

10th
YEAR



वार्षिक प्रतिवेदन
Annual Report 2015-16



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

भविष्य निरूपण एवं लक्ष्य

उच्चतम महत्व के एक ऐसे वैज्ञानिक संस्थान की स्थापना जिसमें अत्याधुनिक अनुसंधान सहित अध्यापन एवं शिक्षण का पूर्णरूप से एकीकरण हो।

जिज्ञासा तथा रचनात्मकता से युक्त सर्वोत्तम समाकलनात्मक अध्यापन के माध्यम से मौलिक विज्ञान को रोचक बनाना।

लचीले एवं सीमारहित / असीम पाठ्यक्रम तथा अनुसंधान परियोजनाओं के माध्यम से छोटी आयु में ही अनुसंधान क्षेत्र में प्रवेश।

Vision & Mission

Establish scientific institution of the highest caliber where teaching and education are totally integrated with state-of-the-art research

Make learning of basic sciences exciting through excellent integrative teaching driven by curiosity and creativity

Entry into research at an early age through a flexible borderless curriculum and research projects



IISER PUNE

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Dr. K.N. Ganesh

Director

Indian Institute of Science Education and Research Pune

Dr. Homi J. Bhabha Road

Pashan, Pune 411 008, India

Telephone: +91 20 2590 8001

Fax: +91 20 2025 1566

web: www.iiserpune.ac.in

Compiled and Edited by

Dr. Shanti Kalipatnapu

Dr. V.S. Rao

Dr. Apurva Barve

Ms. Madhura Joglekar

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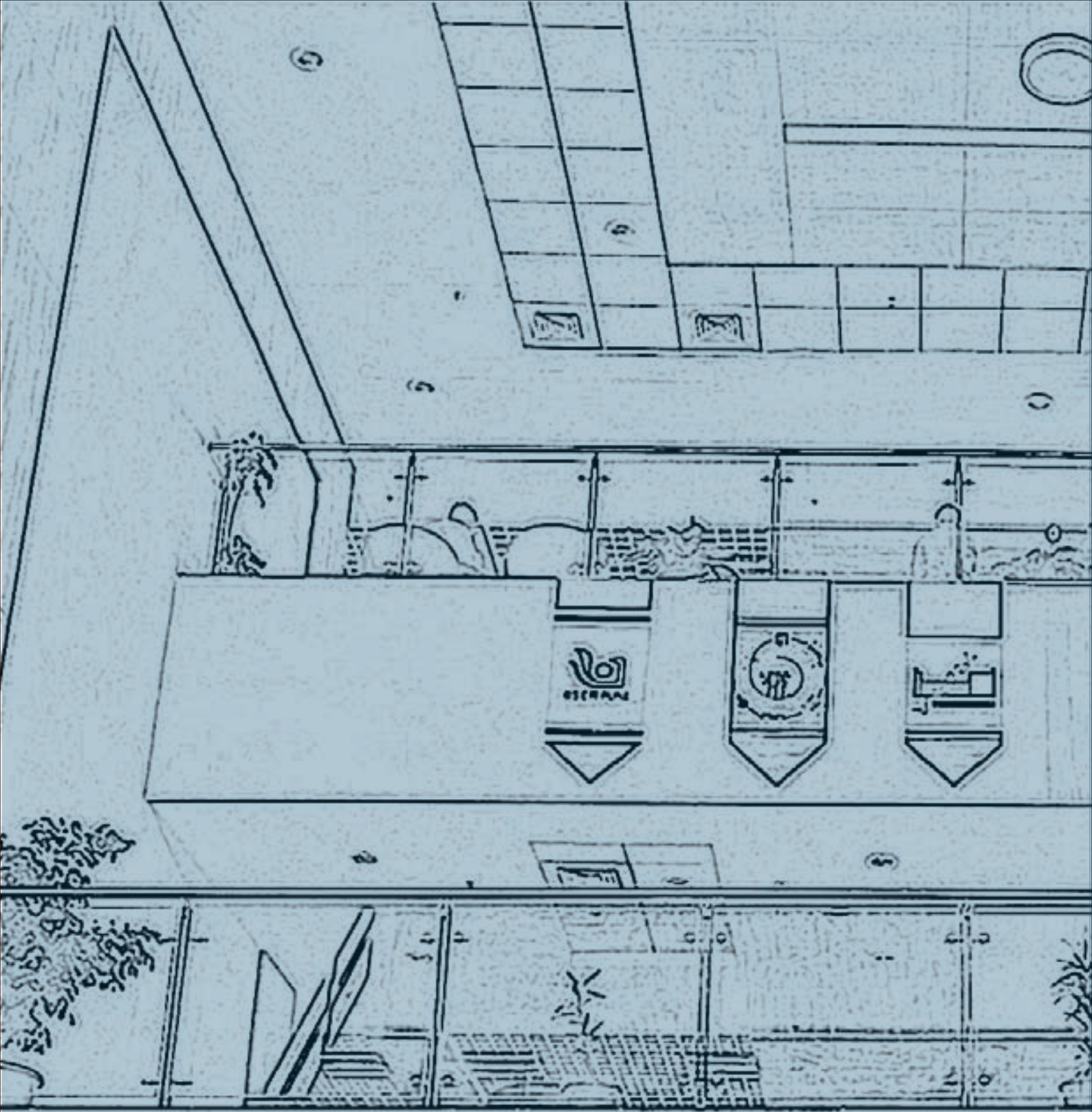
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IISER PUNE

...where tomorrow

Foreword



In 2016, IISER Pune has entered its tenth year of being set up by the Ministry of Human Resource Development (MHRD). Looking back, it has been a great experience of establishing a new institute from the scratch, brick by brick. As of March 31, 2016, IISER Pune has 105 faculty and a total of 1109 students with 678 BS MS students and 431 Integrated PhD/PhD students. In terms of cumulative strength of students, academic programs, campus construction and infrastructure, IISER Pune has met the targets as envisaged in DPR. The celebrations of a decade of IISER Pune were launched in February 2016 by the then Union Minister of Human Resource Development Smt. Smriti Zubin Irani and included organizing of public lectures on topics such as health, education and science communication and meetings of interest to the scientific community.

IISER Pune is very proud of the many achievements of its students. Over the last year, many students of IISER Pune have received several fellowships and awards to carry out research projects. These include DAAD-WISE Fellowship (10), Khorana Program at Wisconsin University (1), Ohio State University (2), 9th Asian Science Camp (2), Charpak Research Internship Program (4), Mitacs Global Program (2), National University of Singapore (2), S.N. Bose Scholarship (1) and fellowships in a few other universities (9). Students have also gone overseas to present their work in at least 15 conferences. Very creditably, 6-month internship of Integrated PhD student Mr. Abhishek Swarnakar at the National Renewable Energy Laboratory, Colorado, USA has led to a publication in the prestigious journal *Science* recently, which is a first for IISER Pune. Among other achievements of students is the award of a Bronze Medal at iGEM2015 competition in the area of synthetic biology held in Boston, USA to a team of IISER Pune students led by faculty member Dr. Chaitanya Athale.

During 2015-16, faculty members of IISER Pune have received the following awards and honors: Dr. Nixon Abraham - Wellcome Trust-DBT

ow's science begins today

India Alliance Intermediate Fellowship (2015); Dr. V.G. Anand - CRSI Bronze Medal; Dr. Sudarshan Ananth - Buti Foundation Award (2016); Prof. Sanjeev Galande - G.D. Birla Award for Scientific Research for the year 2014; Prof. K.N. Ganesh - H.K. Firodia Vijnan Bhushan Award for Excellence in Science & Technology (2015) and National Research Award in Nano Science and Technology (DST) (2015); Prof. M. Jayakannan - Professor K. Kishore Memorial Award, Society for Polymer Science, India (SPSI) (2015); Dr. G.V. Pavan Kumar - Malhotra Weikfield Foundation's Nano Young Researcher Award (2015) and NASI-Scopus Young Scientist Award (2015); Prof. A. Raghuram - Fellow, Indian Academy of Sciences, Bangalore (2016); Prof. Seema Sharma - Convenor of the JetMET Physics Object Group, CMS Collaboration (2016); Prof. L.S. Shashidhara - Elected as Secretary-General, International Union of Biological Sciences (IUBS) (2016-2019); Dr. Gyana Ranjan Tripathy - Young Scientist Medal, Indian National Science Academy (INSA), New Delhi (2015) and Young Associate, Indian Academy of Sciences, Bangalore (2015).

During 2015-16, about 60 new research projects have been sanctioned and the funds generated from all running projects amounted to 45 crores. The number of research publications has increased to 245 and one US patent was granted in 2015 and 9 patents were filed.

IISER Pune has formalized several Memoranda of Understanding for academic cooperation and student/staff exchange in 2015-16. These include MoU between Max Planck Society (MPG) and all IISERs; MoU with IC-IMPACTS, Canada-India Research Centre of Excellence; renewal of MoU with Department of Biological Science and Mechanobiology Institute (MBI) of the National University of Singapore; University of Goettingen regarding Gottingen-Pune Outreach Centre funded by Federal Ministry of Education and Research (BMBF), Germany; Agreement with the British Council regarding Generation UK Program; MoU with ENS Lyon, France; MoU with Hokkaido University, Japan; and University Pierre and Marie Curie--Erasmus+ agreement to exchange faculty. Savitribai Phule Pune University and IISER Pune have initiated a blended mode Bachelor of Science (BSc) program in collaboration with University of Melbourne.

Several conferences, workshops, and events were held at IISER Pune during 2015-16: Indo-US Workshop on Time Series Analysis, Indo-French Conference on Frontiers in Cytoskeleton Research: Coordination, Adaptation, Fine tuning; Annual Meeting of Indian Academy of Science, Bangalore; Joint Symposium with Temple University on Chemistry and Physics of Advanced Materials, Peptide Engineering Meeting (PEM) – 7; International Complex Fluids Conference Compflu-2016; India-EMBO Partnership Symposium; International Conference on Nanoscience and Technology (ICONSAT - 2016); Indo-French Meeting on Glycochemistry; and a workshop on Data Analysis: Estimation and Approximation in Science conducted by Prof. L. Mahadevan (Harvard University, USA). Among the eminent visitors to the institute were Prof. Aron Pinczuk (Columbia University, USA); Dr. Kenneth Mullen (University of Glasgow, UK); Prof. Madhu Sudan (Harvard University, USA); Prof. Peter Hoffmann (Wayne State University, USA); Prof. Ashok Venkitaraman (University of Cambridge, UK).

As part of the Science and Beyond public lecture series organized by IISER Pune in collaboration with the British Council across 10 cities in India, speakers from the UK, including Prof. Iain Stewart, Prof. Semir Zeki, who are leaders in their field, have visited IISER

Pune and gave public lectures attended by a large number of students and professionals from Pune. IISER Pune's academic and social outreach efforts through the student community's voluntary organizations such as *Disha* and *Prutha* continue 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.

A Centre of Excellence in Science and Mathematics Education (CoESME) that focuses on training teachers across India has become functional at IISER Pune since October 2015 as part of the Pandit Madan Mohan Malaviya National Mission for Teachers and Training (PMMMNTT) scheme of MHRD. It has organized pedagogy workshops and other educational events. Similarly, under Rashtriya Unnat Bharat Abhiyan, two workshops have been organized and under the Ishān Vikās program, two sessions were held in which ~ 65 students participated for a period of 10 days, to experience the excitement of science.

As we celebrate 10 years of establishment of IISERs, it is gratifying to note that the 2016 *Nature Index* Tables spanning the year 2015 rank IISERs 2nd in India, 41st in Asia Pacific and 137th at the global level for institutional research output in the academic sector. Thus IISERs have begun to realize the original goals and aspirations of the founders of IISERs and IISER Pune has played a key role in this process, leading from the front. With continued support from MHRD in terms of sufficient and regular flow of funds, IISER Pune will be in a position to meet the challenge of sustenance, and relevance rising even higher in international rankings.

At this 10-year milestone, I wish to sincerely thank all those who made this possible – the faculty, students and staff of IISER Pune, MHRD, IISER Pune Board of Governors and well wishers.



K.N. Ganesh
Director

Ten Years of IISER Pune

The decade that was

IISER Pune starts functioning with 5 faculty members and 44 undergraduate students. On August 16, 2006, Prof. N. Kumar and Dr. R.A. Mashelkar inaugurate IISER Pune at NCL Innovation Park.

2006

A transit campus at Sai Trinity Building is taken up to accommodate new labs and the growing numbers of researchers at the institute. Alongside academics, co-curricular activities thrive; with faculty mentors, students begin to produce *Kalpa* magazine, *Karavaan* cultural festival, and *Mimamsa* science quiz.

2007

Dr. S. Sivaram and Dr. K.N. Ganesh exchange an agreement document for allotment of 98 acres of CSIR-NCL land to IISER Pune.

The then Prime Minister of India Dr. Manmohan Singh unveils the foundation stone of IISER Pune campus.

2008

IISER Pune receives its first big grant—from DST to set up a nanoscience centre. In the subsequent years, the institute gets selected for several other major projects including becoming a member of one of the largest international scientific collaborations, the CMS experiment at the LHC in CERN, Geneva.

NIT (Amendment) Act of 2012 is passed in the Parliament naming IISERs Institutions of National Importance. IISER Pune, now an autonomous institution that can award its own degrees, holds its First Convocation.

2009

2010

HR 4, the first building to come up on the main campus, is fully functional, housing classrooms as well as residential space for students. In the ensuing years, when student hostels and lecture hall complex become ready, HR 4 gets converted into a guest house and mini-convention centre.

Earth & Climate Science is introduced, making it the 5th discipline at the institute the other disciplines being Biology, Chemistry, Physics, and Mathematics. The Main Building of the campus that houses research labs and offices is inaugurated and the institute is dedicated to the nation by the Honorable President of India Shri Pranab Mukherjee.

2011

2012

IISER Pune bids farewell to the Sai Trinity campus. The challenge of moving entire labs with sensitive equipment and reassembling them in the main campus threatens to slow down research, but a carefully planned, well-organized move ensures a smooth transition.

More than 350 BS MS students and about 60 PhD students have so far received their degrees from IISER Pune. Over 1000 research papers have resulted from work carried out by IISER Pune members. The IISER chain of Institutes, within just about 10 years of establishment, is ranked among the top in India for institutional research output in the academic sector by *Nature Index*.

2013

2014

Institute begins a Humanities and Social Sciences discipline. For the first time, the entire IISER Pune community is located on one single campus. With two of the towers of the housing block ready for occupation, the campus is also now home to families of several staff members.

2015

2016



Academic Activities and Achievements of Faculty Members

Awards and Honors

Publications

Invited Lectures

Contributed Talks and Poster Presentations

Academic Events Organized

Memberships and Affiliations

National and International Visits

Awards and Honors

Nixon Abraham	Wellcome Trust-DBT India Alliance Intermediate Fellowship (2015)
Sudarshan Ananth	<ul style="list-style-type: none"> Member, Indian National Young Academy of Science (2015)/ Chosen by the INSA Council to be one of twenty Founder Members of the newly formed Indian National Young Academy of Science (INIAS) Buti Foundation Award (2016)
Chaitanya Athale & Group of students	Bronze Medal awarded to the IISER Pune team at the iGEM 2015 Meeting in Boston, USA
Harinath Chakrapani	CRSI Young Scientist Award (2015)
Sanjeev Galande	G.D. Birla Award for Scientific Research for the year 2014
K.N. Ganesh	<ul style="list-style-type: none"> Vice President, Indian Academy of Sciences, Bangalore (2016) H.K. Firodia Vijnan Bhushan Award for Excellence in Science & Technology (2015) National Research Award in Nano Science and Technology (DST) (2015)
Sujit Ghosh	<ul style="list-style-type: none"> Editorial Board Member, <i>Scientific Reports</i>, a journal of Nature Publishing Group Membership Award by the American Chemical Society
M. Jayakannan	Professor K. Kishore Memorial Award, Society for Polymer Science, India (SPSI) (2015)
Rajani Panchang	Mani Shankar Shukla Memorial Gold Medal of Palaeontological Society of India (2015)
G.V. Pavan Kumar	<ul style="list-style-type: none"> Malhotra Weikfield Foundation's Nano Young Researcher Award (2015) NASI-Scopus Young Scientist Award (2015)
A. Raghuram	Fellow, Indian Academy of Sciences, Bangalore (2016)
Seema Sharma	Convenor of the JetMET Physics Object Group, CMS Collaboration (2016)
L.S. Shashidhara	<ul style="list-style-type: none"> Elected as Vice President, Indian National Science Academy (INSA), New Delhi (2016) Elected as Secretary-General, International Union of Biological Sciences (IUBS) (2016-2019)
Gyana Ranjan Tripathy	<ul style="list-style-type: none"> Young Scientist Medal, Indian National Science Academy (INSA), New Delhi (2015) Young Associate, Indian Academy of Sciences, Bangalore (2015)

Publications in 2015

Research Papers

Chemical Biology

1. Mallick, A., More, P., Ghosh, S., Chippalkatti, R., Chopade, B.A., Lahiri, M. and Basu, S. (2015). Dual drug conjugated nanoparticle for simultaneous targeting of mitochondria and nucleus in cancer Cells. *Applied Materials & Interfaces* 7(14): 7584-7598.
2. Palvai, S., More, P., Mapara, N. and Basu, S. (2015). Chimeric nanoparticle: A platform for simultaneous targeting of phosphatidylinositol-3-kinase signaling and damaging DNA in cancer cells. *ACS Applied Materials Interfaces* 7(33):18327-18335.
3. Sultane, P.R., Mete, T.B. and Bhat, R.G. (2015). A convenient protocol for the deprotection of N-benzyloxycarbonyl (Cbz) and benzyl ester groups. *Tetrahedron Letters* 56:2067-2070.
4. Tyagi, P., Dharmaraja, A.T., Bhaskar, A., Chakrapani, H. and Singh, A. (2015). *Mycobacterium tuberculosis* has diminished capacity to counteract redox stress induced by elevated levels of endogenous superoxide. *Free Radical Biology and Medicine* 84: 344-354.
5. Pardeshi, K.A., Malwal, S.R., Banerjee, A., Lahiri, S., Rangarajan, R. and Chakrapani, H. (2015). Thiol activated prodrugs of sulfur dioxide (SO₂) as MRSA inhibitors. *Bioorganic & Medicinal Chemistry Letters* 25(13):2694-2697.
6. Bhatia, P., Raina, S., Chugh, J., and Sharma, S. (2015) miRNAs: Early prognostic markers for Type 2 Diabetes Mellitus? *Biomarkers in Medicine* 9(10):1025-1040.
7. Ellipilli, S. and Ganesh, K.N. (2015). Fluorous Peptide Nucleic Acids: PNA analogues with fluorine in backbone (gamma-CF₂-apg-PNA) enhance cellular uptake. *Journal of Organic Chemistry* 80(18):9185-9191.
8. Umashankara, M., Sonar, M.V., Bansode, N.D. and Ganesh, K.N. (2015). Orchestration of structural, stereoelectronic, and hydrogen-bonding effects in stabilizing triplexes from engineered chimeric collagen peptides (ProX- ProY- Gly)₆ incorporating 4(R/S)-aminoproline. *Journal of Organic Chemistry* 80:8552-8560.
9. Ganesh Kumar, M., Thombare, V.J., Bhaisare, R.D., Adak, A. and Gopi H.N. (2015). Synthesis of tetrasubstituted symmetrical pyrazines from β-keto γ-amino esters: A mild strategy for self-dimerization of peptides. *European Journal of Organic Chemistry* 2015(1):135-141.
10. Ganesh Kumar, M., Mali, S.M., Raja, K.M.P. and Gopi H.N. (2015). Design of stable β-hairpin mimetics through backbone disulfide bonds. *Organic Letters* 17:230-233.
11. Ganesh Kumar, M. and Gopi, H.N. (2015). γ- and β-Peptide foldamers from common multifaceted building blocks: Synthesis and structural characterization. *Organic Letters* 17(19):4738-4741.
12. Ganesh Kumar, M., Benke, S.N., Raja, K.M.P. and Gopi, H.N. (2015). Engineering polypeptide folding through trans double bonds: transformation of miniature β-meanders to hybrid helices. *Chemical Communications* 51:13397-13399.
13. Satpathi, S., Sengupta, A., Gavvala, K., Koninti, R.K., Roy, B. and Hazra, P. (2015). A green solvent induced DNA package. *Scientific Reports* 5: Article number 9137.
14. Sagar, S., Gavvala, K. and Hazra, P. (2015). Fluorescence switching of sanguinarine in micellar environments. *Physical Chemistry Chemical Physics* 17:20725-20732.
15. Roy, B., Satpathi, S., Gavvala, K., Koninti, R.K. and Hazra, P. (2015). Solvation dynamics in different phases of the lyotropic liquid crystalline system. *Journal of Physical Chemistry B* 119(35):11721-11731.

16. Gavvala, K., Satpathi, S. and **Hazra, P.** (2015). Ultrafast dynamics of a molecular rotor in chemical and biological nano-cavities. *RSC Advances* 5:72793-72800.
17. Koninti, R.K., Gavvala, K., Sengupta, A. and **Hazra, P.** (2015). Excited state proton transfer dynamics of topotecan inside biomimicking nanocavity. *Journal of Physical Chemistry B* 119:2363-2371.
18. Satpathi, S., Gavvala, K. and **Hazra, P.** (2015). Fluorescence up-conversion studies of [2,2-bipyridyl]-3,3-diol in octyl- β -D-glucoside and other micellar aggregates. *Journal of Physical Chemistry A* 119(51):12715-12721.
19. Gavvala, K., Satpathi, S. and **Hazra, P.** (2015). pH responsive translocation of an anticancer drug between cyclodextrin and DNA. *RSC Advances* 5:98080-98086.
20. Rao, B.V., Manmode, S. and **Hotha, S.** (2015). Propargyl 1,2-orthoesters for a catalytic and stereoselective synthesis of pyrimidine nucleosides. *Journal of Organic Chemistry* 80:1499-1505.
21. Islam, M., Gayatri, G. and **Hotha, S.** (2015). Influence of steric crowding on diastereoselective arabinofuranosylations. *Journal of Organic Chemistry* 80(16):7937-7945.
22. Rao, B.V., Manmode, S. and **Hotha, S.** (2015). Propargyl 1, 2-orthoesters for stereoselective synthesis of thioglycosides and 1-thiotrehaloses. *Carbohydrate Research* 417:103-108.
23. Murthy, R.V., Bavireddi, H., Gade, M. and **Kikkeri, R.** (2015). Exploiting the lactose-GM3 interaction for drug delivery. *ChemBioChem* 10:792-796.
24. Preeti, M.C., Murthy, R.V. and **Kikkeri, R.** (2015). A rationally designed peptidomimics biosensor for sialic acid on cell surfaces. *Chemical Communications* 51:8112-8115.
25. Gade, M., Paul, A., Alex, C., Choudhury, D., Thulasiram, H.V. and **Kikkeri, R.** (2015). Supramolecular scaffolds on glass slides as sugar based rewritable sensors for bacteria. *Chemical Communications* 51:6346-6349.
26. Chaudhari, P.M., Murthy, R.V., Paul, A., Thulasiram, H.V. and **Kikkeri, R.** (2015). Assessing the effect of different shapes of glycol-gold nanoparticles on bacterial adhesion and infections. *Chemical Communications* 51:15669-15672.
27. Yadav, R., Murthy, R.V. and **Kikkeri, R.** (2015). Sialic acid hydroxamate: A potential antioxidant and inhibitor of metal-induced β -amyloid aggregates. *ChemBioChem* 16(10):1448-1453.
28. Karnawat, V. and **Puranik, M.** (2015). Solution structures of purine base analogues 9-deazaguanine and 9-deazahypoxanthine. *Journal of Biomolecular Structure and Dynamics* 34(3):640-652.
29. Karnawat, V., Gogia, S., Balaram, H. and **Puranik, M.** (2015). Differential distortion of purine substrates by human and plasmodium falciparum hypoxanthine-guanine phosphoribosyl transferase to catalyse the formation of mononucleotides. *ChemPhysChem* 16:2172-2181.
30. Karnawat, V. and **Puranik, M.** (2015). Solution structure of ligands involved in purine salvage pathway. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy* 151:679-686.
31. Tanpure, A.A. and **Srivatsan, S.G.** (2015). Conformation-sensitive nucleoside analogues as topology-specific fluorescence turn-on probes for DNA and RNA G-quadruplexes. *Nucleic Acids Research* 43(22):e149.
32. Saha, T., Kand, D. and **Talukdar, P.** (2015). Performance comparison of two cascade reaction models in fluorescence off-on detection of hydrogen sulfide. *RSC Advances* 5:1438-1446.
33. Roy, A., Saha, T. and **Talukdar, P.** (2015). Turn-on fluorescent probe designed for fluoride ion sensing in aqueous media. *Tetrahedron Letters* 56(35):4975-4979.
34. Kand, D., Saha, T., **Lahiri, M.** and **Talukdar, P.** (2015). Lysosome targeting fluorescence probe for imaging intracellular thiols. *Organic and Biomolecular Chemistry* 13(30):8163-8168.

Materials Science, Nanoscience, Condensed Matter and Statistical Physics

35. Rajendra, R., Bhatia, P., Justin, A., Sharma, S. and **Ballav, N.** (2015). Homogeneously-alloyed gold-silver nanoparticles as per feeding moles. *Journal of Physical Chemistry C* 119(10):5604-5613.
36. **Banerjee, N.**, Dutta, S. and Jain, A. (2015). Equilibrium partition function for nonrelativistic fluids. *Physical Review D* 92:8.

37. Banerjee, N., Dutta, S. and Jain, A. (2015). Higher derivative corrections to charged fluids in 2n dimensions. *Journal of High Energy Physics* 2015:10.
38. Gupta, A.K., Yadav, A., Srivastava, A.K., Ramya, K.R., Paithankar, H., Nandi, S. Chugh, J. and Boomishankar, R. (2015). A neutral cluster cage with a tetrahedral [Pd₁₂L₆] Framework: Crystal structures and host-guest studies. *Inorganic Chemistry* 54:3196-3202.
39. Yadav, A. and Boomishankar, R. (2015). Concentration dependent ratiometric turn-on selective fluorescence detection of picric acid in aqueous and non-aqueous media. *RSC Advances* 5:3903-3907.
40. Deshmukh, M.S., Yadav, A., Pant, R. and Boomishankar, R. (2015). Thermochromic and mechanochromic luminescence umpolung in isostructural metal-organic frameworks based on Cu₆I₆ clusters. *Inorganic Chemistry* 54:1337-1345.
41. Srivastava, A.K., Divya, P., Praveenkumar, B. and Boomishankar, R. (2015). Potentially ferroelectric {(CuL₂)-L-II}(n) based two-dimensional framework exhibiting high polarization and guest-assisted dielectric anomaly. *Chemistry of Materials* 27(15):5222-5229.
42. Gupta, A.K., Srivastava, A.K. and Boomishankar, R. (2015). A tetrakis (amido) phosphonium cation containing 2-pyridyl (²Py)substituents, [P(NH²Py)₄]⁺ and its reactivity studies with Ag(I) salts. *Journal of Chemical Science* 127:619-626.
43. Mubeena, S. and Chatterji, A. (2015). Hierarchical self-assembly: Self organized nanostructures in a nematically ordered matrix of self assembled polymeric chains. *Physical Review E* 91:032602.
44. Kulkarni, A., Lele, A., Sivaram, S., Rajamohanam, P.R., Velankar, S. and Chatterji, A. (2015). Star telechelic poly(l-lactide) ionomers. *Macromolecules* 48(18):6580-6588.
45. Gopannagari, M. and Chaturvedi, H. (2015). Light induced aggregation of specific single walled carbon nanotubes. *Nanoscale* 7:16590-16596.
46. Das, A. and Chaudhury, S. (2015). Modeling the heterogeneous catalytic activity of a single nanoparticle using a first passage time distribution formalism. *Chemical Physics Letters* 641:193-198.
47. Rejaul, S.K., Shirolkar, M.M., Dhara, B., Kulkarni, S. and Deshpande, A. (2015). Enhancing the thermopower and tuning the resistivity in Bi₂Se₃ with Fe-doping. *Chemical Physics Letters* 638:94-98.
48. Joarder, B., Desai, A.V., Samanta, P., Mukherjee, S. and Ghosh, S.K. (2015). Selective and sensitive aqueous phase detection of TNP (2,4,6- trinitro phenol) by an amine functionalized metal-organic framework. *Chemistry-A European Journal* 21:965-969.
49. Mukherjee, S., Ghosh, S.K. (2015). Recent progress in the realm of homonuclear In₆ single molecule magnets: Structural overview and synthetic approaches. *Proceedings of the Indian National Science Academy* 81:357-379. (Invited Article)
50. Mukherjee, S., Joarder, B. Desai, A.V., Manna, B., Krishna, R. and Ghosh, S.K. (2015). Exploiting framework flexibility of a metal-organic framework for selective adsorption of styrene over ethylbenzene. *Inorganic Chemistry* 54(9):4403-4408.
51. Nagarkar, S.S. and Ghosh, S.K. (2015). Reversible structural transformations in a Co(II) based 2d dynamic metal-organic framework showing selective solvent uptake. *Journal of Chemical Sciences* 127:627-633. (Invited Article)
52. Manna, B., Singh, S., Karmakar, A., Desai, A.V. and Ghosh, S.K. (2015). Selective anion exchange and tunable luminescent behaviors of MOF based supramolecular isomers. *Inorganic Chemistry* 54:110-116.
53. Karmakar, A., Desai, A.V., Manna, B., Joarder, B. and Ghosh, S.K. (2015). An amide-functionalized dynamic metal-organic framework exhibiting visual colorimetric anion exchange and selective uptake of benzene over cyclohexane. *Chemistry-A European Journal* 21:7071-7076.
54. Desai, A.V., Samanta, P., Manna, B. and Ghosh, S.K. (2015). Aqueous phase nitric oxide detection by an amine-decorated metal-organic framework. *Chemical Communications* 51(28):6111-6114.
55. Nagarkar, S.S., Desai, A.V., Samanta, P. and Ghosh, S.K. (2015). Aqueous phase selective 2,4,6-trinitrophenol detection via fluorescent metal-organic framework with pendant recognition site. *Dalton Transactions* 44(34):15175-15180.
56. Manna, B., Desai, A.V., Kumar, N., Karmakar, A. and Ghosh, S.K. (2015). Single-crystal-to-single-crystal transformation of an anion exchangeable dynamic metal-organic framework. *CrystEngComm* 17:8796-8800.
57. Nagarkar, S.S. and Ghosh, S.K. (2015). Reversible structural transformations in a Co(II) based 2D dynamic metal-organic framework showing selective solvent uptake. *Journal of Chemical Sciences* 127(4):627-633.

58. Manna, B., Anothumakkool, B., Desai, A.V., Samanta, P., Kurungot, S. and **Ghosh, S.K.** (2015). Coherent fusion of water array and protonated amine in a metal-sulphate based coordination polymer for proton conduction. *Inorganic Chemistry* 54(11):5366-5371.
59. Nagarkar, S.S., Desai, A.V. and **Ghosh, S.K.** (2015). A nitro-functionalized metal-organic framework as a reaction-based fluorescence turn-on probe for rapid and selective H₂S detection. *Chemistry: A European Journal* 21(28):9994-9997.
60. Mukherjee, S., Desai, A.V., Inamdar, A.I., Manna, B. and **Ghosh, S.K.** (2015). Selective detection of 2,4,6-trinitrophenol (TNP) by a π -stacked organic crystalline solid in water. *Crystal Growth & Design* 15(7):3493-3497.
61. Joarder, B., Mukherjee, S., Patil, M., Shufang, X., Tang, J. and **Ghosh, S.K.** (2015). Chiral biomolecule based dodecanuclear dysprosium(III)-copper(II) clusters: Structural analyses and magnetic properties. *Inorganic Chemistry Frontiers* 2:854-859.
62. Mukherjee, S., Desai, A.V., Manna, B., Inamdar, A.I. and **Ghosh, S.K.** (2015). Exploitation of guest accessible aliphatic amine functionality of a metal-organic framework for selective detection of 2,4,6-trinitrophenol (TNP) in water. *Crystal Growth & Design* 15(9):4627-4634.
63. Manna, B., Mukherjee, S., Desai, A.V., Sharma, S., Krishna, R. and **Ghosh, S.K.** (2015). A π -electron deficient diaminotriazine functionalized MOF for selective sorption of benzene over cyclohexane. *Chemical Communications* 51:15386-15389.
64. George, L., Sappati, S., **Ghosh, P.** and Nandini Devi, R. (2015). Surface site modulations by conjugated organic molecules to enhance visible light activity of ZnO nanostructures in photocatalytic water splitting. *Journal of Physical Chemistry C* 119:3060-3067.
65. Pramod, P.S., Shah, R. and **Jayakannan, M.** (2015). Dual stimuli polysaccharide nanovesicles for conjugated and physically loaded doxorubicin delivery in breast cancer cells. *Nanoscale* 7:6636-6652.
66. Goel, M., Narasimha, K. and **Jayakannan, M.** (2015). Direct evidence for secondary interactions in planar and nonplanar aromatic pi-conjugates and their photophysical characteristics in solid-state assemblies. *Journal of Physical Chemistry B* 119:5102-5112.
67. Pramod, P.S., Deshpande, N.U. and **Jayakannan, M.** (2015). Real-Time drug release analysis of enzyme and pH responsive polysaccharide nanovesicles. *Journal of Physical Chemistry B* 119(33):10511-10523.
68. Surnar, B., Sharma, K. and **Jayakannan, M.** (2015). Core-shell polymer nanoparticles for prevention of GSH drug detoxification and cisplatin delivery to breast cancer cells. *Nanoscale* 7:17964-17979.
69. Aluri, R. and **Jayakannan, M.** (2015). One-pot two polymers: ABB' melt polycondensation for linear polyesters and hyperbranched poly(ester-urethane) based on natural L-amino acids. *Polymer Chemistry* 6:4641-4649.
70. Anantharaj, S. and **Jayakannan, M.** (2015). Amyloid-like hierarchical helical fibrils and conformational reversibility in functional polyesters based on L-amino acids. *Biomacromolecules* 16(3):1009-1020.
71. Smita, K. and **Jayakannan, M.** (2015). Super LCST thermo-responsive nanoparticle assembly for ATP binding through Hofmeister effect. *Journal of Materials Chemistry B* 3:1957-1967.
72. More, N.Y. and **Jeganmohan, M.** (2015). A regioselective synthesis of benzopinacolones via aerobic dehydrogenative α -arylation at tertiary sp³-C-H Bond of 1, 1-diphenylketones with aromatics and heteroaromatics. *Chemistry - A European Journal* 21(3):1337-1342.
73. More, N.Y. and **Jeganmohan, M.** (2015). Oxidative cross-coupling of two different phenols: An efficient route to unsymmetrical Biphenols. *Organic Letters* 17(12):3042-3045.
74. Chinnagolla, R.K., Vijeta, A. and **Jeganmohan, M.** (2015). Ruthenium- and palladium-catalyzed consecutive coupling and cyclization of aromatic sulfoximines with phenylboronic acids: An efficient route to dibenzothiazines. *Chemical Communications* 51(65):12992-12995.
75. Manoharan, R. and **Jeganmohan, M.** (2015). Synthesis of isoindolinones via a ruthenium-catalyzed cyclization of N-substituted benzamides with allylic alcohols. *Chemical Communications* 51:2029.
76. Reddy, M.C. and **Jeganmohan, M.** (2015). Ruthenium-catalyzed ortho alkenylation of aromatic nitriles with activated alkenes via C-H bond activation. *Chemical Communications* 51:10738.
77. Manoharan, R. and **Jeganmohan, M.** (2015). Ruthenium-catalyzed cyclization of N-carbamoyl indolines with alkynes: an efficient route to pyrroloquinolinones. *Organic and Biomolecular Chemistry* 13:9276.

78. Manikandan, R., Madasamy, P. and **Jeganmohan, M.** (2015). Ruthenium-catalyzed oxidant-free allylation of aromatic ketoximes with allylic acetates at room temperature. *Chemistry-A European Journal* 21:13934.
79. Manikandan, R. and **Jeganmohan, M.** (2015). Recent advances in the ruthenium-catalyzed hydroarylation of alkynes with aromatics: synthesis of trisubstituted alkenes. *Organic and Biomolecular Chemistry* 13:10420.
80. **Khan, S.**, Ahirwar, S.K., Pal, S., Parvin, N. and Kathewad, N. (2015). Silicon(II) Bis(trimethylsilyl) amide (LSiN(SiMe₃)₂), L = PhC(NtBu)₂) supported copper, silver, and gold complexes. *Organometallics* 34(22):5401-5406.
81. Pal, S., Kathewad, N., Pant, R. and **Khan, S.** (2015). Synthesis, characterization and luminescence studies of Au(I) complexes with PNP and PNB based ligand systems. *Inorganic Chemistry* 54:10172-10183.
82. Swamy, V.S.V.S.N. , Pal, S., **Khan, S.** and Sen, S.S. (2015). Cations and dications of heavier group 14 elements in low oxidation state. *Dalton Transactions* 44: 12903-12923.
83. Apte, A., Bhaskar, P., Das, R., Chaturvedi, S., Poddar, P. and **Kulkarni, S.** (2015). Self assembled vertically aligned gold nanorod superlattices for ultra-high sensitive detection of molecules. *Nano Research* 8:907-919.
84. Chaturvedi, S., Das, R., Poddar, P. and **Kulkarni, S.** (2015). Tunable band gap and coercivity of bismuth ferrite-polyaniline core-shell nanoparticles: the role of shell thickness. *RSC Advances* 5:23563-23568.
85. **Kulkarni, S.** (2015). The lightest solid on earth. *Construction World* 17(11):82-84.
86. Apte, A., Joshi, P., Bhaskar, P., Joag, D. and **Kulkarni, S.** (2015). Vertically aligned self-assembled gold nanorods as low turn-on, stable field emitters. *Applied Surface Science* 355(7):978-983.
87. Kumar, V., Patil, V., Apte, A., Harale, N., Patil, P. and **Kulkarni, S.** (2015). Ultrasensitive gold nanostar - polyaniline composite for ammonia gas sensing. *Langmuir* 31(48):13247-13256.
88. Shiva Shanker, G., Swarnkar, A., Chatterjee, A., Chakraborty, S., Phukan, M., Parveen, N., Biswas, K. and **Nag, A.** (2015). Electronic grade and flexible semiconductor film employing oriented attachment of colloidal ligand-free PbS and PbSe nanocrystals at room temperature. *Nanoscale* 7:9204-9214.
89. Jagadeeswararao, M., Dey, S., **Nag, A.** and Rao, C.N.R. (2015). Visible light-induced hydrogen generation using colloidal (ZnS)_{0.4}(AgInS₂)_{0.6} nanocrystals capped by S²⁻ ions. *Journal of Materials Chemistry A* 3:8276-8279.
90. Shiva Shanker, G., Tandon, B., Shibata, T., Chattopadhyay, S. and **Nag, A.** (2015). Doping controls plasmonics, electrical conductivity, and carrier-mediated magnetic coupling in Fe and Sn codoped In₂O₃ Nanocrystals: Local structure is the key. *Chemistry of Materials* 27:892-900.
91. Tandon, B., Ashok, A. and **Nag, A.** (2015). Colloidal transparent conducting oxide nanocrystals: A new infrared plasmonic material. *Pramana- Journal of Physics* 84(6):1087-1098.
92. Mir, W.J., Swarnkar, A., Sharma, R., Katti, A., Adarsh, K.V. and **Nag, A.** (2015). Origin of unusual excitonic absorption and emission from colloidal Ag₂S nanocrystals: Ultrafast photophysics and solar cell. *Journal of Physical Chemistry Letters* 6(19):3915-3922.
93. Swarnkar, A., Chulliyil, R., Ravi, V. K., Irfanullah, A., Chowdhury, A. and **Nag, A.** (2015). Colloidal CsPbBr₃ perovskite nanocrystals: Luminescence beyond traditional quantum dots. *Angewandte Chemie International Edition* 54:15424-15428.
94. Bhosale, R., Kelkar, S., Parte, G., Fernandes, R., Kothari, D. and **Ogale, S.** (2015). NiS_{1.97}: A new efficient water oxidation catalyst for photoelectrochemical hydrogen generation. *ACS Applied Materials & Interfaces* 7(36):20053-20060.
95. Ghosh, S., Jagtap, S., More, P., Shete, U.J., Maheshwari, N.O., Rao, S.J., Kitture, R., Kale, S., Bellare, J., **Patil, S.**, Pal, J.K. and Chopade, B.A. (2015). *Dioscorea bulbifera* mediated synthesis of novel Au core Ag shell nanoparticles with potent antibiofilm and antileishmanial activity. *Journal of Nanomaterials* 2015:562938.
96. Thimmappa, R., Paswan, B., Gaikwad, P., Devendrachari, M.C., Kotresh, H.M.N., Mohan, R.R. Alias, J.P. and **Thotiyl, M.O.** (2015). Chemically chargeable photo battery. *Journal of Physical Chemistry C* 119(25):14010-14016.
97. Gaikwad, P., Devendrachari, M.C., Thimmappa, R., Paswan, B., Kottaichamy, A.R., Kotresh, H.M.N. and **Thotiyl, M.O.** (2015). Galvanic cell type sensor for soil moisture analysis. *Analytical Chemistry* 87:7439-7445.
98. Kottaichamy, A.R., Kotresh, H.M.N., Devendrachari, M.C., Thimmappa, R., Paswan, B., Tiwari, O.,



- Chanda, V., Gaikwad, P. and **Thotiyl, M.O.** (2015). Effects of electrochemical tailoring of monolayers on catalytic redox entity: An ON-OFF phenomenon regulated by the surrounding medium. *Journal of Physical Chemistry C* 119:28276-28284.
99. Milan-Garces, E.A, Thaore, P., Udgaonkar, J.B. and **Puranik, M.** (2015). Formation of a CH- π Contact in the core of native barstar during folding. *Journal of Physical Chemistry B* 119: 2928-2932.
100. Karmakar, K. and **Singh, S.** (2015). Finite-size effects in the quasi-one-dimensional quantum magnets Sr_2CuO_3 , $Sr_2Cu_{0.99}M_{0.01}O_3$ (M=Ni,Zn), and $SrCuO_2$. *Physical Review B* 91:224401.
101. Karmakar, K., Bag, R. and **Singh, S.** (2015). Crystal growth of spin chain compound Sr_2CuO_3 doped with quantum defects: Zn, Co, Ni, and Mn. *Crystal Growth & Design* 15:4843-4853.
102. Mullangi, D., Nandi, S., Shalini, S., Sreedhala, S., Chathakudath P.V. and **Vaidhyanathan, R.** (2015). Pd loaded amphiphilic COF as catalyst for multi-fold Heck reactions, C-C couplings and CO oxidation. *Scientific Reports* 5:Article No. 10876.
103. Shaikh, A.C., Shalini, S., **Vaidhyanathan, R.**, Mane, M.V., Barui, A.K., Patra, C.R., Venkatesh, Y., Bangal, P.R. and Patil, N.T. (2015). Identifying solid luminogens through gold-catalysed intramolecular hydroarylation of alkynes. *European Journal of Organic Chemistry* 22:4860-4867.
104. Nandi, S., Luna, P.D., Daff, T., Rother, J., Liu, M., Buchanan, W., Hawari, A.I., Woo, T.K. and **Vaidhyanathan, R.** (2015). A single ligand ultra-microporous MOF for pre-combustion CO_2 capture and hydrogen purification. *Science Advances* 1(11):e1500421
105. Nandi, S., Werner-Zwanziger, U. and **Vaidhyanathan, R.** (2015). A triazine-resorcinol based porous polymer with polar pores and exceptional surface hydrophobicity showing CO_2 uptake under humid conditions. *Journal of Materials Chemistry A* 3:21116-21122.
106. Nandi, S., Dhavale, V.M., Shalini, S., Werner-Zwanziger, U., Singh, H., Kurungot, S. and **Vaidhyanathan, R.** (2015). Lithium assisted proton conduction at $150^\circ C$ in a microporous triazine-phenol polymer. *Advanced Materials Interfaces* 2:1500301.

Spectroscopic Sciences, Optics, and Quantum Information

107. Singh, S.K. and **Das, A.** (2015). The $n\pi^*$ interaction: A rapidly emerging non-covalent interaction. *Physical Chemistry Chemical Physics* 17(15):9596-9612.
108. Singh, D., Dasgupta, A., Aswathy, V.G., Tripathi, R.P.N. and **Pavan Kumar, G.V.** (2015). Directional out-coupling of light from a plasmonic nanowire-nanoparticle junction. *Optics Letters* 40(6):1006-1009.
109. Aswathy V.G., Patra, P.P. and **Pavan Kumar, G.V.** (2015). Geometry dependent anti-Stokes SERS radiation patterns from gold nanorod dimers. *Journal of Optics (IoP)* 17:114011 (Special Issue on SERS)
110. Kumar, S., Sarkar, S., Verma, G., Vishwakarma, C., Noaman, Md. and **Rapol, U.** (2015). Bose-Einstein condensation in an electro-pneumatically transformed quadrupole-Ioffe magnetic trap. *New Journal of Physics* 17:023062.
111. Raghunandan, M., Mishra, C., Kazimierz, L., Pedri, P., Santos, L. and **Nath, R.** (2015). Two dimensional bright solitons in dipolar Bose-Einstein condensates with tilted dipoles. *Physical Review A* 92(1):013637.
112. **Nath, R.**, Dalmonte, M., Glaetzle, A.W., Zoller, P., Schmidt-Kaler, F. and Gerritsma, R. (2015). Hexagonal plaquette spin-spin interactions and quantum magnetism in a two-dimensional ion crystal. *New Journal of Physics* 17:065018.

Theoretical Sciences, Complex Systems, Particle Physics, and Astrophysics

113. Shekatkar, S.M. and **Ambika, G.** (2015). Novel coupling scheme to control dynamics of coupled discrete systems. *Communications in Nonlinear Science and Numerical Simulations* 25:50-65.
114. Shekatkar, S.M. and **Ambika, G.** (2015). Complex networks with scale-free nature and hierarchical modularity. *The European Physical Journal B* 88:227.

115. George, S.V., **Ambika, G.** and Misra, R. (2015). Effect of data gaps on correlation dimension computed from light curves of variable stars. *Astrophysics and Space Science* 360:5.
116. Goswami, B., Shekatkar, S.M., Rheinwalt, A., **Ambika, G.** and Kurths, J. (2015). A random interacting network model for complex networks. *Scientific Reports* 5: Article No 18183.
117. Shekatkar, S.M., **Bhagwat, C.** and **Ambika, G.** (2015). Divisibility patterns of natural numbers on a complex network. *Scientific Reports* 5: Article No 14280.
118. Akshay, Y. S. and **Ananth, S.** (2015). Fermi-Bose cubic couplings in light-cone field theories. *Physical Review D* 91:085029.
119. **Ananth, S.** and Mali, M. (2015). Light-cone gravity in dS(4). *Physics Letters B* 745:48-51.
120. **Ananth, S.**, Brink, L. and Mali, M. (2015). Yang-Mills theories and quadratic forms. *Journal of High Energy Physics* 2015:153.
121. **Bagchi, A.**, Basu, R., Grumiller, D. and Riegler, M. (2015). Entanglement entropy in Galilean conformal field theories and flat holography. *Physical Review Letters* 114:111602.
122. Afshar, H., **Bagchi, A.**, Detournay, S., Grumiller, D., Prohazka, S. and Riegler, M. (2015). Holographic Chern-Simons theories. *Lecture Notes in Physics* 892 (2015) 311-329.
123. Biswas, A. and **Bhattacharyay, A.** (2015). Equilibrium of a Brownian particle in a damping induced inhomogeneous space: An alternative approach. *Journal of Physics A: Mathematical and Theoretical* 48:015003.
124. **Chaudhury, S.** (2015). Modeling the effect of transcriptional noise on switching in gene networks in a genetic bistable switch. *Journal of Biological Physics* 41(3):235-246.
125. Kumar, P.S., Mukherjee, A. and **Hazra, A.** (2015). Theoretical study of structural changes in DNA under high external hydrostatic pressure. *Journal of Physical Chemistry B* 119:3348-3355.
126. Yadav, R.K., **Khare, A.** and Mandal, B.P. (2015). The scattering amplitude for rationally extended shape invariant Eckart potentials. *Physics Letters A* 379:67-70.
127. Yadav, R.K., Kumari, N., **Khare, A.** and Mandal, B.P. (2015). Group theoretic approach to rationally extended shape invariant potential. *Annals of Physics* 359:46-54.
128. Cuevas-Maraver, J., **Khare, A.**, Kevrekidis, P.G., Xu, H. and Saxena, A. (2015). PT-symmetric dimer in a generalized model of coupled nonlinear oscillators. *International Journal of Theoretical Physics* 54 (11):3960-3985.
129. **Mahesh, T.S.**, Shukla, A., Hegde, S., Kumar, C.S.S., Katiyar, H., Joshi, S. and Rao, K.R.K. (2015). Ancilla-assisted measurements on quantum ensembles: general protocols and applications in NMR quantum information processing. *Current Science* 109 (11):1987-1996.
130. Saha, D., Supekar, S. and **Mukherjee, A.** (2015). Distribution of residence time of water around DNA base pairs: Governing factors and the origin of heterogeneity. *Journal of Physical Chemistry B* 119:11371-11381.
131. Singh, K.R., Sasikala, W.D. and **Mukherjee, A.** (2015). Molecular origin of DNA kinking by transcription factors. *Journal of Physical Chemistry B* 119(35):11590-11596.
132. Lokhande, S.F. and **Mukhi, S.** (2015). Modular invariance and entanglement entropy. *Journal of High Energy Physics* 2015:106.
133. Hullet, T. and **Santhanam, M.S.** (2015). Preface to the special issue on Extreme Events and its Applications. *Chaos Solitons & Fractals* 74:1-2.
134. Patil, A. and **Santhanam, M.S.** (2015). Random matrix approach to categorical data analysis. *Physical Review E* 92(3):032130.
135. Chauhan, S., **Dube, S.**, **Sharma, S.**, Khachatryan, V. et al. (CMS Collaboration) (2015). Search for a light charged Higgs boson decaying to cs in pp collisions at $\sqrt{s}=8$ TeV. *Journal of High Energy Physics* 1512:178.
136. Chauhan, S., **Dube, S.**, **Sharma, S.**, Khachatryan, V. et al. (CMS Collaboration) (2015). Search for a charged Higgs boson in pp collisions at $\sqrt{s}=8$ TeV. *Journal of High Energy Physics* 1511:018.
137. Chauhan, S., **Dube, S.**, **Sharma, S.**, Khachatryan, V. et al. (CMS Collaboration) (2015). Search for supersymmetry in the vector-boson fusion topology in proton-proton collisions at $\sqrt{s}=8$ TeV. *Journal of High Energy Physics* 1511:189.
138. **Sharma, S.**, Khachatryan, V. et al. (CMS Collaboration) (2015). Measurement of the underlying event activity using charged-particle jets in proton-proton collisions at $\sqrt{s}=2.76$ TeV. *Journal of High Energy Physics* 1509:137.

139. Chauhan, S., Dube, S., Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Limits on the Higgs boson lifetime and width from its decay to four charged leptons. *Physical Review D* 92(7):072010.
140. Chauhan, S., Dube, S., Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Pseudorapidity distribution of charged hadrons in proton-proton collisions at $\sqrt{s} = 13$ TeV. *Physics Letters B* 751:143-163.
141. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for supersymmetry with photons in pp collisions at $\sqrt{s} = 8$ TeV. *Physical Review D* 92(7):072006.
142. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Production of leading charged particles and leading charged-particle jets at small transverse momenta in pp collisions at $\sqrt{s} = 8$ TeV. *Physical Review D* 92(11):112001.
143. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for neutral MSSM Higgs bosons decaying into a pair of bottom quarks. *Journal of High Energy Physics* 1511:071.
144. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for diphoton resonances in the mass range from 150 to 850 GeV in pp collisions at $\sqrt{s} = 8$ TeV. *Physics Letters B* 750:494-519.
145. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for the standard model Higgs boson produced through vector boson fusion and decaying to $b\bar{b}$. *Physical Review D* 92(3):032008.
146. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for neutral color-octet weak-triplet scalar particles in proton-proton collisions at $\sqrt{s} = 8$ TeV. *Journal of High Energy Physics* 1509:201.
147. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for a pseudoscalar boson decaying into a Z boson and the 125 GeV Higgs boson in $llb\bar{b}$ final states. *Physics Letters B* 748:221-243.
148. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Angular coefficients of Z bosons produced in pp collisions at $\sqrt{s} = 8$ TeV and decaying to $\mu^+\mu^-$ as a function of transverse momentum and rapidity. *Physics Letters B* 750:154-175.
149. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Measurement of the Z boson differential cross section in transverse momentum and rapidity in proton-proton collisions at 8 TeV. *Physics Letters B* 749:187-209.
150. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for the production of dark matter in association with top-quark pairs in the single-lepton final state in proton-proton collisions at $\sqrt{s} = 8$ TeV. *Journal of High Energy Physics* 1506:121.
151. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for a Higgs Boson in the Mass Range from 145 to 1000 GeV Decaying to a Pair of W or Z Bosons. *Journal of High Energy Physics* 1510:144.
152. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for Third-Generation Scalar Leptoquarks in the $t\tau$ Channel in Proton-Proton Collisions at $\sqrt{s} = 8$ TeV. *Journal of High Energy Physics* 1507:042.
153. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Searches for third-generation squark production in fully hadronic final states in proton-proton collisions at $\sqrt{s} = 8$ TeV. *Journal of High Energy Physics* 1506:116.
154. Sharma, S., Aad, G. *et al.* (CMS Collaboration) (2015). Combined Measurement of the Higgs Boson Mass in pp Collisions at $\sqrt{s} = 7$ and 8 TeV with the ATLAS and CMS Experiments. *Physical Review Letters* 114:191803.
155. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for resonant pair production of Higgs bosons decaying to two bottom quark-antiquark pairs in proton-proton collisions at 8 TeV. *Physics Letters B* 749:560-582.
156. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for vector-like T quarks decaying to top quarks and Higgs bosons in the all-hadronic channel using jet substructure. *Journal of High Energy Physics* 1506:080.
157. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Evidence for transverse momentum and pseudorapidity dependent event plane fluctuations in PbPb and pPb collisions. *Physical Review C* 92(3):034911.
158. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Study of final-state radiation in decays of Z bosons produced in pp collisions at 7 TeV. *Physical Review D* 91(9):092012.

159. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for lepton-flavour-violating decays of the Higgs Boson. *Physics Letters B* 749:337-362.
160. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for Physics beyond the standard model in events with two leptons, jets, and missing transverse momentum in pp collisions at $s = 8$ TeV. *Journal of High Energy Physics* 1504:124.
161. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Evidence for collective multiparticle correlations in p-Pb Collisions. *Physical Review Letters* 115(1):012301.
162. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for Narrow High-Mass Resonances in Proton-Proton Collisions at $s = 8$ TeV decaying to a Z and a Higgs Boson. *Physics Letters B* 748:255-277.
163. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Measurement of J/ψ and $\psi(2S)$ Prompt Double-Differential Cross Sections in pp Collisions at $\sqrt{s} = 7$ TeV. *Physical Review Letters* 114(19):191802.
164. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Performance of Photon Reconstruction and Identification with the CMS Detector in proton-proton collisions at $\sqrt{s} = 8$ TeV. *Journal of Instrumentation* 10(08):P08010.
165. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Performance of electron reconstruction and selection with the CMS detector in proton-proton collisions at $\sqrt{s} = 8$ TeV. *Journal of Instrumentation* 10(06):P06005.
166. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Constraints on the pMSSM, AMSB model and on other models from the search for long-lived charged particles in proton-proton collisions at $s = 8$ TeV. *European Physical Journal C* 75(7):325.
167. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for a Standard Model Higgs Boson produced in association with a top-quark pair and decaying to bottom quarks using a matrix element method. *European Physical Journal C* 75(6):251.
168. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Measurements of the $Y(1S)$, $Y(2S)$, and $Y(3S)$ differential cross sections in pp collisions at $s = 7$ TeV. *Physics Letters B* 749:14-34.
169. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for heavy Majorana neutrinos in $\mu\pm\mu\pm$ + jets events in proton-proton collisions at $s = 8$ TeV. *Physics Letters B* 748:144-166.
170. Khachatryan, V. *et al.* (CMS Collaboration) (2015). Search for resonances and quantum black holes using dijet mass spectra in proton-proton collisions at $s = 8$ TeV. *Physical Review D* 91(5):052009.
171. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Precise determination of the mass of the Higgs boson and tests of compatibility of its couplings with the standard model predictions using proton collisions at 7 and 8 TeV. *European Physical Journal C* 75(5):212.
172. Sharma, S., Khachatryan, V. *et al.* (CMS Collaboration) (2015). Searches for supersymmetry based on events with b jets and four W bosons in pp collisions at 8 TeV. *Physics Letters B* 745:5-28.
173. Mercier, C., Subramanian, P., Chambe, G. and Janardhan, P. (2015). The structure of solar radio noise storms. *Astronomy and Astrophysics* 576:A136.
174. Ingale, M., Subramanian, P. and Cairns (2015). Coronal turbulence and the angular broadening of radio sources - the role of the structure function. *Monthly Notices of the Royal Astronomical Society* 447:3486-3497.
175. Arunbabu, A., Dugad, G., Hayashi, K., Mohanty, O. and Subramanian, P. (2015). How are Forbush decreases related with interplanetary magnetic field enhancements? *Astronomy and Astrophysics* 580:A41.
176. Mercier, C., Subramanian, P., Chambe, G. and Janardhan, P. (2015). The structure of solar radio noise storms. *Astronomy & Astrophysics* 576:3486-3497.
177. Sachdeva, N., Subramanian, P., Colaninno, R. and Angelos, V. (2015). CME propagation: where does aerodynamic drag "take over"? *Astrophysical Journal* 809(2).
178. Suneeta, V. (2015). The sausage sigma model revisited. *Classical and Quantum Gravity* 32(11).

179. Kumar, M. and Venkatnathan, A. (2015). Quantum chemistry study of proton transport in imidazole chains. *Journal of Physical Chemistry B* 119:3213-3222.
180. Ramya, K.R., Kumar, P. and Venkatnathan, A. (2015). Molecular simulations of anion and temperature dependence on structure and dynamics of 1-hexyl-3-methylimidazolium ionic liquids. *Journal of Physical Chemistry B* 119(46):14800-14806.

Earth & Climate Science

181. Pavan Kumar, V., Prakasam, K.S., Rai, S.S. and Gupta, S. (2015). Upper-mantle anisotropy beneath the south Indian Shield: Influenced by ancient and recent Earth processes. *Lithosphere* 7:108-116.
182. Das, R., Saikia, U. and Rai, S.S. (2015). The deep geology of South India inferred from Moho depth and Vp/Vs ratio. *Geophysical Journal International* 203(2):910-926.

Plant Biology, Ecology, Evolution and Biodiversity

183. David, P., Agarwal, I., Athreya, R., Mathew, R., Vogel, G. and Mistry, V.K. (2015). Revalidation of *Natrix clerki* Wall, 1925, an overlooked species in the genus *Amphiesma* Dumeril, Bibron & Dumeril, 1854 (Squamata: Natricidae). *Zootaxa* 3919:375-395.
184. Varma, V., Barua, D., et al. (2015). Perceptions of priority issues in the conservation of biodiversity and ecosystems in India. *Biological Conservation* 187:201-211.
185. Karve, S.M., Daniel, S., Chavhan, Y.D., Anand, A., Kharola, S.S. and Dey, S. (2015). *Escherichia coli* populations in unpredictably fluctuating environments evolve to face novel stresses through enhanced efflux activity. *Journal of Evolutionary Biology* 28(5):1131-1143.
186. Prasad, N.G., Dey, S., Joshi, A. and Vidya, T.N.C. (2015). Rethinking inheritance, yet again: Inheritomes, contextomes and dynamic phenotypes. *Journal of Genetics* 94:367-376.

Cell & Developmental Biology, Neurobiology, and Computational Biology

187. Pawar, A.B., Deshpande, S.A., Gopal, S.M., Wassenaar, T.A. and Athale, C.A. and Sengupta, D. (2015). Thermodynamic and kinetic characterization of transmembrane helix association. *Physical Chemistry Chemical Physics* 17:1390-1398.
188. Raghavan, R., Dahanukar, N., Philip, S., Iyer, P., Kumar, B., Daniel, B. and Molur, S. (2015). The conservation status of decapod crustaceans in the Western Ghats of India: an exceptional region of freshwater biodiversity. *Aquatic Conservation-Marine and Freshwater Ecosystems* 25:259-275.
189. Dahanukar, N., Kumkar, P., Katwate, U., Raghavan, R. (2015). *Badis britzi*, a new percomorph fish (Teleostei: Badidae) from the Western Ghats of India. *Zootaxa* 3941:429-436.
190. Raghavan, R. and Dahanukar, N. (2015). Taxonomy matters. *Current Science* 108:1416-1418.
191. Molur, S., Krutha, K., Paingankar, M.S., Dahanukar, N. (2015). Asian strain of *Batrachochytrium dendrobatidis* is widespread in the Western Ghats, India. *Diseases of Aquatic Organisms* 112:251-255.
192. Katwate, U., Raghavan, R. and Dahanukar, N. (2015). The identity of Hamilton's Ticto Barb, *Pethia ticto* (Teleostei: Cyprinidae). *Zootaxa* 3964(4):401-418.
193. Raghavan, R., Dahanukar, N. and Molur, S. (2015). Curbing academic predators: JoTT's policy regarding citation of publications from predatory journals. *Journal of Threatened Taxa* 7(10):7609-7611.
194. Padhye, S. and Dahanukar, N. (2015). Determinants of 'water fleas' (Crustacea: Branchiopoda: Cladocera) diversity across seasonal and environmental gradients of a polluted river. *Current Science* 109(10).

195. Keskar, A., Kumkar, P., Katwate, U., Ali, A., Raghavan, R. and **Dahanukar, N.** (2015). Redescription of *Nemachilichthys rueppelli*, a senior synonym of *N. shimogensis* (Teleostei: Nemacheilidae) *Zootaxa* 4059(3):555-568.
196. Keskar, A., Kumkar, P., Paingankar, M.S., Padhye, A. and **Dahanukar, N.** (2015). Length-weight and length-length relationships of seven loach species (Teleostei: Cypriniformes) from five localities in northern Western Ghats, India. *Journal of Threatened Taxa* 7 (15):8205-8220.
197. Padhye, A.D., Jadhav, A., Sulakhe, S. and **Dahanukar, N.** (2015). Sexual dimorphism in the Kudremukh Bush Frog (Anura: Rhacophoridae: *Raorchestes tuberochumerus*) of the Western Ghats, India, with a note on its distribution and conservation status. *Journal of Threatened Taxa* 7 (6):7211-7222.
198. Reddy, P.C., Sinha, I., Kelkar, A., Habib, F., Pradhan, S.J., Sukumar, S. and **Galande, S.** (2015). Comparative sequence analyses of genome and transcriptome reveal novel transcripts and variants in the Asian elephant *Elephas maximus*. *Journal of Biosciences* 40:891-907.
199. Hardikar, A.A., Limaye, A. and **Galande, S. et al.** (2015). Multigenerational undernutrition increases susceptibility to obesity and diabetes that is not reversed after dietary recuperation. *Cell Metabolism* 22(2):312-319.
200. Reddy, P.C., Unni, M.K., Gungi, A., Agarwal, P. and **Galande, S.** (2015). Evolution of Hox-like genes in Cnidaria: Study of Hydra Hox repertoire reveals tailor-made Hox-code for Cnidarians. *Mechanisms of Development* 138(2):87-96.
201. **Karmodiya, K.**, Pradhan, S.J., Joshi, B., Jangid, R., Reddy, P.C. and **Galande, S.** (2015). A comprehensive epigenome map of *Plasmodium falciparum* reveals unique mechanisms of transcriptional regulation and identifies H3K36me2 as a global mark of gene suppression. *Epigenetics & Chromatin* 8(32).
202. Sahasrabudhe, A., Ghate, K., Mutalik, S., Jacob, A. and **Ghose, A.** (2015). Formin-2 regulates stabilization of filopodial tip adhesions in growth cones and affects neuronal outgrowth and pathfinding *in vivo*. *Development* 143(3):449-460.
203. Rawat, M., Bhosale, M.A. and **Karmodiya, K.** (2015). *Plasmodium falciparum* epigenome: A distinct dynamic epigenetic regulation of gene expression. *Genomics Data* 7:79-81.
204. Chand, M.K., Nirwan, N., Diffin, F.M., Aelst, K.V., Kulkarni, M., Pernstich, C., Szczelkun, M.D. and **Kayarat, S.** (2015). Translocation-coupled DNA cleavage by the Type ISP restriction-modification enzymes. *Nature Chemical Biology* 11(11):870-879.
205. **Matange, N.** (2015). Revisiting bacterial cyclic nucleotide phosphodiesterases: cyclic AMP hydrolysis and beyond. *FEMS Microbiology Letters* 362(22).
206. Holkar, S.S., Kamerkar, S.C. and **Pucadyil, T.J.** (2015). Spatial control of epsin-induced clathrin assembly by membrane curvature (2015). *Journal of Biological Chemistry* 290:14267-14276.
207. Dar, S., Kamerkar, S., and **Pucadyil, T.** (2015). A high-throughput platform for real-time analysis of membrane fission reactions reveals dynamin function. *Nature Cell Biology* 17(12):1588-1596.
208. Mungi, C.V. and **Rajamani, S.** (2015). Characterization of RNA-like oligomers from lipid-assisted nonenzymatic synthesis: Implications for origin of informational molecules on early earth. *Life* 5:65-84.
209. Scharf, C., Virgo, N., Cleaves, H.J. 2nd, Aono, M., Aubert-Kato, N., Aydinoglu, A., Barahona, A., Barge, L.M., Benner, S.A., Biehl, M., Brassler, R., Butch, C.J., Chandru, K., Cronin, L., Danielache, S., Fischer, J., Hernlund, J., Hut, P., Ikegami, T., Kimura, J., Kobayashi, K., Mariscal, C., McGlynn, S., Menard, B., Packard, N., Pascal, R., Pereto, J., **Rajamani, S.**, Sinapayan, L., Smith, E., Switzer, C., Takai, K., Tian, F., Ueno, Y., Voytek, M., Witkowski, O. and Yabuta, H. (2015). A strategy for origins of life research. *Astrobiology* 15(12):1031-1042.
210. Bapat, N.V. and **Rajamani, S.** (2015). Effect of co-solutes on template-directed nonenzymatic replication of nucleic acids. *Journal of Molecular Evolution* 81(3-4):72-80.
211. Deivasigamani, S., Basargekar, A., Shweta, K. Sonavane, P., **Ratnaparkhi, G.S.** and Ratnaparkhi, A. (2015). A presynaptic regulatory system acts transsynaptically via Mon1 to regulate glutamate receptor levels in *Drosophila*. *Genetics* 201(2):651-664.
212. Handu, M., Kaduskar, B., Ravindranathan, R., Elango, V., Giri, R., Gowda, H. and **Ratnaparkhi, G.S.** (2015). SUMO enriched proteome for the *Drosophila* innate immune response. *G3: Genes, Genomes & Genetics* 18:2137-2154.

213. Singh, S., Sánchez-Herrero, E. and **Shashidhara, L.S.** (2015). Critical role for Fat/Hippo and IIS/Akt pathways downstream of Ultrabithorax during haltere specification in *Drosophila*. *Mechanisms of Development* 138 (Pt 2):198-209.
214. Prasad, N. and **Shashidhara, L.S.** (2015). Gliolectin positively regulates Notch signalling during wing-vein specification in *Drosophila*. *International Journal of Developmental Biology* 59:187-194.
215. Shelkar, G.P., Kale, A.D., Singh, U., Singru, P.S., **Subhedar, N.K.** and, Kokare, D.M. (2015). Alpha-melanocyte stimulating hormone modulates ethanol self-administration through melanocortin-4 receptors in posterior ventral tegmental area. *Addiction Biology* 20(2):302-315.
216. Bharne, A.P., Borkar, C.D., **Subhedar, N.K.** and Kokare, D.M. (2015). Differential expression of CART in feeding and reward circuits in binge eating rat model. *Behavioural Brain Research* 291:219-231.
217. Borkar, C.D., Upadhyaya, M.A., Shelkar, G.P., **Subhedar, N.K.**, Kokare, D.M. (2015). Neuropeptide Y system in accumbens shell mediates ethanol self-administration in posterior ventral tegmental area. *Addiction Biology* 21:766-775

Number Theory, Analysis, and Applicable Mathematics

218. **Bhagwat, C.** On Deligne's periods for tensor product motives. *Comptes rendus - Mathématique* 353:191-195.
219. **Chorwadwala, A.**, Mahadevan, R. and Toledo, F. (2015). On the Faber-Krahn inequality for the Dirichlet p -Laplacian. *ESAIM: Control, Optimization and Calculus of Variations* 21:60-72.
220. **Chorwadwala, A.** and Mahadevan, R. (2015). An eigenvalue optimisation problem for the p -Laplacian. *Proceedings of the Royal Society of Edinburgh: Section A Mathematics* 145:1145-1151.
221. **Goel, P.** (2015). Insulin resistance or hypersecretion? The beta IG picture revisited. *Journal of Theoretical Biology* 384:131-139.
222. **Mahalanobis, A.** (2015). The MOR cryptosystem and finite p -groups. *Contemporary Mathematics* 633:81-95. (Special Issue on Algorithmic problems of group theory, their complexity and applications to cryptography)
223. **Sebastian, R.** (2015). Examples of smash nilpotent cycles on rationally connected Varieties. *Journal of Algebra* 438:119-129.
224. Murty, R.M. and **Sinha, K.** (2015). The generalized Dedekind determinant, in SCHOLAR---a scientific celebration highlighting open lines of arithmetic research. *Contemporary Mathematics* 655:153-164.

Humanities and Social Sciences

225. **Mathew, J.** (2015). Edward Blyth, John M'Clelland, the curatorship of the Asiatic Society's collections and the origins of the Calcutta Journal of Natural History. *Archives of Natural History* 42(2):265-278.

Book Chapters

226. Mukherjee, S., and **Ghosh, S.K.** (2015). Cadmium based catalysis. In Sustainable Catalysis: With Non-endangered Metals Part 2 (Ed: Prof. Michael North) Royal Society of Chemistry, ISSN:1757-7039.

Publications of IISER Pune Faculty Members with part or all of the work carried out elsewhere

- Banerjee, A.** and Azam, M.F. (2015). Temperature reconstruction from glacier length fluctuations in the Himalaya. *Annals of Glaciology* 57:71.
- Naro, E., Mero, E.L., Naro, E., Kapfo, K., Wezah, K., Thopi, K., Rhakho, K., Akami, L., Thopi, L., Chirhah, M., Chirhah, T., Tshah, T., Thopi, T., Wezah, W., Mero, W.L., Thopi, W., Thopi, K., Naro, T., Tshah, W., **Dahanukar, N.** and Molur, P.B. (2015). Project hunt: an assessment of wildlife hunting practices by local community in Chizami, Nagaland, India. *Journal of Threatened Taxa* 7(11): 7729-7743.
- Dwivedi, S., **Goswami, B.N.** and Kucharski, F. (2015). Unraveling the missing link of ENSO control over the Indian monsoon rainfall. *Geophysical Research Letters* 42(19):8201-8207.
- Ganguly, S., **Kabir, M.**, Autieri, C., and Sanyal, B. (2015). Manipulating magnetism of MnO nanoclusters by tuning the stoichiometry and charge state. *Journal of Physics: Condensed Matter* 27:056002.
- Kalia, J.**, Milescu, M., Salvatierra, J., Wagner, J., Klint, J.K., King, G.F., Olivera, B.M. and Bosmans, F. (2015). From foe to friend: Using animal toxins to investigate ion channel function. *Journal of Molecular Biology* 427:158-175.
- Pahuja, K.B., Wang, J., Blagoveshchenskaya, A., Lim, L., **Madhusudhan, M.S.**, Mayinger, P., Schekman, R. (2015). Phosphoregulatory protein 14-3-3 facilitates SAC1 transport from the endoplasmic reticulum. *Proceedings of the National Academy of Sciences USA* 112(25):E3199-E3206.
- Majumdar, M.**, Omlor, I., Yildiz, C.B., Azizoglu, A., Huch, V. and Scheschkewitz, D. (2015). Reductive cleavage of carbon monoxide by a diselenide. *Angewandte Chemie International Edition* 54:8746-8750 (Hot Paper).
- Glaetzle, A.W., Dalmonte, M., **Nath, R.**, Greene, C., Bloch, I. and Zoller, P. (2015). Designing Frustrated quantum magnets with laser-dressed Rydberg atoms. *Physical Review Letters* 114(17):173002.
- Nath, R.**, Dalmonte, M., Glaetzle, A.W., Zoller, P., Schmidt-Kaler, F. and Gerritsma, R. (2015). Hexagonal plaquette spin-spin interactions and quantum magnetism in a two-dimensional ion crystal. *New Journal of Physics* 17:065018.
- Nag, A.**, Zhang, H., Janke, E. and Talapin, D.V. (2015). Inorganic surface ligands for colloidal nanomaterials. *Zeitschrift für Physikalische Chemie* 229:85-107.
- Kulkarni, K.G. and **Panchang, R.** (2015). New insights into polychaete traces and fecal pellets: Another complex ichnotaxon? *PloS One* 10(10):e0139933.
- Borah, K., Kanna, N., **Rai, S.S.** and Prakasam, K.S. (2015). Sediment thickness beneath the Indo-Gangetic Plain and Siwalik Himalaya inferred from receiver function modelling. *Journal of Asian Earth Sciences* 99:41-56.
- Gilligan, A., Priestley, K.F., Roecker, S.W., Levin, V. and **Rai, S.S.** (2015). Crustal structure variation across the western Himalaya and Tibet. *Journal of Geophysical Research* 120:3946-3964.
- Rikhy, R.**, Mavrakis, M. and Lippincott-Schwartz, J. (2015). Dynamin regulates metaphase furrow formation and plasma membrane compartmentalization in the syncytial *Drosophila* embryo. *Biology Open* 4(3):301-311.
- Geboy, N.J., **Tripathy, G.R.**, Ruppert, L.F., Eble, C.F., Blake, B.M., Hannah, J.L., Stein, H.J. (2015). Re-Os age for the Lower-Middle Pennsylvanian Boundary and comparison with associated palynoflora. *International Journal of Coal Geology* 140:23-30.
- Tripathy, G.R.** and Singh, S.K. (2015). Re-Os depositional age for black shales from the Kaimur Group, Upper Vindhyan, India. *Chemical Geology* 413:63-72.
- Tripathy, G.R.**, Hannah, J.L., Stein, H.J., Geboy, N.J. and Ruppert, L.F. (2015). Radiometric dating of marine-influenced coal using Re-Os geochronology. *Earth and Planetary Science Letters* 432:13-23.

Patents

During the year 2015-16, one patent has been granted and nine applications for patents have been filed.

Chakrapani, H. and Malwal, S.R. Thiol mediated/activated prodrugs of sulfur dioxide (SO₂) having anti-bacterial activity. Patent No. US 9,079,870 B2 (Granted)

Invited Lectures

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

G. Ambika	<p><i>Complexity Measures from Time Series</i> Indo-US Workshop on Time Series Analysis (WTSA), IISER Pune, May 25-30, 2015 • <i>Environmental effects in the dynamics of coupled systems</i> National Seminar on Recent Trends and Applications in Nonlinear Dynamics, D.B. College, Kottayam, July 9-11, 2015 • <i>Complex networks and time series</i> IIT Ropar, August 11, 2015 • <i>Complex networks from chaotic time series</i> Dynamics Days - Europe, University of Exeter, UK, September 5-11, 2015 • <i>Control of dynamics in coupled systems</i> Recent Trends in Physics and Research, UGC National Seminar, St. Xavier's College, Aluva, December 15, 2015 • <i>Control of dynamics in coupled s discrete systems</i> National Seminar on Dynamical Systems and Chaos, St. Mary's College, Sultan Bathery, January 26, 2016 • <i>Divisibility Pattern of Natural Numbers on a Complex Network and Complexity Measures from Time series</i> (Special session on Time Series Analysis), Complex System Approach to Self-organization (CSAS), IIT Chennai, February 1-5, 2016</p>
Sudarshan Ananth	<p><i>Technical Lectures: Fermi-Bose cubic couplings in light-cone field theories</i> Chennai Mathematical Institute, September 22, 2015 • <i>Spacetime and quantum mechanics</i> IISER Mohali, October 12, 2015 • <i>Relating the forces of Nature</i>, INYAS Meeting, Mohali, October 13, 2015 • <i>Fermi-Bose cubic couplings in light-cone field theories</i> International Workshop on Higher Spin Gauge Theories, Institute for Advanced Studies, Nanyang Technological University, Singapore, November 5, 2015; <i>Public Lectures: Spacetime and quantum mechanics</i> Army Institute of Technology, Pune, February 17, 2016 • <i>Spacetime and quantum mechanics</i> SPS, Jawaharlal Nehru University, Delhi, February 26, 2016 • <i>Spacetime and quantum mechanics</i> Tryst, IIT Delhi, February 28, 2016 • <i>Spacetime and Quantum Mechanics</i> University of Hyderabad, Hyderabad, March 11, 2016</p>
Chaitanya Athale	<p><i>A tug-of-war in the transport of radial microtubule arrays</i> Indo-French Conference on Frontiers in Cytoskeleton Research: Coordination, Adaptation, Fine Tuning, IISER Pune, October 25-27, 2015 • <i>A theoretical model of replication stochasticity in the bacterial cell cycle</i> Bacterial Expressions, NCBS-TIFR, Bengaluru, December 1-5, 2015</p>
Nagaraj Balasubramanian	<p><i>To stick or not to stick: The role of cell adhesion in our lives</i> DBT STAR Program, Fergusson College, Pune, February 2016 • <i>Cells in 2D vs 3D: Which is better and why</i> NAAC Lecture Series, Garware College, Pune, February 2016</p>
Baskar Balasubramanyam	<p><i>Special values of L-functions and congruences of modular forms</i> University of Padova, Italy, October 2015 • <i>Special values of L-functions and congruences of modular forms</i> ICTP Trieste, Italy, October 2015</p>
Nirmalya Ballav	<p>IISER Pune-Temple University Joint Symposium on Chemistry and Physics of Advanced Materials, IISER Pune, December 2015 • <i>Emerging Trends in Advanced Functional Materials</i>, IOP Bhubaneswar, February 2016</p>
Argha Banerjee	<p><i>Glacier fluctuations in the Himalaya</i> Seminar Series of IDP in Climate Studies, IIT Bombay, February 10, 2016</p>
Debargha Banerjee	<p><i>Eisenstein elements inside the modular symbols</i> Colloquium Talk, IMSc, Chennai, August 2015 • <i>Eisenstein elements inside the modular symbols</i> Arithmetic Geometry Seminar, Bielefeld University, Germany, September 18, 2015 • <i>\$\$\$ on the Eisenstein elements inside the modular symbols</i> ISI, Kolkata, November 2015 • <i>Uniform boundedness</i></p>

	<i>theorem and the Kloosterman sums</i> ISI, Kolkata, February, 2016 • <i>p-adic L-functions on GL_n</i> , IIT Madras
Nabamita Banerjee	<i>Null Fluid, a new view to Galilean Fluid</i> Quantum Spacetime Seminar Series, TIFR Mumbai, November 5, 2015 • <i>Charged Galilean Fluids</i> Fourth India-Israel Workshop on Quantum Field Theory and String Theory, Goa, December 22, 2015
Deepak Barua	<i>Plant reproductive strategies and pollination</i> Pollination of flowers by insects: From ecology to chemistry and behaviour, JNTBGRI, Workshop organized by Exeter University, UK and IISER Thiruvananthapuram, January 9-13, 2016
Rabeya Basu	Series of talks, Department of Mathematics, Lady Brabourne College, Kolkata, May 2015 • Algebra and Group Theory Conference in honor of Otto Kegel, Mulhouse, France, October 21-24, 2015 • <i>Group theory</i> (4 talks), ATM School, Bhaskaracharya Pratisthana, AFSI, December 2015
Sudipta Basu	<i>Nanotechnology in cancer chemotherapy</i> , NCCS Pune • <i>Chimeric nanoparticle: A platform for simultaneous targeting of PI3K signaling and DNA damage in cancer</i> International Conference on Cancer Research: New Horizons, NCCS, Pune, November 19-21, 2015 • <i>Dual drug conjugated nanoparticle for simultaneous targeting of mitochondria and nucleus in cancer cells</i> Nano-Bio-Med-2015, IIT Bombay, December 1-4, 2015 • <i>Targeting mitochondria in cancer</i> RSC-WIS Symposium, North Maharashtra University, Jalgaon, December 11-12, 2015 • <i>Nanoparticle mediated targeting of mitochondria induces apoptosis in cancer cells</i> BITS Conference on Gene and Genome Regulation, BITS, Pilani, February 18-20, 2016 • <i>Nanoparticle mediated targeting of mitochondria induces apoptosis in cancer cells</i> International Conference on Frontiers in Nanoscience and Nanotechnology, SASTRA University Thanjavur, February 26-28, 2016 • <i>Nanoparticle mediated targeting of mitochondria in cancer</i> Recent Advances in Nanotechnology, Department of Microbiology, SP Pune University, Pune
Chandrasheel Bhagwat	<i>On ratios of Deligne periods</i> Department of Mathematics, University of Maryland, USA, June 2015 • Series of lectures on <i>Linear Groups</i> Annual Foundational School at Bhasakaracharya Pratishthan, Pune, December 2015
Ramakrishna G. Bhat	<i>Chemistry, curiosity and common-sense: Teaching at its best</i> Teachers Training Programme, Raipur, October 6-8, 2015 • <i>Tactics and strategies in organic synthesis</i> RSC-WIS Symposium, Frontiers of Advances in Chemistry and Technology (FACT), Jalgaon, December 11-12, 2015 • <i>Newer strategies for the synthesis of molecules of industrial relevance</i> National Conference on Chemical Sciences (NCCS), Amravati, January 29-30, 2016
Anup Biswas	Indo-UK workshop on SPDEs and application, IISc, Bengaluru, December 9-19, 2015 • International Indian Statistical Association Conference, Pune, December 20-24, 2015
R. Boomi Shankar	<i>Functional metal-organic materials derived from rigid and flexible P-N scaffolds</i> 14 th International Conference on Inorganic Ring Systems (IRIS-14), University of Regensburg, Germany, July 26-August 1, 2015 • <i>Polar and ferroelectric metal-organic materials supported by amino-P(V) ligands</i> National Meeting on Chemical Frontiers-2015, organized by IIT-Bombay and JNCASR Bengaluru, Majorda Beach Resort, Goa, August 15-18, 2015 • <i>Functional metal-organic materials derived from rigid and flexible P-N scaffolds</i> Department of Chemistry, IISER Bhopal, September 8, 2015
Harinath Chakrapani	National Meeting on Chemical Frontiers-2015, organized by IIT Bombay and JNCASR, Bengaluru, in Goa, August 15-18, 2015 (Selected for Young Scientist Award) • Complex Chemical Systems, IIT Kanpur, November 2-3, 2015 • Inter-IISER Chemistry Meet, IISER Thiruvananthapuram, December 11-13, 2015 • 5 th INDIGO Research Conference, Lucknow, February 21-24, 2016 • Optics Within Life Sciences (OWLS 2016), March 16-19, 2016

Apratim Chatterji	<i>Hierarchical self assembly: Self organized nano-structures in a nematically ordered matrix of self-assembled polymeric chains</i> Growing length scale phenomenon in Condensed Matter Physics, JNCASR, Bengaluru, October 8-10, 2015 • <i>Multiscale simulations in soft matter physics</i> Mumbai Pune Complex Fluids Meeting, IIT Mumbai, January 10, 2016 • <i>Basic notions of soft matter</i> Workshop on Driven Soft Matter and Biological Systems, Physics Department, SP Pune University, March 18, 2015
Srabanti Chaudhury	<i>Probing randomness parameter to study single event statistics using a first passage time distribution formalism</i> Two-day symposium on Perspective in Teaching & Research in Physical Chemistry, IACS, Kolkata, August 21-22, 2015 • <i>Probing randomness parameter to study single event statistics using a first passage time distribution formalism</i> Conference on Anomalous Diffusion: Wild and Bad, Bad Wildbad, Germany, October 3-8, 2015
Anisa Chorwadwala	<i>Louis Nirenberg, the Abel Prize 2015 winner</i> , Abel Prize Symposium, Mathematics Club, IISER Pune, April 17, 2015 • <i>Lecture and demonstrations on Fun with Maths</i> Summer School: Joy of Learning Program and Ishan Vikas Shibir, IISER Pune, May 18, 2015; Hutatma Balabir Shirishkumar School, Pune, November 27, 2015; K.C. Thackeray Vidyaniketan School, Pune, November 28, 2015; Dr Vasantdada Patil Vidyaniketan School, Pune, December 1, 2015 • <i>Fun with Maths</i> Ishan Vikas Shibir, IISER Pune, December 2, 2015 • <i>Six lectures on basic topics in Algebraic Topology</i> Instructional School for Teachers (IST) on Algebraic Topology, Department of Mathematics, Goa University, December 7-19, 2015 • <i>Colloquium</i> , Department of Mathematical Sciences, University of Bath, UK, March 24, 2016
Jeetender Chugh	<i>Characterization of therapeutic peptides by NMR</i> USP Biology Workshop, Hyderabad, February 15-16, 2016 • <i>Basics of NMR spectroscopy and its applications to small molecules</i> Rasayanika: Chemistry Festival, Miranda House, New Delhi, March 4, 2016
Aloke Das	<i>Direct spectroscopic evidence of $n \rightarrow \pi^*$ interaction</i> 13 th DAE-BRNS Biennial Trombay Symposium on Radiation & Photochemistry (TSRP-2016) and 6 th Asia Pacific Symposium on Radiation Chemistry (APSRC-2016), Bhabha Atomic Research Centre, Mumbai, January 5-9, 2016 • <i>Direct spectroscopic evidence for $n \rightarrow \pi^*$ interaction</i> International Conference on Recent Advances in Molecular Spectroscopy: Fundamentals and Applications in Materials and Biology (RAMS-2016), School of Chemistry, University of Hyderabad, March 2-4, 2016
Neelesh Dahanukar	<i>Integrated taxonomy</i> 6 th Student Conference on Conservation Science, Satellite workshop on Freshwater Fish Conservation: Concepts, Techniques and Strategies, IISc, Bengaluru, September 8-11, 2015 • <i>Molecular systematics of freshwater fishes with special reference to the Western Ghats</i> National Seminar on Modern Trends in Molecular Systematics, Research and Postgraduate Department of Zoology, St. Thomas' College, Thrissur, Kerala, September 10-11, 2015 • <i>Application of bioinformatics: An overview</i> Lecture series and hands-on training in Application of Bioinformatics in Biodiversity study, Department of Biodiversity, M.E.S. Abasaheb Garware College, Pune March 21-23, 2016
Shouvik Datta	<i>Electro-optical characterization of defects in electronic materials & devices</i> IISER Pune, NCL Pune, July 29, 2015 • <i>Sky is the limit: The story of blue light emitting diodes</i> Karnatak University, August, 2015 • <i>Negative activation energy and dielectric signatures of excitons and excitonic mott transitions in quantum confined laser structures</i> IISER Pune-Temple University joint symposium on Chemistry and Physics of Advanced Materials, IISER Pune, December 1, 2015
Aparna Deshpande	<i>Scanning Tunnelling Microscopy (STM) - A window into the world of atoms, molecules, and surfaces</i> Frontiers in Physics VIII, Fergusson College, Pune, January 20, 2016

Sutirth Dey	<i>Life at the time of uncertainties: How fluctuating complex environments affect the evolution of bacteria</i> National Conference on Ethology and Evolution, IISER Mohali, October 30-November 1, 2015 and Second Bengaluru School on Population Genetics and Evolution ICTS, Bengaluru, January 25 - February 6, 2016
C.V.Dharmadhikari	<i>Scanning Probe Microscopy: Fundamentals to applications</i> 2 nd National Seminar on Nanotechnology - New Materials & Applications in ITM Universe, Vadodara, April 10-11, 2015 • <i>Scanning Probe Microscopy in device characterization</i> International Conference on Electron Microscopy & XXXVI Annual Meeting of Electron Microscope Society of India (EMSI), CIDCO Convention Centre, Navi Mumbai, July 8-10, 2015
Sourabh Dube	<i>Experimental particle physics</i> Annasaheb Awate College, Manchar, Pune, December 2015
Sanjeev Galande	<i>Epigenetic regulation by the RNAi machinery</i> Summer School on RNA-interference as a Tool for Plant Functional Genomics and Crop Improvement, National Research Centre for Plant Biotechnology, New Delhi, May 20, 2015 • <i>Chromatin organizer SATB1 as molecular target for cancer therapy: A novel mechanism for anti-cancer activity of statins</i> International Conference on Cancer Research: New Horizons, NCCS Pune, November 19-21, 2015 • <i>From genome to epigenome</i> (in Marathi) Vidhyan Bharati, Pune Chapter, November 24, 2015 • <i>Hydra as an emerging model system for understanding the molecular basis of body patterning</i> Guha Research Conference-2015, Bodhgaya-Nalanda, November 28 - December 2, 2015 • <i>Evolutionary adaptation of transcription factors into Wnt signaling network: Insights into the head organizer in hydra</i> National Institute of Plant Genome Research, Delhi, January 6, 2016 • <i>Regulation of chromatin organizer SATB1 in colorectal tumorigenesis: A novel role of Wnt signalling</i> 6 th International Symposium on Current Trends in Drug Discovery & Research (CTDDR-2016), CSIR-CDRI, Lucknow, February 25-28, 2016 (Also Chaired a session in this meeting) • <i>Signaling to chromatin: Tale of SATB family genome organizers</i> Turku Centre for Biotechnology, Turku, Finland, February 10, 2016 • <i>From genome to epigenome: A new perspective towards understanding complex diseases</i> National Seminar on Current Trends in Epigenetics, Institute of Bioinformatics and Biotechnology, SP Pune University, February 5, 2016 • <i>From genome to epigenome</i> at the General Practitioners' Meet in Pune and two INSPIRE camps, including National Institute of Technology, Raipur
Aurnab Ghose	<i>On growth and Formin(g) neuronal filopodia</i> Cell Mechanics Meeting, Raman Research Institute, Bengaluru, April 24-26, 2015 • <i>FORMIN(g) neuronal filopodia and the development of neural circuits</i> Biennial meeting of the Indian Society of Developmental Biologists (InSDB), CCMB, Hyderabad, July 15-18, 2015 • <i>Mechanobiology of the neuronal growth cone</i> National Symposium on Medical Biophysics, SP Pune University, September 25-26, 2015 • <i>Neuronal pathfinding and regulation of filopodial adhesions by Formin-2</i> Indo-French Meeting on Frontiers of Cytoskeleton Research: Coordination, adaptation and fine tuning, IISER Pune, October 25-27, 2015 • <i>Building connections and tuning outputs: From Molecules to Behaviour via Circuits</i> National Research Scholar Meeting, ACTREC, Navi Mumbai, December 17-18, 2015 • <i>Growth cone mechanobiology and the development of neural circuits</i> INSA-Leopoldina Symposium Brain and Eye, LV Prasad Eye Institute, Hyderabad, February 1-2, 2016 • <i>Building connections & tuning outputs: From molecules to behaviour via circuits</i> IBRO-APRC School on Development and Functions of Brain Circuits: From Molecules to Behaviour, NBRC, Manesar, March 15-30, 2016
Prasenjit Ghosh	<i>Tuning properties of supported graphene through chemical functionalization and substrate modifications</i> Condensed Matter and Statistical Physics Section, Abdus Salam International Centre for Theoretical Physics, Trieste, Italy, May 18, 2015 • <i>Practical aspects of DFT using Quantum ESPRESSO</i> 3 rd International E-Workshop/Conference on Computational Condensed Matter Physics and Materials Science, ABV-Indian Institute of Information Technology & Management, Gwalior, October 18-22, 2015 • <i>Nuclear</i>

	<i>quantum effects on structural and optical properties of ellipticine in water and methanol</i> IISER Pune-Temple University Joint Symposium on Chemistry and Physics of Advanced Materials, IISER Pune, December 1, 2015
Sujit Ghosh	<i>Metal-Organic Frameworks (MOFs) as chemical sensors and fuel cell membrane</i> Inter-IISER Chemistry Meet, IISER Thiruvananthapuram, December 11-13, 2015 • <i>Metal-Organic Frameworks (MOFs) as chemical sensors and fuel cell membrane</i> National Symposium on Emerging Trends in Chemistry (ETC 2016), Department of Chemistry, North Eastern Hill University (NEHU), Shillong, March 28-19, 2016
H.N. Gopi	5 th Indian Peptide Symposium, JNCASR Bengaluru, September 24-25, 2015 • 7 th Peptide Engineering Meeting, IISER Pune, December 5-7, 2015
Anindya Goswami	<i>Statistical inference in a regime switching market</i> Research Workshop and Conference on Statistical Methods in Finance, CMI, Chennai, July 16, 2015 • <i>Regime switching model of financial market</i> IISER Thiruvananthapuram, November 27, 2015
Amrita Hazra	<i>Discovery of the genes for the anaerobic biosynthesis of 5,6-dimethylbenzimidazole, the lower ligand of Vitamin B12</i> IUSSTF Cell Factories Workshop, IIT Bombay, March 2016
Anirban Hazra	<i>Mechanism of nitrogen dioxide chemiluminescence</i> Discussion Meeting on Spectroscopy and Dynamics of Molecules and Clusters, Mahabaleshwar, February 20, 2016 • <i>Science! A scientist's perspective</i> Sri Sri Ravishankar Vidya Mandir, Bhugaon, Pune, April 17, 2015 • Workshop on Science as a process of discovery, Isha Home School, Coimbatore, July 1, 2015 • <i>Hartree-Fock theory: Problem definition and the nature of the solutions</i> National Workshop on Electronic Structure Methods: Density Functional Theoretic Perspectives (NWESM-2016), March 2, 2016
Partha Hazra	<i>Excited state photophysics and conformational transition of molecules and biomolecules in presence of graphene oxide and ionic liquid</i> IISER Pune-Temple University Joint Symposium on Chemistry and Physics of Advanced Materials, IISER Pune, December 1, 2015 • <i>Conformational transition and stabilization of DNA by ionic liquid</i> Workshop on Radiation and Photochemistry (PUWORP-2016), SP Pune University, January 10-12, 2016
M. Jayakannan	<i>Block copolymer assemblies for cisplatin delivery to breast cancer cells</i> Inter IISER-Chemistry Meet, Thiruvananthapuram, December 11-13, 2015 • Indo-Austria Conference on Polymer Vesicles for Combination Therapy in Cancers, October 28-31, 2015, Karnatak University, Dharwad • <i>Polymer nano-scaffolds as drug delivery platforms</i> Biopolymers & Green Composites—Emerging Science & Technology Conference, CBPST-CIPET, Kochi, October 9-10, 2015 (Plenary Lecture) • <i>Polymer vesicles for drug delivery</i> CSIR-NEIST, Jorhat, July 23, 2015 • <i>Enzyme and pH responsive polymer vesicles for drug delivery</i> Indo-German Meeting, Delhi University, March 30, 2015 • <i>Polymer vesicles as drug delivery platforms</i> MACRO-2015 International Conference, IACS, Kolkata, January 23-26, 2015
Mukul Kabir	<i>Point-defect and transition metal complexes in phosphorene</i> Functional Materials for Today and Tomorrow, Hotel Hindusthan International, October 28-30, 2015 • <i>Transition metal and vacancy defect complexes in phosphorene: A spintronic perspective</i> IISER Pune and Temple University joint symposium on Chemistry and Physics of Advanced Materials, IISER Pune, December 1, 2015 • <i>The lessons we learn from Density Functional Theory</i> , Electronic Structure Methods: Density Functional Theoretic Perspective, SP Pune University, March 1, 2016 • <i>Controlling adatom magnetism on bilayer graphene by external field</i> APS March Meeting, Baltimore, USA, March 14-18, 2016
Tejas Kalelkar	Topology and Dynamics Conference, IISER Bhopal, December 2015

Saikrishnan Kayarat	Indo-French Seminar on Application of Structural Biology in Translational Research & Structure-guided Drug Design, ACTREC, Mumbai, November 19-20, 2015 • Society of Biological Chemists (India), Mumbai Chapter Meeting, NIRRH, Mumbai, 2015 • Computational Biotechnology at Nanoscale, CCP4 workshop, Regional Centre for Biotechnology, New Delhi, February 15-20, 2016 • Annual Meeting of the Indian Biophysical Society, IISc, Bengaluru, February 8-10, 2016
Shabana Khan	<i>Phosphine, silylene and germylene based PNP, SiNP and GeNP ligand systems and their Au(I) complexes and catalytic activity</i> Department of Inorganic Chemistry, University of Goettingen, Germany, August 3, 2015 • <i>Aurophilic interactions and photophysical properties</i> National Conference on Recent Advancements in Chemical Sciences, MNIT, Jaipur, August 21-23, 2015
Raghavendra Kikkeri	7 th Peptide Engineering Meeting, IISER Pune, December 5-7, 2015 • Max-Planck Institute of Colloids and Interface, Berlin, Germany, January 5, 2016 • University of Jena, Jena, Germany, January 7, 2016
G.V.Pavan Kumar	SYMPHYS - National Symposium on Physics, IIT Bombay, May 2015 • Discussion Meeting on Plasmonics and Metamaterials, Goa, December 2015 • Physical Science Division, NASI Annual meeting, Bhubaneswar, December 2015 • ICANN 2016, IIT Guwahati, December 2015 • Indo-Norway meeting, IIT Delhi, December 2015 • Workshop on Radiation and Photochemistry, Pune University, January 2016 • ICONSAT, IISER Pune, February 2016 • Mumbai-Pune Semiconductor meeting, IISER Pune, March 2016 • Bengaluru Nano International Conference, Bengaluru, March 2016
M. Jeganmohan	<i>Ruthenium-catalyzed oxidative cyclization of substituted aromatics with carbon-carbon - components: An efficient route to heterocycles</i> 22 nd National Symposium on Catalysis (CATSYMP 22), CSIR-Central Salt and Marine Chemicals Research Institute, Bhavnagar, January 7-9, 2016; and National Symposium on Nanomaterials and Sustainable Synthetic Strategies Department of Chemistry, Banaras Hindu University, March 21-22, 2015; and National Symposium on Nanomaterials and Sustainable Synthetic Strategies, Catalysis and Inorganic Chemistry Division, CSIR-NCL, Pune, September 30, 2015 • <i>Ruthenium-catalyzed C-H bond functionalization of substituted aromatics, alkenes and heteroaromatics</i> Refresher Course, Department of Chemistry, Shivaji University, Kolhapur, November 27, 2015
Pankaj Mandal	<i>Time resolved THz studies of CsPbBr₃ perovskite QDs</i> PBCTE-2015, IIT Bombay, December 4-6, 2015
Nishad Matange	<i>From Darwin to diabetes</i> Part of a lecture series titled "From basic Science to Social Benefit", Science Day Celebrations, IISER Pune, February 28, 2016
John Mathew	<i>Making zoological natural history in the early 19th century by the French and the British in South and South-East Asia</i> Among Empires: The British Empire in Global Imperial Context, Lingnan University, Hong Kong, May 2015 • <i>Tracing choices for inclusion in an exemplary journal, Conservation Biology</i> Student Conference on Conservation Science, IISc, Bengaluru, September 2015 • <i>Broader implications of the history of biology for society</i> (with Neeraja Sankaran), Seminar on Science and Society, Sophia College, Bombay, January 2016 • <i>Environmental history and its impulses</i> Seminar on science and philosophy in honour of Professor Kozhamthadam, Jnana-Deepa Vidyapeeth, Pune, January 2016 • <i>Buchanan's Barrackpore menagerie and faunal studies under Company Raj</i> Second Cities of the Empire – Calcutta or Glasgow, Centre for the Study of the Social Sciences, Kolkata, February 2016 • <i>The Animalia and British India</i> Colloquium at TIFR Mumbai, February 2016
Sonam Mehrotra	<i>Differential apoptotic response to mitotic and endocycling cells to genotoxic stress</i> Indian <i>Drosophila</i> Conference-15, IIT Kanpur, December 20-23, 2015

<p>Arnab Mukherjee</p>	<p><i>On the molecular mechanism of proflavine intercalation to DNA</i> KTH Royal Institute of Technology, Sweden, June 2015 • <i>Single water entropy: Hydrophobic crossover and application to drug binding</i> IISER Pune-Temple University joint symposium on Chemistry and Physics of Advanced Materials, IISER Pune, December 2015 • <i>Distribution of residence time of water around DNA: Origin of heterogeneity</i> Inter IISER Chemistry Meet, IISER Thiruvananthapuram, December 2015 • <i>How does a ligand get intercalated into a double helical DNA?</i> Bose Institute, Kolkata, January 2016</p>
<p>Sunil Mukhi</p>	<p><i>Entanglement entropy and modular invariance</i> Yukawa Institute of Theoretical Physics, Kyoto University, May 2015; Osaka University, May 2015; University of British Columbia, Vancouver, June 2015; Regional Meeting on String Theory, Nafplio, Greece, July 2015; CMI Chennai, August 2015; ETH Zurich, November 2015 • <i>The wonders of conformal symmetry</i> (Colloquium), CMI, Chennai, August 2015 • <i>On 2d conformal field theories with two characters</i> TIFR Mumbai, October 2015 • <i>Goals, models, frameworks and the scientific method</i> Current Science Scientific Session, Bengaluru, November 2015 • <i>Few-character conformal field theories</i> Indo-Israel Meeting, Goa, December 2015; National Strings Meeting, IISER Mohali, December 2015 • <i>The relevance of irrelevant science</i> Fergusson College Pune, January 2016; Jigyasa Student Festival, IIT-BHU, January 2016</p>
<p>Muhammed Musthafa</p>	<p>Sunandan Divatia School of Science, NMIMS University, Vile Parle, Mumbai, October 17, 2015 • National Institute of Technology, Calicut, December 21, 2015 • Post-graduate lecture series in Industrial Chemistry, Vijayanagara Sri Krishnadevaraya University, Bellary, March 12, 2016</p>
<p>Angshuman Nag</p>	<p><i>Semiconductor nanocrystals for magneto- and opto-electronic applications</i> Alpha (a multinational company) Global R&D Meet, Bengaluru, April 21-23, 2015 • <i>Magnetically doped ito nanocrystals exhibit plasmonics, and carrier-mediated magnetic coupling</i> JNC Conference on Chemistry of Materials-2015, October 2-4, 2015 • <i>Plasmonic and magnetically doped colloidal metal oxide nanocrystals</i> IISER Pune-Temple University joint symposium on Chemistry and Physics of Advanced Materials, IISER Pune, December 1, 2015 • <i>CsPbBr₃ perovskite nanocrystals: Luminescence beyond traditional quantum dots</i> International Conference on Advanced Nanomaterial and Nanotechnology (ICANN), IIT Guwahati, December 8-11, 2015 • <i>Overview of nanocrystal synthesis and applications</i> IUSSTF Workshop on Synthesis, Characterization and Application of Nanoparticle Assemblies, CSIR-NCL Pune, January 4-6, 2016 • <i>Plasmonic and magnetically doped colloidal metal oxide nanocrystals</i> International Conference on Nano Science and Technology (ICONSAT), IISER Pune, February 29-March 2, 2016</p>
<p>Uttara Naik-Nimbalkar</p>	<p><i>Likelihood, estimating functions and method of moments</i> 26th V. Ramaswami Aiyar Memorial Award Lecture, 81st Annual Conference of the Indian Mathematical Society, Visvesvaraya National Institute of Technology (VNIT), Nagpur, December 27-30, 2015</p>
<p>Arvind Natu</p>	<p><i>Research Motivation</i> North Maharashtra University, Jalgaon, March 29, 2016 • <i>Drug Discovery</i> Ahmednagar, March 22, 2016 • FESEM Meeting, Yashwantrao Chavan Academy of Development Administration (YASHADA), Pune, March 11, 2016 • <i>Research Motivation</i> Modern College, Pune, March 4, 2016 • Teachers Workshop, February 21, 2016 • Nano For Young Program, IISER Pune, February 29, 2016 • <i>Drug Discovery</i>, Sinhgad Institute of Engineering (SIE), Pune, February 6, 2016 • INSPIRE Program, Willingdon College, Sangli, February 17, 2016 • <i>Opportunities in Basic Sciences</i> New Arts, Commerce and Science College, Parner, February 18, 2016 • <i>Future of Natural Drugs</i> D.Y. Patil College of Pharmacy, February 16, 2016 • Workshop on Vigyan Prasar Science Research for the Modern Society, Pimpri Chinchwad Science Park (PCMC), February 7, 2016 • <i>Interdisciplinary Teaching & Science</i>, Modern College, Pune, January 30, 2016 • <i>Science Motivation</i> Marathwada Mitra Mandal School, Pune, January 29, 2016 • <i>Interdisciplinary Teaching & Science</i> Modern College, Pune, January 29, 2016 • Science Congress <i>Interdisciplinary Research</i>, Rayat Vigyan Parishad, Pune, January 25, 2016 • <i>Green Chemistry</i> Kirti M. Doongursee College, Mumbai, January 22, 2016</p>

	<ul style="list-style-type: none"> • <i>Opportunities in Basic Science</i> Nanded, January 18-19, 2016 • Workshop on Flow Chemistry Symposium, January 12, 2016 • <i>Science Teaching</i> Vigyan Shikshan Santha, Balewadi, Pune, January 16, 2016 • <i>Interdisciplinary Research</i> S.M. Joshi College, Hadapsar, Pune, January 12, 2016 • <i>Science Teaching</i> Indira National School, Wakad, Pune, January 11, 2016 • Indian Council of Medical Research (ICMR), Belgaum, December 16, 2015 • <i>Opportunities in Basic Sciences</i> Eureka Club, Kankavli, December 17, 2015 • <i>Advances in Drug Chemistry</i> Deogarh College, Deogarh, December 18, 2015 • North Maharashtra University (NUM), Jalgaon, December 12, 2015 • Krishna School, Karad, October 21, 2015 • <i>Future Trends in Science</i> Yashwantrao Chavan Institute of Science (YCIS), Satara, October 8, 2015 • Rayat Shikshan Sanstha, October 15, 2015 • Indian Peptide Symposium, Bengaluru, September 23, 2015 • Study & Research in Germany, DAAD Pune, September 12, 2015 • INSPIRE Program, Smt. Veeramma Gangasiri College for Women, Gulbarga, August 24, 2015 • <i>Opportunities in Basic Science</i>, Walavalkar High School, Dervan, August 1, 2015 • <i>Innovation Research Techniques</i>, S.G College, August 7, 2015 • <i>Research Career Opportunities in India & Abroad</i>, Smt. Kashibai Navale College of Pharmacy, Pune, July 22, 2015 • <i>Drug Discovery & Research Methodology</i> SMBST College, Sangamner, July 4, 2015 • <i>Role of Interdisciplinary Research</i> KIIT Bhubaneswar, June 27, 2015 • <i>Opportunities in Basic Sciences</i>, Brihan Maharashtra College of Commerce (BMCC), Pune, May 30, 2015 • <i>Opportunities in Basic Sciences</i> May 9, 2015 • B.D. Tilak Distinguished Lecture, Institute of Chemical Technology, April 30, 2016 • <i>Emerging Trends in Characterization</i> Vikhe Patil College, Pravaranagar, February 10, 2016 • INSPIRE Camp, Dayanand Science College, Latur, September 18, 2015 • <i>Careers in Science</i>, Career Mohotsav, Pune, September 18, 2015
Gayathri Pananghat	<p>MACFAST, Tiruvalla, Kerala (part of IISER Pune Outreach program), June 25, 2015</p> <ul style="list-style-type: none"> • <i>Pushing and pulling by protein filaments</i> Sahyadri School, Pune, August 1, 2015 • Lectures for school students, Exciting Science Group, August-September 2015
Shivprasad Patil	<p><i>Measurement of photo-induced dark fraction and photo-darkening probability in aqueous CdTe quantum dots</i> EMN/quantum Meeting, Beijing, China, April 14-18, 2015</p> <ul style="list-style-type: none"> • <i>The world of nano-bio-mechanics: How Physics meets biology</i> (Inaugural Lecture), DST INSPIRE camp, Shirpur, Dhule, February 15, 2016 and Willingdon College Sangli, February 20, 2016 • <i>The nano-rheology of confined liquids</i> National Conference on Advanced Materials and Applications, March 4, 2016
Supriya Pisolkar	<p><i>Spectra and arithmetic</i> University of Maryland, USA, June 2015</p>
Thomas Pucadyil	<p><i>Mechanism of dynamin-catalyzed membrane fission</i> IIT Bombay, Mumbai, 2015</p> <ul style="list-style-type: none"> • <i>Membrane curvature controls epsin-induced clathrin assembly</i> Cell Mechanics Meeting, Raman Research Institute, Bengaluru, April 24-26, 2015 • <i>Membrane fission: Diverse players and mechanisms</i> Indian Biophysical Society Annual Meeting, Bengaluru, February 8-10, 2016
Sudha Rajamani	<p><i>Life in our Universe: How did it come about?</i> Popular Science Talks, Muktangan Exploratory Science Centre, Pune, April 21, 2015</p> <ul style="list-style-type: none"> • <i>How did life chemically originate on the early Earth?</i> 6th Indo-American Frontiers of Science (IAFOS) Irvine, California, USA, August 9-12, 2015 • <i>An overview of the chemical origins of life</i> Molecular and Cellular Biology Beyond the Rubicon: Graduating Perspectives Meeting, National Institute of Immunology, New Delhi, December 23-24, 2015 • <i>Chemical origins of life</i> Indo-French Workshop on 'Exploring the scope of collaborations in Marine Biology and Biotechnology between France and India', IISc Bengaluru, March 7-9, 2016
Raghav Rajan	<p><i>To start or not to start: Understanding how the songbird brain initiates learned movement sequences</i> Inaugural Lecture, Science Talkies Series, ACTREC, Mumbai, July 17, 2015</p>

Umakant Rapol	CNRS-GDR Meeting, Ecole Normale Superieure, Paris, November, 2015 • Meeting on Quantum Information Processing and Applications (QIPA-2015), Harish-Chandra Research Institute (HRI), Allahabad, December 7-13, 2015 • Colloquium, Saha Institute of Nuclear Physics, Kolkata, March 2, 2016
Richa Rikhy	<i>Onset of epithelial like plasma membrane polarity and polygonal packing in early Drosophila embryos</i> Indo-French Conference on Frontiers in Cytoskeletal Research, Coordination, Adaptation, Fine Tuning, IISER Pune, October 25-27, 2015 • <i>Mitochondrial morphology control of Drosophila follicle cell differentiation in oogenesis</i> Biennial Indian <i>Drosophila</i> Research Conference, IIT Kanpur, December 20-23, 2015 • <i>Onset of epithelial like plasma membrane polarity and polygonal packing in early Drosophila embryos</i> Workshop on Exploring the scope of collaborations in marine biology & biotechnology between France and India, March 7-9, 2016
M.S. Santhanam	<i>Extreme events and approach to network failure</i> Complex System Approach to Self-organisation, IIT Madras, Chennai, February 1, 2016 • <i>Networks: Web search, financial markets and other complex systems</i> VIT University, Chennai, February 5, 2016
L.S. Shashidhara	<i>Evolution of Insect hind wing morphology: A comparative genomic analysis of targets of HOX protein Ultrabithorax</i> Indian Science Congress, Mysore, January 6, 2016 • <i>dA2BP1: A novel component of Notch Pathway during Nervous System development in Drosophila</i> 2 nd Indian <i>Drosophila</i> Research Conference, IIT Kanpur, December 21-23, 2015 • <i>Cell Biology of Organ development in Drosophila</i> 39 th All India Cell Biology Conference on Cellular Organization and Dynamics, IISER Thiruvananthapuram, December 6-8, 2015 • <i>A comparative genomic analysis of targets of Hox protein Ultrabithorax amongst distant insect species: New insights into evolution of halteres in Drosophila</i> 14 th FAOBMB Congress, Hyderabad, November 27-30, 2015
Kundan Sengupta	<i>Genes, chromosomes and cancer</i> Science is Fun Lecture Series (IISER Pune outreach activity), New Arts Commerce and Science College, Ahmednagar, March 2, 2016 • <i>Where are my genes? - A journey through the nucleus of a human cell</i> Exciting Science Group (ESG), IISER, Pune March 20, 2016 • <i>Genes, chromosomes and cancer</i> Department of Biotechnology, Modern College, Pune, March 21, 2016
Seema Sharma	<i>Searching for Supersymmetry in 13 TeV proton proton collisions at the LHC</i> Free Meson Seminar, TIFR, Mumbai, March 17, 2016
Surjeet Singh	Indo-French Symposium on Correlated Oxide Materials, Université de Montpellier, France, July 15-17, 2015 • Emerging Trends in Advanced Functional Materials (2016), IOP Bhubaneshwar, January 18-21, 2016 • International Conference on Quantum Disordered Systems, IMSc Chennai, March 1-3, 2016
Kaneenika Sinha	Annual Meeting of the Ramanujan Mathematical Society, Symposium on Number Theory, IISER Mohali, May 2015
S.G. Srivatsan	<i>Functionalized nucleoside toolbox for studying nucleic acid structure, dynamics and function</i> SSGM College, Kopargaon, February 12, 2016
N.K. Subhedar	<i>Addiction initiated neuroplasticity – a model for studying how experiences shape the brain</i> 3 rd MKC Memorial Meeting, JNCASR Bengaluru, February 5, 2016 • <i>Pleasure centers in the brain</i> Institute of Chemical Technology, Mumbai, February 12, 2016 • <i>Experimental design</i> Sinhgad Institute of Pharmacy, Pune, February 13, 2016 • <i>Brainy tales</i> IISER Pune Outreach Programme, New Arts Commerce and Science College, Ahmednagar, March 2, 2016
Prasad Subramanian	<i>Living with our star, the Sun</i> International Conference on Celestial Mechanics and Dynamical Astronomy, Maulana Azad Urdu University, Hyderabad, December 15-17,

	<p>2015 • <i>Triggering of episodic blobs in AGN jet – clues from solar coronal mass ejections</i> Jet Triggering Mechanisms in Black hole Sources, TIFR Mumbai, January 20-23, 2016 • <i>CME propagation – where does aerodynamic drag take over</i> International Meeting on Science for Space Weather, Goa, January 24-29, 2016</p>
Pinaki Talukdar	<p><i>Supramolecular rosette-based nanotubes for transmembrane anion transport</i> Kaleidoscope, Goa, July 2-5, 2015 • <i>Synthetic ion channels for selective anion transport</i> 10th Mid-Year CRSI Symposium in Chemistry, NIT Trichy, July 23-25, 2015</p>
Gyana Ranjan Tripathy	<p><i>Re-Os geochronology of ancient marine sediments: Implications to their ages and past atmospheric oxygen evolution</i> IISER Kolkata, February 12, 2016</p>
R. Vaidhyanathan	<p>CSC 2015 Conference and Exhibition, Ottawa, Canada, June 13-17, 2015</p>
Arun Venkatnathan	<p>Bharathiar University, May 6, 2015 • IISER Pune-Temple University joint symposium on Chemistry and Physics of Advanced Materials, IISER Pune, December 1, 2015 • Ionic liquids for Clean Energy and Environment NCL Pune, December 16-17, 2015 • IIT Kharagpur, February 29, 2016</p>
Milind Watve	<p>Student interaction, katta and talk on <i>Challenging a paradigm: Role of undergraduates</i> • <i>Understanding the life of E. coli</i> (Plenary lecture) Conference on Microbial Biofilms (CoMB), SASTRA University, Tanjavur, January 29-30, 2016 • Student and faculty interaction, discussion on curriculum, katta and talk on <i>Challenging a Paradigm: Role of undergraduates</i> Azim Premji University, February 1-3, 2016 • <i>Why diabetes is incurable: Reflections on research in medicine</i> Conference on Trends in Drug Discovery Research (CtDDR), February 25-28, 2016 • Student interaction and talk on <i>Would computers cure diabetes?</i> Indraprastha Institute of Information Technology, Delhi, March 17, 2016</p>

Contributed Talks and Poster Presentations

G. Ambika Sandip V. George, G. Ambika and R. Misra *Effect of data gaps on calculation of correlation dimension from time-series data* Workshop on Time Series Analysis (WTSA), IISER Pune, May 25-30, 2015 • Sandip V. George, G. Ambika and R. Misra *bispectral analysis for strange non-chaotic time series* Complex System Approach to Self-Organization (CSAS), 2016

Sudarshan Ananth Mahendra Mali (PhD student) *Light-cone gravity* International Conference on Gravitation and Cosmology (ICGC), IISER Mohali, December, 2015 (Talk)

Chaitanya Athale Kunalika Jain, Anushree R. Chaphalkar and Chaitanya A. Athale *Filament tracking based quantification of microtubule collective transport on dynein* Biophysics Paschim, October 2, 2015 • Prangya Mishra, Kiran Nilangekar and Chaitanya A. Athale *Quantitation of PC12 polarization on NGF differentiation* Biophysics Paschim, October 2, 2015 Kunalika Jain *Filament tracking based quantification of microtubule collective transport dynein* Indo-French Conference on Frontiers in Cytoskeleton Research, IISER Pune October 25-27, 2015 (Selected Talk) • Manasi S. Gangan *Gene expression 'noise' and cell length variability in E. coli populations* Bacterial Expressions, NCBS-TIFR, Bengaluru, December 1-5, 2015 Manasi S. Gangan *Growth rate dependence of cell length variability in wildtype E. coli* 5th American Society of Microbiology Conference on Prokaryotic Cell Biology and Development, Washington DC, USA, December 1-5, 2015 • Kunalika Jain, Anushree R. Chaphalkar and Chaitanya A. Athale *Filament tracking based quantification of microtubule collective transport dynein* 60th Annual Meeting of the Biophysical Society of USA, Los Angeles, USA, February 28 - March 2, 2016

Nagaraj Balasubramanian Archana Pawar *Ral-Arf6 crosstalk and its role in anchorage dependent signalling* International Conference on Cancer Research: New Horizons, National Centre for Cell Science, Pune, November 19-21, 2015 (Best Poster Prize) • Neha Deshpande *Adhesion dependent differential regulation of Ral GTPases: Role of Ral GEFs* International Conference on Cancer Research: New Horizons, National Centre for Cell Science,

Pune, November 19-21, 2015 Archana Pawar *Ral-Arf6 crosstalk and its role in anchorage dependent signaling* Graduate Students Meet, ACTREC, Navi Mumbai, November 19-21, 2015 (Best Poster Prize) • Neha Deshpande *Adhesion dependent differential regulation of Ral GTPases: Role of Ral GEFs* Graduate Students Meet, ACTREC, Navi Mumbai, November 19-21, 2015

Nirmalya Ballav *Increase in electrical conductivity of MOF to billion-fold upon filling the nanochannels with conducting polymer* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016 • *Size controlled synthesis of high-index facet AuNCs* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016 • *Pb(II)-N bonding chemistry: Recycling of polyaniline-Pb nanocrystals waste for generating high-performance supercapacitor electrodes* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016 • *Highly hydrophobic and chemically rectifiable surface anchored metal-organic framework thin film devices* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016

Deepak Barua Sunny, R., Guha, A., Jezeera, A., Mohan, K., Mohan Babu, N., Barua, D. *Experimentally induced intra-specific variation in leaf functional in tropical tree in response to light and water* I-BEE (Behaviour, Ecology and Evolution) Conference, Corbett National Park, Uttarakhand, March 2016

Sudipta Basu Sandeep Palvai, Piyush More, Nikunj Mapara and Sudipta Basu *Chimeric nanoparticle: A platform for simultaneous targeting of phosphatidylinositol-3-kinase signaling and damaging DNA in cancer cells* 7th Peptide Engineering Meeting (PEM-7), IISER Pune, December 2-5, 2015 • Abhik Mallick, Piyush More, Sougata Ghosh, Rohan Chippalkatti, Balu A. Chpade, Mayurika Lahiri and Sudipta Basu *Dual drug conjugated nanoparticle for simultaneous targeting of mitochondria and nucleus in cancer cells* 7th Peptide Engineering Meeting (PEM-7), IISER Pune, December 2-5, 2015 • Aditi Nandi, Abhik Mallick, Piyush More

and Sudipta Basu *Graphene oxide nanocomposite for dual drug delivery in cancer* 7th Peptide Engineering Meeting, IISER Pune, December 2-5, 2015 (PEM-7) and International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016 • Chandramouli Ghosh, Neha Gupta, Manas Kumar Santra and Sudipta Basu *Nanoparticle mediated targeting of proteasome in cancer cells* BiTERM, IIT Delhi; 7th Peptide Engineering Meeting (PEM-7), IISER Pune, December 2-5, 2015 and International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016

R. Boomi Shankar A.K. Srivastava, P. Divya, B. Praveen Kumar, and R. Boomishankar *Ferroelectricity In $\{Cu^II L_2\}_n$ based frameworks derived from flexible amino-P(V) ligands* Modern Trends in Inorganic Chemistry-XVI, Jadavpur University, Kolkata, December 3-5, 2015 • A. Yadav, A.K. Srivastava, and R. Boomishankar *Hierarchical growth of highly water soluble cage connected MOFs from discrete cage: Induced chirality and dielectric anomaly* Modern Trends in Inorganic Chemistry-XVI, Jadavpur University, Kolkata, December 3-5, 2015 (Best Poster Prize) • M.S. Deshmukh, T. Vijayakanth and R. Boomishankar *Stereochemically Distinct cyclotrasiloxanes containing 3-pyridyl moieties and their functional metal-organic frameworks* 5th Inter-IISER Chemistry Meet, IISER Thiruvananthapuram December 11-13, 2015 • M.S. Deshmukh, T. Vijayakanth and R. Boomishankar *Stereochemically distinct cyclotrasiloxanes containing 3-pyridyl moieties and their functional metal-organic frameworks* 18th CRSI National Symposium in Chemistry, Punjab University, Chandigarh, February 5-7, 2016

Harinath Chakrapani *Small molecule tools for studying mycobacterial responses to reactive sulfur species* Gordon Research Conference on Tuberculosis Drug Discovery & Development, Girona, Spain, July 12-17, 2015 • *Mycobacterium tuberculosis has diminished capacity to counteract redox stress induced by elevated levels of endogenous superoxide* Gordon Research Conference on Tuberculosis Drug Discovery & Development, Girona, Spain, July 12-17, 2015 • *Synthesis and biological evaluation of indole-based 2-aryl-2, 3-epoxy-1, 4-naphthoquinones as methicillin-resistant Staphylococcus aureus (MRSA)* 17th International Congress on Infectious Diseases (ICID), Hyderabad, March 2-5, 2016

Apratim Chatterji Shaikh Mubeena (PhD student) *Hierarchical self assembly: Self organized nanostructures in a nematic matrix of self-assembled polymeric chains* Complex Fluids 2016

(CompFlu 2016), IISER Pune, January 2-4, 2016 • Tejal Agarwal (i-PhD student) *Identifying Chromosomal Territories from Contact Maps of DNA* Complex Fluids 2016 (CompFlu 2016), IISER Pune, January 2-4, 2016 • Indrajit Wadgaokar (Project student) *Structure formation in telechelic star polymers with Dipoles at arm tips* Complex Fluids 2016 (CompFlu 2016), IISER Pune, January 2-4, 2016 • Tejal Agarwal (i-PhD student) *Identifying chromosomal territories from contact maps of DNA* Mumbai Pune Soft Matter Meet, IIT Bombay, March 5, 2016 (Talk) • Mainak Ghosh (PhD student) *Structure formation in models active matter incorporating hydrodynamics* Mumbai Pune Soft Matter Meet, IIT Bombay, March 5, 2016

Smita Chaturvedi S. Chaturvedi, P. Shyam, A. Apte and S. Kulkarni *Visualizing the effect of chemical pressure using electron density maps of RFeO₃ (R = Sm, Ho, Lu) nanoparticles* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016

Srabanti Chaudhury Bappa Ghosh (PhD student) *Entropy production theorems in systems with memory* Physical and Biophysical Chemistry - Theory and Experiment, IIT Bombay, December 4-6, 2015 • *Modeling the heterogeneous catalytic activity of a single nanoparticle using first passage time distribution formalism* (Oral Presentation) Mumbai Pune Soft Matter Meet, IIT Bombay, March 5, 2016

Jeetender Chugh S.K. Singh, C.V. Mungi, S. Rajamani and J. Chugh *NMR characterization of pre-RNA world informational molecules* 22nd Conference of National Magnetic Resonance Society, Indian Institute of Technology, Kharagpur, February 18-21, 2016 • Paithankar, H. and Chugh, J. *Investigating the plasticity of double stranded RNA-binding domain 1 of TRBP* 22nd Conference of National Magnetic Resonance Society, Indian Institute of Technology, Kharagpur, February 18-21, 2016

Neelesh Dahanukar A.D. Padhye, N. Modak and N. Dahanukar *Preliminary observations on vicariance of the genus Indirana in northern Western Ghats* 18th European Congress of Herpetology (SEH 2015), Wroclaw, Poland, September 11, 2015 • N. Modak, N. Dahanukar and A.D. Padhye *Niche based distribution of two leaping frogs, Indirana chiravasi and I. leithii, endemic to northern Western Ghats of India* 18th European Congress of Herpetology (SEH 2015), Wroclaw, Poland, September 11, 2015 • A. Keskar, P. Kumkar, R. Raghavan, A.D. Padhye, and N. Dahanukar *Speciation along the mountain ranges of the Western Ghats: A case study of hillstream loach of the genus Indoreonectes (Teleostei:*

Nemacheilidae) YETI 2016, Amity University Noida, January 17-20, 2016

Aloke Das S.K. Singh *Direct spectroscopic evidence of $n \rightarrow \pi^*$ interaction* 5th Inter IISER Chemistry Meet, IISER Thiruvananthapuram, December 11-13, 2015 (Invited Talk) • S.K. Singh, K.K. Mishra, N. Sharma, and A. Das *Direct spectroscopic evidence of $n \rightarrow \pi^*$ interaction* 13th DAE-BRNS Biennial Trombay Symposium on Radiation & Photochemistry (TSRP-2016) and 6th Asia Pacific Symposium on Radiation Chemistry (APSRC-2016), Bhabha Atomic Research Centre, Mumbai, January 5-9, 2016 • S.K. Singh, K.K. Mishra, N. Sharma and A. Das *Effect of methyl group on $n \rightarrow \pi^*$ interaction* 13th DAE-BRNS Biennial Trombay Symposium on Radiation & Photochemistry (TSRP-2016) and 6th Asia Pacific Symposium on Radiation Chemistry (APSRC-2016), Bhabha Atomic Research Centre, Mumbai, January 5-9, 2016 • S.K. Singh *Direct spectroscopic evidence of $n \rightarrow \pi^*$ interaction* International Conference on Recent Advances in Molecular Spectroscopy: Fundamentals and Applications in Materials and Biology (RAMS-2016), School of Chemistry, University of Hyderabad, March 2-4, 2016

Shouvik Datta Amit Bhunia, Kanika Bansal, Mohamed Henini and Shouvik Datta *Bias activated dielectric response of excitons in quantum confined lasers* International Workshop on Physics of Semiconductor Devices (IWPSD-2015), IISc, Bangalore, December 2015 • Kanika Bansal, Amit Bhunia, Shouvik Datta, Marzook S. Alshammari, Mohamed Henini *Bias activated dielectric response of excitons and excitonic Mott transition in quantum confined lasers structures* American Physical Society's Meeting, Baltimore, USA, March 2016 • Amit Bhunia, Kanika Bansal, Mohamed Henini and Shouvik Datta *Bias activated dielectric response of excitons in quantum confined lasers* 2nd Mumbai-Pune Semiconductor Meeting, Pune, March 2016

Aparna Deshpande S.K. Rejaul *Investigation of surface and bulk electrical transport properties of undoped and iron doped Bi_2Se_3* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016

Sutirth Dey Sudipta Tung *Effects of upper and lower limiter controls on the dynamics of populations of *Drosophila melanogaster** Biology Department Day, IISER Pune, July 28-29, 2015 • Shraddha Karve *Investigating the effect complex fluctuations* National Conference on Ethology and Evolution, IISER Mohali, October 15, 2016 (Talk) • Abhishek Mishra *Density-dependence in dispersal: Insights from lab experiments on *Drosophila melanogaster** National

Conference on Ethology and Evolution, IISER Mohali, October 30 - November 1, 2015 (Talk) • Selveshwari S *Environmental fluctuations do not select for increased variation or population-based resistance in *Escherichia coli** National Conference on Ethology and Evolution, IISER Mohali, October 30 - November 1, 2015 • Sudipta Tung *Evolution of dispersal in laboratory populations of *Drosophila melanogaster** National Conference on Ethology and Evolution, IISER Mohali, October 30 - November 1, 2015 (Talk) • Shraddha Karve *Red queen* AMRxDC Autumn School, Edinburgh, UK, November 15, 2015 (Talk) • Abhishek Mishra Winter School on Quantitative Systems Biology 2015, ICTS, Bengaluru, December 5-19, 2015 • Sudipta Tung *Empirical investigation of the effect of four methods for stabilizing population dynamics* The 2015 NNMCB National Meeting, IISER Pune, December 27-30, 2015 (Talk) • Yashraj Chavhan 2nd Bengaluru Winter School on Population Genetics and Evolution ICTS, Bengaluru, January 25 - February 6, 2016 (Participated)

Sourabh Dube Shubhanshu Chauhan *Estimation of misidentified lepton background for multilepton analysis* India-CMS Meeting, TIFR Mumbai, November 2015 (Talk) • Kunal Kotheekar *Pair produced B prime Analysis using Multileptons Final State* India-CMS Meeting, TIFR Mumbai, November, 2015 (Talk) • Anshul Kapoor *Recent modifications in FastSim tracking* India-CMS Meeting, TIFR Mumbai, November, 2015 (Talk) *Probing BSM Physics with multileptons* TWAS Regional Conference of Young Scientists, December 2015 • Sai Neha Santpur *Probing BSM Physics with multileptons* Frontiers in Physics IX, Fergusson College, January 2016 Anshul Kapoor *Debugging of fast tracking CMS FastSim Day*, February 2016 (Talk) • Dr. Dube and students from his group have been active in internal CMS meetings, with students giving a total of 30 presentations across various meetings.

Sanjeev Galande P.C. Reddy and S. Galande *Evolution of Hox-like genes: Hydra Hox repertoire reveals a tailor made Hox-code for Cnidarians* Indian Society of Developmental Biologists' 2015 Meeting, CCMB Hyderabad, July 15-18, 2015 (Oral Presentation) • P.C. Reddy, S. Ubhe, A. Gungi, A. Kolte, F. Habib, S. Pradhan, and S. Galande *Evolutionary adaptation of transcription factors into Wnt signaling network: Insights into the head organizer in Hydra* Indian Society of Developmental Biologists' 2015 Meeting, CCMB Hyderabad, July 15-18, 2015 • Sonam Mehrotra, Praveena R.L., Aditi Gavande, Rakesh Mishra and Sanjeev Galande *Identification of defective proventriculus (DVE) as the ortholog of SATB1 in *Drosophila** Indian Society of Developmental Biologists' 2015 Meeting, CCMB

Hyderabad, July 15-18, 2015 • P.C. Reddy, S. Ubhe, A. Gungi, A. Kolte, F. Habib, S. Pradhan, and S. Galande *Evolutionary adaptation of transcription factors into Wnt signaling network: Insights into the head organizer in Hydra* Animal evolution: New perspectives from early emerging metazoans Tutzing, Germany, September 14-17, 2015 • P.C. Reddy, M.K. Unni, A. Gungi, P. Agarwal and S. Galande *Study of Hydra Hox repertoire reveals tailor-made Hox-code for Cnidaria* Animal evolution: New perspectives from early emerging metazoans Tutzing, Germany, September 14-17, 2015 • Sonam Mehrotra *Differential apoptotic responses of mitotic and endocycling cells to genotoxic stress* Indian *Drosophila* Conference, IIT Kanpur, December 22-24, 2015 (Invited Oral Presentation) • G.P. Manjunath, Vina Tikiyani, Dipeshwari J. Shewale, Pavana L. Vaddavalli, Kavita Babu and Sanjeev Galande *C. elegans homeodomain protein DVE-1 regulates transcription in response to Insulin/Insulin like Growth Factor (IGF) signaling* First Indian *C. elegans* Meeting, Alibaug, January 30 - February 2, 2016

Aurnab Ghose *Internal state-dependent neuromodulation of olfactory processing* Gordon Research Conference (GRC), Modulation of Neural Circuits and Behaviour, The Hong Kong University of Science and Technology, Hong Kong SAR, China, June, 2015

Prasenjit Ghosh *First principles study of nuclear quantum effects on structural & electronic properties of ellipticine in solvents* Mumbai-Pune Complex Fluids Meet, IISER Pune, August 1, 2015 • Niharika Joshi and Subrahmanyam Sappati *Hands on tutorial on Quantum ESPRESSO 3rd International E-Workshop/Conference on Computational Condensed Matter Physics and Materials Science at ABV-Indian Institute of Information Technology & Management, Gwalior, October 18-22, 2015 (Conducted the tutorial)* • Niharika Joshi *Is graphone ferromagnetic?* Mumbai-Pune Semiconductor Meet, IISER Pune, March 12, 2016 (Talk) • Debnath Talukdar *Importance of spin-orbit coupling (SOC) in lead halide perovskite CsPbBr₃ using first principles calculations* Mumbai-Pune Semiconductor Meet, IISER Pune, March 12, 2016

Sujit Ghosh Soumya Mukherjee *We Create chemistry* Poster Competition, BASF, The Prince of Wales Museum, Kala Ghoda, Mumbai, January 23, 2015 (Best Poster Award) • Soumya Mukherjee, International Summer Course-BASF 2015, Ludwigshafen, Germany, August 1-9, 2015 (Attended upon Invitation) • Soumya Mukherjee and Avishek Karmakar, 16th International Symposium on Modern Trends in Inorganic Chemistry (MTIC-XVI),

Department of Chemistry, Jadavpur University, December 3-5, 2015 • Soumya Mukherjee and Avishek Karmakar, 17th CRSI National Symposium in Chemistry and 9th CRSI-RSC Symposium, CSIR-National Chemical Laboratory, Pune, February 5-8, 2016

Anirban Hazra Avdhoot Datar (PhD student) *Theoretical study of nonradiative decay of 5,6-dihydroxyindole, a key eumelanin building block* Discussion Meeting on Spectroscopy and Dynamics of Molecules and Clusters, Mahabaleshwar, February 20, 2016 • Mahesh Gudem (PhD student) *Mechanism of nitrogen dioxide chemiluminescence* Discussion Meeting on Spectroscopy and Dynamics of Molecules and Clusters, Mahabaleshwar, February 20, 2016 • Meghna Manae (PhD student) *Mechanism of intersystem crossing in 2,4-dithiothymine: A potential chemotherapeutic drug* Discussion Meeting on Spectroscopy and Dynamics of Molecules and Clusters, Mahabaleshwar, February 20, 2016

Partha Hazra Sagar Satpathi and Partha Hazra *A green solvent induced DNA compaction* PEM7-2015, IISER Pune, December, 2015 • Raj Kumar Koninti and Partha Hazra *Silica nano-channel as a potential nano-carrier for anticancer drug ellipticine and biomolecular assisting drug releases* iChem-2015, IISER Thiruvananthapuram, December, 2015 (Best Poster Award) • Sagar Satpathi and Partha Hazra *A green solvent induced DNA compaction* iChem-2015, IISER Thiruvananthapuram, December, 2015 (Oral Presentation) • Raj Kumar Koninti and Partha Hazra *Silica nano-channel as a potential nano-carrier for anticancer drug ellipticine and biomolecular assisting drug releases* PUWOP-2016, Pune University, January, 2016 (Best Poster Award) • Sagar Satpathi and Partha Hazra *A green solvent induced DNA compaction* 13th DAE-BRNS Biennial Trombay Symposium on Radiation & Photochemistry (TSRP-2016), Bhabha Atomic Research Centre, Mumbai, January 5-9, 2016 • Sagar Satpathi and Partha Hazra *A green solvent induced G-quadruplex formation* CRSI-2016 Punjab University, INST and IISER Mohali in February, 2016 • Raj Kumar Koninti and Partha Hazra *Mesoporous silica nano-channel (MCM-41) as a potential nano-carrier for anticancer drug ellipticine and biomolecular assisting drug releases* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016

Mukul Kabir Rohit Babar *Transition metal and vacancy defect complexes in phosphorene: A spintronic perspective* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016 Srilatha Arra

- Microscopic mechanism of H₂ oxidation by Fe Complex* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016 Rohit Babar *Transition metal and vacancy defect complexes in phosphorene* Mumbai-Pune Semiconductor Meet 2016, IISER Pune, March 12, 2016 (Talk)
- Krishanpal Karmodiya** Young Investigator Meeting, Gulmarg, Srinagar, March 28 - April 1, 2015
- Saikrishnan Kayarat** Microsymposium on Hot Structures in Biology, Asian Crystallography Association Meeting, Kolkata, December 5-8, 2015 • 7th NEB Meeting on DNA Restriction and Modification, Gdansk, Poland, August 24-29, 2015
- Shabana Khan** *PPh₂N(2,6-iPr₂C₆H₃)PPh₂ (PNP) and PPh₂N(2,6-iPr₂C₆H₃)BCy₂ (PNB) based Au(I) complexes aurophilicity, and their luminescence studies* International Conference Inorganic Ring Systems (IRIS 14), Regensburg, Germany, July 26-31, 2015 • *Aurophilic interaction and luminescence properties* IISER Pune-Temple University Joint Symposium on Chemistry and Physics of Advanced Materials, December 1, 2015 • 5th Inter-IISER Chemistry Meet 2015, Thiruvananthapuram, December 11-13, 2015
- G.V. Pavan Kumar** Discussion Meeting on Plasmonics and Metamaterials, Goa, December 2015 • Mumbai-Pune Semiconductor meeting, IISER Pune, March 2016 • International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016
- Mayurika Lahiri** Abhinav Parivesh and Mayurika Lahiri *Api5 and TopBP1 interactions in response to DNA damage* Zing Conference on Genomic Integrity, Pullmans Cairns International, Australia, August 1-5, 2015 ("DNA Repair" Best Poster Award)
- Tressa Jacob** *Functional analysis of twist paralogs during zebrafish scale development* XXXIX Mahabaleshwar Seminar on Recent Advances in Zebrafish Genetics and Development, Alibaug, March 21-23, 2015 (Oral Presentation)
- M. Jeganmohan** R. Manoharan and M. Jeganmohan *Synthesis of isoindolinone and pyrroloquinolone derivatives via a ruthenium catalyzed ortho C-H bond functionalization of N-substitued benzamides and indoline carbamates* 11th National Organic Symposium Trust (J-NOST11), NISER Bhubaneswar, 2015 • N.Y. More and M. Jeganmohan *A regioselective aerobic -arylation of benzyl ketones with aromatics* 11th National Organic Symposium Trust (J-NOST11), NISER Bhubaneswar, 2015
- Soumen Maity** *Covering arrays on product graphs* 47th Southeastern International Conference on Combinatorics, Graph Theory & Computing, Boca Raton, Florida, USA, March 7-11, 2016 (Talk)
- Pankaj Mandal** Sohini Sarkar (PhD student) *Carrier dynamics in CsPbBr₃ nanocrystals in the presence of electron and hole acceptors: A time resolved terahertz spectroscopy study* SDMC, Mahabaleshwar, February 18-21, 2016 • Y. Gurivi Reddy (PhD student) *Carrier dynamics in CsPbBr₃ nanocrystals studied by time resolved THz spectroscopy* SDMC, Mahabaleshwar, India, February 18-21, 2016 • Sohini Sarkar (PhD student) *Carrier dynamics in CsPbBr₃ nanocrystals in presence of electron and hole acceptors: A time resolved terahertz spectroscopy study* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016 • Y. Gurivi Reddy (PhD Student) *Carrier dynamics in CsPbBr₃ nanocrystals studied by time resolved THz spectroscopy* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016
- Arnab Mukherjee** *Mechanism of DNA Intercalation of anti-cancer agent proflavine* Exploring mechanism in biology, A-Star University, Singapore, November 2015 (Contributed Talk) • Physical and Biophysical Chemistry: Theory and Experiment, December 4-6, 2015 (Poster Presentations by students)
- Sunil Mukhi** Panel Discussion on How can we get more women into Science, New Indian Express ThinkEdu Conclave, Chennai, February 2016
- Angshuman Nag** Anur Yadav *Unusual LSPR variation from Cr doping in Cr-Sn codoped In₂O₃ nanocrystals* International Conference on Advanced Nanomaterials and Nanotechnology (ICANN), IIT-Guwahati, December 8-11, 2015 • Anur Yadav *Unusual near-IR plasmonic properties in Cr-Sn codoped In₂O₃ nanocrystals* Mumbai-Pune Semiconductor Meet, IISER Pune, March 12, 2016 • Ashutosh Acharya *Colloidal thallium halide quantum dots* Mumbai-Pune Semiconductor Meet, IISER Pune, March 12, 2016 • Anur Yadav *Electron mediated magnetic coupling and plasmonics from colloidal Mn-Sn co-doped In₂O₃ nanocrystals* International Conference on Frontiers in Advanced Materials (FAM), IISc Bengaluru, June 15-18, 2015 • Bharat Tandon *Delocalized electrons mediating magnetic coupling in Mn-Sn codoped In₂O₃ nanocrystals: Plasmonics shows the way* International Conference on Advanced Nanomaterials and Nanotechnology (ICANN), IIT-Guwahati, December 8-11, 2015; International

Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016 • Bharat Tandon *Plasmonic and magnetically doped colloidal metal oxide nanocrystals* Mumbai-Pune Semiconductor Meet, IISER Pune, March 12, 2016 • Bharat Tandon *Doping controls plasmonics, electrical conductivity, and carrier-mediated magnetic coupling in Fe and Sn codoped In_2O_3 nanocrystals: Local structure is the key* International Conference on Frontiers in Advanced Materials (FAM), IISc Bengaluru, June 15-18, 2015 (Best Poster Award) • G. Shiva Shanker *Electronic grade and flexible semiconductor film employing oriented attachment of colloidal ligand-free PbS and PbSe nanocrystals at room temperature* International Conference on Frontiers in Advanced Materials (FAM), IISc Bengaluru, June 15-18, 2015; International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016; Mumbai-Pune Semiconductor Meet, IISER Pune, March 12, 2016 • Ganesh B. Markad *Electrochemical properties of CsPbX_3 ($X = \text{Cl}, \text{Br}, \text{I}$) perovskite and other semiconductor nanocrystals* Mumbai-Pune Semiconductor Meet, IISER Pune, March 12, 2016 (Talk) • Jagadeeswararao Metikoti *$\text{Ag}_2\text{S-AgInS}_2$ heterodimer single nanocrystals with inherent p-n junction and optoelectronic properties* 5th Inter-IISER Chemistry Meet, IISER Thiruvananthapuram, December 11-13, 2015 Jagadeeswararao Metikoti *Ligand-free but colloidal semiconductor nanocrystals for optoelectronics* Mumbai-Pune Semiconductor Meet, IISER Pune, March 12, 2016 (Talk) • Jagadeeswararao Metikoti *Opto-electronic properties of solution processable $\text{Ag}_2\text{S-AgInS}_2$ heterodimer nanocrystals* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016 • Pranavi Reddy *Unusual LSPR variation from Cr doping in Cr-Sn codoped In_2O_3 nanocrystals* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016 • Sreejith P. Nandan *Photoluminescence of CsPbX_3 ($X = \text{Br}, \text{Cl}, \text{Br/Cl}$) perovskite nanocrystals* Mumbai-Pune Semiconductor Meet, IISER Pune, March 12, 2016 Sreejith P. Nandan *CsPbX_3 ($X = \text{Br}, \text{Cl}$): Luminescence beyond traditional quantum dots* International Conference on Advanced Nanomaterials and Nanotechnology (ICANN), IIT-Guwahati, December 8-11, 2015 (Best Poster Award); International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016 • Vikash Kumar Ravi *Colloidal CsPbBr_3 perovskite nanocrystals: Luminescence beyond traditional quantum dots* Mumbai-Pune Semiconductor Meet, IISER Pune, March 12, 2016

Wasim Jeelani Mir *An overview of photo physical properties of colloidal Ag_2S nanocrystals* Mumbai-Pune Semiconductor Meet, IISER Pune, March 12, 2016 (Talk) • Wasim Jeelani Mir *Origin of unusual excitonic absorption and emission from colloidal Ag_2S nanocrystals: Ultrafast photo physics* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016 (Best Poster Award); International Conference on Frontiers in Advanced Materials (FAM), IISc Bengaluru, June 15-18, 2015

Gayathri Pananghat Jyoti Baranwal (PhD Student), Smarth Lakhnopal and Gayathri Pananghat *Structural studies on MgIA, a small GTPase in spatial positioning of *Myxococcus xanthus* motility* Asian Crystallography Association Meeting, Kolkata, December 11-14, 2015

Shivprasad Patil Ajit V.J. *A first step to probe nano confined water optically* Complex Fluids 2016 (CompFlu 2016), IISER Pune, January 2-4, 2016 • Arpita Roychoudhary (Post-doctoral fellow) *Mechanical properties of membranes probed with force spectroscopy* Complex Fluids (CompFlu) 2016, IISER Pune, January 2-4, 2016 (Talk) • Amandeep Sekhon and S. Patil *How shear viscosity changes for water under nanoconfinement?* Complex Fluids 2016 (CompFlu 2016), IISER Pune, January 2-4, 2016 • Amandeep Sekhon and S. Patil *Nonlinear behavior of nanoconfined liquid: Shear-thinning, slippage* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016 • Sourabh Talele and Shatruhan Singh Rajput *Small amplitude AFM: direct and linear measurement of molecular forces* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016 • Ajit V.J. *A first step to probe nano confined water optically* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016 • Ajit V.J. *A first step to probe nano confined water optically* Mumbai Pune Soft Matter Meet, IIT Bombay, March 5, 2016 • Sourabh Talele and Shatruhan Singh Rajput *Small amplitude AFM: Direct and linear measurement of molecular forces* Mumbai Pune Soft Matter Meet, IIT Bombay, March 5, 2016 • Ajit V.J. *A first step to probe nano confined water optically* Optics Within Life Sciences (OWLS), TIFR Mumbai, March 16-19, 2016 • Amandeep Sekhon and S. Patil *Nonlinear behavior of nanoconfined liquid: Shear-thinning, slippage* Optics Within Life Sciences (OWLS), TIFR Mumbai, March 16-19, 2016 • Arpita Roychoudhary (Post-doctoral fellow) *Measurement of viscoelastic properties of single biomolecules using thermal fluctuation method* Optics Within Life Sciences (OWLS), TIFR

Mumbai, March 16-19, 2016 • Sourabh Talele and Shatruhan Singh Rajput *Small amplitude AFM: direct and linear measurement of molecular forces* Optics Within Life Sciences (OWLS), TIFR Mumbai, March 16-19, 2016

Pramod Pillai Anish Rao, Soumendu Roy, Mahima Unnikrishnan, Sumit S. Bhosale, Gayathri Devatha and Pramod P. Pillai *Regulation of interparticle forces reveals controlled aggregation in charged nanoparticles* • Gayathri Devatha, Soumendu Roy and Pramod P. Pillai *Electrostatically driven energy transfer in biocompatible InP QDs towards live cell imaging*

Thomas Pucadyil M. Kushwah, S. Dar and T.J. Pucadyil *Mechanism of vesicle release at the endocytic recycling compartment* Annual Meeting of the American Cell Biology Society, San Diego, USA, 2015 • S. Dar and T.J. Pucadyil *Dynamin-catalyzed membrane fission in the absence of a pleckstrin-homology domain* Annual Meeting of the American Cell Biology Society, San Diego, USA, 2015 • S. Dar, S. Kamerkar and T.J. Pucadyil *A high-throughput platform for real-time analysis of membrane fission reactions reveals dynamin function* 14th EMBO Endocytosis Meeting, Nice, France, 2015 • T.J. Pucadyil and S. Holkar *Design principles for synergy between clathrin-associated sorting proteins (CLASPs) and the heterotetrameric AP2 adaptor* Gordon Conference on Molecular Membrane Biology, Andover, USA, 2015 • S. Kamerkar and T.J. Pucadyil *Biochemical screen for potential membrane fission catalysts* Cell Mechanics Meeting, Raman Research Institute, Bengaluru, 2015 • D. Raunaq and T.J. Pucadyil *Dynamics of assembly of ESCRT-III complex on membranes* Cell Mechanics Meeting, Raman Research Institute, Bengaluru, 2015

Sudha Rajamani Niraja Bapat and Sudha Rajamani *Effect of presence of co-solutes on enzyme-free template-directed primer extension reactions* Peptide Engineering Meeting (PEM-7), IISER Pune, December 5-7, 2015 • Chaitanya Mungi, Sachin Singh, Jeetender Chugh and Sudha Rajamani *Abiotic synthesis and characterization of prebiotically relevant pre-RNA nucleotides* Peptide Engineering Meeting (PEM -7), IISER Pune, December 5-7, 2015

Raghav Rajan *Learning to produce a complex movement sequence: lessons from the zebra finch* Computational Approaches to Memory and Plasticity (CAMP) 2015, NCBS, Bengaluru, July 2015 (Talk as lecturer) • *Neural mechanisms of song sequence generation: how "bird-brains" produce song and behavioural and neural mechanisms of song learning* 3rd SERB School on Avian Biology, NEHU, Shillong,

October 2015 (Participated as lecturer)
• *Understanding how activity in the brain produces movements* Exciting Science Group Lecture Series, NCL Innovation Centre, Pune, November 2015 (Talk)

Richa Rikhy Sameer Thukral (PhD Student) *Probing cytoplasmic compartmentalization in Drosophila early embryo syncytium* Annual Meeting of Indian Society of Developmental Biologists (InSDB), 2015 • Rohan Chippalkatti (Project Student) *Ras/ERK dependent increase in mitochondrial potential in fission deficient Drosophila follicle cells leads to loss of differentiation* Annual Meeting of Indian Society of Developmental Biologists (InSDB), 2015 • Bipasha Dey (PhD Student) *Role of Bazooka Peanut and Cadherin in mediating polarized protein distribution and architecture in the syncytial Drosophila embryo* Annual Meeting of Indian Society of Developmental Biologists (InSDB), 2015 • Sayali Chowdhary (Integrated PhD Student) *Role of mitochondrial morphology and dynamics in Drosophila Embryogenesis* Annual Meeting of Indian Society of Developmental Biologists (InSDB), 2015 • Dnyanesh (Integrated PhD Student) *Analysis of mitochondrial dynamics and metabolism in neuroblast differentiation in Drosophila melanogaster* Annual Meeting of Indian Society of Developmental Biologists (InSDB), 2015 • *Onset of epithelial like plasma membrane polarity and polygonal packing in early Drosophila embryos* Indo-French Conference on Frontiers in Cytoskeletal Research, Coordination, Adaptation, Fine Tuning, IISER, Pune, October 25-27, 2015 • Bipasha Dey (PhD Student) *Role of Bazooka Peanut and Cadherin in mediating polarized protein distribution and architecture in the syncytial Drosophila embryo* Indo-French Conference on Frontiers in Cytoskeletal Research, Coordination, Adaptation, Fine Tuning, IISER Pune, October 25-27, 2015 • Sameer Thukral (PhD Student) *Probing cytoplasmic compartmentalization in Drosophila early embryo syncytium* Indo-French Conference on Frontiers in Cytoskeletal Research, Coordination, Adaptation, Fine Tuning, IISER Pune, October 25-27, 2015 • Aparna Sherlekar (PhD Student) *Role of Bar domain protein Syndapin in actin remodeling in pseudocleavage furrow formation in syncytial Drosophila embryos* Indo-French Conference on Frontiers in Cytoskeletal Research, Coordination, Adaptation, Fine Tuning, IISER Pune, October 25-27, 2015 (Talk) • *Mitochondrial morphology control of Drosophila follicle cell differentiation in oogenesis* Biennial Indian Drosophila Research Conference, IIT Kanpur, December 20-23, 2015 • Sameer Thukral (PhD Student) *Probing cytoplasmic compartmentalization in Drosophila early embryo syncytium* Biennial Indian Drosophila Research Conference, IIT Kanpur, December 20-23, 2015

- (Poster and talk) Sayali Chowdhary (Integrated PhD Student) *Role of mitochondrial morphology and dynamics in Drosophila Embryogenesis* Biennial Indian *Drosophila* Research Conference, IIT Kanpur, December 20-23, 2015 • Darshika (PhD Student) *Ras/ERK dependent increase in mitochondrial potential in fission deficient Drosophila follicle cells leads to loss of differentiation* Biennial Indian *Drosophila* Research Conference, IIT Kanpur, December 20-23, 2015 • *Onset of epithelial like plasma membrane polarity and polygonal packing in early Drosophila embryos* Indo French Workshop Exploring the Scope of Collaborations in Marine Biology and Biotechnology between France and India, March 7-9, 2016
- M.S. Santhanam** Statistical Physics Community Meeting, TIFR International Centre for Theoretical Studies, Bengaluru, February 13, 2016 (Talk) • Sanku Paul *Classical and quantum dynamics of non-KAM systems* Statistical Physics Community Meeting, TIFR International Centre for Theoretical Studies, Bengaluru, February 12-14, 2016 • Harshini Tekur *Higher order level spacing distributions* Statistical Physics Community Meeting, TIFR International Centre for Theoretical Studies, Bengaluru, February 12-14, 2016
- L.S. Shashidhara** Shital Ahale, *An in vivo RNAi screen identifies Synaptojanin as a modulator of Hedgehog signalling during Drosophila wing development* Indian Society of Developmental Biologists Biennial Meeting, CCMB, Hyderabad, July 15-18, 2015 • Shital Ahale, *RNA binding proteins: The unexplored regulators of Hedgehog signalling* 2nd Indian *Drosophila* Research Conference, IIT Kanpur, 21-23 December 2015 (Invited Talk) • Jay Prakash Shukla *dA2BP1: A novel component of Notch Pathway during nervous System development in Drosophila* 2nd Indian *Drosophila* Research Conference, IIT Kanpur, December 21-23, 2015
- Kundan Sengupta** Devika Ranade, 5th Meeting of Asian Forum of Chromosome and Chromatin Biology, Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Bengaluru, January 15-18, 2015 • Roopali Pradhan, Indian Cell Mechanics Meeting, NCBS, Bengaluru, April-May, 2015 • Ayantika Sen Gupta, Bengaluru Microscopy Course, NCBS, Bengaluru, September, 2015 • Devika Ranade, Indo-French Meeting on Frontiers of Cytoskeleton Research, October 25-27, 2015 (Oral Presentation) • Maithilee Khot (PhD student), Ayantika Sen Gupta (PhD Student) and Apoorva Kulkarni (Wellcome-DBT India Alliance, Project JRF), International Conference on Cancer Research: New Horizons, NCCS, Pune, November 19-21, 2015
- Surjeet Singh** Koushik Karmakar *Inelastic neutron scattering studies of quasi-one-dimensional quantum magnets* 5th International Conference on Neutron Scattering, BARC and Neutron Society of India, BARC, Mumbai, 2015 (Best Poster Award) • Kshiti Mishra, Prachi Telang *Bismuth substitution studies on potential weyl semimetal $\text{Eu}_2\text{Ir}_2\text{O}_7$* Topological particles in Condensed Matter Physics-Advanced School and Topical Workshop, IISER Pune, 2015 • M. Giri *Single crystal growth and physical characterization of $\text{Sr}(\text{Fe}_{1-x}\text{Co}_x\text{Mn}_y)_2\text{As}_2$ ($x = 0.14$ and $0 < y < 0.05$) series of compounds* Emerging Trends in Advanced Functional Materials, IOP Bhubaneswar, 2016 • Rabindranath Bag *High temperature structural and magnetic study in Ho doped BiFeO_3 nanoparticles and single crystals* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016
- S.G. Srivatsan** P.S. Sabale and S.G. Srivatsan *A base-modified fluorescent PNA oligomer for the study of depurination activity of ribosome inactivating proteins toxin AvH* Humboldt Conference, Goa, November 19-21, 2015 • N. Ashok and S.G. Srivatsan *Uridine based nucleolipids: Synthesis and molecular recognition properties* 7th Peptide Engineering Meeting, IISER Pune, December 2-5, 2015 • S. Manna and S.G. Srivatsan *Two-in-one nucleoside probe to study the topology of human telomeric DNA repeats by using fluorescence and NMR spectroscopy* XI J-NOST Conference for Research Scholars, NISER Bhubaneswar, December 14-17, 2015 • N. Ashok and S.G. Srivatsan *Hierarchical self-assembly of switchable nucleolipids supramolecular gels based on environmentally-sensitive fluorescent nucleoside analogs* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016
- Pinaki Talukdar** P. Talukdar *Synthetic ion channels for selective anion transport* 10th International Symposium on Macrocyclic and Supramolecular Chemistry (10th ISMSC-2015), Strasbourg, France, June 28 - July 2, 2015 • P. Talukdar *Anion selective artificial channels based on smart glycomotifs* 18th European Carbohydrate Symposium (Eurocarb18), Moscow, Russia, August 2-6, 2015 • T. Saha, S. Dasari, D. Tewari, A. Prathap, K.M. Sureshan, A.K. Bera, A. Mukherjee and P. Talukdar *Hopping mediated anion transport through a mannitol-based rosette ion channel* Reaxys PhD Prize Symposium, Hong Kong, September 7-8, 2015 and Sustainable Development: Mega Trends of the 21st Century, Goa, October 2015 (Best Poster Award) • S.C. Deshmukh and P. Talukdar *Diastereoselective construction of (2S,3R)- α -amino alcohols: synthesis of (+)- β -*

conhydrine, valinoctin A and (2S,3R)- α -hydroxy- β amino acids 7th Peptide Engineering Meeting, IISER Pune, December 2-5, 2015 • T. Saha, M. S. Hossain, D. Saha, M Lahiri, and P. Talukdar *Structure activity relationship of sulfonamide based anionophores for chloride transport mediated apoptosis inducing activity* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016

R. Vaidhyanathan *Enhancing carbon capture capacities of a rigid ultra-micro porous MOF by CO₂ induced gate opening* Modern Trends in Inorganic Chemistry-XVI (MTIC-XVI), Jadavpur University, Kolkata, December 3-5, 2015 • *Pd loaded COF as catalyst for multi-fold Heck reactions, C-C couplings and CO oxidation* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016

Suneeta Vardarajan Amruta Sadhu *Semiclassical stability of Schwarzschild-Tangherlini black holes* ICGC 2015, Mohali, December 2015 • Dhanya Menon *Necessary conditions for an AdS-type instability* ICGC 2015, Mohali, December 2015

Arun Venkatnathan Praveen Kumar, *Frontiers in Electronic Structure Theory*, Goa, May 26-28, 2015 •

Praveen Kumar, *Ionic liquids for Clean Energy and Environment*, NCL Pune, December 16-17, 2015

Seema Verma R. Surya and Seema Verma *Morphological to nanostructural transformation from -FeOOH nanorods to biocompatible hematite nanocube* International Conference on Nanoscience and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016

Milind Watve Manawa Diwekar, Arushi Bodas and Milind Watve *Insulin-amylin and β -cell dynamics model to differentiate between alternative evolutionary hypotheses for type 2 diabetes mellitus* Evolutionary Medicine Conference, Zurich, Switzerland, July 30 - August 1, 2015 • Manawa Diwekar, Anamika Chatterjee, Pramod Patil and Milind Watve *Distinct statistical signatures of peripheral and central mechanisms of glucose regulation* Evolutionary Medicine Conference, Zurich, Switzerland, July 30 - August 1, 2015 • Manawa Diwekar, Suraj Chawla; Anagha Pund, Shubhankar Kulkarni and Milind Watve *What Lotka-Volterra competition model teaches us about type 2 diabetes mellitus* Evolutionary Medicine Conference, Zurich, Switzerland, July 30 - August 1, 2015 • Milind Watve *A critical evaluation of evolutionary hypotheses for type 2 diabetes* Evolutionary Medicine Conference, Zurich, Switzerland, July 30 - August 1, 2015 (Talk)

Academic Events Organized

G. Ambika	Indo-US Workshop on Time Series Analysis, IISER Pune, May 25-30, 2015
Argha Banerjee	Training School on Modelling of Mountain Glacier Dynamics, IISER Pune, October 23 - November 4, 2015
Apratim Chatterji	Mumbai Pune Soft Matter Meet, IISER Pune, August 1, 2015 • Compflu-2016, IISER Pune, January 2-4, 2016
Srabanti Chaudhury	Contributed to organizing the International Training Program on Leadership and Career Development for Women Scientist & Technologists from August 28 - September 1, 2015
Anisa Chorwadwala	Member of Scientific Committee of the Indian Women and Mathematics-2015 Symposium, Delhi University, April 2-4, 2015
Aloke Das	Chair of the Conference for the 13 th International Conference on Spectroscopy and Dynamics of Molecules and Cluster (SDMC-2016), Brightland Resort, Mahabaleshwar
Shouvik Datta	2 nd Mumbai-Pune Semiconductor Meeting, IISER Pune, March 12, 2016
Sutirth Dey	Third Foundations of Biology Meeting, March 12-14, 2016, IISER Pune
Aurnab Ghose	2 nd workshop on Mechanical Manipulations and Responses at the Scale of the Cell and Beyond, National Centre for Biological Sciences (NCBS) and Raman Research Institute (RRI), Bangalore, March 2015 • Indo-French Meeting on Frontiers of Cytoskeleton Research: Coordination, Adaptation, Fine-Tuning, October 25-27, 2015, IISER Pune
H.N. Gopi	7 th Peptide Engineering Meeting (PEM-7), a triennial international symposium, IISER Pune, December 5-7, 2015
Anindya Goswami	Co-organizer of Indo-US Workshop on Time Series Analysis, IISER Pune, May 25, 2015 • Session organizer in 2015 International Indian Statistical Association Conference, Pune, December 20, 2015
Anirban Hazra	Co-organized the Discussion meeting on Spectroscopy and Dynamics of Molecules and Clusters, Mahabaleshwar, February 18-21, 2016
Partha Hazra	Organized a session of workshop on Radiation and Photochemistry (PUWORP-2016), IISER Pune
Shabana Khan	Salters' Chemistry Camp, December 9-11, 2015, IISER Pune • Contributed to organizing International Conference on Nanoscience and Technology (ICONSAT 2016), February 29-March 2, 2016
G.V.Pavan Kumar	Member of Organizing Committee of the International Conference on Nano Science and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016
Pankaj Mandal	One of the co-conveners of Structure and Dynamics of Molecules and Clusters – SDMC 2016, Mahabaleshwar, February 18-21, 2016
John Mathew	Contributed to organizing the British Council – IISER Pune Public Lecture Series “Science and Beyond”, October 2015 - February 2016

Sunil Mukhi	One of the conveners of Topological Particles in Condensed Matter Physics: An Advanced School and Workshop, IISER Pune, August 6-11, 2015
Angshuman Nag	Member of Local Organizing Committee, International Conference on Nano Science and Technology (ICONSAT), IISER Pune, February 29 - March 2, 2016 • Member of the Core Organizing Committee for IISER Pune-Temple University Joint Symposium on Chemistry and Physics of Advanced Materials, IISER Pune, December 1, 2015
A.A. Natu	The Salters' Chemistry Camp for School Children, December 09-11, 2015 • Ishan Vikas camp, May 18-27, 2015 and December 02-11, 2015
Shivprasad Patil	Co-organized International Conference on Complex Fluids (Compflu-2016), IISER Pune, January 1-3, 2016 • Part of the Organizing Committee of International Conference on Nanoscience and Technology (ICONSAT 2016), IISER Pune, February 29 - March 2, 2016
Supriya Pisolkar	Organized Math Symposium, September 30 - October 1, 2015, IISER Pune
S.G. Srivatsan	Member of Organizing Committee, Humboldt Kolleg on Sustainable Development: Mega Trends of the 21 st Century, November 19-21, 2015, Goa • Member of Organizing Committee, 7 th Indo-German Frontiers of Engineering Symposium (INDOGFOE), February 19-22, 2015, Agra
Suneeta Vardarajan	Co-Chair (with K.G. Arun) for a Classical Gravity-Gravitational Waves workshop at the International Conference on Gravitation and Cosmology, ICGC-2015, IISER Mohali, December 2015

Memberships and Affiliations

G. Ambika	Visiting Associate, IUCAA, Pune • Life Member, Indian Science Congress • Member, Indian Association of Physics Teachers • Member of Academy of Physics Teachers
V.G. Anand	Life Member, Chemical Research Society of India (CRSI) • Member, International Advisory Board, <i>Macromolecules</i>
Sudarshan Ananth	Member, National Academy of Sciences India (NASI), Allahabad • Founder Member, Indian National Young Academy of Science (INAYAS)
Chaitanya Athale	Member, Biophysical Society of USA
Ramana Athreya	Member, Arunachal Pradesh State Wildlife Advisory Board • Trustee, EcoSystems-India, Guwahati, India (a conservation NGO)
Nagaraj Balasubramanian	Member, American Chemical Society (ACS)
Argha Banerjee	Member, International Glaciological Society
Rabeya Basu	Member, Departmental Research Committee, Department of Mathematics, Lady Brabourne College, Kolkata
Sudipta Basu	Member, Indian Science Congress Association
Nirmalya Ballav	Member, Editorial Board of the Journal <i>ISRN Spectroscopy</i> • Member, American Chemical Society • Member, American Vacuum Society • Visiting Scientist in the group of Prof. Thomas A. Jung at Paul Scherrer Institute (ETH Domain), Switzerland
Anjan Banerjee	Member, Indian Society of Cell Biology (Executive Committee Member, 2015-17) • Member, Indian Society of Developmental Biology • Member, Plant Tissue Culture Association of India • Member, American Society of Plant Biologists (ASPB) • Executive International Scientific Program Board Member, International Plant Molecular Biology (IPMB) Congress held in Brazil in 2015
Deepak Barua	Member, Bombay Natural History Society • Executive Member of Steering Committee to establish the Indian Society of Evolutionary Biology
Ramakrishna Bhat	Life Member, Chemical Research Society of India • Member, Royal Society of Chemistry (RSC)
Anup Biswas	Member of International Indian Statistical Association (IISA) • Invited Member of the Indian Society of Industrial and Applied Mathematics (ISIAM)
R. Boomi Shankar	Life Member, Chemical Research Society of India • Member, American Chemical Society
Harinath Chakrapani	Life Member, Chemical Research Society of India • Member, American Chemical Society
Srabanti Chaudhury	Life Member, Chemical Research Society of India
Anisa Chorwadwala	Member, Indian Women and Mathematics Executive Committee
Jeetender Chugh	Life Member, Nuclear Magnetic Resonance Society (NMRS) of India
Aloke Das	Life Member, Chemical Research Society of India • Life Member, Indian Society for Radiation and Photochemical Sciences

Aditi Deo	Member, Society for Ethnomusicology, USA • Member, British Forum for Ethnomusicology, UK
Sutirth Dey	Editorial Board, <i>Journal of Theoretical Biology</i>
Sourabh Dube	Member, India-CMS collaboration, CERN, Geneva • Member of the Indian Association of Physics Teachers
Sanjeev Galande	Life Member, Society of Biological Chemists, India • Honorary Associate, Sydney Medical School, Sydney, Australia 2013-16 • Fellow of the Indian Academy of Sciences, Bengaluru • Fellow, Indian National Science Academy • Member, Guha Research Conference
K.N. Ganesh	<p>Vice-President, Indian Academy of Sciences, Bangalore • Fellow, National Academy of Sciences India, Allahabad • Fellow, Indian National Science Academy, New Delhi • Fellow, The World Academy of Sciences (TWAS), Trieste • Honorary Professor, JNCASR, Bengaluru</p> <p><i>Memberships of Editorial Boards of Journals: Journal of Organic Chemistry (ACS–International Editorial Advisory Board); Chemistry – An Asian Journal (Wiley, Germany) Member International Advisory Board; Beilstein Journal of Organic Chemistry (Germany); Artificial DNA:PNA, XNA (Landbiosciences, U.S.A.); Oligonucleotides (Mary Ann Liebert Inc, USA); Nature: Scientific Reports (Nature Publishing Group); Co-Editor, ACS Omega for India</i></p> <p><i>Committee Memberships:</i> Chairman, FIST Expert Committee in Chemical Sciences, DST, New Delhi (2012-2015) • Member, FIST Advisory Board (FISTAB), DST, New Delhi Chairman, Programme Advisory Committee in Organic Chemistry, DST, New Delhi (till July 2015) • Member, Board of Directors, Venture Centre, NCL Innovation Park, Pune • Chairman, Indian Advisory Committee, Lady Tata Memorial Trust, Mumbai • Member, Research Council, CSIR-Institute of Genomics & Integrative Biology (IGIB), New Delhi • Member, Empowered Committee, Science and Engineering Board, New Delhi (till July 2015) • Member, Maharashtra State Innovation Council (MSInC) • Member, DBT-IISc Partnership Program's Scientific Advisory Committee • Chairman, DBT Task Force on Human Resource Development • Member, Oversight/Umbrella Committee for DBT's Bioenergy Centres and New Centre (Pan-IIT) • Member, Nano Mission Council (NMC), DST New Delhi • Chairman, Nano Science Advisory Group-Biological Sciences (NSAG-II) • Member, Governing Body of the GSFC University, Vadodara • Member, Board of Directors, Innovassynth Technologies (I) Ltd • Member, Board of Directors, Bharatiya Reserve Bank Note Mudran Private Limited (BRBNMPL), Bangalore • Member, Centre for Materials for Electronics Technology [C-MET] Apex Bodies • Member, Board of Management, DIAT Pune • Member, Board of College & University Development (BCUD), Swami Ramanand Teerth Marathwada University, Nanded • Chairman, DST, Nanoscience Advisory Group, Bio-nanotechnology (2015) • Chairman, Research Council, High Energy Material Research Laboratory, DRDO, Pune • Member, Executive Council of Central University of Tamil Nadu, Thiruvavur • Chairman, Research and Academic Advisory Council (RAAC), Institute of Nano Science and Technology (INST), Mohali</p>
Aurnab Ghose	Life Member, Indian Society for Cell Biology • Life Member, Indian Academy of Neurosciences • Life Member, Society for Neurochemistry (India) • Member, Society for Neuroscience (USA) • Member, Indian Society for Developmental Biology
Prasenjit Ghosh	Regular Associate of the Abdus Salam International Centre for Theoretical Physics (Jan 2012 to Dec 2017) • Member, Chemical Research Society of India
Sujit Ghosh	Life Member, Chemical Research Society of India • Life Member, Materials Research Society of India (MRSI) • Life Member, Society of Materials Chemistry (SMC), India • Member, Indian Society for Radiation and Photochemical Sciences
Boopathy Gnanaprakasam	Life Member, Chemical Research Society of India • Member, Flow Chemistry Society India, 2016-2017

Anindya Goswami	International Indian Statistical Association • Indian Society of Industrial and Applied Mathematics
Amrita Hazra	Member, American Society for Microbiology • Sponsored Member, New York Academy of Sciences
Anirban Hazra	Member, Indian Society for Radiation and Photochemical Sciences
Partha Hazra	Life Member, Chemical Research Society of India • Life Member, American Chemical Society, USA
M. Jayakannan	Life Member, Society for Polymer Science India (SPSI) • Member, Chemical Research Society of India (CRSI)
M. Jeganmohan	Life Member, Chemical Research Society of India
Mukul Kabir	Member, Materials Research Society, USA
Krishanpal Karmodiya	Member, Malaria Research and Reference Reagent Resource Center (Mr4)
Saikrishnan Kayarat	Member, Indian Crystallographic Association
Shabana Khan	Life Member, Chemical Research Society of India (CRSI) • Life Member, American Chemical Society (ACS)
Raghavendra Kikkeri	Life Member, Chemical Research Society of India
Sulabha Kulkarni	Member, Indian Physics Association (IPA) • Member, Materials Research Society of India (MRSI) • Member, Indian Association of Physics Teachers (IAPT) • Member, INS
G.V. Pavan Kumar	Life Member, Optical Society of India • Member, Optical Society of America
Mayurika Lahiri	Life Member, Indian Association for Cancer Research • Life Member, Indian Society of Cell Biology
Soumen Maity	Member, Institute of Electronics, Information and Communication Engineers (IEICE)
Moumita Majumdar	Life Member, Chemical Research Society of India (CRSI)
Sonam Mehrotra	Life Member, Indian Society of Developmental Biologists
Muhammed Musthafa	Life Member, Chemical Research Society of India
Pankaj Mandal	Member, Chemical Research Society of India, Bengaluru • Member, Optical Society of America • Member, Optical Society of India
Rama Mishra	Member, Editorial Board for the <i>American Journal of Mathematical Analysis</i> , Science Education Publishing, USA • Member, Mathematical Reviews
Arnab Mukherjee	Life Member, Chemical Research Society of India (CRSI) • Member, American Chemical Society
Sunil Mukhi	Fellow, Indian Academy of Sciences • Fellow, Indian National Science Academy • Fellow, The World Academy of Science
Angshuman Nag	Member, Chemical Research Society of India (CRSI) • Associate of Indian Academy of Science, Bengaluru
Arvind Natu	Board of Directors, Bakul Pharmaceutical Research Centre, Mumbai • Member, National Coordination Committee of Olympiads • Research Ambassador, DAAD • Visiting Professor, Bielefeld University, Germany • Member, PMC Scientists Awards Committee

	<ul style="list-style-type: none"> • Senate Member, SVNIT, Surat • Academic Council, DY Patil University, Pune • Member, International Junior Science Olympiad • UGC-SAP Committee, Chemical Sciences • PMC of DRDO HEMRL Panel • Board of Directors, PCMC Science Park, Pune • Chairman, URDIP, Admission Committee • Editorial Board, <i>Indian Drugs</i>
Pramod Pillai	Life Member, Chemical Research Society of India (CRSI)
Thomas Pucadyil	Member, Indian Society for Cell Biology • Member, Biophysical Society, USA • Member, American Society for Cell Biology • Member Indian Biophysical Society
Shyam S. Rai	Senior Associate, the Abdus Salam ICTP, Trieste • UGC Expert, Indian School of Mines, 2014-17 • Fellow, Indian National Science Academy • Fellow, Indian Academy of Sciences • Fellow, National Academy of Sciences of India
Sudha Rajamani	Member, International Society for Astrobiology (previously known as ISSOL)
V.S. Rao	Member Institutional Biosafety Committee, Syngenta, Pune • Adjunct Visiting Professor, University of Pune • Life Member, Indian Society of Genetics and Plant Breeding and Indian Society for Plant Biochemistry and Biotechnology • Member, Standing Committee of DST-INSPIRE program
Girish Ratnaparkhi	Member, Society of Developmental Biology • Member, Genetics Society of America
M.S. Santhanam	Member, Editorial Board of <i>Physics Education</i>
L.S. Shashidhara	Vice-President (Science and Society), Indian National Science Academy (INSA, New Delhi) (2016-2018) • Secretary-General, International Union of Biological Sciences (IUBS) (2016-2019) Committee Member, Governing Council, Indian Association for Cultivation of Science, Kolkata • Member, Advisory Board, Science Express, DST-NCSTC • Member, Management Board/Research Council, NCBS, Bengaluru • Chairman, DBT's Expert Group on Research on Technology Development in Silk and its Applications in Biomaterials • Co-Chair, Selection and Review Committee on DBT's Star College Scheme • Member, Scientific Advisory Council, RGCB, Thiruvananthapuram • Member, Screening Committee, DST-Swarnajayanthi Fellowship • Member, Research Advisory Committee, NCCS, Pune
S.G. Srivatsan	Life Member, Chemical Research Society of India • Member, AvH Foundation, Pune Chapter • Member, American Chemical Society
Nishikant Subhedar	President, Indian Subcontinental Branch of the International Neuropeptide Society
Prasad Subramanian	Life Member, Astronomical Society of India
R. Vaidhyathan	Member, American Chemical Society • Member, Chemicals Research Society of India Member, Canadian Chemical Society
Pinaki Talukdar	Life Member, Chemical Research Society of India
Arun Venkatnathan	Member, Chemical Research Society of India • Member, Indian Society for Radiation and Photochemical Sciences • Member, American Chemical Society
Seema Verma	Member, Materials Research Society of India (MRSI)
Milind Watve	Founder Member, International Society for Evolutionary Medicine and Public Health • Technical Committee Member for Research wing, Forest Department, Maharashtra State • Member of INSA Sectional Committee VIII: Animal Sciences

National and International Visits

Nixon Abraham	Visited RGCB, Thiruvananthapuram, Kerala, for collaboration (February 2016)
G. Ambika	Visited University of Melbourne, Australia as part of delegation from IISER Pune for discussions on Blended BSc Curriculum (June 7-11, 2015)
Chaitanya Athale	Invited to a Discussion Workshop on Information Processing in Biological Systems, ICTS, Bengaluru (January 4-7, 2015)
Baskar Balasubramanyam	Academic visit to ICTP Trieste (October-November 2015)
Nirmalya Ballav	Visiting Scientist in the group of Prof. Thomas A. Jung, Paul Scherrer Institute (ETH Domain), Switzerland (June and October 2015)
Argha Banerjee	UK-India Science Workshop on the Future Ganga: Science Needs for Water Security, New Delhi, December 2-4, 2015 organized by NERC Centre for Ecology & Hydrology, UK PAMC-Hydrology and Cryosphere, MoES, IIT Kanpur (April 11-12, 2016)
Debargha Banerjee	Visited HCM, Bonn, Germany to participate in a workshop on Arithmetic Groups, their Cohomology and Arithmetic Applications (January 2016)
Rabeya Basu	Visited Mulhouse, France to be present at the Algebra and Group Theory Conference held in honor of Otto Kegel (October 21-24, 2015) • Visited IIT Gandhinagar for attending CoCoA 2016 International School on Computer Algebra (February 2016)
Sudipta Basu	Visited Young Investigator Meeting (YIM) in Boston, USA as young faculty returned to India to represent IISER Pune
Ramakrishna G. Bhat	Attended XVII NOST Organic Chemistry Conference (OCC) through invitation (October 27-30, 2015)
Sandanaraj Britto	Academic Visit – Novartis Institutes for BioMedical Research – Cambridge – USA (May 15, 2015 - July 15, 2015)
Smita Chaurvedi	Visited Photon Factory, KEK, Tsukuba, Japan and led a project team for the high and low temperature X ray diffraction experiments. The work was sponsored and supported by DST under the collaboration between DST (Saha Institute of Nuclear Physics) and Photon Factory, Japan (June 24-27, 2015)
Srabanti Chaudhury	Attended upon invitation conference titled Frontiers in Electronic Structure Theory held in Goa (May 26-28, 2015)
Anisa Chorwadwala	Visited Dr. Apala Majumdar at the Department of Mathematical Sciences, University of Bath, UK on a collaborative research work (March 22-31, 2016)
Neelesh Dahanukar	Resource person at the National Workshop on Advances in Integrative Taxonomy of Freshwater Fishes organized by Kerala University of Fisheries and Ocean Studies (KUFOS), Kochi, Kerala (December 1-4, 2015)
K.N. Ganesh	Visited University of Melbourne, Australia (June 7-11, 2015) • Visited Vienna, Austria, TWAS Meeting (November 17-21, 2015) • Visited San Diego, USA, Annual Meeting of the American Chemical Society (ACS) and Launching of ACS Omega (March 13-17, 2016)

Sanjeev Galande	Meeting with the Nutrition and Health Research Funding team at the Bill And Melinda Gates Foundation, Seattle, USA (July 17, 2015) • Visit to Lab of Prof. Riitta Lahesmaa in Turku, Finland for initiating new collaboration in Proteomics (February 8-12, 2016)
Prasenjit Ghosh	Visited Abdus Salam International Centre for Theoretical Physics, Trieste, Italy as a Regular Associate of the Condensed Matter and Statistical Physics Section (April 22 - May 31, 2015)
Sujit Ghosh	Attended IUPAC-2015 in Busan, Korea, through the IUPAC Young Scientist Travel Grant
Anindya Goswami	Workshop: Stochastic Processes and Random Fields in Technion, Haifa, Israel (June 29, 2015) through invitation • International Congress on Industrial and Applied Mathematics, Beijing (August 10, 2015) supported by NBHM
Krishapal Karmodiya	Visited JNCASR, Bengaluru for collaboration (March 15-17, 2016)
Raghavendra Kikkeri	Visited MPI, Berlin as a part of Max-Planck Partner Group Research Exchange Program, to present work and discuss future course of action (January 5-7, 2016)
Vivek Mallick	Invited to participate in the International Colloquium on K theory, TIFR, Mumbai (January 6-14, 2016)
John Mathew	Visited UK (England and Wales) to promote a course titled 'Science and Culture in British India' that Dr. Mathew floated to the British Council for IISER Pune in response to its call for classes to be offered for British students in India during the summer. Of the 44 applying institutes, 9 were successful of which IISER Pune was one (April 2016)
Muhammed Musthafa	Visited as Institute Guest, National Institute of Technology, Calicut (January 18-23, 2016)
Supriya Pisolkar	Visited University of Yale, USA to participate at Invariant Theory, Number Theory and Representation Theory Conference held in honor of Prof. Howe (June 2015)
Sudha Rajamani	Invited as a thought-leader to craft a strategy for origins of life research, ELSI Origins Network (EON) Roadmap Workshop, Earth Life Science Institute (ELSI), Tokyo Tech, Tokyo, Japan (August 24-29, 2015)
M.S. Santhanam	Visited Max Planck Institute for the Physics of Complex Systems, Dresden, Germany for collaborative work with the nonlinear dynamics group there (June 20 - July 10, 2015)
Kundan Sengupta	Visited National Institute of Immunology (NII), New Delhi for roundtable discussions with Prof. Harold Varmus (Nobel Laureate & Former Director National Cancer Institute, USA) (November 15, 2015)
Seema Sharma	Visited CERN, Geneva, Switzerland to attend the CMS collaboration meeting and report on the progress made in inclusive searches for Supersymmetric particles (May 3-10, 2015) • Visited Fermi National Accelerator Laboratory, USA upon invitation under the Guest and Visitors program to collaborate on the searches for supersymmetry in proton proton collisions at a centre-of-mass energy of 13 TeV, the highest energy ever achieved by colliders (May 28-July 28, 2016) • Visited IIT Kanpur upon invitation to organize activities of the Working Group on Standard Model (SM)+Beyond Standard Model (BSM) in the workshop on High Energy Physics Phenomenology (December 4-13, 2015)
L.S. Shashidhara	Attended ISEF 2015 (https://www.societyforscience.org/intel-international-science-and-engineering-fair) as an observer on the invitation of DST and IUSSTF to understand the process of selection of awards (May 11-15, 2015) • Attended EMBO2015 and YIMUK2015 as a representative of Indian academia and spoke about career and collaborative opportunities in India (September 7-11, 2015) • Visited ENS-Lyon as a representative of IISER Pune delegation to develop bilateral cooperation (November 16-20, 2015) • Participated in the General Assembly of IUBS at Berlin as a member of the

	Executive Council and convened a session on Unified Biology Education for Future Earth (December 14-18, 2015)
Prasad Subramanian	Visited the Department of Physics and Astronomy, University of Glasgow to initiate a collaboration in the areas of solar coronal physics and space weather. This is under the purview of the existing MoU between IISER Pune and the University of Glasgow (July 27-30, 2015)
Gyana Ranjan Tripathy	<p>Attended a brainstorming session on Integrated Isotope Hydrology Research Programme in India at Physical Research Laboratory, Ahmedabad (July 30-31, 2015)</p> <ul style="list-style-type: none"> ● Visited University of Kashmir, Srinagar to collect geological samples (May 11-15, 2015) ● Visited Wadia Institute of Himalayan Geology, Dehradun to collect organic-rich sedimentary rocks from the Himalaya (December 16-21, 2015) ● Visited National Institute of Oceanography, Goa for collaborative research (September, 2015)
R. Vaidyanathan	University of Ottawa, Canada (2015) ● BASF Germany, Ludwigshafen, Germany (2015)

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Conferences, Events and Initiatives

Conferences, Symposia and Workshops

News and Events

International Relations

Outreach Activities

Public Lectures and Lecture Series

Research Seminars

Conferences, Symposia and Workshops

Indo-US Workshop on Time Series Analysis

May 25-30, 2015

Conveners: G. Ambika, Richard Smith (SAMSI, USA), Sujit Ghosh (SAMSI, USA)

This workshop was organized jointly by IISER Pune and SAMSI (Statistical and Applied Mathematical Sciences Institute), USA and funded by Indo - US S&T Forum, New Delhi and SAVI (Science Across Virtual Institute), NSF, USA.



The workshop incorporated both the statistical approaches used in data analysis for forecasting and modeling, and the techniques based on nonlinear dynamics to understand and identify nontrivial structures in time series. The main objective was to create awareness on time series analysis related to fundamental analysis as well as real-life applications, from earth and climate science, physiology, astrophysics, econometrics, finance, etc. This has also strengthened scientific collaborations between Indian and US researchers due to utilization of complementary expertise.

There were 8 speakers from the USA and 12 from India who are active researchers covering all areas and trends in statistical analysis and nonlinear dynamics approach. There were 4 overview lectures covering various aspects on Time domain methods for time series analysis, Frequency domain methods for time series analysis, Bayesian dynamic modeling, and nonlinear time series analysis. In addition, 15 research level talks and 6 lab sessions of demo and hands on work covering Time series analysis using R, Time series clustering analysis, Change-point data analysis, Modeling Time series using Dimension Reduction Methods and Nonlinear Time series analysis were organized. A poster session conducted in parallel also initiated many fruitful interactions and discussions. About 60 participants from a wide pool of academics like faculty, post-doc, PhD, MSc and industry attended the 5-day workshop.

Mumbai-Pune Complex Fluids Meeting

August 01, 2015

Organizer: [Apratim Chatterji](#)

This biannual event is a meeting of researchers working on soft matter in the Mumbai-Pune area. The participating institutes for this meeting were IIT Bombay, TIFR, BARC, ICT, CSIR-NCL and IISER Pune. As every time, 100 researchers met in this day-long meet. There were 8 talks and an extended poster session.

Topological Particles in Condensed Matter Physics: An Advanced School and Workshop

August 06-11, 2015

Organizers: [Sunil Mukhi](#), [Jainendra Jain \(Penn State University, USA\)](#), [Mukul Kabir](#), [Sunil Nair](#), [Rajeev Pathak \(S.P. Pune University\)](#)

This workshop, held at IISER Pune, was inspired by the theme of emergent topological particles in condensed matter — such as anyons, composite fermions, Majorana fermions, Dirac monopoles and skyrmions — the investigation of which has led to fascinating new developments in recent years. These particles are relevant to the fractional quantum Hall effect, topological insulators and topological quantum computation. The workshop started with an Advanced School featuring many pedagogical lectures that provided an introduction to the basic background, intended for students as well as others new to these topics. This was followed by invited talks by experts from India and abroad. There were around 80 participants.

Pune-Mumbai Number Theory Seminar

September 25-26, 2015

Organizer: [Debargha Banerjee](#)

This year's Pune-Mumbai Number Theory Seminar had a new session exclusively for young mathematicians.



Course on Econometrics: Modeling Financial Markets

September 29 – October 2, 2015

Organizer: Anindya Goswami

This was a mini-course on Time Series Econometrics, a branch of computational Finance. The course had 6 sessions of 90 minutes each. The course was taught by Dr. Vishwanathan Iyer, an Associate Professor in the area of Accounting, Economics and Finance and currently the Chairman – Admission at T.A. Pai Management Institute (TAPMI). There were lab sessions with equal importance. Participants performed numerical experiments on spot.

Course on Modelling Mountain Glacier Dynamics

October 23 – November 4, 2015

Organizer: Argha Banerjee

This SERB-DST sponsored short course had 21 participants, mostly those who are doing PhD in glaciology in various labs in India and a few Masters' students. Basic analytical and numerical methods in glaciology were taught. There were hands-on sessions on Matlab and a few glacier modelling software/packages. Well known glaciologists from India and abroad were instructors for this course.



Indo-French Conference on Frontiers in Cytoskeleton research: Coordination, Adaptation, Fine tuning

October 25-27, 2015

Organizers: Roop Mallik (TIFR, Mumbai), Carsten Janke (Institut Curie, France), Aurnab Ghose

About 25 principal investigators working on understanding cytoskeletal processes attended this conference along with students from across India. The meeting resulted in intensive discussions between scientists working on cytoskeletal dynamics across many scales.



Each seminar was followed by discussion and questions which continued through the poster sessions that were very well attended. There were also lively discussions about different career paths in India and France, about possibilities for young and established researchers, the role of women in research in both countries, and about the role of EMBO in fostering international exchange.

The meeting also included a discussion on where the cytoskeleton field is moving, and how collaborations can be sustained between Indian and French scientists in future.

Chemistry and Physics of Advanced Materials - Joint Symposium with Temple University

December 01, 2015

Organizers: Arun Venkatnathan, Angshuman Nag

This event had 22 lectures in two parallel sessions, out of which, 8 lectures were delivered by scientists from Temple University, Philadelphia, United States. This one-day symposium was jointly organized by IISER Pune and Temple University in order to promote research collaboration between the two institutes.

7th Peptide Engineering Meeting (PEM-7)

December 05-07, 2015

Organizers: P. Balaram (IISc), K.N. Ganesh, H.N. Gopi

The Peptide Engineering Meeting (PEM) is a triennial international symposium addressing structure-based design of peptides, peptide-protein interactions, peptide-membrane interactions, bioactive peptides and peptide-based materials.



The seventh edition of this meeting was held for the first time in India at IISER Pune. Around 200 research scholars, scientists, academicians participated in this meeting. It brought established scientists from across the globe together with younger researchers. There were 32 invited talks, posters and informal discussions on various aspects of peptides including peptide engineering and related fields. The Meeting attracted eminent scientists and researchers across the globe working in the area of structure based design of peptides, peptide-protein interactions, structure activity relationships, peptide-membrane interactions, bioactive peptides and peptide based materials.

Workshop on Hyperbolic Knot Theory

December 07-17, 2015

Organizer: Rama Mishra

This workshop was conducted by Prof. Abhijit Champanerkar (City University of New York, USA). Lectures were on the basics of hyperbolic geometry in dimensions two and three. In addition, techniques in hyperbolic 3-manifolds and hyperbolic knots and links were taught. Students were exposed to interactions of hyperbolic geometry to other areas such as number theory (via arithmetic knots and links) and surface dynamics (via fibered knots and links). Also many computational tools and resources for various topics in low-dimensional topology were introduced. In addition, various research problems and research directions were discussed.

National Network of Mathematical and Computational Biology (NNMCB) National Meeting

December 27-30, 2015

Organizer: Pranay Goel

The Pune node of NNMCB organized a National Meeting on Mathematical and Computational Biology with the objective of bringing together experts working in various thematic areas and providing young researchers an opportunity to share their research findings and learn about recent developments in related areas. The meeting was held at IISER Pune and CSIR-NCL, and co-organized by all Pune-based institutions participating in the NNMCB program. The meeting comprised of contributed talks and sessions, a poster session, and a limited number of invited talks, including some by experimental biologists.



International Complex Fluids Conference (Compflu-2016)

January 02-04, 2016

Co-organizers: Apratim Chatterji, Shivprasad Patil, K. Guruswamy (CSIR-NCL, Pune), Sarika Bhattacharyya (CSIR-NCL, Pune)

This Annual meeting of Indian Society of Rheology was held, in three parallel sessions, with 250 participants, of whom 30 were from abroad. More than 100 faculties from many IITs, IISc, IISERs and universities participated. Around 80 posters were displayed and 112 talks were delivered.

Workshop on Data Analysis: Estimation and Approximation in Science

January 06-08, 2016

This three-lecture series was delivered by Prof. L. Mahadevan (Harvard University, USA). The short introductory course was aimed at students/faculty from across science who have had basic mathematics (linear algebra, calculus, statistics) and some computational experience. These lectures were planned to lead to a summer workshop by the same instructor. The workshop covered data analysis topics such as correlations, networks, and inverse problems, using examples.

India-EMBO Partnership Symposium

February 05, 2016

Organizer: Sanjeev Galande

The Government of India, through the Department of Biotechnology (DBT) recently signed an agreement with the European Molecular Biology Conference (EMBC) and the European Molecular Biology Organisation (EMBO), inducting India as a member state of the EMBC and EMBO. The agreement aims to provide impetus to the strengthening of links between Indian and European life sciences research. As part of the agreement, Indian scientists would be able to participate in the same EMBO programmes as researchers from all other member states. The launch of this partnership was accompanied by a series of events across India. At each event scientists from Europe and India as well as EMBO representatives talked about science and opportunities afforded by the partnership. IISER Pune had organized a half-day symposium as a part of this series.

Recent Developments in M-theory held at CERN, Geneva

February 08-19, 2016

Organizers: Neil Lambert (King's College London), Kimyeong Lee (KIAS), Noppadol Mekareeya (CERN), Sunil Mukhi, Piljin Yi (KIAS)

This topical workshop featured research seminars on the following topics: Localization calculations of superconformal indices in 5 and 6 dimensions and higher dimensional gauge theories, the bootstrap approach to conformal field theories, field theory models of M-branes, in particular M5-branes, higher spin gravity. This Theory Institute organized at CERN, Geneva was devoted to recent developments in M-theory. The structure of the Theory Institute included a small number of talks each day, typically around 3 or 4, with plenty of time scheduled for discussions and interactions. This Theory Institute was also supported by the CERN-Korea program.

Conference on Spectroscopy and Dynamics of Molecules and Clusters

February 18-21, 2016

Organizers: Alope Das, Pankaj Mandal, Anirban Hazra, Debashree Ghosh (CSIR-NCL, Pune), Sayan Bagchi (CSIR-NCL, Pune)

The 13th International conference on Spectroscopy and Dynamics of Molecules



and Cluster (SDMC-2016) was organized jointly by IISER Pune and CSIR-NCL Pune. The conference was held at the Brightland Resort, Mahabaleshwar. About 80 scientists including students from various Institutes/Universities in India and abroad (Canada, United States, and Germany) took part in the conference. There were 20 oral presentations and 40 poster presentations in the conference. The conference covered topics such as VUV photoionization mass spectrometry, X-ray photoelectron spectroscopy, gas phase laser

spectroscopy, microwave spectroscopy, attochemistry, spectral signatures of chirality recognition, theoretical studies on chemiluminescence, dynamics of laser-molecule interaction, and intramolecular energy flow in slow-fast system and 2D-IR spectroscopy.



International Conference on Nanoscience and Technology (ICONSAT-2016)

February 29-March 2, 2016

Local Organizing Committee: K.N. Ganesh, M. Jayakannan, Shivprasad Patil, Shouvik Datta, G.V. Pavan Kumar, Angshuman Nag, Pramod Pillai, Satish Ogale, B.L.V. Prasad (CSIR-NCL, Pune)

International Conference on Nanoscience and Technology (ICONSAT) is a premier conference in India in the area of Nanoscience and Nanotechnology. It is held once every two years to review the recent fundamental understanding and technological advancement in the area of nanoscience. It is attended by participants from academia and industry from worldwide, and has been pivotal for the growth of research and applications of this area in India. ICONSATs were held earlier at INST Mohali (2014), ARCI Hyderabad (2012), IIT Mumbai (2010), IIT Chennai (2008), IIT Delhi (2006) and SNBNCBS (2003).

ICONSAT-2016 started with the inaugural keynote lecture by Prof. C.N.R. Rao, followed by 6 plenary and 40 invited lectures by internationally distinguished



nanoscientists. The main highlight was the poster presentation by ~370 students and teachers. The conference covered a wide spectrum of topics in modern nanoscience ranging from optical to electrical to biological properties of nanomaterials.

Third Foundations of Biology Meeting

March 12-14, 2016

Organizer: Sutirth Dey

The general idea for this series of meetings has been to get together ~20 academics from different disciplines and spend three days discussing and arguing about fundamental issues in evolutionary biology. The meeting is planned to involve a few short "seed"-talks where the speakers highlight some of the current ideas and controversies in the field. These then serve as the starting points for discussions and arguments involving all the participants.

The themes and speakers for this year were: Co-evolution (Speaker: Ullasa Kodandaramiah); Constructing evolutionary theory (Speakers: K.P. Mohanan and Milind Watve); Complexity in biology (Speaker: Ramray Bhat); Evolutionary psychology (Speakers: Mewa Singh and Garga Chatterjee).

Indo French Meeting on Glycochemistry

March 15, 2016

Organizer: Srinivas Hotha

Researchers from IIT Bombay, CSIR-NCL, and IISER Pune along with scientists visiting from University of Renne, France delivered talks on advances in glycochemistry. About 50 students attended the talks.

News and Events

Foundation Day

April 06, 2015

The 5th Foundation Day function was held with Prof. Devang Khakhar, Director, IIT Bombay as the Chief Guest. He delivered the Foundation Day Address on *The Role and Impact of Modern Research Universities*.

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



Celebrating the International Year of Light

April 13, 2015

The year 2015 is recognized as the International Year of Light and Light-based Technologies. In view of this, twenty-five undergraduate and Integrated PhD students of the institute gave a series of short talks. Topics they covered were polarization-entangled photons; laser cooling; orbital angular momentum of light; negative refractive Index and superlensing; and Brown and Twiss effect.

Ishan Vikas Shibir

May 18-27, 2015 and December 02-10, 2015

Ishan Vikas is a program initiated by MHRD to bring selected students from the north-eastern states of India to various national institutes like IISERs and IITs during their vacation period and give students an exposure to the various opportunities available for their further education. During 2015-16, two such camps were held at IISER Pune. In the camp held during May 18-27, 2015, 26 students (14 boys and 12 girls) had participated accompanied by 4 teachers. In the camp held during December 02-10, 2015, the team consisted of 40 students (20 boys and girls each) and 5 teachers.

During these visits the students were exposed to the current level of understanding in different topics in the basic sciences and what the implications to the society are. Apart from classroom lectures, they got an opportunity to work in the laboratories for hands-on demonstration of scientific concepts. In addition, students were given a flavor of other important aspects such as computer literacy, sports and communication skills, and visits were arranged to historical and cultural sites around Pune.



Summer School: Joy of Learning

May 18-22, 2015



This five-day non-residential camp for students of Class IX to Class XII was hosted by IISER Pune for the first time. The aim was to provide students an exposure to the different branches of science by engaging them in various types of activities like hands-on experiments, competitions, interactive sessions, demos, mind games etc. Each day of the camp was devoted to one branch of science. The camp aimed at making learning of science interesting and exciting. Fifty students were selected to participate in the camp from among students nominated by their school / college principals.



Inauguration of the Housing Complex

May 27, 2015

The housing complex on the campus was formally inaugurated by Prof. T.V. Ramakrishnan, Chairperson, BoG. The complex currently has two towers with 40 apartment units each. Following the inauguration, faculty along with their family members planted trees around the area.



4th Convocation

May 27, 2015

The Fourth Convocation of IISER Pune was held on May 27, 2015. Prof. Man Mohan Sharma (Emeritus Professor and Former Director of Institute of Chemical Technology, Mumbai) delivered the Convocation Address. In his speech, Prof. Sharma outlined the importance of basic science research and more particularly interdisciplinary research in solving the problems of the country. He appreciated IISER Pune for addressing this requirement and working towards abolishing the boundaries that inhibit original work. He also suggested that a fertile relationship between science and industry should be developed and hoped that IISER Pune will soon embark on such an activity.

During this convocation, 87 BS MS students and 16 PhD students were awarded degrees. Thirteen BS MS students were declared passed with distinction. Mr. P. Shiva Chidambaram, majoring in Mathematics, was awarded the Institute Gold Medal for academic excellence.



10th Meeting of Research, Development and Innovation Club for French Companies in India

June 22, 2015

Many French companies operating in India have established high-level research centers which lead to an increasingly important scientific dynamic in a growing number of areas. In particular, the research & development (R&D) centers of Airbus, Schneider Electric and L'Oreal in Bangalore; Alstom in Baroda; Saint-Gobain, Valeo and Renault in Chennai; Danone in Delhi; Lafarge, L'Oreal and Total in Mumbai; Faurecia in Pune. Some companies do not have full R&D centers but collaborate with public research institutions or through subcontracting with private

entities (CRO, Contract Research Organization). The Club aims to share experiences, exchange best practices and increase synergies. The 10th meeting of this club was held at IISER Pune with the aim of exploring possible industry-academia collaborations.

Breast Cancer Screening Camp

July 10-11, 2015

A breast cancer awareness and screening camp, open and free to members of the IISER Pune community, was organized with the cooperation of Prashanti Cancer Care Mission. The Camp was preceded by a talk on July 08, 2015 by Dr. C.B. Koppikar, Founder and Managing Trustee of this NGO on early detection and diagnosis.



iGEM 2015: India Meet-up

July 16-17, 2015

The National Meetup of the Indian Teams participating in the international Genetically Engineered Machines (iGEM) 2015 was organized at IISER Pune. iGEM is a competition on synthetic biology organized annually to pit undergraduate teams from across the world. A team of IISER Pune BS MS students led by Dr. Chaitanya Athale had participated at this competition this year. Teams from IISER Pune, IIT Delhi and IIT Kharagpur attended the national meet-up. The IISER Pune team went on to win a Bronze Medal at iGEM2015 Meeting held later in Boston, USA.

Brainstorming Meeting: Role of Basic Science and Research

July 22-23, 2015

A Brainstorming Session for inputs to the *National Education Policy* was organized on behalf of the Ministry of Human Resource Development. It consisted of panel discussions by various scientists from Indian research institutes and universities. Discussions were held in the following themes: science education at the school and undergraduate levels; higher education in science; research in basic science; role of research funding agencies; connection with social sciences; governance; innovation and entrepreneurship; and science in the context of society.

International Training Program on Leadership and Career Development for Women Scientists / Technologists

August 28 - September 1, 2015

This program was organized by IISER Pune in partnership with DST, IUSSTF and CoACh International, USA. The program focused on providing training in career-building topics not covered in traditional science curricula. The sessions conducted by national and international speakers were highly interactive and included practicing skills and role-playing.

The workshop covered the following broad topics: funding opportunities for women scientists; career launch and acceleration; leadership and networking skills for women in science and technology; the art of effective negotiation; issues related to gender bias; publishing research in peer reviewed journals; mentoring for success; proposal and grant writing; and Indo-US collaborations and funding opportunities.



Mentoring Program for LTMT Scholars

September 04, 2015

This event was organized for the LTMT (Lady Tata Memorial Trust) scholars, who presented research carried out during the two years of their JRF. The Indian Scientific Advisory Committee (ISAC) of the LTMT evaluated their work and recommended them for promotion to SRF. Two LTMT Young Researcher Awardees—Dr. Anurag Agrawal from CSIR-IGIB, New Delhi and Dr. P. D'Silva, IISc, Bengaluru—also made presentations regarding their work. This was followed by short talks of two PhD students from IISER Pune: Abhinav Parivesh and Manawa Diwekar.

LTMT-IISER Pune Workshop for College Teachers

September 05, 2015

This workshop was jointly organized by the Lady Tata Memorial Trust (LTMT) and IISER Pune. Considering that the teaching of biology at under-graduate and post-graduate level has undergone a vast change in the past decade, this workshop was aimed at college teachers teaching life sciences to bring into the discussion some of the emerging topics in biotechnology with a special focus on disease / biomedicine. Talks by various IISER Pune faculty were followed by visits to the campus and to biology facilities.

Mathematics Symposium

September 30, 2015

Mathematics Symposium is an annual intra-departmental activity where members of the department present their research. External experts Prof. C.S. Rajan (TIFR, Mumbai) and Prof. Shobha Madan (IIT Kanpur) were present for this two-day event. PhD students, 5th year and 4th year BS MS students interacted with faculty members to learn about their area of research. This is also an effort towards having more internal collaborations within the department.

Vice Chancellors' Conclave 2015

October 09-11, 2015

This annual conclave of Vice Chancellors, Deans, Directors and other leaders from public and private educational institutions across India was organized by 9.9 media and held at IISER Pune. The Conclave aimed to act as a neutral platform for policy makers, institution heads and solution providers to come together, exchange ideas and formulate actionable solutions to the challenges in Indian higher education today. The theme of this year's retreat was "The Campus of Tomorrow: How to Re-think, Re-design, Re-form Higher Education."

Various aspects related to faculty as well as students, and the use of technology in education were covered in the sessions. Strategies that help institutions take a fresh look at solving their most challenging problems in new and innovative ways were discussed.

Science and Beyond: Public Lecture Series

October 2015 - March 2016

IISER Pune, in collaboration with the British Council, organized a public lecture series titled Science and Beyond spread over five months across ten locations in India. The speakers included eminent scholars from the UK who spoke on topics at the interfaces of science with the humanities, arts and technology.

The following speakers gave lectures held at IISER Pune (title and the day of the lecture in parenthesis): Jon Turney (*Futurama: Does the past cloud our thinking about the futures to come?* October 30, 2015); Jon Agar (*What are the big themes of the history of twentieth-century science?* January 4, 2016); Carol Trager-Cowan (*Engaging the public with science and technology: From statues to rainbows*

January 12, 2016); Sugata Mitra (*Future of learning* January 13, 2016); Charlotte Sleight (*From a medieval rhinoceros to the Birds of America: Picturing animals in history* January 25, 2016); Iain Stewart (*Communicating geoscience through the popular media* January 28, 2016); Yaron Matras (*The Romani minority in Europe: Language, history, and status* February 2, 2016); and Semir Zeki (*The Neurobiology of aesthetic experiences and the significance of beauty* February 6, 2016).



Workshop on Writing Science

October 12-24, 2015

This workshop was organized by the Science Media Centre at IISER Pune in association with Vigyan Prasar. The objective was to improve the quality and quantity of scientific content in print media by empowering interested youth with tools, tricks and tips needed to engage the public with written text, photographs, and pictures. During this 10-day intensive hands-on workshop, participants learnt to plan, schedule, do research, write, edit, rewrite and lay out reports, feature articles, and columns with visual materials designed to attract the eye, mind and heart of different target groups.

Annual Meeting of Indian Academy of Sciences, Bangalore

November 06-08, 2015

The 81st Annual Meeting of the Indian Academy of Sciences was hosted by IISER Pune in association with CSIR-NCL and NCCS. This three-day event was well attended by both senior and new Fellows and Associates of the Academy from diverse fields.

This Meeting had a total of 30 presentations by Fellows and Associates which included the Inaugural Lecture by the President, two Public Lectures, two Special Lectures and two Symposia (one on Light and Matter and the other on General Relativity). This year's annual meeting was also attended by 39 teachers funded/sponsored by the Indian Academy of Sciences, Bangalore.

The Salters' Chemistry Camp for School Children

December 09-11, 2015

A three-day residential camp for students of class IX from rural and municipal schools around Pune was organized at IISER Pune in association with the Royal Society of Chemistry (RSC). This Salters' Chemistry Camp was a part of the Inspirational Chemistry Program funded by Dr. Yusuf Hamied, an Indian philanthropist and pioneer in the pharmaceutical industry.

Six teachers trained by the RSC mentored the participants. The students had an opportunity to carry out hands-on experiments in the IISER Pune undergraduate labs and interact with teachers and like-minded peers. Some exciting chemistry demonstrations, movie screenings, and interactions with IISER Pune faculty



members and other senior academicians like Prof. Jayant Narlikar were also arranged. The participants were a bright and enthusiastic group that made full use of the exposure to academic life at IISER Pune for broadening their horizons.

Half-day Science Communication Workshops

January 26 and 29, 2016

Two half-day science communication workshops were held during January 2016: one focused on communicating with peers and the media while the other focused on presenting one's research through posters and talks.

In a session that connected with undergraduate and graduate students alike, Dr. Charlotte Sleight (University of Kent, UK) addressed the general motives for science communication and the media through which it can occur. Using a specific example, Dr. Sleight highlighted the role of scientists, public information officers and media in shaping the public understanding of research.

Introducing what he termed the NIG method of presenting science, Prof. Yasushi Hiromi (National Institute of Genetics, Mishima, Japan) conducted a half-day workshop on January 29, 2016 that was open to researchers from IISER Pune as well as to the neighboring research institutions in the city. Topics covered during the workshop included the essence, structure and techniques of scientific presentations and the application of humor in scientific presentation. Using examples in the form of video presentations, Prof. Hiromi indicated that clarity in the scientific content and in the mode of presentation together makes for an effective presentation of research work through posters and talks and spoke about how to change the pitch when presenting the same content to different audiences.



Dr. K. Venkataramanan appointed as the Chairperson, Board of Governors

Dr. K. Venkataramanan (Director & President (Engineering & Construction Projects), Larsen & Toubro) was appointed by MHRD as the Chairperson of the Board of Governors of IISER Pune. After his appointment, Dr. Venkataramanan visited the institute on February 1, 2016 and interacted with the faculty and students. He expressed his words of appreciation for the quality of infrastructure developed at the institute.

Grant Management Workshop

February 11, 2016

A Grant Management Workshop was conducted for dissemination of information on various initiatives of funding bodies and to update the guidelines on implementation of the projects. Dr. Milind Kulkarni from DST, Dr. Sanjeev Varshney from the DST International Division, Dr. Meenakshi Munshi from DBT and Dr. Madhankumar Anandhakrishnan from Wellcome-DBT India Alliance guided the faculty from IISER Pune and other institutes in Pune. The talks were followed by discussions on the various queries raised by the audience. The workshop was coordinated by Dr. Vandana Gambhir.



Team members of the top four teams with Director, IISER Pune

Mimamsa Science Quiz 2016 Finals

February 14, 2016

Mimamsa is a national-level annual science quiz for undergraduates organized by students of IISER Pune. The first round or the Prelim of this two-stage event took place in January 2016 at several locations across India. The final round took place in IISER Pune. The questions aimed to encourage debate and discussion among teams and the judges.

The top four teams that made to the final round were IISc, Bengaluru; IIT Madras; IIT Bombay, and University of Hyderabad. IISc, Bengaluru emerged as the winner for the fifth year in a row. Following them as the first runner-up was IIT Bombay with IIT Madras at a close third.



IISc Bengaluru team with the trophy

Launch of Celebrations of 10 years of IISER Pune

February 19, 2016

The celebrations of a decade of IISER Pune were launched in the presence of Honorable Union Minister of Human Resource Development Smt. Smriti Zubin Irani. The Honorable Minister also launched a common website of all six IISERs



that gives consolidated information related to IISERs to all stakeholders like students, parents, potential faculty members and collaborators as well as the MHRD. A poster exhibition on significant research achievements of IISER Pune members and activities conducted under MHRD initiatives was arranged on this occasion.

National Science Day 2016

February 28, 2016

A daylong fiesta of popular science events was held on the occasion of Science Day. The events were designed to generate curiosity and interest in Science and how it affects daily life. The 2nd Linus Pauling Interschool Science Quiz Competition was organized by the Science Club. The quiz had trivia-style questions from major disciplines of science that tested conceptual understanding and led participants and audience to go back to the basics.



A book exhibition and a poster display on IISER Pune's outreach and other activities was also organized.

A set of Public Lectures titled “From Basic Science to Social Benefit” was organized to underscore the historical link between discoveries in basic science and the technological benefits to the society. The talks discussed the connecting strands between these two ends of the science chain. The talks highlighted examples where developments in communications technology, computers, medical treatment and banking owe a major debt to fundamental breakthroughs in diverse areas of biology, chemistry, mathematics and physics.

The topics covered were *From Raman to Remedies* (Dr. Chandrabhas Narayana, JNCASR Bengaluru), *From Darwin to Diabetes* (Dr. Nishad Matange, IISER Pune); *From Microwaves to Mobiles* (Dr. Bhas Bapat, IISER Pune); and *From Primes to Privacy* (Dr. Jaikumar Radhakrishnan, TIFR Mumbai).



Mathematics Day

March 12, 2016



Mathematics Day is an annual student festival held to popularize math among students of IISER Pune and of colleges in and around Pune. For this year, the day started with release of the Math Profile booklet that recorded the yearly departmental activities followed by the Math Clubhouse which was a series of games and puzzles to encourage students to have fun with mathematics. In the afternoon a math themed skit, quiz and a colloquium by an eminent mathematician were organized. A music program by the students and a math movie rounded off the day. The popularity of Math Day has been growing over the years and has been steadily chipping away at the irrational fear students have of this subject. A bust of mathematician Harish-Chandra was unveiled by Prof. M.S. Raghunathan, who later gave a public lecture on "Mathematics: Art that rather be science".



Second K.N. Ganesh Endowment Lecture

March 14, 2016

The second K.N. Ganesh Endowment Lecture was delivered by Dr. Rajesh Gokhale (Director, CSIR Institute of Genomics and Integrative Biology (IGIB), New Delhi) on the topic of *Extrapulmonary TB epidemic in India: Need for alternate regimen*. The Endowment also made a cash donation to Navkshiti, an organization that offers a home to mentally challenged children.



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

A Centre of Excellence in Science and Mathematics Education (COESME) has been established at IISER Pune since October 2015, under the Pandit Madan Mohan Malaviya National Mission for Teachers and Training (PMMMNMTT) scheme of MHRD. More details about the Center can be found under the Outreach section of this report from page 83–84. Through this, several workshops and events relevant for both school education and higher education have been held as listed below:

Events for Undergraduate Science Teachers

STEM Teacher Training Workshop to Develop Research-based Pedagogical Tools

March 10-12, 2016



IISER Pune, in collaboration with DBT and Newton Bhabha Fund, organized a three-day pedagogy workshop for undergraduate science teachers. Teachers from DBT Star colleges were invited to participate at this workshop. In addition, PhD students from nearby institutes (NCCS, NCL, as well as IISER Pune) in their 4th or 5th year of work, who expressed interest in taking up teaching at undergraduate level as a career, were also included. A total of 116 college teachers from four streams – Physics, Chemistry, Mathematics and Biology and allied fields participated.



New pedagogical techniques that can be used for science teaching at the undergraduate level were discussed with the objective of identifying scalable tools that can be deployed for teachers all over the country and to take them beyond their respective colleges.

The workshop provided a platform for teachers to create pedagogical tools and learn through group discussions and exchange of ideas. Experts from India, as



well as an expert team from Sheffield Hallam University, UK provided guidance and training in producing effective Research Based Pedagogical Tools (RBPTs).

Based on the learning from the first two days, there was an exhibition on the third day displaying the finished resources for participants to see each other's work and adopt the best principles from them. Collaborative groups were also created to ensure continuity in the efforts.

Events for School Teachers

Workshop on Inquiry and Integration in Education (IIE) 2015

December 12, 2015

This workshop was organized by Prof. K.P. Mohanan with the goal of developing the inquiry based approach to teaching amongst the participating educators. The inquiry-based approach to learning involves sparking the process of seeking answers through asking questions. This process leads to learners arriving at answers through their own observation, thinking, reasoning, and judgment. The workshop also taught the integration of trans-disciplinary educational methods, wherein concepts and abilities are not restricted to any particular discipline or discipline group, but transcend the barriers of disciplines of study.

There were 23 participants for the workshop who included school-teachers, university professors, educational activists, and senior administrators of school systems. The workshop resulted in the development of concrete lesson plans on inquiry and integration that the participants worked on (and continue to work on), such that they can be used by others. Also, there were requests from schools for assistance to set up inquiry as a subject from class 1 to class 11, and such a course is likely to come up in the near future.

Closely aligned with this workshop, was a session targeted to 7th and 8th grade school children of Pune that aimed to serve as a practical demonstration of the inquiry-based learning model.

8th National Teachers Science Congress (NTSC)

December 17-19, 2015



The National Teachers Science Congress (NTSC) was held at IISER Pune in coordination with the National Council for Science and Technology Communication (NCSTC), Department of Science and Technology (Govt. of India), and Marathi Vidnyan Parishad, a science communication organization in Maharashtra. About 250 science teachers/science educators and 30 resource persons attended this Congress. The participants were selected based on their performance in regional workshops, held prior to the NTSC. This year, the Congress had the theme of “learning science by doing”. The Congress had paper presentations by teachers in 5 parallel groups. Plenary Sessions were held in the evenings. The event also included a sky-gazing program arranged with the help of Amateur Astronomers of IUCAA.

On the third day, there were Science (Pedagogy) Workshops in four groups. These were conducted

by IISER Pune faculty – Dr. Shabana Khan for Chemistry; Dr. Chandrasheel Bhagwat for Mathematics, Dr. G.V. Pavan Kumar for Physics and Dr. Neelesh Dahanukar for Biology. Teachers got an opportunity to carry out experiments of their own.

From the various papers presented, research papers and presentations of 32 participants were chosen for Best Paper and Presentation award. Of these, 10 of the best teachers were offered an opportunity to do an internship of 4 to 6 weeks during 2016 at IISER Pune.

Workshop on School Science Education

March 05-06, 2016

This two-day workshop on School Science Education aimed to address a variety of education themes such as an overview of the existing school system in India, ideal curricular objectives, approaches/challenges in achieving these, innovative experiments in school settings, and possible career opportunities in science education. The workshop was coordinated by Dr. Bhas Bapat, Dr. Aditi Deo and Dr. Nishad Matange.

Around 60 participants from in and around Pune attended the workshop. These included middle- and high-school science teachers, and members of non-government organizations working on educational issues.



A few students who are part of *Disha* (a voluntary organization run by IISER Pune students that conducts classes for school students from underprivileged backgrounds) also participated.

The sessions were a mix of discussions and presentations by workshop participants and also some talks by facilitators and others involved. The format included presenting information about philosophical and practical questions in the field, following which participants would actively engage with these questions. Given the enthusiastic participation, conversations on the workshop themes continued well after the session time was complete.

The workshop served as an opportunity to initiate a network to connect research-oriented scientists/science students and science education practitioners, and also to introduce the field of science education as a potential career to students.

Events for School Children

Mentorship Camp for Winners of the Initiative for Research and Innovation in Science (IRIS)

January 17-22, 2016

IISER Pune hosted twelve selected teams (winners at the IRIS National Fair) for a week to help them fine-tune their projects for participation in the Intel International Science and Engineering Fair (IISEF) held in the US. The IISEF is an annual event, which showcases independent research done by school children. With the help of a mentor from the IISER Pune faculty in the relevant field, students gained the opportunity to trouble shoot their projects and get guidance. Students presented their work (in the form of posters) before their peers and experts, who reviewed the presentations, provided feedback and gave them tips on improving their posters. Following this, the participants presented their reworked presentations with the changes suggested by the experts.



The students were given a brief orientation on the Intel International Science and Engineering Fair. Special sessions on relevant topics were conducted by the IISER Pune fraternity. These included Communication Skills (Dr. Pooja Sancheti, IISER Pune); Inquiry based learning (Prof. K.P. Mohanan); and Research Methods and Career Opportunities in Scientific Research (Dr. Apurva Barve). They also benefited from the IISER Pune Library and informal interactions with PhD students in the laboratories. This mentorship camp was held in cooperation with IRIS (Initiative for Research and Innovation in Science).

Events for College Students

Student Visits from University of Kashmir, Srinagar

January 20-28 and February 11-16, 2016

Two groups of students from University of Kashmir visited IISER Pune during early 2016 as part of their 15-day educational tour to institutes outside Kashmir: a first group of 42 students pursuing their MSc in Botany and a second group of 21 students pursuing MSc in Bioresources.

The visit served as an opportunity for them to interact with the faculty and students at the institute and thus gain exposure to the educational and research atmosphere. Talks by various members of the IISER Pune faculty and other research institutes were arranged. They were also given a tour of the IISER Pune campus and nearby institutes in the city such as NCCS and University of Pune.

Events for Educators

Science Policy Training Program

March 31-April 02, 2016

A Science Policy Training Program was conducted in order to introduce early career scientists interested in exploring a career in policy, management and administration.

The program intended to attract science students to learn necessary skills so that science and its methods are widely used in all policy decisions for better governance and public good. This workshop was conducted by a faculty team from the Department of Science, Technology, Engineering and Public Policy; University College, London. In addition, Ms. Amita Sharma, former Secretary, MHRD and Prof. L.S. Shashidhara participated as resource persons.



Topics covered in the program included an introduction to the decision-making processes and discussions on ways to bring science in all policy decisions (science for policy) and ways to take the scientific enterprise forward (policy for science).

This event included 40 participants, which included PhD students, postdoctoral fellows, those in science management and communication roles and a few faculty members.

Theme-based Events



Non-teaching staff participated in tree plantation on the occasion of Vanamahostav (June 5, 2015)



On the occasion of International Yoga Day, faculty, staff, students and children participated in a yoga exercise program under the guidance of yoga teachers (June 21, 2015)



Hindi Diwas was organized on September 16, 2015. The guests invited for the program were Shri Sadanand Mahajan, Dr. Omkar Nath Shukla and Dr. Umesh Gupta. The program included poetry recitation, letter writing competition, a drama and a scientific lecture in Hindi by Dr. Bhas Bapat on microscope. The program was anchored by Abhishek Ojha, Danish Kaur, Komal, Aniket, Swastik and Shraddha. (September 16, 2015)



Constitution Day was observed through a seminar on *Constitution and its basic structure* by Prof. Rajeshwari Deshpande (Department of Politics & Public Administration, Savitribai Phule Pune University) (November 26, 2015)



On the occasion of Matribhasha Diwas, Dr. Prabhakar Desai (Department of Marathi, SPPU, Pune) gave an invited lecture on the topic of Linguistic Diversity. Other events included singing of folk songs in regional languages and an essay competition (March 03, 2016)



International Relations

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

Memoranda of Understanding (MoU) and Agreements

In the year 2015-16, IISER Pune formalized the following Memoranda of Understanding for academic cooperation and student/staff exchange.

1. MoU between Max Planck Society (MPG) and all IISERs (July 21, 2015)

This MoU is towards enhancing cooperation between collaborators in scientific activities like consultations, research visits, exchange of scientists, joint seminars/workshops, joint research projects and other mutually agreed activities.

2. MoU with IC-IMPACTS, Canada-India Research Centre of Excellence (September 4, 2015)

The aim is to facilitate research collaboration between the teams of Dr. Michele Koppes (Department of Geography's Canada Research Chair in Landscapes of Climate Change, University of British Columbia) and Dr. Argha Banerjee (Earth and Climate Science Discipline, IISER Pune) who together are exploring the dynamics of Himalayan glaciers through remote sensing.

3. Renewal of MoU with Department of Biological Science and Mechanobiology Institute (MBI) of the National University of Singapore (September 26, 2015)

This MoU would facilitate cooperation between collaborators for research visits, exchange of scientists, joint seminars/workshops, joint research projects and other mutually agreed activities.

4. MoU with the French National Center for Scientific Research (CNRS), France (November 17, 2015)

The agreement is to promote cooperation within any field of mutual interest related to Science and Technology, exchange of scientists/faculty /students, and joint research projects.

5. MoU with University of Goettingen regarding Goettingen-Pune Outreach Centre funded by Federal Ministry of Education and Research (BMBF), Germany (December 2015)

IISER Pune is a joint-coordinator in partnership with University of

Goettingen on Erasmus Mundus Action-2 program “NAMASTE”. Mr. Netra Bhandari, Director, India Office, Goettingen University visited the institute on August 19, 2015 to discuss activities and reports for this program. It was agreed that IISER Pune and University of Goettingen will sign an agreement to set-up Indo-German Pavilion at IISER Pune for conducting various outreach activities related to science and social sciences. Based on these discussions, an MoU was signed in December 2015 for setting up this Goettingen-Pune Outreach Centre funded by BMBF.

6. Agreement with British Council regarding Generation UK Program (January 15, 2016)

Generation UK-India program aims to build collaboration, engagement and trust between the UK and India. The agreement enables promotion of India as a destination to gain study and work experience for young people from the UK.

7. MoU with ENS Lyon, France (January 25, 2016)

This agreement was signed by President of ENS Lyon, Jean-François Pinton, and Director of IISER Pune, K.N. Ganesh, and was later exchanged in the presence of Prime Minister of India Narendra Modi and the President of France François Hollande during the latter's visit to India. The aims of the MoU include joint realization of research and/or teaching programs, exchange of personnel, student mobility, joint conferences & workshops, and development of new pedagogy tools and online courses.

8. MoU with Hokkaido University, Japan (February 10, 2016)

A delegation of Directors of IISERs had visited universities in Japan during the last week of February 2015 to discuss possibility of academic collaborations. In response, a delegation from Hokkaido University headed by Prof. Yamaguchi visited IISER Pune on July 24, 2015. It was agreed to sign an umbrella agreement to facilitate student/faculty exchange and joint research. Considering that IISER Pune and Hokkaido University share common goals related to human resource development, during a subsequent visit in 2016, an MoU was signed between the two organizations to enable academic cooperation in research and education.

9. University Pierre and Marie Curie--Erasmus+ agreement to exchange faculty (February 29, 2016)

As part of this, two faculty members would be visiting IISER Pune to take courses for our students.

International Delegations and Visitors

During 2015-16, the Institute has welcomed the following international delegations in order to build a strong alliance and a spirit of collaboration between IISER Pune and institutions of higher education around the world.

1. University of Bath, UK (April 8, 2015)

Following the signing of MoU between University of Bath and IISER Pune, a delegation of faculty from University of Bath visited IISER Pune to discuss strategies to carry the partnership further along with identifying activities for the upcoming year.

2. University of California Davis, USA (June 24, 2015)

Prof. Subhash Risbud met PhD students and gave a talk on “Materials Science Activities at UC Davis and Opportunities for Postdoctoral Research”.

3. British Deputy High Commission (July 7, 2015)

A delegation from the British Deputy High Commission visited IISER Pune with the objective of identifying common synergies with key institutes in Pune and scope for potential research collaboration opportunities. Within the life-sciences/health sector, some of the areas that were of particular interest were anti-microbial resistance and digital health. Prof. K.N. Ganesh and Dr. Amit Hogadi met the members of the delegation: Mr. Murtaza Khan, Deputy Head, Science and Innovation Network, India; Dr. Pradeep Pillai, Sr. Advisor, Science and Innovation Network, Mumbai; Ms. Sheryl Anchan, Advisor, Science and Innovation Network, Mumbai and Ms. Vishakha Chandhere, Knowledge Economy Officer, Pune.

4. CNRS, France (July 8, 2015)

A delegation of CNRS headed by Dr. Patrick Nedellec, Director of the CNRS European Research and International Cooperation Department, visited IISER Pune to discuss the current scientific collaborations and explore the possibilities of new interactions between CNRS and IISER Pune.

5. King Abdullah University of Science and Technology (KAUST), Saudi Arabia (July 17, 2015)

Prof. Yves Gnanou, Dean for the science research program at KAUST, a graduate-level research university, visited IISER Pune to deliver a seminar and discuss about the KAUST curriculum, research funding, international collaboration and other activities. In a following visit, Prof. K-W. Huang and Prof. Z. Lai (King Abdullah University of Science and Technology, Saudi Arabia) visited on October 20, 2015, presented a research seminar and interacted with faculty from Chemistry to further explore opportunities for collaboration.

6. Monash University, Australia (August 4, 2015)

Prof. Freider Seibel (Vice President-Academic Dean, Faculties of Engineering and Information Technology, Monash University, Australia) visited the institute representing Monash University.

7. University of Lincoln, UK (August 13, 2015)

Prof. Ron Bickerton visited to explore possibilities of industrial collaboration, student exchange and joint degree programs.

8. University of Melbourne, Australia (August 27, 2015)

Dr. Belinda Day, Manager, External Relations, University of Melbourne accompanied by Mr. Vinod Mirchandani, Country Manager, India, visited to discuss the course module of the blended BSc program that IISER Pune, along with Savitribai Phule Pune University (SPPU), is collaborating with University of Melbourne for implementing the program in certain colleges affiliated to SPPU.

9. Consulate of Belgium, Mumbai (August 27, 2015)

Dr. Jurgen Maerschand, Trade & Investment Commissioner, Mumbai and Mr. Ralph Moreau, Technology Attaché – South East Asia visited IISER Pune to discuss the upcoming visit of the Minister-President of the Flemish Government and Flemish Minister for Foreign Policy and Heritage, H.E. Geert Bourgeois, and to present the expertise Belgium has to offer, particularly in the cleantech/research industry.

10. U.S. Embassy, New Delhi (August 31, 2015)

Mr. George N. Sibley (Minister-Counselor for Economic, Environment, Science & Technology Affairs, U.S. Embassy, New Delhi) attended parts of the Women in Science meeting organized jointly by DST, IUSSTF and IISER Pune. He also met the Director, Deans and Chairs to discuss IISER Pune interactions with US universities and institutes.

11. Embassy of Switzerland (September 8, 2015)

Dr. Indraneel Ghose gave a talk on the upcoming scholarships from the Swiss government for graduate students, postdocs and other researchers.

12. University of Heidelberg, Germany (December 16, 2015)

Mr. Suboor Bakht visited and interacted with IISER Pune scientists to explore potential areas of collaboration as part of developing a Privileged Partnership model in India.

13. Hebrew University of Jerusalem (December 18, 2015)

Dr. Mala Braslavsky (Special Projects and International Program Coordinator) from the International Studies unit of the Hebrew University of Jerusalem, Faculty of Agriculture campus at Rehovot) visited IISER Pune to explore the possibility of academic collaboration and student exchange between the two institutes.

14. University of Glasgow, UK (January 11, 2016)

Prof. Cushley (International Dean for South Asia) accompanied by Mr. Sanju Dominic, their Delhi-based international officer, visited to discuss the possibility of organizing a workshop or conference to provide a platform for faculty interaction; opportunities to support student, faculty, staff mobilities and funding possibilities for joint-PhD programs.

15. Thales and CNRS France (January 28, 2016)

Dr. Jean Chazelas, Scientific Director of Thales, along with Suren Chandra, Human Resource Manager of Thales India, Dr. Srinivasa Kaveri, Director, CNRS India, and Dr. Sandrine Maximilien (Attache for Science and Technology, Consulate of France, Mumbai) visited IISER Pune. A strong interest has been expressed in the possibility of developing a partnership between Thales and IISER Pune in the context of a PhD Scholarship for shared PhD students between India and France.

16. Delegation from Japan Science and Technology Agency (February 19, 2016)

Dr. Takehito Higuchi and Mr. Nishikawa from Japan Science and Technology Agency (JST) visited IISER Pune as part of a focused study on

"Science Technology and Innovation activities and its policy trends in India" and discussed related activities at IISER Pune and in India.

17. National University of Singapore's Graduate School for Integrative Sciences and Engineering (NGS) (January 11, 2016)

Prof. Reshma Taneja gave an informational talk with the aim of introducing NGS' graduate research programs in the fields of science, engineering, computing and bio-medicine to BS MS students.

18. Consulate General of Canada, Mumbai (January 19, 2016)

Mr. Abhinav Bhatia (Trade Commissioner, Consulate General of Canada) visited to explore partnership opportunities with Canadian Institutions.

19. University of Edinburgh, UK (February 16, 2016)

Prof. Neil Robertson visited to attend a meeting of Energy Consortium organized by Prof. Satish Ogale and discussed possibilities of further academic collaboration between University of Edinburgh and IISER Pune.

20. University Pierre and Marie Curie, France (March 4, 2016)

Dr. Abhay Shukla visited to discuss opportunities and tools for student /faculty exchange between UPMC and IISER Pune.

21. Sharp India (March 17, 2016)

Mr. Tomio Isogai (Managing Director Sharp India Ltd.) visited to explore possibilities of academic and industrial cooperation between IISER Pune and Japanese Higher education organizations and industries.

Other Developments

1. **A French Language Tutor Program** has been initiated in collaboration with the Embassy of France/Institut Francais en Inde to enable IISER Pune students and staff to learn French effectively. The tutors are Master's or higher level French students, who as part of their research and teacher training, have been selected to teach French in various institutions of higher education all over the world. Under this program, Ms. Anais Fauchille joined IISER Pune and taught basal and advanced level French language courses from August 2015 to April 2016.



(Left to Right): Dr. Andrew Drinnan, Associate Dean (Learning & Teaching), Faculty of Science, University of Melbourne; Prof. B.S.M Rao (IISER Pune); Prof. K.N. Ganesh (IISER Pune), Prof. Janet Hergt (Acting Dean, Faculty of Science, University of Melbourne); Prof. G. Ambika (IISER Pune)

2. **Blended mode Bachelor of Science (BSc) program in collaboration with University of Melbourne:** Staff from University of Melbourne (UoM) and IISER Pune, working in consultation with staff from Savitribai Phule Pune University (SPPU) and certain affiliated colleges of SPPU, have outlined a curriculum for a blended mode Bachelor of Science (BSc) program.

The program is proposed to be offered as a trial from mid-2016 via SPPU affiliated teaching colleges. It is intended that students who complete the SPPU Blended BSc will be regarded as having completed a degree of equivalent academic standard to UoM's own BSc degree. Students who wish to pursue higher degree study at UoM may apply for that study and will

be ranked alongside and equivalently with UoM's own BSc graduates. UoM and IISER Pune will provide assessment audit services to the program, in conjunction with SPPU's standard assessment processes.

In this context there have been delegation visits from UoM to IISER Pune and vice versa during the year 2015-16.

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

- 1 student under Ohio State University exchange program
- 6 students from Germany funded by DAAD to carry out short-term research projects
- 1 student from University of Wisconsin under Khorana program
- 1 student from UBC Canada under IISERP-IC IMPACTS MoU



Signing of MoU with Hokkaido University, Japan



Signing of MoU with ENS Lyon, France

Outreach Activities

IISER Pune's academic and social outreach efforts are focused on the following outcomes:

- contributing to and improving primary education and teaching methods
- informing the public about career and research opportunities in science
- spreading awareness about the impact of science on the society

Visits by School and College Students: IISER Pune welcomes visits to the campus by groups from schools, junior & senior colleges, universities, and organizations. Visitors to the institute get a flavor of research and academic life on campus. The visits are tailored to suit the background and age-group of the students.

Visitors are first given an introductory talk about IISER Pune, its philosophy, academic programs, admission procedures etc. This is followed by a general tour of the campus. Undergraduate and post-graduate students are shown specialized instrumentation facilities in the respective disciplines, where the principles and applications of the instruments are explained. For younger students, a tour of all UG labs is generally given. The visiting groups also sometimes interact with IISER Pune faculty members from relevant fields and can spend some time in the library.

Between August 2015 and March 2016, thirty-eight groups totaling to ~1600 people visited IISER Pune. Of these, 1368 were students and 260 were teachers/researchers. The students ranged from those of class IX to MSc. Several of the visits by colleges were as part of research institute tours prescribed by the UG/ PG syllabi, where the aim was to know about current research and facilities available at IISER. There were six visits by groups who

were visiting IISER for a workshop or camp and were given a tour of the campus and/or a talk about the institute. Three of these groups consisted only of teachers / researchers (~140 people).

Most of the visitors came from schools and colleges in and around Pune, and from other parts of Maharashtra like Baramati, Aurangabad, Ahmednagar, Konkan,



Satara, Mumbai, Nashik and Beed. Seven were groups from other states like Gujarat (3 groups), Kashmir (2), Uttar Pradesh and Kerala (1 each). A group of exchange students from Denmark also visited IISER in September 2015, along with their host students from Fergusson College, Pune.

Guest Lectures: As a part of outreach activities beyond the campus, IISER Pune faculty members also travelled to colleges outside Pune to give lectures. Prof.



Sulabha Kulkarni and Dr. Sourabh Dube gave talks at Annasaheb Awate College, Manchar to students of Physics studying in FY, SY and TY BSc. Prof. Nishikant Subhedar, Dr. Sudha Rajamani and Dr. Kundan Sengupta travelled to New Arts Commerce and Science College, Ahmednagar to give lectures to under- and post-graduate students of various streams of the life sciences. As part of the Exciting Science Group's activity, Dr. Kundan Sengupta has demonstrated preparation of metaphase chromosome spreads for school students.



Workshops on inquiry-based teaching and learning: The following developments have been driven by Prof. K.P. Mohanan towards incorporating inquiry-based methods in teaching.

1. Beginning June 2016, Dr. Kalmadi Shamarao school group in Pune has decided to set up inquiry and integration as a school subject, allocating two hours a week of class time. The sessions are planned to begin with class 6, and gradually expand to class 4 to class 9 in about four years. All teaching and learning materials and training of the teachers will be organized in association with ThinQ.
2. St. Xaviers College Mumbai (an autonomous college) wants to set up inquiry and integration as a compulsory course in the first year of their bachelor program. As an experiment, they have decided to set up a 20 hour module in the physics department.
3. Prof. K.P. Mohanan organized a session on Designing School Curricula for Education on April 04, 2016. A tangible outcome of this session was a model school syllabus, oriented to achieve the goals of liberal education and increase self-learning ability amongst the students. About 40 participants attended the session (Principals, Heads of Departments, teachers, and people from NGOs).
4. ThinQ is currently conducting a five-month online course on Inquiry and Integration in Education, with support from IISER Pune. Twenty five most promising participants from this course would be selected for a nine-day face

to face workshop at IISER Pune during December 2016, with the expectation that at least half of them will become resource persons for conducting workshops on Inquiry Oriented Education for school and college educators.

Science Media Centre: As audiovisual media is an integral component of scientific communication, IISER Pune has established a Science Media Centre in the year 2012. The Centre is involved in the conception and production of high quality media for science, scientific research as well as science popularization. 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.



Academic year 2015-16 showcased animated scientific demonstration videos on Bose Einstein Condensate, Field Emission Microscope and Atomic Force Microscope for science popularization and as research and educational materials. As IISER Pune is celebrating its 10th year, the Center showcased a video on IISER Pune's decade of excellence. (https://www.youtube.com/watch?v=2uMak6L_yqg)

With Dr. Harinath Chakrapani as the Faculty Coordinator, the Science Media Centre includes Mr. Vivek Kannadi, Ms. Nita Belliappa, Mr. Parmeshwar Singh Yadav and Mr. Yashodeep Matange.

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, this centre has become functional at IISER Pune since October 2015 with the following objectives.

1. Creation of a Pedagogy Centre for school/college teachers and educationists: COESME aims to organize several short workshops for senior school and college teachers. This aims to bring teachers together, network them and provide them an

opportunity to learn pedagogical techniques from each other and also to refine these techniques to make them more effective. These workshops will focus on implementing effective hands-on training and inquiry-based learning in classrooms.

2. Organizing Science and Mathematics Educational Activities for students: This is intended towards providing promising students a platform to carry out short projects for research-based learning. Short residential camps will be planned to foster research and enquiry based learning amongst school and college students.

3. Creation of a Science Exploratorium: One of the planned activities for COESME is the creation of a Science Exploratorium which would provide students with a hands-on, interactive model of learning basic scientific concepts through the use of models, scientific toys and other interactive learning approaches.

Over the last few months, COESME has organized numerous events towards these goals, which are detailed in pages 68-72 of this report.

Social Outreach

Disha, *Prarambh* and *Prutha* are voluntary organizations at the institute, run primarily by the IISER Pune student community in association with faculty coordinators. Some of the activities initiated and organized by these groups are described here.



Disha works towards bringing quality education to children from underprivileged sections of the society. The Abhyasikas (study centers) at Sanjay Gandhi Vasahat and Lamanvasti meet on all weekdays, and they have seen fantastic progress over the years, owing to the communities' interest in the program. Under another program called Mindspark, *Disha* prepares students from nearby schools for the Maharashtra Scholarship Examination held for students of standard 8. The Science Nurture program looks for students enthralled by science and attempts to provide direction to their enthusiasm, familiarizing them with the scientific method and contemporary science. In addition, *Disha* organizes a discussion forum called Talk for Twenty to engage the IISER Pune community in discussions of social relevance.

Spread the Smile project of *Disha* is held every year in the months of January and February. This year, on four weekends starting from January 16-17, 2016, volunteers of this program visited villages near Pune and conducted science demonstrations and math-based activities to inculcate a sense of practical science among children. Like every year, another annual activity called Vigyan Mela (Science Fest -- an extravaganza of fun science activities), was held on March 19-20, 2016 for children attending the Abhyasikas and members of their community. 2016 has been a huge success in terms of involvement of volunteers and participants, particularly in these programs.

This year, Disha's resource team also helped Gyan Setu (an initiative of Gyan Prabodhini, Pune and Disha) in their content development. Disha has begun to conduct a survey in Sanjay Gandhi Vasahat and Lamanvasti to know the overall educational status of the residents. This survey would help improve the structure of Disha's programs and could potentially lead to new initiatives towards improving the standard of living of the resident communities.



Prarambh's goals are to provide children from less privileged backgrounds with basic education and skills. IISER Pune has been associated with this non-profit organization since 2011. Sessions are held on weekends and are focused on improving Math and English skills for a group of school children mostly from Ambedkar Chowk of Pune.

Prutha, the green initiative on the campus, has organized the following events during March 2015-April 2016.



1. *Baner-Pashan Biodiversity Trek*: Prutha organized a cleanup trek to the Baner-Pashan Biodiversity Park in August 2015 where around 20 volunteers collected the non-biodegradable waste from a section of the park.

2. *Plastic Premiere League*: A competition in which teams collect as much plastic as they can in given number of days and the team which collects the most wins. This encourages people to save the plastic cups and wrappers that they otherwise would have thrown away. All the collected plastic is given for recycling. This happened twice in the last one year.



3. *Junk Art in association with the Art Club using waste material:* Some of the plastic waste (plastic bottles, wrappers etc.) that was collected during the Plastic Premiere League along with torn clothes were used to make a beautiful peacock in the middle of the football ground during Karavaan'15.

4. *Campus clean up in association with Karavaan'16 Social Initiatives:* IISER students volunteered to make our campus cleaner by collecting plastic and other waste from different parts of the campus.



5. *Paper sorting sessions:* Baskets to collect paper waste were placed in various locations on the campus and the collected papers were sorted into reusable and non-reusable piles. Reusable paper was given to Disha for their activities and non-reusable paper was sent for recycling.

6) *Vastrasamman (done annually):* Boxes were put up for collecting old, usable clothes for the month of March, 2016 and the collected clothes were donated to an NGO called "Goodwill India". This NGO collects used clothes and sells them to those in need at very low prices.

Public Lectures and Lecture Series

The year 2015-16 saw several lectures that were open to all. Beyond IISER Pune, the larger scientific community of Pune and members from the public attended these lectures and interacted with the speakers during and after the question and answer sessions. Student Clubs of the institute such as the Science Club and Akashganga, the Astronomy Club, organized a series of lectures.

The institute organized a public lecture series titled “Science and Beyond” in collaboration with the British Council wherein eminent scholars from the UK spoke on topics at the interfaces of science with the humanities, arts and technology. The aim of these lectures was to bring science and related areas closer to the society.

Public Lectures

April 10, 2015

Predicting the onset of radiation fog and aerosols
Dr. K.R. Sreenivas (Engineering Mechanics Unit, Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru)

July 24, 2015

Developmental wiring of brain and brawn: How nature and nurture shape us
Dr. K. VijayRaghavan (Secretary, Department of Biotechnology, Govt. of India)

August 10, 2015

Shining light on electrons at the nanoscale
Prof. Aron Pinczuk (Columbia University, USA)

August 26, 2015

Medical and sociological aspects of alcohol and drug addiction: Implications for research and teaching
Dr. Kenneth Mullen (School of Medicine College of Medical, Veterinary and Life Sciences University of Glasgow, UK)

October 30, 2015

Imaginariness of ignorance: Five ideas of the university and the place of the humanities within them
Prof. Rukmini Bhaya Nair (Linguistics and English, IIT Delhi)

October 30, 2015

Ashoka: Interweaving archaeology with the emperor's story

Prof. Nayanjot Lahiri (Department of History, University of Delhi)

November 2, 2015

Nature and nation: Framing wildlife society relations in an emerging economy
Prof. Mahesh Rangarajan (Former Director, Nehru Memorial Museum and Library, New Delhi)

January 5, 2016

Reliable meaningful communication
Prof. Madhu Sudan (Harvard University, USA)

January 6, 2016

The physics of life: Molecular machines
Prof. Peter Hoffmann (Wayne State University, Detroit, USA)

January 8, 2016

Early intervention in cancer through the tumour suppressive mechanisms that control genome stability
Prof. Ashok Venkitaraman (Medical Research Council Cancer Unit, University of Cambridge, UK)

January 22, 2016

Why don't we get more cancer: The crucial role of the extracellular matrix and tissue architecture
Prof. Mina Bissell (Life Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, California, USA)

February 12, 2016

Space warps: Your chance to discover gravitational lenses
Dr. Anupreeta More and Dr. Surhud More (IPMU, Tokyo, Japan)

Science and Beyond

Public Lecture Series held in collaboration with the British Council during October 2015 to March 2016

October 30, 2015

Futurama: Does the past cloud our thinking about the futures to come?

Mr. Jon Turney (Science Writer based in UK)

January 4, 2016

What are the big themes of the history of twentieth-century science?

Prof. Jon Agar (Science and Technology Studies, University College London, UK)

January 12, 2016

Engaging the public with science and technology: From statues to rainbows

Dr. Carol Trager-Cowan (Department of Physics, University of Strathclyde, UK)

January 13, 2016

Future of learning

Prof. Sugata Mitra (School of Education, Communication and Language Sciences, Newcastle University, UK)

January 25, 2016

From a medieval rhinoceros to the Birds of America: Picturing animals in history

Dr. Charlotte Sleigh (University of Kent, UK)

January 28, 2016

Communicating geoscience through the popular media

Prof. Iain Stewart (University of Plymouth, UK)

February 2, 2016

The Romani minority in Europe: Language, history, and status

Prof. Yaron Matras (University of Manchester, UK)

February 6, 2016

The neurobiology of aesthetic experiences and the significance of beauty

Prof. Semir Zeki (University College London, UK)

Science Club Lecture Series

April 8, 2015

Mars as seen by Mars Orbiter Mission (MOM) and future Planetary Missions by India

Dr. Prakash Chauhan (ISRO, Ahmedabad)

April 11, 2015

The history of sciences: Origins and directions

Prof. Dhruv Raina (Zakir Husain Centre for Educational Studies, Jawaharlal Nehru University, New Delhi)

April 14, 2015

Science for a symbiotic society

Prof. Madhav Gadgil (Founding Member of the Centre for Ecological Sciences, IISc, Bengaluru)

Celebrating Einstein: A 100 Years of Relativity

Series of Public Talks commemorating the centenary of General Theory of Relativity organized by Aakashganga during March-April, 2015

March 23, 2015

General relativity: The first 100 years

Prof. Thanu Padmanabhan (IUCAA, Pune)

March 30, 2015

What physics and astrophysics can gravitational waves teach us?

Prof. Sukanta Bose (IUCAA, Pune)

April 13, 2015

Black holes

Dr. Nabamita Banerjee (IISER Pune)

Research Seminars

April 2015

Speaker	Affiliation	Title	Date
Dheeraj Kulkarni	Ramakrishna Mission Vivekananda University, Kolkata	Relative symplectic caps, 4-genus and fibered knots	April 1, 2015
Pratim K. Chattaraj	IIT Kharagpur	All-metal aromaticity and conceptual DFT	April 2, 2015
Sunita Srivastava	National Institute of Standards and Technology, USA	Structure-function correlations: Polymer nanocomposites to bioinspired programmable nanomaterials	April 6, 2015
Chetna Soni	Pennsylvania State University, USA	TLR7 is indispensable for spontaneous germinal centers responses in mice	
Saikat Mukhopadhyay	Oak Ridge National Laboratory, USA	Ab-initio lattice dynamics for materials with energy applications	April 9, 2015
Momna Hejmadi	University of Bath, UK	Research overview on characterisation of DNA photolyases from extremophiles, and understanding hypoxia signalling cascades	April 9, 2015
Vasanta Subramanian	University of Bath, UK	Role of Talpid 3 and primary cilia in cerebellar patterning, ataxia and cellular reprogramming lessons from knockout mice and ES cell derived models	April 9, 2015
Shiva Athreya	ISI Bengaluru	Sampling and understanding statistics of networks	April 10, 2015
Anand Hardikar	University of Sydney, Australia	Long-term implications of multigenerational undernutrition on metabolome and epigenome	April 13, 2015
Philip Maini	Wolfson Centre for Mathematical Biology, Oxford	Case studies in modelling collective cell motion	April 15, 2015
Sagar Kolte	TIFR, Mumbai	Cuspidal curves on rational homology planes	April 17, 2015
S.S. Islam	JMI, New Delhi	Multi-sensory microsystem for early detection of Chronic Obstructive Pulmonary Disease (COPD)	April 17, 2015
Deepti Deobagkar	Savitribai Phule Pune University	Evidence for epigenetic alterations in Turner Syndrome provides molecular genetic explanation for phenotypes and opens up feasibility of pharmaceutical interventions	April 17, 2015
Atin Pal	ETH Zurich, Switzerland	Electronic transport in graphene and InAs/GaSb composite quantum well	April 20, 2015
Shouvik Datta	IISc, Bengaluru	Universal features of left-right entanglement entropy	April 21, 2015

Speaker	Affiliation	Title	Date
Amritanshu Prasad	IMSc, Chennai	Matrices mod p^k and k commuting matrices mod p	April 24, 2015
Prasad Hegde	Stony Brook University (SUNY), NY, USA	Computing the properties of the quark-gluon plasma	April 28, 2015
Dave Green	Cambridge University, UK	Historical Supernova explosions in our Galaxy and their remnants	April 29, 2015

May 2015

Tanmay Deshpande	Kavli Institute for the Physics and Mathematics of the Universe, Japan	Algebraic groups over finite fields and their representations	May 1, 2015
Manoj A.G. Namboothiry	IISER Thiruvananthapuram	Organic photovoltaics- Approaches to improve the performances	May 5, 2015
Vibhor Singh	Delft University of Technology, Netherlands	Optomechanics with superconducting quantum circuits	May 11, 2015
Shamik DasGupta	University of Oxford, UK	Genes, brain & behaviour	May 12, 2015
Mukul Laad	IMSc, Chennai	High-Tc Superconductivity: New irons stoke the fire	May 14, 2015
Sobhan Roy	University of Chicago, Chicago, USA	Mycobacterial lipid antigen presentation by CD1c and recognition by $\alpha\beta$ and $\gamma\delta$ T-cells	May 18, 2015
Tulasi Parashar	University of Delaware, USA	Kinetic physics of collisionless turbulent plasmas	May 19, 2015
Rajesh Arsada	Yale University, USA	Functions of F-BAR proteins in clathrin-mediated endocytosis and cytokinesis	May 19, 2015
M. Ram Murty	Queen's University, Canada	The Ramanujan conjectures and aftermath	May 22, 2015
Harold Edwards	City University, New York, USA	Abel's theorem	May 26, 2015

June 2015

Kalika Prasad	IISER Thiruvananthapuram	Regeneration: A journey from acquisition of competence to completion	June 3, 2015
Paolo Pedri	University of Paris, France	Magnetism with bosonic chromium atoms	June 8, 2015
K.V. Subrahmanyam	Chennai Mathematical Institute	Lower bounds in computational complexity - A geometric approach	June 10, 2015
Masamichi Nishihara	Kyushu University, Japan	A new concept for polymer electrolyte membranes (PEMs) for high-temperature PEFC	June 11, 2015
Siddhartha Gadgil	IISc, Bengaluru	Enumeration over compact domains	June 12, 2015
Rishi Kant	Zeiss	LSM 800 Airyscan : Principles and applications	June 16, 2015
Anand Deopurkar	Columbia University, USA	Szygies of canonical curves and birational geometry of M_g	June 17, 2015

Speaker	Affiliation	Title	Date
SriBalasubashini Muralimanohara	University of Texas HSCSA, USA	Placental miRNA expression and function in pregnancy associated complications	June 18, 2015
Karthigayan Shanmugasundaram	University of Texas HSCSA, USA	Alternative molecular therapeutic targets for renal cell carcinoma	June 19, 2015
Kirti Joshi	Arizona State University, USA	The dormant operatic locus: Recent developments	June 23, 2015
Kirti Joshi	Arizona State University, USA	Vector bundles on Riemann surfaces: A perspective	June 26, 2015
Kiran Batta	The University of Manchester, UK	Making blood from skin	June 26, 2015
Clare D'Cruz	Chennai Mathematical Institute	Set theoretic complete intersections (STCI), symbolic powers and Groebner basis	June 26, 2015
Atikur Rahman	Brookhaven National Laboratory, NY, USA	Charge transport in 2D nanostructures and applications of nanotextured materials	June 29, 2015

July 2015

Somnath Jha	Jawaharlal Nehru University, New Delhi	Functional equation for Selmer Groups	July 1, 2015
Varun Thakre	HRI, Allahabad	HyperKahler manifolds and Seiberg-Witten equations	July 2, 2015
Ambrus Pal	Imperial College, London	Crystalline Chebotarev density theorems	July 6, 2015
Sujit Gujar	École polytechnique fédérale de Lausanne (EPFL), Switzerland	Mechanism design for heterogeneous resource allocation with strategic agents	July 7, 2015
Siddharth Jhunjhunwala	Massachusetts Institute of Technology (MIT), USA	Physiological responses to biomedical device implantation: The role of neutrophils	July 8, 2015
Amit Shukla	ETH Zurich, Switzerland	Detection of extremely hard spectrum from TeV blazars Mrk 501	July 9, 2015
Sridhar Anandkrishnan	Penn State University, USA	Stability of ice sheets in a changing climate: Ice and ocean interactions	July 9, 2015
Durgha Prasad Challa	Tallinn University of Technology, Estonia	The equivalent refraction index for the acoustic scattering by many obstacles with error estimates and applications	July 10, 2015
Sugata Mondal	Indiana University Bloomington, USA	Minimizing the first Dirichlet eigenvalue of sub-surfaces with amenable fundamental group	July 10, 2015
Pushkar Sohoni	South Asia Centre, University of Pennsylvania, USA	Morphological taxonomy: Contextualising a medieval temple	July 10, 2015
Debabrata Goswami	IIT Kanpur	Exciting prospects of Femtosecond phenomena across multiple disciplines	July 15, 2015
Shashank Kanade	Rutgers University, USA	Some recent developments regarding identities of Rogers-Ramanujan type	July 20, 2015
A.K. Nandakumaran	IISc, Bengaluru	On certain convergences: Multi-scale method of unfolding and homogenization	July 31, 2015

August 2015

Speaker	Affiliation	Title	Date
K. Srinivas	IMSc, Chennai	Hardy's theorem and its generalization	August 07, 2015
Nishant Chandgotia	University of British Columbia, Canada	Parallelism of paths on graphs	August 13, 2015
H.C. Evamarie Hey-Hawkins	Universität Leipzig, Germany	Phosphorus meets carbaborane	August 13, 2015
Mohit Prasad	IISER Kolkata	Gap junction protein, Innexin 2, regulates border cell specification in <i>Drosophila</i> oogenesis	August 14, 2015
K.B. Athreya	Iowa State University, USA	Polynomial formula for sums of powers of integers	August 17, 2015
Niladri Banerjee	University of Cambridge, UK	Spin-polarised supercurrents: From fundamentals to functional devices	August 17, 2015
Lakshmi Pulakat	University of Missouri-Columbia, USA	Heart trouble: Why can't a woman be more like a man (or vice versa)? Physiology and pathology of diabetes and heart disease	August 17, 2015
Rajaraman Ganesh	Institute for Plasma Research, Gandhinagar	Exploring exotic plasmas via simulations	August 17, 2015
Anirban Saha	Istituto Nazionale di Fisica Nucleare (INFN), Italy	Search for new physics at CMS and the future plan	August 18, 2015
K.B. Athreya	Iowa State University, USA	What is probability theory?	August 18, 2015
Raja Bhattacharya	University of Massachusetts Medical School, USA	To bend or not to bend: Neuromodulation of context-dependent behavior	August 18, 2015
Biswanath Maity	University of Calcutta	RGS6: A novel integrator of the cellular response to DNA damage and oncogenesis	August 20, 2015
Aniruddha Pant	AlgoAnalytics Financial Consultancy Pvt Ltd	High level overview of data science as applied to various domains	August 20, 2015
Rajesh Kulkarni	Michigan State University, USA	Ulrich bundles on varieties and related questions in Brauer groups	August 21, 2015
Prosenjit Mondal	IIT Mandi	Glucagon regulates hepatic kisspeptin to impair insulin secretion	August 24, 2015
Hemant Dixit	Global Foundries	Oxides for electronics: First-principles insights into the material properties	August 26, 2015
Joël Riou	Université Paris-Sud, Orsay, France	A relative construction of motivic steenrod operations	August 26, 2015
Arnab Rai Choudhuri	IISc, Bengaluru	Can we predict sunspot cycles?	August 27, 2015
D. Kanjilal	Inter-University Accelerator Centre, New Delhi	Accelerators and associated research activities at IUAC	August 31, 2015

September 2015

Arnab Nayak	Goethe University Frankfurt, Germany	Emerging concepts on the fine-tuning of global epigenetic landscape: The SUMO perspective	September 1, 2015
Vibhor Singh	Kavli Institute of Nanoscience / Delft University of Technology, Netherlands	Optomechanics with superconducting quantum circuits	September 3, 2015

Speaker	Affiliation	Title	Date
Avinash Sonawane	KIIT University, Bhubaneswar	Mechanisms of immune evasion and drug resistance by <i>Mycobacterium tuberculosis</i> : A general perspective on host-pathogen interactions	September 3, 2015
Prabhakar Ranganathan	Monash University, Australia	Self-concentration and self-dilution in polymer solutions	September 7, 2015
Ashwin Joy	Institute for Plasma Research, Gandhinagar	Shear flows & relaxation in visco-elastic liquids	September 10, 2015
Neelima Sinha	University of California Davis, USA	Biology in the 21st century	September 11, 2015
Herschel Dhekne	Vanderbilt University, USA	Pathogenic mechanisms in microvillus inclusion disease	September 11, 2015
Deepak Dhar	TIFR, Mumbai	Explaining 1/f noise	September 14, 2015
Neelima Sinha	University of California Davis, USA	Heteroblasty and heterophyly - when two programs collide	September 14, 2015
T.V. Ramanathan	Savitribai Phule Pune University	Big & high dimensional data in finance: Some statistical issues	September 15, 2015
Rajesh Gupta	HRI, Allahabad	Black hole entropy and holography	September 21, 2015
Michael L. Arnold	University of Georgia, USA	Reproductive isolation and introgression: Lessons learned (and being learned) from the Louisiana Irises	September 22, 2015
Arnab Mitra	Ben Gurion University, Israel	Base change and distinction	September 23, 2015
Syam Prakash Somasekharan	IIT Indore	Stress granules ease the way for cancer metastasis	September 23, 2015
Pradip Sinha	IIT Kanpur	Cancer as an alien entity within: Modeling host-tumor interactions in <i>Drosophila</i>	September 24, 2015
Vibhor Kumar	Genome Institute of Singapore, Singapore	Diving in the sea of chromatin states to understand gene regulation	September 25, 2015
M. Lakshmanan	Bharathidasan University, Tiruchirappalli	Dynamics of certain nonstandard Lagrangian/ Hamiltonian type nonlinear oscillators	September 28, 2015
Umesh Dubey	IISc, Bengaluru	Singularity category and Knörrer periodicity	September 28, 2015
Siva Vallabhpurapu	Louisiana State University, USA	Balancing the act: Regulation of the NF- κ B signaling in normal homeostasis and disease	September 28, 2015
Ipsita Mandal	Perimeter Institute for Theoretical Physics, Canada	UV / IR mixing in non-Fermi liquids	September 28, 2015
Vishwanathan Iyer	T.A. Pai Management Institute, Manipal	Econometrics: Modeling financial markets analyzing nifty returns analyzing cross sectional return - risk relationships estimating portfolio return and risk	September 29, 2015
Vishwanathan Iyer	T.A. Pai Management Institute, Manipal	Modeling Financial Market Modeling Asset Returns	September 30, 2015
Vishwanathan Iyer	T.A. Pai Management Institute, Manipal	Modeling Financial Markets Analyzing Calender Effect in Returns	September 30, 2015

October 2015

Speaker	Affiliation	Title	Date
Vishwanathan Iyer	T.A. Pai Management Institute, Manipal	Modeling Financial Markets Modeling Volatility	October 1, 2015
Vishwanathan Iyer	T.A. Pai Management Institute, Manipal	Modeling Financial Markets Equilibrium Asset Pricing Models	October 1, 2015
Vishwanathan Iyer	T.A. Pai Management Institute, Manipal	Modeling Financial Markets Conditional Variance - GARCH	October 2, 2015
Riddhiman Sarkar	Technische Universitat, Munich, Germany	Tailoring dipole-dipole and chemical shift interactions lead to new methods in NMR spectroscopy	October 5, 2015
Arun Thalappillil	Rutgers University, USA	Probing new physics at the LHC, future colliders & beyond...	October 6, 2015
Neeraj Gupta	IUCAA, Pune	Galaxy evolution through quasar absorption lines	October 12, 2015
Rajesh Patkar	National University of Singapore, Singapore	A chemical bond that breaks plant innate immunity	October 15, 2015
Sukant Khurana	IISER Kolkata	Two sides of same coin: Basic neuroscience research and low-cost drug discovery	October 29, 2015
Dinesh Shetty	Institute for Basic Science (IBS), Korea	A journey from organic chemistry to interdisciplinary science: Focus on biomedical applications	October 30, 2015

November 2015

Amol Dighe	TIFR, Mumbai	The changing flavours of neutrinos: The journey to Nobel 2015 and beyond	November 2, 2015
Anuthaman Parthasarathy	Stanford University, USA	Unusual enzymes from the anaerobic world: A vinyl chloride reductase from a groundwater ecosystem	November 3, 2015
Amar Kumar	University of Delhi, Delhi	Plant-pathogen interaction with respect to plant parasitic nematodes: A sophisticated dialogue	November 4, 2015
Arnab Mitra	Technion, Haifa, Israel	An introduction to the structure theory of p -adic groups-Part I	November 4, 2015
G.D. Heda	Mississippi University for Women, USA	Plasma membrane stability of DF508 CFTR	November 5, 2015
Sudesh Kaur Khanduja	IISER Mohali	Dedekind's theorem on splitting of primes: 137 years of journey	November 6, 2015
Kaushal Verma	IISc, Bengaluru	Fatou-Bieberbach domains	November 6, 2015
Umesh Waghmare	JNCASR, Bengaluru	Theoretical prediction of novel structures and phenomena in materials	November 9, 2015
M.R.S. Rao	JNCASR, Bengaluru	Non-coding RNA biology in differentiation and cancer	November 9, 2015
Arnab Mitra	Technion, Haifa, Israel	How can we use combinatorics to pick our ideal partners?	November 10, 2015

Speaker	Affiliation	Title	Date
Arnab Mitra	Technion, Haifa, Israel	An introduction to the structure theory of p-adic groups-Part II	November 10, 2015
Avisek Das	University of Chicago, USA	Computational studies of large-scale conformational transitions in proteins	November 16, 2015
Anil K. Patnaik	Aerospace Systems Directorate and Wright State University, OH, USA	Ultrafast Saturation of Laser-Matter Interaction	November 19, 2015
Ujjwal Sen	HRI, Allahabad	Resonating valence bond states: A quantum information perspective	November 23, 2015
Ujjwal Sen	HRI, Allahabad		November 23, 2015
Vikas Vikram Singh	Universite Paris-Sud, France	Existence of Nash equilibrium for chance-constrained games	November 24, 2015
Vijayakumar Chikkadi	Weizmann Institute of Science, Israel	A microscopic understanding of the flow of glasses using colloids	November 26, 2015
Shamashis Sengupta	Universite Paris-Sud, Orsay, France	Gate-tunable transport in the Al ₂ O ₃ /SrTiO ₃ interface two-dimensional electron gas	November 27, 2015
Sanghamitra Neogi	University of Colorado, USA	Structure-Processing-property relationships: Thermal transport in ultrathin silicon membranes	November 30, 2015

December 2015

Sumilan Banerjee	Weizmann Institute of Science, Israel	Chiral magnetism, skyrmions and nanoscale superparamagnetism in oxide interfaces	December 2, 2015
Chu-Young Kim	National University of Singapore	Expanding the molecular diversity of natural product antibiotics	December 3, 2015
Anilatmaja Aryasomayajula	University of Hyderabad	Estimates of Hilbert modular cusp forms of integral and half-integral weight	December 3, 2015
Abhishek Chowdhury	HRI, Allahabad	Hilbert Series and Black Hole Microstate Counting	December 4, 2015
Carl - Philipp Heisenberg	Institute of Science and Technology, Austria	Cell and tissue mechanics in zebrafish gastrulation	December 7, 2015
Ralf Metzler		Ergodicity violation and ageing: From granular gases to living cells	December 7, 2015
Prateek Sharma	IISc, Bengaluru	Black holes and galaxy formation	December 8, 2015
Sagar Pandit	Max Planck Institute for Chemical Ecology, Germany	Lepidopteran reverse genetics: The integration of molecular biology and classical ecology for the in situ analysis of tritrophic interactions and their infochemistry	December 8, 2015
Atanu Kumar Das	Pacific Northwest National Laboratory, USA	Metal complexes with redox-active ligands: Electronic structure determination and reactivities towards small molecule activation	December 9, 2015
Christian Wegener	University of Wuerzburg, Germany	Circadian timing of a peptide-orchestrated behaviour in <i>Drosophila</i>	December 11, 2015

Speaker	Affiliation	Title	Date
Abhijit Champanerkar	College of Staten Island, CUNY, USA	Knot, graphs, geometry and densities	December 11, 2015
Deepak Kar	University of the Witwatersrand, South Africa	First ATLAS Run 2 Results	December 14, 2015
Sonal Nagarkar - Jaiswal	Baylor College of Medicine, Houston, TX, USA	The MiMIC: Expanding gene editing tools	December 15, 2015
Manish Jaiswal	Baylor College of Medicine, Houston, TX, USA	Genetic dissection of neuronal maintenance and demise	December 15, 2015
Sushant Raut	KTH Royal Institute of Technology, Stockholm, Sweden	Physics with ultra high energy neutrinos	December 16, 2015
Chiranjib Mitra	IISER Kolkata	Probing quantum phase transitions using tools of Quantum Information Processing	December 16, 2015
Herbert Herzog	Garvan Institute of Medical Research, Australia	CART and thermoregulation	December 17, 2015
Devdatta Majumder	University of Kansas, USA	An exotic journey: Search for the Higgs boson and beyond at the LHC	December 17, 2015
Sayan Bhattacharyya	IISER Kolkata	Connecting the dots: Semiconductor quantum dots as light harvesters and carbon dots as water splitting catalysts	December 17, 2015
Sayantani Bhattacharyya	IIT Kanpur	Black holes in large dimensions	December 18, 2015
Matilde Lalin	University of Montreal, Canada	L-functions of elliptic curves arising from Mahler measure	December 18, 2015
Chinmayee Mishra	IISER Pune	Droplet formation in dipolar Bose-Einstein condensate	December 21, 2015
Sudipta Roy	Georg-August-University, Gottingen, Germany	Syntheses, isolation and reactivity of fascinating molecules containing main group elements and transition metals	December 22, 2015
M. Ram Murty	Queen's University, Canada	Twin primes	December 26, 2015
R. Nagaraj	CSIR-CCMB, Hyderabad	Host-defense Peptides: Therapeutic antibiotics of the future?	December 28, 2015

January 2016

Chandra Verma	Bioinformatics Institute, Singapore	Developing therapeutics against Dengue: a multiscale approach	January 4, 2016
Peter Hoffmann	Wayne State University, USA	Nanoscale biophysics	January 4, 2016
Sagun Chanillo	Rutgers University, USA	The fundamental theorem of calculus, its generalizations to higher dimensions and applications to fluid mechanics and magnetism	January 5, 2016

Speaker	Affiliation	Title	Date
Rashmi Priya	University of Queensland, Australia	Patterning Rho - GTPase signaling at the epithelial cadherin - junctions : A tale of feedback loops	January 5, 2016
Guhan Venkat	Imperial College, London, UK	Darmon cycles and the kohnen-shintani lifting	January 5, 2016
Sagun Chanillo	Rutgers University, USA	CR Geometry in Three Dimensions	January 6, 2016
Faiz Ahmad Mohammed	Case Western Reserve University, Ohio, USA	Structure, function and mechanism of ribonucleotide reductase: Life's essential enzyme	January 6, 2016
Moitri Maiti	Joint Institute for Nuclear Research, Dubna, Russia	Transport and dynamics of Dirac fermions and Majorana modes across superconducting junctions	January 7, 2016
Arul Lakshminarayan	IIT Madras	Entanglement and quantum chaos	January 8, 2016
Ashok Venkitaraman	University of Cambridge, UK	Early intervention in cancer through the tumour suppressive mechanisms that control genome stability	January 8, 2016
Abhijit Ambegaonkar	Rutgers University, USA	Regulation of planar cell polarity by the Dachshous-Fat pathway	January 11, 2016
Carol Trager-Cowan	University of Strathclyde, Glasgow, UK	Studying structure and light emission in the scanning electron microscope	January 12, 2016
Kishore Marathe	City University of New York, USA	Moonshine	January 12, 2016
Xi Yin	Harvard University, Cambridge, USA	Superconformal bootstrap in two dimensions	January 13, 2016
Hitesh J. Changlani	University of Illinois at Urbana-Champaign, USA	Attacking the problem of strong correlations with the density matrix renormalization group	January 14, 2016
Ulrike Zeshan	University of Central Lancashire, UK	Deaf literacy change lab	January 15, 2016
Wilfrid Prellier	Laboratoire CRISMAT, CNRS and University of Caen, France	High-throughput Synthesis of Oxide Thin Films	January 15, 2016
Kishore Marathe	City University of New York, USA	Mock Moonshine	January 15, 2016
Herbert W. Roesky	Georg-August-University, Goettingen, Germany	The Interstellar Space: a Guide for Exciting Chemistry	January 18, 2016
Archana Kamal	Massachusetts Institute of Technology, Cambridge, USA	Quantum information processing with superconducting quantum circuits	January 18, 2016
Nils Christian-Stenseth	Centre for Ecological and Evolutionary Synthesis, Oslo, Norway	Climate change and impact on emerging infectious diseases: Plague as an example	January 19, 2016
Nishant Agarwal	Pennsylvania State University, USA	Early universe cosmology	January 19, 2016
Nils Christian-Stenseth	Centre for Ecological and Evolutionary Synthesis, Oslo, Norway	Black Death: Medieval plague pandemics in Europe - Repeated climate-driven introductions from Central Asia	January 19, 2016

Speaker	Affiliation	Title	Date
Maria Leptin	European Molecular Biology Organization (EMBO)	Cell shape and morphogenesis: Sub cellular and supracellular mechanisms	January 20, 2016
Nilendra G. Deshpande	University of Oregon, Eugene, OR, USA	Violation of Lepton Flavour Universality	January 21, 2016
Helen Skaer	University of Cambridge, UK	Sculpting organ shape: morphogenesis of a tubular system in <i>Drosophila</i>	January 21, 2016
Thomas Lecuit	CNRS & Aix-Marseille Universitat, France	The mechanics of tissue morphogenesis	January 21, 2016
Mina Bissell	Lawrence Berkeley National Laboratory, USA	Why don't we get more cancer: The crucial role of the extracellular matrix and tissue architecture	January 22, 2016
S. P. Rath	IIT Kanpur	Unfolding mystery of multi-heme proteins: Nature's design and role of heme-heme interactions on the functional control	January 25, 2016
Niranjan Kambi	University of Wisconsin-Madison, USA	Brain-wide plasticity in somatomotor systems following spinal cord injury	January 25, 2016
Iain Stewart	Plymouth University, UK	Towards a sustainable earth: Integrating geoscience with sustainable development	January 27, 2016
Jhuma Sannigrahi	Indian Association for the Cultivation of Science, Kolkata	Study of magnetic and dielectric properties of 3d transition metal oxides	January 27, 2016
Yasushi Hiromi	National Institute of Genetics, Mishima, Japan	Things my mentor told me - Spirits of experimental science	January 28, 2016
Amit Bhunia	IISER Pune	Bose-Einstein condensation (BEC) of photons: Challenges and experiments	January 28, 2016
Prasanna Venkatesh	University of Innsbruck, Austria	Ultracold atoms in Cavities - Bloch oscillations, transport and Optomechanics	January 29, 2016
David J. Hannapel	Iowa State University Ames, USA	Front-loaded and doubled-down: The signaling network of tuberization	January 29, 2016
Rohini Godbole	IISc, Bengaluru	The 750 GeV diphoton signal: Will it light up the particle world?	January 29, 2016

February 2016

G. Narahari Sastry	CSIR- IICT, Hyderabad	Cooperativity of non-covalent interactions	February 3, 2016
Chandra Sekar	University of Findlay, Ohio, USA	New developments in inositol lipid signalling	February 4, 2016
Shanta Laishram	ISI Delhi	Power values of sums of products of consecutive integers	February 4, 2016
M. G. Nadkarni	University of Mumbai	On the problem of simple Lebesgue Spectrum in ergodic theory	February 5, 2016
Semir Zeki	University College London, UK	Organisation of the visual brain	February 8, 2016
Sudipto Roy	A*STAR, Singapore	Cilia and ciliopathies	February 9, 2016

Speaker	Affiliation	Title	Date
Anjana Badrinarayanan	Massachusetts Institute of Technology, Cambridge, USA	Dynamics of DNA double-strand break repair in bacteria	February 9, 2016
Mayukh Majumder	Max Planck Institute for Chemical Physics of Solids, Dresden, Germany	Magnetic order at the border: NMR and NQR as a microscopic tool	February 10, 2016
Yogesh Gokhale	TERI University, Delhi	Social - ecological systems: Living laboratory of multidisciplinary sciences	February 11, 2016
Rohit Holkar	Federal University of Santa Caterina, Brazil	C^* -algebraic correspondence and its topological analogue	February 11, 2016
Saraswathi Vishveshwara	IISc, Bengaluru	Protein structure and function: Looking through the network of side-chain interactions	February 12, 2016
Rajarshi Choudhary	University of North Carolina at Chapel Hill, USA	Synthetic biology and systematic regulation of RNA-protein interactions	February 12, 2016
Rituraj Purohit	CSIR-IHBT, Palampur	Role of ELA region in auto-activation of mutant KIT receptor: An in silico insight	February 15, 2016
Denis Benois	University of Bordeaux, France	Exceptional zeros of p-adic L-functions of modular forms	February 15, 2016
Pulak Kar	University of Oxford, UK	CRAC channels, Ca^{2+} microdomains and gene expression	February 16, 2016
Srilakshmi Krishnamoorthy	IIT Chennai	Central L-values of automorphic representations of $GL(2)$ over number fields	February 17, 2016
Nitin P. Padture	Brown University, USA	Harnessing solar energy efficiently, cheaply, and safely	February 18, 2016
Manjunath Krishnapur	IISc, Bengaluru	Zeros of random analytic functions	February 19, 2016
Challa V. Kumar	University of Connecticut, Storrs, USA	Novel protein fluorescent nanoparticles (GlowDots) as pH sensors	February 19, 2016
Kalman Szabo	Stockholm University, Sweden	Highly selective allylation with functionalized allylboronic acids	February 22, 2016
Sarat Kumar Dalai	Institute of Science, Nirma University, Ahmedabad	Understanding the role of sporozoite challenge in the shaping the fate of Plasmodia liver-stage specific CD8+ T cell memory	February 23, 2016
R. Loganayagam	TIFR-ICTS, Bengaluru; IAS Princeton, USA	Topological sigma models and fluid dynamics	February 24, 2016
Ashutosh Kotwal	Duke University, USA	The science case for future circular colliders	February 25, 2016
Padmini Srinivasan	University of Iowa, USA	Text Mining: Opportunities and Challenges	February 25, 2016
Surhud More	IPMU, Tokyo	The edges of Galaxy clusters and self-interaction cross-section of dark matter	February 26, 2016
Abhishek Dhar	ICTS, Bengaluru	Understanding anomalous transport in one-dimensional systems through fluctuating hydrodynamics	February 29, 2016

March 2016

Speaker	Affiliation	Title	Date
Safdar Quddus	NISER, Bhubaneswar	Hochschild and cyclic (co)homology of certain algebras	March 7, 2016
Amit Joshi	National Institutes of Health, Bethesda, USA	Where did I come from? -Peroxisomes search for an answer	March 7, 2016
Manidipa Banerjee	IIT Delhi	Deciphering molecular mechanisms of non-enveloped virus entry and membrane penetration	March 8, 2016
Soumen Basak	National Institute of Immunology, Delhi	An autoregulatory RelB:p50 NF κ B pathway exacerbates environmental drug resistance in multiple myeloma	March 9, 2016
David Díaz-Díaz	Universitat Regensburg, Germany	Two examples of simplicity and robustness: Metal adhesive polymers and intragel reactivity	March 10, 2016
Achanta Venu Gopal	TIFR, Mumbai	Metamaterials with broadband response	March 10, 2016
Rudra Pratap	IISc, Bengaluru	Turning science into technology: A logical path of scientific research	March 14, 2016
Kristian Franze	University of Cambridge, UK	The mechanical control of neuronal development and function	March 15, 2016
Bindusar Sahoo	IISER Thiruvananthapuram	N=4 conformal supergravity	March 16, 2016
S. Anantha Ramakrishna	IIT Kanpur	Anisotropic metamaterials provide for novel applications	March 17, 2016
Ramesh Budhani	IIT Kanpur	Quantum phases and phase transitions in two-dimensional diffusive metals at oxide interfaces	March 17, 2016
Yitzhak Tor	University of California, San Diego, USA	Isomorphic fluorescent nucleosides as biophysical tools	March 21, 2016
Anupam Madhukar	University of Southern California, USA	Quantum dots: What, Why, How, and ??	March 21, 2016
Santosh Sathbhai	Gregor Mendel Institute of Molecular Plant Biology, Austria	Underground tuning: Natural variation of Arabidopsis root development under iron deficiency	March 21, 2016
Anupam Madhukar	University of Southern California, USA	Quantum Dots: Single photon emitters for on-chip integrated nanophotonics	March 22, 2016
Mahesh Hariharan	IISER Thiruvananthapuram	Strategies to reduce the rate of charge recombination	March 23, 2016
Sourendu Gupta	TIFR, Mumbai	Hot stuff	March 28, 2016
Xile Hu	Ecole Polytechnique Federale de Lausanne (EPFL), Switzerland	Base metal catalysis for cross coupling and addition reactions	March 29, 2016
Girjesh Gupta	IUCAA, Pune	Role of waves and small-scale transients in the heating of solar atmosphere	March 30, 2016
Sanjay Sane	NCBS, Bengaluru	Airflow sensing in flying insects	March 31, 2016
Srimanta Middey	University of Arkansas, USA	Heterointerface engineering of correlated oxides	March 31, 2016



Academic Programs

PhD
Integrated PhD
BS MS

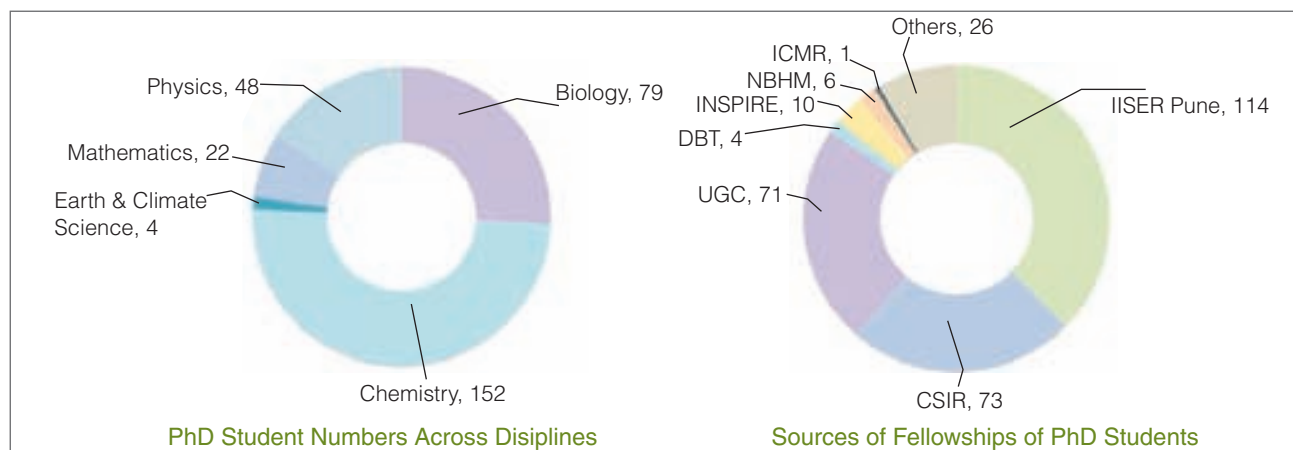
PhD Program

During August 2015 and January 2016 admission sessions, 52 students were admitted to the PhD program. The subject-wise distribution of the students admitted during the year is as follows:

Biology: 14; Chemistry: 21; Earth & Climate Science: 4; Mathematics: 3; Physics: 10

Students enrolled into the IISER Pune PhD program in August 2015 and January 2016 sessions

<p>Biology</p> <p>Abhishek Kanyal Ankita Sharma Soumen Khan Gaiwala Sharma Sujata Shamsunder Virender Kumar Sharma Patil Shalaka Tatyasaheb Bhattacharjee Anindya Subir Nishant Singh Adhav Vishal Annasaheb Abhishek Mishra Selveshwari S. Debjyoti Dutta Parth Kantilal Raval Krishnakanth Baratam</p> <p>Chemistry</p> <p>Dheeraj Chandra Joshi Prateek Kumar Agrawal Udaya H.S.</p>	<p>Santosha B.S. Sattwick Halder Divya Singh Manu Gautam Satish Kumar Aman Bajpai Sawase Laxman Rambhau Todkari Iranna Annappa Khade Vikas Vilas Debashis Mondal Rahane Yogesh Shivaji Prachi Gupta Dharpure Pankaj Dhanraj Sutar Yogesh Vishnu Zahid Manzoor Bhat Prerona Bora Sonawane Amol Dashrath Manish Kumar</p> <p>Mathematics</p> <p>Deshmukh Neeraj Ravindra</p>	<p>Thandar Soumyadip Suprita Talnikar</p> <p>Earth & Climate Science</p> <p>Vivek Kumar Anirban Mandal Mohd Danish Abhinav Prakash Gahlot</p> <p>Physics</p> <p>Jyoti Yadav Suddhasattwa Mandal Anweshi Dewan Sumit Srivastav Ajith V.J. Imrankhan B. Mulani Gautam Sharma Banibrata Chakraborty Parth Chaturvedi Abhishek Gaurav</p>
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During the year, 8 students discontinued from the program and 49 students completed their PhD requirements. Thus, the total strength of active PhD students as on March 31, 2016 stood at 305.

During the convocation held on May 27, 2015, 16 students received their PhD degrees. Details are given below:

	Student	Discipline	Title of Thesis	Advisor
1	Abhigyan Sengupta	Chemistry	Excited state dynamics and photophysics in bulk, confined and bio-mimetic systems	Partha Hazra
2	Sumit Kumar	Chemistry	Probing non-covalent interactions in biomolecules and materials: A gas phase laser spectroscopy study of <i>N</i> -heterocyclic aromatic complexes	Aloke Das
3	Handu Mithila Tej	Biology	SUMOylation in the <i>Drosophila</i> innate response: Proteomics to immune signaling	Girish Ratnaparkhi
4	Pawar Maroti Govindrao	Chemistry	Environment-sensitive base-modified fluorescent ribonucleoside analogue probes: Synthesis, incorporation and applications	S.G. Srivatsan
5	Arun Babu K.P.	Physics	Coronal mass ejections from the sun - propagation and near earth effects	Prasad Subramanian
6	Kanika Bansal	Physics	Electrical and optical investigations of the condensed matter physics of junction diodes under charge carrier injection	Shouvik Datta
7	Malwal Satish Ramesh	Chemistry	Synthesis and evaluation of organic sources of reactive sulfur species	Harinath Chakrapani
8	Dharmaraja A.	Chemistry	Synthesis and evaluation of small molecule based reactive oxygen species (ROS) generators	Harinath Chakrapani
9	Arthur Varghese	Physics	Role of fluid dynamics in nanofabrication: Growth mechanism and optical properties of ligand free CdS nanotubes made using alumina nano-reactor	Shouvik Datta
10	Patil Padmashri Vilasrao	Physics	Synthesis of semiconductor quantum dots, study of its optical properties and its application in sensitized solar cells	Shouvik Datta
11	Nagarkar Sanjog Sunil	Chemistry	Design and synthesis of metal-organic frameworks for selective sensing applications	Sujit Ghosh
12	Yadagiri Gopala Krishna Tullimilli	Chemistry	Synthesis, characterization and redox properties of antiaromatic expanded isophlorins	V.G. Anand
13	Kand Dnyaneshwar Shivaji	Chemistry	Design and synthesis of fluorescent probes for selective detection of thiols	Pinaki Talukdar
14	Biplab Joarder	Chemistry	Design, synthesis and functional studies of biomolecule based coordination polymers	Sujit Ghosh
15	Shree Harsha T.T.	Biology	Evolution and development of insect wings: A comparative analysis of the genome wide targets of the Hox protein Ultrabithorax in <i>Bombyx mori</i> , <i>Apis mellifera</i> and <i>Drosophila melanogaster</i>	L.S. Shashidhara
16	Senthilkumar D.	Biology	<i>Drosophila</i> models of motor neuron disease	Girish Ratnaparkhi

The following students have fulfilled the requirements for the award of Ph.D. degree :

Mahajan Ameya Suhas	Bhogale Sneha Dilip	Sahasrabudhe Abhishek Shrikant
Pramod P.S.	Satheesh Ellipilli	Savita Singh
Payal Arya	Vishakha Karnawat	Rafeeq Ahmad Mir
Tanpure Arun Ankush	Abhishek Shukla	Nitin Dattatreya Bansode
Gadekar Santosh Chandrakant	Arindam Dasgupta	Ravi Kiran
Sharma Kavita Vinod		

The following students have submitted their thesis for the award of PhD degree:

Sachin Holkar	Wilbee D.S.	Ganesh Kumar Mothukuri
Ingale Madhusudan Ganesh	Padala Kishore	Shekatkar Snehal Madhukar
Smita	Praveena R.L.	Sawant Anupam Ashok
Anantraj S.	Karve Shraddha Madhav	Kiran Reddy Baddigam
Biplab Manna	Jay Prakash Shukla	Kadam Vijay Narayanrao
Krishna Gavvala	Rahul Kumar Jangid	Sharad Garud Deshmukh

- Sushil Benke was selected for a three- month internship between May 1 to August 1, 2015 at the Royal Society of Chemistry, UK
- Abhinav Parivesh received the Elsevier DNA Repair Best Poster Award at the Zing Conference on Genomic Integrity held at Cairns, Australia during August 1-5, 2015
- Following students received travel grants for participating in international conferences abroad and for internships :

	Student	Conference/Internship	Funding	Duration
1	Nishta Sachdev	Internship at University of Gottingen under Namaste-India -EU Program	NAMASTE	September 09, 2015 - March 08, 2016
2	Manasi Gangan	ASM Conference	ICMR	June 12-16, 2016
3	Abhinav Parivesh	Zing Conference Limited, Cambridge, UK	DBT	August 5-14, 2015
4	Soumya Mukherjee	129 th International Summer Course at BASF SE, Ludwigshafen	BASF-SE	August 1 - September 8, 2015
5	Yasmeen Akhtar	The 8 th International Congress on Industrial and Applied Mathematics (ICIAM), Beijing, China	NBHM	August 10-14, 2015
6	Swati Hegde	Conference	DST-SERB	November 22-25, 2015
7	Partha Pratim Patra	Conference of European Physical Society	DST-SERB	October 10-17, 2015
8	Shraddha Karve	Autumn School of Department of Medicine, University of Scotland, UK	Host	October 15-21, 2015
9	N. Bhavani	International Plant Molecular Biology 2015, Brazil	Host	October 24-31, 2015
10	Rashmi Kulkarni	Conference at University of Cambridge	DST-SERB	October 6-7, 2015
11	Ashok Yadav	International Scientific School at Samara centre for Theoretical Material Science, Samara	DST-SERB	September 14-20, 2015
12	Srishti Dar	Annual Meeting of American Society of Cell Biology, San Diego, USA	Host and DBT	December 10-19, 2015
13	Neha Prabhu	Talks at Jianguo Normal University, China	Host	March 18-27, 2015

	Student	Conference/Internship	Funding	Duration
14	Sudhir Kumar Pujahari	30 th Workshop on Automorphic Forms, Wake Forest University, USA	University of Oregon, USA	March 6-12, 2016
15	Turmoli Neogi	Participation in Spring School and Workshop, ICTP, Italy	Host	March 9-25, 2016

Integrated PhD Program

During the August 2015 session, 41 students took admission to the post-BSc Integrated PhD program: 18 in Biology, 11 in Chemistry, 2 in Mathematics and 10 in Physics.

Biology

Aishwarya V.
Aparna Thulsidharan
Joyeeta Chakraborty
Meenakshi Pardasani
Mrinmayee Anant Bapat
Singh Pratima Harishankar
Rohit Kandpal
Sathe Rupali Ravindra Madhuri
Bardapurkar Rutwik Vinay
Konakamchi Srinivas Sasank
Shikha Dagar
Shubham Singh
Sneha Tripathi
Sushmita Hegde
Susovan Sarkar

Physics

Sutirtha Bandopadhyay
Tumuluri Vinayak Sadasivam
Yamini Mathur

Chemistry

Abhijit Gupta
Avisikta Upadhyay
Meghmala Sarkar
Mishika Virmani
Rayan Chakraborty
Rinku
Saptashwa Chakraborty
Sheikh Farhan Amin
Soumodip Sur
Swati Deswal
Unmesh Mondal

Angira Rastogi
Arindam Bhattacharjee
Debesh Battacharjee
Deepak Kumar Roy
Devanshu Sinha
Naveen Nishad
Shailendra Kumar Chaubey
Shruti Chakravarty
Sunny Tiwari
Surya Pratap S. Deopa

Mathematics

Debprasanna Kar
Neha Malik

One student discontinued from the program during the year. The present strength of Integrated PhD students is 126 (52 women and 74 men) with 43 students in Biology, 37 in Chemistry, 2 in Mathematics and 44 in Physics.

- Prizes for Academic Excellence to Integrated PhD Students Academic year 2013-15 (Semester I & IV): Divya Rao (Biology), Mehak Malhotra (Chemistry), Adarsh B. Vasista (Physics)
- Nine students qualified for CSIR JRF NET, 1 student for UGC JRF NET and 1 student for DBT JRF. Mr. Neeladri Sen has qualified for the prestigious Shyama Prasad Mukherjee (SPM) Fellowship.
- Amogh Kulkarni from the Chemistry Discipline was selected for a 3-month internship between May 1 - Aug 1, 2015 at the Royal Society of Chemistry, UK
- Avishek Swarnkar from the Physics Discipline was selected for the prestigious Bhaskara Advanced Solar Energy (BASE) Fellowship Program 2015 for internship of 6 months between Nov 2, 2015 and May 1, 2016 at the National Renewable Energy Laboratory, Colorado, USA
- Aditi Maduskar received a travel grant from RIKEN to participate in a conference at the RIKEN Brain Science Institute, Japan
- Prachi Dhananjay Telang received support under the ISIS Newton-Bhabha Funding Scheme for Mass Spectroscopy Training at the Rutherford Appleton Laboratory, Oxfordshire, UK

BS MS Program

During the year 2015-16, 191 (127 boys and 64 girls) students have taken admission into the BS MS program of the institute. Of these, 139 were from state and central boards, 24 from IIT JEE stream, and 28 were from KVPY stream.

List of Students Enrolled in 2015

Esha Swaroop	Umesh K.P.	Aarcha Thadi
Aysha B.	Najma Zehar A.K.	Anwasha Maharana
Kunjan Kumar Patel	Shubham Mallik Thakur	Thakre Rahul Mahadeo
Amal S. Kumar	Ashwin Gopal	Katre Sujeet Nilkanth
Devesh Verma	Abhishek Adimurthi	Srikara S.
Adithyan P.	Sriram Raghunath	Naveen Kumar Digrawal
Arya P.V.	Akber Hussain M.	Charvee R.
Mahajan Jaideep Pralhad	Kiran R.	Pushkar Kunjam
Shubhangi Khobragade	Ajay Verma	Goury Parvathy J. Nair
Rahul Kumar Jingar	Kausal A.K.	Rohit Shashikant Patil
Rajdeep Halder	Akshay Wagh	Namithasree M.
Jyothish S.	Rajaditya Das	Roshni Das
Sheetabh Shringi	Rishika Sagar Bagde	Santhosh S.
Kaarthik R.S.	Vikhyath Premugh	Patil Sourabh Prakash
Sheryl Sreyas	Haritha S.V.	Shreya Lakhera
Swati Choudhary	Anjana T.	Kiran Anne Roy
Nikhil Gupta	Shilpi Bhunia	Bharathi Kannan J.
Kota Siddhartha	Hrishidev	Siddharth Ramakrishnan C.
Tushar Gopalka	Rithwik S.V.	Sreelakshmi J.S.
Athunya P.	Oddharak Tyagi	Prerana Kumar
Amitayush Jha Thakur	Akhil Babu	Ashrith Jacob
Vishnu N.	Gayathri K.	Rahul Poddar
Snehal Bhartiya	Zakhiya P.C.	Ashish Anand
Mohamed Rizal T.A.	Malavika Venu	Nevin Korath Zacharia
Kush Mohan	Haritha A.S.	Joshi Yash Jayant
Koparkar Avani Prasad	Singh Neha Surendra	Adarsh Koul
Abdul Raafik A.T.	Theja Sajeevan	Sawale Rajlakshmi Anjan
Akash Kumar	Harsha Nyapathi	Praveen Jeph
Bhawana	Dyuthi Sreekumar	Harsh Jain
Sirisha V.K.	Apoorva S. Sankar	Feroz Mohamed Hatha

Felix Jose K.	Shephali Dansana	Anil Kumar
Nazia V.	Lomte Shivani Sanjay	Banoth Devender
Anmol Kumar Sahu	Mahendra Patel	Alekh Ranjan Mahankudo
Sachin Verlekar	Dhawale Mayur Shashikant	Heena Suthar
Utkarsh Shrivastava	Sayantika Mondal	Sontakkey Nupur Vijay
Jiffin Benjamin	Anupam Bhoi	Nawale Vaibhav Vilas
Abhishek V.	Keshav Kumar Yadav	Lokhande Rugwed Anil
Bandaru Peddiraju	Thanmay Sunil Menon	Krishnaprasad P.H.
Navdha Mittal	Kunal Helambe	Madhav Sinha
Mohan Naik Jarpla	Bhise Swapnil Rajkumar	Patil Vaishnavi Vilas
Gogate Niramay Vinayak	Bagawade Rishabh Mahavir	Shelke Sanket Satish
Akhil Mithran	Shivam Yadav	Athira K.V.
Saswata Nayak	Pranjal Upadhyaya	Deshpande Aniruddha Chandrashekhar
Patki Raagini Abhay	Aditi Agarwal	Sudipta Rakshit
Adhicary Shomik Sanjay	Mayank Goyal	Harish M.
Jayakrishnan Muhunden Nallappa	Atharva Tanksale	Aarti Kejriwal
Meher Kantroo	Salve Buddhahushan Girish	Dingankar Atharva Arun
Feba Chacko	Prashant Suresh Dagale	Magdum Rushikesh Prakash
Sakshi Mathur	Patil Raj Suresh	Ghogare Digvijay Pralhad
Naresh Kumar. R	Tanayaa Bhagdikar	Pawar Mahendra Rajendra
Keshav Jha	Harikrishnan D.	Shah Saumil Atulkumar
Palash Jitendra Singh	Subham Sahoo	Varun M.
Amritkar Kaustubh Manish	Arghya Rakshit	Sinjini Bhattacharjee
Himanshu Lagachu	Sable Minal Brijlal	Nima Rose Manjila
Bhalerao Sujeet Ganesh	Bhakti Prasad Rout	Ayushman Singh
Prateek Yadav	Arindam Sharma	Potdar Ajay Anil
Dhara Patel	Chandan Shekhar	Teena Shivani R.
Shana Shirin V.	Shukla Vikas Laxmikant	Aswani S.L.
Aditya Porwal	Date Yuvraj Bhaskar	Vyshnav Mohan
Joshi Prasanna Mohan	Rani Gourkhede	Deepshikha
Raghavendra Meena	Jayapriya C.S.	Vaikunt P. Mallya
Akshay Nair	Prasham Jain	Arijit Bokshi
Dubbaku Sri Pragna	Sardar Smruti Raju	Lokhande Rishikesh Aniruddha
Radhika A.C.	Taksande Mayur Rahul	

Category-wise distribution of students enrolled in 2015

	GE	OBC	SC	ST	PD	Total
Boys	64	40	13	8	2	127
Girls	28	19	15	2	0	64
Total	92	59	28	10	2	191

Overall Category-wise Distribution of Existing BS MS Students (as of March 31, 2016)

	GE	OBC	SC	ST	PD	Total
Boys	227	137	65	23	3	455
Girls	114	72	35	2	0	223
Total	341	209	100	25	3	678

Total BS MS Student Strength during 2015-16

	Boys	Girls	Total
2010	10	02	12
2011	48	25	73
2012	70	36	106
2013	88	43	131
2014	117	60	177
2015	122	57	179
Total	455	223	678

Details of Fifth Year Projects carried out by BS MS Students during 2014-15

	Student	Host Institute	Supervisor	Project Title
Biology				
1	Pimpale Lokesh Ghansham 20081008	IISER Pune	Girish Ratnaparkhi	A whole genome RNAi screen to identify modifiers of aggregation of mutant VAPB using automated computational analysis
2	P. Priyatham 20091052	IISER Pune	Chaitanya Athale	Qualification of cell size distribution in <i>Staphylococcus aureus</i> : Effect of environmental factors
3	Somendra Singh Kharola 20091054	IISER Pune	Sutirth Dey	Effects of fluctuating selection on the laboratory populations of <i>E.coli</i>
4	K.S. Supreeth 20091087	IISER Pune	Anjan Banerjee	Exploring the role of AP2-like gene in the development of <i>Chara</i> , an algal ancestor of land plants
5	Satish B. 20091091	IISER Pune	Mayurika Lahiri	Role of Apoptosis Inhibitor-5 (Api 5) in breast cancer morphogenesis
6	Suraj S. Chawla 20091104	IISER Pune	Milind Watve	Towards a statistical species concept and speciation
7	Neeraja Revi 20101003	IISER Pune	Anjan Banerjee	Exploring the role of novel miRNAs in potato development under photoperiodic conditions
8	Abinand Reddy K. 20101008	Nature Conservation Foundation	Suhel Quader	An investigation into brood parasitism by Asian Koels on House Crows
9	V. Saudamini 20101010	IISER Mohali	N.G. Prasad	An empirical assessment of the evolution of immune response using <i>Drosophila melanogaster</i> as a model system
10	Vishnu M.S. 20101011	IISER Pune	Richa Rikhy	To identify and characterize proteins in early <i>Drosophila</i> embryo using monoclonal antibodies from neuronal hybridoma library

	Student	Host Institute	Supervisor	Project Title
11	Abhilesh Dhawanjewar 20101014	IISER Pune	M.S. Madhusudhan	Principles governing the viability of mitochondrial-nuclear interactions in respiratory chain complexes
12	Jagdhane Prarabdha Ulhas 20101021	Indian Institute of Science, Bengaluru	Vijayalakshmi Ravindranath	Protective role of ART in amyloid beta peptide induced degeneration in AD
13	Dincy Mariyam 20101023	National Centre for Biological Sciences, Bengaluru	Mahesh Sankaran	Seasonal distribution of large mammalian herbivores in the Shola-grasslands of the Western Ghats
14	Jirapure Surabhi Suresh 20101024	JNCASR, Bengaluru	Udaykumar Ranga	The biological significance of accessory and subtype-specific natural variations in drug resistance of HIV-1 subtype C
15	Desai Nisarg Parimal 20101030	University of Mysore	Mewa Singh	Primate behavioral flexibility
16	Kawale Prasenjeet Bhimrao 20101031	IISER Pune	Sudha Rajamani	To explore the effect of polycyclic aromatic hydrocarbons (PAHs) on cyclic reaction
17	Shewale Dipeshwari Janardhan 20101035	IISER Pune	Manjunath G.P.	Role of Chromatin organizing proteins SATB1 & SATB2 in stress induced accelerated aging model of Rat: Interplay of chromatin organization & Insulin like growth factor (IGF) signaling
18	Ajesh Jacob 20101040	IISER Pune	Aurnab Ghose	Role of actin nucleators in spinal cord development
19	Ram Krishna Vinayak 20101043	IIT Delhi	Varsha Singh	Behavioral game theoretic model for evolution of cooperation
20	Ravindra P.N. 20101045	Indian Institute of Science, Bengaluru	Raghvendra Gadagkar	Usage of nest mate and non-nest mate recognition in <i>Ropalidia marginata</i>
21	Shailendra Kushwaha 20101049	IISER Pune	Anjan Banerjee	Establishment of VIGS based knockdown system of OIGs in <i>Coccinia</i> sp
22	Anurag Mishra 20101051	IISER Pune	Ramana Athreya	Phylogeography of <i>Philautus</i> genus of frogs in Arunachal Pradesh
23	Abhishek Mishra 20101053	IISER Pune	Sutirth Dey	Effects of reflection for dispersal on life-history of laboratory population of <i>Drosophila melanogaster</i>
24	Marina Victor 20101057	IISER Pune	Mayurika Lahiri	Role of acetylation of Api5 and its interaction with TopBP1
25	Neha M. 20101070	National Centre for Biological Sciences, Bengaluru	Mahesh Sankaran	Studying intraspecific variation in plant functional traits across rainfall and environmental gradients

	Student	Host Institute	Supervisor	Project Title
26	Viraj Doddihal 20101078	Institute for Stem Cell Biology and Regenerative Medicine, Bengaluru	Dasaradhi Palakodeti	Post transcriptional regulation essential for stem cell function and regeneration
27	Krishna Anujan 20101079	National Centre for Biological Sciences, Bengaluru	Jayashree Ratnam	The effect of chital disturbance in the diversity and functional traits of understory vegetation in the forests of Andaman islands
28	Kavya Leo Vakkayil 20101080	IISER Pune	Manjunath G.P.	Biochemical and genetic characterization of chromatin organizer protein Dve-1 and its role in <i>C. elegans</i> development and aging
29	Lalwani Poortata Shirish 20101082	National Centre for Biological Sciences, Bengaluru	Archana Purushotham	Cognitive ability and functional brain connectivity
30	Rachana Suhas Bhawe 20101084	Centre for Ecological Sciences, IISc, Bengaluru	Kavita Isvaran	To study the presence & correlation between alternative mating tactics (AMT) and Behavioral syndromes (BS), using <i>Prammophilus doralis</i> as a model system
31	Sane Niharika Vinay 20101087	National Institute of Mental Health and Neurosciences, Bengaluru	Laxmi T. Rao	Pre-natal exposure to stress affects cognitive development in pups
32	Landge Yovhan Vardhaman 20101091	Transitional Health Science & Technology Institute, Gurgaon	Guruprasad Medigeshe	Role of human tyrosine kinases in dengue virus replication
Chemistry				
1	Nikhil Y.L.K. 20091004	CSIR-National Chemical Laboratory, Pune	Sayam Sengupta	Understanding the reactivity of FeV(O) towards alcohol oxidation under homogeneous conditions
2	Raju Lunkad 20091063	IIT Jodhpur	Ananya Debnath	Molecular Dynamics study on the shape transitions of micelle formations
3	T. Sriharsha 20091088	Indian Institute of Science, Bengaluru	Aninda Bhattacharyya	Nanoscale heterostructures for photocatalysis & photovoltaics
4	Divya Mahendran 20101004	Uniliver R&D, Bengaluru	Ashish Vaidya	Surface chemical modification of biomimetic materials: Underwater Oil / Fouling Repellency

	Student	Host Institute	Supervisor	Project Title
5	Manish Kumar 20101005	IISER Pune	V.G. Anand	Synthesis & characterization of tripyrrine (furan & selenophene) and conjugated furan macrocycles
6	Maddala Bala Gopal 20101012	IISER Pune	Angshuman Nag	Ag (I) and Cu (II) doped colloidal CdSe nanocrystals: Partial cation exchange and effect on photoluminescence
7	Arya Thampi 20101019	IISER Pune	Mrinalini Puranik	Unraveling a few mysteries of melanin polymerization: Structure and kinetics of formation
8	Mhatre Maitreyee Anant 20101026	IISER Pune	M. Jayakannan	Polycaprolactone based amphiphilic diblock C polymers
9	Mallojjala Sharath Chandra 20101029	IISER Pune	Harinath Chakrapani	Design, synthesis and evaluation of nitroreductase activated hydrogen sulfide donors
10	Sarangamath Sangamesh 20101036	IISER Pune	S.G. Srivatsan	Structure of human telomeric DNA G-Quadruplexes in a model cell-like confined environment using a fluorescent nucleoside probe
11	Thameez Mohammed K.Y. 20101038	IISER Pune	M. Jayakannan	pH responsive polysaccharide vesicles for drug delivery
12	Aswathi Ashok 20101042	IISc, Kudapura	M.S. Hegde	Infrared plasmonics of Al-Mn codoped ZnO and In-M (M =Fe and Mn) codoped CdO nanocrystals
13	Padmaja M. 20101058	IISER Pune	M. Jeganmohan	Ruthenium-catalyzed oxidant free ortho-alkenylation of aromatic amides with alkenes at room temperature
14	Mahitha M.K. 20101059	IIT Madras	T. Pradeep	Vertical growth of bimetallic nanostructures at ambient conditions
15	Farzeena C. 20101064	Hindustan Uniliver R&D, Bengaluru	Narayanan Subrahmaniam	Equilibrium, dynamic surface tension properties of alkyl ether sulphates and their relation to foaming behaviour
16	Golu Parte 20101066	CSIR-National Chemical Laboratory, Pune	Satishchandra B. Ogale	Synthesis of high surface area carbon materials and their functional composites with metal oxides for energy storage
17	Niranjana Sreelal 20101081	Uniliver R&D, Bengaluru	Amitava Pramanik	Selective growth of CaCO ₃ polymorphs on aluminum surface: Effect of Mg ²⁺ ions
18	Pooja Prasanthan T. 20101086	Hindustan Uniliver R&D, Bengaluru	Jiji Kottukapally	Study on acidic degradation of SLES and its impact on phase behavior
19	Pratyush Kumar Mishra 20101092	IISER Pune	Pinaki Talukdar	Cascade reaction based fluorescent probes for detection of hydrogen sulfide
20	Sujoy Saha 20101095	JNCASR, Bengaluru	C.N.R. Rao	Modification of wide bandgap semiconductors for visible light driven hydrogen generation

	Student	Host Institute	Supervisor	Project Title
Interdisciplinary				
1	Sadhana Panzade 20101044	Bioinformatics Institute, Singapore	Chandra Verma	Molecular dynamics simulations of proteins: Multiscale modeling studies of the dengue virus
Mathematics				
1	Shirish Kulhari 20091097	IISER Pune	Anindya Goswami	Implied volatility in a regime-switching market: Theory and computation
2	Akash Krishna 20101013	IISER Pune	Anindya Goswami	Pricing in a Semi-Markov modulated jump diffusion model
3	Mandlik Nishad Devendra 20101025	IISER Pune	Rabeya Basu	Constructive proof of Quillen-Suslin theorem for projective modules
4	Preeti 20101028	IISER Pune	Ayan Mahalanobis	Secret sharing schemes and applications
5	K. Hariram 20101047	IISER Pune	Ayan Mahalanobis	Recent advances in the index-calculus attacks on the discrete logarithm problem
6	Shiva Chidambaram P. 20101073	IISER Pune	A. Raghuram	Cohomology of $GL(2)$
7	Reshma C. Chandrasekharan 20101083	IISER Pune	Soumen Maity	Group construction of converting Arrays
8	Sanket Nandan 20101089	IISER Pune	Anindya Goswami	Statistical inference of Semi-Markov process and application in Finance
Physics				
1	Arshad Arjunan Nair 20091025	Indian Institute of Tropical Meteorology, Pune	A.K. Kamra	Lightning distribution during the active and break down monsoon periods over South Asia
2	C. Lallanzuala 20091071	IISER Pune	T.S. Mahesh	NMR experiments with optional control techniques
3	Anilkumar Tolamatti 20101001	Raman Research Institute, Bengaluru	Bala R. Iyer	Topics in post-Newtonian computations for inspiralling compact binaries
4	Shanu Dengre 20101002	IISER Pune	Sunil Nair	Magnetism of some potential multiferroic systems
5	Sukruti Bansal 20101006	IISER Pune	Nabamita Banerjee	Flat directions in higher dimensional supergravity theories
6	Akshay Y.S. 20101007	IISER Pune	Sudarshan Ananth	Deriving interaction vertices in quantum field theories describing higher spin fields in flat spacetime backgrounds

	Student	Host Institute	Supervisor	Project Title
7	Vishnu V. Krishnan 20101009	IISER Pune	Arijit Bhattacharyay	Transport in nonequilibrium stochastic systems
8	Abhijith Gandrakota 20101015	Centre for High Energy Physics, IISc, Bengaluru	Aninda Sinha	Studies of entanglement entropy in holography
9	Sree Vani J. 20101022	Raman Research Institute, Bengaluru	K.S. Dwarakanath	Diffuse radio emission from galaxy clusters
10	Yagyik Goswami 20101027	Indian Institute of Science, Bengaluru	Govindan Rangarajan	Exploration of existence, structure and characteristics of simultaneously stable groups of synchronized nodes in a connected, directed network of oscillators
11	Mohite Siddharth Rajiv 20101033	International Centre for Theoretical Sciences -TIFR, IISc Campus, Bengaluru	Sanjit Mitra	A Bayesian parameter estimation code for gravitational-wave astronomy
12	V.R. Krithika 20101034	IIT Madras	Deepa Venkitesh	Phase sensitive optical amplification
13	Lokhande Sagar Fakirchand 20101037	IISER Pune	Sunil Mukhi	Worksheet string theory and black hole physics
14	Urvashi Gupta 20101041	University of Groningen, Netherlands	Caspar H. Van der Wal	Towards quantum optics with spin states of defects and impurities in semiconductor
15	Ajith V.J. 20101055	IISER Pune	Shivprasad Patil	A novel near-field instrument for measurement of molecular mobility in nano-confined liquids under shear stress
16	Aswathy V.G. 20101056	IISER Pune	G.V Pavan Kumar	Photo-thermal properties of localized plasmonic nanostructures
17	Kshiti Mishra 20101060	IISER Pune	Surjeet Singh	Investigations of geometrically frustrated magnets
18	Sourav Sarkar 20101061	Harish-Chandra Research Institute, Allahabad	Rajesh Gopakumar	Explorations in gauge-gravity duality
19	M. Sainath 20101063	IISER Pune	Umakant Rapol	Storage and control of quantum information using macroscopic gas samples
20	Tamhane Prathamesh Dhananjay 20101065	National Centre for Radio Astrophysics - TIFR, Pune	Yogesh Wadadekar	Properties of faint galaxies in deep, multiwavelength surveys

	Student	Host Institute	Supervisor	Project Title
21	Pranav Kumar 20101067	IISER Pune	Suneeta Vardarajan	Nonlinear (in) stability of asymptotically anti-de sitter spacetimes
22	Kulkarni Mihir Sanjay 20101068	National Centre for Radio Astrophysics - TIFR, Pune	Tirthankar Roy Choudhury	Studying cross-correlation of HI-21 cm signal and Lyman- α forest using simulations
23	Meghana Raghunandan 20101075	IISER Pune	Rejish Nath	Bright solutions in dipolar Bose Einstein condensates
24	Utkarsh Giri 20101077	Indian Institute of Science, Bengaluru	Rohini Godbole	Phenomenological investigations of BSM physics at colliders
25	Mandage Revati Sudam 20101085	New Mexico State University, New Mexico	R.T. James McAteer	The turbulent solar magnetic field
26	Bora Neha Dilip 20101094	IISER Pune	M.S. Santhanam	Random walks on complex media

Details of Fifth Year Projects carried out by the outgoing batch of BS MS Students during 2015-16

	Student	Host Institute	Supervisor	Project Title
Biology				
1	Himanshu V. Rajmane	IISER Pune	Suhita Nadkarni, Collins Assisi	Analysis of spike propagation in feed-forward networks
2	Afsah Hasan V.P.	IISER Pune	L.S. Shashidhara	Comparative analysis of selected targets of Ubx from <i>Apis</i> , <i>Bombyx</i> and <i>Drosophila</i>
3	Rintu M. Umesh	IISER Pune	Mayurika Lahiri	Role of TopBP1 in transformation of 3D breast acini cultures
4	Akash Bahai	IISER Pune	M.S. Madhusudhan	The role of atomic packing in stabilizing protein structures
5	Nitheesh K.	CSIR- Institute of Genomics and Integrative Biology, New Delhi	Shantanu Chowdhury	Isolation of G-quadruplex structures from human cells using small molecular probes
6	Vishnu K.N.	IISER Pune	Collins Assisi	Behavioral correlates of theta and delta oscillations in the hippocampal formation
7	Ghorpade Smita M.	IISER Pune	Aurnab Ghose	Role of Fmn2b in the development of lateral line system of zebrafish (<i>Danio rerio</i>)
8	P.S. Lakshmi	IISER Pune	Aurnab Ghose	Role of cytoplasmic dyneins in neuronal force generation
9	Ashiq K.A.	IISER Pune	Mayurika Lahiri	Elucidate the mechanism of platelet activating factor induced transformation in breast epithelial cells

	Student	Host Institute	Supervisor	Project Title
10	Radhika R.	IISER Mohali	N.G. Prasad	Study of interplay between immune function and reproductive behaviour in populations of <i>Drosophila melanogaster</i> selected for increased pathogen resistance
11	Ashwini Ramesh	IISc, Bengaluru	Kavita Isvaran	The influence of social cues on oviposition decisions in mosquito <i>Aedes Aegypti</i>
12	Sishil Sushanth	IISER Pune	Kundan Sengupta	Role of lamin A and telomerase in DNA damage response
13	Nivedita Rangarajan	IISc, Bengaluru	Vijayalakshmi Ravindranath	To study the role of oxidative stress on Alzheimer's Disease and neurodegeneration using redox sensitive proteins
14	Aparna P.K.	IISER Pune	Sudha Rajamani	Effect of various co-solutes on the oligomerization of prebiotically relevant monomers
15	Asmi Jezeera M.	IISER Pune	Deepak Barua	Variation in plant functional traits across contrasting habitats in a seasonally dry tropical forest in the Northern Western Ghats
16	Akilandeswari B.	Uppsala University, Sweden	Klas Kullander	Molecular characterization of the conditional deletion of Vesicular Aminergic-Associated Transporter (VAAT / SLC10A4) in serotonergic neurons of adult mice
17	Meera Bessy K.A.	IISER Pune	Mayurika Lahiri	Apoptosis inhibitor 5 (Api5) acetylation: Role in apoptosis
18	Agrim Saini	IISER Pune	Sutirth Dey	Investigating the role of fluctuations and complexity in shaping the evolutionary dynamics of laboratory populations of <i>E. coli</i>
19	Rohit Krishnan H.	EMBL Heidelberg, Germany	Stefano De Renzi	Optogenetic modulation of Notch signaling during tissue morphogenesis in <i>Drosophila</i>
20	Abhijeet Petkar	IISER Pune	Richa Rikhy	Functional analysis of mitochondrial metabolism in <i>Drosophila</i> oogenesis and embryogenesis
21	Harsha K. Kumar	IISc, Bengaluru	Rohini Balakrishnan	Baffling behavior in the tree cricket <i>Oecanthus henryi</i> : How is leaf area measured?
22	Pravallika Govada	IISER Pune	L.S. Shashidhara	Validating the function of Bin3 as a potential tumor suppressor that antagonises the function of the oncoprotein yorkie
23	Ningthoujam Birjeet Singh	IISER Pune	Gayathri Pananghat	Biochemical and structural studies on SofG, a GTPase involved in motility of <i>Myxococcus xanthus</i>
24	Kalyanee Shirlekar	EMBL- Monterotondo, Italy	Paul Heppenstall	The role of acetylated microtubules in mechanosensation in mice

	Student	Host Institute	Supervisor	Project Title
Chemistry				
1	Madhusudhan Naik Jarpla	Shell Technogy Centre, Bengaluru	Madhusudhan Rao	Synthesis and testing of porous carbon composites supported catalysts for environmental and refining applications
2	Syed Muhammed Muazzam Kamil	IISER Pune	Sudipta Basu	Nanoparticles for targeted delivery of therapeutics to mitochondria to overcome drug resistance
3	Khushboo Singh	IISER Pune	M. Jayakannan	Size tunable core-shell polymer nanoparticles for cisplatin delivery to cancer cells
4	Vikas Dubey	CSIR-National Chemical Laboratory, Pune	Durba Sengupta	Understanding protein organization in membranes via thermodynamic characterization of transmembrane helix insertion and association
5	Ajay Kumar	Centre of Excellence in Solar energy, CSIR-National Chemical Laboratory, Pune	Satishchandra B. Ogale	Novel organic and inorganic materials for high efficiency electrochemical energy storage and conversion
6	Saurabh	IISER Pune	R. Boomi Shankar	Synthesis and studies on discrete Cu(I) clusters derived from Pyridyl functionalized P-N ligands
7	Pallavi Banerjee	Shell Technogy Centre, Bengaluru	Nitish Nair	Development of coarse-grained molecular models of aqueous polyacrylamide
8	Bhuneshwar Paswan	IISER Pune	Muhammed Musthafa	A solar battery with light assisted discharge and charge interfaces
9	Mona Manoj Katariya	IISER Pune	H.N. Gopi	Structural studies and biological applications of α,γ -hybrid peptide helices composed of γ - and β -hydroxy- γ -amino acids (statins)
10	Akshay Krishna A.K.	Shell Technology Centre, Bengaluru	A.P.J. Jansen	Interval analysis for computational chemistry
11	Jensheer S.S.	Ulsan National Institute of Science and Technology (UNIST), South Korea	Rodney S. Ruoff	Transition metal-assisted growth of graphene and thin layer graphite (few layer graphene) films and their characterisation
12	Charu Jain	IISc, Bengaluru	Amit Singh	Understanding mycobacterial redox response towards endogenous stress produced by peroxyinitrite donor
13	Naveen Kumar	IISER Pune	Sujit Ghosh	Design, syntheses and characterization of multifunctional organic-inorganic hybrid materials

	Student	Host Institute	Supervisor	Project Title
14	Catherine Alex	IISER Pune	Raghavendra Kikkeri	Multivalent homo and hetero glycodendrimers allow sequence-defined carbohydrate-protein interactions
15	Nishanth D. Tirukoti	IISER Pune	Srinivas Hotha	Synthesis and evaluation of small molecules targeting miRNA-21
16	Sreejith P. Nandan	IISER Pune	Angshuman Nag	Blue-green luminescence from CsPbX ₃ perovskite nanocrystals (X = Br, Cl, Br/Cl)
17	Shivgan Aishwary Tukaram	Shell Technology Centre, Bengaluru	Indranil Rudra	Force-field development and validation for styrene-isoprene copolymers
18	Arjun Vijeta	IISER Pune	M. Jeganmohan	Synthesis of dibenzothiazines via a palladium catalyzed cyclization of aromatic sulfoximines with benzyne
19	Anur Yadav	IISER Pune	Angshuman Nag	Plasmonics and magnetism in M (Mn, Cr)-Sn codoped In ₂ O ₃ colloidal nanocrystals
20	Cherukuri Kesava Phaneendra	IISER Pune	Raghavendra Kikkeri	Targeting endothelial inflammation by superparamagnetic iron glyco-nano particles
Earth & Climate Science				
1	Vaddineni Venkata Abhishikth	IISER Pune	Shyam S. Rai	Rayleigh wave tomography of NW Himalaya using Ambient Noise and Earthquake data
Mathematics				
1	Abhinav Sahani	IISER Pune	Vivek Mallick	Topics in algebraic geometry
2	K. Arun Kumar	IISER Pune	Amit Hogadi	Topics in algebraic K-theory
3	Tanmay S. Patankar	IISER Pune	Anindya Goswami	Asset pricing in a semi-markov modulated market with time-dependent volatility
4	Birbal	Shell Technology Centre, Bengaluru	L. Raghupathi	Statistical modeling of extreme events
5	Safeer K.M.	IISER Pune	Tejas Kalelkar	A study of Riemannian geometry
6	Sameer R. Kulkarni	IISER Pune	Debargha Banerjee	Coleman map for elliptic curves
7	Abhishek Kumar Shukla	IISER Pune	Steven Spallone	Inverse Galois problem
Physics				
1	Devika T.D.	IISER Pune	Sunil Nair	Investigation of oxide thermoelectrics based on Indium and Tin
2	K. Sriram	IISER Pune	Rejish Nath	Quantum simulations of spin chains with 1/r ² interactions in a cold ion crystal

	Student	Host Institute	Supervisor	Project Title
3	Chaitra A.	IISER Pune	Arijit Bhattacharyay	Hawking radiation in analogue gravity
4	Govind Unnikrishnan	IISER Pune	T.S. Mahesh	Quantum noise & actuator based control in spinensembles
5	Santpur Sai Neha	IISER Pune	Sourabh Dube	Search for vector-like leptons at the Large Hadron Collider
6	Sujay Vivek Mate	Raman Research Institute, Bengaluru	Biswajit Paul	Calibration and simulation of astronomical x-ray detectors
7	Deepak John M.	IISER Pune	Sunil Nair	Investigation of novel properties in ludwigites
8	Sohan Sarangi	Shell Technology Centre, Bengaluru	Aarthi Thyagarajan	Adaptive particle resolution in smoothed particle hydrodynamics
9	Anandita De	TIFR, Mumbai	Shiraz Minwalla	Black holes in large number of dimensions
10	Shruti Paranjape	TIFR, Mumbai	Gautam Mandal	Exact treatment of quantum quench in a fermionic system and time-dependent entanglement entropy
11	Alpesh Patil	S.N. Bose National Centre for Basic Sciences, Kolkata	Biswajit Chakraborty	Connes spectral distance on noncommutative spaces
12	Sharvaree Vadgama	IISc, Bengaluru	Chethan Krishnan	Black rings
13	Ashish Kakkar	IISc, Bengaluru	Chethan Krishnan	Non relativistic field theories and Black Holes
14	H.R. Harsha	IISER Pune	Sunil Mukhi	Classification of two-dimensional rational conformal field theories
15	Alex Abraham	IISER Pune	Apratim Chatterji	Self-assembly of polymeric chains under a new radially symmetric potential
16	Chaitanya Afle	IUCAA, Pune	Sanjit Mitra	Detection of Spin Orbit Resonances in advance gravitational wave detector era
17	Himanshu Badhani	Chennai, Mathematical Institute, Chennai	Alok Laddha	Quantum fields in de sitter space
18	Khadse Akshay Vijay	Chennai Mathematical Institute (CMI), Chennai	Alok Laddha	Studies of asymptotic symmetries at null and spatial infinity

	Student	Host Institute	Supervisor	Project Title
19	Nihal S. Rao	Harish Chandra Research Institute (HRI), Allahabad	Dileep P. Jatkar	Quantum fields in curved spacetimes
20	Kaustav Dey	IISER Pune	Sunil Nair	Synthesis and investigation of some triple perovskite ruthenates

List of Courses

Fall 2015

Code	Course	Coordinator*/ Instructor	Credits
Semester I			
BIO 101	Introductory Biology I	Kundan Sengupta*, Milind Watve, Thomas Pucadyil	3
CHM 101	Chemical Principles I	Arnab Mukherjee*, Pankaj Mandal	3
MTH 101	Single Variable Calculus	Tejas Kalelkar*, Shane D'Mello	3
PHY 101	World of Physics I - Mechanics	Sudarshan Ananth	3
MTH 100	Introduction to Proofs	Kaneenika Sinha*, Chitrabhanu Chaudhari	2
IDC 101	Introduction to Computing	Collins Assissi	3
BIO 121	Biology Lab I	Raghav Rajan*, Aurnab Ghose, Krishanpal Karmodiya, Jeet Kalia, Nixon Abraham, Anjan Banerjee	3
ENG 100	English - Communication & Writing	Pooja Sancheti	0
Semester III			
BIO 201	Introductory Biology III: Ecology and Evolution	Sutirth Dey*, Milind Watve	3
CHM 201	Chemistry II - Inorganic Chemistry	Nirmalya Ballav*, Moumita Majumdar	3
MTH 201	Linear Algebra	Krishna Kaipa*, Dipramit Majumdar	3
PHY 201	World of Physics III - Electricity & Magnetism	Seema Sharma*, Bhas Bapat	3
BIO 221	Biology Lab III	Neelesh Dahanukar*, Sutirth Dey	2
CHM 221	Chemistry Lab II - Inorganic Chemistry	Shabana Khan, Moumita Majumdar*, Sujit Ghosh, Nirmalya Ballav, R. Vaidhyathan, Seema Verma	2
PHY 221	Physics lab II	Sourabh Dube*, Aparna Deshpande, M.S. Santhanam, Satish Ogale	2
HSS 201	Introduction to History of Science, Technology and Medicine	John Mathew*	2
ECS 201	Earth System I	Shyam Rai*, Raghu Murtugudde	2

Code	Course	Coordinator*/ Instructor	Credits	Open in semesters
Semester V & VII				
BIO 310	Biostatistics	Ramana Athreya*	4	V&VII
BIO 311	Advanced Cell Biology	Nagaraj Balasubramanian*, Thomas Pucadyil	4	V&VII
BIO 313	Advanced Molecular Biology	Mayurika Lahiri*, L.S. Shashidhara	4	V&VII
BIO 314	Bioinformatics	M.S. Madhusudhan*	4	V&VII
BIO 320	Genetics	Richa Rikhy, Girish Ratnaparkhi*	4	V&VII
BIO 322	Biophysics I	Chaitanya Athale	4	V&VII
BIO 410	Advanced Biochemistry I	Sudha Rajamani*, Gayathri Pananghat	4	V&VII
BIO 411	Ecology I	Deepak Barua	4	V&VII
BIO 301	Lab Training/Theory Project	Collins Assisi	3	V
BIO 334	Neurobiology I	Suhita Nadkarni*, Nixon Abraham	3	V&VII
BIO 352	Animal Physiology II	Nishikant Subhedar	3	V&VII
BIO 401	Lab Training/Theory Project	Collins Assisi	3	VII
BIO 431	Epigenetics	Sanjeev Galande	3	V & VII
BIO 454	Structural Biology	Saikrishnan Kayarat*, Jeetender Chugh, Gayathri Pananghat	3	V&VII
BIO 452	Plant Biology II	Anjan Banerjee	3	V & VII
CHM 311	Physical Organic Chemistry	Harinath Chakrapani	4	V&VII
CHM 312	Main Group Chemistry	Shabana Khan*, R. Boomi Shankar	4	V&VII
CHM 320	Symmetry and Group theory	Srabanti Chaudhury*, Alope Das	4	V&VII
CHM 410	Advanced Molecular Spectroscopy	Mrinalini Puranik	4	VII
CHM 411	Organic Synthesis II	Sudipta Basu	4	VII
CHM 413	Bioinorganic Chemistry	V.G. Anand	4	VII
CHM 301	Lab Training/Theory Project I	Harinath Chakrapani	3	V
CHM 331	Self Assembly in Chemistry	Pinaki Talukdar	3	V&VII
CHM 332	Separation Principles and Techniques	Srinivas Hotha, M. Jeganmohan*	3	V&VII
CHM 340	Advanced Organic Chemistry Lab	Raghavendra Kikkeri*, B. Gnanaprakasam	3	V
CHM 401	Lab Training/Theory Project - II	Harinath Chakrapani	3	VII
CHM 430	Advanced Physical Chemistry Lab	Jeetender Chugh*, Angshuman Nag, Pramod Pillai, M. Musthafa	3	VII
CHM 431	Chemical Biology	Britto Sandanaraj	3	VII
CHM 432	Solid State Chemistry	Seema Verma*, Angshuman Nag	3	VII
CHM 436	Molecular Modeling and Simulation	Arun Venkatnathan	3	VII
CHM 445	Electrochemistry	M. Musthafa	3	VII

Code	Course	Coordinator*/ Instructor	Credits	Open in Semesters
MTH 310	Group Theory	Ronnie Sebastain	4	V&VII
MTH 311	Analysis	Rama Mishra	4	V&VII
MTH 301	Reading Project	Diganta Borah	3	V
MTH 318	Combinatorics	Kaneenika Sinha	4	V&VII
MTH 314	Statistics	Uttara Naik-Nimbalkar	4	V&VII
MTH 322	Point Set Topology	Supriya Pisolkar	4	V&VII
MTH 417	Ordinary Differential Equation	Steven Spallone	4	VII
MTH 415	Probability	Anup Biswas	4	VII
MTH 401	Reading Project	Diganta Borah	3	VII
MTH 410	Galois Theory	Vivek Mallick	4	VII
MTH 421	Measure Theory and Integration	Diganta Borah	4	VII
MTH 413	Algorithms	Ayan Mahalanobis	4	VII
MTH 422	Algebraic Topology	Chandrasheel Bhagwat	4	VII
MTH 430	Topics in Algebra: Representation Theory of Finite Groups	A. Raghuram*, Krishna Kishore	3	VII
PHY 310	Mathematical Methods in Physics	Suneeta Vardarajan	4	V & VII
PHY 311	Classical Mechanics	Nabamita Banerjee	4	V & VII
PHY 312	Electrodynamics	Arijit Bhattacharyay	4	V & VII
PHY 321	Quantum Mechanics I	Rejjish Nath	4	V & VII
PHY 335	Electronics I	Shivprasad Patil	3	V & VII
PHY 301	Lab Training/Theory Project	Ashna Bajpai	3	V
PHY 330	Physics Lab IV	Shouvik Datta*, Sulabha Kulkarni, Mukul Kabir	3	V
PHY 410	Physics Lab VI	T.S. Mahesh , C.V. Dharmadhikari *	4	VII
PHY 362	Plasma Physics	Prasad Subramanian	3	V & VII
PHY 412	Condensed Matter Physics I	Surjeet Singh	4	VII
PHY 414	Computational Physics	Prasenjit Ghosh*, Apratim Chatterji	4	VII
PHY 334	Astronomy & Astrophysics	Ramana Athreya	3	V & VII
PHY 340	Methods of Experimental Physics	Sunil Nair	3	VII
PHY 401	Lab Training/Theory project	Ashna Bajpai	3	VII
PHY 433	Statistical Mechanics II	Anil Gangal	3	VII
ECS 311	Physics of the Earth	Shyam Rai	4	V & VII
ECS 312	Isotope Geochemistry	Gyana R. Tripathy	4	V & VII
ECS 301	Lab Training/Theory Project	Gyana R. Tripathy	3	V
ECS 401	Lab Training/Theory Project	Gyana R. Tripathy	3	VII

Code	Course	Coordinator*/ Instructor	Credits	Open in Semesters
HSS 311	Other Ways of Seeing: Introduction to Qualitative Research	Aditi Deo	3	V & VII
HSS 301	Lab Training/Theory Project	John Mathew	3	V
HSS 401	Lab Training/Theory Project	John Mathew	3	VII

Spring 2016

Code	Course	Coordinator*/ Instructor	Credits
Semester II			
BIO 102	Introductory Biology II: Cellular and Molecular Biology	Sudha Rajamani*, Nagaraj Balasubramanian	3
CHM 102	Chemical Principles II	Aloke Das*, Arnab Mukherjee and K.N. Ganesh	3
MTH 102	Multi Variable Calculus	Diganta Borah	3
PHY 102	World of Physics II- Waves and Matter	Bhas Bapat*, Sunil Mukhi	3
CHM 121	Chemistry Lab I	Jeetender Chugh*, M. Musthafa, B.S.M. Rao, Pramod Pillai	3
BIO 122	Biology Lab II	Neelesh Dahanukar*, K. Karmodiya, Nishad Matange, Jeet Kalia, Sonam Mehrotra, Tressa Jacob	3
PHY 121	Physics Lab I	Surjeet Singh*, Arijit Bhattacharyay, Sulabha Kulkarni, Apratim Chatterjee	3
IDC 102	Mathematical Methods	Sudarshan Ananth	3
HSS 102	Critical Reading and Communication	Pooja Sancheti*, Aditi Deo	2
Semester IV			
BIO 202	Introductory Biology IV: Biology of Systems	Aurnab Ghose*, Collins Assissi	3
CHM 202	Chemistry III - Organic Chemistry	H.N. Gopi	3
MTH 202	Probability and Statistics	Uttara Naik Nimbalkar	3
PHY 202	World of Physics IV - Quantum Physics	Satish Ogale	3
PHY 222	Physics Lab III	Shivprasad Patil*, Aparna Deshpande, Sunil Nair, Prasenjit Ghosh	2
CHM 222	Chemistry Lab III	B. Gnanaprakasam*, Pinaki Talukdar, Srinivas Hotha, Britto Sandanaraj, S.G. Srivatsan	2
IDC 202	Optics	G.V. Pavan Kumar	2
ECS 202	Earth System II	G.R. Tripathy*, Shyam S. Rai	2

Code	Course	Coordinator*/ Instructor	Credits	Open in Semesters
Semester VI & VIII				
BIO 312	Animal Physiology I	Nishikant Subhedar*, Nixon Abraham	4	VI & VIII
BIO 321	Plant Biology I	Anjan Banerjee	4	VI & VIII
BIO 323	Immunology I	Krishanpal Karmodiya*, Sanjeev Galande	4	VI & VIII
BIO 412	Microbiology	Gayathri Pananghat* , Nishad Matange	4	VI & VIII
BIO 417	Advanced Biochemistry II	Pucadyil Thomas*, Amrita Hazra	4	VI & VIII
BIO 422	Evolution	Sutirth Dey*, Milind Watve	4	VI & VIII
BIO 423	Ecology II	Deepak Barua*	4	VI & VIII
BIO 302	Lab Training/Theory Project	Nishad Matange	3	VI
BIO 402	Lab Training/Theory Project	Nishad Matange	3	VIII
BIO 435	Biophysics II	Chaitanya Athale*	3	VI & VIII
BIO 442	Computational Biology	Suhita Nadkarni*, M.S. Madhusudhan	3	VI & VIII
BIO 335	Animal Behaviour	Raghav Rajan*, Nixon Abraham	3	VI & VIII
BIO 413/ MTH 427	Mathematical Biology	Pranay Goel	4	VI & VIII
BIO 420	Developmental Biology	Girish Ratnaparkhi*, Richa Rikhy	4	VIII
BIO 351	Biology and Disease	Mayurika Lahiri*, Kundan Sengupta	3	VIII
BIO 491	Literature Review	Saikrishnan Kayarat	3	VIII
CHM 310	Quantum Chemistry	Anirban Hazra*, Arun Venkatnathan	4	VI & VIII
CHM 321	Organic Synthesis I	R.G. Bhat	4	VI & VIII
CHM 322	Transition metal Chemistry	Sujit Ghosh*, Shabana Khan	4	VI & VIII
CHM 302	Lab Training/Theory Project	M. Musthafa	3	VI
CHM 323	Fundamentals of Molecular Spectroscopy	Pramod Pillai*, Partha Hazra	4	VI & VIII
CHM 334	Physical Chemistry of Solutions	Angshuman Nag*, Seema Verma	3	VI & VIII
CHM 351	Bioorganic Chemistry	Raghavendra Kikkeri	3	VI & VIII
CHM 360	Advanced Inorganic Chemistry Lab	Shabana Khan*, R. Vaidhyanathan	3	VI
CHM 420	Structural Methods and Analysis	Jeetender Chugh*, S.G. Srivatsan	4	VIII
CHM 421	Polymer Chemistry	M. Jayakannan	4	VIII
CHM 422	Statistical Thermodynamics	Srabanti Chaudhury	4	VIII
CHM 423	Medicinal Chemistry	Jeet Kalia	4	VIII
CHM 402	Lab Training/Theory Project	M. Musthafa	3	VIII
CHM 433	Photochemistry	Pankaj Mandal*, B. Gnanaprakasam	3	VIII

Code	Course	Coordinator*/ Instructor	Credits	Open in Semesters
CHM 441	Advanced Materials Science	Nirmalya Ballav*, R. Vaidhyanthan	3	VIII
CHM 442	Organometallic Chemistry	M. Jeganmohan	3	VIII
MTH 320	Vector Spaces, Rings and Modules	Supriya Pisolkar	4	VI & VIII
MTH 326	Complex Analysis	Debargha Banerjee	4	VI & VIII
MTH 327	Calculus on Manifolds	Rama Mishra	4	VI & VIII
MTH 323	Graph Theory	Soumen Maity	4	VI & VIII
MTH 328	Coding Theory	Krishna Kaipa	4	VI & VIII
MTH 343	Topics in Discrete Mathematics: Set Theory and Mathematical Logic	Steven Spallone	3	VI & VIII
MTH 420	Algebraic number theory	Anupam Kumar Singh	4	VIII
MTH 423	Commutative Algebra	Rabeya Basu	4	VIII
MTH 411	Functional Analysis	Chandrasheel Bhagwat	4	VIII
MTH 416	Stochastic Processes	Anindya Goswami	4	VIII
MTH 425	Differential Geometry	Vivek Mallick	4	VIII
MTH 424	Partial Differential Equations	Anup Biswas	4	VIII
MTH 302	Reading Project	Diganta Borah	3	VI
MTH 402	Reading Project	Diganta Borah	3	VIII
PHY 320	Physics Lab V	Shouvik Datta*, Seema Sharma	4	VI & VIII
PHY 322	Statistical Mechanics I	Anil Gangal	4	VI & VIII
PHY 324	Quantum Mechanics II	Rejish Nath	4	VI & VIII
PHY 341	Physics at Nano Scale	Ashna Bajpai	3	VI & VIII
PHY 342	Nonlinear Dynamics	G. Ambika	3	VI & VIII
PHY 361	Quantum Information	M.S. Santhanam	3	VI & VIII
PHY 302	Lab Training/Theory Project	Suneeta Vardarajan	3	VI
PHY 420	Atomic and Molecular Physics	Umakant Rapol	4	VIII
PHY 421	Classical and Quantum Optics	T.S. Mahesh	4	VIII
PHY 422	Nuclear and Particle Physics	Sourabh Dube	4	VIII
PHY 430	Physics Lab VII	C.V. Dharmadhikari	3	VIII
PHY 461	Quantum Field Theory	Nabamita Banerjee	3	VIII
PHY 463	Advanced condensed Matter Physics	Mukul Kabir	3	VIII
PHY 464	Astrophysical Processes	Prasad Subramanian	3	VIII
PHY 402	Lab Training/Theory Project	Suneeta Vardarajan	3	VIII
ECS 321	Weather and Climate	Neena Joseph	4	VI & VIII

Academic Achievements of BS MS Students in 2015-16

CNR Rao Education Foundation Prize was awarded to Patki Raagini Abhay (Fall 2015, Semester I) and Bhagwat Pankaj Uttam (Spring 2015, Semester II)

Prizes for Academic Excellence to BS MS Students were awarded to the following students:

- Fall 2015 (Semester III): Surabhi K.S., Joshi Gaurav Shrikant, Bhagwat Pankaj Uttam
- Spring 2015 (Semester IV): Nabha Shah
- Academic year 2014-15 (Semester V & VI): Sappa Sushma Tejasri, V.R. Shree Sruti, Akshay S., Amitosh Gautam
- Academic year 2014-15 (Semester VII & VIII): Santpur Sai Neha

International Programs Attended by Students

Ninth Asian Science Camp - 2015		
1	Shraddha Lall	National Science and Technology Development Agency (NSTDA), Thailand
2	Vishrut Yogesh Patel	
DAAD- WISE Summer Internship 2015, Germany		
1	Navathej P. Genesh	Max Planck Institute for Solar Systems Research, Gottingen
2	Sagarika Basak	Humboldt University, Berlin
3	V.R. Sree Sruti	University of Wurzburg
4	Saikat Bera	Physics Institute, University of Bonn
5	Varun Srivastava	Max Planck Institute for Gravitationsphysik Hannover
6	Harshvardhan Jog	Department of Physics, University of Konstanz
7	Akshay, S.	Max Planck Institute for Extraterrestrial Physics, Garching, Munich
8	Divya Gadkari	Technical University, Munich
9	Irene Dutta	DESY, Hamburg
10	Arushi Bodas	Inst. for Angewandte Physics, University of Bonn
Charpak - Research Internship Program, France		
1	Ajay Kumar Tiwari	Solar and Stellar Physics group of Institut d' Astrophysique Spatiale (CNRS/Universite Paris-Sud)
2	Nilima Walunjkar	BDM (Institut de Biologie du Developpement de Marseille-CNRS-AMU)
3	Darshini Ravishankar	Villefranche sur mer Developmental Biology Laboratory, France
4	Fulkar Abhijit Gajanan	Laboratoire de Physique des Solides
Mitacs Global Program, Canada		
1	Kaustav Dey	McMaster University - Hamilton
2	Birbal	Queen's University - Kingston

S.N. Bose Scholarship		
1	Arjun Vijeta	University of Pennsylvania, USA
Khorana Scholarship		
1	Mona Katariya	University of Wisconsin, Madison, USA
National University of Singapore		
1	Gyana Gourab Mishra	National University of Singapore
2	Kumar Priyadarshi	National University of Singapore
Ohio State University Exchange Program		
1	Sappa Sushma Tejasri	Ohio State University, USA
2	Ashutosh Acharya	Ohio State University, USA
Others		
1	Aditya Rajagopalan	Howard Hughes Medical Institute, Janelia Research Campus, USA
2	Chaitanya Afle	Dept of Physics and Astronomy, Western University, London, Canada
3	Jensheer S.S.	Ulsan National Institute of Science & Technology, South Korea
4	Kalyanee Shirlekar	European Molecular Biology Laboratory
5	Abhishek Das	XLAB International Science Camp 2015
6	Gaurav Bhole	University of Queensland, Australia
7	Kaustubh Tarmale	Ulsan National Institute of Science & Technology, South Korea
8	Rohit Krishnan H.	European Molecular Biology Laboratory, Heidelberg, Germany
9	Pravallika Govada	Department of Cellular and Molecular Medicine

The Fourth Convocation of the Institute was held on May 27, 2015 in which 87 students graduated from the BS MS program. Shiva Chidambaram was awarded the Institute Gold Medal for academic excellence. The following 13 students have graduated with Distinction (CGPA>9.0) : Akshay Y.S., V. Saudamini, Lokhande Sagar Fakirchand, K. Hariram, Ajith V.J., Sourav Sarkar, Kulkarni Mihir Sanjay, Neha M., Shiva Chidambaram P., Krishna Anujan, Kavya Leo Vakkayil, Lalwani Poortata Shirish, and Rachana Suhas Bhave.

List of Courses Continued from Page No. 125...

Code	Course	Coordinator*/ Instructor	Credits	Open in Semesters
ECS 322	Landscapes and Earth Surface Processes	Argha Banerjee	4	VI & VIII
ECS 323	Seismology: Theory and Application	Shyam S. Rai	4	VI & VIII
ECS 302	Lab Training/Theory Project	Gyana Ranjan Tripathy	3	VI
ECS 402	Lab Training/Theory Project	Gyana Ranjan Tripathy	3	VII
HSS 341	Environmental History	John Mathew	3	VI & VIII
HSS 302	Lab Training/Theory Project	John Mathew	3	VI
HSS 402	Lab Training/Theory Project	John Mathew	3	VII



Personnel

Personnel

Faculty

Director & Professor

K.N. Ganesh

Professors

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

Associate Professors

Rama Mishra
Ramana Athreya
M. Jayakannan
Suneeta Vardarajan
Srinivas Hotha
Prasad Subramanian
M.S. Santhanam
Steven Spallone
Soumen Maity
R.G. Bhat
T.S. Mahesh
V.G. Anand
H.N. Gopi
Aloke Das
M.S. Madhusudhan
Sudarshan Ananth
Amit Hogadi
Shivprasad Patil
Bhas Bapat
Sutirth Dey
John Mathew
Partha Hazra

Girish Ratnaparkhi
Arijit Bhattacharyay
Anjan Banerjee
Arun Venkatnathan
S.G. Srivatsan
R. Boomishankar
Aurnab Ghose
Mayurika Lahiri
Shouvik Datta
Apratim Chatterji
Pranay Goel
Sujit Kumar Ghosh
Pinaki Talukdar
Harinath Chakrapani
Arnab Mukherjee
Chaitanya Athale

Assistant Professors

Deepak Barua
Ayan Mahalanobis
Umakant Rapol
Anupam Kumar Singh
Surjeet Singh
Saikrishnan Kayarat
G.V. Pavan Kumar
Richa Rikhy
Kundan Sengupta
Rabeya Basu
Baskar Balasubramanyam
Pankaj Mandal
Nagaraj Balasubramanian
Prasenjit Ghosh
Thomas Pucadyil
Jeganmohan Masilamani
Raghavendra Kikkeri
Nirmalya Ballav
Sunil Nair
Anirban Hazra

Aparna Deshpande
Anindya Goswami
Ramanathan Vaidhyanathan
Sudha Rajamani
Collins Assisi
Vivek Mohan Mallick
Mohammad Mukul Kabir
Kaneenika Sinha
Akanksha Chaturvedi
Anisa Chorwadwala
Shabana Khan
Jeetender Chugh
Srabanti Chaudhury
Jeet Kalia
Sourabh Dube
Rejjish Nath
Debargha Banerjee
Tejas Kalelkar
Diganta Borah
Supriya Pisolkar
Seema Sharma
Britto Sandanaraj
Pramod Pillai
Krishna Kaipa
B. Gnanaprakasam
Suhita Nadkarni
Nabamita Banerjee
Mousomi Bhakta
Anup Biswas
Muhammed Musthafa O.T.
Moumita Majumdar
Chandrasheel Bhagwat
Gyana Ranjan Tripathy
Nixon M. Abraham
Argha Banerjee
Angshuman Nag
Neena Joseph Mani
Amrita Hazra

Professors 9

Associate Professors 38

Assistant Professors 58

Total 105

Non-teaching Staff

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

Engineering Section

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

Technical Staff

Neeta Deo, System Administrator
 Parveen Nasa, Sr. Technical Officer (Instrumentation)
 Nilesh Dumbre, Technical Officer
 Mrinalini Virkar, Technical Officer
 Mahesh Jadhav, Technical Officer
 Saurabh Butolia, Technical Officer (IT)
 Sureshchandra Prajapat, Scientific Assistant
 Prashant Kale, Technical Assistant

Vijay Vittal, Technical Assistant
 Anil Prathamshetti, Technical Assistant
 Nitin Dalvi, Technical Assistant
 Rupali Jadhav, Technical Assistant
 S. Suresh Kumar, Technical Assistant (IT)
 Shabnam Patil, Laboratory Technician
 Devpalsingh Rajput, Laboratory Technician
 Narendra Khandekar, Laboratory Technician
 T.S. Yatish, Laboratory Technician
 Tejal Vadgama, Laboratory Technician
 Santosh Khilare, Laboratory Assistant
 Megha Paygude, Laboratory Assistant
 Sudhir Lone, Laboratory Assistant
 Kalpesh Thakare, Laboratory Assistant
 Piyush Gadekar, Laboratory Assistant
 Yashwant Pawar, Laboratory Assistant
 Ganesh Dimbar, Laboratory Assistant
 Sandeep Kanade, Laboratory Assistant

Registrar	1
Dy. Librarian	1
Superintending Engineer	1
Assistant Registrar	3
Chief Security Officer	1
Office Superintendent	2
Assistant Engineer	1
Junior Engineer	2
Private Secretary	1
Personal Assistant	2
Library Information Assistant	2
Accountant	3
Office Assistant	9
Sr. Technical Officer	1
System Administrator	1
Technical Officer	4
Scientific Assistant	1
Technical Assistant	6
Laboratory Technician	5
Laboratory Assistant	8
Attendant	2
Nurse	1
Physical Training Instructor	1
Driver	1
Total	60

Visiting Faculty

A.A. Natu
Nishikant Subhedar
V.S. Rao
B.S.M. Rao
Anil Gangal
C.V. Dharmadhikari
K.P. Mohanan
Sulabha Kulkarni
Uttara V. Naik-Nimbalkar
Pooja Sancheti
Girish Deshpande
Jahnvi Punekar

IISER Fellow

Seema Verma
Aditi Deo

Externally Funded Fellows/Scientists

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

Post-Doctoral Fellows/Research Associates

Preeti Chaudhary, CSIR Research Associate
P. Chandramouli Reddy, DBT Research Associate
Kirtikumar Kondhare, DBT Research Associate
Priyanka Dutta, DBT Research Associate
Satish Badadhe, SERB National Postdoctoral Fellow
N. Remya, SERB National Postdoctoral Fellow
Pradip Kumar Singh, SERB National Postdoctoral Fellow
Pramod Patil, Project RA
Srinu Meesala, Project RA
Ulfat Baig, Project RA
Uttara Lele, Project RA
Sandip Pasari, Project RA

Rashmi Prabhu, Project RA
P.J. Gregor, Project RA
Monika Bhardwaj, Project RA
Sneha Asai, Project RA
Rafeeq Ahmed Mir, Project RA
Snehal Shekatkar, Project RA
Nitin Bansode, Project RA

IISER Pune Post-Doctoral Fellows

Ravi Kumar
Satyajeeet Khare
Arpita Roychoudhury
Nitin Wadnekar
Dipramit Majumdar
Neelam Shivran
Anup Pillai
Debrina Jana
Chitrabhanu Chaudhuri
Dhrubajyoti Datta
Monika Raina
K. Sasikumar Raja
Jitender Kumar
Udaysinh Bhosale
Keerthi Harikrishnan
T. Surendar
Shane D'Mello
G. Venkata Krishna Kishore
Luminita Harnagea
Ivano Lodato
Gaurang Mahajan
Ganesh Markad
Jaya Pal

Non-teaching and Support Staff on Contractual Basis

Mariamamma John, OSD (F&A)
Shanti Kalipatnapu, Senior Consultant (Publications)
Naresh Sharma, Advisor (Academics)
Goldi Mishra, Chief Technology Officer (IT)
Vivek Kannadi - Senior Technical Officer
(Swayam/MOOC)
Nita Belliappa, Science Media Consultant
Apurva Barve, Web Content Manager
Vandana Gambhir, Grants and Intellectual Property
Rights Manager
Chandrakant Bhojar, Executive Engineer (Civil)
Varsha Hoshing, Executive Engineer (Electrical)

Mohd. Abdul Samad, Asst. Engineer (Mech)
 Shrikrishna Ayala, Consultant Engg. Support Service
 (Civil)
 S.H. Yadav, Consultant (Engineering Support Service)

K.G.K. Marar, Senior Consultant
 M.M. Jana, Consultant (Horticulture)
 V.V. Sinha, Administrative Staff

Part-time Medical Officers

V.S. Savaskar
 Priti Chhajed
 Aarti Rapol

Counsellors

Rebecca D'souza
 Vrinda Walimbe

Project Fellows

Rohan Pandit
 Ashwini Keskar
 Abhishek Rale
 Neha Deshpande
 Apoorva Kulkarni
 Sujit Manmode
 Prangya Mishra
 Kiran Nilangekar
 Parameshwar Singh Yadav
 Ketki Holkar
 Tejal Gujarathi
 Neha Shintre
 Shipra Gupta
 Nelchi Prashali
 Kajol Patel
 Gaurav Isola
 Chitra Shanbhag
 Rajnandini Kashyap
 Rahul Jangid
 Vaishali Chakravarty
 Parichit Sharma
 Yashodeep Matange

Santosh Gadekar
 Shraddha Karve
 Satheesh Ellipilli
 Jay Prakash Shukla
 C.D. Mrutyunjayachari
 Pallavi Kharade
 Hemlata Pawar
 M.Giri
 Ajesh Jacob
 Supriti Ghorui
 Priyanka Gade
 Gokul Kumar Saha
 Aparna Sherlekar
 Avantika Ahiya
 Minal Pednekar
 Sarang Mahajan
 Neha M.
 Anwesha Dasgupta
 Cecily George
 Chinmay Kulkarni
 Poortata Lalwani
 Rachel Paul
 Pooja Vaid
 Shivkumar Biradar
 Priyanka Bansal
 Ishita Agrawal
 J. Mary Beulaa
 Atanu Panda
 Pramod Gaikwad
 Reshma Kumari
 Utpal Saikia

Anupam Sawant
 Bhavani Natarajan
 Vikram Bakaraju
 Srishti Jain
 Varun Natu
 Anil Suryavanshi
 Suyog Ubhe
 Preeti Kumari
 Jyotsna Arora
 Tirthasree Das
 Vinayak Khodade
 S. Anantharaj
 Yogita Salave
 Kiruthiga Jagadeesan
 Vallari Shukla
 Rashmi Kulkarni
 Ajay Khairnar
 Meenur Kuman
 Nitu Saha
 Mahesh Patil
 Namrita Halder
 Atreyee Ghosh
 Pallavi Vetal
 Shital Boriwar, Office Assistant
 (Multi Skill)
 Renuka Ambarkhane, Office
 Assistant (Multi Skill)
 Madhura Joglekar, Senior
 Teaching Associate
 Prachi Pasalkar, Senior
 Teaching Associate

Appointments during the year 2015-16

Nixon M. Abraham	01-06-2015
Argha Banerjee	06-07-2015
Angshuman Nag	28-10-2015
Neena Joseph Mani	07-12-2015
Amrita Hazra	14-12-2015

Priyadarshini Tamhane	11-03-2016
Jahnavi Puneekar	01-12-2015
Jayeeta Banerjee	08-06-2015
Nishad Matange	15-06-2015
Rajani Panchang	17.08.2015

PhD Students**CSIR SRF Direct**

Anant Kumar Srivastava

CSIR SPMRavi Devani
Abhishek Kanyal**CSIR JRF/SRF**Neha Nirwan
Srishti Dar
Bhagyashree Kaduskar
Ayantika Sengupta
Boominathan M.
Santosh Panchal
Maidul Islam
Siva Koti Sangabathuni
Harikrishna Bavireddi
Balu Navale
Pramod Sable
Barun Dhara
Rajendra Aluri
Indumati Patta
Tushar Khopade
Mallu Chenna Reddy
Ashok Yadav
Manidipa Pal
Sushil Bhunia
Pralhad Shinde
Sudipta Tung
Jyoti Baranwal
Nandha Kumar V.
Nagnath More
Trimbak Mete
Shahaji More
Bhagyashree Kulkarni
Rajkumar Mishra
Abhik Mallik
Makarand Sarnobat
Sudhir Kumar Pujahari
Sopan Shinde
Jagadeeswara Rao M.
Ravi Kumar G.
Manikandan R.
Niraja Bapat
Amit Kumar
Bipasha DeyKriti Chaplot
Raunaq Ali Deo
Sameer Thukral
Manoharan R.
Ayesha Fatima
Abhijit Pendse
Shubhanshu Chauhan
Pulastya Parekh
Anil Yadav
Chandramouli Ghosh
Simran Kaur Juneja
Debyan Sarkar
Manisha Balasaheb Walunj
Rupal Bhaisare
Preeti Chauhan
Ajay Kumar Sharma
Balamurugan S.
Pavankumar Bhandari
Pramod Bhingardive
Wasim Jeelani Mir
Sucheta Majumdar
Rajarshi Dasgupta
Siva Kumar G.
Pooja Kumari
Suraj Uttamrao Toraskar
Vishal Annasaheb Adhav
Abhishek Mishra
Prateek Kumar Agarwal
Santhosha B.S.
Suprita Talnikar
Dharpure Pankaj Dhanraj
Zahid Mansoor Bhat**UGC JRF/SRF**Darshika Tomar
Sohini Sarkar
Sushil Benke
Arundhati Roy
Karnati Narasimha
Kajari Gupta
Manu Unnikrishnan
Kundansingh Pardeshi
Tanmoy Saha
Ishtiyah Ahmad Khan
Rajkumar K.
Mahesh Deshmukh
Yettapu Gurivi ReddyAshok Nuthanakanti
Prabhat Kumar Kushwaha
Bijoyanand Mishra
Manish Singh Kushwah
Anushree Chapalkar
Madhuri Gade
Reman Kumar Singh
Prabhakar Pawar
Sandeep Kumar Palvai
Aditya Singh Mehra
Rabindranath Bag
Sanku Paul
Sudeshna Manna
Srilita Arra
Arun Neru B.
Tanushree Kundu
Devika Andhare
Neha Kathewad
Nilesh Deshpande
Partha Samanta
Shiv Pal
Shiva Shankar G.
Yeshwant Kumar
Girish Kulkarni
Milan Kumar Das
Avirup De
Debnath Talukdar
Turmoli Neogi
Vinayak Kulkarni
Mahesh Neralkar
Rajasekhar P.
Vijayakanth T.
Akanksha Ojha
Prajna Nayak
Sohan Dilip Patil
Mohan M.
Manoj Kumar Gupta
Sanjit Dey
Ganesh Shinde
Rahul Nisal
Kamal Kumar Mishra
Sanket Nagarkar
Rishabh Gupta
Nasrina Parvin
Manish Kumar
Saleem Yousf
Soumendu Roy

Alagar Raja K.
Ankita Sharma
Gaiwala Sharma Sujata
Shamsunder
Patil Shalaka Tatyasaheb
Bhattacharjee Anindya Subir
Dheeraj Chandra Joshi
Udaya H.S.
Jyoti
Mollick Samraj
Debashis Mondal
Yogesh Rahane

DBT JRF/SRF

Mahesh Kumar Chand
Ramtirth Yogendra
Shivik Garg
Siddhi Inchanalkar

NBHM JRF/SRF

Neha Prabhu
Jyotirmoy Ganguly
Chaitanya Ambi
Advait Phanse
Debangana Mukherjee
Soumyadeep Thandar

INSPIRE JRF/SRF

Libi Anandi
Kunalika Jain
Amit Bhunia
Danveer Singh
Vidyadhari M.
Anirban Mandal
Chinmayee Mishra
Debanjan Chakraborty
Anwesh Dewan
Sattwick Halder

ICMR SRF

Manasi Gangan

IISER JRF/SRF

Mandar Kulkarni
Trupti Thete
Manasi Mungee
Madhangopal B.
Sudeb Ghosh

Soumya Mukherjee
Rakesh Gaur
Partha Pratim Patra
Avishek Karmakar
Ranguwar Rajendra
Shweta A.
Sampada Mutalik
Mahesh Gudem
Avdhoot Datar
Rohit Joshi
Shatarupa Ganguly
Manawa Diwekar
Vibha Singh
Souparna Chakrabarty
Subrahmanyam Sappati
Aparna Banerjee
Praveen Kumar
Sonashree
Plawan Kumar Jha
Shalini
Shyamaprasad Nandi
Gunja Sachdeva
Nishtha Sachdeva
Sai Harshini Tekur
Shishir Sankhyayan
Ravi Prakash Nath Tripathi
Rejaul S.K.
Kunal Kothekar
Rohit Kumar
Amandeep
Soumendra Nath Panja
Rohit Babar
Gunjan Verma
Neelesh Soni
Devika Bodas
Maithili Khot
Natasha Buwa
Shrikant Harne
Yashraj Chavhan
Debasis Saha
Himani Rawat
Rakesh Pant
Tathagata Mandal
Namrata Pattanayak
Sarath Kumar Thadeti

Sudheer Kumar C.S.
Chetan D.S.
Niharika Joshi
Veeresh K.
Dinesh Mullangi
Neha
Harshad Paithankar
Roy Bibhisan
Satpathi Sagar
Shahila Muhammed
Shammi Rana
Avinash Warankar
Madhumita Chakladar
Gajanan Kendre
Ashok Kumar B.
Shweta Tendulkar
Madan Ambhore
Prakash Prabhat
Bappa Ghosh
Vinay Hegde
Aakanksha Kapoor
Aditee Rane
Chandan Kumar Singh
Shatruhan Singh Rajput
Rutuja Diwan
Yogeshwar More
Ravindra Raut
Naveenkumar Akula
Rahul Maity
Jagannadha Rao Kasuladevu
Javid Ahmad Malla
Sachin Nalawade
Gulab Sudam Walke
Moreshwar Chaudhari
Devatha Gayathri
Sachin Kumar Singh
Soumen Khan
Virendra Kumar Sharma
Selveshwari S.
Nishant Singh
Krishnakant Baratam
Debjyoti Dutta
Vivek Kumar
Divya Singh
Manu Gautam

Neeraj Ravindra Deshmukh
Suddhasattwa Mandal
Sumit Srivastav
Ajith V.J.
Imrankhan B. Mulani
Gautam Sharma
Banibrata Chakraborty
Satish Kumar
Abhishek Gaurav
Aman Bajpai
Laxman Rambhau Sawase
Irranna Annappa Todkari
Vikas Vilas Khade
Prachi Gupta
Yogesh Vishnu Sutar
Prerona Bora
Amol Dashrath Sonawane
Mohd. Danish
Abhinav Prakash Gehlot

PhD students with other financial assistance

Aniruddh Sastry
Rini Shah
Sunil Kumar
Aparna Sherlekar
Abhinav Parivesh
Rashmi Kulkarni
Archana Pawar
Devika Ranade
Dinesh Chauhan
Venkateswara Rao Boddu
Vinayak Khodade
Yasmeen Akhtar
Minal Pednekar
Indu Kaul
Bhavani N.
Mubeena Bano S.K.
Abhijeet Bayani
Manasi Kulkarni
Bapurao Surnar
Lakshmi V.R. Babu Syamala
Vallari Shukla
Rohan Yadav
Hitesh Raundal
Koushik Karmakar

Swati Hegde
Sayan Mandal

Integrated PhD Students

Sayali Chaudhary (UGC-JRF)
Roopali Pradhan (CSIR JRF)
Ketakee Ghate
Shubhankar Kulkarni
Chaitanya Mungi (CSIR JRF)
Ajay Labade
Anandita Adak
Santosh Kumar Singh
Aamod Desai
Amruta Sadhu
Supratik Sarkar
Sumit Sarkar
Srikrishna Sekhar
Mahendra Prasad Mali
Ankita Shetty (CSIR JRF)
Sukrut Karmekar (CSIR JRF)
Neha Khetan
Aditi Maduskar
Dnyanesh Dubal
Mukul Rawat (DBT JRF)
Jerrin Thomas George
Sneha Banerjee
Hridya M.
Rahi Masoom Reja
Aditi Nandi
Amogh Kulkarni
Abhishek Swarnkar
Meghna Manae
Prachi Telang
Anjusha V.S.
Tomin K. James
Dhanya Menon
Mainak Ghosh
Chetan Kumar Vishwakarma
Amarendra Soory
Dhriti Nagar (CSIR JRF)
Divya Rao
Gungi Akhila (CSIR JRF)
Harpreet Singh Kalsi
Neeladri Sen (CSIR SPM)
Ron Sunny
Swati Sharma

Aditi Dixit
Anish Rao
Bharat Tandon (CSIR JRF)
Mehak Malhotra
Shivani Sharma
Sandip Varkey George
Adarsh Vasista
Anshul Kapoor
Charu Garg
Deepak Khurana
G.A.R.S.R.K. Kashyap
Jay Mangaonkar
Nilam Malankar
Punita Bathia
Sanjana Nair
Shikha Kalra
Yashaswi Singh
Arunabha Sen
Bandana Kumari
Girish Singh Bisht
Kingshuk Roy
Konoya Das
Kriti Gupta
Omshankar Tiwari
Prashant Jain
Shalini Pandey
Vikash Kumar Ravi
Arnab Sen
Deepak Kumar Sharma
Dipti
Shubham Pandey
Soham Pal
Sayali Bhatkar
Projjwal Kanti Kanjilal
Rajesh Mandal
Deepak Sharma
Mohit Kumar Singh
Mayur Shende
Yashwant Chougule
Kumar Saurabh (CSIR JRF)
Vikhyaat Ahlawat
Ankita Niranjana
Tejal Agarwal
V. Aishwarya
Aparna Thulasidharan
Joyeeta Chakraborty

Meenakshi Pardasani
Mrinmayee Anant Bapat
Singh Pratima Harishankar
Rohit Kandpal
Sathe Rupali Ravindra
Bardapurkar Rutwik Vinay
Konakamanchi Srinivasa
Sasank
Shikha Dagar
Shubham Singh
Sneha Tripathi
Sushmita Hegde
Susovan Sarkar
Sutirtha Bandopadhyay
Tumuluri Vinayak Sadasivam

Yamini Mathur
Abhijit Gupta
Avisikta Upadhyay
Meghmala Sarkar
Nikshika Virmani
Rayan Chakraborty
Rinku
Saptashwa Chakraborty
Sheikh Farhan Amin
Soumodip Sur
Swati Deswal
Unmesh Mondal
Debaprasanna Kar
Neha Malik
Angira Rastogi

Arindam Bhattacharjee
Debesh Bhattacharjee
Deepak Kumar Roy
Devanshu Sinha
Naveen Nishad
Shailendra Kumar Chaubey
Shruti Chakravarty
Sunny Tiwari
Surya Pratap S. Deopa

**Independent Fellowship
Holders**

Ritima Das
Saurabh Pradhan
Sainath M.



Funding and Infrastructure

Sponsored Projects

New Equipment

Library

Sponsored Projects

(in lakh Rs.)

Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)	Grants received during the year	
On-going Projects						
1	Virtual Centre of Excellence in Epigenetics	Sanjeev Galande	GAP/DBT/BIO-10-0027 30810027	DBT	19.03.2010 - 30.09.2015	67.86
2	Modulation of the innate immune response by SuMOylation	Girish Ratnaparkhi	GAP/WT-DBT/BIO-10-0029 30710029	Wellcome Trust - DBT India Alliance	15.06.2010 - 14.06.2015	19.38
3	Ramanujan Fellowship	Harsh Chaturvedi	GAP/DST/PHY-10-0031 30110031	DST-SERB	01.07.2010 - 30.06.2015	0.00
4	Ramanujan Fellowship	G. V. Pavan Kumar	GAP/DST/PHY-10-0041 30110041	DST-SERB	01.11.2010 - 31.10.2015	0.00
5	Mechanistic analysis of endocytosis of the amyloid precursor protein	Thomas Pucadyil	GAP/WT-DBT/BIO-11-0043 30711043	Wellcome Trust - DBT India Alliance	01.01.2011 - 31.12.2015	19.08
6	Molecular mechanisms of nuclear structure-function relationship in cancer	Kundan Sengupta	GAP/WT-DBT/BIO-11/0044 30711044	Wellcome Trust - DBT India Alliance	01.01.2011 - 31.12.2015	34.68
7	Micro-cantilever based calorimetric biosensor for decentralized diagnostics and drug-discovery using a novel detection mechanism	Shivprasad Patil	GAP/WT-DBT/BIO-11/0045 30711045	Wellcome Trust - DBT India Alliance	15.01.2011 - 14.01.2016	10.44
8	Cascade glycosylations: A novel strategy for carbohydrate epitopes and glycoarrays (Swarnajayanti Fellowship)	Srinivas Hotha	GAP/DST/CHE-11/0046 31211046	DST	17.01.2011 - 16.01.2016	6.00
9	Raja Ramanna Fellowship	Avinash Khare	GAP/DAE/PHY-11/0047 30911047	DAE	21.09.2010 (at IISER from 01.01.2011) - 19.06.2015	0.07
10	J C Bose Fellowship	L. S. Shashidhara	GAP/DST/BIO-11/0048 31511048	DST-SERB	01.02.2011 - 31.01.2021	7.50

(in lakh Rs.)

Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)	Grants received during the year
11 Carbohydrate capped nanoparticles as tumor specific drug delivery systems	Raghavendra Kikkeri	GAP/DST-MPG/CHE-11/0055 30311055	DST / Max Planck Partner	19.12.2011 - for DST- 31.03.2015 / for MPG- 18.12.2016	3.64
12 Total synthesis of natural benzo (C) phenanthridine alkaloids by metal-catalyzed cyclization of C-H bond activation reaction as a key step (DAE - Young Scientist Research Award)	M. Jeganmohan	GAP/DAE/CHE-11/0058 30911058	DAE	16.08.2011 - 31.10.2015	0.00
13 Integrin-dependent regulation of anchorage independence in cancers	Nagaraj Balasubramanian	GAP/WT-DBT/BIO-11/0059 30711059	Wellcome Trust - DBT India Alliance	01.09.2011 - 31.08.2016	53.15
14 Chimeric nanoparticle: A novel nanoplatform for signaling pathway driven cancer chemotherapy (Ramalingaswami Fellowship)	Sudipta Basu	GAP/DBT-RLF/BIO-12-0073 31312073	DBT	06.02.2012 - 05.02.2017	15.40
15 Hypoxia-activated prodrugs of Nitric Oxide (Innovative Young Biotechnologists Award-2011 (YBA 2011))	Harinath Chakrapani	GAP/DBT/BIO-12-0074 30812074	DBT	29.03.2012 - 28.03.2015	5.13
16 Science Media Centre at IISER Pune	L.S.Shashidhara	GAP/DST/GEN/S&T-12-0075 30112075	DST	16.04.2012 - 15.10.2015	20.00
17 The role of SATB proteins in the structure and function of the inactive X	Ashwin Kelkar	GAP/WT-DBT/BIO-12/0076 30712076	Wellcome Trust - DBT India Alliance	01.05.2012 - 30.04.2016	43.82
18 INSPIRE Faculty Award	Chandrasheel Bhagwat	GAP/DST/MTH/INSPIRE-12-0077 31812077	DST	01.03.2012 - 28.02.2017	0.00
19 Ramanujan Fellowship	Ashna Bajpai	GAP/DST/PHY-12-0078 30112078	DST-SERB	09.03.2012 - 08.03.2017	17.80
20 SanGenix: A comprehensive Next Generation Sequence (NGS) data analysis solution (BIPP)	Sanjeev Galande	GAP/DBT/BIO-12-0079 30812079	DBT	12.03.2012 - 12.09.2015	2.54
21 Modeling and observations of CME propagation, associated radio bursts and cosmic ray Forbush decreases at the Earth	Prasad Subramanian	GAP/ISRO/PHY-12-0081 30612081	ISRO	25.05.2012 - 24.05.2015	0.00

(in lakh Rs.)

Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)	Grants received during the year
22 Palladium catalyzed chelation assisted C-H bond functionalisation of aromatics, alkenes and alkanes	M. Jeganmohan	GAP/DST/CHE-12-0082 30112082	DST-SERB	03.07.2012 - 02.07.2015	0.00
23 Functional studies of novel inorganic organic hybrid frameworks with guest accessible sites	Sujit Kumar Ghosh	GAP/DST/CHE-12-0083 30112083	DST - SERB	05.07.2012 - 04.07.2015	6.50
24 Role of network topology in the generation of coordinated neuronal activity	Collins Assisi	GAP/WT-DBT/BIO-12/0084 30712084	Wellcome Trust - DBT India Alliance	01.09.2012 - 31.08.2017	10.06
25 Investigating the role of intracellular calcium signal remodeling in the pathogenesis of Alzheimer's disease	Suhita Nadkarni	GAP/WT-DBT/BIO-12/0085 30712085	Wellcome Trust - DBT India Alliance	01.08.2012 - 31.07.2017	28.27
26 Development and application of theoretical methods for mechanistic understanding of ultrafast photoinduced molecular processes	Anirban Hazra	GAP/DST-SERB/CHE-12-0086 30112086	DST - SERB	03.08.2012 - 02.08.2015	0.00
27 Research partnership and collaboration agreement of IISER Pune with Enovex Technology Ltd.	Ramanathan Vaidhyanathan	GAP/Enovex-IISER/CHE-12-0087 31912087	Enovex Technology Ltd., Canada	19.03.2012 -	0.15
28 Elevational species diversity patterns in the Eastern Himalayas (Arunachal Pradesh)	Ramana Athreya	GAP/DST-SERB/BIO-12-0088 30112088	DST - SERB	06.09.2012 - 05.09.2015	0.00
29 Study of wildlife issues in general and the Schedule I (WPA) endangered Blyth's Tragopan in particular in West Kameng District against Diversion of 78.45 Ha forest land for implementation of 96MW Nafra Hydroelectric project	Ramana Athreya	GAP/ARUNACHAL/BIO-12-0089 30812089	Govt of Arunachal Pradesh / SEW Nafra Power Corporation Ltd.	22.05.2012 - 31.12.2015	0.00
30 Redox directed mycobacterial therapeutics	Harinath Chakrapani / Srinivas Hotha	GAP/DBT/CHE-12-0090 30812090	DBT	28.09.2012 - 27.03.2016	12.08
31 DNA damage surveillance and repairs: Characterizing the interaction between Topbl and Msh2-Msh6 complex	Mayurika Lahiri	GAP/DBT/BIO-12-0091 30812091	DBT	09.11.2012 - 08.11.2015	16.97
32 Ramanujan Fellowship	Angshuman Nag	GAP/DST/CHE-13-0094 30113094	DST - SERB	29.10.2012 - 28.10.2017	17.80

(in lakh Rs.)

	Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)	Grants received during the year
33	Impact study on wildlife for Nyamjang Chhu hydropower project in Tawang District of Arunachal Pradesh	Ramana Athreya	GAP/ARUNACHAL/BIO-13-0095 32013095	Nyamjang Chhu Hydro Power Ltd., New Delhi	22.11.2012 - 31.12.2015	0.00
34	INSPIRE Faculty Award	Neelesh Dahanukar	GAP/DST/BIO/INSPIRE-12-0096 31820096	DST	16.10.2012 - 15.10.2017	16.02
35	Fluorescent nucleoside-based amphiphiles: Synthesis, self assembly properties and applications	S.G. Srivatsan	GAP/CSIR/CHE-12-0097 30512097	CSIR	01.11.2012 - 31.10.2015	0.00
36	FIST Program	K.N. Ganesh	GAP/DST/FIST/CHE-13-0098 30113098	DST	07.01.2013 - 06.01.2018	0.00
37	Structural descriptors of protein-protein and protein ligand binding sites and knowledge based design of new interfaces and ligands	M.S. Madhusudhan	GAP/WT-DBT/BIO-13-0100 30713100	Wellcome Trust - DBT India Alliance	01.04.2013 - 31.03.2018	0.00
38	J C Bose Fellowship	Sunil Mukhi	GAP/DST/PHY-13-0101 31513101	DST	09.06.2008 - 08.06.2018	0.00
39	INSPIRE Faculty Award	Gayathri Pananghat	GAP/DST/BIO/INSPIRE-13-0102 31813102	DST	01.04.2013 - 31.03.2018	14.84
40	Role of RNA binding proteins in Hedgehog signalling	Shital Sarah Ahaley	GAP/WT-DBT/BIO-13-0104 30713104	Wellcome Trust - DBT India Alliance	01.05.2013 - 30.04.2017	30.74
41	INSPIRE Faculty Award	Ronnie Mani Sebastian	GAP/INSPIRE/PHY-13-105 31813105	DST	25.04.2013 - 24.04.2018	0.00
42	Understanding the neural mechanisms underlying initiation of learned motor behaviours (Ramalingaswami Fellowship)	Raghav Rajan	GAP/DBT/BIO-13-0106 31313106	DBT	01.05.2013 - 30.04.2018	16.06
43	INSPIRE Faculty Award	Arjun Bagchi	GAP/INSPIRE/PHY-13-107 31813107	DST	04.06.2013 - 03.06.2018	0.00
44	Fabrication of optical gate based on bacteriorhodopsin functionalized with single walled carbon nanotubes	Harsh Chaturvedi	GAP/DST/PHY-13-0108 30113108	DST	07.06.2013 - 31.03.2016	6.00
45	Ramanujan Fellowship	Mukul Kabir	GAP/DST/PHY-13-0109 31113109	DST-SERB	14.06.2013 - 13.06.2018	6.00

(in lakh Rs.)

	Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)	Grants received during the year
46	Dynamical effects in the mechanism of intercalation of anti-cancer drugs	Arnab Mukherjee	GAP/DST/CHE-13-0110 30113110	DST	14.06.2013 - 13.06.2016	7.00
47	Peripherally functionalized siloxane scaffolds for the assembly of multi-metallic cages, clusters and supramolecules	R. Boomi Shankar	GAP/DST/CHE/13-0111 30113111	DST-SERB	14.06.2013 - 13.06.2016	7.00
48	Design, synthesis and characterization of modified dipyrins and its complexes	V.G. Anand	GAP/DST/CHE/13-0112 30113112	DST-SERB	14.06.2013 - 13.06.2016	10.00
49	Studies on non covalent modulation of gating and selectivity of synthetic ion channels	Pinaki Talukdar	GAP/DST/CHE-13-0114 30113114	DST-SERB	25.06.2013 - 24.06.2016	7.00
50	Deciphering the transcriptional and miRNA mediated control of calcium dependent protein kinases (StCDPKs) in potato (<i>Solanum tuberosum</i> L) tuber development (Indo-Argentina joint project)	Anjan Banerjee	GAP/DST/BIO-13-0115 30113115	DST	01.03.2013 - 28.02.2016	3.00
51	Crystal growth of the newly discovered high-temperature iron-arsenide superconductors AFe_2As_2 (A= Ba, Ca, Sr and Eu)	Surjeet Singh	GAP/DST/PHY-13-0116 30113116	DST - SERB	31.07.2013 - 30.07.2016	0.00
52	Dielectric response of a lasing medium in frequency domain	Shouvik Datta	GAP/DST/PHY-13-0117 30113117	DST - SERB	31.07.2013 - 30.07.2016	1.00
53	Optoelectronic and plasmonic properties of all inorganic Sn doped In_2O_3 (ITO) nanocrystals	Angshuman Nag	GAP/DAE/CHE-13-0118 30913118	DAE	05.08.2013 - 04.08.2016	2.17
54	Origin of plasma membrane polarity during embryogenesis	Richa Rikhy	GAP/DBT/BIO-13-0119 30813119	DBT	23.08.2013 - 22.08.2016	11.12
55	INSPIRE Faculty Award	Diganta Borah	GAP/INSPIRE/MTH-13-120 31813120	DST	21.08.2013 - 20.08.2018	0.00
56	Molecular motor driven centrosomal microtubule mobility: Mechanics and spatio-temporal organization (RGYI)	Chaitanya Athale / Co PI Sudipto Muhuri, IoP, BBH	GAP/DBT/BIO-13-0121 30813121	DBT	03.09.2013 - 02.09.2016	0.00

(in lakh Rs.)

Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)	Grants received during the year
57 Systems modeling and experimental testing of cytoskeletal polarization in cellular pattern formation	Chaitanya Athale	GAP/DBT/BIO-13-0122 30813122	DBT	03.09.2013 - 02.09.2016	0.00
58 Developmental control of mitochondrial morphology	Richa Rikhy / L.S. Shashidhara	GAP/DBT/BIO-13-123 30813123	DBT	04.09.2013 - 03.09.2016	9.90
59 Molecular modeling and simulation of nanostructure and dynamics of ionic liquid doped polymer electrolyte membrane fuel cells	Arun Venkatnathan	GAP/SERB/CHE-13-124 30113124	DST-SERB	17.09.2013 - 16.09.2016	5.00
60 Engineering novel supramolecular nanoplatform for paclitaxel delivery in cancer	Sudipta Basu	GAP/DST/CHE-13-126 30113126	DST-SERB	18.09.2013 - 17.09.2016	5.50
61 INSPIRE Faculty Award	Krishanpal Karmodiya	GAP/INSPIRE/BIO-13-127 31813127	DST	02.09.2013 - 01.09.2018	16.92
62 Learning and memory in aggression: Identifying the neurogenetic substrates and memory traces of a complex social behaviour	Aurnab Ghose	GAP/DST/BIO-13-128 30113128	DST	17.10.2013 - 16.10.2016	12.00
63 Synthesis of BiFeO polyaniline core shell (c/s-BFO-PANI) nanoparticles and their magnetic dielectric characterization (Women Scientist Scheme)	Smita Chaturvedi	GAP/DST/PHY-13-129 30113129	DST	24.10.2013 - 23.10.2016	8.00
64 Understanding the functional relevance of twist paralogs and their interaction with developmental pathways during dermis formation using zebrafish as a model organism	Tressa Panikulangara Jacob	GAP/DBT/BIO-13-130 30813130	DBT	17.10.2013 - 16.10.2016	33.04
65 Stabilizing the dynamics of laboratory populations of <i>Drosophila melanogaster</i> using limiter control	Sutirth Dey	GAP/CSIR/BIO-13-131 30513131	CSIR	01.10.2013 - 30.09.2016	2.08
66 Optical effects in functionalized single walled carbon nanotubes	Harsh Chaturvedi	GAP/DST/PHY-13-132 30113132	DST	27.09.2013 - 26.09.2016	0.00

(in lakh Rs.)

	Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)	Grants received during the year
67	National Network for Mathematical and Computational Biology	L.S. Shashidhara, IISER Pune / G. Rangarajan, IISc Bangalore	GAP/DST/BIO-13-133 30113133	DST-SERB	20.11.2014 - 19.11.2017	6.50
68	Role of neuropeptide Y in zebrafish olfaction	Aurnab Ghose	GAP/DST/BIO-13-134 30113134	DST-SERB	17.12.2013 - 16.12.2016	7.00
69	To set up Maharashtra Gene Bank in Maharashtra State	Milind Watve	GAP/GOM/BIO-14-0135 32214135	RGSTC, Maharashtra State	09.01.2014 - 08.01.2019	700.00
70	Capacity building among village youth for self study and self employment along western boundary of Tadoba, Andhari Tiger Reserve, Maharashtra	Milind Watve	GAP/DST/BIO-13-0136 30113136	DST	05.02.2014 - 04.02.2017	0.00
71	Ligand-free colloidal allinorganic semiconductor nanocrystals: Synthesis, photophysics and optoelectronic application	Angshuman Nag	GAP/DST/CHE-14-137 30113137	DST - SERB	27.02.2014 - 26.02.2017	4.00
72	Understanding dioecy by exploring floral organ identify genes (OIGs) in <i>Coccinia grandis-A</i> new model for study under DBT's Twinning Programme for NE	Anjan Banerjee	GAP/DBT/BIO-13/0138 30813138	DBT	13.03.2014 - 12.03.2017	9.36
73	Disk-B Denmark-India <i>in vivo</i> screen for cancer biomarkers	L.S. Shashidhara	GAP/DBT/BIO-13-0139 30813139	DBT	27.02.2014 - 26.02.2019	31.39
74	Glycochemical studies of mycobacterial arabinomycolate - 5105-1	Srinivas Hotha	GAP/IFC/PAR/CHE-14-0140 31414140	CEFIPRA	01.04.2014 - 31.03.2017	14.54
75	Synthesis of new fluorinated tumor-associated glycopeptide antigens and meningitis vaccine A analogues	Madhuri Vangala	GAP/DST/BIO-14-0141 30114141	DST-SERB	03.07.2014 - 02.07.2017	12.50
76	Development and functional studies of Metal-organic Polyhedras (MOPs) - INSA Young Scientist Project	Sujit Kumar Ghosh	GAP/INSA/CHE/14-142 32314142	INSA	19.09.2014 - 18.09.2017	5.00

(in lakh Rs.)

	Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)	Grants received during the year
77	Target gene identification, regulation and functional characterization of the shoot meristemless (STM) ortholog in potato (<i>Solanum tuberosum</i> L)	Anjan Banerjee	GAP/DST/BIO-14-0143 30114143	DST-SERB	27.06.2014 - 26.06.2017	10.00
78	Structure and filament dynamics of the cytoskeletal protein fibril (Fib) involved in spiroplasma motility (IYBA 2013)	Gayathri Pananghat	GAP/DBT/BIO-14-0144 30814144	DBT	30.06.2014 - 29.06.2017	8.93
79	Erasmus Mundus Action 2 lot 13, NAMASTE - Networking and Mobility Actions for Sustainable Technology and Environment in India	Naresh Sharma	GEN 32414145	George August University Gottingen, Germany	22.03.2016 - 21.09.2017	0.00
80	INSPIRE Faculty Award	Anup Biswas	GAP/DST/MTH-14-0146 31814146	DST	18.08.2014 - 17.08.2019	2.77
81	INSPIRE Faculty Award	Mousomi Bhakta	GAP/DST/MTH-14-0147	DST	18.08.2014 - 17.08.2019	3.18
82	Design and development of amino acid based polymer scaffolds for drug delivery	M. Jayakannan	GAP/DST/CHE-14-0148 30114148	DST - SERB	10.09.2014 - 09.09.2017	0.00
83	Identification and characterization of the card neuropeptide receptor	Aurnab Ghose	GAP/LTMT/BIO-14-0149 32414149	Lady Tata Memorial Trust	11.09.2014 - 10.09.2016	0.00
84	MHRD-CoE-FAST Project - Establishment of Centre of Excellence for Training and Research in Frontier Areas of Science and Technology (FAST) - Research in Energy and sustainable materials	K.N. Ganesh	GAP/MHRD/CHE-14-0150 32514150	MHRD	07.08.2014 - 06.08.2018	0.00
85	Quantum Memory based on nitrogen vacancy centers in diamond (Swarnajayanti Fellowship)	T.S. Mahesh	GAP/DST/PHY-14-151 31214151	DST	30.09.2014 - 29.09.2019	10.00
86	The MOR cryptosystem groups and galois action	Ayan Mahalanobis	GAP/DST/MTH-14-152	DST-SERB	04.09.2014 - 03.09.2017	0.00

(in lakh Rs.)

	Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)	Grants received during the year
87	Porphyrin, chlorin and isophlorin based near-infrared dyes for high-efficiency dye-sensitized solar cells: An inspiration from the nature (Indo-Singapore Project)	V.G. Anand	GAP/DST/CHE-14-153 30114153	DST-SERB	30.09.2014 - 29.09.2017	0.00
88	Introduction of silylene in frustrated lewis pair chemistry and their reactivity towards small molecules	Shabana Khan	GAP/DST/CHE-14-154 30114154	DST-SERB	21.10.2014 - 20.10.2017	5.00
89	Ruthenium catalyzed meta selective C-H bond functionalization of substituted aromatics	M. Jeganmohan	GAP/CSIR-CHE-14-155 30514155	CSIR	01.10.2014 - 30.09.2017	1.98
90	Novel electronic and magnetic states in 4d and 5d transition metal oxide	Sunil Nair	GAP/CSIR/PHY-14-156 30514156	CSIR	01.10.2014 - 30.09.2017	0.00
91	Evolution of evolvability in laboratory populations of <i>E.coli</i>	Sutirth Dey	GAP/DBT/BIO-14-157 30814157	DBT	01.11.2014 - 31.10.2017	0.00
92	DBT Programme support for Fetal Programming Research	Sanjeev Galande	GAP/DBT/BIO-14-158 30814158	DBT	10.11.2014 - 09.11.2019	0.00
93	Studying neoplastic transformation of mammosphere cultures in 3D using chemical carcinogens	Mayurika Lahiri	GAP/DBT/BIO-14-159 30814159	DBT	12.11.2014 - 11.11.2017	0.00
94	Ruthenium catalyzed highly regio and stereoselective oxidative coupling of n components: A versatile route to substitute alkenes, design and heterocycles (INSA-Young Scientist Project)	M. Jeganmohan	GAP/INSA/CHE/14-160 32314160	INSA	01.11.2014 - 31.10.2017	0.00
95	The quest for new multiferroics oxides	Sunil Nair	GAP/DST/PHY-14-161 30114161	DST-SERB	22.11.2014 - 21.11.2017	0.00
96	Design and synthesis of covalent and non covalent composites from aromatic and antiaromatic macrocycles for molecular diode (Swarnajayanti Fellowship)	V.G. Anand	GAP/DST/CHE-14-162 30114162	DST	03.11.2014 - 02.11.2019	0.00

(in lakh Rs.)

	Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)	Grants received during the year
97	J C Bose Fellowship	K.N. Ganesh	GAP/DST/JCB/CHE-14-163 31514163	DST-SERB	01.07.2010 - 30.06.2015	7.00
98	Ramanujan Fellowship	Nabamita Banerjee	GAP/DST/RJ/PHY-14-164 31114164	DST-SERB	17.09.2013 - 01.08.2014 (at IISER Pune) 16.09.2018	0.00
99	Chimeric nanoparticle for targeting signalling network as next generation cancer therapeutics	Sudipta Basu, Nirmalya Ballav	GAP/DBT/CHE-14-165 30814165	DBT	08.12.2014 - 07.12.2017	0.00
100	Non abelian bilinear cryptography	Ayan Mahalanobis	GAP/DAE/MTH-14-166 30914166	DAE-NBHM	25.01.2015 - 26.01.2018	0.00
101	Quantitative characterization of threshold behavior of oxidative stress towards development of insulin resistance	Pranay Goel / Saroj Ghaskadbi, SPPU	GAP/DBT/BIO-15-167 30815167	DBT	11.12.2014 - 10.12.2017	0.00
102	Elucidating the role of lipids in ion channel function	Jeet Kalia	GAP/WT-DBT/CHE-15/0168 30715168	Wellcome Trust - DBT India Alliance	01.03.2015 - 28.02.2020	113.96
103	J C Bose Fellowship	Shyam Sundar Rai	GAP/DST/ECS-15-169 31515169	DST	06.07.2010 - 31.03.2019	13.60
104	INSPIRE Faculty Award	Gyana Ranjan Tripathy	GAP/DST/ECS-15-170 31815170	DST	11.1.2.2014 - 24.04.2019	6.65
105	Development of functional h conjugated polymers for photonic applications	M. Jayakannan	GAP/DST/CHE-15-171 30115171	DST-SERB	24.03.2015 - 23.03.2018	0.00
106	Tailoring glycosylphosphatidylinositol substrates and substrate mimetics to study the GPI biosynthetic pathway and modulate host-pathogen interactions	Srinivas Hotha & Sneha Komath, JNU	GAP/DST/CHE-15-172 30115172	DST-SERB	23.03.2015 - 22.03.2018	0.00
107	Direct assembly of sialic acid specific peptidomimics on cantilever array sensors for detecting cancer biomarkers	Raghavendra Kikkeri	GAP/DST/CHE-15-173 30115173	DST-SERB	20.03.2015 - 19.03.2018	0.00

(in lakh Rs.)

Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)	Grants received during the year
Projects Sanctioned in 2015-16					
108	Theoretical studies on ultra cold dipolar gases	GAP/CEFIPRA/PHY-15-174 31415174	CEFIPRA	01.04.2015 - 31.03.2018	20.45
109	Exploring the complex energy landscapes in multiglasses (Indo German (DST-DAAD))	GAP/DST/PHY-15-175 30115175	DST	10.04.2015 - 09.04.2017	5.35
110	British Council Division - Knowledge Economy Partnership 2015 - Public Lecture series on Science and Pedagogy workshops on Science Education	GAP/BC/GEN/-15-176 31715176	British Council	01.05.2015 - 30.04.2016	19.24
111	A <i>Drosophila</i> model to study adult epithelial stem cells and their role in cancer initiation	GAP/DBT/BIO-15-177 30815177	DBT	18.04.2015 - 17.04.2018	9.63
112	Development of multi-modal nonlinear plasma optical microscopy workstation to probe nanoarchitectures	GAP/DBT/PHY-15-177 30115178	DST	22.05.2015 - 21.05.2018	114.65
113	Synaptic and molecular determinants controlling speed of olfactory information processing and decision making	GAP/WT-DBT/BIO-15-0179 30715179	Wellcome Trust DBT India Alliance	01.06.2015 - 31.05.2017	96.81
114	A proteomic investigation to understand sex expression and modification in dioecious <i>C. grandis</i>	GAP/DST/BIO-15-0180 30115180	DST	04.06.2015 - 03.06.2018	11.10
115	Programme support on Biotechnology approaches for conservation and sustainable utilization of plant wealth of western ghats	GAP/DBT/BIO-15-0181 30815181	DBT	14.05.2015 - 13.05.2018	8.69
116	INSPIRE Faculty Award	GAP/DST/BIO-15-182 31815182	DST	15.06.2015 - 14.06.2020	19.00
117	Role of chromatin organizer SATB2 in gastrulation in <i>Danio rerio</i> (Indo Austrian (DST-BMWF) Joint Project)	GAP/DST/BIO-15-0183 30115183	DST	21.05.2015 - 20.05.2017	1.65
118	Modeling heterogeneity in nanoparticle catalysis at the single molecule level	GAP/DST/CHE-15-184 30115184	DST-SERB	12.08.2015 - 11.08.2018	4.50

(in lakh Rs.)

	Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)	Grants received during the year
119	Magneto optic trapping of strontium atoms for experiments towards distributed quantum information processing	Umakant Rapol	GAP/DST/PHY-15-185 30115185	DST-SERB	12.08.2015 - 11.08.2018	51.00
120	Finding alternative crop strategies for farmers affected due to crop raiding by wild herbivores along western boundary of Tadoba-Andhari Tiger Reserve	Milind Watve	GAP/DEFRIES-BAJPAI/BIO-15-186 30115186	DeFries Bajpai Foundation	03.07.2015 - 02.07.2017	3.70
121	Quantum Field Theory and higher spin fields	Sudarshan Ananth	GAP/DST/PHY-15-187 30115187	DST-SERB	13.08.2015 - 12.08.2018	1.80
122	Travel funds for Participation in International Genetically Engineered Machines Contest (iGEM) at Massachusetts Institute of Technology (MIT), Boston, USA during 24-28 Sept 2015	Chaitanya Athale	GAP/DBT/BIO-15-188 30115188	DBT	19.08.2015 - 28.09.2015	8.00
123	Multiproxy, high resolution paleoclimate reconstructions to separate anthropogenic signature from natural climate variability (Start up Grant for Young Scientists)	Rajani Panchang	GAP/DST/ECS-15-189 30115189	DST-SERB	02.09.2015 - 01.09.2018	10.00
124	Functional studies of porous coordination polymers derived from amide based nitrogen donor ligands	Tarak Nath Mandal	GAP/DST/CHE-15-190 30115190	DST-SERB	02.09.2015 - 01.09.2018	11.90
125	Complexity measures from multifractal analysis to characterize ECG data for diagnosis and therapy	G. Ambika	GAP/DST/PHY-15-191 30115191	DST-SERB	09.09.2015 - 08.09.2018	14.00
126	Exploring the potential of Gamma-delta T Lymphocytes for Immunotherapy of cancer	Sanjeev Galande	GAP/DBT/BIO-15-192 30815192	DBT	31.07.2015 - 30.07.2018	34.96
127	Advancing the efficiency and production potential of excitonic solar cells (APEX Phase II)	Satishchandra Ogale	GAP/DST/CHE-15-193 30115193	DST-SERB	22.09.2015 - 21.09.2017	52.53
128	Measurements and modeling of supraglacial debris layer properties in Hamath Glacier	Argha Banerjee	GAP/DST/ECS-15-194 30115194	DST-SERB	09.06.2014 - (24.09.15 in IISER Pune) 08.06.2017	7.02

(in lakh Rs.)

	Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)	Grants received during the year
129	Environment-responsive fluorescent peptide nucleic acid conjugates: Design, synthesis and applications in nucleic acid diagnosis	S.G. Srivatsan	GAP/DST/CHE-15-195 30115195	DST-SERB	05.10.2015 - 04.10.2018	40.32
130	Conformation specific electronic circular dichroism spectroscopy in isolated gas phase	Aloke Das	GAP/DST/CHE-15-196 30115196	DST-SERB	05.10.2015 - 04.10.2018	44.00
131	Studies on metal catalyzed stereoselective C-C, C-N and C-O bond formation via borrowing hydrogen methods using continuous flow techniques	B. Gnanaprakasam Boopathy	GAP/DST/CHE-15-197 30115197	DST-SERB	05.10.2015 - 04.10.2018	33.92
132	Ruthenium catalyzed C-H bond functionalization of aromatics, heteroaromatics and alkenes via chelation-assisted deprotonation metalation pathway	M. Jeganmohan	GAP/DST/CHE-15-198 30115198	DST-SERB	05.10.2015 - 04.10.2018	35.42
133	Site selective direct C-H bond functionalisation by early transition metal carbenoid insertion and its applications	R.G. Bhat	GAP/DST/CHE-15-199 30115199	DST-SERB	05.10.2015 - 04.10.2018	33.61
134	Solar wind turbulence, viscosity and implications for the propagation of solar coronal mass ejections	Prasad Subramanian	GAP/ISRO/PHY-15-200 30615200	ISRO	14.10.2015 - 13.10.2018	8.04
135	Exploring the antimicrobial activities of short ar hybrid lipopeptides	H.N. Gopi	GAP/CSIR/CHE-15-201 30515201	CSIR	01.10.2015 - 30.09.2018	1.50
136	Small molecule donors of reactive sulfur species	Harinath Chakrapani	GAP/DST/CHE-15-202 30115202	DST-SERB	09.10.2015 - 08.10.2018	35.06
137	Exploration of naturally occurring beta hydroxy gamma amino acids (statines) in the design of foldamers and biological active peptidomimetics	H.N. Gopi	GAP/DST/CHE-15-203 30115203	DST-SERB	14.10.2015 - 13.10.2018	31.42
138	Jamming transitions and structure formation of model colloidal systems in extensional and shear flow	Apratim Chatterji	GAP/DST/PHY-15-204 30115204	DST-SERB	14.10.2015 - 13.10.2018	19.50
139	Setting up of a Centre of Excellence in Science and Mathematics Education under the Scheme PMMMNMTT	L.S. Shashidhara / K.N. Ganesh / Bhas Bapat / A. Raghuram	GAP/MHRD/GEN-15-0205 30115205	MHRD	08.10.2015 - 07.10.2020	282.00

(in lakh Rs.)

	Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)	Grants received during the year
140	Entropy, entanglement and flat space (Indo Austrian (DST-BMWF) Joint Project)	Arjun Bagchi	GAP/DST/PHY-15-206 30115206	DST	21.05.2015 - 20.05.2017	3.75
141	Flexible gas sensors using surface area nanomaterials and composites	Satishchandra Ogale	GAP/DAE/PHY-15-207 30915207	DAE-BRNS	01.04.2015 - 31.03.2018	8.06
142	Development of advanced materials and device systems for green transportation involving energy storage and energy generation	Satishchandra Ogale	GAP/KPIT/PHY-15-208 32615208	KPIT	01.12.2015 - 30.11.2018	10.00
143	Structural studies on spatial positioning of <i>Myxococcus xanthus</i> motility complexes	Gayathri Pananghat	GAP/DST/BIO-15-209 30115209	DST-SERB	18.12.2015 - 17.12.2018	30.00
144	Evolution of dispersal in laboratory population of <i>Drosophila melanogaster</i>	Sutirth Dey	GAP/DST/BIO-15-210 30115210	DST-SERB	19.12.2015 - 18.12.2018	18.27
145	Mitochondrial morphology regulation of epidermal growth factor signaling	Richa Rikhy	GAP/DST/BIO-15-211 30115211	DST-SERB	18.12.2015 - 17.12.2018	17.36
146	Prolyl isomerases as modifiers of protein aggregation and disease progression in a <i>Drosophila</i> model of amyotrophic lateral of protein	Girish Rathnaparkhi	GAP/DST/BIO-15-212 30115212	DST-SERB	30.12.2015 - 29.12.2018	17.30
147	Sugar derived cyclic peptides as artificial ion channels and transporters	Pinaki Talukdar	GAP/DST/CHE-15-213 30115213	DST-SERB	30.12.2015 - 29.12.2018	10.77
148	Nanoholes in graphene and hexagonal boron nitride as templates for two dimensional high spin magnetic arrays at a metal interface	Prasenjit Ghosh	GAP/DST/PHY-15-214 30115214	DST-SERB	06.01.2016 - 05.01.2019	48.80
149	Rechargeable CO ₂ /O ₂ electrode for air breathing energy storage devices	O.T. Musthafa	GAP/DST/CHE-15-215 30115215	DST-SERB	07.01.2016 - 06.01.2019	31.70
150	Interdigitated metal semiconductor nanowires as a platform for plasmon sensitized light harvesting devices	Pramod Pillai	GAP/DST/CHE-16-216 30115216	DST-SERB	12.01.2016 - 11.01.2019	29.20
151	From a tiny stolon tip to a large potato understanding the dynamics of miRNAs and their target genes in controlling tuber transitions	Anjan Banerjee	GAP/DBT/BIO-16-217 30815217	DBT	15.01.2016 - 14.01.2019	27.91

(in lakh Rs.)

	Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)	Grants received during the year
152	Characterization and comprehensive genome wide analysis of histone deacetylase, pifhd1 that may regulate expression of var genes involved in virulence and pathogenicity of <i>Plasmodium falciparum</i> (IYBA-2014 Award)	Krishanpal Karmodiya	GAP/DBT/BIO-16-218 30815218	DBT	23.12.2016 - 22.12.2019	10.00
153	A whole genome RNAi screen to identify modifiers of neuroaggregation using automated computational image analysis	Girish Ratnaparkhi	GAP/DBT/BIO-15-219 30815219	DBT	22.12.2015 - 21.12.2018	15.63
154	Transcriptional regulation post gene duplication and evolution: Role of <i>Drosophila</i> MADF-BESS domain proteins	Girish Ratnaparkhi	GAP/DBT/BIO-15-220 30815220	DBT	19.02.2016 - 18.02.2019	9.21
155	Biochemical characterization of RNA-like oligomers from lipid assisted nonenzymatic synthesis	Sudha Rajamani	GAP/DST/BIO-15-221 30115221	DST-SERB	26.02.2016 - 25.02.2019	20.55
156	INSPIRE Faculty Award	Argha Banerjee	GAP/DST/ECS-15-222 31815222	DST	01.02.2013 - 31.01.2018	0.76
157	Metalsilicon hybrid systems for electronic applications	Moumita Majumdar	GAP/DST/CHE-15-223 30115223	DST-SERB	01.04.2016 - 31.03.2019	50.63
158	Development of advanced optical microscopy system for surface enhanced Raman Scattering	G.V. Pavan Kumar	GAP/INSA/PHY-15-224 32315224	INSA	23.03.2016 - 22.03.2019	5.00
159	The quest for new and improved oxide thermoelectrics	Sunil Nair	GAP/DRDO/PHY-15-225 32715225	DRDO	23.03.2016 - 22.09.2017	22.04
160	National Facility for Laboratory Model Organisms (A collaborative initiative between DBT-IISER Pune-NCCS-UAB)	L.S. Shashidhara, Nixon Abraham, Sanjeev G, Aurnab G, Mohan R Wani, NCCS Pune	GAP/DBT/BIO-15-226 30815226	DBT	18.03.2016 - 17.03.2021	1204.83
161	Structural delineation of smad mediated regulation of miRNA biogenesis pathway using smad3 and miRNA-21 as model system(s)	Jeetender Chugh	GAP/SERB/CHE-15-227 30115227	DST-SERB	18.03.2016 - 17.03.2019	30.52

(in lakh Rs.)

Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)	Grants received during the year
162 Design, synthesis and self assembling studies of protein dendron amphiphilic macromolecules	Britto Sandanaraj	GAP/SERB/CHE-15-228 32815228	DST-SERB	23.03.2016 - 22.03.2019	30.12
163 Molecular analysis of a capacitor Hox protein motif	L.S. Shashidhara	GAP/CEFIPRA/BIO-15-229 31415229	CEFIPRA	29.03.2016 - 28.03.2019	16.65
164 Electrical addressing and control of the plasmonic properties of coupled metal nanowire	G.V. Pavan Kumar	GAP/CEFIPRA/PHY-15-230 31415230	CEFIPRA	30.03.2016 - 29.03.2019	1.50
165 DST INSPIRE Faculty Award	Soumi Chakravorty	GAP/DST/ECS-16-231 31816231	DST	04.12.2015 - 03.12.2020	19.00
166 Doped semiconductor nanocrystals for plasmonic and electron spin based applications synthesis thin film and spectroscopy	Angshuman Nag	GAP/DST/CHE-16-232 30116232	DST-SERB	31.03.2016 - 30.03.2019	38.80
167 Metal oxide and sulfide based nanostructures for charge storage applications	Satishchandra Ogale	GAP/DST/PHY-16-233 30116233	DST-SERB	31.03.2016 - 30.03.2019	59.70
		Total			4480.90

Consultancy Projects

(in lakh Rs.)

Name of the Project	Project Leader	Code	Sanctioning Authority	Period (From - to)
1 Datar Genetics Limited, Pune	Sanjeev Galande	001	Datar Genetics Ltd.	05.12.14 04.12.17
2 BRTF BJ Gompa-NAGA GG Road, Wildlife Management Plan	Ramana Athreya	002	Border Road Task Force (BRTF)	June 2015 July 2017
3 BRTF Dumro-Etalin road, Wildlife Management Plan	Ramana Athreya	003	Border Road Task Force (BRTF)	March 2017

Equipment Purchased During the Year

(costing more than 25 lakh rupees)

Equipment	Make	Cost in INR	Source of Funds
Glove Box	Mbraun Inert Gas-Systeme GmbH, Germany	6,306,859.00	IISER Pune
Tier 3 Cluster	Avnet Asia Pte Ltd, Singapore	8,505,000.00	IISER Pune
MTZ-35 model High Frequency Impedance Analyzer-Proton Conductivity measurement set-up including MT-Lab software and accessories	Bio-Logic SAS, France	3,029,740.00	Project
Fluorescence Microscope	Olympus Corporation, Japan	3,102,125.00	Project
Modular Compact Rheometer	Anton PaarGmbH, Germany	4,824,064.00	Project
Ti Sapphire Femtosecond Laser	Coherent Inc, USA	7,176,000.00	Project
Multi-channel Electrochemical Workstation	Biologic SAS, France	5,590,280.00	Project
Maldi TOF-TOF	AB SCIEX Pte Ltd, Singapore	17,136,000.00	Project
Gas Chromatography	Shimadzu (Asia Pacific) Pte Ltd, Singapore	2,981,500.00	Project
Upgrade of HPC	Ingram Micro Pvt Ltd, Singapore	12,333,762.00	Project



Fluorescence Microscope

This fully motorized upright fluorescence microscope is equipped with "Fly-eye" technology to obtain uniform fluorescence and is used for DIC, fluorescence and bright-field imaging.



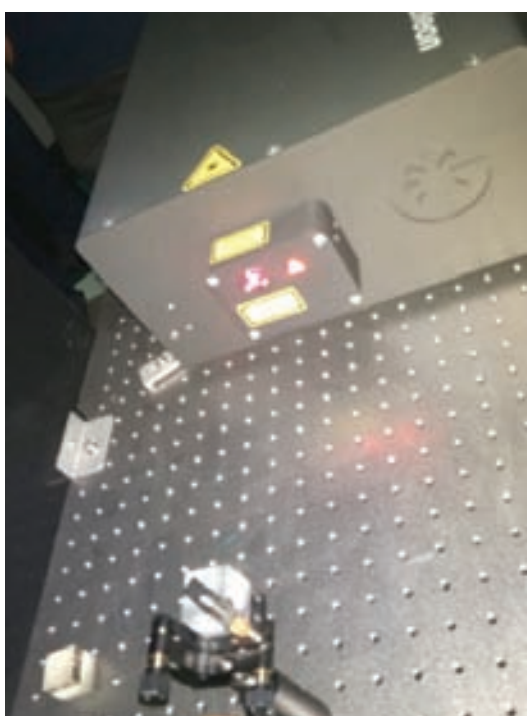
Tier 3 Cluster

The Tier 3 cluster provides local computational resources for the CMS group using a batch queue, storage of large amounts of data using a distributed file system, and access to external computing resources on the WLCG (Worldwide LHC Computing Grid). The Cluster has a theoretical peak performance of 14 TeraFLOPS distributed over 20 compute nodes (with 16 cores and 64 GB memory each). It has a total raw storage capacity of 48 TB, with the nodes connected by an FDR14 Infiniband communication network.



High Frequency Impedance Analyzer-Proton Conductivity Measurement Set-up

MTZ-35 is a bench-top model for impedance analysis with frequency range of 10 μ Hz - 35 MHz along with two humidity chambers for maintaining temperature and humidity for the samples to be analyzed. MTZ-35 deals with the measurement of impedance to check the ionic conductivity of materials.



Ti:Sapphire Femtosecond Laser

This laser can be used to study ultrafast and nonlinear optical effects of plasmonic and excitonic nanostructure. This system provides 140 fs pulses with wavelength that can be tuned from 690 nm to 1100 nm.



Scientific Report

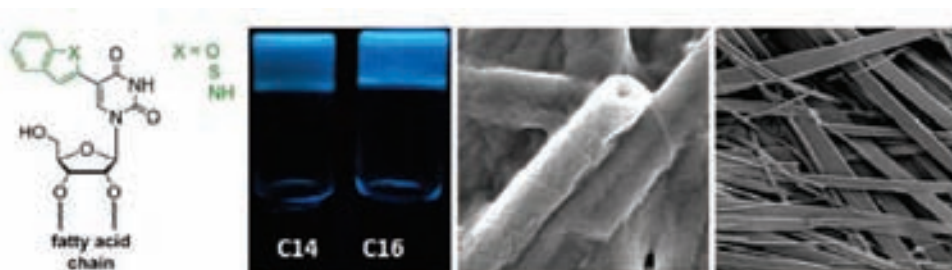
1. Chemical Biology

1.1 Functionalized Nucleobase Analogues for Studying Nucleic Acid Structure and Function

Dr. S.G. Srivatsan's group is interested in developing biophysical platforms to understand the structure-function role of nucleic acids in cell-free and cellular environments and in 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 oligomerization of nucleic acids.

Recently, Dr. Srivatsan's group has been successful in developing functionalized nucleoside analogues that can be easily incorporated into DNA and RNA oligonucleotides and can be used for studying the nucleic acid recognition process. His group has utilized these analogues in developing assays to study the formation of different non-canonical G-quadruplex structures (*Nucl. Acid. Res.* 2015). Multifunction nucleoside probes, which could be used to study the structure and function of nucleic acid simultaneously by fluorescence and NMR spectroscopy and by X-ray crystallography are currently being developed. His group has recently developed a practical chemical labeling and imaging method for cellular RNA by using novel toolbox made of azide- and alkyne-modified UTP analogues (*Nucl. Acid. Res.* 2016). Switchable nucleolipid supramolecular gels that the group developed based on environment-sensitive fluorescent nucleoside analogs have been found to retain or display aggregation-induced enhanced emission. Their gelation behavior and photophysical properties could be reversibly switched by external stimuli such as temperature, ultrasound and chemicals (*Nanoscale* 2016).

Figure 1: Switchable fluorescent nucleolipid organogels (Dr. S.G. Srivatsan's Group)

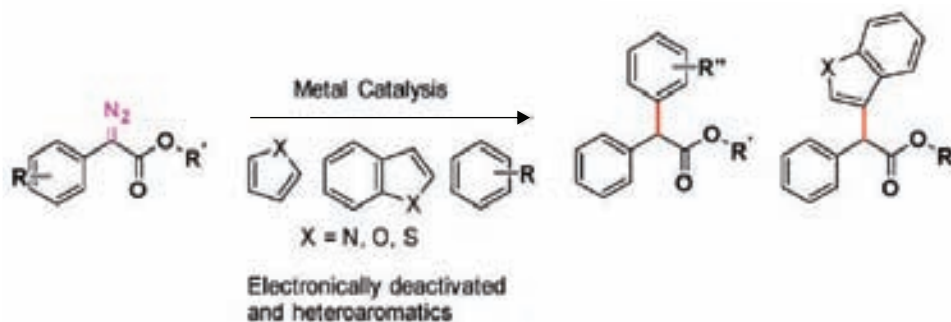


1.2 Strategies for Organic Synthesis and Catalysis

Dr. Ramakrishna Bhat's research group is involved in conducting research in the field of organic synthesis with a focus on asymmetric catalytic synthesis and C-H functionalization, with an emphasis on the development of new synthetic methods that facilitate the construction of complex and bioactive molecules.

Recently, Dr. Bhat's research group has developed novel and practical protocols for the deprotection of acetyl, N-Cbz, benzyl esters groups (*Tetrahedron Lett.* (2015) 56:2067-2070). Currently the lab is focusing on the quinine/Cinchona and thiourea catalyzed asymmetric catalysis (organocatalysis). Efforts are also focused on the metal carbenoid asymmetric intermolecular C-H functionalization using early transition metals at ambient conditions.

Figure 2: Site-selective direct C-H bond functionalization via metal-carbenoid insertion (Dr. Ramakrishna Bhat's Group)

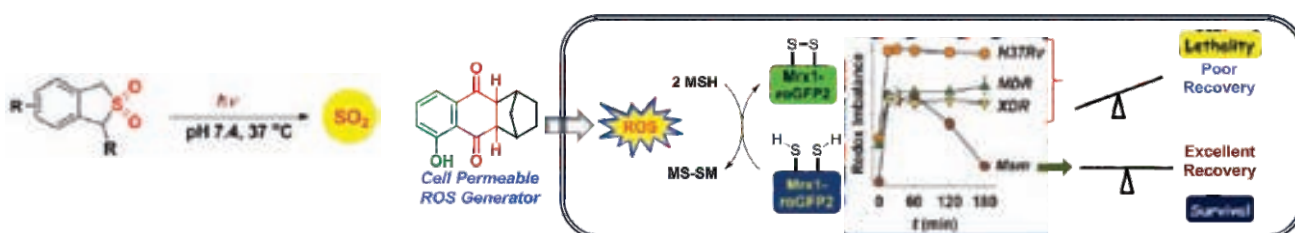


1.3 Controlled Generation of Reactive Species for Therapeutic Applications

Dr. Harinath Chakrapani's laboratory focuses on developing methodologies that facilitate the understanding of biochemical and cellular responses to stress induced by redox-active reactive species derived from oxygen, nitrogen and sulfur. These species play crucial roles in the development of disease, host-pathogen response as well as drug resistance. For example, SO_2 is a gaseous environmental pollutant which is routinely used in industry as a preservative and antimicrobial but few methodologies for controlled generation of this molecule are available. The group has developed a series of benzosulfones that are activated by light to produce sulfur dioxide (SO_2), a reactive sulfur species. A number of thiol-activated sulfur dioxide donors were found to have excellent growth inhibitory activity against methicillin-resistant *Staphylococcus aureus* (MRSA), the causative agent of a bacterial infection that affects millions each year. This study will lay the foundation for a new class of antibacterials based on reactive sulfur species.

Figure 3: (Left) Photochemically activated sulfur dioxide donors; (Right) *Mycobacterium tuberculosis* is uniquely sensitive to redox stress (Dr. Harinath Chakrapani's Group)

Among the drug-resistant bacteria that are a major socioeconomic burden, *Mycobacterium tuberculosis* is perhaps the most difficult to treat. Using the small molecule reactive oxygen species (ROS) generators developed in Dr. Chakrapani's lab, it has been found that this pathogen is uniquely sensitive to manipulation in steady-state endogenous ROS levels, thus suggesting the importance of targeting intramycobacterial redox metabolism for controlling tuberculosis infection.

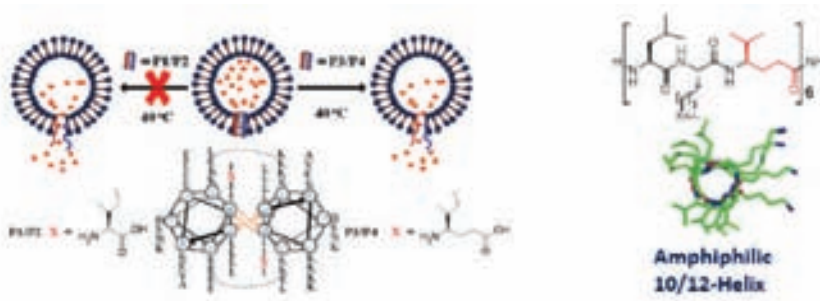


1.4 Hybrid Peptides: Synthesis, Structure and Applications

Research in Dr. H.N. Gopi's group is a combination of organic chemistry, peptides and chemical biology with the ultimate aim of designing inhibitors for protein-protein interactions of various diseases and infections, antibiotics and biomaterials.

Work is mainly focused on exploring the naturally occurring non-ribosomal amino acids along with novel synthetic γ -amino acids towards the design of proteolytically stable protein secondary structure mimetics, and their utilization in the structure based drug design for protein-protein interactions, protease inhibitors, antibiotics (antimicrobials), self-assembled soft biomaterials such as hydrogels, vesicles and nanotubes, and exploitation of these soft biomaterial towards the biology and materials science. Development of new methodologies for the peptide synthesis, peptide ligation and novel amino acids synthesis is also a thrust area.

Figure 4: (Left) Temperature sensitive coiled-coils liposome composites; (Right) Designed potent antimicrobial foldamers (Dr. H.N. Gopi's Group)



Dr. Gopi's group has recently developed peptide nanotubes from supramolecular assembly of hybrid peptide 12-helices and demonstrated their potential utility in casting silver nanowires using silver ions. The group also showed thermo-reversible gelation properties of γ -peptides in various organic solvents as well as hydrogels from short γ -peptides. The thixotropic gelation properties of γ -peptides in PBS buffer, and their excellent biocompatibility can be potentially used in biomedical tissue engineering. Also, temperature and pH modulated coiled-coils have been developed and the "proof-of-concept" principle in their applications as mild temperature and pH sensitive triggers in the controlled release of encapsulated molecules from liposomes has been shown.

1.5 Glycans in the Study of Neuronal Growth

Multivalent glycodendrimers were extensively used as a mimic of cell surface glycans to study carbohydrate-protein interactions. However, these dendrimers are much more effective, if certain properties of dendrimers are tuned. Hence, multivalent probes are designed with additional parameters, where inherent properties of the dendrimers such as symmetry, size and shape were altered to optimize the carbohydrate-lectin binding events. On the other hand, glycodendrimers with different sugar topology provided useful information about the spatial display of glycan and optimal carbohydrate density essential for carbohydrate-lectin interactions. Indeed, these parameters provided valuable insight into the multivalency and dendrimer structures. The intrinsic chirality and shapes of the dendrimers leading to the establishment of carbohydrate-mediated

interactions has yet to be deciphered. Understanding how the stereogenic centers and shapes in glycodendrimers translate their information to the final carbohydrate-protein interactions will generate a new set of rules to synthesize smart glycodendrimers to target and image cell surface lectins.

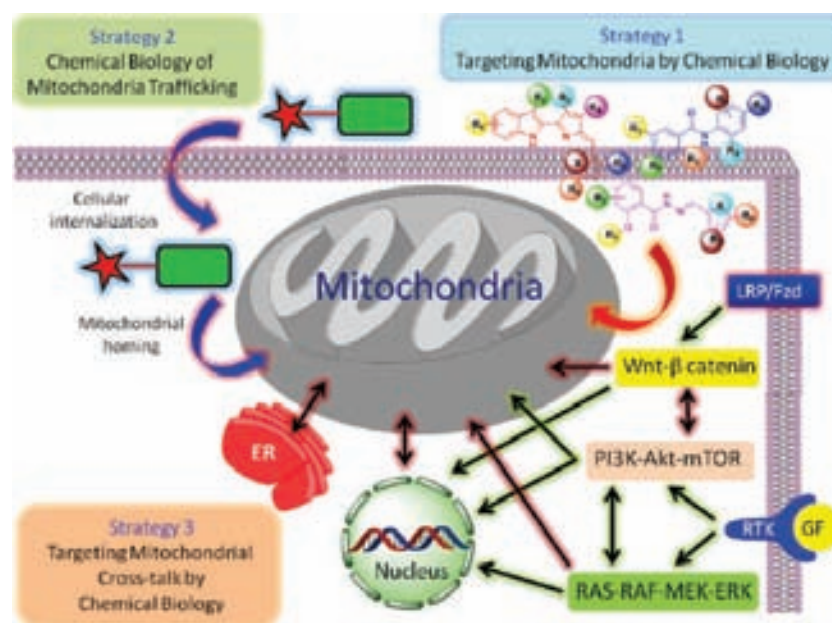
To understand the role of chirality and shape effect, **Dr. Raghavendra Kikkeri's** group used a simple supramolecular conjugation technique to synthesize chiral-metalloglycodendrimers and glyco-gold nanoparticles to study *in vivo* and *in vitro* uptake. Their results showed that inherent chirality and shapes of the dendrimer translate information to the sugars on the surface and fine tune the chiral microenvironment to amplify carbohydrate-protein interactions. These results could set a new rule that can help design synthetic glycodendrimers to target carbohydrate binding lectin on the cell surfaces much more effectively and use them as a tool for single cell level studies.

1.6 Targeting Mitochondria in Cancer

The mitochondrion is a crucial organelle in eukaryotic cells, which, as the powerhouse of the cell, controls cellular bioenergetics via oxidative phosphorylation. It performs diverse yet interconnected cellular functions and plays a vital role in cell death pathways. Mitochondrial dysfunctions are associated with an increasingly large number of human inherited diseases as well as common diseases like neurodegenerative disorders, cardiomyopathies, metabolic syndromes, obesity and cancer. As a result, mitochondrion has emerged as a potentially important, but seemingly neglected therapeutic target.

Currently, therapeutic strategies targeting mitochondria in diseased states are elusive. For successful targeting in diseased states, the key challenges in mitochondrial chemical biology are manifold: (a) understanding the complex interconnected mitochondrial signaling cascades; (b) modulating and targeting of mitochondrial signaling in diseased states; (c) understanding the cross-talk of mitochondria with other signaling hubs or sub-cellular organelles; and (d)

Figure 5: Targeting mitochondria in cancer
(Dr. Sudipta Basu's Group)



synchronized targeting of mitochondria and related signaling hubs for improved next generation therapeutics.

To address these challenges, **Dr. Sudipta Basu's** group is currently developing different strategies inspired by chemical biology based tools and techniques to target mitochondria (as signaling hub) in cancer (as disease model).

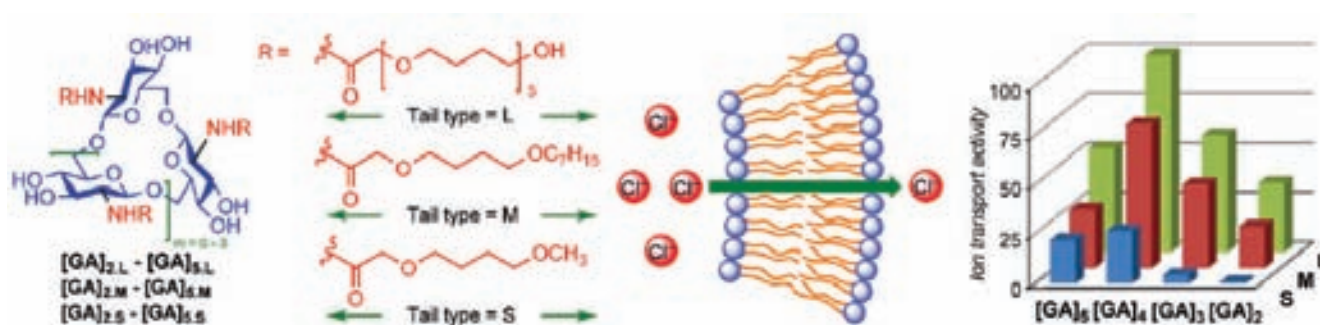
1.7 Synthesis, Self-Assembly and Sensing

Noncovalent interactions play a crucial role in assembling multiple organic molecules. **Dr. Pinaki Talukdar's** lab is developing small organic molecules and studying their self construction of supramolecular structures to study their functions.

Towards the goal of developing synthetic receptors for ions and studying their ion transporting ability across lipid membranes, the group has recently developed cyclo-oligo-(1→6)-β-D-glucosamines, functionalized with hydrophobic tails, as a new class of transmembrane ion-transport system. These macrocycles with hydrophilic cavities were introduced as an alternative to cyclodextrins, which are supramolecular systems with hydrophobic cavities. The transport activities of these glycoconjugates were manipulated by altering the oligomericity of the macrocycles, as well as the length and number of attached tails. All glycoconjugates displayed a uniform anion-selectivity sequence: $\text{Cl}^- > \text{Br}^- > \text{I}^-$. From theoretical studies, hydrogen bonding between the macrocycle backbone and the anion bridged through water molecules was observed. The self-assembly of a 1,2-diol appended naphthalene diimide derivative which features chiral and J-type aggregation has also been investigated. In MCH/CHCl₃, the compound exhibited intense yellow excimer and thermoreversible "sol-gel" behavior.

Figure 6: Synthetic molecular systems for transmembrane chloride ion transport (Dr. Pinaki Talukdar's Group)

In a different area of research Dr. Talukdar's group is interested in the design and development of fluorescent probes for sensing species which are of biological interest. Present designs are focused towards the development of probes for the selective detection of cations, anions, biological thiols, thiophenols, hydrogen sulfide, etc.



1.8 Chemical Physiology and Optical Molecular Imaging

The second half of 20th century has witnessed the prowess of chemists to design and engineer elegant complex molecules. However, there was a shift in the paradigm towards syntheses of molecules with defined function rather than

defined structure. As the focus of chemistry changes from structure to function, the present challenge of chemical community is "Synthesis of New Function" through engineering of small molecule and biomacromolecules. Dr. Britto Sandanaraj's group is interested in designing new (macro) molecules for applications in the area of chemical biology/physiology and molecular imaging. The following areas are being focused on.

- (i) Developing new technologies for accurate and specific detection of "active enzymes" *in vivo*
- (ii) Activity-based protein profiling technology
- (iii) Synthetic protein chemistry: Molecular tinkering of proteins using chemical tools to synthesize new functions

1.9 Natural Product Synthesis

Dr. Gnanaprakasam's research group is working on developing sustainable approach towards the synthesis of bioactive natural products. In this direction, his research group has developed an efficient method to produce substituted amide and 3-hydroxy functionalized 2-oxindole by using alcohols and Ru-catalyst. Presently, this methodology is being focused for the synthesis of Arundaphine alkaloid. The group is also developing new synthetic processes for the industrial importance under flow techniques. In addition, his research group is developing catalytic processes for the synthesis of bio-active natural products. The key intermediate for Baulamycin has been synthesized. Further investigation on coupling of the key intermediate towards the total synthesis of Baulamycin antibiotic is under progress.

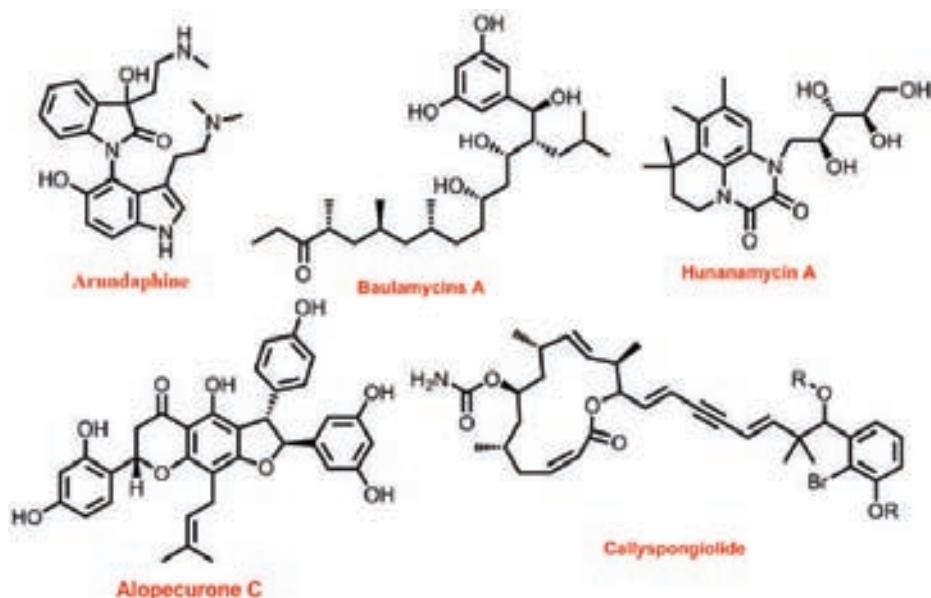


Figure 7: Targeted biologically active natural products (Dr. Gnanaprakasam's Group)

Dr. Gnanaprakasam's group has also developed a highly enantioselective method for the synthesis of (S)-2-(2,4-dihydroxyphenyl)-5,7-dimethoxychroman-4-one, which is the core structure of the Alopecurone C. Further, structural modification on (S)-2-(2,4-dihydroxyphenyl)-5,7-dimethoxychroman-4-one to complete the total synthesis of the Alopecurone C is under progress.

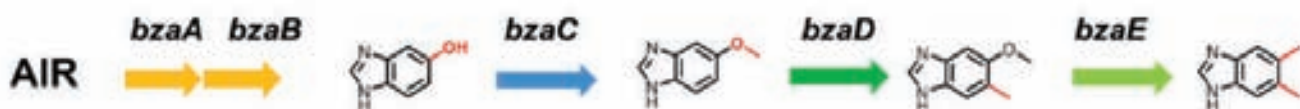
1.10 Chemical Biology of Microbes

Figure 8: The *bza* operon consists of *bzaA*, *B*, *C*, *D*, and *E* genes. The gene products of *bzaA* and *bzaB* have been shown to convert 5-aimnoimidazole ribotide (AIR) to 5-hydroxybenzimidazole. The mechanistic roles of the gene products of *bzaC*, *bzaD* and *bzaE* are being explored. (Dr. Amrita Hazra's Group)

Dr. Amrita Hazra's research explores the vast chemical space that exists within biological systems, especially in the microbial world, using the tools of mechanistic enzymology, analytical chemistry, and genetics.

Microbes have evolved since billions of years to thrive in diverse environmental niches and conditions. Their evolution is accompanied by a staggering range of diverse metabolic reactions and the production of a rich repertoire of biomolecules, enabling survival in varied environmental conditions. Dr. Hazra's group wishes to investigate the genetic pathways and molecular and enzymatic mechanisms involved in the metabolism of microbial systems.

Current projects include the mechanistic enzymology of the enzymes *bzaA-E* involved in the anaerobic biosynthesis of 5,6 dimethylbenzimidazole, the lower ligand of Vitamin B12 and studying the mechanisms of thermoprotection of heat unstable metabolites in thermophiles.



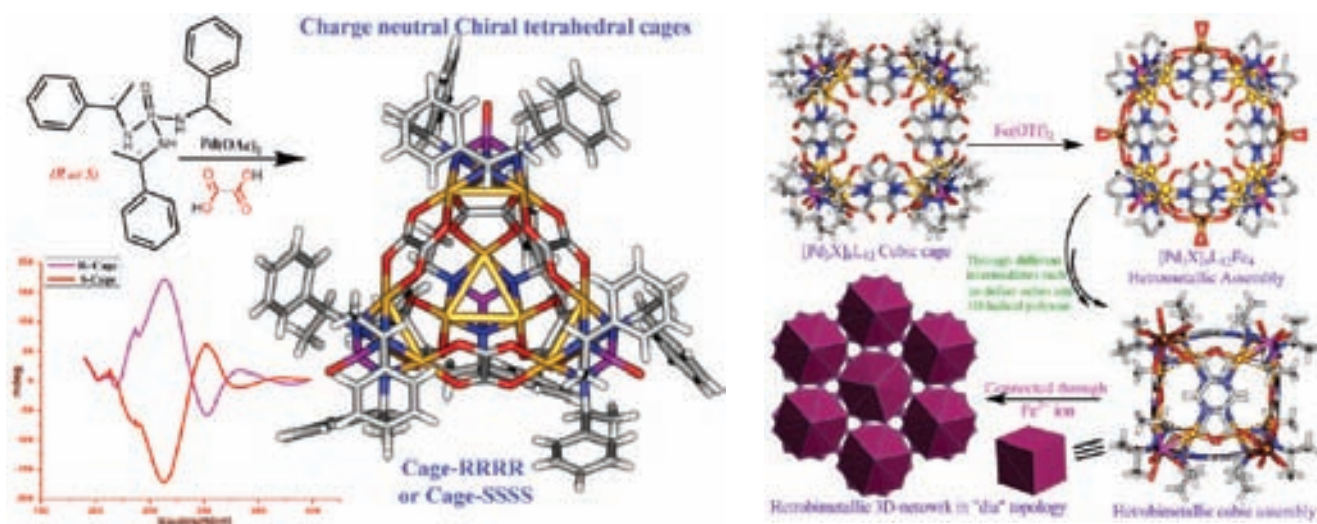
2. Materials Science and Nanoscience

2.1 Inorganic, Supramolecular and Nonlinear Materials Chemistry

The research interests of Dr. R. Boomishankar's group involve the development of novel molecular systems based main-group scaffolds and to address the problems in functional supramolecular chemistry and materials science.

His group has pioneered the stabilization of the highly basic imido (phosphate) trianions, $[(RN)_3PO]^{3-}$ ($(X)^{3-}$) (analogous to $[PO_4]^{3-}$ ion), in the polar protic medium as its trinuclear imido- Pd_3 species. This cis-protected imido- Pd_3 unit has been shown to act as novel polyhedral building unit (Pd_3X -PBU) for neutral polyhedral cages in the presence of suitable linker ligands. Further, by employing chiral phosphoramidate precursors, their group has synthesized the first examples of enantioselective neutral tetrahedral cages (Figure 9). These cage molecules have been shown to encapsulate small chiral guest molecules such as epichlorohydrin, glycidol, propylene oxide and 2-methyl tetrahydrofuran in an enantioselective fashion. In a different approach, they have shown a stepwise conversion of a homometallic cubic cage assembly based on these Pd_3X -PBUs, featuring active coordinative functional groups at the polyhedral periphery, to chiral cage-

Figure 9: (Left) Formation of chiral neutral polyhedra from enantiopure phosphoramidate ligands; (Right) Observation of structural snapshots during the conversion of a neutral cubic cage to a cage connected 3D-framework (Dr. R. Boomishankar's Group)



Due to the current interest in the exploration of the use of ferroelectric metal-organic materials for high technique application, his group investigates the formation of polar metal-organic materials based on axially symmetric di- and tripodalpyridyl functionalized phosphoramidate ligands. In this effort, their group has earlier described a new family of cationic $[Cu^II L_2]_n$ based frameworks derived from flexible and less symmetric dipodal phosphoramidate ligands of the type $[PhPO(NHPy)_2]$, (Py = 3-pyridyl (3Py) or 4-pyridyl(4Py)), which showed tuned ferroelectric responses depending upon the counter anions, dimensionality of the framework and other guest molecules present in them. Inspired by the rich ferroelectric behaviour of infinite metal-organic materials, they next focussed on the existence of ferroelectric order in discrete molecular cavitands/cages based on such pyridyl functionalized P(V) ligands. Thus, they have found that a charge-separated assembly of a Ni(II) tetrameric cavitand, built on the $[PhPO(NH^3Py)_2]$ ligand, and nitrate anions show excellent ferroelectric behaviour. In addition, the unit cell packing of the Ni-cavitand shows the formation of 1D-nano channel structure that can be filled with an array of hydrated alkali metal cations facilitating a tuned ferroelectric coercive field (Figure 10). In another attempt, they were able to show the possibility of an elusive anion induced polar order in an otherwise nonpolar octahedral $[Zn_6L_8]^{12+}$ cages that are derived from the tripodal ligand $[PO(NH^3Py)_3]$ (Figure 10). In addition, their group has recently found that simple heteroleptically substituted phosphonium salts can also be crystallized in polar symmetry and show ferroelectric order at room temperature. Synthetic efforts are currently focussed on obtaining novel examples of cationic phosphonium stabilized materials that exhibit improved ferro-, pyro-, and piezoelectric responses.

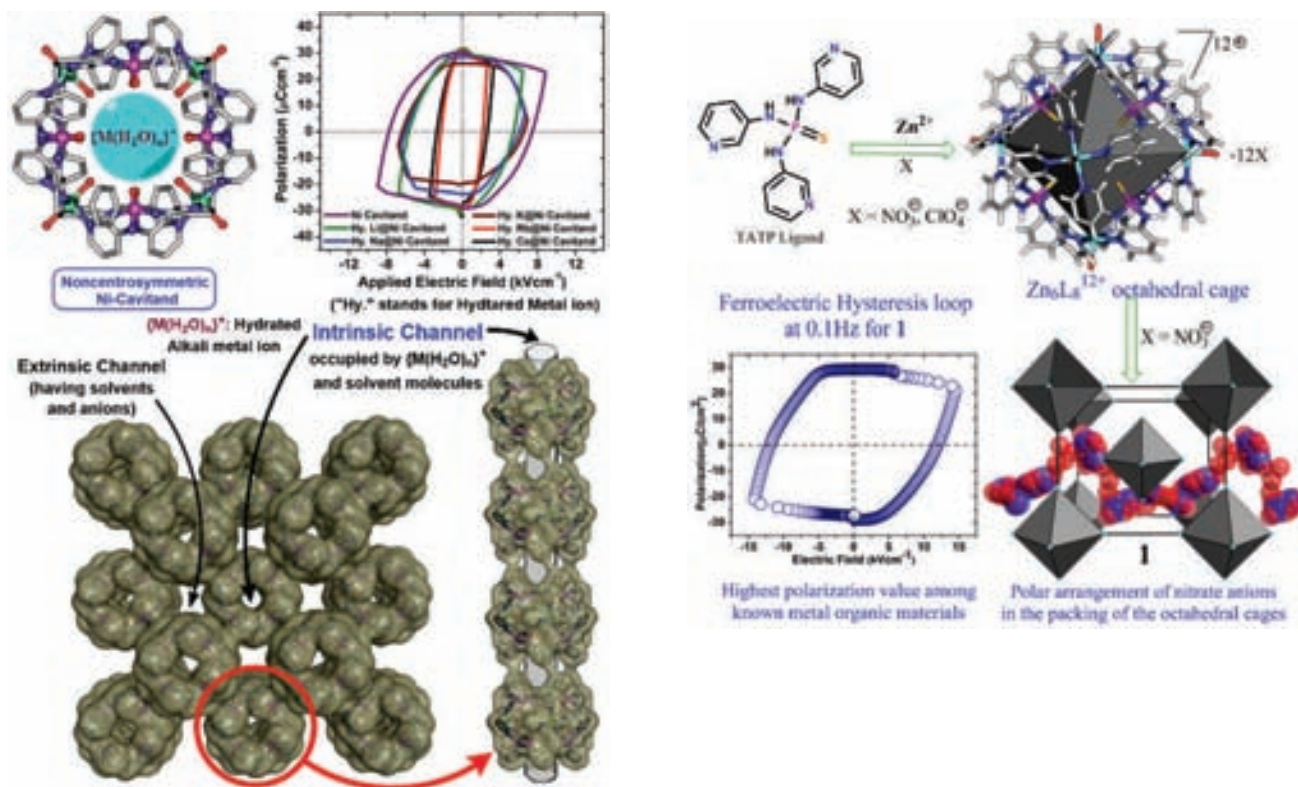


Figure 10: (Left) A polar Ni_4 -cavitant showing guest encapsulation and ferroelectric behaviour; (Right) Anion-induced ferroelectric polarization in a cationic octahedral cage assembly (Dr. R. Boomishankar's Group)

In contrast to pyridyl functionalized P-N scaffolds, access to such peripherally functionalized ligands on the isoelectronic Si-O cyclic platforms are not that straightforward. This is owing to the difficulties associated with metal catalysts that are not tolerant to functional groups and the degrees of conformational freedom exhibited by the cyclic Si-O groups. In this regard, their group has been able to successfully employ a Heck-type coupling approach to synthesize tetra-pyridyl functionalized cyclotetrasiloxane derivatives in three different stereoisomers and subjected them to metal coordination for obtaining coordination polymers built on stereoregular cyclosiloxanes. Recently, their group has developed a dense cobalt (II) octahedral cationic cage, based on tripodalpyridyl functionalized silane ligand, which shows excellent photocatalytic activity towards water oxidation reaction with very high turnover efficiencies.

2.2 Metal-Organic Frameworks

Dr. Sujit Ghosh's laboratory works on the coherent development and systematic studies of metal-organic framework (MOF)/ porous coordination polymer (PCP) based porous functional materials for serving chemical industry, energy and environmental applications.

From the application perspective, the separation of liquid phase hydrocarbons, especially those having similar physical properties and comparable molecular sizes, is highly challenging for industrial applications. In this context, the industrially crucial separation of benzene (Bz: planar π -cloud entity) and cyclohexane (Cy: chair or boat configuration) poses a pressing challenge. Employing a predesigned diaminotriazine (DAT) core-based π -electron deficient carboxylate ligand, his group has developed a two-dimensional new dynamic

MOF (DAT-MOF-1) with highly electron-deficient pore surface. Substantiating the anticipated selective interplay of Bz with DAT-MOF-1, the single component vapor sorption experiments for both the solvents Bz and Cy when measured at 298 K revealed the striking difference between their respective uptake amounts (1.5 mol kg^{-1} for Bz, while only 0.2 mol kg^{-1} for Cy) (Figure 11b). As a first-of-its kind convergent approach, the diaminotriazine core's π -electron-deficiency coupled with the mutual attendance of lewis basic primary amino moieties for the reported DAT-MOF-1 has been strategically exploited for the achievement of selective benzene sorption over its aliphatic analogue cyclohexane (Figure 11a). (*Chem. Commun.* (2015)51:15386-15389).

Figure 11: a) Schematic representation of the strategic employment of π -electron deficient diaminotriazine (DAT)-functionalized pore surface for exhibiting a selective interplay with benzene over cyclohexane; b) Perspective view of a single pore of DAT-MOF-1 along crystallographic a axis; c) Solvent sorption isotherms of compound DAT-MOF-1 recorded at 298 K for Bz and Cy. Closed and open symbols denote adsorption and desorption, respectively. (Dr. Sujit Ghosh's Group)

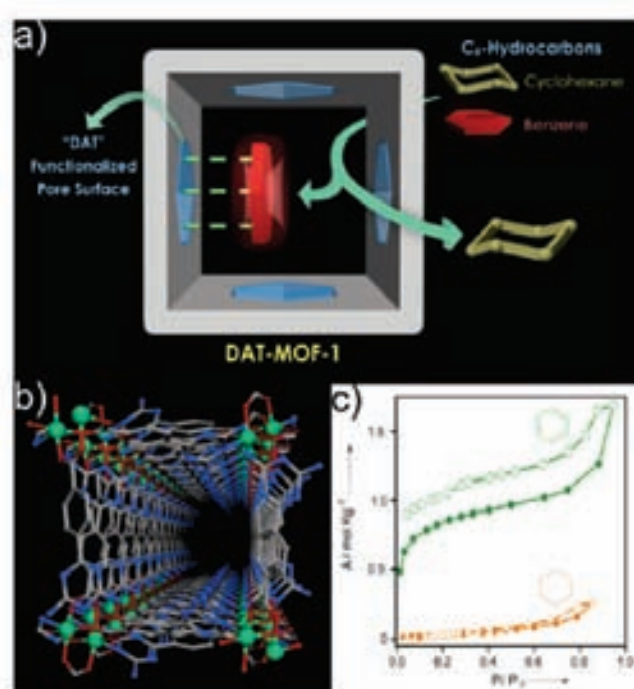
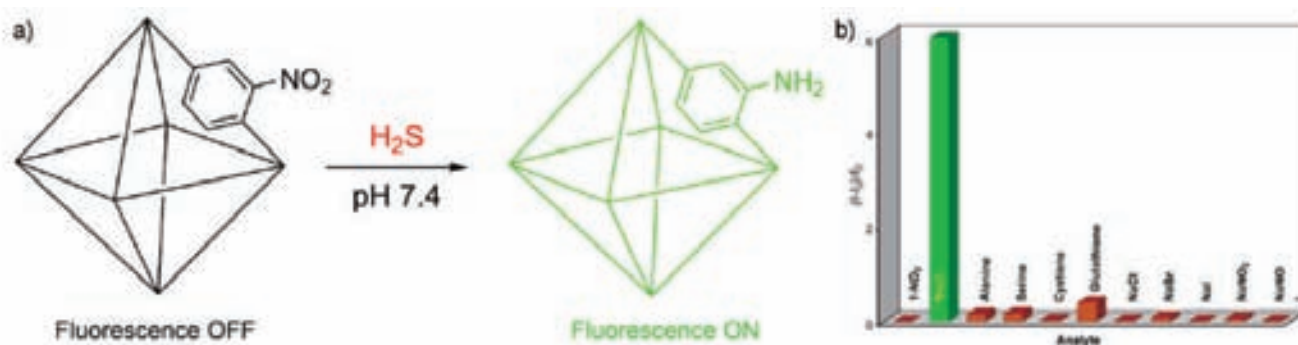


Figure 12: (a) Schematic illustration of H₂S sensing by a nitro-functionalized MOF; (b) Comparison of fluorescence response of MOF to H₂S and other competing chemical species (Dr. Sujit Ghosh's Group)

Hydrogen sulfide (H₂S) which is released as a by-product from a range of industries, is a colorless flammable gas with a distinct egg-like smell. It has been recently regarded as the third signaling molecule in biological systems after nitric oxide (NO) and carbon monoxide (CO). Apart from its toxic effects upon prolonged exposure, H₂S has been found to regulate several biological processes in living cells. Thus, to gauge the precise understanding of H₂S reactivity pathway,



design and development of artificial sensors working in living cells is an active area of research. H_2S is highly volatile, has high lipid solubility and fast diffusion under cellular conditions making it a difficult molecule to probe. In this regard reaction-based fluorescence sensing has commanded significant attention. The reduction of nitro ($-\text{NO}_2$) group by H_2S has been well understood, although no notable progress has been reported with regard to development of sensors. Combining this knowledge, Dr. Ghosh's group has investigated a nitro-functionalized metal-organic framework (MOF) having a pendant active site for the selective & rapid detection of H_2S (Figure 12a). The MOF has been found to respond selectively to H_2S even in concurrent presence of potentially interfering chemical species (Figure 12b). (*Chem. Eur. J.* (2015) 21:9994-9997)

2.3 Synthesis of Main Group Cations (e.g. R_3Si^+ , R_2Si^{2+} , RGe^+ , RSn^+) and their Application in Catalysis

(a) Synthesis of Si/B and P/B based frustrated lewis pair and their reactivity toward small molecules

Frustrated Lewis pair (FLP) is a combination of a Lewis acid and a Lewis base where the simple adduct formation is precluded due to steric demand. It has shown its potential to activate H_2 reversibly. Recent work has extended the list of H_2 activation by FLP systems to include borane complexes of carbenes, amines and phosphines. Apart from these, there are some other exciting reactions shown by FLPs including the addition to small molecules such as CO_2 , N_2O , NO , alkenes, alkynes, dienes, diyenes, azides, and P4 and cleavage of several bonds e.g. C-H, B-H, C-O etc. There is no example of silicon based FLPs. All the FLPs reported till date are P/B, N/B, C/B, and C/C based FLPs. Dr. Shabana Khan's research group is currently exploring the potential of Si(II) compounds as a base in FLP chemistry. Similarly, intramolecular FLPs are scant and seeing their potential to activate H_2 reversibly, development of new small P/B based intramolecular FLPs which can further be utilized in catalysis has been initiated.

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

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

2.4 Metal-catalyzed C-H Bond Activation

Biphenol units are present in various natural products, drug molecules and functional materials. In addition, biphenol molecules are efficiently used as ligands in various organic transformations including enantioselective reactions. Dr. M. Jeganmohan's group has reported a practical route to synthesize unsymmetrical

biphenols via the oxidative cross-coupling of two different phenols in the presence of $K_2S_2O_8$ and $Bu_4N^+HSO_3^-$ in CF_3COOH at ambient temperature under air. The Cyclic Voltammetry study clearly reveals that the oxidation potential of phenol up to 0.7 eV nicely reacts with $SO_4^{\cdot-}$, providing the corresponding cationic phenolic radical intermediate. The sulfoximine is a pivotal structural motif which presents in various biologically active molecules, pharmaceuticals and agrochemicals. Synthesis of tricyclic dibenzothiazines by a ruthenium-catalyzed *ortho*arylation of phenyl sulfoximines with aromatic boronic acids followed by intramolecular cyclization in the presence of palladium catalyst in the consecutive two steps has been demonstrated.

Figure 13: Oxidative cross-coupling of two different phenols (Dr. M. Jeganmohan's Group)



The pyrroloquinoline unit present in various agrochemicals, drug molecules, natural products and materials shows potent biological activity towards conditions such as asthma, obesity etc. Dr. Jeganmohan's group has reported a convenient route to synthesize pyrroloquinolinone derivatives via a ruthenium-catalyzed base free oxidative cyclization of *N*-carbamoyl indolines with alkynes. The group has also demonstrated an oxidant free *ortho*allylation of substituted aromatic ketoximes or amides with allylic acetates in the presence of ruthenium catalyst at room temperature under mild reaction conditions. In the alkenylation reaction, mostly, the electron lone pair of nitrogen or oxygen atom of directing groups coordinates with the metal complex through σ -coordination and activates the C-H bond of organic moieties selectively. They reported nitrile as a π -bond coordinating group for the *ortho* alkenylation of aromatic and heteroaromatic nitriles with activated alkenes in the presence of a ruthenium catalyst. Later, *ortho* alkenylated aromatic nitrile was converted into chiral phthalide in the presence of AD-mix- β .

2.5 Multifunctional Magnetic Nanoparticles

The main research focus of Dr. Seema Verma's laboratory is to develop novel low temperature synthetic routes to obtain highly monodispersed nanocrystals using suitable surfactants and to achieve the generic strategy to obtain nanocrystals of different shapes, sizes and morphology. Hematite ($\alpha-Fe_2O_3$) in nanoscale has attracted the attention of the scientific community due to its low toxicity, great abundance, magnetic, optical, electronic properties and more recently as a photoanode to efficiently convert solar energy into chemical energy. Therefore, it is

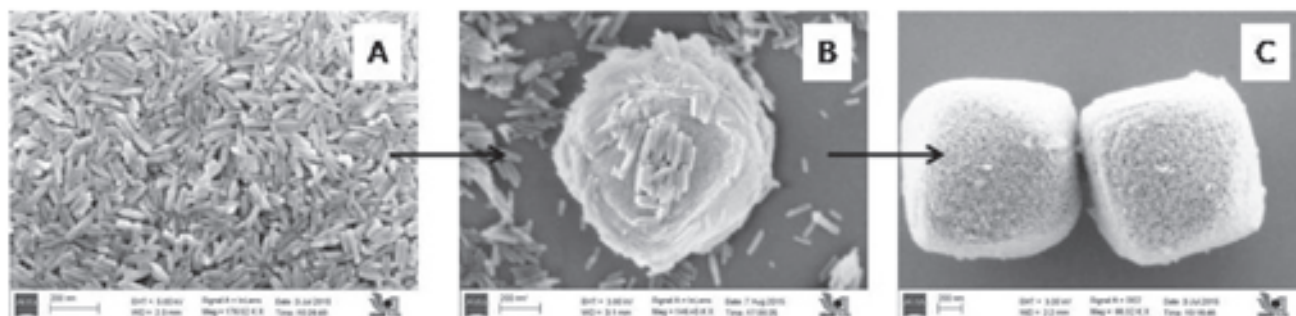


Figure 14: FESEM images of (A) β -FeOOH; (B) Intermediate phase; and (C) α -Fe₂O₃ phase (Dr. Seema Verma's Group)

desirable to develop a facile approach to controllably synthesize iron oxide nanostructures with ideal performance.

Dr. Seema Verma's group is standardizing the morphology-controlled synthesis of nanocrystals that show unique magnetic and electrochemical properties. Hematite formation was proposed to proceed through two steps: first, hydrolysis of Fe³⁺ in aqueous solution to form β -FeOOH precursor, and second, a topotactic transformation of resulting β -FeOOH to α -Fe₂O₃ phase (Figure 14). The group's work has found that the morphology, shape, and sizes of the nanocrystals are strongly governed by the reaction parameters. This enables selecting appropriate size and shape of the nanocrystals for different technological and biomedical applications.

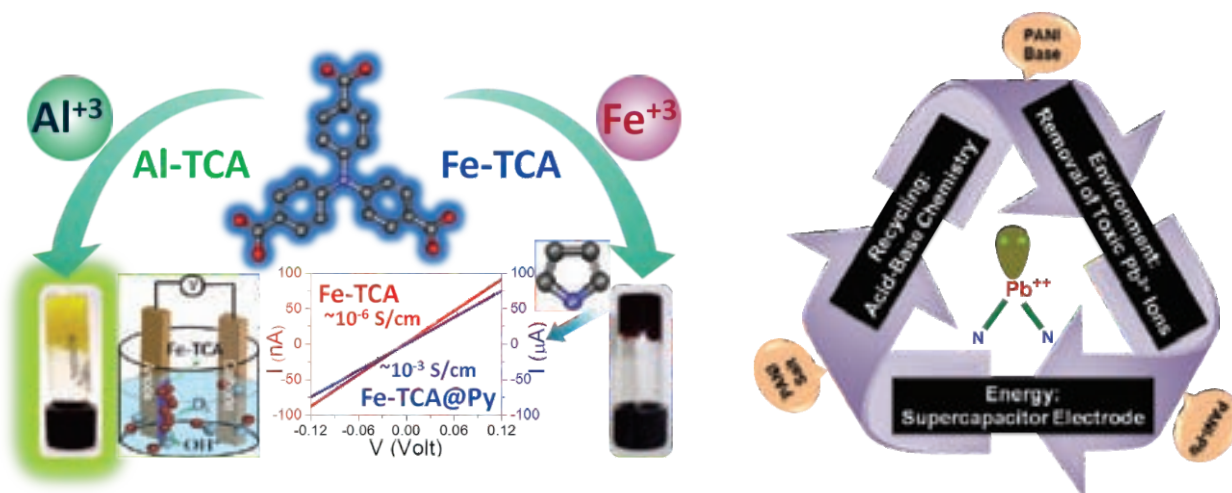
2.6 Self-Assembly of Gold Nanoparticles and Supramolecular Assembly of Polyaniline

Figure 15: (Left) Preparation and characterization of coordination polymers of Fe(III) and Al(III) ions with the 4,4',4''-tricarboxyltri phenylamine (TCA) ligand; (Right) Polyaniline (PANI) as an important material in both environment and energy related research (Dr. Nirmalya Ballav's Group)

Work from Dr. Nirmalya Ballav's group led to the following outcomes.

(a) Wet-chemical co-reduction method

A robust wet-chemical co-reduction method was developed for synthesizing citrate-stabilized and homogeneously-alloyed Au–Ag NPs with average size sub-10 nm – as per the feeding moles of HAuCl₄ and AgNO₃. By exploring the power of wet-chemistry, more than a decade old problem in the standard NaBH₄ co-reduction was solved by the use of NH₄OH; and the alloying of Au and Ag was achieved well-above the solubility product of AgCl.



(b) Coordination polymers of Fe(III) and Al(III) ions

Coordination polymers of Fe(III) and Al(III) ions with the 4,4',4''-tricarboxyltri phenylamine (TCA) ligand were prepared and distinctive behavior in their physicochemical properties was observed. The group attributes such distinctive properties to their observation that the frontier orbitals (HOMO and LUMO) are mostly metal-centered and ligand-centered for the Fe–TCA and Al–TCA systems, respectively, as revealed by DFT calculations.

(c) Self-assembled EB-Pb nanocrystals

An unusual affinity of aqueous Pb(II) ions toward polyaniline (PANI) emeraldine base (EB) producing self-assembled EB-Pb nanocrystals was demonstrated. The electrochemical device based on recycled-polyaniline emeraldine salt (ES) showed high energy density of ~14.8 Wh/kg at a power density of ~663 Wh/kg as well as excellent cycling stability with less than 15% degradation in course of 1100 cycles of continuous operation.

2.7 Colloidal Nanocrystals: Optoelectronics, Surface Modification and Photophysics

Dr. Angshuman Nag's group explores nanoscale physical phenomena, in order to achieve functional inorganic semiconductor nanocrystals. The specific interest is on developing colloidal semiconductor nanocrystals with desired electronic structures that can give rise to interesting photophysical, magneto-electric and magneto-optic properties. These properties were studied in solutions, thin films (employing active device geometry), and also at the level of single nanocrystal. This work was interdisciplinary in nature involving materials chemistry, spectroscopy, and condensed matter physics. Three of the group's major research directions are discussed below:

(a) Plasmonic and magnetically doped colloidal metal oxide nanocrystals

The group has developed a unique category of material that simultaneously exhibits plasmonic, magnetic and magneto-electric interaction. This has been achieved via doping a magnetic ion such as Mn^{2+} or Fe^{3+} or Cr^{3+} in a colloidal transparent conducting oxide ITO (Sn^{4+} -doped In_2O_3) nanocrystals that localized surface plasmon resonance (LSPR) in the infrared region. LSPR provides a unique and advantageous readout to probe delocalized CBe, unlike all other prior studies on bulk samples, and therefore, allows one to study whether delocalized CBe can mediate ferromagnetic exchange interaction among distant localized magnetic ions such as Mn^{2+} .

(b) Ligand-free semiconductor nanocrystals for optoelectronics

Integration of nanocrystals in electronic and optoelectronic devices like photovoltaics, light-emitting-diodes (LEDs), photodetectors and printable electronics depends on the electronic property of the nanocrystal film, and thus on the interconnect between adjacent nanocrystals. However, colloidal nanocrystals are generally capped with an insulating organic layer. Consequently, the benefits of quantum confinement effect and solution processibility cannot be utilized because of inefficient injection or extraction of charge carriers. Dr. Angshuman

Nag's group has worked on designing organic-free metal chalcogenide semiconductor nanocrystals for various optoelectronic applications including solution processed transparent conductor, flexible and electronic grade semiconductor film, photocatalyst for water splitting, and solar cells.

(c) Colloidal CsPbX₃ (X = Cl, Br, I) perovskite nanocrystals: Optical properties

Solution processed organic-inorganic hybrid perovskite such as CH₃NH₃PbI₃ is one of the most celebrated material of recent times because of exhibiting ~20% solar cell efficiency. Dr. Nag's group is developing an intrinsically new kind of luminescent material using colloidal nanocrystals of CsPbX₃ perovskite and other metal halides. Colloidal CsPbBr₃ nanocrystals (11 nm) exhibit ~90% PL quantum yield with very narrow (FWHM = 86 meV) spectral width. FWHM of a single-nanocrystal and ensemble are almost identical, ruling out the problem of size-distribution in PL broadening.

2.8 Main Group Chemistry - Catalysis and Materials Applications

Dr. Moumita Majumdar's research focus is on the development of metallosilicon hybrid functional materials that are directed towards electronic applications. In this effort, her group has established synthetic methodology to combine functionality provided by the metal center and silicon framework and extended the work to other heavier Group 14 congeners. Currently, the extent of orbital overlap in such systems is being studied. The group aims to develop metallosilicon hybrid systems with improved charge transport pathways that would lead to implementations in electronic devices and to extend their efforts in the realm of metallosilicon polymers.

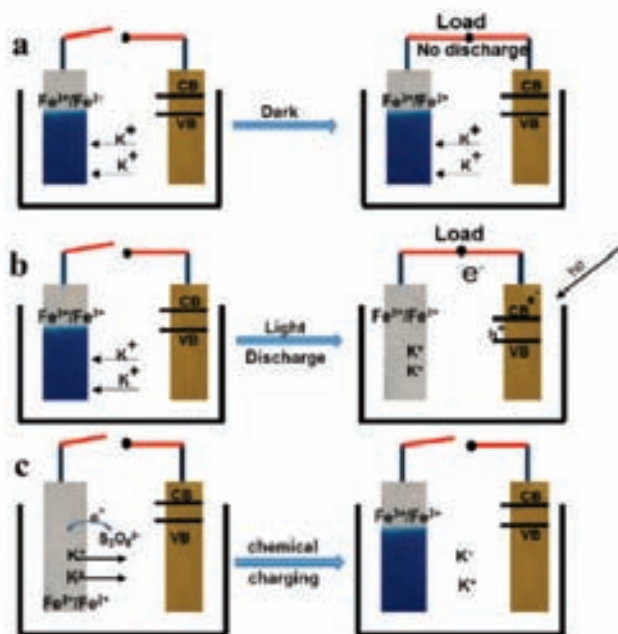
2.9 Energy Storage and Conversion

For addressing climate change due to inconsiderate use of fossil fuels, development of efficient electrochemical energy storage and conversion devices is critical.

The rechargeable lithium-ion battery has revolutionised portable electronics. However Li-ion batteries, with LiCoO₂ and Li transition metal oxides as the Li active materials, used widely today face serious problems relating to safety and resource costs. The raw materials extraction and electrode processing techniques require large amounts of energy. Additionally, the rechargeable batteries must be recycled from regular solid wastes. A thermal recovery process reclaims the metals and prepares them for use in new products but the associated cost and emissions would not be negligible for the foreseeable future.

Dr. Mustafa's laboratory is working on the complex phenomena at the electrode/electrolyte interface by a range of physicochemical techniques to understand the double layer structure in detail. Towards solving some of the critical issues facing the rechargeable batteries, fuel cells and supercapacitors, the group has explored the possibility of light to trigger discharge and charge reactions in batteries to develop solar batteries.

Figure 16: (a) Reactions in the dark; (b) Discharge reactions in the ambient light; (c) Rapid recovery of battery active species (Dr. Musthafa's Group)



Dr. Musthafa's group has successfully demonstrated ambient light assisted power production in a battery wherein light is used as the anode to actuate a discharge reaction in its cathode. By employing a range of techniques, they proved that the battery discharge chemistry was light driven. This brought in an unprecedented means for charging the battery rapidly using chemical charging agents and it revitalized the battery in 30 seconds without any external bias.

Apart from bringing out a sustainable way for power production, this device has opened up avenues for charging the battery in the likely events of electrical input unavailability while solving the critical issues of longer charging time and higher charging voltage.

Further, they have successfully developed a simple, inexpensive and portable soil moisture sensor by bringing in the concept of galvanic cells using simple architectural components such as AI and

redox active conducting polymers. The developed galvanic sensor is first of its kind in moisture analysis.

Unlike the state-of-the-art soil moisture sensors, it does not require an external power input to function, is light in weight, the moisture sensor is probe-size independent and the sensor can be regenerated by simple treatment with acidic water. This device will be beneficial for developing effective and energy efficient irrigation strategies, understanding the heat and water transfer at the atmosphere-land interface, meteorology, soil mechanics etc.

The group is currently working on developing an efficient electro-catalyst for water splitting reaction, novel architect for water desalinization and novel pathways for charging supercapacitors.

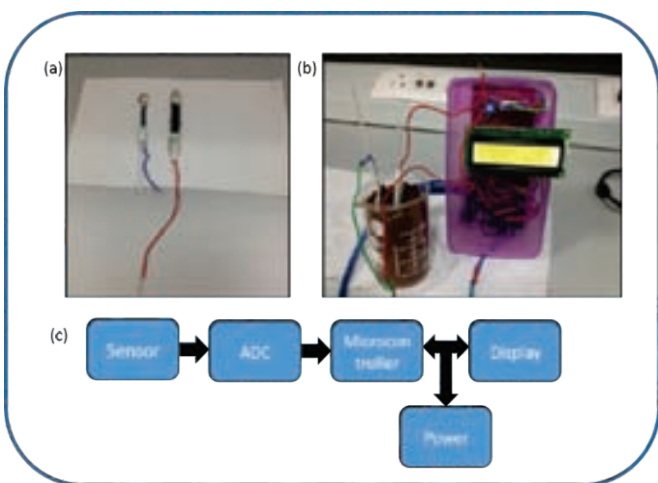


Figure 17: Architectural components of moisture sensor (a) AI and PANI sensing electrodes; (b) The complete soil moisture sensing device with alphanumeric liquid crystal display, output of sensor is given to microcontroller and the display system; (c) Block diagram of the sensing device (Dr. Musthafa's Group)

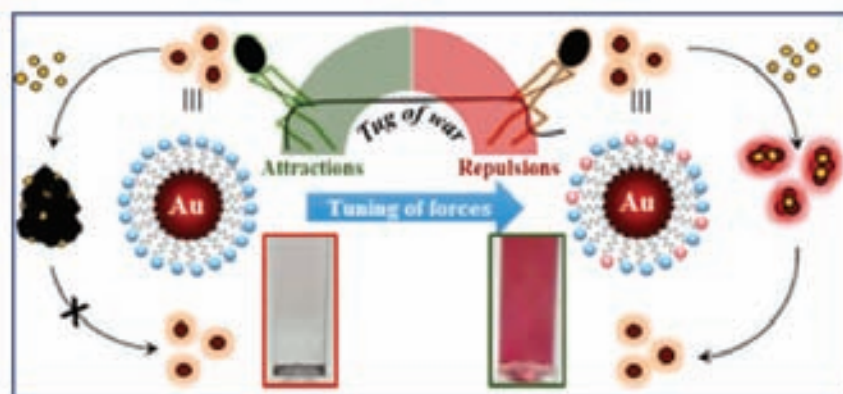
2.10 Regulation of Interparticle Forces at the Nanoscale

Dr. Pramod Pillai's laboratory is working on the design and synthesis of hybrid nanomaterials for fundamental as well as applied studies to address two global issues: energy and therapeutics. Using new methodologies, the group is working on fabricating hybrid nanomaterials based on organic-inorganic, metal-metal and metal-semiconductor nanomaterials and on studying their new advanced properties.

Recently, they have regulated the interparticle forces in heterogeneously charged metal nanoparticles (NPs) to reveal the phenomenon of controlled aggregation, which successfully translated into reversible trapping and scavenging of toxic ions. A perfect balance between the attractive and repulsive forces was achieved by tuning the [+] and [-] ligands on the surface of heterogeneously charged metal NPs. The NP-ion aggregates were stable for ~2 days, with a visible color change, which makes them available for scavenging from the site of action.

The incorporation of 'potent' forces like repulsions, rather than a mere dilution of attractive forces, was necessary to ensure the formation of controlled aggregates. The net surface charge of NPs was conveniently modified to trap ions irrespective of their charge and binding strength. More importantly, the regulation of interparticle forces imparted a new function of selectivity towards trapping of toxic ions in carboxylate functionalized NP system. This approach of regulating the interparticle forces to achieve long term stability for NP - toxic ion aggregate is a big step forward towards improving NP functionalities. The ability to control nanoscale forces beyond the trapping & scavenging phenomena such as in self-assembly, optoelectronics, bio-targeting and catalysis is currently being explored.

Figure 18: Concept of regulating interparticle forces to achieve controlled aggregation in charged NPs. The interactions of [-] and [+/-] AuNPs with triggering ions resulting in the formation of unstable and stable AuNP-ion aggregates. The colloidal stability of [+/-] AuNPs is retained in the aggregates due to the electrostatic repulsions experienced from the like charged head groups on adjacent NPs. (Dr. Pramod Pillai's Group)



2.11 Advanced Porous Materials

In the last two years, Dr. R. Vaidhyanathan and group have developed porous materials by linking metals with organic ligands (Metal Organic Frameworks) or by polymerizing monomers functionalized with hydrophobic groups into 3-D structures with micropores (porous polymers). The major application of the metal organic framework (MOF) material has been in separation of CO₂ from gas mixtures containing CO₂ and H₂. This is a crucial step in obtaining pure H₂ from 'steam-methane reformation' process through an alternative electricity production method involving burning of coal with steam.

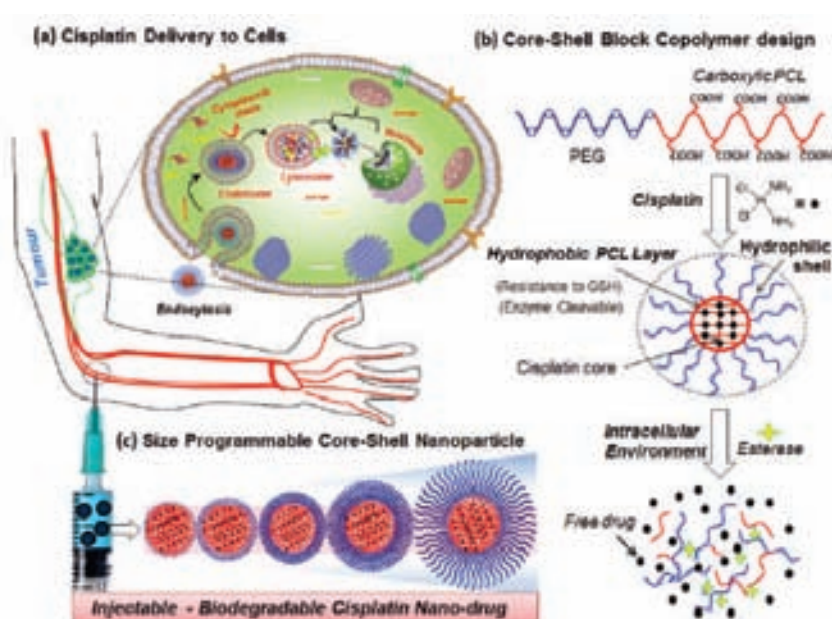


The MOF prepared by the group selectively captures CO₂ via simple physical adsorption, making the hydrogen purification very energy- and cost-efficient. Additionally, the group has developed hydrophobic-polar polymers which are capable of selectively capturing CO₂ from humid gas mixtures which contain CO₂ in low concentrations, making its capture a challenge. This is crucial for mitigating CO₂ released into the atmosphere from industrial effluents (black smoke from chimneys). With a separate focus, highly crystalline organic polymers which support Pd nanoparticles on its surface and serve as solid catalyst for several challenging organic reactions has been synthesized.

2.12 New Polymer-cisplatin Prodrug for Breast Cancer Treatment

Platinum drug delivery against the glutathione (GSH) detoxification urgently needs to be addressed for achieving better efficacy in breast cancer treatment. To accomplish this goal, Dr. M. Jayakannan's group has custom designed GSH resistant polymer-cisplatin core shell nanoparticles on biodegradable carboxylic polycaprolactone di-block copolymers. They found the new core-shell Pt-prodrug nanoparticles to be stable in saline and blood plasma for intravenous administration. The hydrophobic PCL layer acted as protecting layer against the cytoplasmic thiol residues (GSH and cysteine) and exhibited high resistance towards drug detoxification. *In vitro* drug release studies proved that the core-shell nanoparticles were ruptured exclusively at the intracellular compartments upon exposure to lysosomal enzymes and delivered the drugs. Cytotoxicity studies in breast cancer cell line revealed that the free cisplatin drug exhibited only < 40 % cell death whereas complete cell death (> 99 %) was accomplished by the polymer cisplatin core-shell nanoparticles. Confocal microscopic images confirmed that the core-shell nanoparticles are taken up by the cells and they are accumulated both at the cytoplasm as well at peri-nuclear environments. This strategy lays a new foundation for polymer based core-shell nanoparticle approaches to overcome the detoxification in platinum drugs and enhance the treatment efficacies in breast cancer.

Figure 19: Core-shell polymer-cisplatin nanoparticle delivery to breast cancer cells (Dr. M. Jayakannan's Group)



3. Spectroscopic Sciences

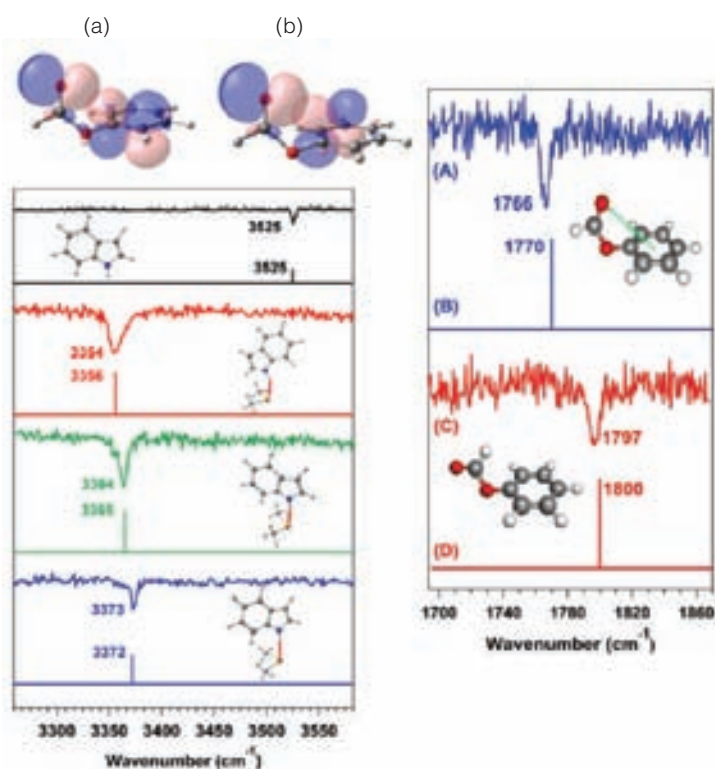
3.1 Gas Phase Laser spectroscopy

The major research focus of **Dr. Alope Das** and his group is on molecular level understanding of a variety of weak non-covalent interactions responsible for the stabilization of specific structures of biomolecules (proteins, DNA etc.) and materials as well as biological recognition processes. The group investigates the nature, strength, and interplay of these intermolecular interactions by studying small molecules and their complexes in the gas phase using UV and IR laser based spectroscopic techniques as well as ab initio calculations. In-depth understanding of these non-covalent interactions helps in designing efficient drugs and functional materials. Recent emphasis of the group is on detailed understanding of a newly discovered non-covalent interaction named $n \rightarrow \pi^*$ interaction.

(a) Direct spectroscopic evidence for an $n \rightarrow \pi^*$ interaction

$n \rightarrow \pi^*$ interaction, which is an extremely weak but very important non-covalent interaction, has been discovered very recently. The $n \rightarrow \pi^*$ interaction involves delocalization of lone pair electrons (n) on electronegative atoms into a π^* orbital of generally an aromatic ring or carbonyl group. Although this interaction is widely present in biomolecules and materials, its existence has been debated extensively

Figure 20: (Top Left) NBO view showing the overlap between the lone pair orbital of the carbonyl oxygen and π^* orbitals of phenyl ring in the cis conformer of phenyl formate; (Top Right) IR spectra by probing (a) (a) (cis) + 83 cm^{-1} and (c) (trans) + 126 cm^{-1} bands in the electronic spectrum of phenyl formate. The carbonyl stretching frequency in the cis conformer having the $n \rightarrow \pi^*$ interaction is red-shifted by 31 cm^{-1} compared to that in the trans conformer without having any $n \rightarrow \pi^*$ interaction; (Left) IR spectra of indole monomer and three conformers of indole...dimethyl selenide complex (Dr. Alope Das's Group)



due to its counterintuitive nature. Dr. Das's group has given direct spectroscopic evidence of the $n \rightarrow \pi^*$ interaction for the first time by probing carbonyl stretching frequency in the cis and trans conformer of phenyl formate using IR spectroscopy in isolated gas phase. The current result also demonstrates that the conformational preference in the cis conformer of phenyl formate compared to the trans conformer arises due to the presence of the $n \rightarrow \pi^*$ interaction in the former one. The direct proof of this controversial but important non-covalent interaction will stimulate further experimental and theoretical investigation on this research topic.

(b) First experimental observation of selenium hydrogen bonding in the gas phase

Following the recent re-definition of hydrogen bonding in the literature, there has been growing search for the presence of this ever interesting non-covalent interaction between a hydrogen atom in X-H group and any other atom in the same molecule or different molecule. Dr. Das's group has explored selenium hydrogen bonding by studying indole...dimethyl selenide complex in the gas phase using resonant two photon ionization (R2PI) and IR-UV double resonance spectroscopy combined with quantum chemistry calculations. They have observed three conformers of indole...dimethyl selenide due to different orientation of the methyl groups in dimethyl selenide (DMSe) with respect to the indole ring. It has been found that selenium hydrogen bond (N-H...Se) has similar strength like any conventional hydrogen bonding interaction (i.e. N-H...N, O-H...O etc).

3.2 Terahertz Spectroscopy and Ultrafast Dynamics

Dr. Pankaj Mandal's laboratory is studying ultrafast dynamics in small molecules, biomacromolecules and nanomaterials using ultrafast pump-probe technique where both pump and probe can be varied from THz to deep ultraviolet.

Broad band THz spectrometer has been built in-house from a four-wave-mixing process in air-plasma. Air Biased Coherent Detection scheme was implemented for broadband detection to achieve a bandwidth of ~ 20 THz. Along with optical pump-THz/white light probe spectroscopy, this set-up enables probing a time-dependent (transient) event using broadband THz or white light (WL) probes to obtain a temporal resolution of ~ 100 femto-second (fs).

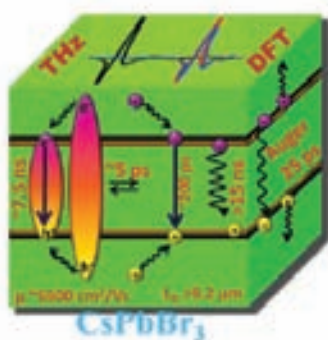


Figure 21: Schematic with a summary of the different mechanisms of carrier recombination in CsPbBr₃ NCs (Dr. Pankaj Mandal's Group)

Photoconductivity of the light emitting colloidal CsPbBr₃ perovskite nanocrystals (NCs) has been studied using time domain and time-resolved THz spectroscopy and density functional theory based calculation. A three-fold free carrier recombination mechanism, namely, non-radiative Auger, bi-molecular electron-hole recombination and inefficient trap-assisted recombination in 11 nm sized colloidal CsPbBr₃ NCs, has been established. These results indicate a negligible influence of surface defects in trapping charge carriers, which, in turn, results in remarkably high carrier mobility (~ 5000 to $7000 \text{ cm}^2 \text{V}^{-1} \text{s}^{-1}$), large diffusion length ($> 9.2 \text{ } \mu\text{m}$) and high luminescence quantum yield (80%). Combination of high carrier mobility and diffusion length, along with nearly ideal photoluminescence quantum yield (80%), makes CsPbBr₃ NCs unique even though these are solution processed and possess high surface to volume ratio. The group has also studied carrier dynamics in films prepared from these NCs upon photo-excitation by single photon and two-photon processes. Electron and hole transfer rates have also been studied.

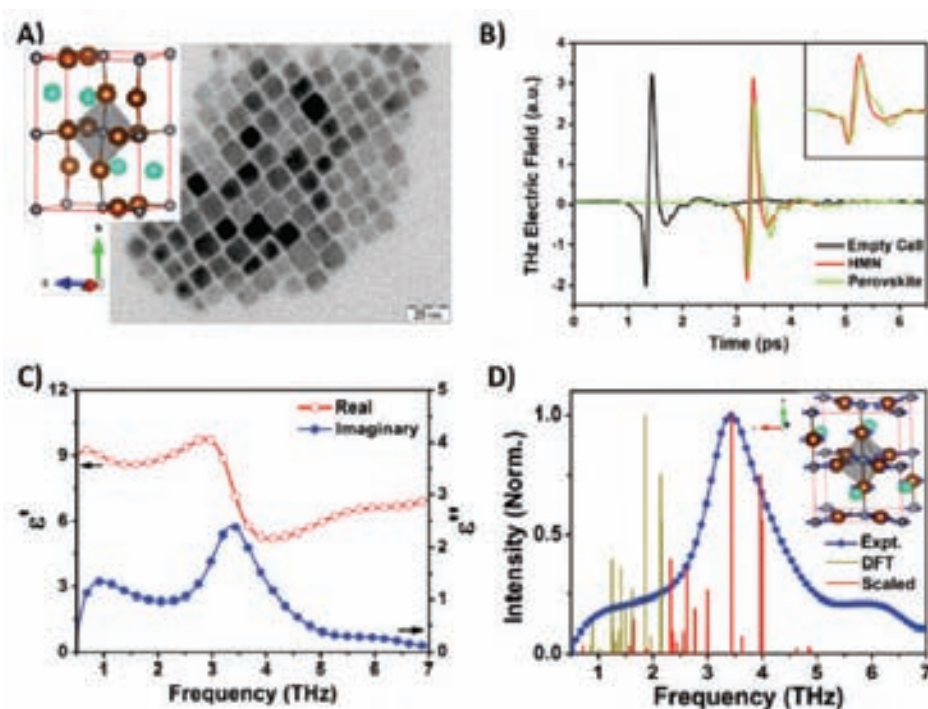


Figure 22: A) TEM image of synthesized CsPbBr₃ NCs. The inset shows the orthorhombic crystal structure obtained from DFT calculation on bulk crystal. B) THz-TDS waveforms transmitted through the empty sample cell (black), solvent (red) and the NC solution (fluorescent green), C) Intrinsic real (open circles) and imaginary (solid circles) parts of the frequency dependent dielectric functions of NCs, D) Normalized THz-TDS absorption spectrum (blue solid circles) of NCs and optical phonon intensities (dark yellow sticks) from DFT calculation. The computed spectrum was scaled by 1.85 so that the strongest line coincides with the peak of the THz spectrum. The scaled spectrum is plotted as red sticks. (Dr. Pankaj Mandal's Group)

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

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

Large quantities of Smad3-MH1 have been successfully prepared and tested for DNA binding activity using electrophoretic mobility shift assays. Smad3-MH1 is currently being characterized using MALDI, CD Spectroscopy and fluorescence spectroscopy. Preliminary studies using MALDI and DLS show that the protein forms soluble oligomers, a property that makes it difficult to be studied by solution-state NMR spectroscopy. Work is ongoing on folding of proteins in the presence of chaperones to exclude the possibility of mis-folding that may eventually promote oligomer formation.

On similar lines, the domain 1 and domain 2 of TRBP have been successfully purified and tested by ¹H NMR for its folded-ness. A series of 3D NMR experiments required for resonance assignment of the protein have been recorded. In

preliminary experiments of dynamics measurement by NMR spectroscopy, it has been found that protein is dynamic at ms- s timescale that is required to flex its muscles to bind to a variety of target RNA molecules. Detailed analysis is being carried out.

Dr. Chugh has reviewed the potential role of early diagnostic markers such as circulating miRNAs to include studies done so far and challenges to be considered while taking into account the novel role of miRNAs as prognostic biomarkers (*Biomarkers in Medicine* (2015) 9(10):1025-40) in collaboration with Dr. Shilpy Sharma, Department of Biotechnology, SP Pune University.

In another area of research, metabolic pathways under various cellular stresses are being characterized using NMR spectroscopy. In this direction, a number of collaborations (Dr. Shekhar Mande, NCCS Pune; Dr. Sharmishtha Banerjee, University of Hyderabad; Dr. Shilpy Sharma, SP Pune University; Prof. Ameeta R.K., SP Pune University; Prof. Saroj Ghaskadbi, SP Pune University) have been set up wherein cellular/tissue extracts are being analyzed to quantify various metabolites in either cells grown in different conditions or in human blood samples of healthy controls and disease-affected individuals.

In a collaborative project with Dr. Sudha Rajamani (IISER Pune), products of a reaction between ribose 5-monophosphate and barbituric acid have been characterized in the context of a hypothesis that RNA is thought to have allowed the transition from Chemistry to Biology (*Phys Chem. Chem. Phys.* (2016) Accepted for Publication).

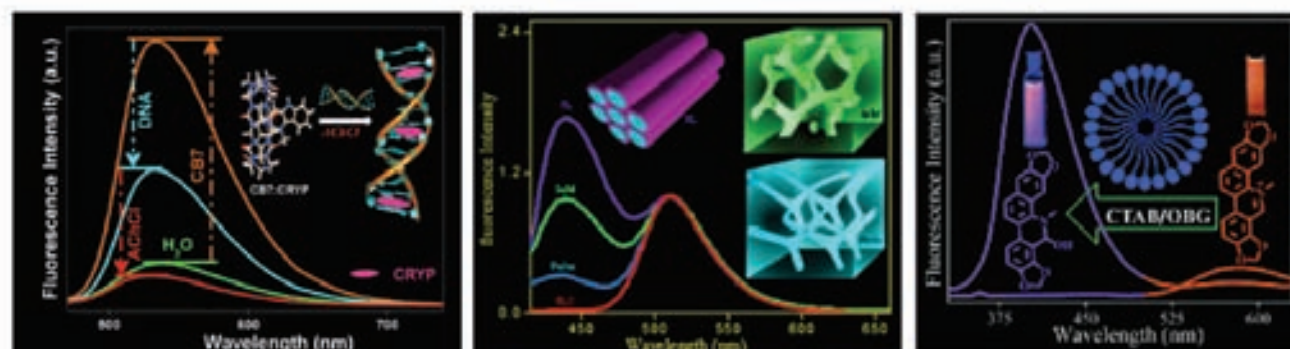
3.4 Spectroscopic Studies of Biological Systems

Dr. Partha Hazra's group is studying excited state photophysics (like excited state proton transfer dynamics) in biological and bio-mimicking systems such as DNA, protein, molecular containers, liquid crystals and mesoporous nanomaterials through fluorescence and other biophysical techniques. A few glimpses of results obtained from the group during the last one year are as below.

(a) Spectroscopy and dynamics of cryptolepine in the nano-cavity of cucurbit[7]uril and DNA

Steady-state and time-resolved fluorescence measurements were employed to elucidate cryptolepine (CRYP), an antimalarial/anticancer drug, encapsulation inside the nano-cavity of cucurbit[7]uril (CB7), and its subsequent release to DNA using an external stimulus, acetylcholine chloride (AChCl).

Figure 23: (Left) AChCl triggered translocation of CRYP in between CB7 and DNA; (Middle) Effect of topology of LLC systems on ESPT process of HPTS reflected through emission spectra; (Right) Fluorescence switching of sanguinarine in micellar environment (Dr. Partha Hazra's Group)



(b) Topological influence of lyotropic liquid crystalline systems on excited-state proton transfer dynamics

The excited state proton transfer (ESPT) dynamics inside lipid based reverse hexagonal (H_{II}), gyroid Ia3d and diamond Pn3m lyotropic liquid crystalline (LLC) systems has been investigated. It was found that slower solvation, hampered 'Grotthuss' proton transfer process and most importantly topological influence of the LLC systems are believed to be mainly responsible for the slower and different extent of ESPT dynamics in these LLC systems.

(c) Fluorescence switching of sanguinarine in micellar environments

Cationic and neutral micelles (CTAB and OBG) have been observed to trigger the conversion from the iminium to alkanolamine form (orange to violate) of an anticancer drug sanguinarine, whereas the iminium form is stabilized in the anionic micelle.

4. Theoretical and Computational Chemistry

4.1 Stochastic Processes

Dr. Srabanti Chaudhury's group has been working on the following research projects over the past year.

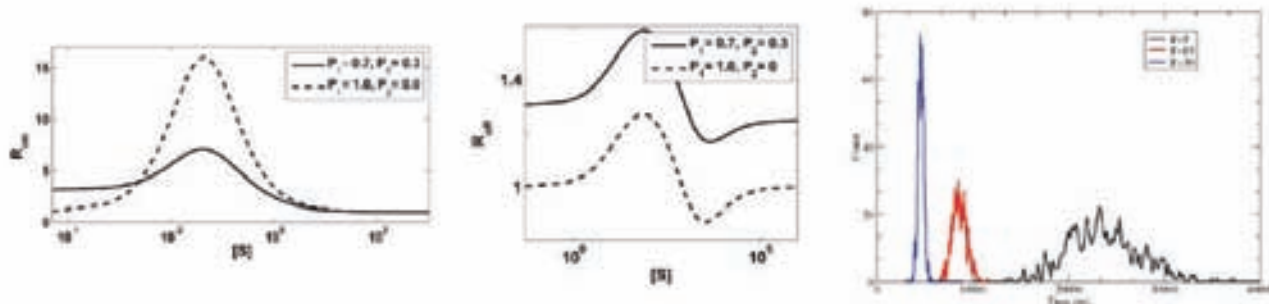
(a) Heterogeneity in single nanoparticle catalysis

A theoretical formalism based on the first passage time distribution to understand the role of heterogeneity in single nanoparticle catalysis has been developed. The developed model is versatile as it not only considers multiple product dissociation pathways, but also multiple active sites on the nanoparticle surface to incorporate the role of heterogeneity explicitly. Theoretical studies from the group show that such heterogeneity can lead to dynamic disorder even at low substrate concentrations due to the competitive timescale of binding of the substrate to the individual active sites on the nanoparticles surface.

(b) Validity of fluctuation theorems for total entropy production

The validity of fluctuation theorems of certain measured quantities for systems with memory driven out of equilibrium by a time-dependent external force is being studied. The group studies the probability distribution of total entropy production using a theoretical formalism based on the generalized Langevin equation with colored noise and tests the validity of fluctuation theorems for total entropy production for such systems with memory. Their preliminary results show that these fluctuations theorems are satisfied even in the presence of memory.

Figure 24: (Two panels on the Left) Randomness parameter for off and on states for heterogeneous nanoparticle catalysis; (Right) Translocation time distribution of polymer at different forces at a chain length of 50 units (Dr. Srabanti Chaudhury's Group)



(c) Polymer translocation through nanopores

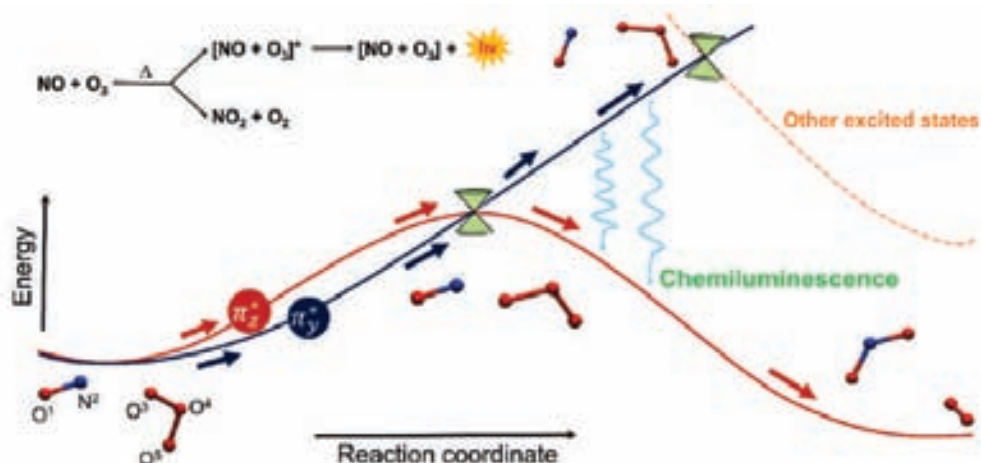
The group is also studying the process of polymer translocation in three dimensions through a nanopore under the effect of a constant pulling force applied to one end of the polymer using molecular dynamics simulations. They plan to investigate how the mean translocation time scale changes with the force and the length of the polymer chain in the strong force limit.

4.2 Theoretical Studies of Ultrafast Photoinduced Molecular Processes

Research in Dr. Anirban Hazra's group focuses on studying excited state molecular phenomena. The emphasis is on understanding the mechanism of such phenomena using tools from electronic structure theory and nonadiabatic dynamics. Several of these processes like photoinduced electron transfer, photodissociation and fluorescence quenching occur at the femtosecond timescale and play important roles in living organisms and in atmospheric processes. The detailed mechanistic understanding, that the group's research seeks, is of basic scientific interest and is also important for its technological implications in solar-based renewable energy devices.

There are several ongoing projects in the group including the mechanistic study of excited-state hydrogen transfer, chemiluminescence and radiationless decay in heterocyclic aromatics. One of the projects, mechanistic understanding of chemiluminescence, is described in greater detail below.

Figure 25: Schematic showing the mechanism of chemiluminescence in the reaction $\text{NO} + \text{O}_3 \rightarrow \text{NO}_2 + \text{O}_2$ (Dr. Anirban Hazra's Group)

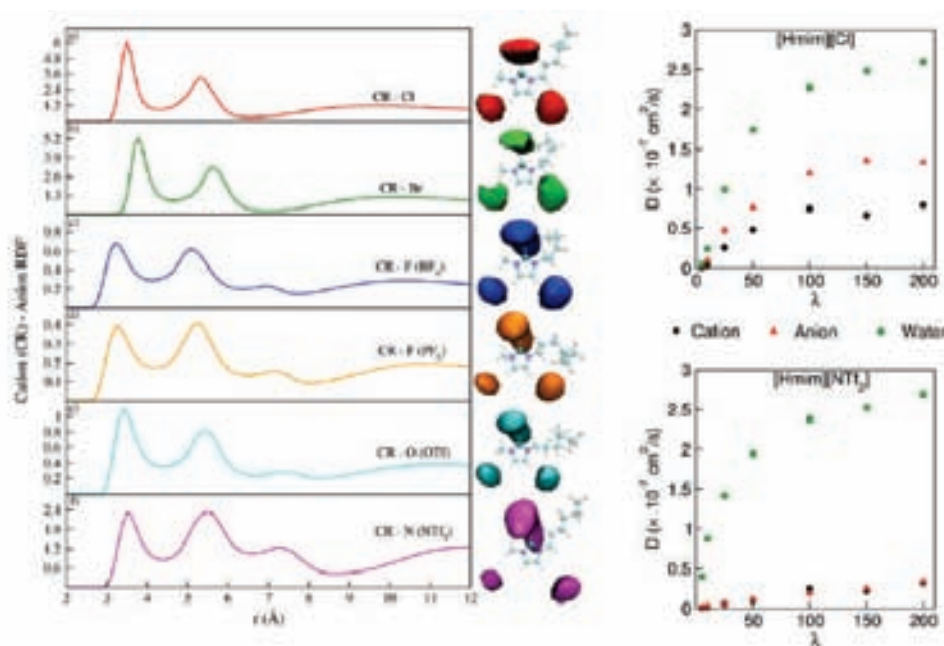


The gas phase reaction of nitric oxide with ozone to give chemiluminescence—a bimolecular and non-enzymatic reaction used extensively in measuring NO_x gas levels in the atmosphere—has been studied using the complete active space self-consistent field electronic structure method with second order perturbative energy corrections. The mechanism of chemiluminescence proposed is distinct from other previously studied chemiluminescent systems and is successful in explaining the broad chemiluminescence spectrum that is observed.

4.3 Modeling and Simulation of Materials

Room temperature imidazolium ionic liquids (ILs) have potential applications in catalysis, gas separation and capture, electrolysis and green solvent chemistry. The molecular understanding of physico-chemical properties of these ILs is important to determine their suitability and effectiveness in various technological applications. Dr. Arun Venkatnathan's group examines the influence of various anions, water concentration and temperature on nanostructure and dynamical properties using Molecular Dynamics simulations.

Figure 26: Cation-anion radial and spatial distribution functions and diffusion coefficients (Dr. Arun Venkatnathan's Group)



Results from simulations show the following features: The structural properties (characterized using Radial and Spatial Distribution Functions) show that ILs with smaller anions like Cl^- , Br^- , BF_4^- have relatively higher cation-anion interactions, compared to IL with larger anions like PF_6^- , OTf^- , NTf_2^- . The cationic and anionic diffusion are the lowest with anions like Cl^- and Br^- , and highest with anions like BF_4^- , OTf^- and NTf_2^- . In accordance with experiments, simulations predict that ILs with an intermediate size BF_4^- anion show highest cationic and anionic diffusion as supported by Ion Pair Lifetime. The diffusion coefficients show that mobility of water molecules is similar in $[\text{Hmim}][\text{Cl}]$ and $[\text{Hmim}][\text{NTf}_2]$ ILs. At all water concentrations, the mobility of cations is similar to anions in $[\text{Hmim}][\text{NTf}_2]$ IL, which indicates that cation and anions are in associated state, compared to $[\text{Hmim}][\text{Cl}]$ IL.

Figure 27: (Left)

Schematic figure showing local water dynamics around DNA grooves. The dynamics is slower in the minor groove compared to the major groove.

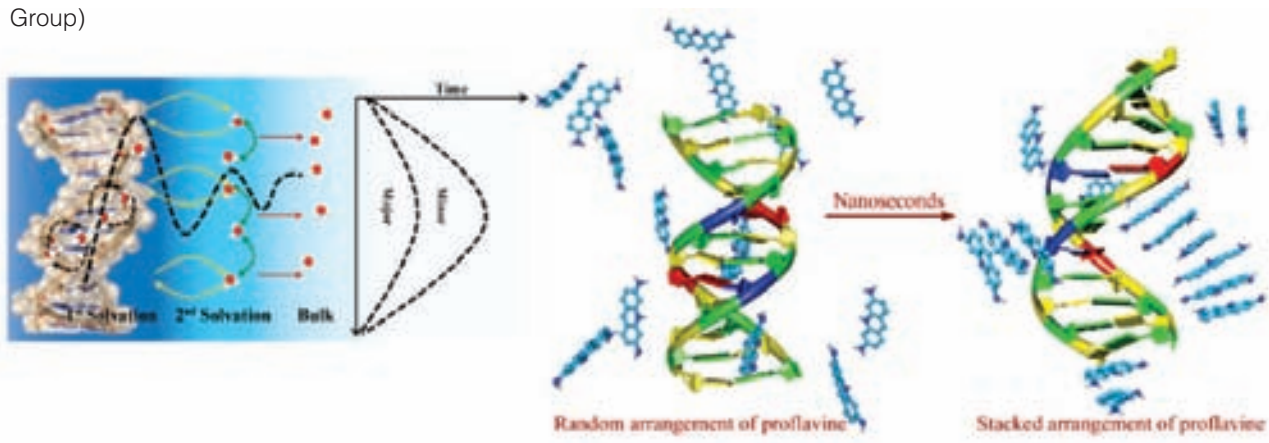
However, for both grooves, water dynamics is position dependent and it is slowest in the middle of the DNA; (Right)

Proflavine associates around DNA in nanoseconds, six orders of magnitude faster than what was interpreted from fluorescence experiments (Dr. Arnab Mukherjee's Group)

4.4 Mechanism of DNA Kinking, Misfolding of Prion Protein, Dynamical Recrossing

Dr. Arnab Mukherjee's group has reported their research on water dynamics around DNA, origin of DNA kinking by proteins, B/A junction free energy and binding dynamics of proflavine around DNA. The group's work on water dynamics around DNA provided the microscopic origin of different timescales of water observed in experiment. It was shown that apart from groove width, the position of DNA is important for the dynamics of water. Water in the middle of the DNA is slower than terminal water due to movement of the water along the DNA.

The group's work on the calculation of junction free energy between "B" and "A" form of DNA provides a tool to predict the propensity of a nucleotide sequence to adopt either of the two above conformations. In another project involving proflavine, the group showed that the first step in the intercalation process, binding to outside of the DNA, is six orders of magnitude faster than that argued in experimental fluorescence kinetic studies of DNA intercalation. This study opens up the possibility of reinterpretation of the sub-millisecond timescales observed in experiment.



5. Condensed Matter, Statistical Physics, and Materials

5.1 Density Functional Theory for Transition Metals

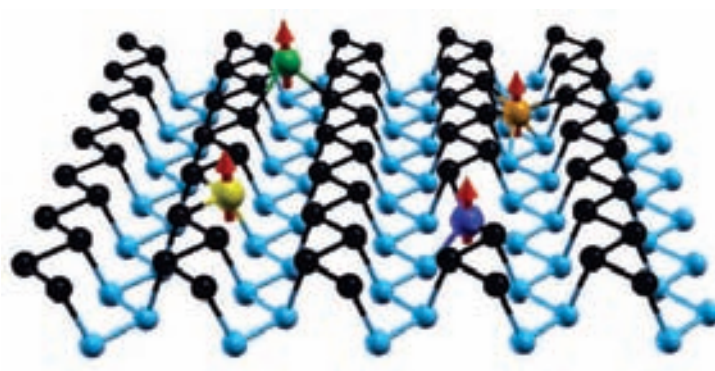
Dr. Mukul Kabir's group is focused on predictive materials modeling, and interested in problems in 2D materials, magnetism and spintronics, defect kinetics, superconductivity, and catalyst design.

Inducing magnetic moment in otherwise nonmagnetic two-dimensional semiconducting materials is the first step to design spintronic material. Dr. Kabir's group has studied the adsorption of transition-metals on pristine and defected single-layer phosphorene, within density functional theory. They predict that (i) increased transition-metal diffusivity on pristine phosphorene would hinder any

possibility of controlled magnetism, and (ii) in contrast, the point-defects will anchor metals and exponentially reduce diffusivity. Metals bind strongly on both pristine and defected phosphorene and a microscopic description of bonding has been provided.

The group proposes that the di-vacancy complex is more important in any practical purpose due to their increased thermodynamic stability over mono-vacancy. Defect-transition metal complexes retain the intrinsic semiconduction properties in most cases and also induce a local moment. A simple microscopic model has been proposed, which describes the local moment formation for these transition metal and defect complexes. It has been noted that metal absorption could completely alter the intrinsic semiconducting nature of the single-layer phosphorene and give rise to half-metallic [(Cr/Co)@DV] or metallic [(Sc/Cu)@DV] composite system.

Figure 28: Transition-metal absorption at the pristine and defected single-layer phosphorene (Dr. Mukul Kabir's Group)



5.2 Electronic Origin of Light Emission and Lasing

Dr. Shouvik Datta's group investigates coherent light emission and electronic transport in semiconductor laser diodes as well as in microcavity polaritons. They are also pursuing electrical and optical investigation of excitonic and exciton-polaritonic Bose Einstein condensation and superconductivity in semiconductor structures and 2D material using GHz scale dielectric response and energy-momentum spectroscopy etc. The group is developing experimental techniques to investigate photon statistics and shot noise measurements towards these goals. A study on the physics of Perovskite Quantum Dot materials in both solar cell and light emitting diode applications has been initiated. Time-of-Flight photoconductivity measurements are being developed to study drift mobility of charge carriers.

5.3 Matter at the Atomic Scale

Dr. Aparna Deshpande's group has studied the self-assembly of cyano(-CN) functionalized copper phthalocyanine (CuPc(CN)₈) on Au(111) substrate. Submolecular resolution STM images show that the molecules form domains on terraces and some domains go over the steps of Au(111). The study notes that molecules are weakly bound to the substrate. The intermolecular hydrogen bond formation of cyano group with the hydrogen of the neighboring molecule guides the self assembly of the molecule on the substrate. Scanning Tunnelling Spectroscopy (STS) measurements over the molecule show the energy position of

HOMO and LUMO for the molecule, LUMO for this molecule is at -2.20V and the HOMO is at -2.26V. Such molecular self-assembly studies provide an insight into the functionality of the molecules as potential interconnects in nanoscale device fabrication.

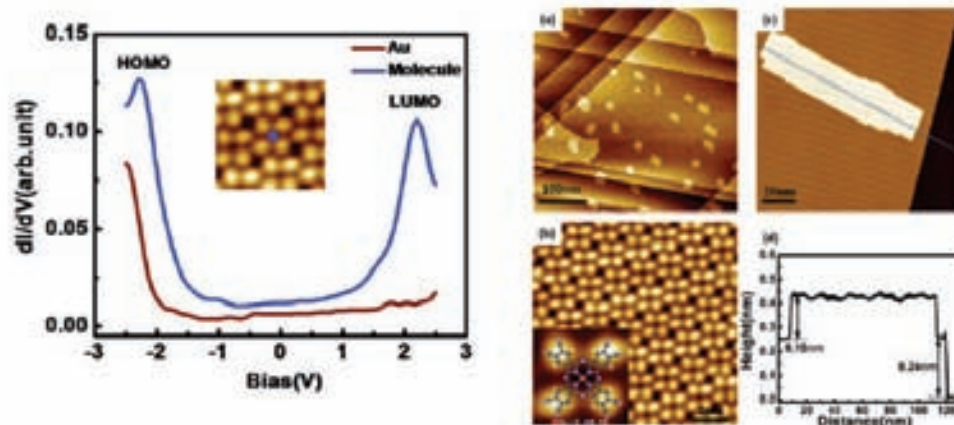


Figure 29: (Left) Blue curve showing dI/dV spectrum over Cu atom in the molecule for the bias range of -2.5 to +2.5 V. Inset shows the position of point spectroscopy. Red curve shows dI/dV spectrum for the bare Au(111) surface. (Right) (a) STM image of CuPc(CN)₈ clusters on Au(111); (b) A closer look at the cluster of molecules, the inset shows a single molecule with its chemical structure superimposed on top of the STM image; (c) Single cluster and the molecules at the step edge. All images taken at $V=1.0V$, $I=0.2nA$; (d) line profile along the dotted line in (c) showing the thickness of molecular cluster and height of Au step. (Dr. Aprarna Deshpande's Group)

5.4 Statistical Physics, Complex Systems

Dr. Arijit Bhattacharyay's research is on the following topics:

(a) Statistical physics of mesoscopic systems

Work from the group has been towards showing that the equilibrium distribution of a mesoscopic system with conformation dependent damping is a modified Boltzmann distribution. The derivation of the generalized Langevin dynamics starting from a microscopic Hamiltonian system comprising of the mesoscopic entity and the bath degrees of freedom has been described (arXiv:1503.00223).

(b) Nonlocal interactions in BEC

With student Abhijit Pendse, the correspondence of the free energy and the dynamics of a BEC when the nonlocal interactions are taken into account has been studied. Their recent work shows that the so far accepted approximate result that the width of the core of a vortex in BEC is of the order of healing length is wrong. The correct size of a vortex scales as the s-wave scattering length has now been described (arXiv:1602.05303).

(c) Analogue gravity

With student Supratick Sarkar, Dr. Bhattacharyay has studied the effects of quantum potential in producing massive excitations in an analogue gravity model of BEC. Quantum potential, in such models, is a Lorentz symmetry breaking term and is generally neglected. The group showed that it can be taken into account

through an ultraviolet-infrared coupling to capture massive excitations at large length scales (*Phys. Rev. D* (2016) 93:024050). Along with another student Chaitra Agrahar a scattering framework of Hawking radiation is being developed considering finite and continuous velocity profiles varying from sub to supersonic regimes.

5.5 Soft Matter Physics

Soft matter systems are liquid-like matter which is made of up macromolecules like polymers, colloids, or living cell membranes. **Dr. Apratim Chatterji** uses coarse grained, multiscale molecular simulation methods to investigate the properties of soft-matter.

(a) Hierarchical self assembly

The self-organization of model nanoparticles (modeled as Lennard Jones spheres) has been studied inside a nematic matrix of semiflexible polymers, which themselves are self-assembled from constituent particles interacting by a potential which was developed. Cases with attractive, weakly attractive and purely repulsive nanoparticles have also been studied.

(b) Large scale structure formation in bacterial DNA

Using inputs from collaborators from the Biology discipline of IISER Pune, Dr. Chatterji is using Monte Carlo simulations to establish if the large scale structure (at microns scale) can be predicted and if the large scale structure crucially depends on contact maps. Contact maps are probability maps of finding two different sections of the DNA in close proximity with each other.

(c) Gel-structure formation in telechelic star-polymers

With inputs from experiments performed at CSIR-NCL, star polymers have been modeled with dipoles at the polymer arm tips. The dipoles from different stars cluster together to form a system spanning gel-like network of polymers. This leads to an increase of the elastic moduli of the star polymer melt. This could have interesting ramifications for industry, as the experiments have been performed using polymers made from lactic acid which can be made into bio-degradable plastic sheets. These previously lacked the required elastic rigidity, but now with star telechelic polymers with dipoles at star tips, one can potentially achieve the required “strength” of the bio-degradable polymer sheets.

(d) Active Matter incorporating hydrodynamics

Two models of active Brownian motion have been developed, one of which is more relevant for the dynamics of swarms of bacterial motion. The other model is more relevant for artificial active matter: examples are baths of Janus particles. Active matter refers to systems of living/non-living particles each of which have their own independent sources of energy and can “swim” around in a liquid bath. The collective behavior of such active moving particles in 3d boxes and incorporating hydrodynamics is being investigated. This has become a very prolific area of research in the last 10 years, but scientists have primarily looked at active matter in 2D and without hydrodynamics, primarily due the difficulties involved in modeling such systems using multiscale simulations. Investigations in this regard are being planned.

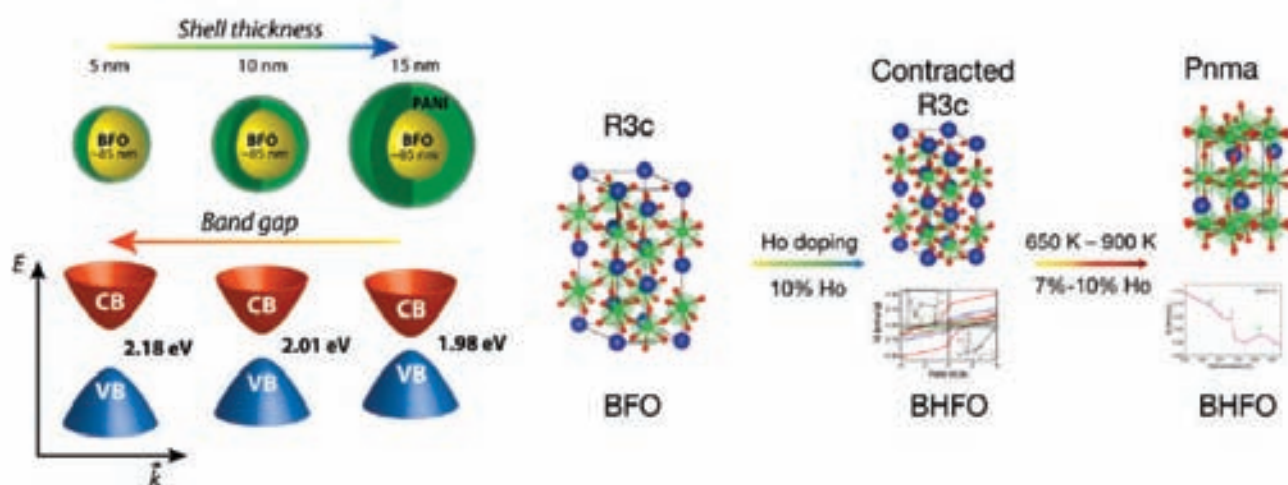
5.6 Synthesis and Analysis of Nanoparticles

Dr. Smita Chaturvedi's research has focused on syntheses, understanding the structure and electron density distribution in nanoparticles of bismuth ferrite and rare earth orthoferrites, which are upcoming potential materials for nanodevices. The aim is to understand the structure property relation by analyzing their magnetic, dielectric and optical properties.

Doping of a rare earth and coating of polymer have been useful in tailoring the magnetic and optical properties of bismuth ferrite nanoparticles. Enhancing the magnetic properties by means of doping an ion with higher magnetic moments and inducing ferroelectricity in these materials by inducing asymmetry and multiferroicity has been achieved.

By varying the thickness of the polyaniline shell, a tunable band gap of bismuth ferrite–polyaniline core–shell nanoparticles from 2.24 to 1.98 eV and the variation of coercivity from 118 to 100 Oe has been achieved. In another study, the structural and magnetic properties of $\text{Bi}_{1-x}\text{Ho}_x\text{FeO}_3$ were investigated in detail as a function of doping concentration and temperature. The antiferromagnetic ordering temperature of the Fe-sublattice ($T_N \sim 640$ K) was found to be robust against Ho substitution. These investigations suggest that moderately Ho-doped BiFeO_3 samples can be useful multifunctional materials because of their enhanced ferromagnetism, large exchange bias field and polar symmetry.

Figure 30: (Left) Tunable band gap of bismuth ferrite–polyaniline core–shell nanoparticles with varying the thickness of the polyaniline shell (*RSC Adv.* (2015) 23563-23568); (Right) Structural and magnetic properties of $\text{Bi}_{1-x}\text{Ho}_x\text{FeO}_3$ as a function of doping concentration and temperature (Dr. Smita Chaturvedi)



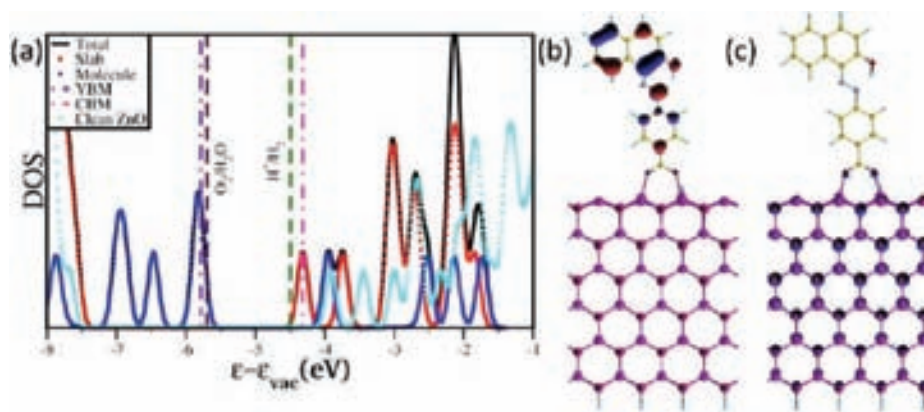
5.7 Nanostructures and Photo-Catalytic Water Splitting

Hydrogen generation by photocatalytic water splitting with solar energy is a renewable process for clean energy production and has been an active area of research over the last couple of years. Among the possible candidates, ZnO is a promising one because it is cheap, chemically stable and environmentally friendly. However, because of its large band gap, it absorbs mostly in the ultra-violet region of the solar spectrum. Moreover, the large exciton (electron-hole pair created by absorption of photon) binding energy in these materials makes it difficult to generate free electrons and holes that can be used as charge carriers. Hence there are efforts to modify the exposed surfaces of ZnO chemically to improve the efficiency.

Dr. Prasenjit Ghosh's group in collaboration with an experimental group led by Dr. Nandini Devi at the National Chemical Laboratory, Pune has shown that by controlled modulation of the surface sites of ZnO nanoparticles with organic

molecules it is possible to enhance the visible light activity of ZnO nanostructured particles in photocatalytic water splitting. From first principles calculations the group showed highest occupied states of the interface are localized on the molecule while the lowest unoccupied states are localized on the ZnO nanoparticle. As a result, not only the effective band gap of the interface is reduced, thereby enhancing visible light absorption, but also the excited electron from the molecule is directly transferred to ZnO as a free carrier rather than formation of strongly bound excitons that require additional energy to break them.

Figure 31: (a) Electronic states near the band gap of the interface; (b) and (c) show the wavefunctions corresponding to the highest occupied and lowest unoccupied electronic states (Dr. Prasenjit Ghosh's Group)



5.8 Nano-mechanics of Biomaterials

Research efforts in Dr. Shivprasad Patil's group were focused on two topics:

(a) *The rheological response of nano-confined water*

Shear response of water confined to less than 20 nm thick water films has been measured and shear thinning on hydrophilic surfaces was observed. Shear viscosity of water under confinement by varying the wettability of the confining surfaces was measured. The group found that for wetting surfaces there is no violation of no-slip boundary condition, whereas for non-wetting surfaces there is finite slip at the boundary. Moreover, the shear thinning behavior could be modeled well with Carreau-Yashuda model of shear thinning liquids. The group has developed a new instrument to measure diffusion along with mechanical shear on nanoconfined water.

(b) *Mechanics of single protein molecule, bacteriorhodopsin*

Dr. Patil's group has developed a new methodology for measuring the landscape of protein molecules in a single measurement. The instrument involved has the sensitivity to measure stiffness and damping of a single protein molecule. These quantities were measured by two methods - by externally oscillating the cantilever (spring) that measures the stiffness of the protein and by allowing thermal excitations at room temperature to drive the lever. They found that by performing relevant linear analysis of the data, one can quantitatively measure stiffness and damping of single protein molecule tethered to the cantilever.

5.9 Magnetism and Superconductivity

Based on their melting behaviors, solids can be broadly classified as congruently or incongruently melting. In the congruent melting solids, the solid-liquid transformation is well-defined and it takes place at a fixed temperature, as in ice-

water system. In the incongruent case, on the other hand, the solid decomposes upon heating rather than melting. Ironically, most quantum solids, including the high-temperature superconductors, exhibit the incongruent type of melting.

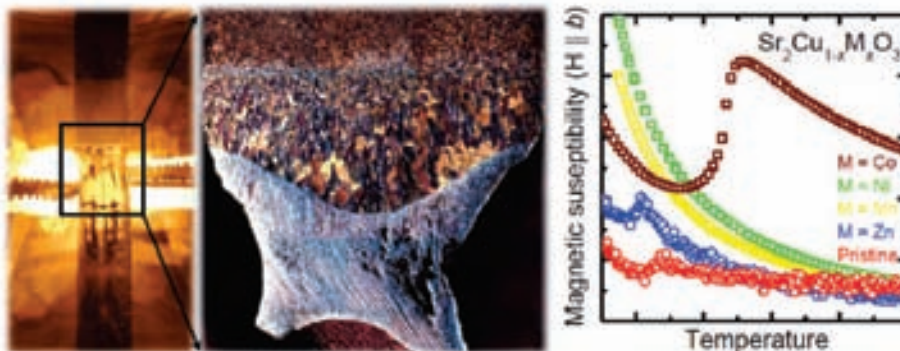
Dr. Surjeet Singh's group has contributed to the understanding of the crystal growth mechanism of incongruent melting solids, using the Traveling-Solvent Floating-Zone (TSFZ) method associated with an infrared image furnace. The group's work mainly focuses on low-dimensional quantum magnets, namely, spin chain and spin ladders. These are solids where the magnetic ions are arranged on chain or ladder-like geometries. This arrangement makes them a close relative of the high-temperature superconductor where the magnetic ions (Cu^{2+}) arrange on two-dimensional square-net geometry. From the physics point of view, these systems are interesting due to the fact that one-dimensional models often provide tractable theoretical solutions. Therefore, experiments on high-quality crystals of spin chains/ladders provide a way of verifying the validity of these theoretical approaches, which can be advanced to understand the high-temperature superconductivity in layered materials.

Figure 32: (Left) A view of the crystal growth process using TSFZ in an optical floating zone furnace.

(Middle) Polarized light optical microscope image of the quenched floating zone and a section of the feed adjacent to during the crystal growth of one of doped Sr_2CuO_3 .

(Right) Magnetic susceptibility of doped and pristine crystals. The plot shows the sensitivity of the magnetic ground state to the various disorders (< 1 %).

(Dr. Surjeet Singh's Group)



6. Atomic and Molecular Physics, Optics, and Quantum Information

6.1 Plasmonics and Raman Spectroscopy

Dr. G.V.Pavan Kumar's group has focused on these projects over the last year.

(a) Plasmonics and Excitonics 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 (x, y, z). 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 (k_x, k_y, k_z). 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. Pavan Kumar's group has constructed and optimized this advanced optical imaging-spectroscopy method to study plasmonic and excitonic nanostructures. Specifically, the group has been addressing the issue of optical antenna effects in such nanostructures.

(b) Femtosecond pump-probe optical microscopy and spectroscopy

Through a grant from DST Nanomission, a tunable, femtosecond Ti-Sapphire laser has been obtained, which has now been coupled to the group's indigenous two-channel microscope system. This system will now be employed to perform femtosecond pump-probe micro-spectroscopy to study picosecond ultrasonics of plasmonic, excitonic and phononic crystal in real and momentum space. Such studies give direct insight into energy cascade processes in nanostructures and have relevance in both fundamental physics and applications.

6.2 Quantum Simulation of Condensed Matter Models

(a) Two-dimensional bright solitons in dipolar Bose-Einstein condensates with tilted dipoles

Dr. Rejish Nath's group has studied the existence of matter wave bright solitons in two dimensional (2D) dipolar condensates with dipoles tilted with respect to the 2D plane. There are so far no experimental realizations on 2D dipolar solitons. The tilting angle constitutes an additional tuning parameter, which provides us a tool to control the in-plane anisotropy of the soliton, relaxes the stringent requirements in the interaction parameters that could augment the possibilities of observing the solitons in the state-of-the-art dipolar experiments using either Chromium, Erbium or Dysprosium atoms and an easily accessible probe to drive the BEC into phonon instability without changing its interaction parameters and trap geometry. The low-lying excitations of the soliton as a function of system parameters will be investigated, which would provide a time scale at which the soliton can be manipulated adiabatically.

(b) Rydberg dressed atoms in a one-dimensional optical lattice

Dr. Rejish Nath's group calculated ab initio the Hubbard parameters for Rydberg-dressed atoms in a one-dimensional sinusoidal optical lattice in the basis of maximally localized wannier states. The calculation will provide a guide to experimental people to identify different interaction parameter regimes for studying many body dynamics. In the end, they provide the minimal two-band model describing the atoms in an optical lattice. The current state of the art experimental setup of Rubidium atoms is studied in great detail.

6.3 Ultracold Atoms: Classical to Quantum Crossover

An atom optic delta kicked rotor (AOKR) is a system of ultracold atoms that are imparted with periodic kicks in momentum space. The periodic kicks are given by an optical standing wave that generates periodic optical potentials for neutral atoms. This system is analogous to a classical pendulum that is given periodic kicks. The Hamiltonian for this system can be written as follows:

$$H = \frac{p^2}{2m} + K \cos \theta \sum_{n=1}^N \delta(t-nT)$$

where, K is the kick strength and T is the period of the pulses. Beyond a critical value of K (≈ 0.9673), the system starts becoming chaotic and for large values of K ($K \geq 5$), the phase-space diagram of the system becomes completely chaotic. The RMS energy growth of the system is diffusive and hence linear with time.

Figure 33: (Left) Energy as a function of kicks: Energy gained by the system starts to saturate as the no of the kicks increases. Initially, below ~9 kicks, the energy is linear as expected from a classically chaotic kicked rotor. However, after 9 kicks the energy growth starts to deviate from the classical case. This time period is known as the Quantum break time. (Right) Momentum distribution of the cloud of cold atoms as a function of kicks: For small number of kicks, the momentum distribution is Gaussian. However, for large number of kicks, the momentum distribution deviates from a Gaussian and becomes exponential. This exponential momentum distribution is the signature of Localization. (Dr. Umakant Rapol's Group)

For the Quantum case, the dynamics is governed by the Floquet operator and it turns out that initially the energy increases linearly with time and then saturates after some time (known as break-time). After the break-time, the energy growth is suppressed leading to localization of the momentum states, similar to Anderson localization as shown in Figure 34. Such dynamical localization has been studied extensively earlier by others (*Phys. Rev. Lett.* 73:2974(1994)). Using an AOKR system, it has previously been demonstrated that by introducing noise through spontaneous emission or noise in the kick-strength itself, one can make the energy-growth of the system to be sub-diffusive (*Phys. Rev. Lett.* 98:260401 (2007)). It has been proposed that by introducing a levy noise in the periodicity of the kicks one can modify the functional form of the decoherence factor itself and make it follow a power law rather than being an exponential function of time. **Dr. Umakant Rapol's** group plans to work on such systems to study the de-coherence properties of the system. Also it will provide a novel technique to engineer desired coherence properties of a system which is at the heart of quantum information processing. The group has carried out such experiments and the current efforts are on making an appropriate model to describe the behavior of the system.

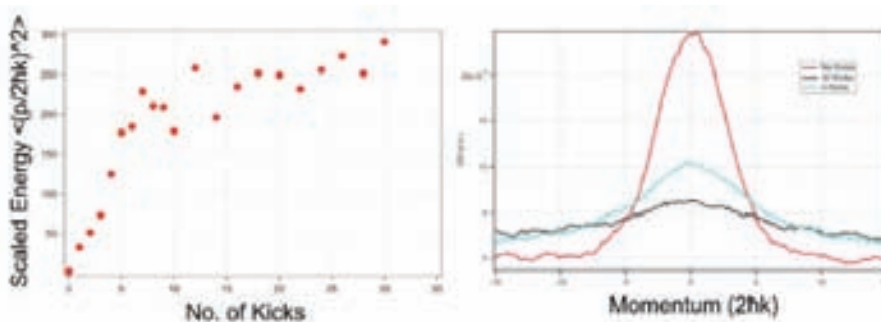
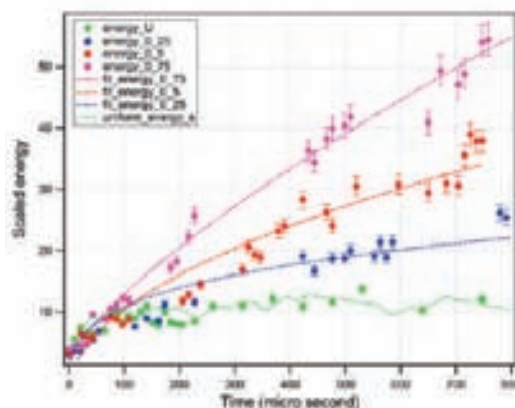


Figure 34: Subdiffusion nature of energy evolution of the system with off-times following Lévy distribution with different exponentials (Dr. Umakant Rapol's Group)



7. Particle Physics and Gravity

7.1 Higher Spin Fields

Three of the four fundamental forces of Nature (electromagnetic, weak and strong) are mediated by spin 1 bosons which play the role of force carriers in the quantum description. There is, however, no such consistent mediator picture for gravity. Apart from forces, the other important particles are the Higgs boson (spin 0) and spin-half fermions which constitute all matter. With BS MS student Y. S. Akshay (presently Ph.D. student at Princeton University), **Dr. Sudarshan Ananth** has worked on establishing a complete framework to derive quantum field theory Lagrangians describing fields of arbitrary spin. Their approach uses the fundamental symmetries in a theory to completely derive, from first principles, the corresponding Lagrangians (*Phys. Rev. D* 91:085029). An interesting finding from this publication is that in momentum space, the coefficient of the cubic interaction vertex for a spin λ field is equal to the corresponding Yang-Mills (spin=1) coefficient, raised to the power λ .

With Ph.D. student Mahendra Mali, Dr. Ananth adapted this framework to curved backgrounds like de Sitter and anti de Sitter spacetimes. This formalism should yield many interesting generalizations of flat-space results. The group also plans to derive a Lagrangian corresponding to the Vasiliev equations of motion, describing higher spin fields (*Phys. Lett. B* (2015) 745:48-51).

7.2 Gravitation and Quantum Effects

Dr. Suneeta Vardarajan's group has addressed two open problems in gravitation and made an important breakthrough in both these problems. The first concerns the recently discovered nonlinear instability of AdS (anti-de Sitter) spacetime. The presence of a scalar field of arbitrarily small amplitude leads to black hole formation in AdS. Work with student Dhanya Menon (published in *Phys. Rev. D*) uses nonlinear dynamics to provide the only analytical explanation that fits all the numerically observed facts about this system. In addition, they have shown that asymptotically AdS spacetimes (which are important in string theory) can have similar instabilities, but in this case, a minimum threshold amplitude of scalar field is needed to trigger it. Currently, the (in)stability for gravitational waves in AdS spacetime is being investigated.

Spacetimes with extended singularities such as black strings and branes are studied extensively in gravitation and string theory. However, to date, a complete analysis of the stability of even the black string under non-spherically symmetric perturbations has not been done. The equations are coupled and very difficult to analyze. With student Amruta Sadhu, Dr. Vardarajan has expressed the perturbation equations in the simplest form to date. They have used the large dimension (D) limit of general relativity (a very recent topic of research) to provide

the first analytical breakthrough in analysis of these equations. By using matched asymptotic expansions, they prove for a large class of non-spherically symmetric perturbations that the black string is stable. They also prove that the Gross-Perry-Yaffe unstable mode for semiclassical Schwarzschild black hole perturbations is the unique unstable mode even in the large D limit (arxiv.org/abs/1604.00595).

7.3 Entanglement, Conformal Field Theory, Asymptotic Symmetries in Gravity

Prof. Sunil Mukhi's research during this period covered three areas: entanglement entropy, the classification of rational conformal field theories, and asymptotic symmetries of asymptotically flat gravitational theories.

The relation between entanglement in 2d CFT and modular invariance was explored for theories of free fermions and bosons using the replica trick. It was shown that free compact scalar computations in the literature are modular covariant, however free-fermion ones are not since they are computed at fixed spin structures. It was shown that on summing over spin structures one recovers modular covariance, but there are ambiguities in the order of this sum and the product over replicas.

The differential equations approach to classifying Rational Conformal Field Theory (RCFT) was extended to two-character theories that solve singular differential equations. An entire family of such theories was found and their Kac-Moody algebras identified. A new type of coset construction involving meromorphic CFT was discovered which explains the observed relations between the new theories and known ones. Based on this construction, new theories with three and four characters were identified.

The asymptotic symmetries of gravitational theories in an asymptotically flat space-time background are described by the Bondi-van der Burg-Metzner-Sachs (BMS) algebra. In 3 dimensions, this algebra is an extension of the Virasoro algebra with a new central term. A free-field realisation with arbitrary central charges was discovered for this algebra, and extended to the higher-spin and supersymmetric cases.

7.4 Black Hole, Holography and Hydrodynamics

Dr. Nabamita Banerjee has worked on the following topics over the last year:

- a) Dr. Banerjee constructed an equilibrium partition function for a non-relativistic fluid and used it to construct the dynamics of the system. Upon modifying the constitutive relations of a relativistic fluid, it has been found that its symmetry broken phase – 'null fluid' is equivalent to the non-relativistic fluid. In particular, their symmetries, thermodynamics, constitutive relations and equilibrium partition function match exactly to all orders in derivative expansion.
- b) Dr. Banerjee's work gave free field realisations of BMS algebra that arises as the asymptotic symmetry group of flat space time. The analysis has been extended to super BMS and higher spin BMS algebras.
- c) A long standing entropy puzzle for non-supersymmetric black holes in $N=4$ theories has been solved by the group.

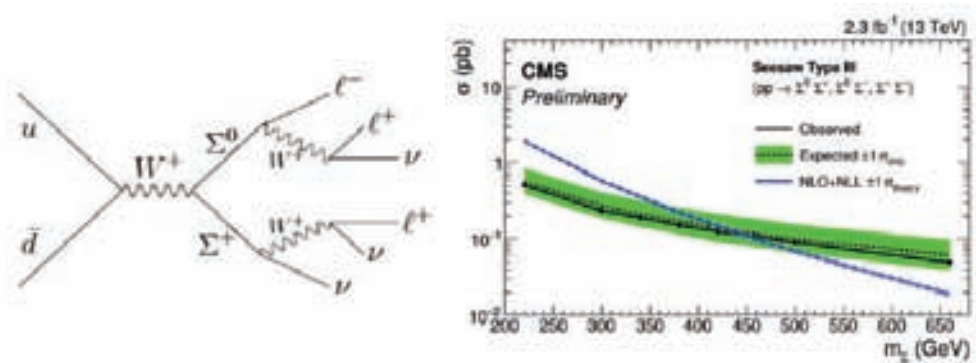
7.5 Experimental High Energy Physics

IISER Pune joined the CMS Collaboration at CERN in September 2014. The CMS experiment collected 2.3 fb^{-1} of proton-proton collisions at $\sqrt{s}=13 \text{ TeV}$ in 2015. Dr. **Sourabh Dube's** primary focus during the last year was to analyze this data for signs of new physics. His group, along with collaborators at Rutgers University, USA, started searches in the multilepton final state.

Earlier this year, a CMS Physics Analysis Summary was prepared where they described their search for Type-III Seesaw heavy fermions. The collected 13 TeV CMS data was analyzed and efforts were focused on final states with high momentum leptons and large missing transverse energy. An example of Feynman diagram depicting the production and decay of these heavy fermions (Σ^+ and Σ^0) is shown in the Figure. The collected dataset failed to reveal any signs of these heavy fermions. However, the team was able to constrain the production of such fermions, and the results obtained ruled out the presence of such fermions with masses less than 430 GeV at 95% CL (see Figure 35).

The multilepton search will continue with the collision data collected in 2016, where now the scope will be expanded to search for vector-like leptons as well. A Master's thesis done by an IISER Pune student in 2015-2016 explored this model and outlined a strategy that the multilepton search will now adopt for the vector-like lepton searches.

Figure 35: (Left) Feynman diagram example of the fermion production and decay in the type-III seesaw model. (Right) Exclusion for the flavor-democratic type-III seesaw model ($V_e=V_\mu=V_\tau=10^{-6}$). We exclude heavy fermion production for masses below $m_\Sigma=400 \text{ GeV}$ (expected: 430 GeV). (Dr. Sourabh Dube's Group)



Dr. Seema Sharma's group efforts are focused on searching for Supersymmetry (SUSY) and the group has completed a generic analysis to search for pairs of gluinos. Another project to search for stop pair production is nearing completion. To be able to do these complex physics analysis, the key is to understand the various experimental and detector components. The group studies forward and central Hadron calorimeter and is responsible for monitoring the energy response in forward detector, validation of weekly release of HCAL reconstruction workflow and improvement of parametrization of hadronic shower energy profile in fast simulation.

As part of the research services within the CMS collaboration, Dr. Sharma has served as the Co-convenor of Inclusive SUSY searches subgroup (Jan 2014 - Dec 2015). With the data collected at a centre-of-mass energy of 13 TeV in 2015, the

group completed seven analysis projects for searching for gluino pair-production. Since January 2016, Dr. Sharma has been a Co-convenor of Hadron Calorimeter (HCAL) Detector Performance Studies group and coordinating various activities to ensure an efficient running of experiment as well as to measure the long term performance of the detector response which can directly affect the physics program.

8. Complex Systems

8.1 Nonlinear Dynamics and Complex Systems

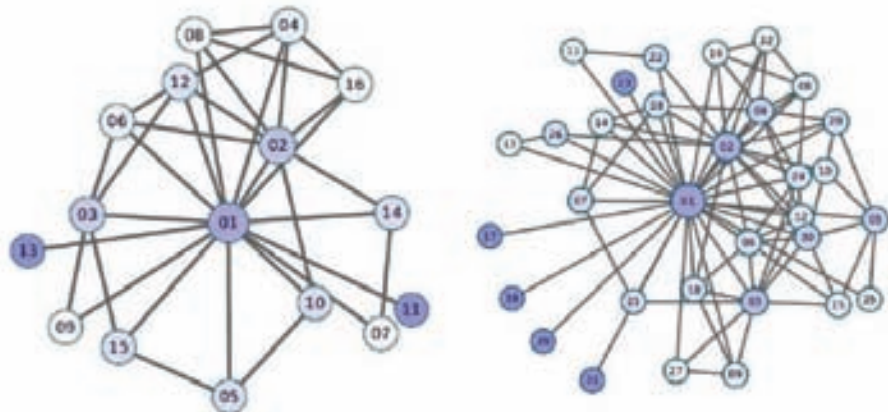
(a) Control of dynamics in connected systems

Prof. G. Ambika's research group has recently reported a new coupling scheme to control spatio-temporal patterns and chimera states on 1-d and 2-d lattices and random networks of discrete dynamical systems. The scheme involves coupling with an external lattice or network of damped systems. When the system network and external network are set in a feedback loop, the system network can be controlled to a homogeneous steady state or synchronized periodic state. The control scheme has the advantage that its design does not require any prior information about the system dynamics or its parameters and works effectively for a variety of dynamical systems. It is proposed that this mechanism can provide a phenomenological model for the control of spatio-temporal patterns in coupled neurons by coupling with the extra cellular medium.

(b) Control of patterns in a neuronal network

The group has also reported a novel generative mechanism for complex networks that exhibit both scale-free nature and hierarchical modularity. This mechanism relies on an important property of the nodes, called mediating capacity, that decreases rapidly with increase in degree, making hubs weak mediators of the

Figure 36: Networks of different sizes were analyzed to derive information on divisibility patterns (Prof. G. Ambika's Group)



process. This also explains the high clustering and small-path length seen in real networks as well as nonzero degree-correlations.

The divisibility of natural numbers is studied using the framework of a growing complex network by considering natural numbers as nodes and their divisibility pattern giving the connection topology. Such a network of natural numbers is found to possess a new kind of similarity pattern in its local clustering, called “stretching similarity”.

(c) Network of natural numbers with 16 and 32 nodes

In collaboration with Prof. Juergen Kurths' group in Potsdam under a DST DAAD project, a RANdom Interacting Network (RAIN) model has been developed to study the interactions between a pair of complex networks. The model explains how selection of a pair of nodes, one from each network, happens based on intra-network node-based characteristics, and how inter-connections occur based on the similarity of their relative importance in their respective networks. This is applied to the interaction between the USA and Schengen airline transportation networks (ATNs). They claim that the framework of the RAIN model is general and can be potentially adapted to various real-world complex systems.

(d) Complexity measures from Time series

Prof. Ambika and her group have investigated how gaps in observational can affect the computed values of various measures like correlation dimension of the system. This study introduces a method of checking the reliability of computed values by calculating the distribution of gaps with respect to its size and position and warns against possible misinterpretations if cubic spline interpolation is used to fill gaps. It is shown with data from light curves of variable stars that a careful choice of binning, in addition to reducing noise, can help in shifting the gap distribution to the reliable range for measures.

In addition, Prof. Ambika along with collaborator, Ranjiv Misra, IUCAA and K.P. Harikrishnan, Cochin College, developed a general method for the construction and analysis of unweighted recurrence networks from chaotic time series. This provides us a uniform framework for the nonsubjective comparison of the statistical measures of the recurrence networks constructed from various chaotic attractors. This is applied to two practical applications, detection of transition between two dynamical regimes in a time-delayed system and identification of the dimensionality of the underlying system.

8.2 Chaos and Extreme Events

Research efforts in Dr. M.S. Santhanam's group were focused on studying the quantum manifestations of a chaotic, non-KAM Hamiltonian system. The group has shown that the classical subdiffusive energy regimes in the system of kicked particle in periodic potential barriers leave their imprint in the quantum dynamics through the \hbar -scaling in the semiclassical regime.

Investigations on the general questions related to the transitions to failure of networks as a whole due to extreme events taking place on them have been continued. The signatures of transition to network failures in the case of realistic networks found in nature and society are being studied.

IISER Pune Library

The Institute Library provides essential and specialized information, resources and services to support the teaching, learning, and research programs of the institute. Library adopts state-of-the-art technologies to facilitate access to online and print resources to its users.

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

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



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

Library is providing two monthly services to the IISER Pune community: *Monthly Table of Contents Service* to make users aware of newly published journal papers, book chapters, conference papers or any other publications by the faculty members and

A two-day book exhibition was organized by the Library during February 28-29, 2016 on the occasion of the 2016 National Science Day

the students of IISER Pune; and a *Monthly List of New Additions of Books Service* to make users aware of new reading materials added to the library collection in different subject fields.

Over 1100 print books and many more online resources have been added to the Library's collection during the last financial year.

Collection Statistics of the Library as on March 31, 2016

Print Books: 18585

Gratis Books: 908

e-Books: 6070

Print Journals/Magazines: 50

e-Journals: 3000

Full-Text Databases: 10

Bibliographic Databases: 5

Records in IISER Digital Library (IDL): 554

Users of the Library: 1314

Important Online Full-Text Resources

ACS Web Edition + Legacy Archive

American Institute of Physics (AIP) + Archives

American Physical Society (APS)

Elsevier's Science Direct

Institute of Physics (IOP) + Archives

Journal of Visualized Experiments (All Sections)

JSTOR

Nature Publishing Group (NPG) + Archives

OSA's Optics Infobase

Project Euclid's Prime Collection

Royal Society of Chemistry (RSC) + Archives

SPIE: International Society for Optics and Photonics

Wiley Interscience Journals

Important Online Bibliographic Resources

Faculty of 1000: Post-publication Peer Review Database

MathSciNet

SciFinder Scholar

Synfacts

Web of Knowledge



The IISER Pune Library has been awarded with the 'Highest User Award' among IISERs for the year 2015 by Nature Publishing Group, Royal Society of Chemistry and Elsevier. Seen here is IISER Pune Deputy Librarian Dr. Umeshreddy Kacherki (*left*) accepting the award from Dr. R.K. Chadha (Former Additional Secretary, Lok Sabha Secretariat).

9. Astrophysics

9.1 Solar Physics

(a) Solar-terrestrial physics using galactic cosmic rays as a probe

Using cosmic ray data from the GRAPES-3 cosmic ray telescope, former PhD student Arun Babu (PhD 2014, currently a postdoc at TIFR Mumbai) from **Dr. Prasad Subramanian's** group has quantified, for the first time, the level of turbulence in the sheath region between Earth-directed solar coronal mass ejections and the shocks they drive (*Astron. Astrophys.* (2013) 555:A139; *Astron. Astrophys.* (2015) 580:A41).

(b) Understanding the Sun-Earth propagation of coronal mass ejections using a combination of theory and data from the STEREO spacecraft

Using a physically motivated prescription for the viscous aerodynamic drag experienced by CMEs, PhD student Nishtha Sachdeva has established that typical slow CMEs can be considered drag-dominated only beyond 15 to 50 solar radii (*Astrophys. J.* (2015) 809:158).

(c) Studying density turbulence in the solar wind, specifically focusing on its dissipation

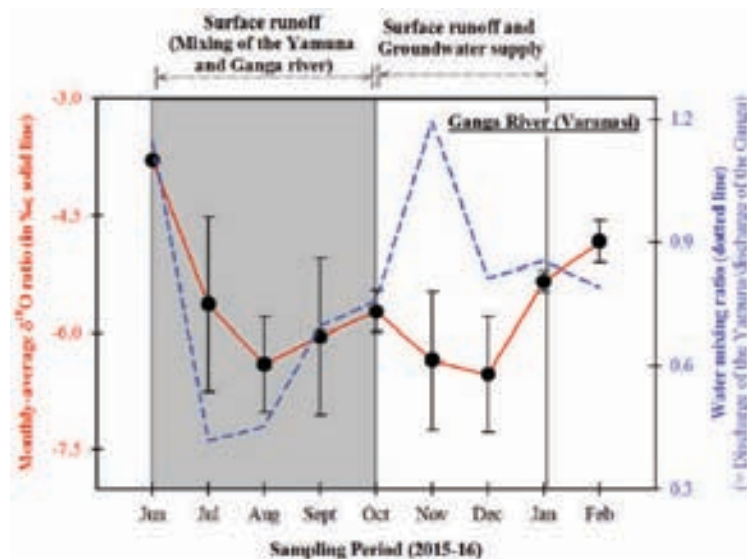
Madhusudan Ingale from the group has used published observations of the radio scintillation of distant cosmic sources observed through the solar wind, together with novel theoretical tools, to estimate, for the first time, the heating rate of the solar wind all the way from the Sun to the Earth (Ingale, PhD Thesis, 2015).

10. Earth & Climate Science

10.1 Isotope Hydrology of the Ganga River System

Stable isotopes of oxygen and hydrogen of surface runoff are mainly controlled by isotopic compositions of its sources, their mixing proportions and isotopic fractionation during phase changes through different hydrological pathways. These isotopic ratios and their distribution in a watershed, therefore, serve as a useful tool to trace contributing water masses, and to quantify rates of various hydrological processes. Recent research of **Dr. Gyana Ranjan Tripathy's** group focuses on time-series analyses of oxygen and hydrogen isotopes ($\delta^{18}\text{O}$ and δD ratios) of the Ganga river water at Varanasi to assess the isotopic variability during

Figure 37: Comparison of the monthly-averaged $\delta^{18}\text{O}$ data (solid line) with ratio of water supplied from the water sources (the Ganga and the Yamuna; the dotted line). Depleted $\delta^{18}\text{O}$ ratios during monsoon season are attributable to mixing of the water supplied from the Ganga and the Yamuna, whereas depletion in the isotopic composition during the post-monsoon season is due to significant contribution from the groundwater. (Dr. Gyana Ranjan Tripathy's Group)



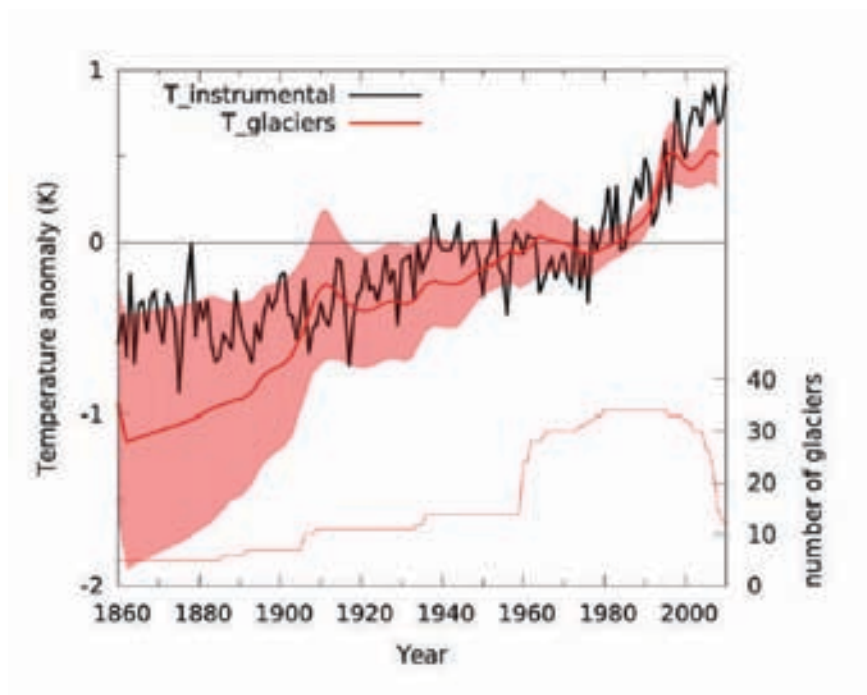
10.2 Himalayan Glaciers

Himalayan glaciers are responding to a changing climate. To understand the detailed nature of the response and the forcing is a difficult task, due to a lack of long term data on glacier change, and also due to a serious lack of understanding of the effects of supraglacial debris cover that is commonly observed in Himalayan glaciers. Recent work from **Dr. Argha Banerjee's** group focused on both these issues.

The record of length, area and volume changes of Satopanth glacier, Garhwal Himalaya, in the last century has been compiled. This is an important addition to the sparse data-set on changing Himalayan glaciers in the first half of twentieth century (Nainwal *et al* (2015) *Ann. Glaciol.*). Work by the group has pointed out an inconsistency in the glacier extent in the topographic map by Survey of India (1962).

The group has shown, using model simulation, that the long term length fluctuation record in weakly debris covered glaciers can be inverted using known methods for the temperature change in the high Himalaya, where no such long term data exists. They have compiled extensive data set on length fluctuation of Himalayan glaciers and inverted them to obtain a 150 year long time series for the temperature changes in the region. The results show a sharp warming starting in the 1980's followed by steady temperatures since the late 1990's.

Figure 38: Reconstructed temperature anomaly (red line) during 1860-2010 obtained from length fluctuation records of 34 glaciers in the Himalaya-Karakoram region. The 95% confidence interval associated with the uncertainties in the climate sensitivity is shown as a red band. Global instrumental record is also shown for comparison. Thin red line shows the number of glaciers used in the reconstruction (right vertical axis) (Dr. Argha Banerjee's Group)

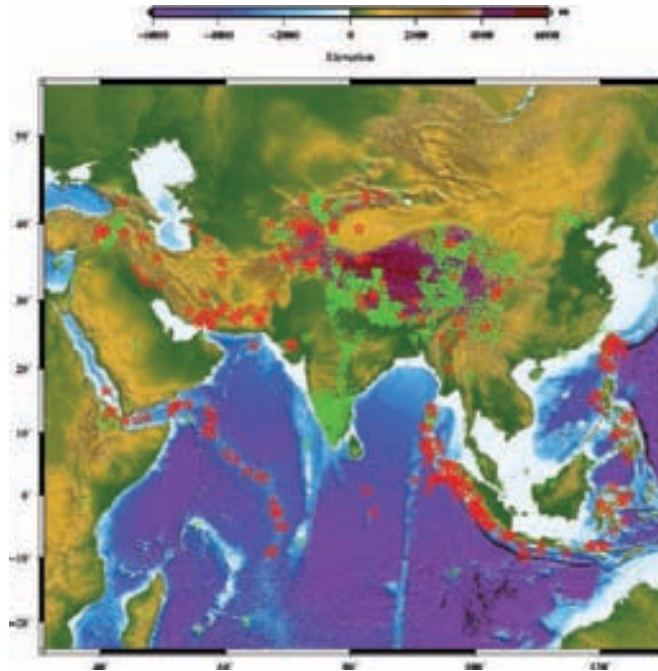


10.3 Geophysical Data Modeling in Deep Earth Exploration

The structure and systems response of planet Earth's shallow surface layer that sustains human civilization, is an integral product of the fundamental global/regional scale dynamic processes operating in the Earth's interior through a free interplay of gravity, mechanics, and electromagnetism including thermodynamics that mediates phase transformations and material behaviour in its various domains. Understanding how the Earth works depends on our knowledge of the properties of rocks and minerals. The long time scales of geological processes, large domains and multiple interactions of processes are unique and remain challenges in Earth Science. Material properties and seismology are interdependent in a fundamental way. Seismologists can measure the velocity at which elastic waves traverse the Earth's interior and use this information to reconstruct the pictures of the Earth in a process analogous to a medical CAT scan. Here earthquakes are the source recorded on seismographs. The travel time of seismic wave between locations are inverted in terms of seismic wave velocity that is dependent on the temperature and compositional variation and hence is effectively used to map the composition of crust and the mantle and pattern of convection in the mantle.

Dr. Shyam Rai, along with students from his group, has initiated a major research project aimed at elucidating the evolutionary history of the Indian- Eurasian region and the adjoining continent and ocean (Bay of Bengal and Arabian Sea) by modelling the elastic properties (velocity, attenuation) of the underlying Earth using seismological observations from these regions. The project would help answering several key questions in the regional geology, resource mapping and predicting domains of earthquake hazard, viz. 3-D variability of material property of the Earth and its deformational history beneath Indo-Asian region; state of stress in the region and possibility of mapping future earthquake zones, mapping the zone of economic minerals, composition and evolution of Bay of Bengal and the Arabian Sea and demarcating legal continental shelf of India.

Figure 39: Earthquake (triangle) and seismograph location (star) used to image the Earth interior (Prof. Shyam Rai's Group)



11. Ecology, Evolution, and Biodiversity

11.1 Plant Physiological Ecology

Research performed in **Dr. Deepak Barua's** group examining intra-specific variation in leaf functional traits in widespread tropical trees from contrasting climates has been completed (work done along with Neha Mohan Babu, Mahesh Sankaran and Jayashree Ratnam). Complementing the above study, a BS MS 5th year student from the group has studied intra-specific variation in plant functional traits and how intra-specific variation and species turnover contributes to community weighted means of traits and trait diversity. The data collection for this has been completed and analysis is ongoing.

Experimental work done in the greenhouse, examining tradeoffs in water use by tropical trees, and how this is mediated by plant xylem traits and leaf traits has been completed. The processing of leaf and stem samples for anatomical characterization is in progress.

Work examining thermotolerance of tropical trees has been completed by a PhD student and other projects including long term monitoring of phenology and plant pollinator interactions in tropical trees, and variation in floral morphology in *Jasminum* species are under investigation by PhD students from Dr. Barua's group.

A new project has been initiated based on a multi-institutional grant between JNTBGRI, IISER Thiruvananthapuram and IISER Pune. This joint venture examines

plant pollinator interactions in tropical forest in the Southern Western Ghats, specifically asking how fragmentation in natural forests because of oil plantation alters plant-pollinator interactions.

11.2 Population Biology

There is considerable understanding about how laboratory populations respond to predictable (constant or deteriorating environment) selection for single environmental variables such as temperature and pH. However, such insights may not apply when selection environments comprise multiple variables that fluctuate unpredictably, as is common in the nature. To address this issue, **Dr. Sutirth Dey's** group grew replicated laboratory populations of *Escherichia coli* in nutrient broth whose pH and concentrations of salt (NaCl) and hydrogen peroxide (H₂O₂) were randomly changed every day. After ~170 generations, the fitness of the selected populations had not increased under any of the three selection environments. However, these selected *E. coli* populations had significantly greater fitness in four novel environments which have no known fitness-correlation with tolerance to pH, NaCl or H₂O₂. Contrary to expectations, hypermutators were not found to evolve. Instead, the selected populations displayed an increased ability for energy-dependent efflux activity that might enable them to throw out toxins from the cell at a faster rate, including antibiotics.

This provides an alternate mechanism for how evolvability can evolve in bacteria and potentially lead to broad-spectrum antibiotic resistance, even in the absence of prior exposure to any antibiotics. Considering increasing environmental variability in the nature, this finding might have potential utility for public health.

11.3 Evolutionary Biology in Behavior, Health and Metabolism

The following research outcomes from **Prof. Milind Watve's** group are of societal and public health relevance and efforts are on towards implementation.

(a) Watve protocol: A model based on principles of behavioral economics has been developed for estimating and compensating crop damage by wild herbivores near protected wild life parks. After a series of meetings with various divisions of the Forest Department of Maharashtra State, the forest research division has proposed to undertake a model implementation of the Watve protocol in a small group of villages near Tadoba Andhari Tiger Reserve in Maharashtra.

(b) Behavioral intervention clinic: Based on interpretation of type 2 diabetes and other life style disorders by Prof. Watve, a leading hospital of Pune (Deenanath Mangeshkar Hospital and Research Centre) has decided to set up a separate clinic for behavioral interventions in prevention and reversal of life style disorders including Diabetes, which is functional from May-June 2016.

11.4 Molecular Phylogeny and Phylogeography of Freshwater Fishes and Frogs

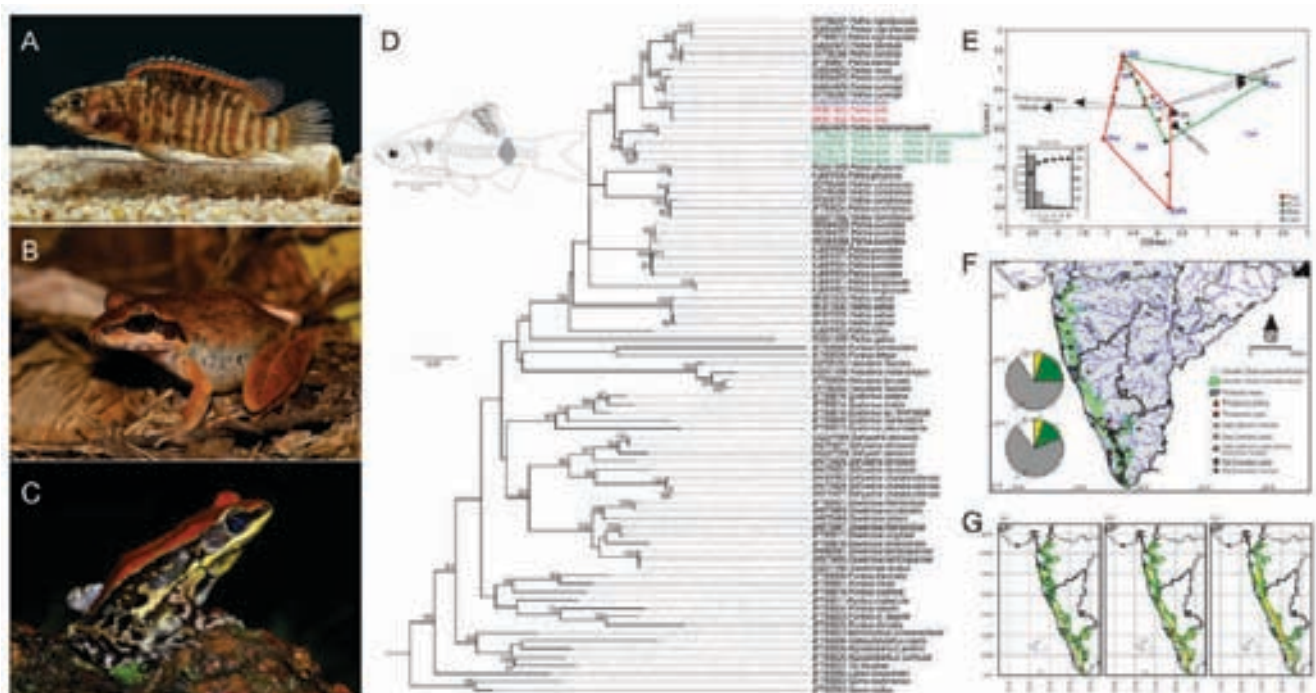
Conservation of biological diversity in a biodiversity hotspot like the Western Ghats of India is a challenging task because of limited information on the diversity,

Figure 40: Highlights of research outputs. (A) New species of percomorph fish *Badis britzi*; (B) new species *Indirana salelkari*; (C) new species *Hydrophylax bahuvistara*; (D) molecular phylogeny of barb *Pethia ticto*; (E) environmental determinants of branchiopod diversity and distribution; (F) conservation status of decapod crustaceans; and (G) niche based modeling of infectious chytrid fungus distribution in the anurans of the Western Ghats (Dr. Neelesh Dahanukar's Group)

distribution, ecology, and biology of several taxa. With an interest in freshwater biodiversity conservation in the Western Ghats, Dr. Neelesh Dahanukar's group works on the diversity, distribution, systematics, molecular evolution, biogeography, ecology and biology of freshwater dependent taxa such as fishes, amphibians and crustaceans.

Dr. Dahanukar's group has reported a new species of percomorph fish (*Badis britzi*), which is the first species of this genus endemic to the Western Ghats and described two new frog species, *Hydrophylax bahuvistara* and *Indirana salelkari*. These reports also include information on the distribution, molecular evolution, DNA barcoding, habitat, and ecology of identified species.

Other work on fish included clarifying systematics of barb (*Pethia ticto*) and loach (*Nemachilichthys ruppelli*) with observations on their molecular evolution, distribution, osteology and ecology and understanding the allometric relationships in growth of seven hillstream loach species. Additional work on frogs included description of sexually dimorphic osteological character from the bush frog (*Raorchestes tuberochumerus*) and understanding the distribution of infectious chytrid fungus in the anurans of the Western Ghats with diagnostic molecular studies and niche based modeling. Further, work on crustaceans included two ecological studies to understand the effect of environmental parameters on the diversity and distribution of branchiopods and a review on conservation status of decapod crustaceans of the Western Ghats.



11.5 Antimicrobial Resistance

Antimicrobial resistance is a serious concern for the biomedical community. The rampant spread of resistant bacterial strains and emergence of multi-drug resistance (MDR) can only be curbed by improving our current understanding on the governing processes that lead to development of MDR. One of the factors

thought to counteract the emergence and sustenance of MDR in bacteria is that resistance is often accompanied by an energetic or metabolic 'cost' that allows drug-susceptible bacteria to out-compete drug-resistant bacteria in environments where antibiotics are absent or present at sub-lethal levels. In the past year, **Dr. Nishad Matange's** group has embarked upon a study to understand how effective these 'costs' are against the emergence of MDR in a laboratory model of drug-resistance. Preliminary results from Dr. Matange's group indicate that the costs of resistance can indeed prevent the emergence of MDR. However, the influences of costs are limited to environments where drug exposure is very low and on resistant strains with relatively low-level of resistance. These findings will change the current view of the role played by costs of resistance in determining whether or not MDR will emerge in a bacterial population. Further studies are in progress on how and why costs have limited influence on the emergence of MDR.

12. Cell and Developmental Biology

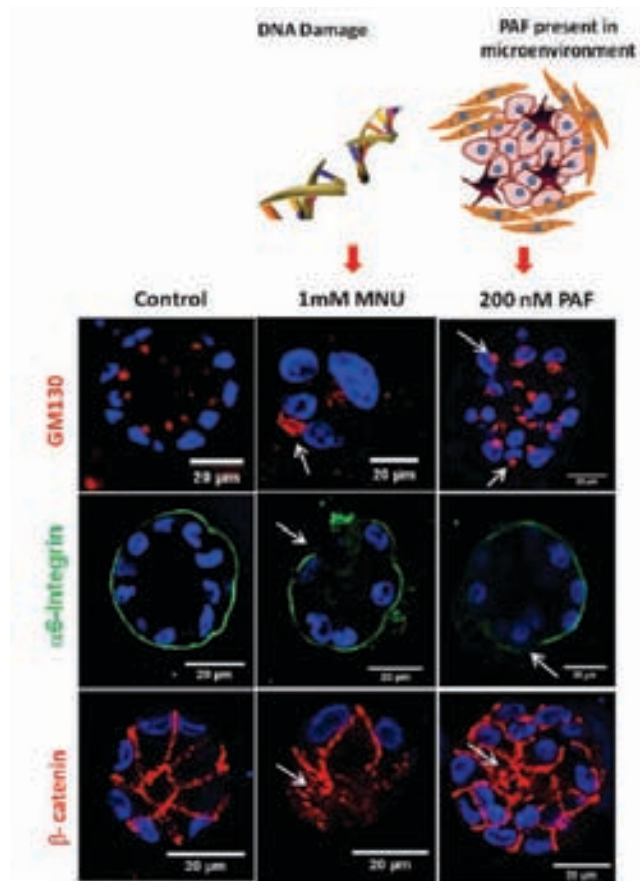
12.1 DNA Damage and Maintenance of Genome Integrity

Many harmful chemicals in the environment challenge human DNA. Cells have evolved exquisite surveillance mechanisms known as DNA damage response (DDR), which maintain genome integrity following DNA damage. Consequently, an aberrant regulation of DDR leads to genome instability and various diseases including cancer. **Dr. Mayurika Lahiri's** group has been trying to dissect out the process by which DNA damage or lipid mediators in the micro-environment can lead to cellular transformation of breast epithelial cells using three-dimensional breast acini as a model system.

Exposure of mammary epithelial cells to a methylating agent shown to cause DNA damage was sufficient to disrupt apico-basal polarity and to lead to epithelial-mesenchymal transition (EMT)-like phenotype. Additionally, it was found that the dispersed Golgi morphology and impaired trafficking was through activation of DNA-PK in methylation damaged breast acini. Interestingly, a small molecule inhibitor of DNA-PK was able to partially rescue the dispersed Golgi phenotype.

Micro-environment and tumor infiltrate have been shown to profoundly affect different stages of cancer development ranging from cancer cell initiation, promotion and progression. The role of phospholipid mediators such as platelet activating factor (PAF) in breast cancer has not been studied extensively in breast cancer, particularly during early events of cancer initiation. Dr. Lahiri's group has been investigating the role of PAF in breast cancer initiation, progression and promotion. Results have indicated that PAF treatment led to disruption of apico-basal polarity and diffused cell-cell junction resembling EMT. The pathways involved in transformation are currently being investigated.

Figure 41: Representative images of 3D cultures exhibiting DNA damage and PAF induced transformation. MCF10A, a non-tumorigenic breast epithelial cell line, were 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 micro-environment. On exposure to these chemicals, the spheroids exhibit (a) loss of apical polarity (mislocalization of GM130, a Golgi marker), (b) loss of basal polarity (loss of $\alpha 6$ -Integrin); and (c) disrupted cell-cell junctions (aberrant staining of β -catenin), all indicative of transformation. (Dr. Mayurika Lahiri's Group)



12.2 Regulation of Adult Epithelial Stem Cell Functions

Dr. Sonam Mehrotra's research involves the elucidation of mechanisms that regulate functions of adult epithelial stem cell and identity by utilizing *Drosophila* intestinal stem cells (ISCs) as a model system. Whether defects in adult stem cell development trigger pre-cancerous states remains largely elusive. Earlier studies have provided evidence for the differences in tumor initiation, progression and metastasis to be due to regional differences in the properties of apparently similar stem cells. Regions of *Drosophila* intestine such as the mid-gut exhibit very few ISCs. Over expression of the Wnt and other pathways increase their numbers in the rest of the regions, but has very mild effects on ISCs from mid-gut region. Based on the existing scientific data, homeotic transcription factors such as *defective proventriculus (dve)* and *labial (lab)* are expressed exclusively in this region and correlate with very few numbers of ISCs. Studies suggest that DVE and LAB could be potential candidates with crucial roles in the maintenance and differentiation of ISCs and, hence, contribute to regionalization in the mid-gut. Dr. Mehrotra's study suggests that specific expression of *dve* in the ISCs throughout the intestine decreases their numbers. The mechanism by which DVE expression regulates ISCs is currently being investigated.

12.3 Role of Cell Adhesion in Cellular Trafficking

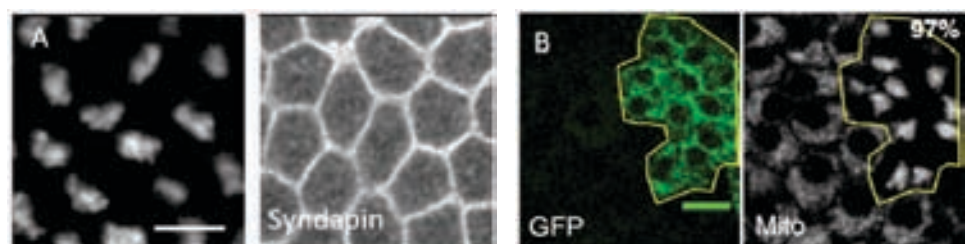
Growth factor mediated cell cycle progression and growth is dependent on the ability of cells to adhere to the extracellular matrix (ECM). This phenomenon of anchorage dependence is deregulated in cancers, which correlates with their

tumorigenicity. Studies from **Dr. Nagaraj Balasubramanian's** group have identified the regulation of membrane raft trafficking through caveolar endocytosis and exocyst-dependent exocytosis to control anchorage independence. This exocytosis is regulated by GTPases Ral and Arf6, which the group has shown to exhibit a regulatory crosstalk through a Ral-RalBP1-ARNO-Arf6 pathway. This also reveals a role for the differential activation of Arf6 downstream of Ral in mediating Ral isoform specific function in cells. Dr. Balasubramanian's group has also characterized how adhesion differentially regulates RalA vs RalB, implicating the Ral GEF RGL1 in mediating the same by the differential localization of RGL1 and Ral in cells. Their studies have also further looked at the role and regulation of caveolar trafficking and endocytosis in cells in 3D matrices. These results have revealed how mobility in the plasma membrane and endocytosis in cells in 3D matrices are differentially regulated by caveolin1.

12.4 Cell Biology of Development and Differentiation

The first morphologically distinct cell type to form during metazoan embryo development is an epithelial cell. Epithelial cells are organized as polygons and typically divide in the vertical axis to form more cells. **Dr. Richa Rikhy's** group has been studying the mechanisms, which initiate polygonal cell formation and remodeling in the early *Drosophila* embryo as well as follicle epithelial cells and how the organization of organelles in these cells influence their patterning and differentiation. The group has studied Bar domain family for their function in organization and remodeling of proteins in the plasma membrane and have found that Syndapin, a Bar domain protein, is essential for actin remodeling in pseudocleavage furrow formation in the syncytial *Drosophila* embryo. Syndapin mutants show looseness in the polygonal plasma membrane and disruption of actin organization possibly due to lack of association of actin remodeling proteins such as Diaphanous and Peanut. Dr. Rikhy's group has been also studying the role of mitochondrial morphology in cell organization and patterning in epithelial follicle cells. It has been found that mitochondrial fission deficient mutants of Drp1 show aggregated mitochondria with increased mitochondrial potential which leads to accumulation of EGFR pathway components and loss of Notch mediated differentiation in these cells.

Figure 42: (A) Syndapin localizes to the polygonal furrow membrane and is important for actin remodeling in furrow extension; (B) Drp1 mutant follicle cells (green) show aggregated mitochondria and loss of differentiation as compared to the background control cells. (Dr. Richa Rikhy's Group)



12.5 Functional Analysis of *twist* Paralogs during Zebrafish Scale Development

During vertebrate development, a reciprocal interaction between the epidermis and dermis is essential to form skin appendages like scales, feathers and hair. In zebrafish, scales are dermal derivatives and protect the underlying tissues from the physical assaults. Histological studies suggest that the skin cells undergo

changes that serve as signals to initiate scale formation. For example, the basal epidermal cells become columnar and few fibroblasts condense below them to initiate the process of scale formation. However, molecular mechanisms involved in scale formation in zebrafish are not well understood. **Dr. Tressa Jacob** is working on understanding the molecular regulation leading to scale formation in zebrafish and is investigating the role of *dermo1/twist 2*, regulator of dermis development in vertebrates, in scale formation. Results suggest that while *dermo1/twist2* is expressed in the scale forming cells during scale development, the mutant does not show any scale formation phenotype. This is possibly due to functional redundancy between the *twist* paralogs. The expression of *twist* paralogs, the role of Wnt signaling and its interactions with *twist* family of genes in scale formation in zebrafish are currently being studied.

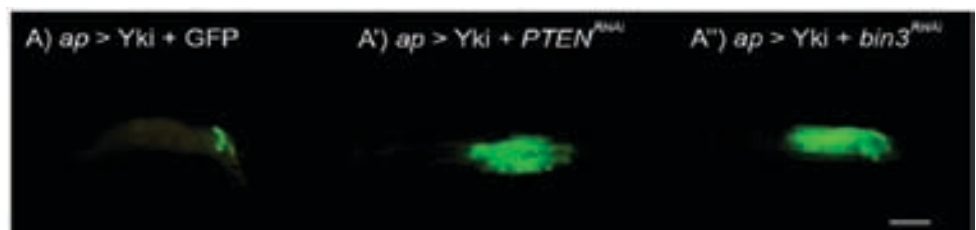
12.6 Screen for Cancer Biomarkers

Cancer is a leading cause of mortality. Complex and diverse nature of causal factors make prognosis and treatment of the disease difficult. Also, current understanding of progression of disease from a benign tumor to an aggressive metastatic form remains limited to certain specific contexts.

Fly tumor model has been used in the past to identify genetic interactions and in some cases to elucidate mechanisms of tumor development. Many tumor suppressors and oncogenes were originally identified in fly model (eg. Hpo, wrts, Yki) and have been found to be conserved and associated with human disease. Thus, fly tumor model is a useful tool to identify novel genes causally linked to cancer and cooperation between these genes can be studied *in vivo*.

To identify novel tumor suppressors that function in the context of an oncogene, **Prof. L.S. Shashidhara's** group in collaboration with Prof. Stephen Cohen (University of Copenhagen, Denmark) is using Yki/YAP and EGFR overexpression backgrounds, expressed specifically in wing imaginal disc tissue (*ap gal4*) in a temporally regulated manner (using *Gal80^{ts}*). More than 9000 individual genes were knocked down in these backgrounds separately, using KK RNAi library. Characteristic giant larval phenotype and GFP positive growth of wing disc tissue were used to identify positive candidates. Knock-down of a known tumor suppressor (PTEN) was used as a positive control (Figure 43).

Figure 43: GFP positive 3rd instar larvae indicating tissue overgrowth. Genotypes of the larvae are shown on top of the images. Note increased wing disc size (almost filling half of the larval body) when PTEN or bin3 are downregulated in the background of Yki/YAP over-expression. (Prof. L.S. Shashidhara's Group)



The group has so far screened around 8000 lines representing as many genes in both EGFR and Yki/YAP-overexpression backgrounds. They have identified 56 potential tumor suppressor genes, whose loss of function enhances EGFR-induced growth and 190 genes for Yki/YAP background. Potential tumor suppressors, thus identified, are being investigated (i) for their role in growth control in *Drosophila*, (ii) for the function of their human orthologs and (iii) the status

of their expression in various human cancers vis-à-vis clinical history of those patients (using TCGA database). Several genes have been short-listed such as MEPCE, NELFA, NELFB, PTPN11, etc. for such detailed analyses. Amongst these, genes which show potential causal relationship to cancer would be further subjected to experimental validation using human cell culture and xenograft assays followed by examination of their expression status in clinical samples.

12.7 A Novel Regulator of Hedgehog Signaling Pathway

A limited number of signaling pathways contribute to the development of an organism. All these pathways are highly conserved in spite of diversity in form and function across phyla. They are reiteratively used in different contexts. While they are well characterized at the levels of their activation and biological function, relatively less is known about how a single pathway generates multiple outputs depending on the context. Understanding the mechanism and functions of these pathways can unveil the molecular and cellular mechanisms of development and disease.

Hedgehog (Hh) is a highly conserved signaling pathway regulating various developmental events. In humans, mutations in Hh and related genes lead to congenital defects. Abnormal Hh signaling is associated with several types of cancer and, therefore, has been considered for therapeutic purposes. Hh pathway and its various components were first identified in searches for embryonic lethal mutations in *Drosophila* and via several genetic and RNAi screens that followed later.

Using phenotypes at the level of wing size and vein pattern due to aberrant Hh signaling in the wing disc as an assay, **Dr. Shital Ahaley** has identified Synaptojanin (Synj), an inositol-polyphosphate 5-phosphatase, as a negative regulator of Hh signaling. Synj affected Hh signaling by increasing the expression domain of Dpp, a Hh target, thereby causing aberrant Dpp signaling (Figure 44). This was due to increased activation of the signal transducer, Smoothened (Smo), as observed by increased Smo staining in *Synj* knockdown wing discs (Figure 44). Synj also showed genetic interaction with Smo. This finding shows a novel function of Synj in Smo regulation mechanism, which is currently under investigation. Work is also in progress to understand the precise mechanism by which Synj regulates Smo function.

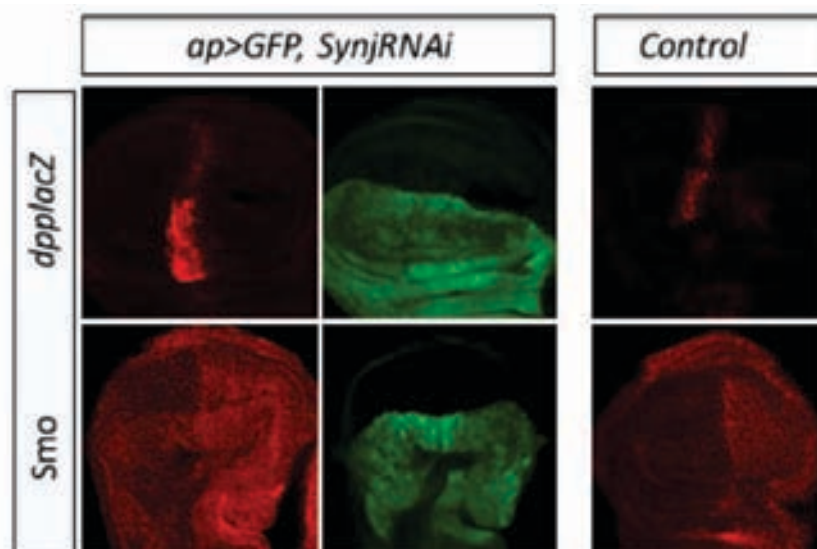


Figure 44: Synj knockdown in the dorsal region of wing discs (marked by GFP expression) lead to upregulation of *dpplacZ*, aHh target; and Smo, the 7-transmembrane protein that transduces the Hh signal. This upregulation is not observed in the ventral region of wing discs. (Dr. Shital Ahaley)

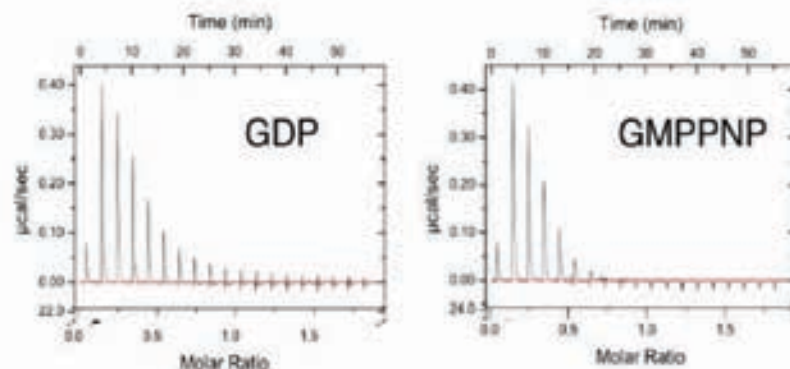
13. Biochemistry and Biophysics

13.1 Cell Motility and Bacterial Cytoskeleton

Dr. Gayathri Pananghat's group studies the molecular mechanisms of motility based on the bacterial cytoskeleton using *Spiroplasma* and *Myxococcus xanthus* as model systems. The group uses X-ray crystallography, electron microscopy and single-molecule fluorescence microscopy to study and analyze the structure and dynamics of the assembly of macromolecular complexes involved in motility, thereby capturing the assemblies at both spatial and temporal resolutions.

In the past year, Dr. Pananghat's group has studied the interaction between MglA and MglB proteins of *Myxococcus xanthus*, which are involved in spatial positioning of the motility complexes. Towards this end, crystal structures of these individual proteins, and their complexes in the presence of nucleotide have been determined. Interaction studies using isothermal calorimetry (Figure 45) and fluorescence assays monitoring binding of GTP and complex formation for MglB and relevant mutant constructs, and GTPase activity assays to support the crystallographic data are in progress. *In vitro* characterization of other proteins of *Myxococcus* motility such as MreB, FrzCd and SofG have also been initiated.

Figure 45 : Isothermal calorimetry data for characterizing binding affinity between MglA and MglB in the presence of GDP and GMPPNP shows that they bind to each other (Dr. Gayathri Pananghat's Group)



To understand the motility and shape determination in the helical Mollicute *Spiroplasma*, the MreBs have been cloned, expressed and purified. One of the five MreBs has been crystallized, x-ray diffraction data collected and the structure determined. Studies towards polymerization interface identification for Fib using GFP tagged constructs are also under progress.

13.2 Self Organization and Cell Morphogenesis

Dr. Chaitanya Athale's group is interested in studying the role of the cytoskeleton in cell shape determination using a combination of computational models and quantitative experiments. In the recent years, this cellular biophysics based approach has been enabled by dramatic improvements in experimental tools and

has improved the theoretical understanding of physical models of pattern formation at the cellular scale. Dr. Athale's group has focused on the problem of the transport of cytoskeletal proteins, namely, microtubules, where their role in spindle assembly and neuronal development is being examined.

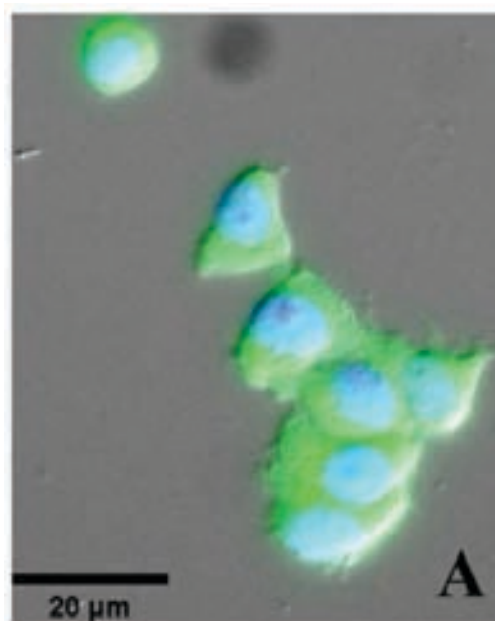
(a) A novel simulation of centripetal motility of microtubule arrays has been developed as they converge to the chromosomes in mouse oocytes. This can address the puzzle of how passive molecules can find the center of a cell in a manner independent of contact with the cell cortex (Khetan and Athale, *in review*).

(b) Role of cytoskeletal polarization triggered by nerve growth factor (NGF) dependent cell polarization is under investigation in the model pheochromocytoma (PC12) cell line and examining the morphological and subcellular localization changes in such cells (Figure 46). The ultimate aim is to use this quantification to compare to multiple models in the field that appear to govern the initiation and growth of neurites in such cell types, shedding light on more general cell polarization events.

(c) In order to improve quantification of microscopy based experimental data, a MATLAB software tool with a graphical user interface (GUI) has been developed to automatically detect and quantify tracks in a kymograph, i.e. 1D movement vs. time plot (Chaphalkar et al., *in preparation*). Together with other filament tracking tools developed in the lab (Chaphalkar et al., *in preparation*), a general toolset is being developed for the community for quantitative understanding of the dynamics of sub-cellular events.

(d) In 2015, from May to October, Dr. Athale's lab hosted a synthetic biology team from IISER Pune to develop novel diagnostic tools by engineering a bacterium to produce pigments and become easily visible in a diagnostic lab setting. This project won a bronze medal at the international Jamboree in Boston, USA. Such combinatorial approach of experiments, automated quantification and simulations may help to discover principles of cell growth and shape, which will be relevant for both our fundamental understanding of mechanobiology and provide new tools for discoveries in disease biology.

Figure 46: A fixed image of PC12 cells in culture with the cell outline visible in DIC (grey), the nucleus stained by DAPI (blue) and the microtubule cytoskeleton stained by a FITC-conjugated antibody (green) (Dr. Chaitanya Athale's Group)



13.3 Reconstitution of Cargo-Sorting during Coated-Vesicular Transport

Generation of vesicles from a membrane compartment is fundamental to diverse cellular processes such as synaptic transmission, organelle biogenesis and protein degradation. Every vesicle that is formed in the cell is an outcome of membrane fission. Membrane fission requires the localized application of curvature stresses to the lipid bilayer in order for a membrane tube to go from a highly constricted to a cut state. Since these topological transformations require the bilayer to deviate from its preferred planar configuration, membrane fission is an energetically unfavorable process.

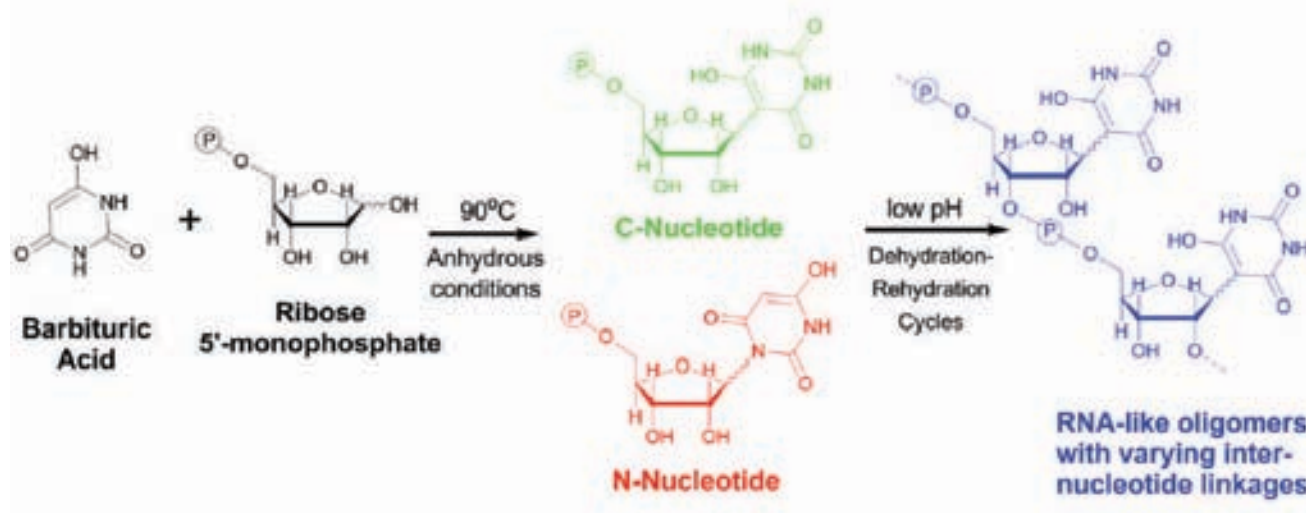
Cells have evolved protein machines that often utilize energy provided by nucleotide hydrolysis to catalyze this process. Research efforts of **Dr. Thomas Pucadyil's** group are directed towards understanding the mechanisms by which such proteins manage to cut membranes. Tools for such analysis constitute direct reconstitution of membrane fission on model membrane systems that mimic the topology of transport intermediates.

13.4 Origins and Early Evolution of Life

The fundamental question of how life originated is one of the greatest scientific mysteries. In particular, the processes by which polymers capable of catalysis and replication emerged and propagated on the early Earth, which have implications for discerning how life could have chemically originated on the early Earth, are questions that **Dr. Sudha Rajamani's** group has been focusing on.

Ongoing work is on delineating the possible sequence of events that might have led to the origin of an RNA World, a time when RNA molecules facilitated information processing and catalytic activity. In this context, the group has worked on discerning plausible prebiotic molecules that could have worked as precursors and resulted in primitive informational molecules of a pre-RNA World, prior to the emergence of molecules of the RNA World. In this recently published work (*Phys. Chem. Chem. Phys.* (2016) 18), the group has demonstrated the formation of a prebiotically relevant nucleotide using an informational moiety that is different from modern nucleic acid bases. In a second project, Dr. Rajamani's team has addressed the role of prebiotically relevant co-solutes on relevant non-enzymatic

Figure 47: Synthesis of barbituric acid containing nucleotides under prebiotically relevant conditions (Dr. Sudha Rajamani's Group)



reactions and have delineated the role of an amphiphile and PEG, a molecular proxy for prebiotic oligomers, on the rate and accuracy of nonenzymatic replication of RNA. Their publication (*J. Mol. Evol.* (2015) 81) demonstrated that the presence of these co-solutes in the reaction mixture led to an increase in the mutation rates of replication. This work helps in understanding the fidelity of prebiotically realistic early replication processes and is pertinent for characterizing the steps that would have led to the emergence and early evolution of protocells on the early Earth.

13.5 Structure and Function of Molecular Machines

The research focus of **Dr. Saikrishnan Kayarat's** group is to understand how modular, multifunctional and multi-domain protein molecules, often referred to as macromolecular machines, orchestrate their varied activities to carry out a specific cellular function. Aberrations in their coordination can be deleterious to the cell. Towards this, Dr. Kayarat's group has carried out mechanistic studies on a model system of the multidomain/multisubunit NTP-dependent restriction-modification (RM) enzymes, primarily using X-ray crystallography and complemented by biochemical and biophysical studies.

Though first discovered and purified in 1968, the crystal structure of NTP-dependent RM enzymes had been an unaccomplished challenge due to the large size of these enzymes. Detailed studies have been initiated using three types of RM enzymes Type ISP, Type III and McrBC and here are a few important highlights of the study so far.

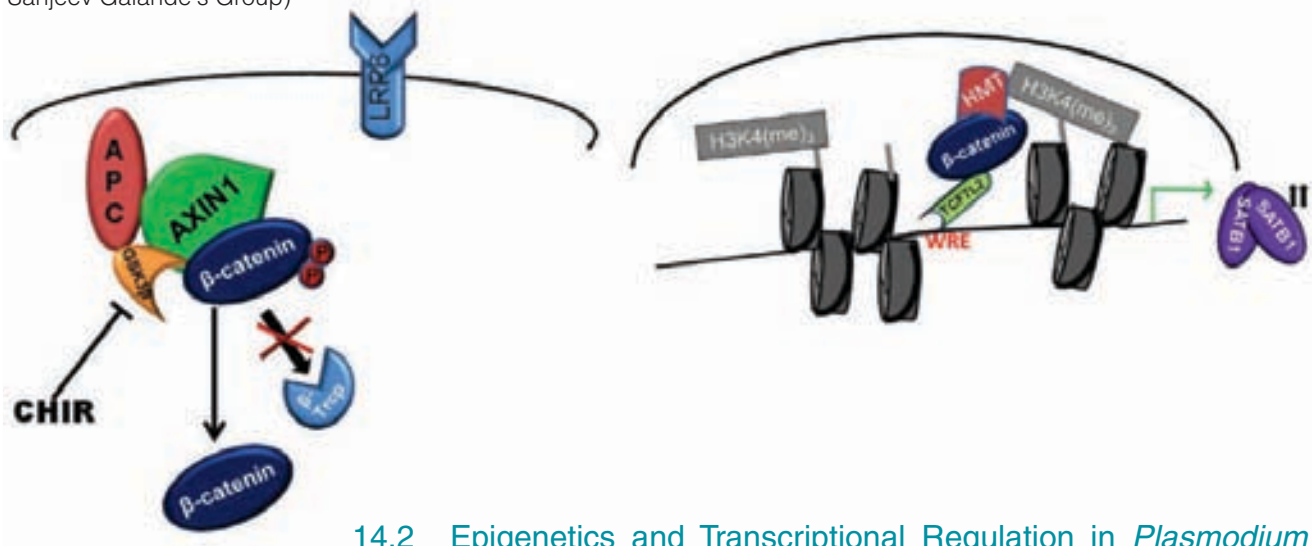
- a) The first crystal structure of a complete NTP-dependent RM enzyme, the Type ISP enzyme has been determined.
- b) This structure of the enzyme with a bound DNA substrate mimic provided a molecular framework and unprecedented insights into the mechanism of these enzymes.
- c) The structural findings with complementary biophysical and biochemical studies led to the discovery of a new mode of DNA cleavage by endonucleases.

14. Epigenetics and Immunology

14.1 Wnt/ β -catenin Signaling regulated SATB1 promotes Colorectal Cancer Tumorigenesis and Progression

Special AT-rich binding protein 1 (SATB1) is a global chromatin organizer that links higher-order chromatin architecture to gene regulation. In addition to its key role in gene regulation, it is also known to interact genetically/physically with components of multiple signaling pathways, including the Wnt/Wg signaling pathway. Previous

Figure 48: TCF7L2 / β -catenin directly regulates SATB1 expression (*Left*): Upon activation of Wnt signaling cascade, the TCF7L2/ β -catenin complex binds to *SATB1* promoter and thereby regulates its expression; (*Right*): TCF7L2/ β -catenin complex presumably recruits histone methyltransferase complex to modify nucleosomes in the vicinity of the Wnt Response Element (WRE) on the *SATB1* promoter and stimulates its transcription (Prof. Sanjeev Galande's Group)



studies have shown that SATB1 interacts with β -catenin and competes with TCF7L2 for binding to it and thereby modulating the final outcome of Wnt signaling. However, it is still unclear whether recruitment of β -catenin is the only role of SATB1 in the Wnt/Wg pathway.

Recent studies from Prof. Sanjeev Galande's group have provided evidence that, in the mammalian system, SATB1 also interacts with Dishevelled (*Dvl/dsh*), an upstream effector of the Wnt/Wg pathway. Mammalian SATB1 suppresses the phenotypes associated with Wnt/Wg activation in *Drosophila*. Further, ectopic expression of SATB1 resulted in upregulation of the Wnt/Wg pathway antagonists at the transcript level. Thus, in the fly system, SATB1 is a negative regulator of the Wnt/Wg pathway. Therefore, regulation by SATB1 is a context-dependent phenomenon. Upon investigating the molecular mechanisms of regulation of SATB1, the group has found that SATB1 is induced upon hyperactivation of Wnt/ β -catenin signaling and repressed upon depletion of TCF7L2 (TCF4) and β -catenin. Using several colorectal cancer cell line models and the APC min mutant zebrafish *in vivo* model, they have established that SATB1 is a novel target of Wnt/ β -catenin signaling.

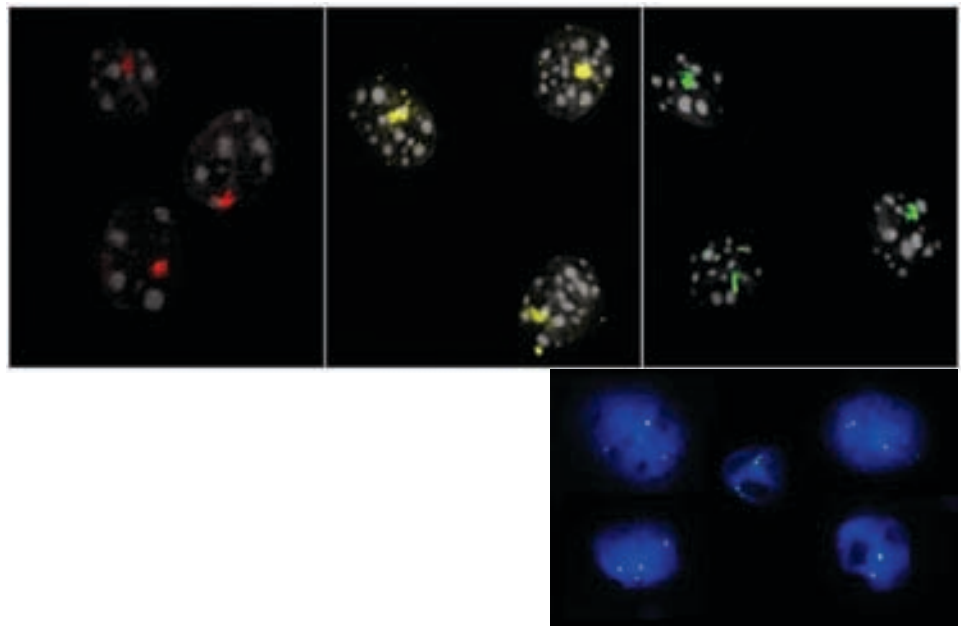
14.2 Epigenetics and Transcriptional Regulation in *Plasmodium falciparum*

Malaria is a major public health hazard in many developing countries, with *Plasmodium falciparum* causing the most malaria-associated mortality. Efforts on malaria eradication are mainly focused on vaccine development. However, the vaccine approach has failed globally as the parasite is able to mutate continuously. How these mutations are generated at the levels of genome, transcriptome and epigenome is poorly understood. Research in Dr. Krishanpal Karmodiya's group addresses the issue of epigenetic regulation of gene expression in the malaria parasite. Epigenetics is defined by heritable changes in gene expression that are not associated with changes in DNA sequence. It is mainly reflected in methylation of DNA and post-translational modifications of DNA-associated proteins, histones. Their project will take advantage of the genome sequence to identify regions that may undergo epigenetic regulation, a phenomenon that is poorly understood. Better fundamental knowledge of epigenetic regulation in *Plasmodium falciparum* and their comparison with the human system would open the hitherto unexplored pathways for targeting the malaria parasite.

14.3 Chromosome Biology

Dr. Kundan Sengupta's group addresses the role of lamins in regulating nuclear structure-function relationships in cancer cells. Chromosomes in the nucleus are non-randomly arranged with gene poor chromosomes (human chromosome 18) positioned at the nuclear periphery, while gene rich chromosomes (human chromosome 19) are at the interior of nucleus. However, the mechanisms that regulate spatial organization of chromosome territories remain unclear. Recent findings from the group reveal that nuclear lamins are required for correctly positioning not only diploid but also aneuploid chromosomes in the interphase nucleus. Just as lamins serve as landmarks for guiding chromosome positions in the nucleus, Nucleoporins (Nups) and nucleolus are prominent nuclear landmarks involved in chromatin organization. In addition to their canonical functions of regulating the entry and exit of molecules in and out of the nucleus, Nups organize the chromatin and regulate expression levels of specific genes in the nucleus. The nucleolus is required for the synthesis of ribosomal RNA (rRNA). Work from the group reveals a remarkable role for nuclear lamins (otherwise localized at the nuclear periphery) in also regulating nucleolar structure and function. The goal is to investigate nuclear structure function relationships in models of cancer initiation and progression.

Figure 49: (*Top*): Human chromosome 7 (red), 18 (yellow) and 19 (green) in murine cells introduced using microcell mediated chromosome transfer (MMCT), large foci (grey) are chromocenters stained with DAPI in murine cells; (*Bottom*): C-Myc gene loci (green) show amplifications in cancer cell nuclei (blue) (Dr. Kundan Sengupta's Group)



15. Neurobiology and Computational Biology

15.1 Neural Circuits and Behavior

Dr. Aurnab Ghose's group investigates the development and organization of neural circuits and behavior. Their recent work has identified the molecular mechanisms underlying the function of Fmn2, a protein implicated in mental

retardation. This study provides insight into a novel mechanism of neural circuit development and its underlying cell biological logic. Current work is not only focused on dissecting Fmn2 function in detail but also looking at other novel cytoskeleton regulatory activities that have been identified earlier.

Other studies have uncovered a new mechanism underlying olfactory modulation by internal states, involving direct alteration of odorant sensitivity by the receptor neurons. In addition, Dr. Ghose's group is defining a new circuit in zebrafish whose activity states govern the release of hunger/satiety-associated behaviors.

15.2 Neurobiology of Movement Initiation

Animals produce a vast variety of behaviors that are well suited for survival and reproduction in their environment. Dr. Raghav Rajan's group is working on understanding the neural mechanisms underlying such ethologically relevant behaviors. One well-studied example of an ethologically relevant behavior is the song of an adult male zebra finch, a songbird. The song consists of a highly stereotyped sequence of sounds interleaved by silent gaps and forms part of a courtship ritual performed by the male to attract females. Each song bout starts with a variable number of repetitions of a short sound called an introductory note (IN). Their earlier results suggested that INs may represent an initiation process by which the zebra finch brain gets "ready" to sing. Dr. Rajan's lab is currently testing this hypothesis with a combination of behavioral experiments and song analysis coupled with reverse microdialysis techniques to pharmacologically manipulate the activity of neuronal populations in the awake singing bird. Their research also uses electrophysiological techniques to record the activity of individual neurons in the awake singing bird to understand how activity of these neurons is linked to IN production and song initiation.

15.3 From Neural Circuits to Behavior

The specific behaviors shown by individuals provide the ultimate read-outs from the brain. These behaviors happen through the interactions of different neuronal circuits and are judged by decisive or non-decisive actions performed by the individual. Dr. Nixon Abraham's laboratory studies how different neuronal circuits shape perception and decision-making that leads to well-defined behaviors (Figure 50). The group uses rodent olfaction as a model system, combined with the state-of-art automated behavioral training, electrophysiology and optogenetics.

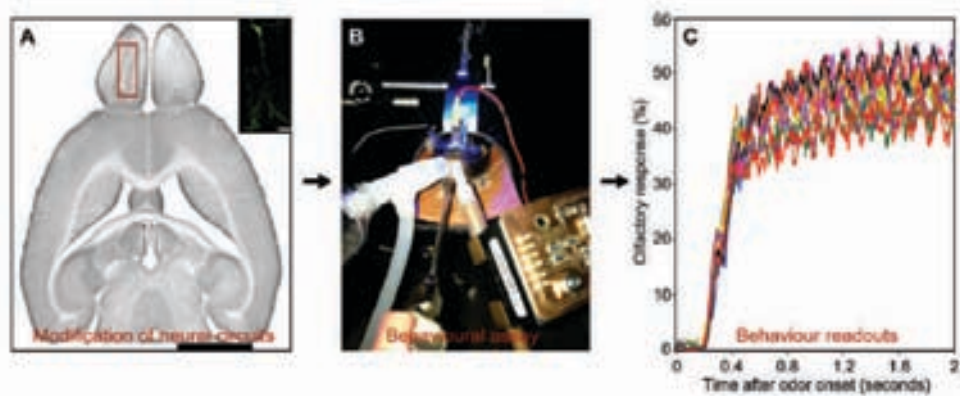
Olfactory decisions: One of the scientific goals is to unravel the behavioral relevance of genetically identified subsets of neurons in the olfactory pathway. By using optogenetic/pharmacogenetic techniques, Dr. Abraham's group is identifying the circuit motifs that give rise to olfactory specific behaviors. They have developed an "olfactory-action meter" that enables the study of olfactory behavior in rodents with high temporal precision. The same device can also be adapted to measure the olfactory detection/discrimination abilities in humans. Addressing the olfactory decision related questions will further allow creation of novel animal models for brain disorders associated with excitatory/inhibitory imbalance.

Multisensory decisions: The second, and a complimentary, focus of the lab is on the neural mechanisms of multisensory decision-making, with a particular interest

Figure 50: Modifications of neural circuits are reflected in animal behavior. (A) Modification of GCs in the OB by direct stereotaxic delivery of viral vectors into the GC layer. Red square shows the *Cre* recombinase expressing GCs in the OB in comparison to the whole brain (DAB-stained transverse section). Scale bar 2.5 mm. Right upper corner: confocal image of a single GC (*Cre* expressing, labeled with mGFP). Scale bar 25 μ m; (from Abraham *et al.* 2010). (B) Mouse involved in an olfactory behavioral assay; (C) Example traces olfactory responses towards a rewarded odor in a discrimination assay (Dr. Nixon Abraham's Group)

in understanding the mechanisms of how animals combine sensory information across modalities. Rodents heavily rely on olfactory and tactile sensing while synchronizing sniffing and whisking to optimize their sensory navigation. Using automated behavioral assays, high-resolution tracking systems and targeted optogenetic control of neural activity, Dr. Abraham's team will study the neural basis of multi-modal sensory decision-making. This research work is a collaborative initiative between IISER Pune and Radboud University/Donders Institute in the Netherlands.

Neurogenesis and synaptic inhibition: The brain works efficiently on a balance between the excitatory and inhibitory synaptic transmission occurring at millisecond time scales. The rodent olfactory bulb (OB), the first relay station in olfactory pathway, offers an excellent model to study the excitatory-inhibitory balance. As there is a continuous renewal of inhibitory interneurons in OB, what are the factors controlling the synaptic integration of adult-born inhibitory interneurons? Dr. Abraham's group plans to address this question by using a combination of imaging and behavioral approaches.



16. Algebra and Number Theory

16.1 Special Values of L-Functions Associated to Automorphic Forms

In a joint project with Eknath Ghate of TIFR, Dr. Baskar Balasubramanyam has analyzed the behavior of Asai L-function attached to Bianchi modular forms under twisting by characters of prime power order. The specific goal of this project is to understand how the 'periods' of such L-functions change under twisting. Another aspect of this project is to construct a p -adic analytic function that interpolates the values of such twists as characters vary p -adically.

In another project with Anilatmaja Aryasomayajula, the Bergman kernel for quaternion algebras over totally real fields has been studied. Point-wise asymptotic estimates for the Bergman kernel in the compact case and inequalities in the non-compact case were obtained. An average version of the QUE for quaternion algebras has also been obtained.

16.2 Arithmetic Geometry and Automorphic Forms

The theory of modular symbols was invented independently by Manin and Birch. Modular symbols give us an effective way to understand the modular forms. William Stein used the theory of modular symbols to give an algorithmic way to understand the theory of classical elliptic modular forms. The Eisenstein series is the most natural modular form. **Dr. Debargha Banerjee** is working to understand the modular symbols corresponding to the Eisenstein series. Shokurov defined the Eisenstein elements inside the space of modular symbols for weight greater than two. The space of modular symbols has explicit representations in terms of Manin symbols. The Eisenstein elements of higher weights are written explicitly in terms of Manin symbols.

In a joint work with Loïc Merel of Universite de Paris, Dr. Banerjee uses the Hecke theory on the space of modular symbols to write down Eisenstein elements. This method is completely different from Dr. Banerjee's previous work. The precise statement is the following:

Theorem 1. For $P \in (\mathbb{Z}/N\mathbb{Z})^2$, the modular symbols \mathcal{E}_P satisfy the following properties: Suppose l is an odd prime number and $l \equiv 1 \pmod{N}$. Let T_l be the Hecke operator at the prime l . The Eisenstein cycles \mathcal{E}_P satisfy the correct equality:

$$T_l(\mathcal{E}_P) = (l + 1)\mathcal{E}_P$$

The converse of this theorem has also been proved.

16.3 Arithmetic Aspects of Locally Symmetric Spaces

Dr. Supriya Pisolkar is trying to answer some interesting questions which relate spectra of the locally symmetric spaces corresponding to the Laplacian acting on the space of smooth function on these spaces to that of the arithmetic of these spaces. One such question is as follows: Suppose F_1 and F_2 are two totally real number fields of degree r over \mathbb{Q} such that the unit groups U_{F_1} and U_{F_2} are spectrally commensurable as lattices in the natural embedding into \mathbb{R}^{r-1} . Then, are F_1 and F_2 arithmetically equivalent, *i.e.*, do they have the same Dedekind Zeta functions?

Another project that Dr. Pisolkar is interested in is related to the Archimedean analogue of Tate's conjecture which was posed by C.S. Rajan and D. Parsad. The conjecture says if X and Y are algebraic curves over a number field K and if the corresponding Riemann surfaces via an embedding of K into \mathbb{C} are isospectral with respect to the Kahler metric, then the Hasse-Weil zeta functions of X and Y are the same and the Weil restriction of Jacobians from L to \mathbb{Q} are isogenous. It is now known that Jacobians of isospectral surfaces are isogenous upto conjugacy. It now an open problem to verify that this is the only case.

16.4 Number Theory, Representation Theory and Spectral Theory of Symmetric Spaces

Special values of L-functions: In an earlier joint work with A. Raghuram (2013), Dr. Chandrasheel Bhagwat has established theorems which describe the period relations for motives. They are compatible with the theorems of Harder and Harder-Raghuram on ratios special values of automorphic L-functions for group $GL(n)$. Dr. Bhagwat has also published a paper in *Comptes rendus-Mathematique* in 2015 in which he proved another theorem on Deligne periods which in turn explains the theorem by Bhagwat-Raghuram. In an ongoing project with Raghuram, using ideas like Eisenstein cohomology, they aim to prove similar theorems for special orthogonal and other classical groups.

Endoscopy and cohomology of arithmetic groups: In this project (jointly with Raghuram), the question of existence of cohomological representations of $GL(n)$ and the classification of the arithmetic data for which such representations exist has been addressed. Techniques like local Langlands correspondence and endoscopic transfers have been used. This work will appear in the special Shahidi volume of BIMS in 2016.

Harmonic analysis and Zeta functions on locally symmetric spaces: Dr. Bhagwat's graduate student Ayesha Fatima is working on a problem which involves establishing a geometric analogue of the classical strong multiplicity one theorem for hyperbolic locally symmetric spaces. This is in analogy with some theorems by Bhagwat-Rajan (IMRN 2010, JNT 2011). Ajith Nair, a BS MS fourth year student at IISER Pune plans to work on a project that involves a problem on spherical spectrum of locally symmetric spaces for which he will be studying harmonic analysis on Lie groups (e.g. $SL(2, \mathbb{R})$ and other Lorentz groups).

Discrete subgroups of Lie groups: In a joint work with Supriya Pisolkar (IISER Pune), Dr. Bhagwat has established some results on co-compactness of discrete subgroups of Lie groups. This work has been published in the journal *Proceedings of AMS*.

Divisibility patterns in Integer network: With G. Ambika (IISER Pune) and her graduate student Snehal Shekatkar, Dr. Bhagwat has worked on a network whose nodes are positive integers and the links are defined by divisibility relations. They have named this 'Integer network'. In the published work (*Scientific Reports* 5(2015)) they have shown that this network is scale-free but with a non-stationary degree distribution. They have also reported a very interesting similarity pattern which they have called 'Stretching similarity'. The mathematical theory which plausibly explains this pattern is being investigated.

Laplacian spectrum of graphs: Dr. Bhagwat is part of two ongoing projects in this area. The first one is jointly with Anisa Chorwadwala and graduate student Pralhad Shinde in which they aim to formulate and establish the analogues of some of the results in classical analysis which involve the Laplacian and Dirichlet boundary value problems; in the context of certain families of finite graphs which resemble the geometric objects in classical setup. In this ongoing work, many interesting questions can be asked in this context and there is a hope to use some other tools in analysis and geometry to attack these questions. The other project on Laplace spectrum of graphs involves the aforementioned 'Integer network'. Snehal Shekatkar and Dr. Bhagwat are working to study the spectral properties of

network. In this ongoing work, they have established a few interesting theorems which relate the multiplicity of the eigenvalue one in the Laplace spectrum of this network and distribution of primes.

16.5 Analytic Number Theory and Arithmetic of Modular Forms

Dr. Kaneenika Sinha's primary research interests are in analytic number theory and arithmetic geometry. One of her primary goals is to investigate statistical phenomena in the distribution of sequences that arise from the theory of modular forms, zeta functions of curves over finite fields and eigenvalues of adjacency matrices of certain kinds of graphs.

In 1916, the German mathematician Hermann Weyl asked a fine question: take an irrational number T , look at its multiples $T, 2T, 3T$, etc and record the sequence of its decimal parts. While these numbers find a place throughout the interval $[0, 1)$, are they likely to cluster around some parts more than others? Weyl discovered that each and every part of the interval $[0, 1)$ gets its fair share of elements from the sequence. That is, this sequence is equidistributed in the interval $[0, 1)$. In showing this, Weyl discovered and outlined a beautiful technique that was capable of answering generalizations of this question in a wider paradigm. This technique relates the phenomenon of equidistribution to exponential sums in number theory and places this phenomenon in a wider landscape of harmonic analysis.

Many sequences arising in number theory follow a distribution pattern that can be defined by very elegant functions. In particular, one of the major breakthroughs in recent times is the discovery (by Richard Taylor, Michael Harris and many others) that certain sequences arising from the Fourier coefficients of modular forms (certain complex-analytic functions with rich inner symmetries and growth conditions) follow the “semi-circle” equidistribution law, also called the Sato-Tate law.

Dr. Sinha's primary research work focuses on equidistribution of various such families and sequences arising in the context of modular forms, arithmetic geometry and graph theory. She is investigating several deeper statistical phenomena associated with such families; for example, fluctuations in the distribution and pair correlation.

16.6 K_1 Stabilization of General Quadratic and General Hermitian Groups

Dr. Rabeya Basu's recent work involves a very newly developed subject, viz. Leavitt path algebras (LPA), which bridges algebra and functional analysis, especially graph C^* -algebra. Dr. Basu plans to work on the algebraic and K -theoretic aspects LPA.

It has been observed that the K -groups K_0 and K_1 of Leavitt path algebra $L_k(E)$ (k a field, E a row-finite directed graph) work better over a number field instead of the field of rational number. On the other hand, Alain Connes applied C^* -algebras to differential geometry, and Vaughan Jones related von Neumann algebras to solving problems in knot theory. Motivated by these facts, Dr. Basu is looking at literature to get a broad view of the subject and developing her work on classification problems of K -theory of LPA.

To introduce this newly developed subject in India, Dr. Basu is organizing a CIMPA Research School 2017 at IISER Pune on Recent Trends in Non-Commutative Algebras. The proposal has got final approval from the Scientific Council and the Steering Council of CIMPA. Here is the link: <https://iiserpunecimpa17.wordpress.com/>

17. Analysis and Applicable Mathematics

17.1 Shape Optimization Problems

Dr. Anisa Chorwadwala works on shape-optimization problems including the isoperimetric problems. The details of the research work are as described below.

Let S be a Riemannian manifold with metric g and Laplace-Beltrami operator Δ . Let B_1 be an open (geodesic) ball in S . Let B_0 be an open ball whose closure is contained in B_1 . Let $\Omega = B_1 \setminus B_0$. Consider the following problems:

$$-\Delta u = 1 \text{ in } \Omega, u = 0 \text{ on } \partial\Omega, \text{ --- (1)}$$

$$-\Delta u = \lambda u \text{ in } \Omega, u = 0 \text{ on } \partial\Omega. \text{ --- (2)}$$

In the case that S is Euclidean space, Kesavan (*Proceedings of the Royal Society of Edinburgh Section A* (2003); 133:617-624) (and also Ramm-Shivakumar (*Math. Inequalities and Appl.* (1998) 1:559-563) proved the following:

(I) If u is a solution of problem (1), the energy functional $\int_{B_1 \setminus B_0} |\nabla u|^2 dx$ attains its minimum if and only if B_0 and B_1 are concentric.

(II) The first eigenvalue λ_1 of problem (2) attains its maximum if and only if the balls are concentric.

The proofs described earlier by Kesavan and Ramm-Shivakumar rely on shape differentiation and the moving plane method. In the application of the moving plane method, the commutativity of the Laplacian and reflection in the hyperplane was used.

Dr. Chorwadwala has studied the behaviour of the above-mentioned functionals associated to a non-linear differential operator namely the p -Laplacian. The Shape-calculus for the p -Laplacian is developed. The existence and uniqueness of non-negative solution of a particular boundary value problem involving the p -Laplacian with non-vanishing boundary conditions is derived. As a consequence, a weak comparison principle for the p -Laplacian (with non-vanishing boundary condition) is proved.

Dr. Chorwadwala has proved a generalized version of a famous conjecture made by Lord Rayleigh. The conjecture was as follows: The first eigenvalue of the Laplacian on an open domain of given measure with Dirichlet boundary conditions is minimum when the domain is a ball and only when it is a ball. This conjecture was

proved simultaneously and independently by Faber and Krahn. Dr. Chorwadwala's work dealt with the p -Laplacian version of this Theorem.

17.2 Elliptic Partial Differential Equations

(a) Elliptic equation with biharmonic operator: Dr. Mousomi Bhakta has studied the existence/ nonexistence of positive solution of a semilinear elliptic problem with biharmonic operator and Navier boundary conditions.

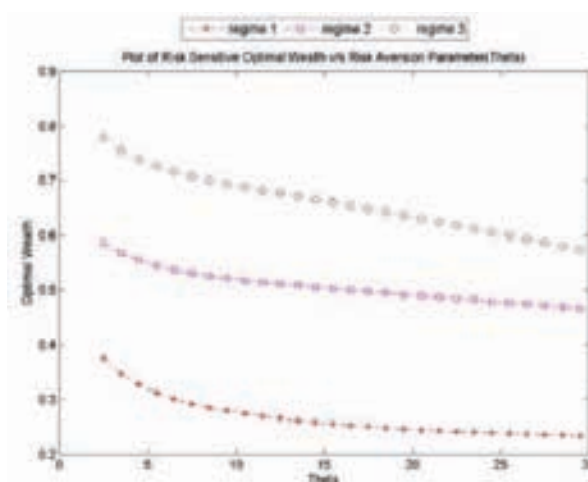
(b) Elliptic problem with nonlocal operator: Dr. Bhakta, along with PhD student Debangana Mukherjee, is studying the existence of infinitely many nontrivial solutions of semilinear type elliptic equations with nonlocal integro-differential operator and concave-convex nonlinearities. They considered the bounded domain with Dirichlet boundary conditions. Moreover, when that integro-differential operator reduces to the fractional laplace operator, they have studied the existence of sign changing solution to the same problem.

(c) Singular elliptic equation with critical and supercritical nonlinearities: With collaborator Sanjiban Santra (CIMAT, Mexico), Dr. Bhakta is studying the existence/nonexistence phenomenon, singularity, blow up profiles of positive solution of a singular problem with critical and supercritical exponents.

17.3 Math Finance: Risk Sensitive Portfolio Optimization in a Jump Diffusion Model with Regimes

In this project, Dr. Anindya Goswami has worked along with a PhD student and a BS MS student using a probabilistic approach to establish the existence and uniqueness of the classical solution of the corresponding Hamilton-Jacobi-Bellman (HJB) equation. The optimal controls have been obtained. The technique of separation of variables has been employed to reduce the HJB equation to a linear first order system of PDE containing non-local terms. Furthermore, the nature of non-locality is such that the standard theory of integro-pde is inadequate. To show wellposedness, a Volterra integral equation (IE) of second kind has been obtained and then the existence of a unique continuously differentiable solution was shown. Then it is proved that the solution of the IE is a classical solution of the PDE under study. The uniqueness of the PDE is proved by showing that any classical solution also solves the IE.

Figure 51: Optimal wealth v/s risk aversion parameter with 3 different initial regimes (Dr. Anindya Goswami's Group)



17.4 Probability Theory and Control Theory

(a) Queueing with help

In this project by **Dr. Anup Biswas**, a model of queueing network with multiple customer classes where every class gets priority in one of the servers is considered. No two servers have the same priority customer class. These servers may serve a non-priority class in the absence of its priority class. One of the main questions of interest is the optimal scheduling of customers with respect to some reasonable cost criterion. These questions have been answered in the settings of single and many-servers.

(b) Mean field games

This is one of the emerging areas in non-cooperative game theory and probability. Mean field games represents limiting dynamics of a large population of players trying to optimize a similar reward function. Dr. Biswas has looked at the stationary version of this problem and answered some natural questions of interest under very general setup.

(c) Controlled equilibrium selection

This is a project that concerns ergodic behavior of small noise diffusion perturbed by an expensive control. The effect of the control and noise on the concentration nature of the optimal invariant measures has been studied. It is shown that the concentration phenomenon depends on the scale of noise-variance and control.

18. Geometry and Topology

18.1 Low-Dimensional Topology: 3-Dimensional Manifolds

This is an active area of research with several longstanding conjectures proved fairly recently, such as Thurston's Geometrization conjecture (which implies the Poincare conjecture) and the Virtual Fiberings conjecture. Within low-dimensional topology, **Dr. Tejas Kalelkar** focuses mainly on foliations, triangulations and Heegaard splittings of 3-dimensional manifolds.

In previous work (with Rachel Roberts), Dr. Kalelkar showed that the fiber structure of a punctured surface bundle can be perturbed to taut foliations that realize all boundary slopes in a neighbourhood of the boundary slopes of the fiber. In the case of a surface bundle with pseudo-Anosov monodromy, he is now attempting to pin down such an interval explicitly expressed in terms of the slope of the fiber.

Six of the eight Thurston geometries are something called Seifert Fibered spaces. Dr. Kalelkar is currently working on construction of a triangulation of such manifolds that has certain nice properties as regards the fiber structure of the space.

18.2 Intersection Theory, Derived Categories and T-Varieties

Dr. Vivek Mallick has worked with Umesh V. Dubey on understanding the derived categories of schemes and showed that considering the differential graded structure gives more information about the underlying scheme and gives more evidence for the philosophy that the derived category of a space contains all the information of the geometry of the underlying space.

In the second part of this project, a way of doing intersection theory on differential graded categories admitting a tensor structure is being explored. Derived categories are a natural example where this would work.

In a project with Prof. José Ignacio Burgos, Dr. Mallick is working on modifying their algorithm of computing mixed Hodge numbers of varieties admitting an action of a codimension 1 torus to also find mixed Hodge numbers of hypersurfaces inside such varieties.

Paul Balmer has a theorem which relates the spectrum of the stable module category of a finite group scheme to the even cohomology ring of the same group. In an independent project, following an idea by Prof. Henning Krause, Dr. Mallick is trying to find an analogue of the theorem which would “recover” the whole cohomology ring. This problem was suggested by Prof. V. Srinivas.

19. Humanities and Social Sciences

19.1 Ethnomusicology and Music and Technologies

Dr. Aditi Deo's research interests span diverse musical genres in India including Hindustani khyal music, vernacular musics in western India, Marathi popular songs and Hindi film music. Themes that run through the questions that Dr. Deo asks of these musics include: the mediations of social, sonic, political and material dimensions of music; constructions of musical categories (e.g. classical, popular, folk, etc.); tensions between notions of tradition/modernity; and technologies of music circulation. Key research directions that were focused on in the past year included contemporary media practices and non-hereditary musicianship in Hindustani Khyal music; digital technologies of music production and circulation in non-metropolitan India; an applied project that includes development of an online archive of a/v documentation, images and texts for oral performance forms (e.g. musics, narratives, rituals) in the tribal regions on the borders of north Maharashtra and south Gujarat.

19.2 History of Science

Dr. John Mathew has been involved with three major projects:

a) Documenting and curating of a rare collection of glass models of marine invertebrates in the Trivandrum Natural History Museum fashioned (to the best of our knowledge) by Leopold and Rudolf Blaschka from Bohemia working in Dresden in the 19th century, and working with collaborators towards filling out more of the story of Blaschka holdings in India (the vast proportion otherwise being in Europe and North America)

b) Embarking on a project linking military history, medical history and natural history in relation to epidemics in British and French holdings in South and South-East Asia through the study of two epidemics, the 1890's plague and the 1918 great influenza, which will be presented in Hong Kong in May 2016 and for which he visited Vietnam and Hong Kong (the latter also for a conference) in May and June 2015.

c) Studying about science under the kings of Travancore in the 19th century, and working on a project work on the curators of seminal museums in India during the same period.

Indian Institute of Science Education and Research (IISER) Pune

Balance Sheet as at March 31, 2016

Amount in Rs.

Sources of Funds	Schedule	Current Year 2015-16	Previous Year 2014-15
Corpus / Capital Fund	1	5,061,853,897	4,858,669,216
Designated / Earmarked / Endowment Funds	2	215,808,102	161,823,534
Current Liabilities & Provisions	3	612,838,802	514,016,584
Total		5,890,500,801	5,534,509,334

Sources of Funds	Schedule	Current Year 2015-16	Previous Year 2014-15
Fixed Assets	4		
Tangible Assets		2,051,092,266	1,627,288,283
Intangible Assets		1,190,789	170,000
Capital Works-In-Progress		3,009,570,842	3,231,210,933
Investments from Earmarked / Endowment Funds	5		
Long Term			
Short Term		60,000,000	21,372,694
Investments - Others	6	166,904,767	114,265,502
Current Assets	7	378,132,381	133,854,650
Loans, Advances & Deposits	8	223,609,754	406,347,270
Total		5,890,500,801	5,534,509,334
Significant Accounting Policies	23	0	0
Contingent Liabilities and Notes to Accounts	24		

For and on Behalf of IISER Pune

sd/-

Mrs. Mariamma John
OSD - Finance

sd/-

Col. G. Raja Sekhar (Retd.)
Registrar

sd/-

Prof. K.N. Ganesh
Director

Place: Pune

Date: 10.05.2016

Indian Institute of Science Education and Research (IISER) Pune

Income & Expenditure Statement for the Period Ended March 31, 2016

Amount in Rs.

Sources of Funds	Schedule	Current Year 2015-16	Previous Year 2014-15
Income			
Academic Receipts	9	25,926,572	21,151,363
Grants / Subsidies	10	507,500,000	456,000,000
Income from Investments	11	11,190,081	15,010,404
Interest Earned	12	2,018,850	1,813,223
Other Income	13	2,570,185	1,209,960
Prior Period Income	14	235,510	75,465
Deferred Income for the year (in proportion to depreciation charged)	4	248,642,224	226,735,685
Total (A)		798,083,422	721,996,100
Expenditure			
Staff Payments & Benefits (Establishment Expenses)	15	281,814,288	240,542,942
Academic Expenses	16	136,245,381	135,466,485
Administrative and General Expenses	17	237,948,325	207,007,338
Transportation Expenses	18	6,137,057	7,817,032
Repairs & Maintenance	19	46,717,227	34,298,408
Finance Costs	20	86,297	68,296
Depreciation	4	248,642,224	226,735,685
Other Expenses	21	-	1,043,525
Prior Period Expenses	22	41,253	7,625
Total (B)		957,632,052	852,987,336
Balance being excess of Income over Expenditure (A-B)			
Transfer to / from Designated Fund			
Other - Institute reserves fund (Sch 9 + Sch 13)			
		28,496,757	22,361,323
Balance being unspent carried to Grant Balance in Current Liabilities			
		(188,045,387)	(153,352,559)
Significant Accounting Policies	23		
Contingent Liabilities and Notes to Accounts	24		

For and on Behalf of IISER Pune

sd/-

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OSD - Finance

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Registrar

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Prof. K.N. Ganesh
Director

Place: Pune

Date: 10.05.2016





IISER PUNE

Indian Institute of Science Education and Research Pune

Dr. Homi J. Bhabha Road, Pune - 411 008, India

Phone: +91 20 25908001 Fax: +91 20 20251566

Web: www.iiserpune.ac.in