



Indian Institute of Technology Madras is one among the foremost institutes of national importance in higher science and technology education, basic and applied research. The first Indo-German agreement for the establishment of the Indian Institute of Technology at Madras was signed in 1959. The Institute was formally inaugurated in 1959 by Prof. Humayun Kabir, Union Minister for Scientific Research and Cultural Affairs. The IIT system now has sixteen Institutes of Technology.

IIT Madras is a residential institute with nearly 550 faculty, 8000 students and 1250 administrative and supporting staff and is a self-contained campus located in a beautiful wooded land of about 250 hectares. It has established itself as a premier centre for teaching, research and industrial consultancy in the country.

The Institute has sixteen academic departments and a few advanced research centres in various disciplines of engineering and pure sciences, with nearly 100 laboratories organised in a unique pattern of functioning. A faculty of international repute, a brilliant student community, excellent technical and supporting staff and an effective administration have all contributed to the pre-eminent status of IIT Madras. The campus is located in the city of Chennai, previously known as Madras. Chennai is the state capital of Tamilnadu, a southern state in India.



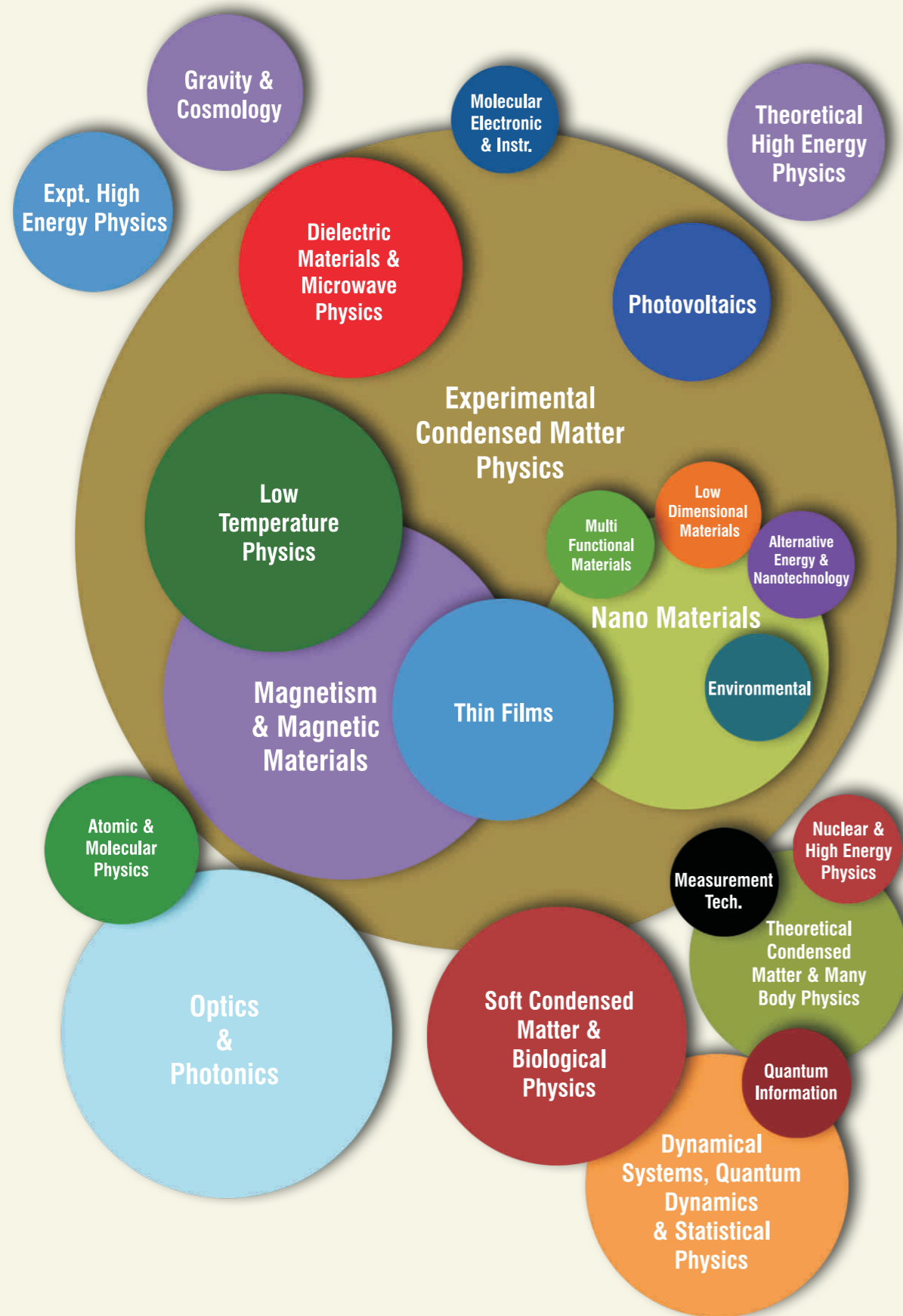
The department of Physics provides a place where faculty, graduate and undergraduate students work together in a vibrant academic atmosphere. Equal emphasis is placed, both in research and pedagogy, on topics which are of fundamental nature and those with immediate applications.

The department currently has 46 faculty members, 150 graduate and 200 undergraduate students. Its faculty and students have published on the average 120 journal papers per year during the last few years. In addition, several undergraduate students in the department actively participate in the research projects. The department attracts outstanding youngsters to join its faculty by providing an environment where academic ideas can blossom without barriers of groups and laboratories. Our researchers are engaged in a wide variety of areas spanning the whole spectrum of highly application oriented materials research to purely theoretical foundations. The department faculty engages in research collaborations with many leading institutions and industries in India and abroad and are also involved in many national and international interdisciplinary projects such as India based Neutrino Observatory and the Gravitational wave detection program, LIGO.

The department offers several academic programs with the goal of providing an education that prepares the students with a scientific outlook which will help solve challenging problems not only in Physics, but also other areas of science, and indeed society in general. The B.Tech program in Engineering Physics and M.Tech program in Solid State Technology are two courses which aim to generate manpower with a strong foundation in both Technology and Physics. Our M.Sc. and B.S.-M.S. dual degree programs aim to generate students who are excited about science and ready to take up challenging research without much more classroom training. The instructional labs are continuously upgraded to the highest standards, having experiments at different grades of difficulties ranging from the higher secondary to beginning research level. The course curricula are modernized periodically and a complete review of the programs are undertaken on the average once every 5 years.

Several members of our faculty are involved with outreach programs to engage teachers and students of the undergraduate colleges and high schools in the region, in addition to writing articles to popularize physics. The department has a vibrant summer student program which sees about 20 senior undergraduate or graduate students visiting and interacting with faculty for about 2 months. The department faculty has had considerable experience and success in 'distance-education' through NPTEL programs. Many members of the faculty have given lecture-based courses in NPTEL over the past few years, with substantial favorable response from viewers.

P. B. Sunil Kumar
Head of the Department
Department of Physics



Alternative Energy & Nanotechnology	Dr. S. Ramaprabhu
Atomic & Molecular Physics	Dr. G. Aravind, Dr. P. C. Deshmukh
Dielectric Materials & Microwave Physics	Dr. V. R. K. Murthy, Dr. P. Murugavel, Dr. V. Subramanian
Dynamical Systems, Quantum Dynamics & Statistical Physics	Dr. V. Balakrishnan, Dr. S. Lakshmi Bala, Dr. N. M. Gupte, Dr. Arul Lakshminarayan
Environmental Nanotechnology	Dr. Somnath Chanda Roy
Experimental High Energy Physics	Dr. Prafulla Behera, Dr. James Libby
Gravitation & Cosmology	Dr. Dawood Kothawala, Dr. L. Sriramkumar
Low Dimensional Materials	Dr. Manu Jaiswal
Low Temperature Physics	Dr. R. Nirmala, Dr. V. Sankaranarayanan, Dr. P. N. Santhosh, Dr. K. Sethupathi
Magnetism & Magnetic Materials	Dr. N. Harish Kumar, Dr. G. Markandeyulu, Dr. V. Srinivas
Molecular Electronics & Instrumentation	Dr. T. S. Natarajan
Multi Functional Materials	Dr. Sudakar Chandran
Nano-Scale Physics	Dr. Prahallad Padhan
Non-Destructive Measurements	Dr. C. V. Krishnamurthy
Nuclear & High Energy Physics	Dr. Sunethra Ramanan
Optics & Photonics	Dr. P. B. Bisht, Dr. A. R. Ganesan, Dr. M. P. Kothiyal, Dr. M. Pattabiraman, Dr. M. V. Satyanarayana, Dr. C. Vijayan
Photovoltaics	Dr. M. K. Jain, Dr. A. Subrahmanyam
Soft Condensed Matter & Biological Physics	Dr. Aditi Simha, Dr. Manoj Gopalakrishnan, Dr. Dillip Satapathy, Dr. P. B. Sunil Kumar
Theoretical Condensed Matter Physics	Dr. B. R. K. Nanda, Dr. Rajesh Narayanan
Theoretical High Energy Physics	Dr. Suresh Govindarajan, Dr. Prasanta Tripathy
Thin Films	Dr. S. Kasiviswanathan
Thin Films & Nanomaterials for Magnetic, Optical, Photovoltaic & Energy Applications	Dr. M. S. Ramachandra Rao

BS-MS Dual Degree

Entry: JEE Duration: 10 semesters
Features: The 210 credit program offers

- Core courses (117 credits), Laboratory courses (35 credits), Electives (24 credits) and a two semester project (14 credits).
- Minor stream courses (11 credits), Engineering drawing (3 credits), Workshop training (6 credits).
- Introductory courses on Chemistry, Life sciences and Ecology & Environment.
- A course on Professional ethics, two electives in Humanities and a self-study course.
- Option for exceptional students to get a Honors Degree (12 extra credits).

M.Sc

Entry: JAM
Duration: 4 semesters
Features: The 84 credit program offers

- Core courses (47 credits), Laboratory courses (18 credits), Electives (12 credits) and a project (7 credits).

CORE COURSES:

- Three and four credit core courses cover the fundamentals of Classical physics, Electrodynamics, Quantum physics, Statistical physics, Nuclear and Atomic physics, and Condensed matter physics. In addition, courses on Mathematical physics, Numerical/Computational physics and Electronics are also prescribed.

ELECTIVES:

- Wide ranging electives reflecting the broad spectrum of faculty research interests.
- Courses include General Relativity & Cosmology, Quantum computation & Quantum Information, Ultrafast lasers, Photonics, Introduction to Physics of the Cell, Physics & Technology of Thin Films, Science and Technology of Nanomaterials (a complete list includes 150 electives).
- Self-study options (under faculty supervision).

LABORATORY COURSES:

- Thematic labs dealing with Mechanics, Thermal physics, Electricity & Magnetism, Optics and Spectroscopy, Electronics, Computational physics, Condensed matter physics and Materials science are designed to expose the students to various methods of experimental physics and to augment class-room activity. Emphasis is laid on quantitative aspects as well as on the conceptual basis.

PROJECTS:

- Research oriented projects.
- Exposure to research level facilities (XRD, SEM, TEM, AFM, SQUID Magnetometer).
- Internships at leading universities/institutes in India and abroad.

RESEARCH FACILITIES:

- Research facilities include systems common to IITM, specialized systems at SAIF, and systems exclusive to the Department of Physics.

B.Tech (Engineering Physics)

(Jointly offered by the Dept. of Physics and the Dept. of Electrical Engg.)
Entry: JEE
Duration: 8 semesters
Features: The 180 credit program includes\

- Core courses (87 credits), Laboratory courses (21 credits), Electives (38 credits) and a two semester project (10 credits).
- Minor stream courses (9 credits), Engineering drawing (3 credits), Workshop training (6 credits).
- Industrial training and lecture (3 credits), Seminar/Viva-Voce (3 credits).
- Introductory courses on Chemistry, Life sciences and Ecology & Environment.
- Courses include Networks & Systems, Analog and Digital Circuits.
- Option for exceptional students to get a Honors Degree (12 extra credits).
- Specific electives include VLSI Design, Fiber optics, Analog/Digital/Optical Communication systems.
- A course on Professional ethics, two electives in Humanities and a self-study course.

M.Tech (Solid State Technology)

Entry: GATE
Duration: 4 semesters
Features: The 69 credit program includes

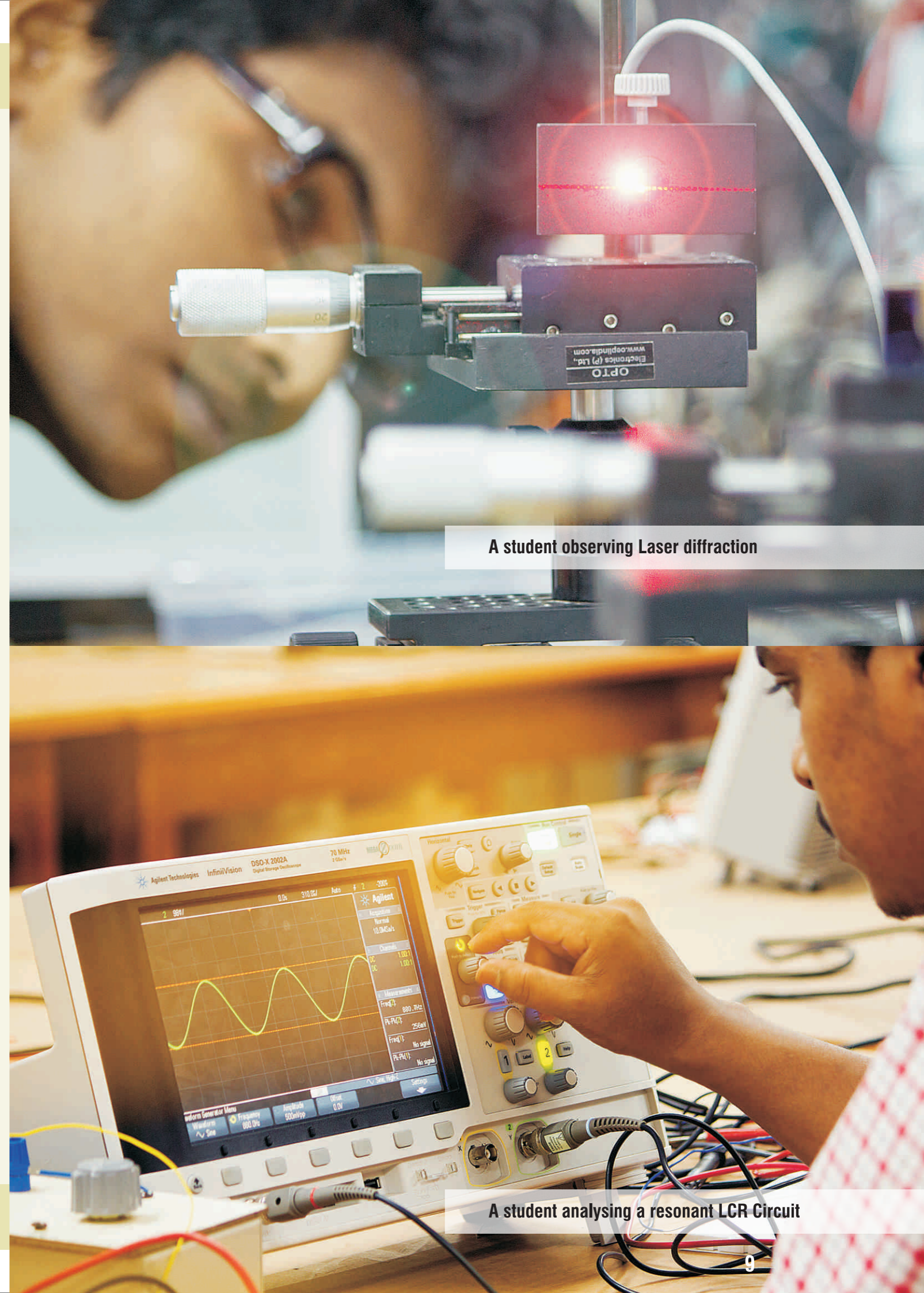
- Core courses (20 credits), Laboratory courses (10 credits), Electives (18 credits) and a two semester project/seminar (21 credits).
- Core courses focus on Materials synthesis and characterization, Dielectric, magnetic and optical materials, Techniques of Physical measurements and Numerical Methods.
- Laboratory courses focus on Materials synthesis and characterization.
- Courses include Semiconductor Device modeling, VLSI Technology (offered by the Department of Electrical Engineering).
- Electives include Low Temperature Physics, Physics of Semiconductor Devices.

Ph.D.

Entry: Written exam and interview conducted by the Department twice a year in May and November.
Duration: 5 years with fellowship
Features:

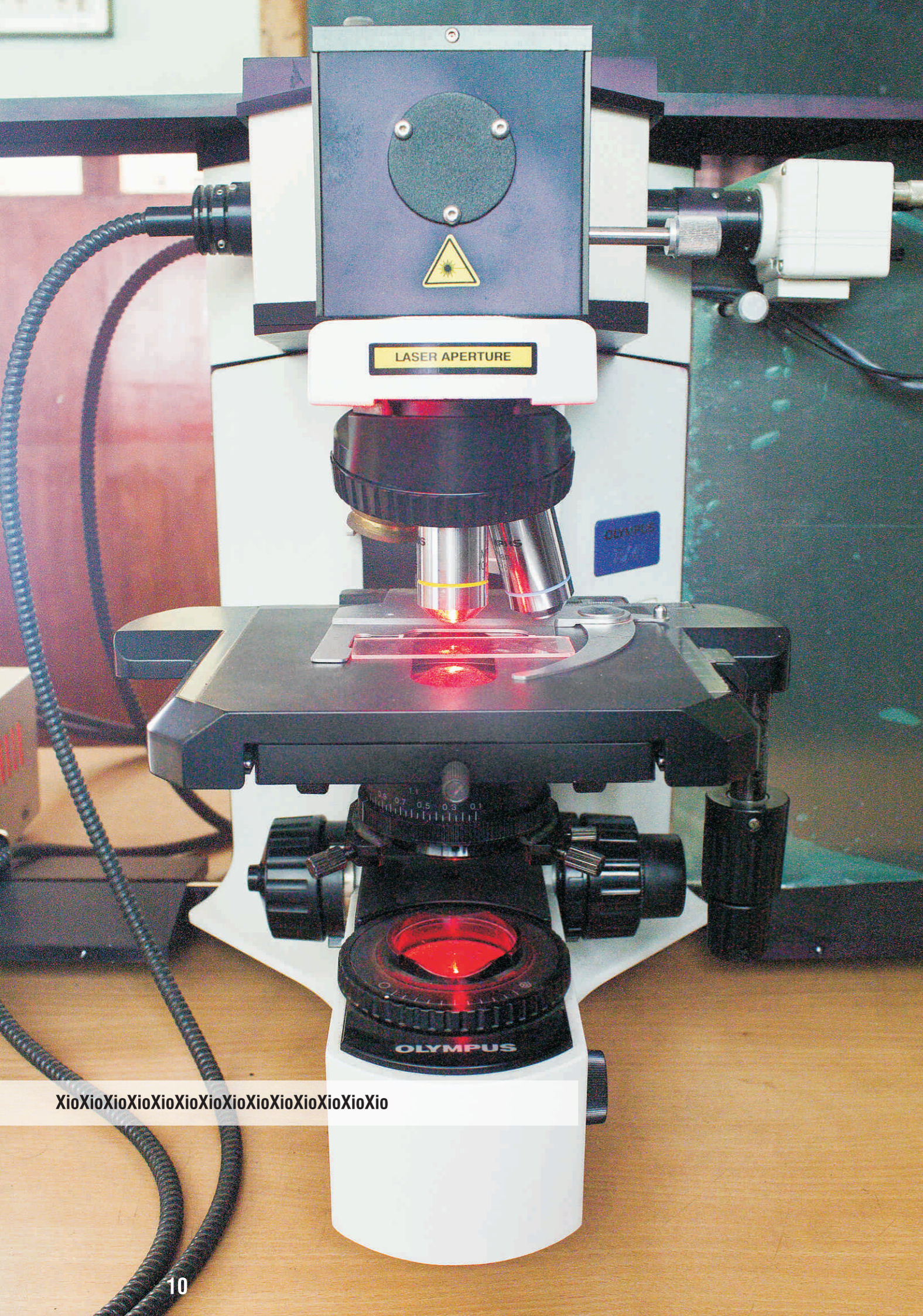
- Course work includes three core courses Foundations of Theoretical Physics and Foundations of Experimental Physics and Introduction to Research and a minimum of two electives.
- Graduate students go through a orientation program enabling them to take up the role of teaching assistants and provide support to faculty in handling tutorials of large classes, lab courses and in handling various common experimental facilities.

- Department and Central Workshops, Central Fabrication facilities, Central Glass blowing facilities.
- Liquid Nitrogen and Liquid Helium plants.
- Supercomputing facility at the institute computer centre.



A student observing Laser diffraction

A student analysing a resonant LCR Circuit



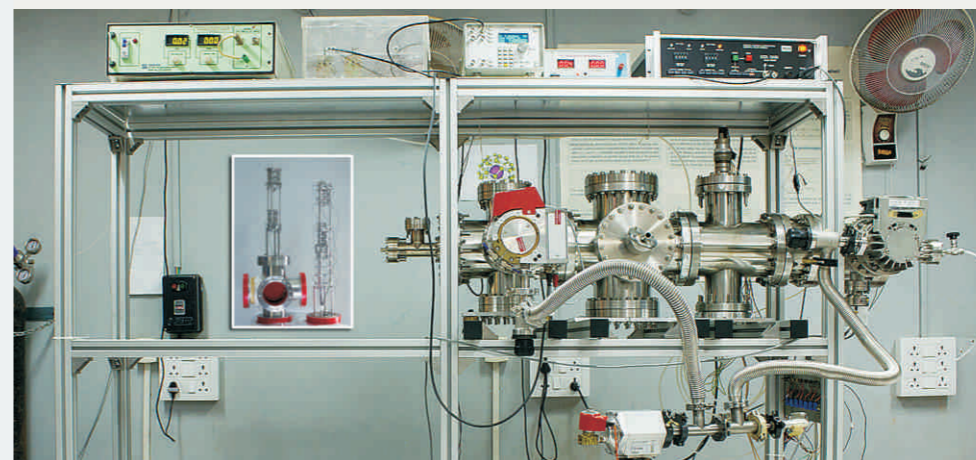
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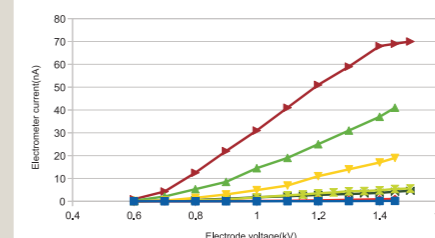


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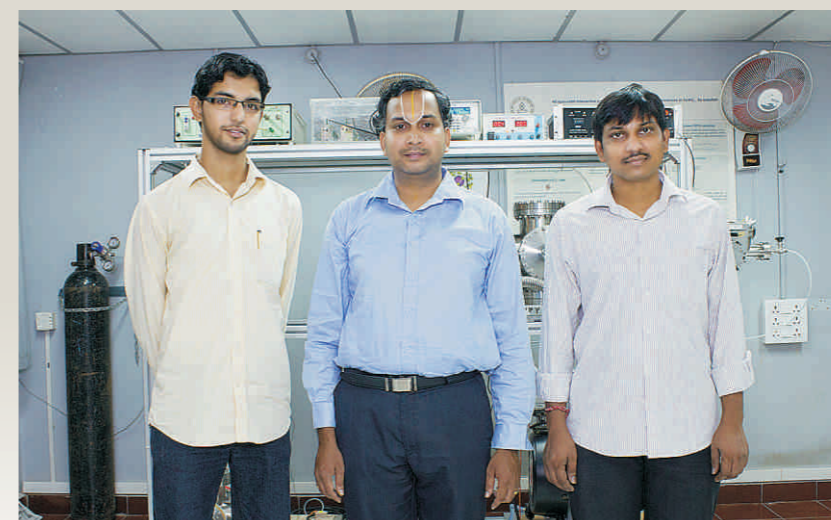


Selected Publications

- Autoionization resonances in the argon isoelectronic sequence, J. George, G. B. Pradhan, M. Rundhe, J. Jose, G. B. Aravind, P. C. Deshmukh, Canadian Journal of Physics, Vol. 90, 6, 547-555, (2012).
- Photodissociation pathways and lifetimes of protonated peptides and their dimers, G. Aravind, Benedikte Klaerke, Jyoti Rajput, Yoni Toker, Lars Andersen, Anastasia Bochenkova, Rodolphe Antoine, Jerome Lemoine, Amandine Racaud, and Philippe Dugourd, J. Chem. Phys. 136, 014307 (2012).
- Sub-microsecond regime dissociation lifetime studies on Adenosine 5'-monophosphate ions, G. Aravind, R. Antoine, B. Klaerke, J. Lemoine, A. Racaud, D. B. Rahbek, J. Rajput, P. Dugourd, and L. H. Andersen. Phys. Chem. Chem. Phys., 2010, 12, 3486-3490.
- Spectral tuning of the Photoactive Yellow Protein chromophore by H-bonding, Jyoti Rajput, Dennis Rahbek, G. Aravind and Lars H. Andersen Biophysical Journal. 98, Issue 3 (2010).
- Probing channel coupling effects on the photoelectron angular distribution in the photodetachment from Cu^+ , G. Aravind, N. Bhargav Ram, A. K. Gupta and E. Krishnakumar. Phys. Rev. A 79, 043411 (2009).
- Dissociation lifetime studies of doubly deprotonated angiotensin peptides G. Aravind, L. Lammich and L. H. Andersen, Phys. Rev. E 79, 011908 (2009).
- Experimental characterization of the metastable D_2^+ ion by photofragment imaging Lutz Lammich, Lars H. Andersen, G. Aravind and Henrik B. Pedersen Phys. Rev. A 80, 023413 (2009).
- Book Chapters: Photodissociation Lifetimes Studies on Gas-Phase Biomolecules: Atomic and Molecular Physics: Introduction to Advanced Topics, 2012, Narosa Publishing House.



Current yield for various gas-pulse length from our supersonic expansion-pulsed discharge ion source that we have built



Aravind G.
Assistant Professor

2001-07: Doctoral Research, at Tata Institute of Fundamental Research, Mumbai, INDIA.

2008-09: Post Doctoral Research at University of Aarhus, Aarhus, DENMARK.

2010 (Jan-June): Post Doctoral Research at University of Basel, Basel, Switzerland.

2010 (July 2nd): Joined IIT Madras as Assistant Professor.

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Email: aravind@physics.iitm.ac.in

Awards & Recognitions

- INSA Medal for Young Scientist 2012.
- Geeta Udgankar award for the best thesis in Physics from TIFR (2008).
- Best thesis award for the year 2008 from Indian Society of Atomic and Molecular Physics.
- "Best outgoing student of Physics for the class of 2001" award, BITS, Pilani, India.

Research Interests

- Construction of photoelectron spectroscopy experiment.
- Photoelectron spectroscopy of Inter-stellar medium anions. We are interested in the electronic structure of these ions.
- Construction of state-of-the-art multipole ion trap experimental setup.
- Study of chemical reactions that occur in the interstellar space. We will study the rate of these reactions using a RF-multipole ion trap.



Balakrishnan V.
Professor Emeritus

B. Sc. Hons. & M. Sc. Physics, University of Delhi (1963, 1965)

Ph. D. Physics, Brandeis University (1970)
Visiting Fellow, Theoretical Physics Group, TIFR (1971 - 74)

Scientific Officer, Matl. Sci. Lab, RRC, DAE, Kalpakkam (1974 - 80)

Professor, Dept. of Physics, IIT Madras (1980 - 2009)

Professor Emeritus, Dept. of Physics, IIT Madras (2009 to date)

Fellow, Indian Academy of Sciences (elected in 1985)

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Research Interests

Probabilistic and statistical properties of classical dynamical systems; random walks and applications of stochastic processes; quantum wave packet dynamics.

In order to investigate the level crossings of the random variable $x(t)$, consider for definiteness the case $v_0 = 0$, so that $\langle x(t) \rangle = x_0$ and $\langle v(t) \rangle = 0$. The probability density in phase space is then given by

$$P(x, v, t) = \frac{1}{2\pi q^2 \sqrt{AC - B^2}} \exp \left\{ -\frac{A(x - x_0)^2 - 2B(x - x_0)v + Cv^2}{2q^2(AC - B^2)} \right\}$$

where q^2 is the diffusion coefficient, $\gamma(t)$ is the time-dependent drift coefficient and

$$A(t) = \int_0^t \phi^2(t') dt', \quad B(t) = \frac{1}{2} \psi^2(t), \quad C(t) = \int_0^t \psi^2(t') dt',$$

$$\phi(t) = \exp \left(-\int_0^t \gamma(t') dt' \right), \quad \psi(t) = \int_0^t \phi(t') dt'.$$


Selected Publications

➤ V. R. Dantham, P. B. Bisht, High-Q whispering gallery modes of doped and coated single microspheres and their effect on radiative rate. J Opt Soc Am B 2009, 26:290-300.

➤ S. A. Ali, P. B. Bisht, A. Nautiyal, V. Shukla, K. S. Bindra, S. M. Oak, Conical emission in β -barium borate under femtosecond pumping with phase matching angles away from second harmonic generation. J Opt Soc Am B 2010, 27:1751-1756.

➤ V. R. Dantham, P. B. Bisht, C. K. R. Namboodiri, Enhancement of Raman scattering by two orders of magnitude using photonic nanojet of a microsphere. Journal of Applied Physics 2011, 109(10):103103-103104.

➤ B. S. Kalanoor, P. B. Bisht, S. Akbar Ali, Baby TT, S. Ramaprabhu: Optical nonlinearity of silver-decorated graphene. J Opt Soc Am B 2012, 29(4):669-675.

➤ C. K. R. Namboodiri, P. B. Bisht, R. Mukkamala, B. Chandra, I. S. Aidhen: Solvatochromism, multiphoton fluorescence, and resonance energy transfer in a new octupolar dye-pair. Chemical Physics 2013, 415:190-195.

➤ Prem B. Bisht and Indrapal Singh Aidhen, Indian Patent, A new dye for applications in dye laser and nonlinear optics and as a fluorescence lifetime standard, Patent application no.2643/CHE/2008 dated 30 Oct. 2008.

➤ Prem B Bisht, Venkata Ramanaiah Dantham, C. K Raman Namboodiri, US Patent, Enhancement of Raman scattering signal by using photonic nanojet of a single microsphere, IN-818882-01-US-REG, March 2012.

I. White light continuum and Optical parametric amplification: Ultrafast lasers

II. Whispering Gallery Modes (WGM) of a micro-cavity: Sensing applications

III. Laser Induced transient gratings: Nonlinear optics and photonic applications of nanomaterials



Selected Publications

➤ V. Balakrishnan, Regge trajectory structure of the ABFST multiperipheral model, J. Math. Phys. 15, 247-257 (1974).

➤ V. Balakrishnan, General linear response analysis of anelasticity, Pramana - J. Phys. 11, 379-388 (1978).

➤ M. Khantha and V. Balakrishnan, Hopping conductivity of a one-dimensional bond-percolation model in a constant field: Exact solution, Phys. Rev. B29, 4679-4690 (1984).

➤ V. Balakrishnan, C. Van den Broeck and P. Hänggi, First passage times of non-Markovian processes: The case of a reflecting boundary, Phys. Rev. A38, 4213-4222 (1988).

➤ V. Balakrishnan, Random walks on fractals, Mater. Sci. Eng. B32, 201-210 (1995).

➤ V. Balakrishnan, G. Nicolis and C. Nicolis, Recurrence time statistics in chaotic dynamics: I. Discrete time maps, J. Stat. Phys. 86, 191-212 (1997).

➤ V. Balakrishnan, I. Bena and C. Van den Broeck, Velocity correlations, diffusion and stochasticity in a one-dimensional system, Phys. Rev. E65, 031102(1-9) (2002).

➤ C. Nicolis, V. Balakrishnan and G. Nicolis, Extreme events in deterministic dynamical systems, Phys. Rev. Lett. 97, 210602(1-4) (2006).

➤ C. Sudheesh, S. LakshmiBala and V. Balakrishnan, Dynamics of quantum observables in entangled states, Phys. Lett. A373, 2814-2819 (2009).

➤ V. Balakrishnan, Extreme value statistics for deterministic dynamical systems, Int. J. Bif. Chaos 21, 3457-3463 (2011).

Books:

G. Venkataraman, D. Sahoo and V. Balakrishnan, Beyond the Crystalline State: An Emerging Perspective, Springer Series in the Solid State Sciences, Vol. 84, Springer, 1989.
V. Balakrishnan, Elements of Nonequilibrium Statistical Mechanics, CRC Press & ANE Books, 2008.

Books in an advanced state of preparation:

V. Balakrishnan, Elements of Mathematical Physics (~800 pp.)
V. Balakrishnan, Nonlinear Dynamics: Problems and Solutions (~400 pp.)



Bisht, P. B.
Professor

Ph.D.: Kumaun University, Naini Tal, India.

PDF: Institute for Molecular Science, Okazaki, Kyoto Institute of Technology, Kyoto, Japan.

Teaching UG and PGs: Basic Physics courses, Ultrafast lasers and applications. Laboratory courses.

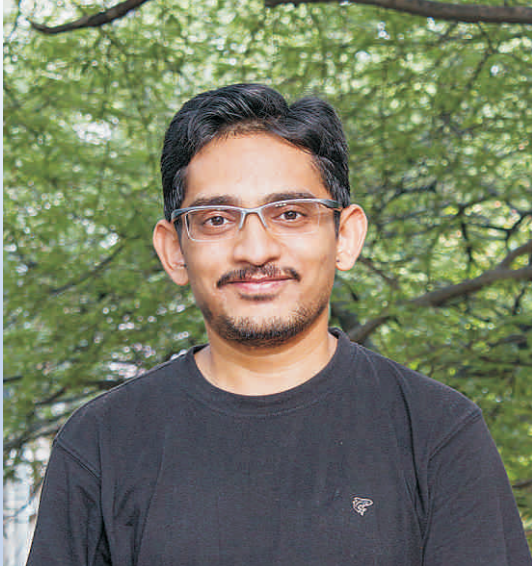
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Research Interests

- Whispering gallery modes (WGMs) of microparticles and their applications.
- Nonlinear optical parametric amplifiers.
- New materials for applications in photonics and multiphoton spectroscopy.
- Active collaboration with:
Chemistry Department, IIT Madras
RRCAT, Indore
Ludwig Maximilian University, Munich
Dublin City University, Dublin
Toyohashi University of Technology, Toyohashi.



Dawood Kothawala

Assistant Professor

Ph.D.: Inter-University Centre for Astronomy and Astrophysics, Pune , 2010.

Post-doctoral Fellowship: Department of Mathematics and Statistics, University of New Brunswick, Fredericton, Canada, 2010 - 2012.

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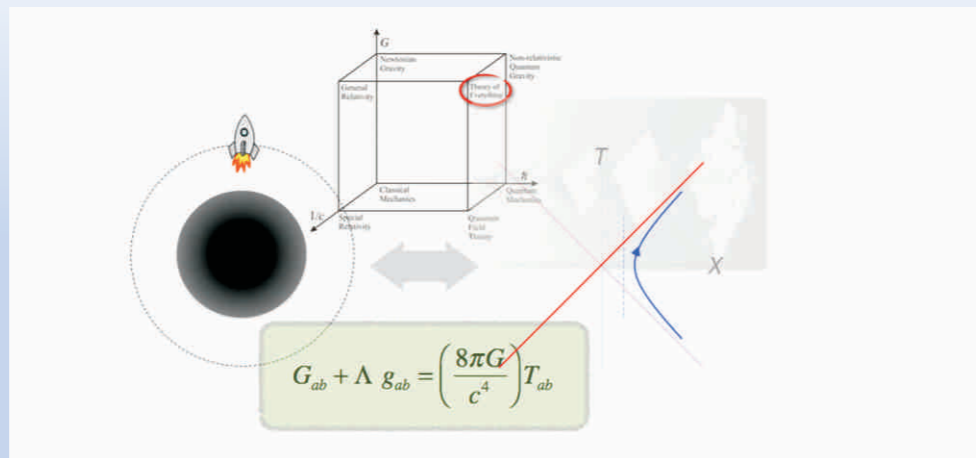
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Research Achievements

One of our research emphasis has been the structure of gravitational field equations near spacetime horizons, and it's implications for the connection between gravity and thermodynamics revealed by research in quantum aspects of gravity. We have shown that several insights into this connection as well as various mathematical and conceptual aspects of semi-classical gravity can be obtained by going beyond Einstein's theory and analyzing it's simplest, non-trivial, higher curvature generalization. An extensive review of this research has recently appeared in Physics Reports. Our research has also been focused on (i) thermal systems in curved spacetimes, effects of spacetime curvature on matter entropy, and their relevance for understanding of Bekenstein-Hawking entropy of black holes, (ii) implications of a "minimal spacetime length" for spacetime singularities and quantum field theory.

Research Interests

- Thermodynamic aspects of gravity, Black hole entropy, Statistical mechanics in curved spacetime.
- Quantum field theory on non-trivial spacetime backgrounds.
- Implications of minimal spacetime length.



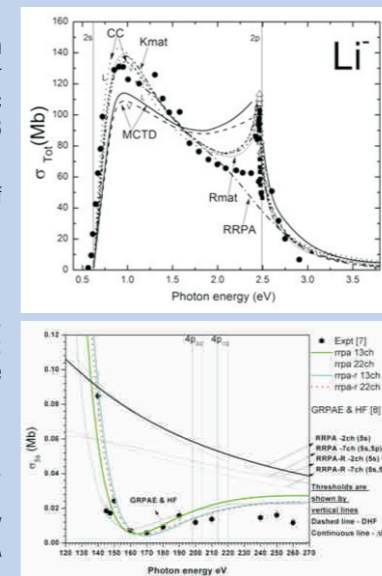
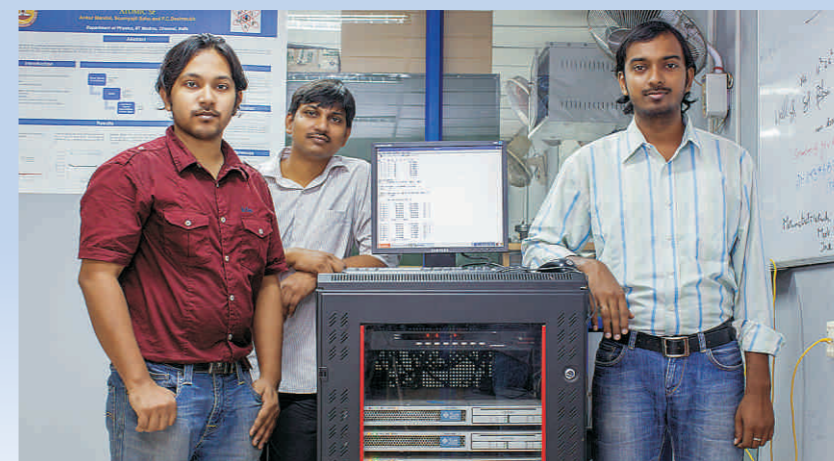
Selected Publications

- T. Padmanabhan, Dawood Kothawala, Lanczos-Lovelock models of gravity, Physics Reports 531, 115 (2013).
- V. Husain, Dawood Kothawala, S. Seahra, Generalized uncertainty principles and quantum field theory, Phys. Rev. D 87, 025014 (2013).
- V. Husain, Dawood Kothawala, Holographic repulsion and confinement in gauge theory, Class. Quant. Grav. 30 [Fast Track Communication], 032001 (2013).
- S. Kolekar, Dawood Kothawala, Membrane Paradigm and Horizon Thermodynamics in Lanczos-Lovelock gravity, Jour. High Energy Phys. 1202, 006 (2012).
- S. Kolekar, Dawood Kothawala, T. Padmanabhan, Two aspects of black hole entropy in Lanczos-Lovelock models of gravity, Phys. Rev. D 85, 064031 (2012).
- Dawood Kothawala, Box of ideal gas in free fall, Phys. Letts. B 720, 410 (2013).
- Dawood Kothawala, Duality of force laws and conformal transformations, Am. J. Phys. 79, 6 (2011).
- Dawood Kothawala, The thermodynamic structure of Einstein tensor, Phys. Rev. D 83, 024026 (2011).
- Dawood Kothawala, L. Sriramkumar, S. Shankaranarayanan, T. Padmanabhan, Path integral duality modified propagators in spacetimes of constant curvature, Phys. Rev. D 80, 044005 (2009).
- Dawood Kothawala, T. Padmanabhan, Thermodynamic structure of Lanczos-Lovelock field equations from near-horizon symmetries, Phys. Rev. D 79, 104020 (2009).
- Dawood Kothawala, T. Padmanabhan, S. Sarkar, Is gravitational entropy quantized?, Phys. Rev. D 78, 104018 (2008).
- Dawood Kothawala, S. Sarkar, T. Padmanabhan, Einstein's equations as a thermodynamic identity: the cases of stationary axisymmetric horizons and evolving spherically symmetric horizons, Phys. Letts. B 652, 338 (2007).



Selected Publications

- J. George, H. R. Varma, P.C. Deshmukh and S. T. Manson; Photoionization of atomic krypton confined in the fullerene C60 J. Phys. B: At. Mol. & Opt. Phys. 45, 185001 (2012).
- P. C. Deshmukh, Dilip Angom and Alak Banik; Symmetry in Electron-Atom Collision and Photoionization Process Invited article in DST-SERC-School publication (Narosa, November 2011); collection of articles based on lecture course given at the DST-SERC School at the Birla Institute of Technology, Pilani, January 9-28, 2011.
- G. B. Pradhan, J. Jose, P. C. Deshmukh, L. A. LaJohn, R. H. Pratt, and S. T. Manson; Cooper minima: a window on nondipole photoionization at low energy J. Phys. B: At. Mol. & Opt. Phys. (Fast Track) 44, 201001 (2011).
- J. Jose, G. B. Pradhan, V. Radojević, S. T. Manson and P. C. Deshmukh; Electron correlation effects near the photoionization threshold: The Ar isoelectronic sequence J. Phys. B: At. Mol. & Opt. Phys. 44, 195008 (2011).
- Vivishesh Sudhir and P. C. Deshmukh; Scattering of electrons by multi-walled cylindrical potentials J. Comput. Theor. Nanosci. 8, 2321-2326 (2011).
- P.C. Deshmukh, Tanima Banerjee, Hari R. Varma, O. Hemmers, R. Guillemin, D. Rolles, A. Wolska, S. W. Yu, D. W. Lindle, W. R. Johnson and S. T. Manson; Theoretical and experimental demonstration of the existence of quadrupole Cooper minima J. Phys. B: At. Mol. & Opt. Phys. (Fast Track) 41, 021002 (2008).
- S. Sunil Kumar, P. C. Deshmukh, R. K. Kushawaha, V. Sharma, I. A. Prajapati, K. P. Subramanyan and B. Bapat; Break-up of the SF63+ photoion revealed by momentum correlation between fragments Phys. Rev. A 78, 062706 (2008).
- H. R. Varma, P.C. Deshmukh, V. K. Dolmatov and S. T. Manson; Correlation and relativistic effects on the photoionization of confined atoms Phys. Rev. A 76, 012711 (2007).



Deshmukh P. C.

Professor

1972 - 77: Doctoral Research, at Nagpur University, Nagpur, INDIA.

1978 - 79: Post Doctoral Research at University of Aarhus, Aarhus, DENMARK.

1979 - 81: Post Doctoral Research at University of Notre Dame, Notre Dame, USA.

1981- 83: Research Assoc. & Adjunct Asst. Professor, Georgia State University, Atlanta, USA.

Joined IIT-Madras on 12th March, 1984

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Awards & Recognitions

- Secretary, Indian Society of Atomic and Molecular Physics (ISAMP) (2001-2003)
- Vice President, Indian Society of Atomic and Molecular Physics (ISAMP) (2003-2004)
- President, Indian Society of Atomic and Molecular Physics (ISAMP) (2005-2006)
- Member, International Advisory Committee, Asian International Seminar on Atomic and Molecular Physics (AISAMP) (2002-2004), (2004-2006)

Research Interests

- Study of atomic photoabsorption processes using relativistic many-body theory.
- Resonances in electron collisions from atoms and nanotube-like cylindrical potentials.
- Study of atomic clock transitions and of time delays in atomic photoionization.



Dillip K. Satapathy

Assistant Professor

Ph.D. in physics from Faculty of Mathematics and Natural Sciences, Humboldt University, Berlin, Germany. M.Tech in Solid State Materials from IIT Delhi; M.Sc in Physics from Utkal University, India.

Postdoctoral research fellow at the Department of Synchrotron Radiation and Nanotechnology, Paul-Scherrer Institute, Switzerland.

Postdoctoral scientist at Fribourg Center for Nanomaterials (FriMat), Dept of Physics, University of Fribourg, Switzerland.

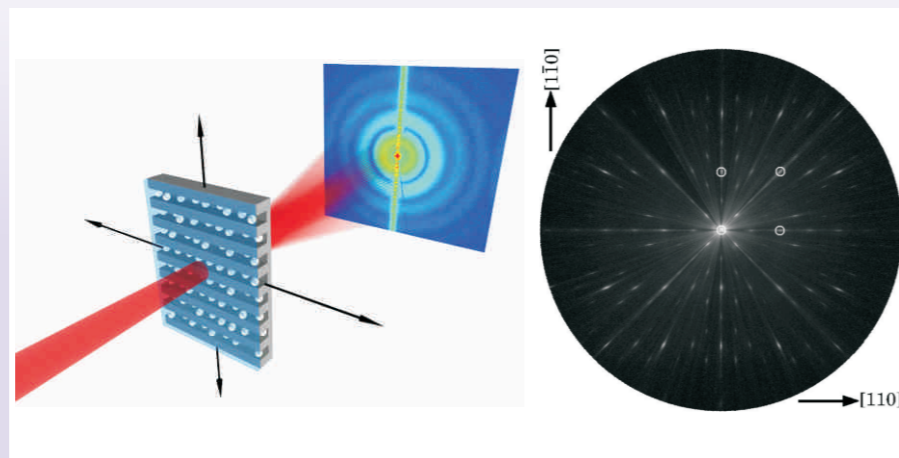
The group is broadly engaged in investigating the dynamics and structure of condensed matter and confined fluids using X-ray, neutron, electron and light scattering. To a large extent the techniques used are small angle X-ray scattering (SAXS), grazing incidence X-ray diffraction (GIXD), X-ray reflectivity (XRR), polarized neutron reflectometry (PNR), X-ray magnetic circular dichroism (XMCD), X-ray resonant magnetic reflectometry (XRMR) and reflection high-energy electron diffraction (RHEED).

Performed many experiments using advanced instrumentations at large-scale research facilities (i.e. synchrotron radiation sources and neutron reactors).

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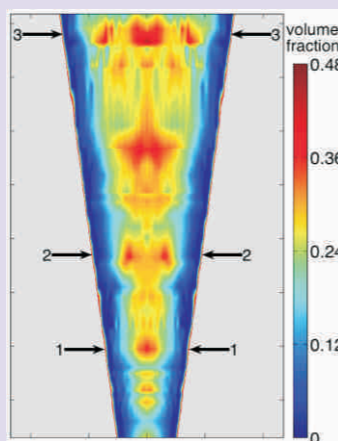
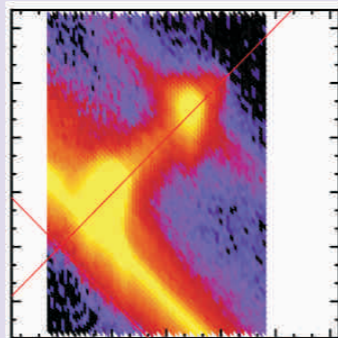
Research Interests

- Structure and dynamics of soft condensed matter.
- Fragility and glass transition in polymer films.
- Physics of strongly correlated electron systems.
- Magnetic proximity effect in oxide based super lattices.
- Condensed matter physics using x-ray and neutron scattering.



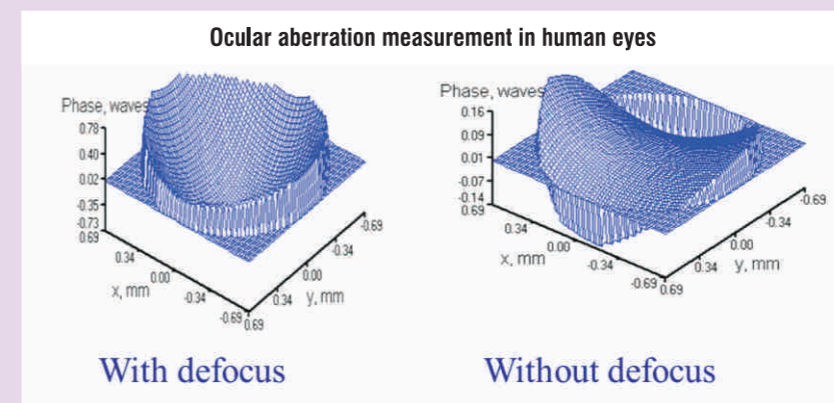
Selected Publications

- D. K. Satapathy, M. A. Uribe-Laverde, I. Marozau, V. K. Malik et al, "Magnetic proximity effect in $\text{YBa}_2\text{Cu}_3\text{O}_7/\text{La}_{0.66}\text{Ca}_{0.33}\text{MnO}_3$ and $\text{YBa}_2\text{Cu}_3\text{O}_7/\text{LaMnO}_3$ superlattices", Phys. Rev. Lett. 108, 197201 (2012).
- M. A. Uribe-Laverde, D. K. Satapathy, I. Marozau, et al. "Depth profile of the ferromagnetic order in a $\text{YBa}_2\text{Cu}_3\text{O}_7/\text{La}_{0.66}\text{Ca}_{0.33}\text{MnO}_3$ superlattice on a LSAT substrate: A polarized neutron reflectometry study" Phys. Rev. B 87, 115105 (2013).
- K. Dillip Satapathy, Bernd Jenichen, Klaus H. Ploog and Wolfgang Braun, "Azimuthal reflection high-energy electron diffraction study of MnAs growth on GaAs(001) by molecular beam epitaxy" J. Appl. Phys. 110, 023505 (2011).
- Kim Nygård, D. K. Satapathy, Edith Perret, et al, "Surface-Specific Ordering of Reverse Micelles in Confinement" Soft Matter 6, 4536, (2010).
- D. K. Satapathy, K. Nygård, O. Bunk, K. Jefimovs et al., "Buckling and layering transitions in confined colloids" EPL-Europhys. Lett. 87, 34001 (2009).
- D. K. Satapathy, O. Bunk, K. Jefimovs, K. Nygård et al., "Colloidal monolayer trapped near a charged wall: A synchrotron x-ray diffraction study" Phys. Rev. Lett. 101, 136103 (2008).
- K. Nygård, D. K. Satapathy, O. Bunk, F. Pfeiffer, C. David and J. F. van der Veen, "Dynamical theory for diffractive x-ray imaging of one-dimensional periodic objects" Appl. Phys. Lett. 92, 214105 (2008).
- D. K. Satapathy, V. M. Kaganer, B. Jenichen et al., Periodic array of misfit dislocations at the MnAs/GaAs interface studied by synchrotron x-ray diffraction, Phys. Rev. B 72, 155303 (2005).



Selected Publications

- Text Book: "Optics" E. Hecht and A. R. Ganesan, Pearson Education (2008).
- Monograph: "Collimation Testing Techniques" authoring R. S. Sirohi, S. Singh and A. R. Ganesan in "Encyclopedia of Optical Engineering" Taylor & Francis, UK, DOI: 10.1081/E-E0E-120047167 (2012).
- A. R. Ganesan and P. Venkateswarulu, Laser Beam collimation using Talbot interferometry, Appl. Opt., Vol.32, 2918-20 (1993).
- A. R. Ganesan, P. Meinschmidt and K. D. Hinsch, Vibration Mode separation using comparative Electronic Speckle Pattern Interferometry (ESPI), Opt. commun., Vol.107, 28-34 (1994).



- V. M. Murukeshan and A. R. Ganesan, Real time curvature measurement using double shear TV Holography, Optik, Vol. 110, No. 2, 57-60 (1999).
- A. R. Ganesan, P. Meinschmidt and Klaus D. Hinsch, Transition between rationality and irrationality related vibration modes in Time-Average Holography, Opt. Commun., Vol.174, pp. 347-353 (2000).
- A. R. Ganesan, P. Arulmozhivarman, D. Mohan, Ashok Kumar and A. K. Gupta, Design and Development of a Closed Loop Adaptive Optics system for Wavefront Sensing and Control, J. of Optics, Vol. 34, No.2, pp. 67-81 (2005).
- Novel Adaptive Optics Deformable Mirrors using Magnet-Polymer Composite membranes, A. R. Ganesan, V. M. Murukeshan, V. Q. Nguyen and R. V. Ramanujan J. of Adv. Sci. Engg. & Med. Vol. 5, no.5., 449-454 (2013).



Ganesan A. R.

Associate Professor

Ph.D. from IIT Madras (1989).

Post-doctoral fellows at Institute for Advanced Studies, Univ. of Malaya, Malaysia. Alabama A & M university, USA.

Univ. of Oldenburg, Germany. Visiting Scientist, DRDO, Dehradun.

Assistant Professor at NIT, Trichy for 8 years.

Associate Professor at IITM since 2006

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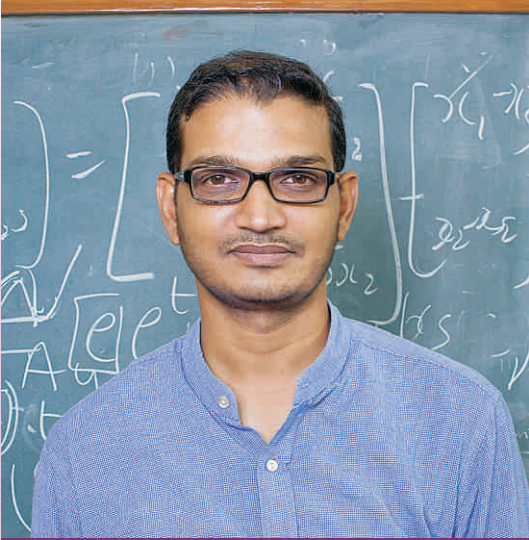
Email: arg@iitm.ac.in

Profile

Has been teaching courses in Optics, Lasers, Instrumentation, Electrodynamics and Electronics, Recipient of Alexander von Humboldt Fellowship from Germany, has been principal Investigator for 7 sponsored research projects and 4 consultancy projects of more than Rs. 1.5 crore funding.

Research Interests

- Applied Optics.
- Phase Shifting Interferometry for optical testing.
- Holography and Speckle Metrology for measurement and testing, Adaptive Optics and Vision Science.



Gopalakrishnan Manoj

Assistant Professor

Ph.D. (Institute of Mathematical Sciences, 2001)

Post-doctoral Research Associate (Virginia Tech, USA, 2001 - 2004)

Guest Scientist (MPI-PKS, Dresden, Germany, 2004 - 2006)

Fellow and Reader, Harishchandra Research Institute, Allahabad (2006 - 2008)

Courses taught at IITM

Under-graduate: Classical Mechanics, Electrodynamics, Quantum Mechanics, Thermodynamics

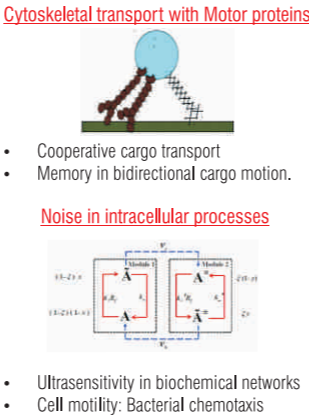
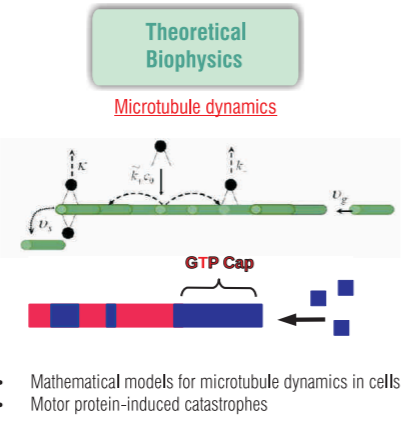
Post-graduate: Mathematical Methods in Physics, Physics of the Cell (elective)

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Email: manojgopal@iitm.ac.in

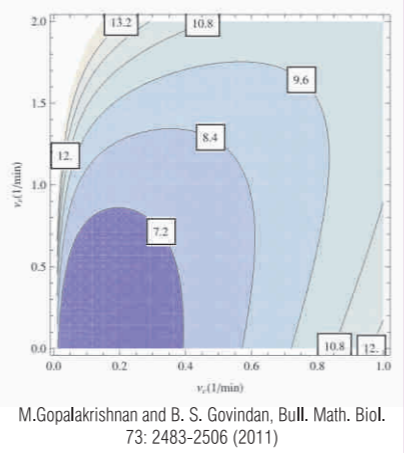
Research Interests

Biological Physics is a new and emerging multidisciplinary area of research. Biophysical processes in the cell take place in a highly noisy environment. I use concepts and tools from the theory of stochastic processes to study these phenomena, using mathematics and computer simulations. Specific subareas of interest include motor proteins, microtubule dynamics, signal transduction, biological information and bacterial chemotaxis.

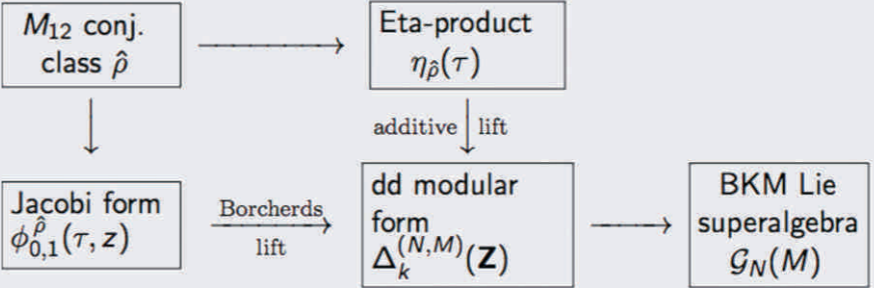


Selected Publications

- Memory and bias in bidirectional transport of molecular motor-driven cargoes, D. Bhat and M. Gopalakrishnan, Phys. Rev. E 88: 042702 (2013).
- Microtubule catastrophe from protofilament dynamics, V. Jemseena and M. Gopalakrishnan, Phys. Rev. E 88: 032717 (2013).
- Effectiveness of a dynein team in tug of war helped by reduced load sensitivity of detachment: evidence from study of bidirectional transport in D. discoideum, D. Bhat and M. Gopalakrishnan, Phys. Biol. 9 (4): 046003 (2012).
- A first-passage-time theory of capture of chromosomes by microtubules in mitosis, M. Gopalakrishnan and B. S. Govindan, Bull. Math. Biol. 73: 2483-2506 (2011).
- Theoretical results for chemotactic response and drift of E. coli in a weak attractant gradient, M. Reneaux and M. Gopalakrishnan, J. Theor. Biol. 266 (1): 99-106 (2010).
- Length control of microtubules by depolymerizing motor proteins, B. S. Govindan, M. Gopalakrishnan and Debashish Chowdhury EPL 83(4) 400006-6pp (2008).
- Self-consistent theory of reversible ligand binding to receptors on a spherical cell surface, Shivam Ghosh, Manoj Gopalakrishnan and Kimberly Forsten-Williams, Phys. Biol. 4 (4) 344-354 (2007).
- Effects of receptor clustering on ligand dissociation: Theory and simulations, Manoj Gopalakrishnan, Kimberly F.-Williams, Matthew A. Nugent and Uwe C. Täuber, Biophys. J. 89: 3686-3700 (2005).



Moonshine for the sporadic Mathieu group M_{12}



Selected Publications

- Worldsheet approaches to D-branes on supersymmetric cycles, Suresh Govindarajan, T. Jayaraman, Tapobrata Sarkar., Nucl. Phys. B 580 (2000) 519-547. (This paper is one of the first papers to consider microscopic descriptions of D-branes for Calabi-Yau compactifications)
- D-branes, exceptional sheaves and quivers on Calabi-Yau manifolds: From Mukai to McKay, Suresh Govindarajan and T. Jayaraman. Nucl. Phys. B 600 (2001) 457-486.
- D-branes on Calabi-Yau manifolds and superpotentials, M. R. Douglas, Suresh Govindarajan, T. Jayaraman, and A. Tomasiello, Commun. Math. Phys. 248 (2004) 85-118. (First non-trivial D-brane superpotential computed here).
- BKM Lie superalgebras from dyon spectra in Z_N CHL orbifolds for composite N, Suresh Govindarajan and K. Gopala Krishna. JHEP 1005 (2010) 014. (This paper points out a connection between the Mathieu group M_{24} and Dyon Spectra).
- On the asymptotics of higher-dimensional partitions, S. Balakrishnan, Suresh Govindarajan and N. S. Prabhakar. J. Phys. A 45 (2012) 055001. (Paper with undergraduate students).
- Unravelling Mathieu Moonshine, Suresh Govindarajan. Nucl. Phys. B 864 (2012) 823-839. (Provided additional evidence for Mathieu Moonshine).
- Notes on higher-dimensional partitions, Suresh Govindarajan. J. Comb. Theory Ser. A 120 (2013) 600-622. (Significantly improves on a 1967 result of Atkin et. al. and explicitly computes numbers of partitions in all dimensions for integers ≤ 26).

There are 3464274974065172792 solid partitions of 72.



Govindarajan, Suresh

Professor

Ph.D. (U Pennsylvania, 1991).

Postdoctoral Fellowships (IMSc, Chennai and Tata Institute Mumbai).

Faculty Member at IIT Madras (since 1995).

Humboldt Fellow at Bonn U (1997) and CERN-Asia Fellow (2006).

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Email: suresh@physics.iitm.ac.in

Awards & Recognitions

- National Talent Scholar (1980-86).
- Dean's Fellow at U. Pennsylvania (1987-88).
- Alexander von Humboldt Fellow (1997).
- CERN-Asia Fellow (2006).

Research Interests

Quantum Field Theory, String Theory, Conformal Field Theory, Partitions & Exact enumerations; Topological Field Theories; Mathematical Physics.



Gupte N. M.
Professor

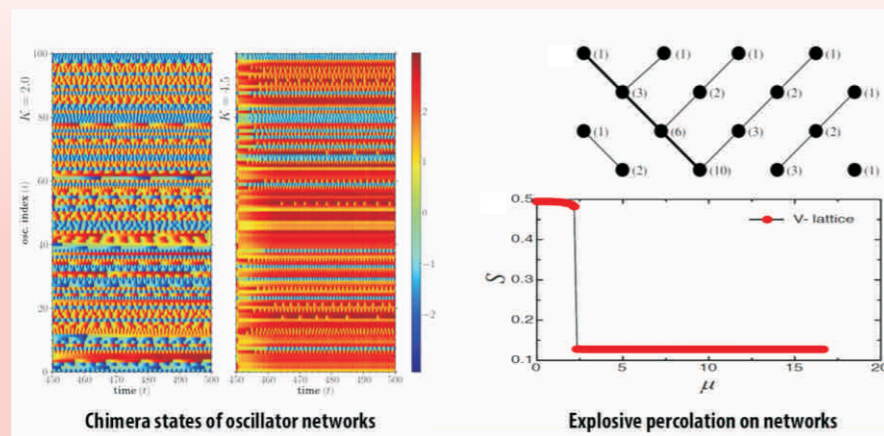
Ph.D. (1983) SUNY at Stony Brook.
M.Sc (1978) IIT Bombay.
B.Sc (1976) Univ. of Bombay.
Univ. of Hyderabad (1984 - 1985)
Univ. of Pune (1985 - 1996)
IIT (Madras) (1996 onwards)
Ph.: +91 - 44 - 2257 4861
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Awards & Honours

- Stree Shakti Science Samman (2006).

Research Interests

- Dynamical Systems and Statistical Physics.
- Dynamics of extended systems, Complex Networks.



Selected Publications

- Crisis, unstable dimension variability and bifurcations in systems with high dimensional phase space: Coupled sine circle maps, A. Das and N. Gupte, Phys. Rev. E 87, 04296(2013).
- Transmission of packets on a hierarchical network: Statistics and explosive percolation, A. D. Kachhvah and N. Gupte, Phys. Rev. E 86, 026104 (2012).
- The dynamic origin of the universality classes of spatiotemporal intermittency, Z. Jabeen and N. Gupte, Phys. Letts. A 374, 4488 (2010).
- Statistical characterizers of transport in communication networks, S. Mukherjee, N. Gupte and G. Mukherjee, Phys. Rev E 81, 046109 (2010).
- Transport and diffusion in the bail-out embedding map, N. N. Thyagu and N. Gupte, Phys. Rev. E 79, 066203 (2009).
- Congestion and de-congestion in a communication network, B. K. Singh and N. Gupte, Phys. Rev. E 71, 055103(R)(2005).
- Synchronisation of chaotic orbits: Effect of finite step, R. E. Amritkar and N. Gupte, Phys. Rev. E, 47,3889 (1993).
- Perspectives in Nonlinear Dynamics edited by N. Gupte, A. Lakshminarayan and R. Ramaswamy, Indian Academy of Sciences, Bangalore (2011).

Significant Results

- Method of Impulsive Synchronisation.
- Multifractal Analysis of self-similar measures.
- Analytic studies of periodic behaviour in extended dynamical systems.
- Connectivity strategies for the enhancement of efficiency of networks.
- Statistical Characterisers of networks.
- Explosive percolation in networks.





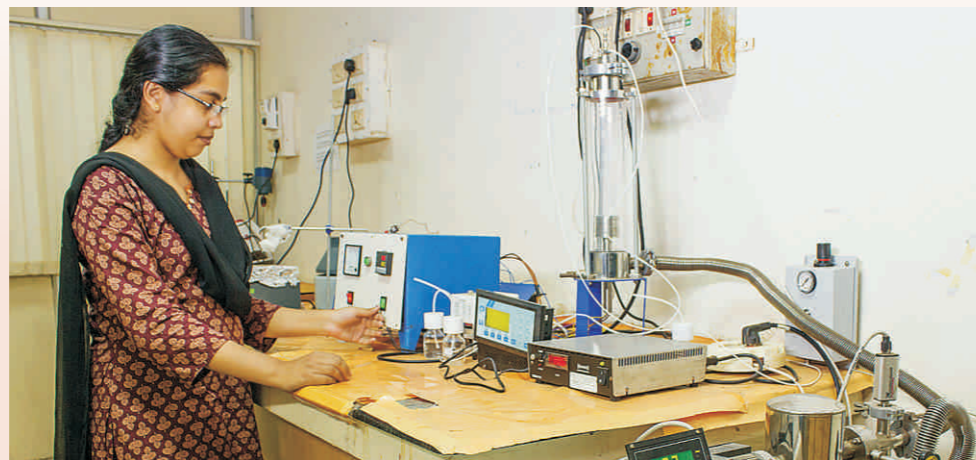
Harish Kumar N.

Associate Professor

Ph.D.: University of Hyderabad (1996)
Visiting Fellow: TIFR, Mumbai (1996 - 98)
Guest Scientist: FZK, Germany (1998 - 99)
Visiting Scientist: IGCAR, Kalpakkam (2000 - 01)
Lecturer: BITS-Pilani (2001 - 03)
Assistant Professor: IIT Madras (2003 - 10)
Associate Professor: IIT Madras (2010)
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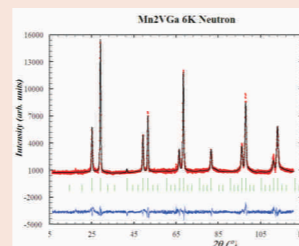
Research Interests

- Halfmetals.
- Optospintronics.
- Metastable magnetic phases.
- Nanostructured Magnetic Materials.
- Superconductivity.



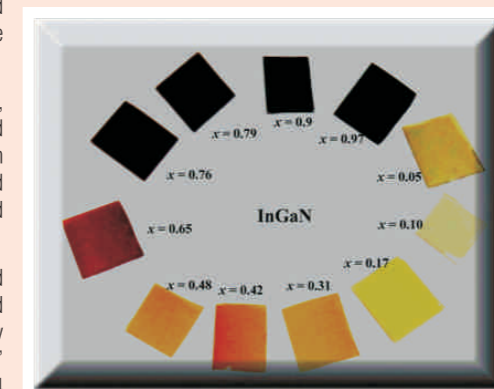
Selected Publications

- First-principles calculation and experimental investigation on full Heusler alloy Co_2FeGe , K. Ramesh Kumar, K. Kamala Bharathi, J. Arout Chelvane, S. Venkatesh, G. Markandeyulu and N. Harish Kumar, IEEE trans. Magn 45, 3997 (2009).
- Room temperature ferromagnetism in Fe-doped BaSnO_3 , K. Balamurugan, N. Harish Kumar, J. Arout Chetudentlvane, and P. N. Santhosh, J. Alloys Compd., 472, 9 (2009).
- Effect of Co substitution on the magnetic and transport properties of the half-metallic ferrimagnet Mn_2VGa , K. Ramesh Kumar, J. Arout Chelvane, S. K. Malik, G. Markandeyulu and N. Harish Kumar, Solid State Commun 150, 70 (2010).
- Structural, magnetic and semiconducting properties of Fe doped SrSnO , G. Prathiba S. Venkatesh, N. Harish Kumar, Solid State Commun. 150, 1436 (2010).
- Half metallic Co_2TiGe —a theoretical and experimental investigation G. Prathiba, S. Venkatesh, M. Rajagopalan, N. Harish Kumar J. Magn. Magn. Mater. 323, 22 (2011).
- Magnetic and transport properties of transparent $\text{SrSn}_{0.9}\text{Sb}_{0.5}\text{Fe}_{0.5}\text{O}_3$ semiconductor films, G. Prathiba, S. Venkatesh, K. Kamala Bharathi, and N. Harish Kumar, J. Appl. Phys. 109, 07C320 (2011).
- Investigation of atomic anti-site disorder and ferromagnetic order in half-metallic Heusler alloy Mn_2VGa , K. Ramesh Kumar, N. Harish Kumar, P. D. Babu, S. Venkatesh and S. Ramakrishnan, J. Phys.: Condens. Matter 24, 336007 (2012).
- Dielectric resonance and magnetic properties of Fe-3% doped BaSnO_3 thin films grown by pulsed laser deposition, K. Balamurugan, E. Senthil Kumar, B. Ramachandran, S. Venkatesh, N. Harish Kumar, M. S. Ramachandra Rao, and P. N. Santhosh, J. Appl. Phys. 111, 074107 (2012).



Selected Publications

- R. Meher, A. Subrahmanyam and Mahaveer K. Jain, "Composition dependent structural, optical and electrical properties of $\text{In}_{1-x}\text{Ga}_x\text{N}$ ($0.5 \leq x \leq 0.93$) thin films grown by modified activated reactive evaporation" J. Materials Science Research 48 (2013), 1196.
- S. R. Meher, Kuyyadi P. Biju, and Mahaveer K. Jain, "Impedometric anion sensing behaviour of $\text{In}_x\text{Ga}_{1-x}\text{N}$ film grown by modified activated reactive evaporation", Applied Surface Science, 258 (2011) 1744-9.
- S. R. Meher, R. V. Muniswami Naidu, Kuyyadi P. Biju, A. Subrahmanyam, and Mahaveer K. Jain, "Carrier transport in $\text{In}_x\text{Ga}_{1-x}\text{N}$ thin film grown by modified activated reactive evaporation", Applied Physic Letters 99, 082112 (2011).
- Kuyyadi P. Biju, S. R. Meher and Mahaveer K. Jain "Role of charged species on the growth of GaN films by modified activated reactive evaporation" Electrochem. Solid-State Lett., 14 (2011) H46-9.
- Kuyyadi P. Biju, Mahaveer K. Jain, "The effect of rf power on the growth of InN films by modified activated reactive evaporation." Applied Surface Science, Volume 254, Issue 22, 15 September 2008, Pages 7259-7265.
- K. P. Biju, A. Subrahmanyam and Mahaveer K. Jain, "Growth of InN thin films by modified activated reactive evaporation", J. Phys. D: Appl. Phys., 41, 155409 (Aug. 2008).



Jain M. K.

Associate Professor

Dr. Mahaveer Kumar Jain has done his Ph.D. at Physics Department, Indian Institute of Technology, Delhi. For his post doctoral work at University of Kentucky and Pennsylvania State University, USA he has worked on various chemical and physical sensors using remote query magnetoelastic base materials. In another post doctoral research at RRCAT Indore, he has worked with transparent IR window materials like ZnS grown using chemical vapor deposition. He joined IIT Madras in Feb 2003 as Assistant Professor and is presently working here as Associate Professor since July 2012.

Throughout being school topper, he ranked fourth in Ajmer University for his B.Sc. While doing his Ph.D., he earned CSIR fellowship. During his 20 year career in research, he has published 36 peer reviewed papers with H-index of 12. He has presented 38 papers in national and international conferences and guided 5 Ph.D. students.

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Email: mkj@physics.iitm.ac.in

Research Interests

- Worked extensively on chemical sensors during his Ph.D. and post doctoral program, his current interest is in materials for energy applications. Specifically he is interested in materials for photovoltaics like CZTS (Copper Zinc Tin Sulphide/Selenides).
- He has also developed materials for LED's like InGaN (a full spectrum material).
- He has developed an industrially viable technique for depositing thin films called MARE (Modified Activated Reactive Evaporation).



Kasiviswanathan S.
Professor

Ph.D., IIT Madras.

DAAD Fellow, RWTH Aachen.

Member, Task Force for IIT Hyderabad,
2008 - 09.

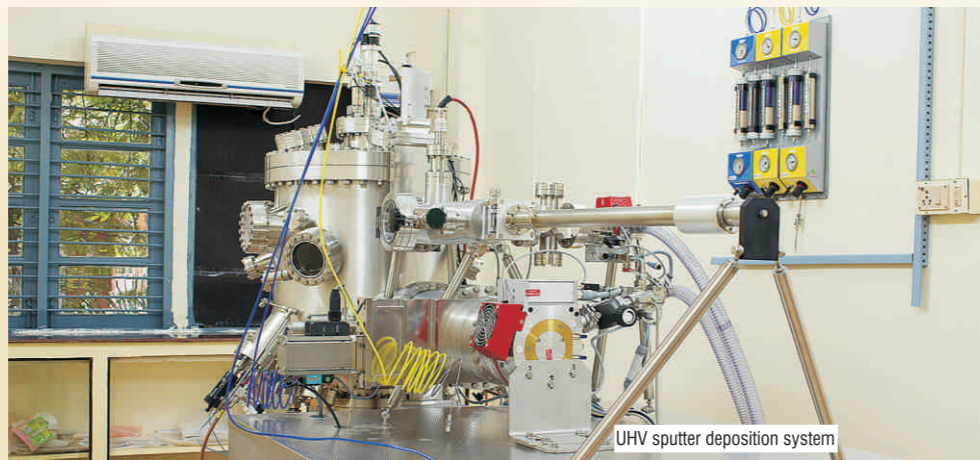
Received plaque at IIT Hyderabad: Teacher
who made lasting positive influence on
students, Jan 2009.

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Email: kasi@physics.iitm.ac.in

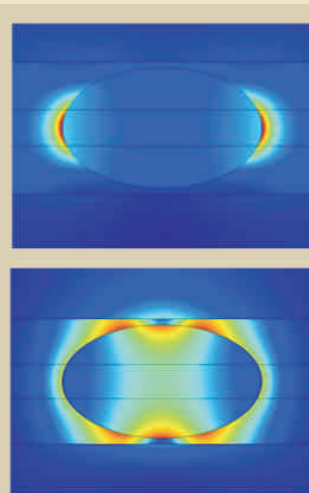
Research Interests

- Current: Topological insulators and systems exhibiting quantum coherence.
- Near and far field response of Plasmonic structures.
- Recent Past: Films of transparent oxides embedded with metal nanoparticles and ternary semiconductors.

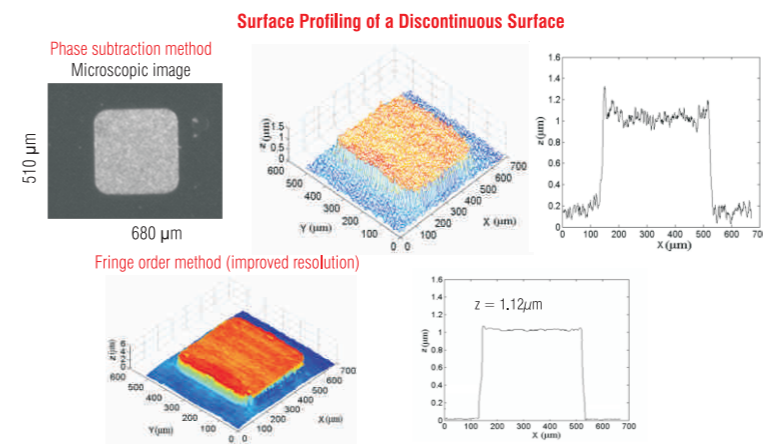
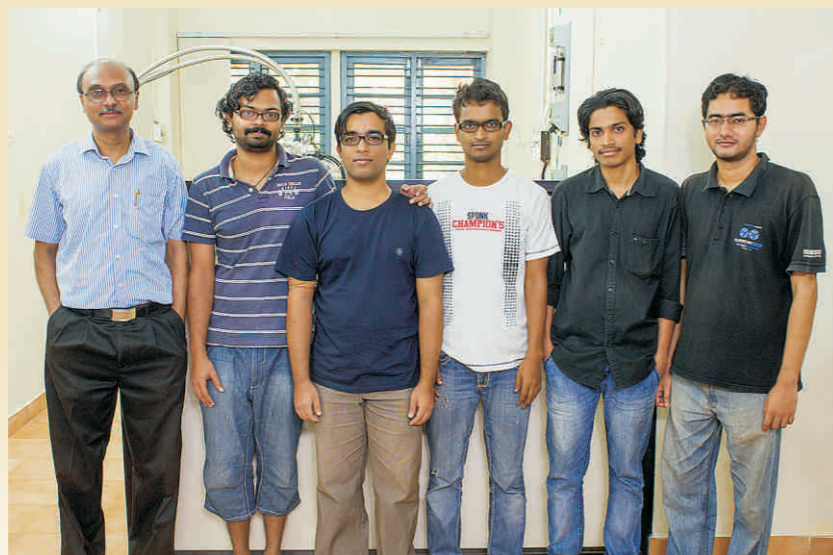


Selected Publications

- Localized surface plasmon resonance in gold nanoparticles embedded dc sputtered ZnO thin films. Anuradha Patra, M. Balasubrahmaniam, Ranjit Laha, P. Malar, T. Osipowicz, A. Manivannan and S. Kasiviswanathan. J. Nanosci. Nanotechnol. (2013) To appear.
- Enhanced SWIR third order nonlinearity of gold nanoparticle embedded ZnO thin films. S. Akbar Ali, P. B. Bisht, B. S. Kalanoor, Anuradha Patra, and S. Kasiviswanathan, JI. Opt. Soc. Am. B 30 (2013) 2226.
- Spectral response of nanocrystalline ZnO films embedded with Au nanoparticles. Anuradha Patra, A. Manivannan and S. Kasiviswanathan, JI. Opt. Soc. Am. B 29 (2012) 3317.
- Structure of melt-quenched $\text{AgIn}_3\text{Te}_5\text{C}$. Rangasami, P. Malar, T. Osipowicz, Mahaveer K. Jain, and S. Kasiviswanathan. Powder Diffraction, 26 (2011) 248.
- Correlation of Mn charge state with the electrical resistivity of Mn doped indium tin oxide thin films. S. R. Sarath Kumar, M. N. Hedhili, H. N. Alshareef and S. Kasiviswanathan. Appl. Phys. Lett. 97 (2010) 111909.
- Transparent ITO-Mn:ITO thin film thermocouples S. R. Sarath Kumar and S. Kasiviswanathan. IEEE Sensors Journal, 9 (2009) 809.
- A hot probe setup for the measurement of Seebeck coefficient of thin wires and thin films using integral method. S. R. Sarath Kumar, and S. Kasiviswanathan. Review of Scientific Instruments, 79 (2008) 024302.

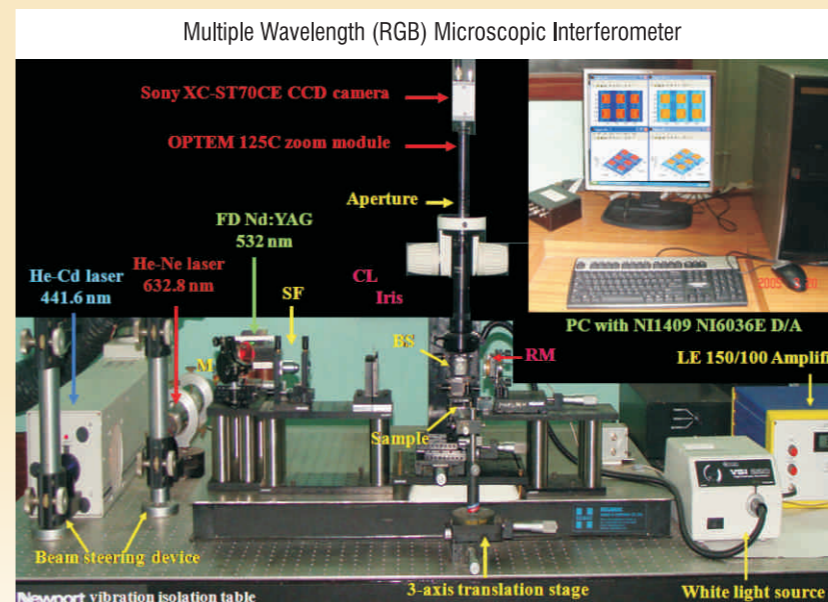


Controlling near field distribution
of ANPs using interfaces



Selected Publications

- S. Suja Helen, M. P. Kothiyal and R. S. Sirohi, "Achromatic Phase-shifting using a Rotating Polarizer," Opt. Commun. 154, 249-254 (1998).
- P. Haible, M. P. Kothiyal and H. J. Tiziani, "Heterodyne Temporal Speckle Pattern Interferometry," Appl. Opt., 39, 114-117 (2000).
- S. K. Debnath, M. P. Kothiyal, J. Schmit and P. Hariharan, "Spectrally resolved white light phase shifting interference microscopy for thickness profile measurements of transparent thin film layers on patterned substrates," Optics Express, 14, 4662-4667 (2006).
- S. K. Debnath, K. V. Nirmal and M. P. Kothiyal, "Spectrally-resolved phase-shifting interferometry for accurate group velocity dispersion measurements," Optics Letters, 31, 3098-3100 (2006).
- Basanta Bhaduri, N. Krishna Mohan, M. P. Kothiyal and R. S. Sirohi, "Use of spatial phase shifting technique in digital speckle pattern interferometry (DSPI) and digital shearography (DS)," Optics Express 14 (24), 11598-11607 (2006).
- U. Paul Kumar, N. Krishna Mohan, and M. P. Kothiyal, "Microscopic TV sherography for microsystems characterization," Optics Letters, 34, 1612-1614 (2009).
- U. Paul Kumar, N. Krishna Mohan, and M. P. Kothiyal, "Time average vibration fringe analysis using Hilbert transformation," Applied Optics, 49, 5777-5786 (2010).
- Book: "Optical Components, Systems and Techniques in Engineering", by R. S. Sirohi & M. P. Kothiyal, Marcel Decker Inc., New York (1991).



Kothiyal M. P.
Professor

Ph D: (1977) IIT Madras.

Stuttgart University, Stuttgart (1972 - 74,
1994, 1998); Technical University,
Braunschweig (1980).

Physikalish-Technisches Bundesanstalt,
Braunschweig.(1990).

Laval University, Canada (1983 - 85).

Ph.: +91 - 44 - 2257 4857

Email: kothiyal@physics.iitm.ac.in

Awards & Recognitions

- Fellow: (1) SPIE - The International Society for Optical Engineering; (2) OSA (Optical Society of America).
- Award: Joint recipient (with 5 others) of National Research and Development Council (NRDC) of India Meritorious Invention Award (2003) for development of a test system based on Electronic Speckle Pattern Interferometry.

Research Interests

Monochromatic and broadband light interferometry for optical testing and surface profiling; holography and speckle techniques for non destructive evaluation; optical instrumentation.



Krishnamurthy C. V.
Associate Professor

Ph.D. (IIT Madras, 1989).

Post- PhD: Developmental activity in two R&D establishments.

Phone: +91 - 44 - 2257 4864

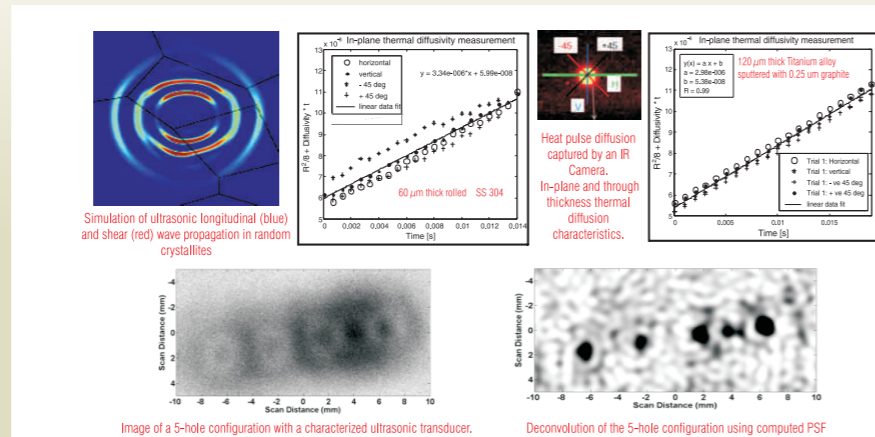
Email: cvkmind@physics.iitm.ac.in

Products / On-going work:

- Engineering grade radiowave/radar propagation assessment tool for the IN/DRDO (Helios, Chennai).
- System for rapid detection of contamination in Cotton (CNDE, IITM).
- Ultrasonic ray tracing and wave propagation tools to assist inspection of industrial components of complex geometries (CNDE/Dhvani R&D Solutions Pvt. Ltd., IITM Research Park).
- Identifying and sizing buried pipes using GPR.
- Characterization of thick viscoelastic composites with ultrasound.
- Near-field imaging with ultrasound (Center for NEMS/Photonics, IITM).

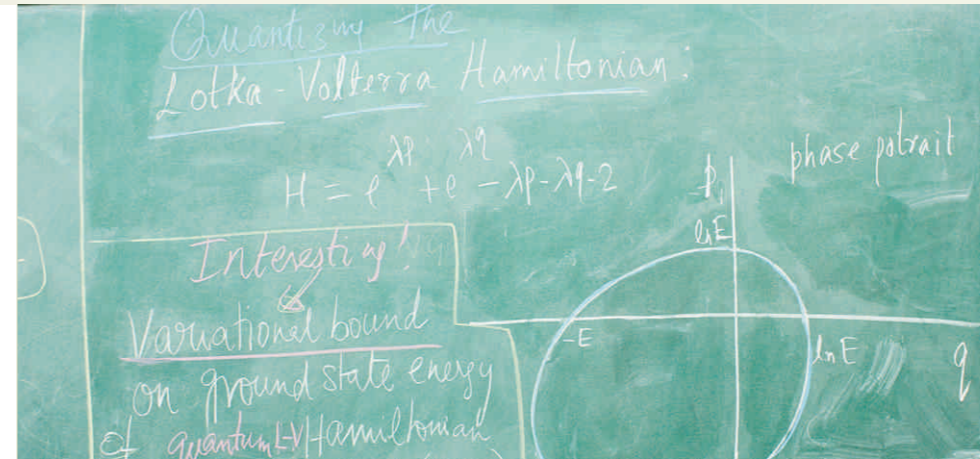
Research Interests

- Non-Fourier heat transport (Molecular Dynamics simulations / Experiments); Thermal imaging.
- Attotfarad capacitance sensing (Computational / Experimental aspects); Nano-dielectrics; Low k materials; Capacitance imaging .
- Light scattering (Computational/ Experimental aspects); atmospheric aerosols; Developing low-cost DLS system.



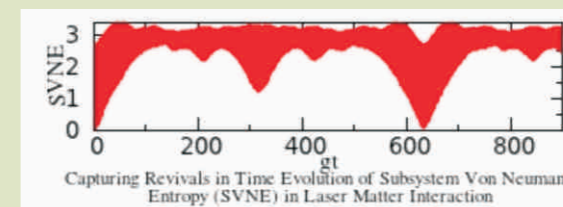
Selected Publications

- Thermomechanical response of metals: Maxwell vs. Kelvin–Voigt models, Chandraprakash Chindam, Krishnan Balasubramaniam, Raghu Prakash, C. V. Krishnamurthy, Materials Science & Engineering A v 560, p 54–61, 2013.
- Shape reconstruction of metal pipes with corrosion defects using single frequency limited view scattered data, G. Gantala, C. V. Krishnamurthy, K. Balasubramaniam, N. Ganesan, NDT & E International, v 52, p 129-35, Nov. 2012.
- Interaction of Lamb mode (A0) with structural discontinuity and generation of "Turning modes" in a T-joint C. Ramadas, K. Balasubramaniam, M. Joshi, C. V. Krishnamurthy, Ultrasonics, v 51, n 5, p 586–95, July 2011.
- Simultaneous Estimation of Electrical and Thermal Properties of Isotropic Material from the Tone-Burst Eddy Current Thermography (TBET) Time-Temperature N. Data Biju, N. Ganesan, C. V. Krishnamurthy, K. Balasubramaniam, IEEE Transactions on Magnetics, v 47, n 9, p 2213–19, Sept. 2011.
- Simultaneous measurement of ultrasonic longitudinal wave velocities and thicknesses of a two layered media in the absence of an interface echo S. P. Kannajosyula, V. K. Chillara, K. Balasubramaniam, C. V. Krishnamurthy, Review of Scientific Instruments, v 81, n 10, p 105101 (7 pp.), Oct. 2010.
- Blind inversion method using Lamb waves for the complete elastic property characterization of anisotropic plates J. Vishnuvardhan, C. V. Krishnamurthy, K. Balasubramaniam, Journal of the Acoustical Society of America, v 125, n 2, p 761–71, Feb. 2009.
- Ultrasonic circumferential guided wave for pitting-type corrosion imaging at inaccessible pipe-support locations K. Shivaraj, K. Balasubramaniam, C. V. Krishnamurthy, R. Wadhwan, Journal of Pressure Vessel Technology, v 130, n 2, p 021502–1–11, May 2008.
- Ultrasonic imaging using a computed point spread function R. Rangarajan, C. V. Krishnamurthy, K. Balasubramaniam, IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control, v 55, n 2, p 451–64, Feb. 2008.



Selected Publications

- S. Seshadri, S. Lakshmibala and V. Balakrishnan Quantum revivals, geometric phases and circle map recurrences. Phys. Lett. A 256, 15–19 (1999).
- S. Lakshmibala and M. V. Satyanarayana Phase estimation, photon cloning and the Bernoulli map. Phys. Lett. A 298, 1–6 (2002).
- V. Balakrishnan and S. Lakshmibala On the connection between biased dichotomous diffusion and the one-dimensional Dirac equation. New Journal of Physics 7, 11 2005.
- C. Sudheesh, S. Lakshmibala and V. Balakrishnan Wave packet dynamics of photon-added coherent states. Europhys. Lett. 71 (5), 744–750 (2005).
- C. Sudheesh, S. Lakshmibala and V. Balakrishnan Wave packet dynamics of entangled two-mode states. J. Phys. B At. Mol. Opt. Phys. 39 3345 (2006).
- C. Sudheesh, S. Lakshmibala and V. Balakrishnan Recurrence statistics of observables in quantum-mechanical wave packet dynamics. Europhys. Lett. 90 (50001), 1–6 (2010).
- Lijo T. George, C. Sudheesh, S. Lakshmibala, and V. Balakrishnan Ehrenfest's Theorem and Nonclassical States of Light 1. Ehrenfest's Theorem in Quantum Mechanics Resonance, January 2012.
- Lijo T. George, C. Sudheesh, S. Lakshmibala, and V. Balakrishnan Ehrenfest's Theorem and Nonclassical States of Light 2. Dynamics of Nonclassical States of Light Resonance, February 2012.



Lakshmi Bala S.
Professor

Ph. D. Madras University (1987).

Post-doctoral Fellow, Dept. of Physics, IIT Madras (1987 - 1991)

Assistant Professor, Dept. of Physics, IIT Madras (1991 - 1999)

Associate Professor (2000-2006), Professor (since 2006)

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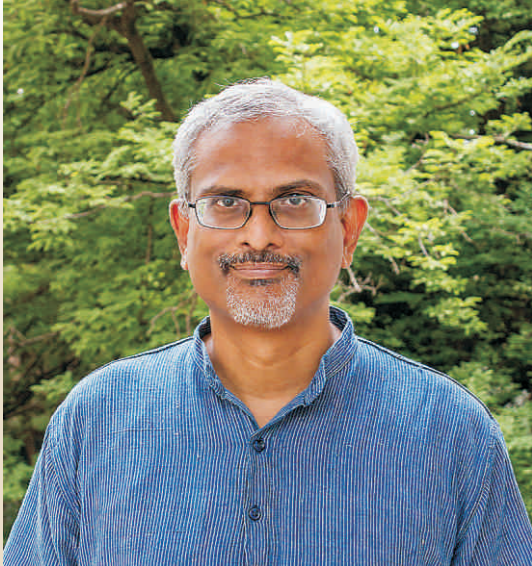
Email: slbala@physics.iitm.ac.in

Profile

Teaching: Taught a variety of undergraduate, postgraduate and Ph.D level courses and undergraduate and postgraduate labs in IIT Madras. Includes coordination of B.Tech and Ph.D courses. Have taught all the core courses at the postgraduate level. Guided several projects at the postgraduate and undergraduate level, set curriculum for many UG and PG courses including the Minor Stream courses. Written pedagogical articles for undergraduate and postgraduate students, given an NPTEL course on quantum mechanics (available on YouTube and on the NPTEL site).

Research Interests

Papers in areas ranging from high energy physics, random walks, chaos and more recently quantum dynamics, and quantum optics.



Lakshminarayan Arul

Professor

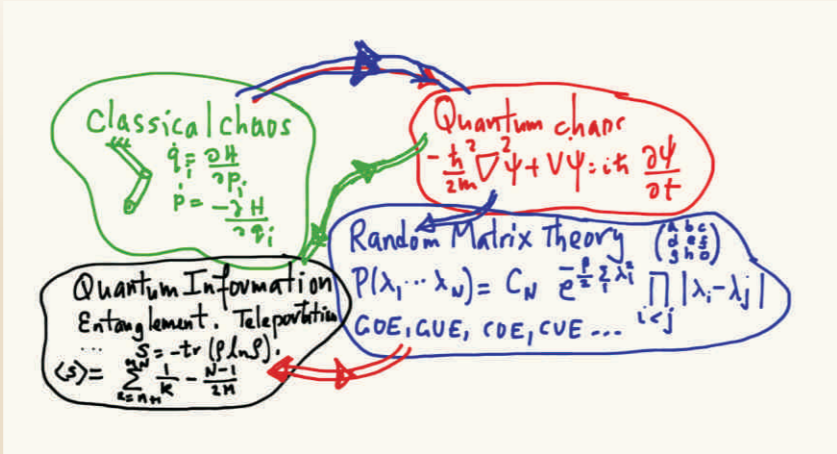
Ph. D. (S.U.N.Y. Stony Brook, 1993)
 Post-Doc: Physical Research Laboratory, Ahmedabad (1993 – 96)
 Scientist and Reader, Physical Research Laboratory, Ahmedabad (1996 – 2003)
 Faculty at IIT Madras (2003 – Present)
 Visiting Professor at WSU Pullman, (1998), IIT Kanpur (2002)
 Visiting Scientist, Max Planck Institute for Physics of Complex Systems, Dresden (2007)
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Awards & Recognitions

- Ph. D. Thesis accepted with Distinction (1993, Stony Brook).
- INSA Young Scientist award for Theoretical Physics (1998, New Delhi).

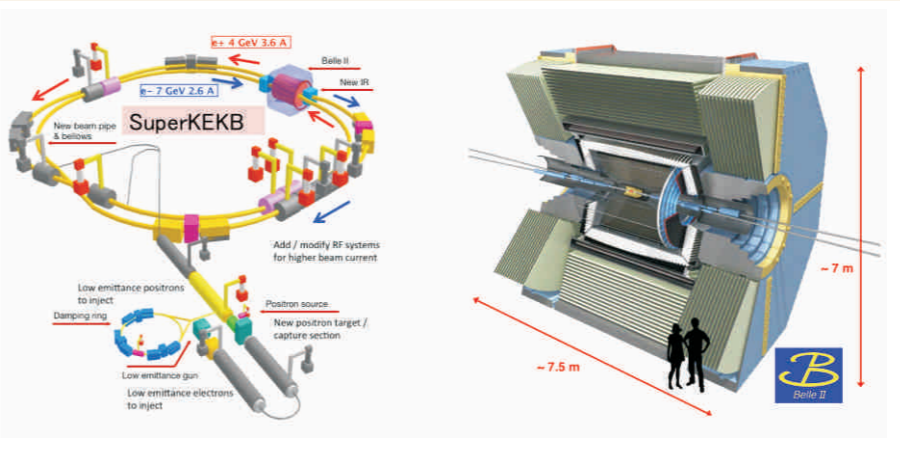
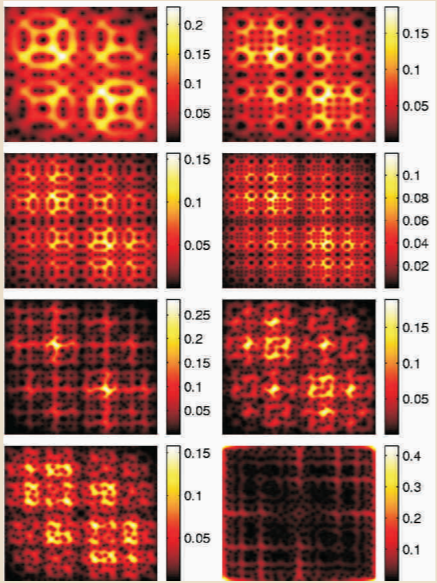
Research Interests

Quantum Chaos, Hamiltonian Chaos, Quantum Information, Entanglement in Condensed Matter Models, Random Matrix Theory, Extreme Value Statistics.



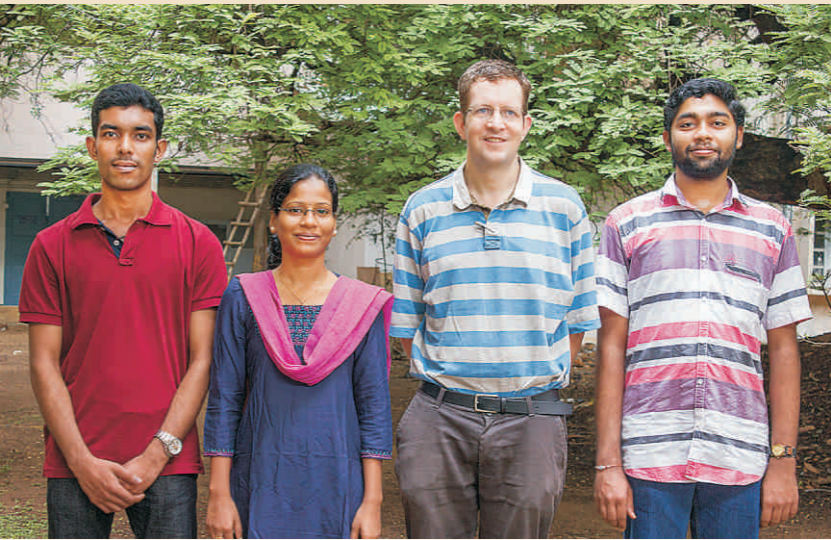
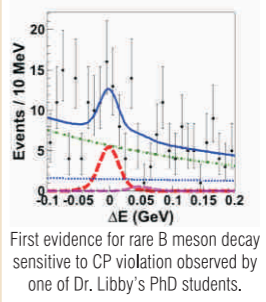
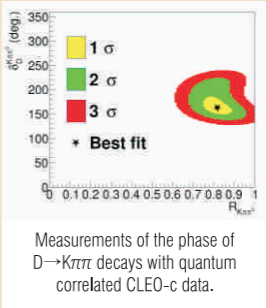
Selected Publications

- Entangling Power of Quantized Chaotic Systems, A. Lakshminarayan, Phys. Rev. E, 64 (2001) 036207.
- Testing Statistical Bounds on Entanglement Using Quantum Chaos, J. N. Bandyopadhyay, A. Lakshminarayan, Phys. Rev. Lett. 89 (2002) 060402.
- Cyclic Identities Involving Jacobi Elliptic Functions – II, A. Khare, A. Lakshminarayan, U. Sukhatme, J. Math. Phys. 44 (2003) 1822.
- Multifractaleigenstates of quantum chaos and the Thue-Morse sequence, N. Meenakshisundaram, A. Lakshminarayan, Phys. Rev. E. 71, 065303 (Rapid Comm.) (2005).
- Extreme statistics of complex random and quantum chaotic states Arul Lakshminarayan, Steven Tomsovic, Oriol Bohigas, Satya N. Majumdar, Phys. Rev. Lett. 100, 044103 (2008).
- Exact Minimum Eigenvalue Distribution of an Entangled Random Pure State, Satya N. Majumdar, Oriol Bohigas, Arul Lakshminarayan, J. Stat. Phys. 131, 33 (2008).
- Entanglement signatures for the dimerization transition in the Majumdar-Ghosh model, M. S. Ramkarthik, V. Ravi Chandra, and Arul Lakshminarayan, Phys. Rev. A 87, 01230 (2013).
- On the number of real eigenvalues of products of random matrices and an application to quantum entanglement, Arul Lakshminarayan, J. Phys. A: Math. Theor. 46 152003 (2013). (FastTrack and IoP Select article).



Selected Publications

- H. Aihara et al. [Belle Collaboration], “First Measurement of ϕ_s with a Model-independent Dalitz Plot Analysis of $B \rightarrow DK, D \rightarrow K_s^0 \pi^+ \pi^-$ Decay,” Phys. Rev. D 85 (2012) 112014.
- J. Libby et al. [CLEO Collaboration], “Model-independent determination of the strong-phase difference between D^0 and $\bar{D}^0 \rightarrow K_s^0 h^+ h^-$ ($h = \pi, K$) and its impact on the measurement of the CKM angle $= \gamma/\phi_s$,” Phys. Rev. D 82 (2010) 112006.
- N. Lowrey et al. [CLEO Collaboration], “Determination of the $D^0 \rightarrow K\pi^+ \pi^-$ and $D^0 \rightarrow K\pi^+ \pi^+ \pi^-$ Coherence Factors and Average Strong-Phase Differences Using Quantum-Correlated Measurements,” Phys. Rev. D 80 (2009) 031105.
- M. Adinolfi et al., “Performance of the LHCb RICH photo-detectors and readout in a system test using charged particles from a 25-ns-structured beam,” Nucl. Instrum. Meth. A 603 (2009) 287.
- B. Aubert et al. [BABAR Collaboration], “Measurements of the $B \rightarrow X s \gamma$ branching fraction and photon spectrum from a sum of exclusive final states,” Phys. Rev. D 72 (2005) 052004.
- J. Schwiening et al. [BABAR-DIRC Collaboration], Performance of the BABAR-DIRC,” Nucl. Instrum. Meth. A 553 (2005) 317.
- T. Bowcock et al., “Performance Of An Irradiated LHCb Prototype p-on-n Silicon Microstrip Detector,” Nucl. Instrum. Meth. A 478 (2002) 291.
- P. Abreu et al. [DELPHI Collaboration], “Measurements of the trilinear gauge boson couplings WWV ($V = Z, \gamma$) in $e+e-$ collisions at 183 GeV,” Phys. Lett. B 459 (1999) 382.



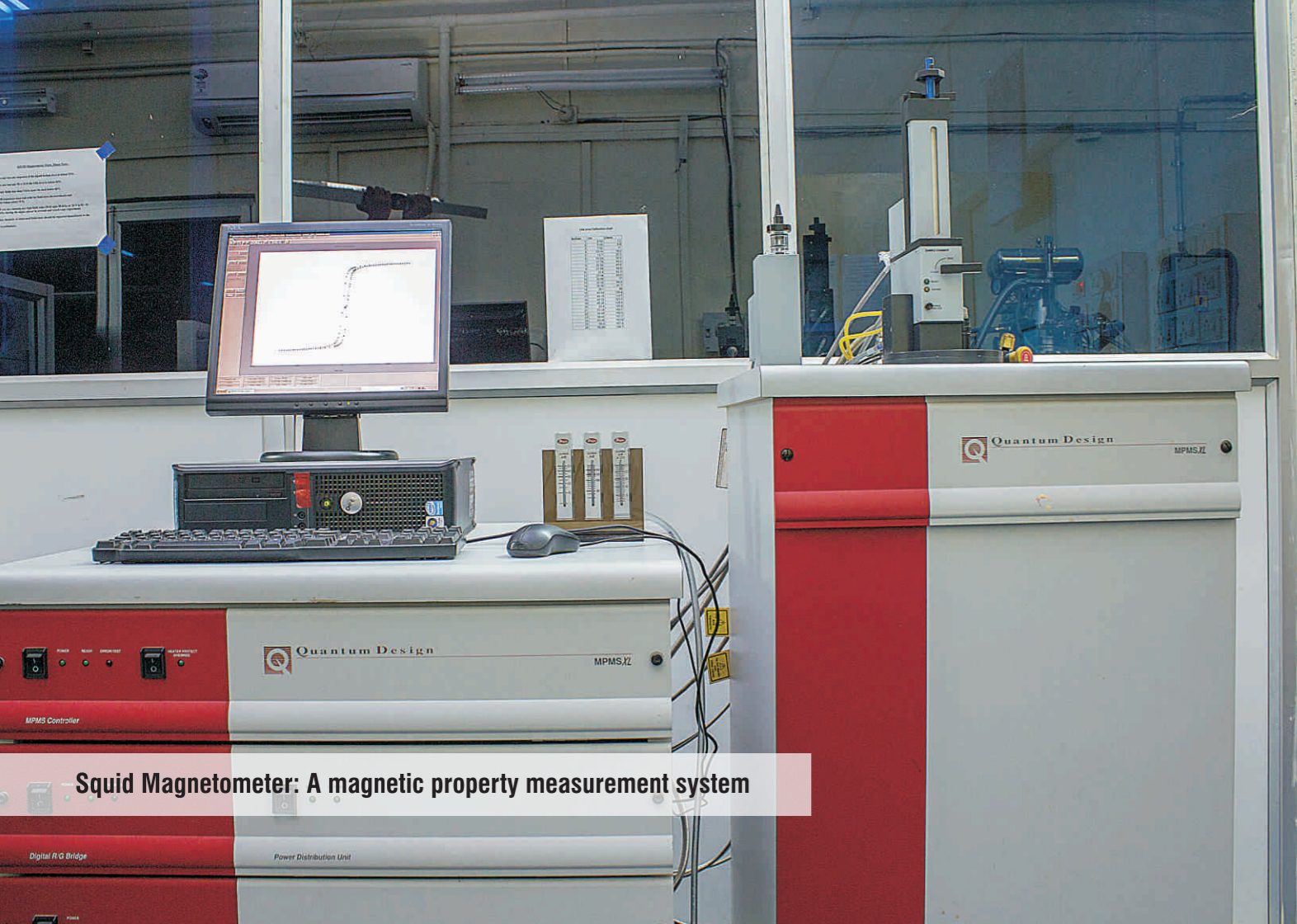
Libby James

Associate Professor

1999: D.Phil. in Experimental Particle Physics (DELPHI experiment), University of Oxford, UK.
 1999 - 2000: Postdoctoral Fellow, LHCb experiment, University of Oxford.
 2000 - 2002: Postdoctoral Fellow, LHCb experiment, CERN, Switzerland.
 2002 - 2005: Postdoctoral Fellow, BABAR experiment, Stanford Linear Accelerator Center, USA.
 2005 - 2009: Departmental Lecturer, LHCb and CLEO-c experiments, University of Oxford.
 2009 - 2010: Assistant Professor, Belle, CLEO-c and INO experiments, IITM.
 2010 - present: Associate Professor, Belle, CLEO-c and INO experiments, IITM.
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Research Interests

Currently, Dr Libby is working on determining CP violation parameters in beauty meson decay and to search for them in charm meson decay with the Belle experiment. In addition, he is a member of the Indian-based Neutrino Observatory (INO), which will make precise measurements of atmospheric neutrino oscillations and the Belle-II, which will generate a 50-fold larger data sample than Belle, collaborations. At present, Dr Libby is PI or co-PI on sponsored projects for CLEO-c, Belle-(II) and INO.



Squid Magnetometer: A magnetic property measurement system



Thermal Constants Analyzer that measures the thermal transport properties of materials



Stirling-cycle Nitrogen liquefier that has 40-liters/hour capacity



Manu Jaiswal
Assistant Professor

PhD: Department of Physics, Indian Institute of Science – Bangalore, 2004 - 2008.

Post-Doctoral Fellowship (1): Max Planck Fellow, Max Planck Institute for Polymer Research, Mainz, Germany, 2008 - 2009.

Post-Doctoral Fellowship (2): Graphene Laboratory, National University of Singapore, Singapore, 2009 - 2011.

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Awards & Recognitions

- Prof. Anil Kumar Memorial Best PhD Thesis in Physics Award from IISc.Bangalore.
- GC Jain Memorial Award for Best PhD Thesis in Material Science by MRS-India.

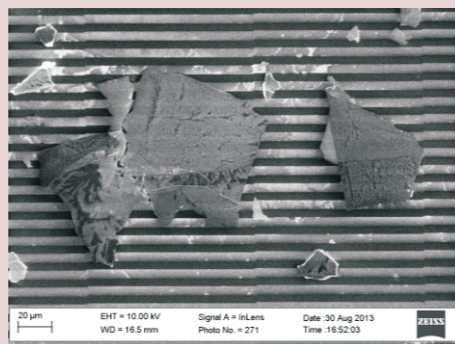
Research Interests

Electronic properties of low dimensional systems, such as graphene and other 2D atomic crystals. Among topics of interest are charge and spin transport, physics of mesoscopic systems, transport in disordered systems, thermal transport, Raman spectroscopy, liquid flow in nanocapillaries. Other systems of interest are graphene: metal oxides hybrids, conducting polymers, self-assembled monolayers and carbon nanotubes.



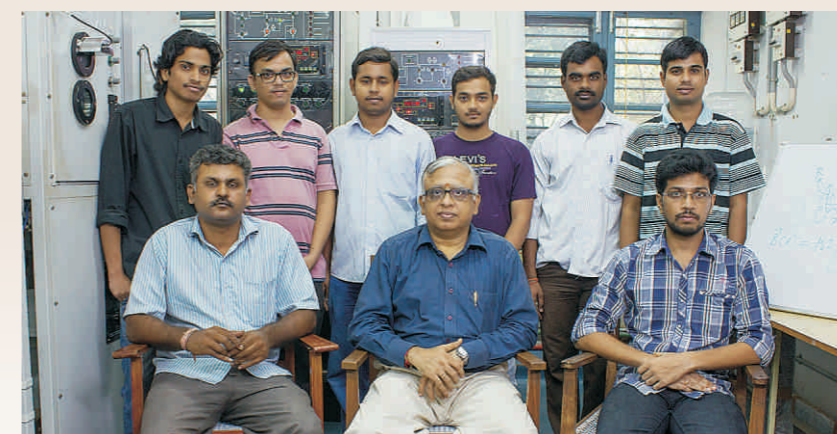
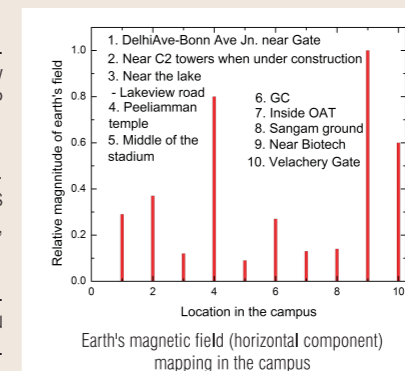
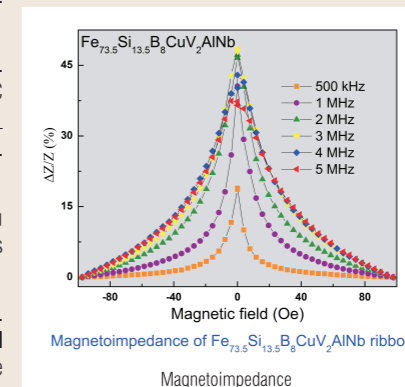
Selected Publications

- Colossal enhancement of spin-orbit coupling in weakly hydrogenated graphene, J. Balakrishnan, G. Koon, Manu Jaiswal, A.H. Castro Neto and B. Ozyilmaz, Nature Physics, 9, 284–287, (2013).
- Charge transport in lightly reduced graphene oxide: A transport energy perspective, R. S. Kajen, N. Chandrasekhar, K. L. Pey, C. Vijila, Manu Jaiswal, et al., K. P. Loh, Journal of Applied Physics, 113, 063710 (2013).
- Trap Levels in Graphene Oxide: A Thermally Stimulated Current Study, R. Kajen, N. Chandrasekhar, K. L. Pey, C. Vijila, Manu Jaiswal, K. P. Loh et al. ECS Solid State Letters, 2(2), M17-M19 (2012).
- Electronic Properties of Nano-diamond Decorated Graphene, Y. Wang, Manu Jaiswal, M. Lin, S. Saha, B. Ozyilmaz, K. P. Loh, ACS Nano 6, 1018–1025 (2012).
- K. K. Manga, S. Wang, Manu Jaiswal, Q. Bao, K.P. Loh, High-Gain Graphene-Titanium Oxide Photoconductor Made from Inkjet Printable Ionic Solution, Advanced Materials, 22, 5265, (2010).
- Controlled Hydrogenation of Graphene Sheets and Nanoribbons, Manu Jaiswal, C. H. Y. X. Lim, Q. Bao, C. T. Toh, K. P. Loh, B. Ozyilmaz ACS Nano, 5, 888, (2011).
- Flow Sensing of Single Cell by Graphene Transistor in a Microfluidic Channel, P. K. Ang, A. Li, Manu Jaiswal, Y. Wang, H. W. Hou, J. T. L. Thong, C. T. Lim, K. P. Loh Nano Letters, 11, 5240–5246 (2011).
- Graphene Ferroelectric Device and Opto-Electronic Control of Graphene Ferroelectric Memory Device, Manu Jaiswal, O. Kahya, T. C. Toh, B. Ozyilmaz, S. Saha, U. S. Patent Appl. WO 2013/048347, (2013).



Selected Publications

- V. HariBabu, J. Rajeswari, S. Venkatesh and G. Markandeyulu Effect of thickness on structural and magnetic properties in nanocrystalline Fe-N thin films J. Magn. Magn. Mater., 339, pp. 1–5 (2013).
- VenkataraoChunchu and G.Markandeyulu Magnetoimpedance studies in as quenched $\text{Fe}_{73.5}\text{Si}_{13.5}\text{B}_9\text{CuV}_2\text{AlNb}$ nanocrystalline ribbons J. Appl. Phys., 113, art. no. 17A321 (2013).
- K. Kamala Bharathi, G. Markandeyulu and C. V. Ramana Microstructure, AC impedance and DC electrical conductivity characteristics of $\text{NiFe}_{2-x}\text{Gd}_x\text{O}_4$ ($x = 0, 0.05$ and 0.075) AIP Adv. 2 (1), art. no. 012139 (2012).
- SandhyaDwevedi and G. Markandeyulu Magnetoimpedance in Co-rich ribbons/thin films AIP Conf. Proc., 1347, pp. 149–152 (2011).
- SandhyaDwevedi, G. Markandeyulu, P. R. Ohodnicki, A. Leary and M. E. McHenry Stress-MI and domain studies in Co-based nanocrystalline ribbons J. Magn. Magn. Mater., 323, pp. 1929–1933 (2011).
- Talari Mahesh Kumar, G. Markandeyulu, K. Prasad Rao Magnetic force microscopy investigation of magnetic domains in $\text{Nd}_2\text{Fe}_{14}\text{B}$ AIP Conf. Proc., 1250, pp. 496–499 (2010).
- V. HariBabu, G. Markandeyulu and A. Subrahmanyam Effect of anisotropy on anomalous Hall effect in Tb-Fe thin films J. Appl. Phys., 105, art. no. 113907 (2009).
- K. Kamala Bharathi, K. Balamurugan, P. N. Santhosh, M. Pattabiraman and G. Markandeyulu Magnetocapacitance in Dy-doped Ni ferrite Phys. Rev. B 77, art. no. 172401 (2008).



Markandeyulu G.
Professor

Ph.D. - IIT Madras.

Postdoctoral - IIT Kharagpur and TIFR.

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Research Interests

- Magnetoimpedance in Fe/Co rich ribbons, thin films and wires: Development of magnetic field sensors.
- Magnetostriction and magnetoelectric effect in rare-earth and 5d-doped ferrites and rare-earth iron intermetallic compounds.
- Rare earth substituted ferrite permanent magnetic materials.



Murugavel P.
Assistant Professor

Ph.D from IISc, Bangalore, India (2001)
Joined in the department of Physics, IIT-Madras in (November) 2006.
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Profile

- Currently teaching both undergraduate and postgraduate courses along with guiding research students in the area of experimental condensed matter physics at IIT-Madras – (2006 onwards).
- Visiting Lecturer, Seoul National University, Republic of Korea – (2004-2006).
- Postdoctoral fellow, CHRISMAT, CNRS, Caen, France – (2003-2004).
- Postdoctoral fellow, Seoul National University, Republic of Korea – (2001-2003).
- Ph.D. from Indian Institute of Science, Bangalore, India – (1995-2001).
- Materials Engineer, Vintek RF Product, Bangalore, India – (1993-1995).
- M.Tech. in Solid State Technology, Department of Physics, IIT-Madras – (1991-1993).
- M.Sc. in Materials Science, Anna University, Guindy Campus, Chennai – (1989-1991).

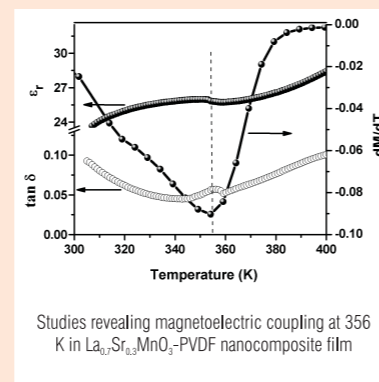
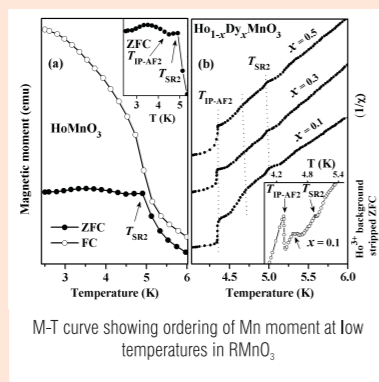
Research Interests

- Magnetic and dielectric studies on rare earth manganites $R\text{MnO}_3$ (R = rare earth element).
- Magnetoelectric effect in nanocomposites and thin films layered structures.
- Photoelectric effect on some oxide thin films.



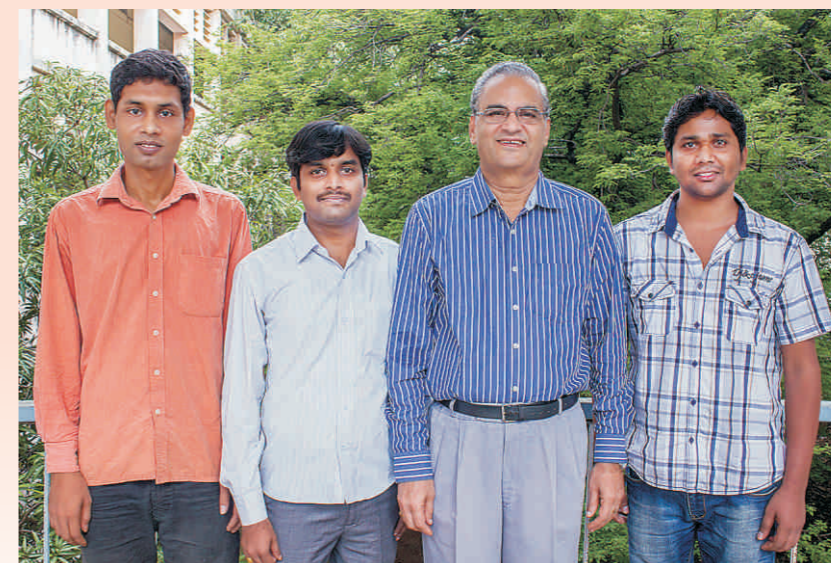
Selected Publications

- “Role of rare earth on the Mn^{3+} spin reorientation in multiferroic $\text{Ho}_{1-x}\text{Lu}_x\text{MnO}_3$ ” J. Magesh, P. Murugavel, R. V. K. Mangalam, K. Singh, Ch. Simon and W. Prellier, J. Appl. Phys. 114, 094102 (2013).
- “Magnetoelectric effect in $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3$ - BaTiO_3 core-shell nanocomposite” Chiranjib Nayek, Kishor Kumar Sahoo, and P. Murugavel, Materials Research Bulletin 48, 1308 (2013).
- “Study of magnetodielectric effect in hexagonal $\text{Ho}_{1-x}\text{Dy}_x\text{MnO}_3$ ” J. Magesh, P. Murugavel, K. V. R. Mangalam, K. Singh, Ch. Simon, and W. Prellier, J. Appl. Phys. 112, 104116 (2012).
- “Strong enhancement of magnetoelectric coupling in Dy^{3+} doped HoMnO_3 ” J. Magesh, P. Murugavel, K. V. R. Mangalam, K. Singh, Ch. Simon, and W. Prellier, Appl. Phys. Lett. 101, 022902 (2012).
- Book Chapter: S. P. N. Nair, and P. Murugavel, Oxides: Their Properties and Uses. In: Jan Reedijk and Kenneth Poeppelmeier, editors. Comprehensive Inorganic Chemistry II, Vol 4. Oxford: Elsevier; 2013. p. 47-72.



Selected Publications

- S. D. Ramarao and V. R. K. Murthy, “Crystal structure refinement and microwave dielectric properties of new low dielectric loss AZrNb_2O_6 (A: Mn, Zn, Mg and Co) ceramics”, Scripta Materialia 69 (2013) 274–277.
- S. D. Rama Rao, S. Roopas Kiran and V. R. K. Murthy, “Correlation Between Structural Characteristics and Microwave Dielectric Properties of Scheelite $\text{Ca}_{1-x}\text{Cd}_x\text{MoO}_4$ Solid Solution”, Journal of the American Ceramics Society 95 (2012) 3532–3537.
- V. Jagadeesh Babu, D. V. B. Murthy, V. Subramanian, V. R. K. Murthy, T. S. Natarajan and S. Ramakrishna Microwave Hall mobility and electrical properties of electrospun polymer nanofibers, Journal of Applied Physics 109, 074306 (2011).
- M. Penchal Reddy, W. Madhuri, M. Venkata Ramana, N. Ramamanohar Reddy, K. V. Siva Kumar V. R. K. Murthy, K. Siva Kumar Reddy, R. Ramakrishna Reddy, Effect of sintering temperature on structural and magnetic properties of NiCuZn and MgCuZn ferrites, Journal of Magnetism and Magnetic Materials, 322 2819 (2010).
- W. Madhuri, M. P. Reddy, N. R. Reddy, K. V. Siva Kumar, V. R. K. Murthy, Comparison of initial permeability of MgCuZn ferrites sintered by both conventional and microwave methods, Journal of Physics D: Applied Physics, 42, 165007 (2009).
- G. Santosh Babu, V. Subramanian, V. R. K. Murthy, R. L. Moreira, R. P. S. M. Lobo, Crystal structure, Raman spectroscopy, far-infrared, and microwave dielectric properties of $(1-x)\text{La}(\text{MgSn})_{0.5}\text{O}_3+x\text{Nd}(\text{MgSn})_{0.5}\text{O}_3$ system, Journal of Applied Physics, 103, 084104 (2008).
- G. Santosh Babu, V. Subramanian, V. R. K. Murthy, I-Nan Lin, Chia-Ta Chia, Hsiang-Lin Liu, Far-infrared, Raman spectroscopy, and microwave dielectric properties of $\text{La}(\text{Mg}_{0.5}\text{Ti}_{0.5-x}\text{Sn}_x)\text{O}_3$ ceramics, Journal of Applied Physics, 102, 064906 (2007).
- Amit Rastogi, V. Sivasubramanian, V. R. K. Murthy, M. S. Hegde, S. V. Bhat, Nonresonant microwave absorption studies of surface passivation of superconducting $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ thin films, Applied Physics Letters, 66, 1995 (1995).



Murthy V. R. K.
Professor

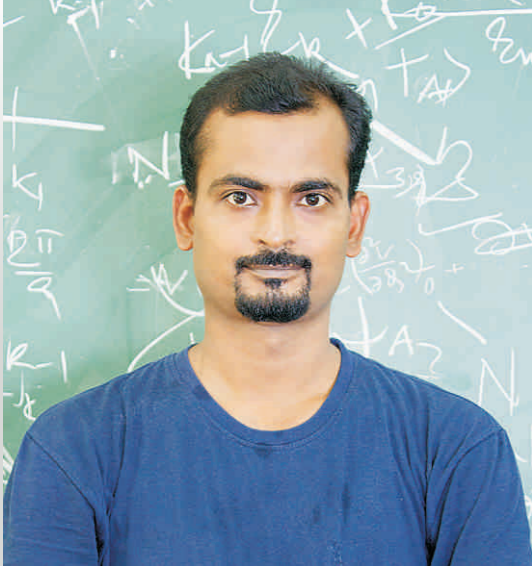
Professor: IITM (1993 Feb)
Associate Professor: IITM (1991 - 1993)
Assistant Professor: IITM (1984 Dec - 1991 Jan)
Senior Staff Scientist: Litton Industries, New Jersey, USA (1980 - 1984)
Visiting Assistant Professor: University of Kentucky, USA (1978 - 1980)
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Awards & Recognitions

- Charles B. Thorton Highest Adv. Technology Achievement – Litton Industries, CA.
- Outstanding contribution to the field of Microwaves and Dielectrics - XIVth National Seminar on Ferroelectrics & Dielectrics, IIT Kharagpur.
- Best paper awards: International Conference on Dielectric Liquids, Nara, Japan.
- XIIth National Seminar on Ferroelectrics & Dielectrics, IISc, Bangalore.
- XIVth National Seminar on Ferroelectrics & Dielectrics, IIT Kharagpur.
- Patents: A process for the electroless deposition of copper on polytetra fluoro ethylene substrates Patent No: 185263/24 Feb 1992-Patent Office GOI.
- Preparation of Dielectric Resonators-patent No:185377/29 Sep 1993 –Patent Office GOI.
- Books: B. Viswanathan and V.R.K. Murthy, Ferrites Science and Technology, Springer Verlag, Germany.
- V.R.K. Murthy and B. Viswanathan, Microwave Materials, Springer Verlag, Germany & Narosa Publishing House, New Delhi.

Research Interests

Nano Magneto-electric composites, Dielectrics, Microwave LTCC tapes and Device Technology.

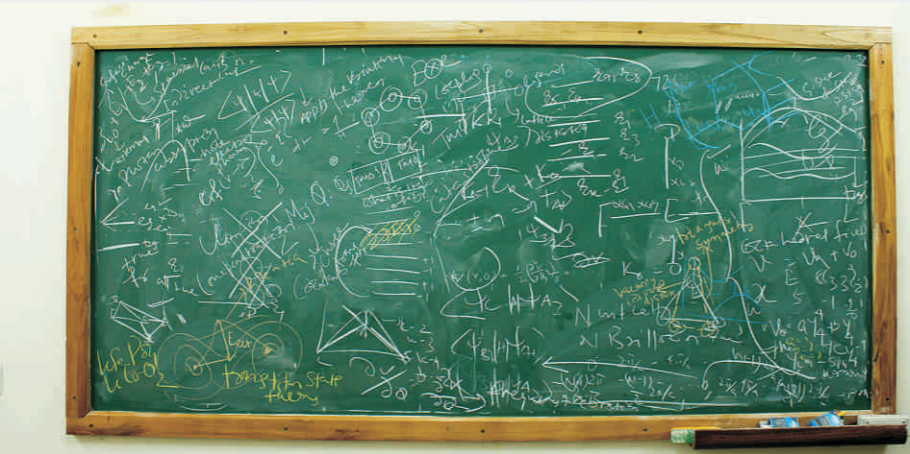


Nanda Ranjit Kumar
Assistant Professor

Condensed Matter Theory & Computational Division.
Assistant Professor (2010)
Post-Doct, University of Missouri, USA (2005 - 2010)
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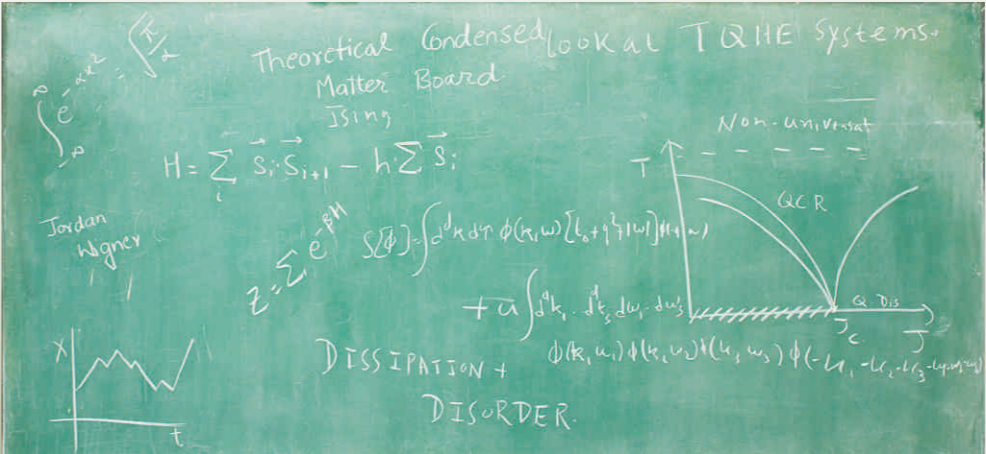
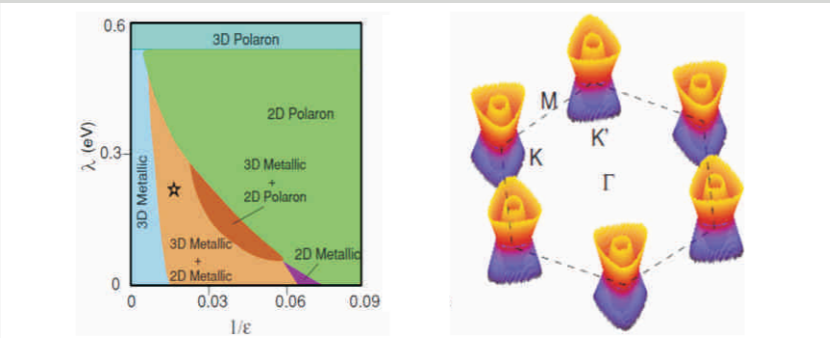
Research Interests

- Electronic structure of crystalline solids through solving the many-body Hamiltonian using density-functional theory and tight-binding models.
- Research Focus:
- Nanoscale Electronic and Magnetic Properties:
Oxide Interfaces/Superlattices
Graphene.
 - Energy Research:
Lithium based Cathode Materials.



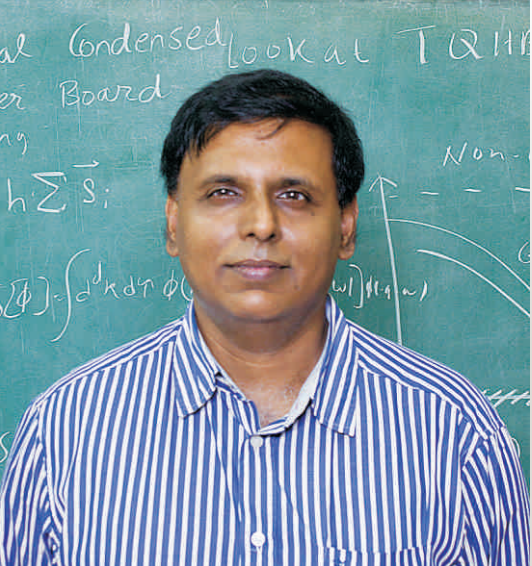
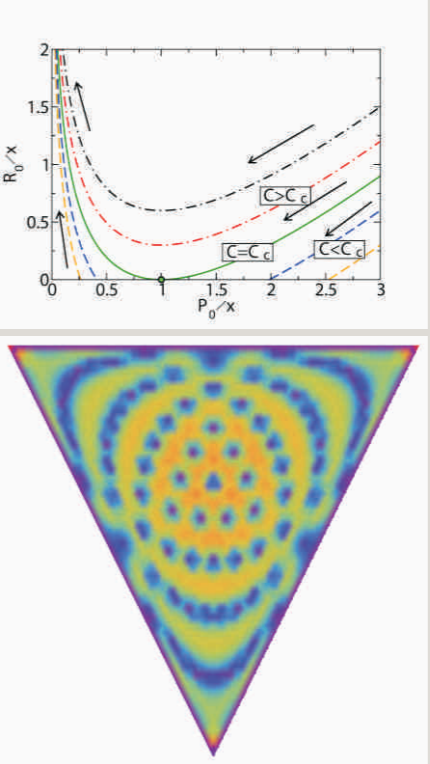
Selected Publications

- Electronic structure of the substitutional vacancy in graphene: density-functional and Green's function studies, B. R. K. Nanda, M. Sherafati, Z. Popovic, and S. Satpathy, New J. Phys. 14, 083004 (2012).
- Electronic Phases and Phase Separation in the Hubbard-Holstein Model of a Polar Interface, B. R. K. Nanda and S. Satpathy Phys. Rev. B 83, 195114 (2011).
- Polar Catastrophe, electron leakage, and magnetic ordering at the LaMnO₃/SrMnO₃ interface, B. R. K. Nanda and S. Satpathy, Phys. Rev. B 81, 224408 (2010).
- Electronic Structure of Bilayer Graphene under External Electric Field and Strain B. R. K. Nanda and S. Satpathy, Phys. Rev. B 80, 165430 (2009).
- Two-Dimensional Spin-Polarized Electron Gas at Oxide Interfaces B. R. K. Nanda and S. Satpathy, Phys. Rev. Lett. 101, 127201 (2008).



Selected Publications

- Quantum critical behavior of clean itinerant ferromagnets, T. Vojta, D. Belitz, R. Narayanan and T. R. Kirkpatrick, Z. Phys. B. 103, 451(1997).
- Strong enhancement of superconducting T_c in ferromagnetic phases, T. R. Kirkpatrick, D. Belitz, T. Vojta, and R. Narayanan, Phys. Rev. Lett. 87, 127003, (2001).
- Griffiths phase in the thermal quantum hall effect., A. Mildenberger, F. Evers, R. Narayanan, A. D. Mirlin and K. Damle, Phys. Rev. B (Rapid Communications) 73, 121301 (R), (2006).
- Infinite randomness and "quantum" Griffiths effects in a classical system: the randomly layered Heisenberg magnet}, Priyanka Mohan, Rajesh Narayanan, Thomas Vojta, Phys. Rev. B. 82, 195445 (2010).
- An Anomalously Elastic, Intermediate Phase in Randomly Layered Superfluids, Superconductors, and Planar Magnets, Priyanka Mohan, Paul M. Goldbart, Rajesh Narayanan, John Toner, Thomas Vojta, Phys. Rev. Lett. 105, 085301 (2010).
- Localised zero-energy modes in the Kitaev model with vacancy-disorder, Santhosh G., V. Sreenath, Arul Lakshminarayan, Rajesh Narayanan, Phys. Rev. B 85, 054204 (2012).



Narayanan, Rajesh
Associate Professor

Ph. D. (University of Oregon, Eugene, 1999)
Post-doctoral fellowships:
Oxford University (1999 - 2001)
Max-Planck Institute for Physics of Complex Systems (2001 - 2003)
Institute of Nanotechnology (2003 - 2006)
Assistant Professor, IIT-Madras (2006 - 2010)
Associate Professor (2010-Present)
Visiting positions at the Hong Kong University, Hong Kong University of Science and technology, and Zhejiang University, Hangzhou, China, (2011 - 2012)

Teaching: Has taught a variety of courses at the undergraduate and graduate level. They include Classical Dynamics, Statistical Mechanics, Advanced Statistical Mechanics, Condensed Matter Physics II, Advanced Greens functions in solids, and the Introductory Physics Courses PH1010, and PH1020.

Research: The research output of our group is usually published in journals like Physical Review Letters, Physical Review B, Europhysics Letters, and Journal of Physics (Condensed Matter)
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Research Interests

Quantum Phase Transitions, Disordered Systems, Quantum Hall Effects, Dissipative Systems, Superconductivity, Dynamical Mean Field Theory.



Natarajan T. S.
Professor

Ph.D (IITM, 1984)

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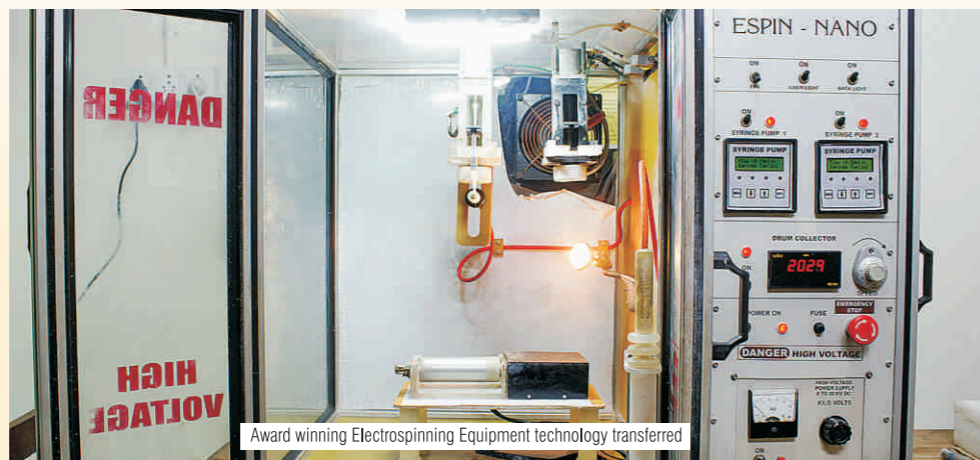
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Awards & Recognitions

- Won Three National Awards from Ministry of Chemicals & Fertilizers, in 2012 and 2013, one for Heated Gloves for Soldiers in Cold Regions, another for Development of Smart Materials ZnO nano fibers by electrospinning and the last for Electrospinning Apparatus (Developed and transferred technology to a company in Chennai – More than 50 machines sold already).
- Annual Achievement Award from Indian Science Monitor during 2008 for popularizing Science among Children and Molecular Electronics.
- Listed among the Top 10 Most Popular Professors on YouTube (based on his NPTEL Lectures on Basic Electronics), by New York Times, http://www.nytimes.com/2010/04/18/education/edlife/18opentop10-t.html?_r=00;
- Took the first batch of 5 students from India to International Physics Olympiad in Iceland in 1998 as Delegation Leader.

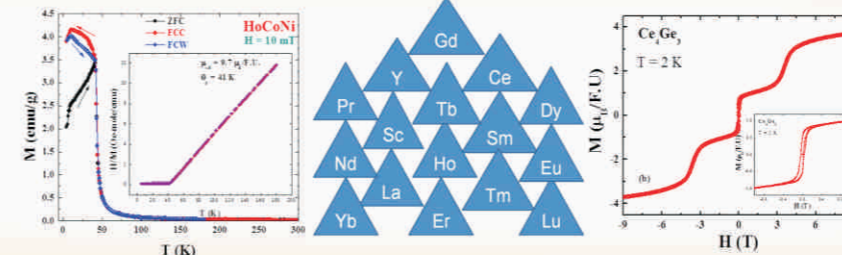
Research Interests

- Polymer and Metal Oxide Nanofibers through Electrospinning.
- PC-based Electronic Instrumentation.
- Physics Education.



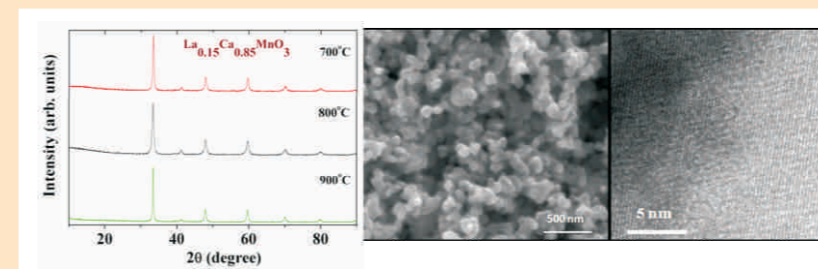
Selected Publications

- S. Anitha, B. Brabu, K. P. Rajesh, T. S. Natarajan, (2013) “Fabrication of UV sensor based on electrospun composite fibers” Mater. Lett. 92, pp. 417–420.
- P. Mohanapriya, H. Segawa, K. Watanabe, K. Watanabe, S. Samitsu, T. S. Natarajan, N. V. Jaya, N. Ohashi (2013) “Enhanced ethanol-gas sensing performance of Ce-doped SnO₂ hollow nanofibers prepared by electrospinning” Sensors and Actuators B: Chemical Volume 188, November 2013, Pages 872-878.
- “Functional Nanofibers in Microelectronics Applications” Chapter 16 in a Book titled “Functional Nanofibers and Their Applications” Edited by Qufu Wei, Published by Woodhead Publishing UK (2012).
- S. Anitha, B. Brabu, D. John Thiruvadigal, C. Goplakirshan, T. S. Natarajan, (2012) “Optical, Bactericidal and water repellent properties of electrospun nano-composite membranes of cellulose acetate and ZnO,” Carbohydrate Polymers., 87, pp. 1065-1072.
- Anshika Agarwal, Anant Raheja, T. S Natarajan, T. S Chandra, Development of universal pH sensing electrospun nanofibers, Sensors and Actuators B 161 (2012) 1097– 1101.
- Naveen Nagiah, Uma Tirichurapalli Sivagnanam, R. Mohan, Natarajan Tirupattur Srinivasan, Praveen Kumar Sehgal (2012) “Development and characterization of electrospun poly(propylene carbonate) ultrathin fibers as tissue engineering scaffolds” in Advanced Engineering Materials, 14, 4: B138-148.
- V. Jagadeesh Babu, D. V. B. Murthy, V. Subramanian, V. R. K. Murthy, T. S. Natarajan., (2011) “Microwave Hall mobility and electrical properties of electrospun polymer nanofiber” J. Appl. Phys. 109, 074306.
- Bibekananda Sundaray, V. Subramanian, T. S. Natarajan and K. Krishnamurthy, (2004) “Electrical conductivity of a single electrospun fiber of poly (methyl methacrylate) and multiwalled carbon nanotube nanocomposites”, Appl. Phys. Lett., 88, 143114_1-143114_3.
- Bibekananda sundaray, V. Subramanian, T. S. Natarajan, Rong-Zeng Xiang, Chia-Cheng Chang and Wun-Shain Fann (2003) “Electrospinning of continuous aligned fibers”, Appl. Phys. Lett., 84, 1222-1224.
- T. S. Natarajan, U. M. S. Murthy and J. Sobhanadri, (1985) “Microprocessor based Microwave Dielectric Measurement, IEEE-IM-34, No.4, p643-646.



Selected Publications

- “Magnetocaloric effect in the rare earth intermetallic compounds RCoNi (R = Gd, Tb, Dy and Ho)” Rajib Mondal, R. Nirmala, J. Arout Chelvane and A. K. Nigam; Journal of Applied Physics 113 (2013) 17A930.
- Size effect on the structural, magnetic, and magnetotransport properties of electron-doped manganite La_{0.15}Ca_{0.85}MnO₃ Rini Thomas, Gangadhar Das, Rajib Mondal, R. Pradheesh, R. N. Mahato, T. Geethakumary, R. Nirmala, A. V. Morozkin, J. Lamsal, W. B. Yelon, A. K. Nigam and S. K. Malik; Journal of Applied Physics 111 (2012) 07D7293.
- “Magnetic and magnetocaloric properties of rare earth intermetallic compound DyCoNi” Rajib Mondal, J. Arout Chelvane and R. Nirmala; AIP Conference Proceedings 1447 (2012) 1115.
- First order transition in Dy₃Si₂Ge: Transport and thermal properties, and first principles calculations R. Nirmala, Durga Paudyal, V. K. Pecharsky, K. A. Gschneidner, and A. K. Nigam; Journal of Applied Physics 109 (2011) 07A923.
- Magnetotransport study of the magnetic superconductors GdSr₂Ru_{1-x}Cu_{2+x}O₈ T. Geetha Kumary, J. Janaki, Awadhesh Mani, R. Nirmala, S. K. Malik and M. C. Valsakumar; Superconductor Science and Technology 24 (2011) 095001.



Nirmala R.
Associate Professor

Ph.D (IIT Madras, 2003)

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Research Interests

- Rare earth-transition metal compounds and oxides.
- Structure-Property relationships.
- Magnetism and Magneto-transport properties.
- Magnetic entropy changes near magneto-structural transitions.
- Magnetic nanoparticles.
- Phase separation.
- Naturally layered magnetic multilayers.

Sponsoring Agencies:
DAE-BRNS, DST, UGC-DAE-CSR.



Pattabiraman M.
Associate Professor

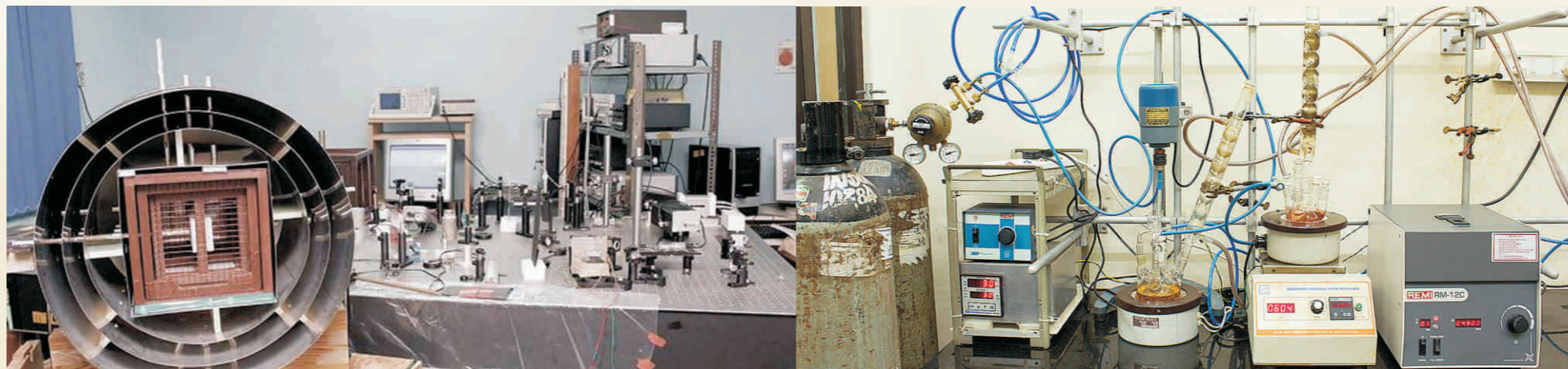
Ph. D (IIT, Madras 2002)
Postdoctoral (Paul Drude Institut, Berlin)
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Awards & Recognitions

Young Faculty Recognition Award 2011.

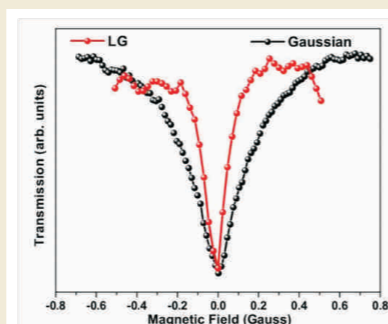
Research Interests

Study of coherent atom-electromagnetic field interactions.

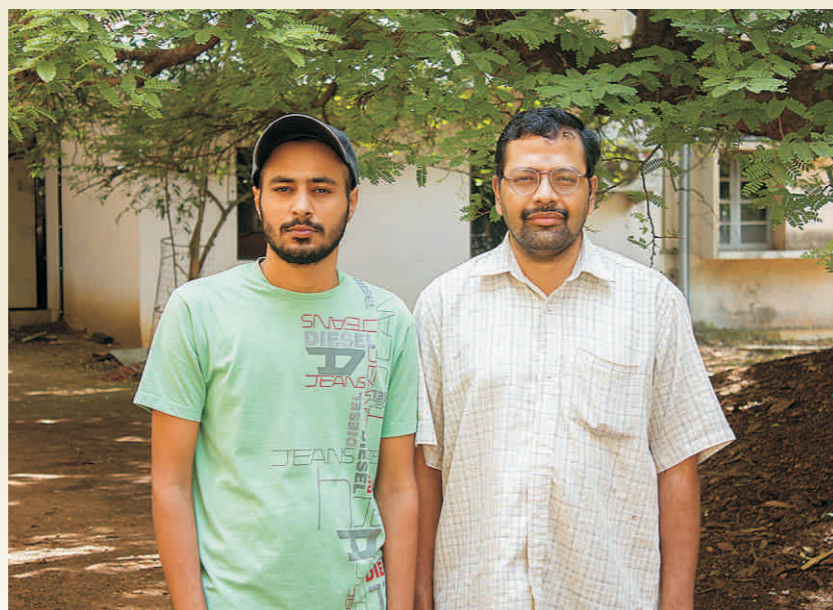


Selected Publications

- Nibedita Ram and M. Pattabiraman, Sign reversal of Hanle Electromagnetically Induced Absorption with orthogonal circularly polarized optical fields, J. Phys. B: At. Mol. Opt. Phys, 43, 245503 (2010).
- Nibedita Ram, M. Pattabiraman and C. Vijayan, Effect of Ellipticity on Hanle Electromagnetically Induced Absorption and Transparency Resonances with Longitudinal and Transverse Magnetic fields, Phys Rev A, 82, 033417 (2010).
- J. Anupriya, Nibedita Ram and M. Pattabiraman, Hanle electromagnetically induced transparency and absorption resonances with a Laguerre Gaussian beam, Phys Rev A, 81, 043804 (2010).
- Nibedita Ram, J Anupriya, M. Pattabiraman, and C. Vijayan, Role of Transfer of Coherence in Enhanced Absorption Hanle Effect with Two Optical Fields, J. Phys. B: At. Mol. Opt. Phys. 42, 175504 (2009).

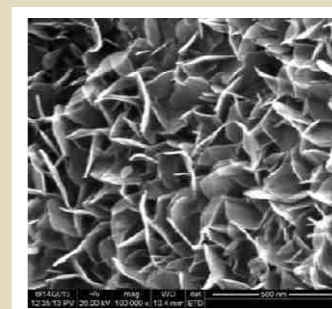


Narrowing observed in the electromagnetically induced absorption window of a Rubidium hyperfine transition with a Laguerre Gaussian (LG) beam. This narrowing can help improve the sensitivity of atomic clocks and low field magnetometers.

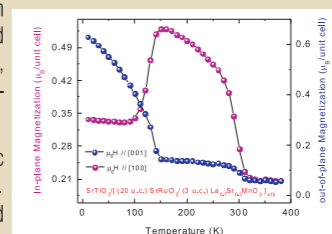


Selected Publications

- "Laser induced structural phase transformation of cobalt oxides nanostructures" A. V. Ravindra, B. C. Behera and P. Padhan, J. Nanosci. Nanotechnol. (Accepted for publication).
- "Electronic structure and optical band gap of CoFe_2O_4 thin films", A. V. Ravindra, Prahallad Padhan and W. Prellier Appl. Phys. Lett. 101, 161902 (2012). (Citation - 2) (Impact - 3.844).
- "Size effect on magnetic coupling in all-ferromagnetic superlattices", Prahallad Padhan and W. Prellier, Appl. Phys. Lett. 99, 263108 (2011). (Impact - 3.844).
- "Magnetocaloric effect and improved relative cooling power in $\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3/\text{SrRuO}_3$ superlattices", Q. Zhang, S. Thota, F. Guillou, Prahallad Padhan, V. Hardy, A. Wahl and W. Prellier, J. Phys.: Condens. Matter 23, 052201 (2011). (Impact - 2.546).
- "Tunable Magnetic Interaction at the Atomic Scale in Oxide Heterostructures", J. W. Seo, W. Prellier, Prahallad Padhan, P. Boullay, J.-Y. Kim, H. Lee, C. D. Batista, I. Martin, Phys. Rev. Lett. 105, 167206 (2010). (Citation - 4) (Impact - 7.370)
- "Anisotropic magnetocaloric effect in all-ferromagnetic ($\text{La}_{0.7}\text{Sr}_{0.3}\text{MnO}_3/\text{SrRuO}_3$) superlattices", S. Thota, Q. Zhang, F. Guillou, U. Lüders, N. Barrier, W. Prellier, A. Wahl, and Prahallad Padhan, Appl. Phys. Lett. 97, 112506 (2010). (Citation - 9) (Impact - 3.844).
- "Effect of stacking order on the magnetic and transport properties of bilayer-based oxide superlattices with inversion symmetry", Prahallad Padhan and W. Prellier, Appl. Phys. Lett. 95, 203107 (2009). (Citation - 3) (Impact - 3.844).
- Prahallad Padhan and Arunava Gupta, "Magnetic/Multifunctional Double Perovskite Oxide Thin Films", in "Functional Metal Oxides: New Science and Novel Applications", (Edited by S. B. Ogale, T. V. Venkatesan, M. Blamire), Wiley-VCH Verlag GmbH & Co, ISBN: 978-3-527-33179-6, December 2012.



First time observed Morphology of CoO



In-plane antiferromagnetic coupling and out-of-plane ferromagnetic coupling in the superlattice consisting of two ferromagnetic components.



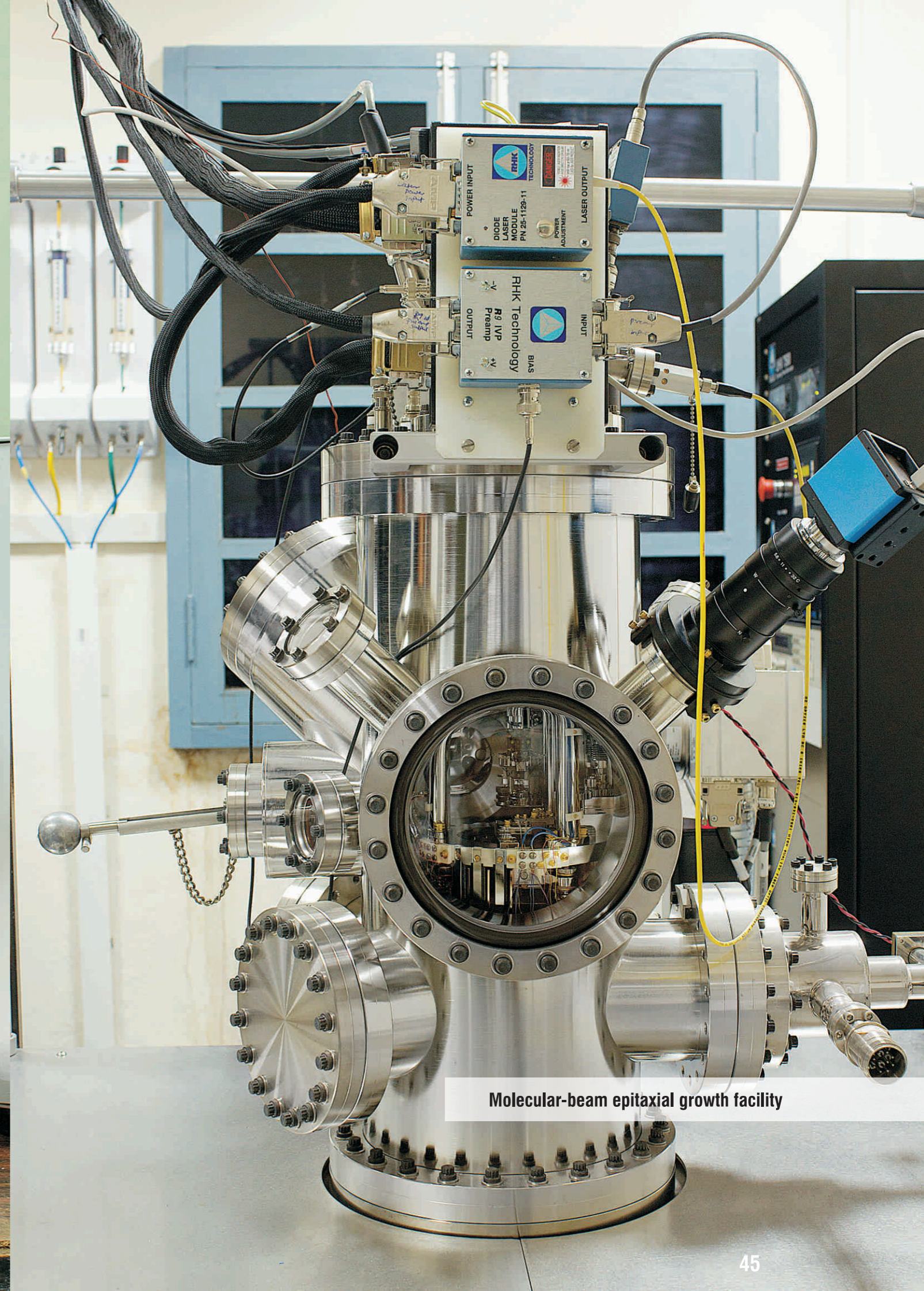
Padhan, Prahallad
Assistant Professor

Dr. Padhan is an experimental physicist with interest in the areas of electronic transport and magnetism in nanostructured materials, with emphasis on the controlled fabrication and synthesis of novel structures, manipulating and probing their surface and interface properties, and exploring potential applications. He received his M.Sc. Degree in physics from Sambalpur University and Ph.D. in condensed matter physics from the Indian Institute of Technology, Kanpur. He has been a Post-Doctoral Fellow at Laboratoire CRISMAT, CNRS UMR, Caen Cedex, France during the period 2003 – 2006 and at MINT Center, University of Alabama from 2006 till 2008. Dr. Padhan has also been a visiting fellow at CRISMAT Laboratory, Caen - France, after joining IIT Madras in the year 2008.

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Research Interests

Material physics and device engineering: Investigation of nanostructured materials, with emphasis on the controlled fabrication and synthesis of novel structures in the form of nano-crystal, nanowires and thin films, manipulating and probing their surface and interface properties, and exploring potential applications. The effect of structural and chemical variations on the transport, optical, magnetic and mechanical properties of materials is thus of paramount interest.





Prafulla Kumar Behera
Associate Professor

2003: Ph.D Utkal University, Orissa, (supported by KEK, Tsukubashi, Ibaraki-Ken, Japan)

2002 - 2006: Postdoctoral Fellow, BABAR Experiment, University of Pennsylvania, USA.

2006 - 2011: Assistant Research Scientist, BABAR and ATLAS Experiment, University of Iowa, Iowa City, IA, USA.

2011 - 2012: Visiting Associate Professor, IIT Madras, Chennai, India.

2012 - Present: Associate Professor, Indian IIT Madras, Chennai, India.

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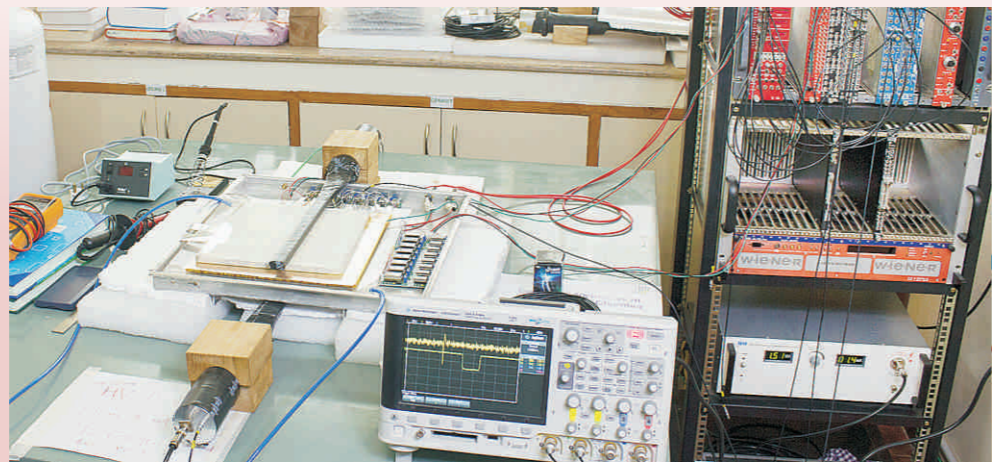
Awards & Recognitions

- Referee of the Physical Review Letters for the American Physical Society since 2006.
- Best participant award from the organizing committee of XXXIX International Symposium on Multiparticle Dynamics "Gold Sands", Gomel Region, Belarus, 4-9 September 2009.

Research Interests

Experimental High Energy Physics

- ATLAS experiment at CERN, contributed to the discovery of Higgs boson.
- India-based neutrino experiment (INO).
- BELLE and BELLE-II experiment, Japan.

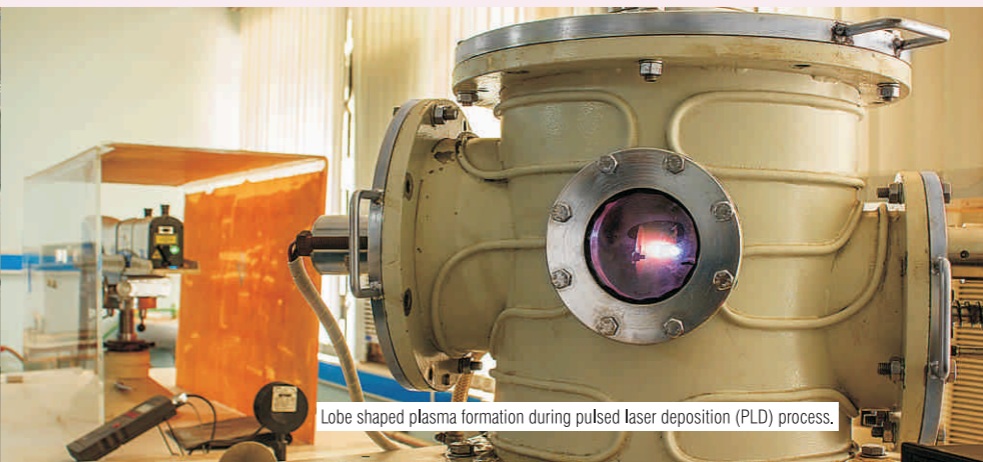
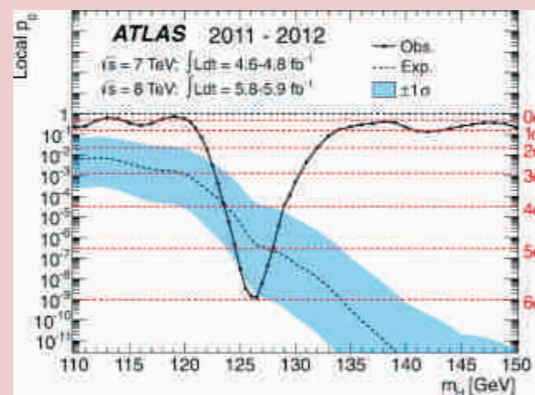


Selected Publications

- G. Aad, et al. [The ATLAS Collaboration], "Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC", Phys. Lett. B716 (2012) 1-29.
- G. Aad et al. [The ATLAS Collaboration], "Charged-particle multiplicities in pp interactions at $\sqrt{s} = 900$ GeV measured with the ATLAS detector at the LHC", Phys. Lett. B688 (2012) 21-42.
- G. Aad et al., "ATLAS pixel detector electronics and sensors", JINST3 (2008) 07007.
- B. Aubert et al. [BABAR Collaboration], "Observation of an Excited Charm Baryon Ω_c^* Decaying to $\Omega_c^0 \gamma$ ", Phys. Rev. Lett. 97 (2006) 232001.
- B. Aubert et al. [BABAR Collaboration], "Observation of $B^+ \rightarrow \phi \phi K^+$ and Evidence for $B^0 \rightarrow \phi \phi K^0$ below η_c Threshold", Phys. Rev. Lett. 97, (2006) 261803.

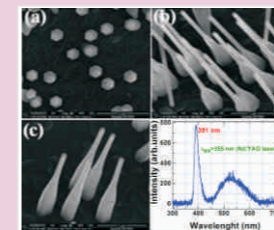
- K. Abe et al. [Belle Collaboration], "Observation of Double $c\bar{c}$ production in e^+e^- Annihilation at $\sqrt{s} \approx 10.6$ GeV", Phys. Rev. Lett. 89, (2002) 142001.
- K. Abe et al. [Belle Collaboration], "Production of Prompt Charmonia in e^+e^- Annihilation at $\sqrt{s} \approx 10.6$ GeV", Phys. Rev. Lett. 88, (2002) 052001.

- A. Abashian et al., "The K_L/μ detector subsystem for the Belle experiment at the KEK B-factory", Nucl. Instrum. Meth. A449 (2000) 112-124.



Selected Publications

- EXAFS and XANES investigation of (Li, Ni) co-doped ZnO thin films grown by pulsed laser deposition. Lorenzo Mino, Diego Gianolio, Fabrizio Bardelli, Carmelo Prestipino, E. Senthil Kumar, F. Bellarmine, M. Ramanjaneyulu, Carlo Lamberti and M. S. Ramachandra Rao. J. Phys. Condens. Matter.25 (2013) 385402.

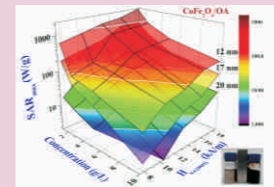


Highly crystalline PLD grown self-assembled ZnO nanorods exhibiting intense UV emission.

M. S. Ramachandra Rao. J. Experimental Nanoscience. 8 (2013) 320.

- Charge transfer and electronic transitions in polycrystalline BiFeO₃. B. Ramachandran, A. Dixit, R. Naik, G. Lawes, and M. S. Ramachandra Rao. Phys. Rev. B. 82 (2010) 012102.

- B. Ramachandran and M. S. Ramachandra Rao. Low temperature magnetocaloric effect in polycrystalline BiFeO₃ ceramics. Appl. Phys. Lett. 95 (2009) 142505.



Increase in specific absorption rate (SAR) with increase in the dilution of ferrofluid and applied magnetic field. A maximum SAR was observed near superparamagnetic (12 nm) limit at room temperature – useful for 'magnetic hyperthermia application'.

- Optical and electrical resistivity studies of isovalent and aliovalent 3d transition metal ion doped ZnO. Shubra Singh and M.S. Ramachandra Rao. Phys. Rev. B. 80 (2009) 045210.
- Influence of d-d transition bands on electrical resistivity in Ni-doped polycrystalline ZnO. Shubra Singh, N. Rama and M. S. Ramachandra Rao. Appl. Phys. Lett. 88 (2006) 222111.

- Evidence for reduction in spin disorder by Ho³⁺ doping in La_{0.7}Ca_{0.3}MnO₃. M. S. Ramachandra Rao, V. Ravindranath and R. Gross. Phil. Mag. 83 (2003) 1631.



Ramachandra Rao M. S.
Professor

M.Sc. (Physics); IIT Kharagpur.
Ph.D. (Expt. Solid State Physics); IIT Kharagpur.

Postdoc: CNRS, Bellevue, France
Visiting Fellow: TIFR, Mumbai.

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Awards & Recognitions

- Alexander von Humboldt Fellow, Germany.
- Fellow of Institute of Physics (FInstP), Institute of Physics (IoP), UK.
- JSPS fellow and JST fellow, Japan.
- ERASMUS MUNDUS Foreign academician (2007 - present).
- STAR Professor award fellowship, Germany (2010).
- Visiting faculty, University of Maryland, College Park, USA.
- Editorial Board Member (from India) of J.Phys.D. Appl. Phys.

Research Interests

- ZnO nanostructures and quantum dots for UV & white light emission. ZnO-Graphene interfaces. Flexible electronics.
- Magnetic Nanoparticles for hyperthermia and water purification. Magnetic tunnel junctions, heterostructures, multiferroics, DMS and spintronics.
- Nanocrystalline Diamond coatings for mechanical applications. Physics of doping in diamond.
- Novel photovoltaics and power harvesting.
- Physics of diffusion in nano-oxide phases.



Ramaprabhu S.
Professor

Ph.D. (IIT Madras)

Post Doc (Université de Genève, Switzerland,
Technische Universität, Darmstadt, Germany)

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Awards & Recognitions

- Alexander von Humboldt Fellow, Germany.
- DAAD Fellow, Germany.
- Visiting Fellow to Germany by BMBF & DFG German Science Foundations.
- Chair-Elect of Local section of India, American Nano Society.
- Editor in Chief, GRAPHENE (American Scientific Publishers).
- Editorial Board Member of Journal of Nanofluids, Journal of Nano communication (American Scientific Publishers).

Research Interests

- Hydrogen Energy Technology, Nanotechnology, Fuel Cell Technology.
- Synthesis of Carbon Nanotubes, Graphene, Metal oxide NTs & their hybrid Composites.
- Applications of Nanostructured materials:
- Proton Exchange Membrane Fuel Cell, Micro Fuel cell, Direct Alcohol Fuel cell, Hydrogen storage, Photovoltaic (3G, 4G), Li ion-(S) battery, Nanofluids, Supercapacitor, Gas sensors, biological sensors, Water purification, CO₂ capture and conversion.

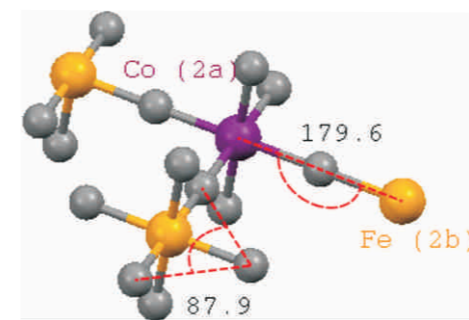
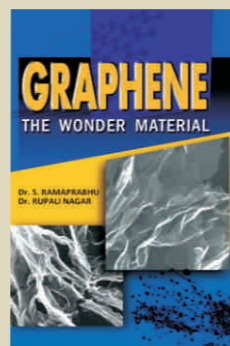


Solar simulator with impedance analyzer

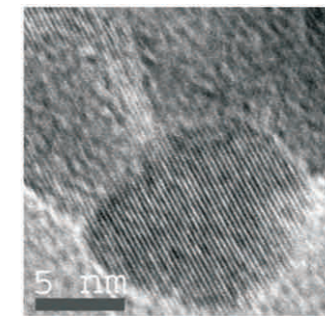
Selected Publications

- B. P. Vinayan and S. Ramaprabhu, "Solar light assisted green synthesis of palladium NPs decorated nitrogen doped graphene for hydrogen storage application", Journal of Materials Chemistry A, 1, 11192, 2013.
- B. P. Vinayan and S. Ramaprabhu, "Platinum-TM (TM=Fe, Co) alloy nanoparticles dispersed nitrogen doped reduced graphene oxide-multiwalled carbon nanotube hybrid structure cathode electrocatalysts for high performance PEMFC applications", Nanoscale, 5, 51095, 2013.
- B. P. Vinayan and S. Ramaprabhu, "Facile synthesis of SnO₂ NPs dispersed nitrogen doped graphene anode material for lithium ion battery applications", Journal of Materials Chemistry A, 1, 3865, 2013.
- S. S. Jyothirmayee Aravind and S. Ramaprabhu, "Graphene Wrapped Multiwalled Carbon Nanotubes Dispersed Nanofluids for Heat Transfer Applications", Journal of Applied Physics, 112, 124304, 2012.
- Ashish Kumar Mishra and S. Ramaprabhu, "Ultrahigh arsenic sorption using iron oxide-graphene-nano composite supercapacitor assembly", Journal of Applied Physics, 112, 104315, 2012.
- Tessy Theres Baby and S. Ramaprabhu, "Experimental Study on the Field Emission Properties of Metal Oxide Nanoparticle Decorated Graphene", Journal of Applied Physics, 111, 034311, 2012.
- B. P. Vinayan, Rupali Nagar, Natarajan Rajalakshmi, and Sundara Ramaprabhu, "Novel Platinum-Cobalt Alloy Nanoparticles Dispersed on Nitrogen-Doped Graphene as a Cathode Electrocatalyst for PEMFC Applications", Advanced Functional Materials, 22, 3519, 2012.
- B. P. Vinayan, Rupali Nagar and S. Ramaprabhu, "Effect of nitrogen doping on hydrogen storage capacity of palladium decorated graphene", Langmuir, 28 (20), 7826, 2012.
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- Tamilarasan and S. Ramaprabhu, "Polyaniline-Magnetite Nanocapsules Based Nanocomposite for Carbon dioxide Adsorption", International Journal of Greenhouse Gas Control, 10, 486, 2012.

Book: 'Graphene-The wonder material', SAMS publishers, Chennai (2012).



Schematic of the crystal structure of Sr₂FeCoO₆.



High resolution TEM micrograph of the nanocrystalline Ce_{0.9}Gd_{0.1}Pr_{0.1}O_{2-x} material calcined at 800 °C. Size of the particle shown here is around 14 nm.

Selected Publications

- Large magneto resistance and Jahn-Teller effect in Sr₂FeCoO₆ R. Pradeesh, Hari Krishnan. S. Nair, V. Sankaranarayanan, K. Sethupathi, Euro. J. Phys. B, 85, 260 (2012).
- Exchange bias and memory effects in Sr₂FeCoO₆ R. Pradeesh, Hari Krishnan S. Nair, v. Sankaranarayanan, k. Sethupathi. Appl. Phys. Lett., 101, 142401 (2012).
- Observation of spin glass state in weakly ferromagnetic Sr₂FeCoO₆ double perovskite R. Pradeesh, Hari Krishnan S. Nair, C. M. N. Kumar, Jagat Lamsal, R. Nirmala, P. N. Santhosh, W. B. Yelon, S. K. Malik, V. Sankaranarayanan, K. J. Sethupathi Appl. Phys. 111, 053905 (2012).
- Graphene based Engine Oil Nanofluids for Tribological Applications V. Eswaraiyah, V. Sankaranarayanan. and S. Ramaprabhu, ACS Appl. Mater. Interfaces 3, 4221 (2011).
- Giant Magnetoresistance and table-like magnetocaloric effect in double perovskite oxide PrSrMnCoO₆. Rabindranath Mahato, K. Sethupathi, V. Sankaranarayanan, R. Nirmala, A. K. Nigam and S. K. Malik J. Appl. Phys. 109, 073E319 (2011).
- Magnetic behaviour in Dy_{1-x}Mm_xCo₂Compounds G. Srinivas, M. Ellerby, N. T. Skipper, S. Ramaprabhu, and V. Sankaranarayanan, J. Phys.: Cond. Matter 22, 436001 (2010).
- Ionic transport properties in nanostructured Ce_{0.8}A_{0.2}O_{2-δ} (A = Eu, Gd, Dy and Ho) materials Ashok Kumar Baral, V. Sankaranarayanan, Nanoscale Res. Lett., 5, 637 (2010).
- Coexistence of giant magnetoresistance and large magnetocaloric effect near room temperature in La_{0.7}Te_{0.3}MnO₆. Rabindranath Mahato, K. Sethupathi, V. Sankaranarayanan, and R. Nirmala J. Magn. Mater., 322, 2537 (2010).



Sankaranarayanan V.
Professor

Ph.D. - IIT Madras (1984)

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Assistant Professor (1993)

DAAD Fellow - Max Planck Institute for
Solid State Research, Stuttgart, Germany.

Professor, IIT Madras (2006)

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Profile

- Taught both undergraduate and graduate level courses for the past 27 years. Associated with the Low Temp. Physics Lab of the department.
- His research field is Experimental Condensed Matter Physics.
- Responsible for setting up various indigenous experiments for measuring physical properties like heat capacity, thermal conductivity, thermoelectric power and electrical resistivity at low temperatures.
- Research areas: High temperature superconductivity, magnetic materials, magnetocaloric effects, electrode materials for Solid Oxide Fuel Cells.
- Actively involved in setting up Cryogenic facilities like Nitrogen and Helium Liquefiers and sophisticated experimental facilities like SQUID Magnetometer, experiments at Millikelvin and so on.

Research Interests

- Magnetocaloric materials (intermetallic and oxides).
- Basic studies on Solid Oxide Fuel Cells.
- Studies on novel Superconducting materials.



Santhosh P. N.
Associate Professor

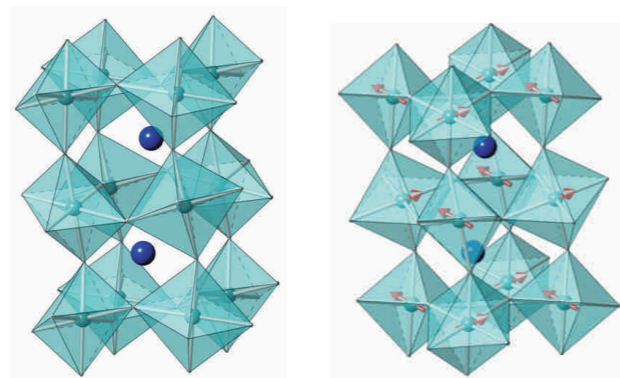
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Academic Profile

- Completed Ph.D work at National Chemical Laboratory (University of Pune) in 1997.
- Post Doctoral research work at IISc./JNCASR (Bangalore), Ohio State University (Columbus, USA), Oxford (UK).
- Joined IIT Madras as an Asst. Professor on 4th Aug. 2003.
- Taught both undergraduate and graduate level courses for the past 10 years.
- Associated with Low Temp. Physics lab of the department.
- His research area is in Experimental Condensed Matter Physics, with special emphasis on structure-property correlations in perovskites, Brownmillerite, Ruddlesden-popper structures etc.
- Completed research projects funded by DST, CSIR, MHRD, NRB and DBT.
- Royal Society (UK) International Joint Project on core-shell magnetic nano structures.

Research Interests

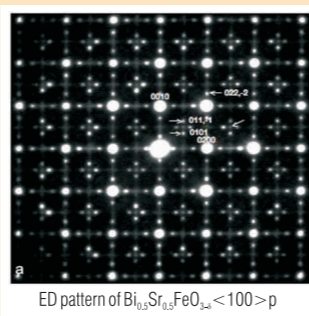
- Multifunctional materials (Multiferroics, CMR materials, SOFC's etc.)
- Structure-property correlations in perovskites and related structures.
- X-ray and Neutron Diffraction studies in understanding crystal and magnetic structure.
- Magnetic/semiconducting/Bio-nano materials.
- First principle calculations on electronic magnetic and vibrational properties of oxides using CASTEP.



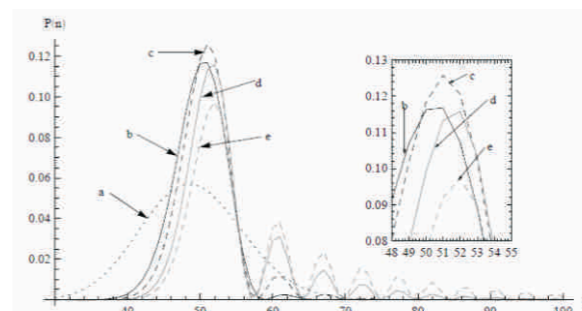
Crystal and magnetic structure of $\text{YFe}_{0.5}\text{Cr}_{0.5}\text{O}_3$ from neutron diffraction data

Selected Publications

- Jahn-Teller assisted polaron hopping and associated dielectric response of $\text{PrFe}_{0.5}\text{Mn}_{0.5}\text{O}_{2.95}\text{C}$. Ganeshraj, S. Kavita, R. Mahendiran, Neetika Sharma, A. Das, and P.N. Santhosh, Appl. Phys. Lett. 103, 112909 (2013).
- Magnetic structure and magnetodielectric effect of $\text{YFe}_{0.5}\text{Cr}_{0.5}\text{O}_3$, Vidhya, G. Nair, A. Das, V.Subramanian and P. N. Santhosh, J. Appl. Phys., 113, 213907 (2013).
- Chemistry of conjugation to gold nanoparticles affects G-protein activity differently, Vibha Singh, Santhosh P. Nagappan Nair and A. Gopala krishna, J. Nano Biotech., 11:7 (2013).
- Dielectric resonance and magnetic properties of Fe-3% doped BaSnO_3 thin films grown by pulsed laser deposition, K. Balamurugan, E. S. Kumar, B. Ramachandran, S. Venkatesh, N. H. Kumar, M. S. R. Rao, P.N. Santhosh, J. Appl. Phys., 111, 074107 (2012).
- Observation of spin glass state in weakly ferromagnetic $\text{Sr}_2\text{FeCoO}_6$ double perovskite, R. Pradheesh, H. S. Nair, C. M. N. Kumar, J. Lamsal, R. Nirmala, P. N. Santhosh, W. B. Yelon, S. K. Malik, V. Sankaranarayanan, K. Sethupathi, J. Appl. Phys, 109, 07E329 (2011).
- Structural, transport and magnetic properties of $\text{Sr}_2\text{RuTiO}_6$, S. Savitha Pillai, P. N. Santhosh, F. Tuna, P. John Thomas and K. G. Suresh, Solid State Commun., 150, 1450-1452 (2010).
- Cluster glass properties and magnetic phase separation studies of $\text{Nd}_{1-x}\text{Bi}_{0.5-x}\text{Sr}_x\text{MnO}_3$ ($x=0.1, 0.2, 0.3$ and 0.4), S. Savitha Pillai, P. N. Santhosh, N. Harish Kumar, F. Tune and P. John Thomas J. Phys. Cond. Matter., 21, 195409 (2009).
- Multiferroic properties of $\text{Bi}_{1/2}\text{Sr}_{1/2}\text{FeO}_3$, K. Balamurugan, N. Kumar, Harish; P. N. Santhosh, J. Appl. Phys., 105, 07D909 (2009).
- A TEM investigation of the $(\text{Bi}_{1-x}\text{Sr}_x)\text{Fe}^{3+}\text{O}_{3-4/2}$, $0.2 \leq x \leq 0.67$, solid solution and a suggested superspace structural description thereof., R. L. Withers, L. Bourgeois, K. Balamurugan, N. H. Kumar, P. N. Santhosh, Woodward, PM, J. Solid State. Chem., 182, 2176-2184 (2009).
- "Oxides: Their Properties and Uses" by S. P. N. Nair, and P. Murugavel, Comprehensive Inorganic Chemistry II, Vol 4., p. 47-72. In: Jan Reedijk and Kenneth Poeppelmeier, editors. Oxford: Elsevier (2013).



ED pattern of $\text{Bi}_{0.5}\text{Sr}_{0.5}\text{FeO}_3 <100>_p$



$P(n)$ versus n for squeezed coherent stat with $N_c=49$ for different squeezing parameters. (a) coherent state, (b) $N_s=2$, $N_s=5$, (e) $N_s=10$.

Selected Publications

- 1. Effect of Squeezing on the Atomic and the Entanglement Dynamics in the Jaynes-Cummings Model, T. SUBEESH, VIVISHEK SUDHIR, A. B. M. AHMED & M. VENKATA SATYANARAYANA, Nonlinear Optics and Quantum Optics, Vol. 44, 245-258, 2012.
- Phase Estimation, photon cloning and Bernoulli map, S. Lakshmi bala and M. Venkata Satyanarayana, Phys. Letters A298, 1-6 (2002).
- Effects of higher-order nonlinear dispersion on ultrashort pulse evolution in a fiber laser, T. G. Sindhu, P. B. Bisht, R. J. Rajesh and M. Venkata Satyanarayana, Microwave @ Opt. Tech. Letters, 28, 196-198 (2001)
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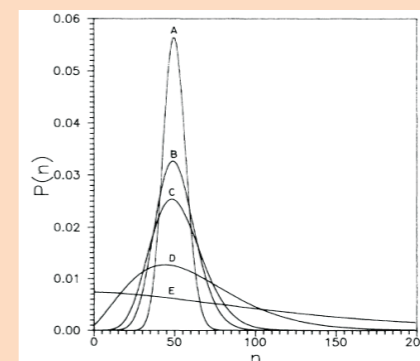
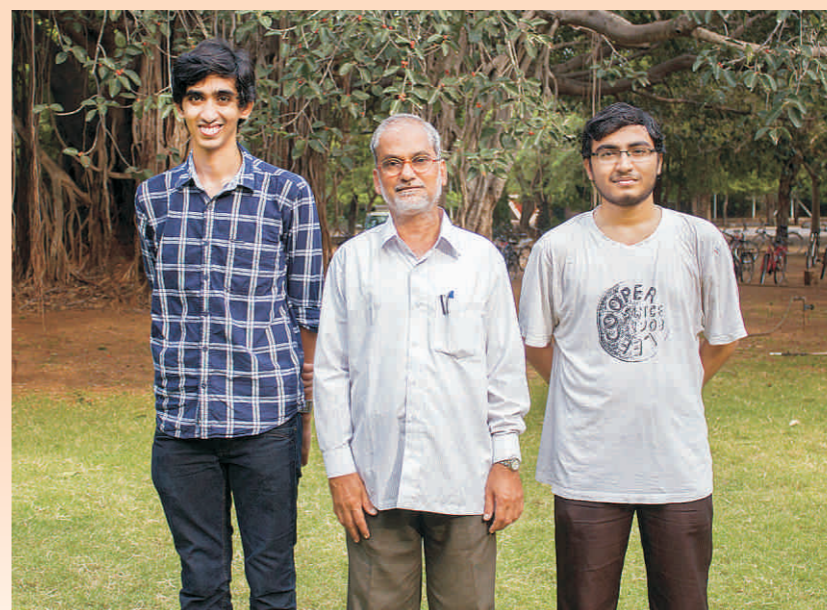


FIG. 1. A, B, C, D, and E denote the photon-counting distributions for the Glauber-Lachs states corresponding to $S=50$, $N=0$; $S=50$, $N=1$; $S=50$, $N=2$; $S=50$, $N=10$; and $S=50$, $N=50$; respectively.



Satyanarayana M. V.
Professor

Ph. D (from the Institute of Mathematical Sciences, Chennai) Madras University (1987)

Post-doctoral Fellow, Department of Physics, University of Arkansas, USA (1987 -1988)

Post-doctoral Fellow, Department of Physics, Department of Physics, IIT Madras (1988 – 1990)

Research Scientist (UGC) at the Department of Physics, IIT Madras (1991 – 1995)

Reader, Department of Physics, Mangalore University, Mangalore (1995)

Assistant Professor, Department of Physics, IIT Madras (1995 – 2004)

Associate Professor, Department of Physics, IIT Madras (2004 – 2010)

Professor (since 2010)

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Research Interests

Theoretical Quantum Optics/ Optical Coherence, Non-classical states of radiation

- Quantum Mechanics/ Entanglement – role of squeezing and anti-bunching, atom-radiation interaction – generation and application to novel sources of radiation – dynamics of atom(s)-radiation interaction - Role of entanglement in Quantum Optics.
- Localization of photon counting distribution and consequences.
- Fresnel Optics/ connection between squeezing and Fresnel propagation.



Sethupathi K.
Professor

Ph.D. from Moscow State University,
Moscow (1992)

Junior Scientific Officer in the Dept. of Low
Temperature Physics and Superconductivity,
Moscow State University.

Post Doctoral research work at IIT Madras.

Assistant Professor IITM (1995)

Professor IITM (2009)

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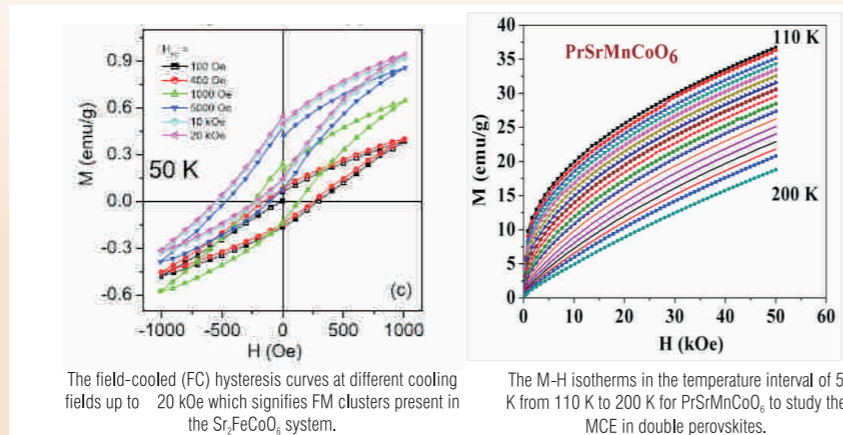
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Profile:

- 18 years of experience in teaching undergraduate and graduate students.
- Does research in Experimental Condensed Matter Physics, with special emphasis on magnetic oxide materials and high temperature superconductors.
- Has published about 80 research papers in international peer reviewed journals and equal number in conference proceedings.

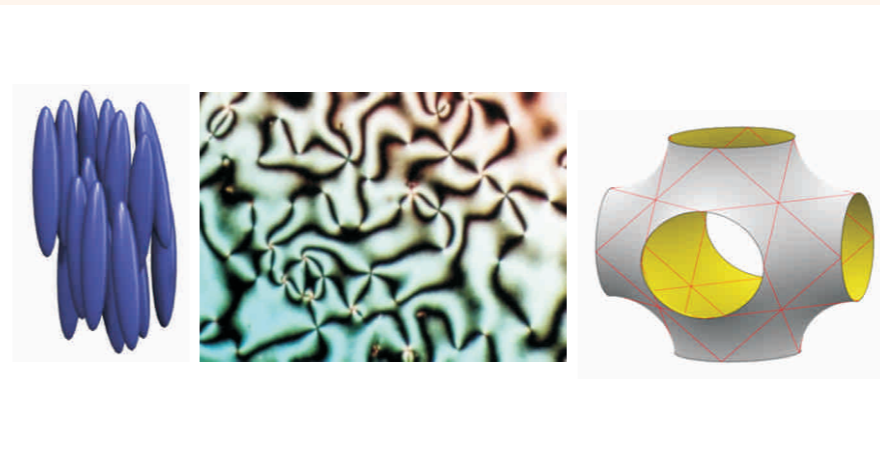
Research Interests

- Magnetism and Transport properties of Colossal Magnetoresistance Oxides at low temperatures.
- Investigation of Novel materials in the bulk, thin film and nanocrystalline forms for magnetic cooling and for magneto resistive sensor applications.
- High Temperature Superconductors.
- Cryogenic Insulation.



Selected Publications

- R. Pradheesh, Hari Krishnan S. Nair, V. Sankaranarayanan, K. Sethupathi Large magnetoresistance and Jahn Teller effect in $\text{Sr}_2\text{FeCoO}_6$, Eur. J. Phys. B, 85, 260 (2012).
- R. Pradheesh, S. Hari Krishnan, V. Sankaranarayanan, K. Sethupathi Exchange bias and memory effect and in $\text{Sr}_2\text{FeCoO}_6$, Appl. Phys. Lett., 101, 142401 (2012).
- B. P. Vinayan, K. Sethupathi and S. Ramaprabhu, Hydrogen storage properties of Pd decorated nitrogen doped graphene nanoplatelets, Journal of Nanoscience and Nanotechnology, 12, 1, (2012).
- B. P. Vinayan, K. Sethupathi, and S. Ramaprabhu Facile synthesis of triangular shaped palladium nanoparticles decorated nitrogen doped graphene and their catalytic study for renewable energy applications. International Journal of Hydrogen Energy, 38, 2240-2250. (2013) .
- Rabindra Nath Mahato, K. Sethupathi, V. Sankaranarayanan, R. Nirmala, A. K. Nigam and S. K. Malik Giant magnetoresistance and table-like magnetocaloric effect in double perovskite oxide PrSrMnCoO_6 . J. Applied Physics, 109, 07E319 (2011).
- Rabindra Nath Mahato, K. Sethupathi, V. Sankaranarayanan, R. Nirmala and S. K. Malik, Magnetic and magnetocaloric properties of nanocrystalline perovskite oxides $\text{Pr}_{1-x}\text{A}_x\text{Mn}_{1-y}\text{Co}_y\text{O}_6$ (A = Ca, Sr: x = 0.3, y = 0.5) manganites. Journal of Nanoscience and Nanotechnology 11, 2560-2564 (2011).
- R. Sarathi, A. V. Giridhar, and K. Sethupathi, Influence of barrier on partial discharge activity by a conducting particle in liquid nitrogen under AC voltages adopting UHF technique, Cryogenics, 51, 79-84 (2011).
- R. Sarathi, A. V. Giridhar and, K. Sethupathi Understanding the incipient discharge activity in liquid nitrogen under AC voltage by adopting UHF technique, IEEE Transactions on Dielectrics and Electrical Insulation, 18, (3), 707-713 (2011).



Selected Publications

- Hydrodynamic Fluctuations and instabilities in ordered suspensions of self-propelled particles, R. Aditi Simha, S. Ramaswamy, Phys. Rev. Lett. 89, 058101 (2002).
- Active Nematics on a substrate: giant number fluctuations and long-time tails, S. Ramaswamy, R. Aditi Simha, J. Toner, Europhys. Lett. 62, 196 (2003).
- Wave Propagation by Critical Oscillators, D. Andor, T. Duke, R. A. Simha, F. Julicher, Auditory Mechanisms-Processes and Models, World Scientific Publishing, 2006.
- Properties of a non equilibrium heat bath, Aditi Simha, R. M. L. Evans, A. Baule, Phys. Rev. E 77, 031117 (2008)
- Statistical Mechanics far from equilibrium: prediction and test for a sheared system, R. M. L. Evans, Aditi Simha, A. Baule, P.D. Olmsted, Phys. Rev. E 81, 051109 (2010).
- A dynamic renormalization group study of active nematics, Shraddha Mishra, Aditi Simha, S. Ramaswamy, J. Stat. Mech. P02003, (2010).
- A minimal polar model for self-propulsion in viscous flows, Ankita Pandey, Aditi Simha, Eur. Phys. J. E 35, 52 (2012).
- Soft Active Matter, M. C. Marchetti, J. F. Joanny, S. Ramaswamy, T. B. Liverpool, J. Prost, M. Rao, Aditi Simha, Rev. Mod. Phys. 85, 1143 (2013).



Simha Aditi
Assistant Professor

Ph.D. – Indian Institute of Science, Bangalore
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Max Planck Institute for the Physics of
Complex Systems, Dresden
Germany (2003 - 2005).

School of Physics and Astronomy, University
of Leeds, Leeds -United Kingdom
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Research Interests

- Theoretical soft matter with a focus on systems driven out of equilibrium.
- Hydrodynamics and topological defects in Liquid crystalline phases.
- Fluctuations and response in nonequilibrium steady states.



Somnath Chanda Roy
Assistant Professor

Ph.D. IIT Delhi, (2005)

Post-doctoral research:
Materials Research Institute,
Pennsylvania State University.

State College, USA (2006 - 2010)

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Awards & Recognitions

- Certificate of Merit for Poster presentation at 15th AGM of the Materials Research Society of India, held at IT, BHU Varanasi in February 2004.
- Paper on "Solar Fuels" published in 2010 in ACS Nano is among the highly cited publications with over 200 citations in 3 years.

Research Interests

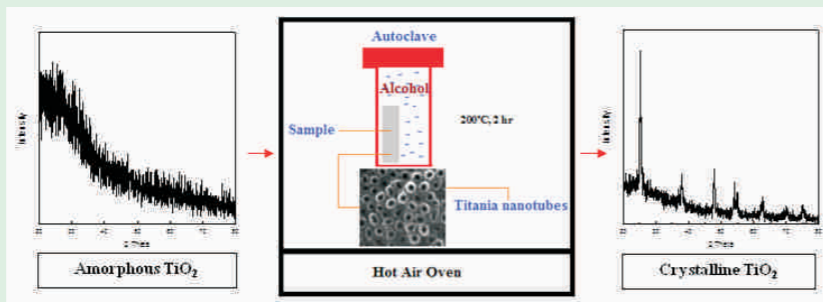
- Chemical sensors for green-house gases.
- Hydrogen generation by photo-electro-chemical water splitting and Artificial Photosynthesis using semiconductor nano-structures.
- Solid state Quantum dot sensitized and Hybrid solar cells.

Research facilities located at HSB 102A
Environmental Nanotechnology Laboratory.



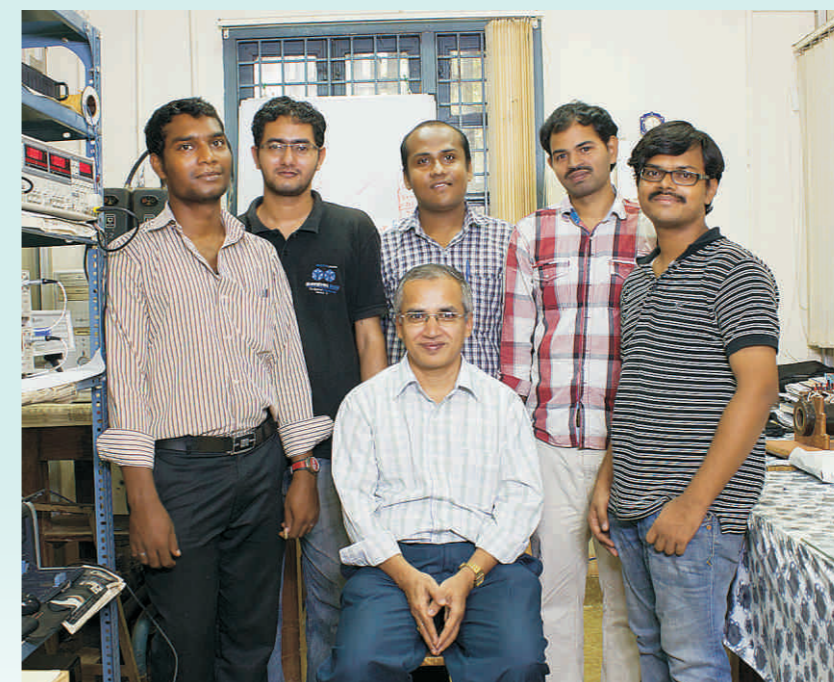
Selected Publications

- Somnath C. Roy et al. Toward solar fuels: Photocatalytic conversion of carbon dioxide to hydrocarbons; ACS Nano, 4, p 1259 (2010).
- S. Rani, Somnath C. Roy, et al. Synthesis and applications of electrochemically self-assembled titania nanotube arrays; Phys. Chem. Chem. Phys. 12, p 2780, (2010).
- Craig A. Grimes, Somnath C. Roy et al. Theory, instrumentation and applications of magnetoelastic resonance sensors: A review; Sensors 11 p 2809 (2011)



Selected Publications

- Role of particle size on the magnetoresistance of nano-crystalline graphite, G. Mandal, V. Srinivas and V. V. Rao, CARBON 57 (2013) 139.
- Observation of magnetic cluster phase above Curie temperature in Fe_2CrAl Heusler alloy, Ritwik Saha, V. Srinivas and A. Venimadhav, J. Magn. Mag. Mater 324 (2012) 1296-1304.
- Role of polymer matrix in large enhancement of dielectric constant in polymer-metal composites M. Panda, V. Srinivas and A. K. Thakur, Appl. Phys. Lett. 99 (2011) 042905.
- Effect of polymer coating on magnetic properties in oxygen stabilized Nickel nanoparticles, V. Singh, V. Srinivas, M. Ranot, S. Angappane, and Je-Geun Park, Phys. Rev. B 82 (2010) 054417.
- Evolution of ferromagneticlike order in $\text{Fe}_2\text{V}_{1-x}\text{Cr}_x\text{Al}$ Heusler alloys, R. Saha, V. Srinivas, and T. V. Chandrasekhar Rao, Phys. Rev. B 79 (2009) 174423.
- Evidence for Cluster glass behavior in Fe_2VAl Heusler alloys, M. Vasundhara and V. Srinivas and V. V. Rao, Phys. Rev. B 78 (2008) 064401.
- Low-temperature magnetization dynamics of oxygen-stabilized tetragonal Ni nanoparticles Aparna Roy, V. Srinivas, J. A. De. Toro and U. Mizutani, Phys. Rev. B 74 (2006) 104402.
- Critical exponents at the metal-insulator transition in AlPdRe quasicrystals, O. Rapp, V. Srinivas and S.J. Poon, Phys. Rev. B 71 (2005) 012202.
- Effect of interstitial oxygen on the crystal structure and magnetic properties of Ni nanoparticles, A. Roy, V. Srinivas, S. Ram J. A. De Toro and J. M. Riveiro, J. Appl. Phys. 96 (2004) 6782.
- The direct observation of the effect of quenched disorder on the critical behavior of a partially frustrated system, A. Perumal, V. Srinivas, V. V. Rao and R. A. Dunlap, Phys. Rev. Lett. 91 (2003) 137202.



Srinivas V.
Professor

Ph D (I.I.T Bombay 1988)

Post Doc, Dal. Univ. Canada, 1987.

Visiting fellow TIFR 1990.

Lecturer IITKGP 1992.

Asst. Prof. IITKGP 1995.

Asso. Prof. IITKGP 1999.

Visting Scientist, KTH, Sweden. 1999.

Visiting Scientist, South Korea, 2002.

JSPS fellow (short term), Nagoya Univ., 2003.

Professor IITKGP 2004.

Professor IITM 2010.

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Research Interests

- Magnetic & Electrical transport properties.
- Soft magnetic materials.
- Artificially structured materials.
- Thermoelectrics.



Differential-Scanning calorimeter (DSC)



Nanoparticles assisted PLD facility



RF sputtering facility



Sriramkumar L .
Associate Professor

Ph.D.: Inter-University Centre for Astronomy and Astrophysics, Pune, India, 1992 - 97.

Post-doctoral Fellowships:

Racah Institute of Physics, Hebrew University, Jerusalem, Israel, 1997 - 99.

Department of Physics, University of Alberta, Edmonton, Canada, 1999 - 2001.

Harish-Chandra Research Institute, Allahabad, India, 2001 - 03.

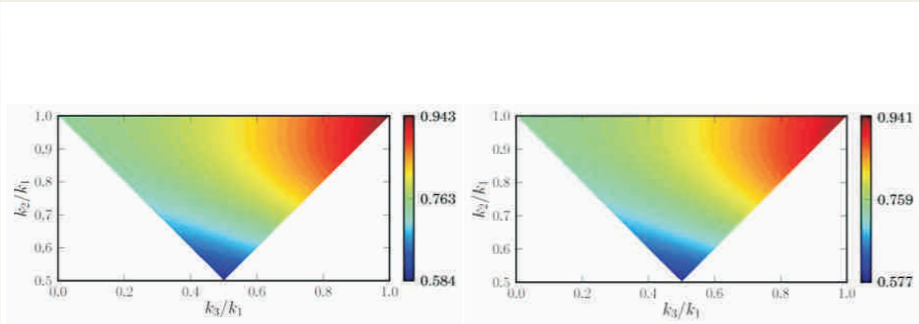
Faculty: Harish-Chandra Research Institute, Allahabad, India, 2003 - 11.

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Research Interests

- Inflationary cosmology and the cosmic microwave background.
- Aspects of black hole physics.
- Quantum field theory in classical backgrounds.



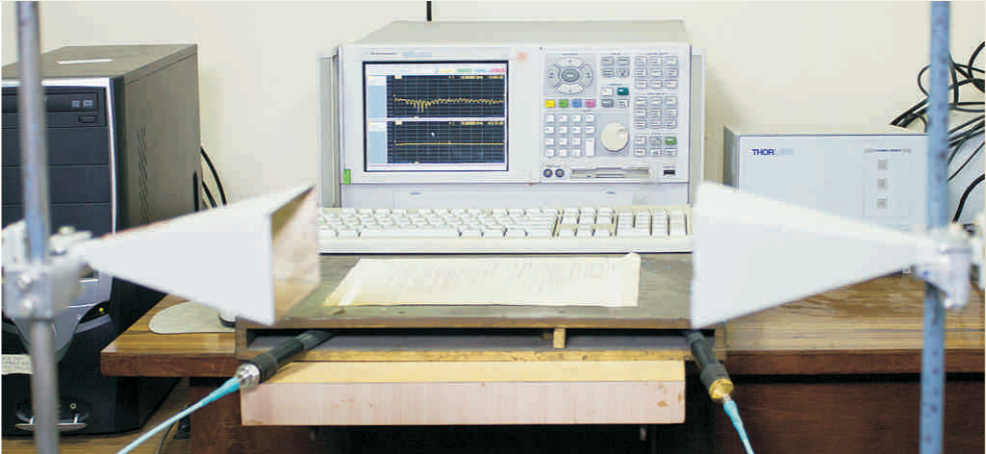
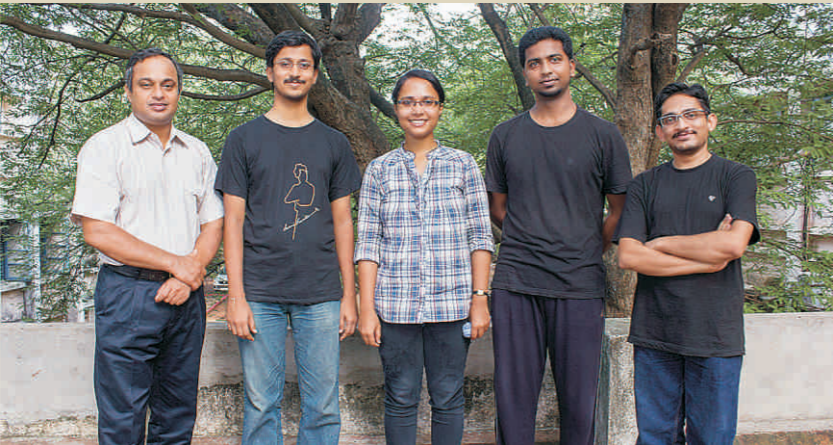
Non-Gaussianities in inflationary models

Selected Publications

- D. K. Hazra, L. Sriramkumar and J. Martin, BINGO: A code for the efficient computation of the scalar bi-spectrum, JCAP 1305, 026 (2013).
- D. K. Hazra, J. Martin and L. Sriramkumar, The scalar bi-spectrum during preheating in single field inflationary models, Physical Review D 86, 063523 (2012).
- J. Martin and L. Sriramkumar, The scalar bi-spectrum in the Starobinsky model: The equilateral case, JCAP 1201, 008 (2012).
- R. K. Jain, P. Chingangbam, J.-O. Gong, L. Sriramkumar, T. Souradeep, Punctuated inflation and the low CMB multipoles, JCAP 0901, 009 (2009).
- L. Sriramkumar, An introduction to inflation and cosmological perturbation theory, Current Science 97, 868 (2009).
- L. Sriramkumar and T. Padmanabhan, Initial state of matter fields and trans-Planckian physics: Can CMB observations disentangle the two?, Physical Review D 71, 103512 (2005).
- L. Sriramkumar and T. Padmanabhan, Probes of the vacuum structure of quantum fields in classical backgrounds, International Journal of Modern Physics D 11, 1 (2002).
- L. Sriramkumar and T. Padmanabhan, Finite-time response of inertial and uniformly accelerated Unruh-De Witt detectors, Classical Quantum Gravity 13, 2061 (1996).

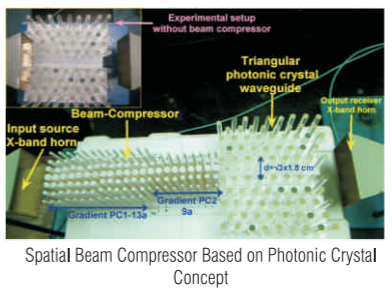
Research Highlights:

- Recently, we have developed numerical codes for the evaluation of non-Gaussianities in inflationary models, which we have made publicly available. These are, possibly, the first publicly available packages in cosmology from a research group in India. The two figures above illustrate how the numerical results (on the right) compare with the analytical ones (on the left) in the case of one of the two new non-Gaussianity parameters that we have introduced to characterize the so-called scalar-tensor three-point functions. The striking similarity between the two figures indicates the accuracy of the adopted numerical procedure.



Selected Publications

- A new approach of measuring the Q factor of a cavity using cavity perturbation technique. - V. Subramanian and J. Sobhanadri - Rev. Sci. Instrum., 65, 453-455, 1994.
- Low frequency dielectric study of Barium and Strontium substituted $Pb(Zn_{1/3}Nb_{2/3})O_3$ ceramics - R. R. Vedantam, V. Subramanian, V. Sivasubramanian and V. R. K. Murthy - Jap. J. Appl. Phys., 42, 7392-7396, 2003.
- Electrospinning of continuous aligned polymer fibers - Bibekananda Sundaray, V. Subramanian, T. S. Natarajan, Rong-Zheng Xiang, Chia-Cheng Chang and Wun-Shain Fann - Appl. Phys. Letters, 84, 1222-1224, 2004.
- Microstructure and dielectric properties of $(1-x)Pb(Yb_{1/2}Ta_{1/2})O_3-xPb(Fe_{1/2}Ta_{1/2})O_3$, $0 < x < 0.2$ solid solution ceramics - Dibyaranjan Rout, V. Subramanian, K. Hariharan and V. Sivasubramanian - Materials Science and Engineering B, 123, 107 - 114, 2005.
- Numerical study of the effect of permeability on square and triangular microwave band gap structures. - Nagesh, E. D. V., Subramanian, V., Sivasubramanian V. and Murthy V. R. K. - Physica B, 382, 45-50, 2006.
- Microwave Hall mobility studies on polymer - single walled carbon nanotube composite fibers - D. V. B. Murthy, V. Subramanian, Bibekananda Sundaray and T. S. Natarajan - Applied Physics Letters, 92, 222111, 2008.
- Field confinement and quality factor of the multilayer cavity resonators - N. Yogesh and V. Subramanian - J. Appl. Phys., 110, 114519, 2011.
- Evolution of polar order in $(1-x)Pb(In_{1/2}Nb_{1/2})O_3-xPbTiO_3$ ($0 \leq x \leq 1$) system as investigated by dielectric and Raman spectroscopy - G. Ramesh, V. Subramanian and V. Sivasubramanian - J. Appl. Phys., 113, 074101, 2013.



Subramanian V.
Professor

Ph.D. - Indian Institute of Technology Madras.

Professor since October 2012.

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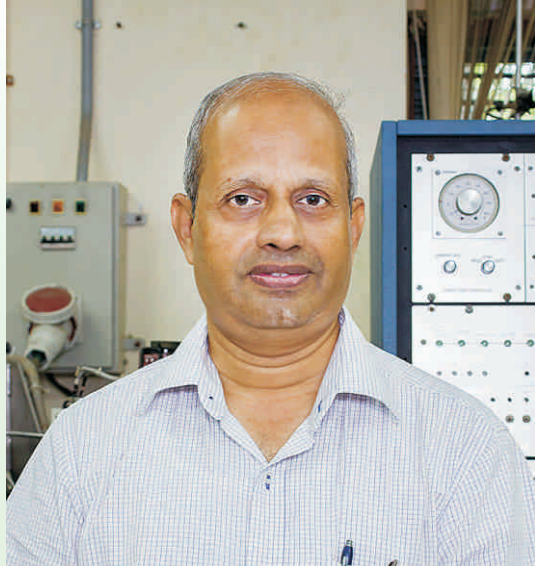
Email: manianvs@physics.iitm.ac.in

Profile

- Teaching under-graduate and post-graduate courses for the past 14 years.
- Guided 9 Ph.D. students, Guiding 7 Ph.D. students.
- Completed around 12 sponsored research projects.
- Conducted Short Term Training Program on Microwave under QIP in 2005.
- Conducted Technology Appreciation Program on Microwave Applications.
- Associate Professor at IIT Madras during 2006-2012.
- Assistant Professor at IIT Madras during 1998-2006.
- Lecturer at BITS, Pilani during 1996-1998.

Research Interests

- Multiferroic materials.
- Relaxor ferroelectrics.
- Microwave band gap structures.
- Metamaterials.
- Microwave imaging.
- EMI shielding.
- Non-destructive evaluation at microwave frequencies.



Subrahmanyam A.

Professor

M.Sc Physics (Andhra University, Visakhapatnam)

Ph D Experimental Solid State Physics, IIT Kharagpur.

Post Doctoral Fellowship: International Centre for Theoretical Physics, Trieste, Italy.

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Awards & Recognitions

- BOYSCAST Fellowship, DST Govt of India (1979).
- Alexander von Humboldt Fellowship, AvH Foundation, Germany (1980).
- Saint Gobain Chair Professor, Ecole Polytechnique, Palaiseau, France (2008).
- DAAD Professor (W3), Technical University Dresden, Germany (2009).
- Member, Plasma Group of Joint Plasma Committee, European Commission.
- International Advisory Committee Member: Society for Vacuum Coaters (USA), Plasma and Surface Engineering, (Germany), Photocatalysis and Advanced oxidation Technology (USA).
- Editor, Solar Energy Materials and Solar Cells (Journal from Elsevier).

Research Interests

- Functional metal Oxide Thin Films.
- Photovoltaics, Energy Efficient Windows (Electro-chromics).
- Bio-medical Engineering.
- Surface Engineering with Kelvin Probe.



Selected Publications

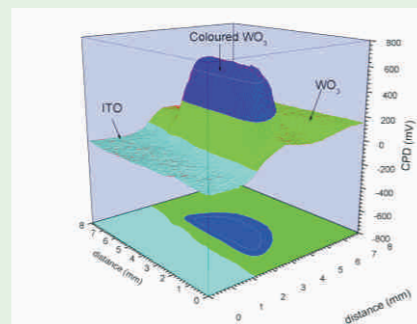
➤ Gate Recess Structure Engineering using Silicon Nitride Assisted Process for Increased Breakdown Voltage in Pseudomorphic HEMTs K. MahadevaBhat, A. Subrahmanyam and P.D. Vyas, Semiconductor Science and Technology (2013) Vol 27 pp 115013.

➤ Composition Dependent Structural, Optical and Electrical Properties of $\text{In}_x\text{Ga}_{1-x}\text{N}$ ($0.5 \leq x \leq 0.93$) Thin Films Grown by Modified Activated Reactive Evaporation S. R. Meher, A. Subrahmanyam and Mahaveer K Jain Journal of Materials Science Research (2013) vol 48 pp 1196.

➤ Surface Modification of Sol-gel TiO_2 Surface with Sputtered Metallic Silver for Sunlight Photo-Catalytic Activity: Initial Studies A. Subrahmanyam, K. P. Biju, P. Rajesh, K. Jagadeesh Kumar, M. Raveendra Kiran Solar Energy Materials and Solar Cells (2012) vol 101 pp 241.

➤ Grain Boundary Carrier Scattering in ZnO Thin Films: A Study by Temperature-Dependent Charge Carrier Transport Measurements R. V. Muniswami Naidu, Aryasomayajula Subrahmanyam, Arnaud Verger, M. K. Jain, S. V. N. Bhaskara Rao, S. N. Jha and D. M. Phase Journal of Electronic Materials (2012) vol 41 pp 660.

➤ Carrier Transport in $\text{In}_x\text{Ga}_{1-x}\text{N}$ Thin Films Grown by Modified- Activated Reactive Evaporation S. R. Meher, R. V. Muniswami Naidu, Kuyyadi P Biju, A. Subrahmanyam, and Mahaveer K. Jain Applied Phys Letter (2011) vol 99 pp 110.



The CPD contour and surface plots of WO_3/ITO thin film structure. Blue color region of the color map surface shows electrochromically colored WO_3 . Reference electrode is stainless steel.



Selected Publications

➤ Tunable Bandgap in BiFeO_3 Nanoparticles: The Role of Microstrain and Oxygen Defects, Pavana S. V. Mocherla, C. Karthik, R. Ubic, M. S. R. Rao, C. Sudakar, Appl. Phys. Lett. 2013, 103, 022910.

➤ A. V. Radhamani, C. Karthik, R. Ubic, M.S.R. Rao, C. Sudakar, Suppression of antisite defects in fluorine-doped LiFePO_4 , Scripta Materialia, 2013, 69 (1), 96.

➤ Surface ferromagnetism and exchange bias in vacuum annealed $\text{Co}_{3-x}\text{Zn}_x\text{O}_4$ ($y=0, 0.25$, and 1) Thin Films, C. Sudakar, P. Kharel, G. Lawes, R. Suryanarayanan, V. M. Naik, R. Naik, Appl. Phys. Lett., 2008, 92, 062501.

➤ Ferromagnetism induced by planar nanoscale CuO inclusions in Cu-doped ZnO thin films, C. Sudakar, J. S. Thakur, G. Lawes, R. Naik, V. M. Naik, Phys. Rev. B, 2007, 75, 054423.

➤ Ferromagnetism and spin-polarized charge carriers in In_2O_3 thin films, R. P. Panguluri, P. Kharel, C. Sudakar, R. Naik, R. Suryanarayanan, V. M. Naik, A. G. Petukhov, B. Nadgorny, and G. Lawes, Phys. Rev. B 2009, 79, 165208.

➤ Band gap engineering by tuning particle size and crystallinity of $\text{SnO}_2\text{-Fe}_2\text{O}_3$ nanocrystalline composite thin films, M.B. Sahana, C. Sudakar, G. Setzler, A. Dixit, J. S. Thakur, G. Lawes, R. Naik, V. M. Naik, and P. P. Vaishnava, Appl. Phys. Lett. 2008, 93, 231909.

➤ Experimental and theoretical investigations of dopant, defect, and morphology control on the magnetic and optical properties of transition metal doped ZnO nanoparticles, O. D. Jayakumar, C. Persson, A. K. Tyagi, C. Sudakar, Springer Series in Materials Science, 2014, 180, 341.

➤ The role of defects in functional oxide nanostructures, C. Sudakar, S. Singh, M. S. R. Rao, G. Lawes, Springer Series in Materials Science, 2012, 149 (1), 37.



MFML group: (from left) Muthu, Sudakar, Tapan, Pavana, Radhamani, Das, Viji, (not in the picture) Fabitha, Vikas and Seena

Sudakar Chandran

Assistant Professor

PhD (IISc Bangalore, 2004)

Postdoc (Wayne State Univ., MI, & Royal Inst. Tech., Sweden)

At IITM (21-06 - 2010)

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Awards & Recognitions

- Awarded JSPS Fellowship 2005.
- Carl Tryggers postdoctoral fellowship, Sweden 2004.
- Prof. K.P. Abraham Medal for best Ph.D. thesis in the area of Materials Chemistry (Indian Institute of Science, Bangalore).
- Indian Institute of Science Research Fellowship (1998-2004).

Research Interests

- Synthesis/fabrication for nanostructures, complex heterostructures, composites for advanced applications.
- Controlling the microstructure and defect structure of cathode and anode materials for Li-ion battery applications.
- Nanomaterials for dye and quantum dot sensitized solar cells.
- Role of oxygen/nitrogen defects and surface/interface effects on the physical properties of multiferroic, semiconducting oxide and nitride materials.
- Functionalizing magnetic nanoparticles for bio-medical applications.



Sunethra Raman

Assistant Professor

PhD: The Ohio State University, Columbus Ohio, U.S.A. (2007)

Post-doctoral Positions:

* ICTP, Trieste, Italy (2010 - 2011)

* IISc, Bangalore, India (2007 - 2010)

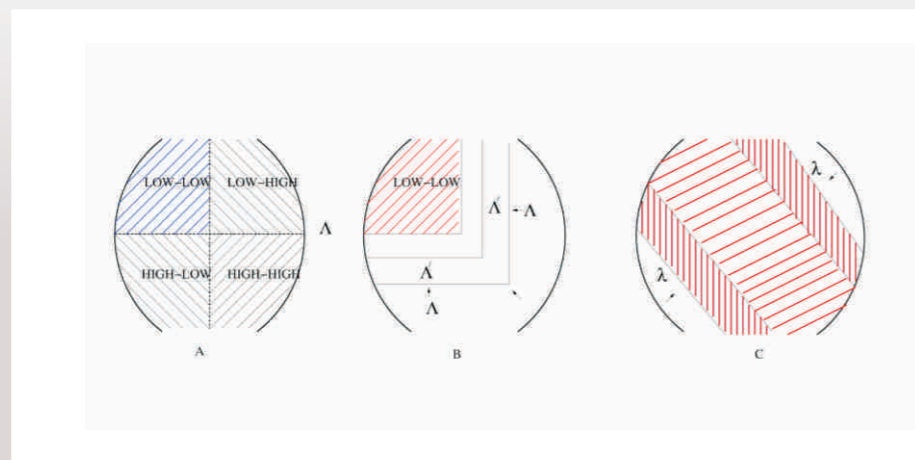
* The Ohio State University, Columbus, Ohio, U.S.A (2007)

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Research Interests

- EFT approach to Nuclear Structure.
- Renormalization Group Approaches.
- Cold Atomic Systems.
- Computational Many-body Physics.



Selected Publications

➤ BEC-BCS Crossover in Neutron Matter with Renormalization Group based Effective Interactions S. Ramanan (IITM), M. Urban, e-Print: arXiv:1308.0939 [nucl-th].

➤ Local Projections of Low-Momentum Potentials K. A. Wendt, R. J. Furnstahl, S. Ramanan (IITM) Phys. Rev. C86 (2012) 014003, e-Print: arXiv:1203.5993 [nucl-th]

➤ Theory of Unitarity Bounds and Low-Energy Form Factors, Gauhar Abbas, B. Ananthanarayan, I. Caprini, S. Imsong and S. Ramanan, arXiv:1004.4257 [hep-ph].

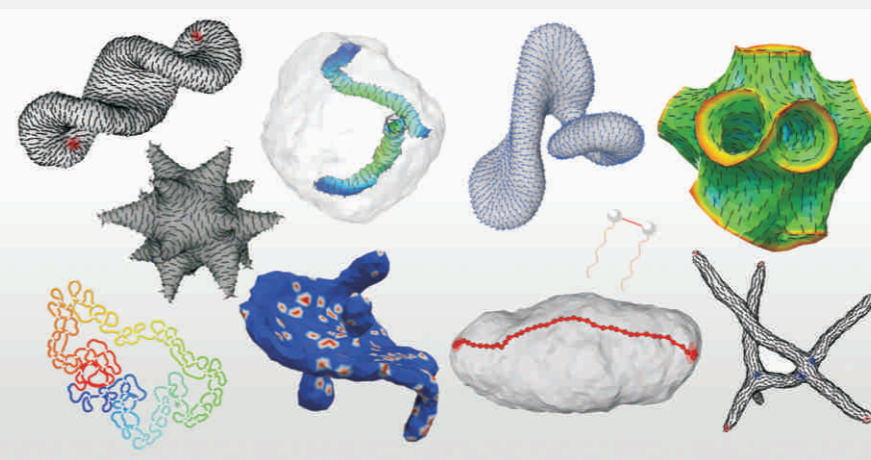
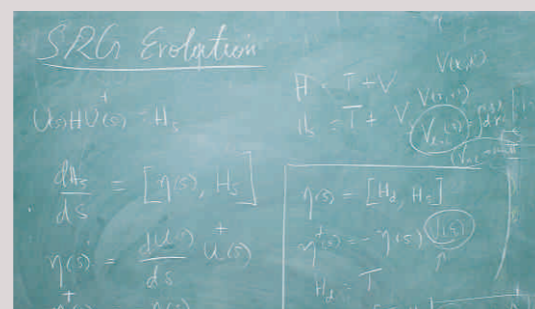
➤ Supersolid and solitonic phases in 1-D Bose-Hubbard model, Tapan Mishra, R. V. Pai, S. Ramanan, M. Sethi, and B. P. Das, arXiv: 0907.1258 [cond-mat.quantgas], Phys.Rev.A80, 043614 (2009).

➤ Signatures of the superfluid to Mott insulator transition in cold bosonic atoms in a one dimensional optical lattice, S. Ramanan, T. Mishra, M. Sethi, R. V. Pai and B. P. Das, Phys. Rev. A 79, 013625 (2009), arXiv:0811.1280 [condmat.other].

➤ Weinberg eigenvalues and pairing with low-momentum potentials. S. Ramanan, S. K. Bogner, R. J. Furnstahl, Nucl. Phys. A 797 (2007), arXiv:0709.0534 [nucl-th].

➤ Low-momentum potentials with smooth cut-offs S. K. Bogner, R. J. Furnstahl, S. Ramanan, A. Schwenk, Nucl. Phys. A. 784 (2007), nucl-th/0609003.

➤ Convergence of the Born series with low-momentum interaction. S. K. Bogner, R. J. Furnstahl, S. Ramanan, A. Schwenk Nucl. Phys. A 773, (2006), nucl-th/0602060.



Selected Publications

➤ Hydrodynamic instabilities provide a generic route to spontaneous biomimetic oscillations in chemomechanically active filaments Abhrajit Laskar, Rajeev Singh, Somdeb Ghose, Gayathri Jayaraman, P. B. Sunil Kumar and R. Adhikari, Scientific Reports 3, Article number: 1964 (2013).

➤ Membrane-Mediated Aggregation of Curvature-Inducing Nematogens and Membrane Tubulation N Ramakrishnan, P. B. Sunil Kumar, J. H. Ipsen Biophysical journal 104 (5), 1018-1028 (2013).

➤ Autonomous Motility of Active Filaments due to Spontaneous Flow-Symmetry Breaking Gayathri Jayaraman, Sanoop Ramachandran, Somdeb Ghose, Abhrajit Laskar, M. Saad Bhamla, P. B. Sunil Kumar, and R. Adhikari, PRL 109, 158302 (2012).

➤ Role of disclinations in determining the morphology of deformable fluid interfaces N. Ramakrishnan, John H. Ipsen and P. B. Sunil Kumar, Soft Matter 8, 3058 (2012).

➤ Effects of counterion size on the attraction between similarly charged surfaces J Zelko, A Iglič, V Kralj-Iglič, P. B. Sunil Kumar, The Journal of chemical physics 133, 204901 (2010).

➤ Aster formation and rupture transition in semi-flexible fiber networks with mobile cross-linkers A. Astrom, P. B. Sunil Kumar and Mikko Karttunen, Soft Matter 5, 2869 (2009).

➤ Distribution Functions, Loop Formation Probabilities and Force-Extension Relations in a Model for Short Double-Stranded DNA Molecules P. Ranjith, P. B. Sunil Kumar, Gautam I. Menon, Phys. Rev. Lett., 94, 138102 (2005).

➤ Dynamics of Domain Growth in Self-Assembled Fluid Vesicles Mohamed Laradji and P. B. Sunil Kumar, Phys. Rev. Lett., 93, 198105 (2004).



Sunil Kumar P. B.

Professor

Ph.D. 1995, Raman Research Institute (Bangalore University),

Post doc: Institute of Mathematical Sciences, Chennai (2005 - 2007)

Max Planck Institute of Colloids and Interfaces, Germany (2007 - 2009)

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Awards & Recognitions

- Associate Member: Memphys: Center for biomembrane physics. University of Southern Denmark.
- 2006-Visiting Professor Fellowship: Finnish Academy of Science, Finland. (2005-2006).

Research Interests

- Soft condensed matter physics: Theory and simulations of polyelectrolytes, rheology of polymer solutions and melts, active polymers and membranes.
- Biological physics: Computational modeling of membranes, cytoskeleton and their composites.



Tripathy Prasanta
Associate Professor

Ph.D. (IOP, Utkal University, 2001),
Arnold Sommerfeld Center for Theoretical
Physics, LMU, Munich
(2004 - 2005).
Dept of Theoretical Physics, TIFR, Mumbai
(2001 - 2004)
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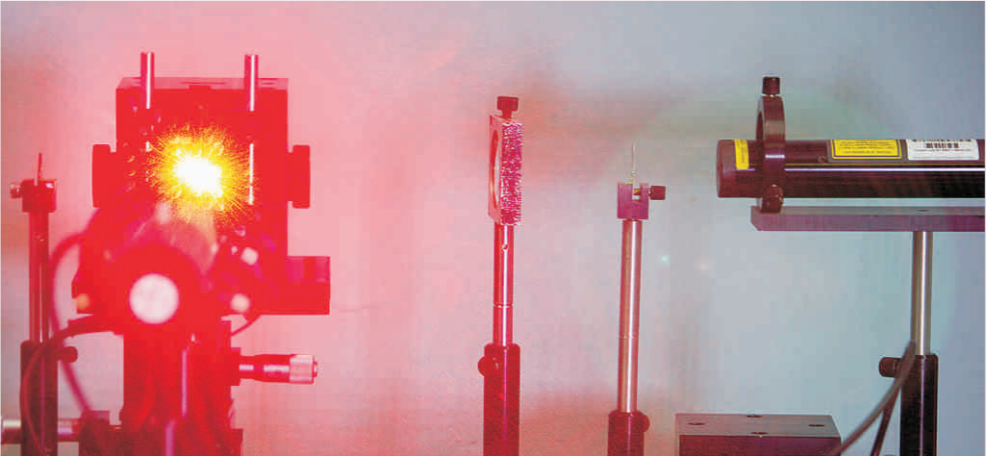
Research Interests

- Attractor Mechanism.
- Black holes.
- Gauged Supergravity.
- Flux Compactification.

Geometry	λ	u_0	$u_i, i \neq 0$	Stability
Lifshitz	-34	3	1	no
Bianchi II	$-\frac{22}{3}$	$\sqrt{2}$	$u_1 = u_2 = \frac{1}{2\sqrt{2}}$	no
Bianchi VI $h < 0$	$-1 + \frac{14h}{3} - h^2$	$\frac{1}{\sqrt{2}}(1-h)$	$u_1 = -\frac{1}{\sqrt{2}}h, u_2 = \frac{1}{\sqrt{2}}$	no
$Li f_{u_0}(2) \times M_I$	$-\frac{5u_0^2}{3}$	any $u_0 > 0$	0	yes
$AdS_2 \times M_I$	$-\frac{2}{3}$	1	0	yes
$Li f_{u_0}(2) \times M_{II}$	$-\frac{u_0}{6}$	$\sqrt{\frac{11}{2}}$	0	yes
$Li f_{u_0}(2) \times M^*$	$\lambda < 0$	any $u_0 > 0$	0	yes

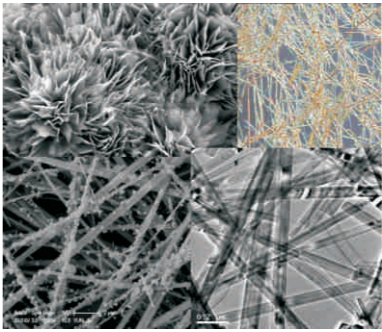
Selected Publications

- Generalized Attractors in Five-Dimensional Gauged Supergravity By KarthikInbasekar, Prasanta K. Tripathy. JHEP 1209 (2012) 003.
- Non-Supersymmetric Stringy Attractors By Pramod Dominic, Prasanta K. Tripathy. JHEP 1201 (2012) 030.
- On the Stability of Non-Supersymmetric Quantum Attractors in String Theory By Pramod Dominic, Prasanta K. Tripathy. JHEP 1106 (2011) 112.
- On The Stability of Non-Supersymmetric Attractors in String Theory By Suresh Nampuri, Prasanta K. Tripathy, Sandip P. Trivedi. JHEP 0708 (2007) 054.
- Non-supersymmetric attractors in string theory By Prasanta K. Tripathy, Sandip P. Trivedi. JHEP 0603 (2006) 022.
- Fermion zero modes in the presence of fluxes and a non-perturbativesuperpotential By Dieter Lust, Susanne Reffert, WaldemarSchulgin, Prasanta K. Tripathy. JHEP 0608 (2006) 071.
- On the taxonomy of flux vacua By Alexander Giryavets, ShamitKachru, Prasanta K. Tripathy. JHEP 0408 (2004) 002.
- Compactification with flux on K3 and tori By Prasanta K. Tripathy, Sandip P. Trivedi. JHEP 0303 (2003) 028.
- New supersymmetric string compactifications By ShamitKachru, Michael B. Schulz, Prasanta K. Tripathy, Sandip P. Trivedi. JHEP 0303 (2003) 061.



Selected Publications

- Spectral and temporal evolutions of ultrashort pulses diffracted through a slit near phase singularities Suhas Poyyil Veetil', Nirmal K. Viswanathan, C. Vijayan, and Frank Wyrowski Appl. Phys. Lett. 89, 041119 (2006).
- Nonlinear optical response of silica-encapsulated chloroaluminiumphthalo-cyanine core-shell particles K. Sathiyamoorthy, C. Vijayan and Shikha Varma Langmuir, 24, 7485 (2008).
- Effect of ellipticity on Hanle electromagnetically induced absorption and transparency resonances with longitudinal and transverse magnetic fields Nibedita Ram, M Pattabiraman and C. Vijayan Phys. Rev. A 82, 033417 (2010).
- Efficient ultrafast optical limiting using single walled carbon nanotubes functionalized noncovalently with free base and metalloporphyrins Jyotsana Gupta, C. Vijayan, Sandeep Kumar Maurya, and D. Goswami. J. Appl. Phys.109, 113101 (2011).
- Single- and few-layer graphene growth on stainless steel substrates by direct thermal chemical vapor deposition R. John, A. Ashokreddy, C. Vijayan, T. Pradeep, Nanotechnology, 22, 165701, (2011).
- Room Temperature Ferromagnetism and Optical Limiting in V2O5 Nanoflowers Synthesized by a Novel Method M. R. Parida, C. Vijayan, C. S. Rout, C. S. S. Sandeep, R. Philip, P. C. Deshmukh The Journal of Physical Chemistry C 115, 112 (2012).
- Enhanced optical nonlinearity in β -AgVO₃ nanobelts on decoration with Ag nanoparticles M. R. Parida, C. Vijayan, C. S. Rout, S. Sandeep, R. Philip Applied Physics Letters100, 121119 (2012).
- Raman mode random lasing in ZnS- β -carotene random gain media Jayachandra Bingi, Anita R. Warriar, and C. Vijayan Appl. Phys. Lett. 102, 221105 (2013).
- Anita Warriar and C. Vijayan Resonance, (Indian Academy of science) (to appear in Oct 2013).
- Efficient Photoluminescence of Mn²⁺-Doped ZnS Quantum Dots Excited by Two-Photon Absorption in Near-Infrared Window II Radhu Subha, Venkatram Nalla, Jung Ho Yu, Samuel Woojoo Jun, Kwangsoo Shin, Taeghwan Hyeon, C. Vijayan, and Wei Ji (to appear in J. Phys. Chem C, in 2013).



Nanoflowers and decorated nanorods of certain oxide semiconductors



Vijayan C.
Professor

Ph. D. from IIT, Madras.
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Recognitions

- Several Invited talks in national and international conferences, other IITs and NITs, workshops for refresher courses for college teachers.
- Delivered Inaugural lecture of the Golden Jubilee Series Lectures of the NCERT in April 2011.
- Member, Board of studies for University of Kerala and Cochin University of Science and Technology and Ph.D examiner for several institutes such as IITs, NITs and Universities.
- A few papers received most downloaded status, best paper awards and a mention in Nature, India.

Research Interests

Light-matter interaction at nanoscale, Nanophotonics: processes and materials, bandgap engineering in semiconductors, photonic bandgap materials, optically smart materials.

Department of Physics
2013 - B.Tech - First Year



Department of Physics
2013 - B.Tech - Third Year



Department of Physics
2013 - B.Tech - Second Year



Department of Physics
2013 - B.Tech - Final Year



Department of Physics
2013 - M.Sc. - First Year



Department of Physics
2013 - M.Tech. - First Year



Department of Physics
2013 - M.Sc. - Second Year



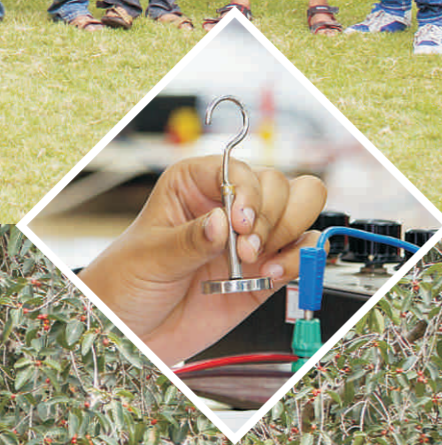
Department of Physics
2013 - M.Tech. - Second Year



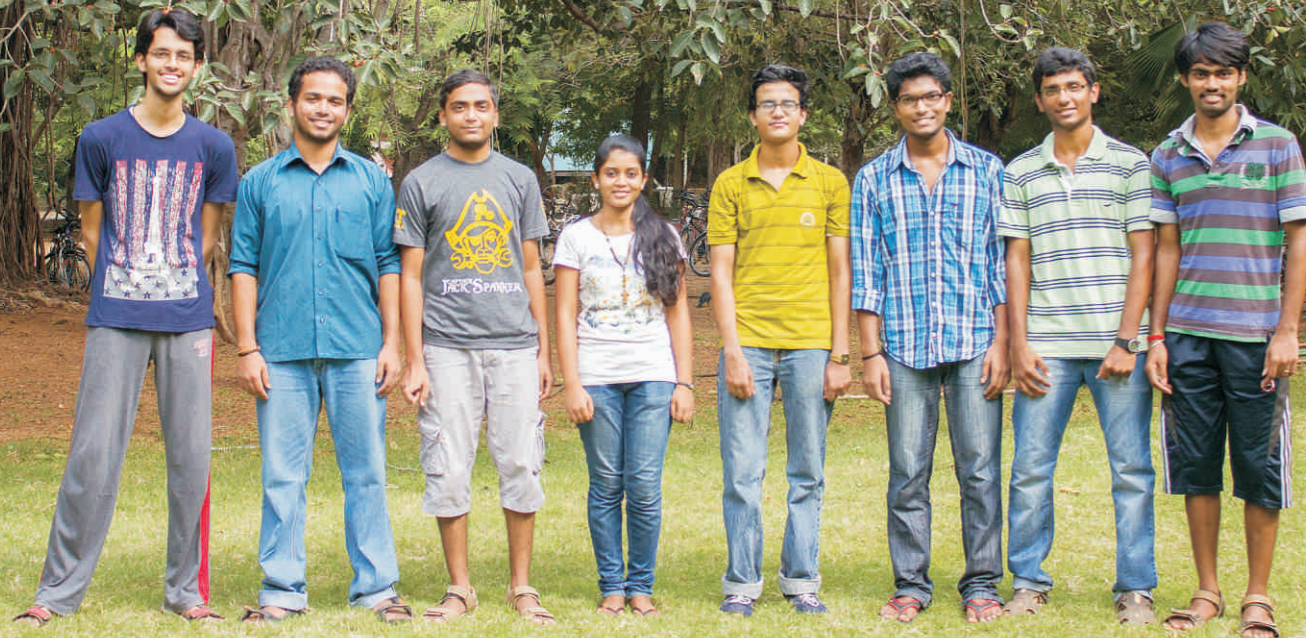
Department of Physics
2013 - Dual Degree - First Year



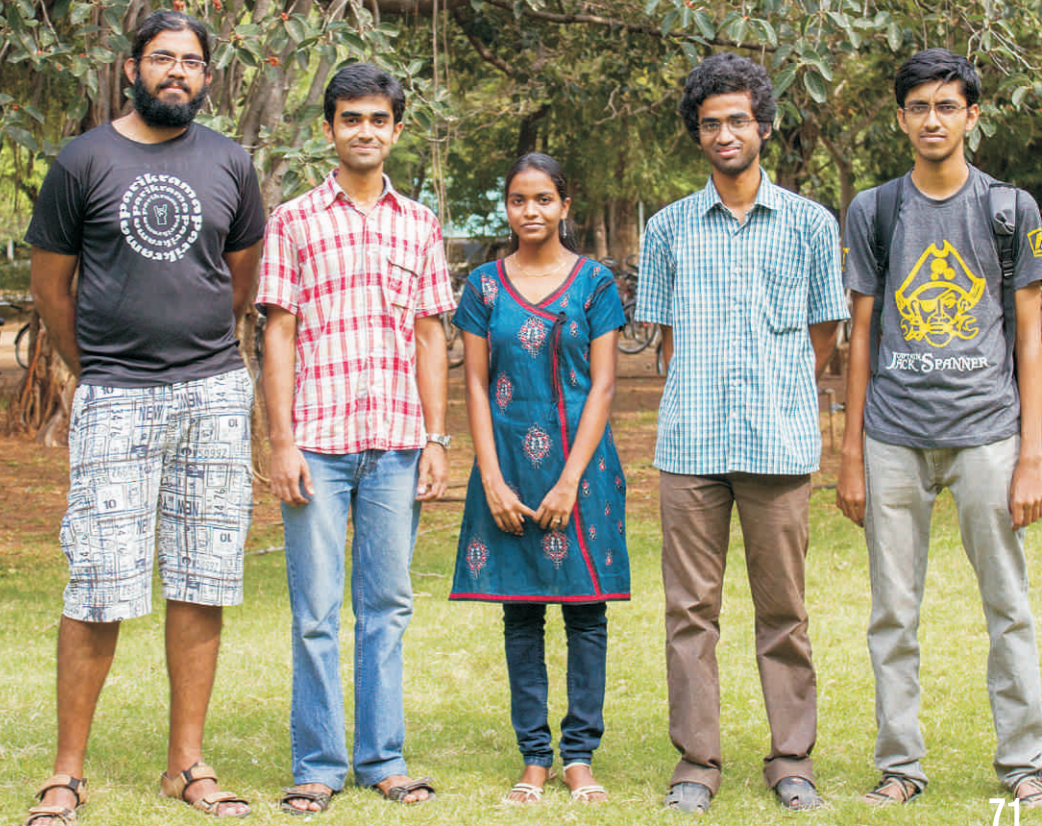
Department of Physics
2013 - Dual Degree - Third Year



Department of Physics
2013 - Dual Degree - Second Year

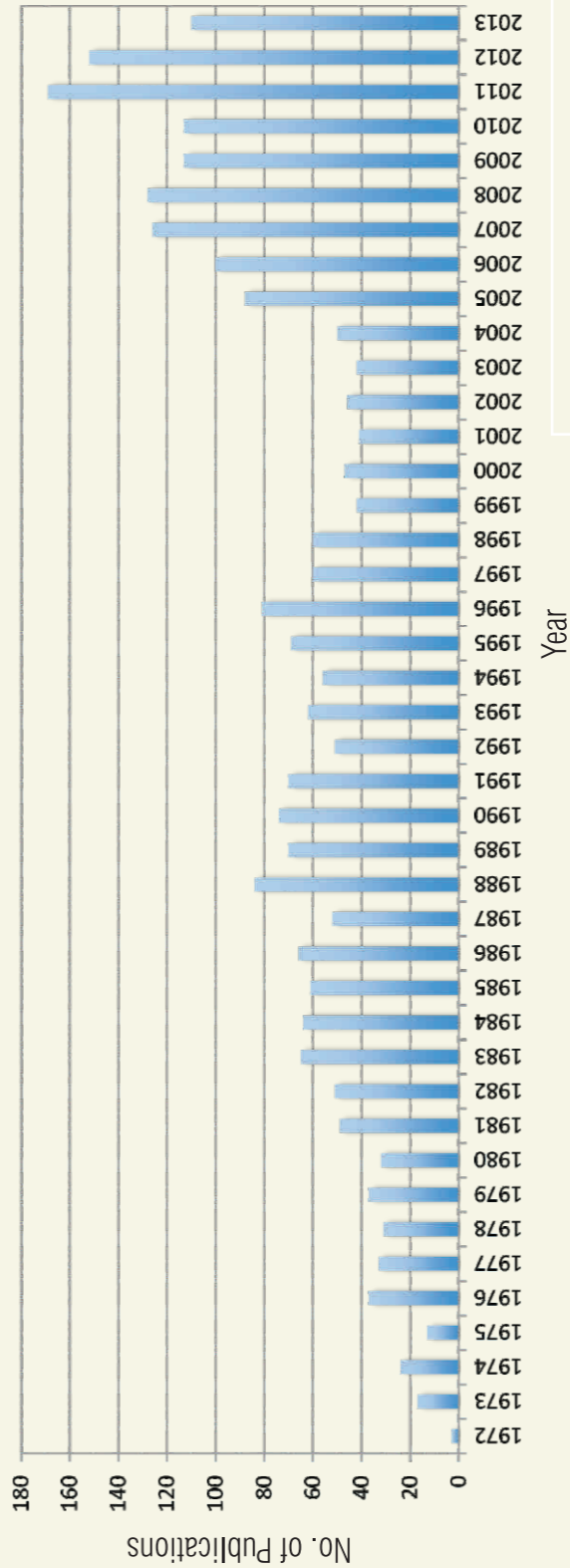


Department of Physics
2013 - Dual Degree - Fourth Year

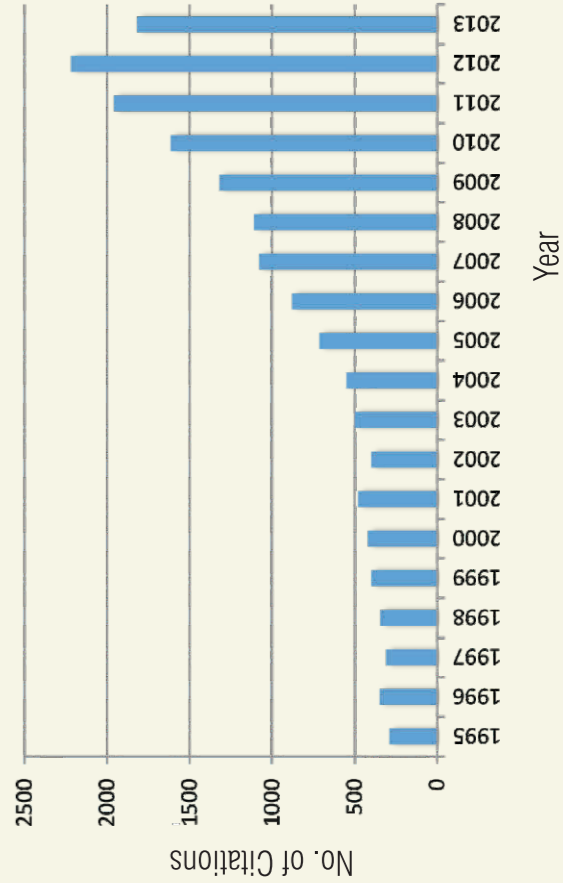




Department of Physics Academic Achievements



No. of Ph.D. Students	
Completed	Ongoing
401	152
Time line*	1972 - 2013
Publications	2739
Citations	20081
h-index	45



* citation shown from 1995 onwards
**Source: ISI Web of Science



A Physics class in progress



Students in the First year B.Tech. laboratory