a prebiotically relevant nucleotide that uses an informational moiety that is different from extant nitrogenous bases. The landscape

of plausible pre-RNA World heterocycles to characterize those molecules that might have possibly resulted in primitive informational molecules is currently being explored. Furthermore, the group is synthesizing these molecules to evaluate if they could facilitate information transfer with molecules of a putative RNA World. In another major project, the group is discerning the role of prebiotically relevant co-solutes on relevant nonenzymatic reactions. Previously, they showed that the presence of co-solutes, such as amphiphiles and PEG (a molecular proxy for prebiotic oligomers), in the reaction mixture, lead to an increase in the mutation rates of nonenzymatic replication of RNA. During last year, the group has been working on dissecting the biochemical underpinnings of this process as it has important consequences for understanding how fidelity of replication processes might have affected the emergence of functional RNA molecules on the early Earth.

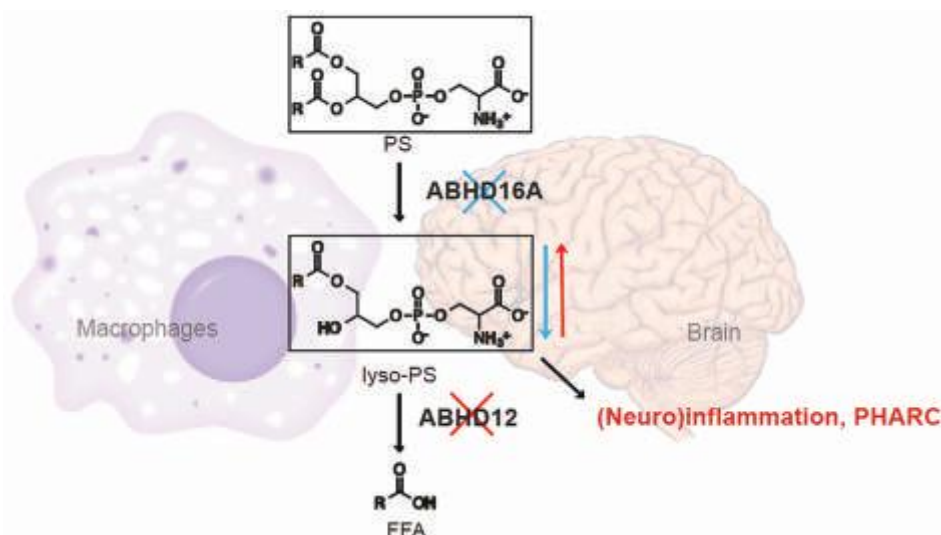
13.5 Structure and Function of Molecular Machines

Dr. Saikrishnan Kayarat's research focuses on understanding the mechanism of NTP-dependent restriction-modification enzymes that are the most bacterial defense against foreign DNA. These DNA could be bacteriophage DNA, genes encoding antibiotic resistance or pathogenicity islands. Dr. Kayarat's group determined the first crystal structure of these enzymes. The structural and biochemical work carried out in the group has allowed dissecting out the mechanism of how these enzymes protect the host by destroying the foreign DNA while at the same time protecting the host DNA.

13.6 Biological Mechanisms of Lipid Signaling Pathways

PHARC (polyneuropathy, hearing loss, ataxia, retinitis pigmentosa, cataract) is a rare genetic neurological disorder in humans caused by deleterious mutations to the *Abhd12* gene. The *Abhd12* gene codes for the serine hydrolase enzyme ABHD12, which serves as the principal lysophosphatidylserine (lyso-PS) lipase in the mammalian brain, thereby terminating lyso-PS mediated signaling. **Dr. Siddhesh Kamat** has earlier discovered another serine hydrolase enzyme ABHD16A (also known as BAT5), that functions upstream of ABHD12, and biosynthesizes lyso-PS lipids in the central nervous system (CNS) and innate immune system from phosphatidylserine (PS) precursors. These findings illuminated a new lyso-PS nodal

Figure 45: Schematic representation of the ABHD12/ABHD16A-lyso-PS pathway (Dr. Siddhesh Kamat's Group)



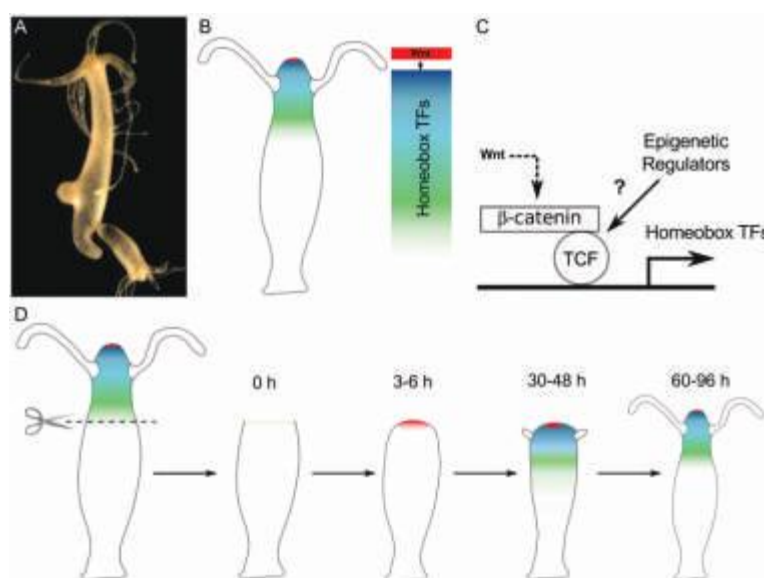
axis in humans. Both ABHD12 and ABHD16A have high expression and activity in the CNS and immune system, and so do the recently deorphanized putative lyso-PS receptors from the GPCR family: GPR34, GPR174 and P2Y10. Taken together, the lyso-PS class of lipid transmitters have several unsolved problems and biological mechanisms in broad neuro(immunological) processes like PHARC, which Dr. Kamat's group is interested in studying.

14. Epigenetics and Immunology

14.1 Wnt Signaling Head Patterning and Head Regeneration in Hydra

A defined body axis is a major innovation in eumetazoan evolution. Members of the basal metazoan phylum Cnidaria are ideal model systems to unravel the changes in molecular mechanisms associated with patterning of body axis. In Cnidarians such as *Hydra*, Wnt signaling plays critical role in body axis determination. To understand the regulatory network and epigenetic changes involved in body axis, **Prof. Sanjeev Galande's** group activated Wnt signaling in hydra and performed differential gene expression analysis. Gene sets regulating multiple cellular processes critical for tissue morphogenesis were found to be deregulated. The group identified major set of master regulatory transcription factors, epigenetic modulators and developmental signaling pathways differentially regulated upon activation of Wnt signaling. Spatio-temporal expression studies revealed regulation of different classes of transcription factors by Wnt signaling during hydra head development. Majority of them belong to homeodomain and forkhead family members. The group identified a gene regulatory

Figure 46: Wnt signaling in formation of head patterning and head regeneration in hydra. (a) Hydra polyp with two buds; (b) Schematic representation of expression gradients of Wnt and its target homeobox transcription factors in hydra; (c) A working model of regulation of genes encoding homeobox transcription factors by Wnt signaling; (d) Regeneration dynamics – schematic depiction of spatio-temporal organization of expression patterns of homeobox genes during hydra head regeneration (Prof. Sanjeev Galande's Group)



network that defines the head organizer in *Hydra*. Further exploration and characterization of epigenetic modulators and other gene regulatory molecules in hydra resulted in identification of major evolutionary transitions in epigenetic machinery specific to eumetazoa. These findings provide unprecedented insights into the genetic and epigenetic regulatory networks that play critical role in body axis patterning.

14.2 Epigenetics and Transcriptional Regulation in *Plasmodium falciparum*

Malaria is a major public health problem in many developing countries, with the *Plasmodium falciparum* causing the most malaria-associated mortality. Efforts are on for malaria eradication, which are mainly focused on the vaccine development. However, vaccine approach has failed world over because parasite is able to mutate continuously. How these mutations generated at the levels of genome, transcriptome and epigenome is poorly understood. **Dr. Krishanpal Karmodiya's** research aims to address the issue of epigenetic regulation of gene expression in the malaria parasite. Epigenetics is defined by heritable changes in gene expression that are not associated with changes in DNA sequence. It is mainly reflected in methylation of DNA and post-translational modifications of DNA-associated proteins, histones. This project will take advantage of the genome sequence to identify regulatory regions that may undergo epigenetic regulation, an approach that is poorly understood. Better understanding of the basics of epigenetic regulation in *Plasmodium falciparum* and their comparison with human system would open the hitherto unexplored pathways for targeting malaria parasite.

14.3 Chromosome Biology

Dr. Kundan Sengupta's group investigates the mechanisms that regulate genome organization and function. Chromosomes are non-randomly organized with gene rich chromosomes closer to the nuclear center and gene poor chromosomes near the nuclear periphery. The structural and functional integrity of the nucleus is maintained by the Lamin family of proteins. The group showed that Lamin depletion, resulted in a striking increase in chromosomal gains. Furthermore, extra chromosomes were mislocalized in the interphase nucleus in lamin depleted cells, highlighting the crucial role for lamins in the maintenance of chromosome positions of even aneuploid chromosomes in the nucleus. Interestingly, even gene loci, which are $\sim 10^4$ – 10^6 fold lower in DNA content than chromosome territories, are non-randomly organized in the interphase nucleus. We interrogated the nuclear organization of HOXA – an essential gene locus required for early organismal development, with respect to a nuclear landmark such as the nucleoporin complex. Decrease in the levels of Nup93

Figure 47: Organization of HOXA locus: (Left to Right) 2D FISH image of chromosome 7 (Green) and HOXA gene locus (Red); Enlarged image of chromosome 7 (Green) and HOXA gene locus (Red); DAPI banding of Chromosome 7 red line indicates position of HOXA locus; 3D FISH for HOXA (red) and Chromosome 7 (green). (Labade A.S., Karmodiya, K. and Sengupta, K.(2016) *Epigenetics & Chromatin* 9:54) (Dr. Kundan Sengupta's Group)

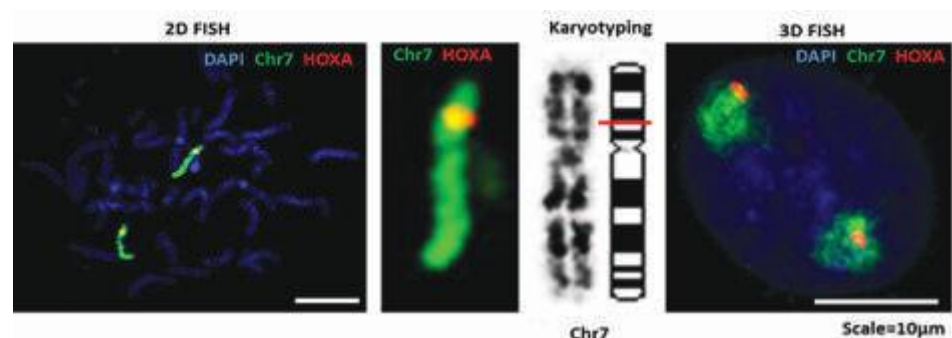
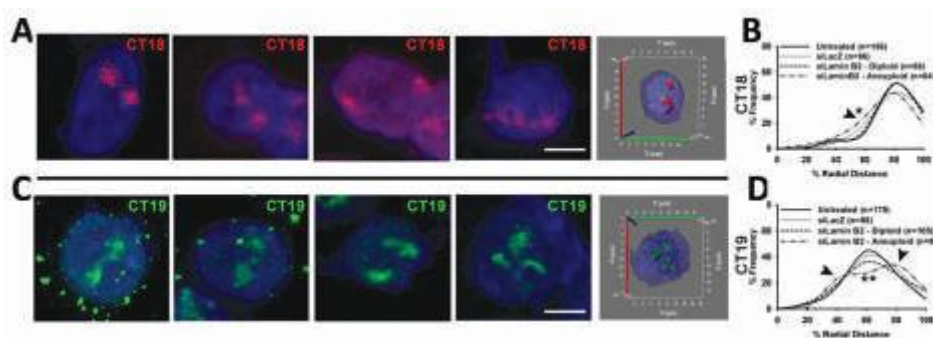


Figure 48: 3D FISH for Chromosome 18 and 19 territories in DLD1 cells. (a) 3D represents reconstruction of Lamin knockdown cells aneuploid for CT18;(b) Radial distance (% R.D) distribution profiles for CT18 in control, siLamin B2 treated diploid and aneuploid cells in DLD1 cells. Aneuploid CT18 shows a mislocalized subpopulation at R.D. 60%;(c) 3D FISH for CT19 (green) in control, siLamin B2 treated diploid and aneuploid cells in DLD1 cells. 3D represents reconstruction of siLamin B2 treated cell aneuploid for CT19;(d) Radial distance distribution profiles (% R.D) for CT19 in control, siLamin B2 treated diploid and aneuploid cells in DLD1 cells. Aneuploid CT19 shows mislocalized subpopulations at R.D. 80% and 40%. (Ranade, D., Koul, S., Thompson, J., Prasad, K.B. and Sengupta, K. (2016) *Chromosoma* 1–22) (Dr. Kundan Sengupta's Group)



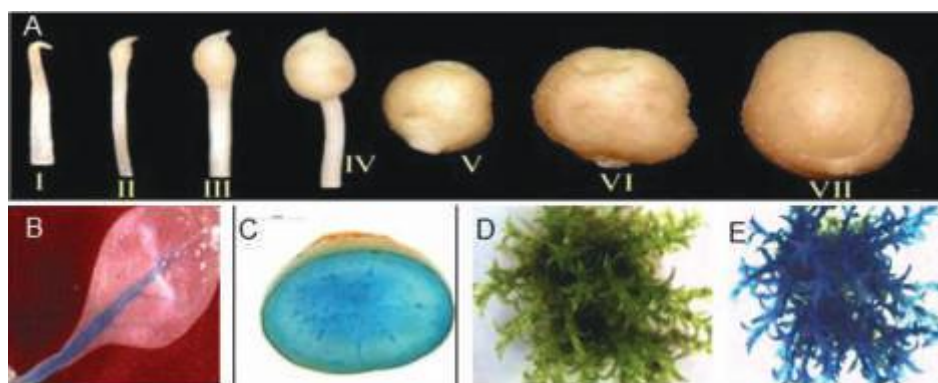
(one of the subunits of the nuclear pore complex), revealed a striking increase in the levels of HOXA gene, suggesting a requirement for Nup93 as well as its interacting partners Nup188 and Nup205 in maintaining the repressed state of the HOXA gene cluster.

14.4 Long Distance RNA Transport in Plants

Dr. Anjan Banerjee's group is studying how plants perceive signals and respond to environmental cues for their growth and development focusing on the role of long-distance RNA transport in plants. Using potato as a model system, the group strives to address these fundamental questions during potato development (tuberization). Recently, the group has characterized three members of TALE superfamily of transcription factors (TFs) e.g., POTH15 (a class-I KNOX gene) and two BEL1-like TFs (StBEL11 and StBEL29) in potato. They showed that over-expression of POTH15 can alter multiple morphological traits. Approximately, 2000 target genes regulated by POTH15 were also identified from potato that is involved in diverse developmental processes. Additionally, RNAs of StBEL11 and StBEL29 (close homologs of a tuberization inducer StBEL5) were found to be phloem-mobile and both acted as repressors of tuberization. RNA suppression lines of BEL11/29 resulted in two- to three-fold increase of tuber yield. The role of calcium dependent protein kinase 1 (CDPK1) in potato development was also elucidated through this work.

The group has recently completed a stolon stage specific small RNA sequencing and identified several novel potato miRNAs possibly involved in tuber developmental transitions. The role of apical cell development in plants is being investigated. Using moss as a model and tobacco retro-transposon (Tnt1) as a mutagen, the group is studying the evolutionary link between moss (a bryophyte) and higher angiosperm plants.

Figure 49: (a) Stolon to tuber developmental transitions in potato;(b) StBEL11/29 RNA expression in mid-vein of a potato leaf indicating RNA transport;(c) POTH15 RNA expression pattern in pith of a potato tuber;(d) Wild type moss (*Physcomitrella patens*); and (e) GH3:GUS gene expression in gametophytic body of moss. (Dr. Anjan Banerjee Group)



15. Neurobiology and Computational Biology

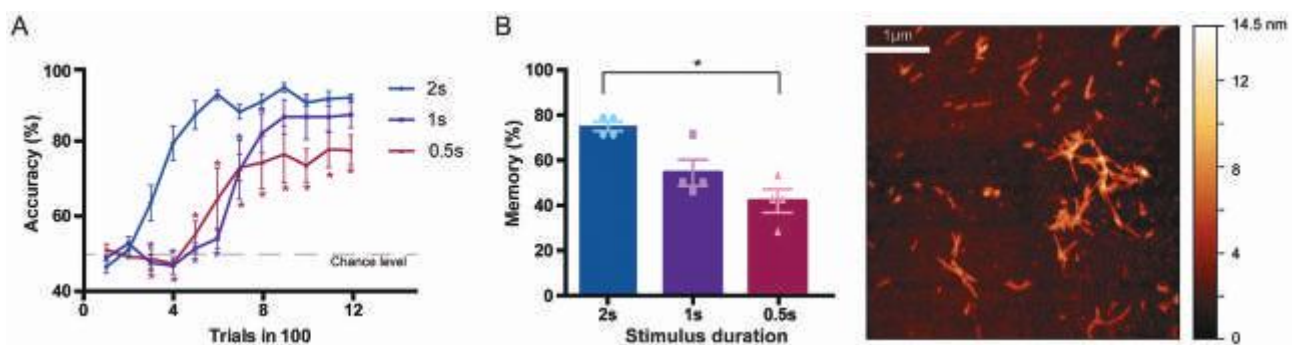
Figure 50: (Left) Olfactory learning and memory measured for binary mixture of enantiomers. (a) Olfactory learning was slowed down while mice were trained with shorter durations of stimuli compared with 2s stimuli (Two-way ANOVA, $F(22,108) = 4.07$; $p < 0.001$). (B) Olfactory memory was reduced while mice were trained with 1s and 0.5s stimuli (One-way ANOVA, $F = 13.21$; $p < 0.01$); (Right) Atomic Force Microscopy (AFM) image of α -synuclein fibrils formed under controlled aggregation (5mg/ml) in 20mM tris buffer at pH 7.4, incubated at 37°C for 7 days. 7 μ M solution was used for the AFM imaging. Color code indicates the height differences on the surface (Dr. Nixon Abraham's Group)

15.1 From Neural Circuits to Behavior

In nature, animals face challenging decision-making situations where different sensory systems are involved. **Dr. Nixon Abraham's** group studies the mechanisms of olfactory cue driven decisions and multi-sensory decisions in mouse model system using state-of-art automated olfactory and multi-sensory behavior experiments, electrophysiology and optogenetics.

How much sensory information is desirable for quick and accurate decisions? Is there an optimal amount of information needed for efficient learning and memory? The group is addressing these questions by training the mice on simple and complex odour discrimination tasks, challenging their learning and memory by providing different durations of olfactory stimuli (2, 1 and 0.5 seconds). Preliminary results indicate that longer stimulus exposure helps the animals to learn and memorize certain odors more efficiently compared with shorter stimuli. The next step is to investigate how the rodent olfactory system is benefitted by the longer stimuli in making accurate decisions.

Olfactory deficits are one of the early symptoms that appear in some neurodegenerative diseases. For example, the aggregate of α -synuclein, the major component of lewy bodies and lewy neuritis, formed in the olfactory bulb may cause the impaired sense of smell in patients with Parkinson's Disease. In vitro and in vivo models are being developed to study the formation of aggregates (in collaboration with Dr. Jancy Abraham, NCL Pune) and the causes of impaired olfaction found in patients with neurodegenerative diseases.



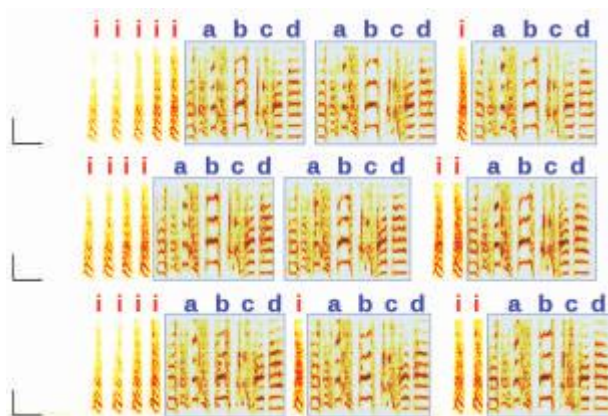
15.2 Neurobiology of Movement Initiation

Animals produce a vast variety of behaviors that are well suited for survival and reproduction in their environment. **Dr. Raghav Rajan's** group is interested in

Figure 51: Song bouts begin with a variable number of introductory notes (INs). Shown here are the spectrographic representation of 3 song bouts produced by an adult male zebra finch. The blue rectangles (with the sequence abcd) represents the stereotyped song sequence of this bird and they form a prominent part of all 3 song bouts. However, each of the song bouts starts with the repetition of a short syllable (sound) called an introductory note (IN represented by the letter 'i'). The first bout begins 5 INs, while the next two bouts begin with 4 INs each. INs sometimes occur within a bout between two consecutive song sequences. Scale bars: 200 ms (x scale bar) and 2kHz (y scale bar) (Dr. Raghav Rajan's Group)

understanding the neural mechanisms underlying such ethologically relevant behaviors.

One well-studied example of an ethologically relevant behavior is the song of an adult male zebra finch, a songbird. The song consists of a highly stereotyped sequence of sounds interleaved by silent gaps and forms part of a courtship ritual performed by the male to attract females. While a lot is known about how song is produced, how it is initiated remains poorly understood.



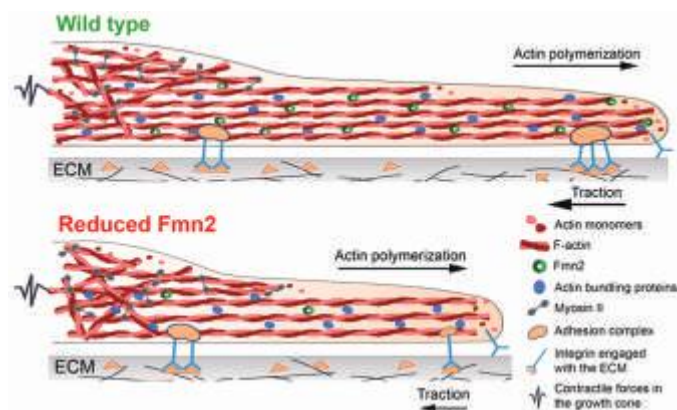
Each song bout starts with a variable number of repetitions of a short sound called an introductory note ('i's in Figure), before production of the stereotyped song sequence (blue boxes in Figure). Our earlier work characterizing the properties of INs suggested that INs represent motor preparation before song initiation similar to motor preparation seen in primates before movement initiation. However, how INs are produced, what makes them variable in number, what they represent and what role they play in song initiation is unclear. Dr. Rajan's group address these questions using a combination of behavior, pharmacological manipulation experiments and electrophysiological recordings in the awake singing bird.

15.3 Neural Circuits and Behavior

Dr. Aurnab Ghose's group investigates the development and organization of neural circuits and behavior. Their recent work has led to the development of mechanistic framework for Fmn2 function in neurons. Fmn2 is implicated in intellectual disabilities and work from Dr. Ghose's group implicates it as key regulator of cytoskeleton dynamics.

A second line of study has identified the modulation of fear in animals by the neuropeptide CART. The group has identified a new CART-regulated functional

Figure 52: Fmn2 mediates mechanotransduction in neuronal filopodia to stabilize adhesion complexes linking the filopodia to the extracellular matrix (Adapted from Sahasrabudhe *et al.*, 2016) (Dr. Aurnab Ghose's Group)



circuit in the amygdala regulating the intensity of the fear response. Another study has uncovered a new mechanism underlying olfactory modulation by internal states involving direct alteration of odorant sensitivity of the olfactory receptor neurons.

16. Algebra and Number Theory

16.1 Special Values of L-Functions Associated to Automorphic Forms

Dr. Baskar Balasubramanyam's research over the last year has been focused on understanding the special values of L-functions associated to certain automorphic forms and in understanding p-adic properties of certain Langlands transfer.

In a recent work, he proved that the twisted twisted-tensor (or Asai) L-values associated to an automorphic form for $GL(2)$ over a CM field are algebraic after dividing by certain periods and that they satisfy certain distribution relations. In a joint work with D. Majumdar, it was shown that the Asai transfer from Hilbert modular forms to automorphic representations over $GL(4)$ can be p-adically interpolated to the eigenvariety.

In a joint work with A. Aryasomayajula from IISER Tirupati, estimates of the Bergman kernel of automorphic forms associated to quaternion algebras for large weights are being studied.

16.2 Arithmetic Geometry and Automorphic Forms

(a) *Self-intersection number of relative dualizing sheaves*

For an integer $N > 1$ consider the following principal congruence subgroup:

$$\Gamma_0(N) = \left\{ \begin{pmatrix} a & b \\ c & d \end{pmatrix} \in \mathrm{SL}_2(\mathbb{Z}) \mid c \equiv 0 \pmod{N} \right\}$$

It acts on the upper half plane $\mathbb{H} = \{z \in \mathbb{C}, \mathrm{Im}(z) > 0\}$ and the quotient space is $Y_0(N) = \Gamma_0(N) \backslash \mathbb{H}$ with compactification $X_0(N) = Y_0(N) \cup \mathcal{O}(\Lambda_0(N))$. The modular curve $X_0(N)$ is a compact Riemann surface and hence an algebraic curve over \mathbb{C} . In fact its equations can be written with \mathbb{Q} coefficients and hence can be considered as a curve over \mathbb{Q} and let g_N denote the genus of $X_0(N)$.

In a joint work with Diganta Borah and Chitrabhanu Chowdhuri, **Dr. Debargha Banerjee** wrote down the Arakelov self intersection number of the relative dualizing sheaf for the minimal regular model over \mathbb{Z} of the modular curve $X_0(p^2)$ in terms of its genus g_{p^2} .

(b) Local Brauer class at the supercuspidal prime

Let f be a primitive non-CM cusp form of weight k and let M_f be the abelian variety attached to f by Shimura when $k = 2$, or the Grothendieck motive associated to f by Scholl when k is greater than 2. Let X_f denote the \mathbb{Q} -algebra of endomorphisms of M_f defined by

$$X = X_f := \text{End}_{\mathbb{Q}}(M_f) \otimes_{\mathbb{Z}} \mathbb{Q}.$$

The Brauer class of X locally can be studied by the following where v runs over all primes in F . It is known that $X_v = X \otimes_F F_v$ is a central simple algebra over F_v and the class of X_v is a 2-torsion element in the Brauer group $\text{Br}(F_v)$ of F_v , that is, the class $[X_v] \in {}_2\text{Br}(F_v) \cong \mathbb{Z}/2$. The algebra X_v is a matrix algebra over F_v if its class $[X_v]$ is trivial, and is a quaternion division algebra over F_v if the class $[X_v]$ is non-trivial. In a new theorem proved with PhD student Tathagata Mandal, it was possible to find the algebra $[X_v]$ if V is a supercuspidal prime.

16.3 Arithmetic Aspects of Locally Symmetric Spaces

The reciprocity map in the class field theory is very well understood in the case when the base field under consideration is a perfect field. For imperfect fields, it is believed that the reciprocity map in general is not injective. Fesenko has defined the reciprocity map in this case and has computed the kernel of this map when L/F is a finite totally ramified p -extension. **Dr. Supriya Pisolkar** is investigating whether this reciprocity map is injective when L/F is arbitrary abelian totally ramified p extension or a totally ramified abelian extension.

Another project which is an ongoing work with Amit Hogadi is to check whether the zeroth Hochschild cohomology group $\text{HH}_0(E(A))$ is isomorphic to $W(A)$. Here A is a non-commutative ring, to which L. Hesselholt has associated in a functorial way an abelian group $W(A)$. Now $\text{HH}_0(A)$ is the quotient $A/[A,A]$ where $[A,A]$ is the subgroup generated by elements of the form $ab-ba$ and $E(A)$ is a ring of p -typical Witt vectors associated to A .

16.4 Number Theory, Representation Theory and Spectral Theory of Symmetric Spaces

(a) L-functions for orthogonal groups

In an ongoing project with Prof. Raghuram, using the ideas like Eisenstein cohomology, **Dr. Chandrasheel Bhagwat** is working towards a rationality result for special values of L -functions for orthogonal groups.

(b) Harmonic analysis and Zeta functions on locally symmetric spaces

Ayesha Fatima, PhD student with Dr. Bhagwat, is working on a problem which involves establishing a geometric analogue of the classical strong multiplicity one theorem for hyperbolic locally symmetric spaces. This is in analogy with some theorems by Bhagwat-Rajan (IMRN 2010, JNT 2011). In his fifth year project, BS MS Student Ajith Nair worked with Dr Bhagwat. This project involved a problem on spherical spectrum of locally symmetric spaces for which harmonic analysis on Lie groups (e.g., $\text{SL}(2, \mathbb{R})$ and other Lorentz groups) will be studied.

(c) Laplacian spectrum of graphs

Dr. Bhagwat is working jointly with Dr. Anisa Chorwadwala (Faculty, IISER Pune mathematics group) and Mr. Pralhad Shinde (Mathematics PhD student, IISER Pune) to formulate and establish the analogues of some of results in classical analysis which involve the Laplacian and Dirichlet boundary value problems, in the context of certain families of finite graphs which resemble the geometric objects in classical setup.

16.5 Analytic Number Theory and Arithmetic of Modular Forms

Dr. Kaneenika Sinha's primary research interests are in analytic number theory and arithmetic geometry. One of her primary goals is to investigate statistical phenomena in the distribution of sequences that arise from the theory of modular forms, zeta functions of curves over finite fields and eigenvalues of adjacency matrices of certain kinds of graphs.

In 1916, the German mathematician Hermann Weyl asked the following question: take an irrational number T , look at its multiples $T, 2T, 3T, \dots$, and record the sequence of its decimal parts. While these numbers find a place throughout the interval $[0,1)$, are they likely to cluster around some parts more than others? Weyl discovered that each and every part of the interval $[0,1)$ gets its fair share of elements from the sequence. That is, this sequence is equidistributed in the interval $[0,1)$. In showing this, Weyl discovered and outlined a beautiful technique that relates the phenomenon of equidistribution to that of studying what are called exponential sums in number theory and places this phenomenon in a wider landscape of harmonic analysis.

Many sequences arising in number theory follow a distribution pattern that can be defined by very elegant functions. In particular, one of the major breakthroughs in recent times is the discovery that certain sequences arising from the Fourier coefficients of modular forms (certain complex-analytic functions with rich inner symmetries and growth conditions) follow the “semi-circle” equidistribution law, also called the Sato–Tate law.

Dr. Sinha's primary research work focuses on equidistribution of various such families and sequences arising in the context of modular forms, arithmetic geometry and graph theory. She is investigating deeper statistical phenomena associated with such families, for example fluctuations in the distribution and pair correlation. In this direction, in joint work with her PhD student Neha Prabhu, she has recently proved that the fluctuations of the prime Fourier coefficients of certain families of modular forms about their limiting distribution are Gaussian.

16.6 K_1 Stabilization of General Quadratic and General Hermitian Groups

Dr. Rabeya Basu's research involves three major problems in algebraic K -theory studied very rigorously during 1950's to 1970's, viz. stabilization of K_1 -functor, Suslin's Local–Global Principle, and Bak's unitary group over form rings. Her work deduced an analogue of Suslin's Local–Global Principle for the transvection subgroup of the general quadratic (Bak's unitary) group. As a consequence, it generalized Bak's result on injective stabilization for unitary group from the free case to the module case.

16.7 Representation Theory of p-adic Groups, Langlands Program

(a) Langlands–Shelstad transfer

The Langlands–Shelstad transfer appears in the theory of “Endoscopy”. In a joint project with Bertrand Lemaire, **Dr. Manish Mishra** is working on the description of Langlands–Shelstad transfer for the Bernstein center of depth zero principal series blocks, where the endoscopic group is the one appearing in Roche–Hecke algebra isomorphism. They have already reduced the question to the existence of “Hales local data” and reduced the existence of local data to the elliptic case.

(b) Frobenius–Schur indicator

Dr. Mishra established a sufficient condition for the existence of self-dual representations of a p-adic reductive group. A part of this project is finding the necessary condition as well. Dipendra Prasad started the study of calculating Frobenius–Schur indicator of a self-dual representation by the action of a certain distinguished central element. Dr. Mishra proved that for generic depth zero supercuspidal representations of a connected reductive p-adic group with connected center, the Frobenius–Schur indicator is given in such a way. He is working on extending this to positive depth case.

17. Analysis and Applicable Mathematics

17.1 Shape Optimization Problems

Dr. Anisa Chorwadwala works on shape-optimization problems including the isoperimetric problems. The details of the research work are as described below.

Let S be a Riemannian manifold with metric g and Laplace–Beltrami operator Δ . Let B_1 be an open (geodesic) ball in S . Let B_0 be an open ball whose closure is contained in B_1 . Let $\Omega = B_1 \setminus B_0$. Consider the following problems:

$$-\Delta u = 1 \text{ in } \Omega, u = 0 \text{ on } \partial\Omega, \text{ --- (1)}$$

$$-\Delta u = \lambda u \text{ in } \Omega, u = 0 \text{ on } \partial\Omega. \text{ --- (2)}$$

In the case that S is Euclidean space, Kesavan (*Proceedings of the Royal Society of Edinburgh Section A* (2003); 133:617–624) (and also Ramm–Shivakumar (*Math. Inequalities and Appl.* (1998) 1:559–563) proved the following:

(I) If u is a solution of problem (1), the energy functional $\int_{B_1 \setminus B_0} |\nabla u|^2 dx$ attains its minimum if and only if B_0 and B_1 are concentric.

(II) The first eigenvalue λ_1 of problem (2) attains its maximum if and only if the balls are concentric.

The proofs described earlier by Kesavan and Ramm–Shivakumar rely on shape differentiation and the moving plane method. In the application of the moving plane method, the commutativity of the Laplacian and reflection in the hyperplane was used.

Dr. Chorwadwala has studied the behavior of the above-mentioned functionals associated to a non-linear differential operator namely the p -Laplacian. The Shape-calculus for the p -Laplacian is developed. The existence and uniqueness of non-negative solution of a particular boundary value problem involving the p -Laplacian with non-vanishing boundary conditions is derived. As a consequence, a weak comparison principle for the p -Laplacian (with non-vanishing boundary condition) is proved.

Dr. Chorwadwala has proved a generalized version of a famous conjecture made by Lord Rayleigh. The conjecture was as follows: The first eigenvalue of the Laplacian on an open domain of given measure with Dirichlet boundary conditions is minimum when the domain is a ball and only when it is a ball. This conjecture was proved simultaneously and independently by Faber and Krahn. Dr. Chorwadwala's work dealt with the p -Laplacian version of this Theorem.

So far, shape optimization problems being solved were over a family of punctured balls where the puncture was also spherical and was free to move in the interior of the outer ball. Dr. Chorwadwala is now considering solving a shape optimization problem over a different family of domains. It is again a family of spherical punctured domains, however, this time the puncture is not spherical but has other symmetries and is free to rotate about its 'center'. Efforts are also on to prove analogous results in the area of Spectral Graph Theory.

17.2 Elliptic Partial Differential Equations

In a joint project with Sanjiban Santra (CIMAT, Mexico), **Dr. Mousomi Bhakta** has studied semilinear equation with Hardy Potential and critical and supercritical exponents. In this project they have completely classified the singularity of any positive solution at origin, which is very different from the subcritical case. Asymptotic profile of solutions of the above mentioned equations has been studied which brings complete new idea compared to the smooth case where the equation did not have any singularity (To appear in *Journal of Differential Equation*).

Dr. Bhakta has studied entire solution of fractional Laplace equation with critical and supercritical nonlinearities. Existence/nonexistence, qualitative properties of the solution and established precise decay rate of solution and the gradient of solution at infinity have been studied (with PhD student Debangana Mukherjee; to appear in *Communications on Pure and Applied Analysis*, 2017).

Asymptotic profile of positive solution of nonlocal equation has been studied with a vanishing parameter and critical and supercritical nonlinearities. In this work, proof has been provided as to how the solutions concentrate and blow up at an interior point of the domain (with Sanjiban Santra (CIMAT, Mexico) and Debangana Mukherjee).

The existence of infinitely many nontrivial solutions of semilinear type elliptic equations with nonlocal integro-differential operator and concave-convex nonlinearities has been proved. Moreover, when that integro-differential operator

reduces to the fractional Laplace operator, the existence of a sign changing solution to the same problem has also been proved (with PhD student Debangana Mukherjee, to appear in *Differential and Integral Equation*, 2017).

p -fractional type equation with concave-convex nonlinearities has been studied. Using fibering maps, an existence of a sign changing solution has been established.

17.3 Math Finance: Risk Sensitive Portfolio Optimization in a Jump Diffusion Model with Regimes

Along with a PhD student and a BS MS student, **Dr. Anindya Goswami** worked on pricing derivatives in a regime switching market with time inhomogeneous volatility. Dr. Goswami supervised one BS MS project this year on option pricing in a regime switching jump diffusion model.

Regime switching model is one of the popular generalizations of Black, Scholes and Merton model of asset price. In both the above projects, the most general kind of regime switching models are considered. In the first one asset prices were assumed to have continuous paths almost surely whereas that assumption is relaxed in the second project. The second one accommodates provision of discontinuities where regimes are semi-Markov pure jump processes. For both the cases, the models are shown to be arbitrage free. These models may not have been addressed in the literature of quantitative finance. However, many interesting special cases have been studied by various authors in last two decades. Despite this being a vibrant and competitive area of research, the contributions in these two projects are far from just incremental as the technicalities are very different from any other earlier works. In both, the locally risk minimizing prices of a large class of contingent claims (Lipschitz continuous with respect to the terminal stock price) are obtained as the classical solutions of two separate Cauchy problems involving integro partial differential equations of parabolic type with a terminal condition, provided each of the problems has a solution. Finally each of the problems is proved to be well posed. The nature of non-locality is such that the standard theory of integro-pde is inadequate. To show wellposedness, integral equations (IE) satisfied by the mild solutions are initially considered. Then continuous differentiability is shown in multiple steps. The techniques and difficulties in these two projects are very different from each other.

17.4 Probability Theory and Control Theory

(a) *Non-linear Neumann boundary value problem*

Dr. Anup Biswas together with Prof. Hitoshi Ishii, Subhamay Saha and Lin Wang considered an optimal control problem from a queueing network with help and showed that the discounted value function is a viscosity solution to a HJB equation with non-linear Neumann boundary condition. The key contribution of this project is the uniqueness on the viscosity solution.

(b) *Measure-valued Skorohod map*

Dr. Biswas's work provides a unified approach to study scaling limits of queueing network. The key contribution of this project is the measure-valued Skorohod map. With help of this map, they establish scaling limits of several measure-valued processes associated to the queueing networks.

(c) *Risk-sensitive control under near-monotone structure*

In this project carried out with Ari Arapostathis, Dr. Biswas removed the assumption of stability from the controlled dynamics and established existence–uniqueness result for the HJB equation.



18. Geometry and Topology

18.1 Low-Dimensional Topology: 3-Dimensional Manifolds

This active area of research has several longstanding conjectures proved fairly recently, such as Thurston's Geometrization conjecture (which implies the Poincaré conjecture) and the Virtual Fibration conjecture. Within low-dimensional topology **Dr. Tejas Kalelkar** focuses mainly on foliations, triangulations and Heegaard splittings of 3-dimensional manifolds.

In a previous paper (with Rachel Roberts), Dr. Kalelkar had showed that the fiber structure of a punctured surface bundle can be perturbed to taut foliations that realize all boundary slopes in a neighbourhood of the boundary slopes of the fiber. In the case of a surface bundle with pseudo-Anosov monodromy, they are now attempting to pin down such an interval explicitly expressed in terms of the slope of the fiber.

Six of the eight Thurston geometries are called Seifert Fibered spaces. Dr. Kalelkar is currently working on the construction of a triangulation of such manifolds that has certain nice properties as regards the fiber structure of the space.

18.2 Intersection Theory, Derived Categories and T-Varieties

Dr. Vivek Mallick's research has been in the following areas:

(a) *(with Umesh Dubey) On Differential graded Eilenberg-Moore construction*

Dr. Mallick studied an abstract categorical construction called Monads in the context of categories admitting a differential graded structure on the sets of morphisms. They proved that such a construction is useful in deducing theorems about derived categories. As an application, they prove two theorems: one in the area of twisted derived categories, as defined by Caldararu, and the other a theorem describing the derived category of G equivariant sheaves.

(b) *(with Jose Ignacio Burgos) Mirror symmetry of T-varieties*

T-varieties are algebraic varieties admitting an algebraic torus action. This work computed a complicated formula to find out the Hodge numbers of such varieties resulting in some way of describing symmetries in the parameter space of all such varieties.

(c) Generalizations of the super-category construction

Dr. Mallick has defined a $\mathbb{Z}/2$ graded tensor triangulated category and showed how Balmer's construction can be generalized to reconstruct super-schemes. He is trying to get a general categorical setup which will compute the group cohomology of a finite group where the characteristic of the base field divides the order of the group.

(d) (with Ayan Mahalanobis) Elliptic Curve cryptography

Based on a theorem in algebraic geometry, an algorithm to solve the discrete log problems on cyclic subgroups of elliptic curves is being developed along with an implementation of the algorithm.



19. Humanities and Social Sciences

19.1 English Literature: Postmodernist Fiction

Dr. Pooja Sancheti's work (both research and teaching) is primarily in the area of English literature, more specifically, the genre of the novel (in English). While her PhD research was focused on postmodernist fiction and magical realism, her teaching has included such areas as the contemporary Indian novel in English (taught in the Spring 2017 semester) and Science Fiction (taught in the Fall 2016 semester).

The novel, in its various forms, allows for a two-fold study: that of stylistics, narratology, and aesthetics; and the other of political, historical, social, and cultural contexts that a particular novel reflects, encompasses, and creates in its specific fictional world.

An allied interest of Dr. Sancheti is English Language Teaching. At IISER Pune, Dr. Sancheti teaches the Remedial English course and assorted writing, communication, and presentation skills workshops that deal with English in a more functional capacity. The Remedial English course (offered for first year BS-MS students in their first semester of study) is a 35-40 hour evening course that has been created for students who may find themselves linguistically challenged given that all their instruction at IISER Pune is in the medium of English. The course addresses their common as well as individual problems with English, while also enhancing their reading, writing, speaking, and listening skills.

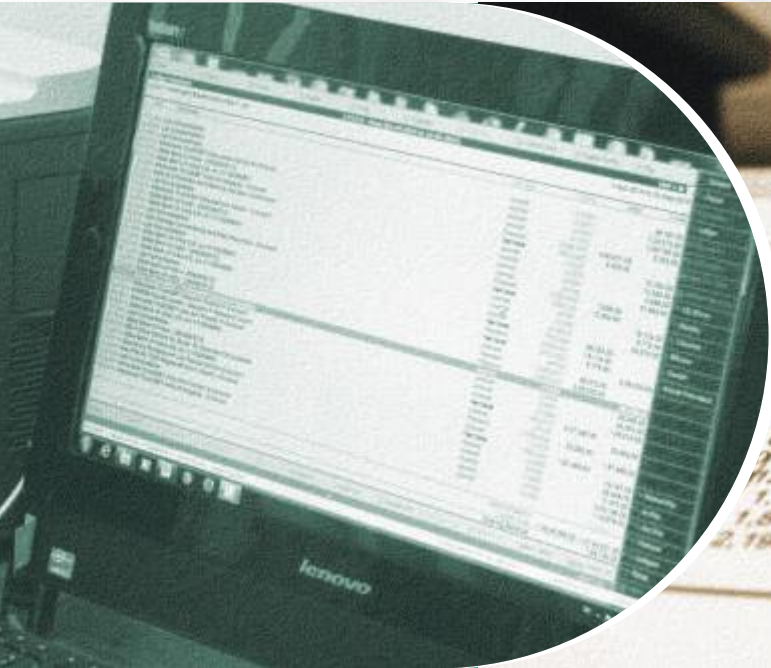
19.2 History of Architecture and Material Culture of the Deccan

Dr. Pushkar Sohoni is currently working on a monograph on the court culture of the Nizam Shahs of Ahmadnagar, and has given lectures on the material history of the medieval Deccan. Future projects include research on market-halls in colonial India,

and a translation of the great inscription in the Brihadeshwara temple at Tanjore. In 2016–17, he was a non-residential fellow at the Center for the Advanced Study of India (CASI), University of Pennsylvania. In the past year, his publications have included a co-authored architectural guide on Jewish sites in the western Deccan, and essays on medieval language, scripts, and Mughal architecture.

19.3 History of Science

Dr. John Mathew's research activity has been directed towards unearthing more information about the Great Influenza on 1918 in colonial Bombay and Poona (largely in the Maharashtra State Archives) as well as continuing his studies on the making of zoological natural history in British India. In June 2016, he presented work comparing plague and influenza influences at the University of Hong Kong. Dr. Mathew also visited the Siriraj Medical Museum in Bangkok, Thailand as part of his study on epidemic disease in South and South East Asia around the turn to the twentieth century.



2,700,000	25,509	0	2,700,000	1,500,000
2,410,000	11,522	0	2,435,505	77.2
700,000	8,917	0	708,917	177.2
7,200,000	133,578	0	7,333,578	51.1
915,750,000	314,810	0	16,064,810	
650,000	10,194	0	660,194	
1,540,200	30,461	0	1,570,661	
2,600,000	35,468	0	2,635,468	
3,709,600	36,153	0	3,745,753	759.1
1,425,000	16,671	0	1,441,671	
4,790,400	51,546	0	4,841,946	
4,100,000	53,683	0	4,153,683	
13,500,000	177,322	0	13,677,322	
1,150,070	4,834	0	1,154,904	
1,877,996	30,813	0	1,908,809	
2,196,541	21,724	0	2,218,265	

2,600,000	35,468
3,709,600	36,153
1,425,000	16,671
4,790,400	51,546
4,100,000	53,683
13,500,000	177,322
1,150,070	4,834
1,877,996	30,813
2,196,541	21,724

Accounts at a Glance

Indian Institute of Science Education and Research (IISER) Pune

Balance Sheet as on March 31, 2017

Amount in Rs.

Sources of Funds	Schedule	Current Year 2016-17	Previous Year 2015-16
Corpus / Capital Fund	1	5,50,76,41,638	5,27,76,61,999
Designated / Earmarked / Endowment Funds	2	31,54,99,592	–
Current Liabilities & Provisions	3	96,48,41,998	61,28,38,802
Total		6,78,79,83,228	5,89,05,00,801

Application of Funds	Schedule	Current Year 2016-17	Previous Year 2015-16
Fixed Assets	4		
Tangible Assets		4,47,80,29,331	2,05,10,92,266
Intangible Assets		16,05,454	11,90,789
Capital Works-In-Progress		72,92,80,553	3,00,95,70,842
Investments from Earmarked/Endowment Funds	5		
Long Term		–	–
Short Term		30,60,45,753	–
Investments- Others	6	74,35,99,259	22,69,04,767
Current Assets	7	42,75,07,221	37,81,32,381
Loans, Advances & Deposits	8	10,19,15,651	22,36,09,754
Total		6,78,79,83,228	5,89,05,00,801

Significant Accounting Policies	23
Contingent Liabilities and Notes to Accounts	24

For and on Behalf of IISER Pune

sd/–
CA. Vasundhara Laad
Joint Registrar (F&A)

sd/–
Col. G. Raja Sekhar (Retd.)
Registrar

sd/–
Prof. K.N. Ganesh
Director

Place: Pune

Date: May 05, 2017

Indian Institute of Science Education and Research (IISER) Pune

Income & Expenditure Account for the Year ended March 31, 2017

Amount in Rs.

Particulars	Schedule	Current Year 2016-17	Previous Year 2015-16
Income			
Academic Receipts	9	3,02,68,439	2,59,26,572
Grants / Subsidies	10	82,50,00,000	50,75,00,000
Income from investments	11	61,94,676	1,11,90,081
Interest earned	12	12,22,328	20,18,850
Other Income	13	24,51,786	25,70,185
Prior Period Income	14	–	2,35,510
Total (A)		86,51,37,229	54,94,41,198
Expenditure			
Staff Payments & Benefits (Establishment expenses)	15	36,46,90,378	28,18,14,288
Academic Expenses	16	10,61,04,156	13,62,45,381
Administrative and General Expenses	17	33,54,37,213	23,79,48,325
Transportation Expenses	18	44,32,652	61,37,057
Repairs & Maintenance	19	6,31,13,576	4,67,17,227
Finance costs	20	1,10,231	86,297
Depreciation	4	43,59,41,295	24,86,42,224
Other Expenses	21	4,30,79,816	–
Prior Period Expenses	22	68,59,667	41,253
Total (B)		1,35,97,68,984	95,76,32,052
Balance being excess of Income over Expenditure (A-B)		(49,46,31,755)	(40,81,90,854)
Less: Transfer to Designated Fund			
Others - Institute reserve fund (Sch 9 + Sch 13)		(3,27,20,225)	(2,84,96,757)
Transfer to Capital Fund (Depreciation)		43,59,41,295	24,86,42,224
Over Utilization of Grant in Aid for Revenue Exps (Schedule 3C)		(9,14,10,685)	(18,80,45,387)
Under Utilization of Grant in Aid for Revenue Exps (Schedule 3C)			
Significant Accounting Policies	23		
Contingent Liabilities and Notes to Accounts	24		

For and on Behalf of IISER Pune

sd/-
CA. Vasundhara Laad
Joint Registrar (F&A)

sd/-
Col. G. Raja Sekhar (Retd.)
Registrar

sd/-
Prof. K.N. Ganesh
Director

Place: Pune

Date: May 05, 2017





IISER PUNE

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