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The Physics Programme at IISER Pune is built on the twin pillars of research and education, in keeping with the overall philosophy of IISER. We see this as a mutually beneficial arrangement for faculty and students alike. Faculty members find it invigorating to have strongly motivated students participating in their laboratory-based or theoretical research. Students, in turn, benefit from the strong research background of their teachers, who bring a confident and modern understanding of their subject to the classroom and the teaching laboratory. The involvement of undergraduates in research work, often leading to publications, is a key feature of IISER’s programme.

Our programme is still youthful. It is in a phase where strengths are being consolidated and plans starting to bear fruit. Our research goals span all the profound and challenging questions in physical science, from the micro-world to the cosmos. We are equally at home pursuing fundamental principles of long-term relevance and seeking solutions with a more immediate social impact. Rather than compartmentalising our programme, we emphasise the unity of all of physics and encourage research across traditional boundaries.

Over the next decade, I am confident that we will be seen as a leading player in Indian and global science, and a force to reckon with.

Sunil Mukhi
Research in Physics at IISER Pune is broad-based and spans virtually all contemporary areas of global excitement in the field.

From the outset, the goal has been to put together exceptionally skilled and innovative faculty with state-of-the-art facilities to pursue the most challenging questions in both experimental and theoretical Physics. Experimental research has been generously supported, both in terms of funding and infrastructure.

The Physics research laboratory, named h-bar, is a pre-engineered building that was rapidly built to kickstart experimental research while the rest of the IISER campus was still under construction. This may have initially been conceived as a temporary measure, but today this smart and spacious building functions smoothly and houses nearly a dozen major laboratories and facilities, most of which will continue to function there in the near future. Additional space has recently become available in the new Main Building to house future research laboratories. On the theoretical side, plans are also under way for a new High Performance Computing Centre. All Physics faculty and Ph.D. student offices are located within the Main Building.

Research in Physics at IISER Pune can broadly be classified into Complex Systems and Nonlinear Dynamics, Condensed Matter and Statistical Physics, Soft Condensed Matter, Plasmonics and Photonics, Ultracold Atoms, NMR and Quantum Information, Nanoscience and Nanomaterials, High Energy Physics, Gravitation and String Theory, and Astronomy and Astrophysics. These are broad headings but not boundaries, and there is considerable collaboration across them through the exchange of ideas and facilities as well as through joint publications. Several faculty members associated to the Physics programme are jointly associated with other programmes at IISER, particularly Chemistry and Biology. An outline of the research of each faculty member associated to the Physics Programme can be found in the appropriate section of this brochure.

While IISER does its best to support new faculty in setting up their research programmes, all faculty members are encouraged to apply for competitive, peer-reviewed grants to fund their research in the longer term. Many faculty members have entered into formal collaborations both nationally and internationally with the support of granting agencies and/or joint agreements between science academies. Some of the grants active or recently active at IISER Pune include DST-SERB projects, DST-DAAD projects, DST Nano-mission grants, Wellcome Trust-DBT Fellowships, CEFIPRA grants, ISRO projects, INSPIRE, Ramanujan and J.C. Bose Fellowships. Special mention may be made of the Centre for Research in Energy and Sustainable Materials being set up at IISER (across different disciplines) under a DST grant, and the recent entry of IISER Pune into the CMS Collaboration at CERN, for which India’s participation is supported by a special DAE-DST Consortium.

Ph.D. students are a key component of our programme. Endowed with fellowships and housed on campus, they play a major role in our research activity and provide a lively audience for seminar speakers. We have held special lecture series to sensitise our students to exciting opportunities in areas ranging from soft matter systems to neutrinos to topological insulators, and these have always been widely appreciated.

We are also appreciative of the excellent scientific staff who manage our research and teaching laboratories. We pride ourselves on our instrumentation, both purchased and home-built, and on the fact that it is kept in excellent working condition, for which their dedicated service (through very long days and sometimes nights) has proved essential. This provides an efficient research and teaching environment and goes a long way towards inspiring students in the direction of experimental research.
Selected Publications / Last Five Years:

- Classical Electrodynamics, Fall 2013.
- Dynamical Systems, Spring 2011.
- World of Physics III (Electromagnetism): Fall 2008, Fall 2009, Fall 2010, Fall 2011, Fall 2012.
- Dyanmical Systems, Spring 2011.
- Electrodynamics, Fall 2011.
- Classical Electrodynamics, Fall 2013.
- Quantum Yang-Mills theory provides a remarkably accurate description of three of the four fundamental forces in Nature (the weak, strong and electromagnetic forces). The fourth force, gravity, is classically well understood thanks to the general theory of relativity but lacks a consistent quantum description. My research is aimed at understanding this apparent incompatibility between general relativity and quantum mechanics. Current themes of investigation include the physics of higher spin fields, perturbative ties between Yang-Mills theory and gravity, and continuous-spin representations.

Organisational Activities:
- Member, National Academy of Sciences India, 2013.
- N. S. Sathy Murthy Memorial Award, Indian Physics Association, 2012.
- Young Scientist Medal, Indian National Science Academy, 2011.
- Young Scientist Platinum Jubilee Award, National Academy of Sciences India, 2011.
- Young Associate, Indian Academy of Sciences, 2009 – 2013.
- Ramakrishnan Fellowship, DST, Govt. of India, 2008 – 2012.

Teaching Activities:
- World of Physics I (Mechanics): Fall 2008, Fall 2009, Fall 2010, Fall 2011, Fall 2012.
- Nuclear and Particle Physics: Spring 2011.
- Quantum Field Theory: Spring 2013.

Outreach Activities:
- Irregularly give talks aimed at student audiences at various colleges/institutions.
- Most recently on the ‘Forces of Nature’ at NIT Suratkal, the University of Hyderabad and CMU, Chennai.
Ramana Athreya  
Associate Professor

Research:
I am a radio astronomer with research interests spanning a range of phenomena best studied at low radio frequencies, viz. galaxy cluster radio halos, high redshift Universe, active galactic nuclei and pulsars. To this end we have invested considerable effort into developing high sensitivity imaging algorithms. I also devote half my time to research in biological diversity and evolutionary biology.

Academic Background:
Following a PhD from the National Centre for Radio Astrophysics (TIFR) in 1996, I worked at the Institute of Astrophysics, Paris (postdoc, 1998-99), European Southern Observatory (postdoc, 1999-2002), and NCRA-TIFR (faculty, 2003-2009), before joining IISER.

Selected Publications / Last Five Years:

Organisational Activities:
I have been managing the Summer Student programme at IISER for the last 4 years.

Teaching Activities:
- Introduction to Astronomy & Astrophysics; Fall 2010, Fall 2011, Fall 2012.
- Introduction to Mathematical Methods, Spring 2013.
- Biostatistics; Fall 2011, Spring 2012.
- Scientific Enquiry, Spring 2011.

Arjun Bagchi  
INSPIRE Faculty Fellow

Research:
I am a theoretical high energy physicist working on aspects of string theory. String theory is the most successful attempt at a theory of quantum gravity. One of its most intriguing ideas is the Holographic Principle which states that in a quantum gravity theory all physics within some volume can be described in terms of some theory on the boundary. This revolutionary proposal was put on firm footing by the AdS/CFT correspondence, a conjectured equivalence or duality between a theory of gravity in a negatively curved Anti de-Sitter (AdS) spacetime and a confomal field theory (CFT) on its boundary. The primary goal of my research is to understand the Holographic Principle by trying to generalise it to different situations which go beyond standard AdS/CFT. My current main research programme aims to understand aspects of holography in flat spacetimes. I am also interested in the recent formulations of a holographic connection for higher spin theories and its potential link to the tensionless limit of string theory.

Academic Background:
I did my PhD in 2010 at the Harish Chandra Research Institute, India under Ashoke Sen. Thereafter I was a Post-Doctoral Fellow at the University of Edinburgh, UK (2010-2013) and a Visiting Post-Doctoral Fellow at MIT (2013).

Selected Publications / Last Five Years:

Grants and Awards:
- “Holography for Flat Spacetimes” Fulbright Nehru Research Award 2014 Awarded by Department of State, USA (Fulbright foundation): Research Fellowship for a stay of 18 months at Massachusetts Institute of Technology, USA (2014-2016). Total amount: 70,000 USD (approx).
- Gravitational Research Foundation-Gravitational Essay Competition 2013 Honorable Mention (with Daniel Grumiller).
- Luis Meitner Award 2013: Awarded by FWF, Austrian Science Fund.
- “Prosing Quantum Gravity through Holography” – Luis Meitner Award 2013. Awarded by FWF Austrian Science Fund. Total amount: 150,000 Euro (approx).

Organisational Activities:

Teaching Activities:
- Classical Mechanics, Fall 2014.
- Quantum Field Theory, Spring 2014.
Research:
I am an experimental condensed matter physicist, and my broad area of
research is electronic correlations and magnetism. My current interests centre
around synthesis and physical properties of magnetic materials for spintronic
applications. One of the key research areas in spintronics has been to identify
materials with large spin polarization (normal ferromagnets / half metallic
ferromagnets) as well as materials that can change their magnetic state by not
only the applied magnetic field but also through electric field (magnetoelectricity)
or mechanical stress (piezomagnetism). I am particularly interested in exploring
interfacial effects in magnetically functional core-shell materials relevant to above
mentioned spintronic applications.

Academic Background:
I received my PhD in Physics from UGC-DAE Consortium for Scientific Research in
Indore, India. My post doctoral research spanned different institutes: Tata Institute of
Fundamental Research, Mumbai (2000-2002 and 2004-2005); Center for Advanced
Technology, Indore (2003); Leibniz Institute for Solid State and Material Research,
Dresden, (2005-2009) and the Department of Materials at Oxford University (2010-
2011).

Selected Publications / Last Five Years:
* The filling of carbon nanotubes with
magnetoelectric CrO2/Cr2O3, A. Bajpai, A.
Koós, S. Downes, Z. Aslam, N. Rümmeli, J.
Thomas, M. Ritschel, T. Gorantla, M.
Löffler, S. Hampel, M.H. Borisov, S.
Gorantala, R. Klingeler, J. Thomas, M.
Ritschel, T. Borisov, S. Gorantala, R. Klingeler, J.
Thomas, M. Ritschel, T. Borisov, S.
Gorantala, R. Klingeler, J. Thomas, M.
* The influence of nano-meter thick
antiferromagnetic surface layer on
crystalline CrO2/Cr2O3, A. Bajpai and A.
204533 / EU Patent Pending.
* Chromium dioxide and composites of
chromium dioxide and other oxides of
chromium such as CrO2/Cr2O3 and CrO/
Cr2O3, A. Bajpai and A. K. Nigam. US
204533 / EU Patent Pending.

Grants and Awards:
Marie Curie International Incoming
Fellowship (IF) Ramanujan Fellowship (2012)

Teaching Activities:
* Physics Lab IV Fall 2012
* Physics Lab III Spring 2013
* Physics Lab II Fall 2013
* Physics Lab II Spring 2014
* Physics Lab I Fall 2014

Outreach Activities:
Organised the Science Academicians Refresher
Course in Experimental Physics in IISER Pune in
December 2013.

Nabamita Banerjee
Assistant Professor

Research:
I am a theoretical high energy physicist. I mainly work on black holes. We
explore the fundamental issues related to black hole entropy and apply various
black hole solutions to understand properties of interacting quantum field
theories in the context of AdS/CFT correspondence. I am also interested in fluid
dynamics. By applying the second law of thermodynamics, we constrain the
number of transport coefficients for both relativistic and non-relativistic fluids. We
also build models to compute the transport coefficients of Quark-Gluon Plasma
that has been produced at the Relativistic Heavy Ion Collider (RHIC).

Academic Background:
I did my Ph.D at the Harish Chandra Research Institute in 2010. Thereafter I had several
postdoctoral positions including a FOM Fellowship, ITU Unrecht, under Prof. Gerard’s
Hoof (2009-2010), a Veni Grant at Utrecht University (2010-2012) and at NHKHE, The
Netherlands (2012-2013). I then took up an Assistant Professorship at IACS, Kolkata
during 2013-2014.

Selected Publications / Last Five Years:
* Entropy current for non-relativistic
fluid, Nabamita Banerjee, Suvarnkar Dutta,
Akash Jain and Debakar Roychowdhury,
JHEP 1408, 037 (2014).
* Constraints on fluid dynamics from equilibrium partition functions", N.
Banerjee, J. Bhattacharya, S. Jain, S. Minwalla and T.
Sharma, JHEP 1305, 046 (2012).
* Hydrodynamics from charged black
branes, Nabamita Banerjee, Jeetmitty
Bhattacharya, Sayantani Bhattacharyya,
Suvarnkar Dutta, R Loganayagam. JHEP 1103,
094 (2011).
* Moduli and electromagnetic black
brane holography, Chumitu Antfinassen,
Nabamita Banerjee and Suvarnkar Dutta,
* “Black hole hair removal”, Nabamita
Banerjee, Iota Mandal and Ashoke Sen,

Grants and Awards:
* NWO Veni grant, The Netherlands
* Ramanujan Fellowship, 2013, DST India.

Teaching activities:
Will teach Quantum Field Theory in Spring
2015.
Research:  
I work in experimental atomic and molecular physics. A major area of research has been kinematically complete dissociative ionisation studies on molecules, with a view to understand the formation, properties and stability of highly charged molecular ions. We combine ion momentum spectrometry and electron energy spectroscopy along with multiparticle coincidence techniques to obtain phase-space maps of the dissociative ionisation products. To create highly charged molecules we use fast electrons and ions from an accelerator (IUAC, Delhi) as well as soft x-rays from a synchrotron (Indus-1, Indore). Some highlights of our work include identification of bent states of CO$^+_{2+}$ and determination of the lifetimes of metastable states of CO$^+_{2+}$.

Academic Background:  
I got my Ph.D from TIFR, Mumbai (1997). Thereafter I was a Postdoctoral Fellow at University of Freiburg, Germany (1998-2000), a Visiting Fellow at Centre for Advanced Technology, Indore (2000-2001) and a Faculty Member at PRL, Ahmedabad (2001-2014).

Grants and Awards:  
At PRL, we have a sanction for developing the ion spectrometer for the Aditya-L1 mission of IROD.

Teaching activities:  
In the first semester after joining IISER Pune I coordinated the first year Physics laboratory course. In Ahmedabad I taught regularly in an extra-curricular programme for BSc students from colleges all over Gujarat for 7 years.

Organisational Activities:  
I am coordinating the creation of online courses from IISER Pune under the ‘Swajam’ initiative of the Ministry of Human Resource Development. I have proposed a project for re-building of classic experiments that form the bedrock of 20th and 21st century physics, with the participation of students, thereby facilitating experimental pedagogy in physics. Eventually this activity could enable the formation of a nodal centre for experimental activities in undergraduate physics courses throughout the country.

Selected Publications / Last Five Years:  


• “A combined electron-ion spectrometer for the Aditya-L1 mission of IROD.”

Outreach Activities:  
I work with Bhabha, an organisation based at Bhopal working on improving science education in the primary school. Currently I am the primary author of the module on Heat and Temperature (published), and a contributor of modules on Motion (in press), Nature of Matter (in press), Light (in press), and Electricity (being developed).

In Ahmedabad I have worked for several years coordinating science competitions, conducting quizzes and screening school and college students for scholarships under the outreach programmes of PRL.

Selected Publications / Last Five Years:  


• “Equilibrium of a mesoscopic system over an inhomogeneous conformation space. The other areas of my interest on which I am presently working are analogue gravity in Bose-Einstein condensates, effects of non-local interactions on density modulated states, and vortices in a Bose-Einstein condensate. I am also working on the resistive regime of a one-dimensional superconductor where the superconducting and normal phases coexist.

Academic Background:  
I did my Ph.D. work on pattern formation at IACS (Kolkata) and got a degree from Jadavpur University, Kolkata. I carried out postdoctoral work at TU Darmstadt, Germany (2003-2006), Padova University, Italy (2004-2007) and University of Warwick, UK (2007-2008).

Grants and Awards:  
Co-PI on the DST Project “Emergent dynamics on growing networks with comparable time scales” with Dr. M.S. Santanaranjan and Dr. G. Ambika.

Teaching Activities:  
• Linear Algebra (2008)

• Statistical Physics (Spring 2009)

• Condensed matter physics I(2009)

• Condensed matter physics II (2010)

• Physics Lab II (Spring 2011)

• Biophysics (2011)

• Condensed matter physics I (2011)

• Quantum Mechanics and Statistical Physics (2012)

• Condensed matter physics II (2012)

• Thermodynamics (2013)

• Quantum Mechanics I (2014)

• Physics Lab I (Fall 2014)

Organisational Activities:  
Member, Curriculum Committee, selection committees for PhD and undergraduates in physics and interdisciplinary areas. I have been a regular member of various departmental committees. I helped in developing the academic time-table at an early stage of IISER Pune. I organized several seminars and special lectures by experts in the respective fields.

Research:  
I am a theoretical physicist. I am presently working on some basic issues related to equilibrium of a mesoscopic system over an inhomogeneous configuration space. The other areas of my interest on which I am presently working are analogue gravity in Bose-Einstein condensates, effects of non-local interactions on density modulated states, and vortices in a Bose-Einstein condensate. I am also working on the resistive regime of a one-dimensional superconductor where the superconducting and normal phases coexist.

Academic Background:  
I did my Ph.D. work on pattern formation at IACS (Kolkata) and got a degree from Jadavpur University, Kolkata. I carried out postdoctoral work at TU Darmstadt, Germany (2003-2006), Padova University, Italy (2004-2007) and University of Warwick, UK (2007-2008).

Grants and Awards:  
Co-PI on the DST Project “Emergent dynamics on growing networks with comparable time scales” with Dr. M.S. Santanaranjan and Dr. G. Ambika.

Teaching Activities:  
• Linear Algebra (2008)

• Statistical Physics (Spring 2009)

• Condensed matter physics I(2009)

• Condensed matter physics II (2010)

• Physics Lab II (Spring 2011)

• Biophysics (2011)

• Condensed matter physics I (2011)

• Quantum Mechanics and Statistical Physics (2012)

• Condensed matter physics II (2012)

• Thermodynamics (2013)

• Quantum Mechanics I (2014)

• Physics Lab I (Fall 2014)

Organisational Activities:  
Member, Curriculum Committee, selection committees for PhD and undergraduates in physics and interdisciplinary areas. I have been a regular member of various departmental committees. I helped in developing the academic time-table at an early stage of IISER Pune. I organized several seminars and special lectures by experts in the respective fields.
Apratim Chatterji  
Assistant Professor

www.iiserpune.ac.in/~apratim/  
Joined IISER Pune: January 2009

Research:
I am a soft matter physicist using methods of statistical physics and multiscale simulations to investigate emergent properties of coarse-grained models of many interacting macromolecules (a) in equilibrium, and (b) in flow. I have been working at identifying the principles leading to self-assembly of nano-rods with an axial pore seen in some experiments performed in IISER-Pune. In a different project, we observe the hierarchical self assembly of model (Lennard-Jones) nano-particles in a background nematically ordered self-assembled micellar matrix. We are currently investigating the effect of shear on these systems. I have also been working to develop a computational scheme to obtain steady state extensional flow with PBC incorporated so that one can systematically investigate soft matter systems in extensional flow. I have started projects looking at active matter incorporating 3-D hydrodynamic interactions and its effect on the coil globule transition of a polymer. Two other running projects are the dynamics of a single polymer diffusing in a hydrodynamic medium confined between two fluctuating membranes, and equilibrium structure and aggregation of star polymers with dipoles at the tips of star-arms.

Academic Background:
I did my PhD from IISc, Bangalore in 2003 under the supervision of Rahul Pandit. Thereafter I held postdoctoral positions at University of Mainz (2002-2005), University of Wisconsin Madison (2005-2007). I joined IISER Pune in 2009. I am interested in developing a computational scheme to obtain steady state extensional flow with PBC incorporated so that one can systematically investigate soft matter systems in extensional flow. I have started projects looking at active matter incorporating 3-D hydrodynamic interactions and its effect on the coil globule transition of a polymer. Two other running projects are the dynamics of a single polymer diffusing in a hydrodynamic medium confined between two fluctuating membranes, and equilibrium structure and aggregation of star polymers with dipoles at the tips of star-arms.

Selected Publications / Last Five Years:

Teaching Activities:
- Electrodynamic, Fall 2009
- Statistical Physics, Spring 2010
- Electrodynamic, Spring 2011
- Statistical Physics, Spring 2011
- Mathematical Methods, Fall 2011
- Statistical Physics, Spring 2012
- Mathematical Methods, Fall 2012
- Modern Physics Lab, Spring 2013
- Modern Physics Lab, Spring 2014
- Computational Methods in Physics, Fall 2014

Organisational Activities:
- Coordinator for Integrated PhD programme in Physics since its inception.
- Organised various question paper committees for IISER admissions and other all India competitive exams.
- Organised various question paper committees for IISER admissions and other all India competitive exams.
- Hosted the Mumbai Pune Soft Matter meetings twice at IISER Pune.
- Kickstarted the Soft-Matter IFM (Pondicherry) programme along with other soft matter physicists in India.

Harsh Chaturvedi  
Ramanujan Fellow

www.iiserpune.ac.in/people/fellows-details/65  
Joined IISER Pune: June 2010

Research:
Our research can broadly be classified as: (1) solution phase studies, (2) condensed phase studies and (3) application driven research and development. We aim to functionalize nanoparticles such as single wall carbon nanotube (SWNT) and graphene with optically active and biologically sensitive molecules and use these functionalized SWNT/graphene for fabricating novel electro-optical sensors and bio-nano hybrid devices. In these years, we have specifically functionalized SWNT with optically active, organic polymer OPV and also biologically synthesized, optically active bacterio-rhodopsin. We have built required research labs and a clean room facility at IISER Pune for functionalisation, fabrication and electro-optical characterization of fabricated thin film and molecular transistors based on these functionalised SWNT for diverse electro-optical applications. Along with devices we are deeply interested in understanding electro-optical effects in colloidal solutions of nanoparticles.

Academic Background:
Completed doctoral research on optical effects in functionalized single wall carbon nanotubes at the University of North Carolina, Charlotte, under the supervision of Dr. Jordan C. Poler in 2008. Joined as an IISER Fellow in 2009 and was subsequently awarded Ramanujan Fellowship by Dept. of Science and Technology (DST, India) in 2010.

Selected Publications / Last Five Years:
- Technology for Separation of semiconducting and metallic single Walled carbon nanotubes Patent (2013) applied for

Teaching Activities:
- Electrodynamic: Spring 2009, Spring 2010
- Optics: Fall 2009, Spring 2011
- Photonics) Research Scholarship Award, 2007
- USI Lab, Spring 2009, Fall 2009, Fall 2010, Fall 2012, Fall 2013, Spring 2014
- Nanoscience Spring 2012

Outreach Activities:
- Actively contributed for outreach activities giving talks, donating books and encouraging students at Ravi Shankh (Rajkot), Jain Institutes (Bangalore), Bhartiya Vidya Vihar (Pune), Indus Valley School (Pune) among other places.

Grants / Awards:
- “Perovskite on carbon nanotubes”, DRDO (Reviewed), Rs 85 Lakhs.
- “Optical and electronic properties of carbon nanotubes”, INDIA (Reviewed), Rs 60 Lakhs.
- “Optical and electronic properties of carbon nanotubes”, INDIA (Reviewed), Rs 60 Lakhs.
- SPIE (International Society for Optics and Photonics) Research Scholarship Award, 2007.
- SPIE Graduate Award, 2007.
- Ramanujan Fellowship, DST, 2010.

Outreach Activities:
- Activities contributed for outreach activities giving talks, donating books and encouraging students at Ravi Shankh (Rajkot), Jain Institutes (Bangalore), Bhartiya Vidya Vihar (Pune), Indus Valley School (Pune) among other places.

Selected Publications / Last Five Years:
- “Mechanically-docked metaladendrimers about single Walled carbon nanotubes” Patent (2013) applied for

Outreach Activities:
- Actively contributed for outreach activities giving talks, donating books and encouraging students at Ravi Shankh (Rajkot), Jain Institutes (Bangalore), Bhartiya Vidya Vihar (Pune), Indus Valley School (Pune) among other places.

* Before joining IISER Pune.
Shouvik Datta
Assistant Professor

www.iiserpune.ac.in/~shouvik
Joined IISER Pune: July 2008

Research:
I am an experimental condensed matter physicist studying the quantum opto-electronics of semiconductor nano-structures and devices. Some of the questions I focus on are: how to understand electronic processes within a semiconductor laser diode under very high charge injection, what happens to the dielectric response of a material medium or a laser diode, when it starts to emit light and finally starts lasing, what are the electrical signatures of excitonic electroluminescence, Mott transition as well as excitonic BEC and excitonic lasing, what is the precise role of fluid dynamics in nanofabrication. In my laboratory we also carry out studies on how to fabricate efficient quantum dot solar cells and how bulk electronic defects behave at the nano-scale.

Academic Background:
I got my Ph.D. from the Tata Institute of Fundamental Research (University of Mumbai) in 2001. Thereafter I was a Postdoctoral Fellow at the University of Nebraska-Lincoln, USA (2001-2004) and University of Oregon, USA (2004-2008).

Selected Publications / Last Five Years:
5. “Voltage modulated electroluminescence spectroscopy to understand negative capacitance and the role of sub-Bandgap states in light emitting devices” Kanika Bansal and Shouvik Datta, IAPL 110, 114509 (2011).

Grants and Awards:
1. Co-PI on a DST Nano-Science Unit at IISER-Pune, Rs 5.6 Crore (2009-2014).
3. PI of a DST project, Rs 3.4 Lakhs, July, 2013.

Teaching Activities:
1. Physics Laboratory-I, Fall 2008, Fall 2010, Fall 2014.
5. Wave Theory-I, Fall 2011.
7. Physics Lab-II, Fall 2014.
11. Physics Lab-VI (Coordinator), Fall 2013.

Outreach Activities:
2. Before joining IISER Pune

Aparna Deshpande
Assistant Professor

www.iiserpune.ac.in/~aparna.d
Joined IISER Pune: August 2011

Research:
I am a condensed matter experimentalist specializing in Scanning Tunneling Microscopy (STM), Scanning Tunneling Spectroscopy (STS), and single atom and molecule manipulation to visualize, probe and manipulate matter at the atomic scale. My research interests span the investigation of local electronic properties of novel materials like graphene, topological insulators and strongly correlated electronic systems. Presently, in my lab, my students and I are working on the topological insulator material Bi2Se3, i am also interested in the manipulation of single molecules and molecular self assembly on conducting surfaces to test their functionality for device applications.

Academic Background:
I did my B.Sc in Physics from D. G. Ruparel College, Mumbai followed by an M.Sc in Physics from Mumbai University. I completed my PhD in Physics at Ohio University, Athens, Ohio, USA in 2007. I did my postdoctoral research work at the University of Arizona, Tucson (2007-2010) and at Northwestern University, Evanston (2010-2011).

Selected Publications / Last Five Years:

Selected Publications / Last Five Years:

Teaching Activities:
1. Introductory physics lab, Fall 2011
2. Physics Lab-I, Spring 2012
3. Physics Lab-II (Coordinator), Fall 2012
4. Physics Lab-V (Coordinator), Fall 2012
5. Introductory physics lab (Coordinator), Fall 2013
6. Physics Lab-II, Fall 2014

Outreach Activities:
1. Gave a talk titled “Scanning Tunneling Microscopy, Atomic Force Microscopy” at the DST sponsored Consolidation of University Research for Innovation and Excellence (CURIE) Workshop at Banasthali University, Rajasthan during 5-7 October 2012.

* Before joining IISER Pune
C.V. Dharmadhikari
Visiting Faculty

Research:
My work involves development of a whole range of Scanning Probe Microscopes and their applications to the investigation of a host of problems at the forefronts of surface science, thin films and nanoscience. My current interests are in:
• photon emitting STM (PESTM), low current STM operating in field emission mode for imaging nanostructures/nanobiostuctures
• contact mode/non-contact mode current imaging using AFM
• force spectroscopy of colloidal systems
• AFM imaging using piezoelctric/ piezoresistive cantilevers
• noise analysis of tunneling and field emission current fluctuations
• electron transport across nanostructures
• synthesis of nanostructures using SPM

Academic Background:
I did my Ph.D from the University of Pune in 1979. After this I was a Postdoctoral Fellow at the James Franck Institute, University of Chicago (1980-84) and a faculty member at the University of Pune (1984-2011).

Selected Publications / Last Five Years:

Grants and Awards:
• Priyadarshini Visiting Professorships India (2001-02)

Teaching activities:
• Physics Lab II: Spring 2012
• Physics Lab V: Spring 2013
• Physics Lab IV: Fall 2012, Fall 2013, Fall 2014
• Physics Lab VI: Spring 2014

Outreach Activities:
• Workshop on Innovation: Brokering Nanotechnology, Creating Capacity, March 27-28, 2014
• Science academies refresher course in experimental physics, December 9-24, 2013
• Symposium on collaboration between industries and academia, October 28-29, 2013
• Experimental physics workshop for post-graduate teachers, May 13-14, 2013

Sourabh Dube
Assistant Professor

Research:
I am an experimental particle physicist. I work at the CMS experiment and try to discover new particles in the high energy collisions at the LHC. The LHC is gearing up to start collisions at 13 TeV in 2015, which is the highest energy collisions achieved ever. I will primarily focus on sifting through the data to find hints that the Standard Model of particle physics is insufficient. I also have an interest in finding supersymmetric particles. I hope and expect the next two years of data at the LHC will help us to address a lot of unanswered questions about our universe.

Academic Background:

Teaching Activities:
• World of Physics – Quantum Mechanics: Spring 2014
• Physics Laboratory II: Fall 2014

Outreach Activities:
I am an experimental particle physicist. I work at the CMS experiment and try to discover new particles in the high energy collisions at the LHC. The LHC is gearing up to start collisions at 13 TeV in 2015, which is the highest energy collisions achieved ever. I will primarily focus on sifting through the data to find hints that the Standard Model of particle physics is insufficient. I also have an interest in finding supersymmetric particles. I hope and expect the next two years of data at the LHC will help us to address a lot of unanswered questions about our universe.

Selected Publications / Last Five Years:
• “Search for microscopic black holes in a B-field 


* Before joining IISER Pune.
Research:
I am a theoretical physicist. I work in the area of nonlinear dynamics with a particular focus on calculus on fractals. My main research program currently consists of developing calculus on highly irregular structures and fractals with a view to applications in statistical physics and space-time physics. A systematic development of calculus on two classes of fractals was carried so far. These are (1) fractal subsets of real line and (2) fractal paths or continuous fractal curves. Sobolev spaces on fractals of these classes were constructed. The calculus developed retains much of the simplicity of ordinary calculus. A conjugacy of this calculus with ordinary calculus is established, which allows one to construct solutions of a wide class differential equations on fractals with ease.

Academic Background:
I obtained a PhD in Physics in 1981 from the University of Bombay working at the Tata Institute of Fundamental Research. I then worked at the University of Kaiserslautern, Germany as a Wissenschaftlicher Mitarbeiter till July 1983. Subsequently I was on the faculty of University of Pune until 2010.

Selected Publications / Last Five Years:
- Fractals 52, 30 (2013).
- World of Physics II: Spring 2012.
- Statistical Mechanics I: Spring 2013, Spring 2014
- Statistical Mechanics II: Fall 2012, Fall 2013.

Teaching Activities:
- Thermodynamics: Fall 2010.
- Particle and Nuclear Physics: Spring 2010, Spring 2013.
- Electrodynamics: Fall 2011.
- World of Physics II: Spring 2012.
- Statistical Mechanics II: Fall 2012, Fall 2013.

* Before joining IISER Pune
Mukul Kabir  
Assistant Professor

Selected Publications / Last Five Years:
- “Condensed Matter Physics I: Fall 2013
- Condensed Matter Physics II: Fall 2013
- Physics Lab IV: Fall 2014

Organisation Activities:
- Member of the question paper setting committee for B.S.-M.S entrance, 2013, 2014.
- Member of Physics Outreach Committee.
- Member of Physical Science Screening Committee.
- Member of Institutional Dining Committee.

Grants and Awards:
- Ramanujam Fellowship (2013-2018), Department of Science and Technology, India
- Raja Ramanna Fellowship, DAE.
- Raja Ramanna fellow, DAER.
- Fellow, Indian National Academy of Sciences, New Delhi.
- Fellow, Indian Academy of Sciences, Bangalore.
- Raja Ramanna Fellowship, DAE.

Teaching Activities:
- Advanced Quantum Mechanics: Spring 2011, Spring 2012, Fall 2012, Fall 2013, Fall 2014.

Outreach Activities:
- I have been acting as mentor at over 40 INSPIRE camps all over India for meritorious students. I have visited schools and colleges in the villages of Maharashtra and given over 16 popular science talks (in Marathi).
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- I was a member of the Academic Committee of IISER for 2 years.

Organisational Activities:
- I was a member of the Academic Committee of IISER for 2 years.
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- I was a member of the Academic Committee of IISER for 2 years.

Academic Background:
I did my Ph.D. at the S. N. Bose National Center for Basic Sciences, Kolkata in 2006, and was then a Postdoctoral Associate at the Massachusetts Institute of Technology from 2006-2011.

Research:
I work on understanding material phenomena at different length and time scales, where we combine density functional theory, transition state theory and kinetic Monte Carlo. I apply these techniques to understand edge magnetism in graphene nanoflakes, band-gap engineering in 2D materials under external perturbations, and defect kinetics in graphene, and carbon nanotubes.

Apart from these projects, a significant effort is devoted to the problems in sustainable energy research. Here, we focus on designing Fe-based (low-cost) catalysts for molecular hydrogen splitting, which is useful toward green energy production (chemical energy to electricity), understanding oxygen reduction reaction, and oxygen diffusion at perovskite oxide surface (used as cathode for solid-oxide fuel cell) for renewable energy technologies, and understanding the phase segregation in FeCr-alloys relevant to nuclear reactors.

Avinash Khare  
Raja Ramanna Fellow

Selected Publications / Last Five Years:

Teaching Activities:
- Advanced Quantum Mechanics: Fall 2011, Fall 2012, Fall 2013, Fall 2014.
- During the fall of 2011, I gave a set of lectures on Basic Quantum Mechanics to second year students and on Advanced Quantum Mechanics to Ph.D. students.

Grants and Awards:
- Raja Ramanna Fellow
- Fellow, Indian National Science Academy, New Delhi.
- Fellow, Indian Academy of Sciences, Bangalore.
- Raja Ramanna Fellowship, DAE.

Research:
While my initial work is in the area of quantum field theory and elementary particle physics, in recent years I have been interested in broader area of theoretical physics. One of my interests for the last 30 years is in the area of supersymmetry in quantum mechanics. Even today it is giving new insight into the area of conventional quantum mechanics. My other interest is in the area of nonlinear dynamics with special interest in coherent structures and their relevance to optical communication, BEC-BCS transition etc.

Academic Background:
I got my Ph.D. from SNSP, Kolkata in 1971. I have been a faculty member at the Institute of Physics, Bhubaneswar for 36 years.

Outreach Activities:
- Outreach Activities: I have been acting as mentor at over 40 INSPIRE camps all over India for meritorious students. I have visited schools and colleges in the villages of Maharashtra and given over 16 popular science talks (in Marathi).

Organisational Activities:
- I was a member of the Academic Committee of IISER for 2 years.
Sulabha Kulkarni
Visiting Professor

Research:
I work in the area of experimental condensed matter physics. My research is focused in surface science, nanotechnology and materials science. In recent years I have worked on some problems related to localized surface plasmon resonance and multiferroics. I often make use of synchrotron radiation to analyse the materials properties.

Academic Background:
I got my Ph. D. from University of Pune in 1976. After a postdoctoral position at the Technical University, Munich (1977-1978), I have been a faculty member at the University of Pune until 2009.

Selected Publications / Last Five Years:


Grants and Awards:
- Fellow, Asia Pacific Materials Society (2013).
- Fellow, Indian National Science Academy (2011).
- Maharashtra State Award for Book Writing (2009).

Teaching activities:
- Physics Lab (1st Year): Spring 2009, Fall 2009, Fall 2013.
- Physics Lab (2nd Year): Fall 2014.
- Nanotechnology: Fall 2010, Fall 2011.
- Advanced Materials Science: Spring 2013.

Organisational Activities:
- Organised the workshop "Powder X-ray Diffraction and Small Angle Scattering" May 15-16, 2012 for Ph.D. Students (49) in IISc, IIT, JNU, and IOP Pune.
- Organised the workshop "Nanotechnology for Energy and Health" Oct. 10-11, 2014 in Fergusson College, Pune.
- Reviewed DST, CSIR projects and an NPTel Course on Semiconductor Nanoelectronics (2015).
- Served as Member of the Selection/ Awards committees in different Institutions/Universities.
- Associate Editor of "Journal of Nanophotonics" (IEEE) and reviewer for several journals.

Outreach Activities:
- Every year minimum 6 talks in colleges/schools/teacher's training programs, plus talks in (mostly) remote schools/colleges in Maharashtra.

T.S. Mahesh
Associate Professor

Research:
I am an NMR (nuclear magnetic resonance) spectroscopist working in the experimental aspects of quantum information, quantum computation, and quantum control. Using ensembles of nuclear spin networks in organic compounds as quantum testbeds, we investigate a variety of concepts involving quantum coherence. The nuclear spin-networks can retain quantum coherences for long durations, from seconds to minutes, and also permit precise and complex controls on their dynamics via carefully designed radio frequency pulses. We have experimentally simulated various concepts such as quantum phase transitions, Schrodinger dynamics of a particle in various potentials, Frisch-Condon transitions, quantum mirror inversion, etc. Recently we have developed certain ultra-fast protocols for quantum state tomography and quantum process tomography.

Academic Background:
I did my PhD under the guidance of Prof. Anil Kumar (Physics Department, IISc, Bangalore) during 1997 to 2003. I was a postdoctoral fellow at MIT, Cambridge, USA (2003-2004), and a Humboldt fellow at the University of Dortmund, Germany (2005-2007).

Selected Publications / Last Five Years:

- "Quantum Information Processing by Nuclear Magnetic Resonance Oriented Spin Systems as Large Quantum Registers", DST (2011-11) Rs. 27 lakh.
- "Quantum Memory based on Nitrogen Vacancy Centers in Diamond: DFT Swamiyay ti Fellowship (2014-2019), Rs. 2.14 crores.

Teaching activities:
- Physics Laboratory: Fall 2007, Spring 2010, Spring 2011, Fall 2013, Fall 2014.
- Quantum Information: Fall 2009, Fall 2011, Fall 2013, Fall 2014.
- Experimental Methods (spring 2009).
- Atomic and Molecular Physics: Spring 2014.

Grants and Awards:
- "Quantum Information Processing by Nuclear Magnetic Resonance Oriented Spin Systems as Large Quantum Registers", DST (2011-11) Rs. 27 lakh.

Organisational Activities:
I have been supervising the NMR Research Center, a central facility which has recorded tens of thousands of NMR spectra over the last five years. The center is currently being expanded and is aimed at becoming one of the best NMR facilities in India. Over the past several years, I have been a member of various committees including the Purchase Committee, Curriculum Committee, Faculty Screening Committee, etc.

Outreach Activities:
- Talks in schools and colleges.
Sunil Mukhi
Professor and Chair, Physics Programme

www.sunilmukhi.in
Joined IISER Pune: November 2012

Research:
I am a particle theorist with a strong interest in the formalism of gauge theory, supersymmetry, gravity and unification. My research has been primarily in the area of string theory, with a focus on theoretical mechanisms and mathematical properties of the theory in different phases. Some of the areas in which I have previously made contributions are: conformal invariance of the field theory on the superstring worldsheet, mass corrections for supersymmetric solitons and monopoles, dualities in string and M-theory, properties of black holes, and multiple membranes in M-theory. I am currently carrying out research on black hole entropy and its relation to entanglement entropy, and writing a textbook for Cambridge University Press on the Standard Model of Particle Physics.

Academic Background:
I did my Ph.D at the State University of New York, Stony Brook (1981). Thereafter I was a Postdoctoral Fellow at the International Centre for Theoretical Physics, Trieste (1981-84), and at the Tata Institute of Fundamental Research (1984-85). From 1985 to the present I have been a faculty member at the Tata Institute of Fundamental Research.

Grants and Awards:
• Shanti Swarup Bhatnagar Prize in Physical Sciences (1999).
• J.C. Bose Fellowship (2009-present).
• Fellow of Indian Academy of Sciences.
• Fellow, Indian National Science Academy.
• Fellow, The World Academy of Sciences.

Selected Publications / Last Five Years:
• “Multiple Membranes in M-theory”, 25 years” , Sunil Mukhi, Class. Quant. Grav.
• “String theory: a perspective over the last 25 years”, Sunil Mukhi, Class. Quant. Grav.

Organisational Activities:
• Chair, Physics Programme, IISER.
• Dean, Student Activities, IISER.
• Member, IISER Senate.
• Chair, IISER Ethics Committee.
• Editor, Journal of High Energy Physics (since 1997).
• Member of DST Committee on INSPIRE Fellowships.

Teaching Activities:
• Nuclear and Particle Physics, Spring 2014
• World of Physics IV: Quantum Mechanics, Spring 2014
• World of Physics II: Electromagnetism, Fall 2014
• Mathematical Methods, Spring 2015

Outreach Activities:
• Numerous public lectures and articles aimed at school/college students, mainly on particle physics, string theory, unification and the Large Hadron Collider.

Selected Publications / Last Five Years:

Grants and Awards:
• SERB-DST research project on new multiferroics (2014).

Research area:
I am an experimental condensed matter physicist with interests in the synthesis and investigations of strongly correlated electron systems. The problems being investigated by me at IISER Pune span from multiferroics and geometrically frustrated systems to unconventional superconductors. We specialise in synthesising novel materials with an eye on their potentially useful properties, and investigate them using a host of characterisation tools. This includes measurement of the magnetic, electronic and thermodynamic properties, as well as scattering using X-rays and neutrons. For the next few years, my research is likely to concentrate on the discovery of new multiferroics, investigation of anomalous magnetism in 4d/5d transition metal oxides, and on the normal state magnetotransport of unconventional superconductors.

Academic Background:

Grants and Awards:
• SERB-DST Research project on new multiferroics (2014).
• CSIR research project on 4f-5d transition metal oxides (2014).
• Equipment subsidy grant from the Alexander von Humboldt Foundation (2014).

Teaching Activities:
• Physics Lab 2: Fall 2011
• Physics Lab 7: Spring 2012
• Physics Lab 7: Fall 2013
• Methods in Experimental Physics: Fall 2014
• Physics Lab 2: Fall 2014

Organisational Activities:
• Served on the iPhD admissions committee. Currently serving on the Research Lab committee, Physics, Safety Committee, JEST Co-ordination Committee, Physics Curriculum Committee, Industry-Academia Collaboration Committee, and Neutron Scattering, Feb 2014 at IISER Pune.
• *Before joining IISER Pune.

Sunil Nair
Assistant Professor

www.iiserpune.ac.in/~sunil
Joined IISER Pune: July 2011

Research:
I am a particle theorist with a strong interest in the formalism of gauge theory, supersymmetry, gravity and unification. My research has been primarily in the area of string theory, with a focus on theoretical mechanisms and mathematical properties of the theory in different phases. Some of the areas in which I have previously made contributions are: conformal invariance of the field theory on the superstring worldsheet, mass corrections for supersymmetric solitons and monopoles, dualities in string and M-theory, properties of black holes, and multiple membranes in M-theory. I am currently carrying out research on black hole entropy and its relation to entanglement entropy, and writing a textbook for Cambridge University Press on the Standard Model of Particle Physics.

Academic Background:
I did my Ph.D at the State University of New York, Stony Brook (1981). Thereafter I was a Postdoctoral Fellow at the International Centre for Theoretical Physics, Trieste (1981-84), and at the Tata Institute of Fundamental Research (1984-85). From 1985 to the present I have been a faculty member at the Tata Institute of Fundamental Research.

Grants and Awards:

Selected Publications / Last Five Years:

Grants and Awards:
• SERB-DST Personal exchange programme (2014).
• SERB-DST research project on new multiferroics (2014).

Teaching Activities:
• Physics Lab 2: Fall 2011
• Physics Lab 7: Spring 2012
• Physics Lab 2: Fall 2013
• Physics Lab 7: Spring 2014
• Methods in Experimental Physics: Fall 2014

Organisational Activities:
• Served on the iPhD admissions committee. Currently serving on the Research Lab committee, Physics, Safety Committee, JEST Co-ordination Committee, Physics Curriculum Committee, Industry-Academia Collaboration Committee, and Neutron Scattering, Feb 2014 at IISER Pune.
• *Before joining IISER Pune.
Rejish Nath
Assistant Professor

www.iiserpune.ac.in/~rejish
Joined IISER Pune: October 2013

Research Area:
The field of ultra-cold atomic systems, including trapped ions and polar molecules, has developed as an interdisciplinary area, studying diverse problems across many areas of physics. The key in all these studies is the ability to manipulate and design inter-particle interactions using external fields. My research focuses on some of these problems, including the study of (non-local) non-linear phenomena such as solitons, vortices and pattern formation in weakly interacting Bose-Einstein condensates with long-range interactions. On the strongly correlated side, we address condensed matter problems using atoms in optical lattices or trapped ions. Our studies also intensively involve pure atomic physics, where the current focus is on the high-angular momentum, Rydberg-state properties of alkali atoms.

Academic Background:
I got my PhD at Leibniz University of Hannover, Germany in June 2009, in the group of Luís Santos. My post-doctoral positions were at MPIPKS, Dresden, Germany (2009 – 2011), group of Dr. Thomas Pfah, and IQOQI, University of Innsbruck, (Oct. 2011 – 2013), group of Prof. Peter Zoller.

Selected Publications / Last Five Years:

Teaching Activities:
- Quantum Mechanics I, Fall 2014.
- Part of Quantum Optics, jointly with Dr. Pavan Kumar, Spring 2013.

Organisational Activities:
- Committee for Ph.D. Student Admissions, Physics.
- Outreach Committee, Physics.

Grants and Awards:
- DST Nano-mission grant.
- Welcome-Trust DBT India alliance intermediate fellowship and grant.

Outreach Activities:
- A talk in Ferguson college, Nov. 2013 “Atomic Force Microscopy: Beyond imaging”.
- DST Inspire camp lectures in Jayashrir College, Dist. Kolhapur.
- DST Inspire camp lectures in Willington college, Dist. Sangli.

Shivprasad V. Patil
Associate Professor

www.iiserpune.ac.in/~s.pati
Joined IISER Pune: January 2008

Research:
I am an experimental physicist working in nano-mechanics, biophysics and instrumentation. The main focus of my laboratory is to understand how molecules respond to external mechanical perturbations at the boundary where the continuum picture of matter breaks down. We develop novel experimental tools to understand mechanics at the nano-scale. So far we have probed normal and shear response of water under nano-scale spatial confinement. Other systems of our current as well as future interest are lipid bilayers and single protein molecules. To measure the response of few molecules to external mechanical perturbations is a difficult experimental proposition. Our group possesses a somewhat unique talent for building instruments for this purpose.

Academic Background:
I did my PhD at the University of Pune in 2003. This was followed by postdoctoral positions at Wayne State University (2003-2005) and Institute of Microelectronics, CSIC Madrid (2005-2008).

Selected Publications / Last Five Years:

Grants and Awards:
- DST Nano-mission grant.
- Welcome-Trust DBT India alliance intermediate fellowship and grant.

Outreach Activities:
- A talk on Ferguson college, Nov. 2013 “Atomic Force Microscopy: Beyond imaging”.
- DST Inspire camp lectures in Jayashrir College, Dist. Kolhapur.
- DST Inspire camp lectures in Willington college, Dist. Sangli.

* Before joining IISER Pune.
G.V. Pavan Kumar  
Assistant Professor

www.iiserpune.ac.in/~pavan  
Joined IISER Pune: May 2010

Research:  
I am interested in optical physics and applications of plasmons and excitons in nanostructures and molecular systems. Specifically, I am interested in questions pertaining to propagation and localization of light at sub-wavelength scale. To answer such questions, we (1) fabricate and synthesize a variety of nano-architectures; (2) probe them using home-built optical microscopy and nano-scopy methods; (3) theorize and model the nano- optical interaction. Over the past 4.5 years at IISER-Pune, we have fabricated a novel plasmonic nano-element called end-to-end coupled nanowires. We have developed a new method – plasmofluidic surface enhanced Raman scattering - to detect and probe single molecules using dynamic evanescent traps of plasmonic nanoparticles. We have developed Fourier-space optical microscopy method that can be used to determine k-vector distribution of photons emerging from nanostructures.

Academic Background:  
I did my Ph.D at the Jawaharlal Nehru Centre for Advanced Scientific Research (NCASR), Bangalore in 2008. Thereafter I was an IFCO post-doc fellow at the Institute of Photonic Sciences, Barcelona (2008) and a Postdoctoral Associate at Discovery Park, Purdue University (2008-2010).

Selected Publications / Last Five Years: 

Grants and Awards: 
- 2014, DST Nanomission grant on Nonlinear Plasmonics, Rs 1.3 crore (as PI).
- 2014, DST-SERB grant on organic materials and photonics, Rs 50 lakhs (as co-PI).
- 2014, Young Scientist Award, INCASR conference on materials, Trivandrum, Kerala.
- 2013, INSA Medal for Young Scientist (Physics), Indian National Science Academy (INSA).
- 2012, DST-SERB grant On Raman microscopy, Rs 50 lakhs.
- 2011, Associate, Indian Academy of Sciences.
- 2010, DST Ramanujan Fellowship in Physical Sciences.

Teaching Activities:  
- Advanced Physics: Fallow 2010, Fall 2011, Fall 2012.
- Physics Lab: Spring 2009, Fall 2014.
- Electrons: Spring 2011.
- Some experiments in Advanced Physical Chemistry: Fall 2014, Fall 2013, Fall 2012.

Organizational Activities:  
- Hostel Warden (Since Oct 2010).
- Member, Committee on Students Activity (COSA) – since 2013.

Outreach Activities:  
- Organizer, KVPI camp (2011).
- Speaker, DST inspire camps (since 2010).

Selected Publications / Last Five Years: 

Outreach Activities:
- Organizer, KVPI camp (2011).
- Speaker, DST inspire camps (since 2010).

Research:  
I am an experimental physicist working in the area of atomic physics and quantum optics with particular emphasis in the area of physics with ultra-cold atoms/ions. Current research interests are in exploring novel phases of matter using Bose-Einstein condensates (BECs). The atomic physics and quantum optics laboratory setup at IISER Pune is the only laboratory in the country where a Bose-Einstein condensation can be routinely produced. Current experiments are focused on looking for novel phases in Bose-Einstein condensates by engineering the inter-atomic interactions. Parallel efforts are being undertaken to create vortices in Rb BEC using synthetically generated magnetic fields and to reach the quantum Hall regime.

Academic Background:  

Selected Publications / Last Five Years: 

Grants and Awards: 
- British Council grant under Knowledge Economy Partnership programme with the University of Birmingham (2013).
- Prof. And Kumar memorial award for best Ph. D. Thesis, Department of Physics, IITC Bangalore.

Teaching Activities:  
- Physics Lab: Fall 2009, Fall 2014.

Organizational Activities:  
- British Council grant under Knowledge Economy Partnership programme with the University of Birmingham (2013).
- Prof. And Kumar memorial award for best Ph. D. Thesis, Department of Physics, IITC Bangalore.

Outreach Activities:  
- British Council grant under Knowledge Economy Partnership programme with the University of Birmingham (2013).
- Prof. And Kumar memorial award for best Ph. D. Thesis, Department of Physics, IITC Bangalore.

Organisational Activities: 
I have been actively involved in the development of design of undergraduate physics laboratories, curriculum and contents. I have been instrumental in the introduction of physics laboratories courses for the third and fourth year lab and in extending the curriculum of courses on electronics.

Past committee work: Member of the Purchase Committee, Member of various Ph.D Int. committees, member of Joint Admissions committee for undergraduate admissions, Member of the Joint Entrance Screening test (JEST) Consortium, Present committee work: Member of the Academic committee, Member of Faculty applications screening committee, Co-organizer of the Joint Entrance Screening test 2015, Representative of the Ligo-India consortium (INDIGO).
M.S. Santhanam
Associate Professor

www.iiserpune.ac.in/~santh
Joined IISER Pune: May 2008

Research:
My primary research interests are in the broad areas of nonlinear dynamics and chaos and statistical physics. Most of my work is concentrated in the area of quantum chaos in which we study quantum mechanical manifestations of classical chaos, directed transport in quantum chaotic systems and more recently quantum chaos in microparticle resonators. In the last few years, I have extensively worked on random walks and extreme events on complex networks. We focus on the occurrence of extreme events in network settings with flux defined through random walk model. This has applications in many areas ranging from transport properties in physical systems to search engine algorithms. In the next few years, much of my work would be focused on understanding transport properties in non-KAM chaotic systems in both classical and quantum regimes.

Academic Background:
I got my Ph.D at the Physical Research Laboratory, Ahmedabad in 1999. Subsequently I was a Research Staff Member at IBM India Research Laboratory (1998-2002) and a Guest Scientist at the Max Planck Institute for the Physics of Complex Systems, Dresden, Germany (2002-2004). After this I took up a faculty position at PRL, Ahmedabad (2004-2008).

Selected Publications / Last Five Years:

Grants and Awards:
Research project sanctioned by DST, Govt of India on ‘Emergent dynamics on growing networks with comparable time scales’ (jointly with Dr. Arjit Bhattacharjaya and G. Ambika) for the years 2010-2013.

Teaching Activities:
- Introduction to computation, Fall 2008.
- Quantum mechanics I, Spring 2009.
- Quantum mechanics II, Fall 2009.
- Mathematical methods, Fall 2009.
- Quantum mechanics I, Spring 2010.
- Quantum mechanics II, Fall 2010.
- Computational Physics, Spring 2011, Fall 2011.
- Nonlinear Dynamics, Spring 2012.
- Physics Laboratory I, Fall 2012.
- Computational Physics, Fall 2013.
- World of Physics II (Waves and Matter), Spring 2014.

Organisational Activities:
- Active member of IT Committee since 2008.
- Chairperson of IT Committee since 2012.

Outreach Activities:
I have given talks at schools and colleges, at KVPY camps and groups of children hosted by other organisations on science related topics.

Selected Publications / Last Five Years:

Grants and Awards:

* Before joining IISER Pune.

Seema Sharma
Assistant Professor

www.iiserpune.ac.in/~seema
Joined IISER Pune: April 2014

Research:
My research interests mainly revolve around understanding the elementary particles which constitute the universe and their interactions. The Large Hadron Collider is scheduled to operate at a centre-of-mass energy of 13 TeV starting in 2015, and will open an unprecedented phase space for the production of heavy particles. The goal of my current research is to identify signatures of new physics beyond the standard model. I am searching for supersymmetric particles, which provide a solution to the hierarchy problem and in some cases are also a potential candidate for the dark matter. Once any new particles are observed, I will work on characterizing the new phenomena. At present, I am also leading the subgroup of the CMS SUSY physics program which focuses on the generic searches for gluinos and squarks in a variety of all hadronic and single lepton final states. I plan to work on the detector upgrade efforts and contribute to the hardware improvements that will help in better particle identification and reconstruction in the more powerful phase of the LHC in 2022-23.

Academic Background
I did my PhD in experimental particle physics at Tata Institute of Fundamental Research (TIFR), Mumbai (2008). Thereafter I was a Postdoctoral Research Associate at Fermilab, USA (2008-2014).

Selected Publications / Last Five Years:

Grants and Awards:
- World of Physics – Electricity and Magnetism, Fall 2014.

Teaching Activities:
- World of Physics - Electricity and Magnetism, Fall 2014.

Organisational Activities:
Member of the institute IT committee.
Research:

I am an experimentalist working in the area of condensed matter physics. In my research group we use the optical floating zone and the high-temperature solution or flux methods to grow single-crystals of strongly correlated oxides and intermetallics. Materials that are currently being pursued include spin S = ½ chains and ladders where the quantum effects are particularly strong; iron-based superconductors which provide the first example of high-temperature superconductivity outside the cuprate family; the pyrochlore structure based indates where a combination of geometrical frustration and substantial spin-orbit and electronic correlations result in many interesting phases including topological insulators; and some perovskite based oxides as potential thermoelectrics.

Academic Background:


Selected Publications / Last Five Years:


Grants and Awards:

- Propagation and observations of CME propagation: associated radio bursts and cosmic ray Forbush decreases at the earth, PI: Prasad Subramanian, 2012-2015, ISRO/CWIKES program, Rs. 769 lakh.
- Birla Foundation Award for excellence in Plasma Science and Technology, 2013.

Teaching Activities:

- Classical Electrodynamics, Fall 2008, Fall 2009, Fall 2010, 2014
- Plasma Physics, Spring 2014
- Introductory Physics Lab, Fall 2013
- Fluid Dynamics, Spring 2013 (also coordinated Earth System Science)
- Special Relativity and Electrodynamics, Spring 2013 (also lectures of astrophysics for World of Physics 1)
- Mathematical Methods in Physics, Fall 2011
- Fluid Dynamics, Fall 2009 (one module), Spring 2011
- Electricity and Magnetism, Spring 2009, Spring 2010
Suneeta Vardarajan
Associate Professor

www.iiserpune.ac.in/~suneeta

Joined IISER Pune: July 2010

Research:
I am a theoretical physicist and work in two inter-connected fields: gravitation and mathematical physics. In gravitation, I am mainly interested in black hole physics, and work on problems ranging from classical perturbation theory (which is important for providing astrophysical signatures of black holes) to quantum features of black holes. I also study the dynamics of matter propagating in non-black hole spacetimes such as asymptotically anti-de Sitter spacetimes, which interface with related areas like string theory.

In mathematical physics, I am mainly interested in Ricci flow, a flow of geometries which was used to prove the Poincare conjecture in mathematics. New geometric techniques were introduced in the proof. This flow equation appears naturally in physics as a renormalization group (RG) flow for a class of quantum field theories. My work in the last few years in this area has been to exploit this connection, and the geometric techniques from Ricci flow, to yield insights both in two dimensional quantum field theories and mathematics.

Academic Background:
I got my Ph.D at the Institute of Mathematical Sciences, Chennai, India (2002). Thereafter I was an Alexander von Humboldt Fellow, University of Munich (2002-2003), a Pacific Institute for Math. Sciences Fellow, University of Alberta, Canada (2003-2005) and a Research Fellow, University of New Brunswick, Canada (2005-2007). After this I took on a position as Assistant Professor, University of Alberta, Canada (2007-2010).

Selected Publications / Last Five Years:

Grants and Awards:
Canadian $90,000 from Natural Sciences and Engg. Research Council of Canada and Canadian $40,000 from the University of Alberta for the period 2007-2010.

Teaching Activities:
• Mathematical methods in physics: Fall 2012, Fall 2013, Fall 2014.
• Calculus: Spring 2012.
• World of Physics: Spring 2011.
• Mathematical methods for the sciences: Fall 2010.

Organisational Activities:
• Chair, Library committee (2010 to present).
• Member, Senate Council of IISER Pune (until 2014).
• Chair, Infrastructure Committee, Physics (2013 to present).
• Chair, World of Mathematics committee, the Canadian Mathematical Society 2010-2011.

• Chair, Library committee (2010 to present).
• Member, Senate Council of IISER Pune (until 2014).
• Chair, Infrastructure Committee, Physics (2013 to present).
• Chair, Library committee (2010 to present).
• Member, Senate Council of IISER Pune (until 2014).
• Chair, Infrastructure Committee, Physics (2013 to present).
• Chair, World of Mathematics committee, the Canadian Mathematical Society 2010-2011.
Postdoctoral Fellows
Research: Currently I am involved in studying nano-mechanics of bio-membrane and lipid bilayers as well as understanding mechanical properties of single proteins and the effects of external stresses on these properties. Currently I am working on investigating the mechanical strength of tethers formed in supported lipid bilayers by pulling them using atomic force microscopy, as well as understanding mechanical properties of single proteins and the effects of external stresses on their structure and properties and applications in the area of spintronics and nano device applications.


Selected Publications / Last Five Years:
Madhusudan Ingale (August 2008)
I work in solar astrophysics under the guidance of Dr. Prasad Subramanian. Heating of the solar corona and solar wind has been the subject of intense research in heliophysics. Turbulent dissipation is often invoked as a major candidate for this heating. In my research I study the constraints imposed on the amplitude of density turbulence in solar corona and solar wind using observations of angular broadening of radio source.

Abhishek Shukla (August 2009)
I am working in quantum information and quantum computation under the guidance of Dr. T.S. Mahesh. My research is focused on quantum measurements, foundations of quantum mechanics, study and suppression of decoherence, and applications of quantum information processing (QIP) techniques in spectroscopy.

Koushik Karmakar (August 2010)
I work in experimental condensed matter physics under the guidance of Dr. Surjeet Singh. I study the magnetic ground state and magnetic excitation spectrum of spin $S = \frac{1}{2}$ chains related to high TC superconductors. These chains are grown as large crystals suitable for inelastic neutron Scattering using the flux method adapted to an optical floating zone furnace.

Snehal Shekatkar (August 2010)
I work in the theory of control of chaos and theory of complex networks under supervision of Prof. G. Ambika. In my research I study the theoretical and numerical investigations on how the time scale properties of dynamics can play a role in coupled systems and in complex networks. These studies can help us to understand complex systems with varying time scale properties such as climate system, social interaction.

Shaikh Mubeena (August 2010)
I work under the supervision of Dr. Apratim Chatterji. In my research, I worked on developing a coarse grained model potential to study the isotropic nematic transition for self assembling polymeric systems (micelles) using MC simulations. I am also investigating self assembly of model nanoparticles in a background matrix of nematically ordered polymeric chains. My expertise is soft-matter physics and multiscale simulation techniques.

Sunil Kumar (August 2010)
I work in quantum optics and atomic physics under the supervision of Dr. Umakant Rapol. My research work includes the demonstration of trapping of ultra cold atoms (87Rb) in the vicinity of optical near field potentials created by plasmonic nanostructures and study of atom-plasmon interactions. This system can be used as a new possible candidate for distributed quantum information processing.

Swathi Hegde (August 2010)
I work in NMR quantum information processing under the guidance of Dr. T.S. Mahesh. I have been involved in the problems concerned with quantum simulations of unitary and non-unitary dynamics. Specifically, we have experimentally investigated decoherence, its suppression, and exotic freezing in many-body quantum system.

Arindam Dasgupta (August 2010)
I work in photonics and optical nanoscopy with Dr. G.V. Pavan Kumar. My research focuses on optical antenna, remote excitation surface enhanced Raman scattering (SERS) and directivity measurements. An optical antenna work as a transducer between near-field and far-field radiation. while SERS studies characterize near-field gain, directivity measurements give insights on far-field radiation properties.

Kajari Gupta (August 2011)
I work in nonlinear dynamics and complex systems under supervision of Prof. G. Ambika. In my research I study the theoretical and numerical investigations on how the time scale properties of dynamics can play a role in coupled systems and in complex networks. These studies can help us to understand complex systems with varying time scale properties such as climate system, social interaction.

A. Shweta (August 2011)
I work in radio astronomy under Dr. Ramana Athreya. I study diffuse and extended (Mpc scale) emission, known as 'radio halos' associated with intra-cluster medium of some clusters of galaxies. My work primarily deals with GMRT data analysis, as the emission is more prominent at low frequencies (below 500 MHz).
Amruta Sadhu (August 2011, IPhD)
I work in the area of general relativity under Dr. Suneeta Vardarajan. My work includes stability analysis of different spacetimes using perturbation techniques.

Supratik Sarkar (August 2011, IPhD)
I work in Grav. Black-hole-Hawking radiation under the guidance of Dr. Arijit Bhattacharyay and in collaboration with my co-guide Prof. Soumitra Sengupta, IACS-Kolkata. My PhD work focuses on the emergence of a massive scalar modulating field in the analogue gravity model of a BEC as a result of Lorentz symmetry breaking.

Mahendra Mali (August 2011, IPhD)
I work on theoretical particle physics under the supervision of Dr. Sudarshan Ananth. My research involves understanding of one of the four forces of nature, gravity, using quantum field theory.

Srikrishna Sekhar (August 2011, IPhD)
I work on observational radio astronomy under the guidance of Dr. Ramana Athreya. Our group is interested in radio halos, which is diffuse emission present in galaxy clusters. My work deals with the physics of the emission as well as developing techniques for high sensitivity imaging at low radio frequencies.

Nishtha Sachdeva (August 2012)
I work in solar astrophysics under the guidance of Dr. Prasad Subramanian. My research topic includes data analysis and study of Coronal Mass Ejection (CME) kinematics and propagation. Earth-directed CMEs can cause destruction to space borne missions and technologies on the Earth. I also look at GRAPES-3 data for Forbush decrease precursors for the study of turbulence levels near Earth.

Kunal Kothekar (August 2012)
I work in the experimental particle physics group under the supervision of Dr. Sourabh Dube. Our group is a part of the CMS Collaboration at LHC-CERN. We are preparing for the 2015 LHC run, where we will smash protons at energy of 13 TeV and will look forward to understand the current problems of Standard Model. My current work focuses on the calibration of the CMS hadron calorimeter for the 2015 run.

Amandeep (August 2012)
I study nanomechanical properties of confined liquid with the research group led by Dr. Shivprasad Patil. My PhD work focuses on measuring rheological properties of confined water with home built instrument. My research is expected to shed light on the complex visco-elastic behavior of the water under nano-confinement.

Harshini Tekur (August 2012)
I am working under Dr. M.S. Santhanam in the field of quantum chaos, which seeks to understand quantum mechanical analogues of classically chaotic systems. In particular, we are interested in studying quantum chaos in optical microcavities. In our work we use both theoretical and computational strategies to focus on several fundamental and applied aspects of physics.

Gunjan Verma (August 2012)
I work in the field of ultra cold atomic gases under the guidance of Dr. Umakant Rapol. I am building an experimental setup to achieve strong coupling between a single Strontium atom and surface plasmon modes. My work will have direct implications in demonstrating distributed quantum information processing. I am also interested in short and long range interaction in Rb-87 BEC.
Ravi Prakash Nath Tripathi (August 2012)

I am working in nano photonics under the supervision of Dr. G. V. Pavan Kumar. My research focuses on the investigation how light interacts with plasmonic metamaterials and organic nano/meso structures. These investigations utilize knowledge from both material science and optics.

Somendranath Panja (August 2012)

I work under the supervision of Dr. Sunil Nair. In our research we explore novel oxide multiferroics by studying their physical properties by linear & nonlinear dielectric, magnetic susceptibility measurements, neutron diffraction, and pyroelectric measurement. We also study the mechanisms that give rise to the coupling between charge & spin degrees of freedom.

Shishir Sankhyayan (August 2012)

I work in observational cosmology under the supervision of Dr. Ramana Athreya (IISER) and Dr. Joydeep Bagchi (IUCAA). I study the large scale structure (LSS) using galaxy redshift surveys. The properties of LSS (super-clusters, walls, filaments and voids) from these surveys give the cosmological parameters apart from the cosmic microwave background radiation, thus putting further constraint on them.

Rohit Babar (August 2012)

I work in materials modeling under the guidance of Dr. Mukul Kabir. In my research, I study defects in graphene and carbon nanotubes, and how the physical, electronic and magnetic properties can be tailored through control of the defects.

Sanku Paul (August 2012)

I work in quantum chaos under the supervision of Dr. M.S. Santhanam. My work is to study novel phenomena like interplay between disorder and localisation, coherent quantum control and quantum transport.

Aditya Mehra (August 2012)

I work in different aspects of string theory under the guidance of Dr. Arjun Bagchi. In my research, I explore various aspects of Galilean electrodynamics and also study the corresponding holographic picture.

Sk Rejaul (August 2012)

I work under the supervision of Dr. Aparna Deshpande. My research work involves investigation of local electronic properties of Dirac materials using scanning tunneling microscopy (STM) at low temperature. These properties help to define and design these materials for applications in spintronics. Presently, I am focusing on topological insulator material Bi2Se3 and its Fe doped variants.

Rabindranath Bag (August 2012)

I work under the supervision of Dr. Surjeet Singh. I focus on the single crystal growth using the Traveling Solvent Floating Zone technique associated with an image furnace. My work aims to clarify subtle issues related to the crystal growth of strongly correlated oxides. I am also interested in the magnetic and thermal transport properties of these materials.

Chetan Kumar Vishwakarma (August 2012, IPhD)

I work in the field of ultra cold atoms under the guidance of Dr. Umakant Rapol. My PhD work focuses on laser cooling and trapping of single Strontium atoms in near field optical potential for experiments towards distributed quantum information processing. My work is expected to open up new avenues in studying atom-plasmon and atom-atom interactions in the nanometer regime.

Rohit Kumar (August 2012)

I work with Drs. Sunil Nair and Surjeet Singh in recently discovered iron based High TC Superconductors. My concern is to address the relation of electronic nematic order and Unconventional superconductivity using magnetotransport as a primary tool on high-quality crystals which we grow using the flux method.
Dhanya. S. Menon (August 2012, IPhD)

I work under the supervision of Dr. Suneeta Vardarajan in the area of general relativity. My research focuses on the (in)stability of Ads and related space-times.

Anjusha V.S. (August 2012, IPhD)

I work in experimental quantum information under the guidance of Dr. T.S. Mahesh. My research involves NMR-Quantum information processing and quantum simulations. Quantum information deals with the identification and exploitation of quantum resources for information processing.

Mainak Ghosh (August 2012, IPhD)

I work in soft matter physics under Dr. Apratim Chatterji’s guidance. My current research topic includes complex fluids as well as active matter. I also study complex biological systems including polymers and membranes.

Tomin K James (August 2012, IPhD)

I work under Dr. Prasad Subramanian in solar astrophysics. My topic of research is Coronal Heating, wherein I search for energy sources responsible for heating up of solar corona and estimate the energy budget involved in such heating events. I use the NASA/ESA/JAXA spacecraft data dedicated for the study of Sun and heliosphere.

Prachi Telang (August 2012, IPhD)

I work in the experimental condensed matter physics group under the supervision of Dr. Surjeet Singh. My research focuses on the synthesis and investigation of oxide based thermoelectric materials. This class of materials holds great potential for harnessing waste energy along with being non-toxic and stable at high temperatures.

Srilatha Arra (January 2013)

I am working in computational materials under the supervision of Dr. Mukul Kabir. I am currently working on catalysis, which generates hydrogen. Hydrogen is an excellent energy carrier and can be used in fuel cells.

Vinayak Mallikarjuna Kulkarni (August 2013)

I work in experimental condensed matter physics under the supervision of Dr. Surjeet Singh. Currently, I am setting up experiments for measuring thermoelectric properties of materials with higher precision, ease of operation and a wider temperature range than is available commercially. We can use this system to investigate materials with strong spin-orbit coupling.

Debnath Talukdar (August 2013)

I work in computational material science under the guidance of Dr. Prasenjit Ghosh. Presently I am working on studying the structure, stability and electronic properties of Germanium bilayer, and the effect of Stone-Wales defect on the electronic properties of germanene.

Abhijit Pendse (August 2013)

I work on the theory of Bose Einstein Condensates (BEC) under the guidance of Dr. Arijit Bhattacharyya. A BEC is a state of matter of a dilute gas of bosons in which a large fraction of bosons occupy the lowest quantum state. In such a state many quantum phenomenon show up on a macroscopic scale. In my research I study the effect of non-local interactions on the amplitude modulated states and vortices in BEC.

Avirup De (August 2013)

I work in spin caloritronics under the guidance of Dr. Sunil Nair. Spin caloritronics focuses on the interaction of spins with heat currents. Spin Seebeck effect and inverse Spin Seebeck effect are the two key mechanisms that play an important role in this field of spin caloritronics. I am interested in understanding the coupling of spin, charge and heat currents in magnetic thin-films.
Shubhanshu Chauhan (August 2013)

I work in the experimental particle physics group with Dr. Sourabh Dube. My research focuses on using data collected by CMS detector to find any new physics beyond Standard Model. I am also studying the simulation of the CMS detector for the upcoming LHC run of data taking at CERN.

Pulastya Parekh (August 2013)

I am working in theoretical high energy physics under the supervision of Dr. Arjun Bagchi. I am looking into the tensionless limit of string theory, exploring the connections to Galilean Conformal Symmetry. We would attempt to quantize the theory in this limit using this symmetry. The goal is to obtain a connection between string theory and higher spin theories.

Namrata Patnaik (August 2013)

I work in the condensed matter physics group under the supervision of Dr. Ashna Bajpai. My work focuses on the synthesis and characterization of antiferromagnetic materials which show the phenomenon of piezomagnetism. I intend to study size effects in these systems through dc magnetization and non-linear ac susceptibility.

Turmoli Neogi (August 2013)

I work in theoretical high energy physics under the guidance of Prof. Sunil Mukhi. I am presently studying various aspects of asymptotic limits of space-time, and the BMS-CFT correspondence in different dimensions.

C.S. Sudheer Kumar (August 2013)

I work in the group of Dr. T.S. Mahesh on experimental quantum information processing (QIP). My research work is focused towards quantum measurements and includes standard projective measurement, generalised measurement (POVM), weak measurement, protective measurement, and so on. I am trying to understand these and implement them in QIP tasks.

Anshul Kapoor (August 2013, IPhD)

I work in the experimental particle physics group with Dr. Sourabh Dube. My research focuses on the search for new particles produced in the proton-proton collisions at the LHC. Presently I am developing a code framework that will be used to analyse data from the CMS experiment during the 2015 LHC run.

Jay Mangaonkar (August 2013, IPhD)

I’m working in atomic physics and quantum optics under Dr. Umakant Rapol. My project is to build an paul type ion trap. These devices trap a single ion or a chain of ions using static and RF oscillating electric fields in a quadrupole arrangement. They are a useful tool to build high precision atomic clocks, quantum computing, quantum information processing and quantum simulation experiments.

Sandip Varkey George (August 2013, IPhD)

I work in the complex systems group under the supervision of Prof. G. Ambika. My work is on non linear time series analysis with a focus on technique development to characterize and quantify non-linearity in observational time series. At present I am working on characterization of chaotic time series using Fourier transforms and multi-fractal analysis of irregular variable stars.

Deepak Khurana (August 2013, IPhD)

I work in quantum information processing group under the supervision of Dr. T.S. Mahesh. Currently I am looking at the lifetime of long lived nuclear singlet spin states in strongly coupled ordered systems. Potential applications of these special states include studies of slow molecular process, and the improvement of NMR imaging methods.
Adarsh B Vasista (August 2013, IPhD)  
I work in photonics and optical nanoscopy group under the supervision of Dr. G.V. Pavan Kumar. My work mainly focuses on studying antenna properties of heterogeneous 1D nanostructures with different coupling. Understanding antenna properties of nanostructures will give a deeper insight into light-matter interactions at nanoscale. I also look at circuital modelling of these nanostructures.

Charu Garg (August 2013, IPhD)  
I work in condensed matter physics under the supervision of Dr. Sunil Nair. I am currently working on 4d- and 5d- transition metal oxides which crystallize in a geometrically frustrated lattice. The frustration imposed by the lattice, magnetic interaction and spin orbit coupling combines to give rise to a number of exotic electronic and magnetic ground states in these materials.

G.A.R.S.R.K. Kashyap (August 2013, IPhD)  
I work in the area of applied non-linear dynamics under the supervision of Prof. G. Ambika. At present, I am studying the effect of random deletion of links in a directed random network. Specifically, I study the effect on the connectivity of the network. A potential application of this study is in treating Alzheimer’s disease.

Shrreya Krishnamurthy (Project Assistant since 2013)  
I work in the field of experimental condensed matter under the guidance of Dr. Ashna Bajpai. My current research work includes synthesis of 2D monolayers by the method of liquid exfoliation. Graphene analogous layered compounds show extremely novel properties, I intend to study the magnetic and transport behaviour in this class of oxide materials.

Amit Bhunia (January 2014)  
I work in the experimental condensed matter physics group under the supervision of Dr. Shouvik Datta. I study the electronic origin of light emission, the onset of lasing and coherence, and the physics of excitons in semiconductor laser diodes using electrical and optical techniques in frequency, time and temperature domains.

Aditee Rane (August 2014)  
I work in the experimental particle physics group under the guidance of Dr. Seema Sharma. I am learning the basics of experimental collider physics to analyze proton-proton collision data produced at the LHC. I plan to search for supersymmetric particles using the data of the upcoming 2015 LHC run.

Chandan Kumar Singh (August 2014)  
I work in material modeling under the guidance of Dr. Mukul Kabir. My research topic includes the study of new materials MAX Phases and MXenes.

Chinmayee Mishra (August 2014)  
I have recently joined the PhD program. I work in theoretical quantum optics under the supervision of Dr. Rajesh Nath. We study the system of 2D solitons in dipolar Bose-Einstein condensate with tilted dipoles. We show that 2D solitons can be stabilised in a wide range of interaction strengths by simply tilting the dipoles with rest to a 2D plane.

Shatruhan Singh Rajput (August 2014)  
I work under the guidance of Dr. Apratim Chatterji. My research will focus on multiscale simulations of jamming of colloids in an extensional flow.

Sucheta Majumdar (August 2014)  
I work in theoretical high energy physics under the guidance of Dr. Sudarshan Ananth. I am currently studying Yang-Mills Theory in light-cone gauge, which focuses on the physical degrees of freedom of the theory. Hence, it is very suitable for the study of real-world processes like scattering amplitudes.
Aakanksha Kapoor (August 2014)  
I work in experimental condensed physics under the supervision of Dr. Ashna Bajpai. In my research, I focus on the synthesis and characterization of magnetically functionalized carbon nanotubes. I intend to study the potential applications of CNTs in spintronic devices.

Projjwal Kanjilal (August 2014, IPhD)  
I work under the supervision of Dr. Nabamita Banerjee. At present I am learning quantum field theory through active reading projects. It feels great to be a member of the IISER Pune physics department.

Ankita Niranjan (August 2014, IPhD)  
I work under the supervision of Dr. Rejish Nath in the area of theoretical condensed matter. My current research focuses on the Rydberg states of atoms.

Shubham Pandey (August 2014, IPhD)  
I work in the experimental particle physics group under the supervision of Dr. Seema Sharma. I am currently trying to understand the working of the CMS detector and the software used to analyze the collision events collected by CMS at the LHC in CERN.

Sayali Atul Bhatkar (August 2014, IPhD)  
I work under Dr. Nabamita Banerjee. I am studying construction of entropy current for relativistic fluids.

Soham Pal (August 2014, IPhD)  
I work under the supervision of Dr. T.S. Mahesh in the area of quantum information and processing. At present I am studying NMR as a test bed for quantum information and computing, along with quantum simulating simple molecules like HeH+ and H2 molecule.

Tejal Agarwal (August 2014, IPhD)  
I work under the supervision of Dr. Apratim Chatterji. Currently I am working on self-assembling micro fluids.

Deepak Kumar Sharma (August 2014, IPhD)  
I work under the guidance of Dr. G.V. Pavan Kumar in the field of photonics and optical nanoscopy. My research will focus on plasmonic nanoparticle antennas.

Yashwant Chougale (August 2014, IPhD)  
I work under the guidance of Dr. Rejish Nath, investigating the properties of ultra cold atomic systems realized in various optical lattice geometries, involving the quantum simulation of various phenomena in condensed matter physics.

Kumar Saurabh (August 2014, IPhD)  
I work in experimental condensed matter and quantum opto-electronics under the supervision of Dr. Shouvik Datta. My research includes the study of photon statistics before and after lasing in semiconductor laser diodes.
Dipti D (August 2014, IPhD)
I work under the guidance of Dr. Aparna Deshpande. Presently my research involves studying molecular self assembly with scanning tunneling microscopy.

Mohit Kumar Singh (August 2014, IPhD)
I work in the experimental condensed matter group under the supervision of Dr. Shouvik Datta. At present, I am studying the shot noise before and after lasing in semiconductor laser diodes.

Deepak Sharma (August 2014, IPhD)
I work under the guidance of Dr. Seema Sharma. Currently I am working with Dr. Bhas Bapat and Dr. Seema Sharma on setting up a magnetic spectrometer to study the momentum distribution of beta particles in the decay of cesium atoms.

Mayur Shende (August 2014, IPhD)
I work in experimental condensed matter physics under the supervision of Dr. Shouvik Datta. I work on the network analysis of coherent quantum transport in semiconductor laser diodes.

Arnab Sen (August 2014, IPhD)
I work under the guidance of Dr. Mukul Kabir. At present I am learning about density-functional theory.

Deepak Sharma (August 2014, IPhD)
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<tr>
<td>26.07.2012</td>
<td>Guglielmo M. Tino</td>
<td>Cold atom interferometers and optical clocks</td>
</tr>
<tr>
<td>25.09.2012</td>
<td>Anand D. Joshi</td>
<td>High-resolution and Doppler observations of filaments in Hα</td>
</tr>
<tr>
<td>18.12.2012</td>
<td>Milind N. Kunchur</td>
<td>Magnetic flux vortices in superconductors and the vortex explosion transition</td>
</tr>
<tr>
<td>01.01.2013</td>
<td>Mohammed Mia</td>
<td>Holographic Thermal QCD</td>
</tr>
<tr>
<td>08.01.2013</td>
<td>Chandrabhas Narayana</td>
<td>Elucidating microscopic origin of multifractality using Raman spectroscopy</td>
</tr>
<tr>
<td>16.01.2013</td>
<td>K.V. Ramanathan</td>
<td>A tale of two techniques - the story of structural and dynamical studies using Solid State NMR</td>
</tr>
<tr>
<td>30.01.2013</td>
<td>N. Kumar</td>
<td>Revisiting classical orbital diamagnetism: a surprise</td>
</tr>
<tr>
<td>06.02.2013</td>
<td>Kazi Rajibul Islam</td>
<td>Probing many body physics with cold atom quantum simulators</td>
</tr>
<tr>
<td>07.02.2013</td>
<td>Christian Ruegg</td>
<td>Luttinger-liquid Physics and quantum critical points in one-dimensional magnets</td>
</tr>
<tr>
<td>11.02.2013</td>
<td>Krishnendu Sengupta</td>
<td>Aspects of Dirac materials</td>
</tr>
<tr>
<td>12.02.2013</td>
<td>S. Ramakrishnan</td>
<td>Novel superconductivity in non-magnetic d-band superconductors: A tale of two superconductors</td>
</tr>
<tr>
<td>14.02.2013</td>
<td>Kedar Damle</td>
<td>Resonating valence-bond wavefunctions for spin liquids, and interacting dimer models</td>
</tr>
<tr>
<td>Date</td>
<td>Speaker</td>
<td>Subject</td>
</tr>
<tr>
<td>------------</td>
<td>----------------------------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>18.02.2013</td>
<td>Sunanda Banerjee</td>
<td>Higgs boson: have we seen it?</td>
</tr>
<tr>
<td>19.02.2013</td>
<td>M. Henini</td>
<td>III-V semiconductor nanostructures: fabrications and applications</td>
</tr>
<tr>
<td>25.02.2013</td>
<td>Vijay B Shenoy</td>
<td>Fermions in synthetic non-Abelian gauge fields</td>
</tr>
<tr>
<td>26.02.2013</td>
<td>V. V. Sreedhar</td>
<td>An exact expression for a flat connection on the complement of a torus knot</td>
</tr>
<tr>
<td>25.03.2013</td>
<td>Ananth Ramakrishna</td>
<td>Extra-ordinary transmission of light through plasmonic subwavelength apertures</td>
</tr>
<tr>
<td>08.04.2013</td>
<td>Sarajit Sengupta</td>
<td>Deformation from Hooke to quantum metallurgy</td>
</tr>
<tr>
<td>15.04.2013</td>
<td>Tarun Sauravdeep</td>
<td>Cosmos revealed by Planck: simplicity or duplicity?</td>
</tr>
<tr>
<td>16.04.2013</td>
<td>Amit Goyal</td>
<td>Controlled optical simulators and self-similar rogue waves in nonlinear fiber optics</td>
</tr>
<tr>
<td>06.05.2013</td>
<td>Bedangadas Mohanty</td>
<td>Strong interaction phase diagram and high energy heavy-ion collisions</td>
</tr>
<tr>
<td>09.06.2013</td>
<td>Utpal Chatterjee</td>
<td>Electronic phase diagram of cuprate high temperature superconductors</td>
</tr>
<tr>
<td>26.08.2013</td>
<td>Rajdeep Sensarma</td>
<td>Fun with cold atoms: ferromagnetic response of a “high temperature” quantum antiferromagnet</td>
</tr>
<tr>
<td>28.08.2013</td>
<td>Jainendra Jain</td>
<td>From Hofstadter to Chern</td>
</tr>
<tr>
<td>02.09.2013</td>
<td>G. Rangarajan</td>
<td>Are you connected? Detecting connectivity patterns in networks</td>
</tr>
<tr>
<td>12.09.2013</td>
<td>Siddharth Parmeswaran</td>
<td>A typology for quantum Hall liquids</td>
</tr>
<tr>
<td>16.09.2013</td>
<td>Atul Digha, Naka K. Mondal, R. Satyanarayana</td>
<td>Neutrino@IISER: presentations on neutrino physics and the India Based Neutrino Observatory</td>
</tr>
<tr>
<td>07.10.2013</td>
<td>Roop Mallik, Guruvumary Kumaraswamy, Rama Govindarajan, Aparat Chatterji</td>
<td>Soft Matter@IISER</td>
</tr>
<tr>
<td>10.10.2013</td>
<td>Rohini Godbole</td>
<td>Higgs and its discovery</td>
</tr>
<tr>
<td>21.10.2013</td>
<td>G. Ravindra Kumar</td>
<td>The light intensity frontier</td>
</tr>
<tr>
<td>25.10.2013</td>
<td>Priya Mahadevan</td>
<td>Orbital ordering in transition metal oxides - a route to high polarization multiferroics</td>
</tr>
<tr>
<td>25.10.2013</td>
<td>Shubhankar Bedanta</td>
<td>Magnetic domains, domain walls and their dynamics</td>
</tr>
<tr>
<td>04.11.2013</td>
<td>R. Vijayabhavan</td>
<td>Quantum measurement and feedback with superconducting circuits</td>
</tr>
<tr>
<td>06.11.2013</td>
<td>Stefano Kovacs</td>
<td>Membranes from monopole operators in ABJM theory</td>
</tr>
<tr>
<td>11.11.2013</td>
<td>Aninda Sinha</td>
<td>HEE-how?: Derivations of entanglement entropy</td>
</tr>
<tr>
<td>11.11.2013</td>
<td>Nitin Samarth</td>
<td>Topological Insulators: from exotic particles to spintronics</td>
</tr>
</tbody>
</table>
**Date** | **Speaker** | **Subject**
---|---|---
15.11.2013 | Pratap Raychaudhuri | Disordered superconductors: the TIFR story |
18.11.2013 | Shobo Bhattacharya | Persistence of memory: What do you see and what can you remember or forget? |
17.12.2013 | Tiziano Camporesi | High energy physics: understanding how our universe works |
10.02.2014 | Axel Kleinschmidt | Scattering in string theory: Beyond perturbation theory |
14.02.2014 | Gegan Mohanty | The Higgs discovery and what lies ahead at LHC |
03.03.2014 | Ashok Singal | Is the Copernican principle violated in the sky? |
06.03.2014 | Atish Dabholkar | Quantum black holes: A window into the short-distance structure of quantum gravity |
07.03.2014 | Sandip Trivedi | Gravity and condensed matter physics: the beginning of a dialogue? |
26.03.2014 | Subhabrata Majumdar | The discovery of primordial gravitational waves |
27.03.2014 | Stefan Zollner | Precision measurements of optical constants using spectroscopic ellipsometry |
07.04.2014 | Subrata Pradhan | Steady state superconducting tokamak (SST-1) |
08.04.2014 | Sahana Roessler | Phase transitions and magnetic precursor state in Fe(1+y)Te |
15.04.2014 | R. Rajaraman | Indistinguishability in quantum physics |
15.04.2014 | Daniel Baumann | Newest technologies with superconducting NMR magnets |
16.04.2014 | Fred Gent | Supernova regulatedISM: the multiphase structure, magnetic field and the dynamo |
21.04.2014 | T. Saha Dazgupta | Correlation effects in real materials |
21.05.2014 | Atul Gurtu | Looking beyond the Higgs and the Large Hadron Collider |
25.07.2014 | Amitabh Lath | Where could the new physics be hiding? |
04.09.2014 | Tiziana Venturi | Galaxies and galaxy clusters at radio frequencies: An observational overview |
05.09.2014 | Upal Chaterjee | Phase coherence driven melting of CDW order across quantum and thermal phase transitions in intercalated 2H-NbSe2 system |
11.09.2014 | M. Sivakumar | Higher spin particles: past, present and future |
19.09.2014 | Nandini Trivedi | Topology and correlations driving new phases and phenomena |
12.11.2014 | Massimo Taronna | From higher spins to strings: a constructive approach |
18.11.2014 | Valery Rubakov | The universe before the hot big bang |
19.11.2014 | N.D. Hari Dass | Varieties of quantum measurements |
03.12.2014 | Raghavan Rangarajan | Gravitinos, reheating and the matter-antimatter asymmetry of the universe |
Academic Events
and Special Lectures
Academic Events:

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Session on “Women in Science: Global and Local Scenario” WiSeGaLS 2010</td>
<td>February 20, 2010</td>
</tr>
<tr>
<td>Emerging Trends in Strongly Correlated Electronic Materials</td>
<td>April 17, 2010</td>
</tr>
<tr>
<td>Mumbai-Pune Soft Matter Meet</td>
<td>January 2011</td>
</tr>
<tr>
<td>Lecture Series in Physics by Sir Anthony J. Leggett under Erudite Scheme at IISER &amp; IUCAA Pune</td>
<td>January 12-13, 2011</td>
</tr>
<tr>
<td>Quantum Field Theory</td>
<td>February 23-27, 2011</td>
</tr>
<tr>
<td>DST-SERC school in Nonlinear Dynamics</td>
<td>December 04-24, 2011</td>
</tr>
<tr>
<td>International Symposium on Solar-Terrestrial Physics</td>
<td>November 05-09, 2012</td>
</tr>
<tr>
<td>Ultracold Atoms for Fundamental Science and Enabling Technologies</td>
<td>December 17-21, 2012</td>
</tr>
<tr>
<td>Mumbai-Pune Soft Matter Meet</td>
<td>August 2013</td>
</tr>
<tr>
<td>Meeting on Neutron Scattering</td>
<td>February 10-12, 2014</td>
</tr>
<tr>
<td>Inter-IISER Physics Meet</td>
<td>March 15-17, 2014</td>
</tr>
<tr>
<td>Summer School, MATerials Simulations Theory And NumerIcs (MASTANI)</td>
<td>June 30 – July 12, 2014</td>
</tr>
<tr>
<td>Stringy Days</td>
<td>December 22-23, 2014</td>
</tr>
</tbody>
</table>

Special Lecture Series:

<table>
<thead>
<tr>
<th>Lecture Series</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Critical phenomena and renormalization groups”, J. K. Bhattacharjee</td>
<td>February 7-11, 2011</td>
</tr>
<tr>
<td>“Introduction to general relativity and black holes”, Soumitra Sengupta</td>
<td>September 3-7, 2012</td>
</tr>
<tr>
<td>“Quantum field theory”, Soumitra Sengupta</td>
<td>January 28 - February 2, 2013</td>
</tr>
<tr>
<td>“From broken symmetry to topology in condensed matter physics”, Nandini Trivedi</td>
<td>February 11-14, 2013</td>
</tr>
</tbody>
</table>
Facilities and Equipment
Magnetic Properties Measurement System (MPMS) from Quantum Design, USA. The magnetometer uses a highly sensitive Superconducting Quantum Interference Device (SQUID) for magnetization measurements over wide temperature and magnetic field ranges.

Thin-film Deposition system from Excel Instruments, Mumbai using thermal evaporation technique.

Powder X-ray Diffractometer from Bruker, USA. The diffractometer is equipped with a powerful LYNXEYE detector. It is used to check the phase purity of samples and for carrying out crystal structure refinements.

The mirror section of the four mirror image furnace for single crystal growth. The highly reflecting surfaces are semi-ellipsoidal shaped mirrors. The light flux from halogen lamps is concentrated at their common focal point where temperatures as high as 2500 °C can be reached, sufficient to melt most refractory materials.

Scanning Electron Microscope from Carl Zeiss. The microscope provides high-resolution images of surfaces and nano-structures. It is equipped with an energy dispersive x-ray analysis tool for composition determination. The system also has an integrated state-of-the-art nano-lithography attachment for device fabrication.

Scanning Tunneling Microscope (STM) from Omicron Germany. Operates in ultra high vacuum (UHV) and at low temperatures for dedicated STM, spectroscopy and atom/molecule manipulation experiments at 77 K and 4.2 K.
Physical Properties Measurement System (PPMS) from Quantum Design, USA. Several physical properties including resistance, heat capacity, Hall effect, thermal conductivity and magnetic susceptibility of solids can be measured as a function of varying temperature and magnetic field. The lowest temperature that can be reached is about 2° K above the absolute zero. Magnetic fields up to 9 Tesla can be applied using a superconducting magnet (not shown).

Glove-box from mBRAUN, Germany. Materials sensitive to moisture and/or oxygen (for example alkali and alkaline earth metals used in the preparation of pnictide superconductors) are processed and stored in this box, which maintains a highly inert, moisture-free atmosphere.

Vacuum sealed High Temperature Tube Furnace from Nabertherm, Germany. This is quintessential equipment used in condensed matter physics labs for materials processing under inert atmospheres of high integrity. There are several such furnaces in the Physics Programme at IISER Pune. The range of operation is from room temperature to about 1600 °C.

Set-up for dielectric spectroscopy in a closed cycle refrigerator for measurements from 4 °K up to room temperature. The real and imaginary parts of the dielectric function are measured using a high precision analyzer.

Experimental set-up for studying opto-electronic properties of semiconductor nano-structures and devices.
Above: X-ray Laue Diffractometer for crystal alignment from Photonic Science, UK.

Below: Confocal Raman Microscopy system with multiple LASER excitation options (532, 632.8 and 785 nm).

Right: The complex experimental setup used to produce an ultracold sample of quantum gas: the Bose-Einstein condensate.
Below: Optical Fourier Microscope for studying the directional emission from nano-antennas.

Below: Nuclear Magnetic Resonance (NMR) spectrometer: This 500 MHz Bruker NMR spectrometer operates at a magnetic field of 11.7 Tesla and is capable of controlling nuclear spin dynamics in both liquid and solid state samples. It is being routinely used for quantum information studies as well as for chemical characterization. IISER Pune also has a Bruker 600 MHz, a Bruker 400 MHz, and a JEOL 400 MHz spectrometer.

Below: Thin-film Deposition Chamber from Fourvac, Pune.

Below: Closed-cycle Refrigerator: Temperatures as low as 4 °K can be reached for studying the temperature dependence of various physical properties.

Thin film Deposition Chamber from Moorfield, UK. This state-of-the-art deposition chamber is equipped with several evaporation, RF and DC sputtering techniques for thin-films and multi-layer depositions.

Atomic Force Microscope
Three distinct degree programmes are offered in Physics at IISER Pune, an integrated 5-year B.S.-M.S. programme, an integrated M.S.-Ph.D. programme and a Ph.D. programme. Students join the B.S.-M.S. programme straight after their 12th standard (equivalent to high school) through a common admissions procedure across all the IISERs. For the integrated Ph.D. programme, started in 2011, students join after a Bachelor's degree and typically take up to 6 years to get a doctorate. The regular Ph.D. programme selects students who have completed a Master’s degree, and normally lasts 5 years. More details on each programme are provided below.

In the IISER system, B.S.-M.S. students all take the same courses during their first two years, thereby gaining a basic exposure to Biology, Chemistry, Mathematics and Physics as well as, more recently, Earth and Climate Sciences. For the subsequent two years they are allowed to choose freely from among the courses offered in the different disciplines. This provides them the flexibility to tailor an interdisciplinary curriculum for themselves if they so desire. Students wanting to specialise in one of the disciplines can choose a large fraction of their courses from within that discipline, subject to the requirement of a few courses outside their main discipline. Students also have the possibility of undergoing guided study projects on specific topics. Such projects are counted as courses under the heading “Lab Training/Theory Project.” The fifth and last year is completely dedicated to research, leading to a Master’s thesis defended in a seminar at the end of the year. During this year students are free to work with a guide at IISER Pune or at another institution, within or outside India. They do not take any regular courses during this year, which allows them both mobility and the ability to pursue a research problem in depth frequently leading to one or more publications. In the last four years nearly twenty physics papers have been published involving undergraduates as authors.

Integrated Ph.D. students take two years of courses along with the 3rd and 4th year undergraduates. After this, they are essentially on par with Ph.D. students. During this period they are encouraged to avail of guided study with individual faculty members to customise their training in the direction of their intended research.

Ph.D. students are required to take a minimal load of courses during their first year. We have very recently started Ph.D. level courses specifically aimed at them, however the number of such courses at the time of writing is very small and we expect it to increase as our faculty and student strength grows. Therefore at present, Ph.D. students may take one or more of the Ph.D. level courses and also a few courses selected from the advanced (primarily 4th-year) segment of our undergraduate curriculum. Courses at IISER are assigned 2, 3 or 4 credits. For classroom courses, 2 credits corresponds to two one-hour lectures per week. No specific tutorial hours are assigned. 3-credit courses typically involve two one-hour lectures and an hour of tutorials. 4-credit courses are offered only in the 3rd and 4th year and for these courses there are three hours of lectures per week plus an hour of tutorials. For laboratory courses credits are roughly proportional to the extent of work done, but the number of contact hours is, naturally, larger than for classroom courses. All courses having at least 40 registered students are assigned one or more teaching assistants drawn from among the Ph.D. students, who are required to perform this duty for three semesters as part of their programme. Large courses, typically for first- or second-year undergraduates, can have as many as four TAs. For laboratory courses the dedicated laboratory staff also play an essential role.

The list of courses given below displays the semester in which the course is offered and the number of credits. Courses marked “interdisciplinary” are intended to cater to the needs of students interested in any of the major disciplines offered at IISER. Altogether seven Laboratory Courses in Physics are offered during the 5-year B.S.-M.S. programme, the first three are taken by all IISER students, since they fall in the first two years, while the remaining four are more advanced. Courses offered at semesters V-VIII are optional courses. Even though they are primarily targeted at students of a given year, most of them are open to both 3rd and 4th year students subject to certain prerequisites. Wherever two courses appear as alternates in the list below, it means each one is typically offered in alternate years.

At the time of writing, all classroom courses in Physics are offered in the Lecture Hall Complex which features a variety of classrooms holding between 50-200 students, as well as a larger auditorium. All laboratory courses in Physics are offered in four dedicated undergraduate laboratories on the first floor of the Main Building.
Physics Ph.D. Theses

<table>
<thead>
<tr>
<th>Name</th>
<th>Advisor</th>
<th>Thesis title</th>
<th>Degree awarded</th>
</tr>
</thead>
<tbody>
<tr>
<td>V. Resmi</td>
<td>G. Ambika</td>
<td>Environmental effects on the dynamics of coupled non-linear systems</td>
<td>2012</td>
</tr>
<tr>
<td>Soumya Singh Roy</td>
<td>T.S. Mahesh</td>
<td>Nuclear spins as quantum testbeds: Singlet state, quantum correlations and delayed choice experiments</td>
<td>2013</td>
</tr>
<tr>
<td>Appala Venkata Ramana Murthy</td>
<td>Shripad Patil</td>
<td>Photo physical properties of single semiconductor nano-structures using fluorescence correlation spectroscopy</td>
<td>2014</td>
</tr>
<tr>
<td>Kanika Bansal</td>
<td>Shousik Datta</td>
<td>Electrical and optical investigations of the condensed matter physics of junction diodes under charge carrier injection</td>
<td>Thesis submitted</td>
</tr>
<tr>
<td>Padmashri Vlasisaa Patil</td>
<td>Shousik Datta</td>
<td>Synthesis of semiconductor quantum dots, study of its optical properties and its application in sensitized solar cells</td>
<td>Thesis submitted</td>
</tr>
<tr>
<td>Arun Babu K.P.</td>
<td>Prasad Subramanian</td>
<td>Coronal mass ejections from the sun - propagation and near earth effects</td>
<td>Thesis submitted</td>
</tr>
<tr>
<td>Arthur Varghese</td>
<td>Shousik Datta</td>
<td>Role of fluid dynamics in nanofabrication: Growth mechanism and optical properties of ligand free CdS nanocubes made using alumina nano-reactor</td>
<td>Thesis submitted</td>
</tr>
</tbody>
</table>

Selected IISER alumni studying for an advanced degree in Physics

<table>
<thead>
<tr>
<th>Name</th>
<th>University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sushant More</td>
<td>Ohio State University, USA</td>
</tr>
<tr>
<td>C. B. Ajit</td>
<td>Pennsylvania State University, USA</td>
</tr>
<tr>
<td>Abhijeet Kumar</td>
<td>IIT-Delhi, India</td>
</tr>
<tr>
<td>Bedartha Goswami</td>
<td>University of Potsdam, Germany</td>
</tr>
<tr>
<td>Sheetal Kumar Jain</td>
<td>Aarhus University, Denmark</td>
</tr>
<tr>
<td>Shadab Alam</td>
<td>Carnegie Mellon University, USA</td>
</tr>
<tr>
<td>Darshan Joshi</td>
<td>TU-Cottbus, Germany</td>
</tr>
<tr>
<td>Sarthak Parikh</td>
<td>Princeton University, USA</td>
</tr>
<tr>
<td>Hemant Katiyar</td>
<td>IIT-Delhi, India</td>
</tr>
<tr>
<td>Ashutosh Agnihotri</td>
<td>Centrum Wiskunde &amp; Informatica (Sponsored by Shell), Netherlands</td>
</tr>
<tr>
<td>Md. Noaman</td>
<td>University of Mainz, Germany (Marie Curie Fellow)</td>
</tr>
<tr>
<td>P. Shruthi</td>
<td>Rice University, US</td>
</tr>
<tr>
<td>Jammi Sindhu</td>
<td>University of Nottingham, UK</td>
</tr>
<tr>
<td>Madhusudan Raghunath</td>
<td>EPFL, Switzerland</td>
</tr>
<tr>
<td>Anirban Choudhary</td>
<td>University of New Mexico, USA</td>
</tr>
<tr>
<td>Monika Dash</td>
<td>ETH Zurich, Switzerland</td>
</tr>
<tr>
<td>Akash Gadekar</td>
<td>National University of Singapore, Singapore</td>
</tr>
<tr>
<td>Rohit Chikkaraddi</td>
<td>University of Cambridge, UK (Manmohan Singh Fellow)</td>
</tr>
<tr>
<td>Avani Gowdheran</td>
<td>Cornell University, USA</td>
</tr>
<tr>
<td>Shubham Pandey</td>
<td>King’s College London, UK</td>
</tr>
</tbody>
</table>

The year indicated is the year of graduation from the IISER BS-MS Programme.
Map of IISER Alumni in Physics Programmes

produced by Aashay Patil using Google Maps
Physics Publications with Undergraduate Authors

Master’s Theses

**2013-14**

1. Antony Shashwat
   Statistics of bursts in the solar corona at x-ray wavelengths.

2. Adwiteey Mauriya
   Study of tokamak equilibria using variational moment method.

3. Akash Ramesh Gadekar
   Optoelectronic characterization of photovoltaic devices & application of nanofibers for charge storage.

4. Shreyash Tandon
   A study on optical and plasmon based trapping: towards structured light fields.

5. Arme Anant Apte
   Ultrastransverse detection of D-glucose and TNT molecules using vertically aligned self-assembled gold nanorods.

6. Rohit Chikkaraddy
   Emission characteristics of organic meso/nanowires coupled with dielectric and plasmonic structures.

7. Sharad Joshi
   Quantum simulation using nuclear quantum processor.

8. Pravu Prasad Dhal
   Structural and magnetic studies of orthoferrite BaFeO$_{3-\delta}$.

9. Siddhartha Das
   Semi-lectonic b-meson decay.

10. Shibananda Das
    A multiscale simulation scheme to investigate dynamics of membrane confined polymer.

11. C Gaurav
    Effect of D-spacer layer in the interaction between graphene and graphene with a ferromagnetic metal substrate.

12. Mohit Dixit
    Molecular Simulations of hydrocarbon water interfaces.

13. Avani Gowardhan
    A blind Ka- and Q-band survey for molecular absorption.

14. Pallavi Dilip Patil
    Search for OH megamasers at redshift z = 1.7 in the GOODS-North field.

15. Aashay Prakash Patil
    Correlation of categorical and random matrix data.

16. Bhavesh Khamesra
    Stability analysis of spherically symmetric space-time sourced by Planck data 2013.

17. Shivraj Prajapat
    Noncommutative quantum mechanics and noncommutative geometry.

18. Sri Haritej Kolagani
    Random walks on complex media.

19. Rashmi Runjhun
    Synthesis and characterization of transparent and conducting thin films.

20. Shreya Ray
    Precision triple-slot experiment in the microwave regime.

21. Shubham Pandey
    Numerical schemes for conservation laws on moving mesh.

22. Prashant Bhaskar
    Plasmon-exciton interaction in gold-CdTe nanostructures.

**2014-15**

23. Sandesh Bhat
    Models of inflation in the light of Planck data 2013.

24. Aravind H. V.
    Path-integrals and quantum-walks in multi-slit systems.

25. Ashok Choudhary
    Modelling of gravitational waves.

26. Tanya Kumari
    Synthesis of metal oxides for energy and environmental application.

27. B. Anand Deepika
    On metric independent perturbation scheme and associated relativistic acoustic geometry for spherical accretion.

28. Prashant Bhaskar
    Plasmon-exciton interaction in gold-CdTe nanostructures.

29. Somil Subhash
    Chandra Gupta
    Modelling Fe-Cr alloys: a multiscale approach.

30. Aparna Pili
    Physical and chemical characterization of colloidal floc systems.

31. Karishma Bansal
    Multi-frequency study of pulsar radio emission.

32. Naveen Aerpula
    Modelling of electrolysis of ions in a flow cell.

33. Dinesh Kumar
    Study of light transport in multilayered turbid media.

1. Aswathy V.G.
   Photo-thermal properties of gold-CdTe nanostructures.

2. Akshay Y. S.
   Deriving interaction vertices in quantum field theories describing higher spin fields in flat spacetime background.

3. Yagyik Goswami
   Explorations of existence, structure and characteristics of simultaneously stable groups of synchronized nodes in a connected, directed network of oscillators.

4. Sukruti Bansal
   Flat directions in higher dimensional supergravity theories.

5. Urvashi Gupta
   Electromagnetically induced transparency in ultra cold Rydberg atoms.

6. Sourav Sarkar
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