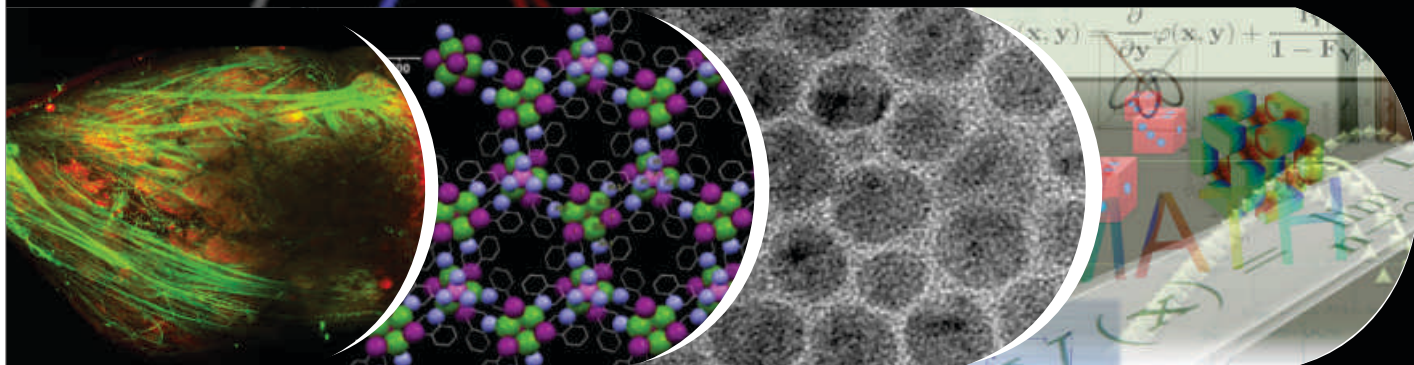


वार्षिक प्रतिवेदन
Annual Report
2012-13



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 पाठ्यक्रम तथा अनुसंधान परियोजनाओं के माध्यम से छोटी आयु में ही अनुसंधान क्षेत्र में प्रवेश

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

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

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



Annual Report 2012-13

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Foreword

I am delighted to present the Annual Report of the Institute for the year 2012-2013. During this period, the Institute has made a steady progress in all fronts, from academic achievements to campus construction. Foremost among these is the conduct of the first convocation of the Institute in August 2012 during which 91 students (2006 and 2007 batch) were awarded BS MS dual degrees along with the award of the first PhD degree of the Institute. It was a momentous occasion in the short history of the Institute when Dr. Sam Pitroda delivered an inspiring and motivating First Convocation Address to the graduating students.

The year saw induction of about ten new faculty members and most importantly, a very distinguished physicist Prof. Sunil Mukhi from TIFR joined the Institute as the Chair of the Physics program at IISER Pune. Dr. Steven Spallone, a US mathematician, was also enrolled as an associate professor at IISER Pune. Several of our faculty members received recognition from different science academies in India and many others succeeded in securing awards of competitive research grants. The research publication profile of the Institute soared with more than 150 papers in high impact international journals emanating from either work done in the institute or from collaborations. These are evenly spread across different research areas of the Institute indicating uniform performance of faculty in different areas. A significant outcome is also the participation of some faculty members as authors of three books. The success of the different research programs is also reflected in the increasing number of invited lectures and attendance by faculty members in major international conferences and meetings. In addition, the Institute itself has organized several important meetings and workshops with participation of distinguished national and international speakers. To mention a few: cell compartmentation, division and signaling (with EMBO), minisymposium on spectroscopy and dynamics (with BARC, TIFR), polymer solar cells (DST), X-ray diffraction and small angle scattering (with NCL, University of Pune), pan asian number theory conference (ICTS), atomic forms (Indo-French CEFIPRA), solar terrestrial physics 9ISWI), structure and dynamics (UKEIRI-Glasgow University) and ultra cold atom physics (University Birmingham and Nottingham). These activities clearly reflect the dynamic and vibrant research activity emerging at the Institute thus making an international impact. The same is also mirrored by a number of international delegations that visited the Institute to seek collaborations and student exchange. These comprised delegations from Goettingen University (Life Sciences), Glasgow University (Physical Chemistry), teams of editors of journals published by American Chemical Society, Royal Society of Chemistry and EMBO. The institute also had short term visits by more than a dozen students from USA, UK and Germany as part of research collaborations between faculty members. The Institute organized more than 150 research seminars during this academic year. A number of distinguished scientists visited the Institute to deliver colloquia and interact with students and faculty. These included Dr. Anil Kakodkar (Foundation Day), Prof. Sriram Ramaswamy (Science Day), Professors D. Balasubramanian (LVP Institute, Hyderabad), P. Balaram (IISc, Bangalore), John Coates (Cambridge University, UK), Benedict Gross (Harvard University, USA) and nobel laureate Jules Hoffmann (Institute of Molecular and Cellular Biology, France).

As part of our science outreach program, the Institute organized KVPY summer school, DST-INSPIRE camp, Jigyasa science camp and the Institute's flagship science quiz program-Mimamsa. The students of the Institute also responsibly managed two educational programs for underprivileged children-Disha and Prarambh. The Science Day and Mathematics Day functions attracted a large number of college students from in and around Pune. Following the acclaimed success of the first documentary film on the famous astrophysicist, S. Chandrasekhar, produced and released by the Institute during 2011-2012, the Institute has now produced its second film on the legendary mathematician, Srinivasa Ramanujan. This was released on the Mathematics Day, March 14, 2013, and has already received international kudos.

I am proud to inform that the Chemistry program at the Institute was recognized for support under DST-FIST (level II) with a grant of Rs. 6 crores for the purchase of 600 MHz NMR and advanced X-ray spectrometers and AFM. The Institute thus joined a select band of a very few chemistry departments in the country that have received such major support and is thus a recognition of top quality research by the Institute faculty. The Institute has attracted total extra mural research grants amounting to Rs. 15 crore during this year.

The construction of the campus has progressed steadily beyond the expectations. In August 2012, the first hostel for students (350 double rooms) having modern amenities was completed and occupied by BS MS and Integrated PhD students. A second hostel (500 single rooms) is expected to be completed and available for occupation by PhD students by September 2013. A modern Lecture Hall Complex having state-of-the-art teaching facilities (electronic) is close to completion by July 2013 and will be commissioned from semesters starting in August 2013. The experimental physics laboratory (h-cross) housing most modern laser spectrometers, cold atom physics laboratory, FE-SEM, STM, magnetic and electronic property measurement instruments etc is now completely operational. The biology laboratory close to completion will be occupied by September 2013. This will also mark the progressive shifting of the transit Sai Trinity campus to IISER Pune campus by December 2013. The construction of housing for non-teaching staff members has begun. The total strength of students at the end of academic year 2012-2013 was about 620 with ~420 BS MS students and ~200 PhD and Integrated PhD students.

The year 2012-2013 has been a very busy and satisfying year for the Institute with significant achievements in both academic as well as campus construction. We need to maintain and accelerate these activities during 2013-2014 in order to meet the mandate entrusted by the Government of India in the establishment of IISER Pune. As Director of IISER Pune, it has been my great pleasure and privilege to have wonderful colleagues (faculty, all administration wings and engineering) around me without whom the above-mentioned progress and achievements would not have been possible. My heartfelt thanks to all of them. The continued excellent support from Ministry of Human Resource Development is gratefully acknowledged. I sincerely thank the members of various selection committees, members of the Building and Works committee, Finance committee and finally the Board of Governors for their invaluable advice, suggestions and contribution to the pre-eminent growth of the Institute.



(K.N. Ganesh)

Academic Achievements of Faculty Members

Sudarshan Ananth: Member of the National Academy of Sciences India, 2013

Sujit Ghosh: NASI Young Scientist Platinum Jubilee Award 2012 and Young Associate of the Indian Academy of Sciences 2012

G.V. Pavan Kumar: Young Associate, Indian Academy of Sciences, Bangalore

Sunil Mukhi: DAE-CV Raman Lecture Award, 2012-2013

A. Raghuram: Research grant from National Science Foundation, USA; Humboldt Fellowship for experienced researchers

S.G. Srivatsan: RSC West India Section: Early Career Scientist 2012

Nishikant Subhedar: Research paper from his group entitled "Nicotine evoked improvement in learning and memory I mediated through NPY Y1 receptors in rat model of Alzheimer's disease" has been selected for the Olson Prize awarded by the Journal PEPTIDES

Ashna Bajpai: Patent Award from TIFR Alumni Association in October 2012 for getting US patent based on the work done in TIFR during her post-doctoral tenure

Chandrasheel Bhagwat: DST-INSPIRE Faculty Fellowship (availed at IISER Pune from March 2012)

Neelesh Dahanukar: DST-INSPIRE Faculty Fellowship (availed at IISER Pune from October 2012)

Angshuman Nag: Ramanujan Fellowship from Department of Science and Technology (DST), Govt. of India

Academic Activities of Faculty Members

Research Publications in 2012

Chemical Biology

1. Gopalakrishna, T.Y., Sreedhar Reddy, J. and **Anand, V.G.** (2012). Antiaromatic supramolecules: F...S, F...Se and F...pi intermolecular interactions in 32pi expanded isophlorins. *Angewandte Chemie International Edition*, 52:1763-1767
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3. Sengupta P.*, **Basu S.***, Soni S.*, Pandey A., Roy B., Oh M. S., Chin K. T., Paraskar A. S., Sarangi S., Connor Y., Sabbisetti V. S., Kopparam J., Kulkarni A., Muto K., Amarasiriwardena C., Jayawardene I., Lupoli N., Dinulescu D. M., Bonventre J. V., Mashelkar R. A., Sengupta S.* (2012). Cholesterol-tethered platinum II-based supramolecular nanoparticle increases antitumor efficacy and reduces nephrotoxicity. *Proceedings of the National Academy of Sciences U.S.A.*, 109, 11294-11299.
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11. Khodade, V.S., Dharmaraja, A.T. and **Chakrapani, H.** (2012). Synthesis, reactive oxygen species generation and copper-mediated nuclease activity profiles of 2-aryl-3-amino-1,4-naphthoquinones. *Bioorganic Medicinal Chemistry Letters*, 22:3766-3769.
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Books/Book Chapters

1. **Pavan Kumar, G.V.** (2012). Raman Scattering. In: *A textbook of Nanoscience and Nanotechnology*. T. Pradeep (Ed.), McGraw Hill.
2. **Watve, M.** (2012). Doves, Diplomats, and Diabetes: A Darwinian Interpretation of Type 2 Diabetes and Related Disorders. Springer.
3. **Ballav, N.,** Terfort, A. and Zharnikov, M. (2012). Making gradient patterns by electron beam chemical lithography with monomolecular resists. In J. Genzer (Ed.) *Soft Matter Gradient Surfaces: Methods & Applications*, Wiley-VCH, Weinheim.

Invited Lectures

G. Ambika *Suppression of Dynamics in networks in interaction with Environment* NCNSD, July 12-15, 2012 • *Fascinating Fractals* in the INSPIRE Science camp at Loyola Degree College, Pulivendula, Kadapa August 26, 2012 • *Environmental effects in the dynamics of complex systems* International Conference on Frontiers of Mathematical Sciences with Applications (ICFMSA-2012), Calcutta Mathematical Society, December 9, 2012 • *Nonlinear Time Series Analysis* Lectures in the DST SERC school on Nonlinear Dynamics, SNBNCBS, Kolkata December 8-9, 2012 • *Environmental effects and evolution of clusters in networks* Alexander von Humboldt Workshop on complex networks, PIKS, Potsdam, Germany, March 20, 2013 • *Nonlinear Dynamics* Application in Biological systems, National colloquium on Applicable Mathematics in Basic Science Education and Research, Srinivasa Ramanujan Institute for Basic Sciences, Trivandrum, April 5-7, 2013

- Sudarshan Ananth** *Trouble with gravity*, Chennai Mathematical Institute, April 2012 • *Frontiers in physics program* University of Hyderabad, September 2012
- Chaitanya Athale** At the lab of Dr. Mark Bathe, MIT, Boston, August 17, 2012 • At the lab of Dr. Suckjoon Jun, Harvard University, Boston, August 10, 2012
- Ashna Bajpai** *Interface effects in Spintronic Chrome Oxides*, Nanoscience & Condensed Matter Interface, School of Physical Sciences and Special Center for Nanoscience of Jawaharlal Nehru University (JNU), March 8-9, 2013 • Invitation to participate in the 2nd Annual Word Congress of Nano Science and Technology, China, September 2012
- Nagaraj Balasubramanian** *To stick or not to stick: The role of cell adhesion in our lives*, KVPY Summer camp, IISER Bhopal, June 11-15, 2012
- Anjan Banerjee** *RNA Signaling and Transport in Plant growth and Development* International Conference on Perspectives of Computer Confluence with Sciences (ICPCCS12), Nowrosjee Wadia College, December 9-11, 2012 • *Exploring the role of miRNAs in plant development* XXXVI All India Cell Biology Conference and International Symposium on Stress Adaptive Response and Genome Integrity, BARC, Mumbai, October 17-19, 2012 • *Small RNAs in plant defense- A case study with potato Phytophthora interaction* Department of Botany, Tripura University, Agartala, November 20, 2012
- Rabeya Basu** *Stabilization of unitary groups*, University of Bielefeld, Germany, August 2012 • *Introduction to K-theory*, Institute of Science, Mumbai, January 2013 • *Course on Representation theory*, Pune University, Spring 2013
- Chandrasheel Bhagwat** *On spectral analogues of strong multiplicity one theorem*, TIFR-CAM, Bangalore, February 14, 2013
- Ramakrishna Bhat** INSPIRE camps – I²IT Pune, April and May 2012; JNN Engineering College Shimoga, Karnataka, July 2012
- R. Boomi Shankar** *Amino P(V) ligands for cages, clusters and functional supramolecules*, New Direction in Chemical Sciences (NDCS), IIT-Delhi, December 7-9, 2012
- Diganta Borah** *A study of the metric induced by the Robin function*, IISER Mohali, August 17, 2012
- Harinath Chakrapani** KVPY Summer camp, IISER Pune, May 21-26, 2012 • RSC West India IYC-Challenge Symposium, Institute of Science, Nagpur, August 31-September 1, 2012 • National Seminar in Chemistry *Advances in synthetic and applied chemistry* Sangamner College, September 6-8 2012 • Indian Lab Automation: Drug Discovery & Development 2012, Mumbai, October 30-31, 2012 • Chemical Biology Laboratory, National Cancer Institute at Frederick, USA Nov 27, 2012 • International conference on Physics, Mathematics and Engineering Sciences, Pune, March 18, 2013 • *MDR/XDR Tuberculosis: A healthcare menace to developing countries*, Sinhgad College of Pharmacy, Pune, March 22, 2013
- Apratim Chatterji** *Molecular Dynamics and Multi-scale Simulation techniques*, Center for Modelling and Simulations, University of Pune, February 25, 2012. • *Nano-channel induced advection*

combined with reaction diffusion dynamics of reacting ions leads to self-assembly of ordered cylindrical Nano-structures, Condensed Matter and Biological Systems-13, BHU, Varanasi, January 11-14, 2013 • *Creating Nano-cigars by Self-Assembly: A simple model to Elucidate Experimental Observations*, Department of Chemical Engineering, IIT-Bombay, March 28, 2013.

Anisa Chorwadwala Department of Mathematics, University of Delhi, February 15, 2013 • *The INSPIRE Science Camp* under Scheme for Early Attraction of Talent for Science (SEATS), HNB University, Srinagar (Garhwal), December 18, 2012 • *Geometry Seminar* at IISER Pune, November 16, 2012 • Departamento di Mathematica, Facultad de Ciencias Fisicas y matematicas, Universidad de Concepcion, Chile, June 18, 2012 • *Interview to Doordarshan Gurnar Channel* as part of minority welfare awareness program telecast on February 8, 2012. **Outreach Lectures:** Conducted a workshop in Ambavane village in Taluka Velhe as a part of DISHA's 'Spread the Smile' program, February 23, 2013 • Gave a lecture and demonstrations under the title "Fun with Maths" as part of "Popular Science Talks" which are organized by the Exciting Science Group- An Initiative of NCL scientists and IISER-P faculty at the Venture Centre, Innovation Park, NCL, Pune on November 25, 2012 • Gave a lecture and demonstrations under the title "Fun with Maths" at Hutatma Balabir Shirishkumar School in Pune on September 28, 2012 • Gave a lecture and demonstrations under the title "Fun with Maths" at Jawahar Navoday Vidyalay at Shirur on September 27, 2012 • Conducted a workshop in Mangdari village during the DISHA IISER Pune activity of "Spread the Smile" program • *Isoperimetric Problems* at the Kendriya Vidyalaya, Range Hills Estate, Khadki, Pune, August 30, 2012

Aloke Das *Non-covalent interactions in biomolecules and materials: Jet-cooled laser desorption studies*, Discussion meeting on Spectroscopy and Dynamics of Molecules and Clusters, Chunda Palace, Udaipur, Rajasthan, India, February 21-24, 2013 • *Non-covalent interactions in biomolecules and materials: Gas phase laser spectroscopy and quantum chemistry calculations*, National Symposium on Radiation and Photochemistry (NSRP) at NEHU, Shillong, India, March 20-22, 2013

Aparna Deshpande *Electronic properties at the nanoscale: insight from scanning tunnelling microscopy*, Nanolab, Basel University, Department of Physics, December 10, 2012

Sutirth Dey *Project-oriented Biology Education (POBE)*, JNCASR, Bangalore May, 2012 • *Inter IISER NISER Meeting cum Tropical Biology Training School*, IISER-Trivandrum December 16-19, 2012 and *Exploratory Data Analysis*, December 18, 2012

Anil Gangal *Fractals* INSPIRE workshop, Bhubaneswar, August, 2012

Prasenjit Ghosh *Diffusion of small Rh and Pt clusters on MgO(100) surface in discussion meeting on noble metal clusters*, IIT Chennai, April 25, 2012

Sujit Ghosh *Coalescence of Chemical Sciences to Confront the Future Challenges* by RSC-West India Section at SP College, Pune between 9-10 February 2013 • *Young Scientist Research Awardees' Meet (YSRAM)*, BARC, Mumbai, November 26-28, 2012.

Pranay Goel *Dynamical System Course (7 lectures)*, DST-SERC School on Nonlinear Dynamics, S.N. Bose National Center for Basic Sciences, Kolkata, November 30 - December 4, 2012

- *Mathematics Primer (2 lectures)*, SERB School: Introduction to systems and synthetic biology for scientists and engineers, IIT Bombay, Mumbai, April 30, 2012

Anindya Goswami *A Tribute to Prof. Lloyd Stowell Shapley and Prof. Alvin Elliot Roth* Science Club Talks on the Nobel Prizes: 2012, October 19, 2012

Srinivas Hotha RSC IYC Challenge Symposium, Nagpur, August 30, 2012

Sulabha Kulkarni *Nanotechnology: Past, present and Future, A Public Lecture for Science Popularization*, NTTTR, Bhopal, sponsored by DST, India, May 22, 2012 • *Synthesis and Characterization of Nanomaterials*, a lecture at NTTTR, Bhopal, May 22, 2012 • *Nanotechnology*, INSPIRE program, Shivaji University, Kolhapur, June 1, 2012. • INSA lecture series, seven lectures in rural areas of Maharashtra from September 2012 to February 2013. Lecture on Nanotechnology and interaction sessions with school/junior college teachers and students • *Core-Shell Particles*, Physics Department, BHU, Varanasi, March 22, 2013

Mayurika Lahiri *DNA damage surveillance mechanism in the maintenance of genome integrity*, Dr DY Patil School of Biotechnology and Bioinformatics, Tathawade, Pune, India, September 27, 2012

Rama Mishra *Knots and Physics*, HRI, Allahabad, January 2013 • *On 3-superbridge knots*, Osaka City University, Japan, February 2013

Sunil Mukhi *Searching for the superworld*, Fergusson College, January 5, 2013 • *Windows onto Nature*, Wilson College, February 23, 2013 • *Recent Advances in String Theory*, NCRA Colloquium, March 25, 2013

Arvind Natu *Outreach Lectures: Opportunities in basic sciences* Creative Academy, Pune, April 2012 • *Science for all* Viswa Scientific Satellites. Pune, May 2012 • *How drugs are discovered* Fergusson College, Pune, May 2012 • *Chemistry everywhere* BJS, Wagholi, Pune, August 2012 • *Exciting chemistry* Muktangal Science Club, September 2012 • *Student centric education* International seminar on Innovation in Science Education, Shanghai, October 2012 • Gave lectures at INSPIRE Camps held at three locations: Ratnagiri (October 2012); Latur (November 2012); and IISER Pune (December 2012) • Gave two lectures *Drug discovery* and *Opportunities in basic sciences* at S.H. Kelkar College, Devgad • *Fun in chemistry* Jigyasa Science Camp, IISER Pune, December 2012 • *Enzyme kinetics* National Initiative on Undergraduate Sciences, Homi Bhabha Centre for Science Education, December 2012 • *Opportunities in basic sciences* Indrayani Mahavidyalaya, Talegaon, Pune, February 2013 • *Nature inspired technology* Science Centre Science Day, Pune, February 2013 • *Innovations in chemistry: DNA & protein based drugs* • North Maharashtra University, Jalgaon, March 2013 • Gave 2 lectures *Opportunities in basic sciences* and *Avenues of biotechnology* Rajarshi Sahu College, Latur, March 2013

Thomas Pucadyil *Membrane tether dynamics analyzed using force spectroscopy* Indo-US Symposium on Structure, Dynamics and Mechanics of Biological Membranes, Indian Institute of Science, Bangalore, India, • *Membrane fission catalyzed by the dynamin family of proteins* Lipid-Protein Interactions in Membranes: Implications for Human Health and Disease, Biophysical Society Satellite Meeting, Centre for Cellular and Molecular Biology (CCMB), Hyderabad, India

Umakant Rapol *Towards Quantum information processing with ultracold atoms and plasmonics*, workshop on “Frontiers in Physics” University of Hyderabad, September 27-29, 2012

Richa Rikhy *Unzipping and installing the embryo development program*, KVPY talk, IISER Bhopal, June 2012 • *Unzipping and installing the embryo development program*, St. Xaviers College Life Science Department Retreat, Xavier Villa, Khandala, August 2012

Kundan Sengupta *Nuclear structure and function*, St. Xaviers College, Mumbai, August, 2012
• *Nuclear organization and cancer* Meeting on Chromosome Instability, Indian Institute of Science Education and Research (IISER), Trivandrum • *Chromosome aberrations and cancer*, Cancer Consortium meeting, Jawaharlal Nehru Center for Advanced Scientific Research (JNCASR), Bangalore

Anupam Kumar Singh *Strongly real classes in finite unitary groups*, Mathematics Colloquium, IISER Mohali, November 2012 • *Strongly real classes in finite unitary groups*, Seminar at IMSc October 2012

S.G. Srivatsan *Functionalized nucleoside analogues: Synthesis, incorporation and applications*, DG Vaishnav College, Chennai, February 13, 2013 • *Synthesis, incorporation and applications of functionalized ribonucleoside analogues*, Agharkar Research Institute, Pune, July 27, 2012

Arun Venkatnathan *Theoretical Chemistry Symposium*, IIT Guwahati, December 19-22, 2012
• IISER-UKIERI Physical Chemistry Symposium, IISER Pune, December 9-11, 2012

Priya Iyer *Evolution of Ornamentation*, National Seminar on Recent Trends in Biology, Department of Zoology, University of Pune, March 22-23, 2013

Avinash Khare *Colloquium on Nonlinear Schrödinger Equation*, Punjab University, Chandigarh, October 2012 • *Solitons in Nonlinear Dirac Equation and Their Stability*, Punjab University, Chandigarh, October 2012 • *Colloquium on Nonlinear Schrödinger Equation With Forcing Term*, BARC, Mumbai, January 2013 • *Solitons in Nonlinear Schrödinger Equation With Forcing Terms*, Advances in Quantum Theory, Central University, Hyderabad, February 25-27, 2013

G.V. Pavan Kumar *Surface Enhanced Raman scattering microscopy*, FCS-2012, December 2012 *Single-molecule Surface Enhanced Raman scattering microscopy*, Department of Physics, IISER-Kolkata, December 2012 • *Surface Enhanced Raman scattering microscopy based on propagating plasmons*, International Conference on Raman Spectroscopy, IISc, Bangalore, August 2012 • *Nanowire plasmonics*, META-IN - ICTS Discussion meeting on emerging themes in Plasmonics, TIFR, Hyderabad, May 2012 • *Numerical simulations of propagating and localized plasmons*, School on Plasmonics and Nano-optics, TIFR, Hyderabad - University of Hyderabad, May 2012.

Angshuman Nag *National Conference on Nano science and Nano technology (NCNSNT-2013)*, University Institute of Chemical Technology, North Maharashtra University, Jalgaon, March 23, 2013

Seema Verma *Nanomagnetic materials: Opportunities and challenges*, and *Fine particle magnetism: A search for novel phenomena* Workshop on Recent Advances in Materials Engineering and Technologies, Sinhgad Institutes, Lonavala, May 2-3, 2012

Participation in Conferences, Workshops and Symposia

G. Ambika Harikrishnan, K.P., Misra, R. and Ambika, G. *Can the multifractal spectrum be used as diagnostic tool?* Chaotic Modeling and Simulation (CMSIM), Athens, May 2012 • Goswami, B., Ambika, G., Marwan, N. and Kurths, J. *Time evolution of global stock market connectivity: a recurrence based approach* NCNSD, July 2012 • Resmi, V., Ambika, G., Rangarajan, G. and Amritkar, R.E. *Amplitude Death in Complex Networks Induced by Environment* NCNSD July 2012 • Joshi, S. and Ambika, G. *Secure Communication Using Discrete Dynamics* NCNSD, July 2012 • Shekatkar, S. and Ambika, G. *Generation and Suppression of Excitation Waves on Rulkov Lattice* NCNSD, July 2012 • *Characterizing Hyper chaotic Attractors from nonlinear data analysis* Nonlinear data Analysis and modeling: Advances, Applications, Perspectives, PIKS, Potsdam, March 22-23, 2013

Sudarshan Ananth *Symmetries, unification and the search for quantum gravity*, Max Planck Institute for Gravitational Physics, Potsdam, Germany, September 6-8, 2012

Chaitanya Athale Biophysics Paschim 4, NCL Pune, March 2, 2013 (*Poster Presentation*) • *Stochasticity and Cell Shape*, International Conference on Structural and Functional Genomics (ICSAFG), School of Chemical and Biotechnology, SASTRA University, Thanjavur, Tamil Nadu, India, January 6-7, 2013

Nagaraj Balasubramanian Cell Mechanics Meeting, Raman Research Institute, Bangalore, India (*Invited Speaker*)

Baskar Balasubramanyam IWASAWA 2012 workshop and conference, Mathematics Institute of the University of Heidelberg, July 23-August 3, 2012 • Lectures, ATM Workshop on Hilbert modular forms and varieties, KSOM Kozhikode, January 21-31, 2013

Deepak Barua Lamba, K. and Barua, D. *Status of plant phenology studies in the Indian Subcontinent: A comparison with the Indo-Malayan region*. National Biodiversity Conference: Assessment, Conservation and Utilization, Garware College, Pune, January 2012 • Gaurav, B.K., Agarwal, P., Patil, C., Lamba, K., Watve, A. and Barua, D. *Germination and dormancy in species adapted to the highly seasonal environment of the Satara Plateaus*, National Biodiversity Conference: Assessment, Conservation and Utilization, Garware College, Pune, January 2012 • *Phenological monitoring at long-term ecological observatories in India*. Plenary meeting to discuss the scientific plan to establish long term ecological research observatories in India, Center for Ecological studies, IISc, Bangalore, May, 2012 • IISER/NISER Ecology group meeting and Tropical Field Biology Training Program. IISER, Trivandrum, December 2012 • Pan IISER-NISER Biology meeting, DBT sponsored working group meeting to facilitate inter-institutional collaborations, IISER, Pune, July 2012 • Plenary Meeting to discuss the Scientific Plan for establishing long-term ecological research observations in India, Ministry of environmental and Forest, Government of India, Centre for Ecological Sciences, IISc, Bangalore, May 28-29, 2012. • Working Group Meeting-Horizon Scanning India, National Centre for Biological Sciences (NCBS), Bangalore, January 11-12, 2012.

Rabeya Basu Descriptive set theory and model theory workshop and conference, ISI Kolkata, December 27, 2012 to January 2, 2013 • National conference on topics in commutative algebra, Institute of Science, Mumbai, January 2013

Sudipta Basu Patil, S., Gawali, S., Patil, S. and Basu, S. *Self-assembled vitamin D3 nanoparticles: A novel nanoplatform for drug delivery in cancer* • Patil, S., Patil, S., Gawali, S. and Basu, S. *Synthesis and characterization of drug loaded lithocholic acid nanoparticles for drug delivery in cancer*

Chandrasheel Bhagwat Workshop on Bloch-Kato Conjecture, IISER Pune, July 2012 • Pan Asian Number Theory Conference, IISER Pune, July 2012 • Workshop on Representations of real Lie groups, TIFR, Mumbai, February 2013 • *Spectral analogues of strong multiplicity one theorem* IFCPAR-CEFIPRA symposium on Automorphic forms, Galois representations and L-functions, IISER Pune, September 2012 (*Invited Lecture*)

R. Boomi Shankar Gupta, A.K., Reddy, S.A.D. and Boomishankar, R. *Facile formation of stable tris(imido)phosphate trianions $\{[OP(NR)_3]^{3-}$ ($R = \text{any alkyl}$)\} as their multi-nuclear Pd(II) complexes in protic solvents*, IISER Pune and University of Glasgow joint symposium on "Structure And Dynamics", December 10-11, 2012 (*Poster Presentation*) • Gupta, A.K. and Boomishankar, R. *Coordination polymers of a bis(imido)phosphate ligand showing high water uptake over aliphatic alcohols*, Science Day, IISER Pune, February 28, 2013 (*Poster Presentation*) • ACS ON CAMPUS Event Organized by CSIR-NCL Pune, attended by Yadav, A., Deshmukh, M., Srivastava, A.K. and Gupta, A.K. October 10, 2012 • RSC Road Show Event Organized by CSIR-NCL Pune, attended by Gupta, A.K. February 11, 2013 • Gupta, A.K., Reddy, S.A.D. and Boomishankar, R. *Facile formation of stable tris(imido)phosphate trianions $\{[OP(NR)_3]^{3-}$ ($R = \text{any alkyl}$)\} as their multi-nuclear Pd(II) complexes in protic solvents*, Science Day, IISER Pune, February 28, 2013 (*Poster Presentation*) • Srivastava, A.K. and Boomishankar, R. *Assembling hierarchical coordination polymers from peripherally functionalized acyclic P-N Scaffolds*, IISER Pune and University of Glasgow joint symposium on "Structure and Dynamics, December 10-11, 2012 (*Poster Presentation*)

Harinath Chakrapani Poster Presentations at the Society for Free Radical Biology and Medicine's (SFRBM,) 19th Annual Meeting, San Diego, California USA, November 14-18, 2012: *Organic sources of sulfur dioxide, a reactive sulfur species*; • *Design, synthesis and study of reactive oxygen species generators* Design and development of benzosultines as organic sources of sulfur dioxide (SO_2) IISER Pune and University of Glasgow Symposium on "Structure and Dynamics", December 10-12, 2012 (*Poster Presentation*) • *Small molecule reactive oxygen species generators as anti-mycobacterial agents*, National Science Day, IISER Pune, February 28, 2013 (*Winner of Best Poster Award*) • *Design and development of benzosultines as organic sources of sulfur dioxide (SO_2)*, National Science Day, February 28, 2013, IISER Pune, India • *Design, synthesis and evaluation of bioreductively activated Nitric oxide prodrugs*, New Directions in Chemical Sciences (NDCS) December 7-9, 2012, IIT Delhi • Poster presentations at the 2nd UK-India Medchem Congress, IICT Hyderabad March 22-23, 2013: *Design, synthesis and evaluation of bioreductively activated nitric oxide prodrugs*; *Design, synthesis and evaluation of natural product based reactive oxygen species (ROS) generators*; *Small molecule reactive oxygen species generators as anti-mycobacterial agent* (*Winner of Best Poster Award*)

Apratim Chatterji *Isotropic to Nematic Transition in semiflexible Equilibrium polymer*, Mumbai-Pune Soft Matter Meet, Institute of Chemical Technology (ICT-Mumbai), (*Poster Presentation*) • *Self assembly of Nanostructures mediated by a background nematic matrix*. Conference on Condensed Matter and Biological Systems-13, BHU, Varanasi, January 11-14, 2013 (*Poster Presentation*)

Anisa Chorwadwala *Discussion Meeting of the ICTS Program: Groups, Geometry and Dynamics, Almora Campus of Kumaun University, Uttarakhand, December 13-16, 2012 • Workshop on Elliptic and Parabolic Partial Differential Equations and Related Topics: Theory and Numerical Methods, IIT Gandhinagar, August 16-19, 2012 (Invited Speaker) • ATMW Riemannian Geometry, TIFR-CAM, Bangalore, July 24-28, 2012 (Invited Speaker) • Conferences as part of the bimester on Geometric and Analytic Techniques in Calculus of Variations and Partial Differential Equations organized by Centro de Recerca Matematica Ennio De Giorgi held at Scuola Normale Superiore, Pisa, Italy: Geometric Inequalities in Calculus of Variations, July 8-13, 2012; and New Trends in Shape Optimization organized by Centro de Recerca Matematica Ennio De Giorgi, July 16-20, 2012 • Shape Optimization Problems and Spectral Theory, CIRM Marseille, France, May 28-June 2, 2012*

Neelesh Dahanukar Raghavan, R., Dahanukar, N. and Molur, S *The status and conservation of freshwater fishes in the Western Ghats Hotspot* Symposium on Global Challenges in Caring for and Conserving Freshwater Fishes, Freshwater Fish Specialist Group, Chester, UK, May 1-3, 2012, • Consultation workshop on Freshwater fish conservation and Alliance for Zero Extinction (AZE) sites organized by The Conservation Research Group (CRG) at St. Albert's College, Kochi in collaboration with the Critical Ecosystem Partnership Fund (CEPF), Thiruvananthapuram, Kerala, March 9, 2012 • Meeting on 'Networking of researchers working on plateaus of northern Western Ghats' organized by Biome Conservation Foundation, Pune in collaboration with the Critical Ecosystem Partnership Fund (CEPF), IISER Pune, May 26-27, 2012

Aloke Das *Mimicking trimeric interactions in the aromatic side chains of the proteins: A gas phase study of indole...(pyrrole)₂ heterotrimer* in 67th Ohio State University international symposium on Molecular Spectroscopy June 18-22, 2012 (Contributed Lecture)

Shouvik Datta Bansal, K. and Datta, S. *Role of light emission and sub-bandgap defects in the dielectric response of semiconductor junction under charge carrier injection* European Materials Research Society's spring meeting in Strasbourg, France, May 14, 2012 (Oral Presentation)

Aparna Deshpande *Self assembly and photopolymerization of photoactive molecules on graphene*, ELECMOL'12 December 6, 2012 (Poster Presentation) • Participated in the sixth international meeting on molecular electronics ELECMOL'12 at Grenoble, France, December 3-7, 2012 • *Scanning Tunneling Microscopy, Atomic Force Microscopy*, DST sponsored Consolidation of University Research for Innovation and Excellence (CURIE) Workshop, October 5-7, 2012 (Invited Speaker)

Sutirth Dey *Stabilizing the dynamics of Drosophila populations and metapopulations through adaptive limited control*, NCNSD Symposium, July 13, 2012 • *Stabilizing biological populations and metapopulations through adaptive limiter control* MK Chandrashekar Symposium, JNCASR, Bangalore, January 9-10, 2013 • *Karve, S. Evolving in an unpredictable world: the E. coli story* MK Chandrashekar Symposium, JNCASR, Bangalore 9-10 Jan, 2013 • *Karve, S. Selection for evolvability in laboratory populations of E. coli* Inter IISER NISER Meeting cum Tropical Biology Training School at IISER-Trivandrum • *Tung, S. Life-history meets dynamics: an individual based model for laboratory population of Drosophila melanogaster* MK Chandrashekar Symposium at

JNCASR, Bangalore January 9-10, 2013 • Tung, S. *Individual based model: Insights into the mechanistic underpinnings for the evolution of population stability in Drosophila* Inter IISER NISER Meeting cum Tropical Biology Training School at IISER-Trivandrum

Krishna N. Ganesh *Multi-Partner Collaboration and Centres of Excellence, India-UKERI Round Table, New Delhi, April 20, 2012* • *Cationic polypeptides and peptide nucleic acids: Probing their entry into cells* Department of Chemistry, National Technological University, University of Singapore, May 14, 2012 • *Nano DNA: From genetics and generics* International Conference Frontiers in Material Science, DIAT, Pune, May 18, 2012 • *Cationic polypeptides and peptide nucleic acids: Probing their entry into cells*, Department of Chemistry, University of Goettingen, May 31, 2012 • *What is Science and Why do science?* INSPIRE Summer Camp, IISER Pune, June 2012 • *Nano DNA: From Genetics and Generics* RMTI, Melbourne, Australia, July 3, 2012 *Nano DNA: From Genetic Material and Generics*, Indo-Korean Joint Symposium, Hanyang University, Seoul, South Korea, August 2012 • *Cationic polypeptides and peptide nucleic acids: Probing their entry into cells* IUPAC symposium, ISBOC 9, Beijing, China, August 29, 2012 • *IISER Pune* Max Planck Institute, Munich, November 2012 • *Making drugs out of nucleic acids: The genomic medicine* KVPY, Vijoshi Camp, Bangalore, December 2, 2012 • *Nanomedicine: Diagnostics and Therapeutics*, Bangalore Nano, Bangalore, December 7, 2012 • *DNA base pairing: structure and dynamics* University of Glasgow, December 10, 2012 • *Cationic collagen peptides and peptide nucleic acids as cell penetrating agents* Symposium on New Directions in Chemistry-Biology Interface, IIT Delhi December 2012 • *Chemistry- our life, our future* Khalsa College, Mumbai, November 2012 • *Cationic polypeptides: Molecules for delivering materials into cells* RSC-CRSI Joint Symposium 2012 – Strathclyde University • *Supramolecular mimics of DNA base pairing*, IUPAC meeting ICPOC 21, University of Durham, Durham, UK, 2012

Anil Gangal *Diffusion and Random walk problems on fractal curves*, National Conference on Nonlinear Systems and Dynamics, NCNSD 2012 Pune, July 12-15, 2012 • *Fractional Operators on fractals*, Workshop on Fractional Calculus: Organized by Department of Mathematics, University of Pune, November 2012

Aurnab Ghose *Actin nucleation and mechanical forces in axon guidance*, XXX Annual meeting of the Indian Academy of Neurosciences, Amritsar, India • *Actin nucleators in regulating axonal pathfinding and traction forces in growth cones*, Chick7, Nagoya, Japan • *Axonal transport and neurodegenerative disorders* XXXVII Mahabaleshwar Seminar • *Neural control of feeding: circuits, modulation and behaviour* Genes, circuits and development of behaviour, Mumbai, India

Prasenjit Ghosh *Hydrogenation of ferromagnetic grapheme on a Co surface: Significant enhancement of spin moments by C-H functionality*, International Conference on nanoscience+ technology 2012, Paris, France July 23-27, 2012 (Poster Presentation) • *School on Numerical Methods for Materials Science Related to Renewable Energy Applications*, Abdus Salam ICTP, Trieste, Italy, with project student Ms. Niharika Joshi November 26-30, 2012 • 57th DAE Solid State Physics Symposium at IIT Mumbai, Mumbai, December 3-7, 2012 • *Spin enhancement and band gap opening of ferrimagnetic graphene on fcc-Co (111) surface upon hydrogenation* International Symposium on Materials Chemistry, BARC, Mumbai, December 2012 (Poster Presentation by Niharika Joshi) • *International Symposium on Materials Chemistry*, BARC, Mumbai, December 11-15, 2012 (Poster Presentation by Indu Kaul) • *Adsorption of 1,5-cyclo-*

dodecadiene on H-precovered Pd surfaces Theoretical Chemistry Symposium, IIT Guwahati, Guwahati, December 19-22, 2012 • *Density functional theory based study of PdGa Alloy clusters as nano-catalysts for Selective Hydrogenation of acetylene* Theoretical Chemistry Symposium, IIT Guwahati, Guwahati, December 19-22, 2012 (Poster Presentation by Indu Kaul)

Sujit Ghosh 40th International conference on Coordination Chemistry (ICCC40) at Valencia, Spain, September 9-13, 2012

Pranay Goel *Glucose stimulates insulin secretion in pancreatic islets via multiple dynamic modes*, International Neuroinformatics Coordinating Facility Workshop (INCF workshop 2012), IMSc Chennai, November 7, 2012 (Invited Lecture) • *Dynamical models of glucose-stimulated insulin secretion*, 2nd Indian Association for Statistics in Clinical Trials (IASCT) Annual Conference, Bangalore, April 20, 2012 (Invited Lecture) • *The doughball gap junction in homogenization models of pancreatic islets*, Dynamics in Neural Endocrine and Metabolic systems, symposium in honor of Dr. Arthur Sherman, Bethesda, MD, USA, June 8, 2012 (Invited Lecture) • *Timing maps in analyzing neural patterns*, National Conference on Nonlinear Systems and Dynamics (NCNSD 2012), Pune, July 12, 2012 (Invited Lecture) • *The doughball gap junction model*, National Conference on Nonlinear Systems and Dynamics (NCNSD 2012), Pune, July 13, 2012 (Invited Lecture)

H.N. Gopi Frontiers in Chemical Sciences (FICS-2012), IIT-Guwahati, December 2-4, 2012 (Invited Speaker) • Chennai Chemistry Conference-2013, February 8-10, 2013 (Invited Speaker)

Anindya Goswami National workshop on *mathematical modeling and analysis of financial data*, Mathematics Department, Pune University, September 27, 2012 (Invited Speaker) • Conference on Quantitative Finance, Rani Channamma University, Belgaum, October 4-6, 2012 (Invited Speaker) • National Conference RASAFAS [2 days], Department of Statistics, Central University of Rajasthan, February 22, 2013 (Invited Speaker)

Partha Hazra Mini symposium on Dynamics and Spectroscopy, IISER, Pune, April 20, 2012

Srinivas Hotha 5th Baltic meeting of Microbial Saccharides, Suzdal, Russia, September 2-6, 2012

Priya Iyer *Games between the sexes over parental care*, 5th Indo-American Frontiers of Science Symposium. Agra, April 7-10, 2013 (Poster Presentation) • Participant at the Annual Evolutionary and Organismal Biology Unit Symposium, JNCASR, Bangalore, January 9-10, 2013

Mukul Kabir *Topological defect formation and activation in carbon nanostructures*, 16th International Workshop on Computational Physics and Materials Science: Total Energy and Force Methods, ICTP, Trieste, Italy, January 10-18, 2013 • *Topological Defect Formation & Activation in Carbon Nanostructures* Science of Clusters, Nanoparticles and Nanoscale-Materials, Jaipur, March 4-7, 2013 (Invited Lecture)

Krishanpal Karmodiya 4th Asian Chromatin Meeting on Epigenetic mechanisms in Development & Disease, CCMB, Hyderabad, November 22-24, 2012

Avinash Khare *Forced Nonlinear Schrödinger Equation with Arbitrary Nonlinearity*, National Conference on Nonlinear Dynamics (NCNSD), IISER Pune, July 12-15, 2012 (Invited Lecture)

- *Hamiltonian Dynamics at SERC School on Nonlinear Dynamics*, SN Bose Center, Kolkata, December 2012 (*Invited Lecture*)

Raghavendra Kikkeri *Cyclodextrin based smart biomaterials*, RSC Meeting, Pune January 2013

- *Chiral lanthanide complexes to understand specific carbohydrate-protein interactions* DAE Young Investigator Meeting, December 2012

Sulabha Kulkarni *Role of Plasmonics in Energy and Water Related Problems*, Indian Science Congress Association Banasthali University Chapter Workshop on Science for Shaping the Future of India Meeting the Challenges of water and Energy, August 25, 2012 • *Synthesis and Applications of Nanomaterials*, in national Workshop on Advanced Syntheses of Nano materials and their applications, Karmaveer Bhaurao Patil Mahavidyalaya, Pandharpur, September 17-18, 2012 • *Nano and other Materials Synthesis*, in Advanced Materials Characterization, Banasthali University, Rajasthan, October 3, 2012 • *X-ray Sources and Powder Diffraction*, *Advanced Materials Characterization*, October 4, 2012, Banasthali University, Rajasthan • *Nanotechnology : Past, Present and Future*, National Conference on nanotechnology and Superconductivity, Indore Institute of Science & Technology, Indore, March 12-13, 2013

Mayurika Lahiri *DNA damage checkpoint response to alkylating damage in cells*, XXXVI AICB conference and International Symposium on Stress adaptive response and Genome integrity at BARC and Homi Bhabha National Institute, Mumbai, October 17-19, 2012

Soumen Maity *Mixed covering arrays on hypergraphs* in International conference on eco-friendly computing and communication systems- ICECCS 2012, Kochi August 2012 • International Workshop on Mathematical Modeling and Scientific Computing (IWMS 2012), Indian Institute of Science Education and Research (IISER) Thiruvananthapuram, India, August 11, 2012, • Recent Trends in Discrete Mathematics, Tata Institute of Fundamental Research (TIFR), Mumbai, India, December 17-20, 2012

Vivek Mallick *Advanced Training in Mathematics Workshop on Singularity Categories in Algebraic Geometry and Commutative Algebra*, Indian Institute of Technology, Chennai, India, January 10-12, 2013 (*Invited Speaker*)

Pankaj Mandal *Perturbation with THz light* ISRAP 2012 mini symposium on Spectroscopy, IISER Pune, April 20, 2012 (*Oral Presentation*) • *Perturbation with THz light* Glasgow University-IISER Pune bilateral mini-symposium on Dynamics and Spectroscopy, IISER-Pune, December 10-12, 2012 (*Oral Presentation*) • *Concentration dependent aggregates of serum albumin* Glasgow University-IISER Pune bilateral mini-symposium on Dynamics and Spectroscopy, IISER-Pune, December 10-12, 2012 (*Poster Presentation* by graduate student Sohini Sarkar) • *Terahertz Spectroscopy* Science Day IISER-Pune, February 28, 2013 (*Poster Presentation* by graduate student Sohini Sarkar) • *Terahertz Spectroscopy* 10th Discussion Meeting on Structure and Dynamics, Udaipur, February 21-24, 2013 (*Invited Lecture*)

Rama Mishra *E-KOOK Seminar on Knots*, Osaka City University, Feb 2013 (*Invited Speaker*) • *Seminar on Algebra, Topology and their Applications* (*Invited Speaker*), ANJA College Sivakasi 626 124. Tamil Nadu, March 2013 • *Topology Discussion Meeting*, IMSc, Chennai, May 2013 (*Invited Speaker*)

Sunil Mukhi *Recent Advances in String Theory*, XX DAE-BRNS Symposium, Shantiniketan, January 16, 2013 (*Invited Lecture*) • Workshop on Ultracold Atoms and Gauge Theories, ICTP Trieste, May 13-17, 2013 • Strings 2013, Seoul, Korea, June 24-29, 2013

Angshuman Nag IISER Pune-University of Glasgow symposium on Structure and Dynamics, Pune, December 10-12, 2012 (*Poster Presentation*) • Group members presented poster on the occasion of Science Day, IISER Pune February 28, 2013

G.V. Pavan Kumar *Propagation and localization of surface plasmons*, National Laser symposium, Bhabha Atomic Research Centre, Mumbai, February 2013 (*Invited Lecture*) • *Nanowire photonics* National symposium on Nano-metrology, National Physical Laboratory, New Delhi, January 2013 (*Invited Lecture*)

Thomas Pucadyil Bano, R., Murthy, A.V.R., Patil, S., and Pucadyil, T. *Mechanical responses of membranes probed with force spectroscopy* Indo-US Symposium on Structure, Dynamics and Mechanics of Biological Membranes, Indian Institute Of Science, Bangalore, India • Dar, S. and Pucadyil, T.J. *Inhibition of dynamin-catalyzed membrane fission by the accessory endocytic protein sorting nexin 9*, Lipid-protein Interactions in Membranes: Implications for Health and Disease. Biophysical Society Sponsored Meeting (*Poster Presentation*) • Holkar, S., and Pucadyil, T.J. *Cargo-containing supported bilayers with excess reservoir: Novel model membrane systems to analyze protein sorting in vesicular transport pathways*. Lipid-protein Interactions in Membranes: Implications for Health and Disease. Biophysical Society Sponsored Meeting (*Poster Presentation*)

Mrinalini Puranik *Mechanism of substrate recognition by nucleic acid enzymes*, New Directions in the chemical sciences, IIT Delhi (*Invited Lecture*) • Mechanisms of substrate recognition by nucleic acid enzymes, IISER Glasgow Symposium • *Materials characterization with Raman and resonance Raman Spectroscopy*, Curie workshop on advanced materials characterization Banasthali University, October 3-5, 2012 (*Invited Lecture*) • *Mechanisms of lesion recognition by DNA repair enzymes AlkB and Fpg* International Conference on Raman Spectroscopy, Bangalore 2012 (*Invited Lecture*) • *Substrate recognition in multisubstrate nucleic acid binding proteins: Fpg/MutM and AlkB* Trends in Enzymology 2012, Going Beyond Frontiers, Gottingen, Germany June 03-06, 2012 (*Poster Presentation*)

A. Raghuram *Arithmeticity for periods of automorphic forms*, Number Theory Seminar, Max Planck Institute für Mathematik, Bonn, Germany. May 2012 (*Invited Lecture*) • *Arithmetic properties of automorphic L-functions*, Aachen-Köln-Lille-Siegen joint seminar on Automorphic Forms. Bonn, Germany, May 2012 (*Invited Lecture*) • *Arithmeticity for periods of automorphic forms*, Number Theory Seminar, University of Göttingen, Germany. June 2012 (*Invited Lecture*) • *Special values of Riemann zeta function: results and conjectures*, Two lectures in Bloch-Kato Workshop, IISER Pune July 2012 • *Arithmeticity for periods of automorphic forms*, Pan Asian Number Theory conference, IISER Pune, July 2012 • Eisenstein cohomology and special values of L-functions, Indo-French Conference on Automorphic Forms, etc., IISER Pune, September 2012 • *Special values of L-functions of modular forms*, Two lectures in workshop on modular forms, Kerala School of Mathematics. October 2012 • *Motives and L-functions*, Colloquium at ISI Bangalore, November

2012 (*Invited Lecture*) • *Special values of L-functions attached to the Ramanujan Delta-function*, Legacy of Ramanujan Conference, New Delhi, December 2012 (*Invited Lecture*)

Sudha Rajamani Bapat, N. and Rajamani, S. *Prebiotic relevance of molecular crowding in non enzymatic polymerization of nucleotides* International Meeting on Chemical Biology (IMCB-2013), May 26- 28, 2013 (*Poster Presentation*) • Mungi, C. and Rajamani, S. *Nonenzymatic oligomerization in liquid crystalline matrices of lipids: Implications for emergence of informational molecules on prebiotic earth* (*Poster Presentation*) • Khoja, S. and Rajamani, S. *Abiotic synthesis of DNA polymers on early Earth* (*Poster Presentation*) • *Origin and replication of informational molecules on prebiotic earth* IISER Kolkata, April 5, 2013 (*Invited Lecture*) • *Nonenzymatic oligomerization in liquid crystalline matrices of lipids: Implications for emergence of informational molecules on prebiotic earth* Young Investigator Meeting, Jodhpur, Rajasthan, February 10- 14, 2013 (*Poster Presentation*)

Umakant Rapol *European conference on trapped ions* September 9-16, 2012 • on *Fundamental Physics in space*, 39th COSPAR assembly (2012)

Richa Rikhy *Mitochondrial morphology characterization during embryogenesis in Drosophila*, ICTS Conference on Mechanical Manipulations and Responses at the scale of the cell and beyond, NCBS Bangalore, April 2013 (*Poster Presentation*-Sayali Chowdhary) • *Role of f-bar domain containing protein syndapin in plasma membrane polarity formation during drosophila embryogenesis* ICTS Conference on Mechanical Manipulations and Responses at the scale of the cell and beyond, NCBS Bangalore, April 2013

Kundan Sengupta *Lamins A and B2 differentially regulate nuclear organization and genome stability of diploid colon cancer cells* international meeting on Dynamic organization of nuclear function at Cold Spring Harbor Laboratories, New York, USA (*Poster Presentation*)

Anupam Kumar Singh FRG Workshop and Conference on Characters, Liftings, and Types American University Washington DC, June 19-24, 2012 • Conference on Groups and Geometries ISI Bangalore, December 10-21, 2012

Surjeet Singh *Perturbing the $s = \frac{1}{2}$ zigzag chains of quantum magnet SrCuO_2* in summer school in Ljubljuna, Slovenia on Dynamic and Transport in low-dimensional quantum magnets, June 4 -6, 2012 (*Poster Presentation*) • *Growth and properties of low-dimensional quantum magnets* International workshop on *loading zone technique* at Leibniz-Institut (IFW), Dresden, February 20-22, 2013 (*Invited Lecture*) • *Perturbation of the magnetic ground state by doping in zigzag spin chain compound SrCuO_2* , Raman Memorial Conference 2013, University of Pune, February 22-23, 2013 (*Invited Lecture*) • National conference on Functional Nanomaterials: Synthesis, Characterization and Application, Department of Physics, University of Pune, January 31 to February 02, 2013 (*Invited Speaker*)

Steven Spallone University of Oklahoma Representation Theory Seminar, June 29, 2012 (*Invited Speaker*) • Indo-French Symposium on Automorphic forms, Galois representations and L-functions, IISER Pune, September 7, 2012 • TIFR Mathematics Seminar, speaker, October 12, 2012 IISER Pune Number Theory Seminar, speaker, November 6,8,20, 2013 • National Workshop on Ramanujan Graphs, University of Pune, 3 lectures, March 8,9,11, 2013

S.G. Srivatsan *Functionalized nucleoside analogues: Synthesis, incorporation and applications*, Chennai Chemistry Conference, Chennai, February 8-10, 2013 (*Invited Lecture*) • *Synthesis, incorporation and applications of functionalized nucleoside analogues XV NOST Organic Chemistry Conference (NOST-OCC)*, Agra, October 10-13, 2012 (*Invited Lecture*) • *Functionalized nucleoside analogues: synthesis incorporation and applications RSC West India IYC Challenge Symposium 2012*, Nagpur, August 31 to Sept.1, 2012 (*Invited Lecture*) • *Environment sensitive fluorescent ribonucleoside analogues: synthesis, incorporation and photophysical characterization*, Fluorescent Biomolecules and their building blocks–design and applications (FB 3), Gothenberg, Sweden July 5-8, 2012 (*Invited Lecture*)

Nishikant Subhedar *CART peptide as a potential target for drug delivery* Third meeting of the Japan Branch of the International Neuropeptide Society held at Kokura, Japan, September 20-30, 2012 • *Organization and evolution of the brain of vertebrates* taught at the DST sponsored Sixth SERB School in Neurosciences at NISER, Bhubaneswar, December 10-22, 2012 • *Screening of centrally acting drugs: CART as a model agent*, One day national symposium on pre-clinical evaluation for drug discovery: Current Trends and Emerging opportunities, Nagpur University, Nagpur, March 16, 2013 (*Plenary Lecture*)

Pinaki Talukdar *Practical Applications of Modern Tools in Organic Synthesis and Purifications II*. Organized by RSC in IISER Pune, April 02-04, 2012 • *Development of Inhibitors, Sensors and Ion Transporting Systems 5th Baltic Meeting on Microbial Carbohydrates*. Suzdal, Russia, September 02-06, 2012

Arun Venkatnathan Ramya, K.R. and Venkatnathan, A. *Stability and reactivity of methane clathrate hydrates*, Introduction to Gaussian Workshop organized on January 2-6, 2012 at IIT Chennai (*Poster Presentation*) • Sunda, A.P. and Venkatnathan, A. *Atomistic simulations of structure and dynamics of hydrated aciplex polymer electrolyte membrane*, Mini symposium on Spectroscopy and Dynamics on April 20, 2012 at IISER Pune (*Poster Presentation*) • Ramya, K.R., Kumar, R. and Venkatnathan, A. *Structure, reactivity and stability of gas hydrates* Mini symposium on Spectroscopy and Dynamics, IISER Pune, April 20, 2012 (*Poster Presentation*) • Sunda, A.P. and Venkatnathan, A. *Molecular modeling and simulations in design and development of novel materials for renewable energy*, Chemical Constellation Cheminar – an International conference held during September 9-12, 2012 at NIT Jalandhar (*Oral Presentation*) • The Indo-German conference on Complex Chemical Systems, IISER Bhopal, December 3-5, 2012 (*Invited Speaker*) • Ramya, K.R. and Venkatnathan, A. *Thermodynamic stability, reactivity and spectra of methane gas hydrates from electronic structure calculations* IISER-UKIERI Physical Chemistry Symposium, IISER Pune, December 9-11, 2012 (*Oral Presentation*) • Sunda, A.P. and Venkatnathan, A. *Molecular dynamics simulations of nanostructure and dynamics of aciplex polymer electrolyte membrane*, Theoretical Chemistry Symposium, IIT Guwahati, December 19-22, 2012 (*Poster Presentation*) • Ramya, K.R. and Venkatnathan, A. *Stability, reactivity and spectra of methane gas hydrates: Insights from density functional theory* Theoretical Chemistry Symposium, April 20, 2012, December 19-22, 2012 (*Poster Presentation*) • Sunda, A.P., More, M. and Venkatnathan, A. *Molecular Dynamics simulations of nanostructure and dynamics of phosphoric/triflic acid doped hydrated ABPBI [poly(2,5-benzimidazole)] polymer electrolyte membranes* Theoretical Chemistry

Symposium, IIT Guwahati, December 19-22, 2012 (*Poster Presentation*) • Sunda, A.P. *Atomistic investigation of nanostructure and dynamics in polymer electrolyte fuel cell membranes* 7th RSC-CRSI Symposium BHU-Varanasi, January 31, 2013 (*Invited Lecture*)

Seema Verma Thampi, A., Babu, K. and Verma, S. *Large scale solvothermal synthesis and a strategy to obtain stable Langmuir-Blodgett film of CoFe₂O₄ nanoparticles* IISER Pune -Glasgow Symposium on Structure and Dynamics, IISER Pune, December 10-12, 2012 (*Poster Presentation*)

Academic Events Organized

G. Ambika Organized “National Conference on Nonlinear Systems and Dynamics (NCNSD)” during July 12-15, 2012

Baskar Balasubramanyam Co-organizer for the “Indo-French Symposium on Automorphic Forms, Galois Representations and L-functions” from 3-7 Sept 2012 • Resource person for the ATM Workshop on “Hilbert Modular Forms and Varieties” held at KSOM Kozhikode from Jan 21-31, 2013

Anjan Banerjee Coordinator for IISER-Ohio State University (OSU), undergraduate “Students Exchange Program for Interdisciplinary Research on Cancer and related areas” • Organized the second “DST INSPIRE science camp” from December 10-15, 2012

Rabeya Basu Organized “One-Day symposium on K-theory” on May 15, 2013

Ramakrishna Bhat Organizing Committee member – “RSC Practical Applications of Modern tools in Organic Synthesis and Purification II (PAMTOP-II)” during April 2-4, 2012

Chandrasheel Bhagwat Involved in organizing the “Mathematics Day” on March 14, 2013

Harinath Chakrapani Co-organizer “Practical applications of modern tools in organic synthesis and purifications II” during April 2-4, 2012

Aloke Das Organized a mini symposium on Spectroscopy and Dynamics” on April 20, 2012

Shouvik Datta Organized “National Workshop on Polymer Solar cells (NWPSC-2012)” during April 21-22, 2012

Sutirth Dey Organized a mini-Symposium “Modelling biological systems: from traits to communities” as a part of the National Conference on Nonlinear Systems and Dynamics during July 12-15, 2012. • Mimamsa-2013, All India Science quiz for undergraduates during February 16-17, 2013

Pranay Goel Co-organized “National Conference on Nonlinear Systems and Dynamics (NCNSD 2012)”, during July 12-15, 2012

Sulabha Kulkarni Organized a workshop on “Powder X-ray Diffraction and Small Angle Scattering” at IISER, NCL and UOP, Pune during May 15-16, 2012 for Ph. D. Students • Organized Workshop on Advanced Materials Characterization under CURIE program of DST at Banasthali University, Rajasthan during October 3-7, 2012

Soumen Maity Organized Workshop on “Bloch-Kato Conjectures for the Riemann Zeta” function during July 17-21, 2012 sponsored by ICTS- TIFR • Organized the “4th Pan Asian Number Theory Conference (PANT 2012)” during July 23-27, 2012

A. Raghuram Workshop funded by ICTS on the “Blach-Kato conjectures for the Riemann zeta function at odd positive integer”, July 17-21, 2012 • *Pan Asian Number Theory Conference.*, July, 23-27, 2012 • Both these events held back-to-back, were very high-level mathematical events with mathematicians of international eminence participating and giving talks. The proceedings of the Blach-Kato workshop is being prepared and will be published perhaps in a year's time • *Indo-French conference on Automorphic forms, Galois Representations and L-functions.* Held in September 2012. This was funded by CEFIPRA

Sudha Rajamani Organized “KVPY Summer Program” in conjunction with Dr. Mrinalini Puranik from May 21- 26, 2012

Umakant Rapol Organized a winter meeting on Ultra Cold Atoms for Fundamental Science and Enabling Technologies in Goa during December 17-21, 2012 in collaboration with the universities of Birmingham and Nottingham, United Kingdom

Kundan Sengupta Organized a scientific meeting on “Cell compartmentation, Division & Signalling” at IISER, Pune during April 10-11, 2012 • March 6, 2013: Organized an interaction session with Dr. Pamela Feliciano, Senior Editor Nature Genetics, New York, USA and students and faculty of IISER, Pune during April 10-11, 2012

Nishikant Subhedar Served as a chairman of the Planning Committee which organized DST sponsored “Eleventh SERB School in Chronobiology” at NEHU, Shillong, during June 20-July 3, 2012 • Served as a member of the Planning Committee which organized DST sponsored “Sixth SERB School in Neurosciences” at NISER, Bhubaneswar, during December 10-22, 2012

Suneeta Vardarajan Organized the 27th meeting of the “Indian Association of General Relativity and Gravitation (IAGRG)” at HN Bahugana Garhwal University, Srinagar, Uttarakhand during March 7-9, 2013

Memberships and Affiliations

G. Ambika 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, Macroheterocycles

Sudarshan Ananth Associate, Indian Academy of Sciences, Bangalore 2009-2013 • Member, National Academy of Sciences India, 2013

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 • Member, American Society of Cell Biologists

Nirmalya Ballav Editorial Board Member of the Journal *ISRN Spectroscopy*

Ramakrishna Bhat Life Member, Chemical Research Society of India

Anjan Banerjee Member, All India Cell Biology Association • Member, Plant Tissue Culture Association of India

Deepak Barua Member, Bombay Natural History Society • Executive member of steering committee to establish the Indian Society of Evolutionary Biology • Member, Association for Tropical Biology and Conservation

R. Boomi Shankar Life Member, Chemical Research Society of India

Harinath Chakrapani Life Member, Chemical Research Society of India

Aloke Das Member, American Chemical Society

Shouvik Datta Member Ad-hoc Board of Studies on Nanoscience and Nanotechnology, Shivaji University, Kolhapur • Invited Member Executive Council of Electron Microscopy Society of India (West-Zone)

Prasenjit Ghosh Selected as a Regular Associate of the Abdus Salam International Centre for Theoretical Physics, Italy, Jan 2012 to Dec 2017 • Member, American Physical Society • Member, Chemical Research Society of India

Sanjeev Galande Life Member, Society of Biological Chemists, India

Krishna N. Ganesh President, Division of Organic and Bimolecular Chemistry, Division-III, IUPAC • Chairman, FIST Expert Committee in Chemical Sciences, DST, New Delhi • Chairman, Programme Advisory Committee in Organic Chemistry, DST New Delhi Honorary Professor, JNCASR, Bangalore • Member, Research Advisory Committee, Agharkar Research Institute, Pune • Member, Board of Directors, Venture Centre, NCL Innovation Park, Pune • Member, Nanoscience Advisory Group, DST, New Delhi • Member, Indian Advisory Committee, Lady Tata Memorial Trust, Mumbai • Member, Editorial Board, Chemistry-An Asian Journal, Wiley Publishers, Germany • Member, Editorial Board, Oligonucleotides, Mary Ann Liebert, U.S.A. • Member, Editorial Board, Artificial DNA: PNA, XNA, Landes Bioscience, U.S.A • Member, Editorial Board, Beilstein Journal of Organic Chemistry, Germany • Member, Editorial Advisory Board, Journal of Organic Chemistry, ACS, USA • Member, Research Council, CSIR-Institute of Genomics & Integrative Biology (IGIB), New Delhi • Member, Empowered Committee, Science and Engineering Research Board (SERB), DST New Delhi • Member, Board of Governors, YASHADA, Pune

Sujit Ghosh Life Member, Chemical Research Society of India

Anirban Hazra Member, Indian Society for Radiation and Photochemical Sciences

Partha Hazra Life Member, Chemical Research Society of India

M. Jeganmohan Life Member, Chemical Research Society of India

Saikrishnan Kayarat Member, Biochemical Society • Indian Crystallographic Association

Raghavendra Kikkeri Life Member, Chemical Research Society of India

Sulabha Kulkarni Member, Indian Physics Association • Indian Association of Physics Teachers
• Materials Research Society India

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

Ayan Mahalanobis International Association for Cryptologic Research • American Mathematical Society

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

Sunil Mukhi Fellow, Indian Academy of Sciences • Fellow, Indian National Science Academy

Sudha Rajamani Member of the International Society for Astrobiology (previously known as ISSOL) • Elected as a student councilor of the International Society for Astrobiology for a period of three years (2011-2014).

V.S. Rao Member Institutional Biosafety Committees of Nirmal Seeds, Pachora and Syngenta, Pune • Member, Monitoring and Assessment Committee of USERS program, DST, New Delhi • Member, Task Force on “Accelerated Crop Improvement Program”, DBT, New Delhi • Adjunct Visiting Professor, University of Pune • Member, Research Advisory Committee, Directorate of Wheat Research (ICAR), Karnal • Paper coordinator in Botany e Pathashala project MHRD • Life Member, Indian Society of Genetics and Plant Breeding and Indian Society for Plant Biochemistry and Biotechnology

Kundan Sengupta American Association of the Advancement of Cancer Research (AACR), U.S.A.

Pankaj Mandal Member American Chemical Society • Member, Chemical Research Society of India, Bangalore • Member, Optical Society of America

Arvind A. Natu Adjunct Visiting Professor, Biology and Chemistry, University of Pune
• Member, International Junior Science Olympiad • Board of Editors, Indian Drugs Board of Studies, Rani Chandrama University, Belgaum • Chairman, Technology Development, DSIR • Academic Council, DY Patil University, Pune • Member, Project Renewing Commission, High Energy Materials Research Institute, Pune • Senate member, SVNIT, Surat • Member, National Facility for Biopharmaceuticals

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

L.S. Shashidhara Member, Apex committee of DST-INSPIRE • Member, Research Advisory Council of National Institute of Immunology • Member, Selection Committee, DBT Ramalingaswamy Fellowships-2010 onwards • Member, Asia Pacific Drosophila Board-2010 onwards • Member, Taskforce on Seribiotechnology, DBT, New Delhi-2006 onwards • Member, Board of Studies, Centre for Integrated Studies, HCU-2009 onwards

S.G. Srivatsan Life Member, Chemical Research Society of India • Member, AvH foundation, Pune Chapter

Pinaki Talukdar Life Member, Chemical Research Society of India

Arun Venkatnathan Chemical Research Society of India • Indian Society for Radiation and Photochemical Sciences • American Chemical Society

Seema Verma Member, Materials Research Society of India (MRSI)

International and National Visits

G. Ambika Visited Centre for Neuroscience, IISc Bangalore, for discussion in collaborative research, April 10, 2012 • Potsdam Institute for Climate Impact Research, PIK, Potsdam, Germany for research under DST DAAD project, March 14-27, 2013

Sudarshan Ananth Invited to the International Conference on Symmetrics, Unification and the search for quantum gravity, on the occasion of the 60th birthday of Prof. Dr. Herman Nicolai, at Max Planck Institute for Gravitational Physics, Postdam, Germany during Sept. 6 to 8, 2012

Nagaraj Balasubramanian Attended Cell Mechanics Meeting, Raman Research Institute, Bangalore, India • CDFD, Hyderabad, India

Rabeya Basu Visited ISI Bangalore, January 2012 • University of Bielefeld, Germany, June 18 - August 5, 2012.

Chandrasheel Bhagwat Visited TIFR-CAM, Bangalore in February 2013 • Visited TIFR, Mumbai in February 2013

Diganta Borah Visited Indian Institute of Science, Bangalore, from September 11-14, 2012 for academic collaboration with Prof. Kaushal Verma

Harinath Chakrapani Visited-Bristol University UK during 14-17 June 2012, as a part of the knowledge economy Partnership Program " Application of the Chemistry LabSkills teaching resources to the Indian Education system" funded by British Council., UK. The purpose of this visit was to meet and interact with the faculty and students of Bristol University and understand the successful Labskills software that they are currently using to support their chemistry laboratory course for undergraduates • Visited United States to attend the 19th Annual Meeting of the Society for Free Radical Biology and Medicine's (SFRBM), Nov 14-18, San Diego, California. During this trip, also visited University of California, San Francisco, Duke University, and the National Cancer Institute at Frederick

Anisa Chorwadwala Visited the Theoretical Statistics and Mathematics Unit of Indian Statistical Institute, Delhi during February 14-16, 2013 • Visited Professor Rajesh Mahadevan, Departamento de Matematica, Facultad de Ciencias Fisicas y Matematicas, Universidad de Concepcion, Chile under FONDECYT project No. 1090305 during June 03-July 04, 2012

Aloke Das Visited Ohio State University to attend the international symposium on Molecular Spectroscopy during June 18-22, 2012

Sutirth Dey Only Indian member in the Science Tour on "Understanding Biodiversity and Climate Change" November 25 - December 1, 2012 organized by DAAD, Germany.

Krishna N. Ganesh In the capacity of President of Division III, attended meeting of the Bureau of the International Union of Pure and Applied Chemistry (IUPAC) held at University of Leiden, Leiden, The Netherlands, April 13-15, 2012 • Was invited by Prof. Ulrike Beisiegel, President, Georg-August-Universität Göttingen to take part in the 275th anniversary of Göttingen University and to discuss how to enhance and broaden cooperation between IISER Pune and Göttingen University. He was invited to talk in the Symposium "Governance for Integrity and Quality in Universities" at Göttingen University, Germany; May 28-June 2, 2012 • Member of delegation on India-US Higher Education Dialogue held at Washington DC co-chaired by Hon'ble Minister of Human Resource Development, Shri Kapil Sibal. The agenda of discussion was focus on Research and Innovation partnerships and Community colleges in USA, June 10-15, 2013 • In the capacity of President of Division III Organic and Bio-organic Chemistry, represented IUPAC in the 19th IUPAC International Conference on Organic Synthesis (ICOS19) held in conjunction with the 24th Royal Australian Chemical Institute Organic Conference in Melbourne, Australia, June 29-July 4, 2012 • University of Queensland, Brisbane to give seminar, visit research facilities in the Faculty of Science and explore possible research interactions between IISER Pune and the University of Queensland • On MHRD delegation to DAAD Germany to visit various Institutions /University of Germany, July 8-14, 2012 • Part of delegation led by Prof. CNR Rao to attend INDO-UK Symposium on Molecular Materials 2012 held at the Chemistry Centre, RSC, UK and the University of Strathclyde, Glasgow. The purpose of this event was to bring together researchers from both countries and to facilitate research collaborations in areas from across the chemical sciences, in particular in the broad area of materials research. Also visited University of Glasgow for discussing further scientific collaborations with IISER Pune involving exchange of faculty & students and for joint research projects, September 9-15, 2012 • Attended TWAS 12th General Conference and 23rd General Meeting held at Tianjin Institute of Industrial Biotechnology, Chinese Academy of Sciences, Tianjin, China, September 18-21, September, 2012 • Visited Max Planck Society in Munich as well as Max Planck Institutes in Munich, Göttingen, and Berlin (Germany) with all IISER Directors, November 25-December 1, 2012

Aurnab Ghose Visited University of Tokyo, Japan

Pranay Goel Visited Laboratory of Biological Modelling, NIDDK, National Institutes of Health, Bethesda, USA (5th June to 14th June, 2012) • Presented a talk on June 29, 2012 *Biophysical models of glucose-stimulated insulin secretion from pancreatic islets* at Frontiers in Biology - a joint symposium of the IISER Pune and Göttingen University, University of Göttingen, Göttingen, Germany, June 26, June to July 1, 2012

Srinivas Hotha Visited Suzdal, Russia to deliver an invited talk in 5th Baltic Meeting of Microbial Saccharides

Raghavendra Kikkeri Attended GRC Bioanalytical Chemistry 2012, USA

Sulabha Kulkarni Visited-Capital Normal University, Beijing, China from December 13-28, 2012
 • Visited DESY, Hamburg, Germany from March 28, 2013-April 4, 2013

Mayurika Lahiri Visited University of Goettingen, Goettingen, Germany, as part of a biology contingent; presented a talk *DNA damage checkpoint response to alkylating damage in cells – GZMB symposium – Frontiers in molecular bioscience*, a joint symposium of IISER Pune and GAU, Göttingen, Germany, June 26-29, 2012

Soumen Maity Visited Indian Institute of Technology (IIT) Kharagpur during May 6-27, 2012 to record video lectures on Regression Analysis

Sunil Mukhi Visited Theoretical Physics Unit, CERN, Geneva, March 17-23, 2013

Angshuman Nag Visited North Maharashtra University Jalgaon to deliver a talk • Visited IISc Bangalore for collaborative work

Mrinalini Puranik Attended the Trends in Enzymology 2012 Going Beyond Frontiers, Meeting at Goettingen, Germany 03-06, June 2012

A. Raghuram Visited Oklahoma State University, Stillwater, OK, USA. 1st week of May 2012 • Max Planck Institut für Mathematik, Bonn, Germany. May and June 2012 • IMSc., Chennai. One week in October 2012 • Kerala School of Mathematics. 3 days in October 2012 • Cambridge University, one week in December 2012 • University of Delhi, New Delhi, one week in December 2012

Sudha Rajamani Visited University of Goettingen, Goettingen, Germany, as part of a biology contingent to attend a joint international symposium between June 25 -30, 2012 and to explore possibilities for scientific collaboration. Participated the symposium titled “Frontiers in Biology - A joint international symposium of IISER Pune & Goettingen University and gave a talk on *Replication of information on the prebiotic earth*

Umakant Rapol Visited University College of London, London and University of Birmingham for exploring the student exchange and collaboration opportunities with UCL and Univ. of Birmingham, under the MoU signed between IISER Pune and UCL-KEELE universities, July 1-10, 2012

Richa Rikhy Visited University of Goettingen, Goettingen, Germany, as part of a biology contingent; presented a talk *Origin of plasma membrane polarity and compartmentalization in the syncytial Drosophila embryo* at Frontiers in Modern Science, Goettingen University-IISER Pune Meet, June 2012

Surjeet Singh Visited Leibniz Institute for solid state and materials research (IFW) Dresden during June 1 to July 15, 2012 • Institut Jozef Stefan, Ljubljuna, Slovenia, June 4 -6, 2012 • Leibniz Institute for solid state and materials research (IFW) Dresden during February 20-22, 2013

Steven Spallone Visited University of Oklahoma, June 24-July 5, 2012, for research collaboration

Kanika Bansal (PhD Student) Participated at EUMRS's Spring Meeting at Strasbourg, France in May 2012

Conferences, Symposia and Workshops

Practical Applications of Modern Tools in Organic Synthesis and Purifications II (PAMTOSP 2)

(April 2-4, 2012)

IISER Pune organized 3 day workshop during April 2-4, 2012 on Practical Applications of Modern Tools in Organic Synthesis and Purifications II (PAMTOSP 2) under the prime sponsorship of Royal Society of Chemistry, UK. This event was also cosponsored by various Indian and multinational companies and was attended by participants from diverse range of backgrounds. The workshop was inaugurated by Dr. Sourav Pal, Director, NCL., Pune. Others present for the inauguration were: Dr. K.N. Ganesh, Director, IISER Pune, Mr. David Clark from RSC, UK, Ms. Jayshree Mistry from GSK and Mr. Rajesh Parishwad from RSC, India. Among the 200 participants, students, academicians and industry-based participants are the major. This 3-day event covered a historical overview of high throughput chemistry, use of reagents and scavengers in organic chemistry, solution phase methodology for parallel chemistry, use of solid phase in organic



chemistry, purifications technologies for high throughput chemistry, new developments and techniques in organic chemistry, practical demonstration workshops and computational tools for library design. Lectures and demonstrations were given by eminent persons from academia and industry from both India and abroad.

Cell Compartmentation, Division & Signaling

(April 10-11, 2012)

This scientific meeting was organized by Dr. Kundan Sengupta at IISER Pune along with discussions with the visiting delegation consisting of Vivek Malhotra (Head, Cell & Developmental Biology, Center for Genomic Regulation, Barcelona, Spain); Tom Misteli (Head, Cell Biology of Genomes Group & Senior Investigator, National Cancer Institute (NCI), National Institutes of Health (NIH) USA) and Chief Editor of Journal of Cell Biology); Tarun Kapoor (Head, Laboratory of Chemistry and Cell Biology, The Rockefeller University, USA); Liz Williams (Executive Editor, Journal of Cell Biology, USA); Karin Dumstrei (Senior Editor, EMBO Journal, Heidelberg, Germany). The meeting included talks and panel discussion and interactions of delegates with students of IISER Pune.

Mini-symposium on Spectroscopy and Dynamics

(April 20, 2012)

This mini-symposium organized by Dr. Aloke Das at IISER Pune on April 20, 2012 was part of annual activities of ISRAPS (Indian Society for the Radiation and Phytochemical Society), BARC, Mumbai. The meeting covered discussion on a broad range of spectroscopy including Femtosecond transient absorption, Terahertz, Resonance Raman, Femtosecond stimulated Raman, Fluorescence, Gas phase photodissociation dynamics in supersonic jet, Photo-luminescence microscopy and simulation on dynamics of DNA intercalation. About 100 participants including students and faculty from TIFR,



BARC, IIT Mumbai, University of Pune and IISER Pune were present for the meeting. We had total eight speakers from various institutes like IIT Mumbai, BARC, TIFR and IISER Pune. Prof. L.S. Shashidhara, IISER Pune presented opening remarks by briefly mentioning about scientific activities of IISER Pune. Dr. Tulsi Mukherjee, Director, Chemistry Division, BARC, inaugurated the symposium.

National Workshop on Polymer Solar Cells (NWPSC-2012)

(April 21-22, 2012)

A national workshop on polymer solar cells (NWPSC-2012) was organized with the support of Department of Science and Technology, Govt. of India. The workshop was coordinated by Prof. R.P. Singh and Dr. Shouvik Datta.



Workshop on Powder X-Ray Diffraction and Small Angle Scattering

(May 15-16, 2012)

A two day workshop on Powder Diffraction and Small Angle X-ray/Neutron Scattering was organized for Ph.D. students from IISER Pune, NCL, and University of Pune. This workshop focused on introducing students to X-ray diffraction and small angle scattering and on providing them with a theoretical background and hands-on-experience of data analysis using the technique of Rietveld refinement of powder diffraction data. The workshop was addressed by Sunil Nair and Vaidhyanathan, IISER Pune; P.D. Babu, from UGC-DAE-CSR, Mumbai; V.K. Aswal, S.K. Deshpande, S.N. Chary, BARC, Mumbai.

National Conference on Nonlinear Systems and Dynamics

(July 12-15, 2012)

The National Conference on Nonlinear Systems and Dynamics (NCNSD) is organized periodically with a view to bring together researchers with overlapping interests in nonlinear dynamics on a single platform. It aims at exchange of ideas and collaboration among the young and senior researchers who work in areas spanning a wide range of disciplines but use the language and tools of nonlinear dynamics. The 7th NCNSD was organized by Dr. G. Ambika during July 12-15, 2012. For the first time, the structure of the conference was remodeled to include mini-symposia on various topics which were held in parallel sessions. The 10 mini-symposia organized in the

conference covered wide range of topics in nonlinear dynamics, viz. pattern formation and dynamics of complex fluids, plasma and magnetohydrodynamics, nonlinear dynamics in electronic systems, integrable systems and solitons, Climate and atmospheric turbulence, Modeling biological systems, Time series analysis and Fractals, Quantum chaos, Complex networks and Nonlinear optics. In addition, there were six plenary talks, 20 contributory talks, 29 poster presentations including interactive sessions / demonstration of experiments. Around 150 persons attended the conference as speakers and participants. The proceedings of the conference is being published as a special issue of the International Journal, European Physical Journal ST.

Workshop on Bloch-Kato Conjectures for the Riemann Zeta Function

(July 17-21, 2012)

The workshop on Bloch-Kato Conjectures for the Raman Zeta Function was held during July 17-21, 2012. The aim of the workshop was to present a detailed proof of the highly important case of Bloch-Kato Conjectures for the values of the Riemann Zeta function at the odd positive integers. The special values of the Riemann Zeta function have been important in Number Theory since the work of Euler in the 18th Century A.D. In the 1970's, A. Borel proved that the values at the odd positive integers were linked to K-theory via regulator maps. As an important special case of general conjectures, Bloch and Kato refined Borel's work to give an exact arithmetic formula for these values. This Bloch-Kato conjecture has subsequently been proven with major contributions by Bloch, Kato, Huber, Kings, Soule and Wildeshaus.



No self-contained account of this important body of work exists at present in the literature, and the workshop was aimed to fill this gap. A detailed and comprehensive account of the full proof was presented at the workshop. The plan was to include as much relevant background material as possible. This workshop was a great opportunity for young researchers and students to acquaint themselves with the current state of the subject. The workshop was organized by Prof. John Coates (Cambridge), Prof. A. Raghuram (OSU/IISER Pune), Dr. Soumen Maity (IISER Pune), Dr. A. Saikia (IIT Guwahati) and Prof. R. Sujatha (UBC).

4th Pan Asian Number Theory Conference

(July 23-27, 2012)

The aim of the annual Pan Asian Number Theory (PANT) conferences is to encourage research in Number Theory in Asia, and especially to foster collaborations among young Asian Number Theorists. This ICTS program was held along with the fourth PANT conference, with previous conferences being held in Korea (2009), Japan (2010) and China (2011). The PANT conference itself,

consisting of 20 one-hour invited lectures, took place during July 23-27, 2012. It was preceded by an Instructional Workshop from July 17-22, 2012 aimed at presenting in detail for graduate students and non-specialists what is known about the Bloch-Kato conjectures for the Riemann zeta function at odd positive integers. The conference was organized by Prof. John Coates (Cambridge), Prof. A. Raghuram (OSU/IISER Pune), Dr. Soumen Maity (IISER Pune), Dr. A. Saikia (IIT Guwahati) and Prof. R. Sujatha (UBC).



Automorphic Forms, Galois representations and L-functions

(September 3-7, 2012)

This symposium on Automorphic Forms, Galois Representations and L-functions was supported by Indo-French Centre for Promotion of Advanced Research (IFCPAR/CEFIPRA) to mark the 25th anniversary of the establishment of IFCPAR. The aim of the symposium was to provide a platform for research mathematicians working in Number Theory from India and France to interact with each other. The program was coordinated by Prof. A. Raghuram of IISER Pune and Prof. J. Tilouine of Paris 13 and supported by Dr. Baskar Balasubramanyam of IISER Pune. The other participants from India were: U.K. Anandavardhanan, R. Raghunathan (IIT-B), C.S. Dalawat, R. Thangadurai (HRI, Allahabad), A. Ganguli, E. Ghatge, A. Nair, D. Prasad, C.S. Rajan, S. Shekhar, S. Verma (all from TIFR, Mumbai), C. Bhagwat, S. Spallone (IISER Pune), S. Gun (IMSc, Chennai), S.A. Katre (Pune Univ.), P. Kewat (ISM, Dhanbad), A. Saikia (IIT Guwahati), K. Sinha (IISER Kolkata), R. Sreekantan, B. Sury (ISI Bangalore), R. Tandon (University of Hyderabad).



International Symposium on Solar-Terrestrial Physics

(November 5-9, 2012)

An International Symposium on Solar-Terrestrial Physics was organized with support from SCOSTEP (Scientific Committee on Solar-Terrestrial Physics) and ISWI. The other participating institutes were: IIA, Bangalore, IIG, Mumbai, ISRO, Bangalore, IITM, Pune, IUCAA, Pune, IISER Kolkata and NCRA-TIFR, Pune. The symposium aimed at bringing together leading scientists from around the world in the increasingly important, interdisciplinary fields of Solar activity and its impact on life on the Earth. The topics covered were: Solar Interior, Solar Atmosphere, Solar Wind, Interplanetary Medium, Magnetosphere-Ionosphere-Thermosphere Coupling Process, Atmospheric Coupling Processes, Space Weather and Climate. The Symposium was inaugurated by Prof. K.N. Ganesh, Director, IISER Pune. Apart from scientific sessions, there were tutorial sessions for the benefit of the students and a public talk on “Faint Young Sun Paradox” by Petrus Martens, of Montana State University, Bozeman, MT, USA.



IISER Pune-University of Glasgow Bilateral Symposium on Structure and Dynamics

(December 10-12, 2012)

A joint symposium with the Universities of Glasgow and Strathclyde on Structure and Dynamics was held at IISER Pune during December 10-12, 2012 under the auspices of the UKIERI. Ten faculty members from the two universities participated in the symposium. 15 faculty members from IISER Pune presented their work. More than 50 research students presented posters in the meeting. Some of the speakers at this symposium were Prof. Krishna Ganesh, Prof. Klaas Wynne, Dr. Mrinalini Puranik, Dr. Goetz Bucher, Dr. Serena Korr, and Dr. M. Jayakannan.



Ultra Cold Atoms for Fundamental Science and Enabling Technologies

(December 17-21, 2012)



In collaboration with the universities of Birmingham and Nottingham, United Kingdom, Dr. Umakant Rapol of IISER Pune organized this conference in Goa during December 17-21, 2012. The funding for this school was received from the EPSRC (European Research Council). The school was aimed at training advanced level post graduate students for preparing them to undertake research in the frontier areas of research related to ultracold atoms. There were 50 students selected from various universities and institutes and 15 international and national speakers.



Workshop and Symposium on XRD

(January 19, 2013)

A half-day workshop on XRD was conducted on 19th January 2013, in association with NCL and NCCS, to commemorate the 100 years of X-ray diffraction, for the benefit of undergraduate and post-graduate students. Distinguished X-ray crystallographers like Prof. M. Vijayan, Prof. D.D. Sharma and Prof. Ashwin Nangia spoke in the workshop. The workshop was video-recorded by students of IISER Pune and was telecast on the Lok Sabha channel on January 31, 2013.



News and Events

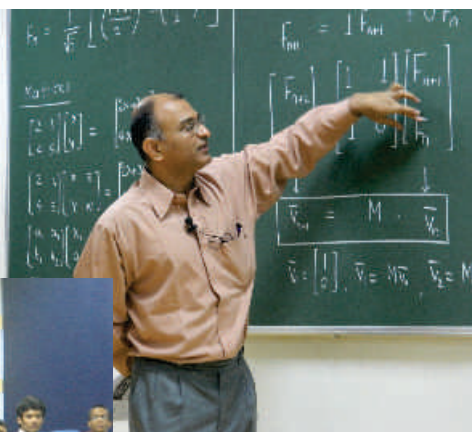
KVPY Summer Program

(May 21-26, 2012)

This week-long event involved introducing 79 students with KVPY fellowship (11th and 12th graders, along with a few first year undergraduates) to several aspects of conducting basic research and what it meant to be a part of the research fraternity. This was achieved through lectures/ talks

(15 in total), given by researchers who are experts in their respective fields, and through lab visits. We also organized four sessions of round table discussions where students interacted with both the speakers and other researchers

from the institute, particularly with those who have a passion for communicating the excitement of practicing basic science to young students.



World Environment Day

(June 5, 2012)

On the occasion of World Environment Day on 5 June 2012, staff and students of the Institute planted saplings in front of the h cross block.



IISER Pune's First Convocation

(August 4, 2012)

The first annual convocation of IISER Pune was held on August 4, 2012 on the new campus of IISER Pune. It was a momentous occasion for the Institute and for the graduates receiving their degrees. The function was presided over by Prof. T.V. Ramakrishnan, Chairman, Board of Governors (BoG); Shri Sam Pitroda, Advisor to the Prime Minister of India on Public Information Infrastructure & Innovations was the Chief Guest.

BS MS students who had joined IISER Pune in 2006 and 2007—91 of them—received their dual degrees of Bachelor of Science and Master of Science. The first PhD student of IISER Pune also received her degree. The function was anchored by Prof. G. Ambika, Dean of Graduate Studies.



Inauguration of Hostel Building

(August 4, 2013)

A new hostel building was inaugurated on 4 August 2013 by Dr. Sourav Pal, Director, NCL, Pune. This hostel has 350 rooms suitable for double occupancy. With the completion of this building, immediate requirement of accommodation for students will be taken care of.



DST-INSPIRE Internship Camp

(December 10-14, 2012)

This 5-day residential DST-INSPIRE Internship camp was held for 139 students (55 boys, 84 girls) studying science subjects in Class XI. Students were selected from 47 schools in and around Pune on the basis of their performance in Class X examinations. The program consisted of ten invited talks by eminent scientists, three workshops, three laboratory sessions, science movies, a play on Einstein, and a panel discussion on careers in science.



Jigyasa Science Camp

(December 18-22, 2012)

As part of its outreach activities, Disha, a voluntary organization started and run by a group of students from IISER Pune, was closely involved in coordinating the Jigyasa Science Camp at IISER Pune during December 18-22, 2012. It was a five-day camp for about 53 students of ninth standard from government schools in Dantewada district, Chhattisgarh. The event was proposed by Bachpan Banao, an educational fellowship program being implemented in government schools in Dantewada and was co-hosted and supported by Jnana Prabodhini, a non-governmental organization based in Pune.

As Kaustubh Deshpande, student of IISER Pune and one of the organizers of the science camp puts it, “The objective of the camp was to give students exposure to what they lacked in Dantewada and to get them excited about science and education. The idea was to give them a flavor of various exciting fields in science; so, the emphasis was on hands-on activities and exposure visits”.

The camp included a hands-on demonstration session about Chemistry in daily life (Anirban Hazra, IISER Pune); an airplane making session (Sadanand Kale, Aeromodeller, Little Wings India); and observing the moon and the Jupiter through a telescope (Mayuresh Prabhune, Khagol Vishwa). Students were taken to Sinhagad valley where they could collect samples that they were to analyse later in the laboratory. At Vigyan Ashram in Pabal, students worked on multiple short projects that were designed to raise awareness about the connection between science, technology and small scale entrepreneurship.



Mimamsa 2013

(February 16-17, 2013)

Mimamsa (मीमांसा) is the flagship program of IISER Pune, claimed to be the toughest undergraduate science quiz in India. Its rigorous quizzing rounds different from the conventional ones make it unique. The philosophy of the quiz focuses more on concepts than numerical and knowledge-based approaches. The format involves arguments and counter-arguments, answers given by one team is debated by the other teams, the marks are allotted not only for the correct answer but also for finding flaws in the logical sequence of presentation of answer. The rigour and the complexity makes it a two-day long, toiling event.

This year the event focused on 7 cities: Bangalore, Chennai, Delhi, Kolkata, Mumbai, Hyderabad and Pune. After rigorous rounds of prelims on 13 January 2013, the four best teams emerged finalists. The final qualifiers



IISc team receiving the trophy from Director, IISER Pune



The IISER Pune Mimamsa team and participants

were St. Xavier's (Kolkata), NISER (Bhubaneswar), IISc (Bangalore) and BITS Pilani (Hyderabad). The final competition was scheduled on 16 & 17 February, 2013.

The event was intellectually stimulating, the teams competing for the top spot, pointing out flaws from the answers and battling with concepts. In the heated battle, IISc Bangalore was the clear leader but NISER Bhubaneswar was not ready to give up. There was a close contest for the next

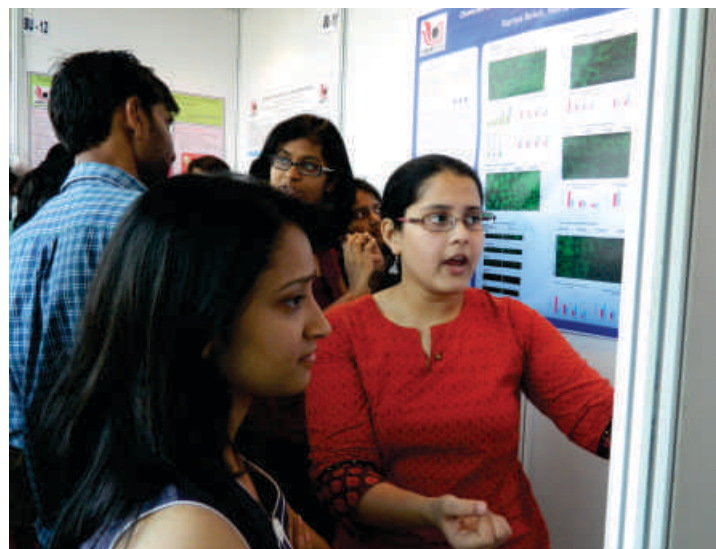
spots between BITS Hyderabad and St. Xavier's Kolkata. Beating other teams in Physics, Chemistry, Mathematics and Biology, IISc Bangalore turned out victorious followed by NISER, Bhubaneswar, BITS-Pilani, Hyderabad and St. Xavier's, Kolkata.

The whole activity is conceptualized, planned and managed by Dr. Sutirth Dey, with the help of several volunteers from BS MS program.

Science Day

(February 28, 2013)

Science Day was celebrated on February 28, 2013 with 2 Invited talks by eminent scientists, Prof Sriram Ramaswamy (Director, TIFR Hyderabad) and Dr Ashish Lele (Senior Scientist - NCL and winner of Infosys Prize in Engineering Sciences 2012); screening of video films produced by the IISER Media Centre, and a poster competition. At the poster competition there were 95 posters by PhD students and 26 posters by BS MS students of IISER Pune, from various disciplines (Biology, Chemistry and Physics). The posters were judged by several IISER Pune Faculty, and 5 posters from the PhD category and 3 posters from the BS MS category were given Awards. Over 200 faculty members and students from 15 colleges and Institutions in and outside Pune had registered and attended the Science Day program.



Mathematics Day

(March 14, 2013)

Mathematics Day was held at IISER Pune on March 14, 2013. This event included conducting a Mathematics Quiz Competition on the evening of March 13 which was open to all BSc and MSc and BS MS students from all over Pune. Many interesting activities were organized on March 14th such as the



premiere of the movie "The Genius of Srinivasa Ramanujan" directed by Nandan Kudhyadi, co-produced by Vigyan Prasara and IISER Pune, featuring Prof. A. Raghuram; a skit by IISER members called "Life of π (4D)"; a colloquium by Prof. Chandrashekhar Khare (FRS) from UCLA; a seminar by Dr. Vivek Mallick; felicitation of Mathematics Olympiad winners; Prize distributions for the quiz competition winners; release of various promotional accessories; and many more fun activities.

Foundation Day

(April 4, 2013)

The Institute celebrated its Foundation Day on April 4, 2013. Dr. Anil Kakodkar, DAE – Homi Bhabha Chair Professor & Former Chairman, Atomic Energy Commission, an eminent Nuclear Physicist and Engineer was the Chief Guest. He gave the 3rd Foundation Day lecture on the topic "Securing our Energy Future". He also distributed prizes and cash awards to meritorious students of the year 2012 (Fall and Spring 2012) and to the staff who made notable contributions to the institute and released the IISER Pune student Magazine Kalpa and film made by IISER Pune with Vigyan Prasara on the life of Srinivasa Ramanujan.



Dr. M. Jayakannan receives the National Technology Innovation Award

Dr. M. Jayakannan, Associate Professor was a recipient of the 2nd National Awards for Technology Innovations 2011-12 in petrochemicals and downstream plastic processing industry from the Department of Chemicals and Petrochemicals, Govt. of India. He received the award on April 26, 2012 at New Delhi.



Participation at the 3rd India-Korea Joint Workshop on the Nanomaterials for Biological Applications



Prof. K.N. Ganesh and Dr. M. Jayakannan participated in the 3rd India-Korea Joint Workshop on the Nanomaterials for biological applications. They were part of a 8 member delegation from India. Preliminary discussions were held on student exchange program and use of the facilities created by the Asian Research Network (ARN), Seoul, South Korea.

Visit of Delegation from Goettingen University

A delegation from Goettingen University, consisting of Prof. Eva-Maria Neher of X labs, Dr. Mar Metzbaaur and Dr. Markus Grumann of PhyWe and Dr. Ramesh Ahuja, Head, Goettingen-India Initiative, visited the institute on 5th and 6th November 2012. The visit was in connection with establishing a state of the art science education centre both for teaching and science popularisation.



DST FIST Committee Meeting

The Chemistry group of the Institute submitted an application for grant under the DST's FIST (Funds for Infrastructure in Science and Technology) program. As a part of the requirement, the members of the Committee visited the institute on 29 Sept 2012 to assess the available infrastructure and academic achievements. Subsequently, DST sanctioned ₹6.0 crores for equipping the labs with 600MHz NMR and other equipment. The process of application and defending the proposal was managed by Dr. Jayakannan and Dr. Srinivas Hotha under the guidance of Prof. Ganesh.

Visitors

Mr. Steiner, Consul General, German Embassy, Mr. Michael Siebert, Consul General Designate and Mr. Zubi Kabraji from the Indo-German Chamber of Commerce visited the institute on August 3, 2012. They met the Director and other senior officials to discuss the on-going and future academic collaborations with German Universities and Institutes.



Prof. Vincent Emery, Vice-Chancellor, Surrey University, UK. visited the institute on August 11, 2012 and discussed collaborative programs with the Director Prof. K.N. Ganesh.



Nobel Laureate, Prof. Jules Hoffmann, from Institute of Molecular Biology and Cellular Biology, Strasbourg, France, visited the Institute on October 9, 2012. He was accompanied by Nicolas Poussielgue, Science and Technology Attache, French Embassy, Mumbai and Dr. Debapriya Datta and Mr. Davinder Kambhoj, from CEFIPRA, New Delhi. During this visit he gave a public lecture at IUCAA auditorium and interacted with faculty members and students.





Prof. P. Balaram, Director, Indian Institute of Science, Bangalore, visited the Institute on December 22, 2012. Prof. Ganesh showed him around the campus and its facilities.

A meeting of the Rajiv Gandhi Commission on Science and Technology, Maharashtra State was held at the Institute on September 6, 2012, under the Chairmanship of Dr. Anil Kakodkar. Dr. Kakodkar interacted with the Director and other faculty members of the institute.



Dr. D. Balasubramanian, Director, R&D, LV Prasad Eye Institute, visited the institute on February 7, 2013. He gave two seminars and exchanged views with Prof. K.N. Ganesh.

Prof. Vimal Chaitanya, Vice-President, research and Prof. Satyajayant Mishra, Computer Science Department, New Mexico State University visited the institute on September 6, 2012 and signed an MoU for collaboration and training of students.



Colloquia

Jul 25, 2012

Arithmetic Mysteries and the Riemann

Professor John Coates, Sadleirian professor of pure mathematics, Cambridge University, U.K.

Aug 22, 2012

Recent Discovery of the Higgs Particle

Prof. Avinash Khare, Raja Ramanna Fellow, IISER Pune

Sep 05, 2012

p-adic Numbers

Prof. Jean-Marc Fontaine, Professor at Paris-Sud 11 University at Orsay, France

Sep 17, 2012

Science in the Headlines: What is the Point of Science Journalism?

James Dacey, Journalist for Physics World, the magazine of the UK Institute of Physics

Oct 10, 2012

Nanoscience, Energy and Environment

Prof. Satishchandra B. Ogale

Chief Scientist, Physical and Materials Chemistry Division, and Co-ordinator, Center of Excellence in Solar Energy, NCL, Pune

Oct 17, 2012

Innovation in India

Dr. Murali Sastry, Director of the India Innovation Centre for DSM

Oct 31, 2012

Creating a Sustainable Future as the Climate Changes

Dr. Rashneh N. Pardiwala, Founder & Director of the Centre for Environmental Research and Education (CERE), Edinburgh, U.K.

Jan 09, 2013

Big History: From Big Bang to the Cooperative Species

Prof. Raghu Murtugudde, Dept. of Atmospheric and Oceanic Science, Univ. of Maryland, U.S.A.

Jan 11, 2013

Solving Cubic Equations

Professor Benedict Gross, George Vasmer Leverett Professor of Mathematics, Harvard University, U.S.A.

Jan 23, 2013

Why Indians are More Susceptible to Diabetes than Westerners

Prof C.S. Yajnik, MD FRCP, Consultant Diabetologist and Director, Diabetes Unit, KEM Hospital Pune

Jan 30, 2013

Need for the Advent of Calculus in India

Prof. Ramasubramaniam, IIT, Bombay

Feb 06, 2013

When Science Meets the Human Eye

Prof. D. Balasubramaniam, LV Prasad Eye Institute, Hyderabad

Feb 13, 2013

Geometrically Frustrated Magnets

Prof. Kedar Damle, Assoc. Prof. Dept of Theoretical Physics, TIFR, Mumbai

Mar 13, 2013

A Unified Model for the Evolution of Cooperative Nesting and Altruism in the Primitively Eusocial Wasp *Ropalidia marginata*

Prof. Raghavendra Gadagkar, INSA SN Bose Research Professor and JC Bose National Fellow, Centre for Ecological Sciences, and Chairman, Centre for Contemporary Studies, IISc, Bangalore

Mar 20, 2013

Science Media Centre at IISER Pune: The Hypothesis, the Experiment and the Results So Far

K.P. Madhu, IISER Pune, Formerly Programme Manager at the Asia-Pacific Institute for Broadcasting Development, as Joint Director, Consortium for Educational Communication

Research Seminars

Plant genomics: Understanding genomes for molecular plant breeding-case studies from wheat and flax

Dr. Raja Ragupathy, Genomics and Sequencing laboratories, Cereal Research Centre (CRC), Canada, Apr 12, 2012

Spectroscopic diagnostics and heating of the upper solar atmosphere

Durgesh Tripathi, IUCAA, Pune, Apr 13, 2012

Innate immune responses to bacterial pathogens: Control by stress response pathways and the nervous system

Dr. Varsha Singh, Duke University Medical Centre, USA, Apr 18, 2012

Active clustering, signalling and cellular uptake in living cells

Dr. Abhishek Chaudhuri, The Rudolf Peierls Centre for Theoretical Physics University of Oxford, U.K., Apr 19, 2012

Mass Spectrometric based metabolomics for biomarker Discovery: Method Development, data analysis and identification of metabolites

Dr. Sangeeta Kumari, Department of Internal Medicine University of Michigan, Apr 23, 2012

Luminescent nano materials for nanophotonic applications

Prof. Amitava Patra, IACS, Kolkata, Apr 24, 2012

Uncovering the physics of DNA translocation through nanopores: Laying the foundations of personal genomics

Dr. Swati Bhattacharya, University of Illinois at Urbana-Champaign, U.S.A., Apr 24, 2012

The Kneser-Tits problem

Prof. Maneesh Thakur, ISI Delhi, Apr 26, 2012

From small carboxylic acids to artificial nucleic acids: molecular design and synthesis towards a better understanding of fundamental organic and prebiotic chemistry

Dr. Phaneendrasai Karri, The Scripps Research Institute, La Jolla, San Diego CA U.S.A., May 04, 2012

Quantum theory of materials: methods and applications

Dr. Manish Jain, Department of Physics, 366 LeConte Hall, Berkeley, CA 94720, USA., May 05, 2012

Black hole membrane paradigm

Dr. Sudipta Sarkar, IMSC Chennai, May 08, 2012

Microbicide development for HIV preexposure prophylaxis: Marking the goal posts

Dr. Rahul P Bakshi, Division of Clinical Pharmacology, Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, USA, May 11, 2012

Density controlled bio-functionalized nanostructures: novel strategies for reliable biosensing

Loredana Casalis, Sincrotrone Trieste S.C.p.A., Trieste, Italy, May 16, 2012

Optogenetics as a tool for synthetic and systems biology

Dr. Devrani Mitra, University of Chicago, USA, May 21, 2012

Moduli of vector bundles on algebraic varieties

Arijit Dey, IIT Madras, May 22, 2012

Ecosystem services and wildlife conservation

Dr. Sumanata Bagchi, NISER, Bhubaneswar; Nature Conservation Fund, Mysore, May 23, 2012

Integrating adaptive and innate immune receptor signaling in B cells

Dr. Akanksha Chaturvedi, NIH, U.S.A., May 23, 2012

Epidemiology and control of infectious diseases – Mathematical modeling, analysis and simulation

Dr. Suma Ghosh, Mathematics, Biology, University of Utah, U.S.A., May 31, 2012

Research pursuits in main group chemistry @ IITM

Prof. M. N. Sudheendra Rao, Department of Chemistry, Indian Institute of Technology Madras, June 05, 2012

Transcriptional control of axon growth in mammalian central nervous system

Dr. Narendrakumar Ramanan, Washington University, St. Louis, U.S.A., June 05, 2012

ACM rank 2 vector bundles on projective hypersurfaces and complete intersections

Dr. Jishnu Biswas, ISI Bangalore, June 09, 2012

Poly (ADP-ribosyl)ation in regulation of mammalian DNA repair

Dr. Pawan Mehrotra, University of Manchester, U.K., June 12, 2012

Solution-processed materials for next-generation electronic/optoelectronic device applications

Dr. Bhola Nath Pal, Los Alamos National Laboratory, U.S.A., June 12, 2012

Moduli of non-very stable bundles over a compact Riemann surface

Dr. Sarbeswar Pal, CMI, Chennai, June 22, 2012

Type III-L solar radio bursts and their associations with solar energetic proton events

Dr. Robert Duffin, Curtin Institute of Radio Astronomy, Australia, June 26, 2012

Wonders of space and time

Prof. Soumitra SenGupta, IACS, Kolkata, June 27, 2012

Pluripotent stem cells as a novel tool in safety pharmacology and predictive toxicology: fundamental biology and practical considerations

Dr. Rajarshi Pal, Manipal Institute of Regenerative Medicine, Bangalore, July 17, 2012

C-H activation reactions by palladium and iridium and some other organic transformations

Dr. Buddhadeb Chattopadhyay, Department of Chemistry, Michigan State University, East Lansing, U.S.A., Jul 20, 2012

Visualizing transient structures in A-site RNA of ribosome

Dr. Jeetender Chugh, University of Michigan, U.S.A., July 23, 2012

Transport through Andreev bound states in a graphene quantum dot

Dr. Siddhartha Lal, IISER, Kolkata, July 23, 2012

Cold atom interferometers and optical clocks: New quantum sensors for gravitational physics and applications in Earth laboratories and in space

Prof. Guglielmo M. Tino, Dipartimento di Fisica e Astronomia and LENS Laboratory - Universita' di Firenze Istituto Nazionale di Fisica Nucleare Firenze, Italy, July 26, 2012

Understanding cohesin functions: Does chromatin play a role?

Dr. Anil Panigrahi, University of Texas, Houston, U.S.A., July 26, 2012

New cancer immunotherapies based on synthetic carbohydrate antigens and metabolic glycoengineering of cancer cells

Prof. Zhongwu Guo, Wayne State University, U.S.A., July 27, 2012

Remodeling the larval motor system in Drosophila- implications for adult specific behavior

Dr. Joyce Fernandes, Dept. of Zoology, Miami University, Ohio, U.S.A., Aug 02, 2012

Congruences between modular forms and lower bounds on Selmer groups

Dr. Mahesh Agarwal, University of Michigan-Dearborn Mon, Aug 06, 2012

Synapsin, SAP47, Bruchpilot: Presynaptic proteins and their roles in synaptic plasticity of Drosophila

Prof. Eric Buchner, University of Wuerzburg, Germany, Aug 06, 2012

Theoretical investigation of stochasticity in molecular motion

Dr. Rajarshi Chakrabarti, Institute for Computational Physics University of Stuttgart Germany, Aug 07, 2012

Structure and transformations in DNA-functioned nanoparticles assemblies at the solid-liquid and liquid-air interfaces

Dr. Sunita Srivastava, Brookhaven National Laboratory, U.S.A., Aug 07, 2012

In search of bimetallic heterogeneous and homogeneous catalysts: From nanomaterials to molecular level

Prof. Suresh K Bhargava, RMIT University, Melbourne, Australia, Aug 08, 2012

Assembly and dynamics of bacterial cytoskeletal proteins

Ramanujam Srinivasan, Mechanobiology Institute, Singapore, Aug 08, 2012

On representations of $GL_{2n}(F)$ with a symplectic period

Dr. Arnab Mitra, TIFR Mumbai, Aug 09, 2012

Human DNA mismatch repair: The inner workings of a complex molecular machine

Dr. Ravi Iyer, Lab of Dr. Paul Modrich, Dept. of Biochemistry, Duke University, U.S.A., Aug 09, 2012

Higher Mahler measures and Lehmer's question

Dr. Kaneenika Sinha, IISER Kolkata, Aug 13, 2012

Life at high Reynolds number

Dr. Prasad Perlekar, Technische Universiteit Eindhoven, Aug 16, 2012

Growth and regeneration: Genetic studies in Drosophila

Dr. Iswar Hariharan, Professor and Division Head Division of Cell and Developmental Biology, Department of Molecular and Cell Biology, University of California, Berkeley, U.S.A., Aug 20, 2012

Rational points on Elliptic curves and congruences between Modular forms

Dr. Aribam Chandrakant Sharma, Mathematics Institute, Heidelberg University, Aug 21, 2012

Double exchange in double perovskites: novel kinetic energy driven antiferromagnetism

Dr. Prabuddha Sanyal, Center for Basic Sciences, Mumbai, Aug 22, 2012

Tuning electronic and spin states in metal-organic supramolecular surface layers

Prof. Thomas A. Jung, Department of Physics, University of Basel & Laboratory for Micro and Nanotechnology, Paul Scherrer Institute (ETH Domain), Switzerland, Aug 22, 2012

Hybrid natural products: Nature's gift and unlimited opportunities for chemists

Prof. Krishna P. Kaliappan, Department of Chemistry, IIT Bombay, Aug 23, 2012

The cerebellar 'Autopilot': Evidence from neuroanatomy and functional MRI

Dr. Narender Ramnani, Royal Holloway, University of London, U.K., Aug 23, 2012

Tune it up: Modulation of neuronal circuitry and synaptic mechanisms of plasticity

Dr. Sharba Bandyopadhyay and **Dr. Sourav Banerjee**, National Brain Research Centre (NBRC), Manesar, India, Aug 27, 2012

Jacobi Sums and MDS codes

Prof. S. Katre, Pune University, Aug 30, 2012

Prof. Robin Wallace, International Dean and Director, Institute for Energy Systems, School of Science & Engineering, University of Edinburgh, Aug 31, 2012

Teaching evolution

Dr. Karen Haydock, Homi Bhabha Centre for Science Education, Tata Institute of Fundamental Research, Mumbai Aug 31, 2012

Introduction to general relativity and black holes

Prof. Soumitra Sengupta, IACS, Kolkata, Sept 03-07, 2012

Polyglutamine amyloids: aggregation mechanism and cytotoxicity

Dr. Karunakar Kar, Department of Structural Biology, School of Medicine, University of Pittsburgh, Pittsburgh U.S.A., Sept 07, 2012

Telomere maintenance in Drosophila: role of Hrp36, a hnRNA binding protein

Prof. SC Lakhotia, DST-Ramanna Fellow & DAE-Raja Ramanna Fellow, Cytogenetics Laboratory, Department of Zoology, Banaras Hindu University, Banaras, Sept 10, 2012

The life and work of Srinivasa Ramanujan

Prof. K. Srinivasa Rao, IMSc Sept 20, 2012

Understanding relation between aberrant cell signaling and disease: experiment coupled with mathematical model

Dr. Samrat Chatterjee, International Centre of Genetic Engineering and Biotechnology (ICGEB), New Delhi, Sept 21, 2012

Multiwavelength study of TeV blazars Mrk421 and Mrk501

Amit Shukla, Indian Institute of Astrophysics, Bangalore, Sept 21, 2012

Diversity-oriented synthesis resulting in a novel lead for anti-malarial drug development

Dr. Sivaraman Dandapani, Broad Institute of MIT and Harvard, Cambridge, MA, U.S.A., Sept 21, 2012

High resolution and Doppler observations of filaments in H α

Dr. Anand D. Joshi, Udaipur Solar Observatory, Sept 25, 2012

Synthesis and reactivity of compounds with heavier group 14 elements in low oxidation states

Dr. Shabana Khan, Max-Planck-Institut für Kohlenforschung, Germany, Sept 26, 2012

Ecology, phylogenetics, and evolution within Zingiberales: From neotropics to paleotropics

Dr. Vinita Gowda, Singapore Botanical Gardens, Singapore, Oct 01, 2012

The minimal complexity of an adapting agent increases with fitness

Dr. Nikhil Joshi, Prof. Christof Koch's laboratory, Caltech, U.S.A., Oct 04, 2012

Understanding the role of eyes absent and sine oculis in fly eye development

Dr. Umesh Karandikar, Dept. Pathology and Immunology, Baylor College of Medicine, Houston, U.S.A., Oct 08, 2012

Anion hosts and their potential applications in extraction studies

Prof. Pradyut Ghosh, HOD, Department of Inorganic Chemistry, IACS, Kolkata, Oct 11, 2012

Divergent promoter architectures employed by the co-regulated budding yeast ribosomal protein genes

Dr. Bhaswar Ghosh, Ecole Polytechnique Federale de Lausanne, Switzerland, Oct 12, 2012

Modelling stochastic fluctuations in biological systems

Dr. Srabanti Chaudhury, Los Alamos National Laboratory, New Mexico, USA, Oct 15, 2012

Inorganic nanotubes and fullerene-like nanoparticles: An update

Prof. Reshef Tenne, Director of the Helen and Martin Kimmel Centre for Nanoscale Science and Drake Family Chair Professor in Nanotechnology, Weizmann Institute of Science, Israel, Oct 18, 2012

Neural stem cells: present and future in brain injury repair

Dr. Bhaskar Saha, INSERM, University of Poitiers, France, Oct 18, 2012

Are mosquitoes in disease "hot-spots" more efficient vectors? Insights on spatial variation in disease resistance and tolerance in a natural vector-parasite system

Dr. Guha Dharmarajan, National Institute of Allergy and Infectious Diseases, NIH, U.S.A. Oct 19, 2012

Free energy barriers during protein folding, unfolding and function

Dr. Santosh Kumar Jha, Institute for Quantitative Biosciences (QB3), University of California, Berkeley, U.S.A., Oct 22, 2012

Group Theory and solving the Rubik's cube

Prof. Kapil Paranjape, IISER Mohali, Oct 25, 2012

Evolution of precipitates in elastic media

Dr. Amlan Barua, IIT Chicago, Oct 26, 2012

The role of habenula in aversive learning and gain of self-confidence in aggressive behaviour

Prof. Hitoshi Okamoto, RIKEN Brain Institute, Japan, Oct 27, 2012

Protein model discrimination and structural analysis using mutational sensitivity derived from deep sequencing

Dr. Raghavan Varadarajan, Molecular Biophysics Unit, Indian Institute of Science, Bangalore, India, Oct 29, 2012

Design, evaluation and genome targeting of DNA by minor groove binding compounds

Prof. David Wilson, Georgia State University, Atlanta, GA, U.S.A., Oct 29, 2012

Genomics of control of- and by- horizontally acquired genes in bacteria

Dr. Aswin Sai Narain Seshasayee, NCBS, TIFR for Biological Sciences, Bangalore, Oct 30, 2012

Two-sided Bayesian and frequentist tolerance intervals: General asymptotic results with applications

Prof. Rahul Mukerjee, Indian Institute of Management, Calcutta, Oct 31, 2012

A metabolic approach of tackling neurodegenerative disorders

Dr. Sudarshana Purkayastha, Albert Einstein College of Medicine, USA, Nov 01, 2012

Existence and Stabilization results to a Quasilinear PDE

Dr. Kaushik Bal, NISER, Nov 02, 2012

The vector field problem

Prof. Parameswaran Sankaran, IMSc Chennai, Nov 02, 2012

Epigenetic regulation of alternative pre-mRNA splicing

Dr. Sanjeev Shukla, National Cancer Institute, U.S.A., Nov 03, 2012

Synthetic stem cell biology enabled by an integrated approach

Dr. Prasanna Kolatkar, Genome Institute of Singapore, Nov 07, 2012

Nanocanonical role of aminoacyl-tRNA synthetases in regulation of gene expression, inflammation and metabolism

Dr. Abul Arif, Asst. Prof./Project Staff, Lerner Research Institute, Cleveland Clinic, USA, Nov 07, 2012

On the fractional powers of Dehn twists

Dr. Kashyap Rajeevsarathy, IISER Bhopal, Nov 09, 2012

Giant Nanocrystal quantum dots for SSL device applications and plasmonic nanostructures for surface enhanced spectroscopies

Dr. Janardan Kundu, Los Alamos National Laboratory, Los Alamos, NM USA Nov 12, 2012

Competing synapses with two timescales: A basis for learning and forgetting

Dr. Anita Mehta, Bose Institute, Nov 15, 2012

A systems paradigm for probing control mechanisms of complex diseases and network-based integrative drug discovery

Dr. Ganesh Bagler, CSIR-Institute of Himalayan Bioresource Technology, Palampur, India, Nov 16, 2012

Preventing catastrophe from sophisticated software sabotage : an introduction to detecting security and safety vulnerabilities in embedded software

Prof. Suraj C. Kothari, Iowa State University, Nov 19, 2012

Exciting your neurons: structure, function and assembly mechanisms of glutamate

Dr. Janesh Kumar, National Institutes of Health, Bethesda, MD, U.S.A., Nov 20, 2012

Self-dual representations with vectors fixed under an Iwahori subgroup

Dr. Kumar Balasubramanian, IISER Bhopal, Nov 21, 2012

Entropy of self-gravitating systems and black hole entropy

Dr. Dawood Kothawala, IIT Madras, Nov 21, 2012

Elucidating the mechanism of plasmid DNA segregation by a bacterial actin ParM using a hybrid approach

Dr. Gayathri Pananghat, Medical Research Centre Laboratory of Molecular Biology, Cambridge, U.K., Nov 22, 2012

Tales of a local algebraist

Dr. Ananthnarayan H., IIT Mumbai, Nov 27, 2012

Correcting movement errors and learning from them using a lateralized brain

Dr. Pratik K. Mutha, University of New Mexico, U.S.A., Nov 29, 2012

Searches for new physics at atlas using leptons

Dr. Sourabh Dube, Lawrence Berkeley National Laboratory, U.S.A., Nov 29, 2012

Function of Set2-mediated H3K36 methylation in regulating histone acetylation and exchange over transcribing regions

Dr. Jerry Workman, Stowers Institute of Medical Research, U.S.A., Nov 29, 2012

Special type affine surfaces

Dr. Alok Maharana, IISER Mohali, Nov 30, 2012

Long-range interaction effects in cold atomic gases

Dr. Rajish Nath Gopinathan Rejani, University of Innsbruck, Austria, Nov 30, 2012

Local theta lifts of unitary lowest weight modules to the indefinite orthogonal groups

Prof. Hung Yean Loke, National Univ. of Singapore, Dec 07, 2012

Algebraic cycles on varieties

Prof. Jaya N. Iyer, IMSC, Dec 07, 2012

Microscopic investigations on the ferromagnetic quantum critical system $\text{YbNi}_4(\text{P}_{1-x}\text{As}_x)_2$

Dr. Rajib Sarkar, TU Dresden, Institute of Solid State Physics, Dec 10, 2012

Probing Manganese coordination in non-enzymatic sites using advanced pulsed Paramagnetic Resonance (EPR) Spectroscopy.

Dr. Ajay Sharma, Northwestern University, Evanston, U.S.A., Dec 11, 2012

An obligatory requirement of gut microbiota in controlling colon cancer progression: Role of Leukotriene B₄ receptors

Dr. Venkatakrishna Rao Jala, Assistant Professor, James Graham Brown Cancer Center, Dept. of Microbiology and Immunology, University of Louisville, Louisville, KY, U.S.A., Dec 11, 2012

The South Pole Telescope

Suman Bhattacharya, Argonne National Lab and University of Chicago, Dec 11, 2012

*FGF signaling plays a vital role for heart and muscle development during *Drosophila* embryogenesis*

Dr. Snehalata Kadam, Caltech, U.S.A., Dec 14, 2012

Magnetic flux vortices in superconductors and the vortex > explosion transition

Prof. Milind N. Kunchur, University of South Carolina, Dec 18, 2012

Cellular interfaces – Bending the rules

Dr. Ashutosh Agarwal, University of Houston, U.S.A., Dec 19, 2012

Complexity of eukaryotic genomes peaked through next-generation sequencing data

Dr. Binay Panda, Head, Genomics Applications and Informatics technology (GANIT) labs, Inst. of Bioinformatics and Applied Biotechnology (IBAB), Bangalore, Dec 20, 2012

Targeting Apolipoprotein E4 to prevent Alzheimer's disease

Dr. Kanchan Garai, Washington University School of Medicine, St. Louis, U.S.A., Dec 21, 2012

Goldman bracket and Topological rigidity

Prof. Siddhartha Gadgil, IISc, Bangalore, Dec 28, 2012

Holographic Thermal QCD

Dr. Mohammed Mia, Columbia University, Jan 01, 2013

SU(2) gauge theory on AdS_4

Prof. Dileep Jatkar, HRI, Allahabad, Jan 02, 2013

*From epithelial cell polarity to retinal degeneration – lessons from *Drosophila**

Prof. Elizabeth Knust, Max Planck Institute of Molecular Biology and Genetics, Dresden, Germany, Jan 07, 2013

Bacterial twitching motility theory + experiments

Dr. Rahul Marathe, University of Cologne, Jan 07, 2013

Investigating surfaces and interfaces at the nanoscale in soft matter and biological systems

Dr. L Kailas, Indira Gandhi Centre for Atomic Research, Kalpakkam, Jan 08, 2013

Euler class groups and Chow-Witt groups

Dr. Sarang Sane, University of Kansas, Jan 08, 2013

Elucidating microscopic origin of multiferroicity using Raman spectroscopy

Prof. Chandrabhas Narayana, JNCASR, Bangalore, Jan 08, 2013

*Novel insights into the metabolism of the unicellular cyanobacterial genus *Cyanothece* using a system biology approach*

Dr. Anindita Bandyopadhyay, Washington University, Saint Louis, U.S.A., Jan 09, 2013

On some weighted Zero-sum problems

Dr. Prabal Paul, BITS Pilani, Goa Campus, Jan 10, 2013

Brownian motion of a heated colloid

Dr. Dipanjan Chakraborty, Max Planck Institute for Intelligent Systems, Stuttgart, Germany, Jan 14, 2013

Glioblastoma initiation by reprogramming of Astrocytes

Dr. Amit Adhikari, Mouse Cancer Genetics Program, Frederick National Laboratory For Cancer Research, NCI, National Institutes of Health, U.S.A., Jan 14, 2013

Cationic amphiphiles: promising transfection vectors in anti-angiogenic cancer therapy and genetic immunization

Dr. Arabinda Chaudhuri, CSIR-IICT, Hyderabad, Jan 15, 2013

Semi-analytical models of high redshift galaxies

Dr. Saumyadip Samui, University of KwaZulu-Natal, South Africa, Jan 16, 2013

The Alexander polynomial and the genus of a knot

Prof. Stefan Friedl, University of Cologne, Jan 17, 2013

The tale of two techniques- the story of structural and dynamical studies using Solid State NMR

Prof. K.V. Ramanathan, NMR Research Centre, IISc Bangalore, Jan 18, 2013

Polymeric materials for health and environment

Prof. Mariastella Scandola, University of Bologna, Italy Jan 18, 2013

Quantum effects in energy and charge transfer in a wheel-shaped artificial photosynthetic complex

Dr. Pulak Kumar Ghosh, Wakoshi, Japan, Jan 21, 2013

Oxazolidinone-containing peptides: Conformational aspects and applications to the design of bioactive peptidomimetics and foldomers

Dr. Luca Gentilucci, Department of Chemistry, University of Bologna, Italy, Jan 24, 2013

Study of local protein synthesis in growth cones of embryonic mouse motor neurons

Dr. Reena Rathod, University of Wuerzburg, Germany, Jan 25, 2013

Telomere associated proteins in transcriptional regulation

Arkasubhra Ghosh, Chief Scientist, Gene Therapy Unit, Narayana Nethralaya, Bangalore, Jan, 28, 2013

Quantum field theory

Prof. Soumitra Sengupta, IACS, Kolkata, Jan 28 - Feb 02, 2013 (6 talks)

Making skinny skin layer: ultrafast solvent permeation through diamond-like carbon nanosheet membrane

Dr. Santanu Karan, The Imperial College of Science Technology and Medicine, South Kensington Campus, Exhibition Road, London SW72AZ, U.K., Jan 28, 2013

Re-visiting classical orbital diamagnetism: a surprise!

Prof. N. Kumar, RRI, Bangalore, Jan 30, 2013

The long of non-coding RNAs in cellular senescence

Dr. Oliver Bischof, Pasteur Institute, Paris, France, Jan 31, 2013

Magnetism and superconductivity

Dr. Vivek Anand, Iowa State University, Feb 04, 2013

Theory of ultrafast laser-induced demagnetization: What is the fundamental mechanism?

Prof. Peter M. Oppeneer, Department of Physics and Astronomy, Uppsala University, Sweden, Feb 05, 2013

Probing many body physics with cold atom quantum simulators

Dr. Kazi Rajibul Islam, Harvard University, Feb 06, 2013

Model for Indian vegetable market bargaining

Prof. K.B. Athreya, IOWA State University, Feb 06 & 08, 2013

Dynamics of fundamental flavours in holographic duals of large N gauge theories

Dr. Arnab Kundu, The University of Texas at Austin, U.S.A., Feb 07, 2013

Human eye lens proteins beta-gamma crystallins and cataract

D. Balasubramanian, Director, R&D, LV Prasad Eye Institute, Hyderabad, Feb 07, 2013

DNA replication stress: the knowns and the unknowns

Dr. Arnab Ray Chaudhuri, Institute of Molecular Cancer Research (IMRC), University of Zuerich, Switzerland, Feb 07, 2013

Luttinger-liquid physics and quantum critical points in one-dimensional magnets

Prof. Christian Rüegg, Department of Condensed Matter Physics, University of Geneva, Switzerland, Feb 07, 2013

Navigating the cellular landscape with new optical probes, imaging strategies and technical innovations

Dr. Jennifer Lippincott-Schwartz, Distinguished NIH Investigator Cell Biology and Metabolism Branch National Institutes of Health, USA, Feb 08, 2013

Switching in biological networks

Dr. Badal Joshi, University of Minnesota, Feb 08, 2013

Semiflexible polymers : Instabilities under confinement, constraint and activity

Dr. Raghunath Chelakkot, Harvard University, Feb 08, 2013

Aspects of dirac materials

Prof. Krishnendu Sengupta, IACS, Kolkata, Feb 11, 2013

From broken symmetry to topology in condensed matter physics

Prof. Nandini Trivedi, Ohio State University, Feb 11-15, 2013 (5 talks)

Novel superconductivity in non-magnetic d-band superconductors: A tale of two superconductors

Prof. S. Ramakrishnan, TIFR, Mumbai, Feb 12, 2013

Cancellation problem for affine varieties over an algebraically closed field

Prof. S. M. Bhatwadekar, Bhaskaracharya Pratishthan, Feb 12, 2013

Ruthenium catalyst promoters for industry and advanced science: catalytic alkene metathesis and C-H bond functionalisation

Prof. Pierre Dixneuf, University of Rennes, France, Feb 13, 2013

Energy conversion and storage at nanoscale in organic optoelectronic devices

Dr. Ajay. K. Pandey, The University of Queensland, Australia, Feb 13, 2013

The complex of HNN-extensions associated to the free group of rank n

Dr. Suhas Pandit, Max Planck Institut für Mathematik, Feb 14, 2013

Resonating valence-bond wavefunctions for spin liquids, and interacting dimer models

Prof. Kedar Damle, TIFR, Mumbai, Feb 14, 2013

Two-dimensional supramolecular electron spin arrays

Prof. Thomas Jung, University of Basel and Paul Scherrer Institut (PSI), Feb 14, 2013

Theoretical study of the solar magnetic cycle and its irregularities

Bidya Binay Karak, Indian Institute of Science, Bangalore, Feb 15, 2013

Algebraic versus topological entropy for surfaces over finite fields

Prof. V. Srinivas, TIFR Mumbai, Feb 15, 2013

Higgs Boson - Have we seen it?

Prof. Sunanda Banerjee, SINP, Kolkata, Feb 18, 2013

History and philosophy of science: the origins of modern biology

Stephane Schmitt, CNRS, Paris, France, Feb 18, 2013

III-V semiconductor nanostructures: Fabrications and applications

Prof. M. Henini, University of Nottingham, Feb 19, 2013

Imaging heart development and function in zebra fish

Prof. Didier Stainier, Director, Max Planck Institute for heart and lung research, Nauheim, Germany, Feb 20, 2013

Higgs physics beyond standard model in the light of LHC results

Priyotosh Bandyopadhyay, University of Helsinki, Feb 21, 2013

At the heart of fungal pathogenesis

Dr. Rajesh Patkar, Temasek Life Sciences Laboratory, NUS, Singapore, Feb 22, 2013

An analogue of Bochner's theorem for semisimple Lie groups

Dr. Sanjoy Pusti, University of Luxembourg, Feb 22, 2013

Rapid construction and high-throughput screening of novel combinatorial libraries to identify bioactive molecules

Dr. Bani Kanta Sarma, The Scripps Research Institute, Florida, Feb 26, 2013

Exact expression for a flat connection on the complement of a torus knot

Prof. V. V. Sreedhar, CMI, Chennai, Feb 26, 2013

Investigating mechanisms of blood progenitor maintenance and stress response using Drosophila

Dr. Tina Mukherjee, Department of Molecular Cell and Developmental Biology, UCLA, U.S.A., Feb 27, 2013

Structural basis for telomerase RNA recognition and RNP assembly by the holoenzyme La family protein p65.

Dr. Mahavir Singh, Department of Biochemistry, University of California, Los Angeles, CA 90095, U.S.A., Feb 27, 2013

Editorial decision making in high impact science

Dr. Pamela Feliciano, Senior Editor, Nature Genetics, Mar 01, 2013

DNA structural motifs as regulatory elements: The emerging story of DNA quadruplexes

Dr. Shantanu Chowdhury, CSIR-Institute of Genomics and Integrative Biology, Delhi, Mar 04, 2013

Magneto-structural transition in intermetallic alloys and compounds

Dr. Subham Majumdar, IACS, Kolkata, Mar 08, 2013

How the brain initiates complex learned movement sequences: lessons from a song bird

Dr. Raghav Rajan, University of California at San Francisco, U.S.A, Mar 08, 2013

Large-scale mouse genetics at the MRC: Implementation and integration with international programs

Dr. Thomas A. Weaver, Director, MRC Harwell, Mary Lyon Centre Science, Technology and Business Campus Harwell, Oxford, U.K., Mar 11, 2013

Playing with non-bonding orbital of phenalenyl: organometallic catalyst to spintronics

Dr. Swadhin K. Mandal, Department of Chemical Sciences, IISER-Kolkata, Mar 12, 2013

Inherited cardiomyopathies and cell-to-cell RNA transfer in the nervous system: Connected only by actomyosin

Dr. John Mercer, InStem, Bangalore and McLaughlin Research Institute, USA, Mar 13, 2013

Self-organisation in biological systems

Dr. Vaibhav Wasnik, Simon Fraser University Mar 14, 2013

Arithmetic jet spaces and witt vectors

Dr. Arnab Saha, ANU College, Mar 15, 2013

Additive combinatorics

Prof. Balasubramanian, IMS, Mar 15, 2013

Protein folding

Dr. Jayant Udgaonkar, National Centre for Biological Sciences, Bangalore, Mar 18, 2013

Protein thermodynamics, kinetics and folding

Dr. Jayant Udgaonkar, National Centre for Biological Sciences, Bangalore, Mar 19, 2013

Finite group actions on Kan complexes

Dr. Swagata Sarkar, Indian Statistical Institute, Kolkata, Mar 22, 2013

Molecular recognition: specific and non-specific complexes between DNA and protein

Prof. Dipankar Chatterji, IISc Bangalore, Mar 22, 2013

Drosophila models for cancer gene discovery

Prof. Stephen Cohen, FRS, IMCB, Singapore, Mar 25, 2013

Extra-ordinary transmission of light through plasmonic subwavelength apertures

Prof. Anantha Ramakrishna, IIT Kanpur, Mar 25, 2013

Making mesoderm in frogs and in human ES cells: T-box genetic regulatory networks

Prof. Jim Smith FRS, Director, NIMR, London, U.K., Mar 26, 2013

A quantum dot close to Stoner instability: the role of Berry's Phase

Dr. Arijit Saha, University of Basel, Mar 26, 2013

Smash nilpotent cycles on varieties dominated by products of curves

Dr. Ronnie Sebastian, ISI Bangalore, Mar 26, 2013

Outreach Activities

In addition to teaching activities, IISER Pune faculty members organize outreach activities in various schools and colleges to popularize science and motivate students to pursue a career in science. Dr. Arvind Natu, Dr. Sheela Donde, Dr. Sutirth Dey, Dr. Anirban Hazra were invited to various colleges to speak to students on the importance of basic sciences and career opportunities therein. Outreach activities at IISER Pune this year were coordinated by Dr. Sheela Donde.

Colloquia A total of 15 Colloquia were organized on a variety of topics including the discovery of the Higgs boson, p-adic numbers, science journalism, nanoscience, energy, environment, innovation in India, sustainable future, life and the brain, cubic equations, origins of calculus, diabetes in the Indian context, frustrated magnets, and evolution of altruism. Renowned scientists, mathematicians, industrialists and entrepreneurs from India and abroad delivered the Colloquial address.

Visits by School / College students were organized throughout the year. Students from schools and colleges from Pune and other locations such as Nasik, Allahabad, Goa and Mysore had visited IISER Pune to know about the institute and its research and teaching activities. This was also an opportunity for the students to learn about career options in science.

Science Education (Sci-Ed) Face-to-Face Workshop on Scientific Inquiry was held by Prof. Mohanan from June 25 to July 5, 2012 for science educators. This was preceded by a six weeks online interaction and followed by a six month web Workshop.

Prarambh, a social outreach arm of IISER Pune, undertook teaching basic life skills, English and Mathematics to children from Class I to Class XI. These children attend municipal schools in Pune and spend a couple of hours every Sunday at Prarambh. Faculty members and student volunteers from IISER Pune, Infosys, and L&T, contributed to teaching on every Sunday as part of this initiative. At the end of the academic year, an IISER Pune sponsored picnic was organized for these children, to Pimpri Chinchwad Science Park, on May 5, 2013.

PhD Program

During the year 2012-13, with August 2012 and January 2013 sessions put together, 67 students enrolled as PhD students. With this, the number of research students pursuing their research towards PhD degree has gone up to 221. In addition, during August 2012, the institute has admitted the second batch of post-BSc Integrated PhD students.

August 2012 Batch		
Shatarupa Ganguly	Rajkumar Misra	Anal Bhowmik
Sudipta Tung	Abhik Mallick	Rohit Kumar
Manawa Diwekar	Praveen Kumar	Amandeep
Jyoti Baranwal	Prabhakar Pawar	Soumendra Nath Panja
Manish Singh Kushwah	Sonashree	Rohit Babar
Vibha Singh	Plawan Kumar Jha	Sanku Paul
Anushree Chaphalkar	Shalini	Gunjan Verma
Souparna Chakrabarty	Sandeep Kumar Palvai	Sayan Mondal
Mahesh Kumar Chand	Shyamapada Nandi	Sudhir Pujahari
Devani Ravi	Jatin Majithia	
Tanaya Roychowdhury	Gunja Sachdeva	January - 2013 Batch
Lopa Paul	Debraj Roy	Shinde Sopan Valiba
Rameswar Bhattacharjee	Makarand Sarnobat	Sudeshna Manna
Madhuri Gade	Neha Prabhu	Srilatha Arra
Sappati Subrahmanyam	Manasi Mahapatra	Manish Chhatre
Bikash Jana	Nishtha Sachdeva	Jagadeeswararao Metikoti
Nandha Kumar	Sai Harshini Tekur	Ravikumar G.
Naganath Yadav More	Shishir Sankhyayan	R. Manikandan
Trimbak Mete	Ravi Prakash Nath Tripathi	Arya Ghate
Shahaji More	Aditya Singh Mehra	Niraja Bapat
Reman Kumar Singh	Rabindranath Bag	Arun Neru B.
Kausik Sahu	Danveer Singh	Neelesh Soni
Aparna Banerjee	Karan Kapoor	Tanushree Kundu
Pankaj	Hemant Katiyar	Kunalika Jain
Kalyanashis Jana	S. K. Rejaul	Shivik Garg
Bhagyashree Kulkarni	Kunal Kothekar	

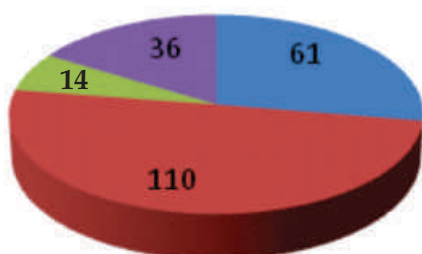
The subject-wise distribution of students is as follows:

Biology - 61

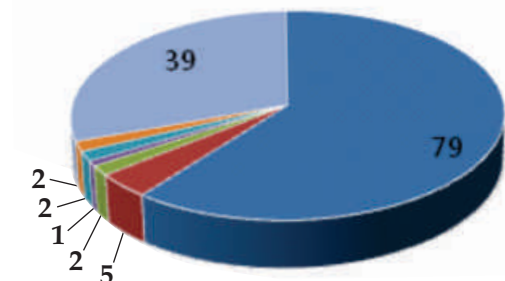
Chemistry - 110

Mathematics - 14

Physics - 36



■ Biology ■ Chemistry
■ Mathematics ■ Physics



■ CSIR ■ DBT ■ INSPIRE
■ NBHM ■ ICMR ■ PMfellowship
■ UGC

Two students from Chemistry stream, Shyamaprasad Nandi and Aparna Banerjee received the prestigious Prime Minister Fellowship for Doctoral Research launched by Govt. of India in partnership with CII to provide a boost to industry connected research in academia and to facilitate more PhDs coming out of institutions doing industrial R&D.

Post-BSc Integrated PhD

In August 2012, 24 students were admitted for Integrated PhD program—7 in Biology, 8 in Chemistry and 9 in Physics.

Shetty Ankitha Ramesh	Neha Khetan
Kamerkar Sukrut Chandrashekhar	Maduskar Aditi Ajit
Dubal Dnyanesh Subhash	Jerrin Thomas George
Mukul Rawat	Sneha Banerjee
Ashish Surana	Hridya V.M.
Rahi Masoom Reja	Sanjay A.
Nandi Aditi Chinmoy	Anjusha V.S.
Kulkarni Amogh Maheshchandra	Jijith M.
Abhishek Swarnkar	Tomin K. James
Meghna Manae A.	Dhanya S. Menon
Prachi Dhananjay Telang	Mainak Ghosh
Chetan Kumar Vishwakarma	Sreejith P.K.

Jijith M. (from 2012 batch) and Gatta Naresh, Akash Pardeshi and Sreejith (from 2011 batch) withdrew from the program.

Undergraduate Program

The responsibility of coordinating admissions to the BS MS program is rotated between the IISERs every year, and during 2012-13, IISER Pune had coordinated the admissions to all IISERs. Director, IISER Pune appointed a Joint Admission Committee (JAC) under the chairmanship of Dr. A.A. Natu. The other members were: Dr. Arnab Mukherjee, Dr. Richa Rikhy, Dr. Umakant Rapol and Dr. Soumen Maity. The functions of this committee involved (a) issue of periodic advertisements in newspapers at all India level in major national and regional newspapers; (b) arranging for setting up question papers; (iii) updating the BS MS admission website; (iv) signing MoU with software manager, KVPY and IIT-JEE; (v) allotment of seats based on counseling for IIT-JEE and KVPY candidates and candidates applying through aptitude test after passing 12th standard examination from State and Central Boards.

During the 2012 admissions, 112 students took admission in IISER Pune. One student was transferred from Mohali on humanitarian grounds. Three students withdrew from the program shortly after joining, leaving 110 students. Of these, 11 students were from IIT JEE channel, 3 from KVPY channel and the remaining are from State and Central Board channel.

List of students admitted in 2012

Suranse Vivek Premnath	Adithya E. Rajagopalan
Alla Dileep Kumar	Abhishek Anand
Dinesh Choudhary	Lipi Jain
Navathej P. Genesh	V.R. Shree Sruti
Sappa Sushma Tejasri	Saikat Bera
A.R. Anandapadmanabhan	Kunal Mozumdar
Anagha M.C.	Sahana V. Srivathsa
Sagarika Basak	Girish L.M.
Anand Kumar	Varun Srivastava
Favaz Ahammed K.	Akhil N.B.
Mayur Kumar	Joge Shubham Dhananjay
Nitesh Kumar Singh	Yaikhomba Mutum
Aswin Pradeep T.	Vishak Sagar
Neethu C.D.	Shevate Sayali Ganesh
Kumar Priyadarshi	Gajhans Kiran Dadasaheb
Abhishek Kumar	Abhijith S.A.
Nithinraj P.D.	Arava Maniteja

Rajath R. Sawant	Naik Suyash Ajay
Meena Brijesh Babulal	Irene Dutta
Pulla Rohi Sudev	Homkar Suvidyakumar Vinod
Jogdand Sukanya Vasantrao	Bhole Gaurav Vijay
Debarun Ghosh	Talele Saurabh Vikas
Nilima Walunjkar	Pande Varad Rajaram
Vished	Chris John
Pofare Ameya Chandrabhan	Papia Bera
G. Aniruddhan	Sujay B.
Darshini Ravishankar	Abhishek Kumar Soni
Akshay S.	Shrinidhi Mahishi
Shipra Kumar	Bhosale Aishwarya Dipak
Subhendu Mondal	Amitosh Gautam
Kavya S.S.	Atmasiddha Prachi Arvind
Anirban Sharma	Sereena Sunny
Patil Atharva Sunil	Nair Ajith Anilkumar
Kanishk Verma	Chaudhari Swapnil Vishwas
Rikame Ketan Bhaskar	Aditya Katti
M. Rushindra	Neena Dhiman
Kulkarni Sumeet Samir	Prashali Chauhan
Manjarekar Omkar Sanjay	Dinesh Kumar Bulani
Fulkar Abhijit Gajanan	Mokashe Subhadra Satish
Sidharth S.	Bhagat Karishma Rajesh
Bagde Saket Rahul	Sawant Abhilash Arun
Mohammed Fawaz P.A.	P.M. Shreenidhi
Lavanya Lokhande	Jog Harshvardhan Prasad
Nibrasul Haque K.M.	Gyana Gourab Mishra
Divya Gadkari	Mohammed Aamir Sadiq
Kavya Mohan N.	Ashutosh Acharya
Visakh Narayanan	N. Anand
Prasanth P.	Kshirsagar Aseem Rajan
Harjot Kumar	Anita Justin
Thasneem A.	Bodas Arushi Ravindra
Tarmale Kaustubh Bhagwan	Jugal Talukdar
Waghmare Amit Giridhar	S. Harini
Khairnar Gaurav Ramesh	Patil Vaishnavi Prabhakar
Deeksha Adil	Jitender Kumar
Lagad Sonal Gulab	Vaibhav Navnath Thakur
Anjana Raj R.	Unkule Mithila Atul
Surya R.	

The net student strength of UG program during 2012-13 is 426.

The distribution of students enrolled in 2012 and overall distribution are given below:

2012 batch

	GE	OBC	SC	ST	PD	Total
Male	37	24	11	3	1	74
Female	22	9	5	0	0	36
Total	59	33	16	3	1	110

Total student strength during 2012-13

Batch	Male	Female	Total
2007	6	0	6
2008	32	14	46
2009	77	22	99
2010	53	36	89
2011	50	26	76
2012	74	36	110
Total	292	134	426

Overall distribution of existing students (2008-2012)

Category	Male	Female	Total	%
GE	152	74	226	52.7
SC	37	19	56	13.3
ST	16	3	19	4.5
OBC	79	38	117	27.9
PD	2	0	2	0.5
Total	286	134	420	

Details of the 5th year projects done by the outgoing students during 2012-13

S. No.	Student	Supervisor	Local coordinator	Discipline	Place of Project Work	Project Title
1	Siddharth Bharath Iyengar 20081001	Mahesh Sankaran	Deepak Barua	Biology	NCBS, Bangalore	Facilitative Effects of a Dwarf Shrub in an Alpine Rangeland
2	Apurv Kulkarni 20081010	Girish Ratnaparkhi		Biology	IISER Pune	Role of MADF-BESS Domain Protein Family in Gene Regulation and Wing Development in <i>Drosophila melanogaster</i>
3	Ritesh Raghavan 20081016	Anita Damodaran	Milind Watve	Biology	Hindustan Unilever, R&D Bangalore	<i>In Vitro</i> Studies On Lipid Metabolism in Keratinocytes of Different Racial Origin
4	Ankita Jha 20081024	Gautam Banerjee	Girish Ratnaparkhi	Biology	Hindustan Unilever R & D, Bangalore	The Role of Inflammation in Type -2 Diabetes Mellitus and Its Correlation with Endothelial dysfunction

S. No.	Student	Supervisor	Local coordinator	Discipline	Place of Project Work	Project Title
5	Amita G Ghadge 20081029	Anjan Banerjee		Biology	IISER Pune	Characterization of <i>Coccinia grandis</i> as a Model System to Study Sex Determination in Plants
6	Jagruiti Jagadish Pattadkal 20081034	Aurnab Ghose		Biology	IISER Pune	A study of Neuronal Response to Mechanical Tension
7	Pooja Naik 20081036	Richa Rikhy		Biology	IISER Pune	Analysis of mitochondrial metabolism control on organism development
8	Roshni Bano 20081042	Thomas Pucadyil		Biology	IISER Pune	Mechanical Responses of Membranes probed with Force Spectroscopy
9	Krithika Mohan 20081048	SP Arun	Aurnab Ghose	Biology	Centre for Neuro-science, IISc, Bangalore	Visual Categorization: The Nature of Category Templates
10	Ramya Balaji 20081049	Richa Rikhy		Biology	IISER Pune	Molecular Characterization of Inception of Polarity in the plasma membrane During early <i>Drosophila</i> Embryogenesis
11	Soumitra Athavale 20081053	Sanjeev Galande		Biology	IISER Pune	Protein Engineering with Zinc Fingers and TALs
12	Mihir Sadanand Umarani 20081056	Deepak Barua		Biology	IISER Pune	Study of effects of ecological determinants on morphological variations of <i>impatiens species</i> in North Western Ghats
13	Piyush Agarwal 20071057	Leeor Kronik, Israel	Arnab Mukherjee, IISER-Pune	Chemistry	Wiezmann Institute, Israel	Pair-wise dispersive corrections of an optimally-tuned range-separated hybrid functional

S. No.	Student	Supervisor	Local coordinator	Discipline	Place of Project Work	Project Title
14	Sumeet Kumar Singh 20081005	H. N. Gopi		Chemistry	IISER Pune	Probing the Stability of Designed coiled-coil motifs using small synthetic fluorescent amino acids
15	Nishant Singh 20081007	Vijay Gadgil	Pinaki Talukdar, IISER Pune	Chemistry	Hindustan Unilever, Bangalore	Design and Synthesis of J and H Aggregates of Glycyrrhetic Acid esters as low molecular Weight organogelators
16	Shreyas Supekar 20081013	Arnab Mukherjee		Chemistry	IISER Pune	Sequence Dependent Localized Distribution of Various Water Dynamics in the Grooves of DNA
17	Anup Ingole 20081023	Partha Hazra		Chemistry	IISER Pune	Study of Interaction between Fluorescent dyes and Cucurbituril host in aqueous solution
18	Amit Kumar 20081043	Ashish Vaidya	M. Jayakannan, IISER Pune	Chemistry	Hindustan Unilever, Bangalore	Synthesis, Properties and Photochemistry of Organomodified Polymers
19	Iti Kapoor 20081044	Srinivas Hotha		Chemistry	IISER Pune	A Diversity Oriented Synthesis Pathway for leodoglucomide Analogues
20	Rohan Kumbhare 20081050	Harinath Chakrapani		Chemistry	IISER Pune	Design, Synthesis and Evaluation of Scaffolds for Thiol-mediated Tunable Drug Release
21	Uma Sridhar 20081051	M. Jayakannan		Chemistry	IISER Pune	Dextrin Vesicles and their Encapsulation Capabilities for Drug Delivery
22	Suhas Shahaji Gawali 20081052	Sudipta Basu		Chemistry	IISER Pune	Synthesis and Characterization of inhibitor loaded nanoparticles for Temporal Targeting of PI3K signalling

S. No.	Student	Supervisor	Local coordinator	Discipline	Place of Project Work	Project Title
23	Hardik Gajera 20081011	Ayan Mahalanobis		Mathe- matics	IISER Pune	On Improvements of r-Adding Walks to Solve The Discrete Logarithm Problem
24	Vivek Pradhan 20071027	Saket Saurabh	Ayan Mahalanobis	Mathe- matics	IMSc	Graph Algorithms using Rank and Determinant
25	Jeeten Patel 20081032	Dr. Anindya Goswami	Arindya Goswami	Mathe- matics	M/s Ventura Securities Ltd	Pricing and Hedging in a GBM market with Markov Switching: A Survey
26	Gaurav Prabhakar Sawant 20081033	K. T. Joseph	Anisa M H C	Mathe- matics	TIFR-CAM, Bengaluru	On Solutions of Nonlinear First-Order PDEs
27	Ankur Paliwal 20081039	Soumen Maity		Mathe- matics	IISER Pune	Transversal Hypergraphs
28	Kumar Vasumitra Singh 20081041	Soumen Maity		Mathe- matics	IISER Pune	Erdos-Ko-Rado Theorem and Kruskal-Katona Theorem
29	Behloul Sabir 20071004	M. S. Santhanam		Physics	IISER Pune	Record Statistics and Random Walks in Financial Time Series
30	Ankur Sharma 20071042	Ashish Arora	M. S. Santhanam	Physics	Escorts ltd, Faridabad	Noise attenuation techniques for gas exhaust from heat engines
31	Md. Noaman 20081002	Umakant Rapol		Physics	IISER Pune	Atoms in Optical Potentials: The Levy-Kicked Rotor
32	Anees Ahmed 20081006	Arijit Bhattacharyay		Physics	IISER Pune	Dynamical Mean Field Approach To Phase Transitions in Falicov-Kimball Model
33	Harshavardhan Ashok Gaonkar 20081021	Dr. Ram Rajgopal	Shouvik Datta	Physics	Hindustan Uniliver Ltd. Bangalore	Study Of Light Transport in Diffuse Media
34	Swetha Bhagwat 20081022	Dr. Sanjit Mitra	Ramana Athreya	Physics	IUCAA Pune	Data Analysis Techniques In Gravitational Wave Astronomy

S. No.	Student	Supervisor	Local coordinator	Discipline	Place of Project Work	Project Title
35	Paritosh Kumar 20081025	Harsh Chaturvedi		Physics	IISER Pune	Kinetic and Photon Induced Effects In Single Walled Carbon Nanotube Solutions
36	P. Sruthi 20081027	G. V. Pavan Kumar		Physics	IISER Pune	Plasmonic and Organic Nanostructures in Evanescent Optical Field
37	Sindhu Jammi 20081028	Umakant Rapol		Physics	IISER Pune	Design of Zeeman Slower for Strontium Atoms
38	Kaustubh Sudhir Deshpande 20081030	Prof. J. V. Narlikar	Prasad Subramanian	Physics	IUCAA Pune	Action-At-A-Distance and Cosmology
39	Madhusudan Raghunathan 20081035	Dr. Rajaraman Ganesh	Prasad Subramanian	Physics	IPR Gandhinagar	Study of Nonlinear Landau Damping and Formation of Bernstein-Greene-Kruskal Structures for Collisionless, 1D Plasmas
40	Bhargava T. 20081037	T. S. Mahesh		Physics	IISER Pune	Dynamical Decoupling On Multi-Qubit Systems
41	Anirban Chakraborty 20081038	Prof. Prasanta K. Panigrahi	T. S. Mahesh	Physics	IISER Kolkata	Quantum Measurements with Post-Selection
42	Ravi Shankar 20081046	T. S. Mahesh		Physics	IISER Pune	Simulation of a Quantum Particle Using NMR
43	Tushar Sanjay Shrotriya 20081057	Prof. Jayaram N. Chengalur	Ramana Athreya	Physics	NCRA Pune	Physical models for the 21cm Emission and Absorption spectra from the Galactic Interstellar Medium
44	Amartya Singh 20081058	Dr. Christian Hess	Dr. Surjeet Singh	Physics	IFW Dresden	Investigation of Physical Properties of a Quasi-1D Quantum Magnet

List of courses

Fall 2012

Semester I			
Code	Course	Coordinator / Instructor	Credits
BIO 101	Introductory Biology I	Kundan Sengupta	03
CHM 101	General Chemistry	R. Vaidhyanathan	03
MTH 101	Single Variable Calculus	Rama Mishra	03
PHY 101	World of Physics I - Mechanics	Sudarshan Ananth	03
MTH 103	Introduction to Computing	Sreekar Sastry	03
BIO 121	Practical: Basic Biology	Neelesh Dahanukar	02
PHY 121	Physics Lab I	Ramana Athreya	02
HSS 103	Communication, Creative & Technical Writing	Sheela Donde	02

Semester III			
BIO 201	Introductory Biology III: Evo & Eco	Sutirth Dey	03
CHM 201	Introductory Organic Chemistry	H.N. Gopi	03
MTH 205	Introductory Mathematics III: Multi-variable Calculus	Chandrasheel Bhagwat	03
PHY 201	Classical Physics	Shouvik Datta	03
BIO 221	Practical: Ecology and Evolution	Neelesh Dahanukar	02
CHM 221	Chemistry Lab III	S.G. Srivatsan	02
PHY 221	Physics lab II	Sunil Nair	02
IDC 206	Mathematical Methods	Apratim Chatterji	02
TDC 201	Rational Enquiry II	K.P. Mohanan	02

Semester V & VII				
Code	Course	Coordinator	Credits	Open in sems
BIO 310	Biostatistics	Milind Watwe	4	V&VII
BIO 311	Advanced Cell Biology	Nagaraj B.	4	V&VII
BIO 312	Animal Physiology I	Nishikant Subhedar	4	V&VII
BIO 322	Biophysics	Chaitanya Athale	4	V&VII
BIO 421	Bioinformatics & Comp Biology	Farhat Habib	4	V&VII
BIO 313	Advanced Molecular Biology	Mayurika Lahiri	4	V
BIO 301	Lab Training/Theory Project	Nagaraj B.	3	V
BIO 334	Neurobiology I	Aurnab Ghose	3	V&VII
BIO 410	Advanced Biochemistry I	Sudha Rajamani	4	V&VII
BIO 420	Developmental Biology	Girish Ratnaparkhi	4	V&VII
BIO 401	Lab Training/Theory Project	Nagaraj B	3	VII

Code	Course	Coordinator	Credits	Open in sems
BIO 431	Epigenetics	Sanjeev Galande	3	V&VII
BIO 454	Structural Biology	Saikrishnan	3	V&VII
CHM 320	Symmetry and Group theory	Anirban Hazra	4	V&VII
CHM 311	Physical Organic Chemistry	Pinaki Talukdar	4	V&VII
CHM 312	Main Group Chemistry	R. Boomi Shankar	4	V&VII
CHM 301	Lab Training/Theory Project	Sudipta Basu	3	V
CHM 331	Self assembly in Chemistry	M. Jayakannan	3	V&VII
CHM 332	Separation principles and Techniques	M. Jeganmohan	3	V&VII
CHM 340	Advanced Organic Chemistry Lab	H.N. Gopi	3	V
CHM 410	Advanced Molecular Spectroscopy	Aloke Das	4	VII
CHM 411	Organic Synthesis II	Srinivas Hotha	4	VII
CHM 413	Bioinorganic Chemistry	V.G. Anand	4	VII
CHM 401	Lab Training/Theory Project	Sudipta Basu	3	VII
CHM 431	Chemical Biology	S.G. Srivatsan	3	VII
CHM 432	Solid State Chemistry	Seema Verma	3	VII
CHM 430	Advanced Physical Chemistry Lab	G.V. Pavan Kumar	3	VII
CHM 436	Molecular modeling and Simulation	Arun Venkatnathan	3	VII
MTH 310	Group Theory	R. Parthasarathi	4	V
MTH 311	Analysis	Baskar Balasubramanyam	4	V
MTH 312 / MTH 415	Elementary Geometry	Anupam Kumar Singh	4	V&VII
MTH 313	Combinatorics and Number Theory	Ayan Mahalanobis	4	V
MTH 314/ MTH 416	Statistics	Jayant Deshpande	4	V&VII
MTH 301	Lab Training/Theory Project	R. Parthasarathi	3	V
MTH 410	Measure Theory and Integration	Anindya Goswami	4	VII
MTH 413	Differential Topology	Vivek Mallick	4	VII
MTH 414	Field Extensions and Galois Theory	Rabeya Basu	4	VII
MTH 401	Lab Training/Theory Project	R Parthasarathi	3	VII
MTH 434	Advanced Topics in Differential Equations	Anisa Chorwadwala	3	VII
PHY 310	Mathematical Methods	Suneeta Vardarajan	4	V&VII
PHY 311	Classical Mechanics	G. Ambika	4	V&VII
PHY 312	Classical Electrodynamics	Surjeet Singh	4	V&VII
PHY 301	Lab training/Theory project	Aparna Deshpande	3	V
PHY 330	Advanced Physics Lab I	Sunil Nair	3	V
PHY 335	Electronics	T S Mahesh	3	V&VII

Code	Course	Coordinator	Credits	Open in sems
PHY 410	Condensed Matter Physics I	Arijit Bhattacharyay	4	VII
PHY 411	Quantum Mechanics II	Avinash Khare	4	VII
PHY 415	Advanced Physics Lab III	Sunil Nair	4	VII
PHY 401	Lab training/Theory project	Aparna Deshpande	3	VII
PHY 443	Physics at Nanoscale	Sulabha Kulkarni	3	V&VII
PHY 433	Statistical Mechanics II	Anil Gangal	3	VII

Spring 2013

Semester II			
Code	Course	Coordinator* and Participating Faculty	Credits
BIO102	Introductory Biology II- Cell Biology	Nagaraj B.* & Sudha Rajamani	3
CHM102	Physical Chemistry	Pankaj Mandal *, Partha Hazra	3
MTH102	Multi Variable Calculus	Anindya Goswami	3
PHY102	World of Physics II- Waves and Matter	Harsh Chaturvedi	3
CHM121	Chemistry Lab I	Seema Verma* & Nirmalay Ballav	2
BIO122	Biology Lab II	Neelesh Dahanukar*, Anjan Banerjee, Sanjeev Galande	2
TDC102	Rational Inquiry I- Scientific Inquiry	K P Mohanan	2
IDC 104	Mathematical methods	Ramana Athreya* & Prasenjit Ghosh	2
Total			20

Semester IV			
Code	Course	Coordinator/ Instructor	Credits
BIO202	Introductory Biology IV-Biology of Systems	Aurnab Ghose* & Chaitanya Athale	3
CHM202	Introductory Chemistry IV- Fundamentals of Spectroscopy	Aloke Das *and Mrinalini Puranik	3
MTH204	Introductory Mathematics IV- Probability and Statistics	Jayant Deshpande	3
PHY204	Quantum Physics	Shouvik Datta	3
PHY222	Physics Lab III	Surjeet Singh	2
IDC 204	Earth Science	Prasad Subramanian (Local coordinator)	2
MTH 100	Introduction to Proofs	Steven Spallone	2
IDC 208	Thermodynamics	Arvind Kumar (HBCSE) Apratim Chatterji (Local Coordinator)	2
Total			20

Semesters VI and VIII

Course Code	Course	Credits	Coordinator* & Participating Faculty	Open in Sems
BIO 320	Genetics	4	Richa Rikhy* and Girish Ratnaparkhi	VI & VIII
BIO 321	Plant Biology I	4	Anjan Banerjee	VI & VIII
BIO 323	Immunology I	4	Sanjeev Galande* and Akanksha Chaturvedi	VI & VIII
BIO 302	Lab Training/Theory Project	3	Farhat Habib	VI
BIO 352	Animal Physiology II	3	N. Subhedar	VI & VIII Pre-requisite: BIO312
BIO 354	Neurobiology II	3	Suhita Nadkarni* & N. Subhedar	VI & VIII Pre-requisite: BIO334
BIO 417	Advanced Biochemistry II	4	Thomas Pucadyil* & Saikrishnan Kayarat	VI & VIII Pre-requisite: BIO410
BIO 413/ MTH 424	Mathematical Biology	4	Pranay Goel	VI & VIII
BIO 422	Evolution	4	Sutirth Dey* & Milind Watve	VI & VIII
BIO 402	Lab Training/Theory Project	3	Krishanpal Karmodiya	VIII
BIO 435	Biophysics II	3	Chaitanya Athale	VI & VIII Pre-requisite: BIO322
BIO 441	Genome Biology	3	Kundan Sengupta	VI & VIII
BIO 491	Literature Review	3	Deepak Barua	VI & VIII
CHM 310	Quantum Chemistry	4	Anirban Hazra* & Sourav Pal	VI & VIII
CHM 321	Organic Synthesis-I	4	R.G. Bhat* & H. N. Gopi	VI & VIII
CHM 322	Transition metal Chemistry	4	S.K. Ghosh* & N. Ballav	VI & VIII
CHM 302	Lab Training/Theory Project	3	Pinaki Talukdar*	VI
CHM 334	Physical Chemistry of Solution	3	Seema Verma* & Madhav Rao	VI & VIII
CHM 351	Bioorganic Chemistry	3	Sudipta Basu* & K. N. Ganesh	VI & VIII
CHM 360	Advanced Inorganic Chemistry Lab	3	Angshuman Nag* & S. K. Ghosh, R. Vaidhyanathan	VI
CHM 420	Structural Methods and Analysis	4	Pinaki Talukdar* & S. G. Srivatasan, Deepti Gholap	VIII
CHM 421	Polymer Chemistry	4	M. Jayakannan*	VIII
CHM 422	Statistical Thermodynamics	4	Arnab Mukherjee*	VIII
CHM 423	Medicinal Chemistry	4	Harinath Chakrapani* & Srinivas Hotha	VIII
CHM 402	Lab Training/Theory Project	3	Pinaki Talukdar*	VIII

Course Code	Course	Credits	Coordinator* & Participating Faculty	Open in Sems
CHM 433	Photochemistry	3	Partha Hazra* & R. G. Bhat	VIII
CHM441/ PHY 444	Advanced Materials Science	3	R. Vaidhyanathan* & S. Kulkarni	VIII
CHM 442	Organometallic Chemistry	3	Jeganmohan*	VIII
MTH 320/ MTH 326	Vector Spaces, Rings and Modules	4	Rabeya Basu	VI
MTH 321	Complex Analysis	4	Diganta Borah	VI
MTH 322	Point Set Topology	4	Rama Mishra	VI
MTH 323	Graph Theory	4	Sreekar Shastry	VI
MTH 324/ MTH 425	Ordinary Differential Equations	4	C. Bhagwat	VI & VIII
MTH 302	Lab Training/Theory Project	3	Rabeya Basu	VI
MTH 402	Lab Training/Theory Project	3	Rabeya Basu	VIII
MTH 420	Functional Analysis	4	Anisa Chorwadwala	VIII
MTH 421	Number Theory	4	B. Balasubramanyam	VIII
MTH 422	Applicable Mathematics- Cryptography	4	Ayan Mahalanobis	VIII
MTH 423	Algebraic Topology	4	R. Parthasarathi	VIII
MTH 424/ BIO 413	Mathematical Biology	4	Pranay Goel	VI & VIII
PHY320	Physics Lab V	4	Shivprasad Patil* C Dharmadhikari	VI
PHY 321	Quantum Mechanics I	4	M.S. Santhanam	VI & VIII
PHY 322	Statistical Mechanics I	4	A D Gangal	VI & VIII
PHY 350	Electronics II	3	Umakant Rapol	VI & VIII
PHY 352	Fluid dynamics	3	Prasad Subramanian	VI & VIII
PHY 356/ 390	Group theory in Physics	3	Sudarshan Ananth	VI & VIII
PHY 302	Lab training/Theory Project	3	Aparna Deshpande	VI
PHY 422	Nuclear and Particle Physics	4	Sunil Mukhi	VIII
PHY 425	Atomic and Molecular Physics	4	G.V. Pavan Kumar	VIII
PHY 424	Classical and Quantum Optics	4	Rajaram Nityananda Pavan Kumar (Local coordinator)	VIII
PHY 434	Advanced Physics Lab IV	3	Sunil Nair*, Aparna Deshpande	VIII
PHY 441	Physics of Information & Quantum Computation	3	T.S. Mahesh	VIII
PHY 444/ CHM 441	Advanced Material Science	3	R. Vaidhyanathan* & S. Kulkarni	VIII
PHY 454	Condensed Matter Physics II	3	Mukul Kabir	VIII
PHY 455	Gravitation& Cosmology	3	Suneeta Vardarajan	VI & VIII
PHY 402	Lab training/Theory Project	3	Aparna Deshpande	VIII

Academic Achievements of Students

- Tanmay Patankar, Shruti Paranjpe and Varun Prasad attended the Asian Science Camp at Jerusalem, Israel from 25-30 August 2012.
- Tanmay Patankar bagged the first prize in the Madhava Mathematics Competition 2012. The following have got 'cheer': K Arun Kumar, Akshay Khadse, Varun Srivastava and Debarun Ghosh
- CNR Education Foundation prizes for 2012 were awarded to Varun Prasad for Spring 2012 and Aditya Rajgopalan for Fall 2012.
- Prizes for Academic Excellence were awarded to the following students of BS MS program.

Spring 2012

Semester 4	Lokhande Sagar Fakirchand
Semester 6	Apte Amey Anant Shada Arun Dixith Reddy
Semester 8	Nishant Singh Pattadkal Jagruti Jagadish Roshni Bano Iti Kapoor

Fall 2012

Semester 3	Santpur Sai Neha
Semester 5	Shiva Chidambaram P.
Semester 7	Rohit Chikkaraddy Shikari Sravani

International Visits and Summer Projects

- 13 students were selected for summer internship under the DAAD-WISE program. The details are given below.

Details of the Projects of DAAD WISE Scholars 2012 of IISER Pune

Student	Mentor in Germany	University in Germany	Project Title
Suraj Chawla	Prof. Manuel Drees	Rheinische Friedrich Wilhelms Universität Bonn	Particle Physics Aspects of Cosmological Inflation.
Akash Guru	Dr. Robert Kittel	University of Würzburg	Molecular mechanisms of neurotransmitter release at active zones of <i>Drosophila melanogaster</i>
Kaustubh Deshpande	Dr. Claus Lammerzähl	ZARM, University of Bremen	Analytic Integration of the Jacobi equation in Schwarzschild spacetimes
Sruthi Polali	Prof. Dr. Cornelia Denz	Department of Non-Linear Photonics, University of Muenster	Nanostructures in Optical Manipulation and Microfluidics
Aashay Patil	Prof. Luca Amendola	University of Heidelberg	Study of Dark Energy Models using Einstein's General Relativity

Student	Mentor in Germany	University in Germany	Project Title
Tushar Shrotriya	Dr. Robert Izzard	Argelander Institute for Astronomy, Bonn (affiliated to Uni-Bonn)	Type I-b Supernovae from Massive Binary Stars
Bhaves Khamesra	Prof. Jutta Kunz	Carl von Ossietzky University of Oldenburg	Charged balanced black rings
Anurag Agrawal	Prof. Dr. Ulf Diederichsen	University of Goettingen	"inclusion of β -peptides to lipid bimembrane
Amey Apte	Dr. Karsten Horn	Fritz Haber Institut von Max Planck Gessellschaft, Berlin.	Structural studies of graphene on Pd(111) using scanning tunnelling microscopy
Avani Govardhan	Prof. Bernd Bruegmann	Friedrich Schiller University Jena	symplectic integration post-newtonian equations of motion.
Vikas Negi	Prof. Buchner, Dr. Kataev	IFW Dresden	Studying the experimental technique of high frequency ESR spectroscopy and applying it to probe the structure of novel compounds.
Ramya Balaji	Prof. Andreas Wodarz	University of Goettingen	Understanding functions of epithelial cell polarity proteins
Soumitra Athavale	Prof Dr. Ulf Diederichsen	University of Goettingen	Synthesis of Spin labels

Mr. Rohit Chikaraddy did summer internship at the Notre Dame Radiation Laboratory to work on the state-of-art UV induced Resonance Raman Spectroscopy, in May-June 2012.

As a part of IISER Pune-Ohio State University, Columbus, USA student exchange program, three students from OSU, viz. Erica Toivonen, Ronald Siebanaler and Michael Dworkin visited IISER Pune, while two students from IISER Pune - Tirthashree Das and Beeraka Sai Prasant Kumar did internship at OSU.

A total of 42 students of the 2007 batch completed their degree requirements in May 2012. The Board of Governors, on the recommendation of the Senate, declared these students as having completed the BS MS program. A total of 91 students from the 2006 and 2007 batches were awarded BS MS dual degrees during the Convocation held on August 4, 2012. The following students passed with distinction: More Sushant Nivasrao; Sisir C. Anand; C. B. Ajit; Lakshmi Priya M. E.; Madhuresh Sumit; Bedartha Goswami; Surojit Sural; Shadab Alam; Vatwan; Akshaa Bharat; Neha Agrawal; Joshi Darshan Gajanan; Sarthak Parikh; Apeksha Tare; Mohammed Zuhair M.M.; Swati Venkat; and Abhinaw Kumar. The Institute Gold Medals for best academic performance were awarded to Ajit Balram, Surojit Sural and Mohammed Zuhair.



Ajit Balram



Surojit Sural



M.M. Zuhair

Equipment

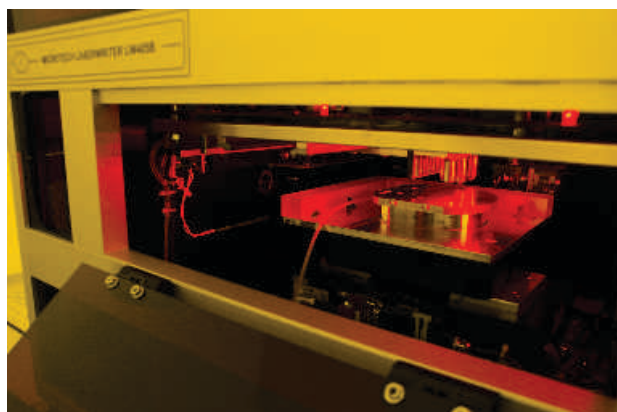
(above ₹ 25 lakhs) purchased during 2012-13

Amount in lakh

S.No:	Description	Order Placed on	Rupees
1	Advanced Spectral Confocal Laser Scanning Microscope	Carl Zeiss Microscopy Gmbh, Germany	171.50
2	X ray Diffractometer	Rigaku Corporation, Japan	27.24
3	Magnetic Properties Measurement System	Quantum Design, USA	310.65
4	Ultra High Vacuum Low Temperature Scanning Tunneling Microscope	Omicron Nano Technology Gmbh, Deutschland	298.64
5	Thermogravimetric analyser with DSC	Netzsch Geratebau GmbH, Germany	29.53
6	Physical Adsorption Analyzer	Micrometrics Instrumnt Corporation, USA	47.97
7	X-ray setup	Phywe Systeme GmbH, Germany	27.97
8	Liquid Scintillation counter/ Luminometer	Perkin Elmer, Singapore	46.82
9	Scanning Electron Microscope	Carl Zeiss NTS Ltd, UK	68.00
10	Automated Protein Purification System	GE Healthcare Biosciences Ltd, Hongkong	36.95
11	Head & Controller for AFM	JPK Instruments AG, Germany	64.40



Nanolitre Liquid Handling Instrument



Laser Writer Maskless-Photolithography



TCSPC & Fluorescence Upconversion Spectrometer



Raman Spectrometer



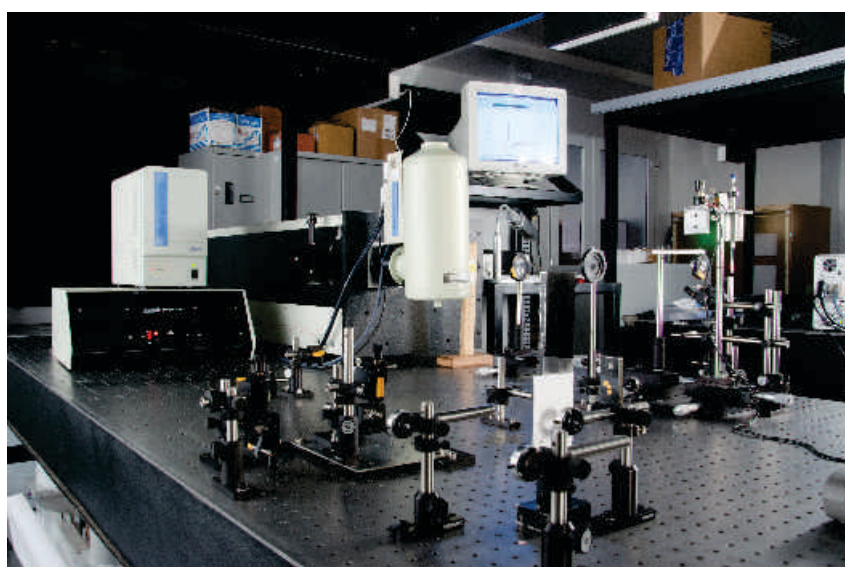
Single Crystal XRD



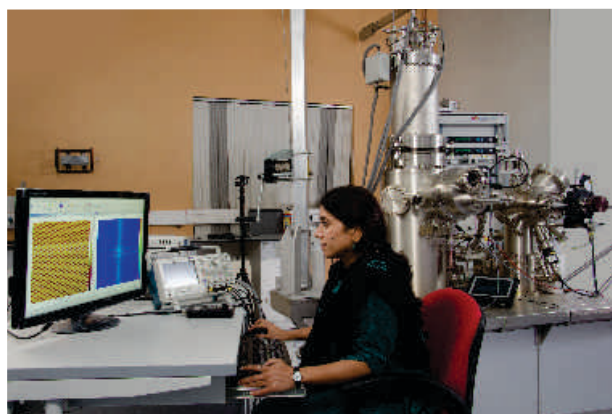
Confocal Microscope with Multiphoton



Scanning Electron Microscope



Biophotonics Lab



Low temperature UHV Scanning tunneling Microscope



Table top Atomic force Microscope & Scanning tunneling Microscope

Personnel

Faculty

Director & Professor

K.N. Ganesh

Professors

L.S. Shashidhara

Milind Watwe

Sanjeev Galande

A. Raghuram

Sunil Mukhi

G. Ambika

Associate Professors

Rama Mishra

Ramana Athreya

M. Jayakannan

Suneeta Vardarajan

Srinivas Hotha

Mrinalini Puranik

Prasad Subramanian

M.S. Santhanam

Steven Spallone

Soumen Maity

R.G. Bhat

V.G. Anand

H.N. Gopi

Aloke Das

M.S. Madhusudhan

Sudarshan Ananth

Assistant Professors

T.S. Mahesh

Sutirth Dey

Aurnab Ghose

Mayurika Lahiri

Shivprasad Patil

Partha Hazra

Girish Ratnaparkhi

Arijit Bhattacharyay

Shouvik Datta

Anjan Banerjee

Anupam Kumar Singh

Arun Venkatnathan

Deepak Barua

S.G. Srivatsan

Apratim Chatterji

Pranay Goel

Ayan Mahalanobis

Sujit Kumar Ghosh

Pinaki Talukdar

Harinath Chakrapani

Chaitanya Athale

Umakant Rapol

Arnab Mukherjee

Surjeet Singh

Saikrishnan Kayarat

R. Parthasarathi

Richa Rikhy

Kundan Sengupta

Rabeya Basu
 Baskar Balasubramanyam
 Pankaj Mandal
 Nagaraj Balasubramanian
 Prasenjit Ghosh
 Thomas Pucadyil
 Jeganmohan Masilamani
 Raghavendra Kikkeri
 Boomishankar Ramamoorthy
 Nirmalya Ballav
 Sunil Nair
 Anirban Hazra
 Aparna Deshpande
 Anindya Goswami
 Ramanathan Vaidyanathan
 Sudha Rajamani
 Collins Assisi
 Vivek Mohan Mallick
 Mohammad Mukul Kabir
 Kaneenika Sinha
 Akanksha Chaturvedi
 Anisa Chorwadwala
 Shabana Khan
 Jeetender Chugh

Assistant Professor (on contract)

Sreekar Shastry

Visiting Faculty

A.A. Natu
 Nishikant Subhedar
 V.S. Rao
 B.S.M. Rao
 Anil Gangal
 Avinash Khare, DAE Raja Ramanna
 Fellow
 C.V. Dharmadhikari
 K.P. Mohanan

Jayant Deshpande
 Rajaram Nityananda

IISER Fellows

Seema Verma
 Priya Iyer
 Neelesh Dahanukar (up to 15-10-12)
 Diganta Borah
 Deepti Gholap
 Harsh Chaturvedi (Ramanujan Fellow, DST)
 G.V. Pavan Kumar (Ramanujan Fellow,
 DST)
 Angshuman Nag (Ramanujan Fellow, DST)
 Ashna Bajpai (Ramanujan Fellow, DST)
 Sudipta Basu (Ramalingaswamy Fellow,
 DBT)
 Neelesh Dahanukar (INSPIRE Faculty-
 from 16-10-12)
 Chandrasheel Bhagwat (INSPIRE Faculty)
 Ashwin Kelkar WT-DBT Early career
 Fellowship (from 1-5-2012)
 Suhita Nadkarni, WT-DBT Intermediate
 Fellowship (from 2-8-2012)
 K.P. Madhu, Incharge, Media Centre (from
 21-6-2012)

Post-doctoral Fellows

Vijay Kumar Muley
 Vimal Kishore
 Milan Kumar
 Saikat Chattopadhyay

Non-teaching Staff

V.S. Rao, Registrar (Officiating)
 Mariamma John (Dy. Registrar- Finance
 and Accounts)
 Santosh Nevse, Assistant Registrar
 (Admin)

Salim Shaikh, Assistant Registrar (Store & Purchase)
 Deepali Dalvi, Assistant Registrar (Acad)
 Umeshreddy Kacherki, Deputy Librarian
 Neeta Deo, System Administrator
 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
 Anuradha Shedbalkar, Library and Information Assistant
 Namrata Shinde, Library and Information Assistant
 Snehal Gaikwad, Accountant
 Prabhas Patankar, Accountant
 Nayana Shirole, Office Assistant
 Shraddha Visal, Office Assistant
 Mayuresh Kulkarni, Office Assistant
 Vrushali Harchekar, Office Assistant
 Sandeep Sankpal, Office Assistant
 Tushar Kurulkar, Office Assistant
 Anil Jadhav, Office Assistant
 Prabhakar Anagare, Office Assistant
 Roshan Mohite, Car Driver
 Sanjay Gomale, Attendant
 Vitthal Shejwal, Attendant

Engineering Section

Yugraj Singh Rajput, Project Engineer-cum-Estate Officer (on deputation from CPWD)
 Ganesh Pingalkar, Assistant Engineer
 Manoj Mane, Junior Engineer (Electrical)
 Vijaykumar Shinde, Junior Engineer (Civil)
 Santosh Kale, Accountant (on deputation from CPWD)

Technical Staff

Mrinalini Virkar, Technical Officer
 Nilesh Dumbre, Technical Officer
 Sureshchandra Prajapat, Scientific Assistant
 Prashant Kale, Technical Assistant
 Vijay Vittal, Technical Assistant
 Anil Prathamshetti, Technical Assistant
 Nitin Dalvi, Technical Assistant
 G. Suresh Kumar, Technical Assistant
 Shabnam Patil, Laboratory Technician
 Devpalsingh Rajput, Laboratory Technician
 Narendra Khandekar, Laboratory Technician
 Yatish, Laboratory Technician
 Santosh Khilare, Laboratory Assistant
 Megha Paygude, Laboratory Assistant
 Sudhir Lone, Laboratory Assistant
 Kalpesh Thakare, Laboratory Assistant
 Piyush Gaddekar, Laboratory Assistant

Academic/Technical staff on contract basis

Susmita Mahapatra, Technical Officer
 Tejasvi Wadkar, Teaching Assistant
 Mahendra Patil, Teaching Assistant
 Deepali Jadhav, Teaching Assistant
 Hemlata Phadke, Teaching Assistant
 Ayesha Fatima, Teaching Assistant
 Kaumudi Bhawe, Teaching Assistant
 Swati Dixit, Teaching Assistant
 Kapil Kumar Gupta, Teaching Assistant
 Pooja Lunawat, Research Assistant
 Sachin Behra, Technical assistant
 Archana Jogdand, Project Assistant
 Swati Shendage, Technical Assistant
 Bhargavi Naik, Technical Assistant

Samir Choudhary, Technical Assistant
Niharika Joshi, Project Assistant

Project Scientists

Sulabha Kulkarni, UGC Professor
Farhat Habib, Scientist D
Krishanpal Karmodiya, Scientist D
A. Nagabhushana, Scientist C
G.P. Manjunath, Scientist C
Jayeeta Banerjee, DST Young Scientist scheme
Mitali Tiwari, DBT Research Associate
Ashwin Kelkar, Research Associate
Shital Sarah S. Ahaley, Research Associate
Ram Kulkarni, Post-Doctoral Fellow
Anju Sharma, Research Associate
Chandra Mouli Reddy, Research Associate
V. Resmi, Research Associate
Shadab Ali Khan, Research Associate
G. Raghavendra Murty, Research Associate
Priyanka Saraswat, Pre-doctoral Research Associate
Saikat Chattopadhyay, Research Associate
Milan Kumar, Research Associate
Vimal Kishore, Research Associate

Project Fellows

Neeraj Maheshwari
Moumita Gupta
S. Shiv Shankar
Abhijeet Choudhary
R. Shankar
Prajakta Godbole
Prashant Mandal
Sreeja Thampi

Abhijeet Andhalkar
Aanchal Asthana
Manali Patil
Srija Bhagavatula
Sumit Pawar
Kriti Chaplot
Harpreet Singh
Aishwarya Iyer
Ajinkya Deogade
Neha
S. Satyanarayana
Ruchira Shah
Vishva Maru
Neha Diwanji
Progya Mukherjee
Mahekta Gujar
Amol Kolte
Rohan Pandit
Mullangi Dinesh
Shaikh Ashif Yasin
Kiran Kadlag
Ashwini Keskar
D. Perumal
R.L. Praveena
Sunita Singh
Kamal Vishnu Prasad
Debia Wakhloo
Shivsmriti Koul
Hrishikesh Joshi
Natasha Buwa
Saurabh Pradhan
Priya Mohan Bharate
Sandeep Pimparkar
Joseph Salve
Kaweri Utturwar
Neeraj Kumar Tiwari
Karishma Lamba
Tejashree Ghat

Shankar Gaware
Jamuna Vaishnav
Madhav Vipradas
Santosh Botre
Nitin Chouhan
Girish Kale

Administrative and support staff on contractual basis

Shanti Kalipatnapu, Consultant (Publications)
Sheela Donde, Consultant (Academics)
Naresh Sharma (Advisor, Academics)
Nita Beliappa (Science Media Consultant)
Shrikrishna Ayala, Consultant Engg. Support Service (Civil)
S.H. Yadav, Consultant (Engineering Support Service)
G.K. Marar, Senior Consultant
S.K. Kelkar, Consultant
Abhijit Kulkarni, Consultant (IT)
Sachin Behra
M.M. Jana
S. Giridhar
V.V. Sinha
Anita Mishra
Archana Pawar

Part-time Medical Officer

V.S. Savaskar
Priti Chhajed
Aarti Rapol

Counsellor

Rebecca Desouza
Vrinda Walimbe

Appointments during the year

Sunil Mukhi	1-11-2012
Steven Spallone	17-7-2012
M.S. Madhusudhan	15-3-2013
Collins Assisi	2-8-2012
Vivek Mohan Mallick	3-8-2012
Mohammad Mukul Kabir	14-8-2012
Kaneenika Sinha	20-12-2012
Akanksha Chaturvedi	31-12-2012
Anisa Chorwadwala	1-1-2013
Shabana Khan	15-3-2013
Jeetendra Chugh	21-3-2013
K.P. Mohanan	1-7-2012
Jayant Deshpande	1-8-2012
Rajaram Nityananda	1-3-2013
Deepti Gholap	31-8-2012
Deepali Dalvi	7-8-2012
Mrinalini Virkar	10-10-2012
Nilesh Dumbre	27-11-2012
Avinash Abhale	24-12-2012
Namrata Shinde	20-7-2012
Prashant Kale	11-10-2012
Vijay Vittal	17-10-2012
Anil Prathamshetti	30-10-2012
Nitin Dalvi	12-11-2012
S. Suresh Kumar	18-1-2013
Sandeep Sankpal	28-12-2012
Tushar Kurulkar	1-1-2013
Shabnam Patil	12-2-2013
Devpalsingh Rajput	20-2-2013
Narendra Khandekar	1-3-2013
T.S. Yathish	11-3-2013
Megha Paygude	18-2-2013
Sudhir Lone	4-3-2013
Kalpesh Thakare	11-3-2013
Vitthal Shejwal	24-1-2013
Piyush Gadekar	25-2-2013

CSIR SRF

Abhigyan Sengupta

CSIR JRF

Savita Singh

Naveen Prasad

T.T. Shree Harsha

Kanika Bansal

Sachidanand Mali

Abhishek Sahasrabudhe

Sandip Jadhav

Mahima Goel

Mithila Handu

Aniruddha Sastry

Prakash Sultane

Maroti Pawar

D. Senthil Kumar

Sneha Bhogale

Anupam Sawant

Smita

T.Y. Gopal Krishna

Vijay Kadam

Dnyaneshwar Kand

Sumit Kumar

Satish Malwal

Shraddha Karve

Rini Shah

Arun Tanpure

Satish Ellipilli

Rohit Joshi

Mothukuri Ganesh Kumar

Biplab Manna

Sharad Garud-Deshmukh

Sunil Kumar

Aparna Sherlekar

Abhinav Parivesh

Rashmi Kulkarni

Archana Pawar

Devika Ranade

Rahul Kumar Jangid

S. Anantraj

Sachin Holkar

Dinesh Chauhan

Venkateshwararao Boddu

Vinayak Khodade

C.G. Ravikiran

Yasmeen Shameem Akhtar

Kishore Padala

Shivaji Thadke

Shrishti Dar

Ayantika Sengupta

M. Boominathan

Santosh Panchal

Maidul Islam

Harikrishna Bavireddi

Balu Navale

Pramod Sabale

Barun Dhara

Rajendra Aluri

Bhagyashree Kaduskar

Sangabathuni Sivakoti

Tushar Khopade

Indumati Patta

Mallu Chenna Reddy

Ashok Yadav

Manidipa Pal

Sushil Bhunia

Pralhad Shinde

Devani Ravi (SPM)

Bhagyashree Kulkarni

Rajkumar Mishra

Abhik Malik

Naganath More

Nandha Kumar

Neha Nirwan

Jyoti Barnwal

Makarand Sarnobat
Trimbak Mete
Sudhir Pujahari
Jagadeeswararao Metikoti
G. Ravikumar
R. Manikandan
Niraja Bapat
Sopan Shinde

DBT JRF

Ameya Mahajan
Jay Prakash Shukla
Payal Arya
Mahesh Kumar Chand
Shivik Garg

UGC JRF

A. Dharmaraja
Anurag Sunda (on leave from 1-1-2013)
Kiran Reddy Baddigam
Bapurao Surnar
Lakshmi V.R. Babu
Kavita Sharma
Vallari Shukla
Rafeeq Ahmed Mir
Snehal Shekatkar
Rohan Yadav
Hitesh Raundal
Nitin Bansode
Arundhati Roy
Sohini Sarkar
Sushil Benke
Karnati Narasimha
Manu Krishnan Unni
Kundansingh Pardeshi
Tanmoy Saha
K. Rajkumar

Manasi Mahapatra
Ishtiyaz Ahmad Khan
Mahesh Deshmukh
Yettapu Gurivi Reddy
Nuthanakanti Ashok
Bijoyanand Mishra
Anushree Chaphalkar
Madhuri Gade
Shahaji More
Reman Kumar Singh
Prabhakar Pawar
Sandeep Palvai
Sudeshna Manna
Srilata Arra
Manish Chhatre
Arun Neru
Tanushree Kundu
Prabhat Kumar Kushwaha

INSPIRE JRF

Libi Anandi
Kunalika Jain

NBHM JRF

Jatin Majithia
Neha Prabhu

Rajat Jayanti Vigyan Sancharak Fellowship

Anurag Sunda (from 1-1-2013)

ICMR JRF

Manasi Gangan

Prime Minister's Scholarship

Aparna Banerjee
Shyama Prasada Nandi

IISER Research Fellows

Amar Mohite
 A.V. Ramana Murthy
 Arthur Varghese
 Madhusudan Ingale
 Padmashri Patil
 Arun Babu K.P.
 Deepak Jain
 Abhishek Shukla
 Indu Kaul
 P.S. Pramod
 Minal More
 Sanjog Nagarkar
 Santosh Gadekar
 Wilbee D.S.
 K.R. Ramya
 Koushik Karmakar
 N. Bhavani
 Manasi Kulkarni
 Swathi Hegde
 S.K. Mubeena Bano
 Arivindam Dasgupta
 Sayan Mandal
 Arvind Gupta
 Abhijeet Bayani
 Mandar Kulkarni
 Krishna Gavvala
 Trupti Thite
 Soumya Mukherjee
 Anantkumar Srivastava
 Darshika Tomar
 B. Madhangopal
 Sudeb Ghosh
 Partha Pritam Patra
 Ranguwar Rajendra
 Rakesh Gaur
 Manasi Mungi

A. Shweta
 Kajari Gupta
 Avishek Karmakar
 Sampada Mutalik
 Mahesh Gudam
 Sathish Dasari
 Prabhat Kumar Kushwaha
 Avdhoot Datar
 Shatarupa Ganguly
 Sudipta Tung
 Manawa Diwekar
 Vibha Singh
 Souparna Chakrabarty
 Sappati Subrahmanyam
 Kausik Sahu
 Kalyanshis Jana
 Praveen Kumar
 Sonashree
 Plavan Kumar Jha
 Gunja Sachdev
 Shalini
 Debraj Roy
 Nishtha Sachdev
 Sai Harshini Tekur
 Shishir Sankhyayan
 Ravi Tripathi
 Aditya Mehra
 Rabindranath Bag
 Danveer Singh
 Karan Kapoor
 Hemant Katiyar
 S.K. Rejaul
 Kunal Kothekar
 Rohit Kumar
 Sanku Paul
 Gunjan Varma
 Manish Kushwah

Arya Ghate
Amandeep
Soumendranath Panja
Rohit Babar
Sayan Mandal
Neelesh Soni
Rohit Joshi
C. Sayali

Post-BSc Integrated PhD

Sayali Choudhary
Roopali Pradhan
Ketakee Ghate
Shubhankar Kulkarni
Chaitanya Mungi
Ajay Labade
Anindita Adak
Santosh Kumar Singh
Gatta K.R.S. Naresh
Ajay Soni
Aamod Desai
Aakash Pardeshi
Amruta Sadhu
Supratik Sarkar
Sumit Sarkar

Srikrishna Sekhar
Mahendra Prasad Mali
Ankhita Shetty
Sukrut Kamberkar
Neha Khetan
Aditi Maduskar
Dyanesh Dubal
Mukul Rawat
Ashish Surana
Jerrin Thomas George
Sneha Banerjee
V.M. Hridya
Rahi Masoom Reja
Aditi Nandi
Amogh Kulkarni
Abhishek Swarnkar
Meghna Manae
Prachi Telang
Chetan Kumar Vishwakarma
Sanjay Ashok
V.S. Anusha
Tomin James
Dhanya Menon
Mainak Ghosh
P.K. Sreejith

Details of Grants Received during 2012-13 on Account of Grant-in-Aid Projects

Name of Project	Project Leader	Project Code	Funding Agency	Duration	Grant Received during 2012-13 (₹)
Projects initiated during 2012-13					
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 - DoS	06.06.2012 to 05.06.2015	420000
Palladium catalyzed chelation assisted C-H bond functionalisation of aromatics, alkenes and alkanes	Masilamani Jeganmohan	GAP/DST/CHE-12-0082 30112082	DST-SERB	03.07.2012 to 02.07.2015	3000000
Functional studies of novel inorganic organic hybrid frameworks with guest accessible sites	Sujit Kumar Ghosh	GAP/DST/CHE-12-0083 30112083	DST - SERB	09.07.2012 to 08.07.2015	824000
Role of network topology in the generation of coordinated neuronal activity	Collins Assisi	GAP/WT-DBT/BIO-12-0084 30712084	Welcome Trust - DBT India Alliance	01.09.2012 to 31.08.2017	13787931
Investigating the role of intracellular calcium signal remodeling in the pathogenesis of Alzheimer's disease	Suhita Nadkarni	GAP/WT-DBT/BIO-12-0085 30712085	Welcome Trust - DBT India Alliance	01.08.2012 to 31.07.2017	11892467
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 to 02.08.2015	1930000
Research Partnership and collaboration Agreement of IISER Pune with Enovex Technology Ltd.	Ramanathan Vaidyanathan	GAP/Enovex/CHE-12-0087 31912087	Enovex Technology Ltd., Canada	01.04.2012 open ended	6872910
Elevational species diversity patterns in the Eastern Himalayas (Arunachal Pradesh)	Ramana Athreya	GAP/DST-SERB/BIO-12-0088 30112088	DST - SERB	06.09.2012 to 05.09.2015	1210000

Name of Project	Project Leader	Project Code	Funding Agency	Duration	Grant Received during 2012-13 (₹)
Study of Wildlife issue 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 32012089	Govt of Arunachal Pradesh / SEW Nafra Power Corporation Ltd.	22.05.2012 to 21.05.2013	656000
Redox directed mycobacterial therapeutics	Harinath Chakrapani	GAP/DBT/CHE-12-0090 30812090	DBT	28.09.2012 to 27.09.2015	2747200
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 to 08.11.2015	3560300
Interacting networks to model and control dynamics of complex systems (Indo Germa Project) (DST-DAAD)	G. Ambika	GAP/DST/PHY-12-0092 30112092	DST	21.09.2012 to 20.09.2014	175500
Electronic, Magnetic & Non-Magnetic Doping of Quantum Spin Chains -Indo Swiss PEP Joint Research project	Surjeet Singh	GAP/DST/PHY-12-0093 30112093	DST	24.09.2012 to 23.09.2014	172500
Ramanujan Fellowship	Angshuman Nag	GAP/DST/CHE-13-0094 30113094	DST - SERB	01.11.2012 to 31-10-2017	600000
Impact study on Wild life 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	01.12.2012 to 31.01.2013	400000
INSPIRE Faculty Award	Neelesh Dahanukar	GAP/DST/INSPIRE/BIO-12-0096 31820096	DST	16.10.2012 to 15.10.2017	1900000
Fluorescent Nucleoside-Based Amphiphiles : Synthesis, self Assembly Properties and applications	S. G. Srivatsan	GAP/CSIR/CHE-12-0097 30512097	CSIR	01.11.2012 to 31.10.2015	566667
FIST Program - 2012	K. N. Ganesh	GAP/DST/FIST/CHE-13-0098 30113098	DST	07.01.2013 to 06.01.2018	50000000

Name of Project	Project Leader	Project Code	Funding Agency	Duration	Grant Received during 2012-13 (₹)
British Council Division - Knowledge Economy Partnership 2012 under Internationalising Higher Education Programme (IHE)	Umakant Rapol	BC-IISER/PHY-13-0099 31713099	British Council	22.03.2013 to 31.12.2013	1035600
JC Bose Fellowship	Sunil Mukhi	GAP/DST/PHY-13-0101 31513101	DST	09.06.2008 (at IISER from Dec. 2012) 09.06.2013	433611
On-going Projects					
Theroretical Physics - Max Planck	Sudarshan Ananth	GAP/DST-MPG/PHY-09-0006 30309006	DST and Max Planck Gesellschaft (DST-MPG)	24.03.2009 to 14.03.2014	2843700
Investigating the dynamics of spatially structured and unstructured lab populations of <i>Drosophila melanogaster</i> under constant perturbations	Sutirth Dey	CSIR/GAP/BIO-09-0010 30509010	CSIR	16.11.2009 to 15.11.2012	393038
Characterization of the novel interaction between check point protein TopBP1 and anti-apoptotic protein Api5	Mayurika Lahiri	GAP/DBT/BIO-10-0016 30810016	DBT	11.01.2010 to 10.07.2013	1188600
Photoinduced electron transfer rate (between flavins and aromatic aminoacids) in nanocavity of proteins versus bulk water	Partha Hazra	GAP/DST/CHE-10-0020 30110020	DST	23.03.2010 to 22.03.2013	250000
Functionalized ribonucleoside analogues: Synthesis, site-specific enzymatic incorporation and applications	S. G. Srivatsan	GAP/DST/CHE-10-0021 30110021	DST	26.03.2010 to 25.03.2012	600000
Development of green chemical melt transurethane reaction for polyurethanes	M. Jayakannan	GAP/DST/CHE-10-0022 30110022	DST	07.04.2010 to 06.04.2013	600000

Name of Project	Project Leader	Project Code	Funding Agency	Duration	Grant Received during 2012-13 (₹)
Investigation of gamma and hybrid gamma helical peptides as HIV-I fusulin inhibitors	Hosahudya Gopi	GAP/DST/CHE-10-0023 30110023	DST	08.04.2010 to 06.04.2013	200000
The MOR cryptosystem and special p-groups	Ayan Mahalanobis	GAP/DAE/MTH-10-0024 30910024	DAE	08.04.2012 to 07.04.2013	135000
Study of CTCT mediated long range interactions in human genome	Sanjeev Galande	GAP/IUSSTF/BIO-10-0025 31010025	IUSSTF	01.04.2010 to 31.03.2012	500000
Genetic control of cell proliferation, cell size and cell affinities - Indo - Spanish Grant	L.S. Shashidhara	GAP/DST/BIO-10-0026 30110026	DST	26.04.2010 to 25.04.2013	900000
Virtual Centre of Excellence on Epigenetics	Sanjeev Galande	GAP/DBT/BIO-10-0027 30810027	DBT	19.03.2010 to 18.03.2015	1480000
Modulation of the innate immune response by SuMOylation	Girish Ratnaparkhi	GAP/WT-DBT/BIO-10-0029 30710029	Welcome Trust - DBT India Alliance	01.07.2010 to 30.06.2015	2817420
Theoretical and empirical investigation on the interaction of asymmetric migration and intrinsic growth rate on the dynamics of laboratory metapopulation of Drosophila melanogaster	Sutirth Dey	GAP/DBT/BIO-10-0030 30810030	DBT	31.05.2010 to 30.05.2013	365000
Ramanujan Fellowship	Harsh Chaturvedi	GAP/DST/PHY-10-0031 30108031	DST	01.07.2010 to 31.06.2015	1460000
Emergent dynamics on growing networks with comparable time scales	G. Ambika	GAP/DST/PHY-10-0033 30110033	DST	03.08.2010 to 02.08.2013	800000
Data Integration to identify biomarkers to diagnose and monitor Type I diabetes and other inflammatory diseases	Sanjeev Galande	GAP/DBT/BIO-10-0034 30810034	DBT	17.09.2010 to 16.09.2013	3284000
Swarnajayanti Fellowship - Capturing the active chromatin in mammalian cell nucleus: comprehensive and large scale mapping of interactions between genomic elements	Sanjeev Galande	GAP/DST/BIO-10-0035 31210035	DST	29.08.2008 to 28.08.2013	4000000

Name of Project	Project Leader	Project Code	Funding Agency	Duration	Grant Received during 2012-13 (₹)
Molecular characterization of the BEL-1 like homologs in potato and their role in long distance signaling of tuberization	Anjan Banerjee	GAP/DST/BIO-10-0037 30110037	DST	07.10.2010 to 06.10.2013	600000
Glucose sensing mechanisms in the brain of teleost fish: identification, characterization and physiological significance	Nishikant Subhedar	GAP/DST/BIO-10-0038 30110038	DST	11.11.2010 to 10.10.2013	800000
Development of aptamer mediated TRAP (targeted reversibly attenuated probes) for in vivo imaging of RNA	Jayeeta Banerjee	GAP/DST/BIO-10-0040 30110040	DST	11.11.2010 to 10.11.2013	300000
Ramanujan Fellowship	G. V. Pavan Kumar	GAP/DST/PHY-10-0041 31110041	DST	01.11.2010 to 31.10.2015	1460000
Role of chromatin architecture in cellular senescence	Sanjeev Galande	GAP/ICPAR/BIO-10-0042 31410042	ICPAR-CEFIPRA	01.04.2010 to 31.03.2011	403873
Mechanistic analysis of endocytosis of the amyloid precursor protein	Thomas Pucadyil	GAP/WT-DBT/BIO-11-0043 30710043	Welcome Trust - DBT India Alliance	01.01.2011 to 31.12.2015	2551023
Molecular mechanisms of nuclear structure-function relationship in cancer	Kundan Sengupta	GAP/WT-DBT/BIO-11-0044 30711044	Welcome Trust - DBT India Alliance	01.01.2011 to 31.12.2015	4060436
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	Welcome Trust - DBT India Alliance	15.01.2011 to 14.01.2016	1430338
Swarnajayanti Fellowship - Cascade glycosylations : A novel strategy for carbohydrate epitopes and glycoarrays	Srinivas Hotha	GAP/DST/CHE-11-0046 31211046	DST	17.01.2011 to 16-01.2015	4355400
Raja Ramanna Fellowship	Avinash Khare	GAP/DAE/PHY-11-0047 30911047	DAE	21.09.2010 (at IISER from 01.01.2011) 20.09.2013	1110000

Name of Project	Project Leader	Project Code	Funding Agency	Duration	Grant Received during 2012-13 (₹)
JC Bose Fellowship	L.S. Shashidhara	GAP/DST/BIO-11-0048 31511048	DST	01.02.2011 to 31.01.2016	1150000
Development of naphthalenediimide and naphthaleneimide based D-Glucose selective synthetic probes	Pinaki Talukdar	GAP/DAE/CHE-11-0049 30911049	BRNS (DAE)	22.03.2011 to 21.03.2014	163986
Organic sources of gaseous entities with physiological relevance	Harinath Chakrapani	GAP/DST/CHE-11-0051 30111051	DST	28.03.2011 to 27.03.2014	500000
Carbohydrate capped nanoparticles as Tumor Specific Drug Delivery Systems - MAX PLANCK PARTNER - Germany	Raghavendra Kikkeri	GAP/DST-MPG/CHE-11-0055 30311055	DST MAX PLANCK PARTNER	19.12.2011 to 18.12.2014	1288260
DAE - Young Scientist Research Award - Development and Functional studies of Homochiral Inorganic - Organic Hybrid Materials	Sujit Kumar Ghosh	GAP/DAE/CHE-11-0056 30911056	DAE	16.08.2011 to 15.08.2014	283071
DAE - Young Scientist Research Award - Total Synthesis of Natural Benzo © phenanthridine Alkaloids by Metal - catalyzed cyclization of C - H bond activation reaction as a key step"	M. Jeganmohan	GAP/DAE/CHE-11-0058 30911058	DAE	16.08.2011 to 15.08.2014	164678
Integrin - dependent regulation of anchorage independence in cancers	Nagaraj Balasubramanian	GAP/WT-DBT/BIO-11-0059 30911059	Welcome Trust - DBT India Alliance	01.09.2011 to 31.08.2016	5453653
Creation of virtual classroom (VCR) at ISER Pune	M.S. Santhanam	GAP/NICSI/ISER-11-0060 31611060	NICSI	25.01.2011 to 24.01.2012	829123
Direct Assembly of Poly nuclear Ru (II) Complexes on carbon Nanostructures - A Prospective Organic Photovoltaic cells/ Indo- Israel Project	Raghavendra Kikkeri /Dr. Shouvik Datta	GAP/DST/CHE-11-0061 30111061	DST	27.09.2011 to 26.09.2013	300000
DBT/ISER Partnership : Facilitation of Research collaboration in emerging areas of Biology - Phase-I	L.S. Shashidhara	GAP/DBT/BIO-12-0067 30111067	DBT	17.02.2012 to 16.08.2013	1411000

Name of Project	Project Leader	Project Code	Funding Agency	Duration	Grant Received during 2012-13 (₹)
Epigenetics of the fetal odor learning	Ram Kulkarni	GAP/DST/BIO-12-0068 30112068	DST	29.02.2012 to 28.02.2014	400000
Chimeric Nanoparticle: A Novel Nanopatform for Signaling Pathway Driven Cancer Chemotherapy - Ramalingaswami Fellowship	Sudipta Basu	GAP/DBT-RLF/BIO-12-0073 30312073	DST	06.02.2012 to 05.02.2017	1490000
Hypoxia - Activated Prodrugs of Nitric Oxide Innovative Young Biotechnologists Award - 2011 (IYBA 2011)	Harinath Chakrapani	GAP/DBT/BIO-12-0074 30812074	DST	29.03.2012 to 28.03.2015	1930000
Science Media Centre at IISER Pune	L.S. Shashidhara	GAP/DST/S&T-12-0075 30112075	DST	30.03.2012 to 29.03.2015	4500000
The Role of SATB proteins in the structure and function of the inactive X	Ashwin Kelkar	GAP/WT-DBT/BIO-12-0076 30712076	Welcome Trust - DBT India Alliance	01.05.2012 to 30.04.2016	3334787
INSPIRE Faculty Award	Chandrasheel Bhagwat	GAP/DST/INSPIRE-12-0077 31812077	DST	01.03.2012 to 28.02.2017	1900000
Ramanujan Fellowship	Ashna Bajpai	GAP/DST/PHY-12-0078 31112078	DST	09.03.2012 to 08.03.2017	1460000
Collaboration in Medicinal Chemistry between IISER Pune, India and Keele University, Keele, UKIERI for 2012-13	B S M Rao	GAP/BC/CHE-12-0080 31712080	British Council	01.04.2012 to 31.03.2013	1169492
Total					168800564

Scientific Report

1.0 Chemical Biology

1.1 Nucleoside Analogue Probes for Bioanalytical Applications

Several ribonucleic acid (RNA) motifs are known to regulate enzyme activity, interact with viral proteins as well as small molecules and are pursued as potential therapeutic targets. The understanding of RNA transport, localization, and protein-RNA interactions are important. In this regard chemically modified nucleic acid motifs have provided effective biophysical systems to investigate the dynamics and recognition properties of nucleic acids (Srivatsan and Sawant (2011) *Pure Appl. Chem.* 1:213). **Dr. Seergazhi Srivatsan** and his group are developing robust methodologies to label nucleic acids with environment-sensitive fluorescent nucleoside analogues and reactive groups, which can be further functionalized by chemoselective reactions. In the past years, his group has been successful in developing fluorescent nucleoside analogues that specifically signal the presence of DNA and RNA abasic sites (Tanpure, Patheja and Srivatsan (2012) *Chem. Comm.* 48:501, Tanpure and Srivatsan (2012) *ChemBioChem* 13:2392). Srivatsan's group is currently exploring the possibility of implementing these analogues in developing assays to investigate therapeutically relevant RNA-protein and RNA-small molecule interactions. Recently, his group has developed a new method to post-transcriptionally modify RNA with biophysical probes by bioorthogonal click and Staudinger reactions (Rao *et al* (2012) *Chem. Comm.* 48:498; Rao *et al* (2012) *Nature Protocols* 7:1097).

1.2 Effects of Alkylation Damage on Cells and the Activation of the Cellular Surveillance Machinery to Maintain Genome Integrity

Humans are exposed not only to preformed N-nitroso compounds (NOC) but also to a wide range of nitrogen-containing compounds and nitrosating agents, which can react *in vivo* to form NOC, a versatile class of carcinogens. Nitrosating agents and NOCs are also synthesized endogenously in reactions mediated by bacteria and activated macrophages. NOC can affect DNA damage causing tumors in laboratory animals. Therefore, it is important to investigate whether the cellular checkpoint signaling cascade is activated when damage is induced by alkylating agents, such as NEU (N-nitroso-N-ethyl urea) or NMU (N-nitroso-N-methyl urea). The cell cycle checkpoint consists of a relay of signal transduction proteins such as the sensor kinases ATM (Ataxia-telangiectasia-mutated) and ATR (ATM and Rad3-related), which recognize the double-strand breaks (DSBs) and single-stranded DNA (ssDNA) or replication fork stalls, respectively.

Dr. Mayurika Lahiri's lab is involved in administering alkylating agents (varying doses) to cells and studying activation of the checkpoint signaling cascade using phospho-specific antibodies. It has been observed that administering varying doses of N-nitroso ethylurea on MCF-7 breast adenocarcinoma cells for 2 hours, showed activation of Chk1, Chk2 and ATM kinases (Fig 1 a and b). Studies have also shown the activation of both ATM-Chk2 and ATR-Chk1 signaling cascades in a time-dependent manner with the activation of the ATM-Chk2 kinases preceding ATR-Chk1. Ongoing research involves dissecting the mechanism by which the alkylating damage is converting into a break and studying which repair pathway is involved in repairing the damage.

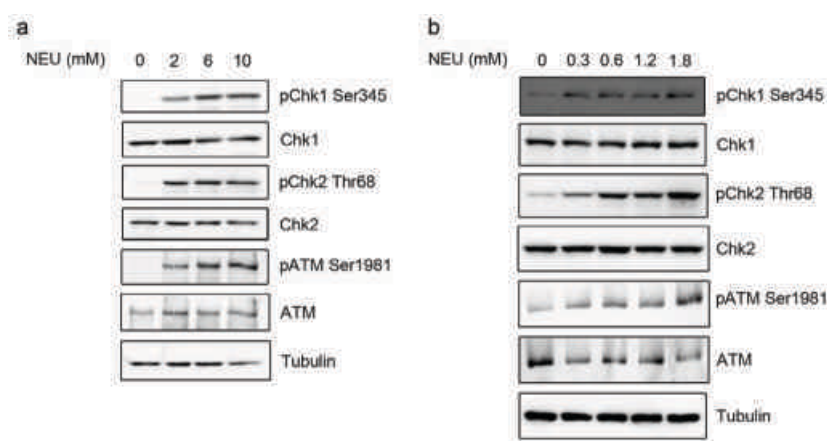


Figure 1 NEU causes activation of checkpoint signaling pathways in a dose dependent manner (Mayurika Lahiri)

1.3 Organic Synthesis and Search for Novel Inhibitors of Aurora Kinase and PI-3 Kinase

Dr. Ramakrishna Bhat's laboratory primarily focuses on novel synthetic methodologies and application of these in the total synthesis of bio-active natural products and medicinal chemistry. Recently they have successfully completed the total synthesis of 1-deoxy-7, 8 α -di-*epi*-castanospermine and the formal synthesis of Pumiliotoxin 251D starting from L-Proline relying on Grubbs' metathesis approach. A novel stereoselective approach to cis-2, 3-disubstituted piperidines via reduction of *N*-acyliminium ion intermediate has been developed. Enantioselective synthesis of (+)-(2*S*,3*S*)-CP-99,994 has been achieved successfully using this approach.

Naturally occurring and chemically synthesized non-natural amino acids are gaining significance as useful and important tools for modern drug discovery research. A novel and concise enantiopure synthesis of side chain-modified α -amino acids such as 4-oxo-L-norvaline, 6-oxo-L-homonorleucine, 5-*cis*-alkyl prolines and fluorescent amino acid has been developed.

The PI3 kinase/aurora kinase family plays an important role in controlling many critical biological processes. There is accumulating evidence that PI3 kinase signalling is involved in a range of diseases and that PI3 kinase inhibitors could offer considerable therapeutic potential. Present focus is on the discovery and development of PI3 kinase inhibitors. Small molecules are designed based on rational drug design approach and *in-silico* molecular modeling for inhibition of target PI-3 kinase α , γ and aurora kinases.

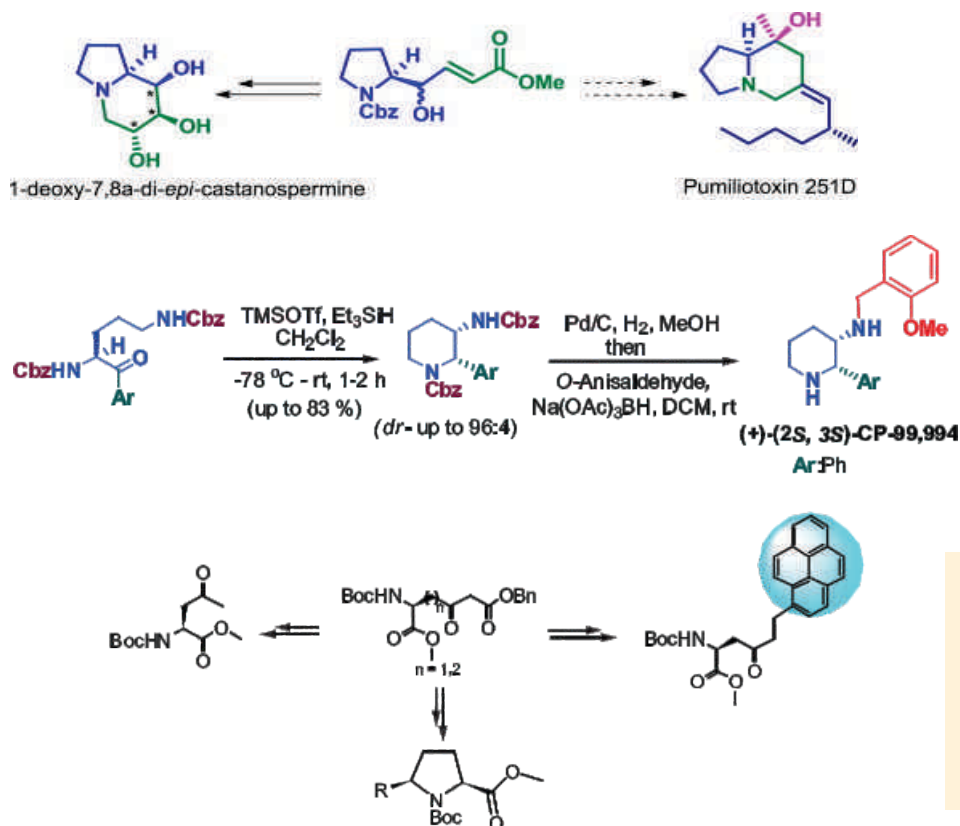


Figure 2 Synthesis of 1-deoxy-7, 8α-di-epi-castanospermine and (+)-CP-99,994-fluorescent amino acid (Ramakrishna Bhat)

1.4 Controlled Generation of Reactive Species for Therapeutic Applications

Reactive oxygen species (ROS), reactive nitrogen species (RNS) and reactive sulfur species (RSS) are constantly generated in nearly all cells. These species being gaseous are highly diffusible across cells and useful for signal transduction. Reactive species cause extensive damage to biomacromolecules including DNA, proteins and lipids and are therefore harmful at elevated concentrations. **Dr. Harinath Chakrapani**'s research group is active in the design, synthesis and evaluation of organic compounds that produce reactive species in a spatiotemporally controlled manner for use as tools for biochemical and cell biological studies as well as potential therapeutic agents against infectious diseases. Two classes of compounds with potent *Mycobacterium tuberculosis* (*Mtb*) growth inhibitory activity have been discovered. These include several thiol-activated sources of sulfur dioxide and novel sources of ROS that inhibit *Mtb* with potency

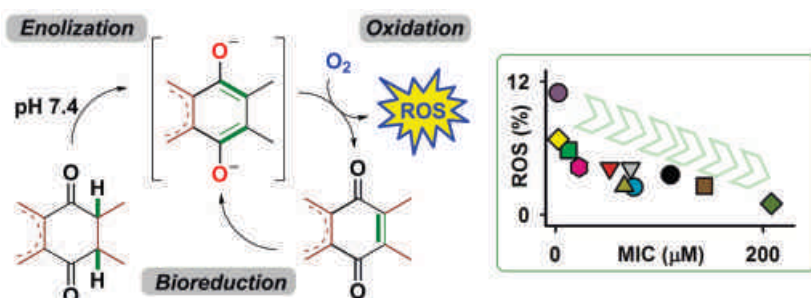


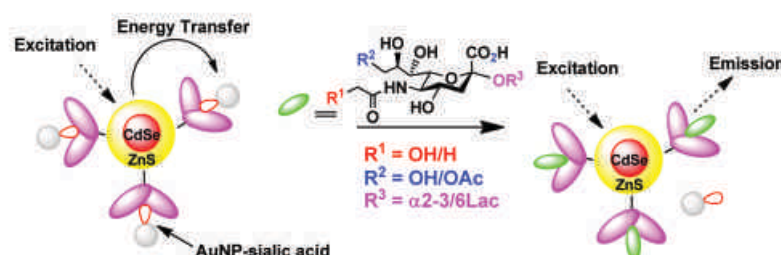
Figure 3 (left) Strategy for generation of reactive oxygen species (ROS) in buffer; (right) compounds producing higher amounts of ROS were better at inhibiting *Mtb* growth (Harinath Chakrapani)

comparable with clinically used TB drugs. A strong correlation between ability to generate SO_2 and *Mtb* growth inhibitory activity was found. Dr. Chakrapani's group has also synthesized a library of 2-aryl-3-amino-1,4-naphthoquinones and several of these compounds were found to induce DNA damage in the presence of Cu(II) . Data from their work suggests that 2-aryl-3-amino-1,4-naphthoquinones' propensity to produce ROS correlated well with its DNA damage inducing ability. Further work on the development of new strategies for site-directed delivery of nitric oxide via bioreductively-activated nitric oxide prodrugs with excellent cancer growth inhibitory activity and evaluation of their biological targets to understand the mechanisms of action is underway.

1.5 Multivalent Carbohydrate Probes

Sialic acids (Sias) are a class of monosaccharides typically found at the terminal location of *N*-glycans, *O*-glycans, and glycosphingolipids (and occasionally capping side chains of GPI anchors) in animals of the *Deuterostome* lineage, and in certain bacteria that associate with them. One of the most striking features of Sias is their structural diversity, with about 50 Sia species known, consisting of *N*-acetylneuraminic acid (Neu5Ac), *N*-glycolylneuraminic acid (Neu5Gc), keto-deoxynonulosonic acid (Kdn), and their derivatives modified by acetylation, lactylation, methylation, and/or sulfation. Current methods for analyzing sialic acid diversity involve multi-step processing. **Dr. Raghavendra Kikkeri's** laboratory is focused on designing single step optical recognition and quantification of different compositions of sialoglycans in glycoproteins and serum using nanometal surface energy transfer (NSET) between quantum dots and gold nanoparticles bound to specific sialic acid binding proteins (SBPs) or sialic acid binding peptides (SBPeptides) and sialic acid sugar moieties, respectively. The biosensing process is based on the turn-off /on fluorescence by external sialic acid species that compete for binding to the SBP/SBPeptides. This nanobiosensor is a prototype of a rapid, simple to use and inexpensive system for high-throughput quantitative analysis of different compositions of sialoglycans present in biological or biomedical samples.

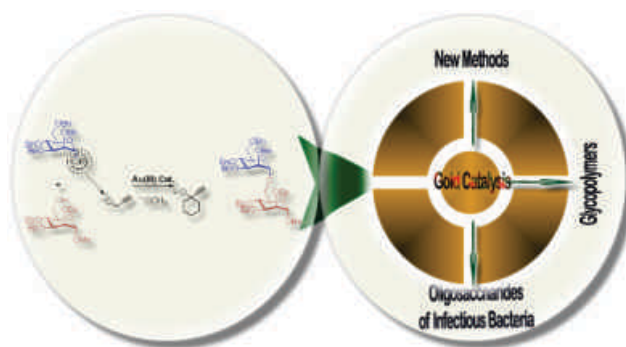
Figure 4 Schematic representation of quantum dot-based biosensing of sialic acid compositions and linkages in biological samples (Raghavendra Kikkeri)



1.6 Glycoconjugates

Complex glycoconjugates play prominent roles in various biological events. Lack of pure and well defined glycoconjugates is the major bottleneck in the process of understanding their significance for eventual exploitation. Biological isolation is tedious since most glycoconjugates are available in minute quantities and are micro-heterogenous in form. **Dr. Srinivas Hotha's** group is pursuing their chemical synthesis using their method of transglycosylation using alkyl groups (propargyl/methyl) activated in the presence of gold (III) salts. Recently, gold catalysis

repertoire was extended to the synthesis of glycomonomers that are polymerized to glycopolymers. Now, Dr. Srinivas Hotha's group have extended this method to efficiently synthesize glycopolypeptides. Further, glycosyl *N*-carboxyanhydrides were prepared successfully in high yields and used for ring opening polymerization to efficiently obtain glycopolypeptides. Gold catalysis was also applied to synthesize carbohydrate epitopes of infectious bacteria.



2.0 Materials Science

2.1 Main-group, Organometallic and Materials Chemistry

Dr. R. Boomi Shankar's research involves facile generation of imido analogues of main-group oxo anions and employing them as ligands in transition metal chemistry. His group has demonstrated that the imido anions corresponding to H_2PO_4^- , HPO_4^{2-} and PO_4^{3-} ions can be obtained by using salts of certain soft transition metal ions such as Ag(I), Pd(II), Cu(I) etc (Figure 5). In addition, the catalytic activity of Pd(II) complexes in the Mizoroki-Heck (M-H) type coupling reaction of phenylboronic acid with alkenes has been established. The labile residual OAc groups attached to the Pd(II) atoms undergo further reactions leading to large metallo-supramolecular cages (Figure 5). In a related project, interesting examples of Zn(II)- and Cu(II)-coordination polymers were synthesized. Vapour adsorption measurements on these polymers reveal a preferential water uptake in their pores over aliphatic alcohols, promising their application in the purification of

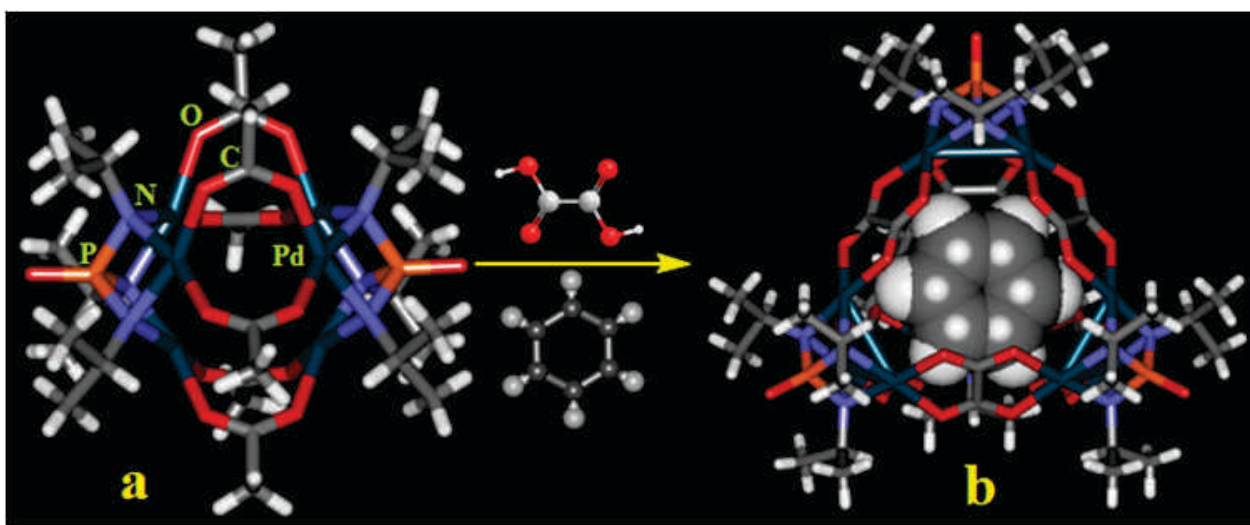


Figure 5 View of the hexanuclear Pd(II) cluster stabilized by imido-P(V) trianions (left) and its reaction with a ditopic linker ligand to generate the tetrahedral metallo-supramolecular cage (Boomi Shankar)

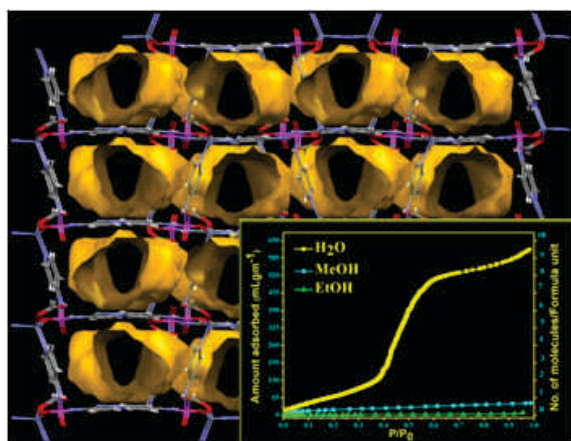


Figure 6 Connolly surface view of a 2D-Zn(II) MOF showing selective water uptake isotherm in its void space (Boomi Shankar)

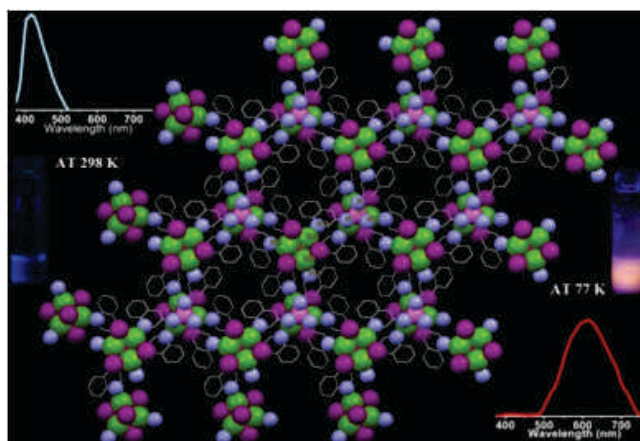


Figure 7 Cationic $(\text{Cu}_6\text{I}_3)^+$ cluster MOF of a thiophosphoramidate ligand showing thermochromic luminescent behaviour at 298 and 77K (Boomi Shankar)

Bioethanol (Figure 6). Employing a tripodal aminopyridyl/aminoquinolyl functionalized thiophosphoramidate ligands, preparation of C_3 -symmetric cationic Rugby-ball shaped $\{[\text{Cu}_6\text{I}_4]^{2+}\}_n/[\text{Cu}_6\text{I}_5]^{2+}$ cluster metal-organic frameworks (MOFs) has been achieved. Studies on the photo-physical behavior of these two MOFs indicate their thermochromic luminescent behavior (Figure 7). The emission colours of these MOFs were selectively quenched in presence of picric acid paving the way for developing new low-cost sensors based on luminescent CuI materials. Future research involves the peripherally functionalized ligands of various P-block elements such as P, Si, Sb, B etc. for constructing functional materials towards application in chiral small molecule recognition, ion separation, sorption, sensing and asymmetric catalysis.

2.2 Physics and Chemistry at the Nanoscale using Theoretical Tools

Dr. Prasenjit Ghosh's group has been working in the area of Materials Science using state-of-the-art computational techniques like density functional theory.

a) Functional K-doping of eumelanin thin films

Eumelanin, an important pigment found in our skin has intriguing properties in the field of electrochemical gas sensing, photon detection, photovoltaics, and organic electronics; however, the intrinsic disordered nature of their thin films is a limitation. In collaboration with Università Cattolica, Brescia, Italy, Dr. Prasenjit Ghosh's group studied the electronic structure of eumelanin thin films by means of x-ray absorption and photoemission spectroscopies and DFT. The structure is a tetrameric macrocycle, made by three hydroquinones and one indolequinone as the smallest building block of eumelanin. In the present study they have demonstrated the possibility of doping eumelanin with K^+ ions. They have identified the doping-related occupied and unoccupied electronic states and their spectral weight using resonant photoemission spectroscopy (ResPES) and x-ray absorption. Analysis indicated intercalation of K with one specific oligomer (a tetramer composed of one indolequinone and 3 hydroquinone monomers).

b) Hydrogen-induced reversal of spin alignment in graphene supported on Ni(111)

Dr. Prasenjit Ghosh's group presents a novel way of changing the alignment of the induced magnetic moment of graphene supported on Ni(111) surface through hydrogenation. For the pristine graphene on Ni(111) surface, the magnetic moments on the fcc (top) C atoms are parallel (anti-parallel) with respect to those of the Ni atoms. The graphene sheet becomes ferrimagnetic with the average magnetic moment of the graphene sheet parallel with respect to that of the Ni atoms of the substrate. Through density functional theory based study, they show that this alignment can be controlled upon gradually hydrogenating the supported graphene layer. At maximum H coverage (0.5 ML), they find the supported hydrogenated graphene to be a ferromagnetic semiconductor, the average magnetic moment of the graphene sheet is anti-parallel with respect to the Ni atoms. Preliminary studies suggest that the hydrogenated graphene sheet can act as a tunneling barrier for magnetic tunnel junctions.

c) Basal plane hydrogenation of ferrimagnetic graphene on Co surface

Using ab initio density functional theory, Dr. Prasenjit Ghosh's group has presented a novel way for simultaneously enhancing the induced magnetic moment and opening up the band gap of a graphene sheet supported on ferromagnetic transition metal surface. It has been demonstrated that hydrogenating graphene supported on ferromagnetic Co surface at saturation coverage results in a six-fold increase in the magnitude of the induced magnetic moment compared with the pristine graphene on the Co surface and a band gap opening at the K-point of the Brillouin zone.

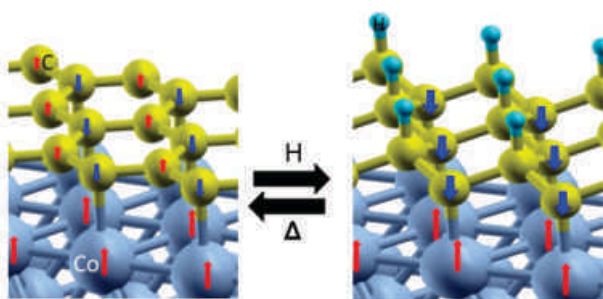
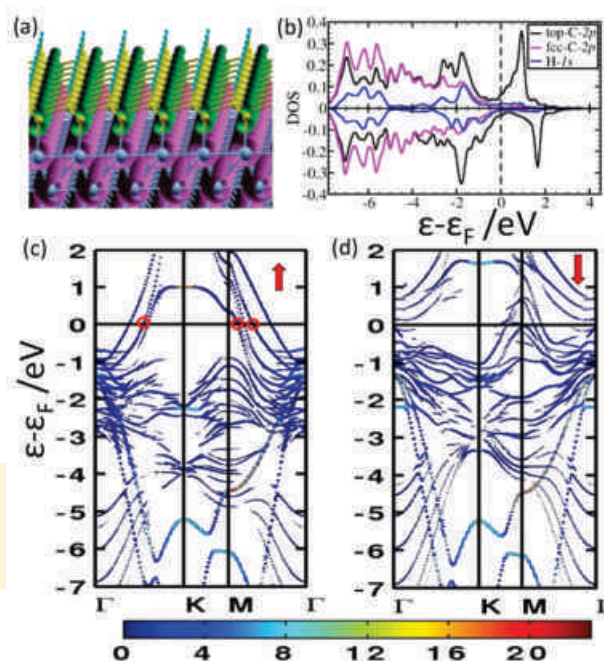


Figure 8 Ref: Kaul, I., Joshi, N., Ballav, N. and Ghosh, P. (2012). *Journal of Physical Chemistry Letters*, 3:2852 (Prasenjit Ghosh)



2.3 Functional Porous Materials

Dr. Sujit Ghosh's laboratory is working on the design, synthesis, structural characterization and functional studies of self-assembled materials based on organic-inorganic hybrid compounds.

Organic-inorganic hybrid materials, also known as porous coordination polymers (PCP) or metal-organic frameworks (MOF), are of great interest for their potential applications in gas storage, separations, sensors, and catalysis. Using suitable commercial or pre-designed organic ligands, new self-assembled framework materials are synthesized by hydrothermal or solvothermal methods and characterized by powder X-ray diffraction (PXRD), thermo gravimetric analysis (TGA), elemental analysis, vibrational spectroscopy (IR), studies of gas sorption, porosity measurements, etc. The synthesized materials are studied for chemical separation, gas storage, magnetism, and heterogeneous catalysis (Figure 9).

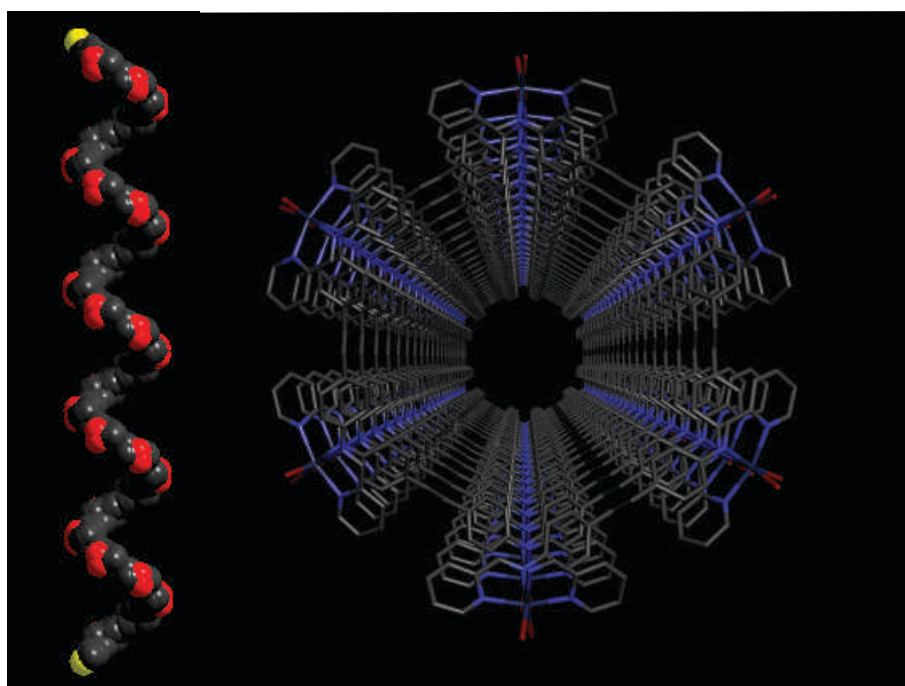


Figure 9 Schematic diagram of a porous hybrid material with helical backbone (Sujit Ghosh)

2.4 Physics of Competing Magnetic Interactions in Magnetic Oxides and Superconductivity in Iron Based Compounds

Ongoing research in **Dr. Surjeet Singh's** laboratory focuses on understanding the nature of elementary spin and lattice excitations in low-dimensional quantum magnets (LDQM) comprising of compounds having chain and/or ladders of antiferromagnetically coupled spin $\frac{1}{2}$ entities. LDQM show many intriguing properties arising from quantum confinement of elementary excitations over the low-dimensional structures. The two prototypical LDQM systems studied are SrCuO_2 (spin $\frac{1}{2}$ chains) and $\text{Sr}_{14}\text{Cu}_{24}\text{O}_{41}$ (layered structure with alternating planes consisting of spin $\frac{1}{2}$ ladders and chains) and their doped variants containing “dilute” magnetic and non-magnetic impurities. The advantage are two-fold: firstly, “dilute” doping can help realize newer ground states and secondly, the impurities can act as a “probe”, for example, to understand the role of spinon-phonon scattering in a thermal conductivity study.

Large and high-quality single-crystals of these compounds were obtained employing a Traveling Solvent Floating Zone (TSFZ) technique in a four-mirror image furnace, one of the specialties in this area at IISER Pune. This accomplishment is noteworthy as both these compounds melt non-congruently, because of which one cannot employ traditional crystal growth techniques for obtaining large crystals.

Magnetization of SrCuO_2 crystal and its doped variants probed from 2 K to 300 K using VSM facility showed that Zn (spin 0) impurities induced staggered magnetization at the impurity site. The effect of Co ($s = \frac{1}{2}$) impurities resulted in huge anisotropy and sharp peaks in susceptibilities near 5 K. Future experiments will throw light on the nature of magnetism of these Co-doped spin $\frac{1}{2}$ chains. Collaborative work with labs from ETH Zurich and IFW Dresden, indicated that Ni ($s = 1$) impurities open up a gap of ~ 8 meV in an otherwise gapless spin excitation spectrum of SrCuO_2 .

2.5 Multifunctional Magnetic Oxides in Spintronics

Dr. Ashna Bajpai is investigating multifunctional magnetic oxides for their potential applications in Spintronics, which utilizes electron 'spin' and 'charge' in electronic conduction. Ferromagnetic metals such as Fe, Co and Ni as a source of spin polarized conduction provide 30-40% spin polarization (SP). Highest SP is achieved in so called Half Metallic Ferromagnets (HMFMs) such as CrO_2 which has a near perfect SP $\sim 100\%$, at low temperatures. The quest is to obtain SP near to the room temperature for not only CrO_2 but also other HMFMs for practical applications. Another challenge in spintronics is to identify materials in which electronic conduction can be manipulated by magnetic field/stress in addition to electric field.

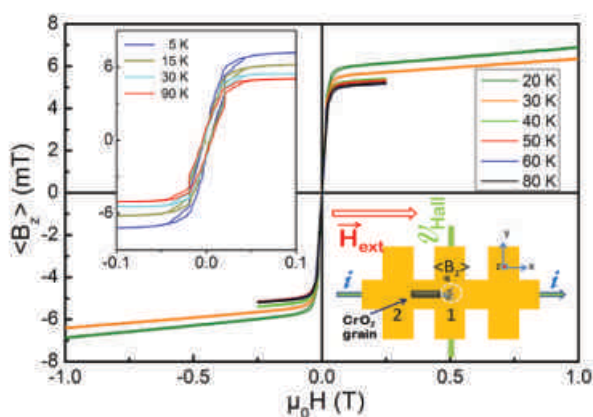


Figure 10 M vs H on a single micro magnet, schematically shown in the yellow Hall Cross using the technique of Micro Hall Magnetometry. This technique indicated the subtle features of AFM surface layer in M vs T which were not visible in bulk magnetization using conventional SQUID Magnetometry (JAP 2012) (Ashna Bajpai)

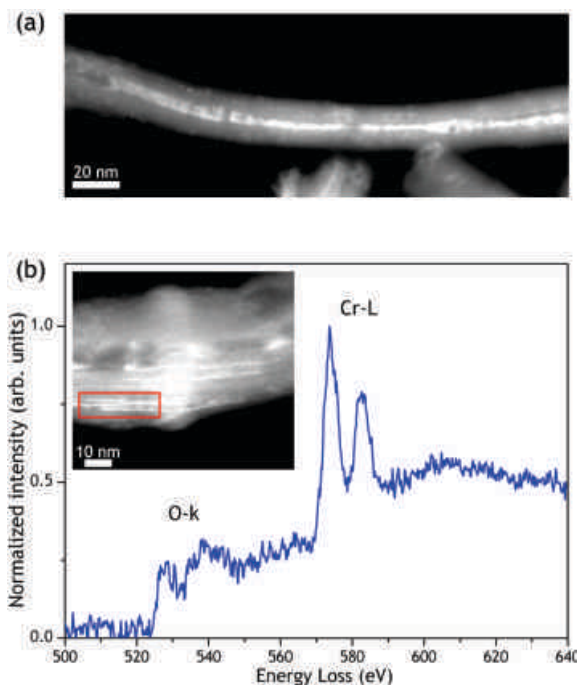


Figure 11 Encapsulation of antiferromagnetic and magnetoelectric oxide Cr_2O_3 inside the carbon nanotubes. The lower panel shows that the oxide in the form of nano sheets exists in between the shells of the CNTs (Carbon 2012) (Ashna Bajpai)

Dr. Bajpai is studying micro crystals of CrO_2 with a nano scale surface layer of another spintronic oxide Cr_2O_3 , which is magnetoelectric (ME) where, magnetism can be controlled via both electric and magnetic fields. Exploiting the size effects, the micro structural parameters are optimized for the functional magnetic properties to be finite near the room temperature (RT) and exhibit new features arising from the interface between two oxides. Micro Raman studies on a single micro grain of CrO_2 with Cr_2O_3 surface layer has been done to investigate the nature of transition around this new feature (Figure 10). In future, spintronic devices exploiting new functional properties of $\text{CrO}_2/\text{Cr}_2\text{O}_3$ interface is the target. The encapsulation of these magnetic oxides inside carbon nanotubes (Figure 11) is underway.

2.6 Multifunctional Magnetic Nanoparticles

Although highly monodispersed magnetic nanocrystals have proliferated new scientific avenues, it remains a big challenge to achieve stable, controlled hierarchically self-assembled architectures using the tiny building blocks of our choice for device fabrication. **Dr. Seema Verma's** group has reported a large scale synthesis of nearly monodisperse ferrite nanoparticles by a simple solvothermal route. Formation of a suitably compressed monolayer of CoFe_2O_4 nanoparticles at the air/water interface utilizing Langmuir-Blodgett (LB) method and its subsequent transfer to cadmium arachidate modified glass substrate at controlled rates has been accomplished. Characterization by TEM images which show long range assembly of nanoparticles is shown below.

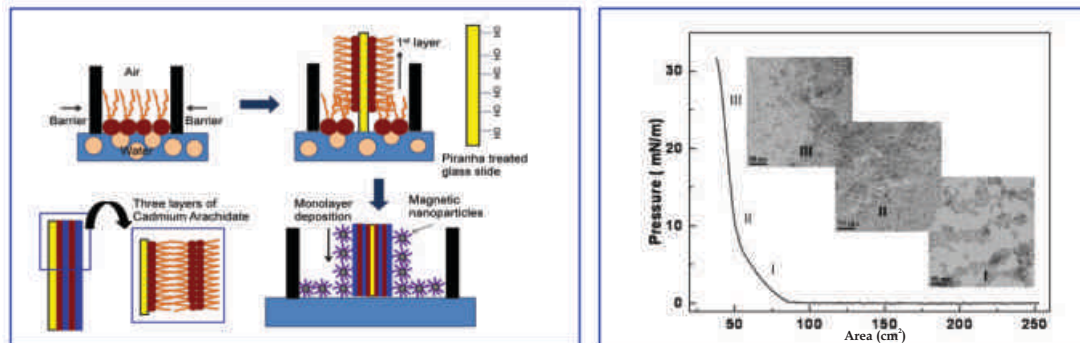


Figure 12 (left) Formation of CoFe_2O_4 nanoparticles; (right) characterization of nanoparticles by TEM (Seema Verma)

Work is in progress to explore a modified thermal decomposition method for obtaining highly monodispersed $\gamma\text{-Fe}_2\text{O}_3@\text{Ag}$ nanocomposites and study them for antibacterial applications.

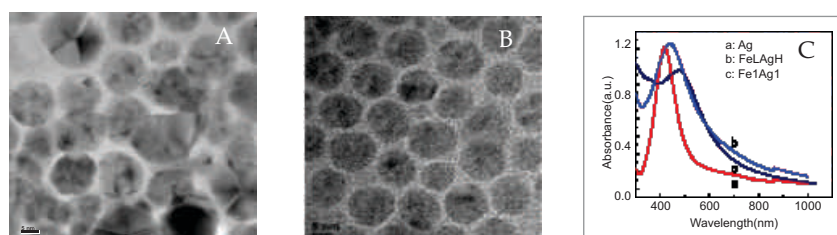


Figure 13 TEM images of Ag nanoparticles (A) and Ag_1Fe_1 nanocomposites (B) Corresponding UV-VIS spectra of nanoparticles and nanocomposites (C) (Seema Verma)

Synthesis of magnetic mesoporous silica nanocomposites for nanomedicine applications is underway. Mesoporous based magnetic materials can be utilized for storage of the small molecules like fluorescent dyes and drugs. Characteristic Photoluminescence spectra (PL) with fluorescence from attached FITC to CoFe_2O_4 nanoparticles is shown in Figure 14.

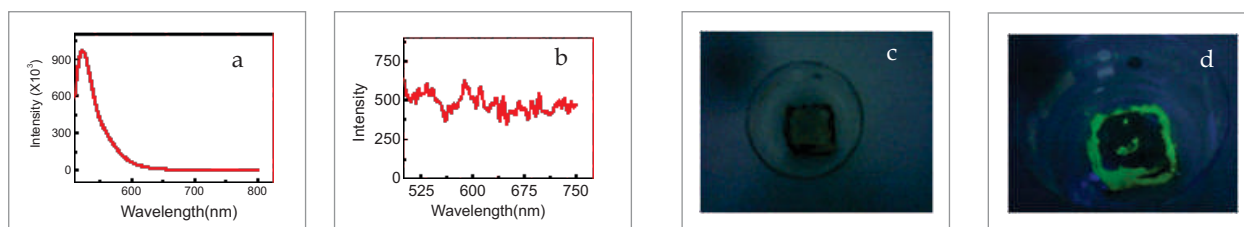


Figure 14 Characteristic PL of (a) CoFe_2O_4 nanoparticles, (b) supernatant after magnetic separation and images of nanoparticles (c) under magnetic field in visible light and (d) under UV lamp (Seema Verma)

More recent studies have shown that integrating single molecule surface-enhanced Raman Scattering (SERS) with optically tweezing methods such as holographic optical trap (HOT) lead to a local field enhancement capability at nano scale. It is interesting to see how light propagates via functionalized nanowires.

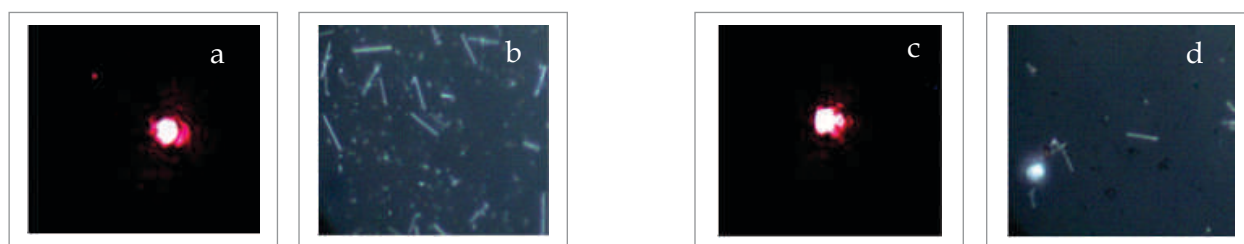


Figure 15 Optical image of focused laser beam of 633nm wavelength illuminating one end of (a) Ag nanowires (c) Ag nanowires treated with $\text{Ag@CoFe}_2\text{O}_4$ nanocomposites. (b) and (d) show corresponding optical images of nanowires of few micrometres length and the diameter of 20- 30 nm (Seema Verma)

2.7 Supramolecular Chemistry and Synthesis of $4n\pi$ Macrocycles: Antiaromaticity and Noncovalent Interactions

Dr. V.G. Anand's research is focused on the synthesis of stable and novel giant antiaromatic macrocycles with isophlorin skeleton. Successful synthesis and characterization of 32π vinylogous expanded isophlorins using thiophene and selenophene as the building blocks for these cyclic systems was reported. The electronic and structural properties confirm their antiaromatic nature both in solution and solid states. Very rare $\text{F}\cdots\text{X}$ ($\text{X} = \text{S}/\text{Se}/\pi$) interactions in the solid state, particularly for $4n\pi$ systems have been seen. Future work is now directed towards understanding the possible role of electronic effects affecting non-bonding interactions in antiaromatic systems.

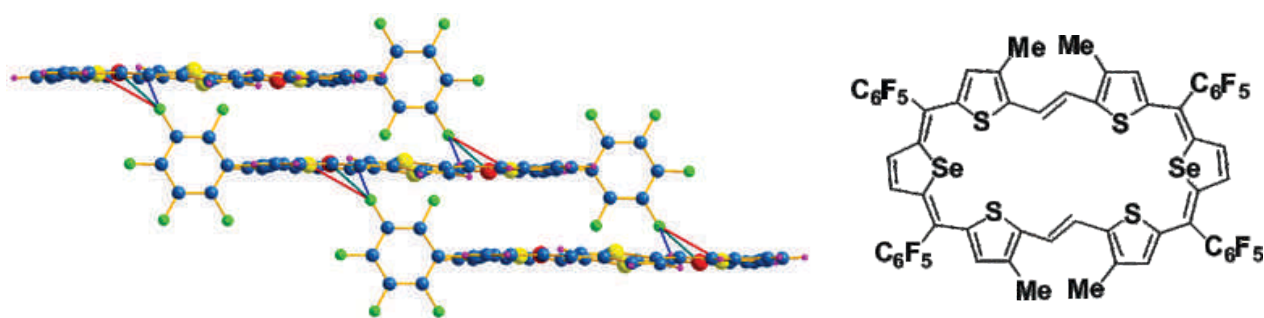


Figure 16 (left) Molecular structure of and depiction of F...S (red lines), F...Se (cyan lines), C-H...F (blue lines), F... π , and π - π non-covalent contacts in the 32 π expanded vinyllogous expanded isophlorin (right). Solvent molecules and pentafluorophenyl rings not involved in these interactions are omitted for clarity. Color Code: Blue:C; Green:F, Pink:H; Yellow:S and Red:Se (V.G. Anand)

3.0 Nanoscience and Nanotechnology

3.1 Quantum Opto-electronics of Semiconductor Nano-Structures and Devices

a) Electrical dielectric response of laser diodes upon light emission

Conventional techniques like DLTS are useful to study material junctions under reverse bias and cannot be used for high forward bias. **Dr. Shouvik Datta's** group is currently studying the condensed matter physics of light emitting medium using electrostatics approximation and the necessity of population inversion for lasing in semiconductor nanostructures (*Journal of Applied Physics* 110:114509 (2011) and also in *Physica Status Solidi C* 10:593 (2013). Studies have shown that unlike ordinary luminescence, modulated electroluminescence does not increase monotonically with decreasing temperature. This has importance in direct modulation for optical communication allowing device optimization to have maximum luminescence at the room temperature or above (*Applied Physics Letters* 102:053508).

b) Revisiting the Bohr exciton radius

Bohr exciton radius is the characteristic size to observe quantum confinement effects at the nanoscale. **Dr. Shouvik Datta's** group has observed a significant departure from the usual limiting form of dielectric screening (ϵ_∞) of coulomb interactions of 'hot' excitonic resonance in the region of strong dispersion at energies much above the fundamental band gap. This allows prediction of optimum size window of semiconductor nanoparticles for efficient usage in nano-photovoltaic devices. Further, the optical absorption yield of such quantum dots also enhance non-linearly with the intensity of incident light.

c) Self-assembly of cadmium sulfide (CdS) nano-tubes under capillary flow in porous alumina 'nano-reactor'

Dr. Shouvik Datta's group is exploring the chemo-hydrodynamic origin of convective interfacial instability of multi-component liquid-liquid reactive interfaces. Surface charge controlled

diffusion competes for sustained nucleation of CdS nano-tubes at the edges of porous nano-channels. They have investigated formation of nanostructure through interdependent connection between chemical kinetics and physical properties of fluids at nanometer length scales. This helps in understanding how confinement affects the entropic changes associated with the fluid flow inside such 'nano-reactor' (*Physical Review E* 85:056104 (2012)). The physics of fluorescence blue-shifts in nano-tubes having diameters much larger than the Bohr exciton radius of CdS and the origin of stoichiometric imbalance of Cadmium and Sulfur on the surface are being studied.

d) Dynamic Light Scattering (DLS) and Fluorescence Correlation Spectroscopy (FCS) Studies of Quantum Dots

In collaboration with **Dr. Shivprasad Patil's group**, influence of particle size distribution of CdTe quantum dots on the wavelength and the intensity of photoexcitation has been investigated using FCS. Autocorrelation time of FCS and the measured hydrodynamic sizes of quantum dots are found to be a strong function of light intensity for band edge photoexcitation. 'Blinking' in such quantum dots can occur due to charge transfer from core to surface states mostly through tunneling.

3.2 Scanning Tunnelling Microscopy and Atom Manipulation

Graphene, the two-dimensional form of carbon, has shown great promise for technological applications. In order to exploit the potential of graphene to the fullest extent, strategies for creative modification of graphene need to be explored. Recently the creation of sub 2-nm one-dimensional organic nanostructures on graphene was achieved (Figure 17)¹. Subsequently it was shown by using atomic layer deposition (ALD) that zinc oxide and alumina ALD precursors preferentially react with PCDA functional groups, resulting in templated oxide nanostructures. This finding has the potential to advance the development of graphene-based electronics and sensors².

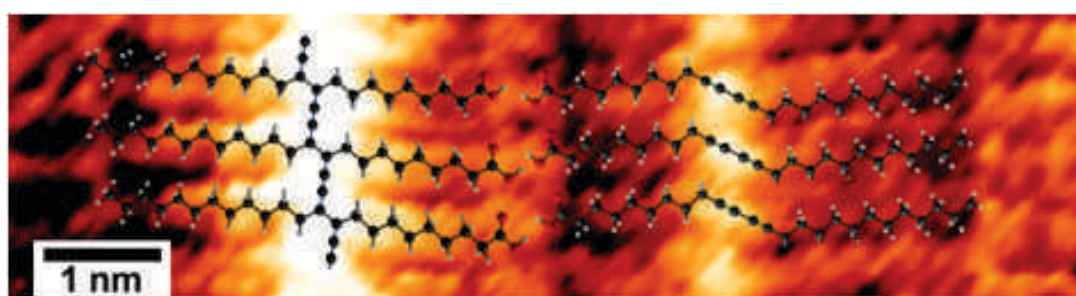


Figure 17 STM image of 10, 12 Pentacosadiynoic acid (PCDA) molecule monomers (right) and polymers (left) self assembled on epitaxial graphene with calculated monomer (right) and buckled polymer (left) structures superimposed on the STM image. (Taken from 1)

¹ Aparna Deshpande et. al. *J. Am. Chem. Soc.*, 134, 16759 (2012).

² Justice Alaboson et. al. *Nano Letters* Publication Date (Web): March 6, 2013 (Letter) DOI: 10.1021/nl4000932

Dr. Aparna Deshpande's laboratory now aims to tackle the problem of band gap engineering in graphene. Growth of epitaxial graphene on silicon carbide substrate and surface functionalization of graphene with self assembly of molecules by vapour deposition is being attempted. With scanning tunnelling microscopy, spectroscopy and manipulation techniques the molecule-graphene interaction will be investigated. Further work involves study of magnetism at the nanoscale with spin-polarized STM and spectroscopy in a number of systems including magnetic molecules on transition metal substrates and on graphene.

3.3 Magnetic Nano and Core Shell Particles

Prof. Sulabha Kulkarni is working on multiferroics and plasmonic materials. Multiferroics work involves synthesis and analysis of bismuth ferrite (BFO) nanoparticles and coating them either with silica or polyaniline (PANI). The group has shown that silica coating induces strain driven ferromagnetism in BFO. High energy X-ray photoelectron spectroscopy (3.5 – 8.5 KeV) at PETRA-III synchrotron, Hamburg, Germany was used to probe the compositional and chemical variations in these particles. Further the role of PANI shell induced effects in BFO core has been studied.

4.0 Spectroscopic Sciences

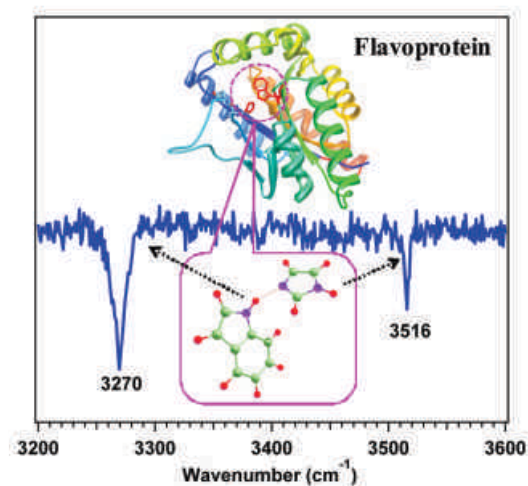
4.1 Gas Phase Laser spectroscopy

The major research focus of **Dr. Alope Das** and his group is on molecular level understanding of weak non-covalent interactions responsible for the stabilization of specific structures of biomolecules (proteins, DNA etc.) and biological recognition processes such as protein-protein, protein-DNA, protein-carbohydrate and protein-ligand interactions. The intermolecular interactions are studied in the isolated gas phase (supersonic jet) employing UV (Ultraviolet) and IR (Infrared) laser based spectroscopic techniques combined with quantum chemistry calculations. The spectroscopy experiments are done on a home-built REMPI (Resonantly Enhanced Multiphoton Ionization) jet-cooled Laser Desorption Time of Flight Mass spectrometer.

a) Binding motifs between the aromatic side chains of tryptophan and histidine residues in proteins

In this work, Dr. Alope Das' group has studied the indole-imidazole heterodimer to investigate the binding motifs between the aromatic side chains of tryptophan and histidine residues in proteins. Combined experimental and theoretical results show that the most preferred binding motif in the dimer is

Figure 18 IR spectrum of indole...imidazole dimer. Crystal structure of flavoprotein highlighting interaction between indole and imidazole units has also been shown in the figure (Alope Das)



N-H...N hydrogen bonding interaction leading to a V-shaped structure having additional C-H $\cdots$ and π -stacking interactions. The structure of the observed dimer resembles with that of the aromatic pair present in tryptophan and histidine residues in a nonfluorescent flavoprotein (see Figure 18).

(b) Synthesis of T-shaped and π -stacked dimers in the gas phase

T-shaped or π -stacked structural motifs are indeed the basic building architectures of the structures of biomacromolecules as well as materials. Dr. Alope Das's group has made the first observation of indole... hexafluorobenzene dimer has sandwich π -stacked structure whereas indole...p-xylene has N-H... π bound tilted T-shaped structure. The results exhibit selective switching of dimeric structure from T-shaped to π -stack by changing the substituent from electron donating ($-\text{CH}_3$) to electron withdrawing group (fluorine) in one of the complexing partners.

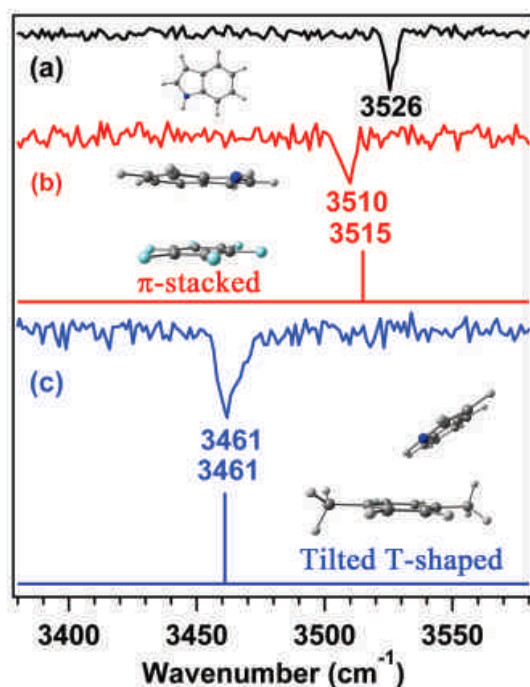


Figure 19. IR spectra in the NH stretching region by probing (a) origin band of indole, (b) and (c) 35180 and 34977 cm^{-1} band positions of the broad R2PI spectra of indole...HFB dimer and indole...p-xylene dimer, respectively. Theoretical IR spectra of π -stacked structure of indole...HFB dimer and tilted T-shaped structure of indole...p-xylene dimer calculated at the M05-2X/cc-pVQZ level of theory are provided with Figure b & c, respectively. (Alope Das)

4.2 Fluorescence Spectroscopy

Dr. Partha Hazra's group is focused on studying DNA/protein-drug interaction, dynamics of electron transfer, and GO-assisted drug delivery and solvation dynamics in biologically relevant systems.

a) Optical detection of an anti-cancer drug loaded onto graphene oxide

The green fluorescence of E switches to blue upon addition of GO, followed by switching back to green upon addition of either DNA or RNA. The intensified blue emission of the E-GO complex with human serum albumin (HSA) switches to bluish-green upon addition of DNA/RNA. Electron

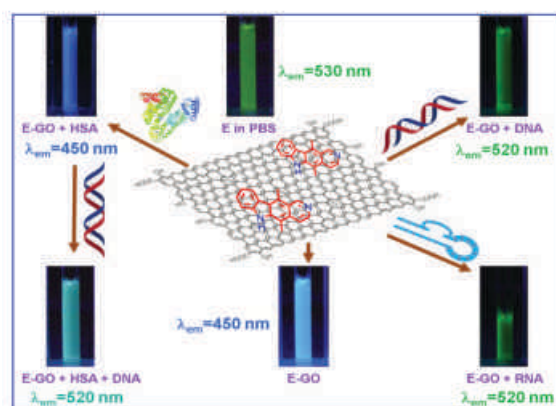


Figure 20 Fluorescence switching of Ellipticine in the presence of graphene oxide and subsequent addition of biomolecules (Partha Hazra)

microscopy studies reveal the formation of distinctive 3D assemblies involving GO and biomolecule(s) through non-covalent interactions, which results in biomolecule assisted fluorescence-switching of E. This kind of GO-DNA network structures could find potential applications in the fabrication of biomedical devices.

b) Probing protein-DNA interaction by anticancer drugs

Present work describes *in vitro* probing of protein-DNA interaction by fluorescence switching of an important anti-cancer drug, ellipticine. It is observed that fluorescence switching takes place from blue to green when serum albumin (SA)-bound ellipticine interacts with DNA. Steady state and time-resolved fluorescence results explore this switching as an outcome of ternary complexation comprising protein, drug and DNA. Electron microscopic (SEM) images disclose the existence of radially branched dendritic architecture in protein-DNA system where DNA starts nucleation at the tip of 'fern leaf' aggregates of protein. This type of self-assembled structure supports the Hazra group's conjecture that DNA does not wrap around but interacts with the protein through major groove and leads to the formation of ternary complex. They believe this simple but effective strategy of using visible colour switch as a tool to monitor protein-DNA interaction will be helpful in understanding many important cellular processes *in vitro* and *in vivo*.

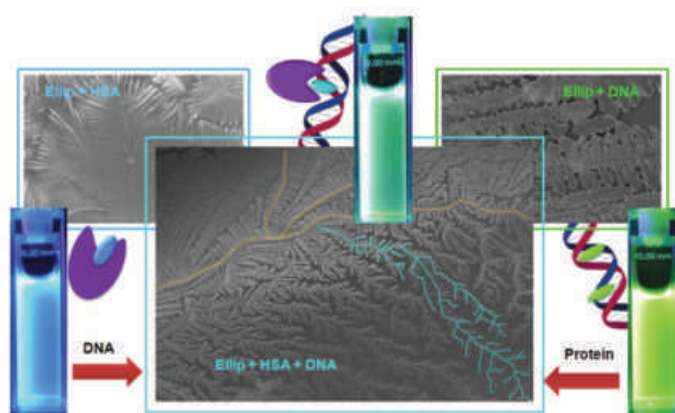


Figure 21 Fluorescence switching of Ellipticine during protein-DNA interaction and SEM images of DNA, protein-DNA systems (Partha Hazra)

4.3 Nanoplasmonics: Raman Spectroscopy

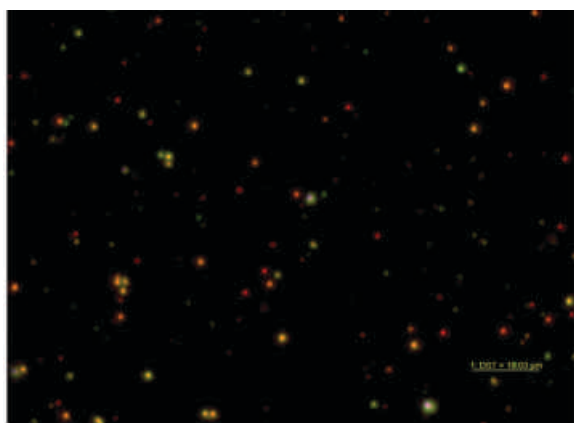


Figure 22 Dark-field optical image of gold nanoparticles on a glass substrate. Each dot in the image is light emitted by a single nanoparticle. The next goal is to perform plasmon spectroscopy on individual nanostructures. (G.V. Pavan Kumar)

Dr. G.V. Pavan Kumar's laboratory works on understanding the interaction of light with materials and molecules at micro- and nano-scales. Surface plasmon polaritons (SPPs) and localized surface plasmons (LSPs) are the two fundamental plasmonic excitations. SPPs can be utilized as nanophotonic waveguides and LSPs as nano-optical sensors. Dr. G.V. Pavan Kumar's group is performing single molecule Raman microscopy on core-shell plasmonic nanostructures (*J. Phys. Chem. Lett.* 2013) to harness single molecule Raman scattering to map the nanoscale plasmonic fields on nanostructures.

Recent experiments from Pavan Kumar's group (*Appl. Phys. Lett.* (2012) 100:43108) have shown that both SPPs and LSPs can be concomitantly realized in serially-coupled plasmonic nanowires. Their work on metallic nanocrescents (*J. Opt. Soc. Am. B* (2012) 22:594-599); nano-optical antennas (*Plasmonics*, *in press*); plasmonic nano-dimers (*Appl. Opt.* (2012) 51:1688-1693) and deterministic aperiodic geometries has shown that unconventional geometries can be harnessed as tunable nano-plasmonic substrates. In order to probe individual plasmonic and photonic nanostructures, Pavan Kumar's laboratory has built optical instruments such as holographic optical trap-based Raman microscope, dark-field nano-imaging microscope and an optical nanoscope based on 4-pi configuration.

4.4 Ultracold Atoms

Current research efforts in **Dr. Umakant Rapol's** group are targeted towards understanding of physics of ultra-cold atoms in exotic potentials formed by optical lattices. In this direction, the group has developed and built an experimental hardware to produce ultracold Bosonic atoms to be able to reach quantum degeneracy. The group managed to observe the first ever Bose-Einstein condensation at IISER Pune.

The very first signature of Bose-Einstein Condensation of ^{87}Rb atoms at IISER Pune obtained on 28th March 2012. About a billion ^{87}Rb atoms were loaded in a standard Magneto-Optic Trap from a Zeeman slower. These atoms were further cooled using Polarization gradient cooling and transferred into a magnetic trap. Atoms were then cooled using forced Evaporative cooling and adiabatically transferred into a single beam optical dipole trap. Further cooling down to quantum Degeneracy was done by lowering the optical trapping potential. The density distribution is probed using Time-of-flight absorption imaging. Efforts are currently underway to improve the SNR of images and stability of the entire machine to produce images with larger number of atoms. This will be achieved using a modified Vacuum Chamber and an improved experiment control system. Figure 23 shows the experimental hardware that was used to achieve BEC at IISER Pune.

Currently experiment has been relocated to the new campus and the experimental hardware has been

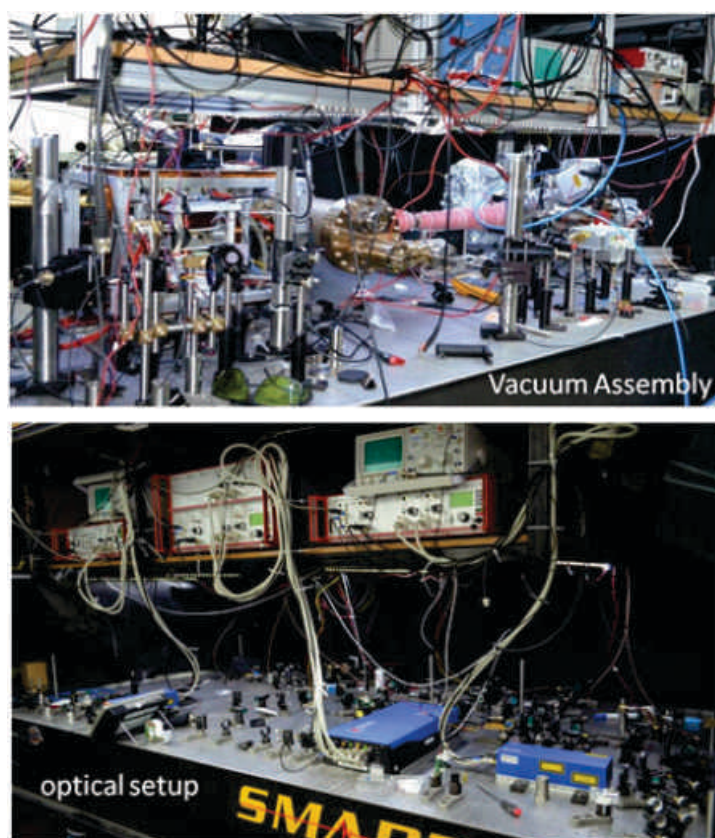


Figure 23 Experimental set-up for Rubidium BEC (Umakant Rapol)

completely revamped. The Vacuum system and the control electronics have been improvised and the magnetic trap has been changed to achieve larger number of atoms.

4.5 Colloidal Semiconductor Nanocrystals

The focus of **Dr. Angshuman Nag's** group is to develop functional inorganic materials using solution processed nanocrystalline modules for optoelectronic applications. Semiconductor nanocrystals, also known as Quantum Dots (QDs), provide unique size-dependent electronic and optical properties along with solution processibility, thus providing ideal building blocks for realizing macroscopic functional materials. Solution phase synthesis of nanocrystals leads to atomic level control over nanocrystal size and shape, and importantly, colloidal nanocrystals can be used as precursor for further reactions with organic, inorganic and biological species. Synthesis of colloidal nanocrystals of group II-VI, III-V, and I-III-VI₂ semiconductor nanocrystals and doping of nanocrystals with transition metal ions, and formation of complex hetero-structures have been carried out. Colloidal nanocrystals are generally capped with an insulating organic layer, which inhibits charge transport in the nanocrystal film. The group is designing inorganic ligands for colloidal nanocrystals that are electronically transparent and can passivate dangling bonds on nanocrystal surface.

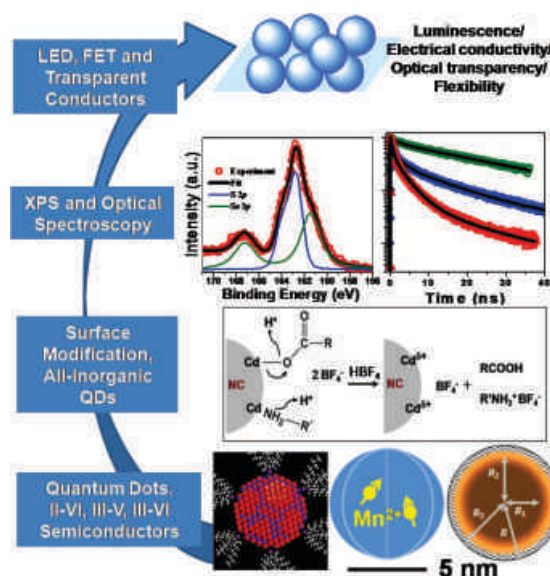


Figure 24 Development of functional inorganic materials (Angshuman Nag)

5.0 Theoretical Sciences

5.1 Nonlinear Dynamics and Complex Systems

a) Amplitude death in complex networks

Prof. G. Ambika's group has introduced a novel mechanism for inducing amplitude death in coupled systems, through feedback coupling with an environment or external medium. This works effectively for different types of systems such as periodic, chaotic and time-delay systems and for different types of direct coupling such as diffusive, replacement and synaptic couplings. In the context of coupled nonlinear dynamical systems on a complex network, the threshold values of the coupling with a common environment are obtained from stability analysis. An important outcome of the study is a universal relation between the critical coupling strength and the largest nonzero eigen value of the coupling matrix.

b) Complexity and connectivity measures from time series

An automated algorithm developed recently, along with collaborators, K.P. Harikrishnan and Ranjeev Mishra, is important in quantifying the complexity measures from the time series. Using

them in the context of hyper chaotic time series, two scaling regions in the correlation sum has been detected. This helps in analyzing chaos-hyper chaos transition and points to cluster like structures in a hyper chaotic attractor.

With collaborators, N Marwan and Juergen Kurths, an estimator based on recurrence plots called the Correlation of Probability of Recurrence (CPR) has been used to analyze connectivity between data and applied to nine stock indices spread worldwide. Binning CPR into three levels of connectedness: strong, moderate and weak, the trends obtained indicate that the markets move in and out of periods of strong connectivity erratically, instead of moving monotonously towards increasing global connectivity.

c) Evolving networks with bimodal degree distribution and phase locked clusters

Networks with bimodal degree distribution are most robust to targeted and random attacks. In the work sponsored by DST project, Ambika and her group introduced a new procedure for constructing a network with bimodal degree distribution in which nodes are added to the network with a probability p and deleted with probability $(1 - p)$. With an additional constraint in the process through an immunity score, which controls the dynamics of the growth process based on the feedback value of the last few time steps, bimodal nature for the degree distribution is obtained as an emergent phenomenon.

5.2 Self Assembling Polymeric Systems with Micelles as Models

Along with PhD student Mubeena Bano, **Dr. Apratim Chatterji** has developed a coarse grained self-assembling model to study the isotropic-to-nematic phase transitions for semiflexible equilibrium polymers (worm like micellar systems) using Monte Carlo simulations. The model is a combination of 3 potential energy terms: (a) a modified Lennard Jones potential which sets a length and energy scale for bond-formation, (b) A 3-body-potential term which incorporates semiflexibility and (c) A term which prevents branching and also control the excluded volume between adjacent polymer chains. Ongoing work focuses on shearing the polymers.

Apratim Chatterji has extended his previous work to study the structure and dynamics of (i) a single polymer chain (ii) a dispersion of colloids modelled as Brownian particles with excluded volume interactions (iii) a star in steady state extensional flow. In the previous year, he has developed a simulation scheme to obtain steady state extensional flow of a model of a fluid (using the multi-particle collision technique) in a channel of uniform cross-section.

There is ongoing work to understand the self assembly of hollow cylindrical nano-structure of Cadmium sulphide growing on a nano-template of anodised aluminium oxide nanotubes. In an experiment performed by Dr. Shouvik Datta and his students of IISER Pune, 0.1M of CdCl_2 and Na_2S was taken in two separate glass chambers and the two chambers were connected by an array of anodised aluminium oxide (AAO) nanochannels. Care was taken that height of the solutions in the two chambers was identical so that there was no hydrostatic pressure across the AAO nanochannel. If CdCl_2 and Na_2S are allowed to mix and react in a test tube, a precipitate of CdS is obtained. However, if the chambers containing the two chemicals are connected through AAO

nanochannels, such that in order to react the ions would need to pass through the nanochannel (of diameter varying from 20 - 100 nm), then the observed results are quite unexpected.

The chemical ions do not diffuse and react inside the nanochannel and thus clog the channel by CdS deposition. Instead, an array of CdS nano-cylinders of uniform length and thickness are formed only on one side of the AAO nanotubes template, viz., the side which contains Na₂S solution. These CdS have a pore inside the cylinder and are closed only at one end, the end which faces away from the nanotube template. The diameter of these cylinders is nearly the same as that of the diameter of the AAO nanochannel.

Dr. Apratim Chatterji has developed a simple lattice model which incorporates the physics of advection of fluid along with the physics of reaction-diffusion systems to understand the physics of growth of CdS precipitate to form these uniform cylindrical nano-structures with a pore in the center.

5.3 Materials Modeling

Research in **Dr. Mukul Kabir's** group can be divided into three major parts: (1) Understanding the complex energy landscape via quantum chemical calculations; (2) Understanding the microscopic kinetic mechanisms via transition-state sampling; and (3) Studying the macroscopic properties at larger spatial and temporal scales via Kinetic Monte Carlo.

a) Understanding and manipulating edge magnetism in graphene flakes. Pure and infinite graphene is nonmagnetic. However and quite fortunately, the presence of defects, and the finite-size-ness brings *p*-orbital magnetism in graphene flakes. But unfortunately, in finite graphene flakes most often the edges are coupled anti-ferromagnetically. Dr. Kabir's group is interested in understanding the origin of such magnetism and finding a way to manipulate it as well.

b) Formation and activation of topological defects in carbon nanostructures. Defects such as impurities, junctions, kinks, vacancies, and 5775 dislocation dipoles may be present in the as-prepared graphene and carbon nanotubes. These defects significantly alter their electrical, chemical, and mechanical properties. In one project, Mukul Kabir's group is trying to understand the thermodynamics and kinetics of 5775 dislocation dipole (topological defect) in carbon nanotube, and trying to find out a way to manipulate it. In another project, they are trying to understand the thermodynamics and kinetics of point-defects (single or multiple vacancies) to study void formation and edge reconstruction in finite sized graphene.

c) Catalyst design for water oxidation. Hydrogen is an energy carrier, and has tremendous future in clean energy sector. However, certain difficulties have to be overcome in terms of production, storage, and extraction for the end-use. Towards the production of hydrogen from water, Mukul Kabir's group is studying the catalytic role of Mn₄O₄Ca-complex (observed in Photosystem II) and analogous Co-complexes in water splitting to find out a rigorous catalyst design principle.

A few other projects are - (1) Microscopic mechanism of methane hydrate (Methane clathrate) formation, (2) Molecular magnetism, (3) Differential diffusion of Cr, Fe and other solute atoms in FeCr alloy towards designing new structural material for nuclear reactor.

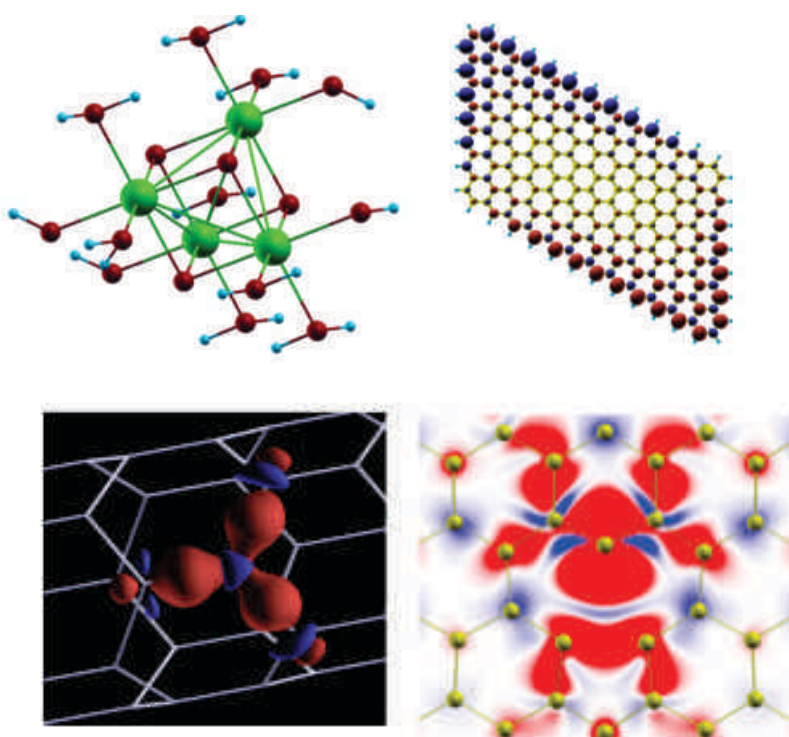


Figure 25 (top left) Structure of Mn_4O_4 Ca-complex in the gas phase; (top right) Edge magnetization in zigzag graphene flake; (bottom left) Bonding charge density in CNT; (bottom right) Spin density around a mono-vacancy in graphene (Mukul Kabir)

5.4 Gravitation and Quantum Effects

In regions of strong gravitation such as near black holes, quantum gravity is required for a correct physical description. One of the most important questions is whether black holes are stable under perturbations. With MS thesis student, Ashutosh Agnihotri, **Dr. Suneeta Vardarajan** has analyzed the stability of the Schwarzschild black hole in quantum gravity. This is an open (and difficult) problem. This project is now being completed by Dr. Vardarajan and Amruta Sadhu, an Integrated PhD student in her group. Another project completed (with an undergraduate student, Carolyn Lambert –who did some initial work on this) is a study of the stability of the Witten black hole in string theory and quantum gravity. In this work the backward limit (in a precise sense) of the sausage sigma model (an integrable nonlinear sigma model) gives the conformal field theory corresponding to the Witten black hole. Dr. Vardarajan's work (in a geometric *target-space* approach) gives new insights into questions such as the correct UV limit of the sausage sigma model which are very hard to address in the world-sheet approach.

Study of Naked singularities: Naked singularities are pathological spacetimes which can be obtained as solutions to Einstein's equations. A censorship conjecture by Penrose states that such spacetimes should not generically form in collapse situations. This implies that naked singularities should be unstable under classical perturbations. Along with an Integrated PhD student, Amruta Sadhu, Dr. Vardarajan has demonstrated the surprising stability of a naked singularity under a class of perturbations. The stability of this and other naked singularities under a wide class of perturbations is being carried out by Dr. Vardarajan, with members of her group (Amruta Sadhu, Bhavesh Khamesra and Dhanya Menon). This should lead to a clearer understanding of the cosmic censorship conjecture.

5.5 Modeling and Simulation of Materials and Processes for Alternate Energy

Research in the group of **Dr. Arun Venkatnathan** focuses on the application of Molecular Dynamics simulation methods to characterize structural and dynamical properties of various polymer electrolyte membranes and quantum chemistry of clathrate hydrates. Some of the important contributions are: characterization of structure of side chain pendants of various Perfluorosulfonic acid membranes, Aciplex membrane and proton-water transport at varying hydration and temperature, investigation of interactions and dynamics of benzimidazole (monomer and polymer) interactions with phosphoric acid and quantum chemistry calculations of proton transfer in triazole doped hydrogenated zero-dimensional cages.

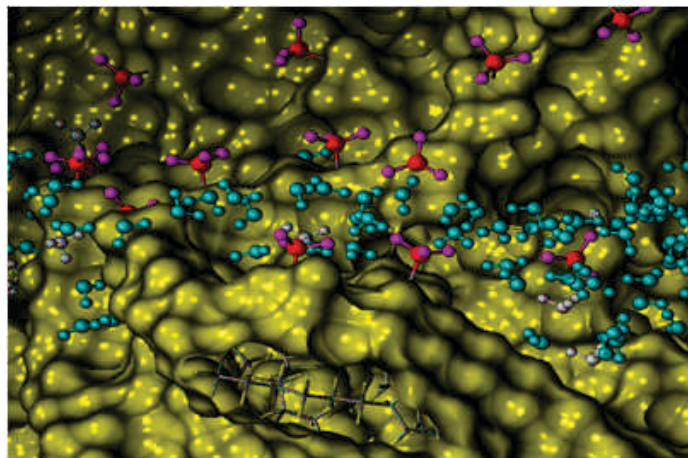


Figure 26 A snapshot of hydrated polymer membrane with water molecules and hydrated protons (Arun Venkatnathan)

The structure, stability and spectral properties of methane clathrate hydrates were also investigated using Density Functional Theory. The calculations show the thermodynamic conditions required for stability of methane encapsulation in cages of clathrate hydrates. The calculated spectral properties were in agreement with experimental findings.

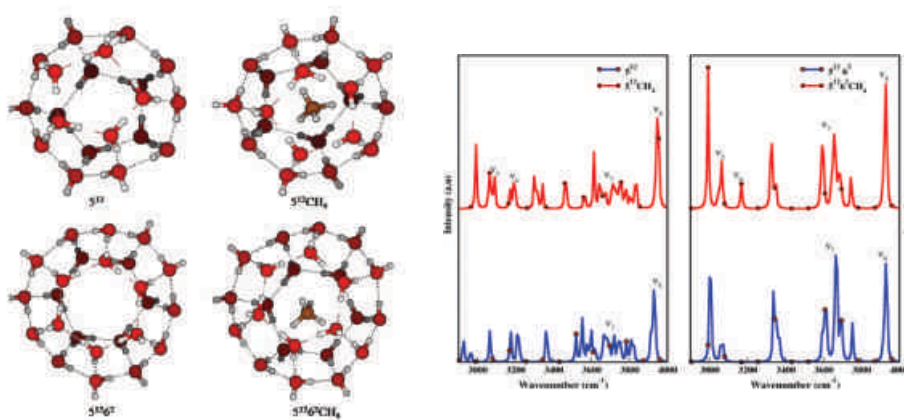


Figure 27 Structure and high frequency vibrational Raman spectra of cages of methane clathrate hydrates (Arun Venkatnathan)

5.6 String Theory and Quantum Field Theory

Research in progress in **Prof. Sunil Mukhi's** group includes a study of a novel proposed method to obtain the action of M5-branes in M-theory. This involves dimensional reduction of the AdS7 background on a rotating-frame time coordinate. The resulting spacetime has Lifshitz scaling and the dual field theory is a conformal invariant 5d CFT.

5.7 Low Dimensional Field Theory and Nonlinear Dynamics

This year **Prof. Avinash Khare** and his collaborators have looked at three different problems in this area. The nonlinear Schrodinger equation (NLSE) with cubic nonlinearity is a well known integrable equation with hosts of applications. It turns out that NLSE with higher order nonlinearities also occurs in variety of physical processes like hard core interaction of low dimensional Bose-Einstein condensation. The question of the stability of the soliton solutions in this model in the presence of external forcing terms has been examined. Exact solutions have been obtained for the forced case and their stability examined in detail using (a) phase portrait of the soliton (b) using a variational ansatz (c) by numerical simulation.

In another work, the well known, integrable Gross-Nevue model has been generalized to arbitrary nonlinearities and exact solutions have been obtained of the corresponding nonlinear Dirac equation with as well as without forcing terms. Further, a dynamical stability criterion has been deduced by using a variational ansatz and confirmed by numerical simulation.

Coupled discrete field theory models have application in several areas. An extensive set of exact quasi-periodic and hyperbolic soliton solutions of the following models have been obtained (a) Coupled Salerno model (b) Coupled Ablowitz-Ladik model (c) coupled ϕ^4 model (iv) coupled ϕ^6 models.

5.8 Supersymmetric Quantum Mechanics

Recently new Laguerre and Jacobi polynomials have been discovered and using these new analytically solvable potentials have been found in the context of Schrodinger equation. Deeper reasons for this development have been explored in this work by **Prof. Avinash Khare's** group. In particular, it has been shown that the quantum Hamilton-Jacobi approach also reproduces the exact bound state spectrum of these newly found potentials while supersymmetry inspired WKB approximation in general does not explain the exact spectrum unless some extra conditions are imposed.

6.0 Biological Sciences

6.1 Making of a Flight Appendage: An Evolutionary Perspective

Amongst the various insect groups, there has been much diversity in the number and size of wings. In the fruitfly, *Drosophila melanogaster*, the differential development of wing and haltere is dependent on the suppression of wing fate and specification of haltere fate by Ultrabithorax (Ubx), a member of Hox family of transcription factors. **Prof. L.S. Shashidhara's** group is studying the evolution of diversity in number, size and shape in insect wings by comparing targets of Ubx in different insect species such as *Apis mellifera*, *Bombyx mori*, *Tribolium castaneum* and *Drosophila*.

A comparison of large number of targets of Ubx between *Drosophila* and *Apis* suggests that while large number of targets of Ubx are similar between *Apis* and *Drosophila*, regulation of transcription is more pronounced in the latter due to the acquisition of binding sites for co-factors of Ubx. This hypothesis is being tested now.

6.2 Macromolecular Transport and Long Distance Signaling in Plant Development

a) Identification and functional characterization of Knotted-like homeobox genes in potato

Knotted like homeobox (KNOX) genes are ubiquitous in green plant lineages and they regulate diverse developmental processes. The focus of **Dr. Anjan Banerjee's** research group has been to understand the role of KNOX genes in potato development and tuberization. They have identified and validated six novel KNOX genes from potato genome sequence database. The group has recently shown (Mahajan et al, 2012) that upstream sequence of POTH1 (a Class I Knox) is rich in Light Regulatory Elements (LREs) and promPOTH1 is light inducible. The grafting studies revealed that POTH1 mRNA is graft transmissible and is indicated to be a signal for development.

b) Role of micro RNAs (miRNAs) in potato development

Tuberization (potato development) is a complex process involving formation of a specialized underground stem (stolon), which further develops into a mature tuber. In the transition process, stolon undergoes massive changes (rapid cell expansion and cell elongation) and passes through a series of developmental stages which under inductive conditions forms a tuber. This complex process is governed by different environmental, biochemical and genetic factors. Though a vast number of genes are known to be involved in this process, the regulatory mechanism in the transition is still not clear. Through a bioinformatic approach, Dr. Anjan Banerjee's group has identified a number of miRNAs that seem to be involved in gene regulatory network. Recently, they have validated the function of one such miRNA in potato. They have shown that miR156 functions as a graft transmissible signal and modulate plant architecture and tuberization in potato.

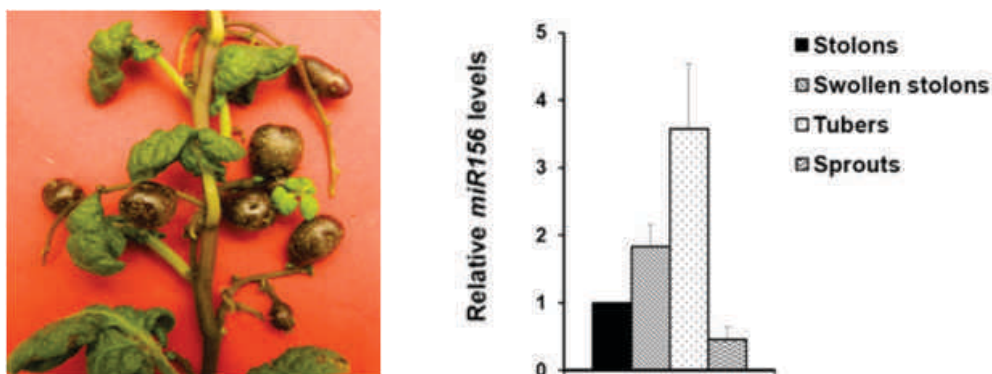


Figure 28 (left) Overexpression of *miR156* in potato modulates plant architecture and develops aerial tubers in potato plant; (right) Relative *miR156* expressions in different developmental stages of potato (Anjan Banerjee)

6.3 The DNA Damage Surveillance Mechanism in the Maintenance of Genome Integrity

Maintenance of genome integrity is critical for survival of an individual. The cell has a surveillance mechanism called "cell cycle checkpoints" that check for any damage incurred to the cell. The cell cycle checkpoints consist of a relay of signal transduction proteins that sense the damage on DNA and convey the signal via a number of protein kinases to the effector kinases. In mammalian cells,

the sensor kinases ATM (Ataxia-telangiectasia-mutated) and ATR (ATM and Rad3-related) play critical roles. Activated ATM or ATR transduce the signal to effector kinases Chk2 and Chk1 respectively via a number of mediator proteins that act as scaffolding proteins to amplify the signal.

Dr. Mayurika Lahiri's group is studying the novel interaction between checkpoint protein, TopBP1 and two protein interactors, anti-apoptotic protein, Api5 and mismatch repair complex, Msh2-Msh6 following DNA damage. Topoisomerase IIb binding protein (TopBP1) has eight BRCA1 C-terminal repeat (BRCT) domains. TopBP1 has been implicated to play a role in the DNA damage checkpoint pathway. A full-length GST-TopBP1 pull-down was performed to reveal novel interactions of TopBP1 with Api5 and Msh-2-Msh6 complex. Current research focuses on the structure-function analysis studies between TopBP1 and Api5 as well as TopBP1 and Msh2-Msh6 complex after damage in both *in vitro* and *in vivo* systems.

Another avenue that her laboratory is currently engaged in studying is the signal transduction pathways in breast cancer cells after nitric oxide [NO] production and the role played by NO in breast cancer invasion and metastasis. Platelet activating factor [PAF] has been shown to enhance motility in a metastatic breast cancer cell, which is abrogated when a PAF inhibitor is added.

6.4 Role of the CART Neuropeptide in Fear Response

Fear is a strong emotional response to real or perceived threat. **Prof. Nishikant Subhedar's** group has been interested in studying the role of the neuropeptide CART in processing of predator related information in rat. During acute exposure to a cat, the rat showed freezing behavior and profound signs of anxiety. While these behavioral effects were potentiated by the intracerebroventricular (icv) and intra-central nucleus of amygdala (CeA) administration of CART peptide, they were blocked by CART antibody. However, exposure of the rat to TMT (an odorant that induces fear in rat) did not produce any significant change in the profile of CART in the CeA. They suggest that there may be inherent differences in the processing of the fear information generated following cat exposure (which included odorant as well as visual information), as against that of TMT, which operates exclusively via the olfactory system.

Subhedar's group is also working toward identification and characterization of glucose sensing mechanisms in the brain of teleost fish. They have demonstrated the role of the neurons of entopeduncular nucleus in the brain of zebrafish in processing of energy homeostasis.

6.5 Population Dynamics

a) Theoretical and empirical studies on methods to stabilize the dynamics of populations and metapopulations

Despite great interest in techniques for stabilizing the dynamics of biological populations and metapopulations, very few practicable methods have been developed or empirically tested. **Dr. Sutirth Dey's** group proposes an easily implementable method, Adaptive Limiter Control (ALC), for reducing the magnitude of fluctuation in population sizes and extinction frequencies and demonstrate its efficacy in stabilizing laboratory populations and metapopulations of *Drosophila melanogaster*. Simulations indicated that ALC was effective over a range of maximal population growth rates, migration rates and population dynamics models. Since simulations using broadly

applicable, non-species-specific models of population dynamics were able to capture most features of the experimental data, these results are expected to be applicable to a wide range of species. Sah, Pratha, Salve, Joseph and **Dey, S.** Stabilizing biological populations and metapopulations by Adaptive Limiter Control arXiv 1205.4086

b) Empirical studies on the evolution of evolvability

Dr. Dey's group has selected replicate *E. coli* populations directly for evolvability, by subjecting them to a complex, randomly fluctuating environment. Only those individuals who can adapt to rapidly changing conditions can be expected to be selected under such circumstances, thus leading to a direct selection for enhanced evolvability. They have then assayed for evolvability by subjecting the selected and corresponding control populations to novel stresses that are uncorrelated with the conditions experienced during the fluctuating selections. They show that the selected populations are able to perform better under some (but not all) of the novel stresses, indicating at least some changes in the evolvability of the selected populations.

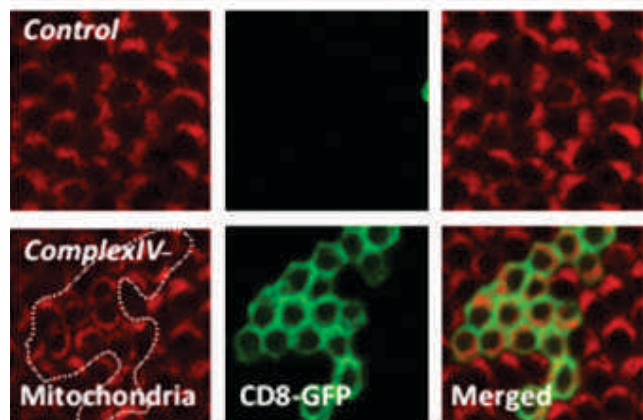
6.6 Development of Cell Morphology

Higher metazoan animals are composed of different cell types specialized to perform functions such as nutrient uptake, secretion, sensory perception, contraction and reproduction. They have highly specialized cell morphologies, to achieve their function. The first morphologically distinct cell type to arise during embryo development is an epithelial cell. It has an apical plasma membrane and a basolateral plasma membrane separated by junctional barriers. **Dr. Richa Rikhy's** lab is interested in understanding cellular mechanisms responsible for epithelial architecture formation and determination. The early syncytial *Drosophila* embryo has polarized plasma membrane domains even in the absence of complete cells. Rikhy's group has systematically imaged various fluorescent-tagged proteins to assess the onset of epithelial like architecture in the syncytial embryo. They find that hexagonal packing of cells arises in interphase of nuclear cycle 13 and the plasma membrane already has 3 distinct domains at this time.

Role of mitochondria in follicle epithelial cell differentiation

Rikhy's group is studying the organization and distribution of mitochondria during epithelial cell determination. Earlier studies have found that growth factor signaling pathways regulate mitochondrial morphology and dynamics. The group is currently probing the effect of altering growth factor signaling pathways on mitochondrial morphology and the effect of electron transport chain mutants on mitochondrial morphology. Complex VI mutant cells show a lack of polarized distribution of mitochondria (Figure 29).

Figure 29 Complex IV mutant cells show a loss in polarized mitochondrial distribution in epithelial follicle cells (Richa Rikhy)



6.7 Chromosome Biology in Disease and Development

It is well established that chromosomes assume a non-random position in the interphase nucleus referred to as the chromosome territory. In humans, gene rich chromosomes (Chromosome 19) are localized towards the center, while gene poor chromosomes (Chromosome 18) are closer to the nuclear periphery. Such an arrangement is strikingly conserved in evolution. The molecular mechanisms involved in establishing non-random arrangements of chromosomes in the nucleus are unclear. The focus of **Dr. Kundan Sengupta's** laboratory is to address the molecular mechanisms that regulate nuclear architecture in cancer cells. They are using 3-dimensional fluorescence in situ hybridization (3D-FISH) along with confocal microscopy to image fluorescently labeled chromosomes in cancer cells (Figure 30).

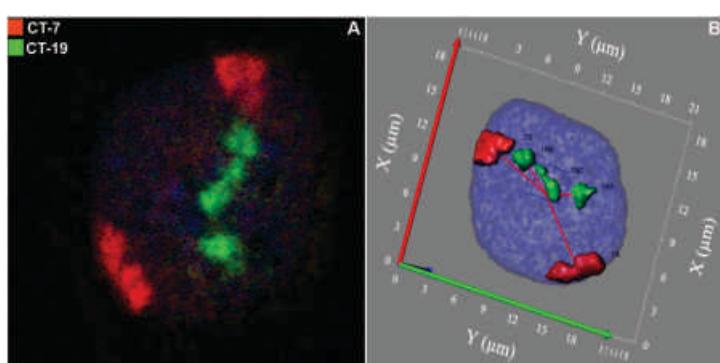


Figure 30 Artificially introduced human chromosome 19 assumes a central non-random position in an otherwise diploid colon cancer cells. (left) Merged confocal image of a nucleus showing peripheral chromosome 18 and 3 copies of chromosome 19 territory localized towards the nuclear center; (right) 3D reconstruction of the image on the left (Kundan Sengupta)

Nuclear structure in models of cellular differentiation and de-differentiation The above models provide a relatively static picture of nuclear structure. We are therefore examining nuclear organization of cells in a more dynamic system, during cellular differentiation. Nuclear organization is being investigated in terms of their chromosomal position and also in terms of the organization of gene loci. Using transcription inhibitors and siRNA based knockdown assays our current experiments show a distinct pattern of transcriptional modulation of genes in colon cancer cells. 3D-FISH and confocal imaging have also revealed the nuclear organization that these genes adopt in colorectal cancer cells.

6.8 Role of Lipids in the Origin of Life

Research being carried out in **Dr. Sudha Rajamani's** laboratory has implications for gaining basic understanding about a very fundamental question in biology - how did life chemically originate? In particular, the lab focus is on delineating the processes by which polymers capable of catalysis and replication emerged and propagated on early Earth. They are trying to delineate relevant processes that might have enabled the formation of complex mixtures of informational molecules (oligomers), like nucleic acids and peptides, on prebiotic Earth. Simple amphiphiles have been identified as model systems to explore their potential catalytic role in promoting nonenzymatic polymerization reactions. In particular, Dr. Rajamani's group is working on the role of liquid crystalline matrices of amphiphiles in the nonenzymatic polymerization of 5'-nucleoside monophosphates to RNA, a prebiotically important informational molecule.

Another line of investigation in this direction is to understand how functional informational sequences, once formed, might have efficiently replicated their information on prebiotic Earth despite high intrinsic mutation rates, which is a hallmark of nonenzymatic replication mechanisms. Membrane assemblies are known to provide local reaction conditions that are vastly different from the bulk medium. This study will also help ascertain the combinations of RNA and prebiotic compartment(s) that might have had an evolutionary advantage during evolution of cellular organization in an RNA world.

6.9 Cell Adhesion and Trafficking

Growth factor mediated cell cycle progression and growth is dependent on the ability of cells to attach to the extracellular matrix (ECM). This phenomenon is known as anchorage dependence and is primarily mediated by integrin receptors. Though growth factors and integrins can both independently propagate intracellular signals, their crosstalk allows for better and finer control of cell growth. Cancer cells overcome this need to be adherent to grow and become anchorage independent. They thereby acquire their unique growth and survival advantage, which correlates closely with tumorigenicity in animal models. Understanding how adhesion regulates growth signaling and how cancer cells overcome this regulation, is important to our knowledge of how cancers are caused and eventually treated.

Dr. Nagaraj Balasubramanian's laboratory is aiming to address some of these questions by trying to a) understand how adhesion regulates caveolar endocytosis and the role this could have in cancers, b) understand how adhesion regulates the small GTPase Arf6 and Ral, testing their role in exocyst function and anchorage dependence and c) studying caveolar trafficking and its differential regulation in 2D vs 3D matrices. In collaboration with Dr. Jayakannan's group at IISER Pune, Dr. Balasubramanian's laboratory is also working to develop and test nanoparticle mediated delivery of drugs targeting existing and newly identified candidates regulating anchorage independence in cancers (Pramod, P., Takamura, K., Chaphekar, S., Balasubramanian, N.* and Jayakannan, M.* (2012) *Biomacromolecules* 13: 3627-3640.)

6.10 Mechanical Responses of Lipid Bilayers

Intrinsic mechanical responses generated in the lipid bilayer during perturbations such as membrane bending and spreading appear to regulate cellular processes such as vesicular transport and cell migration. The characteristic timescales of these cellular processes span two orders of magnitude and it remains to be determined if cell membranes respond similarly across these timescales. Using atomic force spectroscopy, one can pull cell membranes to generate a membrane tether. Results from the groups of **Dr. Thomas Pucadyil** and **Dr. Shivprasad Patil** employing such tether-pulling experiments with variable rates (that match the rates of membrane deformation encountered in cellular processes) reveal interesting tether relaxation dynamics, which they interpret as transition of the lipid bilayer from a viscous to a viscoelastic regime. Their results imply that physical parameters that define the nature of cell membranes need to be interpreted keeping in mind the timescale of membrane deformation.

6.11 Experience Dependent Modification of Innate Behaviors

Aggression is an important social behaviour in animals. However, the mechanistic basis of experience-dependent behavioral plasticity seen during aggression is not well understood. The group of **Dr. Aurnab Ghose** use *Drosophila* genetics to investigate the neurogenetic substrates subserving learning and memory associated with agonistic behaviour. Their study implicates the cAMP pathway in mediating status-dependent behavioural changes during aggressive interactions and in the consolidation of the dominant-subordinate status into a more stable loser effect. They have shown that the two major behavioural features in aggression, learning within a fight and a longer lasting loser effect, not only have distinct biochemical requirements but also involve two memory traces with different decay rates. Their study is not only the first to identify critical neurogenetic mechanisms underlying learning and memory associated with aggression in any model system but it also offers insights into systems memory consolidation in complex social behaviours.

Using zebrafish as a model, they have mapped the neurocircuitry of two neuropeptides involved in regulating energy homeostasis and have also isolated the mechanism of action of these peptides. Further, they have discovered a novel regulation of olfactory sensitivity tuning the latter to the food intake status of the animal.

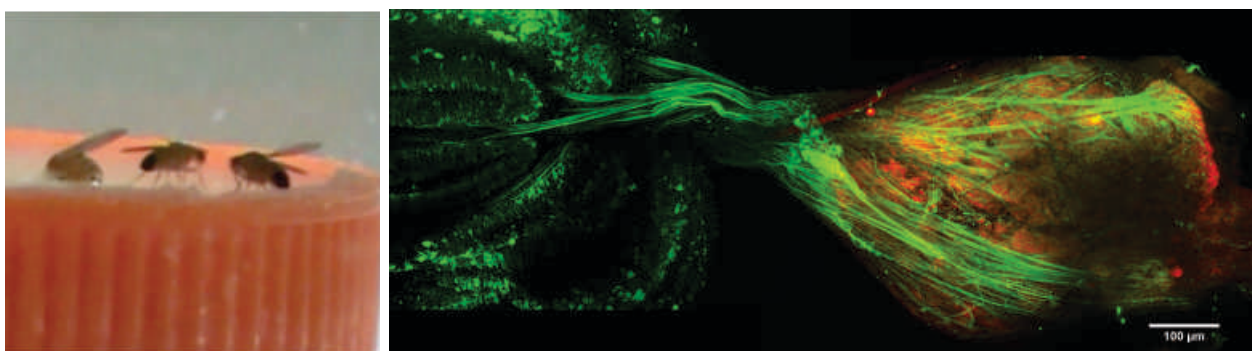


Figure 31 (left) Two male fruit flies engaged in an aggressive encounter (Nitin Chouhan and Aurnab Ghose); (right) Whole brain immunofluorescence of the zebrafish olfactory bulb showing the olfactory nerve stained with NPY (green) terminating in specific glomeruli (marked by SV2 – red). NPY is also seen in the cluster of terminal nerve cells (Ajinkya Deogade and Aurnab Ghose).

6.12 Mechanisms of Global Gene Regulation by SATB1

Tumor development and metastasis involves programmed changes in expression of large number of genes. The precise molecular mechanisms regulating the expression of these genes are not completely understood. The group of **Prof. Sanjeev Galande** has shown that chromatin organizer SATB1 is overexpressed in highly aggressive, potentially metastatic colon cell lines and its expression pattern correlates with Duke's classification of colon cancer types. Depletion of SATB1 from aggressive, potentially metastatic cell line reversed the tumorigenic phenotype and inhibited *in vivo* tumor development.

6.13 SUMOylation in Host Defence

The role of reversible post-translation modifications in rapid transduction of cellular signals has been studied in context of fine-tuning various biological processes. The post-translational modifier Ubiquitin play important roles in elicitation of both cellular and humoral immune response in *Drosophila melanogaster*. What is less understood is the role for the Ubiquitin- like modifier SUMO in regulating host defense. Given the importance of a robust immune response and the widespread nature of SUMO, it is likely that many proteins in signal transduction pathways involved in host defense are subject to regulation by SUMO. **Dr. Girish Ratnaparkhi's** group has shown that SUMO conjugation machinery is involved in Rel/NF- κ B induced anti-microbial peptide response using knockdown approach. For the first time for any biological process, they have obtained a *parts-list* of SUMOylated proteins that are differentially expressed in response to LPS-mediated immune challenge. The list is generated by quantitative mass spectrometry based iTRAQ analysis, which provides an elaborate list of ~1800 proteins, including proteins that were previously shown to be SUMOylated in fly and other organisms. The identified proteins are distributed into different functional groups of which 7% are related to immune functions.

7.0 Mathematics

7.1 Algebraic Groups

Conjugacy questions in group theory have been of interest for its connection with the representation theory and they have not been understood very well for *Algebraic Groups* over arbitrary field. Usually groups are difficult objects and one studies them via their representations to get better understanding.

Let G (e.g. GL_n) be an algebraic group defined over a field k . We denote the k points of G by $G(k)$ (e.g. $GL_n(k)$, $SL_n(k)$ etc.). An element t of $G(k)$ is said to be *real* if it is conjugate to its own inverse in $G(k)$. **Dr. Anupam Singh's** group has been concerned with finding real elements in algebraic groups. Very interestingly often it relates to finding strongly real elements (the elements which are product of two involutions in $G(k)$). Apart from studying structure of real elements in Algebraic Groups over k , the group also looked at many examples such as Linear Groups, Orthogonal groups, Symplectic groups and the groups of type G_2 to get better understanding of the problem. Finding real elements helps in the understanding of real characters of the group which in turn give information about those complex representations of the group which are either orthogonal or symplectic.

7.2 Combinatorics

Dr. Soumen Maity and his group are mostly interested in combinatorial problems that have applications and require expertise in hypergraph theory and combinatorial designs. The projects in which they are currently involved are: (i) New generalizations of covering arrays for software testing applications (ii) Extremal set theory.

a) New generalizations of covering arrays for software testing applications

Covering arrays are combinatorial objects that have been successfully applied in the design of test suites for testing systems such as software, circuits and networks, where failures can be caused by the interaction between their parameters. They perform a new generalization of covering arrays called covering arrays on hypergraphs. In these arrays, only specified choices of distinct parameters need to be tested and these choices are recorded in hypergraphs. This is useful in situations in which some combinations of parameters do not interact; in these cases, they do not insist that these interactions to be tested, which allows reductions in the number of required test cases. They gave a detailed study of constructions for optimal mixed covering arrays on some special classes of hypergraphs.

A practical limitation in the realm of software testing is budget. In most software development environments, time, computing and human resources needed to perform the testing of a component is strictly limited. To deal with such situation, we consider the problem of creating the best possible test suite (covering the maximum number of 3-tuples) within a fixed number of test cases. They have proposed group construction techniques for constructing the covering arrays with budget constraints. An interesting problem is to investigate general strategies which are capable of handling more than 3-way interactions.

b) Extremal set theory

They have initiated working on extremal Combinatorics, specially extremal set theory questions and their analogs for other discrete structures. Given a finite set X , the general problem in extremal set theory asks how large or small a family of subsets of X can be if it satisfies certain restrictions. Two core concepts in extremal set theory are intersecting families and shadows. The main results for intersecting families are the Erdos-Ko-Rado and Hilton-Milner theorems, and the principal result for shadows is the Kruskal-Katona theorem. By defining suitable notions of “intersecting” and “shadow” they intend to find remarkable analogs of these theorems for other structures such as multisets, permutations, set partitions etc.

7.3 Low Dimensional Topology

Dr. Rama Mishra's primary research interest has been the area of Polynomial Representation of knots. The *raison de etre* for using polynomial representation is that it opens a door for relating knot theory to Real Algebraic Geometry.

Mishra's group uses very sophisticated Algebraic geometric tools like: Peauseux Expansion, Milnor Number and Real perturbation of singular curves. They also use Mathematical software such as *Mathematica* and *Maple* to represent the 3D pictures of polynomial knots that they construct. The advantage of these polynomial knots is that they can be used for computations of many knot invariants which are otherwise difficult to compute.

A recent paper from her group titled *Polynomial unknotting and singularity Index*: discusses how polynomial knots can be used to compute a very important invariant of knots known as the unknotting number. Unknotting number is an invariant that is easy to define but hard to calculate,

hence this technique helps in making this invariant more accessible. Also, her work has recently disproved a conjecture on Super bridge index of knots (<http://arxiv.org/pdf/1209.3119v1.pdf>) by making use of theory of polynomial knots.

Also, classification of the topology of the space of all polynomial knots strengthens the connection between Algebraic geometry and Topology. Her ongoing work on *Polynomial knots in degree 6* provides a flavor in this direction.

As an extension of polynomial knots, Dr. Rama Mishra's group is currently working on explicit parameterization of knots in real projective space. "Knots in projective space" is still a new area of research and there are a lot of possibilities in this area. Most important is the question of invariants of knots in projective space and how they relate to knots in $\mathbb{R}^3$ or $\mathbb{S}^3$. This work uses many advanced research techniques such as *Contact geometry* and *Legendrian Contact homology*.

Dr. Rama Mishra's group is interested in classical knot invariants and their application in mathematics and biological sciences. Her joint work with Prof. Louis Kauffman on *A nodal parity invariants of knotted rigid vertex graphs*, discusses the application of this invariant on protein folding classification. Also knot theory can be used in understanding polymers such as Protein in various ways as illustrated in her joint work with Dr. Shantha Bhushan in an article on *Knot theory in understanding Protein*. This has been published in the *Journal of Mathematical Biology*, 2011.

7.4 Galois Representations

Dr. Baskar Balasubramanyam, in collaboration with Dr. E. Gbate (TIFR) and V. Vatsal (UBC), studies local Galois representations attached to Hilbert modular forms. Let f be a Hilbert modular form over a totally real field F . When f is an ordinary or nearly-ordinary form, the local Galois representation attached to it is upper-triangular and diagonal in some cases. Specifically, it can be shown that when f has complex multiplication (CM), the local Galois representation is diagonal. They show that the converse is also generically true. That is, if the Galois representations are not diagonal then except for a finite number of exceptions, the form is not CM.

Current work in Baskar Balasubramanyam's laboratory involves studying the arithmetic properties of special values of L-functions attached to automorphic forms.

7.5 General Quadratic Groups

Dr. Rabeya Basu's recent work is on general quadratic group introduced by A. Bak in 1967. Her group has deduced an analogue of Quillen-Suslin's Local-Global Principle for the general quadratic groups. Recently it has been generalized for the transvection subgroups, and using that they have concluded that the stabilization bound for the module case is the same that of the free case (given by Bak-Petrov-Tang), viz. $2d+4$, where d is the Krull dimension of the base ring.

Dr. Basu's group has also deduced the analogue of the Local-Global Principle for the hermitian groups and studied the solvability property of the unstable K_1 -group of the hermitian groups/modules.

At present, she is working on the quadratic modules and the Dickson-Siegel-Eichler-Roy transformation and trying to generalize the above solvability result for this transvection subgroup.

7.6 Shape Optimization Problems: Partial Differential Equations and Riemannian Geometry

It is known that the torsional rigidity for a punctured ball, with the puncture having the shape of a ball, is minimum when the balls are concentric and the first eigenvalue for the Dirichlet Laplacian for such domains is also a maximum in this case. These results have been obtained by Ashbaugh and Chatelain (private communication), Harrell et. al. [Harrell], Kesavan [Kesavan] and Ramm and Shivakumar [Ramm-Shivakumar].

In the paper Anisa-Vemuri [Anisa-Aithal], Dr. Anisa Chorwadwala's group generalizes the results of Anisa and Aithal for the hyperbolic space (2005) to all rank one symmetric spaces of non-compact type. It is motivated by the analogous one for $\mathbb{R}^n$ proved by Kesavan in 2003. The main results are as follows: Let B_1 be a ball in a non-compact rank-one symmetric space and let B_0 be a smaller ball inside it. It is shown that if y is the solution of the problem $-\Delta u = 1$ in $B_1 \setminus \bar{B}_0$ vanishing on the boundary, then the Dirichlet-energy of y is minimal if and only if the balls are concentric. It is also shown that the first Dirichlet eigenvalue of the Laplacian on $B_1 \setminus \bar{B}_0$ is maximal if and only if the two balls are concentric. The formalism of Damek-Ricci harmonic spaces is used. The results are interesting and it is well into recent research on the subject. It proves that the formalism of harmonic spaces developed by Cowling, Dooley, Koranyi, Ricci [CDKR, CDKR2] is useful.

In the paper Anisa-Rajesh [Anisa-Rajesh], Chorwadwala extends these results from the linear case to non-linear case. That is, they prove the results for the non-linear p -Laplacian ($1 < p < \infty$) which coincides with the linear Laplacian for $p=2$. For proving these results, they follow the same line of ideas as in the aforementioned articles; namely, study the sign of the shape derivative using the moving plane method. But in the place of maximum principles they use comparison principles some of which are already available in the literature but we have also developed a few of them suitable for our problem. In the process, they obtain some interesting new side results such as the Hadamard perturbation formula for the torsional rigidity functional for the Dirichlet p -Laplacian, the existence and uniqueness result for a nonlinear pde and some extensions of known comparison results for nonlinear partial differential equations.

7.7 Stochastic Control and Math Finance

Dr. Anindya Goswami and his research group has studied a multi-class M/M/1 system, with service rate $n \mu_i$ for class- i customers, with the risk-sensitive cost criterion $n^{-1} \log E \exp \sum_i c_i X_i(T)$, where $c_i > 0$, $T > 0$ are constants, $X_i(t)$ denotes the class- i queue-length at time t assuming the system starts empty. It is shown that, as $n \rightarrow \infty$, asymptotic optimality is achieved by the service policy that prioritizes the classes in decreasing order of the index $\mu_i(1 - e^{-c_i})$. This index, can thus be thought of as a modification of the well-known $c \mu$ rule for risk-sensitive cost.

It is known from earlier work of Dr. Anindya Goswami and his research group that the risk minimizing price of European options in Markov modulated market satisfy a system of coupled PDEs, known as generalized B-S-M PDE. Along with a summer student he has considered another system of equations, can be categorized as a Volterra integral equation of second kind. It is shown

that this system of integral equations has smooth unique solution and the solution solves the generalized B-S-M PDE. Apart from showing existence and uniqueness of the PDE, this finding resolves various computational challenges as well. First of all, it enables development of an alternative numerical approach to find the option price by using a quadrature method. Secondly, it enables to find a Volterra equation for optimal hedging strategy. Therefore, calculating hedging strategies becomes as easy as calculating option prices. Needless to mention, solving the PDE for hedging strategy is much harder than solving the PDE for option price.

7.8 Algebraic Geometry

Dr. Vivek Mallick's research in the past year has been revolving around two problems: one concerning Hodge theory of T -varieties; and the other concerning stable module categories as triangulated categories. T -varieties are algebraic varieties with an effective torus action. Klaus Altmann, Jürgen Hausen and Hendrik Süß have developed a theory which attaches a “family” of combinatorial data to such spaces. This combinatorial data becomes particularly nice when the dimension of the torus is close to the dimension of the variety. If they are equal, that is in the case of toric varieties, the combinatorial data given by the above authors, reduce to the classical combinatorial data associated to toric varieties. A lot is known about the geometry of the toric varieties, and most of these facts are proven by reducing the problem to a combinatorial one. In the work, which Dr. Mallick is doing jointly with Jos´e Ignacio Burgos, ICMAT, Madrid and Martin Sombra, Universitat de Barcelona, Barcelona, they are writing a procedure to compute geometric invariants of the T -varieties. This procedure, of course depends on computing some geometric properties of the variety parametrizing the family of combinatorial data. In case the parametrizing family is a nice well known space, like the projective line, then one can actually get some algorithms. Their final aim is to study their derived categories, and phenomena like existence of mirror symmetric pairs for such varieties. This project is potentially a long collaboration promising a series of papers.

The second project is based on an idea of Professor V. Srinivas of TIFR. Dr. Mallick’s group is interested in understanding the triangulated category of stable modules on a finite group scheme. This work relates to an on going work of Benson, Iyenger, Krause and others. They are trying to find a notion of “generalized triangulated category” which will capture more information about the group than the present stable module category. They hope to use such a definition and make constructions, inspired by the work done by Paul Balmer, which in turn would provide a theory helping us to deduce something non-trivial about modular representations of these finite group schemes.

7.9 Number Theory, Representation Theory and Automorphic Forms

Prof. Raghuram's research involves the study of special values of L-functions using results and techniques from the Langlands program, and from the cohomology of arithmetic groups. In the period of time covered by this annual report he has completed work on two papers and have made progress on his collaboration with Günter Harder which is funded by the Alexander von Humboldt Foundation.

- The first paper, with Wee Teck Gan, studies the behavior of periods of automorphic forms under Galois conjugation. This analysis is motivated by, and has applications to, the study of values of L-functions of an object (modular form, motive, etc.) upon conjugating that object by Galois automorphisms.
- The second paper, with Chandrasheel Bhagwat, studies periods of tensor product motives. The results of this paper, together with the famous conjectures of Deligne, exactly predict the results (those proven already, and also the forthcoming ones) of Prof. Raghuram's ongoing collaborative work with Harder.

This work with Harder studies rank-one Eisenstein cohomology for $GL(n)$ and interprets analytic aspects of the Langlands program in a geometric framework and thereby giving new results on the special values of Rankin-Selberg L-functions.

7.10 Number Theory, Representation Theory and Spectral Theory of Symmetric Spaces

The interplay between arithmetic, spectral theory and geometry was studied by mathematicians like Selberg, Maass, and Sunada among many others. From the last few years, **Dr. Chandrasheel Bhagwat** has been working on the study of arithmetic aspects of the spectral theory and geometry of symmetric spaces. His thesis work involved proving various analogues of the classical number theoretic results in the context of symmetric spaces. He is also interested in the study of analytic properties of the Zeta functions associated to a rank one locally symmetric space, which encode a lot of spectral and geometric data. They can be considered as the spectral counterparts of the Dedekind zeta functions associated to number fields. He plans to look at some of the 'inverse problems' on locally symmetric spaces with the aid of the Zeta functions mentioned above.

In a joint work with Prof C. S. Rajan and Dr Supriya Pisolkar, he has established some results which relate the notions of weak commensurability (introduced by Prasad and Rapinchuk) and representation equivalence of arithmetic lattices in Lie groups. These notions are in turn related to the geometry and spectral theory of the locally symmetric spaces defined by them.

Bhagwat's recent work with Prof. Raghuram has established certain period relations for the tensor product of motives which together with the celebrated Deligne's conjecture predict the results of a similar nature about the special values of Rankin-Selberg L-functions and Dirichlet L-series. In future, he would like to work on some of the problems associated with special values of L-functions.

7.11 Mathematical Biology

Dynamical processes in biology naturally span several systems and multiple scales, both in space and in time. **Dr. Pranay Goel's** group is interested in studying the dynamical behavior of biological processes through mathematical modeling to complement experimental understanding. Their research focuses primarily on theoretical neuroscience, cardiac dynamics and diabetes. Each of these areas is rich with issues that arise from a fundamental need to develop theoretical frameworks, and to handle multiscale dynamics within those.

Our understanding of glucose-stimulated insulin secretion from the pancreatic endocrine tissue, the islets of Langerhans, has developed considerably over the last three decades. Much of Dr. Pranay Goel's recent work has been related to analyzing some newly proposed models of islet voltage oscillations (called "bursting") that implicate both ionic as well as metabolic activity as being jointly responsible for function. Additionally, they are also now working on modeling glucose-sensitive neurons of the brain towards a view to understanding their potential role in maintaining energy homeostasis. A recent direction of work in his laboratory relates to analysis of data collected from patients diagnosed with Type 2 diabetes. This is joint work with researchers at the University of Pune and K. E. M. Hospital, Pune.

7.12 Several Complex Variables, Potential Theory and in Differential Geometry

Dr. Diganta Borah's research focuses on the study of the intrinsic properties of a Kahler metric, the so called Robin metric, on bounded pseudoconvex domains in $\mathbb{C}^n$, $n > 1$. This metric was constructed by N. Levenberg and H. Yamaguchi using the Robin function that arises from the Green function associated to the standard sum-of-squares Laplacian in $\mathbb{C}^n$.

Recently, he studied holomorphic sectional curvature, L^2 -cohomology and geodesics of the Robin metric and obtained interesting results which are going to appear in the Michigan Mathematical Journal.

Currently, Diganta Borah is studying some finer properties of the geodesics of the Robin metric. In his breakthrough article, "The Bergman kernel and biholomorphic mappings of pseudoconvex domains", Charles Fefferman proved that a biholomorphic mapping between two strongly pseudoconvex domains extends smoothly up to the boundary. A key idea in the proof is that a geodesic of the Bergman metric on a strongly pseudoconvex domain, that starts very close to the boundary with initial velocity along the normal direction, hits the boundary at a unique point. Very recently, he has obtained a similar result for the Robin metric also. Another result that he has obtained is the existence of geodesic spirals of the Robin metric on strongly pseudoconvex domains. An analogue of this result for the Bergman metric was studied by Gregor Herbolter.

7.13 Representation Theory and Canonical Forms

In one project, **Dr. Steven Spallone** studies arithmetically interesting representations called "discrete series" using this duality. These correspond to modular forms, which are a cornerstone of number theory. Classically, these are functions on the upper half-plane with certain invariance and holomorphicity properties. A typical modular form encodes an interesting sequence of arithmetical data. They form finite-dimensional vector spaces, and so sufficiently many of them will be linearly dependent. Great theorems can arise simply from observing that modular forms from wildly different sources live in the same space. Dr. Spallone's work attempts to write their multiplicities in terms of measures over conjugacy classes of p -adic groups, and thus give a new explicit formula for dimensions of spaces of modular forms.

In another project, Dr. Spallone is studying representations of isometry groups of quadratic forms, notably those induced from a stabilizer P of a nondegenerate subspace. This work shows that relationships between such representations are illuminated by first decomposing P into two

subgroups M and N , and then by finding canonical forms for the conjugation action of M on N . This decomposition can be expressed as an integration formula, which applies to the representation theory of p -adic groups. A certain residue packs a wealth of arithmetic information (via L -functions), if one can only evaluate it. Using the integration formula, he simplifies this residue, and give the first evaluation of it in some low-rank cases.

To introduce another project, consider square matrices, with entries modulo a cubefree integer. Along with collaborators, Dr. Spallone has determined when two such matrices are conjugate, notably in the 4×4 case.

Dr. Spallone also works on local p -adic dynamics, the study of when two germs of dynamical systems fixing a point are analytically equivalent.

7.14 Analytic Number Theory and Arithmetic Geometry

Dr. Kaneenika Sinha's primary research work is concerned with equidistribution of Fourier coefficients of modular cusp forms, Eichler-Selberg trace formula and arithmetic of modular curves. Her research program focuses on the behavior of the Fourier coefficients of normalized Hecke eigenforms and their connections with Jacobian varieties of modular curves.

Dr. Sinha's current research work focuses on the following problems:

Project 1

There has been a lot of interest recently in the study of the rank of these varieties over the rationals. Two questions that are of fundamental importance are as follows:

- Are there large quotients of $J_0(N)$ with rank equal to zero?
- How large can the rank of a quotient of $J_0(N)$ be?

Thanks to the Birch and Swinnerton-Dyer conjecture, the above questions can be interpreted analytically in terms of the order of the zero at $s=1$ of the L -function $L(s, J_0(N))$, also called the analytic rank of $J_0(N)$. Dr. Sinha is working towards obtaining unconditional bounds for the analytic rank of $J_0^{\text{new}}(N)$. Can one find a constant $c < 1$ such that $\text{Rank } J_0^{\text{new}}(N) < c s^{\text{new}}(N, 2)$, where $s^{\text{new}}(N, k)$ denotes the dimension of the space $S^{\text{new}}(N, k)$?

Project 2

Motivated by Project 1 Dr. Sinha is investigating the following question: let f and g run over all normalized newforms of wt 2, level N and let $\otimes$ denote the Rankin-Selberg convolution. Can one estimate the sum of order of vanishing of the Rankin-Selberg L -function $L(f \otimes g, s)$ at the critical point as we run over both f and g ? That is, can one estimate

$$\sum_{f, g} \text{ord}_{s=1/2} L(s, f \otimes g),$$

where the sum runs over all pairs of normalized newforms of weight 2 and level N ?

IISER Pune Library

Over 1500 print books, 500 electronic books and many more online resources have been added to the library's collection during the period under report last financial year.

Statistics of the Library as on March 31, 2013

Print Books Procured – 14517

e-Books - 6000

Print Journals / Magazines - 50

e-Journals - 3000

Full-Text Databases - 10

Bibliographic Databases - 7

Records in IISER Digital Library (IDL) – 191

Users of the library – 815

Some of the important online resources being subscribed to are given below:

Online Full-Text Resources

ACS Web Edition + Legacy Archive

American Institute of Physics (AIP)

American Physical Society (APS)

Annual Review's Publications + Archives

IEEE Xplore Digital Library

Institute of Physics (IOP) + Archives

International Press

JSTOR

Nature Publishing Group (NPG)

OSA's Optics Infobase

Project Euclid's Prime Collection

Royal Society of Chemistry (RSC) + Archives

Science Direct

Society for Industrial and Applied Mathematics (SIAM)

SPIE: International society for optics and photonics

Springer Online Journals + Archives

Wiley Interscience

Online Bibliographic Resources

Faculty of 1000: Post-publication peer review database

MathSciNet

Reaxys - Chemistry workflow solution

Scopus

Synfacts

Web of Knowledge

Digital Library has been setup and currently functioning with 191 records in it. All the MS Thesis of 2006, 2007 and 2008 batch of BS MS students as well as thesis of awarded PhD degrees have been successfully uploaded on to digital library. Records of digital library are fully searchable and accessible within the campus.

Library is subscribing to 'iThenticate: plagiarism checking web tool' which allows researchers compare their content against a massive database before publication to ensure the work is original. Presently, this facility has been given to faculty members of the institute.

Circulation System

For circulation of documents, automated biometric based Kiosk has been installed in the library which enables users to issue, return and renew books by themselves. Kiosk is operational from 8 AM to 11 PM on all days including holidays.

Balance Sheet as at 31st March, 2013

(Amount in ₹)

Sr. No.	Liabilities / Assets	Schedule No.	Current Year 2012-2013	Previous Year 2011-2012
CORPUS / CAPITAL FUND AND LIABILITIES				
I	CORPUS / CAPITAL FUND	1	3,056,339,996	2,306,177,687
II	RESERVES AND SURPLUS	2	82,193,188	-
III	EARMARKED / ENDOWMENT FUNDS	3	577,408,541	313,984,806
IV	SECURED LOANS AND BORROWINGS	4	-	-
V	UNSECURED LOANS AND BORROWINGS	5	-	-
VI	DEFERRED CREDIT LIABILITIES	6	-	26,090,873
VII	CURRENT LIABILITIES AND PROVISIONS	7	38,906,919	18,847,621
TOTAL LIABILITIES			3,754,848,644	2,665,100,987
ASSETS				
I	FIXED ASSETS - NET BLOCK	8	956,230,944	666,326,277
	WORK IN PROGRESS	8	2,100,109,052	1,178,572,702
II	INVESTMENTS -FROM EARMARKED / ENDOWMENT FUNDS	9	-	-
III	INVESTMENTS - OTHERS	10	64,173,992	46,733,995
IV	CURRENT ASSETS, LOANS AND ADVANCES MISCELLANEOUS EXPENDITURE (to the extent not written off or adjusted)	11	634,334,654	773,468,013
TOTAL ASSETS			3,754,848,644	2,665,100,987
	SIGNIFICANT ACCOUNTING POLICIES AND	24	0	0
	NOTES ON ACCOUNTS	25		

For and on behalf of IISER, Pune

sd/-
(**Mariam John**)
Dy. Registrar (F&A)

sd/-
(**Dr. V.S. Rao**)
Registrar

sd/-
(**Prof. K. N. Ganesh**)
Director

Place: Pune
Date: 23.05.2013

Income & Expenditure Statement for the Period Ended 31st March 2013

(Amount in ₹)

Sr. No.	Particulars of Income & Expenditure	Schedule No.	Current Year 2012-2013	Previous Year 2011-2012
I	INCOME			
	INCOME FROM SALES / SERVICES	12	-	-
	GRANTS / SUBSIDIES (REVENUE)	13	548,726,000	413,900,000
	FEES / SUBSCRIPTIONS	14	13,798,602	10,816,950
	INCOME FROM INVESTMENTS	15	-	-
	INCOME FROM ROYALTY, PUBLICATION	16	-	-
	INTEREST EARNED	17	36,720,835	45,013,397
	OTHER INCOME	18	4,464,761	2,459,004
	INCREASED / (DECREASED) IN STOCK OF FINISHED GOODS AND WORK IN PROGRESS	19	-	-
	FOREIGN EXCHANGE FLUCTUATION GAIN		-	-
	DEFERRED INCOME FOR THE YEAR (In proportion to Depreciation charged)		151,335,789	
	TOTAL INCOME		755,045,987	472,189,351
II	EXPENDITURE			
	ESTABLISHMENT EXPENSES	20	129,810,623	98,544,587
	OTHER ADMINISTRATIVE EXPENSES	21	347,179,336	336,946,808
	FOREIGN EXCHANGE FLUCTUATION LOSS		6,883	2,480,026
	EXPENDITURE ON GRANTS, SUBSIDIES	22	-	-
	INTEREST	23	-	-
	DEPRECIATION FOR THE YEAR	8	151,335,789	122,538,103
	TOTAL EXPENDITURE		628,332,631	560,509,524
	PRIOR PERIOD INCOME		110,232	17,500
	PRIOR PERIOD EXPENSES		1,041,953	1,471,279
	EXCESS OF INCOME OVER EXPENDITURE		125,781,635	(89,773,952)
	Less: TRANSFERRED TO INSTITUTE RESERVE FUND (Income from Fees, Income from interest earned and Other Income, Schedule 14, 17 & 18 respectively)		55,094,430	-
	BALANCE BEING UNSPENT CARRIED FORWARD TO EARMARKED AND ENDOWMENT FUND		70,687,205	-89,773,952
III	SIGNIFICANT ACCOUNTING POLICIES AND NOTES TO ACCOUNTS	24 25		

For and on behalf of IISER, Pune
sd/-

(Mariamma John)
Dy. Registrar (F&A)

sd/-
(Dr. V.S. Rao)
Registrar

sd/-
(Prof. K. N. Ganesh)
Director

Place: Pune
Date: 23.05.2013



Latitude : 18° 32' N

Longitude : 73° 48' E

Elevation : 1925 Ft



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