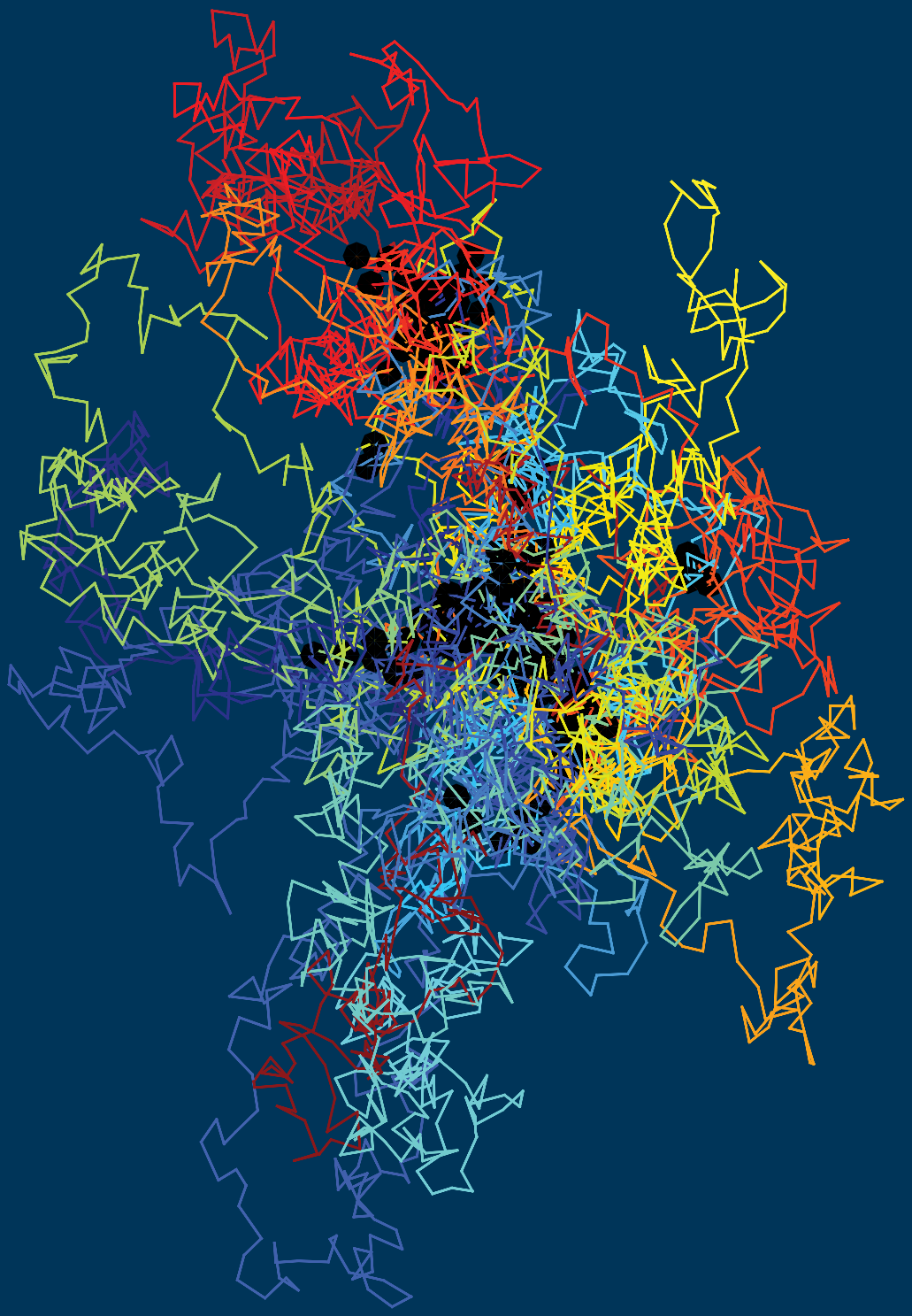


IISER PUNE

भारतीय विज्ञान शिक्षा एवं अनुसंधान संस्थान पुणे

वार्षिक प्रतिवेदन २०१७-१८

Indian Institute of Science Education and Research Pune

Annual Report 2017-18

On the Cover

The image on the cover is a snapshot of the conformation of bacterial DNA predicted through Monte Carlo Simulations. Through this work, Dr. Apratim Chatterji's group has studied how cross-links along the length of the DNA allow the polymer to organise at micron length scales.

Image Credit

Tejal Agarwal
Dr. Apratim Chatterji

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IISER PUNE

भारतीय विज्ञान शिक्षा एवं अनुसंधान संस्थान पुणे

वार्षिक प्रतिवेदन २०१७-१८

Indian Institute of Science Education and Research Pune

Annual Report 2017-18



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IISER PUNE

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

IISER Pune offers undergraduate and graduate programmes in Biology, Chemistry, Earth and Climate Science, Humanities and Social Sciences, Mathematics, and Physics. In just over a decade, IISER Pune has emerged as a prominent academic organisation, bringing together researchers who impart high quality science education. From particle physics to origins of life, new materials for energy solutions to current issues in number theory, algebra and more, researchers at the institute investigate a wide spectrum of topics in the basic sciences as well as in applied areas of research.

Foreword

IISER Pune reached an important milestone in mid-September 2018, when the government declared it to be out of project mode. In the 12 years that it was in project mode, IISER Pune did well, arguably better than its sister IISERs, in setting up an education and research ecosystem where bright young undergraduates can complement their formal education with research-based learning. Having set up a superb infrastructure, IISER Pune will now be able to focus on transforming itself into a world class research and education institute.

We have been told that a world class research institute has many characteristics. It carries out research that contributes to real advancement of the subjects being studied. It imparts an education that teaches students to think independently on their own, to partake of the joy of learning new things. It ensures that each student acquires the knowledge and skills, and develops the self-confidence and character to do well in life, not just in examinations. It fosters a culture of hard work and not of show, a culture of scholarship, a culture of rigor in academic activities, and a culture of innovation. It has faculty members who realise that they have every right to demand excellence from students, from their selection to their graduation, because they continuously demand it from themselves. It thrives on the effective mentoring of students by faculty. It enables the faculty member to function in the manner of an entrepreneur limited only by his/her own intellect. Everyone is mindful of the high expectations that have to be met.

We have heard this again and again. The real question is – how do we actually achieve all this?

Before I joined IISER Pune in November 2017, I was at the National Centre for Biological Sciences – NCBS. When I joined, it was only an idea, literally. Today, NCBS is firmly established as an excellent research institute. How can IISER Pune do this?

My experience has taught me that what matters is not show but substance.

a. We need to have good infrastructure, not necessarily the fanciest. This infrastructure needs to be run efficiently and professionally. World class institutes expect excellence from all their employees, including those in the maintenance and support services, and work of every kind needs to be supervised well.

b. We need to respect the work of all employees. We have to value how well any job is done, not what the job is. Only then will employees have a sense of self-worth, and take pride in doing their work well. This happens when the worth of all jobs is appreciated. We need to expect and appreciate professionalism in all employees, whether a janitor or a professor.

c. We need to have an ambience conducive to serious hard work. The whole campus community must make it their responsibility to keep the campus and the work environment clean and beautiful. We will find that when we put in the effort to keep our campus looking good, we will automatically put in more effort in doing good. We have to make our work environment such that it is a pleasure to work there.

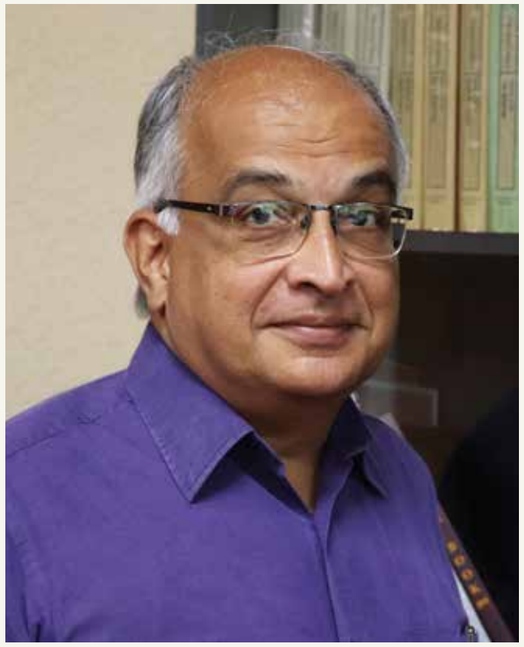
d. We need to have a culture of minimal hierarchy between students and faculty, between junior faculty and senior faculty, and so on, so that everyone is approachable. Junior colleagues must be treated with respect. We must listen to everyone's views and respect them. We must make decisions after listening to differing opinions. At the same time, we must respect decisions that differ from our own opinions.

e. We need to make sure that women faculty members, students and employees are not discriminated against, and are not harassed. We need to ensure that everyone is sensitised to gender, as well as sexuality, so that no one feels uncomfortable in any setting.

What has this to do with good science? It all comes down to a matter of respect. Respect for others, and respect for the ideas of others, translate into a community where good ideas are actively encouraged, irrespective of their source; where questioning is welcome and not looked upon as a personal insult. This is the foundation of truly excellent education and research.

Jayant B. Udgaonkar
Director
September 20, 2018

Director's Report



I am pleased to present the annual report of the institute for the period April 2017-March 2018. This has been an unusual year for the institute, with its change in leadership from November 2017. The efforts of the previous Director, Professor K.N. Ganesh, in founding IISER Pune, and towards making it a premier institute for undergraduate science education and research in the country, are well known. The institute owes much to him. In the coming years, we need to build upon the efforts of the founders, and make IISER Pune a truly word class science education and research institute.

A research university or institute is known by the quality of its faculty and of its students. We are fortunate that we get to select from amongst the best applicants in the country in both categories. As of March 31, 2018, we have 122 faculty members in our six disciplines. We also have 1400 students, with 852 BS MS, 186 Integrated PhD, and 362 PhD students.

The quality of teaching and research in any university is often determined by the commitment and accomplishment of its youngest faculty members. New faculty members bring in new scholarship, new expertise, new technology, and new ways of thinking. We have had seven new faculty members join the institute in the past year. They include S. Jain, B.K. Agarwalla, and V. Chikkadi (Physics); S. Managave, S. Sarkar, and R. Dehiya (Earth and Climate Science); and D. Ganguly (Mathematics). We are sure they will do very well, in teaching as well as in research.

The quality and quantity of research publications from the institute has been increasing over the years, and the past year witnessed a significant increase in productivity. The cumulative number of research publications from the institute is now 1815, with 454 publications during 2017. IISER Pune received the Clarivate Analytics India Research Excellence - Citation Award for 2017 in the category of 'Institutions Established Within 15 Years'. This award recognises research contributions from institutions by analysing research citations as captured in the Web of Science research database and through the InCites research analytics tool.

The quality of research accomplishment at IISER Pune has led to recognition in the form of prestigious awards to faculty members. A. Biswas received the Young Scientist Medal of the Indian National Academy of Sciences (INSA) New Delhi; T. Pucadyil has been chosen as an International Research Scholar by the Howard Hughes Medical Institute (HHMI); P. Talukdar has received the Bronze Medal of Chemical Research Society of India (CRSI) and the National Bioscience Award from Department of Biotechnology (DBT), Govt. of India; S. Ananth received the B.M. Birla Science Prize in Physics for the year 2016; and S. Ghosh received the AVRA Young Scientist Award for 2017. The multi-institutional DST-APEX-II project on solar energy, in which one of the partners is IISER Pune's S. Ogale, has been awarded the prestigious Newton Prize for 2017. In the National Institutional Ranking Framework (NIRF 2017) announced by the MHRD, which considers all universities and national institutes, IISER Pune has been ranked at the 29th position. The ranking tells us not only how far we have come, but also how far we have to go.

Our students continue to do very well. Y. Mutum, a BS MS student, won the prestigious Gates Scholarship to study at St. John's College in the University of Cambridge; H. Tekur, a PhD student in Physics, was selected for a Merit Prize at the Asian Scientist Writing Prize 2017 competition; and a team of seven undergraduate students (A. Kejriwal, A. Koparkar, Y. Joshi, S. Jyothish, Zakhiya P.C., R. Charvee, and S. Shah) who competed in the international Genetically Engineered Machines (iGEM) contest, won a silver medal at the Giant Jamboree that took place during November 9-13, 2017 in Boston, USA. The team was supervised by two Master's students, Y. Jawale and S. Kadam, as well as by K. Jain, a PhD student. The project was hosted with funding from the institute and sponsorship from Lupin Pvt. Ltd. and the Anarde Foundation.

Sports are very important. At the 6th Inter-IISER Sports Meet (IISM) held at IISER Mohali, the IISER Pune team was declared Champions in Football (Men), Kabaddi (Men), Basketball (Women), and Volleyball (Women); Runners-up in Lawn Tennis (Men, Women, and Mix) and Badminton (Mix); and won 5 Gold, 1 Silver, and 5 Bronze medals in athletics events. IISER Pune was placed 3rd in the overall championship ranking.

Other extra-curricular events are also very important. With organisers from the student community taking the lead, IISER Pune hosted several student events including the cultural festival Karavaan; the inter-institutional pan-India science quiz event Mimamsa; the iGEM 2017 India Regional Meet-up; and the Techstars Global Startup Weekend 2017. Disha and Prutha, voluntary organisations at the institute in the areas of education of the underprivileged and environment

A research university or institute is known by the quality of its faculty and of its students. We are fortunate that we get to select from amongst the best applicants in the country in both categories.

"Partnerships and collaborations with other institutes and universities, as well as with industry, are critical for an institute's growth. The institute has signed an MoU with the Inter-University Centre for Astronomy and Astrophysics (IUCAA) to jointly establish a Centre for Gravitational Physics and Astronomy (CGPA). Another MoU will enable IISER Pune to be part of a multi-partner project between institutions in India and UK, in the area of solar technologies. An advanced instrumentation facility for researchers and students of life sciences has been set up at the institute by PerkinElmer India.

IISER Pune has been fortunate to win the trust and support of several non-governmental organisations, including the Infosys Foundation, the Balan group, Bajaj Auto Ltd., Precision Wires Ltd., Cipla Foundation, Xytel India, Forbes Marshall Foundation, and IDeaS."



issues, respectively, continued their important work, which is documented in the two magazines, *Kalpa* and *Pahal*, put together by student volunteers.

Meetings, workshops, and conferences bring the outside scientific community to the campus. About twenty national and international conferences and workshops were organised during the past year. These include the Workshop on Translating Clean Energy to Rural India, the Workshop and Conference on Representation Theory of p-adic Groups, the EMBO Workshop on Frontiers in Cytoskeleton Research, the NGN Neuroscience Meeting, the Conference on Commutative Algebra and Algebraic Geometry, the Meeting of Indo-French Network in High Energy Physics, the Biennial Meeting of Indian Society of Developmental Biologists, a joint IISER-Weizmann conference in the area of Chemical Biology, the 42nd Annual Meeting of the Indian Biophysical Society, and the 83rd Anniversary General Meeting of the Indian National Science Academy (INSA). Workshops on science film production, science administration and management, and science journalism were also organised on the campus.

Distinguished speakers delivered thought-provoking public lectures on campus, including the (1) First Annual P.M. Mukhi Memorial Human Rights Lecture 'The importance of human rights in India's diverse democracy: A perspective' by Vivek Divan; (2) Fourth Annual Homi Bhabha Memorial Public Lecture 'Strange metals and black holes' by Subir Sachdev, Harvard University; (3) KS Krishnan Memorial Lecture in Neuroscience 'The dark side of the brain' by Mani Ramaswami, Trinity College, Dublin; (4) 'Riemann's "nowhere differentiable" continuous function' by Wilfried Schmid, Harvard University; (5) 'The cryoEM revolution in structural biology' by 2017 Nobel Laureate in Chemistry Richard Henderson, MRC Laboratory of Molecular Biology, Cambridge; and (6) 'Deconstruction of the Ras switching cycle through saturation mutagenesis' by John Kuriyan, University of California, Berkeley.

The institute hosted two DST-INSPIRE internship camps, a government initiative, during 2017-18, promoting awareness and training in the sciences among school children. Non-governmental initiatives that were supported include the France-India 24H Chrono Entrepreneurship Challenge, and a Citizen Science Exhibition organised by the University of Zurich and Swissnex India. Eight events related to teacher training (conducted by Centre of Excellence in Science and Mathematics Education (CoESME)) and events related to science outreach (Science Circus by Dr. Graham Walker and a science exhibition for children) were also hosted at the institute. In addition, CoESME organised teacher training workshops across India taking research-based pedagogical tools to teachers and educators, and conducted several sessions on making and using science toys in various schools and institutes.

Partnerships and collaborations with other institutes and universities, as well as with industry, are critical for an institute's growth. The institute has signed an MoU with the Inter-University Centre for Astronomy and Astrophysics (IUCAA) to jointly establish a Centre for Gravitational Physics and Astronomy (CGPA). Another MoU will enable IISER Pune to be part of a multi-partner project between institutions in India and UK, in the area of solar technologies. An advanced instrumentation facility for researchers and students of life sciences has been set up at the institute by PerkinElmer India. This centre aims to educate the region's current and future scientists on high-throughput analyses in the life sciences. The Bhaskara Lab inaugurated in May 2017 at IISER Pune has been established under the Fund for Improvement of S&T Infrastructure (FIST) scheme of the Department of Science and Technology (DST), Govt. of India. The lab will be used for instructional workshops on various computational software especially pertaining to mathematics. Very importantly, the institute received an Endowment from Xytel India towards awards for the best PhD and Master's theses.

Construction of a modern chemistry research laboratory for undergraduate students, funded by the Cipla Foundation, began in the past year. This facility will also provide space for outreach activities involving teacher and student training and will serve as a platform for developing industry-academia interactions. IISER Pune and the Balan Group have signed a formal agreement towards the construction of a building for a science activity centre at IISER Pune. Hands-on activities for school and college students and teachers have already commenced at the Indrani Balan Science Activity Centre.

IISER Pune has been fortunate to win the trust and support of several non-governmental organisations, including the Infosys Foundation, the Balan group, Bajaj Auto Ltd., Precision Wires Ltd., Cipla Foundation, Xytel India, Forbes Marshall Foundation, and IDeaS. These organisations have generously provided funds to enhance our educational and research capabilities. While the Government of India has provided generous funding to IISER Pune, it has become clear that in the future, the institute will require generous support from non-government organisations and from industry. Our faculty and students are talented and enthusiastic, and our administration and engineering services are supportive. There is therefore no reason why IISER Pune will not be able to overcome academic, research, and financial challenges, in order to meet the expectations of the country and become one of the best science education and research institutes in India and the world.

I appreciate the counsel and support of the Chairperson and Members of the Board of Governors, the Senate, the Finance and Building Committees, and the Ministry of Human Resource Development. They have all been of great help in the proper running of the institute.



Jayant B. Udgaonkar

Governance

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Prof. L.S. Shashidhara, *Professor*
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Secretary

Shri Y.S. Rajput, *Superintending Engineer, IISER Pune*

01

Research Activities and Achievements

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Research Report

Research at IISER Pune is carried out in six major disciplines and aims to reach a fundamental understanding of how the physical world works. Recognising that several complex systems and problems require multi-pronged approaches, many research areas pursued in IISER Pune combine the expertise and ideas from people with diverse training.



IISER Pune has shown a consistent upward trend in the number of publications per faculty member over the last few years. New initiatives in research administration foresee some of this research being taken to the next level through patents and product development. Our core strength in fundamental research in combination with recent advances in applied areas have begun to contribute commendably to the body of scientific knowledge. Our research will continue to be competitive and forge both academic and industrial partnerships within and outside India for better research outcomes.

DISCIPLINE-WISE NUMBER OF PUBLICATIONS DURING 2017

60
BIOLOGY

144
CHEMISTRY

10
EARTH AND CLIMATE SCIENCE

05
HUMANITIES AND SOCIAL SCIENCES

27
MATHEMATICS

208
PHYSICS

1. BIOLOGY RESEARCH REPORT

1.1 Biochemistry and Biophysics

Self-organisation and cell morphogenesis

Dr. Chaitanya Athale's laboratory focusses on self-organised mechanisms of spatial patterns at a sub-cellular and cellular level. Progress made over the last year includes

(i) Extending the model of aster centring (Khetan and Athale, 2016) to test the role of compartment size, aster density, and motor localisation
(ii) Extending the cell size heterogeneity (Gangan and Athale, 2017) to an effect in collective cell migration during colony expansion
(iii) Developing an automated DIC based tracking tool and validating it with experimental data
(iv) Analysing the effect of motor numbers in a quantitative gliding assay with dynein (Jain et al., submitted). The comparison of the experimental data with simulations suggests a phase-transition like change in directionality of transport, arising from single molecule kinetics.

Preliminary results are obtained on the effect of cell contractility patterns on tissue patterns, which were compared to cell shapes in *Drosophila* head involution in embryos. A collaboration has been initiated with Dr. Marie Delattre at ENS Lyon to examine the role of mechanical properties of the cytoplasm in *C. elegans* embryos on spindle oscillations.

Biological mechanisms of lipid signalling 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 signalling. Dr. Siddhesh Kamat has earlier discovered another serine hydrolase enzyme ABHD16A (also known as BAT5), that functions upstream of ABHD12, and biosynthesises lyso-PS lipids in the central nervous system (CNS) and innate immune system from phosphatidylserine (PS) precursors. These findings suggested a new lyso-PS nodal axis in humans. Both ABHD12 and ABHD16A have high expression and activity in the CNS and immune system, and so do the recently deorphanised 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.

Cell motility and bacterial cytoskeleton

Dr. Gayathri Pananghat's research focus is to understand the molecular mechanism of motility and cell shape determination based on the bacterial cytoskeleton using *Myxococcus xanthus* and *Spiroplasma* as model systems. This research uses techniques of structural biology (mainly X-ray crystallography and electron microscopy) and complementary biochemical and biophysical characterisation to study the structure and dynamics of assembly of the macromolecular complexes involved in motility.

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

- A novel allosteric mechanism of regulation of a small Ras-like GTPase MglA has been discovered based on ongoing structural and biochemical characterisation of MglA and MglB, proteins involved in spatial oscillations during *Myxococcus xanthus* motility.

- DNA-binding activity for the N-terminal domain of FrzCD, a methyl-accepting chemosensory protein, was discovered. Further delineation of the function of various subdomains of FrzCD for the cooperativity of DNA binding and oligomerisation are in progress.
- Collaborative work on shape determination of *Spiroplasma* involving cryotomography experiments of the organism has been initiated. MreBs in *Spiroplasma* have been purified and characterisation of these is in progress.

Origins and early evolution of life

Dr. Sudha Rajamani's group works on delineating how life chemically originated on the early Earth. The group studies processes by which polymers capable of catalysis and replication might have emerged, propagated, and evolved on prebiotic Earth. Understanding these processes has fundamental implications for discerning how chemistry transitioned to biology on the early Earth. Furthermore, the role of amphiphiles on all three of the aforementioned processes is central to understanding the said phenomena, and has imminent implications for the emergence of cellular life (a hallmark of extant biology). Towards this, Dr. Rajamani's group is characterising the use of various prebiotically pertinent monomers and understanding their polymerisation that would have resulted in the formation of informational molecules (e.g., nucleic acids like RNA). They are also systematically characterising self-aggregation processes involving amphiphiles, to discern how they could result in higher ordered aggregates such as vesicular compartments that eventually gave rise to primitive cells.

1.2 Cell and Developmental Biology

DNA damage and maintenance of genome integrity

Dr. Mayurika Lahiri's group is working on dissecting 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. The group has shown that 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 aberrant Golgi phenotype in methylation damaged breast acini was through activation of DNA-PK. Inhibiting DNA-PK using a small molecule inhibitor was able to rescue aberrant Golgi phenotype and partially rescue polarity and (EMT)-like phenotype. Another avenue under investigation is the role of phospholipid mediators such as platelet activating factor (PAF) in breast cancer initiation and progression. PAF treatment led to apico-basal polarity disruption and diffused cell-cell junction resembling (EMT)-like phenotype.

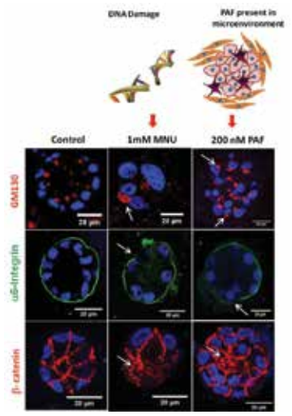


Figure 1: Representative images of 3D cultures exhibiting DNA damage and PAF induced transformation: MCF10A, a non-tumorigenic breast epithelial cell line, was grown as 3D 'on top' cultures, for 16 days. MNU is a prototypic SN1 type methylating agent, known to induce DNA damage, and PAF is known to be secreted by various cell types present in the microenvironment. On exposure to these chemicals these spheroids exhibit (a) loss of apical polarity (mislocalisation of GM130, a golgi marker), (b) basal polarity (loss of α6-Integrin), and (c) disrupted cell-cell junctions (aberrant staining of β-catenin), all indicative of transformation. Currently, pathway(s) involved in the transformation are being investigated. (Dr. Mayurika Lahiri's Group)

Cell biology of development and differentiation

Mitochondria are semi-autonomous organelles inherited maternally in metazoan embryos. Mitochondria are dynamic and their shape is maintained by dedicated mitochondrial fusion and fission proteins. Studies by Dr. Richa Rikhy's group have shown that mitochondria are largely dispersed and fragmented in syncytial *Drosophila* embryos. They are associated with one nucleo-cytoplasmic domain in syncytial embryos and their apico-basal density is maintained with the help of transport along microtubules. ATP derived from mitochondria is crucial for morphogenetic events that progress the syncytial division cycles. Fragmented mitochondria are transported towards the apical region in cellularisation and this transport is inhibited by abrogating mitochondrial fission protein Drp1. Loss of transport to the apical region results in aberrant apical constriction and misalignment of cells during gastrulation thus showing a role for mitochondrial morphology in regulation of germ layer formation.

Analysis of fused mitochondria in Drp1 mutant follicle cells during oogenesis showed that it has a higher mitochondrial membrane potential. This is maintained by the EGFR signalling pathway. Loss of mitochondrial membrane potential leads to reversal of Notch mediated differentiation defects in follicle cells.

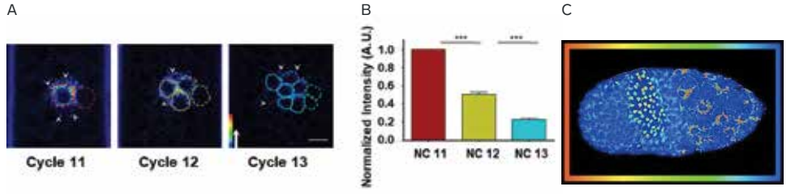


Figure 2: Photoactivated mitochondria (A) are distributed equally (B) into the two daughter cells on division in the syncytial *Drosophila* embryo. Fused mitochondria in drp1 mutant follicle cells (yellow boundary, C) have a higher mitochondrial membrane potential as compared to neighbouring control follicle cells. The rainbow colour scale shown in A and C depicts increase in intensity from blue to red. (Dr. Richa Rikhy's Group)

Molecular principles underlying animal development and disease

Dr. Girish Ratnaparkhi's group uses *Drosophila melanogaster* (fruit fly) as a model organism to uncover fundamental biological mechanisms, ranging from host defence and gene duplication in evolution to neurodegenerative disease. The highlights of research this year, include the generation and validation of Genome Edited, mutant transgenic lines for the genes *Jra*, Dorsal and Caspar using the emerging Crispr/Cas9 technology. The allelic variants thus created express proteins that are resistant to SUMOylation and the group predicts that this lack of SUMOylation will affect the robustness of the immune response. While modelling Amyotrophic Lateral Sclerosis (ALS) causing protein aggregates in the larval brain, the group observed that the levels of cellular Reactive Oxygen Species (ROS) dictate the clearance of aggregates. ROS levels in turn are regulated by another ALS locus SOD1, as also TOR signalling. This is an exciting finding and may have implications for understanding neuroaggregation dynamics in the human brain. While working with the gene-duplicated MADF-BESS family, the redundant function between the genes *Stonewall* and *Brickwall* in the specification of the female germline was uncovered.

Cell growth and development

Prof. L.S. Shashidhara's group is interested in understanding the mechanism by which organ size and shape are determined. The group uses differential development of wing and haltere in *Drosophila* as a model system to study cellular and molecular events regulating epithelial morphogenesis, the results of which have implications to understand human cancer. They also investigate molecular changes that are associated with the evolution of flight appendages in diverse insect groups. A major finding during this year is the involvement of negative regulators of elongation of RNA polymerase II in growth control. The group has also shown

that the PTPN11, a protein phosphatase, functions as a tumour-suppressor by activating apoptosis in cancer cells with severe DNA damage.

1.3 Chromosome Biology and Epigenetic Regulation

Delineating the chromatin modification signature associated with bidirectional promoters

In contrast to unidirectional promoters wherein antisense transcription results in short transcripts which are rapidly degraded, bidirectional promoters produce mature transcripts in both sense and antisense orientation. To understand the molecular mechanism of how productive bidirectional transcription is regulated, Prof. Sanjeev Galande's group focussed on delineating the chromatin signature of bidirectional promoters. To solve this, the group designed and validated a reporter system that enables simultaneous scoring of transcriptional activity in opposite directions. Testing of putative bidirectional promoters in this system demonstrated no measurable bias towards any one direction of transcription. The NUP26L-PIH1D3 bidirectional gene pair was analysed during retinoic acid mediated differentiation of embryonic carcinoma cells. In their native context, it was observed that the chromatin landscape at and around the transcription regulatory region between the pair of bidirectional genes is modulated in concordance with transcriptional activity of each gene in the pair. This analysis was then extended to 974 bidirectional gene pairs in two different cell lines, H1 human embryonic stem cells and CD4 positive T cells using publicly available ChIP-Seq and RNA-Seq data. The group found that for the entire range of intergenic distance separating bidirectional genes, the expression profile of such genes (symmetric or asymmetric) matches the histone modification profile of marks associated with active transcription initiation and elongation. Thus, this work demonstrated unique distribution of histone modification marks that correlate strongly with the transcription status of genes regulated by bidirectional promoters. These findings strongly imply that occurrence of these marks might signal the transcription machinery to drive maturation of antisense transcription from the bidirectional promoters.

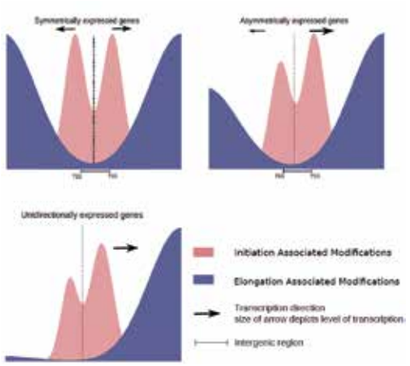


Figure 3: Model depicting the unique enrichment of histone modifications on bidirectional promoter. Distribution of active promoter mark and elongation marks show unique enrichment on bidirectional promoter which correlates with transcriptional status of bidirectional promoter regulated gene pairs. Genes that are symmetrically expressed from bidirectional promoter show bimodal enrichment of transcription associated histone marks. In contrast, asymmetrically expressed genes behave like unidirectional promoters with respect to direction of active mature transcription (Prof. Sanjeev Galande's Group)

Epigenetics and transcriptional regulation in *Plasmodium falciparum*

Malaria parasites can readily sense and adapt to environmental changes, thus making the control and eradication of this disease difficult. Molecular studies have unravelled a very tightly coordinated transcriptional machinery governed by complex regulatory mechanisms including chromatin modification and spatiotemporal compartmentalisation. Histone modifying enzymes play key roles in the regulation of chromatin modification and gene expression, which are associated with cell cycle progression, antigenic variation and immune evasion. Dr. Krishanpal Karmodiya's group performed a comprehensive review of the key regulators of the *Plasmodium falciparum* histone acetylome; histone acetyltransferases (HATs); and histone deacetylases (HDACs). They described the genome-wide occurrence of HATs and HDACs in the *P. falciparum* genome and identified novel as well as previously unclassified HATs. Among these are several HATs and HDACs with unique and noncanonical domain combinations indicating their involvement in other associated functions. Moreover, many of the HATs and HDACs are close to the prokaryotic systems and thus highlighting their potential as therapeutic targets.

Chromosome biology

The nucleus is the control centre of cells which houses our genetic material i.e., DNA, organised as chromosomes. Dr. Kundan Sengupta's group is studying how nuclear architecture impacts the function of cancer cells. Depleting cells of a subunit of nucleoporin (Nup93)—otherwise a controlled gateway for macromolecules into the nucleus—results in the untimely expression of HOXA gene cluster, associated with cancers. The maintenance of chromosome numbers and function is critical in all cells, since chromosomal instability also promotes cancers. The group found that Lamin proteins at the border of the nucleus also maintain chromosome number, organisation, and function. In a surprise finding, they also found that lamins also surround the nucleolus, a nuclear sub-organelle essential for protein synthesis. The group is studying how the nucleus responds to extraneous signals when cells are converted from epithelial to mesenchymal cells—a key process involved in cancer progression.

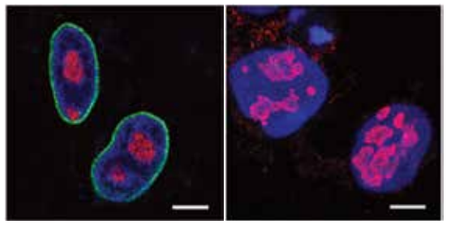


Figure 4: *(Left)* Cells typically have two independent and discrete nucleoli (red), Lamin protein (green) at the edge of the nucleus (blue); *(Right)* Lowering Lamin levels in cells results in large nucleolar blob (red) (Dr. Kundan Sengupta's Group)

1.4 Plant Biology, Ecology and Evolution

Molecular plant biology

Research questions centred on plant growth and development, plant-pathogen interaction as well as the basis of land plant evolution are being addressed in Dr. Anjan Banerjee's group. A variety of model organisms (potato, moss, Marchantia, *Coccinia grandis, Phytophthora infestans* (oomycete) are explored to address hypotheses. The group is working on deciphering molecular signals that trigger the tuberisation mechanism (potato formation) in potato, an important food crop. Apart from the discovery of a number of mobile RNAs, several small RNAs (microRNAs and short-interfering RNAs) that play important role in potato development have also been identified. The role of epigenetic players in tuberisation is also being investigated. The group showed for the first time that microRNA160 plays a crucial role in establishment of Systemic Acquired Resistance in potato-phytophthora interaction.

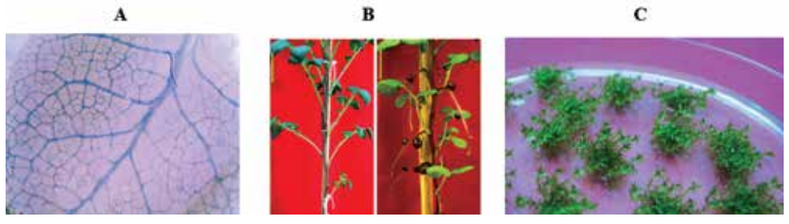


Figure 5: *(Left)* Blue colour in leaf veins reflect GUS marker gene expression pattern indicative of a cyclin DOF factor 1 *(StCDF1)* gene expression in potato leaf. *(Middle)* Over-expression of a Polycomb Repressor Complex-2 (PRC-2) group protein StMSI1 leads to the development of ectopic aerial tubers in potato under short-day photoperiod induction (scale bar: 3 cm) *(Right)* Effect of unilateral white light on moss *(P. patens)* gametophore. (Dr. Anjan Banerjee's Group)

To understand how land plants evolved, the evolution and development of apical meristem is being studied, using moss *(P. patens)* and Liverwort *(Marchantia)* as models. Through a bioinformatics approach and *C. grandis* as a model, the molecular basis of sex-expression and modification in plants is being investigated.

Plant physiological ecology

In work towards understanding the thermal limits for function in tropical plants, Dr. Deepak Barua's group examined thermotolerance in tropical herbaceous plants (with BS MS student Urmi Poddar). The results showed that thermotolerance differed between plant functional types, and the range of thermotolerance observed was substantially lower than in woody species from this region. Importantly, the previously reported relationships between leaf functional traits and thermotolerance were also evident in these herbaceous species. Other ongoing work in the lab includes: 1) Investigation of drought tolerance in tropical dry forest trees, and the underlying mechanistic basis of leaf anatomical and morphological traits (with Integrated PhD student Ron Sunny); 2) Work on understanding plant pollinator interactions in seasonally dry forests of this region (with PhD student Souparna Charkrabarty); and, 3) Work on the reproductive biology of *Jasminum malabaricum* (with PhD student Shatarupa Ganguly).

Population dynamics

Global climate is changing rapidly and is accompanied by large-scale destruction of habitats. Since dispersal is the first line of defence for mobile organisms to cope with such adversities in their environment, it is important to understand the causes and consequences of evolution of dispersal. Although dispersal is a complex phenomenon involving multiple dispersal-traits like propensity (tendency to leave the natal patch) and ability (to travel long distances), the relationship between these traits is not always straight-forward. Dr. Sutirth Dey's group subjected four large (*N~2500*) outbred populations of *Drosophila melanogaster* to artificial selection for increased dispersal, in a setup that mimicked increasing habitat fragmentation over 33 generations. They showed that dispersal properties can evolve rapidly leading to a change in the dispersal kernel. They also found that although sex-biased dispersal exists in *Drosophila melanogaster*, its expression can vary depending on which dispersal component is being measured and the environmental condition under which dispersal takes place. These results are important for understanding phenomena like speed of range expansion, disease spread, evolution of invasive species, and destabilisation of metapopulation dynamics.

Communication signals in animals

Dr. Anand Krishnan's work focusses on understanding how animal communication signals evolve, and studying their functional diversity in an interdisciplinary context. The study is conducted on birds and bats, two flying organisms that use sound for very different purposes. Projects initiated during the year include understanding acoustic signalling strategies in Asian barbets, studying the acoustic niches of scrubland bird communities in relation to environmental sound transmission, quantifying the acoustic diversity of bat communities along a Himalayan altitudinal gradient, and investigating the role of colour complementarity in the diversification of bird colour. This work combines field studies, laboratory techniques, and theoretical and phylogenetic analyses. Research in natural history collections around the world also forms a major component of this work as the tremendous diversity held in museum collections provides a wealth of information on morphology and colour that is invaluable to the interdisciplinary biologist.

Biodiversity and economics, Evolutionary medicine

Prof. Milind Watve's research during 2017-18 involved people, biodiversity, economics, and health.

Peoples' intuitive economics: Addressing a variety of questions related to people's perception of development, as a part of the Maharashtra Gene Bank project, certain intuitive ways of optimising cost-benefits that they follow were observed. This leads to some new fundamental principle in economics and evolutionary biology as well. The group could answer a basic question related to the conditions under which the cost-benefit ratio needs to be optimised and the conditions under which the difference need to be optimised. This clarity at least partly explains people's differential responses to different developmental strategies.

Pilot implementation of community operated compensation: The group suggested a community operated scheme as an alternative to the wild herbivore crop damage compensation protocol that has proved highly unsatisfactory. With support from Vidarbh Development Board, a pilot implementation of the scheme started in two villages which will continue for one more year. This is perhaps the first game theory based protocol that a government agency is considering to implement.

BILD clinic: The clinic-based on the concepts in evolutionary medicine developed at Prof. Watve's lab was inaugurated at Deenanath Mangeshkar Hospital and Research Center, Pune. This is the first clinic in the world based on evolutionary medicine.

1.5 Neurobiology and Computational Biology

From neural circuits to behaviour

Dr. Nixon M. Abraham's group study different aspects of sensory information processing and decision-making. They use a combination of techniques such as automated olfactory behaviour, optogenetics, and electrophysiology to address different questions. The group investigated how sampling behaviour modulates decision-making. Trained mice discriminated monomolecular odorants and binary mixtures on fast but varying time scales depending on chemical class and similarity of the stimuli. They observed maximum number of breath initiations occurring during the decision-making time window for simple odours; and for complex binary mixtures this occurred few milliseconds earlier than the decision-making time period. Decision times were anti-correlated with the similarity and activation strengths of glomerular patterns evoked in the olfactory bulb. These results show that mice develop an optimal and persistent sampling strategy towards the odour discriminations of varying complexities.

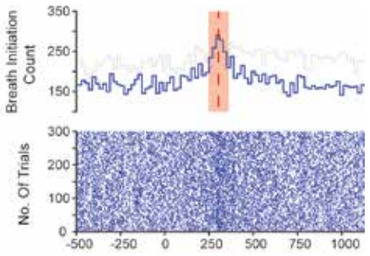


Figure 6: Sampling behaviour of mice during decision-making. Bottom half of the panel, the raster plot, shows the breath initiation pattern of the mice while they are taking accurate decisions. Blue line on top half shows the peri-stimulus time histogram for specific odour pair whereas grey line represents the same for the control task. The red dotted line and shaded region represent the Decision Time ± SEM (Dr. Nixon Abraham's Group)

Neuronal networks

Dr. Collins Assisi's work is focussed on two paradigmatic systems in neuroscience, namely, the networks of the hippocampal formation implicated in navigation and memory and the olfactory system. Work on hippocampal/entorhinal networks is summarised below. Neurons in the medial entorhinal cortex, termed grid cells, spike in a spatially circumscribed manner. The locations of space where a given grid cell fires define a hexagonally symmetric periodic array. This crystalline receptive field serves as a reference frame within which the animal navigates

its environment. The symmetry of grid cell activity and the perturbations of this symmetry as the environmental boundaries are sheared are well known in the extant literature. Much less is known about how these spatiotemporal patterns emerge from the wetware of the brain. The group's work over the last few years is the first to incorporate the known biophysical properties of stellate cells and the connectivity of entorhinal networks to arrive at a model that generates grid cell receptive fields.

Key achievements during the last year were (1) to elucidate the potential network topologies that can generate hexagonal grid like patterns; (2) to understand the role of theta oscillations in the formation of grid cell receptive fields; (3) the process of learning modifies the representation of space evidenced from a change in the spatial frequency of grid cell receptive fields and the spatial extent of individual fields over the duration of learning. The group showed that inhibitory plasticity in the medial entorhinal cortex can lead to the transformation of grid cell receptive fields seen as animals learn their environment.

Structural plasticity of neuronal circuits

Dr. Aurnab Ghose's work in the past year has included the identification of a new activity coordinating the actin and microtubule cytoskeletons and also uncovered mechanisms that mediate intrinsic contractility of neuronal axons. These studies offer new insight into the development and structural plasticity of neural circuits. In a different line of work, the group has identified novel neuronal mechanisms underlying behavioural flexibility in a social behaviour and dissected peptidergic signalling tuning physiological states to behavioural responses to food- and fear-associated cues. The latter line of research underscores the importance of flexibility of behavioural outputs and is of some significance to neuropsychiatric disorders.

Role of CART in reward processing

Prof. N.K. Subhedar's group has been interested in understanding the role of the neuropeptide CART in the reward processing mechanisms in the brain. Using intracranial self-stimulation protocol, they showed that the peptide containing neurons in the lateral hypothalamus project to the paraventricular thalamic neurons in the brain, which in turn seem to communicate with the nucleus accumbens neurons using glutamatergic pathway. They suggest that the circuit might support food seeking behaviour under natural conditions and also store reward memory.

Computational neurobiology

In a novel form of metaplasticity, Dr. Suhita Nadkarni's group showed that the presence of Endoplasmic Reticulum (ER) in CA1 spines constrains potentiation and enhances the depression window via regulation of calcium. Given that most large spines of CA1 have ER, this may be an important mechanism to curb runaway strengthening of large synapses. The group also observed that vesicular release by astrocytes is enhanced in AD. Simulated pathological conditions of changes in mGluR expression and leak in a biophysically detailed model of calcium dynamics and vesicle exocytosis in astrocytes lead to increased synchronous calcium activity (compared to control) and in contrast, a loss in temporal precision of release of gliotransmitter.

Neurobiology of movement initiation

Dr. Raghav Rajan's group is working on understanding how neural activity generates behaviours that are important for an organism, using the zebra finch, a songbird, as the model system. Three broad questions being pursued are as follows:

1. Adult zebra finch song bouts are initiated with a variable number of short syllables called introductory notes (INs). INs are thought to represent motor preparation in the brain. The group is studying how INs are produced and what role they may play in song initiation.
2. Male zebra finches produce courtship song in the presence of a female zebra finch. This courtship song differs in many ways from song produced when the bird is alone. The group is interested in understanding how the brain recognises the two contexts and alters song accordingly.
3. Another topic of study relates to how female zebra finches develop preferences for male zebra finch song.

2. CHEMISTRY RESEARCH REPORT

2.1 Organic and Chemical Biology

Targeting mitochondria in cancer

The mitochondrion is a crucial organelle in eukaryotic cells which controls the cellular bioenergetics, synthesises important metabolic intermediates, and is a signalling hub. Mitochondrial dysfunctions are associated with human inherited diseases as well as common diseases like neurodegenerative disorders and cancer. Lack of tools for manipulating and detecting processes occurring within the mitochondria limit our understanding of this potential therapeutic target. To address this, Dr. Sudipta Basu's laboratory mainly focusses on three aspects of mitochondrial biology: (a) Developing small molecules to impair mitochondrial functions; (b) Developing tools to understand mitochondrial trafficking; and (c) Developing tools to understand mitochondrial microenvironment.

Tandem organocatalytic synthesis

Dr. Ramakrishna Bhat's group developed an expedient and straightforward protocol for the synthesis of highly enantiopure γ-butyrolactones. For the first time, one-pot enantioselective organocatalytic multicomponent reaction (OMCR) is explored to construct functionalised butyrolactones without the use of pre-functionalised substrates and expensive transition metals. This protocol is reproducible on a gram scale.

Enantioselective organocatalytic multicomponent reaction of aldehyde, ketone and Meldrum's acid is developed for the first time since its discovery. Cinchona based primary amine (1 mol%) catalyses the multicomponent reaction via the formation of Knoevenagel product and chiral enamine to form enantiopure δ-keto Meldrum's acids in a tandem catalytic pathway. This mild protocol provides an easy access to enantiopure carboxylic acids, esters, and amides and the method proved to be scalable on a gram scale. Similarly, the group demonstrated a one-pot protocol for the direct and clean transformation of aryl acetic acids to aldehydes and ketones in water using less expensive $K_2S_2O_8$ as a reagent. Further, a transition-metal-free carbamoylation of heterocycles using formamides/NMF/DMF and $K_2S_2O_8$ and a novel one-pot transition-metal-free synthesis of styrenyl ethers from 2-aryloxy/alkoxy acetophenones via Bamford-Stevens reaction were developed for the first time.

Redox homeostasis

Maintenance of redox homeostasis is crucial for cellular survival and growth. An important sub-set of the cellular redox world is gaseous reactive species of nitrogen, oxygen, and sulphur. Altered levels of these gases are associated with various pathophysiological conditions and are key mediators of host-pathogen interactions. Furthermore, perturbation of redox homeostasis has recently been implicated in antibiotic action. Dr. Harinath Chakrapani's laboratory has developed several small molecule tools to reliably enhance gaseous redox-

active reactive species including reactive oxygen species (ROS), nitric oxide (NO), and hydrogen sulphide (H_2S). Their design strategy offers scope for spatiotemporal control, tunable release as well as cell-type specificity. During the previous year, the group has developed a series of new tools to generate hydrogen sulphide within cells using metabolic triggers. They found that sensitivity of antibiotic-resistant bacteria to drugs can be modulated by varying levels of this gas, thus suggesting an important role for hydrogen sulphide and its associated biosynthetic pathways in antibiotic resistance.

Peroxide synthesis using metal catalyst

Oxindole-based nitrogen heterocycles are found in many therapeutic drugs and naturally occurring molecules. Dr. Gnanaprakasam's research group has developed a metal-catalysed approach for C-H alkylation and C-H hydroxylation of 2-oxindoles to generate a series of derivatives containing quaternary carbon centre. Peroxide is a key pharmacophore due to its omnipresence in a variety of biologically active compounds, natural products and drugs. For instance, Artemisinin constituting cyclic peroxide has been used in treating malaria. Therefore, developing a novel sustainable method for peroxide synthesis using metal catalyst with sustainable approach has inspired research in modern organic synthesis. Towards this direction, Dr. Gnanaprakasam's research group developed iron-catalysed dehydrogenative cross-coupling of carbonyl compounds with aliphatic peroxide under mild reaction condition. A library of linear alkylated and arylated peroxides are synthesised in good to excellent yield. This peroxidation reaction is scalable to grams and also synthesisable in continuous flow with increased safety in short duration. In addition, the efficacy of the heterogeneous superparamagnetic catalyst was investigated for C-H peroxidation of carbonyl compounds under batch conditions and in a continuous flow-type reactor. The potential of peroxides is evaluated by cell viability assay and found to exhibit the good anticancer activity with minimum IC_{50}= 5.3 μM. Presently, Dr. Gnanaprakasam's research group is developing synthetic approach for the synthesis of bio-active polyketide and oxindole based natural products.

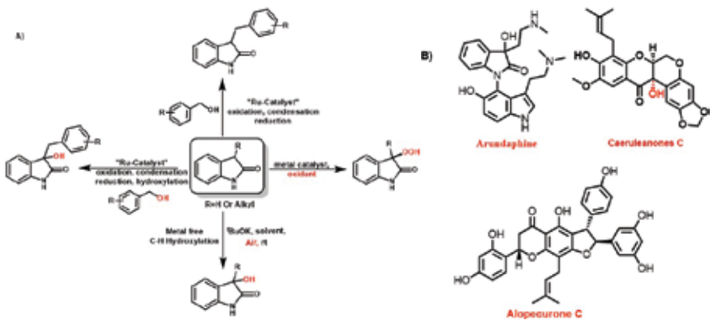


Figure 7: A) Metal-catalysed C-H functionalisation of 2-oxindole derivatives; B) Targeted biologically active natural products (Dr. Gnanaprakasam's Group)

Hybrid peptides

Dr. H.N. Gopi's research group works on naturally occurring non-ribosomal amino acids along with novel synthetic γ-amino acids with an aim to use stable protein mimetics in structure-based drug design, as protease inhibitors, antibiotics (antimicrobials), self-assembled soft biomaterials such as hydrogels, vesicles, and nanotubes. Focus is also on development of new methodologies for peptide synthesis, peptide ligation, and novel amino acids synthesis. The group has designed artificial β-double helices using oligomers of α,β-unsaturated β-amino acids and studied their conformations in single crystals and in solution. They have also designed β-hairpins that can inhibit the aggregation of β-amyloids, and have designed and studied antimicrobial properties of different α,γ-hybrid helical foldamers.

Vitamin biosynthesis

Dr. Amrita Hazra's group works on the enzymology of Vitamin B1, B2, and B12 synthesis in bacteria and archaea and in some eukaryotes such as yeast, and further designing vitamin-based drugs and biosensors based on the enzyme mechanisms. The group is working on three projects: (1) enzymology of three unique methylation reactions that occur during the biosynthesis of 5,6-dimethylbenzimidazole, the lower ligand of Vitamin B12; (2) biosynthesis of riboflavin (Vitamin B2) and its conversion to flavin mononucleotide and flavin adenine dinucleotide. The group is interested in understanding the molecular basis of choice of nucleotide (ATP for most enzymes) for these two conversions, and plans to alter the specificity of the enzyme to accept various nucleotides; (3) cross-talk of Vitamin B1 biosynthesis with nucleotide biosynthesis in *Escherichia coli,* and the physiology of perturbing these two important pathways.

Gaining an understanding of microbial vitamin biosynthesis pathways that are not present in humans not only allows us to improve industrial vitamin production, but also provides a platform for the design of specific drugs and antibiotics for inhibiting microbes while not affecting human health.

Targeted drug delivery in cancer

Receptor-mediated endocytosis of nano-carriers is important for targeted delivery of anticancer drugs to cancer tissues under physiological conditions. Prof. M. Jayakannan's group has developed biotin-conjugated polysaccharide vesicular nanocarriers to accomplish receptor-mediated endocytosis in cancer cells and deliver anticancer drugs at the intracellular compartments under multi-stimuli-responsiveness.

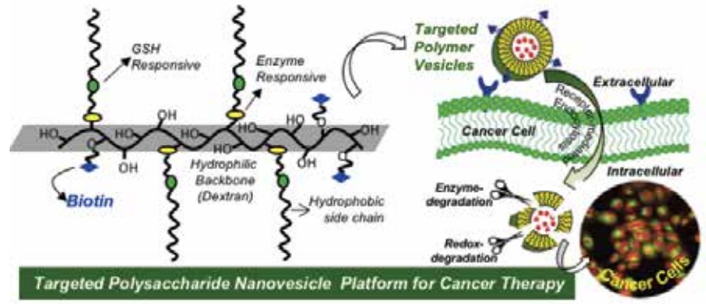


Figure 8: Biotin-tagged polysaccharide vesicular nano-assemblies for receptor-mediated endocytosis in cancer cells and delivery of DOX (Prof. M. Jayakannan's Group)

The custom designed amphiphilic dextran based polymer has self-assembled into nanovesicles of < 200 nm in size and provided appropriate geometry for encapsulation of doxorubicin-hydrochloride (DOX). *In vitro* drug release kinetics revealed the dextran vesicles were stable under extracellular conditions and underwent redox-degradation in the presence of cytosol residue- glutathione (GSH) to release DOX. The intracellular biodegradation of nano-vesicles was further evident by live cell imaging using lyso-trackers. Time-dependent drug uptake studies by confocal microscope and flow cytometry revealed that the streptavidin receptor overexpressed cervical cancer cells (HeLa) exclusively showed large amount of drug accumulation with respect to the biotin-streptavidin receptor-assisted endocytosis. It was proven that the DOX uptake in cancer cells were found to be significantly predominant while delivering the drugs from the biotin-tagged vesicular platform compared. This investigation provides first insights into the targeted drug delivery approach based on polysaccharide vesicle platform, and the proof-of-concept is successfully demonstrated in streptavidin overexpressed cervical cancer cells.

Extracellular matrix (ECM) glycopeptides for cell surface markers

Combinatorial libraries of structurally defined homologs of extracellular matrix (ECM) glycopeptides can significantly accelerate the identification of cell surface markers involved in a variety of physiological and pathological processes. Dr. Raghavendra Kikkeri's group used a simple and reliable host-guest approach to design high-throughput glyco-collagen library to modulate the primary and secondary cell lines migration process. They used 4-amidoadamantyl-substituted collagen peptides and β-cyclodextrin (β-CD) appended with mono or disaccharides to construct self-assembled glyco-collagen conjugates (GCC). The conjugates were found to be thermally stable, with triple helix structures and nanoneedle-like morphologies that altered cell migration processes. The group demonstrated a real-time application of GCC in murine wound model and is working on expanding the scope of this platform for potential applications in stem cell biology and regenerative medicine.

Nucleic acid chemistry and biophysics

Dr. Seergazhi G. Srivatsan's group is 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. It is expected that these self-assemblies would provide platforms for designing biosensors, biomaterials, and scaffolds for non-templated/ non-enzymatic oligomerisation of nucleic acids.

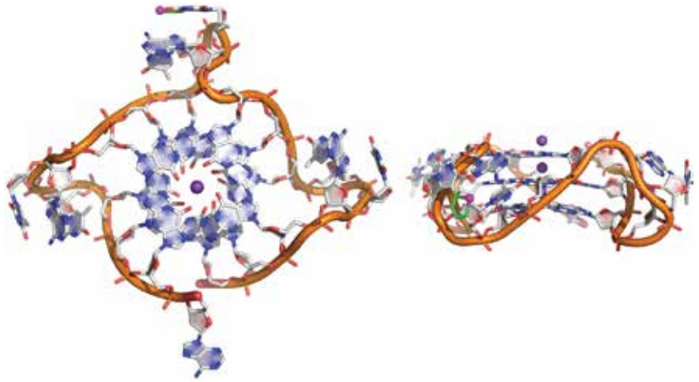


Figure 9: Crystal structure of selenophene-labeled human telomeric DNA repeat (Dr. S.G. Srivatsan's Group)

Some of the nucleoside analogs developed have been successfully used in studying the bacterial ribosomal decoding site RNA-antibiotic interaction *(Angew. Chem. 2017)* and non-canonical nucleic acid structural motifs such G-quadruplexes and i-motif in real time using cell models *(ChemBioChem* 2018), and 3D and live cells by using combinations of fluorescence, NMR and X-ray crystallography techniques (unpublished). The group developed practical chemical labelling and imaging methods for cellular RNA by using chemo-selective reactions and environment-sensitive fluorescent peptide nucleic acid probes *(ChemBioChem* 2018, *Nucl. Acids Res.* 2018, *Bioconjugate Chem.* 2017). In parallel, the group has developed novel functional materials with surface tunability and metal ion responsiveness by using simple self-assembling nucleolipid supramolecular synthons derived by attaching various fatty acids to the sugar residue of thymidine nucleoside (*ACS Appl. Mater. Interfaces* 2017).

Self-assembly and molecular recognition

Dr. Pinaki Talukdar's group has developed diverse small-molecule carriers and channels that facilitate chloride ion (Cl^-) transport and H^+/Cl^- co-transport across the lipid bilayer membrane. Involving the Lipinski's rule of permeability *i.e.*, logP ~ 5 in the design to improve permeability of these molecules in the lipid membrane could help improve ion transport activity. Based on this idea, the group has developed a bispidine-melamine hybrid that transports both H^+ and Cl^- across lipid bilayer by forming a liplock-type complex involving multiple H^+ and Cl^-. The bispidine and melamine moieties were further used by the group to form a tripodal semicage that allows pH-gated chloride transport. Bis(sulfonamide) transmembrane carriers were further developed to allow pH-gated inversion of ion selectivity. Anion channel formation has been demonstrated based on the self-assembly of small-molecule fumaramides and fluorinated sugar amino acid derived alpha, gamma-cyclic peptides.

2.2 Inorganic and Materials Science

Solid-liquid and solid-solid interfaces

Metal-organic coordination polymers (CPs) downsised to thin films with controllable electrical conductivity are promising for electronic device applications. Dr. Nirmalya Ballav's group has demonstrated, for the first time, thermally-driven resistive switching in thin films of semiconducting CP consisting of silver ion and tetracyanoquinodimethane ligand (Ag-TCNQ). High-quality and highly-hydrophobic thin films of Ag-TCNQ were fabricated through layer-by-layer approach upon sacrificing a pre-deposited layer of Cu-TCNQ on thiolated Au substrate. Reversible switching between high-resistance state (HRS) at 300 K and low-resistance state (LRS) at 400 K with an enhancement factor of as high as ~106 in electrical resistance was realised. The phenomenon is attributed to the alternation of Schottky barrier at the metal-semiconductor interface by thermal energy and not due to the formation of conductive filament.

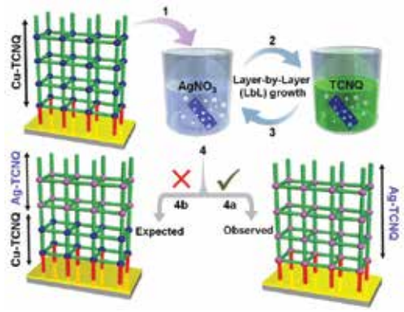


Figure 10: Fabrication of thin films of metal-organics by employing layer-by-layer growth method. An example of sacrificial growth of Cu-TCNQ to Ag-TCNQ is demonstrated. (Dr. Nirmalya Ballav's Group)

Solid-liquid interface

Graphene-based materials with characteristic electrical double layer capacitance (EDLC) are emerging as smart alternatives. Dr. Ballav's group has reported an unconventional approach of producing reduced graphene oxide (rGO) which can be readily used as an active material for the fabrication of supercapacitor electrodes. The reducing agent can be easily recycled for the subsequent feeds of graphene oxide (GO) reduction. An impressive performance of as-synthesised rGO in all-solid-state supercapacitor applications holds a translational promise on the industrial level. The potential window was also increased up to 2.5 V by employing organic electrolyte.

Synthetic inorganic chemistry: Materials applications

Dr. R. Boomishankar's group works on the development of (1) organic and hybrid organic-inorganic ferroelectrics with emphasis to energy harvesting devices; (2) neutral cluster cages supported by anionic cis-blocking phosphorus containing reagents; and (3) organosilane and -siloxane platforms for supramolecular and catalytic applications. Over the last few years, the group has been developing novel di- and tripodal phosphoramide ligands for the assembly of polar metal-organic cages with ferroelectric behaviour. In continuation of these efforts, a rare series of hierarchical cage-connected assemblies have recently been developed based

on an octahedral cage of the type Cu_6L_8 supported by a tripodal phosphoramide ligand (L). The octahedral cage contains a water ligand in each of the six copper atoms which can be sequentially replaced with the formation of connected-cage architectures with only axial symmetric elements. Ferroelectric measurements on these assemblies revealed the presence of anisotropic polarisation behaviour. Such observations are unprecedented in metal-organic cages and frameworks.

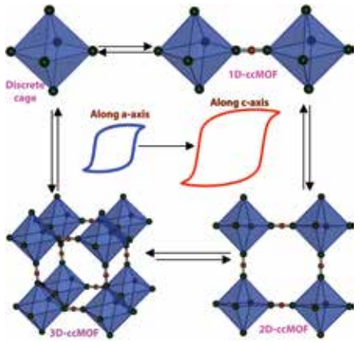


Figure 11: Schematic showing the reversible formation of cage-connected hierarchical frameworks and the existence of ferroelectric anisotropic behaviour (Dr. R. Boomi Shankar's Group)

The group is also interested in organic and organic-inorganic ferroelectric and piezoelectric materials as potential mechanical energy harvesters. They have synthesised and characterised a new ferroelectric phosphonium salt $[Ph_2P(NH^iPr)_2]\cdot PF_6$ which exhibits a significant ferroelectric polarisation value of ~6 μCcm^{-2} for its single crystals. It can further be fabricated into composite films in the presence of polydimethylsiloxane (PDMS) polymer.

Hydrolytic and chemical stability of MOFs

Metal-organic frameworks (MOFs) are porous solids with several potential applications; however, hydrolytic and chemical stability remain core issues in this domain of research. Ionic-MOFs (iMOFs), which are a subset of MOFs, are highly suited as ion-exchange materials for practical implementation. In this regard, Dr. Sujit Ghosh's group has reported a robust design strategy which can lead to synthesis of stable ionic-sorbents for capture of toxic organic dyes. The title compound was found to be stable over a wide pH range, especially under high alkaline conditions, which is rarely observed for MOFs. The stability features of the compound have been tapped for the function of ion-exchange of several anionic dye molecules. The parent compound could be used over multiple cycles and also be applied as stationary phase in a prototype column set-up with no loss of performance.

Transition metal chemistry

The advent of N-heterocyclic silylenes (NHSis) and their ability to activate small molecules led to envisage that they could be the alternative ligands to NHCs. However, the area of transition metal silylene complexes had been held back for many years especially because of the very low yield of silylenes. Since the high yield isolation of Si(II) compounds by dehydrohalogenation protocol, there is a significant paradigm shift in the chemistry of transition metal silylene complexes. Dr. Shabana Khan's group is exploring silylene $[PhC(NtBu)_2SiN(SiMe_3)_2]$ as a ligand to prepare Cu(I), Ag(I), and Au(I) complexes which are being utilised further for photophysical and catalytic applications. The group prepared a series of sila-thione / selenone from the corresponding silylene and used them as ligands for coinage metals and extended these studies towards germylene and stannylene.

In recent years gold(I) complexes have shown their 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, the group is developing PNP and SiNP based Au(I)+ complexes which can be further used in catalytic reactions. The PNP based cations are found to be luminescent due to the presence of strong intramolecular Au...Au interactions. However, SiNP based Au(I) cation is very weakly luminescent. Silylene stabilised Au(I) cations are being utilised as a catalyst in glycoside chemistry.

Main-group and transition metal compounds for catalysis

High-energy-density batteries that are in global demand can be achieved by utilising anode materials with higher specific capacities than the commercially available ones. While the commercial anode material, graphite, has a poor theoretical capacity of 372 mA h g-1, germanium has a theoretical capacity of 1600 mA h g^{-1}. The accompanied large volume expansion during the battery cycles has been detrimental in popularising germanium-based anode materials for commercial usage. Dr. Moumita Majumdar's group, in collaboration with Prof. Satishchandra Ogale (Physics Department, IISER Pune), has developed a germanium nano-composite that shows a very high specific capacity of 1300 mA h g^{-1} and good cycling performances without undergoing any major volume changes and cell pulverisations. The group has stabilised Ge(II) monocations using a variety of tetradentate ligands which are being explored in the laboratory for transition metal-free catalytic applications.

Electrochemistry

Dr. Muhammed Musthafa's group has developed a high voltage aqueous supercapacitor by decoupling the direct acid alkali chemistry. This is expected to pave the way for boosting the energy density of aqueous capacitors without compromising their power capability, which has been a classical challenge for electrochemical capacitors. Since energy density (E) is quadratically related to working voltage window (V) by the relation $\frac{1}{2}CV^2$ (where C is the specific capacitance), the most beneficial strategy to boost the energy density towards developing smart energy devices is targeting the working voltage window. However, expanding the voltage window beyond 1.23 V in aqueous system is thermodynamically challenging due to the occurrence of parasitic water splitting reactions. The group has shown that parasitic chemistry can be arrested by decoupling the direct acid-alkali chemistry, and the voltage window in aqueous capacitors can be expanded beyond thermodynamically restricted voltage of 1.23 V to a value close to 2 V with energy boosting up to ~230%.

Developing novel semiconductors with desirable optoelectronic properties

Dr. Angshuman Nag's group studies these properties in solutions, thin films (employing active device geometry), and also at the level of single nanocrystal. Through an interdisciplinary approach involving materials chemistry, spectroscopy, and condensed matter physics, the group synthesises and studies properties of materials and constructs preliminary devices. This research is driven by physical concepts and facilitated by high quality material design along with collaboration with other groups for expertise in computational studies and device fabrication.

Four major research topics of the group are (1) colloidal $CsPbX_3$ (X = Cl, Br, I) perovskite nanocrystals; (2) lead-free metal halide perovskite for optoelectronics, (3) plasmonics and magnetically doped colloidal metal oxide nanocrystals; and (4) surface engineering of nanocrystals for better charge transport.

Functional nanomaterials

Dr. Pramod Pillai's group demonstrated for the first time that the potency of electrostatic effects arising from nanoparticle (NP) surface in Au NP catalysed the reduction of charged substrates (*ACS Catal.* (2017) 7: 7141-7145). The electrostatic potential around Au NPs is controlled by varying the nature of ligands and ionic strength of the medium. Favourable interactions arising from the attraction between oppositely charged Au NP and substrates results in the channelling of substrates to the NP surface, which in turn enhances the

catalytic reduction. The positively charged ([+]) Au NP outperformed other NP systems despite having comparable or even lower surface area for adsorption, proving the exclusivity of electrostatics in catalysis. At least an order of magnitude higher concentration of negatively charged ([-]) Au NP is required to compete with the catalytic activity of [+] Au NP. A plausible future direction could be to take the assistance of such electrostatic interactions to develop smart catalysts comparable to enzyme catalysts, especially in terms of substrate selectivity.

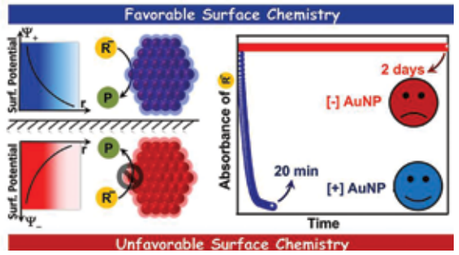


Figure 12: Schematic showing the potency of electrostatic effects arising from nanoparticle surface in Au NP catalysed reduction of charged substrates (Dr. Pramod Pillai's Group)

Graphene-rubber functional nanocomposites

Functional elastomers having enhanced electrical and thermal conductivity are desirable in many applications. Graphene can fetch this property, if it is effectively incorporated into the rubber matrix. Prof. S. Sivaram's group has examined several simple methods to produce defect free few layer (2-5) graphene, capable of being easily dispersed into synthetic and natural rubber. The resulting composite showed large increase in thermal conductivity (480-980%) along with 40% increase in tensile properties and 60% improvement in electrical conductivity. This study provides a novel and generalised approach for the preparation of graphene based thermally conductive rubber nanocomposites (work done in collaboration with scientists from the R&D Centre of HLL Lifecare Ltd., Thiruvananthapuram).

Synthesis, characterisation, and processability of soluble polybenzimidazoles with intrinsic microporosity

Prof. Sivaram's group has explored two novel comonomers, viz, 4,16-dicarboxyl[2.2] paracyclophane and 5,5',6,6'-tetraamino-3,3,3',3'-tetramethyl-1,1'-spirobi[indane], for the synthesis of co-polybenzimidazoles with intrinsic porosity. Both these monomers possess twisted structures that can lead to "awkward" macromolecular shapes that cannot pack efficiently. The consequences of introducing these two monomers on the structure and properties of polybenzimidazoles have been studied. The monomers and copolymers were synthesised and adequately characterised for their structure and composition. These studies define a new synthetic strategy for "bottom-up" synthesis of polybenzimidazoles with intrinsic porosity (work was conducted in collaboration with scientists from CSIR-National Chemical Laboratory, Pune).

MOFs for large scale carbon capture

Dr. R. Vaidhyanathan's group is addressing the societal challenges of CO_2 levels in the environment and affordable alternate energy by developing novel materials designed for optimal performance in targeted applications. Their focus is on design principles that target the practical application of Metal Organic Frameworks in large scale carbon capture and of Covalent Organic Framework (Crystalline Organic Polymers) as cost-effective and highly recyclable energy materials. For example, in the case of MOF, the group has studied the moisture stability of the materials and their functioning under humid/harsh chemical conditions (often ignored topic in the literature), ease of scaled up synthesis, and adsorption properties that minimise the energy of the carbon capture process. In another project, the group has developed a series of COF based nano-catalysts/electrocatalyst/electrodes and demonstrated their application in advanced research areas such as water-splitting and batteries. The choice of organic components in COF construction is made considering cost-effectiveness, stability, and ready-access. These novel materials and design have led to better performance of the materials and work from the group has been published in several papers and has resulted in filing of 7 patents.

2.3 Spectroscopy, Theoretical, and Computational Chemistry

Dynamics of polymer translocation

The translocation of polymers through a small channel plays an important role in many biological processes and could have potential technological applications such as in gene therapy, DNA sequencing, drug delivery, etc. One of the basic problems in polymer translocation is to study the influence of the system parameters such as polymer length, driving force, channel length, polymer concentration, secondary structure, and the polymer pore interaction. Dr. Srabanti Chaudhury's group has numerically studied the effect of the attractive polymer-pore interaction on the translocation of polymer through a nanopore in the presence of an electric field using Langevin dynamics simulations. The group used a coarse grained description to show that the translocation dynamics is strongly influenced not only by the presence of an attractive polymer-pore interaction but also depends on the location of the interaction region. The simulation results are rationalised by a qualitative analysis of the free energy landscape for polymer translocation.

In another project, the group has studied catalytic activity of a single enzyme in the presence of multiple substrates and studied three different mechanisms of bisubstrate binding. Their results indicate the presence of multiple rate-limiting steps in the reaction pathway in all three modes of bisubstrate binding.

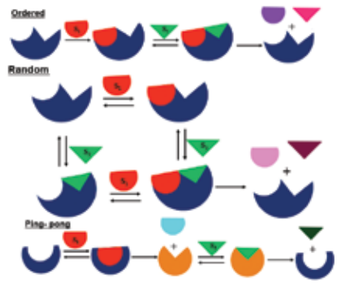


Figure 13: Schemes for bisubstrate binding in enzyme catalysis: ordered, random, and ping-pong mechanism. This arises due to transitions between the free enzyme and the enzyme–substrate complexes that occur on comparable timescales. Such turnover statistics of the single enzyme can also distinguish between the different types of bisubstrate binding mechanisms.(Dr. Srabanti Chaudhury's Group)

Protein-RNA interactions

With an aim to understand the complexity of ligand binding mechanisms prevailing in protein-RNA interactions, Dr. Jeetender Chugh's group is studying three protein-RNA interactions along the miRNA biogenesis pathway. The three model systems chosen differ in terms of the specificity of target RNAs: (1) a ternary complex of MSI2/HuR/miRNA7 where a complex of MSI2 and HuR is specific to miRNA7 only that regulates the downstream processes; (2) Smad/miRNA21 complex where the sequence specificity in target RNA is restricted to CAGAC block; (3) TRBP/miRNA complex where TRBP targets dsRNAs in general without any specificity. The group uses high-resolution multi-dimensional NMR to study biomolecular dynamics. They have found that TRBP is designed to be dynamic to be able to adapt itself to multiple target RNAs having different structures and shapes. Another area the group is interested in is to understand the metabolic signatures found in biological fluids in various diseases and stress conditions using solution NMR spectroscopy.

Studying weak non-covalent interactions

Dr. Aloke Das's research focus is on the molecular level understanding of subtle interplay between various weak non-covalent interactions which are backbones of specific functional

structures of biomolecules and materials. Dr. Das's group, for the first time, has obtained gas phase IR spectroscopic proof of the n→π* interaction between two neighbouring C=O groups by studying the monomeric building block of collagen, which is the most abundant protein in animals. Non-covalent n→π* interaction plays a significant role for stabilising individual polypeptide strands in collagen which has a triple helical structure. Conformation-specific IR spectra of conformers I and II of carboxybenzyl-(4R)Hydroxyproline-OMe showed that both the C=O stretching frequencies (n→π* donor as well as acceptor) of conformer I having n→π* interaction are red-shifted compared to those of conformer II.

In a project on solvent mixtures with binary hydrogen bonding, the group studied indole...H_2O...Me_2Se trimeric complex using gas phase electronic, IR spectroscopy and quantum chemistry calculations. They have observed that H_2O gets preference over Me_2Se to bind with the N-H group of indole although individual hydrogen bonding ability of H_2O and Me_2Se with indole is similar.

Study of excited state phenomena in molecules using quantum chemical tools

Excited state phenomena play critical roles in living organisms and in atmospheric processes, and moreover have important technological implications in solar-based renewable energy devices.

Dr. Anirban Hazra's group has investigated sulphur and selenium substituted thymines, which affect a variety of functions in biological systems and are prospective phototherapeutic agents. It is shown that an interplay between two types of delocalisation, one due to conjugation and the other owing to the varying size of the substituted atom, leads to distinct absorption spectra and electrophilic sites in substituted thymines. This result is supported by *ab initio* quantum chemical calculations and a simple particle-in-a-box model. The study highlights that the widely used concept of delocalisation may be affected not only by the long-established idea of double bond conjugation but also delocalisation owing to the size of atoms.

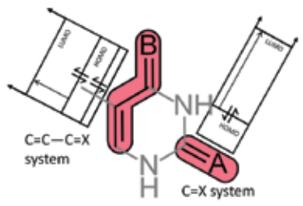


Figure 14: Thymine molecular structure showing the two types of delocalisation modelled by the particle-in-a-box model (Dr. Anirban Hazra's Group)

Photophysics of biologically important molecules

Working on factors responsible for multi-stimuli responsive behaviours by organic molecules, Dr. Partha Hazra's group has found that the synergistic effect between the twisting and conformational flexibility of donor moieties along with numerous non-covalent interactions are responsible for the same. Dr. Hazra's group has studied how G-quadruplex formation is controlled by ligands and has demonstrated that topotecan (TPT), a potential anticancer drug, can instigate the formation and stabilisation of GQ-DNA in the absence of Na+/K+ ions. The techniques used for these studies included circular dichroism, fluorescence, NMR, UV melting, and molecular dynamics (MD) simulation.

The group is working on a new strategy for the synthesis of highly stable fluorescent copper nanoclusters (CuNCs), and they have shown Cu-nanocluster synthesised inside the water pool of reverse micelle (RM) are highly stable. In addition, this study explores the origin of excitation-dependent fluorescence spectral shift of CuNCs by time-resolved fluorescence studies.

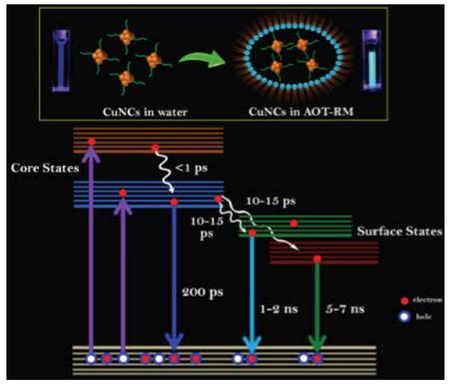


Figure 15: Schematic representation of ultra-bright and stable copper cluster formation inside a reverse micelle. Excited state relaxation dynamics of copper cluster are also shown in the scheme (Dr. Partha Hazra's Group)

Terahertz spectroscopy to study dynamics in different systems

Dr. Pankaj Mandal's group is using time-resolved 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 = Cl, Br, I) nanocrystals (NCs) have emerged to be an excellent material for applications in light emission, photovoltaics, and photocatalysis. Cubic phase $CsPbI_3$ NCs are highly sought after solar cell material due to their appropriate band gap of 1.73 eV. Nevertheless, the NCs are capped by insulating organic ligands. For utilising these NCs in device fabrication, dot-to-dot electronic transport is essential which can be achieved by removal of the capping ligands by washing with methyl acetate and lead acetate. The group has used time-resolved THz spectroscopy to study the photoconductivity and mobility of as-cast, methyl acetate, and lead acetate treated $CsPbI_3$ NC films on nonconducting substrate. They have observed that ligand treatment enhances inter NC coupling but also introduces new defect states confirmed by the presence of a new decay pathway for the treated films. However, the resultant effect of ligand treatment is beneficial.

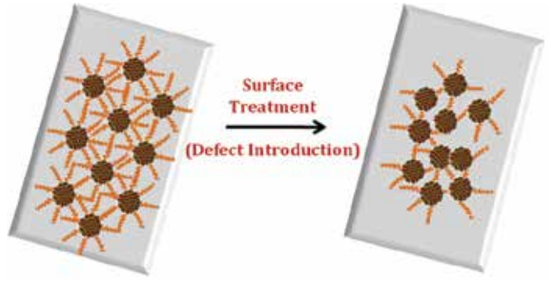


Figure 16: This schematic shows that inter-nanocrystal connectivity increases by ligand-treatment (Dr. Pankaj Mandal's Group)

Understanding properties of materials through simulation methods

Dr. Arun Venkatnathan's group primarily focusses on the use of quantum chemistry and Molecular Dynamics simulation methods to calculate properties of materials for Lithium ion batteries, polymer membrane electrolyte fuel cells and carbon dioxide capture in amino acid based chemical systems. One of the projects involves a collaboration with experimental groups at Temple University Philadelphia, USA, who synthesised and characterised LiCl.DMF co-crystals as a potential electrolytic material for safer Lithium ion batteries. Using state-of-the-art quantum chemistry calculations and Molecular Dynamics simulations, the group could demonstrate the cause of high conductivity (dynamics), thermal decomposition window and structural complexities of the battery electrolyte. The computer simulations predict that ion conduction at the surface is ~10 times higher compared to bulk co-crystal. The calculations

also predict decomposition of smaller aggregates, such as those expected in the liquid-like surface (as observed from experiments), to be more facile than larger aggregates that are more likely to be found in the crystal interior. The theoretical results complement the experimental observations and also explain how a new generation of battery electrolytes that are more reliable would work.

3. EARTH AND CLIMATE SCIENCE RESEARCH REPORT

3.1 Earth's Interior

Seismic imaging

Prof. Shyam Rai's research group is investigating the deep Earth using tools like computerised tomography, akin to medical imaging, to understand the ongoing and past Earth processes responsible for the making of India, the Himalaya-Tibetan region, and the adjoining seas and to investigate the state of stress and earthquake dynamics in the region. Earth materials change their shape and mechanical properties through squeezing, stretching, or pushing in different directions in response to stress. This response depends on the type of stress, the rate at which it is applied, the environmental conditions of the rocks (such as temperature and pressure), and their composition. Understanding the Earth's property could, therefore, be a valuable means of inferring the Earth processes.

The group has studied the elastic property of Earth (Vp, Vs, anisotropy) at different scales. The 3-D Seismic imaging is achieved through (i) the inversion of earthquake arrival time or waveform data recorded over a large number of seismograph locations either independently or jointly with the ambient noise recorded on the seismograph. Ambient noise is gravity waves created as a consequence of undulating atmosphere interacting with the ocean floor and are recorded on the seismograms as waves with low signal strength. Their retrieval involves large scale signal processing through the cross-correlation. Usually, the relationship between the wave propagation parameters and Earth parameters is complex and non-linear. The parameter estimation is performed using linearised inverse theory or through global search algorithms. The Earth physical parameters are then used to reconstruct the geological process. The group is using these elastic waves to provide a new view of the causes and explanation for the deforming of the Indian and Himalayan- Karakorum- Tibet Earth system. Participants to the project are Gokul Saha, Vivek Kumar, Deepak Chaubey, Utsav Mannu and S.S. Rai.

Application of teleseismic receiver function

This approach employs a time series created due to interaction of incoming seismic wave from a distant source with the stratified Earth with well defined impedance contrast across boundaries to map the crust and mantle stratigraphy of the India-Asia plate from southern end of India to the Tian shan. The effort is aimed at understanding the mantle deformation due to several stages of subduction during and prior to India-Asia convergence, particularly with reference to the Tethys and paleo Tethys seas. Participants in the project include Deepak Chaubey, Utsav Mannu and S.S. Rai. These projects are supported by Ministry of Earth Sciences and the Ministry of Science and Technology.

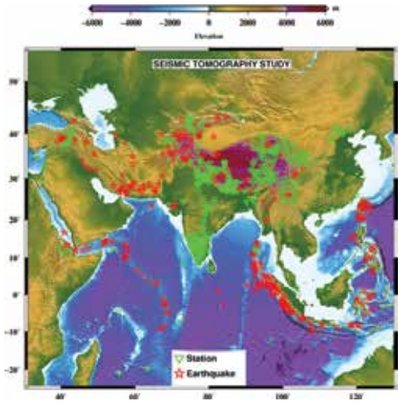


Figure 17: Location of broadband seismographs used for seismic tomography and the teleseismic receiver functions for shallow and deep Earth imaging (Prof. Shyam Rai's Group)

3.2 Earth Surface Process and Climate

Weathering and erosion

The geochemistry group of Dr. Gyana Ranjan Tripathy focusses on quantifying the chemical fluxes delivered by the Indian rivers to the near-by seas. Information on these fluxes, together with abundance and behaviour of elements in rivers and estuaries, are crucial to improve our understanding on geochemical cycling of major and trace elements. Chemical elemental fluxes via rivers are mainly regulated by continental weathering of rocks. Oxidative weathering of sulphides, in particular, influences the global chemical (e.g. carbon, sulphur and oxygen) cycles significantly; however, the related riverine fluxes have not been well-constrained. In a recent study by this group, the dissolved major ions and silica concentrations of two mining-influenced (Damodar and Subarnarekha) river systems from India have been measured to estimate their sulphide oxidation fluxes and silicate weathering rates. The total dissolved solids (TDS) of these streams are about 2-3 times higher than that of the global average for rivers, indicating intense chemical weathering in these basins. Mass balance calculations involving inverse modelling estimate that 63 ± 11% of total cations are derived by rock weathering, of which 28 ± 8% of cations is supplied through silicate weathering. The sulphide-S concentrations are computed by comparing water chemistry of these two rivers with that of a near-by river (Brahmani) with similar lithology (but no sulphide oxidation). The outflows of Damodar and Subranrekha rivers receive 17% and 55% of SO_4 through sulphide oxidation respectively. The sulphide oxidation fluxes from the ore mining areas are disproportionally (~10 times) higher compared to their fractional areal coverage to the global drainage area. Outcomes of this study although underscore dominance of sulphide oxidation in controlling chemical (cationic and sulphur) fluxes, its role in the carbon budget is found to be minimal.

Stable isotope geology

Understanding of the natural climate variability is essential for assessing the role of anthropogenic activities in the changing climate. It also gives an idea about spatial variations in the climatic parameters during different mean states of the climate. However, past instrumental climate data is too short to address this. Various climate proxies, such as tree-rings, lake sediments, and speleothems are used to reconstruct pre-instrumental climate variability. Currently, Dr. Shreyas Managave is reconstructing past millennial's hydroclimatic variability in the western Himalaya using oxygen isotopic composition of tree-rings as a proxy. The work indicates increasing soil-moisture stress in the coming years in the western Himalaya. He is also formulating a research programme for reconstructing the Holocene climate variability over India.

Himalayan glaciers

A strong avalanche contribution to the mass balance of debris-covered Himalayan glaciers have been suspected. However, there were no existing methods to ascertain that. Dr. Argha Banerjee's group solved this problem, and demonstrated that in four of the well-studied glaciers in the Himalaya more than 90% of the accumulation is due to avalanches.

On a debris-covered glacier in the Himalaya, the energy exchange with atmosphere is mediated by the debris layer. Using field data of vertical temperature distribution within it, a numerical procedure to estimate glacier melt is being developed. This method can potentially simplify the logistics of mass-balance measurements in the Himalaya.

The supraglacial debris load contains information about the headwall erosion rate. This connection was exploited to obtain the erosion rate for the high Himalayan crests. An observed exponential weakening of the erosion with elevation is crucial in creation and sustenance of Himalayan topography and relief.

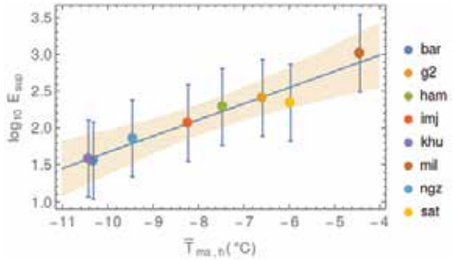


Figure 18: Erosion rate of glacier headwall in the high Himalaya decline exponentially with mean annual temperature, or equivalently with elevation. The implied ~25X decline in erosion with every km of rise in elevation, allows the high Himalayan crests to maintain their high elevation (Dr. Argha Banerjee's Group)

Weather prediction and understanding natural variability

Dr. Neena Joseph Mani's research during the past year focussed on two areas: 1) Understanding the natural variability of monsoon in decadal and longer time scales. Paleoclimate simulations by different climate models were analysed to understand how the last millennial simulations capture the decadal, multidecadal and centennial scale variability of precipitation and winds over the Indian summer monsoon domain; 2) Quantifying the predictability associated by the sudden burst of convective events over the Indian Ocean region which precede the eastward propagation of convective cloud systems along the equator and the northward propagation of convective cloud systems over the Indian land mass. Predicting such events is crucial for predicting the active and break cycles of precipitation during the monsoon season.

Organisation of tropical convection

Over the last year, Dr. Suhas Ettammal's research has focussed on three areas: 1) Tackling the issue of representation of cloud organisation in climate models, the key parameters such as buoyancy, cloud-environmental air entrainment and detrainment rates were estimated from satellite data products; 2) Development of a statistical model to predict the location and intensity of inter-tropical convergence zone: A statistical model was formulated based on the Bayesian methods; 3) Genesis of monsoon depression: Statistical data analysis was conducted to isolate the environmental factors responsible for the growth of monsoon depression.

Understanding organic carbon mobilisation in a young volcanic basin and its impact on climate change

Methane injected from the geosphere into the hydrosphere and atmosphere has been proposed to be a key player in many of the rapid climate changes, for example, the Paleocene-Eocene Thermal Maximum, when the average global climate warmed up by 8˚C. The origin and sources of methane and the sequence of events leading to ocean warming remain elusive, but two primary mechanisms have been suggested, for example, heating of organic matter in sedimentary basins by hot magma releases methane, and methane released by the dissociation of marine methane hydrates (solid ice like compounds that trap methane molecules) in deep-ocean sediments. While the cause(s) of past events of dramatic climate changes and the nature of carbon cycle feedbacks cannot be determined beyond doubt, present day examples may provide clues to those processes. Unravelling them will be useful to understand the future changes and provide inputs to modelling. Dr. Sudipta Sarkar is investigating geological processes that control the transfer of sediment-bound carbon in sedimentary basin using marine reflection seismic data, geological information and modelling approach. The results from this study will allow gaining invaluable insights into the evolution of a sedimentary basin, hydrocarbon (methane) production as a result of thermal cracking of organic matters, and the role of methane hydrates in mobilising climate sensitive methane reaching the ocean. The study will be the basis for identifying geological drivers of carbon mobilisation explaining global-scale climate change.

3.3 Computational Geoscience

Modelling of geophysical data

Geophysics aims at mapping in 3D the physical properties of the Earth at various scales to decipher the Earth processes and the exploration of natural resources. Mathematical approach used to convert the observation (data) to the physical properties using a physical law is termed as data inversion. Dr. Rahul Dehiya is involved in inversion of electromagnetic geophysical data utilising the full physics. This is a very complex and computationally challenging problem. The efficient computation of the forward problem is vital for an efficient inversion algorithm. Dr. Rahul Dehiya has developed 3D forward modelling algorithm based on frequency domain finite difference method. The inverse problem is solved using the Gauss-Newton optimisation method where the Jacobian (sensitivity) matrix is constructed using the adjoint field approach. The coarse level parallel computing using OpenMP framework is implemented that allows optimum utilisation of multi-core computing machine. Currently, other aspect of the inverse problem such as data selection/compression, preconditioning of approximate Hessian is being studied.

4. HUMANITIES AND SOCIAL SCIENCES RESEARCH REPORT

4.1 History of Science, Architecture, Material Culture

History and development of astronomy and mathematics in India

Dr. Venketeswara Pai is critically analysing the source materials pertaining to this area, which are mostly in Sanskrit and Malayalam. Most of medieval manuscripts are in Malayalam. He recently completed a major work (started in 2009—completed in 2017) involving study of an astronomical text *Karanapaddhati.* This provides the mathematical rationales behind one type of astronomical text known as *karana* text, which aims at preparing astronomical manuals by using simple mathematical techniques.

Currently, he is also working on another text *vākyakarana* composed during 13th century (project sanctioned by Indian National Science Academy (INSA)). Study of this text will throw some light on the development of *vākya* school of astronomy prevalent in South India.

In collaboration with M.S. Sriram of University of Madras, Dr. Pai is also working on the auto commentary (*vāsanabhāsya*) of the text *Siddhānta'siromani* of *Bhāskara* II, which is an important text during that time and will provide important insights into the development of astronomy in India during the 12th century.

History of architecture and material culture

One of the projects Dr. Sohoni worked on during 2017-18 involved an analysis of how the prevailing political and kingship aspirations informed architectural production in the Deccan Sultanate, with a focus on the Nizam Shahs (*The Architecture of a Deccan Sultanate: Courtly Practice and Royal Authority in Late Medieval India* (London: I.B. Tauris, 2018). Dr. Sohoni is also working on a translation of the Bhonsalevamsacaritra, an inscriptional text from the great temple at Tanjore. Another area of research interest is colonial architecture, in particular, the market-halls of India.

4.2 Literature

Fictional worlds and their analyses

Dr. Pooja Sancheti is currently working on three papers: a. the novels of Cyrus Mistry; b. neo-colonial politics in Octavia Butler's "Amnesty"; c. illness, food, and the body in Han Kang's *The Vegetarian.*

In academic writing, Cyrus Mistry is more known for his award winning play, *Doongaji* House (1991), than for his short stories and full-length novels. In this paper, Dr. Sancheti would like to elaborate on the two novels he has published so far—*The Radiance of Ashes* (2005) and *Chronicle of a Corpse Bearer* (2013). Mistry's fictional worlds recreate tumultuous moments of Indian history, especially as witnessed in Bombay, through the lens of his protagonists who belong to the minority Parsi community. Vast historical forces are juxtaposed with individual experience and a micro-historical point of view. These narratives also provide insight into various elements that are intrinsically Parsi, but simultaneously also Indian.

Octavia Butler (died in 2006) is a celebrated African-American Science Fiction (SF) writer. While she is well-known in the West, in India, exposure to her work is quite limited. Dr. Sancheti would like to read one of her short stories, "Amnesty", set in America in the distant future, but transplant the dystopian tale into the context of neo-colonialism and analyse the conflicts of language, education, and economics.

Han Kang's *The Vegetarian* (published in Korean in 2007; translated into English in 2015), is a Man Booker Prize winner (2016). The multiple-narrative tale observes how food is closely tied to cultural mores, and through the protagonist, who refuses to eat the food that is "normal", explores how this cultural normality gets disturbed. Dr. Sancheti would like to analyse the centrality of food to a communally shared identity, the narratives of "illness" typically assigned to those that do not participate in this identity, and the struggles of caregivers who must contend with private temptations and public permissibility.

5. MATHEMATICS RESEARCH REPORT

5.1 Algebra and Number Theory

Special values of L-functions associated to automorphic forms

Dr. Baskar Balasubramanyam's research focus is on studying arithmetic properties of special values of L-functions. Work on Asai L-functions was continued and some of the results from the GL(2) case to GL(n) were generalised. In a joint work with Matteo Longo, Dr. Balasubramanyam is working on constructing the p-adic adjoint L-function associated to families of Hilbert modular forms. This work generalises the work of various authors from classical modular forms to Hilbert modular forms. Work in collaboration with Dr. Kaneenika Sinha to study distribution properties of Hecke eigenvalues of various families of automorphic forms is ongoing.

Arithmetic geometry and automorphic forms

Dr. Debargha Banerjee proved several theorems that explore the algebraic side of the modular forms. In an equation like X^N+Y^N=Z^N, he is interested in finding if there are solutions to this equation with all (X,Y,Z) belong to integers. The group found a particular part of these objects to look like as shown here.

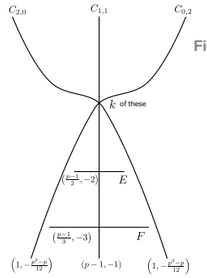


Figure 19: Spatial fibre of a modular curve (Dr. Debargha Banerjee)

Whitehead group of general orthogonal modules

Dr. Rabeya Basu has deduced local-global principle for the transvection subgroup of the general orthogonal group and as a consequence could deduce the injective stabilisation bound for the Whitehead group of general orthogonal modules.

L-functions and zeta functions

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.

Dr. Bhagwat and his PhD student Ayesha Fatima are working on some problems in spectral graph theory where they establish the analogue of strong multiplicity one theorems for the length spectra of periodic graphs and study the relation between Laplace spectrum and length spectrum of periodic graphs.

Analytic number theory and arithmetic of modular forms

Dr. Kaneenika Sinha's research focusses on equidistribution of various families and sequences of real numbers, arising in the context of modular forms. In 1916, Srinivasa Ramanujan wrote a paper titled "On certain arithmetical functions," which revolutionised number theory thereafter. In the 1930s, Erich Hecke laid the foundations of a much deeper theory underlying Ramanujan's work, called the theory of modular forms. Modular forms are some special functions on the upper half complex plane with rich inner symmetries and growth conditions. They can be described in terms of what are called their "Fourier expansions": the coefficients arising in these expansions encode important information about many facets of mathematics. A deep study of Fourier coefficients of modular forms, for example, helped in solving the famous Fermat's Last Theorem.

One of the major breakthroughs in recent times is the discovery (by Barnet-Lamb, Geraghty, Harris and Taylor) that certain sequences arising from Fourier coefficients of modular forms follow the same "semi-circle" equidistribution law that predicts the distribution of energy levels of heavy nuclei of atoms.

Dr. Sinha studies several deeper statistical phenomena associated with Fourier coefficients of modular forms. Focus is on trying to understand the distribution of several families that arise from the Fourier coefficients of modular forms and apply them to problems in arithmetic geometry.

5.2 Analysis and Applicable Mathematics

Elliptical particle differential equations

With PhD student Debangana Mukherjee, Dr. Mousomi Bhakta has proved the existence of sign-changing solution of p-fractional type equations with concave-critical nonlinearities (Accepted for publication in *Topological Methods in Nonlinear Analysis*).

In another joint work with D. Mukherjee, Dr. Bhakta has studied (p,q) fractional Laplacian type equations with concave-critical nonlinearities. They have obtained multiplicity results for nonnegative solutions and proved the problem admits at least $cat_{\Omega}(\Omega)$ number of nonnegative solutions.

The group has worked on nonlocal scalar field equations and proved the existence of solution and established various qualitative properties of the solution. They also characterised the asymptotic profile of solution when the vanishing parameter goes to zero in all the three cases of nonlinearities: critical, subcritical, and super critical.

In a joint project with Dr. Phuoc Tai Nguyen (from Czech Republic), Dr. Bhakta's group has established *a priori* blow up estimates of nonnegative solutions of nonlocal semilinear elliptic equations. Their solutions included any viscosity solution/distributional weak solution/classical solution which may have singularity at the boundary. The group has also proved existence, multiplicity, regularity properties of positive solution of equations with fractional Laplace operator and with power type nonlinearities and measure boundary trace.

Probability theory and control theory

Dr. Anup Biswas's research in the last academic year was broadly based on two topics: on the location of extrema of eigenfunctions and on a problem of Pinchover.

Understanding the properties of higher order eigenfunctions is of interest to mathematical physicists. Many of us are also aware of the famous problem by Kac "Can you hear the shape of a drum?" Extensive research has been conducted in the study of gap between eigenvalues, Weyl's asymptotics of eigenvalues, norm of eigenfunctions, measure of nodal sets, thickness of nodal domains, etc. Another interesting problem is to understand the location of the global maxima of the ground state. This problem is known as the "hot spot" problem and there is a famous open problem of Rauch in this direction for Neumann boundary value problem. Together with József Lörinczi, Dr. Anup Biswas has studied the hot spot problem for all the eigenfunctions of Dirichlet non-local Schrödinger operators considering this problem both in bounded convex domains and in whole Euclidean space. An extension of one of Lieb's inequality for Laplacian to the case of fractional Laplacian has been established.

In collaboration with Ari Arapostathis and Debdip Ganguly, Dr. Biswas answered a question posed by Yehuda Pinchover and also validated the Landis' conjecture for a large class of potentials. These problems can roughly be stated as follows. Given an elliptic operator at criticality can one find sufficient conditions so that if we perturb the coefficients of the operator it remains critical? In 2007, Pinchover provided a sufficient condition for criticality of an operator by imposing conditions on a perturbed operator. This was done for a class of self-adjoint operators. He posed the same result as an open problem for the general elliptic operators, which has now been answered affirmatively by the team.

Several complex variables

Dr. Diganta Borah investigated an invariant weighted Bergman metric with collaborator Dr. Kaushal Verma from IISc, Bengaluru. Usually, weighted Bergman metrics are not invariant under biholomorphisms. The weight that they considered was originally introduced by M.S. Narasimhan and R.R. Simha to study moduli spaces of compact complex manifolds with ample line bundles. In another project with Dr. Debargha Banarjee and Dr. Chitrabhanu Chaudhuri of IISER Pune, Dr. Borah has computed the Arakelov self-intersection number of the relative dualising sheaves for the family of modular curves $X_0(p^2)$.

Arakelov geometry of moduli of elliptic curves

In collaboration with Dr. Debargha Banerjee and Dr. Diganta Borah of IISER Pune, Dr. Chitrabhanu Chaudhuri has completed the investigation of the modular curves $X_0(p^2)$. He is also working on an enumerative geometry project with Dr. Ritwik Mukherjee of NISER Bhubaneshwar. This project involves getting a formula for the number of genus zero curves with a node in the projective plane.

Shape optimisation problems

Dr. Anisa Chorwadwala works on shape-optimisation problems. Details of this research are as described below.

Let S be a Riemannian manifold with metric g and Laplace-Beltrami operator Δ. Let B1 be an open (geodesic) ball in S. Let B_0 be an open ball whose closure is contained in B1. Let $\Omega = B1 \setminus B0$. Consider the following problems:

$-\Delta u=1$ in Ω, $u=0$ on $\partial\Omega$, —- (1)

$-\Delta u=\lambda u$ in Ω, $u=0$ on $\partial\Omega$. —- (2)

In the case that S is Euclidean space of dimension n, Hersch (for n = 2; *Pacific J. Math.* (1963) 13(4):12291238); Ramm-Shivakumar (for n = 2; *Math. Inequalities and Appl.* (1998) 1:559-563); and Kesavan (for $n \geq 2$; *Proceedings of the Royal Society of Edinburgh Section A* (2003); 133:617-624) proved the following:

(i) If u is a solution of problem (1), the energy functional $E(\Omega) = \int_{B_1\setminus B_0} |\,|\nabla u\,|\,|^2\, dx$ 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.

A review of the kind of shape optimisation problems that Dr. Chorwadwala has worked on is available here (*Curr. Sci.* 112(7):1474-1477).

Dr. Chorwadwala has studied an obstacle placement problem which can be formulated as the following eigenvalue optimisation problem considering a disk $B \subset R^2$. The aim is to place an obstacle P, having a specific symmetry, within B so as to maximise or minimise the fundamental Dirichlet eigenvalue λ_1 on $B \setminus P$, in the case when the centers of mass for P and B are non-concentric. That is, the function $\lambda_1(B \setminus \rho(P))$ is to be extremised, where ρ runs over the set of all rigid motions of the plane fixing the centre of mass for P such that $\rho(P) \subset B$. The case where the obstacle P is invariant under the action of a dihedral group D_n; $n \geq 2$; n even is considered. Dr. Chorwadwala has also proved the generalisations of her results from the Euclidean plane to other manifolds, and from the differential equations involving the Laplace operator to the ones involving the Schrödinger-type operators. Numerical evidence to validate the theoretical results for the case when the obstacle P has D_4 symmetry is provided.

Partial differential equations of elliptic and parabolic type and non-linear analysis on manifolds

Dr. Debdip Ganguly's earlier research as a graduate student was in the area of nonlinear elliptic partial differential equations and variational methods. It included the study of existence, non-existence, and multiplicity of solutions of elliptic equations with critical Sobolev growth. He is also interested in the qualitative properties like symmetry, compactness, non-degeneracy and stability of solutions for the non-compact variational problems. He currently works on functional and geometric inequalities, spectral theory, and heat kernel estimates. It includes

the study of inequalities with sharp constants; optimal improvement of functional inequalities of Hardy and Poincare-type on Cartan-Hadamard manifolds; Criticality theory for elliptic second order partial differential operator; and Liouville Theorem for Schrödinger operator. Another aspect of his research is to study equivalence of heat kernels and Green functions on Riemannian manifolds for the second order operator.

Mathematical finance

Along with a PhD student and an MS student, Dr. Anindya Goswami has worked on option pricing in a regime switching jump diffusion model. In another project, working along with collaborators, Dr. Goswami addressed option pricing in a regime switching stochastic volatility model. In this they considered a regime switching stochastic volatility model where the stock volatility dynamics is a semi-Markov modulated square root mean reverting process. Under this model assumption, they find the locally risk minimising price of European type vanilla options. The price function is shown to satisfy a non-local degenerate parabolic PDE which can be viewed as a generalisation of the Heston PDE. The related Cauchy problem involving the PDE is shown to be equivalent to an integral equation (IE). The existence and uniqueness of solution to the PDE is carried out by studying the IE and using the semigroup theory. Dr. Goswami has mentored an MS project on the topic of theory and estimation of drift dynamics of asset price process.

5.3 Discrete Mathematics

Elliptic curve discrete logarithm problem

This problem is one of the backbones of modern public key cryptography. Dr. Ayan Mahalanobis (along with Vivek Mallick) was successful in putting out a new attack on the elliptic curve discrete logarithm problem. This new attack reduces the discrete logarithm problem to a problem in linear algebra. They are working towards solving this linear algebra problem. With 5th year BS MS student Upendra Kapshikar, Dr. Mahalanobis is working on developing a quantum secure cryptosystem. This type of cryptosystem is in demand today.

Combinatorial problems

Dr. Soumen Maity and his group are working on combinatorial problems that have applications and require expertise in graph and hypergraph theory and combinatorial designs. The projects in which they are currently involved include new generalisations of covering arrays for software testing applications, constructions of covering arrays, and covering arrays on product graphs.

Covering arrays are combinatorial objects that have been successfully applied in the design of test suites for testing systems such as software, circuits and networks, where failures can be caused by the interaction between their parameters. The columns of a covering array provide a test suite for software testing. For most applications, it is desirable to construct covering arrays with minimum number of columns. Work from Dr. Maity's group gave an algebraic construction that improves some of the best known covering arrays of strength four with three symbols. They also constructed strength three and strength four testing arrays with high coverage.

A new generalisation of covering arrays called covering arrays on 3-uniform hypergraphs that the group employ is useful in situations in which some combinations of parameters do not interact; in these cases, they do not insist that these interactions be tested, which allows reductions in the number of required test cases. The group has constructed optimal mixed covering arrays on alpha acyclic 3-uniform hypergraphs, 3-uniform interval hypergraphs, conformal 3-uniform hypertrees, 2-tree hypergraphs, and 3-uniform loose cycles.

5.4 Geometry and Topology

Low-dimensional topology

The group considered four most extensively studied graph products in literature and gave upper and lower bounds on the size of a covering array on product graph. They find families of graphs for which the size of a covering array on product graph achieves the lower bound.

Toric vector bundles and tensor triangular geometry

Dr. Tejas Kalelkar studies 3 and 4 dimensional spaces called manifolds, in particular, foliations and triangulations of 3-dimensional manifolds.

Every 3-dimensional manifold is made up of 2-dimensional surfaces, called leaves, packed in parallel together like the pages in a book. In an ongoing project with Rachel Roberts of Washington University in St. Louis and along with student Ramya Nair, Dr. Kalelkar is computing the ranges of slopes for boundaries of taut foliation in the complements of knots when Dehn-filling along these slopes leads to a special class of manifolds called L-spaces. This would lead to further evidence for the well-known L-space conjecture.

Any two triangulations of a 3-manifold are related by finitely many modifications to the triangulation, called the Pachner moves. There is a bound on the number of such moves needed to go from one triangulation to another in a certain class of graph manifolds. However, this bound is highly exponential and not computationally tractable. With student Advait Phanse, Dr. Kalelkar is attempting to lower this bound and extend it to all torus bundles.

In this joint work with Prof. Jose Ignacio Burgos Gil from ICMAT Madrid, Spain, Dr. Vivek Mallick is studying a combinatorial description of torus equivariant vector bundles defined on toric varieties. Some work in this direction has been done by Klyachko, Payne, di Rocco, Perling, and others. Dr. Mallick and team is trying to give a simpler description which will allow making some computations, which in turn will allow further study of the vector bundles from a number theoretic point of view.

In a joint work with Dr. Umesh Dubey from HRI, Dr. Mallick is studying the structure of tensor triangular categories and how to use them to detect classical algebraic geometric structures on the underlying algebraic spaces. In particular, they are interested in understanding cycles in terms of the derived categories.

6. PHYSICS RESEARCH REPORT

6.1 Astrophysics

Mass ejections from solar corona

Dr. Prasad Subramanian and his group have worked on problems relating to the manner in which mass ejections propagate from the solar corona towards the Earth, potentially posing a hazard to space-borne technologies. They have also undertaken a study of small episodes of particle acceleration in the solar corona that could contribute to a resolution of the longstanding problem of coronal heating. They have continued with their focus on turbulent density fluctuations in the extended solar corona and the solar wind—an area that holds promise by way of understanding the mechanisms that accelerate the solar wind.

6.2 Atomic and Molecular Physics, Optics, and Quantum Information

Light-matter quantum systems

Dr. Bijay Kumar Agarwalla's research is focussed on theoretically understanding the properties of photons emitted from a non-equilibrium quantum circuit. The group is investigating the conditions under which one can realise a maser from such highly tunable small scale systems and how to manipulate the properties of photons using quantum effects such as quantum coherence and quantum entanglement. They are also investigating the thermodynamic efficiency of these devices for converting electronic current to photonic current taking into account various non-trivial quantum effects.

Plasmon enhanced Raman and fluorescence scattering in Fourier space

Conventionally, image of an object is captured in real space, where the intensity of the emitted light is mapped as a function of spatial coordinates. There is another way to capture the image of an object, where the directionality of the emitted light is mapped on to so-called reciprocal space. The image-intensity distribution in such reciprocal space represents the wave-vector distribution, and hence the directionality of the emergent light. Such imaging methods are usually called as Fourier-space imaging techniques, and are vital to understand light-matter interaction especially at nanoscale. Dr. G.V. Pavan Kumar's group has recently shown that when molecules are sandwiched between a plasmonic nanowire and gold mirror, the wave-vector distribution of Raman scattered light and the fluorescence from the molecule undergo differential distribution. This effect has been attributed to a specialised gap plasmon cavity effect that essentially alters the way Raman scattered light and fluorescence couple to different modes of the cavity and hence out-couple different in the momentum space.

Ultra cold dipolar gases and Rydberg atoms

Dr. Rejish Nath's group examined and quantified the quantum fluctuations in a quasi-1D dipolar gas. They showed that radial confinement plays a significant role in determining the nature of quantum fluctuations, hence influencing the physics of self-trapped atomic clouds such as droplets and solitons. This work has been done in collaboration with Prof. Luis Santos and his team from University of Hannover and Prof. Subhasis Sinha from IISER Kolkata.

The group has studied the physics of a periodically driven array of highly excited atoms. They have shown that the quantum dynamics of such a system can be controlled in an unprecedented way, which may lead further to the development of quantum technologies, and more fundamental studies in ultra cold atomic systems.

Building a quasi-continuous wave atom interferometer

An atom interferometer is a ubiquitous tool for measurement of fundamental constants and inertial sensing. While it has been extremely useful in measuring inertial rotations, fine structure constant, gravity gradients, and local gravity; the measurement process lacks the ability to get continuous measurements due to its single-shot nature. Dr. Umakant Rapol's group has experimentally demonstrated the diffraction of an atom laser in the Raman-Nath regime—a key step towards development of an atom laser based interferometer. The diffraction orders can be precisely controlled experimentally and momenta up to ±18 times the momentum of single photon can be imparted to the atom laser. The 'atom laser' is formed by out-coupling a continuous beam of coherent atoms from a reservoir of 87Rb Bose-Einstein condensate (BEC) lasting up to 400 ms. This 'atom laser' then interacts with a grating formed by a standing wave of a far detuned laser light. By controlling the interaction time, the strength of diffraction into various orders can be controlled. Such a diffraction would allow for construction of an atom-interferometer to probe changes in physical environments continuously up to a time of the order of a few hundred milliseconds.

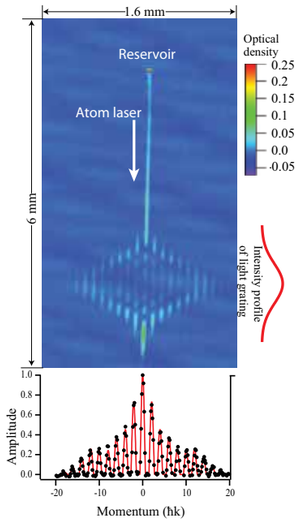


Figure 20: Schematic of realisation of diffraction of an atom laser: The image in the upper panel shows a typical time of flight absorption image of the atom-laser diffraction. The red curve drawn beside the image is the Gaussian intensity profile of the standing wave of light that forms the diffraction grating with which the atom laser interacts. The lower panel shows the normalised population in different diffraction orders (up to ±18hk). Circles represent experimental data whereas the solid line shows the numerical simulation. (Dr. Umakant Rapol's Group)

6.3 Complex Systems

Detecting abnormality in heart dynamics

Prof. G. Ambika and her group developed a novel method in which every ECG time series is compared with variations within itself in the analysis. Supported by DST-SERB, this project was on multifractal analysis of beat replicated time series generated from each beat of ECG to compare the complexity parameters with that of full ECG. Their results indicate that normal heart dynamics, while having greater complexity, has less variability in its complexity compared to unhealthy cases. This is a significant result since complexity variability measures can then be a clinically meaningful index for detecting abnormalities of heart.

The study is further extended to higher order spectral analysis on ECG data where the group observed suppression of fundamental pulse frequency in disease cases, and, specifically, distribution of power at higher frequencies in the case of dysrhythmia compared to normal ECG.

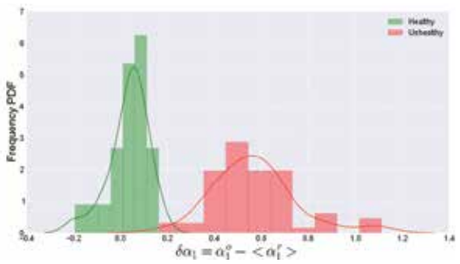


Figure 21: Analysis using beat replicated data showing increase in complexity variability for unhealthy cases (Prof. G. Ambika's Group)

A few other aspects of research in Prof. G. Ambika's group include extracting dynamics from data with noise and gaps. The methods developed were used on real-world datasets of RR Lyrae stars to identify cases of chaotic behaviour and noise contaminated quasi-periodicity among them.

Higher order level statistics for complex quantum systems

Dr. M.S. Santhanam's group is working on understanding the spectral correlations over longer spectral scales through the use of random matrix theory. For nearly three decades now, random matrix theory (RMT) had become an important tool to understand the manifestations of chaotic dynamics in the quantum regime. One of the popular measures used to make the connection between RMT and quantum chaos is the level spacing distribution. More recently,

it was shown that ratio of level spacings is a simpler measure to compute and work with. New scaling relations for the higher order spacing ratio distributions have been obtained, and this relates any k-th order spacing ratio at a particular value of Dyson index to nearest neighbour spacing ratio at some other value of Dyson index. This has turned out to be a finer test of random matrix type universality. When applied to physical systems, this set of relations is useful for detecting deviations from RMT at larger spectral scales which in turn can be related to classical dynamical structures through the semi-classical techniques.

It was also shown that this scaling relation holds for the important case of empirical correlation matrices, which is widely used for analysis of any multivariate data such as the ones arising from stock market data, and geophysical datasets. This result assumes importance in the context of analysis of large multivariate data sets.

6.4 Condensed Matter, Statistical Physics, Materials

Statistical physics of mesoscopic systems, analogue gravity and Bose-Einstein condensate

Dr. Arijit Bhattacharyay's group is developing an alternative equilibrium scenario for an inhomogeneous mesoscopic system and has shown results which can alter our existing concepts of equilibrium statistics of such systems. In Bose-Einstein condensate, the group has shown a new class of vortex solutions, explored soliton states in BEC in the presence of non-local interactions. An exact correspondence between the dynamics and the free energy and roton mode softening in multicomponent BEC have also been shown. The group is presently developing a comprehensive phase diagram for phase separation and transitions in spinor-BEC. Based on healing length modification due to long range interactions in BEC they have developed a model of minimally coupled scalar fields at multiple scales to address effects of trans-Planckian physics on analogue Hawking radiation. An ultraviolet-infrared coupling has been identified.

Soft condensed matter

DNA organisation at length scales ~1000nm is highly debated and polymer models have proved useful to understand the principles of DNA-organisation. Dr. Apratim Chatterji's group showed that <2% cross-links at specific points in a ring polymer can lead to a distinct spatial organisation of the polymer. This work provided some direct and some indirect experimental validation for the group's predicted organisation of DNA-polymers.

The group also proposed a two-body spherically symmetric (isotropic) potential such that colloidal particles interacting by the effective interaction potential self-assemble into linear semiflexible polymeric chains without branching. By suitable control of the potential parameters, the persistence length of the colloidal polymeric could be controlled, and controlled number of branches introduced. Thus the group showed how effective directional interactions starting from spherically symmetric potentials can be achieved.

Multiferroicity

Dr. Smita Chaturvedi's work aims to realise the phenomenon of multiferroicity via two different approaches in a material. (a) By achieving more than one ferroic order within single material: Efforts were directed towards realising the co-existence of o-LFO and h-LFO to achieve ferroelectricity and ferromagnetism simultaneously in a single nanostructure of two different morphologies. Nanoscale particles and fibres of mixed phase LFO were synthesised and characterised. Significant difference in magnetic behaviour of the two samples was observed in terms of structure. (b) By combining two materials with two different primary ferroic orders (ferromagnetic and ferroelectric): Nanocomposite heterostructure of ferromagnetic rare-earth orthoferrite $HoFeO_3$ with a ferroelectric $BaTiO_3$ were realised. The composite nanostructures with high aspect ratio (nanofibers) modifies the physical properties and possess both the ferroic orders, i.e., ferromagnetic and ferroelectric inherited from parent compounds $HoFeO_3$ and $BaTiO_3$, respectively.

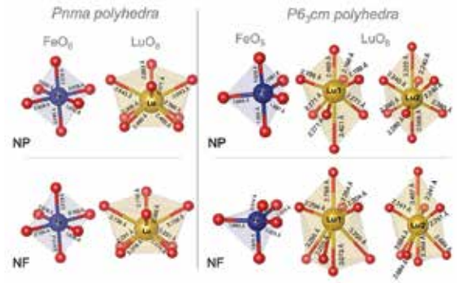


Figure 22: LuO_8 and FeO_6 polyhedra for $LuFeO_3$ nanoparticles and nanofibres obtained after Reitveld refinement of lab source x-ray diffraction data (Dr. Smita Chaturvedi)

Optoelectronics

Dr. Shouvik Datta's group has, for the first time, connected the concept of negative activation energy with excitonic bound states using impedance spectroscopy that was rarely used to detect excitons in the past. The group has demonstrated why there is a finite thermodynamic probability of these indirect excitons to survive even at room temperature. They also found that photocapacitance is much more sensitive to detect indirect excitons and trions as compared to ordinary dc-photocurrent spectra and photoluminescence spectra used in most studies in the past.

Electro-optical experimental techniques from the group to sense thermodynamic signature of 'dipolar' excitons could be useful for probing the still elusive excitonic BEC and bias and frequency dependent experimental control of next generation coherent light emitters consuming much less energy. Measurements of temporal and spatial coherence, photon statistics and optical shot noise are currently ongoing.

Matter at the atomic scale

Dr. Aparna Deshpande's group has carried out a comparative study of CuPc and $CuPc(CN)_8$ molecules on Au(111) substrate using UHV-LT-STM. This has given an insight into the hydrogen bonding and antiparallel dipolar coupling in the molecular self-assembly of these molecules (*J. Phys. Chem. C.* 122:427).

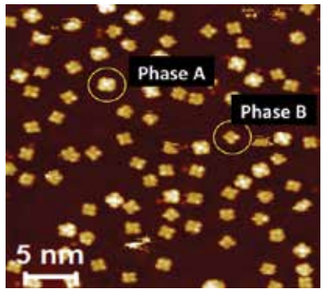


Figure 23: STM image shows two configurations of FePc referred to as Phase A with a raised bright center and Phase B with a lowered dark center (Dr. Aparna Deshpande's Group)

The effect of doping magnetic molecules FePc on the topological insulator surface Bi_2Se_3 was explored with scanning tunneling microscopy (STM) and scanning tunneling spectroscopy (STS). STM showed two configurations of FePc referred to as Phase A with a raised bright center and Phase B with a lowered dark center. The adsorption site of FePc and the atomic scale registry of FePc on the Bi_2Se_3 surface has been recorded by STM imaging. STS measurements showed that the Dirac point for undoped and FePc-doped Bi_2Se_3 surface remains unchanged. This is a signature that the topological surface state of Bi_2Se_3 is preserved despite the influence of FePc molecules.

Phase transitions, sorting dynamics

Prof. Deepak Dhar studied phase transitions in one-dimensional models with short-range interactions (with S. Saryal (IISERP), T. Sadhu (TIFR) and J. Klamser (ENS, Paris)). The misconception that the equilibrium free energy of a one dimensional model with strictly finite-ranged interactions, and at non-zero temperatures, cannot show any singularities as a function of the coupling constants was addressed. Thin rigid linear rods of unit length were considered, whose centres lie on a 1-d lattice, of lattice spacing a. The interaction between rods is a repulsive soft-core interaction, having a finite energy U per overlap of rods. The group showed that the equilibrium free energy per rod F(1/a) has an infinite number of singularities, as a function of 1/a.

In another study (with S. Sabhapandit (RRI), S. Das (RRI), and Aanjaneya Kumar (IISERP)), the team considered a one-dimensional infinite lattice where at each site was an agent carrying a velocity, which is drawn initially for each agent independently from a common distribution. This system evolves as a Markov process where a pair of agents at adjacent sites exchange their positions with a specified rate, while retaining their respective velocities, only if the agent on the left site has a higher velocity than the other. The group studied how the fluctuations of the net overtakings by an agent vary with time.

Interacting quantum many body systems

Dr. Sreejith G.J.'s research explores emergent physics in a classical statistical model called the dimer model, which is closely related to certain phase transitions in quantum spin systems. The year-long calculation has found evidence of new symmetries in this system which emerges from collective behaviour. Together with T.S. Mahesh (IISER Pune), the group explored certain non-equilibrium quantum phases called 'discrete time crystals' in NMR systems. The group's realisation of these phases comes third in sequence after similar results were obtained in other systems in Harvard and JQI in Maryland. Dr. Sreejith has also continued his work on quantum Hall states with a focus on characterising complex electronic correlations in them.

Discovering Kondo state in semiconducting phosphorene

Dr. Mukul Kabir's group has worked on (a) understanding the electronic, optical and magnetic properties of 2D materials; (b) investigating molecular interaction on surfaces; and (c) designing new materials for photovoltaic applications. One of their results is described below.

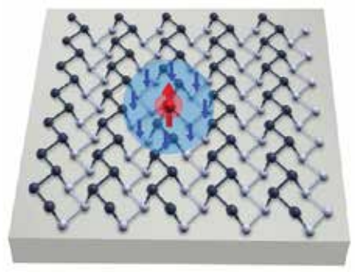


Figure 24: Schematic Kondo screening of magnetic moment by many-body singlet formation with conductio electrons in semiconducting phosphorene
(Dr. Mukul Kabir's Group)

Correlated interaction between dilute localised impurity electrons and the itinerant host conduction electrons in metals gives rise to the conventional many-body Kondo effect below sufficiently low temperature. In sharp contrast to these conventional Kondo systems, the group has described an intrinsic, robust, and high-temperature Kondo state in two-dimensional semiconducting phosphorene. While absorbed at a thermodynamically stable lattice defect, Cr impurity triggers an electronic phase transition in phosphorene to provide conduction electrons, which strongly interact with the localised moment generated at the Cr site. These manifest into the intrinsic Kondo state, where the impurity moment is quenched in multiple stages and at temperatures in the 40–200 K range. Further, along with a much smaller extension of the Kondo cloud, the predicted Kondo state is shown to be robust under uniaxial strain and layer thickness, which greatly simplifies its future experimental realisation. This study could potentially open up new avenues in Kondo physics and trigger further theoretical and experimental studies.

Nanostructured materials: From quantum transport to energy harvesting

Dr. Atikur Rahman's group is interested in understanding the charge transport properties of nanostructured devices and use of nanomaterials for energy harvesting applications. The group is also heavily involved in building new equipment for sample growth and various measurements. His group is currently studying the stability problem of perovskite solar cells using electronic transport and noise characteristics under various environmental conditions. Preliminary data suggest that the interface plays a major role in determining the stability of perovskite solar cells.

To understand the charge transport properties of nanodevices his group is mainly interested in heterostructures of 2D-2D, 2D-3D, and 2D-0D materials. The device fabrication is done either by exfoliating the bulk layered materials or by chemical vapour deposition growth. At present, they can grow large single layer MoS_2 on SiO_2/Si substrates. To fabricate the devices, they use homemade photo-lithography setup.

The group is building several new instruments such as (a) atomic layer deposition unit for coating insulating material with monolayer precession; (b) ultra-low noise voltage pre-amplifier; (c) environment control chamber for solar cell study; (d) transient photo-voltage measurements unit to determine the lifetime and diffusion length of photo-generated charge carriers; (e) DLTS unit for the measurement of deep level trap states; (f) several LN_2 optical cryostats for low-frequency noise measurement; and (g) laser-based zone annealing setup.

6.5 Particle Physics and Gravity

Gravity and Yang-Mills

Dr. Sudarshan Ananth's research spanned two themes this year. The first examined the structure of pure gravity in four dimensions. The group showed that the light-cone Hamiltonian of pure gravity could be expressed as a Quadratic Form. This simple structure is intriguing for a variety of reasons including the possibility that it results from some hidden symmetry.

On the light-cone, Poincaré invariance is not manifest and must be explicitly verified. This idea can be completely reversed to ask: what if we start with just Poincaré symmetry and allow invariance to determine all the permitted interaction vertices? The group demonstrated how powerful this method is by focussing on pure Yang-Mills in four dimensions. One very interesting consequence of this approach is that the very idea of a "gauge group" emerges naturally.

Ultra-relativistic heavy-ion collisions

In this area of research by Prof. Rajeev Bhalerao, a theoretical model was developed to evaluate the effects of pre-equilibrium dynamics on observables in ultra-relativistic heavy-ion collisions. The initial non-equilibrium phase was simulated within a multiphase transport model, while the subsequent near-equilibrium evolution was modelled using (2+1)-dimensional relativistic viscous hydrodynamics. The two stages of evolution were matched carefully by calculating the full energy-momentum tensor from the first stage and using it as input for the second stage. It was found that when the pre-equilibrium evolution was taken into account, final-state observables were insensitive to the switching time between the two stages. Unlike some earlier treatments of pre-equilibrium dynamics in the literature, the initial shear viscous tensor was not found to be large. With a shear viscosity to entropy density ratio of 0.12, the current model described quantitatively a large set of experimental data on collective flow in Pb+Pb collisions at the Large Hadron Collider (LHC) over a wide range of centrality.

Experimental high energy physics

The analysis of data collected by the CMS experiment in 2016 and 2017 continued this year. Dr. Sourabh Dube's group focussed on the multilepton final state, specifically on searches 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 multi-prong approach yielded a sensitivity increase of 500 over the previous publication and seesaw fermions were ruled out in a variety of scenarios with varying branching ratios to the different lepton flavors (*Phys. Rev. Lett.* 119:221802 (2017)). Dr. Dube's group is now working towards understanding the implications of the 2016 and 2017 data on models that predict vector-like leptons.

Conformal field theory

During this year, Prof. Sunil Mukhi's research explored mathematical aspects of quantum field theory, particularly conformal field theory. Correlation functions of scaling fields in a wide class of 2-dimensional rational conformal field theories were computed using the bootstrap technique. A conjecture relating theta functions on genus-g and genus-1 Riemann surfaces was investigated and fresh evidence was found in support of it, including a complete proof for the case of genus 2.

Probing new physics

Dr. Arun Thalapillil's research in the past year has been broadly focussed on two topics: Developing sophisticated methods to search for sterile neutrinos at hadron colliders, and investigating novel constrains on dark matter candidates from astrophysics, via their non-perturbative production.

The group showed that their techniques for sterile neutrinos superseded all previous works, and gave the best limits. Novel, model independent and original bounds were derived for millicharged particles by considering their non-perturbative production in Neutron stars. In another line of work, the group is considering hitherto unexplored theoretical aspects of finite temperature Schwinger pair production.



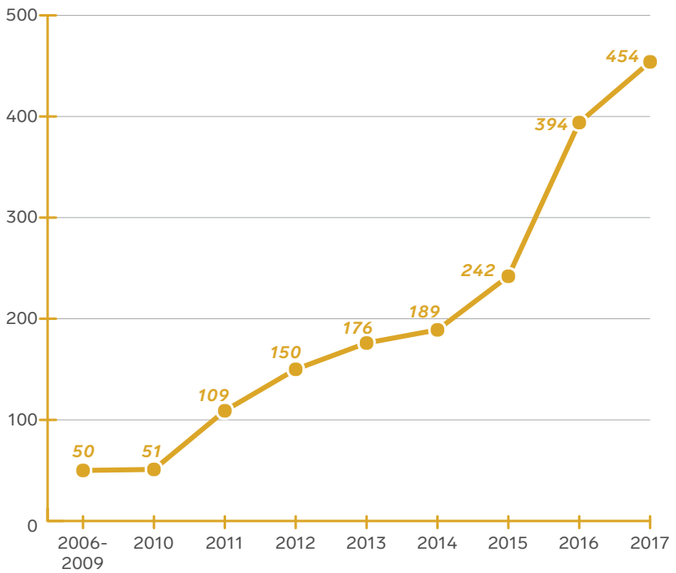
Publications

Research publications from the institute have seen a steady rise, with a total of 1815 since inception and about 3 papers per faculty member during 2017.

The list of publications in 2017 from IISER Pune members is given in the Appendix section of this report.



NUMBER OF PUBLICATIONS, YEAR-WISE



DISCIPLINE-WISE NUMBER OF PUBLICATIONS 2006-2017

310
BIOLOGY

685
CHEMISTRY

28
EARTH AND CLIMATE SCIENCE

08
HUMANITIES AND SOCIAL SCIENCES

97
MATHEMATICS

687
PHYSICS

Extramural Grants

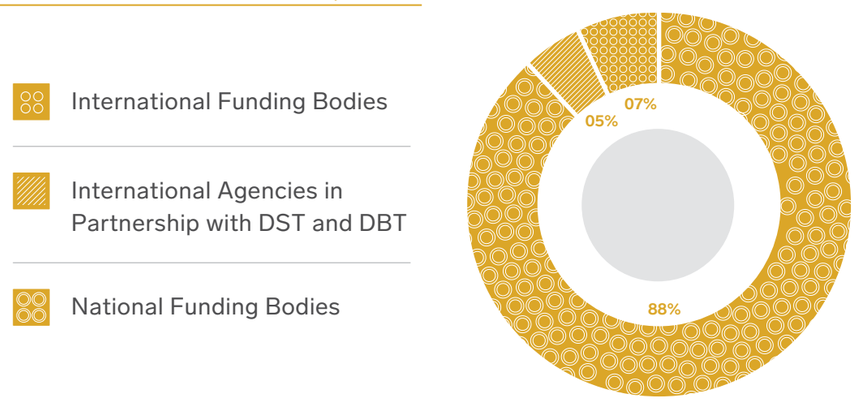
Our faculty members have received 50 new grants during 2017-18 from external funding agencies. In addition, the institute has received funds for 115 ongoing research projects as well.

Among these are Ramanujan Fellowship to Dr. Suhas Ettammal; research grants through DST Women Scientist Scheme to Dr. Keerthi Harikrishnan and Dr. Tressa Jacob; DST-INSPIRE Faculty Awards to Dr. Anand Krishnan and Dr. Chitrabhanu Chaudhuri; a Max Planck Partner Group Project to Dr. Sagar Pandit; and an HHMI International Research Scholar Award to Dr. Thomas Pucadyil.

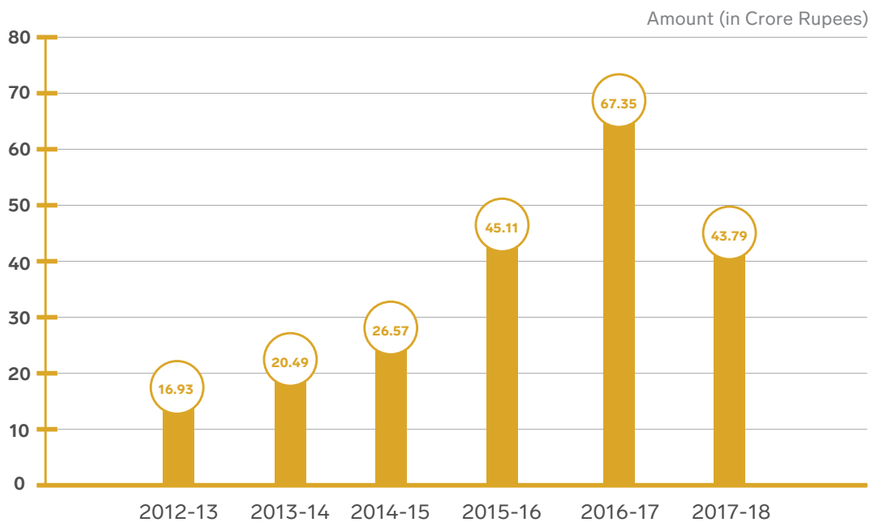
Through a new scheme by DST that supports innovation in the field of energy, Dr. Ramanathan Vaidhyanathan and Prof. Satishchandra Ogale have received research grants during the year 2017-18.

The list of new extramural grants received during 2017-18 is given in the Appendix section of this report.

SOURCES OF EXTRAMURAL GRANTS, 2017-18



EXTRAMURAL FUNDS RECEIVED, YEAR-WISE



Awards and Honours



Dr. Bijay Kumar Agarwalla
ASSISTANT PROFESSOR
Awarded Max Planck India Mobility Grant as a young research scientist, for a period of four years (2017-2021)



Dr. Anup Biswas
ASSISTANT PROFESSOR
Won the Young Scientist Medal of the Indian National Science Academy (INSA), New Delhi



Dr. Sudarshan Ananth
ASSOCIATE PROFESSOR
Won the B.M. Birla Science Prize in Physics for 2016



Dr. Sujit Ghosh
ASSOCIATE PROFESSOR
Won the AVRA Young Scientist Award for 2017



Dr. Deepak Barua
ASSOCIATE PROFESSOR
Selected to join the Editorial Board of *Journal of Ecology* as an Associate Editor



Dr. Shabana Khan
ASSISTANT PROFESSOR
Selected as a member of Editorial Advisory Board for *Organometallics* (ACS Journal) for 2018-2020



Dr. Angshuman Nag
ASSISTANT PROFESSOR
Received Reviewer Excellence (Top 1% reviewer) Award for 2017 from *Chemistry of Materials*



Prof. Satishchandra Ogale
PROFESSOR
One of the partners in a multi-institutional project on solar energy that won the Newton Prize for 2017



Dr. Sagar Pandit
ASSISTANT PROFESSOR
Awarded a Max Planck Partner Group; one of the 32 partner groups of the Max Planck Society in India



Dr. Pinaki Talukdar
ASSOCIATE PROFESSOR
Won the Bronze Medal of Chemical Research Society of India (CRSI); Won the National Bioscience Award given by the Department of Biotechnology (DBT), Govt. of India



Dr. Thomas Pucadyil
ASSOCIATE PROFESSOR
Named Howard Hughes Medical Institute (HHMI) International Research Scholar



Dr. Ramanathan Vaidhyanathan
ASSOCIATE PROFESSOR
Named Best Emerging Young Scientist (Chemical Frontiers), Goa (2017)

Memberships and Affiliations

Nixon Abraham Review Editor, *Frontiers in Neuroscience* (Frontiers in Neuroanatomy)

G. Ambika Editorial Board Member, *Proceedings of the Royal Society A* • Visiting Associate, IUCAA, Pune

V.G. Anand International Advisory Board Member, *Macroheterocycles*

Baskar Balasubramanyam Visiting Assistant Professor, University of California Los Angeles, USA, October 2017 to June 2018

Nirmalya Ballav Editorial Board Member, *ISRN Spectroscopy*

Deepak Barua Associate Editor, *Journal of Ecology*

Anup Biswas Invited Member of the Indian Society of Industrial and Applied Mathematics (ISIAM)

Harinath Chakrapani Editorial Board Member, *Scientific Reports*

Neelesh Dahanukar Editorial Board Member, *Journal of Threatened Taxa*

Sutirth Dey Editorial Board Member, *Journal of Theoretical Biology*

Deepak Dhar Fellow, Indian Academy of Sciences, Bengaluru; Council Member (2016-2019) • Fellow, National Academy of Sciences, Allahabad • Fellow, Indian National Science Academy, New Delhi, • Fellow, The World Academy of Sciences (TWAS), Trieste • Editorial Board Member of *Journal of Mathematical Physics* and *Journal of Physics A* • Associate Editor, *Journal of Statistical Physics*

Sourabh Dube Member, India-CMS Collaboration • Member, CMS Collaboration, CERN, Geneva

Sanjeev Galande Honorary Associate, Sydney Medical School, Sydney, Australia 2013-19 • Fellow, Indian Academy of Sciences, Bengaluru • Fellow, Indian National Science Academy • Member, Guha Research Conference • Editorial Board Member, *Genes and Genetic Systems* • Editor, *Zoology*

K.N. Ganesh Fellow and 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 • Memberships of Editorial Boards of Journals: *Journal of Organic Chemistry* (International Editorial Advisory Board); *Chemistry – An Asian Journal* (Member, International Advisory Board); *Beilstein Journal of Organic Chemistry*; *Artificial DNA: PNA, XNA; Oligonucleotides; Scientific Reports;* Co-Editor, *ACS Omega* for India

Aurnab Ghose Editorial Board Member, *Journal of Biosciences* • Review Editor, *Frontiers in Molecular Neuroscience*

Prasenjit Ghosh Regular Associate of the Abdus Salam International Centre for Theoretical Physics (Jan 2012 to Dec 2017)

Sujit Ghosh Editorial Board Member, *Scientific Reports*

Partha Hazra Editorial Board Member, *Scientific Reports*

Krishanpal Karmodiya Editorial Board Member, *Scientific Reports*

Shabana Khan Editorial Advisory Board Member, *Organometallics*

M.S. Madhusudhan Editorial Board Member, *Biology Direct*

Ayan Mahalanobis Editorial Board Member, *International Mathematical Forum*

John Mathew International Advisory Board Member, *British Journal for the History of Science*

Rama Mishra Editorial Board Member, *American Journal of Mathematical Analysis*

Sunil Mukhi Fellow, Indian Academy of Sciences, Bengaluru • Fellow, Indian National Science Academy, New Delhi • Fellow, The World Academy of Science (TWAS), Trieste • Editorial Board Member (Physics), *Current Science* • Editorial Board Member, *Journal of High Energy Physics*

Angshuman Nag Associate, Indian Academy of Sciences, Bengaluru

A.A. Natu Research Ambassador, DAAD • Visiting Professor, Bielefeld University, Germany • Editorial Board Member, *Indian Drugs*

Satishchandra Ogale Fellow, Indian Academy of Sciences, Bengaluru • Fellow, National Academy of Sciences, Allahabad • Editorial Advisory Board of *Energy and Environmental Science; Sustainable Energy & Fuels; ACS Applied Materials and Interfaces; and Scientific Reports*

Shyam Rai Fellow, Indian National Science Academy, New Delhi • Fellow, Indian Academy of Sciences, Bengaluru • Fellow, National Academy of Sciences, Allahabad

A. Raghuram Fellow, Indian Academy of Sciences, Bengaluru

Sudha Rajamani Editorial Board Member, *Life* • Adjunct Faculty, Dr. Vikram Sarabhai Institute of Cell and Molecular Biology, MSU, Baroda

M.S. Santhanam Editorial Board Member, *Physics Education* (India)

Seema Sharma Member, India-CMS Collaboration • Member, CMS Collaboration, CERN, Geneva

L.S. Shashidhara Fellow and Vice-President (Science and Society), Indian National Science Academy, New Delhi (2016-2018) • Secretary-General, International Union of Biological Sciences (IUBS) (2016-2019) • Fellow, Indian Academy of Sciences, Bengaluru • Fellow, National Academy of Sciences, Allahabad • Associate Editor, *Current Science, Journal of Genetics* • Editorial Board Member and MS Handling Editor, *Scientific Reports*

S. Sivaram Fellow: Indian National Science Academy, New Delhi; Indian Academy of Sciences, Bengaluru; National Academy of Sciences, Allahabad; Indian National Academy of Engineering, New Delhi; The World Academy of Sciences, Trieste (TWAS); International Union of Pure and Applied Chemistry (IUPAC); Royal Society of Chemistry

Pushkar Sohoni Associate Editor, *South Asian Studies* (Journal of the British Association of South Asian Studies) • 2016-17 Visiting Scholar, Center for Advanced Study of India (CASI), University of Pennsylvania, USA

Nishikant Subhedar President, Indian Subcontinental branch of the International Neuropeptide Society

Gyana Ranjan Tripathy Young Associate (2015-2018), Indian Academy of Sciences, Bengaluru

V.S. Rao Adjunct Visiting Professor, SP Pune University

Jayant Udgaonkar Fellow, Indian National Science Academy, New Delhi • Fellow, The World Academy of Sciences (TWAS), Trieste • Fellow, Indian Academy of Sciences, Bengaluru • Editorial Board Member, *Protein Engineering, Design and Selection* • Associate Editor, *Biochemistry*

R. Vaidhyanathan Advisory Board Member, *Scientific Reports*

Milind Watve Fellow and Council Member, Indian National Science Academy, New Delhi • Fellow, Indian Academy of Sciences, Bengaluru

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Every year, faculty members are invited to present their research work at conferences, workshops, and other events across India and elsewhere. Faculty members are also involved in organising scientific conferences in topics relevant to their research.

The list of invited lectures given by them and academic events they have organised during 2017-18 is given in the Appendix section of this report.

02

Academic Programmes

60 / PhD Programme

69 / Integrated PhD Programme

74 / BS MS Programme



PhD Programme

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



PhD STUDENT NUMBERS ACROSS DISCIPLINES
as on March 31, 2018

87
BIOLOGY

176
CHEMISTRY

10
EARTH AND CLIMATE SCIENCE

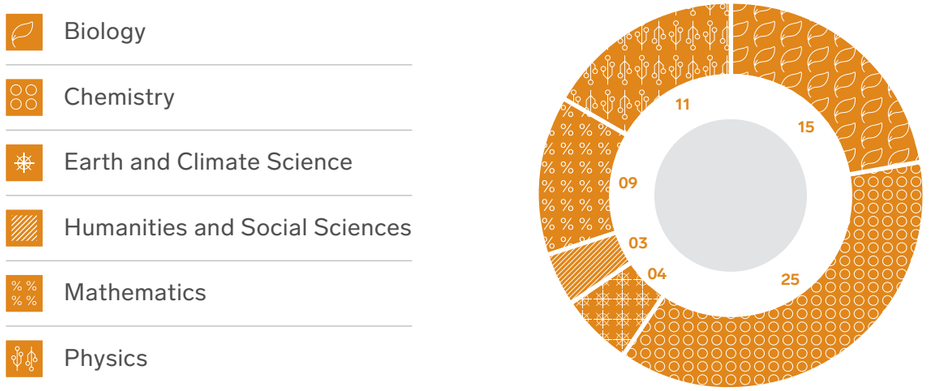
03
HUMANITIES AND SOCIAL SCIENCES

31
MATHEMATICS

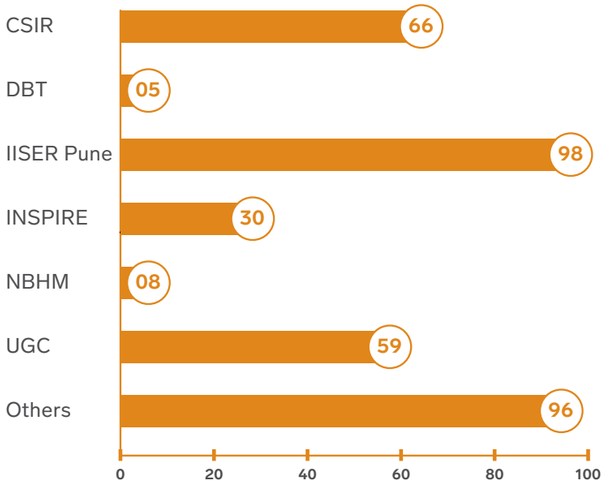
55
PHYSICS

During August 2017 and January 2018 admission sessions, 67 PhD students were admitted to the PhD programme. The list of enrolled students is available on the IISER Pune website.

PhD STUDENT ENROLLMENT DURING AUGUST 2017 AND JANUARY 2018 SESSIONS



SOURCES OF FELLOWSHIPS FOR PhD STUDENTS



During this year, 04 students discontinued from the programme. Thus, there are 362 students working towards PhD at the institute as on March 31, 2018.

Gender	GE	OBC	SC	ST	Total	PD
Men	172	54	15	2	243	3
Women	104	12	3	0	119	1
Total	276	66	18	2	362	4

In the 6th convocation held on May 19, 2017, 41 students were conferred PhD degree. The details are as follows:

Sr.No.	Student	Discipline	Thesis Title	Advisor
01	Sachin Sadashiv Holkar	Biology	Role of clathrin-associated sorting proteins (CLASP) in clathrin assembly on membranes	Thomas Pucadyil
02	Partha Pratim Patra	Physics	Plasmofluidic single-molecule Surface-enhanced Raman Scattering and dynamic assembly of nanostructures	G.V. Pavan Kumar
03	S. Bapu Rao	Chemistry	Polycaprolactone block copolymer nanoscaffolds for drug delivery to cancer cells	M. Jayakannan
04	Yasmeen Shameem Akhtar	Mathematics	Covering arrays and generalizations	Soumen Maity
05	Srishti Dar	Biology	Mechanism of dynamin-catalyzed membrane fission	Thomas Pucadyil
06	Venkateswara Rao Boddu	Chemistry	Strategies for the synthesis of novel glycoconjugates	Srinivas Hotha
07	Khodade Vinayak Shahaji	Chemistry	Synthesis and evaluation of small molecule generators of redox-active reactive species	Harinath Chakrapani
08	Koushik Karmakar	Physics	Disorder in the quantum spin chains Sr_2CuO_3 and $SrCuO_2$	Surjeet Singh
09	Sudhir Kumar Pujahari	Mathematics	Gap distribution among sequences arising in the theory of modular forms	Kaneenika Sinha
10	Pawar Archana Pratap Madhuri	Biology	Adhesion dependent regulatory crosstalk of small GTPases Ral and Arf6 and its role in anchorage dependent signalling	Nagaraj Balasubramanian
11	Soumya Mukherjee	Chemistry	Functionalized Metal-organic Frameworks: Promising porous materials for chemical separation	Sujit K. Ghosh
12	Yadav Rohan Dattatray	Chemistry	Exploring the structural and functional aspects of sialic acid mimetics	Raghavendra Kikkeri
13	Abhijeet Sanjay Bayani	Biology	Crop depredation by wild herbivores at the western boundary of Tadoba-Andhari Tiger Reserve (TATR), Chandrapur, Maharashtra, India	Milind Watve
14	Swathi Shridhar Hegde	Physics	Quantum simulations with unitary & nonunitary controls: NMR implementations	T.S. Mahesh
15	Raundal Hitesh Ramesh	Mathematics	Polynomial knots and their spaces	Rama Mishra
16	Hari Krishna Bavireddi	Chemistry	Cyclodextrin based multivalent glycoprobes for targeting, imaging and drug delivery	Raghavendra Kikkeri
17	Sayan Mondal	Chemistry	Excited state dynamics of nucleobases and structure and dynamics of melanin	Mrinalini Puranik
18	Aparna Sunil Sherlekar	Biology	Syndapin functions in orchestrated remodelling of the membrane and actin cytoskeleton	Richa Rikhy
19	Tanmoy Saha	Chemistry	Synthetic molecular approaches for artificial anion transport systems and their bio-applicability	Pinaki Talukdar
20	Arundhati Roy	Chemistry	Anion recognition: From the perspectives of fluorescent probes and transmembrane ion transporters	Pinaki Talukdar
21	Chauhan Dineshsinha Pratapsinha	Chemistry	Rearrangement strategies towards the synthesis of δ-unsaturated γ-amino acids and functionalized amidines	Pinaki Talukdar
22	N. Bhavani	Biology	Investigating the role of miRNA160 in local and systemic defense responses of potato against *Phytophthora infestans* infection	Anjan Banerjee
23	Vallari Shukla	Biology	Gene duplication, lineage specific expansion and sub-functionalization of genes encoding MADF-BESS domain proteins in *Drosophila* development	Girish S. Ratnaparkhi
24	Rini Mukeshbhai Shah	Biology	Understanding transcriptional regulation of the long noncoding RNA XIST	Sanjeev Galande
25	Ranade Devika Ravindra	Biology	Role of nuclear lamins in chromosome positioning and genome stability	Kundan Sengupta
26	Kulkarni Mandar Vinod	Chemistry	Theoretical study of B-DNA to A-DNA transition: From local dinucleotide step to global helical conversion	Arnab Mukherjee
27	Sunil Kumar	Physics	Towards distributed quantum information processing using coupling of neutral atoms to plasmonic nanostructures	Umakant Rapol
28	Rashmi Govind Kulkarni	Biology	Monitoring oxidative stress enables predictions of personalised glucose targets in diabetic patients	Pranay Goel
29	Siva Koti Sangabathuni	Chemistry	Multivalent glycoconjugates to modulate Carbohydrate Protein Interactions (CPIs)	Raghavendra Kikkeri
30	Abhinav Parivesh	Biology	Studying the interaction of Api5 with TopBP1 and its functional characterization in apoptosis signalling upon DNA damage	Mayurika Lahiri

Sr.No.	Student	Discipline	Thesis Title	Advisor
31	Kulkarni Manasi Vilas	Biology	Biochemical, bioinformatics and crystallographic analyses of the Type III restriction-modification enzyme EcoP1I	Saikrishnan Kayarat
32	Avishek Karmakar	Chemistry	Design, syntheses and applications of MOFs as sensory probes for anion recognition	Sujit K. Ghosh
33	Minal Sachin Pednekar	Chemistry	Atomistic simulations of nanostructure and dynamics of phosphoric acid-benzimidazole systems: A fuel cell initiative	Arun Venkatnathan
34	Indu Kaul	Chemistry	First principles investigations of properties of low dimensional systems and their role in selective hydrogenation	Prasenjit Ghosh
35	Barun Dhara	Chemistry	Metal-organic coordination polymers and composites: Electrical conductivity, photoluminescence, and electro-catalysis	Nirmalya Ballav
36	Libi Anandi Vishwanathan	Biology	Transformation of non-malignant breast epithelial cells: Role of alkylating agents and platelet activating factor	Mayurika Lahiri
37	Prabhat Kumar Kushwaha	Mathematics	Tightest lower bound for the elliptic curve diffie-hellman problem and new attacks on the discrete logarithm problem	Ayan Mahalanobis
38	Ravi Prakash Nath Tripathi	Physics	Nanophotonics of organic molecular waveguides: Towards active optical antenna	G.V. Pavan Kumar
39	Neha Prabhu	Mathematics	Fluctuations in the distribution of hecke eigenvalues	Kaneenika Sinha
40	Danveer Singh	Physics	Coupled plasmonic nanowires: Dual-channel fourier microscopy studies	G.V. Pavan Kumar
41	Manish Singh Kushwah	Biology	EHD1 ATPase, catalyses membrane fission via a novel mechanism	Thomas Pucadyil

The following 26 students have successfully completed their requirements for the award of PhD degree (completed thesis defense on or before March 31, 2018):

Aniruddh Jayant Sastry
Maidul Islam
Gunja Sachdeva
Sabale Pramod Madhavrao
Sushil Bhunia
Rajendra Aluri
Anant Kumar Srivastava
Shinde Pralhad Mohan
Gade Madhuri Hanumant
Thite Trupti Nandkumar
Karnati Narasimha
Aparna Banerjee
Mallu Chenna Reddy
Nagnath Yadav More
Panchal Santosh Prakashrao
Benke Sushil Namdev
Darshika Tomer
Sohini Sarkar
Ranguwar Rajendra Rajmogli
Palvai Sandeep Kumar
Rohit Suhas Joshi
Rajkumar Misra
Bhagyashree Dhananjay Kaduskar
Sudeb Ghosh
Ashok Yadav
Abhik Mallick

The following 17 students have submitted their thesis during the year (defense yet to be conducted as of March 31, 2018):

Shyamapada Nandi
Neha Nirwan
Deshmukh Mahesh Sadashiv
Lakshmi V.R. Babu Syamala
Khopade Tushar Manik
Noothanaganti Ashok
Nishtha Sachdeva
K. Raj Kumar
Trimbak Baliram Mete
Sudipta Tung
Manasi Subhash Gangan
Manikandan R.
Metikoti Jagadeeswararao
Singh Vibha
Sampada Prabhakar Mutalik
Debangana Mukherjee
Supratik Sarkar

The following students received travel grants for participating in international conferences abroad and for internship. These also include a total of 43 Infosys Foundation Travel Awards (national and international) towards partial support.

Student	Purpose and Place of Visit	Duration	Funding Source
Babar Rohit Milind	American Physical Society (APS) March Meeting 2018, Los Angeles, California, USA	March 05-09, 2018	Infosys Foundation; DCMP Graduate Student Travel Award
Babar Rohit Milind	DPG Spring Meeting of the Condensed Matter Section together with EPS Condensed Matter Division Technical University of Berlin, Germany	March 09-16, 2018	SERB
Turmoli Neogi	Spring School on Superstring Theory and Related Topics, Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy	March 14-22, 2018	Host
Chandan Kumar Singh	School on Electron-Phonon Physics from First Principles Abdus Salam International Centre for Theoretical Physics (ICTP) Trieste, Italy	March 19-23, 2018	Host
Naveen Nishad	SFT 2018- Lectures on Statistical Field Theories Galileo Galilii Institute for Theoretical Physics, Florence, Italy	February 05-16, 2018	
Neha	Institut d'Electronique, de Microelectronique et de Nanotechnologie (IEMN), Universite de Lille 1, France	January 03-May 30, 2018	Infosys Foundation; Raman-Charpak Fellowship
Yashwant Kumar	West Coast Bacterial Physiologists Annual Conference, Asilomar, California, USA	December 15-17, 2017	National Science Foundation (NSF), USA
Suddhasattwa Mandal	Beamline at Elettra Sincrotrone Trieste, Italy	November 20-December 06, 2017	Host
Abhishek Mishra	Joint Annual Meeting: Ecology Across Borders, Ghent, Belgium	December 07-15, 2017	British Ecological Society
Kajari Gupta	The 6th International Conference on Complex Networks and Their Applications 2017, University of Lyon, France	November 28-December 04, 2017	Infosys Foundation
Saurabh Pradhan	Department of Genetics, Yale School of Medicine, Yale University, New Haven, USA	January 08-February 07, 2018	Company of Biologists
Soumendra Nath Panja	9th APCTP Workshop on Multiferroics, University of Tokyo, Chiba, Japan	November 08-21, 2017	SERB
Ishtiyaq Ahmed	European Synchrotron Radiation Facility (ESRF), Grenoble, France	October 21-24, 2017	Host

Student	Purpose and Place of Visit	Duration	Funding Source
Shivik Rakesh Garg	47th Annual Meeting of the Society for Neuroscience (SfN) Neuroscience 2017, Washington D.C., USA	November 09-20, 2017	Infosys Foundation
Partha Samanta	The 2nd European Conference on Metal-Organic Frameworks and Porous Polymers (EURO mof 2017), Delft Unversity of Technology, Delft, Netherlands	October 27-November 03, 2017	Infosys Foundation
Abhik Mallick	8th World Congress on Targeting Mitochondria, Berlin, Germany	October 23-November 01, 2017	Infosys Foundation
Raj Kumar Koninti	Applied Nanotechnology and Nanoscience International Conference (ANNIC 2017), Rome, Italy	October 15-22, 2017	SERB; Infosys Foundation
Deshpande Nilesh Umakant	IUPAC-FAPS 2017 Polymer Congress, Jeju, South Korea	October 11-13, 2017	Infosys Foundation
Sonashree	IUPAC-FAPS 2017 Polymer Congress, Jeju, South Korea	October 11-13, 2017	SERB; Infosys Foundation
Sonashree	Ulsan University, Busan, South Korea	October 15-17, 2017	SERB
Aparna Banerjee	New directions in porous crystalline materials: Faraday Discussion, 2017, Edinburgh, UK	June 04-08, 2017	Infosys Foundation
Ranguwar Rajendra	Advances in Functional Materials (AFM 2017), University of California, Los Angeles, USA	August 14-17, 2017	Infosys Foundation
Sai Harshini Tekur	XXXVII Dynamics Days Europe, Szeged, Hungary	June 05-09, 2017	Infosys Foundation
Sai Harshini Tekur	Cracow School of Theoretical Physics organised in the framework of Quantum Technologies Conferences, Zakopane, Poland	June 13-21, 2017	Infosys Foundation
Saurabh Pradhan	To visit the laboratory of Prof. Dr. Antonio J. Giraldez at Department of Genetics, Yale School of Medicine, Yale University, New Haven, USA	July 01- August 15, 2017	Company of Biologists
Saurabh Pradhan	18th International Congress of Developmental Biology, National University of Singapore, Singapore	June 18-22, 2017	International Society of Developmental Biologists
Bipasha Dey	EMBO Conference on Cell Polarity and Membrane Dynamics, San Feliu de Guixols, Spain	June 04-09, 2017	Infosys Foundation; Organisers
Sucheta Majumdar	For delivering a seminar Max-Planck Institute for Gravitational Physics (Albert Einstein Institute), Golm, Germany	May 14-27, 2017	Host
Dibyata Rout	Research in the PETRA III experiment Deutsches Elektronen-Synchrotron (DESY), A Research Center of the Helmholtz Association in Hamburg, Germany	May 20-June 04, 2017	DST-DESY
G. Mahesh	Workshop on Spectroscopy and Dynamics of Photoinduced Electronics Excitations, Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy	May 08-12, 2017	Infosys Foundation; Host

Student	Purpose and Place of Visit	Duration	Funding Source
Abhik Mallick	10th European Global Summit for Cutting Edge Medicine titled CLINAM-Summit 10/2017, Basel, Switzerland	May 07-10, 2017	SERB; Infosys Foundation
Rane Aditee Prabhakar	CERN to take part in activities related to the CMS, Geneva, Switzerland	April 21-June 08, 2017	
Noothanaganti Ashok	6th International Meeting on Quadruplex Nucleic Acids, Prague, Czech Republic	May 31-June 03, 2017	SERB; Infosys Foundation
Sudeshna Manna	6th International Meeting on Quadruplex Nucleic Acids, Prague, Czech Republic	May 31-June 03, 2017	SERB; Infosys Foundation
Sameer Thukral	18th International Congress of Developmental Biology, Singapore	June 18-22, 2017	DBT
Tomer Darshika	18th International Congress of Developmental Biology, Singapore	June 18-22, 2017	Infosys Foundation
Rabindranath Bag	2017 IEEE Magnetic Society Summer School, Universidad International Menendez Pelayo, Santander, Spain	June 19-23, 2017	Infosys Foundation; IEEE Magnetic Society
Debangana Mukherjee	Advanced School/Workshop on Nonlocal Partial Differential Equations and Applications to Geometry, Physics and Probability, International Centre for Theoretical Physics (ICTP), Trieste, Italy	May 22-June 02, 2017	Host
Niraja Vijay Bapat	XVIIIth International Conference on the Origin of Life, University of California, San Diego, California, USA	July 16-21, 2017	DBT; Infosys Foundation
Niraja Vijay Bapat	Collaborative research project at Earth-Life Science Institute (ELSI), Tokyo Institute of Technology, Japan	September 10-October 20, 2017	Host
Ayantika Sen Gupta	EMBO Conference Series on Nuclear Structure and Dynamics, L'Isle-sur-la-Sorgue, France	October 03-13, 2017	DBT; Infosys Foundation
Sameer Thukral	18th International Congress of Developmental Biology, Singapore	June 18-22, 2017	DBT; Infosys Foundation
Neralkar Mahesh Renukadas	2017 Gordon Research Conference on Carbohydrates, Mt. Snow, Vermount, USA	June 25-30, 2017	SERB; Infosys Foundation
Neelesh Soni	10th European Meeting on Intermediate Filaments in 2017, Saint Malo, France	June 14-17, 2017	SERB; Infosys Foundation
Mahesh Kumar Chand	EMBO Conference titled Helicases and nucleic acid-based machines: Structure, mechanism and regulation and roles in human disease, Sponsored by Harden Conferences, Bamberg, Germany	July 23-28, 2017	SERB
Palvai Sandeep Kumar	International Conference on Nanomedicine and Nanobiotechnology (ICONAN 2017), Barcelona, Spain	September 25-29, 2017	SERB; Infosys Foundation
Nishta Sachdeva	International Study of Earth-affecting Solar Transients 2017 (ISEST 2017), Jeju, South Korea	September 18-22, 2017	SERB; Infosys Foundation
Sanku Paul	37th Dynamic Days Europe and Cracow School of Theoretical Physics organised in the framework of Quantum Technologies	June 03-23, 2017	Infosys Foundation

Student	Purpose and Place of Visit	Duration	Funding Source
	Conferences, Szeged, Hungary and Zakopane, Poland		
Sanku Paul	International Workshop on Chaos and Dynamics in Correlated Quantum Matter, Max Planck Institute for the Physics of Complex Systems (MPIPKS),Dresden, Germany	March 13-25, 2018	Infosys Foundation
Subrahmanyam Sappati	Condensed Matter Research (Trieste) and Workshop on Understanding Quantum Phenomena with Path Integrals: From Chemical Systems to Quantum fluids and Solids, ICTP, Trieste, Italy	July 02-29, 2017	Infosys Foundation; Host
Sudipta Tung	2017 Congress of the European Society for Evolutionary Biology (ESEB), Groningen, The Netherlands	August 20-25, 2017	Infosys Foundation; Society for the Study of Evolution
Amandeep	10th Liquid Matter Conference, Cankarjev dom Cultural and Congress Centre in Ljubljana, Slovenia	July 16-24, 2017	Infosys Foundation; SERB
Pramod Sabale	Autumn School Chemical Biology and ISBOC-11, Konstanz, Germany and Zurich, Switzerland	September 23-October 02, 2017	Infosys Foundation; Host
S.K. Rejaul	Operating Quantum States in Atoms and Molecules at Surfaces, QMol Conference 2017, Ascona, Switzerland	September 09-25, 2017	Infosys Foundation; CSIR
Manu K. Unni	International workshop on the diversification of early emerging metazoans: A window into bilaterian origins?, Tutzing, Germany	September 10-18, 2017	Infosys Foundation
Tanushree Kundu	EMBO-ASCB Annual Meeting, 2017, Philadelphia, USA	September 10-18, 2017	Infosys Foundation
Arun Neru	Annual Meeting of the Society for Neuroscience, Washington D.C., USA	November 11-15, 2017	Infosys Foundation
Ravikumar Govindan	255th ACS National Meeting, New Orleans, LA, USA	March 16-23, 2018	Infosys Foundation; SERB
T. Vijayakanth	24th Congress and General Assembly of the International Union of Crystallography (IUCr)2017, India	August 19-30, 2017	Infosys Foundation
Dinesh Mullangi	Hyderabad International Convention Centre Hyderabad, India	August 20-30, 2017	Infosys Foundation
Vibha Singh	International Congress of Cell Biology 2018-CCMB, India (Hyderabad)	January 26-31, 2018	Infosys Foundation
Suraj Prakash Yadav	Workshop on Rigidity and algebraic models in stable homotopy theory, University of Copenhagen, Denmark	April 08-14, 2018	Infosys Foundation
Girish Murlidhar Kulkarni	Workshop on Rigidity and algebraic models in stable homotopy theory, University of Copenhagen, Denmark	April 08-14, 2018	Infosys Foundation
Partha Samanta	24th Congress and General Assembly of the International Union of Crystallography (IUCr-2017)	August 21-28, 2017	Infosys Foundation

Integrated PhD Programme

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



INTEGRATED PhD STUDENT NUMBERS ACROSS DISCIPLINES
as on March 31, 2018

65
BIOLOGY

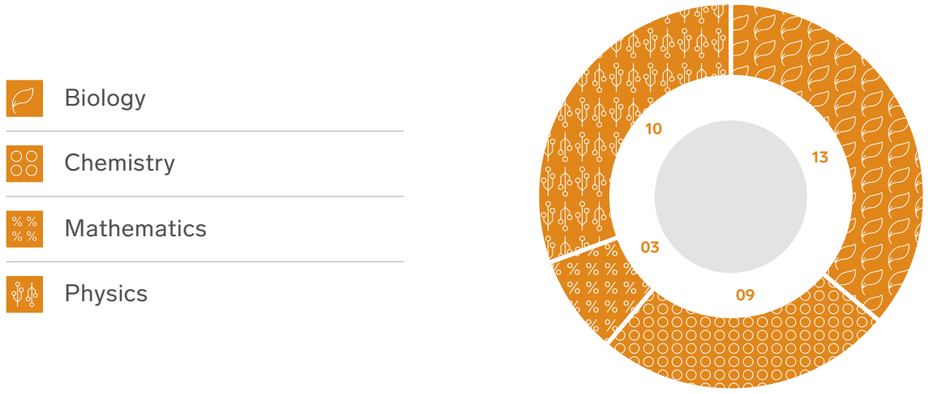
57
CHEMISTRY

08
MATHEMATICS

56
PHYSICS

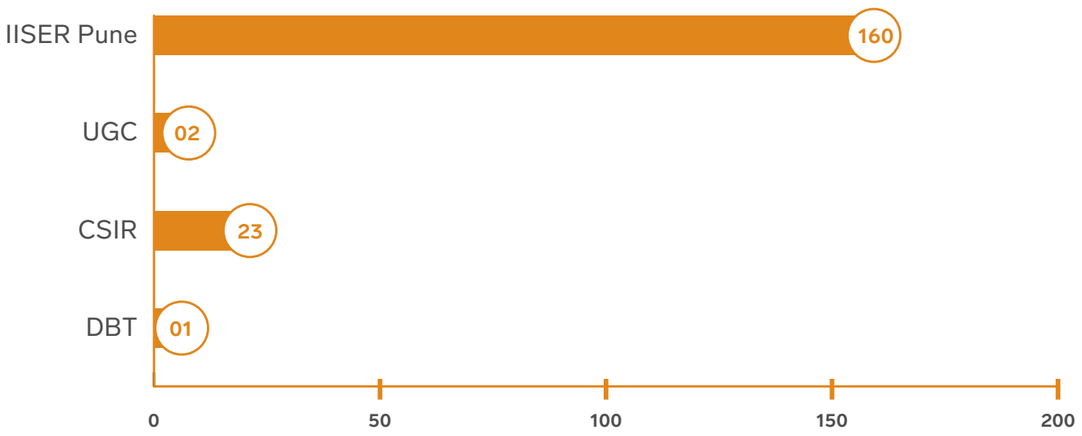
During the August 2017 session, 35 students took admission to post-BSc Integrated PhD programme: 13 in Biology, 9 in Chemistry, 3 in Mathematics and 10 in Physics. Three students discontinued from the programme during the year. The list of enrolled students is available on the IISER Pune website.

INTEGRATED PhD STUDENT ENROLLMENT DURING AUGUST 2017 SESSION



SOURCES OF FELLOWSHIPS FOR INTEGRATED PhD STUDENTS

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



The strength of Integrated PhD students as of March 31, 2018 is 186 (Women: 71; Men: 115) with 65 students in Biology, 57 in Chemistry, 8 in Mathematics, and 56 in Physics.

Gender	GE	OBC	SC	ST	Total
Men	104	10	1	0	115
Women	69	2	0	0	71
Total	173	12	1	0	186

Prizes for Academic Excellence were awarded to the following Integrated PhD students

These prizes are given to the students who have secured the highest CGPA at the end of second year (Academic Year 2015-17): Sathe Rupali Ravindra Madhuri (Biology); Swati Deswal (Chemistry); Debaprasanna Kar (Mathematics); Arindam Bhattacharjee (Physics)

The following Integrated PhD student was awarded Dual Master's and PhD degrees in the 6th convocation held on May 19, 2017

Sr.No.	Student	Discipline	Title of Thesis	Advisor
01	Mali Mahendraprasad Deviprasad Ramrati	Physics	Aspects of gravitation in light-cone gauge	Sudarshan Ananth

One student has successfully completed requirements for the award of Integrated PhD degree (completed thesis defense on or before March 31, 2018): Santosh Kumar Singh

The following students received travel grants for participating in international conferences abroad and for internships. These also include a total of 19 Infosys Foundation Travel Awards (national and international) towards partial support.

Student	Purpose and Place of Visit	Duration	Funding Source
Vikhyaat Ahlawat	49th IFF Spring School 2018, Julich, Germany	February 24-March 13, 2018	
Yashwant Chougule	Coherent Control of Complex Quantum Systems, 2018, Okinawa, Japan	April 17-20, 2017	Infosys Foundation
Sayali Sameer Chowdhary	Gordon Research Conference and Seminar on Developmental Biology, South Hadley, Massachusetts, USA	June 24-30, 2017	Infosys Foundation
Shikha Dagar	6th ELSI International Symposium Earth-Life Science Institute (ELSI), Tokyo Institute of Technology, Japan	January 08-13, 2018	Host
Aamod Desai	The 2nd European Conference on Metal-Organic Frameworks and Porous Polymers (EURO mof 2017), Delft University of Technology, Delft, Netherlands	October 29-November 01, 2017	SERB; Infosys Foundation
Dnyanesh Dubal	The 18th Congress of the International Society of Developmental Biologists, Singapore	June 16-23, 2017	Infosys Foundation

Student	Purpose and Place of Visit	Duration	Funding Source
Sandip Varkey George	XXXVII Dynamics Days Europe, Szeged, Hungary	June 05-09, 2017	SERB; Infosys Foundation
Jerrin Thomas George	Autumn School Chemical Biology and ISBOC 2017, Konstanz, Germany	September 23-October 02, 2017	Infosys Foundation; Host
Anshul Kapoor	Compact Moun Solenoid (CMS) Collaboration, CMS Secretariat, CERN Geneva, Switzerland	February 01-March 23, 2018	
G.A.R.S.R.K. Kashyap	Erasmus+ Program Go International Plus 2016, George-August-University, Goettingen, Germany	October 02, 2017-March 31, 2018	Sponsors
G.A.R.S.R.K. Kashyap	XXXVII Dynamics Days Europe, Szeged, Hungary	June 05-09, 2017	Infosys Foundation
Labade Ajay Shankar	EMBO Conference of European Molecular Biology Laboratory on Chromatin and Epigenetics (5480), EMBL Heidelberg, Germany	May 03-06, 2017	
Mehak Malhotra	IUPAC-FAPS Polymer Congress 2017, Jeju, South Korea	October 09-15, 2017	Infosys Foundation
Rajesh Mandal	Erasmus+ Program Go International Plus 2016, Georg-August-University, Goettingen, Germany	February 01-July 31, 2018	Sponsors
Yamini Mathur	West Coast Bacterial Physiologists Annual Conference, Asilomar, California, USA	December 15-17, 2017	National Science Foundation, USA
Chaitanya Mungi	Gordon Research Conference on Origin of Life, Galveston, Texas, USA	January 11-28, 2018	Infosys Foundation
Nandi Aditi Chinmoy	10th European Global Summit for Cutting Edge Medicine titled CLINAM-Summit 10/2017, Basel, Switzerland	May 07-May 10, 2017	Infosys Foundation
Shubham Pandey	CERN, Geneva, Switzerland to take part in activities related to the CMS	April 25-June 15, 2017	
Roopali Sainath Pradhan	EMBO Workshop on Nuclear Mechano-genomics, Mechanobiology Institute, National University of Singapore, Singapore	April 17-20, 2018	Infosys Foundation
Divya Rao	Transylvanian Experimental Neuroscience Summer School (TENSS) 2017, The Pike Lake, Transylvania, Romania	June 01-19, 2017	FENS-IBRO/PERC
Kingshuk Roy	Collaborative research under the supervision of Prof. (Dr.) Neil Robertson	June 01-August 31, 2017	Infosys Foundation; University of Edinburgh
Amruta Sadhu	Ninth Aegean Summer School: Einstein's Theory of Gravity and Its Modifications: From Theory To Observations, Greece	September 15-26, 2017	Infosys Foundation
Sumit Sarkar	Advanced School and Workshop on Quantum Science and Quantum Technologies, Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy	September 04-15, 2017	Infosys Foundation
Supratik Sarkar	From Static to Dynamical Gauge Fields with Ultracold Atoms, Galileo Galilei Institute for Theoretical Physics, Florence, Italy	May 28-July 08, 2017	Infosys Foundation; Host
Neeladri Sen	French School on Algorithms in Structural Bio-informatics, Institute for Scientific Study (IESC), Cargese, Corsica, France	November 26-December 01, 2017	DBT; Infosys Foundation
Santosh Kumar Singh	72nd meeting of International Symposium on Molecular Spectroscopy 2017, Champaign-Urbana, Illinois, USA	June 19-23, 2017	SERB; Infosys Foundation
Abhishek Swarnkar	67th Lindau Nobel Laureate Meeting, Lindau, Germany	June 25-30, 2017	Lindau Foundation; DST, Govt. of India
Prachi Dhananjay Telang	Deutsches Elektronen-Synchrotron (DESY), A Research Center of the Helmholtz Association in Hamburg, Germany for research in the PETRA III experiment	May 20-June 04, 2017	DST-DESY
Anjusha V.S.	International Workshop on Quantum Simulation & Computation, Bilbao, Spain	February 11-21, 2018	Infosys Foundation
Adarsh B. Vasista	Centre for Nanoscale Materials (CNM) at Argonne National Laboratory, Argonne, USA	October 16-31, 2017	Indo-US Science and Technology Forum (IUSSTF)
Adarsh B. Vasista	Northwestern University, Illinois, USA	November 01-06, 2017	Indo-US Science and Technology Forum (IUSSTF)
Adarsh B. Vasista	8th International Conference on Surface Plasmon Photonics (SPP8), Taipei, Taiwan	May 22-26, 2017	
Aamod Vikas Desai	24th Congress and General Assembly of the International Union of Crystallography (IUCr-2017), Hyderabad, India	August 21-28, 2017	Infosys Foundation
Roopali Sainath Pradhan	EMBO Conference Series on Nuclear Structure and Dynamics, L'Isle-sur-la-Sorgue, France	October 03-13, 2017	DBT

BS MS Programme

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

The academic year 2017-18 saw 222 students (164 boys and 58 girls) taking admission to the BS MS programme. Of these, 148 were admitted through the state and central boards' stream, via the IISER Aptitude Test, 48 through the IIT-JEE stream, and 26 through the KVPY stream. The list of enrolled students is available on the IISER Pune website.



Category-wise Distribution of Students Enrolled in 2017

Gender	GE	OBC	SC	ST	PD	Total
Boys	76	44	32	9	3	164
Girls	23	15	10	8	2	58
Total	99	59	42	17	5	222

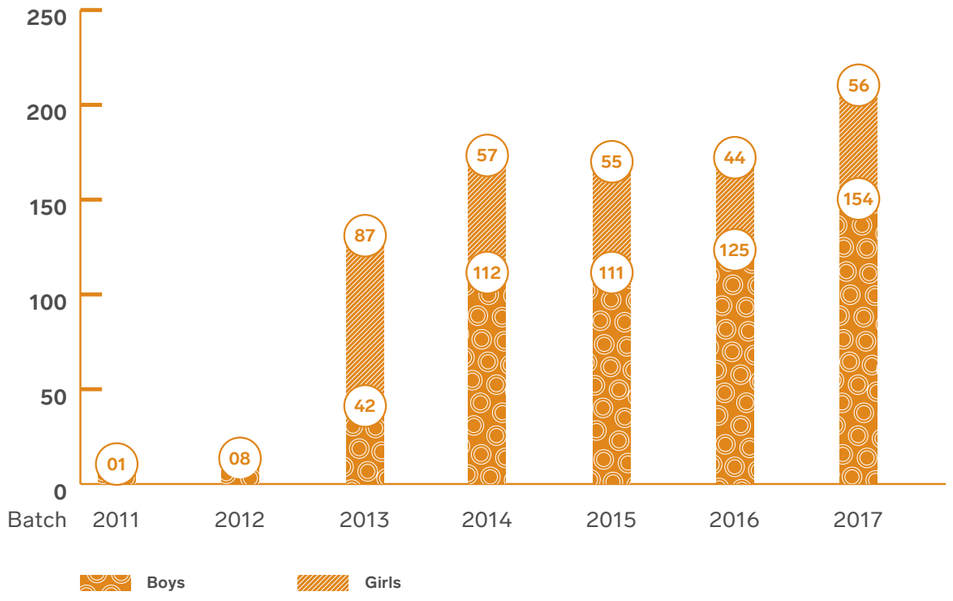
Overall Category-wise Distribution of Existing BS MS Students (as of March 31, 2018)

Gender	GE	OBC	SC	ST	PD	Total
Boys	294	182	87	27	8	598
Girls	130	74	38	9	3	254
Total	424	256	125	36	11	852

From the 2017 batch, 95 students were found eligible for receiving DST-INSPIRE scholarship and 34 students qualified for KVPY scholarship.

Total number of BS MS students receiving DST-INSPIRE and KVPY scholarships is as follows:
DST-INSPIRE= 624, KVPY=146

TOTAL BS MS STUDENT STRENGTH DURING 2017-18



Subsequent to admission, 12 students have discontinued from the programme, as they got admission in other courses, making the final number of students enrolled in 2017 to 210. In addition, from the previous batches, six students opted to discontinue the programme.

FIFTH YEAR PROJECTS CARRIED OUT BY THE OUTGOING BATCH OF BS MS STUDENTS DURING 2017-18

Discipline-wise

38 BIOLOGY

26 CHEMISTRY

02 EARTH AND CLIMATE SCIENCE

03 INTERDISCIPLINARY

14 MATHEMATICS

37 PHYSICS

Host-wise

68 IISER PUNE

18 INTERNATIONAL

34 NATIONAL

120 TOTAL

DETAILS OF FIFTH YEAR PROJECTS CARRIED OUT BY THE OUTGOING BATCH OF BS MS STUDENTS DURING 2017-18

Biology

Sr.No.	Student	Host Institute	Supervisor	Project Title
01	**Pofare Ameya Chandrabhan** 20121042	NCRA-TIFR, Pune	Mahendra Sonawane	Analysis of Grhl3 expression in the zebrafish epidermis upon defective intracellular transport
02	**Vishakha Kasherwal** 20131001	IISER Pune	Nagaraj Balasubramanian	Matrix stiffness dependent regulation of golgi organization
03	**Sameer Kumar Jagirdar** 20131028	Turku Centre for Biotechnology, Finland	Riitta Lahesmaa	The role of ten eleven translocation proteins on regulatory T cell differentiation and function
04	**Jazleena P.J.** 20131033	IISER Pune	P. Gayathri	Structural and biochemical studies of FRZCD, a cytoplasmic methyl- accepting chemosensory protein (MCP)
05	**Gayatri Shreedhar Mundhe** 20131044	IISER Pune	Richa Rikhy	Analysis of phospholipid regulation of epithelial-like architecture in the *Drosophila* blastoderm embryo
06	**Gajbe Karan Chandrakant** 20131047	SACON, Coimbatore	H.N. Kumara	Ranging pattern in Bonnet Macaque (*Macaca radiata*)
07	**Abhishek Das** 20131056	IISER Pune; CRG, Barcelona, Spain	Chaitanya Athale	Analysis and modeling of epithelial tissue organization during head involution stage of *Drosophila* embryogenesis
08	**Aathira Gopinath P.** 20131062	IISER Pune	Saikrishnan K.	Mutagenesis and biochemical characterization of signature motifs in Type III RM enzyme
09	**Amruta Priyadarshini Nayak** 20131064	University of Wisconsin-Madison, USA	Manish S. Patankar	Developing atovaquone and YM155 as chemotherapeutic agents against ovarian cancer
10	**Vrushali Rao G.** 20131066	IISER Pune	Raghav Rajan	Courtship dynamics and factors influencing female choice of mates in Zebra Finches
11	**Faseela E.E.** 20131071	IISER Pune	Mayurika Lahiri	Studying the role of DNA-PK in transformation of breast epithelial cells
12	**Urmi Poddar** 20131072	IISER Pune	Deepak Barua	Variation in thermotolerance in herbaceous plants: Differences between plant functional types and relationship with leaf functional traits
13	**Kezia J. Ann** 20131074	IISER Pune	Mayurika Lahiri	Role of DNA damaging agents in the transformation of breast epithelial cells
14	**Kumar Mekhala** 20131075	IISc, Bengaluru	Sachin Deshmukh	Understanding hippocampal network dynamics by studying sharp-wave ripples across the proximal distal axis of area CA1
15	**Upendra Arya** 20131077	SACON, Coimbatore	H.N. Kumara	Ecology of grizzled giant squirrel *R. macroura* in Cauvery wildlife sanctuary, Karnataka, Southern India
16	**Kadam Snehal Girish** 20131078	MBI, NUS, Singapore	Linda Kenney	SsrB regulates genes outside SPI-2 to affect *Salmonella* lifestyle
17	**Siddhesh Gajanan Zadey** 20131079	Harvard Medical School, Boston, USA	A. Pascual-Leone	Resting motor threshold: towards a non-invasive TMS biomarker of Alzheimer's disease
18	**Chaitanya Erady** 20131080	IISER Pune	Sudhakaran Prabhakaran	Investigation of transcription and translation from sORFs and altORFs in naive B and T cells in *M. musculus*

Sr.No.	Student	Host Institute	Supervisor	Project Title
19	**Rahul Gunwant Biradar** 20131086	IISER Pune	Sanjeev Galande	Mechanism of regulation of SATB1 during T-helper cell differentiation
20	**Jawale Yash Kiran** 20131092	IISER Pune	Chaitanya Athale	Role of external forcing in directional instability of microtubule transport
21	**Naven Narayanan Venkatanarayanan** 20131094	IISER Pune	Sutirth Dey	A theoretical model of coevolution of culture and gene and the effects of mating and learning biases on cultural evolution
22	**Arkajyoti Ghoshal** 20131095	IISER Pune; Cambridge University, UK	Sudhakaran Prabhakaran	Investigation of mutation in the non-coding regions of the cancer genome
23	**V.P. Gokul** 20131096	IISER Pune	Thomas Pucadyil	Understanding the role of B-insert in Dynamin related protein 1(Drp1)-cardiolipin interactions
24	**Sourav Mukherjee** 20131099	IISc, Bengaluru	Sridharan Devarajan	Study of selective attention by non-invasive brain stimulation
25	**Yawatkar Vishruta Prashant** 20131102	NUS, Singapore	Mandar Chitre	Analysis of learning of an echolocation task in a bottlenose dolphin
26	**Bodkhe Swapnil Shankar** 20131103	IISER Pune	Nishad Matange	Mutations in dihydrofolate reductase from *E. coli:* Impact on aggregation, trimethoprim resistance and fitness
27	**Shubham Sohanlal Chhajed** 20131110	University of Georgia, USA	Lisa Donovan	Cultivated sunflower genotypes differ for relative growth rate and physiological trait responses to different nutrient levels
28	**Mukta Suhas Joshi** 20131115	NCBS, Bengaluru	Uma Ramakrishnan	Species identification for small mammals of Western Himalayas using genetics and morphometrics
29	**Bharath Krishnan** 20131116	IISER Pune	Collins Assisi	Network mechanisms that represent novelty and familiarity in the medial Entorhinal Cortex (mEC)
30	**Ira Phadke** 20131120	IISER Pune; NII, New Delhi	Vineeta Bal	Evaluating immune cells in physiological settings: Studying the neonatal immune landscapes and the effect of fever range temperatures on T-cell differentiation
31	**Moghe Prachiti Pradeep** 20131123	IISER Pune	Richa Rikhy	The role of mitochondrial dynamics and metabolism in neuroblast differentiation in *Drosophila melanogaster*
32	**Wagh Vaibhav Prakash** 20131125	IISER Pune	L.S. Shashidhara	Comparative in-silico analysis of the interactions between *Ultrabithorax* and its putative cofactors across different insect groups
33	**Choksi Bhavin Yogesh** 20131127	IISER Pune	Aurnab Ghose	Neural circuitry underlying feeding behaviour
34	**Prachi Balasaheb Shinde** 20131129	NCBS, Bengaluru	Anjana Badrinarayanan	Mechanism of translesional synthesis repair in *Caulobacter crescentus*
35	**Tanmaya Sethi** 20131132	ENS, Lyon, France	Chaitanya Athale	Evolution of mechanisms of asymmetric spindle positioning in nematode species
36	**Pratyush Ramakrishna** 20131133	IISER Pune	Suhita Nadkarni	Pathological implications of APP clustering and its effect on γ-secretase cleavage
37	**Prashastha Mishra** 20131137	IISc, Bengaluru	Vishwesha Guttal	Human impacts and bistability of forest-savanna in Africa
38	**Dheerendra Singh** 20131138	IISER Pune	Jeet Kalia	Elucidating the role of the linker in DkTx mediated TRPV1 activation mechanism

Chemistry

Sr.No.	Student	Host Institute	Supervisor	Project Title
01	**Mohammed Fawaz P.A.** 20121059	CSIR-NCL, Pune	P.A. Joy	Bifunctional OER and ORR electrocatalyst based on cobalt oxide based nanocrystals: Towards rechargeable metal-air batteries
02	**Vikash Kumar** 20131011	IISER Pune	Nirmalya Ballav	Visible emission from hexagonal boron nitride nanosheets upon molecular doping
03	**Reddy Pranavi** 20131013	IISc, Bengaluru	Anshu Pandey	Study of charge transfer between CdSe/CdS core/shell and Vanadium(II) doped ZnS quantum dots
04	**Anjana Sathyan** 20131015	IISER Pune	Pinaki Talukdar	Stimuli responsive small molecule anion transporters
05	**Priyanshu Chandra** 20131016	ENS, Paris, France	Christian Serre	Design and synthesis of stable porous materials for sensing application
06	**Sharafudheen P.C.** 20131020	IISER Pune	Jayakannan	Structural engineering of amphiphilic block copolymer nano-assemblies for cancer therapy
07	**Nila Nandha K.** 20131027	IISER Pune	Angshuman Nag	Doping metal ions into $Cs_2AgInCl_6$ halide double perovskites
08	**Anu Pradeep** 20131039	IISER Pune	Jayakannan	Development of L-Aspartic acid based polyesters and their nano-assemblies in drug delivery

Sr.No.	Student	Host Institute	Supervisor	Project Title
09	**Siddhartha Sohoni** 20131041	TIFR, Mumbai	Jyotishman Dasgupta	Probing charge transfer dynamics in all-organic solar cell blends
10	**Govind S.** 20131043	IISER Pune	Pramod Pillai	Development of magnetically responsive multifunctional nanoparticles for catalytic reduction reactions
11	**D.V.S. Datta** 20131051	Temple University, USA	Eric Borguet	Temperature programmed infrared and mass spectrometry analysis of interactions of covalent organic frameworks with simple polar and nonpolar organic molecules
12	**Keerthana T.V.** 20131052	IISER Pune	Raghavendra Kikkeri	Immunomodulation of globo-h antigen using gold nanoparticles for breast cancer therapy
13	**Shubham Kumar** 20131054	CSIR-NCL, Pune	K. Selvaraj	2d and 3d graphene-based nanomaterials for environmental remediation
14	**Alma Mathew** 20131059	IISER Pune	Satishchandra B. Ogale	Carbon based anode materials for sodium ion batteries
15	**Amit Sahu** 20131067	IISER Pune	Prasenjit Ghosh	First principle investigation of CO_2 conversion on Pd-polyaniline interface
16	**Swetha Jos** 20131070	IISER Pune	Harinath Chakrapani	Oxidative stress triggered tunable hydrogen sulfide donors
17	**Jewel Ann Maria Xavier** 20131073	IISER Pune	Pramod Pillai	Light induced electron transfer processes in surface engineered eco-friendly $CuInS_2$ quantum dots
18	**Datar Prathamesh Madhav** 20131081	IISER Pune	Amrita Hazra	Investigating the regioselective attachment of the lower ligand in Vitamin B12 biosynthesis
19	**Isha Dhami** 20131084	IISER Pune	H.N. Gopi	Synthesis and evaluation of modified Peptide Nucleic Acid (PNA) for improved DNA/RNA binding selectivity
20	**Malpathak Shreyas Vijay** 20131089	Texas Tech University, USA	William Hase	Direct dynamics simulations of unimolecular dissociation of 1,2-dioxetane
21	**Aswin P.K.** 20131114	IISER Pune	Harinath Chakrapani	Green light activated BODIPY based H_2S donor
22	**Harshita Soni** 20131117	Solvay Research and Innovation Centre, Vadodara	G. Padmanaban	Transesterification as a plausible new route for PLGA
23	**Atul Chaudhary** 20131122	IISER Pune	Boomi Shankar	Coordination networks derived from pyridyl functionalized dipodal silane ligands and their possible ferroelectric behaviour
24	**Kanade Chaitanya Kaluram** 20131124	C-MET, Pune	Bharat B. Kale	Synthesis of MoS_2 and nitrogen doped MoS_2 nanostructures as anode materials for Lithium Ion Batteries (LIBs)
25	**Varhade Swapnil Digambar** 20131131	IISER Pune	Muhammed Musthafa	Direct hydrazine fuel cell driven by a non-bonded cathodic interface
26	**Thakur Atul Chudaman** 20131139	IISER Pune	Arnab Mukherjee	Protein stabilization in salt solutions: Specific ion effects

Earth and Climate Science

01	**Athul R.S.** 20131031	IISER Pune	Neena J. Mani	Characterizing equatorial waves in the atmosphere under different mean states
02	**Bhupendra Charan** 20131140	IISER Pune	Shyam S. Rai	Geophysical parameter estimation - Application to denoising of seismological data

Interdisciplinary

01	**Mayank Kumar** 20131032	EMBL, Heidelberg, Germany	Maria Leptin	Deep-tissue imaging using selective plane illumination microscopy in *Drosophila*
02	**Ashley Sreejan** 20131055	IISER Pune	Pranay Goel	Analysis of oxidative stress response with anti-diabetic treatment
03	**Timane Chinmay Ajay** 20131090	C-MET, Pune; IISER Pune	Sulabha Kulkarni	Development of Tin compounds with nano-micro hierarchical structures for thermoelectrics

Mathematics

01	**Chris John** 20121081	IISER Pune	Tejas Kalekar	Topology and geometry of 2 and 3-dimensional manifolds
02	**Aakash Verma** 20131006	IISER Pune	Anindya Goswami	Theory and estimation of drift dynamics of asset price process
03	**Shashank Pratap Singh** 20131017	IISER Pune	Chandrasheel Bhagwat	Class field theory
04	**Shelke Rohit Pandurangrao** 20131018	IISER Pune	Debargha Banerjee	Properties of elliptic modular forms
05	**Shreeya Behera** 20131048	IISER Pune	Kaneenika Sinha	Weighted equidistribution theorems in the theory of modular forms

Sr.No.	Student	Host Institute	Supervisor	Project Title
06	**Sudhir Kumar** 20131053	IISER Pune	Vivek M. Mallick	Characteristic classes
07	**Tanushree Shah** 20131065	ENS-Lyon, France	Etienne Ghys	Topics in low dimensional topology
08	**Addanki Nagarjuna Chary** 20131091	IIT Bombay	Ronnie Sebastian	Class field theory
09	**Arpith Ramakrishna Shanbhag** 20131093	University of Duisburg-Essen, Germany	Marc Levine	Motivic homotopy theory
10	**Manish Kumar Singh** 20131100	IISER Pune	Rabeya Basu	K-theory of monoid algebras
11	**Kabra Aditya Mahesh** 20131108	IISER Pune	Soumen Maity	Parameterized complexity of minimum k union problem
12	**Kushtagi Sri Rama Chandra** 20131128	IISER Pune	Debargha Banerjee	A torsion correspondence for non-compact arithmetic hyperbolic 3-manifolds
13	**Kapshikar Upendra Shamrao** 20131136	IISER Pune	Ayan Mahalanobis	McEliece-type cyptosystems over quasi-cyclic codes
14	**Gonde Samruddha Sunil** 20131142	SPPU, Pune	Vinayak Joshi	The graphs associated with ordered structures and algebraic structures

Physics

01	**Patil Atharva Sunil** 20121050	IIT Bombay	Varun Bhalerao	Implementation of photometry, automation and remote control in the GROWTH-India telescope
02	**Meena Brijesh Babulal** 20121036	IIT Guwahati	Harsh Chaturvedi	Low cost flexible electronic devices based on functional nano-inks
03	**Murli Kartik Maurya** 20131002	TIFR, Mumbai	Sudeshna Benerjee	Study of physics algorithms to setup an efficient trigger for the selection of boosted top quark production where the top decays semi-leptonically, in the CMS experiment
04	**Nived V.N.** 20131003	IUCAA, Pune	Durgesh Tripati	Quiet Sun and coronal hole in transition region
05	**Jithin K.** 20131004	IISER Pune	Umakant D. Rapol	Design and construction of a dual optical tweezer
06	**Arvind B.** 20131007	IIT Bombay	Varun Bhalerao	Mass modeling and search for transients with AstroSat-CZTI
07	**Zilpelwar Sharvari Sudhir** 20131008	TIFR, Mumbai	Sushil Mujumdar	Spectral & temporal studies of multiply scattered ultra-broadband light
08	**Parijat Banerjee** 20131010	TIFR, Mumbai	Gautam Mandal	Quantum quench and thermalization in free scalar field theory and its gravity dual (in arbitrary dimensions)
09	**Jesil Jose** 20131012	IISER Pune	G.V. Pavan Kumar	A study of plasmon coupled emission from molecules confined in plasmonic nano-cavities
10	**Mrunal Prashant Korwar** 20131021	IISER Pune	Arun Thalapillil	Schwinger pair production at finite temperature and novel astrophysical probes on millicharged fermions
11	**Bhumkar Purva Bandurao** 20131026	CNRS-CRHEA, Valbonne Sophia Antipolis, France	Patrice Genevet	Compensation of refractive dispersion of materials with metasurfaces
12	**Lokahith Narendra Agasthya** 20131034	ICTS-TIFR, Bengaluru	Rama Govindrajan	Droplet collision dynamics in turbulence
13	**Swathi Krishna S.** 20131037	IISER Pune	Satishchandra Ogale	Nanocomposite approach to couple magnetic and electric ordering
14	**Spandan Choudhury** 20131038	IISER Pune	Bhaswati Mookerjea	Study of the galactic photon dominated (PDR) in ï Ophiuchus A
15	**Anup Anand Singh** 20131046	ICTS-TIFR, Bengaluru	Spenta R. Wadia	Chaos in field theory and gravity
16	**Majmudar Khilav Jayesh** 20131057	TIFR, Mumbai	Shiraz Minwalla	Level-rank duality of Chern-Simons theory on the Torus
17	**Rajeev Singh Rathour** 20131061	Indian Institute of Astrophysics, Bengaluru	Aruna Goswami	Spectroscopic study of neutron-capture elements in CEMP and Barium stars
18	**Ankit Kumar** 20131063	IISER Pune	Atikur Rahman	Understanding degradation mechanism of perovskite solar cell
19	**Vaidya Ieshan Atul** 20131068	IISER Pune	T.S. Mahesh	Hamiltonian engineering in quantum spin networks
20	**K. Nidhi Sudhir** 20131069	ICTS-TIFR, Bengaluru	Suvrat Raju	Quantum aspects of cosmology
21	**Swanand Khanapurkar** 20131076	TIFR, Mumbai	T.P. Singh	The Einstein-Cartan-Dirac (ECD) theory
22	**Kadam Saurabh Vasant** 20131082	IIT Guwahati	Subhaditya Bhattacharya	Collider search constraints on singlet-doublet fermionic dark matter model
23	**Mangesh Sonawane** 20131083	DESY, Hamburg, Germany	Beate Heinemann	Estimation of the ZZ background in the ll+MET final state using Z+gamma data
24	**S. Vignesh** 20131088	IISER Pune	Sunil Nair	Layered oxides as potential thermoelectrics
25	**Rahul Patidar** 20131097	Energy Research Institute, NTU, Singapore	Anish Priyadarshi	Graphene in large area hole conductor free perovskite solar cells

Sr.No.	Student	Host Institute	Supervisor	Project Title
26	**Susmita Singh** 20131098	ICTS-TIFR, Bengaluru	Subhro Bhattacharjee	Symmetry protected topological phases and quantum geometry
27	**Amanagi Amey Shankar** 20131101	IISER Pune	G. Ambika	Recurrence network analysis of financial data
28	**Vaibhav Madhav Khambalkar** 20131106	C-MET, Pune; IISER Pune	Sulabha Kulkarni	Anisotropic core-shell nanoparticles using silica templates for ammonia gas detection
29	**Divya Singh** 20131107	Max Planck Institute of Graviational Physics (Albert Einstein Institute), Hannover, Germany	Maria Alessandra Papa	Semicoherent DM-off veto for continuous gravitational wave searches
30	**Karthik Prabhu P.** 20131112	IUCAA, Pune	Tarun Souradeep	Reconstruction of the primordial power spectrum from CMB
31	**Pund Rugved Prashant** 20131113	IISER Pune	Sunil Mukhi	Particle-Vortex and Boson-Fermion dualities in 2+1 dimensions
32	**Rohit Bhagchandani** 20131119	IISER Pune	M.S. Santhanam	Numerical studies on disordered interacting fermion chain
33	**Nabha Shah** 20131121	IISER Pune	Sudarshan Ananth	Aspects of field theories in the light-cone formalism
34	**Harsh Gakhare** 20131130	IISER Pune	G. Ambika	Emergence of controlled dynamics and role of topology in complex networks
35	**Lakshya Agarwal** 20131134	IISER Pune	Sunil Mukhi	2D conformal fiel theory and Liouville theory
36	**Satvika Bandarupally** 20131135	IMSc, Chennai; IISER Pune	C.M. Chandrashekar	Quantum metrology with cold atoms
37	**Aman Kumar** 20131143	IISER Pune	Prasad Subramanian	Do transient cosmic ray decreases cause changes in the global cloud cover?

LIST OF COURSES

Fall 2017

Code	Course	Coordinator* / Instructor	Credits
Semester I			
BIO 101	Introductory Biology-I	Kundan Sengupta*, L.S. Shashidhara	3
CHM 101	Chemical Principles-I	Anirban Hazra*, Arnab Mukherjee	3
MTH 100	Introduction to Proofs	Steven Spallone	2
MTH 101	Single Variable Calculus	Amit Hogadi	3
PHY 101	World of Physics-I: Classical Mechanics	Sudarshan Ananth	3
BIO 121	Practical: Basic Biology	Krishanpal Karmodiya*, Tressa Jacob, Nixon Abraham, Anjan Banerjee, Nishad Matange	3
IDC 101	Introduction to Computing	M.S. Santhanam*, Umakant Rapol	3
Semester III			
BIO 201	Introductory Biology-III: Ecology and Evolution	Sutirth Dey	3
CHM 201	Principles of Inorganic Chemistry	N. Ballav*, Moumita Majumdar	3
MTH 201	Linear Algebra	Manish Mishra	3
PHY 201	World of Physics-III: Electricity & Magnetism	Sourabh Dube *, Sunil Mukhi	3
BIO 221	Practical: Ecology and Evolution	Neelesh Dahanukar*, Sutirth Dey	3
CHM 221	Chemistry Lab-II: Inorganic Chemistry	R. Vaidhyanathan*, Seema Verma and Sujit K. Ghosh	3
PHY 221	Physics Lab-II	Bhas Bapat *, Ashna Bajpai, Rejish Nath, Atikur Rahman	3
HSS 201	An Introduction to the History of Science, Technology and Medicine	R. Venkateswara Pai	2
ECS 201	Earth System-I	Gyana Ranjan Tripathy*, Ankush Srivastava	2
Semester V only			
BIO 313	Advanced Molecular Biology	Mayurika Lahiri*, Gayathri Pananghat	4
BIO 311	Advanced Cell Biology	Nagaraj Balasubramanian*, Thomas Pucadyil	4
BIO 301	Lab/Theory Project	Collins Assisi	3
CHM 340	Advanced Organic Chemistry Laboratory	Neeraja Dashaputre*, Harinath Chakrapani	3
CHM 301	Lab Training/Theory Project-I	M. Musthafa	3
MTH 301	Lab Training/Theory Project	Chandrasheel Bhagwat	3
PHY 330	Physics Lab-IV	Aparna Deshpande*, Surjeet Singh	3
PHY 301	Lab Training/Theory Project	Arijit Bhattacharyay	3
ECS 301	Lab Training/Theory Project	Neena Joseph Mani	3
HSS 301	Lab Training/Theory Project; Topics in the History of Science	John Mathew	3
Semester VII only			
BIO 401	Lab/Theory Project	Collins Assisi	3
BIO 352	Animal Physiology-II	N.K. Subhedar	3
BIO 353	Immunology-II	Vineeta Bal*, Satyajit Rath	3
CHM 410	Advanced Molecular Spectroscopy	Partha Hazra*, Pankaj Mandal, Nirmalya Ballav	4
CHM 411	Organic Synthesis-II	B. Gnanaprakasam	4
CHM 413	Bioinorganic Chemistry	R. Boomishankar*, V.G. Anand	4
CHM 430	Advanced Physical Chemistry Laboratory	Pramod Pillai*, Angshuman Nag, M. Musthafa, Neeraja Dashaputre	3
CHM 431	Chemical Biology	Amrita Hazra*, K.N. Ganesh	3
CHM 432	Solid State Chemistry	Angshuman Nag	3
CHM 436	Molecular Modelling and Simulation	Arun Venkatnathan	3
CHM 445	Electrochemistry	M. Musthafa	3
CHM 421	Polymer Chemistry	M. Jayakannan	4
CHM 401	Lab Training/ Theory Project-II	M. Musthafa	3
MTH 410	Galois Theory	Chitrabhanu Chaudhari	4

Code	Course	Coordinator* / Instructor	Credits
MTH 421	Measure Theory & Integration	Mousomi Bhakta	4
MTH 412	Algebraic Topology	Diganta Borah	4
MTH 413	Algorithms	Soumen Maity	4
MTH 415	Probability	Anup Biswas	4
MTH 417	Ordinary Differential Equations	Krishna Kaipa	4
MTH 430	Topics in Algebra: Lie Algebras	Anupam Singh	3
MTH 401	Lab Training/Theory Project	Chandrasheel Bhagwat	3
PHY 410	Physics Lab-VI	G.V. Pavan Kumar*, C.V. Dharmadhikari, Shivprasad Patil	4
PHY 411	Condensed Matter Physics-I	Prasenjit Ghosh	4
PHY 412	Statistical Mechanics-II	Deepak Dhar	4
PHY 453	Computational Physics	Apratim Chatterji*, Sreejith G.J.	3
PHY 461	Quantum Field Theory	Arun Thalapillil	3
PHY 401	Lab Training/Theory Project	Arijit Bhattacharyay	3
ECS 401	Lab Training/Theory Project	Neena Joseph Mani	3
HSS 401	Lab Training/Theory Project; Topics in the History of Science	Pushkar Sohoni	3
Semester V and VII			
BIO 310	Biostatistics	Ramana Athreya*, Milind Watve	4
BIO 314	Bioinformatics	M.S. Madhusudhan	4
BIO 320	Genetics	Richa Rikhy*, Girish Ratnaparkhi	4
BIO 321	Plant Biology-I	Anjan Banerjee*, Sagar Pandit	4
BIO 410	Advanced Biochemistry-I	Sudha Rajamani*, Siddesh Kamat	4
BIO 322	Biophysics-I	Chaitanya Athale	4
BIO 411	Ecology-I	Deepak Barua	4
BIO 334	Neurobiology-I	Suhita Nadkarni*, Nixon Abraham	3
BIO 431	Epigenetics	Sanjeev Galande	3
BIO 454	Structural Biology	Saikrishnan Kayarat*, Gayathri Pananghat, Jeetender Chugh	3
CHM 311	Physical Organic Chemistry	Jeet Kalia	4
CHM 312	Main Group Chemistry	Shabana Khan	4
CHM 320	Symmetry and Group Theory	Jeetender Chugh*, Aloke Das	4
CHM 331	Self-Assembly in Chemistry	Pinaki Talukdar	3
CHM 332	Separation Principles and Techniques	Britto Sandanaraj	3
MTH 310	Group Theory	Chandrasheel Bhagwat	4
MTH 311	Analysis	Anisa Chorwadwala	4
MTH 312	Point Set Topology	Vivek Mallick	4
MTH 318	Combinatorics	Kaneenika Sinha	4
MTH 314	Statistical Inference	Uttara Naik-Nimbalkar	4
PHY 310	Mathematical Methods in Physics	Nabamita Banerjee	4
PHY 311	Classical Mechanics	G. Ambika	4
PHY 312	Electrodynamics	Rajeev Bhalerao	4
PHY 313	Quantum Mechanics-I	T.S. Mahesh	4
PHY 334	Astronomy and Astrophysics	Ramana Athreya	3
PHY 340	Methods of Experimental Physics	Sunil Nair*, Shouvik Datta	3
PHY 462	Plasma Physics	Prasad Subramanian	3
ECS 322	Landscapes and Earth Surface Processes	Argha Banerjee	4
ECS 325	Numerical Computation using MATLAB	Suhas Ettammal*, Ritima Das	4
ECS 315	Physics of Atmosphere & Ocean	Neena Joseph Mani	4
ECS 314	Earth and Life History	Gyana Ranjan Tripathy	4
ECS 316	Earth and Planetary Materials	Shreyas Managave	4
ECS 330	Earth and Planetary Materials Lab	Shreyas Managave*, Ankush Shrivastava	3
HSS 332	Art and Science of Numismatics	Pushkar Sohoni	3
HSS 312	Perspectives on Sound	Aditi Deo*, John Mathew	4
HSS 351	Technological Evolution of Cinema	John Mathew*, Anil Zankar	3
HSS 411	Contemporary Women Novelists	Pooja Sancheti	4

Spring 2018

Semester II			
BIO 102	Introductory Biology-II: Cellular and Molecular Biology	M.S. Madhusudhan*, Nagaraj Balasubramanian	3
BIO 122	Practical: Biochemistry, Genetics & Molecular Biology	Neelesh Dahanukar*, Kundan Sengupta, Sudha Rajamani, Jeet Kalia, Tressa Jacob	3
CHM 102	Chemical Principles-II	Aloke Das *, Arnab Mukherjee, Harinath Chakrapani and Srinivas Hotha	3
CHM 121	Chemistry Lab-I	Jeetender Chugh*, Pankaj Mandal, B.S.M. Rao, Pramod Pillai and Seema Verma	3
HSS 102	Critical Reading and Communication: Sciences and Society	Pushkar Sohoni*, Pooja Sancheti	2
MTH 102	Multivariable Calculus	Anup Biswas	3
PHY 102	World of Physics-II: Waves and Matter	Shivprasad Patil	3
PHY 121	Physics Lab-I	Sourabh Dube*, Rejish Nath, Vijayakumar Chikkadi, Pavan Kumar G.V., Arijit Bhattacharyay	3
IDC 102	Mathematical Methods	Sudarshan Ananth	3
Semester IV			
BIO 202	Introductory Biology-IV: Biology of Systems	Aurnab Ghose*, Collins Assisi	3
CHM 202	Principles of Organic Chemistry	Sudipta Basu*, Neeraja Dashaputre	3
CHM 222	Chemistry Laboratory-III	Neeraja Dashaputre*, S.G. Srivatsan, M. Jayakannan, S. Sandanaraj Britto and Ramakrishna G. Bhat	3
ECS 202	Earth System-II	Neena Joseph Mani	2
MTH 202	Probability & Statistics	Uttara Naik-Nimbalkar	3
MTH 204	Basic Structures of Mathematics	Amit Hogadi	2
PHY 202	World of Physics-IV: Quantum Physics	Nabamita Banerjee*, Sreejith G.J.	3
PHY 222	Physics Lab-III	Atikur Rahman*, Aparna Deshpande, Satishchandra Ogale, Apratim Chatterji	3
IDC 202	Optics	Arun M. Thalapillil*, Sachin Jain	2
Semester VI only			
BIO 302	Lab/Theory Project	Kundan Sengupta*, Krishanpal Karmodiya	3
CHM 360	Advanced Inorganic Chemistry Lab	V.G. Anand	3
CHM 302	Lab Training/Theory Project	Pramod Pillai	3
ECS 302	Lab Training/Theory Project	Neena Joseph Mani	3
HSS 302	Lab Training/Theory Project	Pushkar Sohoni	3
MTH 302	Theory Project	Mousomi Bhakta	3

Code	Course	Coordinator* / Instructor	Credits
PHY 320	Physics Lab-V	Sunil Nair*, Seema Sharma	4
PHY 302	Lab Training /Theory Project	Prasenjit Ghosh	3
Semester VIII only			
BIO 420	Developmental Biology (NKN)	Girish Ratnaparkhi*, Richa Rikhy	4
BIO 351	Biology and Disease	Mayurika Lahiri*, Siddhesh S. Kamat	3
BIO 491	Literature Review	Saikrishnan Kayarat	3
BIO 402	Lab/Theory Project	Kundan Sengupta*, Krishanpal Karmodiya	3
CHM 420	Structural Methods and Analysis	Boopathy Gnanaprakasam*, Pinaki Talukdar and Jeetender Chugh	4
CHM 422	Statistical Thermodynamics	Srabanti Chaudhury	4
CHM 423	Medicinal Chemistry	Harinath Chakrapani	4
CHM 433	Photochemistry	Pankaj Mandal*, Hosahudya N. Gopi	3
CHM 441	Advanced Material Science	Nirmalya Ballav*, Ramanathan Vaidhyanathan	3
CHM 442	Organometallic Chemistry	Ramakrishna G. Bhat	3
CHM 402	Lab Training/Theory Project	Pramod Pillai	3
ECS 402	Lab Training/Theory Project	Neena Joseph Mani	3
HSS 402	Lab Training/Theory Project	John Mathew	3
MTH 420	Algebraic Number Theory	Supriya Pisolkar	4
MTH 411	Functional Analysis	Anindya Goswami	4
MTH 422	Differential Geometry	Tejas Kalelkar	4
MTH 426	Stochastic Processes	Tian An Wong	4
MTH 423	Commutative Algebra	Dilpreet Kaur	4
MTH 424	Partial Differential Equations	Mousomi Bhakta	4
MTH 442	Introduction to Algebraic Geometry	Chandrasheel Bhagwat	3
MTH 402	Theory Project	Mousomi Bhakta	3
PHY 420	Atomic and Molecular Physics	Bhas Bapat	4
PHY 421	Classical and Quantum Optics	Shouvik Datta	4
PHY 422	Nuclear and Particle Physics	Rajeev Bhalerao	4
PHY 430	Physics Lab-VII	Umakant D. Rapol*, C.V. Dharmadhikari	3
PHY 402	Lab Training/Theory Project	Prasenjit Ghosh	3
PHY 463	Advance Condensed Matter Physics	Mukul Kabir	3
PHY 557 / 657	Quantum Field Theory-II	Sunil Mukhi	3
Semester VI and VIII			
BIO 312	Animal Physiology-I (NKN)	N.K. Subhedar*, Nixon M. Abraham	4
BIO 324	Introductory Immunology	Vineeta Bal*, Satyajit Rath	4
BIO 412	Microbiology	Nishad Matange*, Gayathri Pananghat	4
BIO 417	Advanced Biochemistry-II	Thomas Pucadyil*, Amrita Hazra	4
BIO 422	Evolution (NKN)	Sutirth Dey*, Milind Watve, L.S. Shashidhara	4
BIO 414	Mathematical & Computational Biology	Collins Assisi*, Suhita Nadkarni	4
BIO 325	Animal Behaviour	Raghav Rajan*, Anand Krishnan	4
BIO 423	Ecology-II	Deepak Barua*, Sagar Pandit	4
BIO 433	Applied Plant Biology	Anjan Banerjee	3
BIO 451 / IDC 451	Data Science	Pranay Goel	3
CHM 310	Quantum Chemistry	Anirban Hazra*, Arun Venkatnathan	4
CHM 321	Organic Synthesis-I	Srinivas Hotha	4
CHM 322	Transition metal Chemistry	Sujit K. Ghosh*, Shabana Khan	4

Code	Course	Coordinator* / Instructor	Credits
CHM 323	Fundamentals of Molecular Spectroscopy	Pramod Pillai*, Partha Hazra	4
CHM 334	Physical Chemistry of Solutions	Angshuman Nag*, Muhammed Musthafa and Seema Verma	3
CHM 351	Bioorganic Chemistry	S.G. Srivatsan	3
ECS 320	Digital Signal Analysis & Inverse Theory	Rahul Dehiya	4
ECS 321 / 326	Atmospheric Dynamics	Suhas Ettammal	4
ECS 322 / 324	Introduction to Geophysics	Shyam S. Rai*, Rahul Dehiya	4
ECS 332	Geochemistry	Shreyas Managave	3
ECS 333	Sedimentology & Stratigraphy	Sudipta Sarkar*, Ankush Shrivastava	3
ECS 334	Hydrology	Argha Banerjee	3
HSS 331	Development of Mathematical Astronomy in India: A Historical Approach	Venketeswara R. Pai	3
HSS 322	Science, History and Theatre	John Mathew	4
HSS 323	Audio-visual Communication of Science	Anil Zankar*, Pooja Sancheti	4
HSS 352	Philosophy of Technology	Pramod Talgeri*, John Mathew	3
MTH 320	Vector Spaces, Rings and Modules	Manish Mishra	4
MTH 321	Complex Analysis	Rohit Holkar	4
MTH 322	Calculus on Manifolds	Chitrabhanu Chaudhari	4
MTH 323	Graph Theory	Soumen Maity	4
MTH 328	Coding Theory	Krishna Kaipa	4
MTH 341	Fourier Analysis and Applications to Number Theory	Kaneenika Sinha	3
MTH 342	Introduction to Isoperimetric Problems (NKN)	Anisa Chorwadwala	3
PHY 322	Statistical Mechanics-I	Bijay Kumar Agarwalla	4
PHY 321	Quantum Mechanics-II	Suneeta Vardarajan	4
PHY 341	Physics at Nano Scale	Surjeet Singh	3
PHY 342	Nonlinear Dynamics	Deepak Dhar*, G. Ambika	3
PHY 361	Quantum Information	T.S. Mahesh	3
PHY 464	Astrophysical Processes	Prasad Subramanian	3

ACADEMIC ACHIEVEMENTS OF BS MS STUDENTS

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

01 **Pratyush M.R.** *(Fall 2017)*
02 **Shambhavi S.** *(Spring 2017)*

Prizes for Academic Excellence were awarded to the following BS MS students. These prizes are given to the BS MS students who have secured the highest CGPA in Semester 3 to 8.

01 **Viraj Meruliya** *(Semester III, Fall 2017)*
02 **Patki Raagini Abhay** *(Semester IV, Spring 2017)*
03 **Shraddha Lall** *(Semester V and VI, Academic Year 2016-17)*
04 **Bhagwat Pankaj Uttam** *(Semester V and VI, Academic Year 2016-17)*
05 **Jewel Ann Maria Xavier** *(Semester VII, VIII, Academic Year 2016-17)*
06 **Kadam Snehal Girish** *(Semester VII, VIII, Academic Year 2016-17)*

INTERNATIONAL INTERNSHIP AWARDS RECEIVED BY STUDENTS

DAAD-WISE Summer Internship 2017, Germany

01	Manoj M. Hegde	Karlsruhe Institute of Technology (KIT), Karlsruhe
02	Devika Varma	University of Bremen
03	Basila M.A.	University of Potsdam
04	Meera Mohan	Ludwig-Maximilians-Universität, Munich
05	Joshi Guarav Shrikant	Leibniz Institute on Aging –Fritz Lipmann Institute, Jena
06	Shraddha Lall	Max Planck Institute for Evolutionary Biology, Ploen
07	P.V.S. Pavan Chandra Vamsi	Technical University of Munich (TUM), Munich
08	Sandeep Joy	Albert-Ludwigs University of Freiburg

Charpak-Research Internship Programme, France

01	Nida Farheen	Institut De Biologie Paris Seine (IBPS)
02	Surabhi K.S.	Langevin Institute, ESPCI Paris
03	Komal Gupta	Institut de Genetique et de Biologie Molculaire et Cellulaire (IGBMC),Strasbourg

S.N. Bose Scholars Programme 2017

01	Malpathak Shreyas Vijay	Texas Tech University, USA

Other international summer internships through exchange programmes and through individual efforts are listed in International Relations section of this report.

The following 41 BS MS students have been selected to receive Infosys Foundation Scholarship, which allowed a full tuition fee waiver from Spring 2018 to Spring 2019.

Jyothish S.	Ajay Verma	Satyam Saurabh
Akhil Mithran	Heena Suthar	Vivek Kumar
Athira K.V.	Saurav Raj	Bhadrasree R. Jeevan
Arya P.V.	Mahendra Patel	Sujith M.S.
Amar Alok	Abhishek Ojha	Dipankar Maity
Vaibhav Umakant Kumbhar	Anjana T.	Avinash Verma
Nima Rose Manjila	Rishav Kumar	Keerthana M.
Adarsh Koul	Vaibhav Singh	Aman Yadav
Shivam Yadav	Ingale Vaibhav Vijay	Vinay Kumar Daivajna
Sagar Gupta	Hasna H.S.	Muhammed Jibin P.
P. Balakrishna	Sarin T.S.	Devanandan K.
Sruthy J. Das	Shashank Pritam	Sreekuttan L.S.
Nazia V.	Manish Kumar Gupta	Ahammed Suhail Odungat
Minal Wable	Tirumala Venkata Chaktadhar	

During the sixth Convocation of the institute held on May 19, 2017, 109 students graduated with BS MS dual degrees.

Akshay S. who secured a CGPA of 9.9 was awarded the Institute Gold Medal.

The following 19 students passed with Distinction (CGPA>9.0):

Sappa Sushma Tejasri	Darshini Ravishankar	Sujay B.
Sagarika Basak	Akshay S.	Amitosh Gautam
Adithya E. Rajagopalan	Anirban Sharma	Jog Harshvardhan Prasad
V.R. Shree Sruti	Divya Gadkari	Ashutosh Acharya
Varun Srivastava	Deeksha Adil	Bodas Arushi Ravindra
Yaikhomba Mutum	Irene Dutta	
Nilima Walunjkar	Papia Bera	



03

Conferences, Events, and Initiatives

94 / Conferences, Symposia, and Workshops

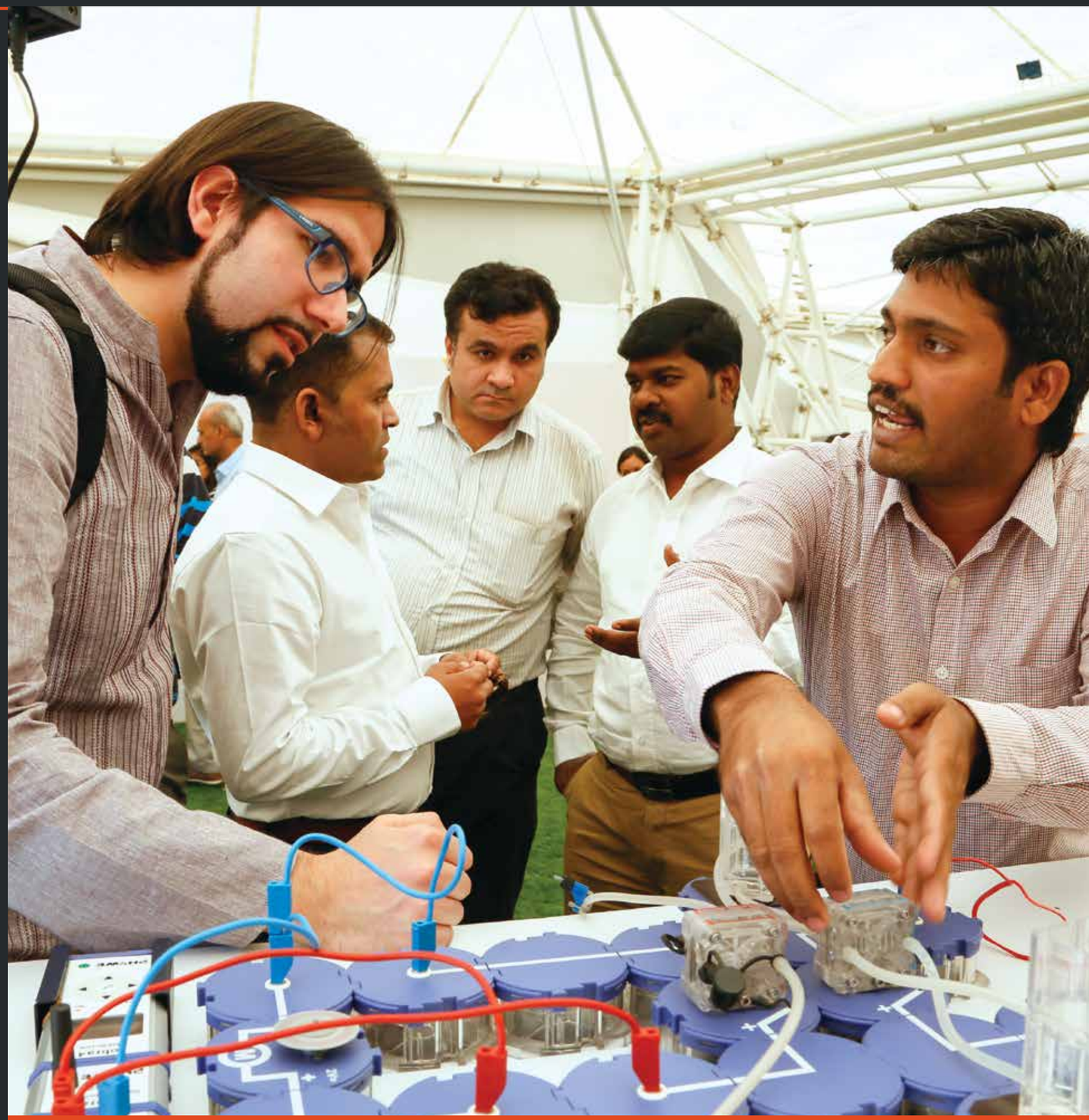
97 / News and Events

102 / Public Lectures

104 / International Relations

107 / Endowments

108 / Outreach Activities



Conferences, Symposia, and Workshops

Bringing together the scientific community from within and outside India are the conferences and workshops hosted at IISER Pune. These provide an opportunity for researchers to discuss and develop their research.



Workshop on Science Film Production
April 08-09, 2017
Organiser Science Media Centre, IISER Pune

Pre-workshop for State Teachers' Science Congress
May 02, 2017
Organisers CoESME, IISER Pune; Marathi Vidnyan Parishad

Inter-IISER Mathematics Meet
May 11-12, 2017
Organisers Anup Biswas, Anindya Goswami

Recent Trends in Non-Commutative Algebra
June 19-30, 2017
Organisers Rabeya Basu, Vivek Mallick

Student Workshops in Experimental Biology
June 21-24, 2017
Organisers IISER Pune; Indian Society of Developmental Biologists

Biennial Meeting of Indian Society of Developmental Biologists
June 24-27, 2018
Organisers L.S. Shashidhara, Girish Ratnaparkhi, Anjan Banerjee, Richa Rikhy, Sanjeev Galande, Girish Deshpande, Aurnab Ghose

Symposium on Cancer Immunotherapy
June 24, 2017
Organisers IISER Pune; NCL-Venture Center; Prashanti Cancer Care Mission

Workshop and Conference on Representation Theory of p-adic Groups
July 10-15 and 17-19, 2017
Organisers Anne-Marie Aubert (Institute of Mathematics at Jussieu, France); Alan Roche (University of Oklahoma, USA); Manish Mishra and Steven Spallone from IISER Pune

Course on Siegel Modular Forms and Associated Representations by Dr. Ameya Pitale from University of Oklahoma (GIAN scheme of MHRD)
August 07, 2017
Organiser Baskar Balasubramanyam

Mumbai Pune Soft Matter Meet
August 12, 2017
Organisers Apratim Chatterji, Shivprasad Patil

Workshop on Translating Clean Energy to Rural India
September 04-08, 2017
Organisers University of Edinburgh (UK); IISER Pune

Workshop for School Science and Mathematics Teachers
September 16, 2017
Organisers CoESME, IISER Pune; NIE (Sakal)

Science Administration and Management Workshop for Women
September 19-21, 2017
Organisers CoESME, IISER Pune; Newton Bhabha Fund, British Council

Workshop on Writing Science 2017
October 02-14, 2017
Organisers Vigyan Prasar; Science Media Centre, IISER Pune

Workshop on LaTeX
October 10-14, 2017
Organiser CoESME, IISER Pune

No Garland Neuroscience Meeting
October 13-15, 2017
Organisers Collins Assisi, Suhita Nadkarni

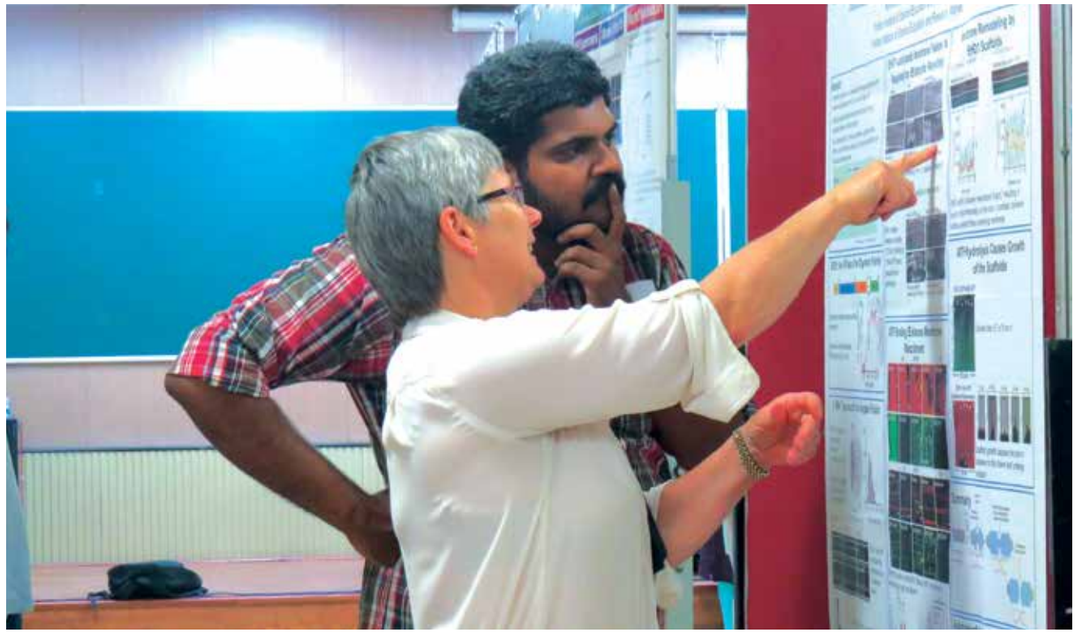
EMBO Workshop on Frontiers in Cytoskeleton Research
October 29 - November 01, 2017
Organisers Carsten Janke (Institut Curie, Orsay, France); Aurnab Ghose (IISER Pune)

Green Chemistry Workshop for College Teachers
November 06-08, 2017
Organiser CoESME, IISER Pune

Science Journalism Workshop for Women
November 13-17, 2017 and January 08-09, 2018
Organisers CoESME, IISER Pune; Newton Bhabha Fund, British Council

Conference on Commutative Algebra and Algebraic Geometry (CAAG) 2017
December 05-08, 2017
Organisers Ravi A. Rao (TIFR, Mumbai); Vivek Mallick (IISER Pune)

State School Teachers' Science Congress
December 08-09, 2017
Organisers Marathi Vidyan Parishad; CoESME, IISER Pune



Conference on Modern Trends in Inorganic Chemistry (MTIC-XVII)
December 13-14, 2017
Organisers CSIR-NCL; IISER Pune; and SPPU

Conference on Evolutionary and Integrative Biology (CEIB) 2017
December 21-22, 2017
Organisers L.S. Shashidhara, Sutirth Dey, Neelesh Dahanukar, Ulfat Baig, and Milind Watve lab members

Annual General Meeting of INSA
December 27-29, 2017
Organisers INSA, New Delhi; IISER Pune

IISER-Weizmann Institute of Science Conference on Chemical Biology
January 17-19, 2018
Organisers Mayurika Lahiri, Raghavendra Kikkeri, Amrita Hazra, Siddhesh Kamat, Naresh Sharma

Workshop on Intertwining Strands of Mathematics and Physics: Fourier Analysis
January 19-23, 2018
Organisers Deepak Dhar (IISER Pune); Rohini Godbole (IISc, Bengaluru)

Dynamics Within and Across the Confined Cellular Space
February 02-03, 2018
Organisers Thomas Pucadyil, Aurnab Ghose

Workshop on Evolution of Deccan Basalt
February 12-13, 2018
Organiser Shreyas Managave

Joint Astro and Particle Physics Meeting
February 25, 2018
Organisers Sourabh Dube, Seema Sharma as part of IUCAA-IISER Centre for Gravitational Physics and Astronomy Activity

Second Meeting of the Indo-French Network in High Energy Physics
February 26-28, 2018
Organisers Sourabh Dube, Seema Sharma

42nd Annual Meeting of the Indian Biophysical Society
March 09-11, 2018
Organisers Jeetender Chugh, Saikrishnan Kayarat, M.S. Madhusudhan

Workshop on High Performance Computing and Artificial Intelligence for Science
March 10-11, 2018
Organisers IISER Pune; Intel

Workshop on Parameterized Algorithms
April 08, 2018
Organiser Soumen Maity

News and Events

Foundation Day 2017
April 10, 2017

After the presentation of the Director's Report by Prof. K.N. Ganesh, Chief Guest Dr. M.N. Rajeevan (Secretary, Ministry of Earth Sciences) delivered the Foundation day Lecture. Student magazine *Kalpa* 2017 and Disha's chronicle *Pahal* 2017 were released as was a portal for IISER Pune alumni. Foundation Day awards were given to students and staff in recognition of their academic and professional excellence.





(Left) Dr. M.N. Rajeevan delivering the 2017 Foundation Day Lecture; *(Right)* The editorial team of Kalpa poses with Dr. Rajeevan and Prof. K.N. Ganesh (From L to R)

Bhaskara Lab Inauguration
May 10, 2017

Bhaskara computer lab established under the Fund for Improvement of S&T Infrastructure (FIST) scheme of the Department of Science and Technology (DST), Govt. of India, was inaugurated by Prof. K.N. Ganesh. A hands-on lecture/workshop by Prof. Akanksha Kashikar from the Department of Statistics, S P Pune University, on the software 'R' was held on this occasion. Located in the Main Building of IISER Pune, the lab will be used for instructional workshops on various computational software in the world of Mathematics.

Convocation 2017
May 19, 2017

During the sixth convocation of IISER Pune, 109 BS MS students, 1 Integrated PhD and 41 PhD students were awarded degrees. The Institute Gold Medal for academic excellence in the BS MS programme was won by Mr. Akshay S. Best Thesis Awards, introduced for the first time this year, through an endowment from Xytel India went to Srishti Dar (Biology), Tanmoy Saha (Chemistry), Neha Prabhu (Mathematics), and Koushik Karmakar (Physics). In his convocation address Chief Guest Dr. R.A. Mashelkar spoke about the genesis of IISERs and his vision for Indian science and commended the parents of the graduates for giving their children the precious gift of education.

In-house Research Symposia

Four in-house research symposia were held during the year, namely, Bioconclave (August 4-5, 2017), ChemSymphoria (July 18-19, 2017), Samiksha (October 07-08, 2017), and Mathematics Symposium (September 08-09, 2017) by the Biology, Chemistry, Earth and Climate Science, and Mathematics disciplines, respectively. The purpose of these events is to provide an overview of various research areas being pursued in each of the disciplines at the institute, with students as the primary audience.

MoU to set up Centre for Gravitational Physics and Astronomy
August 02, 2017

The institute signed an MoU with IUCAA to jointly establish a Centre for Gravitational Physics and Astronomy (CGPA), with dual goals of creating collaborative research and teaching activity, and exposing talented young researchers to challenges in this area. The Centre is anticipated to contribute to training highly skilled individuals to meet the expected scientific opportunities and challenges associated with the planned Advanced Laser Interferometer Gravitational-wave Observatory (LIGO) in India.

Agreement for Smt. Indrani Balan Science Activity Centre
August 10, 2017

Following the announcement of endowment to IISER Pune from the Balan group in May 2016, the two organisations signed a formal agreement towards the construction of a building for a science activity centre at IISER Pune. While the construction is yet to begin, public engagement and science education activities pertaining to Indrani Balan Science Activity Centre have already begun on the campus reaching out to over 10,000 students and teachers through workshops on campus and at schools through the year.

Construction of Undergraduate Chemistry Lab with Support from Cipla Foundation
August 14, 2017

The Cipla Foundation has earlier signed an MoU with IISER Pune, where it committed to contribute to the Endowment Fund of the institute to build a modern chemistry research laboratory for undergraduate students. A formal commencement of the construction took place through a ground-breaking ceremony where Dr. Yusuf Hameid and Mr. M.K. Hameid of Cipla, and Ms. Rumana Hameid of Cipla Foundation were present.



(From L to R): Mr. M.K. Hameid, Prof. K.N. Ganesh, Dr. Yusuf Hameid, Ms. Rumana Hameid, and Col. Raja Sekhar

Housing state-of-the art research labs in a 20,000 sq ft area, this facility is expected to provide space for outreach activities involving teacher and student training and to serve as a platform for developing industry-academia interactions.

PerkinElmer-India's Centre of Excellence
August 16, 2017

An advanced instrumentation facility for researchers and students of life sciences has been set up by PerkinElmer in the Main Building of the institute. The facility houses instruments such as high content analysis and automated liquid handling workstations, plate readers, and those for multispectral imaging and DNA/RNA analysis. The Centre plans to hold annual workshops that will be open to scientists across India. This instrumentation facility is envisaged to help educate the region's current and future scientists on high-throughput analyses in the life sciences.



IISER Pune members and PerkinElmer representatives at the inauguration

Hindi Fortnight Celebration (Hindi Pakhwada Samaroh)
September 01-14, 2017

Hindi Fortnight celebration included two talks: Dr. Sunil Deodhar (Former Assistant Director (Prog.) of All India Radio, Pune) on "Bhasha, vigyan aur saahitya ka samanvay", and Prof. Saheb Ali (University of Mumbai) on "Hindustaan mein Urdu zabaan ka mustaqbil"; and a play titled "Saste Jahaaj ka Sapna" by the Drama Club, along with competitions in poetry recitation, letter writing, drawing, and antakshari.

Inauguration of Housing Block D
October 30, 2017

The construction of a third block, Block D, of the housing complex was completed during the year and was ready for occupation. The building was formally inaugurated by the then Director, Prof. K.N. Ganesh.

Research Excellence Award from Clarivate Analytics India
November 03, 2017

IISER Pune has won the Clarivate Analytics India Research Excellence - Citation Award for 2017 in the category of 'Institutions Established Within 15 Years'. The ceremony of the 6th edition of these awards took place in New Delhi on November 03, 2017, where IISER Pune was given one of the two overall institution-level awards. The award recognises research excellence, outstanding research contribution in designated categories, and influence over the research in that area. Impact and influence of research is determined by analysis of research citations as captured in the Web of Science scholarly research database and InCites research analytics tool.

IISER Pune Team at iGEM Contest
November 09-13, 2017

A team of seven undergraduate students from the institute won a silver medal at the international Genetically Engineered Machines (iGEM) contest. This is a synthetic biology competition held in Boston USA (November 9-13, 2017) in which 310 teams with students from 44 countries had participated. Working in the lab of Dr. Chaitanya Athale along with student mentors, the team presented a strategy to address potential safety concerns for genetically modified pathogens.

Earlier in the year, IISER Pune had hosted a two-day iGEM 2017 India Regional Meet-up where teams from 10 different institutes across India had participated.

6th Inter IISER Sports Meet (IISM)
December 18-22, 2017

At the 6th Inter IISER Sports Meet (IISM) held at IISER Mohali, the IISER Pune team was declared Champions in Football (Men), Kabaddi (Men), Basketball (Women), and Volleyball (Women); Runners-up in Lawn Tennis (Men, Women,

and Mix) and Badminton (Mix); and won 5 Gold, 1 Silver, and 5 Bronze medals in athletics events. IISER Pune was placed 3rd in the overall championship ranking.

Distinguished Visitors to the Campus

Human Resource Department Minister Mr. Prakash Javdekar (October 01, 2017) and Dr. Satya Pal Singh, Minister of State, MHRD (February 12, 2018) visited the institute to interact with faculty members and students. Nobel Laureate Richard Henderson (MRC Laboratory of Molecular Biology, Cambridge, UK); and Mani Ramaswami (Trinity College Institute for Neuroscience, Dublin, Ireland) are among the visitors to the institute (also see *Public Lectures* chapter in this report).



(Left) HRD Minister Mr. Prakash Javadekar at an interaction session with faculty members; *(Right)* Visit of HRD Minister of State (Higher Education) Dr. Satya Pal Singh

Events by Student Teams

- Techstars Global Startup Weekend 2017 (November 10-12, 2017) organised by the Entrepreneurship and Innovation Cell of IISER Pune provided an opportunity to the participants to develop and pitch ideas on products such as news services, travelling apps, smart wardrobes, etc, through discussions with mentors. One of the ideas (iDresser) was selected to compete at the next round of Techstars Global Startup Weekend.



Participants from the 2017 Techstars Startup Weekend

- Quiz and Science Clubs have organised the 4th Linus Pauling Interschool Science Quiz Competition (February 28, 2018) for school students of classes 8-12 as part of the National Science Day celebration.
- Mimamsa is a national-level annual science quiz for undergraduate students. After the preliminary round held in January 2018, Mimamsa finals were held over two days during March 17-19, 2018.

Discovery of Saraswati Supercluster and Giant Radio Galaxies

Shishir Sankhyayan, PhD student in physics at IISER Pune, was involved in two major astronomical discoveries that received world-wide attention—the supercluster Saraswati (*Astrophys. J.* (844(1):25) and 25 rare Giant Radio Galaxies (*Mon. Notices Royal Astron. Soc* (469(3):2886-2906). Sankhyayan carried out this work along with researchers at IUCAA, Pune.

Theme-based Events

The institute celebrated these events through the year: International Yoga Day (June 21, 2017); Independence Day (August 15, 2017); Gandhi Jayanti (October 2, 2017); Vigilance Awareness Week (October 30 to November 04, 2017); National Unity Day (Rashtriya Ekta Diwas, October 31, 2017); and Constitution Day (November 26, 2017). Students and staff took a pledge to address challenges faced by India (August 09, 2017) and to maintain cleanliness within and outside the workplace (September 22, 2017).

Math Day or pi-day, as is celebrated around the world on March 14 every year owing to its resemblance to the pi value, was celebrated at IISER Pune on March 10, 2018. The event was open to the public and included a colloquium by Prof. C.S. Aravinda, TIFR-CAM, Bengaluru; quizzes and other fun events; and a play that drew in students from within and outside IISER Pune.



During the sixth convocation of IISER Pune on May 19, 2017, 109 BS MS students, 1 Integrated PhD, and 41 PhD students were awarded degrees.

Public Lectures

IISER Pune hosted a total 263 research seminars during 2017-18. Apart from this, the institute also hosted several public lectures on a diverse set of topics including black holes, brain function, evolution, math education, structure of language, and more.

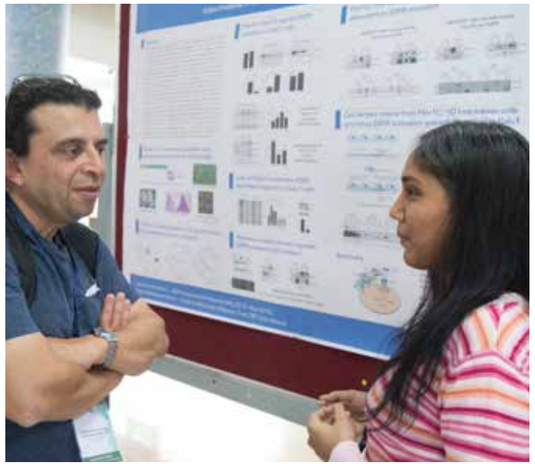
Held either as part of a named lecture or through an outreach event, public lectures are open to all members of the public thus disseminating information on recent advances in science and mathematics beyond the campus.



Date	Title of the Lecture	Speaker	Affiliation
June 17, 2017	**Science circus**	Graham Walker	Australian National University
October 12, 2017	**Science and media: The twain shall meet**	Dinesh Sharma	Journalist and Author
November 08, 2017	**Evidence for the artisan in Indus script**	M.V. Bhaskar	CEO, AuthorCafe
November 10, 2017 Mukhi Memorial Human Rights Lecture	**The importance of human rights in India's diverse democracy: A perspective**	Vivek Divan	Human Rights Lawyer and Legal Consultant
November 14, 2017 Fourth Annual Homi Bhabha Memorial Public Lecture	**Strange metals and black holes**	Subir Sachdev	Harvard University, USA
December 22, 2017	**Evolution and rationality**	Jerry Coyne	Department of Ecology and Evolution, University of Chicago, USA
January 08, 2018 K.S. Krishnan Memorial Lecture in Neuroscience	**The dark side of the brain**	Mani Ramaswami	Director, Trinity College Institute for Neuroscience, Dublin, Ireland
January 12, 2018	**Riemann's "nowhere differentiable" continuous function**	Wilfried Schmid	Dwight Parker Robinson Chair Professor, Harvard University, USA
January 13, 2018	**The role of mathematicians in K-12 mathematics education**		
January 21, 2018	**The cryoEM revolution in structural biology**	Richard Henderson	MRC Laboratory of Molecular Biology, Cambridge, UK 2017 Nobel Laureate in Chemistry
January 31, 2018	**Evolution of cooperative behaviour**	Madhav Gadgil	
February 28, 2018 Public Lectures as part of Science Day	**Emergence in condensed matter physics**	R. Shankar	IMSc, Chennai
	The reverse flow: What can science learn from illiterate people	Milind Watve	IISER Pune
	Constructing theories of the structure of languages, species, and cultures	K.P. Mohanan	Professor and Educationist, Member of ThinQ
March 31, 2018	**Deconstruction of the Ras switching cycle through saturation mutagenesis**	John Kuriyan	University of California, Berkeley, USA

International Relations

IISER Pune's international partnerships aim to foster exchange of research and teaching ideas with academics around the globe. The institute hosts delegations, builds partnerships, and offers opportunities for international students and scholars through its International Relations Office.





Among the major activities during 2017-18 are a 3-day conference on chemical biology (January 17-19, 2018) and a citizen science exhibition (February 21 to March 2, 2018).

A 24-member delegation of 13 faculty members and 11 students from Weizmann Institute of Science, Israel, visited as part of the chemical biology conference where latest advances in chemical biology from scientists from IISER Pune and Weizmann were discussed along with possibilities for potential research collaborations.

A total of 19 citizen science projects run by the University of Zurich (UZH) and other Swiss universities comprised the citizen science poster exhibition on participatory research. The projects were from varying disciplines, drawing on methods that involve citizens in their research. The five key areas included language; cosmos; nature and landscape; mankind and health; and history and digitisation. The exhibition was organised by UZH Graduate Campus and Swissnex India and supported by Stiftung Mercator Schweiz. The event also featured talks by UZH representatives and researchers who gave insights into their projects and UZH's initiatives in Citizen Science.

IISER Pune hosted a 24 Hours Non-Stop Entrepreneurship Challenge (December 1-2, 2017) under the umbrella of Bonjour India, organised by Institut Français India with the aim of fostering entrepreneurial skills of PhD students.

ACTIVITIES UNDER EXISTING MoU

1. **ENS, France:** Bilateral visits were held of members from both organisations to interact with researchers and explore opportunities for collaboration.

2. **University of Glasgow, UK:** Prof. Ion Watson (University of Glasgow) and Prof. William Cushley (International Dean for Eurasia) visited to discuss collaborations and mobilities under Erasmus+ funding. A PhD student from University of Glasgow will be visiting Prof. Satish Ogale's laboratory at IISER Pune for 4 months during 2018, as part of this.

3. **Goettingen University, Germany:** Three joint workshops on the topics of mobility and internationalisation were held, two of which were conducted in Pune (September 16, 2017; November 11-12, 2017) and one in Goa (July 4-6, 2017). University of Goettingen was the primary organiser of these events that offered information on research opportunities along with career development resources for PhD students and postdoctoral fellows.

4. **University of Melbourne, Australia:** Andrew Drinnan from University of Melbourne visited to discuss the quality assurance and sustainability of ongoing Blended BSc programme. Dean (Karen Day) and a delegation (Laura Parry-Associate Dean Research and Industry; Alex Johnson-Associate Dean International visited on January 29, 2018 to discuss research collaborations in the area of biosciences at the institutional level.

5. **Temple University, USA:** Under the IISER-TU DMDD (Dual Masters and Doctoral Degree) programme, BS MS 5th year students can carry out research work at TU which is then considered towards their first year PhD at TU. Prof Eric Borguet (College of Science and Technology, Temple University) visited on October 25, 2017 to explore expanding the DMDD and research collaboration from chemistry to other disciplines at the institute and to initiate the student exchange for summer internships from May 2018.

6. **Visits related to other ongoing partnerships:** Dr. Manjunatha Kini from NUS Singapore; Max Planck Society India Office Manager Ms Poonam Sehgal Suri; Prof Farina Mir University of Michigan; Dr. Sandrine Maximilien, Attaché for Science, Technology and Academic Affairs, Embassy of France in India; Prof. Abhay Shukla from Sorbonne University (through Erasmus+); and Mr. Alok Srivastava from British Trade Office visited during the year to discuss ongoing partnerships along with future directions.

OTHER INTERNATIONAL DELEGATIONS/ REPRESENTATIVES THAT VISITED DURING THE YEAR

Academicians, policymakers, and delegations of administrators and other professionals from foreign universities, research organisations, high commissions, consulates, and embassies visited IISER Pune to explore and discuss research collaborations and academic programmes. These comprised 23 such visits from 10 countries (number of visits shown in parenthesis): Canada (02); Denmark (01); France (02); Germany (01); Japan (02); Korea (01); Spain (1); Switzerland (1); UK (04); and USA (08).

OUTGOING STUDENTS

A total of 59 students (BS MS, Integrated PhD, and PhD) from the institute have participated in international programmes through internships and travel awards that they received.

- 8 undergraduate students were selected for DAAD funded summer internship in German institutes/universities
- 3 undergraduate students were selected for Charpak research internship programme to carry out summer internships in French institutes/universities
- 1 undergraduate student was selected under the SN Bose Program for summer internship in USA
- 6 BS MS students carried out summer internship at Michigan University under the Michigan-IISER Science Exchange programme
- 5 students carried out summer internship or 5th year project at ENS
- 3 students carried out internships at Max Planck Institutes
- 19 undergraduate students went for summer internship/ 5th year project to various other foreign institutes/ universities
- 8 Integrated PhD students and 6 PhD students went abroad under various programmes to carry out part of their research work

INCOMING STUDENTS

A total of 6 students from abroad have visited IISER Pune as part of exchange programmes to carry out short-term research projects. In addition, a group of students from the University of Pennsylvania visited IISER Pune for their study trip for a week during March 2018.

- 3 students under Michigan-IISER Science Exchange programme
- 1 student from ENS-Rennes under IISER-ENS MoU
- 1 student from University of Goettingen funded by DAAD to carry out short-term research projects
- 1 student from UPMC Paris under student exchange

MEMORANDA OF UNDERSTANDING (MoU) AND AGREEMENTS SIGNED DURING 2017-18

Partner Organisation/s	Purpose
May 08, 2017 **MoU between UK gravitational wave partner organisations and the LIGO-India partner organisations**	Establish a collaborative relationship to strengthen and grow capacity in the field of gravitational wave detection, its spin-off technologies and outreach opportunities
May 16, 2017 **MoU with Temple University, USA**	Develop and foster activities strengthening the collaboration towards bilateral student/faculty exchange, joint workshops and conferences, joint research and publications
October 05, 2017 **Inter-Institutional agreement with University of Glasgow, UK in the context of Erasmus+ KA 107 programme**	Bilateral exchange of up to 3 UG, 3 PhD and 4 staff from each side during 2017-19 with funding from EU
October 30, 2017 **MoU with Leibneiz University, Hannover, Germany (renewal)**	MoU was renewed for the duration of 5 years
October 31, 2017 **Inter-Institutional agreement with Leipzig University in the context of Erasmus+ KA 107 Programme**	Bilateral exchange of up to 2 PhD and 4 staff from each side during 2017-19 with funding from EU
December 07, 2017 A letter of intent signed with Lakshmi Mittal South Asia Institute, Harvard University (LMSAI), USA	Aims to jointly run "Building Bharat-Boston Biosciences (B4) Program" to (1) provide an intensive introduction to topics in interdisciplinary life sciences to undergraduate and graduate students; and (2) enable doctoral/postdoctoral fellows from India for a year-long fellowship at leading institutions in the Boston area
February 10, 2018 **An agreement signed with Institut de Physique du Globe de Paris (IPGP), France**	Towards dual Master degree programme from IISER Pune and IPGP (Masters of Research level) in the fields of Solid Earth Sciences
February 20, 2018 **MoU with Faculty of Chemistry and Minerology, Leipzig University, Germany**	To promote and expand international academic and research programmes of mutual interest by stimulating and supporting academic research activities
March 10, 2018 **MoU between ENS network of institutes from France and all IISERs signed during Indo-French Knowledge Summit held at New Delhi**	Joint realisation of research and/or teaching programmes, exchange of personnel, student mobility, joint conferences and workshops, and developing new pedagogy tools and online courses

Endowments

IISER Pune is committed to the teaching and learning of science through research excellence. To take these goals further and reach out to the society, the institute would like to engage with the local and global community in order to sustain social, environmental, technological, and economic development.

Keeping this in mind, the institute is partnering with like-minded individuals and organisations to enhance the institute's sustainability and to extend the institute resources to the society at large. The Endowment Committee set up in 2015 and chaired by Prof. Sunil Mukhi is working towards this goal.

IISER Pune has been fortunate to win the trust and support of the corporate organisations, including the Infosys Foundation, the Balan group, Bajaj Auto Ltd., Precision Wires Ltd., Cipla Foundation, Xytel India, Forbes Marshall, and IDeaS. Endowments committed by various organisations is Rs. 81.32 crores; institute has received an amount of Rs. 53.62 crores up to March 31, 2018.

Endowment from the Cipla Foundation has enabled the ongoing construction of a modern chemistry research laboratory for undergraduate students; this space will also be available for industry-academic interactions and outreach activities involving teacher and student training.

Balan group's endowment will be utilised for the construction of a science activity centre. While the construction is yet to begin, hands-on activities for school and college students and teachers have already commenced at an interim location that has been named Indrani Balan Science Activity Centre. Construction of a hostel for women research scholars at the institute is ongoing through an endowment from Bajaj Auto. Endowment from Forbes Marshall Foundation will support activities of the Exciting Science Group, an academic outreach initiative of scientists from CSIR-NCL and IISER Pune.

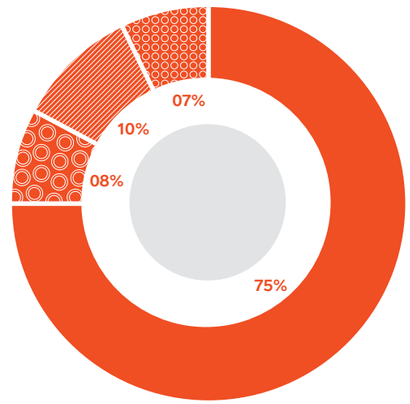
Scholarships and Travel Awards from the Infosys Foundation have enabled students to avail 66 Infosys Tuition Waivers and 74 Infosys Travel Awards for participation in national and international conferences (from 2016 and up to March 31, 2018). Similarly, Xytel India's contribution will be used towards Best Thesis Awards, in recognition of research excellence.

Endowment from IDeaS, an information technology company at Cyber City, Pune, will provide scholarships to IISER Pune students for their academic excellence.

In an endowment directly aimed at supporting research, Precision Wires Ltd. will fund research in the area of string theory and quantum gravity. K.S. Krishnan Memorial Lecture endowment will enable the institute to invite accomplished neuroscientists to visit, give a talk, and interact with institute members.

ACTIVITIES SUPPORTED THROUGH ENDOWMENTS

- Campus Infrastructure
- Research, Labs, Named Lectures
- Scholarships, Travel Grants, Awards for Research/Academic Excellence
- Public Outreach



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 from Schools and Colleges

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 to give them an idea of the research facilities and academic life on campus. Based on relevance and area of interest, the visiting groups get 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 2017-18, over 2500 visitors from 55 institutes from different parts of the country visited IISER Pune. Of these, 2340 were from the Maharashtra state, while the rest were from Rajasthan, Tamil Nadu, and Karnataka. Among the visitors were 1055 school students accompanied by 91 teachers and 1395 college students accompanied by 275 teachers.

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 popularisation. In addition, a major activity is in human resource development in the field of scientific 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. During 2017-18, the centre has organised a science writing workshop along with Vigyan Prasar; and two courses (on graphic design and image processing and on the basics of science video production) for students and researchers from the institute. The centre also facilitated conducting of a 4-credit course on science communication and has initiated video production with faculty members at the institute as part of National Programme on Technology Enhanced Learning (NPTEL) in association with IIT Madras.



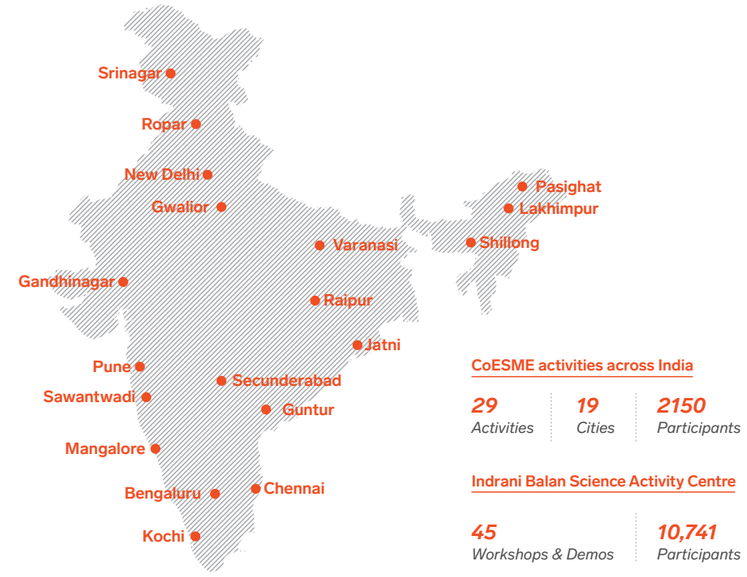
Centre of Excellence in Science and Mathematics Education (CoESME)

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



To better utilise the available resources as well as expertise in the field, CoESME partners with several government (DBT, DST) as well as non-government (Newton-Bhabha Fund [British Council], ISEF) agencies. CoESME's activities are focussed on the following aspects:

1. Teaching/learning of scientific concepts: Training teachers on research-based pedagogical tools (RBPTs) that help students learn the process of science and not just facts
2. Professional development: Training teachers, educators, and other professionals on discipline-specific topics with practical applications in learning and capacity building for associated skills such as for science journalism and science administration
3. Making science fun and understandable to all age groups through hands-on activities: Workshops, science camps (e.g., DST-INSPIRE) and events with public engagement focus through Indrani Balan Science Activity Centre on campus



Teacher training workshops were conducted at the national level for about 150 teachers from all over the country in partnership with educationists from Sheffield Hallam University, UK. These workshops introduce participants to RBPTs and also gets them to design an RBPT of their own, which can be directly implemented in their classroom. Selected participants from this level are further trained by the UK team in Level 2 workshops which clarify concepts and train participants to be trainers themselves. The participants trained in Level 2 act as trainers for the regional workshops thus spreading this innovation further.

Between April 2017 and March 2018, CoESME has implemented 29 different activities across 19 cities/towns for a total of 2150 participants (around 2045 beneficiaries) that included students, teachers, and educators at various levels. Of these, 18 are teacher training workshops conducted at 17 states across India. In addition, Indrani Balan Science Activity Centre has reached out to a total number of 10,741 participants through 45 workshops and demo-sessions at IISER Pune and at schools and other locations.





Around 300 students participated at a five-day DST-INSPIRE Science Internship camp for students from Classes 8-10 (December 17-22, 2017)



About 60 science experiments were demonstrated by school students in a science exhibition event organised on the occasion of Children's Day by Indrani Balan Science Activity Centre through CoESME in collaboration with Sakal NIE and Agastya International Foundation (November 18, 2017)

Science Gappa Public Talk Series

In collaboration with Pune city chapter of Marathi Vidyan Parishad, the institute has initiated a series of popular science talks, under a theme titled 'Science Gappa'. The main objective of the series is to take science from the lab to members of the public and to generate interest and excitement about science among the local community.

Beginning from January 2017, the talks were held on the second Friday of every month at a central venue in the city, to make them more accessible. Talks were usually in Marathi and pitched at non-specialists, taking middle to high-school level science knowledge as a base. The talks are followed by question-answer and discussion session.

Eleven IISER Pune faculty members from Biology, Chemistry, Earth and Climate Science, Mathematics, and Physics have spoken in the series.

Social Outreach

Social outreach activities are conducted by voluntary organisations at the institute run primarily by the IISER Pune student community in association with faculty coordinators and volunteers.

Disha, a student-run voluntary organisation, offers a structured platform for IISER Pune members to interact with the society in meaningful ways. The majority of Disha's work involves increasing the quality and accessibility of education for the socio-economically marginalised through the following programmes.

Abhyasikas are study sessions where volunteers visit Lamanvasti, a locality near IISER Pune, weekday evenings to help students of the vasti with their school studies. Around 30 children studying classes I-VIII attend these sessions held in the vasti's community centre.

Science Nurture Programme is funded by Rashtriya Avishkar Abhiyan, an MHRD initiative. Aimed at popularising science among students from municipal schools (from class VIII and IX), during this year the programme has reached out to 50 students to explain scientific concepts through fun activities. Held on Sundays, the programme also includes a visit to Pimpri Chinchwad Science Park.

Mindspark (Classes VII-VIII) and Prerana (Classes XI-XII) are programmes where students are provided help with basic skills in language, mathematics, etc, to help them prepare for competitive exams. While 30 students from nearby municipal schools attend Mindspark, student numbers for Prerna has grown from 3 in 2017 to 20 in 2018.



Spread the Smile is an annual programme where volunteers visit nearby villages and demonstrate fun scientific experiments, hold interesting activities like sextant making and sky-watching, and hold career guidance sessions for students from these villages. In January 2017, over a period of three weekends, around 150 students from IISER Pune and other colleges in Pune visited the villages of Mandoshi, Dehane, Wada, Donde, Kadus, Kohinde Bk., and Kurungwadi in groups of 6 to 8 to carry out these sessions. Around 500 school students attended the sessions.

Talk for Twenty is a platform to speak on and discuss a variety of topics; topics covered in 2017-18 include education and conservation, along with a series on mental health which aimed to break the stigma surrounding mental health issues and encourage the community to support those with mental health related problems.



Prutha, the green initiative on the campus, organises events to promote a clean campus and to create awareness on issues related to the environment. During 2017-18, Prutha has continued several of its long-standing programmes such as Vastrasamman (clothes-donation drive), campus clean-up drive at multiple points on the campus, and bird watching sessions on the Panchvati hills coupled with a trek up the hill and a clean-up session.

This year, Prutha volunteers mobilised the IISER Pune community to contribute to a pan-India effort initiated by Bird Count India. In an effort to create art from waste material, Prutha has arranged for the collection of tetrapacks, tin cans, plastic bottles, etc, to be used later at an event in *Karavaan*, the cultural festival of IISER Pune. Volunteers were also engaged in making paper bags and envelopes from newspapers and magazines to be used by the food outlets and stationary store on the campus as a substitute for plastic bags.

Prutha surveyed the requirement for dustbins across the campus and identified the need to increase the number of dustbins along with the facility of segregating the waste. Based on this survey, the institute has arranged for waste bins at key locations on the campus through Adar Poonawalla's Clean City Initiative.



Support Structure



Support Structure and Facilities

IISER Pune has set up institutional policies and procedures that facilitate its march towards a teaching and research institute of excellence. Matters related to general administration, finance, human resource management, IT requirements, procurement of equipment and consumables, civil, electrical and other engineering infrastructure are all handled by qualified staff members in consultations with internal committees.

The internal committees are comprised of teaching and non-teaching staff members with a dual purpose: to oversee all support systems and to develop and implement plans to support future needs of the institute. A newly introduced online ticketing system routes and manages the workflow of requests related to IT, electrical, and civil engineering services across the campus.

Here's a glimpse of the administrative framework at IISER Pune along with the roles carried out by various sections.

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

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

The **Purchase** section of the institute looks after the regular procurement and issuance of material required for the entire institute and finalises the rate contract, maintenance, and service related tenders. The procurement process is managed through the Central Public Procurement Portal (CPPP) and Government eMarket (GeM). To streamline and expedite the purchase process, an open order system has been introduced for frequently required materials.

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

The campus is connected through a dedicated leased line of 1 Gbps National Knowledge Network and a 155 Mbps line for uninterrupted internet access. The Institute has a centrally controlled indoor and outdoor dual band campus wide Wi-Fi access network along with IT security perimeter protection. The **Information Technology (IT)** section manages setting up and operations of these facilities along with hosting infrastructure services such as email, website, DNS, Eduroam, Institute Information management system, computer laboratory, virtual reality laboratory, dining management system, biometric attendance system, and admissions software. The IT team provides support for high performance clusters across research groups at the institute. The team also manages institute machines and a local area network, voice over internet phones (VoIP), VPN, and audio-video equipment during on-campus events, and offers support in the running of campus facilities such as the auditorium and e-classrooms.

IISER Pune is now fully operational from its permanent campus. The institute has world-class infrastructure for teaching, research, and housing and recreational facilities for students and employees. The physical infrastructure consists of Main Laboratory Building, Lecture Hall Complex, Animal House Facility, Guest House-cum-Convention Centre,





students' hostels with central dining facility and on-campus housing for employees. Further common amenities include outdoor sports facilities and an indoor sports complex. The **Engineering** section handles all construction activities on the campus along with maintenance and upkeep.

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

Supporting the teaching, learning, and research programmes on campus is the **Srinivasa Ramanujan Library.** With over 20,000 print books, 3000 e-journals, and over 6000 e-books, the Library facilitates access to electronic, print, and multimedia resources and provides essential and specialised information services. Over 1100 print books and several online resources have been added to the collection during 2017-18. A large part of journal and online resources' subscription is through IISER Library Consortium and e-ShodhSindhu, a national consortium for higher education e-resources formed by Ministry of Human Resource Development (MHRD), Govt. of India. The IISER Pune Library also facilitates generation of similarity reports for theses and research publications through iThenticate, a plagiarism detection web tool.

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

The infrastructure and facilities on the campus cater to a total of 147 faculty members (122 regular faculty members + 25 faculty fellows, independent scientists, and visiting faculty); 102 non-teaching staff members; 107 postdoctoral fellows; 1400 students (852 BS MS, 186 Integrated PhD, and 362 PhD); and 99 research and management staff recruited through extramural projects. The numbers are as of March 31, 2018.

05

Accounts at a Glance

120 / Accounts at a Glance

121 / Balance Sheet

122 / Income and Expenditure Statement

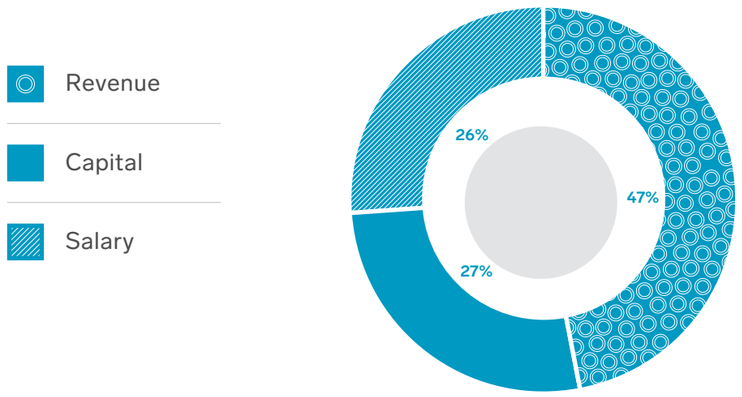


Accounts At A Glance

The Annual Accounts of the institute were approved by the Finance Committee and the Board of Governors on May 3, 2018. The annual audit for the financial year 2017-18 was carried out during June 11-29, 2018. The balance sheet and income and expenditure statement for the 2017-18 financial year are given in the following pages.

FUNDS RECEIVED FROM MHRD

During the 2017-18 financial year, IISER Pune received an amount of Rs. 123.85 crores from MHRD under the budget heads of revenue, capital, and salary. The break-up across the three budget heads is shown.



CORPUS FUND

The cumulative corpus fund as on March 31, 2018 from the Internal Revenue generated is Rs. 35.88 crores. The institute had generated an amount of Rs. 10.41 crores during the 2017-18 financial year from internal receipts.

EXTRAMURAL GRANTS

A number of research projects receive support from extramural grants through individual competitive research grants that faculty members have secured. During the year 2017-18, a total of Rs 43.77 crores have been received by the institute via extramural grants. New grants initiated during 2017-18 are listed in the Appendix section of this report.

ENDOWMENTS

Some of the activities at IISER Pune are supported through endowments from corporate organisations including the Infosys Foundation, the Balan group, Bajaj Auto Ltd, Precision Wires Ltd, Cipla Foundation, Xytel India, Forbes Marshall Foundation, and IDeaS. Endowments committed by various organisations is Rs. 81.32 crores; institute has received an amount of Rs. 53.62 crores up to March 31, 2018.

Balance Sheet

as on March 31, 2018

Amount in Rs.

Sources of Funds	Schedule	Current Year 2017-18	Previous Year 2016-17
Corpus/Capital Fund	1	5,47,35,21,215	5,50,76,41,638
Designated/Earmarked/Endowment Funds	2	38,42,13,045	31,54,99,592
Current Liabilities and Provisions	3	89,57,10,587	96,48,41,998
Total		**6,75,34,44,847**	**6,78,79,83,228**

Application of Funds	Schedule	Current Year 2017-18	Previous Year 2016-17
Fixed Assets	4		
Tangible Assets		4,85,44,62,448	4,47,80,29,331
Intangible Assets		23,68,445	16,05,454
Capital Works-In-Progress		25,79,26,871	72,92,80,553
Investments From Earmarked / Endowment Funds	5		
Long Term		-	-
Short Term		35,05,97,055	30,60,45,753
Investments - Others	6	66,95,69,875	74,35,99,259
Current Assets	7	19,07,89,954	42,75,07,221
Loans, Advances and Deposits	8	42,77,30,196	10,19,15,651
Total		**6,75,34,44,847**	**6,78,79,83,228**
Significant Accounting Policies	23		
Contingent Liabilities And Notes To Accounts	24		

For and on behalf of IISER Pune

sd/-	**sd/-**	**sd/-**
CA. Vasundhara Laad	**Col. G. Raja Sekhar (Retd.)**	**Prof. Jayant B. Udgaonkar**
Jt. Registrar (F & A)	*Registrar*	*Director*

Place: Pune | *Date:* May 03, 2018

Income and Expenditure Statement

For The Year Ended March 31, 2018

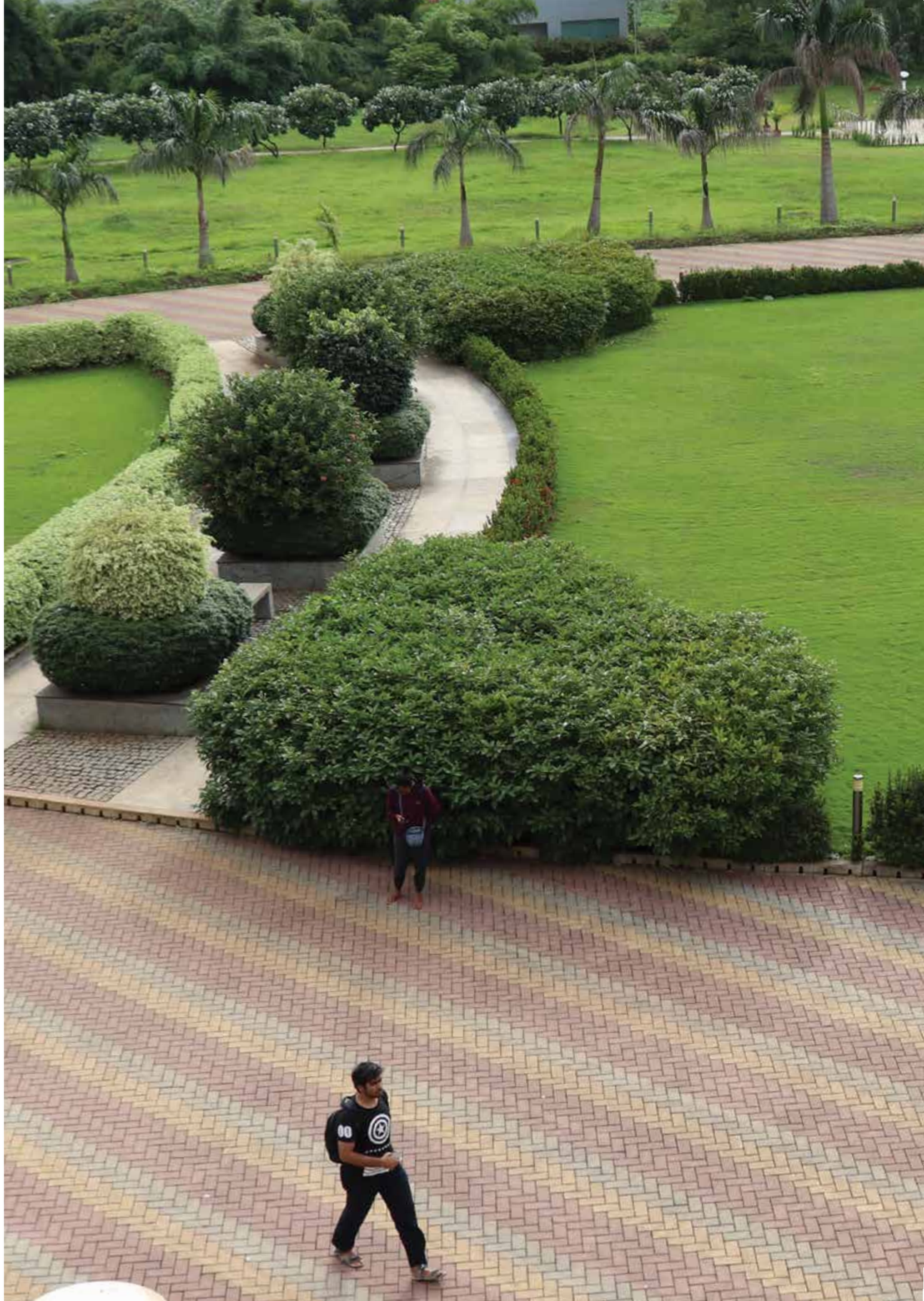
Amount in Rs.

Particulars	Schedule	Current Year 2017-18	Previous Year 2016-17
Income			
Academic Receipts	9	4,10,70,412	3,02,68,439
Grants/Subsidies	10	90,85,00,000	82,50,00,000
Income from Investments	11	1,12,90,121	61,94,676
Interest Earned	12	-	12,22,328
Other Income	13	5,15,98,680	24,51,786
Prior Period Income	14	1,86,831	-
Total (A)		**1,01,26,46,044**	**86,51,37,229**
Expenditure			
Staff Payments and Benefits *(Establishment Expenses)*	15	47,01,41,451	36,46,90,378
Academic Expenses	16	11,34,24,311	10,61,04,156
Administrative and General Expenses	17	29,18,11,577	33,54,37,213
Transportation Expenses	18	47,53,482	44,32,652
Repairs and Maintenance	19	5,64,77,348	6,31,13,576
Finance Costs	20	1,72,330	1,10,231
Depreciation	4	49,46,26,369	43,59,41,295
Other Expenses	21	76,32,113	4,30,79,816
Prior Period Expenses	22	1,10,04,103	68,59,667
Total (B)		**1,45,00,43,084**	**1,35,97,68,984**
Balance being excess of Income over Expenditure (A-B)		**(43,73,97,040)**	**(49,46,31,755)**
Less: Transfer to Designated Fund			
Others - Institute Reserve Fund (Sch 9 + Sch 13)		(9,26,69,092)	(3,27,20,225)
Transfer to Capital Fund (Depreciation)		49,46,26,369	43,59,41,295
Over Utilisation of Grant in Aid for Revenue Exps (Schedule 3C)		(3,54,39,763)	(9,14,10,685)
Under Utilisation 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/-	**sd/-**	**sd/-**
CA. Vasundhara Laad	**Col. G. Raja Sekhar (Retd.)**	**Prof. Jayant B. Udgaonkar**
Jt. Registrar (F & A)	*Registrar*	*Director*

Place: Pune | *Date:* May 03, 2018



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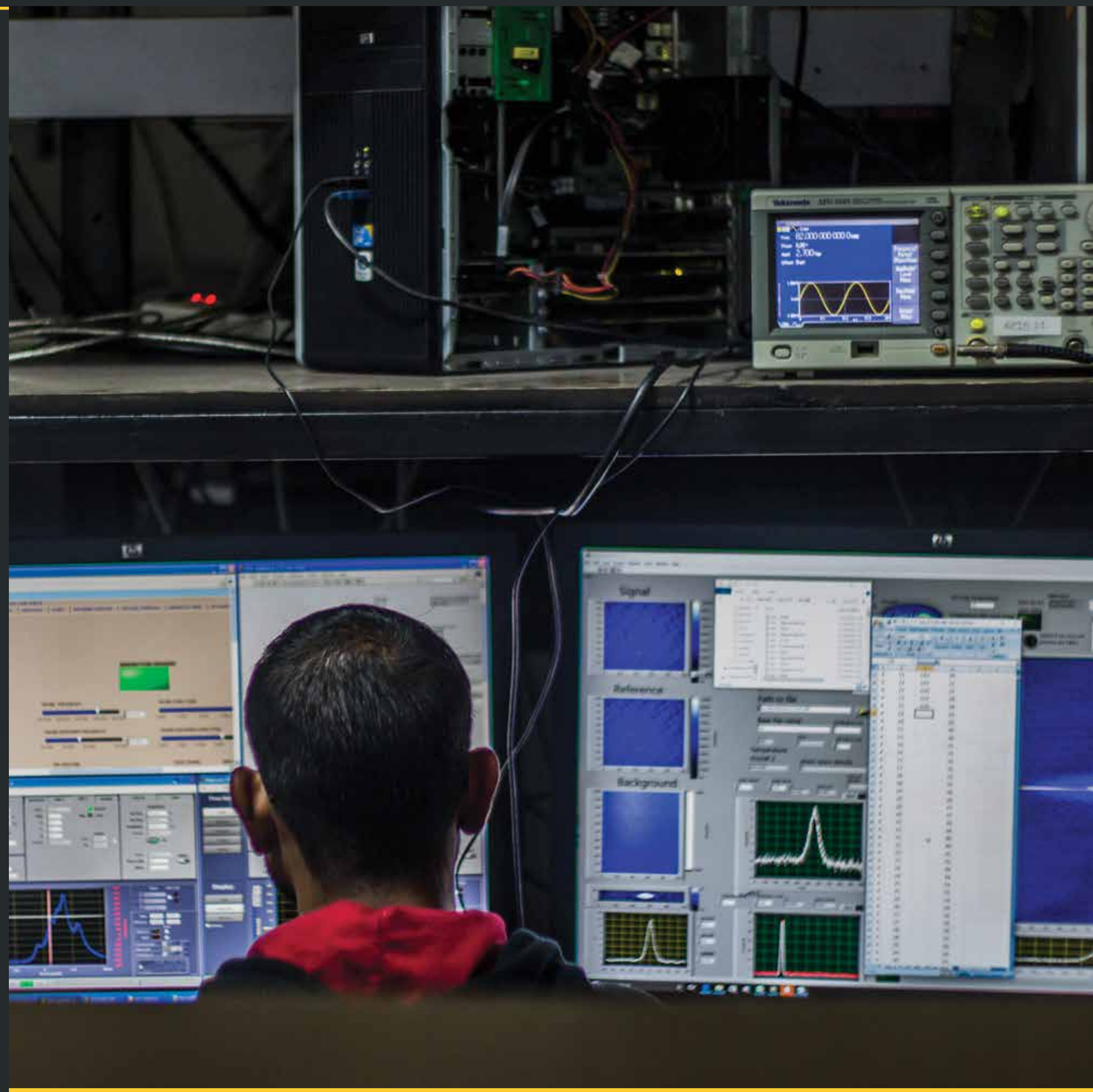
Appendix

126 / Publications

142 / Invited Lectures

149 / Academic Events Organised

151 / New Extramural Grants Received



Publications in 2017

BIOLOGY

01. Deshpande, S.A., Pawar, A.B., Dighe, A., **Athale, C.A.** and Sengupta, D. (2017). Role of spatial inhomogenity in GPCR dimerisation predicted by receptor association-diffusion models. *Physical Biology* 14 (3).

02. Gangan, M.S., and **Athale, C.A.** (2017). Threshold effect of growth rate on population variability of *Escherichia coli* cell lengths. *Royal Society Open Science* 4 (2): 160417.

03. Pawar, A. and **Balasubramanian, N.** (2017). Integrin-dependent regulation of small GTPases: Role in cell migration. *Journal of the Indian Institute of Science* 97 (1): 5-21.

04. Devani, R.S., Sinha, S., Banerjee, J., Sinha, R.K., Bendahmane, A. and **Banerjee, A.K.** (2017). De novo transcriptome assembly from flower buds of dioecious, gynomonoecious and chemically masculinized female *Coccinia grandis* reveals genes associated with sex expression and modification. *BMC Plant Biology* 17: 241.

05. Ghate, T.H., Sharma, P., Kondhare, K.R., Hannapel, D.J. and **Banerjee, A.K.** (2017). The mobile RNAs, StBEL11 and StBEL29, suppress growth of tubers in potato. *Plant Molecular Biology* 93 (6): 563-578.

06. Hannapel, D.J., Sharma, P., Lin, T. and Banerjee, A.K. (2017). The multiple signals that control tuber formation. *Plant Physiology* 174 (2): 845-856.

07. Santin, F., Bhogale, S., Fantino, E., Grandellis, C., **Banerjee, A.K.** and Ulloa, R.M. (2017). *Solanum tuberosum* StCDPK1 is regulated by miR390 at the posttranscriptional level and phosphorylates the auxin efflux carrier StPIN4 in vitro, a potential downstream target in potato development. *Physiologia Plantarum* 159 (2): 244-261.

08. Natarajan, B., Bhogale, S. and **Banerjee, A.K.** (2017). Essential role of microRNAs in potato tuber development: A mini Review. *Indian Journal of Plant Physiology* 22 (4): 401-410.

09. Sastry, A. and **Barua, D.** (2017). Leaf thermotolerance in tropical trees from a seasonally dry climate varies along the slow-fast resource acquisition spectrum. *Scientific Reports* 7: 11246.

10. Iyengar, S.B., Bagchi, S., **Barua, D.**, Mishra, C. and Sankaran, M. (2017). A dominant dwarf shrub increases diversity of herbaceous plant communities in a Trans-Himalayan rangeland. *Plant Ecology* 218 (7): 843-854.

11. **Bhave, R.**, Deodhar, S. and Isvaran, K. (2017). Intrinsic factors are relatively more important than habitat features in modulating risk perception in a tropical lizard. *Behavioral Ecology and Sociobiology* 71 (10).

12. Akkaya, M., Akkaya, B., Miozzo, P., Rawat, M., Pena, M., Sheehan, P.W., Kim, A.S., Kamenyeva, O., Kabat, J., Bolland, S., **Chaturvedi, A.** and Pierce, S.K. (2017). B cells produce Type 1 IFNs in response to the TLR9 agonist CpG-A conjugated to cationic lipids. *Journal of Immunology* 199 (3): 931-940.

13. Anoop, V.K., **Dahanukar, N.**, Ali, A. and Raghavan, R. (2017). Taxonomy of the zodiac loaches, *Mesonoemacheilus triangularis, M-tambaraparniensis* and *M-periyarensis*, endemic to the Western Ghats of India (Teleostei: Nemacheilidae). *Zootaxa* 4341 (1): 124-134.

14. Britz, R., Adamson, E., Raghavan, R., Ali, A. and **Dahanukar, N.** (2017). *Channa pseudomarulius*, a valid species of snakehead from the Western Ghats region of peninsular India (Teleostei: Channidae), with comments on *Ophicephalus grandinosus, O. theophrasti* and *O. leucopunctatus*. *Zootaxa* 4299 (4): 529-545.

15. Conte-Grand, C., Britz, R., **Dahanukar, N.**, Raghavan, R., Pethiyagoda, R., Tan, H.H., Hadiaty, R.K., Yaakob, N.S. and Ruber, L. (2017). Barcoding snakeheads (Teleostei, Channidae) revisited: Discovering greater species diversity and resolving perpetuated taxonomic confusions. *Plos One* 12 (9).

16. Raghavan, R., **Dahanukar, N.** and Britz, R. (2017). The type locality of Tor mosal (Hamilton, 1822) (Teleostei: Cyprinidae). *Zootaxa* 4317 (3): 593-596.

17. Doke, D., Morey, R., **Dahanukar, N.**, Padhye, S.M. and Paripatyadar, S.V. (2017). Ontogenetic trajectory and allometry of *Diplonychus rusticus* (Fabricius), an Oriental aquatic bug (Hemiptera: Belostomatidae) from the Western Ghats of India. *Arthropod Structure & Development* 46 (2): 297-303.

18. Keskar, A., Raghavan, R., Kumkar, P., Padhye, A. and **Dahanukar, N.** (2017). Assessing the sustainability of subsistence fisheries of small indigenous fish species: Fishing mortality and exploitation of hill stream loaches in India. *Aquatic Living Resources* 30.

19. Suranse, V., Sawant, N.S., Paripatyadar, S.V., Krutha, K., Paingankare, M.S., Padhye, A.D., Bastawade, D.B. and **Dahanukar, N.** (2017). First molecular phylogeny of scorpions of the family Buthidae from India. *Mitochondrial DNA Part A 28* (04-May): 606-611.

20. Sahu, A., Ghosh, R., **Deshpande, G.** and Prasad, M. (2017). A Gap Junction Protein, Inx2, modulates calcium flux to specify border cell fate during *Drosophila* oogenesis. *PLOS Genetics* 13 (1).

21. Shukla, J.P., **Deshpande, G.** and **Shashidhara, L.S.** (2017). Ataxin 2-binding protein 1 is a context- specific positive regulator of Notch signaling during neurogenesis in *Drosophila melanogaster. Development* 144 (5): 905-915.

22. Gupta, M., Prasad, N.G., **Dey, S.**, Joshi, A. and Vidya, T.N.C. (2017). Niche construction in evolutionary theory: The construction of an academic niche? *Journal of Genetics* 96 (3): 491-504.

23. **Dutta, P.**, Das, S. and Maiti, S. (2017). Non diaphanous formin delphilin acts as a barbed end capping protein. *Experimental Cell Research* 357 (2): 163-169.

24. Reddy, P.C., Ubhe, S., Sirwani, N., Lohokare, R. and **Galande, S.** (2017). Rapid divergence of histones in Hydrozoa (Cnidaria) and evolution of a novel histone involved in DNA damage response in hydra. *Zoology* 123: 53-63.

25. Moine, A., Espinosa, L., Martineau, E., Yaikhomba, M., Jazleena, P.J., Byrne, D., Biondi, E.G., Notomista, E., Brilli, M., Molle, V., **Gayathri, P.**, Mignot, T. and Mauriello, E.M.F. (2017). The nucleoid as a scaffold for the assembly of bacterial signaling complexes. *PLOS Genetics* 13 (11).

26. Palani, S., Chew, T.G., Ramanujam, S., Kamnev, A., Harne, S., Chapa-y-Lazo, B., Hogg, R., Sevugan, M., Mishra, M., **Gayathri, P.** and Balasubramanian, M.K. (2017). Motor Activity Dependent and independent Functions of Myosin II Contribute to Actomyosin Ring Assembly and Contraction in *Schizosaccharomyces pombe. Current Biology,* 27 (5): 751-757.

27. Chouhan, N.S., Mohan, K. and **Ghose, A.** (2017). cAMP signaling mediates behavioral flexibility and consolidation of social status in *Drosophila* aggression. *Journal of Experimental Biology* 220 (23): 4502-4514.

28. Kasbekar, P.U., **Goel, P.** and Jadhav, S.P. (2017). A decision tree analysis of diabetic foot amputation risk in Indian patients. *Frontiers in Endocrinology* 8.

29. Rai, P., Kumar, M., Sharma, G., Barak, P., Das, S., **Kamat, S.S.** and Mallik, R. (2017). Kinesin-dependent mechanism for controlling triglyceride secretion from the liver. *Proceedings of the National Academy of Sciences of the United States of America* 114 (49): 12958-12963.

30. Ubhe, S., Rawat, M., Verma, S., Anamika, K. and **Karmodiya, K.** (2017). Genome-wide identification of novel intergenic enhancer-like elements: implications in the regulation of transcription in *Plasmodium falciparum.* BMC *Genomics* 18.

31. Muralidharan, B., Keruzore, M., Pradhan, S.J., Roy, B., Shetty, A.S., Kinare, V., D'Souza, L., Maheshwari, U., **Karmodiya, K.**, Suresh, A., **Galande, S.**, Bellefroid, E.J. and Tole, S. (2017). Dmrt5, a novel neurogenic factor, reciprocally regulates Lhx2 to control the neuron-glia cell-fate switch in the developing hippocampus. *Journal of Neuroscience* 37 (46): 11245-11254.

32. Muralidharan, B., Khatri, Z., Maheshwari, U., Gupta, R., Roy, B., Pradhan, S.J., **Karmodiya, K.**, Padmanabhan, H., Shetty, A.S., Balaji, C., Kolthur-Seetharam, U., Macklis, J.D., **Galande, S.** and Tole, S. (2017). LHX2 interacts with the NuRD Complex and regulates cortical neuron subtype determinants Fezf2 and Sox11. *Journal of Neuroscience* 37 (1): 194-203.

33. Lee, W.-J., Falk, B., Chiu, C., **Krishnan, A.**, Arbour, J.H. and Moss, C.F. (2017). Tongue-driven sonar beam steering by a lingual-echolocating fruit bat. *PLoS Biology* 15 (12): e2003148.

34. Anandi, L., Chakravarty, V., Ashiq, K.A., Bodakuntla, S. and **Lahiri, M.** (2017). DNA-dependent protein kinase plays a central role in transformation of breast epithelial cells following alkylation damage. *Journal of Cell Science* 130 (21): 3749-3763.

35. Farheen, N., Sen, N., Nair, S., Tan, K.P. and **Madhusudhan, M.S.** (2017). Depth dependent amino acid substitution matrices and their use in predicting deleterious mutations. *Progress in Biophysics & Molecular Biology* 128: 14-23.

36. Nguyen, M.N., Sim, A.Y.L., Wan, Y., **Madhusudhan, M.S.** and Verma, C. (2017). Topology independent comparison of RNA 3D structures using the CLICK algorithm. *Nucleic Acids Research* 45 (1).

37. Nguyen, T.B., Jayaraman, P., Bergseng, E., **Madhusudhan, M.S.**, Kim, C.Y. and Sollid, L.M. (2017). Unraveling the structural basis for the unusually rich association of human leukocyte antigen DQ2.5 with class-II-associated invariant chain peptides. *Journal of Biological Chemistry* 292 (22): 9218-9228.

38. Soni, N. and **Madhusudhan, M.S.** (2017). Computational modeling of protein assemblies. *Current Opinion in Structural Biology* 44: 179-189.

39. Sahoo, M.R., Gaikwad, S., Khuperkar, D., Ashok, M., Helen, M., Yadav, S.K., Singh, A., Magre, I., Deshmukh, P., Dhanvijay, S., Sahoo, P.K., Ramtirtha, Y., **Madhusudhan, M.S., Gayathri, P.**, Seshadri, V. and Joseph, J. (2017). Nup358 binds to AGO proteins through its SUMO-interacting motifs and promotes the association of target mRNA with miRISC. *EMBO Reports* 18 (2): 241-263.

40. **Mahajan, G.** and Mande, S.C. (2017). Using structural knowledge in the protein data bank to inform the search for potential host-microbe protein interactions in sequence space: application to *Mycobacterium tuberculosis. BMC Bioinformatics* 18.

41. Roy, A., **Nair, S.**, Sen, N., Soni, N. and **Madhusudhan, M.S.** (2017). In silico methods for design of biological therapeutics. *Methods* 131: 33-65.

42. Barone, V., Lang, M., Krens, S.F.G., **Pradhan, S.J.**, Shamipour, S., Sako, K., Sikora, M., Guet, C.C. and Heisenberg, C.P. (2017). An effective feedback loop between cell-cell contact duration and morphogen signaling determines cell fate. *Developmental Cell* 43 (2): 198-211.

43. Dar, S., Kamerkar, S.C. and **Pucadyil, T.J.** (2017). Use of the supported membrane tube assay system for real-time analysis of membrane fission reactions. *Nature Protocols* 12 (2): 390-400.

44. Dar, S. and **Pucadyil, T.J.** (2017). The pleckstrin-homology domain of dynamin is dispensable for membrane constriction and fission. *Molecular Biology of the Cell* 28 (1): 152-160.

45. Joshi, M., Samanta, A., **Tripathy, G.R.** and **Rajamani, S.** (2017). Formation and stability of prebiotically relevant vesicular systems in terrestrial geothermal environments. *Life 7* (4): 51.

46. Chowdhary, S., Tomer, D., Dubal, D., Sambre, D. and **Rikhy, R.** (2017). Analysis of mitochondrial organisation and function in the *Drosophila* blastoderm embryo. *Scientific Reports 7.*

47. Ranade, D., Koul, S., Thompson, J., Prasad, K.B. and **Sengupta, K.** (2017). Chromosomal aneuploidies induced upon Lamin B2 depletion are mislocalized in the interphase nucleus. *Chromosoma* 126 (2): 223-244.

48. Sen Gupta, A. and **Sengupta, K.** (2017). Lamin B2 modulates nucleolar morphology, dynamics, and function. *Molecular and Cellular Biology* 37 (24).

49. Rale, A., Shendye, N., Bodas, D.S., **Subhedar, N.** and **Ghose, A.** (2017). CART neuropeptide modulates the extended amygdalar CeA-vBNST circuit to gate expression of innate fear. *Psychoneuroendocrinology* 85: 69-77.

50. Shelkar, G.P., Kumar, S., Singru, P.S., **Subhedar, N.K.** and Kokare, D.M. (2017). Noradrenergic inputs from locus coeruleus to posterior ventral tegmental area are essential to support ethanol reinforcement. *Addiction Biology* 22 (2): 291-302.

51. Somalwar, A.R., Shelkar, G.P., **Subhedar, N.K.** and Kokare, D.M. (2017). The role of neuropeptide CART in the lateral hypothalamic-ventral tegmental area (LH-VTA) circuit in motivation. *Behavioural Brain Research* 317: 340-349.

52. Borkar, C.D., Sagarkar, S., Sakharkar, A.J., **Subhedar, N.K.** and Kokare, D.M. (2017). Neuropeptide CART prevents memory loss attributed to withdrawal of nicotine following chronic treatment in mice. *Addiction Biology* 2017: doi: 10.1111/adb.12579.

53. **Kulkarni, S.**, Sharda, S. and **Watve, M.** (2017). Bi-stability in type 2 diabetes mellitus multi-organ signalling network. *PLOS One* 12 (8): e0181536.

54. **Watve, M.** (2017). Social behavioural epistemology and the scientific community. *Journal of Genetics* 96 (3): 525-533.

55. Baig, U., Lele, U. and **Watve, M.** (2017). Polarity, asymmetry and aging: Are there Yayaatis among bacteria? *Current Science* 113 (4): 553-554.

56. Meesala, S., Singh, R. and **Watve, M.** (2017). Anti-Mycobacterium

metabolite from marine sponge *Iricinia fusca. British Journal of Pharmaceutical Research* 15 (4): 1-6.

57. Baig, U., Ojha, A. and **Watve, M.** (2017). The evolving opportunistic pathogen communities on host individuals and the evolution of host aging. *Journal of Evolutionary Medicine* 5: Article ID 235975.

58. Vidwans, H. and **Watve, M.** (2017). How much variance in insulin resistance is explained by obesity? *Journal of Insulin Resistance* 2(1): a22.

59. Meesala, S., Lakwal, V., Kharate, D., Mokashe, S., Raina, P., Ghanekar, R.K. and **Watve, M.** (2017). Oxazoles from marine sponge *Mycale* (Zygomycale) *parishii. International Journal of Scientific Research* 6(5): 216-218.

60. Kondhalkar, M., Apte, K., **Watve, M.**, Paygude, S. and Parab, P. (2017). Ugly duckling or a swan: Exploring therapeutic potential of ricin for inhibiting unwanted hair growth. *Matters* 201702000001.

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61. Reddy, B.K., Basavarajappa, A., Ambhore, M.D. and **Anand, V.G.** (2017). Isophlorinoids: The antiaromatic congeners of porphyrinoids. *Chemical Reviews* 117 (4): 3420-3443.

62. Reddy, B.K., Rawson, J., Gadekar, S.C., Kogerler, P. and **Anand, V.G.** (2017). A naphthalene-fused dimer of an anti-aromatic expanded isophlorin. *Chemical Communications* 53 (58): 8211-8214.

63. Panchal, S.P. and **Anand, V.G.** (2017). Oxidative transformation of a tetrathia s-confused Isophlorin into porphyrin cation. *Organic Letters* 19 (18): 4854-4857.

64. Shivran, N., Gadekar, S.C. and **Anand, V.G.** (2017). To twist or not to twist: Figure-of-eight and planar structures of octaphyrins. *Chemistry-An Asian Journal* 12 (1): 6-20.

65. Dhara, B., Jha, P.K., Gupta, K., Bind, V.K. and **Ballav, N.** (2017). Diamagnetic molecules exhibiting room-temperature ferromagnetism in supramolecular aggregates. *Journal of Physical Chemistry C* 121 (22): 12159-12167.

66. Girovsky, J., Nowakowski, J., Ali, E., Baljozovic, M., Rossmann, H.R., Nijs, T., Aeby, E.A., Nowakowska, S., Siewert, D., Srivastava, G., Wackerlin, C., Dreiser, J., Decurtins, S., Liu, S.X., Oppeneer, P.M., Jung, T.A. and **Ballav, N.** (2017). Long-range ferrimagnetic order in a two-dimensional supramolecular Kondo lattice. *Nature Communications* 8: 15388.

67. Jha, P.K., Singh, S.K., Kumar, V., Rana, S., Kurungot, S. and **Ballav, N.** (2017). High-level supercapacitive performance of chemically reduced graphene oxide. *Chem* 3(5): 846-860.

68. Rana, S., Prasoon, A., Jha, P.K., Prathamshetti, A. and **Ballav, N.** (2017). Thermally driven resistive switching in solution-processable thin films of coordination polymers. *Journal of Physical Chemistry Letters* 8 (20): 5008-5014.

69. Nandi, A., Mallick, A., More, P., Sengupta, P., **Ballav, N.** and **Basu, S.** (2017). Cisplatin-induced self-assembly of graphene oxide sheets into spherical nanoparticles for damaging sub-cellular DNA. *Chemical Communications* 53 (8): 1409-1412.

70. Karmakar, A., Joarder, B., Mallick, A., Samanta, P., Desai, A.V., **Basu, S.** and **Ghosh, S.K.** (2017). Aqueous phase sensing of cyanide ions using a hydrolytically stable metal-organic framework. *Chemical Communications* 53 (7): 1253-1256.

71. Devatha, G., Roy, S., Rao, A., Mallick, A., **Basu, S.** and Pillai, P.P. (2017). Electrostatically driven resonance energy transfer in "cationic" biocompatible indium phosphide quantum dots. *Chemical Science* 8 (5): 3879-3884.

72. Palvai, S., Kuman, M.M. and **Basu, S.** (2017). Hyaluronic acid cloaked oleic acid nanoparticles inhibit MAPK signaling with sub-cellular DNA damage in colon cancer cells. *Journal of Materials Chemistry B* 5 (20): 3658-3666.

73. Palvai, S., Kuman, M.M., Sengupta, P. and **Basu, S.** (2017). Hyaluronic acid layered chimeric nanoparticle: Targeting MAPK-PI3K signalling hub in colon cancer cells. *ACS Omega* 2 (11): 7868-7880.

74. Palvai, S., Anandi, L., Sarkar, S., Augustus, M., Roy, S., **Lahiri, M.** and **Basu, S.** (2017). Drug-triggered self-assembly of linear polymer into nanoparticle for simultaneous delivery of hydrophobic and hydrophilic drugs in breast cancer. *ACS Omega* 2 (12): 8730-8740.

75. Mete, T.B., Khopade, T.M. and **Bhat, R.G.** (2017). Oxidative decarboxylation of arylacetic acids in water: One-pot transition-metal-free synthesis of aldehydes and ketones. *Tetrahedron Letters* 58 (29): 2822-2825.

76. Mete, T.B., Khopade, T.M. and **Bhat, R.G.** (2017). Transition-metal-free regioselective thiocyanation of phenols, anilines and heterocycles. *Tetrahedron Letters* 58 (5): 415-418.

77. Mete, T.B., Singh, A. and **Bhat, R.G.** (2017). Transition-metal-free synthesis of primary to tertiary carboxamides: A quick access to prodrug-pyrazinecarboxamide. *Tetrahedron Letters* 58 (50): 4709-4712.

78. Mohite, A.R., Mete, T.B. and **Bhat, R.G.** (2017). An expedient stereoselective synthesis of (E)-alpha, beta-unsaturated esters and thioesters using $FeCl_3$ center dot $6H_{(2)}O$. *Tetrahedron Letters* 58 (8): 770-774.

79. Khopade, T.M., Sonawane, A.D., Arora, J.S. and **Bhat, R.G.** (2017). Direct organocatalytic multicomponent synthesis of enantiopure gamma-butyrolactones via tandem knoevenagel-Michael-lactonization sequence. *Advanced Synthesis & Catalysis* 359 (22): 3905-3910.

80. Babu Syamala, L.V.R. and **Bhat, R.G.** (2017). $FeCl_3.6H_2O$ catalyzed diastereoselective synthesis of (L)-menthyl 4-oxo-2-arylpiperidine-3-carboxylates. *Tetrahedron Letters* 58 (52): 4836-4840.

81. Dhara, D., Vijayakanth, T., Barman, M.K., Naik, K.P.K., Chrysochos, N., Yildiz, C.B., **Boomishankar, R.**, Schulzke, C., Chandrasekhar, V. and Jana, A. (2017). NHC-stabilized 1-hydrosilaimine: synthesis, structure and reactivity. *Chemical Communications* 53 (61): 8592-8595.

82. Gupta, A.K., Reddy, S.A.D., Rajasekar, P., Prakash, P. and **Boomishankar, R.** (2017). Chloro-bridged hexanuclear Pd(II) clusters supported by cis-Blocking tris(imido) phosphate trianions. *ChemistrySelect* 2 (33): 10636-10641.

83. Srivastava, A.K., Vijayakanth, T., Divya, P., Praveenkumar, B., Steiner, A. and **Boomishankar, R.** (2017). Altering polarization attributes in ferroelectric metallo-cavitands by varying hydrated alkali-metal guest cations. *Journal of Materials Chemistry C* 5 (29): 7352-7359.

84. Yadav, A., Deshmukh, M.S. and **Boomishankar, R.** (2017). Cationic and neutral copper(I) iodide cluster MOFs derived from tridentate N-donor functionalized P(V) ligands: Synthesis, structure and photophysical properties. *Journal of Chemical Sciences* 129 (8): 1093-1103.

85. Yadav, A., Gupta, A.K., Steiner, A. and **Boomishankar, R.** (2017). Mapping the assembly of metal-organic cages into complex coordination networks. *Chemistry-A European Journal* 23 (72).

86. Yadav, A., Srivastava, A.K., Kulkarni, P., Divya, P., Steiner, A., Praveenkumar, B. and **Boomishankar, R.** (2017). Anion-induced ferroelectric polarization in a luminescent metal-organic cage compound. *Journal of Materials Chemistry C* 5 (40): 10624-10629.

87. Deshmukh, M.S., Chaudhary, A., Zolotarev, P.N. and **Boomishankar, R.** (2017). A 3D coordination network built from (Cu_4Cl_3)-Cl-II(H_2O)(2) linear clusters and tetrapyridyl tetrahedral silane ligands: Reversible iodine uptake and friedel-crafts alkylation reactions. *Inorganic Chemistry* 56 (19): 11762-11767.

88. Deshmukh, M.S., Mane, V.S., Kumbhar, A.S. and **Boomishankar, R.** (2017). Light-driven hydrogen evolution from water by a tripodal silane based (Co6L81)-L-II octahedral cage. *Inorganic Chemistry* 56 (21): 13286-13292.

89. Chauhan, P., Bora, P., Ravikumar, G., Jos, S. and **Chakrapani, H.** (2017). Esterase activated carbonyl sulfide/hydrogen sulfide (H_2S) donors. *Organic Letters* 19 (1): 62-65.

90. Ravikumar, G., Bagheri, M., Saini, D.K. and **Chakrapani, H.** (2017). A small molecule for theraNOstic targeting of cancer cells. *Chemical Communications* 53 (100): 13352-13355.

91. Ravikumar, G., Bagheri, M., Saini, D.K. and **Chakrapani, H.** (2017). FLUORO/NO: A Nitric Oxide donor with a fluorescence reporter. *ChemBioChem* 18 (15): 1529-1534.

92. Sharma, A.K., Nair, M., Chauhan, P., Gupta, K., Saini, D.K. and **Chakrapani, H.** (2017). Visible-light-triggered uncaging of carbonyl sulfide for hydrogen sulfide (H_2S) release. *Organic Letters* 19 (18): 4822-4825.

93. Shukla, P., Khodade, V.S., Sharathchandra, M., Chauhan, P., Mishra, S., Siddaramappa, S., Pradeep, B.E., Singh, A. and **Chakrapani, H.** (2017). On demand redox buffering by H_2S contributes to antibiotic resistance revealed by a bacteria-specific H_2S donor. *Chemical Science* 8 (7): 4967-4972.

94. Ghosh, B. and **Chaudhury, S.** (2017). Fluctuation theorems for total entropy production in generalized Langevin systems. *Physica A-Statistical Mechanics and its Applications* 466: 133-139.

95. Sarabadani, J., Ghosh, B., **Chaudhury, S.** and Ala-Nissila, T. (2017). Dynamics of end-pulled polymer translocation through a nanopore. *EPL (Europhysics Letters)* 120 (3).

96. Singh, D. and **Chaudhury, S.** (2017). Statistical properties of fluctuating enzymes with dynamic cooperativity using a first passage time distribution formalism. *Journal of Chemical Physics* 146 (14).

97. Singh, D. and **Chaudhury, S.** (2017). A stochastic theoretical approach to study the size-dependent catalytic activity of a metal nanoparticle at the single molecule level. *Physical Chemistry Chemical Physics* 19 (13): 8889-8895.

98. Sharma, S., Mathew, A.B. and **Chugh, J.** (2017). miRNAs: Nanomachines that micromanage the pathophysiology of Diabetes Mellitus. *Advances in Clinical Chemistry* 82: 199-264.

99. Ravi, V.K., Santra, P.K., Joshi, N., **Chugh, J.**, Singh, S.K., Rensmo, H., **Ghosh, P.** and **Nag, A.** (2017). Origin of the substitution mechanism for the binding of organic ligands on the surface of $CsPbBr_3$ perovskite nanocubes. *Journal of Physical Chemistry Letters* 8 (20): 4988-4994.

100. Chauhan, P., Muralidharan, S.B., Velappan, A.B., **Datta, D.**, Pratihar, S., Debnath, J. and Ghosh, K.S. (2017). Inhibition of copper-mediated aggregation of human gamma D- crystallin by Schiff bases. *Journal of Biological Inorganic Chemistry* 22 (4): 505-517.

101. Velappan, A.B., Raja, M.R.C., **Datta, D.**, Tsai, Y.T., Halloum, I., Wan, B.J., Kremer, L., Gramajo, H., Franzblau, S.G., Mahapatra, S.K. and Debnath, J. (2017). Attenuation of *Mycobacterium* species through direct and macrophage mediated pathway by unsymmetrical diaryl urea. *European Journal of Medicinal Chemistry* 125: 825-841.

102. Kumar, S., Singh, S.K., Vaishnav, J.K., Hill, J.G. and **Das, A.** (2017). Interplay among electrostatic, dispersion, and steric interactions: Spectroscopy and quantum chemical calculations of pi-hydrogen bonded complexes. *ChemPhysChem* 18 (7): 828-838.

103. Mishra, K.K., Singh, S.K., Ghosh, P., Ghosh, D. and **Das, A.** (2017). The nature of selenium hydrogen bonding: gas phase spectroscopy and quantum chemistry calculations. *Physical Chemistry Chemical Physics* 19 (35): 24179-24187.

104. Bansode, N.D., Madhanagopal, B., Sonar, M.V. and **Ganesh, K.N.** (2017). Stereodependent and solvent-specific formation of unusual beta-structure through side chain-backbone H- bonding in C4(S)-(NH_2/OH/NHCHO)-L-prolyl polypeptides. *Biopolymers* 108 (1).

105. Karmakar, A., Samanta, P., Desai, A.V. and **Ghosh, S.K.** (2017). Guest-responsive metal-organic frameworks as scaffolds for separation and sensing applications. *Accounts of Chemical Research* 50 (10): 2457-2469.

106. Lustig, W.P., Mukherjee, S., Rudd, N.D., Desai, A.V., Li, J. and **Ghosh, S.K.** (2017). Metal-organic frameworks: functional luminescent and photonic materials for sensing applications. *Chemical Society Reviews* 46 (11): 3242-3285.

107. Manna, B., Desai, A.V., Illathvalappil, R., Gupta, K., Sen, A., Kurungot, S. and **Ghosh, S.K.** (2017). Ultrahigh ionic conduction in water-stable close-packed metal-carbonate frameworks. *Inorganic Chemistry* 56 (16): 9710-9715.

108. Manna, B., Sharma, S., Mukherjee, S., Desai, A.V. and **Ghosh, S.K.** (2017). Toxic aromatics induced responsive facets for a pore surface functionalized luminescent coordination polymer. *Inorganic Chemistry* 56 (12): 6864-6869.

109. Mukherjee, S., Babarao, R., Desai, A.V., Manna, B. and **Ghosh, S.K.** (2017). Polar pore surface guided selective CO_2 adsorption in a prefunctionalized metal-organic framework. *Crystal Growth & Design* 17 (7): 3581-3587.

110. Samanta, P., Desai, A.V., Anothumakkool, B., Shirolkar, M.M., Karmakar, A., Kurungot, S. and **Ghosh, S.K.** (2017). Enhanced proton conduction by post-synthetic covalent modification in a porous covalent framework. *Journal of Materials Chemistry A* 5 (26): 13659-13664.

111. Samanta, P., Chandra, P., Desai, A.V. and **Ghosh, S.K.** (2017). Chemically stable microporous Hyper-Cross-linked Polymer (HCP): An efficient selective cationic dye scavenger from aqueous medium. *Materials Chemistry Frontiers* (1): 1384-1388.

112. Benke, S.N., Thulasiram, H.V. and **Gopi, H.N.** (2017). Potent antimicrobial activity of lipidated short alpha, gamma-hybrid peptides. *ChemMedChem* 12 (19): 1610-1615.

113. Malik, A., Kumar, M.G., Bandyopadhyay, A. and **Gopi, H.N.** (2017). Helices with additional H-bonds: Crystallographic conformations of alpha, gamma-hybrid peptides helices composed of beta-hydroxy gamma-amino

acids (statines). *Peptide Science* 108:e22978.

114. Misra, R., Raja, K.M.P., Hofmann, H.J. and **Gopi, H.N.** (2017). Modulating the structural properties of α, γ-hybrid peptides by alpha-amino acid residues: Uniform 12-helix versus "mixed" 12/10-helix. *Chemistry-A European Journal* 23 (65): 16644-16652.

115. Misra, R., Saseendran, A., George, G., Veeresh, K., Raja, K.M.P., Raghothama, S., Hofmann, H.J. and **Gopi, H.N.** (2017). Structural dimorphism of achiral, α, γ-hybrid peptide foldamers: Coexistence of 12-and 15/17-helices. *Chemistry-A European Journal* 23 (15): 3764-3772.

116. Misra, R., Sharma, A., Shiras, A. and **Gopi, H.N.** (2017). Backbone engineered gamma-peptide amphitropic gels for immobilization of semiconductor quantum dots and 2D cell culture. *Langmuir* 33 (31): 7762-7768.

117. Reja, R.M., Sunny, S. and **Gopi, H.N.** (2017). Chemoselective nitrile oxide alkyne 1, 3-dipolar cycloaddition reactions from nitroalkane-tethered peptides. *Organic Letters* 19 (13): 3572-3575.

118. Chaudhari, M.B., Sutar, Y., Malpathak, S., **Hazra, A.** and **Gnanaprakasam, B.** (2017). Transition-metal-free C-H hydroxylation of carbonyl compounds. *Organic Letters* 19 (13): 3628-3631.

119. Bisht, G.S., Chaudhari, M.B., Gupte, V.S. and **Gnanaprakasam, B.*** (2017). One pot Ru-NHC catalysed C-H alkylation and base mediated aerobic C-H hydroxylation: A short synthesis of donaxaridine. *ACS Omega* 2 (11): 8234-8252.

120. Chauhan, D.P., Varma, S.J., Gudem, M., Panigrahi, N., Singh, K., **Hazra, A.** and **Talukdar, P.** (2017). Intramolecular cascade rearrangements of enynamine derived ketenimines: access to acyclic and cyclic amidines. *Organic & Biomolecular Chemistry* 15 (22): 4822-4830.

121. Datar, A. and **Hazra, A.** (2017). Pathways for excited-state nonradiative decay of 5, 6-dihydroxyindole, a building block of eumelanin. *Journal of Physical Chemistry A* 121 (14): 2790-2797.

122. Manae, M.A. and **Hazra, A.** (2017). Interplay between conjugation and size-driven delocalization leads to characteristic properties of substituted thymines. *Journal of Physical Chemistry A* 121 (42): 8147-8153.

123. Mondal, S.I., Sen, S., **Hazra, A.** and Patwari, G.N. (2017). pi-Stacked dimers of fluorophenylacetylenes: Role of dipole moment. *Journal of Physical Chemistry A* 121 (18): 3383-3391.

124. Roy, B. and **Hazra, P.** (2017). Dynamics of different steps of the photopyrolytic cycle of an eminent anticancer drug topotecan inside biocompatible lyotropic liquid crystalline systems. *RSC Advances* 7 (1): 379-388.

125. Islam, M., Shinde, G.P. and **Hotha, S.** (2017). Expedient synthesis of the heneicosasaccharyl mannose capped arabinomannan of the *Mycobacterium tuberculosis* cellular envelope by glycosyl carbonate donors. *Chemical Science* 8 (3): 2033-2038.

126. Mishra, B., Manmode, S., Panda, R.R.A. and **Hotha, S.** (2017). Expedient synthesis of a linear nonadecaarabinofuranoside of the *Mycobacterium tuberculosis* cellular envelope. *European Journal of Organic Chemistry* (32): 4794-4802.

127. Neralkar, M., Mishra, B. and **Hotha, S.** (2017). Nucleofuge generating glycosidations by the remote activation of hydroxybenzotriazolyl glycosides. *Journal of Organic Chemistry* 82 (21): 11494-11504.

128. Thadke, S.A., Mishra, B., Islam, M., Pasari, S., Manmode, S., Rao, B.V., Neralkar, M., Shinde, G.P., Walke, G. and **Hotha, S.** (2017). [Au]/[Ag]-catalysed expedient synthesis of branched heneicosafuranosyl arabinogalactan motif of *Mycobacterium tuberculosis* cell wall. *Nature Communications* 8.

129. Aluri, R. and **Jayakannan, M.** (2017). Development of L-Tyrosine-based enzyme-responsive amphiphilic poly(ester-urethane) nanocarriers for multiple drug delivery to cancer cells. *Biomacromolecules* 18 (1): 189-200.

130. Kulkarni, B. and **Jayakannan, M.** (2017). Fluorescent-tagged biodegradable polycaprolactone block copolymer FRET probe for intracellular bioimaging in cancer cells. *ACS Biomaterials Science & Engineering* 3 (9): 2185-2197.

131. Saxena, S. and **Jayakannan, M.** (2017). pi-Conjugate fluorophore-tagged and enzyme-responsive l-amino acid polymer nanocarrier and their color-tunable intracellular FRET probe in cancer cells. *Biomacromolecules* 18 (8): 2594-2609.

132. Deshpande, N.U. and **Jayakannan, M.** (2017). Cisplatin-stitched polysaccharide vesicles for synergistic cancer therapy of triple antagonistic drugs. *Biomacromolecules* 18 (1): 113-126.

133. Manikandan, R. and **Jeganmohan, M.** (2017). Recent advances in the ruthenium(II)-catalyzed chelation-assisted C-H olefination of substituted aromatics, alkenes and heteroaromatics with alkenes via the deprotonation pathway. *Chemical Communications* 53 (64): 8931-8947.

134. Manikandan, R., Tamizmani, M. and **Jeganmohan, M.** (2017). Ruthenium(II)-catalyzed redox-neutral oxidative cyclization of benzimidates with alkenes with hydrogen evolution. *Organic Letters* 19 (24): 6678-6681.

135. Manoharan, R. and **Jeganmohan, M.** (2017). Cobalt-catalyzed oxidative cyclization of benzamides with maleimides: Synthesis of isoindolone spirosuccinimides. *Organic Letters* 19 (21): 5884-5887.

136. More, N.Y. and **Jeganmohan, M.** (2017). Solvent-controlled selective synthesis of biphenols and quinones via oxidative coupling of phenols. *Chemical Communications* 53 (69): 9616-9619.

137. More, N.Y. and **Jeganmohan, M.** (2017). Oxidative cross-coupling of substituted phenols with unactivated aromatics. *European Journal of Organic Chemistry* (29): 4305-4312.

138. More, N.Y., Padala, K. and **Jeganmohan, M.** (2017). Ruthenium-catalyzed C-H benzoxylation of tert-benzamides with aromatic acids by weak coordination. *Journal of Organic Chemistry* 82 (23): 12691-12700.

139. Reddy, M.C. and **Jeganmohan, M.** (2017). Total synthesis of aristolactam alkaloids via synergistic C-H bond activation and dehydro-Diels-Alder reactions. *Chemical Science* 8 (5): 4130-4135.

140. Dasgupta, R., Panda, A., Pal, S., Muhasina, P.V., De, S., Parameswaran, P. and **Khan, S.** (2017). Catalyst free boron carbon bond cleavage and facile formation of five-membered (PNBCC) over-bar heterocycles. *Dalton Transactions* 46 (44): 15190-15194.

141. Parvin, N., Dasgupta, R., Pal, S., Sen, S.S. and **Khan, S.** (2017). Strikingly diverse reactivity of structurally identical silylene and stannylene. *Dalton Transactions* 46 (20): 6528-6532.

142. Parvin, N., Pal, S., **Khan, S.**, Das, S., Pati, S.K. and Roesky, H.W. (2017). Unique approach to Copper(I) Silylene chalcogenone complexes. *Inorganic Chemistry* 56 (3): 1706-1712.

143. Gade, M., Chaudhary, P.M., Thulasiram, H.V. and **Kikkeri, R.** (2017). Engineering cell surface glycans with carbohydrate enantiomers to alter bacterial binding and adhesion. *ChemistrySelect* 2 (28): 8865-8869.

144. Sangabathuni, S., Murthy, R.V., Chaudhary, P.M., Subramani, B., Toraskar, S. and **Kikkeri, R.** (2017). Mapping the glyco-gold nanoparticles of different shapes toxicity, biodistribution and sequestration in adult Zebrafish. *Scientific Reports* 7.

145. Toraskar, S., Gade, M., Sangabathuni, S., Thulasiram, H.V. and **Kikkeri, R.** (2017). Exploring the influence of shapes and heterogeneity of glyco-gold nanoparticles on bacterial binding for preventing infections. *ChemMedChem* 12 (14): 1116-1124.

146. Sangabathuni, S., Murthy, R.V., Gade, M., Bavireddi, H., Toraskar, S., Sonar, M.V., **Ganesh, K.N.** and **Kikkeri, R.** (2017). Modeling glyco-collagen conjugates using a host-guest strategy to alter phenotypic cell migration and in vivo wound healing. *ACS Nano* 11 (12): 11969-11977.

147. Khungar, B., Roy, A., **Kumar, A.**, Sadhu, B. and Sundararajan, M. (2017). Predicting the redox properties of uranyl complexes using electronic structure calculations. *International Journal of Quantum Chemistry* 117 (12).

148. **Kumar, A.**, Duran, M. and Sola, M. (2017). Is coronene better described by clar's aromatic pi-sextet model or by the AdNDP representation? *Journal of Computational Chemistry* 38 (18): 1606-1611.

149. Raut, R.K. and **Majumdar, M.** (2017). Direct coordination of a germanium(II) dicationic center to transition metals. *Chemical Communications* 53 (9): 1467-1469.

150. Mir, W.J., Warankar, A., Acharya, A., Das, S., **Mandal, P.** and **Nag, A.** (2017). Colloidal thallium halide nanocrystals with reasonable luminescence, carrier mobility and diffusion length. *Chemical Science* 8 (6): 4602-4611.

151. Jana, M.K., Pal, K., Warankar, A., **Mandal, P.**, Waghmare, U.V. and Biswas, K. (2017). Intrinsic rattler-induced low thermal conductivity in zintl type TlInTe2. *Journal of the American Chemical Society* 139 (12): 4350-4353.

152. Sarkar, S., Saha, D., Banerjee, S., **Mukherjee, A.** and **Mandal, P.** (2017). Broadband terahertz dielectric spectroscopy of alcohols. *Chemical Physics Letters* 678: 65-71.

153. Sarkar, S., Ravi, V.K., Banerjee, S., Yettapu, G.R., Markad, G.B., **Nag, A.** and **Mandal, P.** (2017). Terahertz spectroscopic probe of hot electron and hole transfer from colloidal $CsPbBr_3$ perovskite nanocrystals. *Nano Letters* 17 (9): 5402-5407.

154. Kulkarni, M. and **Mukherjee, A.** (2017). Understanding B-DNA to A-DNA transition in the right-handed DNA helix: Perspective from a local to global transition. *Progress in Biophysics & Molecular Biology* 128: 63-73.

155. Saha, D. and **Mukherjee, A.** (2017). Connecting diffusion and entropy of bulk water at the single particle level. *Journal of Chemical Sciences* 129 (7): 825-832.

156. Singh, R.K., Chamachi, N.G., Chakrabarty, S. and **Mukherjee, A.** (2017). Mechanism of unfolding of human prion protein. *Journal of Physical Chemistry B* 121 (3): 550-564.

157. Aneesh, J., Swarnkar, A., Ravi, V.K., Sharma, R., **Nag, A.** and Adarsht, K.V. (2017). Ultrafast exciton dynamics in colloidal $CsPbBr_3$ perovskite nanocrystals: Biexciton effect and auger recombination. *Journal of Physical Chemistry C* 121 (8): 4734-4739.

158. Mir, W.J., Jagadeeswararao, M., Das, S. and **Nag, A.** (2017). Colloidal Mn-doped cesium lead halide perovskite nanoplatelets. *ACS Energy Letters* 2 (3): 537-543.

159. Pal, J., Manna, S., Mondal, A., Das, S., Adarsh, K.V. and **Nag, A.** (2017). Colloidal synthesis and photophysics of $M_3Sb_2I_9$ (M=Cs and Rb) nanocrystals: Lead-free perovskites. *Angewandte Chemie-International Edition* 56 (45): 14187-14191.

160. Pradhan, N., Das Adhikari, S., **Nag, A.** and Sarma, D.D. (2017). Luminescence, Plasmonic, and Magnetic Properties of Doped Semiconductor Nanocrystals. *Angewandte Chemie-International Edition* 56 (25): 7038-7054.

161. Shanker, G.S., Markad, G.B., Jagadeeswararao, M., Bansode, U. and **Nag, A.** (2017). Colloidal nanocomposite of TiN and N-doped few-layer graphene for plasmonics and electrocatalysis. *ACS Energy Letters* 2 (10): 2251-2256.

162. Swarnkar, A., Ravi, V.K. and **Nag, A.** (2017). Beyond colloidal cesium lead halide perovskite nanocrystals: Analogous metal halides and doping. *ACS Energy Letters* 2 (5): 1089-1098.

163. Tandon, B., Yadav, A., Khurana, D., Reddy, P., Santra, P.K. and **Nag, A.** (2017). Size-induced enhancement of carrier density, LSPR Quality Factor, and carrier mobility in Cr-Sn Doped In_2O_3 nanocrystals. *Chemistry of Materials* 29 (21): 9360-9368.

164. Kumar, R., Yadav, P., **Pal, S.**, Kumar, K.R., Sridhar, B. and Tewari, A.K. (2017). Conformational studies of triazole based flexible molecules: A comparative analysis of crystal structure and optimized structure for DNA binding ability. *ChemistrySelect* 2 (12): 3444-3451.

165. Kumar, R., Gaurav, A., **Pal, S.**, Kumar, K.R., Sridhar, B. and Tewari, A.K. (2017). Reverse intramolecular stacking in o-Xylene bridge symmetrical dimers of 2-Thiopyridine derivative: Assessment of the conformational stability. *ChemistrySelect* 2 (11): 3249-3255.

166. Kumar, R., Gaurav, A., **Pal, S.** and Tewari, A.K. (2017). A case of folding pattern in flexible tripodal of N-substituted bisethylenamine bridged pyridazinone dimers. *ChemistrySelect* 2 (4): 1479-1483.

167. Swamy, V.S.V.S.N., **Parvin, N.**, Raj, K.V., Vanka, K. and Sen, S.S. (2017). C(sp(3))-F, C(sp(2))-F and C(sp(3))-H bond activation at silicon(II) centers. *Chemical Communications* 53 (71): 9850-9853.

168. Roy, S., Rao, A., Devatha, G. and **Pillai, P.P.** (2017). Revealing the role of electrostatics in gold-nanoparticle-catalyzed reduction of charged substrates. *ACS Catalysis* 7 (10): 7141-7145.

169. Timonen, J.V.I., Raimondo, C., Pilans, D., **Pillai, P.P.** and Grzybowski, B.A. (2017). Trapping, manipulation, and crystallization of live cells using magnetofluidic tweezers. *Nanoscale Horizons* 2 (1): 50-54.

170. Mondal, S. and **Puranik, M.** (2017). Ultrafast nuclear dynamics of photoexcited Guanosine-5 '-Monophosphate in three singlet states. *Journal of Physical Chemistry B* 121 (29): 7095-7107.

171. Bi, L., Da'as, E.H. and **Shafi, S.P.** (2017). Proton-conducting solid oxide fuel cell (SOFC) with Y-doped $BaZrO_3$ electrolyte. *Electrochemistry Communications* 80: 20-23.

172. Dai, H.L., **Shafi, S.P.**, He, S.C. and Bi, L. (2017). Tailoring sintering step allows high performance for solid oxide fuel cells prepared by a tri-layer co-firing process. *Materials Research Bulletin* 93: 42-46.

173. Chauhan, R.S. and **Shivran, N.** (2017). Emerging trends in organotellurolate chemistry derived from platinoids. *RSC Advances* 7 (87): 55175-55198.

174. Chauhan, R.S., **Shivran, N**., Slawin, A.M.Z. and Woollins, J.D. (2017). Synthesis and characterization of heterobimetallic complexes with pyridyl selenolato ligands. Crystal structure of [{Pt(C_5H_4N)(SeC_5H_4N)(dppp)}$ZnCl_2$]. *Journal of Organometallic Chemistry* 830: 181-187.

175. George, J.T. and **Srivatsan, S.G.** (2017). Posttranscriptional chemical labeling of RNA by using bioorthogonal chemistry. *Methods* 120: 28-38.

176. George, J.T. and **Srivatsan, S.G.** (2017). Vinyluridine as a versatile chemoselective handle for the post-transcriptional chemical functionalization of RNA. *Bioconjugate Chemistry* 28 (5): 1529-1536.

177. Nuthanakanti, A., Boerneke, M.A., Hermann, T. and **Srivatsan, S.G.** (2017). Structure of the ribosomal RNA decoding site containing a selenium-modified responsive fluorescent ribonucleoside probe. *Angewandte Chemie-International Edition* 56 (10): 2640-2644.

178. Nuthanakanti, A. and **Srivatsan, S.G.** (2017). Surface-tuned and metal-ion-responsive supramolecular gels based on nucleolipids. *ACS Applied Materials & Interfaces* 9 (27): 22864-22874.

179. Manna, S., Panse, C.H., Sontakke, V.A., Sangamesh, S. and **Srivatsan, S.G**. (2017). Probing human telomeric DNA and RNA topology and ligand binding in a cellular model by using responsive fluorescent nucleoside probes. *ChemBioChem* 18 (16): 1604-1615.

180. Pattanayak, S., **Swarnkar, A.**, Paik, P. and Priyam, A. (2017). Seed geometry and hydrogen bonding dependent plasmonic tuning of silver nanocrystals in a citrate-hydrazine matrix and SERS spectroscopic detection of chromium. *RSC Advances* 7 (73): 45911-45919.

181. Burade, S.S., Saha, T., Bhuma, N., Kumbhar, N., Kotmale, A., Rajamohanan, P.R., Gonnade, R.G., **Talukdar, P.** and Dhavale, D.D. (2017). Self-assembly of fluorinated sugar amino acid derived alpha, gamma-cyclic peptides into transmembrane anion transport. *Organic Letters* 19 (21): 5948-5951.

182. Burade, S.S., Shinde, S.V., Bhuma, N., Kumbhar, N., Kotmale, A., Rajamohanan, P.R., Gonnade, R.G., **Talukdar, P.** and Dhavale, D.D. (2017). Acyclic alpha gamma alpha-tripeptides with fluorinated- and nonfluorinated-furanoid sugar framework: Importance of fluoro substituent in reverse-turn induced self-assembly and transmembrane ion-transport activity. *Journal of Organic Chemistry* 82 (11): 5826-5834.

183. Roy, A., Biswas, O. and **Talukdar, P.** (2017). Bis(sulfonamide) transmembrane carriers allow pH-gated inversion of ion selectivity. *Chemical Communications* 53 (21): 3122-3125.

184. Shinde, S.V. and **Talukdar, P.** (2017). A dimeric bis(melamine)-substituted bispidine for efficient transmembrane H+/Cl- cotransport. *Angewandte Chemie-International Edition* 56 (15): 4238-4242.

185. Roy, A., Saha, D., Mandal, P.S., **Mukherjee, A**. and **Talukdar, P.** (2017). pH-Gated chloride transport by a triazine-based tripodal semicage. *Chemistry-A European Journal* 23 (6): 1241-1247.

186. Aralekallu, S., Thimmappa, R., Gaikwad, P., Devendrachari, M.C., Kottaichamy, A.R., Shafi, S.P., Lokesh, K.S., Sanchez, J. and **Thotiyl, M.O.** (2017). Tuning the interfacial chemistry of redox-active polymer for bifunctional probing. *Chemelectrochem* 4 (3): 692-700.

187. Bhat, Z.M., Thimmappa, R., Devendrachari, M.C., Shafi, S.P., Aralekallu, S., Kottaichamy, A.R., Gautam, M. and **Thotiyl, M.O.** (2017). A direct alcohol fuel cell driven by an outer sphere positive electrode. *Journal of Physical Chemistry Letters* 8 (15): 3523-3529.

188. Gaikwad, P., Kadlag, K., Nambiar, M., Devendrachari, M.C., Aralekallu, S., Kottaichamy, A.R., Bhat, Z.M., Thimmappa, R., Shafi, S.P. and **Thotiyl, M.O.** (2017). Redox active binary logic gate circuit for homeland security. *Analytical Chemistry* 89 (15): 7893-7899.

189. Gautam, M., Devendrachari, M.C., Thimmappa, R., Kottaichamy, A.R., Shafi, S.P., Gaikwad, P., Kotresh, H.M.N. and **Thotiyl, M.O.** (2017). Polarity governed selective amplification of through plane proton shuttling in proton exchange membrane fuel cells. *Physical Chemistry Chemical Physics* 19 (11): 7751-7759.

190. Mahne, N., Fontaine, O., **Thotiyl, M.O.**, Wilkening, M. and Freunberger, S.A. (2017). Mechanism and performance of lithium-oxygen batteries - a perspective. *Chemical Science* 8 (10): 6716-6729.

191. Sanchez, J., Butter, B., Basaez, L., Rivas, B.L. and **Thotiyl, M.O.** (2017). Efficient removal of Cr(VI) by polyelectrolyte-assisted ultrafiltration and subsequent electrochemical reduction to Cr(III). *Journal of the Chilean Chemical Society* 62 (3): 3647-3652.

192. Thimmappa, R., Aralekallu, S., Devendrachari, M.C., Kottaichamy, A.R., Bhat, Z.M., Shafi, S.P., Lokesh, K.S. and **Thotiyl, M.O.** (2017). A single chamber direct methanol fuel cell. *Advanced Materials Interfaces* 4 (21).

193. Thimmappa, R., Devendrachari, M.C., Kottaichamy, A.R., Aralekallu, S., Gautam, M., Shafi, S.P., Bhat, Z.M. and **Thotiyl, M.O.** (2017). 2.6 V Aqueous battery with a freely diffusing electron acceptor. *Journal of Physical Chemistry C* 121 (7): 3707-3713.

194. Thimmappa, R., Fawaz, M., Devendrachari, M.C., Gautam, M., Kottaichamy, A.R., Shafi, S.P. and **Thotiyl, M.O.** (2017). Anisotropic amplification of proton transport in proton exchange membrane fuel cells. *Chemical Physics Letters* 679: 1-5.

195. Thimmappa, R., Kottaichamy, A.R., Devendrachari, M.C., Aralekallu, S., Shafi, S.P., Gautam, M., Kotresh, H.M.N. and **Thotiyl, M.O.** (2017). Proton exchange membrane fuel cell with a Pt-free cathode and a freely diffusing electron acceptor. *ChemElectroChem* 4 (2): 283-286.

196. Banerjee, A., Chakraborty, D. and **Vaidhyanathan, R.** (2017). Ultra-microporous Metal-Organic Framework built from rigid linkers showing structural flexibility resulting in a marked change in carbon dioxide capacity. *European Journal of Inorganic Chemistry* (18): 2464-2468.

197. Mullangi, D., Shalini, S., Nandi, S., Choksi, B. and **Vaidhyanathan, R.** (2017). Super-hydrophobic covalent organic frameworks for chemical resistant coatings and hydrophobic paper and textile composites. *Journal of Materials Chemistry A* 5 (18): 8376-8384.

198. Nandi, S., Collins, S., Chakraborty, D., Banerjee, D., Thallapally, P.K., Woo, T.K. and **Vaidhyanathan, R.** (2017). Ultralow parasitic energy or postcombustion CO_2 capture realized in a nickel Isonicotinate metal-organic framework with excellent moisture stability. *Journal of the American Chemical Society* 139 (5): 1734-1737.

199. Nandi, S., Haldar, S., Chakraborty, D. and **Vaidhyanathan, R.** (2017). Strategically designed azolyl-carboxylate MOFs for potential humid CO_2 capture. *Journal of Materials Chemistry A* 5 (2): 535-543.

200. Nandi, S., Rother, J., Chakraborty, D., Maity, R., Werner-Zwanziger, U. and **Vaidhyanathan, R.** (2017). Exceptionally stable Bakelite-type polymers for efficient pre-combustion CO_2 capture and H-2 purification. *Journal of Materials Chemistry A* 5 (18): 8431-8439.

201. Gupta, S.K., Kaleeswaran, D., Nandi, S., **Vaidhyanathan, R.** and Murugavel, R. (2017). Bulky isopropyl group loaded tetraaryl pyrene based azo-linked covalent organic polymer for nitroaromatics sensing and CO_2 adsorption. *ACS Omega* 2: 3572–3582.

202. Patel, K., Deshmukh, S.S., Bodkhe, D., Mane, M., Vanka, K., Shinde, D., Rajamohanan, P.R., Nandi, S., **Vaidhyanathan, R.,** and Chikkali, S.H. (2017). Secondary interactions arrest the hemiaminal intermediate to invert the modus operandi of Schiff base reaction: A route to benzoxazinones. *Journal of Organic Chemistry* 82 (8): 4342-4351.

203. Pant, R., Kumar, M. and **Venkatnathan, A.** (2017). Quantum mechanical investigation of proton transport in imidazolium methanesulfonate ionic liquid. *Journal of Physical Chemistry C* 121 (13): 7069-7080.

204. Sengupta, S., Pant, R., Komarou, P., **Venkatnathan, A.** and Lyulin, A.V. (2017). Atomistic simulation study of the hydrated structure and transport dynamics of a novel multi acid side chain polyelectrolyte membrane. *International Journal of Hydrogen Energy* 42 (44): 27254-27268.

EARTH AND CLIMATE SCIENCE

205. **Banerjee, A.** (2017). Thinning of debris-covered and debris-free glaciers in a warming climate. *The Cryosphere* 11 (1): 133-138.

206. Laha, S., Kumari, R., Singh, S., Mishra, A., Sharma, T., **Banerjee, A.**, Nainwal, H. C., and Shankar, R. (2017). Evaluating the contribution of avalanching to the mass balance of Himalayan glaciers. *Annals of Glaciology* 58 (75): 110-118.

207. Goswami, B.B. and **Goswami, B.N.** (2017). A road map for improving dry-bias in simulating the South Asian monsoon precipitation by climate models. *Climate Dynamics* 49 (05-Jun): 2025-2034.

208. Kumar, S., Arora, A., Chattopadhyay, R., Hazra, A., Rao, S.A. and **Goswami, B.N.** (2017). Seminal role of stratiform clouds in large-scale aggregation of tropical rain in boreal summer monsoon intraseasonal oscillations. *Climate Dynamics* 48 (03-Apr): 999-1015.

209. Sahai, A.K., Sharmila, S., Chattopadhyay, R., Abhilash, S., Joseph, S., Borah, N., **Goswami, B.N.**, Pai, D.S. and Srivastava, A.K. (2017). Potential predictability of wet/dry spells transitions during extreme monsoon years: Optimism for dynamical extended range prediction. *Natural Hazards* 88 (2): 853-865.

210. **Neena, J.M.**, Waliser, D. and Jiang, X.N. (2017). Model performance metrics and process diagnostics for boreal summer intraseasonal variability. *Climate Dynamics* 48 (5-6): 1661-1683.

211. Mateo, P., Keller, G., **Punekar, J.** and Spangenberg, J.E. (2017). Early to Late Maastrichtian environmental changes in the Indian Ocean compared with Tethys and South Atlantic. *Palaeogeography Palaeoclimatology Palaeoecology* 478: 121-138.

212. Das, R. and **Rai, S.S.** (2017). Extensive seismic anisotropy in the lower crust of Archean metamorphic terrain, South India, inferred from ambient noise tomography. *Tectonophysics* 694: 164-180.

213. Saikia, U., Das, R. and **Rai, S.S.** (2017). Possible magmatic underplating beneath the west coast of India and adjoining Dharwar craton: Imprint from Archean crustal evolution to breakup of India and Madagascar. *Earth and Planetary Science Letters* 462: 1-14.

214. Sivaram, K., **Utpal, S.**, Kanna, N. and Kumar, D. (2017). Attenuation characteristics of high frequency seismic waves in southern India. *Pure and Applied Geophysics* 174 (7): 2523-2545.

HUMANITIES AND SOCIAL SCIENCES

215. Anusha, R., Nithya, C., **Venketeswara Pai, R.** and Ramanathan, V. (2017). Coding the encoded: Automatic decryption of kaTapayAdi and AryabhaTa's systems of numeration. *Current Science* 112 (3): 588-591.

216. **Venketeswara Pai, R.** (with Sriram, M.S.) (2017). Madhyāhnakālalagna in Karanapaddhati of Putumana Somayājī, *Ganita Bhāratī*, 39 (1): 55-74.

217. **Sancheti, P.** (2017). The city and its paradoxes in Mark Helprin's *Winter's Tale. Gnosis* 3 (2): 113-121.

218. **Sohoni, P.** (2017). Old fights, new meanings: Lions and elephants in combat. *Res: Anthropology and Aesthetics* 67/68 (2016/2017): 225-234.

219. **Sohoni, P.** (2017). Marathi of a single type: The demise of the Modi script. *Modern Asian Studies* 51 (3): 662-685.

MATHEMATICS

220. **Balasubramanyam, B.** (2017). p-Adic distributions attached to twisted tensor L-functions for GL(2) over CM fields. *Journal of Number Theory* 176: 13-36.

221. **Balasubramanyam, B.** and **Raghuram, A.** (2017). Special values of adjoint L-functions and congruences for automorphic forms on GL(N) over a number field. *American Journal of Mathematics* 139 (3): 641-679.

222. **Bhagwat, C.** and **Raghuram, A.** (2017). Special values of L-functions for orthogonal groups. *Comptes Rendus Mathematique* 355 (3): 263-267.

223. **Bhakta, M.** (2017). Infinitely many sign-changing solutions of an elliptic problem involving critical Sobolev and Hardy-Sobolev exponent. *Proceedings of the Indian Academy of Sciences-Mathematical Sciences* 127 (2): 337-347.

224. **Bhakta, M.** and Mukherjee, D. (2017). Semilinear nonlocal elliptic equations with critical and supercritical exponents. *Communications on Pure and Applied Analysis.*16 (5): 1741-1766.

225. **Bhakta, M.** and Mukherjee, D. (2017). Multiplicity results and sign changing solutions of non-local equations with concave-convex nonlinearities. *Differential and Integral Equations* 30 (05-Jun): 387-422.

226. **Bhakta, M.** and Santra, S. (2017). On singular equations with critical and supercritical components. *Journal of Differential Equations* 263 (5): 2886-2953.

227. Arapostathis, A., **Biswas, A.** and Carroll, J. (2017). On solutions of mean field games with ergodic cost. *Journal de Mathematiques Pures et Appliquees* 107 (2): 205-251.

228. **Biswas, A.** (2017). Location of maximizers of Eigenfunctions of fractional Schrodinger's equations. *Mathematical Physics, Analysis and Geometry* 20 (4):25.

229. **Biswas, A.**, Ishii, H., Saha, S. and Wang, L. (2017). On viscosity solution of HJB equations with state constraints and reflection control. *SIAM Journal on Control and Optimization* 55 (1): 365-396.

230. **Biswas, A.** (2017). An ergodic control problem for many-server multi-class queueing systems with cross-trained servers. *Stochastic Systems* 7 (2): 263-288.

231. **Borah, D.** (2017). Remarks on the metric induced by the Robin function III. *Journal of the Ramanujan Mathematical Society* 32 (1): 17-42.

232. **Borah, D.**, Haridas, P. and Verma, K. (2017). Comments on the Green's function of a planar domain. *Analysis and Mathematical Physics* DOI 10.1007/s13324-017-0177-5.

233. **Chorwadwala, A.M.H.** (2017). A glimpse of shape optimization problems. *Current Science* 112 (7): 1474-1477.

234. Biswas, I., and **D'Mello, S.** (2017). M-curves and symmetric products. *Proceedings of the Indian Academy of Sciences-Mathematical Sciences* 127 (4): 615-624.

235. **Holkar, R.D.** (2017). Composition of topological correspondences. *Journal of Operator Theory* 78 (1): 89-117.

236. Beelen, P., Glynn, D., Hoholdt, T. and **Kaipa, K.** (2017). Counting generalized reed solomon codes. *Advances in Mathematics of Communications* 11 (4): 777-790.

237. **Kaipa, K.** (2017). Deep holes and MDS extensions of Reed-Solomon codes. *IEEE Transactions on Information Theory* 63 (8): 4940-4948.

238. Prabhat, P. and **Mahalanobis, A.** (2017). A probabilistic baby-step giant-step algorithm. In *Proceedings of the 14th International Joint Conference on e-Business and Telecommunications* (ICETE 2017) 4: SECRYPT, 401-406.

239. **Mahalanobis, A.** and Shinde, P. (2017). Bilinear cryptography using groups of nilpotency class 2. In *Cryptography and Coding. IMACC 2017* Lecture Notes in Computer Science Book Series, Ed: O'Neill M. 10655.

240. **Mahalanobis, A.** and **Singh A.** (2017). Gaussian elimination in unitary groups with an application to cryptography. *Journal of Algebra Combinatorics Discrete Structures and Applications* 4(3): 247-260.

241. Akhtar, Y. and **Maity, S.** (2017). Mixed covering arrays on 3-uniform hypergraphs. *Discrete Applied Mathematics* 232: 8-22.

242. Akhtar, Y. and **Maity, S.** (2017). Covering arrays on product graphs. *Graphs and Combinatorics* 33 (4): 635-652.

243. Raundal, H. and **Mishra, R.** (2017). Some spaces of polynomial knots. *Topology and its Applications* 218: 66-92.

244. **Prabhu, N.** (2017). Density of solutions to quadratic congruences. *Czechoslovak Mathematical Journal* 67 (2): 439-455.

245. Prabhu, N. and **Sinha, K.** (2017). Fluctuations in the distribution of Hecke eigenvalues about the Sato-Tate measure. *International Mathematics Research Notices* rnx238.

246. Ayyer, A., Prasad, A. and **Spallone, S.** (2017). Representations of symmetric groups with non-trivial determinant. *Journal of Combinatorial Theory Series A* 150: 208-232.

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247. Mu, A.Q., **Agarwalla, B.K.**, Schaller, G. and Segal, D. (2017). Qubit absorption refrigerator at strong coupling. *New Journal of Physics* 19: 123034.

248. George, S.V., **Ambika, G.** and Misra, R. (2017). Detecting dynamical states from noisy time series using bicoherence. *Nonlinear Dynamics* 89 (1): 465-479.

249. Harikrishnan, K.P., Misra, R. and **Ambika, G.** (2017). Is a hyperchaotic attractor superposition of two multifractals? *Chaos Solitons & Fractals* 103: 450-459.

250. Jacob, R., Harikrishnan, K.P., Misra, R. and **Ambika, G.** (2017). Cross over of recurrence networks to random graphs and random geometric graphs. *Pramana-Journal of Physics* 88 (2): 37.

251. Jacob, R., Harikrishnan, K.P., Misra, R. and **Ambika, G.** (2017). Measure for degree heterogeneity in complex networks and its application to recurrence network analysis. *Royal Society Open Science* 4 (1): 160757.

252. Shekatkar, S.M., Kotriwar, Y., Harikrishnan, K.P. and **Ambika, G.** (2017). Detecting abnormality in heart dynamics from multifractal analysis of ECG signals. *Scientific Reports* 7.

253. Kashyap, G. and **Ambika, G.** (2017). Mechanisms for tuning clustering and degee-correlations in directed networks. *Journal of Complex Networks* cnx057 (20-17) https://doi.org/10.1093/comnet/cnx057

254. Gupta, K. and **Ambika, G.** (2017). Dynamics of slow and fast systems on complex networks. *Indian Academy of Sciences Conference Series* 1:1, DOI:10.29195/iascs.01.01.0003

255. George, S.V. and **Ambika, G.** (2017). Nonlinearity in data with gaps: application to ecological and meteorological datasets. *Indian Academy of Sciences Conference Series* 1:1, DOI: 10.29195/iascs.01.01.0002

256. Jacob, R., Harikrishnan, K.P., Misra, R. and **Ambika, G.** (2017). Determining the minimum embedding dimension for state space reconstruction through recurrence networks. *Indian Academy of Sciences Conference Series* 1:1, DOI: 10.29195/iascs.01.01.0004

257. Jacob, R., Harikrishnan, K.P., Misra, R. and **Ambika, G.** (2017). Weighted recurrence networks from chaotic time series. *Chaotic Modeling and Simulation* (CMSIM) 4: 433-440.

258. **Ananth, S.**, Brink, L., Majumdar, S., Mali, M. and Shah, N. (2017). Gravitation and quadratic forms. *Journal of High Energy Physics* 2017: 169.

259. Curran, S.J., Whiting, M.T., Allison, J.R., Tanna, A., Sadler, E.M. and **Athreya, R.** (2017). Atomic and molecular absorption in redshifted radio sources. *Monthly Notices of the Royal Astronomical Society* 467 (4): 4514-4525.

260. **Bajpai, A.**, Aslam, Z., Hampel, S., Klingeler, R. and Grobert, N. (2017). A carbon-nanotube based nano-furnace for in-situ restructuring of a magnetoelectric oxide. *Carbon* 114: 291-300.

261. Pattanayak, N., Bhattacharyya, A., Nigam, A.K., Cheong, S.W. and **Bajpai, A.** (2017). Quasistatic remanence in Dzyaloshinskii-Moriya interaction driven weak ferromagnets and piezomagnets. *Physical Review B* 96 (10).

262. Abbott B.P., ... **Balasubramanian A.**, ... *et al* (2017). Multi-messenger Observations of a Binary neutron star merger. *Astrophysical Journal Letters* 848 (2).

263. Kasliwal, M.M., Nakar, E., ... **Balasubramanian, A.**, ... *et al.* (2017). Illuminating gravitational waves: A concordant picture of photons from a neutron star merger. *Science* 358 (6370): 1559+.

264. **Banerjee, N.** and Bhatkar, S.A. (2017). Non-relativistic fluids. *Current Science* 112 (7): 1385-1389.

265. **Banerjee, N.**, Dutta, S. and Jain, A. (2017). First order Galilean superfluid dynamics. *Physical Review D* 96 (6).

266. **Banerjee, N.**, Lodato, I. and Neogi, T. (2017). N=4 supersymmetric BMS3 algebras from asymptotic symmetry analysis. *Physical Review D* 96 (6).

267. Janardhan, P., Vadawale, S., **Bapat, B.**, Subramanian, K.P., Chakrabarty, D., Kumar, P., Sarkar, A., Srivastava, N., Thampi, R.S., Yadav, V.K., Dhanya, M.B., Nampoothiri, G.G., Abhishek, J.K., Bhardwaj, A., and Subhalakshmi, K. (2017). Probing the heliosphere using in situ payloads on-board Aditya-L1. *Current Science* 113 (4): 620-624.

268. Pendse, A. and **Bhattacharyay, A.** (2017). Effect of non-local interactions on the vortex solution in Bose-Einstein Condensates. *European Physical Journal B* 90 (12): 244.

269. Sarkar, S. and **Bhattacharyay, A.** (2017). Quantum potential induced UV-IR coupling in analogue Hawking radiation: From Bose-Einstein condensates to canonical acoustic black holes. *Physical Review D* 96 (6): 064027.

270. Wadgaonkar, I. and **Chatterji, A.** (2017). Network formation and gelation in telechelic star polymers. *Journal of Chemical Physics* 146 (8): 084906.

271. Paul, P., Chakraborty, P., **Das, T.**, Nafday, D. and Saha-Dasgupta, T. (2017). Properties at the interface of graphene and Ti(2)CMXene. *Physical Review B* 96 (3).

272. Patil, S., Kolekar, S. and **Deshpande, A.** (2017). Revisiting HOPG superlattices: Structure and conductance properties. *Surface Science* 658: 55-60.

273. Vigneshwar, N., **Dhar, D.** and Rajesh, R. (2017). Different phases of a system of hard rods on three dimensional cubic lattice. *Journal of Statistical Mechanics-Theory and Experiment* 2017: 113304.

274. Yadav, A.C., Ramaswamy, R. and **Dhar, D.** (2017). General mechanism for the 1/f noise. *Physical Review E* 96 (2): 022215.

275. Kolekar, S., Patole, S.P., Patil, S., Yoo, J.B. and **Dharmadhikari, C.V.** (2017). Study of thermal-field emission properties and investigation of temperature dependent noise in the field emission current from vertical carbon nanotube emitters. *Surface Science* 664: 76-81.

276. Verma, G., Vishwakarma, C., **Dharmadhikari, C.V.** and **Rapol, U.D.** (2017). A compact atomic beam based system for Doppler-free laser spectroscopy of strontium atoms. *Review of Scientific Instruments* 88 (3): 033103.

277. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for supersymmetry in events with one lepton and multiple jets in proton-proton collisions at root s=13 TeV. *Physical Review D* 95 (1).

278. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Suppression and azimuthal anisotropy of prompt and nonprompt J/psi production in PbPb collisions at root S-NN=2.76 TeV. *European Physical Journal C* 77 (4).

279. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurements of the associated production of a Z boson and b jets in pp collisions at root s=8 TeV. *European Physical Journal C* 77 (11).

280. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of the differential inclusive B+ hadron cross sections in pp collisions at root s=13TeV. *Physics Letters B* 771: 435-456.

281. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of the t(t)over-bar production cross section using events in the e mu final state in pp collisions at root s=13 TeV. *European Physical Journal C* 77 (3).

282. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Pseudorapidity dependence of long-range two-particle correlations in pPb collisions at root sNN=5.02 TeV. *Physical Review C* 96 (1).

283. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Jet energy scale and resolution in the CMS experiment in pp collisions at 8 TeV. *Journal of Instrumentation* 12.

284. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurements of the t(t)over-bar production cross section in lepton plus jets final states in pp collisions at 8 and ratio of 8 to 7 cross sections. *European Physical Journal C* 77 (1): 1-27.

285. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). The CMS trigger system. *Journal of Instrumentation* 12.

286. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Coherent J/psi photoproduction in ultra-peripheral PbPb collisions at root s(NN)=2.76 TeV with the CMS experiment. *Physics Letters B* 772: 489-511.

287. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Multiplicity and rapidity dependence of strange hadron production in pp, pPb, and PbPb collisions at the LHC. *Physics Letters B* 768: 103-129.

288. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for top squark pair production in compressed-mass-spectrum scenarios in proton-proton collisions at root s=8 TeV using the alpha(T) variable. *Physics Letters B* 767: 403-430.

289. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of the transverse momentum spectra of weak vector bosons produced in proton-proton collisions at root s=8TeV. *Journal of High Energy Physics* (2).

290. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for light bosons in decays of the 125 GeV Higgs boson in proton-proton collisions at root s=8 TeV. *Journal of High Energy Physics* (10).

291. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for leptophobic Z ' bosons decaying into four-lepton final states in proton-proton collisions at root s=8 TeV. *Physics Letters B* 773: 563-584.

292. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for single production of a heavy vector-like T quark decaying to a Higgs boson and a top quark with a lepton and jets in the final state. *Physics Letters B* 771: 80-105.

293. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of inclusive jet cross sections in pp and PbPb collisions at root s(NN)=2.76 TeV. *Physical Review C* 96 (1).

294. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for heavy gauge W ' bosons in events with an energetic lepton and large missing transverse momentum at root s=13TeV. *Physics Letters B* 770: 278-301.

295. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Suppression of gamma(1S), gamma(2S), and gamma(3S) quarkonium states in PbPb collisions at root S-NN=2.76TeV. *Physics Letters B* 770: 357-379.

296. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of the cross section for electroweak production of Z gamma in association with two jets and constraints on anomalous quartic gauge couplings in proton-proton collisions at root s=8 TeV. *Physics Letters B* 770: 380-402.

297. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of electroweak-induced production of W gamma with two jets in pp collisions at root s=8TeV and constraints on anomalous quartic gauge couplings. *Journal of High Energy Physics* (6).

298. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for narrow resonances in dilepton mass spectra in proton-proton collisions at root s=13 TeV and combination with 8 TeV data. *Physics Letters B* 768: 57-80.

299. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for heavy resonances decaying into a vector boson and a Higgs boson in final states with charged leptons, neutrinos, and b quarks. *Physics Letters B* 768: 137-162.

300. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). A search for new phenomena in pp collisions at root s=13TeV in final states with missing transverse momentum and at least one jet using the alpha(T) variable. *European Physical Journal C* 77 (5).

301. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Observation of gamma(1S) pair production in proton-proton collisions at root s=8 TeV. *Journal of High Energy Physics* (5).

302. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of the WZ production cross section in pp collisions at root s=7 and 8 TeV and search for anomalous triple gauge couplings at root s=8 TeV. *European Physical Journal C* 77 (4).

303. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for high-mass diphoton resonances in proton-proton collisions at 13 TeV and combination with 8 TeV search. *Physics Letters B* 767: 147-170.

304. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Charged-particle nuclear modification factors in PbPb and pPb collisions at root s(NN)=5.02 TeV. *Journal of High Energy Physics* (4).

305. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurements of differential production cross sections for a Z boson in association with jets in pp collisions at root s=8 TeV. *Journal of High Energy Physics* (4).

306. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for electroweak production of charginos in final states with two T leptons in pp collisions at root s=8 TeV. *Journal of High Energy Physics* (4).

307. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement and QCD analysis of double-differential inclusive jet cross sections in pp collisions at root s=8 TeV and cross section ratios to 2.76 and 7 TeV. *Journal of High Energy Physics* (3).

308. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Observation of charge-dependent azimuthal correlations in p-Pb collisions and its implication for the search for the chiral magnetic effect. *Physical Review Letters* 118 (12).

309. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for CP violation in t(t)over-bar production and decay in proton-proton collisions at root s=8 TeV. *Journal of High Energy Physics* (3).

310. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for heavy neutrinos or third-generation leptoquarks in final states with two hadronically decaying tau leptons and two jets in proton-proton collisions at root s=13 TeV. *Journal of High Energy Physics* (3).

311. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurements of differential cross sections for associated production of a W boson and jets in proton-proton collisions at root s=8 TeV. *Physical Review D* 95 (5).

312. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Searches for invisible decays of the Higgs boson in pp collisions at root S=7, 8, and 13 TeV. *Journal of High Energy Physics* (2).

313. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for top quark decays via Higgs-boson-mediated flavor-changing neutral currents in pp collisions at root s=8 TeV. *Journal of High Energy Physics* (2).

314. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of the production cross section of a W boson in association with two b jets in pp collisions at root s=8TeV. *European Physical Journal C* 77 (2).

315. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Evidence for collectivity in pp collisions at the LHC. *Physics Letters B* 765: 193-220.

316. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for anomalous Wtb couplings and flavour-changing neutral currents in t-channel single top quark production in pp collisions at root s=7 and 8 TeV. *Journal of High Energy Physics* (2).

317. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for R-parity violating supersymmetry with displaced vertices in proton-proton collisions at root s=8 TeV. *Physical Review D* 95 (1).

318. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for high-mass Z gamma resonances in e(+)e(-)gamma and mu(+)mu(-)gamma final states in proton-proton collisions at root s=8 and 13 TeV. *Journal of High Energy Physics* (1).

319. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for dark matter and supersymmetry with a compressed mass spectrum in the vector boson fusion topology in proton-proton collisions at root s=8 TeV. *Physical Review Letters* 118 (2).

320. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Observation of the decay B+ -> psi(2S)phi(1020)K+ in pp collisions at root s=8 TeV. *Physics Letters B* 764: 66-86.

321. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Inclusive search for supersymmetry using razor variables in pp collisions at root s=13 TeV. *Physical Review D* 95 (1).

322. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for supersymmetry in events with photons and missing transverse energy in pp collisions at 13 TeV. *Physics Letters B* 769: 391-412.

323. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for new phenomena with multiple charged leptons in proton-proton collisions at root s=13TeV. *European Physical Journal C* 77 (9).

324. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for supersymmetry in the all-hadronic final state using top quark tagging in pp collisions at root s=13 TeV. *Physical Review D* 96 (1).

325. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Constraints on anomalous Higgs boson couplings using production and decay information in the four-lepton final state. *Physics Letters B* 775: 1-24.

326. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of the top quark mass in the dileptonic t(t)over-bar decay channel using the mass observables M-bl, M-T2, and M-blv in pp collisions at root=8 TeV. *Physical Review D* 96 (3).

327. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for heavy resonances that decay into a vector boson and a Higgs boson in hadronic final states at root s=13TeV. *European Physical Journal C 77* (9).

328. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for supersymmetry in pp collisions at root s=13 TeV in the single-lepton final state using the sum of masses of large-radius jets. *Physical Review Letters* 119 (15).

329. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for a heavy composite Majorana neutrino in the final state with two leptons and two quarks at root s=13 TeV. *Physics Letters B* 775: 315-337.

330. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Searches for W ' bosons decaying to a top quark and a bottom quark in proton-proton collisions at 13TeV. *Journal of High Energy Physics* (8): 1-42.

331. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for low mass vector resonances decaying to quark-antiquark pairs in proton-proton collisions at root s=13 TeV. *Physical Review Letters* 119 (11).

332. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for supersymmetry in events with at least one photon, missing transverse momentum, and large transverse event activity in proton-proton collisions at root s=13TeV. *Journal of High Energy Physics* (12).

333. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Principal-component analysis of two-particle azimuthal correlations in PbPb and pPb collisions at CMS. *Physical Review C* 96 (6).

334. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for evidence of the Type-III seesaw mechanism in multilepton final states in proton-proton collisions at root s=13 TeV. *Physical Review Letters* 119 (22).

335. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of vector boson scattering and constraints on anomalous quartic couplings from events with four leptons and two jets in proton-proton collisions at root s=13 TeV. *Physics Letters B* 774: 682-705.

336. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for electroweak production of charginos and neutralinos in WH events in proton-proton collisions at root s=13 TeV. *Journal of High Energy Physics* (11).

337. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for a light pseudoscalar Higgs boson produced in association with bottom quarks in pp collisions at root s=8 TeV. *Journal of High Energy Physics* (11).

338. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of the differential cross sections for the associated production of a W boson and jets in proton-proton collisions at root s=13 TeV. *Physical Review D* 96 (7).

339. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for top squark pair production in pp collisions at root s=13 TeV using single lepton events. *Journal of High Energy Physics* (10).

340. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for direct production of super symmetric partners of the top quark in the all-jets final state in proton-proton collisions at root s=13 TeV. *Journal of High Energy Physics* (10).

341. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for physics beyond the standard model in events with two leptons of same sign, missing transverse momentum, and jets in proton-proton collisions at root s=13TeV. *European Physical Journal C* 77 (9).

342. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for supersymmetry in multijet events with missing transverse momentum in proton-proton collisions at 13 TeV. *Physical Review D* 96 (3).

343. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for pair production of vector-like T and B quarks in single-lepton final states using boosted jet substructure in proton-proton collisions at root s=13 TeV. *Journal of High Energy Physics* (11).

344. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurements of properties of the Higgs boson decaying into the four-lepton final state in pp collisions at root s=13 TeV. *Journal of High Energy Physics* (11).

345. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of charged pion, kaon, and proton production in proton-proton collisions at root s=13 TeV. *Physical Review D* 96 (11).

346. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for dark matter produced with an energetic jet or a hadronically decaying W or Z boson at root S=13 TeV. *Journal of High Energy Physics* (7).

347. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for new physics with dijet angular distributions in proton-proton collisions at root S = 13 TeV. *Journal of High Energy Physics* (7).

348. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for standard model production of four top quarks in proton-proton collisions at root s=13TeV. *Physics Letters B* 772: 336-358.

349. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of prompt and nonprompt J/psi production in pp and pPb collisions at root s(NN)=5.02 TeV. *European Physical Journal C* 77 (4).

350. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for dark matter produced in association with heavy-flavor quark pairs in proton-proton collisions at root s=13 TeV. *European Physical Journal C* 77 (12).

351. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for black holes and other new phenomena in high-multiplicity final states in proton-proton collisions at root s=13 TeV. *Physics Letters B* 774: 279-307.

352. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Combination of searches for heavy resonances decaying to WW, WZ, ZZ, WH, and ZH boson pairs in proton-proton collisions at root s=8 and 13 TeV. *Physics Letters B* 774: 533-558.

353. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of the triple-differential dijet cross section in proton-proton collisions at root s=8 TeV and constraints on parton distribution functions. *European Physical Journal C* 77 (11).

354. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for associated production of dark matter with a Higgs boson decaying to b(b)over-bar or gamma gamma at root s=13 TeV. *Journal of High Energy Physics* (10).

355. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for Higgs boson pair production in the bb tau state in proton-proton collisions at root(s)=8 TeV. *Physical Review D* 96 (7).

356. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurements of jet charge with dijet events in pp collisions at root s=8 TeV. *Journal of High Energy Physics* (10).

357. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurements of the pp -> W gamma gamma and pp -> Z gamma gamma cross sections and limits on anomalous quartic gauge couplings at root s=8 TeV. *Journal of High Energy Physics* (10).

358. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for new physics in the monophoton final state in proton-proton collisions at root s=13 TeV. *Journal of High Energy Physics* (10).

359. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for Charged Higgs Bosons Produced via Vector Boson Fusion and Decaying into a Pair of W and Z Bosons Using pp Collisions at root s=13 TeV. *Physical Review Letters* 119 (14).

360. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of the semileptonic t(t)over-bar + gamma production cross section in pp collisions at root s=8 TeV. *Journal of High Energy Physics* (10).

361. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for a heavy resonance decaying to a top quark and a vector-like top quark at root s=13 TeV. *Journal of High Energy Physics* (9).

362. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of the t(t)over-bar production cross section using events with one lepton and at least one jet in pp collisions at root s=13 TeV. *Journal of High Energy Physics* (9).

363. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurements of the charm jet cross section and nuclear modification factor in pPb collisions at root sNN=5.02TeV. *Physics Letters B* 772: 306-329.

364. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for high-mass Z gamma resonances in proton-proton collisions at root s=8 and 13 TeV using jet substructure techniques. *Physics Letters B* 772: 363-387.

365. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for single production of vector-like quarks decaying into a b quark and a W boson in proton-proton collisions at root s=13 TeV. *Physics Letters B* 772: 634-656.

366. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Cross section measurement of t-channel single top quark production in pp collisions at root s=13 TeV. *Physics Letters B* 772: 752-776.

367. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Study of jet quenching with Z plus jet correlations in Pb-Pb and pp collisions at root s(NN)=5.02 TeV. *Physical Review Letters* 119 (8).

368. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for top quark partners with charge 5/3 in proton-proton collisions at root s=13 TeV. *Journal of High Energy Physics* (8).

369. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of the inclusive energy spectrum in the very forward direction in proton-proton collisions at root s=13 TeV. *Journal of High Energy Physics* (8).

370. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for third-generation scalar leptoquarks and heavy right-handed neutrinos in final states with two tau leptons and two jets in proton-proton collisions at root s=13 TeV. *Journal of High Energy Physics* (7).

371. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of the jet mass in highly boosted t(t)over-bar events from pp collisions at root s=8TeV. *European Physical Journal C* 77 (7).

372. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of double-differential cross sections for top quark pair production in pp collisions at root s=8 TeV and impact on parton distribution functions. *European Physical Journal C* 77 (7).

373. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for associated production of a Z boson with a single top quark and for tZ flavour-changing interactions in pp collisions at root s=8 TeV. *Journal of High Energy Physics* (7).

374. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for t(t)over-bar resonances in highly boosted lepton plus jets and fully hadronic final states in proton-proton collisions at root s=13 TeV. *Journal of High Energy Physics* (7).

375. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of the top quark mass using single top quark events in proton-proton collisions at root s=8 TeV. *European Physical Journal C* 77 (5).

376. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Searches for pair production of third-generation squarks in root s=13 TeV pp collisions. *European Physical Journal C* 77 (5).

377. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for single productio no vector-like quarks decaying to a Z boson and a top or a bottom quark in proton-proton collisions at root s=13 TeV. *Journal of High Energy Physics* 29 (5).

378. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for electroweak production of a vector-like quark decaying to a top quark and a Higgs boson using boosted topologies in fully hadronic final states. *Journal of High Energy Physics* 136 (4).

379. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Relative modification of prompt psi(2S) and J/psi yields from pp to PbPb collisions at root(S)(NN)=5.02 TeV. *Physical Review Letters* 118 (16).

380. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for massive resonances decaying in to WW, WZ or ZZ bosons in proton-proton collisions at root s=13 TeV. *Journal of High Energy Physics* (3).

381. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Particle-flow reconstruction and global event description with the CMS detector. *Journal of Instrumentation* 12.

382. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Mechanical stability of the CMS strip tracker measured with a laser alignment system. *Journal of Instrumentation* 12.

383. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Measurement of the B-+/- meson nuclear modification factor in Pb-Pb collisions at root s(NN)=5.02 TeV. *Physical Review Letters* 119 (15).

384. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for dijet resonances in proton-proton collisions at root s=13 TeV and constraints on dark matter and other models. *Physics Letters B* 769: 520-542.

385. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for dark matter and unparticles in events with a Z boson and missing transverse momentum in proton-proton collisions at root s=13 TeV. *Journal of High Energy Physics* (3).

386. Sirunyan, A.M., ... **Dube, S., Sharma, S.**, ... *et al* (CMS Collaboration) (2017). Search for new phenomena with the M-T2 variable in the all-hadronic final state produced in proton-proton collisions at root s=13TeV. *European Physical Journal C* 77 (10).

387. Sirunyan, A.M., ... **Dube, S., Sharma, S**., ... *et al* (CMS Collaboration) (2017). Observation of top quark production in proton-nucleus collisions. *Physical Review Letters* 119 (24).

388. Khachatryan, V., ... **Dube, S., Sharma, S.**, ... *et al* (CMS collaboration) (2017). Measurement of differential cross sections for top quark pair production using the lepton plus jets final state in proton-proton collisions at 13 TeV. *Physical Review D* 95 (9).

389. Khachatryan, V., ... **Dube, S., Sharma, S.,** ... *et al* (CMS Collaboration) (2017). Search for heavy resonances decaying to tau lepton pairs in proton-proton collisions at root s=13 TeV. *Journal of High Energy Physics* (2).

390. **Dube, S.**, Gadkari, D. and **Thalapillil, A.M.** (2017). Lepton jets and low-mass sterile neutrinos at hadron colliders. *Physical Review D* 96 (5).

391. Albouy, P.A., Deville, S., **Fulkar, A.**, Hakouk, K., Imperor-Clerc, M., Klotz, M., Liu, Q., Marcellini, M. and Perez, J. (2017). Freezing-induced self-assembly of amphiphilic molecules. *Soft Matter* 13 (9): 1759-1763.

392. Dey, C., Baishya, K., **Ghosh, A.**, Goswami, M.M., Ghosh, A. and Mandal, K. (2017). Improvement of drug delivery by hyperthermia treatment using magnetic cubic cobalt ferrite nanoparticles. *Journal of Magnetism and Magnetic Materials* 427: 168-174.

393. Arumugam, S., Ghosh, S., **Ghosh, A., Devarajan, U.**, Kannan, M., Govindaraj, L. and Mandal, K. (2017). Effect of hydrostatic pressure on the magnetic, exchange bias and magnetocaloric properties of $Ni_{45.5}Co_2Mn_{37.5}Sn_{15}$. *Journal of Alloys and Compounds* 712: 714-719.

394. Chattaraj, D., Kumar, N., **Ghosh, P.**, Majumder, C. and Dash, S. (2017). Adsorption, dissociation and diffusion of hydrogen on the ZrCo surface and subsurface: A comprehensive study using first principles approach. *Applied Surface Science* 422: 394-405.

395. Drera, G., Cepek, C., Patera, L.L., Bondino, F., Magnano, E., Nappini, S., Africh, C., Lodi-Rizzini, A., Joshi, N., **Ghosh, P.**, Barla, A., Mahatha, S.K., Pagliara, S., Giampietri, A., Pintossi, C. and Sangaletti, L. (2017). Identification of Ni_2C electronic states in graphene-Ni(111) growth through resonant and dichroic angle-resolved photoemission at the C K-edge. *Physical Review B* 96 (16).

396. Gangadharan, P.K., Unni, S.M., Kumar, N., **Ghosh, P.** and Kurungot, S. (2017). Nitrogen-doped graphene with a three-dimensional architecture assisted by carbon nitride tetrapods as an efficient metal-free electrocatalyst for hydrogen evolution. *ChemElectroChem* 4 (10): 2643-2652.

397. Kaul, I. and **Ghosh, P.** (2017). First principles investigations of small bimetallic PdGa clusters as catalysts for hydrogen dissociation. *Chemical Physics* 487: 87-96.

398. Ganguly, S., **Kabir, M.** and Saha-Dasgupta, T. (2017). Magnetic and electronic crossovers in graphene nanoflakes. *Physical Review B* 95 (17).

399. Rondiya, S., Wadnerkar, N., Jadhav, Y., Jadkar, S., Haram, S. and **Kabir, M.** (2017). Structural, electronic, and optical properties of Cu_2NiSnS_4: A Combined experimental and theoretical study toward photovoltaic applications. *Chemistry of Materials* 29 (7): 3133-3142.

400. Brauner, T. and **Kadam, S.V.** (2017). Anomalous low-temperature thermodynamics of QCD in strong magnetic fields. *Journal of High Energy Physics* (11).

401. Brauner, T. and **Kadam, S.V.** (2017). Anomalous electrodynamics of neutral pion matter in strong magnetic fields. *Journal of High Energy Physics* (3).

402. **Chaturvedi, S.**, Shyam, P., Bag, R., Shirolkar, M.M., Kumar, J., Kaur, H., Singh, S., Awasthi, A.M. and **Kulkarni, S.** (2017). Nanosize effect: Enhanced compensation temperature and existence of magnetodielectric coupling in $SmFeO_3$. *Physical Review B* 96 (2).

403. Dey, R.M., Patil, D. and **Kulkarni, S.** (2017). Integrated characterization study of diamond like carbon (DLC) synthesized by 2.45 GHZ microwave electron cyclotron resonance (ECR) plasma CVD. *Surface & Coatings Technology* 328: 30-43.

404. Acharya, S.A., Gaikwad, V.M., **Kulkarni, S.K.** and Despande, U.P. (2017). Low pressure synthesis of $BiMnO_3$ nanoparticles: anomalous structural and magnetic features. *Journal of Materials Science* 52 (1): 458-466.

405. Bhand, G.R., Lakhe, M.G., Rohom, A.B., Londhe, P.U., **Kulkarni, S.K.** and Chaure, N.B. (2017). Optical, structural, and morphological properties of PANI/CdSe(TPs) nanocomposite thin films. *Journal of Materials Science-Materials in Electronics* 28 (17): 12555-12563.

406. Virpal, **Kumar, J.**, Singh, G., Singh, M., Sharma, S. and Singh, R.C. (2017). Room temperature synthesis of wurtzite phase nanostructured ZnS and accompanied enhancement in dielectric constant. *Journal of Applied Physics* 121 (13).

407. Virpal, **Kumar, J.**, Thangaraj, R., Sharma, S. and Singh, R.C. (2017). Enhanced dielectric permittivity and photoluminescence in Cr doped ZnS nanoparticles. *Applied Surface Science* 416: 296-301.

408. Pande, V.R., Bhole, G., Khurana, D. and **Mahesh, T.S.** (2017). Strong algorithmic cooling in large star-topology quantum registers. *Physical Review A* 96 (1).

409. Khurana, D. and **Mahesh, T.S.** (2017). Bang-bang optimal control of large spin systems: Enhancement of C-13-C-13 singlet-order at natural abundance. *Journal of Magnetic Resonance* 284: 8-14.

410. **Mir, W.J.**, Assouline, A., Livache, C., Martinez, B., Goubet, N., Xu, X.Z., Patriarche, G., Ithurria, S., Aubin, H. and Lhuillier, E. (2017). Electronic properties of (Sb;Bi)(2)Te-3 colloidal heterostructured nanoplates down to the single particle level. *Scientific Reports* 7.

411. Kumar, J., Panja, S.N., Dengre, S. and **Nair, S.** (2017). Identification of a Griffiths singularity in a geometrically frustrated antiferromagnet. *Physical Review B* 95 (5).

412. Kumar, J., Panja, S.N., John, D., Bhattacharyya, A., Nigam, A.K. and **Nair, S.** (2017). Reentrant superspin glass state and magnetization steps in the oxyborate Co_2AlBO_5. *Physical Review B* 95 (14).

413. Baral, P.R., Ahmed, N., Kumar, J., **Nair, S.** and **Nath, R.** (2017). Synthesis and physical properties of spin-1 honeycomb lattice $Pb_6Ni_9(TeO_6)(5)$. *Journal of Alloys and Compounds* 711: 568-572.

414. **Narayanan, R.** (2017). Single step hydrothermal synthesis of carbon nanodot decorated V_2O_5 nanobelts as hybrid conducting material for supercapacitor application. *Journal of Solid State Chemistry* 253: 103-112.

415. Edler, D., Mishra, C., Wachtler, F., **Nath, R.**, Sinha, S. and Santos, L. (2017). Quantum fluctuations in quasi-one-dimensional dipolar bose-einstein condensates. *Physical Review Letters* 119 (5).

416. Alencherry, T., **Naveen, A.R.**, Ghosh, S., Daniel, J. and Venkataraghavan, R. (2017). Effect of increasing electrical conductivity and hydrophilicity on the electrosorption capacity of activated carbon electrodes for capacitive deionization. *Desalination* 415: 14-19.

417. Bansode, U. and **Ogale, S.** (2017). On-axis pulsed laser deposition of hybrid perovskite films for solar cell and broadband photo-sensor applications. *Journal of Applied Physics* 121 (13).

418. Bhardwaj, M., Patrike, A., Naphade, R., Tonda, S., Gawli, Y. and **Ogale, S.** (2017). Porous $CuCo_2O_4$ nanotubules for Li-ion battery anode. *ChemistrySelect* 2 (10): 2922-2926.

419. Bhardwaj, M., Suryawanshi, A., Fernandes, R., Tonda, S., Banerjee, A., Kothari, D. and **Ogale, S.** (2017). $CuCo_2O_4$ nanowall morphology as Li-ion battery anode: Enhancing electrochemical performance through stoichiometry control. *Materials Research Bulletin* 90: 303-310.

420. Gawli, Y., Wahid, M., Fernandez, R., Kothari, D., Shelke, M. and **Ogale, S.** (2017). Hexaphosphate-derived phosphorus-functionalized carbon for lithium-ion battery anode. *ChemistrySelect* 2 (20): 5600-5607.

421. Nagane, S., Ichake, A., Agrawal, I., Sadhanala, A., Friend, R.H., **Ogale, S.** and Wadgaonkar, P.P. (2017). Phenothiazine-Based D-A-pi-A dyes for highly efficient dye-sensitized solar cells: Effect of internal acceptor and non-conjugated pi-spacer on device performance. *ChemPlusChem* 82 (2): 280-286.

422. Naphade, R., Nagane, S., Bansode, U., Tathavadekar, M., Sadhanala, A. and **Ogale, S.** (2017). Synthetic manipulation of hybrid perovskite systems in search of new and enhanced functionalities. *ChemSusChem* 10 (19): 3722-3739.

423. Naphade, R., Zhao, B.D., Richter, J.M., Booker, E., Krishnamurthy, S., Friend, R.H., Sadhanala, A. and **Ogale, S.** (2017). High quality hybrid perovskite semiconductor thin films with remarkably enhanced luminescence and defect suppression via quaternary alkyl ammonium salt based treatment. *Advanced Materials Interfaces* 4 (19).

424. Tathavadekar, M., Krishnamurthy, S., Banerjee, A., Nagane, S., Gawli, Y., Suryawanshi, A., Bhat, S., Puthusseri, D., Mohite, A.D. and **Ogale, S.** (2017). Low-dimensional hybrid perovskites as high performance anodes for alkali-ion batteries. *Journal of Materials Chemistry A* 5 (35): 18634-18642.

425. Tonda, S., Kumar, S., Gawli, Y., Bhardwaj, M. and **Ogale, S.** (2017). g-C3N4 (2D)/CdS (1D)/rGO (2D) dual-interface nano-composite for excellent and stable visible light photocatalytic hydrogen generation. *International Journal of Hydrogen Energy* 42 (9): 5971-5984.

426. Sharma, N., Gawli, Y., Ahmad, A., **Muhammed, M.** and **Ogale, S.** (2017). Nanotubular hard carbon derived from renewable natural seed gel for high performance sodium-ion battery anode. *ChemistrySelect* 2 (23): 6909-6915.

427. **Pande, V.R.** and Shaji, A. (2017). Minimum disturbance rewards with maximum possible classical correlations. *Physics Letters A* 381 (25-26): 2045-2049.

428. Sekhon, A., Ajith, V.J. and **Patil, S.** (2017). The effect of boundary slippage and nonlinear rheological response on flow of nanoconfined water. *Journal of Physics-Condensed Matter* 29 (20).

429. Mukherjee, B., Kaushik, N., Tripathi, R.P.N., Joseph, A.M., Mohapatra, P.K., Dhar, S., Singh, B.P., **Pavan Kumar, G.V.**, Simsek, E. and Lodha, S. (2017). Exciton emission intensity modulation of monolayer MoS_2 via au plasmon coupling. *Scientific Reports* 7.

430. Singh, D., Sharma, D.K., Chaubey, S.K. and **Pavan Kumar, G.V.** (2017). Angular emission from 1D and 2D meso- and nano-structures: Probed by dual-channel Fourier-plane microscopy. *Optics Communications* 398: 112-121.

431. Tripathi, R.P.N., Vasista, A.B., Chikkaraddy, R. and **Pavan Kumar, G.V.** (2017). Radiative channeling of nanowire frenkel exciton polaritons through surface plasmons. *Advanced Optical Materials* 5 (4).

432. **Pendse, A**. (2017). Long-range S-wave interactions in Bose-Einstein Condensates: An Exact correspondence between truncated free energy and dynamics. *International Journal of Theoretical Physics* 56 (7): 2081-2085.

433. Kulkarni, S., **Puthusseri, D.**, Thakur, S., Banpurkar, A. and Patil, S. (2017). Hausmannite Manganese oxide cathodes for supercapacitors: Surface wettability and electrochemical properties. *Electrochimica Acta* 231: 460-467.

434. Liapis, A.C., **Rahman, A.** and Black, C.T. (2017). Self-assembled nanotextures impart broadband transparency to glass windows and solar cell encapsulants. *Applied Physics Letters* 111 (18): 183901.

435. Verma, G., **Rapol, U.D.** and **Nath, R.** (2017). Generation of dark solitons and their instability dynamics in two-dimensional condensates. *Physical Review A* 95 (4).

436. Sarkar, S., Paul, S., Vishwakarma, C., Kumar, S., Verma, G., Sainath, M., **Rapol, U.D.** and **Santhanam, M.S.** (2017). Nonexponential decoherence and subdiffusion in atom-optics kicked rotor. *Physical Review Letters* 118 (17).

437. Bagchi, J., **Sankhyayan, S.**, Sarkar, P., Raychaudhury, S., Jacob, J. and Dabhade, P. (2017). Saraswati: An extremely massive similar to 200 Megaparsec scale supercluster. *Astrophysical Journal* 844 (1).

438. Dabhade, P., Gaikwad, M., Bagchi, J., Pandey-Pommier, M., **Sankhyayan, S.** and Raychaudhury, S. (2017). Discovery of giant radio galaxies from NVSS: radio and infrared properties. *Monthly Notices of the Royal Astronomical Society* 469 (3): 2886-2906.

439. Bhosale, U.T. and **Santhanam, M.S.** (2017). Signatures of bifurcation on quantum correlations: Case of the quantum kicked top. *Physical Review E* 95 (1).

440. Ghule, S.S., Garde, C.S., Ramakrishnan, S., **Singh, S.**, Rajarajan, A.K., Laad, M. and Karmakar, K. (2017). Synthesis, magnetic and electrical properties of R_3AlCx (R = Ce, Pr and Nd). *Physica B-Condensed Matter* 521: 168-174.

441. Karmakar, K., Bag, R., Skoulatos, M., Ruegg, C. and **Singh, S.** (2017). Impurities in the weakly coupled quantum spin chains Sr_2CuO_3 and $SrCuO_2$. *Physical Review B* 95 (23).

442. Karmakar, K., Skoulatos, M., Prando, G., Roessli, B., Stuhr, U., Hammerath, F., Ruegg, C. and **Singh, S.** (2017). Effects of quantum spin-1/2 impurities on the magnetic properties of Zigzag spin chains. *Physical Review Letters* 118 (10).

443. Utz, Y., Hammerath, F., Kraus, R., Ritschel, T., Geck, J., Hozoi, L., van den Brink, J., Mohan, A., Hess, C., Karmakar, K., **Singh, S.**, Bounoua, D., Saint-Martin, R., Pinsard-Gaudart, L., Revcolevschi, A., Buchner, B. and Grafe, H.J. (2017). Effect of different in-chain impurities on the magnetic properties of the spin chain compound $SrCuO_2$ probed by NMR. *Physical Review B* 96 (11).

444. Bag, R., Karmakar, K. and **Singh, S.** (2017). Travelling-solvent floating-zone growth of the dilutely Co-doped spin-ladder compound Sr-14(Cu, Co)(24)O-41. *Journal of Crystal Growth* 458: 16-26.

445. **Sreejith, G.J.**, Zhang, Y.H. and Jain, J.K. (2017). Surprising robustness of particle-hole symmetry for composite-fermion liquids. *Physical Review B* 96 (12).

446. Wu, Y.H., Shi, T., **Sreejith, G.J.** and Liu, Z.X. (2017). Fermionic symmetry-protected topological state in strained grapheme. *Physical Review B* 96 (8).

447. Wu, Y.-H., Tu, H.-H. and **Sreejith, G.J.** (2017). Fractional quantum Hall states of bosons on cones. *Physical Review A* 96 (3): 033622.

448. **Srivastava, V.**, Bhalerao, V., Ravi, A.P., Ghosh, A. and Bose, S. (2017). Geographic and annual influences on optical follow-up of gravitational wave events. *Astrophysical Journal* 838 (1).

449. James, T., **Subramanian, P.** and Kontar, E.P. (2017). Small electron acceleration episodes in the solar corona. *Monthly Notices of the Royal Astronomical Society* 471 (1): 89-99.

450. Kontar, E.P., Yu, S., Kuznetsov, A.A., Emslie, A.G., Alcock, B., Jeffrey, N.L.S., Melnik, V.N., Bian, N.H. and **Subramanian, P.** (2017). Imaging spectroscopy of solar radio burst fine structures. *Nature Communications* 8 (1515).

451. Sachdeva, N., **Subramanian, P.**, Vourlidas, A. and Bothmer, V. (2017). CME dynamics using STEREO and LASCO observations: The relative importance of Lorentz forces and solarwind drag. *Solar Physics* 292 (9).

452. Sasikumar Raja, K., **Subramanian, P.**, Ramesh, R. and Vourlidas, A. Ingale, M. (2017). Turbulent density fluctuations and proton heating rate in the solar wind from 9–20 *R* *Astrophysical Journal* 850 (2): 129.

453. **Suresh, A.**, Sharma, R., ... Whitney, A.R., Williams, A. and Williams, C.L. (2017). Wavelet-based characterization of small-scale solar emission features at low radio frequencies. *Astrophysical Journal* 843 (1).

454. Roy, T.S. and **Thalapillil, A.M.** (2017). Augmenting collider searches and enhancing discovery potentials through stochastic jet grooming. *Physical Review D* 95 (7): 075002.

BOOK CHAPTERS

01. **Gayathri, P.** and Harne, S. (2017). Structure and dynamics of actin-like cytomotive filaments in plasmid segregation. In *Prokaryotic Cytoskeletons,* Subcellular Biochemistry Book Series, 84: 299-321.

02. Dewan, I. and **Naik-Nimbalkar, U.** (2017). On competing risks with masked failures. In *Mathematical and Statistical Applications in Life Sciences and Engineering* Eds: Adhikari, A. et al., 257-281 Springer.

03. Yousf, S., Hussain, N., Sharma, S. and **Chugh, J.** (2017). Identification & characterization of secondary metabolites in the biological soup by NMR. In *Applications of NMR Spectroscopy* Eds: Atta-ur-Rahman & Choudhary, M.I., 6: 47-96.

BOOKS

04. Robbins, K.X. and **Sohoni, P.** (2017). *Jewish Heritage of the Deccan: Mumbai, the Northern Konkan, Pune* Deccan Heritage Foundation, Jaico: Mumbai.

05. Deshpande, J.V., **Naik-Nimbalkar, U.** and Dewan, I. (2017). *Nonparametric statistics: Theory and methods* World Scientific.

PATENTS

IISER Pune has 1 patent granted and 17 patent applications filed so far (as of March 31, 2018).

Invited Lectures

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

Nixon Abraham
Olfactory decisions: Behaviour to neural circuits, a reverse approach NGN (No Garland Neuroscience) Meeting, IISER Pune, October 13-15, 2017 • *Neural circuits and behavior: an interdisciplinary topic* National Seminar on Interdisciplinary Chemical Research, St. Joseph's College, Irinjalakuda, Kerala, February 15-16, 2018 • *Correlation to causality: Recent developments in neuroscience* National Seminar on Biosciences: A journey towards innovation, Birla College of Arts, Science & Commerce, Mumbai, March 10, 2018 • *Causality in neuroscience: Optogenetics and more* International Brain Research Organisation (IBRO) – Associate School of Neuroscience on Recent Advances in Tools and Techniques in Neuroscience Research, SP Pune University, Pune, March 26-31, 2018

Bijay Kumar Agarwalla
Workshop on New Trends in Quantum Matter, IIT Bombay, December 2017 • Indian Statistical Physics Meeting, ICTS, Bengaluru, February 2018

G. Ambika
Detecting dynamics form data and fractals in chaotic systems Workshop on Basic Aspects of Nonlinear Dynamics and their Applications, IISER Thiruvananthapuram, April 03-04, 2017 • *Fractal geometry* DST INSPIRE Camp, IISER Pune, December 18-22, 2017 • *Time series analysis* three lectures in SERB School on NLD, SP Pune University, Pune, January 15-17, 2018 • *Detecting abnormality in heart dynamics* International Women Researchers Connect, Arunai International Research Foundation, IWRCA, Tiruvannamalai, March 08, 2018

Sudarshan Ananth
Quantum field theory Beyond the Standard Model Conference, Okinawa Institute of Science and Technology (OIST), Okinawa, Japan

Collins Assisi
Lectures on Computational Neuroscience, TIFR Mumbai, May 2017 • *Sequence generation in the hippocampal formation* Dynamics of Complex Systems, ICTS, June 2017 • *Takes theta to tango* IBRO-APRC School of Neuroscience, SP Pune University, Pune, March 26-31, 2018

Chaitanya Athale
In vitro polymerization kinetics and filament mechanics of mung bean tubulin EMBO Workshop in Frontiers in Cytoskeleton Research, IISER Pune, October 29 - November 01, 2017 • *Self-organisation in cellular and intracellular morphogenesis* 13th National Research Scholar's Meet in Life Sciences, ACTREC Navi Mumbai, December 14-15, 2017 • *Design principles of collective motor-driven transport of microtubules* Natural and Artificial Molecular Motors (NAMM) Conference, IIT Bombay, December 18-20, 2017 • *Regulation of collective motor-driven transport of microtubule filaments* Current Trends in Intracellular Transport and Molecular Motors (CTITMM) Meeting, TIFR Mumbai and IIT Bombay, December 21-23, 2017 • *Theoretical insights and experimental testing of the role of cell size and numbers on cytoskeletal patterns* Indo-French workshop on EVOlutionary DEvelopmental and CEll biology (EVODECE), Banyuls Sur Mer, France, January 10-12, 2018 • *Physical principles of cell centre finding by microtubule-motor systems* 42nd Annual Meeting of the Indian Biophysical Society (IBSc), IISER Pune, March 08-10, 2018

Vineeta Bal
Immune systems of premature newborns, mature newborns and adults: how similar and different are they? Department of Biotechnology, D.Y. Patil Vidyapeeth, Pune, April 2017 • *Gender and science (& technology)* Department of Women's Studies, SP Pune University, July 2017 • *Jeevashastra: ek baayakee drushtikon* In Vidnyan Gappa series co-organised by Marathi Vidnyan Parishad and IISER, Pune, July 14, 2017 • *Pursuing research in immunology: thinking about vaccines* SSPU, Pune Saturday talk series, September 2017 • *Should we take fever more seriously in the context of immune response?* Talk in a meeting of Molecular Immunology Forum, Diveaghar, Maharashtra, January 2018

Baskar Balasubramanyam
Number Theory Seminar, UCLA, USA, January 2018 • *Arithmetic and Geometric Structures* in Physics Seminar, Caltech, USA, November 2017 • Colloquium in University of Oklahoma, USA, November 2017 • Number Theory Seminar, University of Oklahoma, USA, November 2017

Nirmalya Ballav
In search of room temperature ferromagnetism in molecular semiconductors IINCM-2017, NISER Bhubaneswar, December 22-24, 2017 • National Conference on Advanced Perspectives in Chemistry, SP Pune University Pune, February 24-25, 2018 • *Advanced materials for energy* IACS Kolkata, March 16, 2018

Anjan Banerjee
Dynamic role of micro RNA 160 in local and systemic defense response of potato against Phytophthora infestens infection - EMBO Workshop of Intercellular Communication in Development and Disease, Berlin, Germany, July 10-15, 2017 • *Evolutionary crossroads in plant kingdom: can moss be the appropriate model?; How is a potato tuber made?* Indian Science Academy Workshop, D.Y. Patil University, Navi Mumbai, September 21, 2017 • *Mobile RNAs play crucial role in growth and development* Science Academies lecture-workshop on understanding and exploring the interfaces between Biology and Biotechnology, Modern College, Ganeshkhind, Pune, November 02, 2017 • *Mobile RNAs play an activator-repressor role to control tuber development in potato* Meeting of Har Gobind Khorana Memorial Symposium of Genes, Genome and Membrane Biology, NABI, Chandigarh, Mohali, December 03-05, 2017; International Conference on Plant Developmental Biology & Indian Arabidopsis Meeting, NISER Bhubaneswar, December 12-16, 2017 • *All three mobile RNAs play an activator-repressor role to control tuber development in potato -The 3rd most important food crop in the planet* Winter Workshop on Model Systems in Developmental Biology and Disease Research, IIT Kanpur, December 15-16, 2017 • *miRNA160 play a dynamic role in local and systemic acquired resistance during potato Phytophthora infestans interaction* IISER-WIS Conference on Chemical Biology, IISER Pune, January 17-19, 2018 • *The wonders of mobile RNAs in plants* International Conference on Frontiers in Life Sciences and Earth Sciences, YASHADA, Pune, January 18-19, 2018

Argha Banerjee
Modeling Himalayan glaciers, Centre for Modeling and Simulation, SP Pune University, Pune, August 19, 2017

Debargha Banerjee
Supercuspidal ramifications and traces of adjoint lifts at good primes MPIM, Bonn and University of Bordeaux • *Differential modular forms* Number Theory Seminar, University of New South Wales, May 2017 • *Can you differentiate integers?* Number Theory Seminar, University of Queensland, June, 2017 • *Arithmetic self-intersection numbers and its applications* Number Theory Seminar, Australian National University, Canberra, June 2017 • *Arithmetic self-intersection numbers and its applications* Number Theory Seminar, Sorbonne Universite, Paris, November 2017

Deepak Barua
Teaching and learning Skills in plant physiology and biochemistry Workshop for College Teachers, Department of Botany, SP Pune University, Pune, March 2018

Rabeya Basu
Unification of classical groups ISI Sat-Math Unit, Delhi, April 03, 2017 • *On the elementary subgroups of GL_n over commutative rings* Chebyshev Laboratory, Russia, April 28, 2017 • *On stabilization of K_1-functor* Chebyshev Laboratory, Russia, May 22, 2017 • *Facts on unimodular rows* School of Physical Sciences, JNU, Delhi, September 14, 2017 • Lectures at University of Calcutta, Dept. of Pure Mathematics: (a) *Matrix version of the Euclidean algorithm* August 29, 2017 (b) *Completability condition for a unimodular row over commutative rings* August 29, 2017 (c) *An introduction on Serre's problem on projective modules* January 31, 2018 (d) *Unimodular rows over special rings* February 02, 2018

Sudipta Basu
Cutting the power in the powerhouse: Next-generation cancer therapy Mitochondria Metabolism Meet-2017, IISER Pune, November 10-11, 2017 • *Engineering the nanomaterials for theranostics and real time molecular tracking* 2nd Annual Meeting, DBT-Nanobioteck-2017, Thiruvananthapuram, December 06-07, 2017

Chandrasheel Bhagwat
Representation Theory Conference, National University of Singapore, April 17-20, 2017 • Arithmétique, Geométrie et Réprésentations, Séminaire franco-indien, IMJ, Paris, October 2017 • Mathematics Seminar, Purdue University, USA, October 2017

Mousomi Bhakta
Nonlocal equations with critical and supercritical exponents Inter IISER Math Meet, IISER Pune, May 11-12, 2017 • *Nonlocal equations with critical and supercritical exponents* Annual Conference of Indian Women and Mathematics, IISc, Bengaluru, July 13-15, 2017 • *Introduction to nonlocal elliptic equations* National Conference on Fractional Calculus and Fractional Differential Equations, SP Pune University, Pune, November 2017

Rajeev Bhalerao
Ultra-relativistic heavy-ion collisions and Quark-Gluon plasma 2nd Jagiellonian Symposium on Fundamental and Applied Subatomic Physics, Krakow, Poland, June 04-09, 2017 • *Quark-Gluon plasma and heavy-ion phenomenology* A 6-lecture course in XI SERC School on Experimental High-Energy Physics, NISER, Bhubaneswar, November 07-27, 2017

Ramakrishna Bhat
YMU-HKBU Joint Laboratory of Traditional Natural Medicine, Yunnan Minzu University, Kunming, China, June 17-23, 2017 • Green Chemistry Workshop for College Chemistry Teachers, IISER Pune, November 06-08, 2017 • DST INSPIRE Camp, IISER Pune, December 18, 2017 • Ramakrishna More College, September 2017 • S.M. Joshi College, November 2017 • Inter IISER-NISER Chemistry Meet (IINCM), NISER-Bhubaneswar, December 2017 • Recent Advances in Chemistry, sponsored by UGC-DSA-I, Karnatak University, March 24-25, 2018

Arijit Bhattacharyay
Directed transport in equilibrium and modified Boltzmann distribution in systems with conformation dependent damping Advanced Many-body and Statistical Methods in Mesoscopic Physics, Busteni, Romania, September 04-08, 2017

Anup Biswas
Risk-sensitive ergodic control A National Conference in Recent Developments in PDE, TIFR-CAM, Bengaluru, August 18, 2017 • *Some new results on the LLN limits of EDF* 2017 International Indian Statistical Association Conference, Hyderabad, December 27-30, 2017 • *Location of maximizers eigenfunctions of nonlocal Schrodinger's equation* 3rd Indo-Russian Meeting on Probability and Statistics, IISc, Bengaluru, January 08-12, 2018 • *Liouville theorem for nonlocal operator* ISI-NETWORKS Conference in Probability, ISI-Kolkata, January 29 - February 02, 2018

R. Boomi Shankar
Functional metal oxide and metal halide self-assemblies supported by multi-site main group ligands Asian Meeting on Metal Oxide Assemblies 2017 (AMMOA-2017), IISER Kolkata, May 09-10, 2017 • *Functional coordination-driven self-assemblies derived from rigid and flexible P-N scaffolds* IIT Bombay, June 23, 2017 • *Polar and ferroelectric metal-organic materials supported by amino-P(V) ligands* Goa University, August 16, 2017 • *Neutral polyhedral cages built from imido-P(V) trianion supported Pd_3 clusters* Chemical Frontiers-2017, Goa, August 17-20, 2017 • *Polyhedral cages supported by amido and imido-P(V) ligands* 24th Congress and General Assembly of the International Union of Crystallography 2017 (IUCr-2017), Hyderabad, August 21-28, 2017 • *Ferroelectric metal-organic materials supported by amino-P(V) ligands* National Meeting of Synthetic and Theoretical Chemists (NMSTC) 2017, University of Hyderabad, October 13-14, 2017

Diganta Borah
Analysis and mathematical physics Usa-Uzbekistan Conference, Urgench State University, Uzbekistan, August 08-12, 2017 • *Analysis and number theory* National Conference on Algebra, North Maharashtra University, Jalgaon, January 13-14, 2018 • Seminar talks, IISER Kolkata, February 08-09, 2018

Harinath Chakrapani
1st BASF Innovation Campus Science Symposium, Mumbai, May 30, 2017 • Kaleidoscope: A Discussion Meeting in Chemistry International Centre, Goa, July 05-08, 2017 • 86th Conference of Society of Biological Chemists, JNU, New Delhi, November 16-19, 2017 • Newton Bhabha Fund Antimicrobial Resistance Workshop, Bengaluru, December 14-18, 2017 • IISER-WIS Conference on Chemical Biology, IISER Pune, January 17-19, 2018 • National Conference on Chemical Science: An Interdisciplinary Approach, Modern College, Pune, January 18, 2018

Apratim Chatterji
Origin of spatial organisation of DNA-polymer in chromosomes Liquids-2017, 10th Liquid Matter conference, Ljubljana, Slovenia, July 17-21, 2017 • *The role of special cross-links in the organisation of bacterial chromosome* Biophysics Paschim-11, IISER Pune, November 04, 2017 • *Role of special cross-links in the spatial organisation of DNA-polymer*, JNU, New Delhi, January 16, 2018 • *Heirarchical Self-Assembly: Nanoparticles in Self-assembled polymers* Pattern Dynamics in Complex systems, IIT Delhi, January 17, 2018 • *The role of special cross-links in the organisation of bacterial chromosome* Molecular Biophysics Unit, IISc, Bengaluru, February 16, 2018 • *Self- assembly of model colloids to linear polymeric chains using spherically symmetric (isotropic) potentials* Indian Stat-phys Community Meeting, ICTS, Bengaluru, February 16, 2018

Chitrabhanu Chaudhuri
Introduction to moduli of curves I & II, J-holomorphic curves and Gromov Witten theory NISER Bhubaneshwar, July 15-17, 2017 • *Witten Conjectures I & II, J-holomorphic Curves and Gromov Witten Theory* NISER Bhubaneshwar, July 18-20, 2017 • Moduli of Curves, J-Holomorphic Curves and Gromov-Witten Invariants, ICTS, Bengaluru, December 29, 2017

Srabanti Chaudhury
Understanding co-operativity and dynamic disorder in the fluctuating enzymes at the single molecular level Marian Smoluchowski Symposium on Statistical Physics, Krakow, Poland, September 05, 2017; IISER Tirupati, December 2017 • *Dynamics of end-pulled polymer translocation through a nanopore* CompFlu, IIT Chennai, December 2017

Anisa Chorwadwala
How Mathematicians think? Simple Mathematics Learning Workshop: Special Program for Mathematics Teachers of Pune District, New English School, Sadashiv Peth, Pune, April 10, 2017; as part of a three day meet up of Ganit Sarthi Fellow, May 19, 2017 • *An eigenvalue optimisation problem over a family of planar punctured disks where the puncture has a dihedral symmetry* Inter IISER Mathematics Meet, IISER Pune, May 12, 2017 • *Work of Deepti Mishra, a Hindi-Urdu poet* Symposium on The Role of Women in Urdu Literature University of Mumbai, September 21, 2017 • *An eigenvalue optimisation problem* Department of Mathematics, IIT Delhi, January 30, 2018; International Conference in Mathematics celebrating Centenary Year of Professor S.S. Shrikhande, founding Head of the Department of Mathematics, University of Mumbai, January 22-25, 2018; National Conference on Algebra, Analysis

and Number Theory, School of Mathematical Sciences, North Maharashtra University, Jalgaon, January 13-14, 2018 • *A glimpse of shape optimisation problems via the problem of Queen Dido"* An App Called Math - Women Edition, IISER Pune March 07, 2018 • *A proof of the classical isoperimetric problem in the Euclidean plane using Fourier analysis* Intertwining strands in Physics and Mathematics: Fourier analysis Workshop for undergraduate teachers in Mathematics and Physics, IISER Pune, January 19-23, 2018 • *Why are soap bubbles approximately spherical?* Bhasha Bhavan, Shivaji University, Kolhapur, Maharashtra, January 09, 2018; Old Conference Hall, Jalgaon, Maharashtra, January 15, 2018; Department of Applied Mathematics, Faculty of Technology and Engineering, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, February 20, 2018

Jeetender Chugh

NMR as a high-throughput screening method in drug-design/discovery SP Pune University, Pune, February 03, 2018 • *Applications of NMR in drug-design/discovery* Defence Institute of Advanced Technology, Pune, February 07, 2018

Aloke Das

n→π non-covalent interaction: Weak in strength but strong in action* 6th Asian Spectroscopy Conference, National Tsing Hua University, Hsinchu, Taiwan, September 03-06, 2017 • *Gas phase IR spectroscopic signature for C=O...C=O n→π* interaction in the building block of collagen,* Conference on Electronic Structure Spectroscopy and Dynamics (CESSD), Indian Association for the Cultivation of Science, Kolkata, February 22-25, 2018

Aparna Deshpande

Reaching out to atoms, molecules, and surfaces using Scanning Tunneling Microscopy (STM) Popular Science talk at Garware College, Pune, October 13, 2017 • *Nano Science using Scanning Tunneling Microscopy* Workshop for School Teachers, Khadki Cantonment Board, Pune, October 30, 2017 • *Dirac point tuning of topological insulator surface Bi_2Se_3(111) with molecules* Recent Trends in Condensed Matter Physics (RTCMP), Department of Solid State Physics, IACS, Kolkata, January 16, 2018

Sutirth Dey

Evolution in the 21st century: New wine, but what about the bottle? Janeev Week of the Socio-Environmental Club of the College of Engineering Pune (COEP), October 04, 2017 • *Evolution of dispersal: The Drosophila story* 3rd Indian Drosophila Research Conference, IISER Bhopal, December 06-09, 2017; Conference on Evolutionary and Integrative Biology (CEIB) 2017, IISER Pune, December 21-22, 2017; Dept of Zoology, Calcutta University, January 18, 2018 • *Confluence: a platform for science-society interface* Ranga Mandir, Raichur Teacher's Fair, January 05-06, 2018 • *Designing experiments: From a consumer to a producer of scientific knowledge* Confluence 18, DBT-Star sponsored Seminar, St. Xavier's College, Mumbai, January 13, 2018 • *How dispersal evolves and why we should care* Saha Institute of Nuclear Physics (SINP), Kolkata, January 18, 2018 • *Evolution: The extended synthesis* Rahara Ramakrishna Mission, Kolkata, January 19, 2018 • *Is this how it feels to be like a rolling stone?* Frontiers in Modern Biology (FIMB), 2018, IISER Kolkata, January 19-21, 2018 • *Hardy-Weinberg Equilibrium: A pedagogical appreciation* Workshop on Teaching and Learning skills in Plant Genetics and Angiosperms, SP Pune University, January 30, 2018

Deepak Dhar

A strategy for achieving coordination amongst agents in a minority game Workshop on Applied Probability, TIFR, Mumbai, April 01, 2017; Third Mumbai Area Physics Meeting, R.N. Jhunjhunwala College, Mumbai, April 08, 2017 • *Phase transitions and renormalization group* a set of six lectures in the Science Academies' Refresher Course in Statistical Physics, Tripura University, Agartala, May 06-13, 2017 • *Phase transitions in a systems of hard rigid rods on a cubic latice* Recent Trends in Condensed Matter Physics and Complex Systems, SP Pune University, Pune, October 30 - November 01, 2017 • *Nonlinear dynamics and cellular automata* SERB School on Nonlinear Dynamics, S.P. Pune University, Pune, January 02, 2018

Sourabh Dube

Aaplya wishwache sarwat chote tukade Vidnyan Gappa, Garware College, Pune, June 09, 2017 • *Searches for Exotics at CMS* Light Cone 2017, Univ. of Mumbai, September 22, 2017

Aurnab Ghose

Fmn2, a new regulator of actin, microtubule and adhesion dynamics in the growth cone Focused Meeting on Emerging Concepts of the Neuronal Cytoskeleton, IUBMB, Puerto Varas, Chile, April 02-06, 2017 • *Formin-2: a new mediator of actin - microtubule crosstalk in neurons* Young Scientist Networking Meeting Barcelona, Spain, April 2017 • *Cytoskeleton dynamics and brain wiring* National Conference on Neurodegenerative Diseases, Bhanuben Nanavati College of Pharmacy, Mumbai, July 27-29, 2017 • *Neuropeptides and maintenance of behavioural states* INSA Mini-symposium on New in Biology, INSA Bengaluru, July 2017 • *Thesis and paper writing: Some suggestions* Annual Progress Review Meeting of Prime Minister's Fellowship Scheme for Doctoral Research, IISER Pune, August 2017 • *Fmn2 in neurons: Regulating adhesion and mediating actin-microtubule crosstalk* EMBO workshop on Frontiers of Cytoskeleton Research, IISER Pune, October 29 - November 01, 2017 • *Growth cone mechanics and neuronal wiring* IISER-Weizmann Institute of Science Conference on Chemical Biology, IISER Pune, January 17-19, 2018 • *Peptidergic signalling in the persistence and coordination of behavioural states* National Brain Research Centre, Manesar, February 2018 • *Elements of nervous system: An evolutionary perspective* Design and functional organisation of neural circuits, SP Pune University, Pune, March 2018

Prasenjit Ghosh

Studying solid liquid interfaces using QMMM approach Energy Transition Summit, 2017, Shell Technology Centre, Bengaluru, September 05-06, 2017 • *Nuclear quantum effects and optical properties of molecule in solvent* NanoMaterials Science, Technology and Applications (NAMASTA 2017), Dibrugarh University, Assam, November 10-11, 2017; International Conference on Systems and Processes in Physics, Chemistry and Biology (ICSPPCB-2018), Assam University, Silchar, March 01-03, 2018

Sujit Ghosh

Metal-organic Frameworks (MOFs) for sensing applications 24th Congress and General Assembly of the International Union of Crystallography, Hyderabad, August 21-28, 2017

Hosahudya Gopi

Peptides-natural and designed – An NMR point of view NMR-Centre, IISc, Bengaluru, July 11, 2017

Anindya Goswami

Recent development in analysis of regime switching market 32nd Annual Conference of the Ramanujan Mathematical Society (RMS), Rani Channamma University, Belagavi, June 23, 2017 • *Financial derivatives and its pricing under Heston model* Instructional School, SP Pune University, Pune, November 06, 2017

Amrita Hazra

The molecular basis and consequences of nucleobase specificity Kaleidoscope: A Discussion Meeting in Chemistry, Goa, July 05, 2017 • *The molecular basis of nucleobase selectivity in nucleotide-utilizing enzymes* 83rd Anniversary General Meeting of INSA, IISER Pune, December 27-29, 2017 • *Investigating the enzymology of methylations in anaerobic Vitamin B12 biosynthesis* IISER-Weizmann Institute Conference on Chemical Biology, Pune, January 17-19, 2018 • *The Millet project* Dialogue on Millets, Monsoon and Market, M.S. Swaminathan Research Foundation, Chennai, March 2018

Anirban Hazra

Interplay between conjugation and size-driven delocalization leads to characteristic properties of substituted thymines Kaleidoscope: A Discussion Meeting in Chemistry, Goa, July 05, 2017 • *What drives a chemical reaction?* Modern College, Shivajinagar, Pune, August 19, 2017 • *The chemical revolution* Course on An Introduction to the History of Science, Technology and Medicine, IISER Pune, September 15, 2017 • *Intersystem crossing drives photo-isomerization in ortho-nitrotoluene, a model for photo-labile caged compounds* Asia-Pacific Conference in Theoretical and Computational Chemistry (APCTCC8), IIT Bombay, December 15-17, 2017

Neena Joseph Mani

Understanding El Nino monsoon teleconnections Humboldt Kolleg on Climate Change and Energy Options, Aurangabad, Maharashtra, February 02-04, 2018

Mukul Kabir

Kondo state in phosphorene? National Conference on Electronic Structure, IISER Bhopal, December 27-29, 2017

Tejas Kalelkar

Taut foliations in compact manifolds with constrained boundary slopes Topology Seminar, University of California, Davis, USA, June 05, 2017

Krishanpal Karmodiya

Plasmodium falciparum epigenome: A distinct dynamic epigenetic regulation of gene expression Aspects of Gene and Cellular Regulation, Institute of Mathematical Sciences, Chennai, January 12-13, 2018

Shabana Khan

The rise, respite, and resurrection of Silylene (as a ligand) International Conference On Phosphorus, Boron and Silicon – PBSi 2017, France (Paris), July 03-05, 2017

Anand Krishnan

Divergent vocal frequencies in assemblages of Asian Barbets International Bioacoustics Congress, Haridwar, October 07-12, 2017

Mayurika Lahiri

DNA-dependent protein kinase plays a central role in transformation of breast epithelial cells following alkylation damage Indo-French conference on Recent advances in Genome Integrity and Plasticity, Bengaluru, December 04-05, 2017; Session Keynote at the International Conference on Cell Death in Cancer and Toxicology, CSIR-Indian Institute of Toxicology Research, Lucknow, February 20-22, 2018

Moumita Majumdar

Germanium chemistry: catalysis and Lithium ion battery applications Indo-US Bilateral Workshop on Organometallic Chemistry: From Fundamentals to Applications, Lonavala, December 07-10, 2017

Shreyas Managave

Stable isotopic composition of tropical cyclone Neelam National Seminar on Dynamics of Surface and Subsurface Geological Processes, Department of Earth Sciences, Pondicherry University, February 08-09, 2018

Pankaj Mandal

Probing dynamics using THz Spectroscopy AstroTHz, Chennai, October 30-31, 2017 • *Carrier dynamics in $CsPbBr_3$ perovskite nanocrystals from time-resolved THz spectroscopy* Hy-pe, SNBNCBS, Kolkata, December 14-15, 2017 • *THz spectroscopy as a biophysical tool* IBS 2018, IISER Pune, March 09-11, 2018

Manish Mishra

Hecke algebras and the Langlands program Colloquim, JNU Delhi, October 2017 • *Depth preservation in local Langlands correspondence* Colloquim, JNU Delhi, January 2018

Sunil Mukhi

Technical Talks: *Entanglement, replicas and thetas* Conference on New Developments in AdS3/CFT2 Holography, Galileo Galilei Institute, Florence, April 2017; University of Amsterdam, May 2017; Institute for Advanced Study, Princeton, May 2017; McGill University, Montreal, May 2017; Saha Institute of Nuclear Physics, Kolkata, February 2018 • *Bootstraps, cosets and monsters in rational CFT* McGill University, Montreal, May 2017; University of British Columbia, Vancouver, June 2017 • *Introduction to supersymmetry* (3 lectures), Pre-SUSY School, TIFR, December 2017 • *The Omnipresence of conformal invariance* Physics Colloquium, HRI Allahabad, February 2018 • *Rational CFT and the modular Bootstrap* Korean Institute for Advanced Study, Seoul, March 2018; Non-technical/Policy/Popular: *A survey of academic ethics* Indian Academy of Sciences, Bengaluru, June 2017 • *The Relevance of irrelevant science* Abhiyantran Student Fest, NIT Sikkim, December 2017 • *Large projects in high-energy Physics* INSA Anniversary Meeting, IISER Pune, December 27-29, 2017 • *The social relevance of basic science* 12th Chandigarh Science Congress, Panjab University, February 12-14, 2018

Muhammed Musthafa

Electrochemistry: Energy storage and conversion Central University of Karnataka, Gulbarga, October 26-28, 2017 • *Electrochemistry: The philosophy and the science* Foundations of Physical Chemistry and its Applications lecture series, Indian Women Scientists' Association, Mumbai, December 19, 2017 • *Sustainable future for a green planet with fuel cells* National Science Day Lecture, National Institute of Technology, Calicut, Kerala, February 23, 2018

Suhita Nadkarni

Lecture series and computational tutorial targeted at graduate students at Department of Biological Sciences, TIFR, Mumbai, May 2017 • *Dynamic complex system* International Center for Theoretical Studies Discussion Meeting, Bengaluru, June 2017 • *Neuroscience across scales* International Neuroscience Meeting, NCBS, Bengaluru, July 2017 • *Computational approaches to neuronal plasticity* Summer School, NCBS Bengaluru, August 2017 • *Computational neuroscience* International Brain Research Organisation- Associate School of Neuroscience, March 29, 2018

Angshuman Nag

Defect tolerant Cesium Lead Halide perovskite nanocrystals Smart Materials: Methods and Applications – 2017, IISER Kolkata, April 20-22, 2017 • *Beyond colloidal Pb-Halide perovskite nanocrystals* JNC conference on Chemistry of Materials-2017, Thiruvananthapuram, October 01-03, 2017; Hybrid Perovskites (HyPe) 2017, S.N. Bose National Centre for Basic Sciences, Kolkata, December 14-16, 2017 • *Near-Infrared emitting $AgInS_2$ and Ag_2S nanocrystals* Newton Bhabha Researcher Links Workshop, IISER Kolkata, December 14-16, 2017 • *Beyond colloidal Pb-halide perovskite nanocrystals Pb-free metal halide perovskite nanocrystals* Workshop on Advanced Materials for Energy, IACS Kolkata, March 16, 2018

Rejish Nath

Workshop on Open Quantum Systems, ICTS, Bengaluru, July 19, 2017 • *Conference on condensed matter physics-2018,* PRL, Ahmedabad, March 14, 2018 • *Conference on ultra cold matter,* IIT Guwahati, Assam, March 29, 2018

A.A. Natu

Career in basic science and the role of I.I.S.E.R Shree Vidyavikas Seva Pratishthan, April 01, 2017 • *What we learn from nature* Science exploratory, Muktangan, Pune, April 17, 2017 & May 24, 2017; Homi Bhabha Centre for Science Education, Mumbai, May 26, 2017 • *Opportunities in basic sciences* Akashvani – Education in sustainable development, April 27, 2017 • *Drug discovery* Modern College, Pune, July 28, 2017 • *Role of basic sciences* Cipla Ltd., Patalganga Complex, Rasayani, August 19, 2017 • *Research* Sardar Vallabhbhai National Institute of Technology (SVNIT), Surat, November 15, 2017 • *Basic sciences* Children's day Science Exhibition, IISER Pune, November 18, 2017 • *Science Exhibition* at Gramin Vidhya Vikas Kendra, Bhamburde, December 06, 2017 • *Science education* New English School and Science College, Hadapsar, December 09, 2017 • *Novel methods of evaluation* NVP workshop, IISER Pune, December 09, 2017 • *Future of basic sciences* Science Exhibition, Sahyadri National School, Pune, December 15, 2017 • *Importance of basic sciences* Children Science Conference and exhibition, Saraswati Vidyalaya, Akurdi, December 16, 2017 • *Basic sciences* SRTMU Avishkar, Shri Shivaji College, Parbhani, December 29, 2017 • *Bioorganic chemistry* Academic workshop for Chemistry teachers and Post-Graduate students, Dayanand College, Latur, January 06, 2018 • *Science view* NS Military School, Pune, January 23, 2018 • *Futuristic computers* International

Conference on *Advances in usability engineering for computing* Maharashtra Institute of Technology, Pune (MIT Pune), February 14, 2018 • *Interdisciplinary approach in education* Modern College, Pune, January 18, 2018; NCRACS 2018 Shivaji College Akola, February 26, 2018; Maharaja Sayajirao University of Baroda (MSUB), March 17, 2018 • *Traditional knowledge... Ground reality?* Science Day Lecture, Kala Academy, Goa, February 28, 2018 • *Student centric education* Indian Institute of Management Ahmedabad (IIMA), March 16, 2018 • *Interdisciplinary science in education* North Maharashtra University (NMU), Jalgaon, March 22, 2018 • *Opportunities in basic sciences* Mahatma Phule Vidyalaya, Ghulewadi, December 07, 2017; Rotary Club Career Fair, Chinchawad, April 27, 2017; Science Exhibition, Location MES School, Pune, August 26, 2017; Kusumtai College, Nanded, September 03, 2017; INSPIRE Camp, Shivaji College, Latur, October 16, 2017; Shambhavi's Technical Institute, Nanded, September 02, 2017; Shri V. Joshi English Medium School, Dervan, November 28, 2017; Dhruv Academy, Sangamner, December 07, 2017; Amrutvahini College of Engineering, Sangamner, December 07, 2017; Ramkrishna More College, Chinchwad, December 12, 2017; INSPIRE Camps, IISER Pune, December 18 & 22, 2017; Dapoli Urban Bank Senior Science College, January 15, 2018; K.K. Public College, Nanded, January 19, 2018; D.Y. Patil Technical College, Talegaon, January 20, 2018; Sanjay Ghodawat University, Kolhapur, February 09, 2018; Educon Solutions, Karad, March 24, 2018

Uttara Naik-Nimbalkar

Tests for specific nonparametric relations between two distribution functions with applications 10th International MMR, Grenoble, France, July 03-06, 2017 • *Empirical process and applications* AIS on Asymptotic Theory of Statistical inference, SP Pune University, Pune, October 31 - November 03, 2017 • *Variable Selection in Survival Analysis* Workshop on Reliability and Survival analysis, Indian Statistical Institute, Kolkata, November 20-22, 2017 • *Markov Chains, Directed Graphs and the Web.* Lecture series on Markov Chains and its Applications in today's era of Analytics SP Pune University, Pune, January 13, 2018 • *Regression and Neural Networks* State level seminar on Recent trends in mathematics and statistics, Bharatiya Jan Sanghatana's College, Pune, February 08, 2018 • *Hazard Rate under Frailty* National Conference for Women in Statistics and Analytics, SP Pune University, Pune, February 14-16, 2018 • *On Hazard Rate Models* National Seminar on Statistics and New Directions, Farook College, Kozhikode, March 07-08, 2018

Venketeswara Pai

Role of Mandalas and Madaladhruvas in determining the longitudes of planets in Vākya School of Astronomy; A catalogue of stars derived from Indian astronomy texts International Symposium on History of Science in India, University of Canterbury, Christchurch, New Zealand, April 19-20, 2017 • *Mandalavākyas: An intermediate numerical table used in the computation of planetary longitudes* International Conference on Traditional Sciences in Asia (ICTSA 2017), Kyoto University, Kyoto, Japan, October 25-28, 2017 • Mathematical basis for *Vākya* system in *Karanapaddhati*, International Conference on Exploration of History of Indian Mathematics, Jointly organised by ISHM and IIT Gandhinagar, December 04-06, 2017 • Understanding astronomy through verses, prose and phrases, Annual General Meeting, INSA, IISER Pune, December 27-29, 2017 • Mathematical concepts laid down in Sanskrit Verses (Public Lecture) Nalanda University, Rajgir, Bihar, March 19, 2018

Gayathri Pananghat

Motility driven by the bacterial cytoskeleton International Union of Crystallography Meeting (IUCr) 2017, Hyderabad, August 25, 2017 • *Bacterial cytoskeleton: Novel functions and interacting partners* NMR Meets Biology III Meeting, Leipzig, Germany, September 05, 2017; IISER-WIS Conference on Chemical Biology, IISER Pune, January 17, 2018 • *Spatial positioning of Myxococcus xanthus motility complexes: Towards a motility mechanism* INPEC 2017, Bose Institute, Kolkata, November 10, 2017 • *Structural biology of cytoskeletal filaments and bacterial cytoskeleton* Science Academies, Lecture-Workshop on Role of Three-Dimensional Structures in Biological Function, Goa University, December 14-15, 2017 • *Phase problem in crystallography* Workshop on Practical Protein Crystallography at Indus-2 Synchrotron, RRCAT, Indore, March 27-28, 2018

G.V. Pavan Kumar

Plasmonic nanowires: Towards Raman optical-antenna Horiba Optics School, JNCASR, Bengaluru, May 26, 2017 • *Fourier-plane elastic and inelastic light scattering microscopy of nanowire emission* Optics Symposium, IIST, Thiruvananthapuram, August 11, 2017 • *Plasmonic nanowire kinks and hybrids: Towards engineering fluorescence and Raman emission* ICES 2017, Munich, September 05, 2017 • *Nanowire plasmonics: Controlling field enhancement and directionality* Indo-Israel, IISc, Bengaluru, October 19, 2017; OSI Annual Meeting, Hisar, November 25, 2017 • *Nanowire plasmonics with hybrid structures* NLS 2017, BARC, Mumbai, December 23, 2017 • *Gap-plasmons: Harnessing light and heat at nanoscale* INSA Annual Meeting, IISER Pune, December 27, 2017

Pramod Pillai

Exploring nanoscience - How BIG is small! DST INSPIRE Internship Camp, Sacred Heart College, Kochi, Kerala, January 09-13, 2018 • *Crafting advanced nanoparticle functions through interplay of forces* IISER-Weizmann Institute of Science Scientific Workshop, IISER Pune, January 18-20, 2018; Inter IISER & NISER Chemistry Meet (IINCM-2017), NISER Bhubaneswar, December 22-24, 2017 • *Advanced nanoparticle functions through interplay of forces* International Conference on Advanced Nanostructures (ICAN-2018), Catholicate College, Kerala, March 12-14, 2018

Atikur Rahman

Block copolymer self-assembly: 3D nanopatterning and applications Department of Physics, Indian Institute of Science, Bengaluru, April 07, 2017 • *Block Copolymer Based Nanostructures for Energy Harvesting and Self-Cleaning Applications* International Conference on Thin Film technology (ICTF), National Physical Laboratory, Delhi, November 13-17, 2017 • *Fabrication of ultra-high density 3D nanostructures using block copolymer and their applications in energy harvesting and self-cleaning* Newton Bhabha Researcher Links Workshop, IISER Kolkata, December 14, 2017 • *Origin of degradation in Perovskite solar cells* Strategic University Network to Revolutionise Indian Solar Energy (SUNRISE), Launch Meeting and Symposium on Solar Energy Advances: Rural Perspective, IISER Pune, March 26-28, 2018

Sudha Rajamani

Informational molecules of a pre-RNA World Reconstructing the Phenomenon of Life -To Retrace the Emergence of Life ELSI International Workshop, Earth Life Science Institute (ELSI), Tokyo Institute of Technology, Tokyo, Japan, May 31, 2017 • *Messy prebiotic chemistry and its implications for the emergence of an RNA world* International Conference on the Origin of Life - Synergy among RNA, Protein and Lipid Worlds, The University of Tokyo, Komaba, Tokyo, May 29-30, 2017

Raghav Rajan

What the zebra finch has taught us about how we initiate learned movement sequences Pondicherry University, Pondicherry, October 2017 • *On your marks, get set, go! Listening to the zebra finch brain getting ready to start song* 42nd Annual Meeting of the Indian Biophysical Society, IBS 2018, Pune, March 09-11, 2018

Umakant Rapol

Quantum Networking: The essentials of distributed quantum computing Colloquim, IIT Kanpur, September 01, 2017 • Raman Research Institute, Bengaluru, February 06, 2018 • Driven Quantum Systems: School and Conference on Driven Quantum Systems, IACS, Kolkata, February 19-21, 2018 • International Conference on Recent Trends in Cold and Ultracold Matter IIT Guwahati, March 27-29, 2018

Girish Ratnaparkhi

SOD1/ALS1 modulates VAPB/ALS8 aggregates via Reactive Oxygen Species in a Drosophila model of Amyotrophic Lateral Sclerosis Indian Drosophila Research Conference (InDRC), IISER Bhopal, December 06-09, 2017

Richa Rikhy

Formation and function of cellular architecture in Drosophila blastoderm embryos Indian Society for Developmental Biology Biennial Meeting, IISER Pune, June 24-27, 2017 • *Onset of cellular architecture in Drosophila embryogenesis* EMBO Frontiers in Cytoskeletal Research, IISER Pune, October 29, 2017 • *Mitochondrial architecture interaction with signalling pathways in development* Mitochondria Network Meeting, IISER Pune, November 2017 • *Formation and function of architecture onset in Drosophila embryogenesis* Indian Drosophila Research Conference, IISER Bhopal, December 06-09, 2017 • *Distribution and function of organelles in Drosophila embryogenesis* Indo-French Workshop on EVOlutionary DEvelopmental and CEll Biology (EVODECE), Banyuls sur Mer, France, January 2018 • *Mitochondrial dynamics and function in Drosophila stem cell differentiation* International Conference in Cell Biology, Hyderabad, January 27, 2018 • *Mitochondria: where they come from and where they will take us* International Conference on Integrative Biology & Applied Genetics (ICIBAG), CSIR-IICT, Hyderabad, March 15-17, 2018

Kundan Sengupta

Spatial organisation of aneuploid chromosome territories in the interphase nucleus 6th Meeting of Asian forum for Chromatin and Chromosome Biology, CCMB, Hyderabad, March 03-05, 2017 • *Genome plasticity in cells on softer matrices* Indo-French Meeting on Recent Advances in Genome Integrity and Plasticity, Bengaluru, December 04-05, 2017 • *Molecular biology of cancer cells* Horizons in Microbiology, Abasaheb Garware College, Pune, February 05, 2018 • *Loss of nuclear lamins induces chromosomal instability and mislocalization of aneuploid chromosomes in the interphase nucleus – insights from cancer cytogenetics and modern genomics* International Conference on Integrative Biology & Applied Genetics (ICIBAG), CSIR-IICT, Hyderabad, March 15-17, 2018

L.S. Shashidhara

A comparative genomic analysis of targets of HOX protein Ultrabithorax In 4th Asia-Pacific Drosophila Conference, Osaka, Japan, May 08-11, 2017 • *A comparative genomic analysis of targets of HOX protein Ultrabithorax among distant insect species* In 21st Evolutionary Biology Meeting, Marseille, France, September 26-29, 2017 • *Fly genetics to study growth control in development and its aberration in cancer* Annual Talk of NCBS, Bengaluru, January 03-05, 2018 • *Attenuation of Yki-driven transcription by promoter proximal-pausing of RNA Polymerase II activity: implications on growth control* In International Conference on Cell Biology, Hyderabad, January 27-30, 2018

Kaneenika Sinha

Pair correlation statistics for Hecke eigenvalues, Mumbai-Pune Number Theory Seminar, Indian Institute of Technology, Mumbai, February 17, 2018; Mathematics Colloquium, Indian Statistical Institute, Bengaluru, February 12, 2018; Conference on Number Theory: Arithmetic, Diophantine and Transcendence, Indian Institute of Technology, Ropar, December 24, 2017 • *Distribution patterns in number sequences* INSA Meeting, IISER Pune, December 27, 2017

S. Sivaram

Whither translational science in academia: Risks and opportunities, smart materials: methods and applications Indian Institute of Science Education and Research, Kolkata, April 21, 2017 • *Porous polymers in energy applications: The fascinating world of invisible polymers* International Conference on Direct Digital Manufacturing, Marinha Grande, Portugal, May 18, 2017 • *Functional and porous polymers as separator membranes for Lithium ion battery* IUPAC-FAPS 2017, Jeju, Korea, October 12, 2017; University of Akron, College of Polymer Science and Polymer Engineering, USA, June 09, 2017 • *Porous materials in energy applications,* Hanyang University, Seoul, Korea, October 16, 2017 • *Functional polymers in energy applications: challenges and opportunities* Clean and Renewable Energy Technologies, Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru, December 01, 2017 • *Sustainable polymers: challenges and opportunities* Fourth International Symposium on Advances in Sustainable Polymers, IIT, Guwahati, January 08, 2018 • *Self-healing elastomers: Glimpses from current literature* Sixth R&D Advisory Committee Meeting, Apollo Tires, Amsterdam, January 11, 2018 • *Technology and business challenges in solar PV technology* Third National Workshop on Solar Energy Utilization for Sustainable Development, CSIR-NEERI, Nagpur, February 02, 2018 • *Industry academia interaction: Myths and realities* First Industry-Academia Meeting, IISER Kolkata, February 08, 2018 • *Positron annihilation spectroscopy: A tool to probe complex structures* Third Trombay Positron Meeting, Bhabha Atomic Research Centre, Mumbai, March 24, 2018

Pushkar Sohoni

Maratha Art and Architectural Heritage in the Deccan Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, May 2017 • *Nizam's heritage in the Deccan* National Seminar New Researches in History of Deccan, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, May 2017 • *Medieval Architecture: The Kingdom of Ahmadnagar* Indian Council for Historical Research (ICHR) – Western Regional Centre, Deccan College Post-Graduate and Research Institute, Pune, November 2017 • *Ahmadnagar: Capital of the Nizam Shahs; Visual language of piety and power: Ta'ziahs and temples in the western Deccan* 5th International Archaeology of Maharashtra Conference, Centre for Extra-Mural Studies, University of Mumbai, January 2018

Sreejith G.J.

Driven Chern insulators 22nd Conference on emergent phenomena in two dimensional systems, Penn State, USA, August 2017 • *Mean field approximations to n-body Hamiltonians in FQHE* Mini Conference on Recent Trends on Quantum Matter, IIT-Bombay, December 2017 • *Temporal order in periodically driven spins in star-shaped clusters* School and Conference on Driven Quantum Systems, IACS Kolkata, February 2018

S.G. Srivatsan

Probing nucleic acid structure and function using multifunctional nucleoside analog probes XVII Symposium on Chemistry of Nucleic Acid Components (SCNAC 2017), Český Krumlov, Czech Republic, June 04-09, 2017; 9th RNA Group Meeting, BHU, Varanasi, October 26-28, 2017 • *Probing nucleic acid structure and recognition using multifunctional nucleoside analog probes* 6th International Meeting on Quadruplex Nucleic Acids (G4thering), Prague, Czech Republic, May 31 - June 03, 2017; RSC-NOST Symposium on Organic and Biomolecular Chemistry, Leeds, UK, October 03-06, 2017

Pinaki Talukdar

Innovative molecular machineries for transmembrane chloride transport Colloquium Lecture, Saha Institute of Nuclear Physics, Kolkata, West Bengal, April 12, 2017 • *Artificial chloride transport en route to cellular apoptosis* New Dimensions of Chemistry, Aahana Resort, Jim Corbett National Park, Uttarakhand, May 03-05, 2017; University of Geneva, Switzerland, May 26, 2017 • *Development of synthetic chloride transporters for inducing cell death* International Symposium on Systems, Synthetic & Chemical Biology (SSC 2017), Bose Institute, Kolkata, December 05-07, 2017; Anniversary General Meeting Indian National Science Academy, IISER Pune, Pune, December 27, 2017 • *Self-assembled synthetic ion channels for selective chloride transport* IISER-WIS Conference on Chemical Biology, IISER Pune, Pune, January 18, 2018 • *Artificial chloride channel formation based on small-molecule self-assembly* Advanced Perspectives in Chemistry – 2018, SP Pune University, Pune, February 24-25, 2018 • *Synthetic molecular machineries for transmembrane chloride transport* UGC-SAP Supported National Symposium on Recent Advances in Chemistry Research, Department of Chemistry, Visva-Bharati, Santiniketan, West Bengal, March 11, 2018; Supramolecular Chemistry in Biology and Functional Materials, IISER Kolkata, March 29-30, 2018

N.K. Subhedar

Reward processing mechanism in the brain Meeting on Recent trends in Life Sciences organised by the Modern College of Arts, Science and Commerce, Ganeshkhind, Pune, February 02, 2018 • *The art and science of writing manuscripts* Meeting on Writing of manuscripts, research proposals and extending consultancies organised by the Dadasaheb Balpande College of Pharmacy, Nagpur, February 24, 2018 • *Understanding brain- An exciting journey* Meeting on Elements of nervous system: an evolutionary perspective, SP Pune University, Pune, March 15, 2018 • *Neuroanatomy* Meeting on Recent advances in tools and techniques in neuroscience research organised by IBRO-APRC Associate School of Neurosciences, SP Pune University, Pune, March 27, 2018

Arun Thalapillil
Blueprints beyond the standard model workshop Tata Institute of Fundamental Research, Mumbai, January 2018

Ramanathan Vaidhyanathan
Framework solids for CO_2 clean up Faculty Development Workshop, IIT Jammu, June 04-06, 2018 • *Covalent organic framework: Near-crystalline organic polymers for energy applications* Chemical Frontiers, Goa, August 17-20, 2017 (won the Emerging Young Researcher award from Prof. C.N.R. Rao); IISER Thiruvananthapuram and Vikram Sarabhai Space Centre, Thiruvananthapuram, November 16, 2017 • *Ultra-microporous MOFs for selective CO_2 capture from industrial gas mixtures* 24th Congress and General Assembly of the International Union of Crystallography, Hyderabad, August 21-28, 2017

Arun Venkatnathan
Modeling molecular interactions of CO_2 absorption in amino acid ionic liquid Department of Chemistry, IIT Bombay, October 31, 2017 • *Modeling proton transfer in ionic liquids: Insights from quantum chemistry* Asia-Pacific Conference of Theoretical and Computational Chemistry (APCTCC 8), IIT Bombay, December 15-17, 2017

Milind Watve
Undergraduate inquiry in type 2 diabetes Indian Academy of Sciences Lecture-Workshop on Understanding and Exploring the Interfaces Between Biology and Biotechnology, Modern College of Science, Pune, November 01-03, 2017

Academic Events Organised

Nixon Abraham
Member, Organising Committee for the IBRO-APRC-Associate School of Neuroscience, Recent advances in tools and techniques in neuroscience research, SP Pune University, March 26-31, 2018

Collins Assisi
Co-founded and organised a National Neuroscience Meeting, No Garland Neuroscience, IISER Pune, October 13-15, 2017

Chaitanya Athale
Supervised and hosted iGEM contest team from IISER Pune with project "TB or not TB" for point-of-care diagnostics, IISER Pune, May-October, 2017

Baskar Balasubramanyam
Course Coordinator for 2-week GIAN course on "Siegel modular forms and associated representations" by Dr. Ameya Pitale from University of Oklahoma, IISER Pune, August 07-18, 2017

Nirmalya Ballav
Local Organising Member, Modern Trends in Inorganic Chemistry (MTIC-XVII), Organised by CSIR-NCL, IISER Pune and SP Pune University, December 11-14, 2017

Anjan Banerjee
Co-organiser, Biennial Meeting of Indian Society of Developmental Biology (InSDB), IISER Pune, June 24-27, 2017

Debargha Banerjee
4th Pune-Mumbai Number Theory, IIT Bombay, Mumbai, February 16-17, 2018

Rabeya Basu
Recent Trends in Non-Commutative Algebras; CIMPA Research School, IISER Pune, June 19-30, 2017 • National meeting on Commutative Algebra and Algebraic Geometry, IISER Pune, December 05-09, 2017

Rajeev Bhalerao
Member, National Advisory Committee, 62nd DAE-BRNS Symposium on Nuclear Physics, Thapar University, Patiala, Punjab, December 20-24, 2017

R. Boomi Shankar
Organising Committee Member, Modern Trends in Inorganic Chemistry (MTIC-XVII), Organised by CSIR-NCL, IISER Pune and SP Pune University, December 11-14, 2017

Diganta Borah
Instructional School for Teachers (IST): Linear Algebra and Multivariable Calculus, Dibrugarh University, Dibrugarh, December 18-30, 2017

Apratim Chatterji
Organised Mumbai Pune Soft Matter Meet along with Shivprasad Patil, IISER Pune, August 12, 2017

Anisa Chorwadwala
Co-organiser, a session on PDEs on May 12, 2017 as part of the Inter IISER Mathematics Meet, IISER Pune, May 11-12, 2017

Jeetender Chugh
Joint Convener of the 42nd Annual Meeting of the Indian Biophysical Society, Emerging Trends in Biophysics, IISER Pune, March 09-11, 2018 • Joint Convener of a Satellite workshop on Archiving and Enriching Structural Data in Biology, IISER Pune, March 12-13, 2018

Sutirth Dey
Co-organised the 4th Foundations of Biology Meeting, Orange County, Coorg, February 23-25, 2017

Deepak Dhar
Science Academies' Refresher Course in Statistical Physics, Sir P.T. Sarvajanik College, Surat, December 17-20, 2017 • Workshop on Intertwining strands of Mathematics and Physics: Fourier analysis, CoESME, IISER Pune, January 19-23, 2018

Sourabh Dube
Co-organised by IISER Pune, IUCAA; Joint Astro & Particle Physics Meeting, February 25, 2018 (with Seema Sharma) • Co-organised the second workshop of the Indo-French Network in High Energy Physics (LIA THEP and CEFIPRA INFRE-HEPNET) on February 26-28, 2018 (with Seema Sharma)

Aurnab Ghose
Co-organiser, Monsoon NeuroGroup Meeting, Khandala, September, 2017 • Co-organiser, EMBO workshop on Frontiers in Cytoskeleton Research, IISER Pune, October 29 - November 01, 2017 • Co-organiser, Dynamics Within and Across the Confined Cellular Space, IISER Pune, February 02-03, 2018

Anindya Goswami
Inter-IISER Mathematics Meet, IISER Pune, May 11-12, 2017 • Workshop on LaTeX, IISER Pune, October 10-14, 2017 • Workshop on SAGE, IISER Pune, January 26-27, 2018

Amrita Hazra
Co-organiser, IISER-Weizmann Institute of Science Conference in Chemical Biology, IISER Pune, January 17-19, 2018

Tejas Kalelkar
Local organiser, National Centre for Mathematics Workshop, Differential Geometry, IISER Pune, July 24-29, 2017

Siddhesh Kamat
Co-organiser, IISER-Weizmann Institute of Science Conference in Chemical Biology, IISER Pune, January 17-19, 2018

Shabana Khan
Co-organiser, Modern Trends in Inorganic Chemistry (MTIC-XVII), Organised by CSIR-NCL, IISER Pune and SP Pune University, December 11-14, 2017

Anand Krishnan
Co-organised with Dr. Raghav Rajan (IISER Pune), Symposium on Vocal Neuromechanics, International Bioacoustics Congress, Haridwar, October 07-12, 2017

Mayurika Lahiri
IISER-Weizmann Institute of Science Conference in Chemical Biology, IISER Pune, January 17-19, 2018

Soumen Maity
Workshop on Parameterized Algorithms, IISER Pune, April 08, 2018

Moumita Majumdar
Co-organiser, Modern Trends in Inorganic Chemistry (MTIC-XVII), Organised by CSIR-NCL, IISER Pune and SP Pune University, December 11-14, 2017

Vivek Mallick
National Conference on Commutative Algebra and Algebraic Geometry (CAAG

2017), IISER Pune, December 05-08, 2017 • Co-organiser, CIMPA School, Recent Trends in Non-commutative Algebra, IISER Pune, June 19-30, 2017

Shreyas Managave
Workshop on Evolution of Deccan Basalt, IISER Pune, February 12-13, 2018

Manish Mishra
International Conference, Representation Theory of p-adic groups, IISER Pune, July 10-19, 2017

Suhita Nadkarni
Co-founded and organised a National Neuroscience Meeting, No Garland Neuroscience, IISER Pune, October 13-15, 2017

Venketeswara Pai
Three-day Spoken-Sanskrit Workshop, Nalanda University Rajgir, Bihar, March 16-19, 2018

Sudha Rajamani
2nd South East Asia - India Thematic School on Aquatic Microbial Ecology (ASIAME 2): Andaman and Nicobar Centre for Ocean Science and Technology (ANCOST)-NIOT, Port Blair, Andaman Islands, November 06-18, 2017

Girish Ratnaparkhi
Biennial Meeting of the Indian Society of Developmental Biologists (InSDB), IISER Pune, June 24-27, 2017

Richa Rikhy
Indian Society for Developmental Biology, Microscopy and Image Analysis workshop, IISER Pune, June 21-24, 2017 • Indian Society for Developmental Biology Meeting, IISER Pune, June 24-27, 2017 • Mitochondria Network Meeting, November 2017 • CEFIPRA sponsored Indo-French workshop on EVOlutionary DEvelopmental and CEll biology (EVODECE), Banyuls sur Mer, France, January 10-12, 2018

Sudipta Sarkar
The second ASEAN-IOC WESTPAC Indian Ocean Floating Summer School on Marine Geoscience and Geohazard on board R/V Marion Dufresne II, September 27 - October 20, 2017

Pushkar Sohoni
Organised a programme for students from the University of Pennsylvania who were at IISER Pune for 8 days in March 2018 as part of a course called Tech and Innovation in India

Arun Thalapillil
Co-Organiser, Mumbai-Pune Collider Meet, Indian Institute of Technology, Bombay, Mumbai, October 07, 2017

Ramanathan Vaidhyanathan
Co-organiser, Modern Trends in Inorganic Chemistry (MTIC-XVII), Organised by CSIR-NCL, IISER Pune and SP Pune University, December 11-14, 2017

Milind Watve
Conference on Evolutionary and Integrative Biology (CEIB), IISER Pune, December 21-22, 2017 • Indian Academy of Sciences Lecture Workshop on Understanding and Exploring the Interfaces Between Biology and Biotechnology, Modern College of Science, Pune, November 01-03, 2017

New Extramural Grants Received

(in Lakh Rupees)

	Name of the Project	Project Leader	Project Code	Funding Agency	Period From-To	Funds Received During the Year
01	**INSPIRE Faculty Award**	Dr. Anand Krishnan	GAP/DST-17-298	DST	24.04.2017 23.04.2022	19.00000
02	**TROP ICSU Project-Trans-disciplinary research oriented pedagogy for improving climate studies and understanding**	Prof. L.S. Shashidhara	GAP/IUBS/BIO-17-300	IUBS	01.05.2017 01.12.2019	49.99043
03	**Magnetic and dielectric studies on the room temperature magnet $SrRu_2O_6$ and its doped variants**	Dr. Sunil Nair	GAP/DST/PHY-17-301	DST	29.05.2017 28.05.2020	10.05600
04	**Pursuit of novel and enhanced optoelectronic effects in hybrid perovskite based nanostructures**	Prof. Satishchandra Ogale	GAP/DST/PHY-17-302	DST	29.05.2017 28.05.2020	20.32240
05	**INSPIRE Faculty Award**	Dr. Chitrabhanu Chaudhuri	GAP/DST/MTH-17-303	DST	31.05.2017 30.05.2022	19.00000
06	**Ferroelectric metal organic materials supported by cationic phosphorus moieties for potential sensor application**	Dr. R. Boomi Shankar	GAP/DRDO/CHE-17-304	DRDO	31.05.2017 30.05.2022	33.35000
07	**Max Planck Partner Group Project**	Dr. Sagar Pandit	GAP/MPG/BIO-17-305	Max Planck	01.06.2017 31.05.2020	23.75560
08	**Ion source facility for calibration of ion mass and energy analysers for space missions**	Dr. Bhas Bapat	GAP/ISRO/PHY-17-306	ISRO-DoS	06.06.2017 05.06.2019	32.00000
09	**Surface anchored metal organic thin film devices**	Dr. Nirmalya Ballav	GAP/SERB/CHE-17-308	SERB	17.06.2017 16.06.2020	42.67750
10	**Small molecule inducers of redox stress targeting antibiotic resistance**	Dr. Harinath Chakrapani / Dr. Sidharth Chopra, CDRI	GAP/DBT/CHE-17-309	DBT	30.06.2017 29.06.2020	39.46000
11	**Monte carlo simulation based determination of genome conformation using chromosome conformation capture (3C)**	Dr. Apratim Chatterji / Dr. Farhat Habib, Dr. Manjunath G.P.	GAP/DBT/PHY/-17-310	DBT	06.07.2017 05.07.2020	27.40000
12	**Tumor associated carbohydrate antigen conjugated gold nanoparticles of different morphologies-a potential cancer vaccine platform**	Dr. Preeti Chaudhary - Mentor-Dr. Raghavendra Kikkeri	GAP/DBT/CHE-17-311	DBT	03.07.2017 02.07.2020	18.94971
13	**Formin-2 function in neural circuit development and organisation of behaviour**	Dr. Aurnab Ghose	GAP/CSIR/BIO-17-312	CSIR	01.05.2017 30.04.2020	9.58333
14	**Studies on the total synthesis of baulamycins A and B via stereoselective C-C bond formation using metal catalyst**	Dr. B. Gnanaprakasam Boopathy	GAP/CSIR/CHE-17-313	CSIR	01.05.2017 30.04.2020	7.75000

	Name of the Project	Project Leader	Project Code	Funding Agency	Period From-To	Funds Received During the Year
15	Internal state dependent modulation of decision making: CART neuropeptide in coordinating energy levels with risk taking behavior at the amygdala / CSRI	Dr. Nishikant Subhedar	GAP/DST/BIO-17-314	DST	25.07.2017 24.07.2020	28.11600
16	Conjugacy problem in groups of Lie type—Indo Russian Joint Project	Dr. Anupam Singh	GAP/DST/MTH-17-315	DST-IBCD	28.07.2017 27.07.2019	13.08000
17	Stable isotope based dendroclimatological investigations of trees from Indian region (transferred from Univ. of Pondicherry in 2017)	Dr. Shreyas Managave	GAP/ISRO/ECS-17-316	ISRO-GBP	31.10.2017 (Date of Closure)	4.79494
18	Plasma membrane organisation and protein dynamics in early epithelial like cells in *Drosophila* embryogenesis	Dr. Richa Rikhy	GAP/DBT/BIO-17-317	DBT	25.07.2017 24.07.2020	33.93000
19	Ramanujan Fellowship	Dr. Suhas Ettammal	GAP/DST/ECS-17-318	SERB	03.07.2017 02.07.2022	7.60000
20	Investigating PAF induced transformation in 3D breast acini	Dr. Mayurika Lahiri	GAP/SERB/BIO-17-319	SERB	28.08.2017 27.08.2020	20.68666
21	Mitochondrial central dogma by chimeric nanoparticle in cancer	Dr. Sudipta Basu	GAP/DST/CHE-17-320	DST	29.08.2017 28.08.2020	36.10000
22	Metal free phosphorus compound for small molecule activation and catalysis	Dr. Moumita Majumdar	GAP/CSIR/CHE-17-321	CSIR	01.05.2017 30.04.2020	2.75000
23	Light activated supramolecular ion channels for transmembrane anion transport	Dr. Pinaki Talukdar	GAP/SERB/CHE-17-322	SERB	12.09.2017 11.09.2020	54.45000
24	International Research Scholars Program-Howard Hughes Medical Institute (HHMI)	Dr. Thomas Pucadyil	HHMI/BIO-17-323	Howard Hughes Medical Institute	01.09.2017 31.08.2022	178.15296
25	Role of structure, metal carbon stoichiometry and defects on reactivity of transition metal clusters supported on metal carbites and mxenes for selective hydrogenetion of CO_2 to methanol; an *ab initio* study	Dr. Prasenjit Ghosh	GAP/PHY/-17-324	SERB	27.09.2017 26.09.2020	48.42600
26	RNAI mediated supression of Stbel 1-like genes to investigate the potential for tuber yield increase in potato *S. tuberosum*	Dr. Anjan Banerjee	GAP/CSIR/BIO-17-325	CSIR	01.05.2017 30.04.2020	4.58333
27	5803-B mechanism of polarity reversals in *Myxococcus xanthus*	Dr. Gayathri Pananghat	GAP/CEFIPRA/BIO-17-326	IFCPAR-CEFIPRA	15.01.2018 14.01.2021	21.60916
28	Wellcome Trust/DBT India Alliance Early Career Fellowship-Identification of cell type transitions and their regulation by hedgehog signalling in reestablishment of organiser centre during hydra regeneration	Dr. Chandramouli Reddy Puli	GAP/Wellcome Trust/BIO-17/327	Wellcome Trust - DBT India Alliance - Other	01.01.2018 31.12.2023	6.70120

	Name of the Project	Project Leader	Project Code	Funding Agency	Period From-To	Funds Received During the Year
29	Role of molecular complexity in nonenzymatic replication reactions of the RNA world	Dr. Sudha Rajamani / Dr. Nishikant Subhedar	GAP/DBT/BIO-17-328	DBT	27.12.2017 26.12.2020	31.95000
30	Tuberculosis diagnostics based on mycobacterial glycolipid protein Interactions	Dr. Srinivas Hotha	GAP/DBT/CHE-17-329	DBT	02.01.2018 01.01.2021	15.36800
31	Women Scientist Scheme - Fibulin-1 A novel regulator of EGFR signaling in lung cancer ?	Dr. Keerthi Harikrishnan	GAP/DST/BIO-17-330	DST	24.01.2018 23.01.2021	11.10000
32	Synthesis of a new saturated N-heterocyclic silylene, its reactivity and catalytic application	Dr. Shabana Khan	GAP/DAE/CHEM-17-331	DAE-BRNS	06.02.2018 05.02.2021	15.49516
33	DBT, University of Cambridge and ICGEB Joint Fellowship Programme / Functional Interpretation and prioritization of disease associated variants in the noncoding regions of the human genome using cloud based systems proteogenomic, machine learning and modeling approaches	Dr. Sudhakaran Prabhakaran	GAP/DBT-ICGEB/BIO-17-332	ICGEB-DBT	30.10.2017 29.10.2022	9.98400
34	Identification of the most active cocoonase of sericigenous insects through molecular characterisation	Dr. Gayathri Pananghat	GAP/DBT/BIO-17-333	DBT	21.02.2018 20.02.2021	7.80000
35	Identifying molecular cues and their interactions during scale formation in zebrafish - Women Scientist Scheme A (WOS-A)	Dr. Tressa Panikulangara Jacob	GAP/DST/BIO-17-334	DST	08.03.2018 07.03.2021	11.10000
36	Covalent organic framework and metal organic framework as solid electrolytes for batteries and fuel cells and as charge storage matrix for supercapacitors and organic electronics	Dr. Ramanathan Vaidhyanathan	GAP/DST/CHE-17-335	DST	22.02.2018 21.02.2021	73.18300
37	Janus PNAs as innovative programmable and functional supramolecules for multifaceted chemical biology applications	Prof. K.N. Ganesh	GAP/SERB/CHE-17-336	SERB	07.03.2018 06.03.2021	62.53000
38	Analysing of mitochondrial morphology and metabolism regulation in *Drosophila* neuroblast differentiation	Dr. Richa Rikhy	GAP/DBT/BIO-17-337	DBT	08.03.2018 07.03.2021	31.20000
39	Vigyan Jyoti Pilot Project-Vigyan Jyoti Knowledge Centre	Dr. G. Ambika	GAP/DST/PHY-17-338	DST	15.03.2018 14.03.2019	15.00000
40	Understanding the mechanism of protein misfolding in neurodegenerative disease (transferred from NCBS in 2017)	Prof. Jayant Udgaonkar	GAP/DBT/CHE-17-339	DBT	29.09.2015 28.09.2018	42.11180
41	Principal eigenvalue problems and its application to risk sensitive controls	Dr. Anup Biswas / Dr. Anindya Goswami	GAP/SERB/MTH-17-340	SERB	16.03.2018 15.03.2021	6.60000

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42	**Charge transport and mechanical motion in one dimensional nano-materials: Towards ultrasensitive detection and mechanochemistry**	Dr. Pramod Pillai	GAP/DST/CHE-17-341	DST	16.03.2018 15.03.2021	57.31664
43	**Two fundametal problems in coding theory**	Dr. Krishna Kaipa	GAP/SERB/ MTD-17-342	SERB	16.03.2018 15.03.2021	4.33330
44	**Atom Interferometry using Talbot Resonances with RB Bose Einstein Condensate**	Dr. Umakant Rapol	GAP/CSIR/PHY-17-343	CSIR	21.03.2018 20.03.2021	0.83333
45	**Understanding structural and dynamic basis for adaptive targeting of dsRNAs comprising of corrupted helices by TAR RNA binding protein (TRBT)**	Dr. Jeetender Chugh / Co-PI-Dr. Saikrishnan Kayarat	GAP/DBT/CHE-17-344	DBT	19.03.2018 18.03.2021	29.07000
46	**Nanostructured hybrid materials for energy harvesting**	Dr. Atikur Rahman	GAP/SERB/PHY-17-345	SERB	19.03.2018 18.03.2021	53.00000
47	**Conjugacy classes of centralizers in algebraic group**	Dr. Anupam Singh	GAP/DAE/MTH-17-346	DAE-NBHM	20.03.2018 19.03.2021	2.16500
48	**The effect of interannual variation in flowering intensity periodicity and synchrony on pollination and fruit set in a highly seasonal tropical forest in the Western Ghats**	Dr. Deepak Barua	GAP/SERB/BIO-17-347	SERB	17.03.2018 16.03.2021	11.45611
49	**Role of Dmon1 at the synapse and regulation of glutamate receptors**	Dr. Girish Ratnaparkhi / Dr. Anuradha Ratnaparkhi-ARI	GAP/DBT/BIO-17-348	DBT	21.03.2018 20.03.2021	13.40000
50	**Theoretical and empirical investigations on the interaction of predictability, perdiodicity of fluctuations and bottleneck size in affecting microbial evolution**	Dr. Sutirth Dey - Co-PI-Prof. L.S. Shashidhara	GAP/DBT/BIO-17-349	DBT	22.03.2018 21.03.2021	27.89000



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