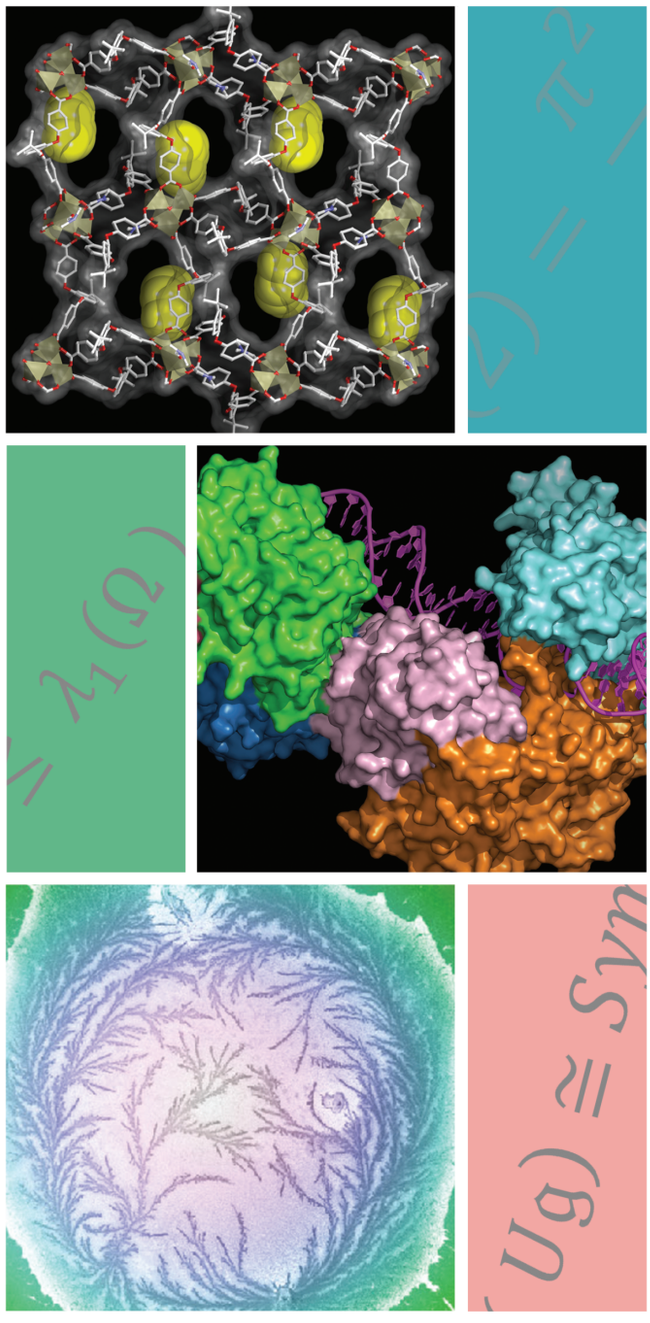


IISER PUNE

वार्षिक प्रतिवेदन

Annual Report

2013-14

भविष्य निरूपण एवं लक्ष्य

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

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

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

Vision & Mission

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

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

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

Main Building, IISER Pune

IISER PUNE

वार्षिक प्रतिवेदन

Annual Report

2013-14

Correct Citation

IISER Pune Annual Report 2013-14
Pune, India

Published by

Dr. K.N. Ganesh
Director
Indian Institute of Science Education and Research (IISER) Pune
Dr. Homi J. Bhabha Road
Pune 411008, India
Telephone: +91 20 25908101
Fax: +91 20 25908186
Web: www.iiserpune.ac.in

Compiled and Edited by

Dr. Shanti Kalipatnapu
Dr. V. S. Rao

© No part of this publication be reproduced
without permission from the Director, IISER Pune
at the above address

Printed by

Repro Vision Printers Pvt. Ltd., Pune
Email: reprovision@gmail.com

Board of Governors

CHAIRMAN

1) **Prof. T.V. Ramakrishnan**
Distinguished Associate
Centre for Condensed Matter Theory
Department of Physics, Indian Institute of Science
Bangalore 560012

MEMBERS

2) **Shri Ashok Thakur**
Secretary
Ministry of Human Resource Development, Govt. of India
127-C Wing, Shastri Bhawan
New Delhi 110115

3) **Prof. K.N. Ganesh**
Director
Indian Institute of Science Education and Research
Pune 411008

4) **Prof. P. Balaram**
Director
Indian Institute of Science
Bangalore 560012

5) **Prof. Indranil Manna**
Director
Indian Institute of Technology
Kanpur 208016

6) **Dr. R.K. Sinha**
Secretary, Department of Atomic Energy
Anushakti Bhavan
Chatrapathi Shivaji Maharaj Marg
Mumbai 400001

7) **Shri J.S. Saharia**
Chief Secretary, Govt. of Maharashtra
Mantralaya, Mumbai 400052

8) **Prof. Srikumar Banerjee**
DAE Homi Bhabha Chair Professor
Bhabha Atomic Research Centre
Trombay, Mumbai 400085

9) **Dr. Shailesh Nayak**
Secretary, Ministry of Earth Science, Govt. of India
Block No. 12, C.G.O. Complex
Lodhi Road, New Delhi 110003

10) **Shri Yogendra Tripathi**
Joint Secretary & Financial Advisor
Ministry of Human Resource Development, Govt. of India
Shastri Bhawan, New Delhi 110115

11) **Prof. L.S. Shashidhara**
Professor and Chair
Indian Institute of Science Education and Research
Pune 411008

12) **Prof. A. Raghuram**
Professor and Chair
Indian Institute of Science Education and Research
Pune 411008

SPECIAL INVITEES

13) **Prof. Sourav Pal**
Director
National Chemical Laboratory
Pune 411008

14) **Prof. Vijayalakshmi Ravindranath**
Chairperson
Centre for Neuroscience
Indian Institute of Science
Bangalore 560012

SECRETARY

15) **Col. G. Raja Sekhar (Retd.)**
Registrar
Indian Institute of Science Education and Research
Pune 411008

Finance Committee

CHAIRMAN

1) **Prof. T.V. Ramakrishnan**
Distinguished Associate
Centre for Condensed Matter Theory
Department of Physics, Indian Institute of Science
Bangalore 560012

MEMBERS

2) **Prof. K.N. Ganesh**
Director
Indian Institute of Science Education and Research
Pune 411008

3) **Shri Yogendra Tripathi**
Joint Secretary & Financial Advisor
Ministry of Human Resource Development, Govt. of India
Shastri Bhawan, New Delhi 110115

4) **Smt. Amita Sharma**
Additional Secretary
Ministry of Human Resource Development, Govt. of India
Shastri Bhawan, New Delhi 110115

5) **Shri C.P. Mohan Kumar**
Registrar
Tata Institute of Social Sciences
Mumbai 400088

6) **Shri R.Y. Deshpande**
Director (Legal and Contracts)
Centre for Development of Advanced Computing
Pune 411007

SECRETARY

7) **Col. G. Raja Sekhar (Retd.)**
Registrar
Indian Institute of Science Education and Research
Pune 411008

Senate

CHAIRMAN

1) **Prof. K.N. Ganesh**
Director
Indian Institute of Science Education and Research
Pune 411008

MEMBERS (INSTITUTIONAL)

2) **Prof. L.S. Shashidhara**
Professor and Dean, Research and Faculty

3) **Prof. G. Ambika**
Professor and Dean, Graduate Studies

4) **Prof. A. Raghuram**
Professor and Chair

5) **Prof. Sunil Mukhi**
Professor and Chair

6) **Prof. Milind Watve**
Professor

7) **Dr. V.G. Anand**
Associate Professor

8) **Dr. Rama Mishra**
Associate Professor

9) **Dr. M. Jayakannan**
Associate Professor

10) **Dr. Suneeta Vardarajan**
Associate Professor

11) **Dr. Girish Ratnaparkhi**
Assistant Professor

12) **Dr. Soumen Maity**
Associate Professor

13) **Dr. M.S. Santhanam**
Associate Professor

14) **Dr. Umesh Kacherki**
Deputy Librarian

MEMBERS (EXTERNAL)

15) **Prof. B.N. Goswami**
Director, Indian Institute of Tropical Meteorology, Pune

16) **Dr. Dilip Dhawale**
Professor, University of Pune

17) **Dr. S.A. Katre**
Professor, University of Pune

18) **Dr. Satish Ogale**
Scientist, National Chemical Laboratory, Pune

19) **Dr. Saroj Ghaskadbi**
Professor, University of Pune

SECRETARY

20) **Col. G. Raja Sekhar (Retd.)**
Registrar
Indian Institute of Science Education and Research
Pune 411008

Building and Works Committee

CHAIRMAN

1) **Prof. K.N. Ganesh**
Director
Indian Institute of Science Education and Research
Pune 411008

MEMBERS

2) **Shri K.S. Wagh**
Chief Advisor, Civil Infrastructure
Indian Institute of Technology
Powai, Mumbai

3) **Mr. Sushant Baliga**
Additional Director General (Retd.)
CPWD, Delhi

4) **Mr. P.M. Kanvinde**
Architect
Former Principal Abhinav K.M. & College of Architecture
Pune

5) **Prof. L.S. Shashidhara**
Professor and Chair
Indian Institute of Science Education and Research
Pune 411008

6) **Col. G. Raja Sekhar (Retd.)**
Registrar
Indian Institute of Science Education and Research
Pune 411008

7) **Shri Balachandra Y. Khandait**
Superintending Engineer
Maharashtra State Electricity Distribution Company Ltd.
Ganeshkhind, Pune 411007

SPECIAL INVITEE

8) **Mr. S.M. Mane**
Sr. Technical Officer
National Chemical Laboratory, Pune 411008

SECRETARY

9) **Shri Y.S. Rajput**
Superintending Engineer
Indian Institute of Science Education and Research
Pune 411008

Contents

* *प्राक्कथन*
* Foreword
* Awards and Honors 1
* Academic Activities of Faculty Members 2
* Conferences, Symposia and Workshops 44
* News and Events 58
* Colloquia 70
* Research Seminars 72
* Outreach Activities 88
* PhD Program 92
* Undergraduate Program 94
* Equipment Procured during 2013-14 110
* Personnel 112
* Grants Received 122
* Scientific Report 134
* Library 184
* Balance Sheet 186
* Income & Expenditure Statement 187

प्राक्कथन

आयसर, पुणे के संक्षिप्त इतिहास में वर्ष २०१३-२०१४ ने महत्वपूर्ण मील का पत्थर देखा है। इस वर्ष के दौरान संस्थान की सम्पूर्ण शैक्षिक गतिविधि को मुख्य कैम्पस में स्थापित किया गया । साई ट्रिनिटी में हमारे ट्रान्जिट कैम्पस को औपचारिक रूप से बन्द कर दिया गया है । सिंहावलोकन में २००८-२००९ से कार्यरत इस अत्यधिक कार्यान्वित ट्रान्जिट कैम्पस की स्थापना इस दृष्टि से महत्वपूर्ण थी कि इसी के द्वारा हम आयसर, पुणे को वर्तमान शैक्षिक सुस्थिति में ला सके हैं । इसने संस्थान को अपने निर्माणाधीन वर्षों में सफलतापूर्वक स्थापित होने हेतु मजबूत अध्यापन तथा अनुसंधान अवसंरचना उपलब्ध कराई । किसी भी नए संस्थान की स्थापना के बाद संक्रमण अवस्था में भी उत्कृष्ट प्राध्यापकवर्ग एवं छात्रों को आकर्षित करने के लिए इस प्रकार की उच्च गुणता की अवसंरचना बहुत ही आवश्यक तथा महत्वपूर्ण थी । नए संस्थानों की स्थापना में आयसर, पुणे का अनुभव एक आदर्श नमूना हो सकता है ।

वर्ष २०१३-१४ के शैक्षिक वर्ष के दौरान कैम्पस में स्थित लेक्चर हॉल कॉम्प्लेक्स के सभी आधुनिक क्लासरूमों (२x२००, ४x१००, ८x५०) को कार्यरत किया गया । इससे शैक्षिक कार्यक्रमों, समांतर ट्यूटोरियल सत्रों का संचालन, अनुसंधान संगोष्ठियाँ, परिचर्चा आदि का विस्तार एवं आयोजन एक ही भवन में हो सके । इस कैम्पस में एक अन्य महत्वपूर्ण सुविधा को पूर्ण करके स्थापित किया गया और वह है पीएच.डी. के शोधछात्रों हेतु ५०० सेल्फ कन्टेन्ड कमरों की क्षमता का सिंगल ऑक्युपन्सी का छात्रावास । वर्तमान में बीएस-एमएस छात्रों के लिए डबल ऑक्युपन्सी वाले ७०० कमरों की क्षमता का छात्रावास उपलब्ध है और इस प्रकार शैक्षिक वर्ष २०१५-२०१६ तक यह संस्थान छात्रों के आवास के मामले में आत्मनिर्भर बन जाएगा । निकट भविष्य में छात्रावास की आवश्यकता की संभावना को देखते हुए हमने पहले ही डबल ऑक्युपन्सी वाले ५०० कमरों की क्षमता के तीसरे छात्रावास के निर्माण की प्रक्रिया आरम्भ की है । इस वर्ष जी१ (जीवन) नामक जीवविज्ञान अनुसंधान प्रयोगशाला का उद्घाटन प्रो. बलराम, निदेशक, भारतीय विज्ञान संस्थान, बेंगलुरू ने किया । जी१ प्रयोगशाला में वेट लैब्ज एवं आधुनिक उपकरण प्रयोगशाला के अलावा कोशिका संवर्धन तथा सूक्ष्मदर्शिकी सुविधाएं भी उपलब्ध हैं । आगामी वर्ष में भोजन-कक्ष सुविधा एवं प्राध्यापकवर्ग हेतु आवास की सुविधा को पूरा किया जाएगा ।

कैम्पस में रसायनविज्ञान (मेन्डलीव), भौतिकी (एच-क्रॉस) एवं जीवविज्ञान (जी१) अनुसंधान प्रयोगशालाओं के पूर्णत: कार्यान्वित होने के साथ ही संस्थान में पूरी तरह से किए गए शोधकार्यों से उत्पन्न अनुसंधान प्रकाशनों की गुणता और परिमाण में वृद्धि हुई है । वर्ष के दौरान कुल प्रकाशनों की संख्या १८० रही है, जिसमें विधानुसार रासायनिक जीवविज्ञान (४०), पदार्थ एवं नैनोविज्ञान (४६), स्पेक्ट्रमविज्ञान (१५), सैद्धान्तिक विज्ञान (३५), जैविक विज्ञान (२७) एवं गणित (१८) का योगदान रहा है । इनमें से कई सम्बन्धित विधाओं के सुप्रतिष्ठित पत्रिकाओं में प्रकाशित हुए हैं । इसके अलावा हमारे संकाय सदस्यों के २२ शोधपत्र ऐसे भी हैं जिनपर उन्होंने अपने पूर्व के संस्थानों में कार्य आरम्भ किया था किन्तु आयसर, पुणे में कार्यभार संभालने के बाद उसे पूरा किया, ५ बुक चाप्टर, पत्रिकाओं (२) के विशेषांकों के अतिथि संपादक एवं प्रकाशित/फाइल किए गए पेटेन्ट्स (२) हैं । संस्थान की शैक्षिक गतिविधि अपना प्रभाव दिखा रही है जो शोध प्रकाशनों एवं हमारे संकाय सदस्यों द्वारा विभिन्न राष्ट्रीय एवं अन्तर्राष्ट्रीय सम्मेलनों में दिए गए व्याख्यानों से स्पष्ट होता है । इस संस्थान ने कई राष्ट्रीय एवं अन्तर्राष्ट्रीय वैज्ञानिक बैठकों का आयोजन किया है जिनमें रासायनिक जीवविज्ञान पर अन्तर्राष्ट्रीय बैठक (एवं डीएनए का ६० वाँ जन्मदिवस - दोनो एकसाथ सम्पन्न हुए),

ओलिगोसैकाराइड्स एवं कार्बोहाइड्रेट्स पर अन्तर्राष्ट्रीय सम्मेलन की सैटेलाइट बैठक, मानव के क्रमविकास के बोध पर सम्मेलन, संरचनात्मक जीवविज्ञान पर भारत-ब्रिटेन की बैठक, न्यूट्रॉन विकिर्णन पर राष्ट्रीय सम्मेलन, विन्टर स्कूल ऑन कोल्ड एट्म्स, तथा नैनोप्रौद्योगिकी में नवोन्मेष पर बैठक प्रमुख हैं। आयसर, पुणे ने विभिन्न संस्थाओं के संकाय सदस्यों के बीच परस्पर विचार-विमर्श का आयोजन करने में पहल की है। इसके अन्तर्गत इन्टर-आयसर फिजिक्स मीट, डीबीटी द्वारा प्रायोजित आयसर-नायसर फैकल्टी नेटवर्कींग इन प्लान्ट बायोलॉजी, प्रतिरक्षाविज्ञान एवं उष्णकटिबंधीय जीवविज्ञान तथा डीएसटी रामानुजम फेलोज की दूसरी बैठक का आयोजन किया गया।

वर्ष के दौरान आयसर, पुणे के संकाय सदस्यों एवं छात्रों को प्राप्त महत्वपूर्ण शैक्षिक उपलब्धियाँ हमारे लिए प्रेरणादायी हैं। इनमें डॉ. वी.जी. आनंद (रसायनविज्ञान) एवं डॉ. टी.एस. महेश (भौतिकी) को डीएसटी स्वर्णजयन्ती फेलोशिप; डॉ.सुजीत घोष एवं डॉ. एम. जगनमोहन (रसायनविज्ञान) तथा डॉ. जी.वी. पवन कुमार (भौतिकी) को इन्सा का युवा वैज्ञानिक पदक शामिल हैं। किसी भी संस्थान के लिए ये सम्मान बहुत ही महत्वपूर्ण हैं। डॉ. गायत्री को डीबीटी का नवोन्मेषी युवा जैवप्रौद्योगिकीविद् पुरस्कार प्राप्त हुआ। आयसर, पुणे को छात्रों को सुकुबा (जपान) में आयोजित एशिया सायन्स कैम्प में भाग लेने के लिए चुना गया और उन्हें डाड-वाइज शोधवृत्ति प्राप्त हुई। हमारे संस्थान के इन सदस्यों ने अपनी उपलब्धियों द्वारा अपने संस्थान को सम्मान दिलाया है।

संस्थानो में गतिविधियों का अन्तर्राष्ट्रीयीकरण उच्च शिक्षा में एक उभरता हुआ विषय है। आयसर, पुणे के छात्र कैन्सर अनुसंधान के क्षेत्र में ओहिओ स्टेट यूनिवर्सिटी, यूकेरी प्रोग्राम के अधीन सरे विश्वविद्यालय, ब्रिटेन एवं इन्स्पायर प्रोग्राम के अधीन फ्रेई विश्वविद्यालय, बर्लीन तथा सर्न (जिनेवा) के साथ आदान-प्रदान कार्यक्रम का एक भाग हैं। हमारे संकाय सदस्यों ने औषधीय रसायनविज्ञान में संयुक्त अनुसंधान/अध्यापन की संभावनाओं का पता लगाने हेतु कील विश्वविद्यालय, ब्रिटेन तथा ज्ञान के हस्तान्तरण को मजबूत बनाने हेतु बर्मिंगहम विश्वविद्यालय का दौरा किया। रसायनविज्ञान संकाय सदस्यों का एक प्रतिनिधिमंडल स्ट्रक्चर ऐण्ड डाइनामिक्स के क्षेत्र में आयोजित संयुक्त संगोष्ठी में भाग लेने हेतु एडिनबर्ग विश्वविद्यालय के दौरे पर गया था। इसके परिणामस्वरूप संयुक्त रूप से प्रकाशन भी किए जा रहे हैं। हमारे लिए एक महत्वपूर्ण मान्यता के रूप में आयसर, पुणे का गोटिंजेन विश्वविद्यालय के साथ भागीदारी में नमस्ते (नेटवर्कींग एण्ड मोबिलीटी एक्शन्स फॉर सस्टेनेबल टेक्नोलॉजी ऐण्ड एनवायर्नमेन्ट इन इंडिया), जो एक एरास्मस म्युन्डस एक्शन २ कार्यक्रम पहल है, में समन्वयन हेतु एक अन्तर्राष्ट्रीय प्रतियोगी बोली में चयन किया गया। इस दिशा में आरम्भ करते हुए पहले कदम के रूप में आयसर, पुणे ने ८ युरोपियन एवं १२ भारतीय संस्थाओं की एक बैठक आयोजित की तथा इस कार्यक्रम के परिणाम के रूप में प्रतिभागी संस्थानों में १५५ छात्रों को तथा फैकल्टी मोबिलीटी इवेन्ट्स को आदान-प्रदान कार्यक्रम के समायोजित किया जाएगा।

आयसर, पुणे के लिए एक अन्य घटना अन्तर्राष्ट्रीय मील का पत्थर बनी है और वह है संस्थान को रसायनविज्ञान बीएस एमएस प्रोग्राम हेतु रॉयल सोसायटी ऑफ केमिस्ट्री एक्रेडिटेशन प्राप्त होना। यह सम्मान संस्थान में रसायनविज्ञान प्रोग्राम के अन्तर्राष्ट्रीय मानक को प्रमाणित करता है। इससे हमारे छात्रों को ब्रिटेन की संस्थाओं में उन्नत शैक्षिक एवं व्यावसायिक रसायनविज्ञान पाठ्यक्रमों में आसानी से प्रवेश मिल सकेगा। इस सम्बन्ध में अमेरीकन केमिकल सोसायटी की अध्यक्ष, प्रो. मारिन्डा वू द्वारा की हमारे रसायनविज्ञान संकाय सदस्यों एवं छात्रों के साथ बैठक हेतु किया गया दौरा महत्वपूर्ण है। न्यू मेक्सिको स्टेट यूनिवर्सिटी के एक उच्च स्तरीय दल ने परस्पर सहयोग एवं मानव संसाधनों के आदान-प्रदान हेतु आयसर, पुणे का दौरा किया था।

संस्थान ने मई २०१३ में अपना दूसरा दीक्षान्त समारोह आयोजित किया था। डॉ. कस्तुरीरंगन, सुप्रतिष्ठित अन्तरिक्ष वैज्ञानिक एवं योजना आयोग के पूर्व सदस्य (विज्ञान) इस समारोह के मुख्य अतिथि थे और उन्होंने दीक्षान्त व्याख्यान दिया। इस समारोह में २००८ की बैच के ४४ छात्रों को बीएस एमएस की डिग्री एवं ३ छात्रों को पीएच.डी की डिग्री प्रदान की गईं। इस समारोह का मुख्य आकर्षण थे भारत के अति सुप्रतिष्ठीत वैज्ञानिकों

में से एक डॉ. सी.एन.आर. राव जिन्हे आयसर, पुणे की मानद डॉक्टरेट की उपाधि प्रदान की गई । ऐसे महान एवं सुप्रतिष्ठीत वैज्ञानिक का सम्मान करके संस्थान ने स्वयं को सम्मानित किया है । जैसा कि हम सभी जानते हैं इसी वर्ष में तत्पश्चात प्रो. सी.एन.आर. राव को देश के सर्वोच्च नागरी सम्मान भारत रत्न से सम्मानित किया गया और नवंबर २०१३ में आयसर, पुणे ने पुणे स्थित अन्य चार संस्थाओं के साथ डॉ. राव के सम्मान की पहल की । ये संस्थानएँ हैं – पुणे विश्वविद्यालय, एन.सी.एल., एन.सी.सी.एस. एवं आई.आई.टी.एम. । इस अवसर पर डॉ. राव द्वारा किया गया संबोधन संस्थान के छात्रों एवं संकाय सदस्यों के लिए बहुत ही प्रेरणादायी था।

हमारे संस्थान में प्रो. डेविड ग्रॉस, भौतिकी में नोबेल पुरस्कार विजेता (२००४) एवं प्रो. आर. चिदंबरम, वैज्ञानिक सलाहकार का भी आगमन हुआ । इसके अलावा श्री अशोक ठाकुर, सचिव, एमएचआरडी एवं मैडम अमिता शर्मा, अतिरिक्त सचिव, एमएचआरडी ने हमारी विभिन्न कार्यों में प्रगति का निरीक्षण करने हेतु संस्थान का दौरा किया । चूँकि उन्होंने आयसर का कड़ा समर्थन किया इसलिए उनका यह दौरा हमारे लिए बहुत महत्वपूर्ण था ।

वर्ष २०१३–२०१४ के दौरान संस्थान ने कैम्पस निर्माण, संकाय सदस्यों एवं अनुसंधान एवं अन्तर्राष्ट्रीय गतिविधियों पर केन्द्रीत शैक्षिक क्षेत्र में महत्वपूर्ण प्रगति की है । इनमें से कई गतिविधियों को वार्षिक प्रतिवेदन में दर्शाया गया है । संस्थान के सभी प्रशासनिक अनुभागों एवं अभियांत्रिकी स्टाफ का मैं अत्यंत ऋणी हूँ जिन्होंने अपने कार्यक्षेत्र से बाहर जाकर तथा ड्यूटी–समय की परवाह किए बिना संस्थान के विकास में महत्वपूर्ण योगदान दिया है । मैं नियामक मंडल के सदस्यों एवं अन्य सांविधिक समितियों का संस्थान के संचालन हेतु हार्दिक आभारी हूँ । एमएचआरडी के अधिकारियों द्वारा प्रदान की गई अबाधित सहायता के बिना संस्थान की वर्तमान प्रगति संभव नहीं थी, उनकी भी में सराहना करता हूँ ।

वर्ष २०१३–२०१४ का आयसर, पुणे का वार्षिक प्रतिवेदन प्रस्तुत करते हुए मुझे बहुत प्रसन्नता हो रही है ।

के. एन. गणेश

(के. एन. गणेश)

निदेशक

Foreword

The year 2013-2014 has seen an important milestone in the short history of IISER Pune. During this year, the entire academic activity of the Institute has been shifted to the main campus. The transit campus at "Sai Trinity" has been formally closed. Looking back, the establishment of this highly functional transit campus since 2008-2009 was crucial to reach the present academic status of IISER Pune. It provided a strong teaching and research infrastructure to successfully launch the Institute during its formative years. Such a high quality infrastructure even in a transit situation was essential and crucial to attract the best of faculty and students for any new institute and the experience of IISER Pune could be a good model for establishing new institutes.

During the academic year 2013-14, all modern classrooms (2x200, 4x100, 8x50) in the Lecture Hall Complex on the campus became functional, providing opportunities for expansion of academic programs, conducting parallel tutorial sessions, research seminars, colloquia etc in a single building. Another important facility completed and commissioned on the campus is the self-contained single occupancy 500 capacity hostel for PhD students. Together with the existing double occupancy 700 capacity hostel for BS-MS students, it is expected that the Institute is self-sufficient in students' accommodation till the academic year 2015-2016. In anticipation of requirement in the near-future, we have already initiated the process for construction of a third hostel building with 500 double occupancy rooms. This year also saw the inauguration of the biology research laboratory called G1 (Jeevan) by Prof. Balaram, Director, IISc, Bangalore. G1 houses wet labs as well as a modern instrument lab along with cell culture and microscopy facilities. Coming year will see the completion of dining hall facility and faculty housing.

With the complete functioning of Chemistry (Mendeleev), Physics (h-cross) and Biology (G1) research laboratories on campus, the quality and magnitude of research publications emanating from the work entirely done at the Institute has soared. The number of total publications during the year is 180, with area-wise break up of chemical biology (40), materials science and nanoscience (46), spectroscopy (15), theoretical science (35), biological sciences (27) and mathematics (18), several in journals of high repute in those disciplines. In addition, 22 research papers have resulted from the work of faculty carried out in their previous institutes but completed after their joining IISER Pune, 5 book chapters, guest editors of special issues of journals (2) and patents published/filed (2). The academic activity of the Institute is making an impact as is seen from research publications together with invited lectures delivered by our faculty members at various important national and international conferences. The Institute has also hosted several significant national and international scientific meetings: International Meeting on Chemical Biology

(coinciding with DNA's 60th birthday), Satellite meeting of the International Conference on Oligosaccharides and Carbohydrates, Conference on Evolution of Human Cognition, Indo-UK Meeting on Structural Biology, National Conference on Neutron Scattering, Winter School on Cold Atoms, and the Meeting on Innovations in Nanotechnology to name a few. IISER Pune has taken the lead in organizing interactions among faculty members of different institutes, in the form of Inter-IISER Physics Meet, DBT sponsored IISER-NISER faculty networking in Plant Biology, Immunology and Tropical Biology and the second meeting of DST Ramanujan Fellows.

It is heartening to record the important academic recognitions that IISER Pune faculty members and students have received during the year. These involve the award of DST Swarnajayanti Fellowships to Dr. V.G. Anand (Chemistry) and Dr. T.S. Mahesh (Physics); INSA Young Scientist medals to Dr. Sujit Ghosh and Dr. M. Jeganmohan (Chemistry) and Dr. G.V. Pavan Kumar (Physics). These are of great significance to any Institute. Dr. Gayathri Pananghat received the Innovative Young Biotechnologist award of DBT. IISER Pune students have been selected for participation in Asia Science Camp at Tsukuba (Japan) and have received DAAD-WISE scholarship. These members have made the Institute proud through their achievements.

Internationalization of activities in Institutes is an emerging theme in higher education. IISER Pune students are a part of an exchange program with Ohio State University in the area of cancer research, with University of Surrey, U.K. under UKIERI program and with Freie University, Berlin under INSPIRE program, and with CERN (Geneva). Our faculty members have visited University of Keele, U.K. to explore joint research/teaching in medicinal chemistry and to University of Birmingham for strengthening knowledge transfer. A delegation of chemistry faculty members visited University of Edinburgh for a joint seminar in the area of Structure and Dynamics, which is resulting in joint publications. In a very significant credit for us, IISER Pune, in partnership with Goettingen University, was selected through an international competitive bidding process to coordinate the NAMASTE (Networking and Mobility Actions for Sustainable Technology and Environment in India) program, which is an Erasmus Mundus Action 2 program initiative. As a first step, IISER Pune has organized a kick-off meeting with 8 European and 12 Indian Institutions and the outcome of the program would be to engineer 155 student and faculty mobility events across the participating Institutes.

Another international milestone for IISER Pune is receiving the Royal Society of Chemistry Accreditation for the Chemistry BS MS program. IISER Pune is the first Institute in India to receive this accreditation, which proclaims the international standard of the chemistry program at the institute; this could enable easy acceptance of our students for advanced academic and professional chemistry courses in U.K. institutions. In this connection, the visit of Prof. Marinda Wu, President, American Chemical Society to meet the chemistry faculty members and students is significant. IISER Pune was also visited by a high level delegation from New Mexico State University to establish mutual co-operation and exchange of human resources.

The institute held its 2nd convocation in May 2013 with Dr. K. Kasturirangan, an eminent space scientist and a former member (Science) of the Planning Commission delivering the convocation

address. 44 students of 2008 batch received their BS MS degrees, while 3 students received PhD degrees. A high spot of the event was Prof. C.N.R. Rao, one of the most eminent scientists of the country receiving the first Honorary Doctorate of IISER Pune. Through honoring such a distinguished scientist, the Institute honored itself! Later in the year, as we all know, Prof. C.N.R. Rao was conferred the nations's highest civilian award 'Bharat Ratna' and in November 2013, IISER Pune took the initiative of felicitating him along with four other institutions in Pune - University of Pune, NCL, NCCS and IITM. His address on the occasion was very inspiring to all students and faculty members. The Institute also hosted the visit of Prof. David Gross, Nobel Laureate (2004) in physics and Prof. R. Chidambaram, Scientific Advisor to the Govt. of India. The visit of Shri Ashok Thakur, Secretary, MHRD and Madame Amita Sharma, Additional Secretary, MHRD to see our progress on various fronts was particularly important, since they have strongly supported IISERs.

The institute has made very important strides during the year 2013-2014 in campus construction and in academics centered on both faculty members and research and international activities. Much of these are highlighted in this Annual Report. I am highly indebted to all sections of the administrative and engineering staff of the Institute who have made significant contributions, beyond the call of their duty. I would like to place on record my sincere thanks to members of the Board of Governors and other statutory committees for their guidance in steering the Institute and my appreciation to MHRD officials for their unstinted support, without which the Institute would not have progressed to this level.

I am very delighted to present the Annual Report of IISER Pune for the year 2013-2014.

(K.N. Ganesh)
Director

Awards and Honors

V.G. Anand DST Swarnajayanti Fellowship 2014

Sudarshan Ananth N.S. Satya Murty Memorial Award in Physics for 2012 (awarded in 2014)

Arjun Bagchi Fulbright Nehru Research Award 2014: Research Fellowship for a stay of 18 months at the Massachusetts Institute of Technology, Boston, U.S.A. • Lise Meitner Award 2013: Awarded by FWF Austrian Science Fund

Diganta Borah DST INSPIRE Faculty Award 2013

Sujit Ghosh INSA Medal for Young Scientist 2013 • Alkyl Amines-ICT Mumbai Foundation Day Young Scientist Award 2013

Krishanpal Karmodiya DST INSPIRE Faculty Award 2013

G.V. Pavan Kumar INSA Medal for Young Scientist (Physics) 2013

M. Jeganmohan INSA Medal for Young Scientist 2013 • ISCB Award of Appreciation for Chemical Science, CSIR-CDRI Lucknow, India 2014 • Alkyl Amines-ICT Mumbai Foundation Day Young Scientist Award 2013

T.S. Mahesh DST Swarnajayanti Fellowship 2014 • Prof. S. Subramanian's 60th Birthday Lecture Award (by National Magnetic Resonance Society) 2014

Arvind Natu Life Time Achievement Award, School of Chemical Sciences, North Maharashtra University, Jalgaon

Gayathri Pananghat DBT Innovative Young Biotechnologist Award (IYBA) 2013 • DST INSPIRE Faculty Award 2013

Raghav Rajan DBT Ramalingaswami Re-entry Fellowship

Academic Activities of Faculty Members

Publications in 2013

Chemical Biology

1. Patil, S., Patil, S., Gawali, S., Shende, S, Jadhav, S. and **Basu, S**. (2013). Novel self-assembled lithocholic acid nanoparticles for drug delivery in cancer. *RSC Advances*, 3:19760-19764.

2. Patil, S., Gawali, S., Patil, S. and **Basu, S**. (2013). Synthesis, characterization and in vitro evaluation of novel vitamin D3 nanoparticles as versatile platform for drug delivery in cancer. *Journal of Materials Chemistry B*, 1:5742-5750.

3. Kulkarni, A.A., Roy, B., Rao, P.S., Wyant, G.A., Mahmood, A., Ramachandran, M., Sengupta, P., Goldman, A., Kotamraju, V.R., **Basu, S**., Mashelkar, R.A., Ruoslahti, E., Dinulescu, D.M. and Sengupta, S. (2013). Supramolecular nanoparticles that target phosphoinositide-3-kinase overcome insulin resistance and exert pronounced antitumor efficacy. *Cancer Research*, 73:6987-6997.

4. Mohite, A.R. and **Bhat, R.G**. (2013). A practical and convenient protocol for the synthesis of (e)-.alpha.,.beta.-unsaturated acids. *Organic Letters*, 15:4564-4567.

5. Navale, B.S. and **Bhat, R.G**. (2013). Copper(I) iodide-DMAP catalyzed homo- and heterocoupling of terminal alkynes. *RSC Advances*, 3:5220-5226.

6. Malwal, S.R., Gudem, M., **Hazra, A.** and **Chakrapani, H.** (2013). Benzosultines as sulfur dioxide (SO_2) donors. *Organic Letters*, 15:1116-1119.

7. Sharma, K., Iyer, A., **Sengupta, K. and Chakrapani, H.** (2013). INDQ/NO, a bioreductively-activated nitric oxide prodrug. *Organic Letters*, 15:2636-2639.

8. Sharma, K., **Sengupta, K.** and **Chakrapani, H.** (2013). Nitroreductase-activated nitric oxide (NO) prodrugs. *Bioorganic & Medicinal Chemistry Letters*, 23:5964-5967.

9. Deschamps, J.R., Saavedra, J.E., Cao, Z., Keefer, L.K. and **Chakrapani, H**. (2013). Stereochemical origins of chromophore extension in O_2-substituted diazeniumdiolates, prodrugs of nitric oxide. *Journal of Chemical Crystallography*, 43:123-126.

10. Gavvala, K., Sasikala, W.D., Sengupta, A., Dalvi, S.A., **Mukherjee, A**. and **Hazra, P**. (2013). Modulation of excimer formation of 9-(dicyano-vinyl)julolidine by the macrocyclic hosts. *Physical Chemistry Chemical Physics*, 15:330-340.

11. Gavvala, K., Sengupta, A. and **Hazra, P.** (2013). Modulation of photophysics and pk_a shift of the anticancer drug camptothecin in the nanocavities of supramolecular hosts. *ChemPhysChem*, 14:532-542.

12. Gavvala, K., Sengupta, A., Koninti, R.K. and **Hazra, P.** (2013). Supramolecular host inhibited excited state proton transfer and fluorescence switch of an anti-cancer drug, Topotecan. *ChemPhysChem,* 14:3375-3383.

13. Sengupta, A., Gavvala, K., Koninti, R.K., Chaudhuri, H. and **Hazra, P.** (2013). Folding dynamics of flavin Adenine dinucleotide (FAD) inside non-aqueous and aqueous reverse micelles. *Chemical Physics Letters,* 584:67-73.

14. Gavvala, K. Sengupta, A., Koninti, R.K. and **Hazra, P.** (2013). Prototropical and photophysical properties of an anti cancer drug, Ellipticine inside the nano-cavities of molecular containers. *Journal of Physical Chemistry B*, 117:14099-14107.

15. Boddu, V.R., Dhokale, S., Rajamohanan, P. and **Hotha, S**. (2013). A tetrazine templated method for the synthesis of ternary conjugates. *Chemical Communications*, 49:10808-10810.

16. Kayastha, A.K. and **Hotha, S**. (2013). Gold-catalyzed glycosidation for the synthesis of trisaccharides by applying the armed-disarmed strategy. *Beilstein Journal of Organic Chemistry,* 9:2147-2155.

17. Thadke, S.A., Mishra, B. and **Hotha, S**. (2013). Facile synthesis of β - and α - arabinofuranosides and application to cell wall motifs of *M. tuberculosis*. *Organic Letters*, 15:2466-2469.

18. Dhaware, V., Shaikh, A.Y., Kar, M. and **Hotha, S**. and Sen Gupta, S. (2013). Synthesis and self-assembly of amphiphilic homoglycopolypeptide. *Langmuir*, 29:5659-5667.

19. **Ganesh, K.N**. and Krishnan, Y. (2013). Nucleic acids − Chemistry and applications. *Journal of Organic Chemistry*, 78:12283-12287.

20. **Ganesh, K.N**. (2013). DNA structure to synthesis. *Chemistry International*, 35:7-8.

21. Jadhav, S.V., Singh, S.K., Reja, R.M. and **Gopi, H.N**. (2013). γ-Amino acid mutated α-coiled coils as mild thermal triggers for liposome delivery. *Chemical Communications*, 49:11065-11067.

22. Shankar, S.S., Benke, S.N., Nagendra, N., Srivastava, P.L., Thulasiram, H.V. and **Gopi, H.N**. (2013). Self-assembly to function: Design, synthesis, and broad spectrum antimicrobial properties of short hybrid E-vinylogous lipopeptides. *Journal of Medicinal Chemistry*, 56:8468-8474.

23. Jadhav, S.V., Misra, R., Singh, S.K. and **Gopi, H.N**. (2013). Efficient access to enantiopure γ4-residues with proteinogenic side chains and structural investigation of γ4-Asn and γ4-Ser in hybrid peptide helices. *Chemistry*, 19:16256-16262.

24. Jadhav, S.V. and **Gopi, H.N**. (2013). Remarkable thermoresponsive nanofibers from γ-peptides. *Chemical Communications*, 49:9179-9181.

25. Mali, S.M., Bhaisare, R.D. and **Gopi, H.N**. (2013). Thioacids mediated selective and mild N-acylation of amines. *Journal of Organic Chemistry*, 78:5550-5555.

26. Sonti, R., **Gopi, H.N**., Muddegowda, U., Ragothama, S. and Balaram, P. (2013). A designed three-stranded β-sheet in an α/β hybrid peptide. *Chemistry-A European Journal*, 19:5955-5965.

27. Ganesh Kumar, M., Mali, S.M. and **Gopi, H.N.** (2013). Synthesis and stereochemical analysis of β-nitromethane substituted γ-amino acids and peptides. *Organic & Biomolecular Chemistry,* 11:803-813.

28. Jadhav, S.V., Bandyopadhyay, A. and **Gopi, H.N**. (2013). Protein secondary structure mimetics: crystal conformations of α/γ^4-hybrid peptide12-helices with proteinogenic side chains and their analogy with α- and β-peptide helices. *Organic & Biomolecular Chemistry,* 11:509-514.

29. Bavireddi, H., Bharate, P. and **Kikkeri**, **R**. (2013). Probing carbohydrate-carbohydrate interactions by photoswitchable supramolecular glycoclusters. *Chemical Communications*, 49:3988-3990.

30. Bavireddi, H., Bharate, P. and **Kikkeri, R**. (2013). Use of Boolean and fuzzy logics in lactose glycocluster research. *Chemical Communications*, 49:9185-9187.

31. **Kikkeri**, **R**., Padler-Karavani, V., Diaz, S., Verhagen, A., Yu, H., Cao, H., Langereis, M.A., De Groot, R.J., Chen, X. and Varki, A. (2013). Quantum dot-FRET based biosensing of sialic acid compositions and linkages in biological samples. *Analytical Chemistry*, 85:3864-3870.

32. Sabale, P.M., Nuthanakanti, A. and **Srivatsan, S.G**. (2013). Synthesis and fluorescence properties of a full set of extended RNA base analogues. Thematic special issue on Complex Chemical Systems. *Indian Journal of Chemistry*, 52A:1004-1013.

33. Pawar, M.G., Nuthanakanti, A. and **Srivatsan, S.G**. (2013). Heavy atom containing fluorescent ribonucleoside analog probe for the fluorescence detection of RNA-ligand binding. *Bioconjugate Chemistry,* 24:1367-1377.

34. Tanpure, A.A., Pawar, M.G. and **Srivatsan, S.G**. (2013). Fluorescent nucleoside analogs: probes for investigating nucleic acid structure and function. *Israel Journal of Chemistry*, 53:366-378.

35. Peters, J.P., Yelgaonkar, S.P., **Srivatsan, S.G**., Tor, Y. and Maher III, L.J. (2013). Mechanical properties of DNA-like polymers. *Nucleic Acids Research,* 41:10593-10604.

36. Pawar, M.G. and **Srivatsan, S.G**. (2013). Environment-responsive fluorescent nucleoside analogue probe for studying oligonucleotide dynamics in a model cell-like compartment. *Journal of Physical Chemistry B,* 117:14273-14282.

37. Kand, D., Chauhan, D.P., **Lahiri, M**. and **Talukdar, P**. (2013). δ-Unsaturated γ-amino acids: Enantiodivergent synthesis and cell imaging studies. *Chemical Communications*, 49:3591-3593.

38. Kand, D., Kalle, A.M. and **Talukdar, P**. (2013). Chromenoquinoline-based thiol probes: a study on the quencher position for controlling fluorescent Off-On characteristics. *Organic & Biomolecular Chemistry*, 11:1691-1701.

39. Saha, T., Kand, D. and **Talukdar, P**. (2013). A colorimetric and fluorometric BODIPY probe for rapid, selective detection of H_2S and its application in live cell imaging. *Organic & Biomolecular Chemistry*, 11:8166-8170.

40. Gening, M.L., Tsvetkov, Y.E., Titov, D.V., Gerbst, A.G., Yudina, O.N., Grachev, A.A., Shashkov, A.S., Vidal, S., Imberty, A., Saha, T., Kand, D., **Talukdar, P.**, Pier, G.B. and Nifantiev, N.E. (2013). Linear and cyclic oligo-β-(1→ 6)-D-glucosamines: Synthesis, conformations, and applications for design of a vaccine and oligodentate glycoconjugates. *Pure and Applied Chemistry*, 85:1879-1891.

Materials Science and Nanoscience

41. Gopalakrishna, T.Y., Reddy, J.S. and **Anand, V.G.** (2013). Antiaromatic supramolecules: f···s, f···se, and f···π intermolecular interactions in 32π expanded isophlorins. *Angewandte Chemie International Edition,* 52:1763-1767.

42. Gadekar, S.C., Reddy, B.K. and **Anand, V.G.** (2013). Metal assisted cyclomerization of n-confused dipyrrins to expanded norroles. *Angewandte Chemie International Edition,* 52:7164-7167.

43. Waeckerlin, C., Nowakoskwi, J., Liu, S-X., Jaggi, M., Siewert, D., Girovsky, J., Shchyrba, A., Haehlen, T., Kleibert, A., Oppeneer, P.M., Nolting, F., Jung, T.A. and **Ballav, N**. (2013). Two-dimensional supramolecular electron spin arrays. *Advanced Materials,* 25:2404-2408.

44. Waeckerlin, C., Tafarder, K., Girovsky, J., Nowakoskwi, Haehlen, T., Shchyrba, A., Siewert, D., Kleibert, A., Nolting, F., Oppeneer, P.M., Jung, T.A. and **Ballav, N**. (2013). Ammonia coordination introducing a magnetic moment in an on-surface mow-spin porphyrin. *Angewandte Chemie International Edition,* 52:4568-4571.

45. Dhara, B. and **Ballav, N**. (2013). In situ generation of conducting polymer in a redox-active metal-organic gel. *RSC Advances,* 3:4909-4913.

46. Nowakoskwi, J., Waeckerlin, C., Girovsky, J., Siewert, D., Jung, T.A. and **Ballav, N**. (2013). Porphyrin metalation providing an example of a redox reaction facilitated by a surface reconstruction. *Chemical Communications,* 49:2347-2349.

47. Siegfried, T., Kind, M., Terfort, A., Martin, O.J.F., Zharnikov, M., **Ballav, N**. and Sigg, H. (2013). Reusable plasmonic substrates fabricated by interference lithography: A platform for systematic sensing studies. *Journal of Raman Spectroscopy,* 44:170-175.

48. Ranguwar, R. and **Ballav, N**. (2013). Discriminative response of aliphatic and aromatic dithiol in the self-assembly of gold nanoparticles. *RSC Advances,* 3:15622-15625.

49. Waeckerlin, C., Maldonaldo, P., Arnold, L., Shchyrba, A., Girovsky, J., Nowakoskwi, J., Ali, Md.E., Haehlen, T., Baljozovic, M., Siewert, D., Kleibert, A., Muellen, K., Oppeneer, P.M., Jung, T.A. and **Ballav, N**. (2013). Magnetic exchange coupling of a synthetic Co(II)-complex to a ferromagnetic Ni substrate. *Chemical Communications*, 49:10736-10738. (Invited)

50. Waeckerlin, C., Siewert, D., Jung, T.A. and **Ballav, N**. (2013). On-surface coordination chemistry: Direct imaging of the conformational freedom of an axial ligand at room temperature. *Physical Chemistry Chemical Physics,* 15:16510-16514. (Invited)

51. **Ballav, N**., Waeckerlin, C., Siewert, D., Oppeneer, P.M. and Jung, T.A. (2013). Emergence of on-surface magnetochemistry. *Journal of Physical Chemistry Letters,* 4:2303-2311. (Invited and Cover Art)

52. Gupta, A.K., Reddy, S.A.D. and **Boomishankar, R**. (2013). Facile formation of stable tris(imido)phosphate trianions as its tri- and hexa-nuclear Pd(II) complexes in polar solvents. *Inorganic Chemistry*, 52:7608-7614.

53. Gupta, A.K., Nagarkar, S.S. and **Boomishankar, R**. (2013). Zn(II) coordination polymer of an in-situ generated 4-pyridyl (4 Py) attached bis(amido)phosphate ligand, $[PO_2 (NH\ 4\ Py)_2]^-$ showing preferential water uptake over aliphatic alcohols. *Dalton Transactions,* 42:10964-10970.

54. Bansal, K. and **Datta S.** (2013). Temperature dependent reversal of voltage modulated light emission and negative capacitance in AlGaInP based multi quantum well light emitting devices. *Applied Physics Letters*, 102:053508.

55. **Bansal, K**. (2013). Role of light emission and sub-bandgap defects in the dielectric response of electroluminescent diodes. *Physica Status Solidi C*, 10:593-596.

56. P. Francis, S. Patil, Ch. Rajesh, S. Chakraborty, S. Mahamuni, **C.V. Dharmadhikari** and S.V. Ghaisas (2013). Electronic and optical properties of agglomerated hydrogen terminated silicon nanoparticles. *European Physical Journal D*, 67:144-151.

57. Patil, S., Datar, S., Narayan, R., Asha, S.K. and **Dharmadhikari, C.V.** (2013). Charge storage and electron transport properties of gold nanoparticles decorating urethane - methacrylate comb polymer network. *Nanoscale,* 5:4404-4411.

58. Patil, S., Rajesh, Ch. Pramod, M.R., More, S., Mahamuni, S., Jadkar, S.R., Dusane, R.O., **Dharmadhikari, C.V.** and Ghaisas, S.V. (2013). Passivation of n-type emitter and p-type base in solar cells via oxygen terminated silicon nanoparticles. *Progress in Photovoltaics: Research and Applications*, 2:1146-1152.

59. Nagarkar, S.S., Joarder, B., Chaudhari, A.K., Mukherjee, S. and **Ghosh, S.K.** (2013). Highly selective detection of nitro-explosive by a luminescent metal-organic framework. *Angewandte Chemie International Edition,* 52:2881-2885.

60. Manna, B., Chaudhari, A.K., Joarder, B., Karmakar, A. and **Ghosh, S.K.** (2013). Structural dynamism with anion-responsive tunable luminescent behaviors of a flexible cationic MOF. *Angewandte Chemie International Edition,* 52:998-1002.

61. Joarder, B., Chaudhari, A.K., Nagarkar, S.S., Manna, B. and **Ghosh, S.K.** (2013). Amino acid based dynamic metal-biomolecule framework. *Chemistry - A European Journal,* 19:11178-11183.

62. Chaudhari, A.K., Nagarkar, S.S., Joarder, B. and **Ghosh, S.K.** (2013). A continuous π-stacked starfish array of two-dimensional luminescent mof for detection of nitro explosives. *Crystal Growth & Design*, 13:3716-3721.

63. Chaudhari, A.K., Mukherjee, S., Nagarkar, S.S., Joarder, B. and **Ghosh, S.K.** (2013). Bi-porous metal-organic framework with hydrophilic and hydrophobic channels: selective gas sorption and reversible iodine uptake studies. *CrystEngComm,* 15:9465-9471.

64. Mukherjee, S., Chaudhari, A.K. and **Ghosh, S.K**., Xue, S. and Tang, J. (2013). An asymmetrically connected hexanuclear Dy(III)6 cluster exhibiting slow magnetic relaxation. *Inorganic Chemistry Communications,* 35:144-148.

65. Chaudhari, A.K., Nagarkar, S.S., Joarder, B., Mukherjee, S. and **Ghosh, S.K.** (2013). Structural dynamism and controlled chemical blocking/unblocking of active coordination space of a soft porous crystal. *Inorganic Chemistry,* 52:12784-12789.

66. Balamurugan, A., Kumar, A.G., **Boomishankar, R.**, Reddy, M.L.P. and **Jayakannan, M.** (2013). Heavy atom effect driven organic phosphors and their luminescent lanthanide metal-organic frameworks. *ChemPlusChem*, 78:737-745.

67. Balamurugan A., Reddy, M.L.P. and **Jayakannan, M.** (2013). π-conjugated polymer-Eu^{3+} complexes: a versatile luminescent molecular probe for temperature sensing. *Journal of Materials Chemistry A*, 1:2256-2266.

68. Shinde, S.D. and **Jayakannan, M.** (2013). New amphiphilic sulfonic acid dopant-cum-template for diverse conducting polyaniline nanomaterials. *Journal of Applied Polymer Science*, 127:1781-1793.

69. Surnar, B. and **Jayakannan, M.** (2013). Stimuli-responsive polycaprolactone vesicles for dual drug delivery under GI tract. *Biomacromolecules*, 14:4377-4387.

70. Singh, H., Balamurugan, A. and **Jayakannan, M.** (2013). Solid state assemblies and photophysical characteristics of linear and bent-core π-conjugated oligophenylenevinylenes. *ACS Applied Materials Interfaces*, 5:5578-5591.

71. Sridhar, U., Pramod, P.S. and **Jayakannan, M.** (2013). Creation of dextrin vesicles and their loading-delivering capabilities. *RSC Advances*, 3:21237-21241.

72. Reddy, M.C., Manikandan, R. and **Jeganmohan, M.** (2013). Ruthenium-catalyzed aerobic oxidative cyclization of aromatic and heteroaromatic nitriles with alkynes: a new route to isoquinolones. *Chemical Communications,* 49:6060-6062.

73. Reddy, M.C. and **Jeganmohan, M.** (2013). Ruthenium catalyzed selective aerobic oxidative ortho-alkenylation of substituted phenols with alkenes through C-H bond activation. *European Journal of Organic Chemistry,* 6:1150-1157.

74. Ravi Kiran, C.G., Pimparkar, S. and **Jeganmohan, M.** (2013). Ruthenium catalyzed intramolecular selective halogenation of O-methylbenzohydroximoyl halides: a new route to halogenated aromatic nitriles. *Chemical Communications*, 49:3146-3148.

75. Reddy, M.C. and **Jeganmohan, M.** (2013). Ruthenium catalyzed highly regio- and stereoselective hydroarylation of aryl carbamates with alkynes via C-H bond activation. *Chemical Communications*, 49:481-483.

76. Kishor, P. and **Jeganmohan, M.** (2013). Ruthenium-catalyzed oxidative ortho-benzoxylation of acetanilides with aromatic acids. *Chemical Communications,* 49:9651.

77. Ravikiran, C.G., Pimparkar, S. and **Jeganmohan, M.** (2013). A regioselective synthesis of 1-haloisoquinolines via Ruthenium-catalyzed cyclisation of O-methylbenzohydroximoyl halides with alkynes. *Chemical Communications*, 49:3703-3705.

78. Khurana, P., Thatai, S., Wang, P., Lihitkar, P., Zhang, L., Fang, Y. and **Kulkarni, S.K.** (2013). Speckled SiO_2@Au core shell particles as surface enhanced Raman scattering probes *Plasmonics*, 8:185-191.

79. Acharya, S.A., Maheshwari, N., Tatikondewar, L., Kshirsagar, A. and **Kulkarni, S.K.** (2013). Ethylenediamine-mediated wurtzite phase formation in ZnS. *Crystal Growth & Design*, 13:1369-1376.

80. Yusuf, S.M. Manna, P.K., Shirolkar, M.M., **Kulkarni, S.K.**, Tewari, R. and Dey, G.K. (2013). A study of exchange bias in $BiFeO_3$ core/$NiFe_2O_4$ shell nanoparticles. *Journal of Applied Physics*, 113:173906-5.

81. Dey, R.M., Deshpande S.K., Singh S.B., Chande, N., Patil, D.S. and **Kulkarni S.K**. (2013). X-ray reflectivity of bias graded diamond like carbon films synthesized by ECR plasma. *Bulletin of Materials Science*, 36:9-14.

82. Kadlag, K.P., Jagadeeswara Rao, M. and **Nag, A.** (2013). Ligand-free, colloidal, and luminescent metal sulfide nanocrystals. *Journal of Physical Chemistry Letters*, 4:1676-1681.

83. Kapoor, K., Kanawade, V., Shukla, V. and **Patil, S.** (2013). A new tuning fork-based instrument for oscillatory shear rheology of nano-confined liquids. *Review of Scientific Instruments*, 84:025101.

84. Murthy, A.V.R., Patil, P., **Datta, S.** and **Patil, S.** (2013). Photo-induced dark fraction due to blinking and photodarkening probability in aqueous CdTe quantum dots. *Journal of Physical Chemistry C*, 117:13268-13275.

85. Montagnese, M., Otter, M., Zotos, X., Fishman, D.A., Hlubek, N., Mityashkin, O., Hess, C., Saint-Martin, R., **Singh, S**., Revcolevschi, A. and van Loosdrecht, P.H.M. (2013). Phonon-magnon interaction in low dimensional quantum magnets observed by dynamic heat transport measurements. *Physical Review Letters*, 110:147206.

86. Thampi, A., Babu, K. and **Verma, S**. (2013). Large scale solvothermal synthesis and a strategy to obtain stable Langmuir–Blodgett film of $CoFe_2O_4$ nanoparticles. *Journal of Alloys and Compounds*, 564:143-150.

Spectroscopic Sciences

87. Kumar, S. and **Das, A.** (2013). Observation of exclusively pi-stacked heterodimer of indole and hexafluorobenzene in the gas phase. *Journal of Chemical Physics*, 139:104311.

88. Milan-Garces, E.A., Kaptan, S. and **Puranik**, **M.**, (2013). Mode-specific reorganization energies and ultrafast solvation dynamics of tryptophan from Raman line-shape analysis. *Biophysical Journal*, 105:211-221.

89. Katiyar, H., Shukla, A., Koteswara Rao, R. and **Mahesh, T.S.** (2013). Violation of entropic leggett-garg inequality in nuclear spin ensembles. *Physical Review A*, 87:052102.

90. Karthik, H.S., Katiyar, H., Shukla, A., **Mahesh, T.S.**, Usha Devi, A.R. and Rajagopal, A.K. (2013). Inversion of moments to retrieve joint probabilities in quantum sequential measurements. *Physical Review A*, 87:052118.

91. Shankar, R., Hegde, S.S. and **Mahesh, T.S**. (2013). Quantum simulations of a particle in one-dimensional potentials using NMR. *Physics Letters A*, 378:10.

92. Shukla, A., Rama Koteswara Rao, K. and **Mahesh, T.S.** (2013). Ancilla assisted quantum state tomography in many-qubit registers. *Physical Review A,* 87:062317.

93. Rama Koteswara Rao, K., Katiyar, H., **Mahesh, T.S.**, Sen (De), A., Sen, U. and Kumar, A. (2013). Multipartite quantum correlations reveal frustration in a quantum Ising spin system. *Physical Review A,* 88:022312.

94. Mettela, G., Radha, B., Singh, D., **Pavan Kumar, G.V.** and Kulkarni, G.U. (2013). Highly tapered pentagonal bipyramidal Au microcrystals with high index faceted corrugation: Synthesis and optical properties. *Nature Scientific Reports,* 3:1793.

95. Polali, S., Singh, D. and **Pavan Kumar, G.V.** (2013). Evanescent field-assisted intensity modulation of surface enhanced Raman scattering from a single plasmonic nanowire. *Journal of Physics D: Applied Physics*, 46:195107.

96. Patra, P.P. and **G.V. Pavan Kumar** (2013). Single molecule surface enhanced Raman scattering sensitivity of Ag-core au-shell nanoparticles: Revealed by bi-analyte method. *Journal of Physical Chemistry Letters*, 4:1167-1171.

97. **Pavan Kumar**, **G.V.** and Raghuwanshi, M. (2013). Palladium adjoined gold split-ring resonators: a prospective nanoplasmonic hydrogen sensor. *Optics Communications,* 300:65-68.

98. Raghuwanshi, M. and **Pavan Kumar, G.V.** (2013). Plasmonic nanowires arranged in fibonacci number chain: excitation angle-dependent optical properties. *AIP Advances,* 3:022112.

99. Arif, M., Kathigeyan, D., Siddhanta, S., **Pavan Kumar, G.V**., Narayana, C. and Kundu, T.K. (2013). Analysis of protein acetyltransferase structure-function relation by surface-enhanced Raman scattering (SERS): A tool to screen and characterize small molecule modulators. *Methods in Molecular Biology,* 981:239-261.

100. Chikkaraddy, R., Dasgupta, A., Dutta Gupta, S. and **Pavan Kumar, G.V.** (2013). Microsphere-coupled organic waveguides: Preparation, remote excitation of whispering gallery modes and waveguiding property. *Applied Physics Letters,* 103:031112.

101. Dasgupta, A., Singh, D. and **Pavan Kumar, G.V.** (2013). Dual-path remote-excitation surface enhanced Raman microscopy with plasmonic nanowire dimer. *Applied Physics Letters,* 103:151114.

Theoretical Sciences

102. Harikrishnan, K.P., **Ambika, G**. and Misra, R. (2013). Characterising chaos-hyperchaos transition using correlation dimension. *European Physical Journal Special Topics,* 222:839-846.

103. Harikrishnan, K.P., Misra, R. and **Ambika, G**. (2013). On the transition to hyperchaos and the structure of hyperchaotic attractors. *European Physical Journal B,* 86:394.

104. Akshay, Y.S. and **Ananth, S.** (2013). Cubic interaction vertices in higher spin theories. *Journal of Physics A*: *Mathematical and Theoretical*, 47:045401.

105. Afshar, H., **Bagchi, A.**, Fareghbal, R., Grumiller, D. and Rosseel, J. (2013). Higher spin theory in 3-dimensional flat space. *Physical Review Letters,* 111:121603.

106. **Bhattacharyay, A.** (2013). Equilibrium of a mesoscopic system with conformation dependent damping: An alternative approach. *Physica A: Statistical Mechanics and its Applications*, 392:4265-4270.

107. Kiruthiga, J. and **Chatterji, A.** (2013). Nanochannel induced advection combined with reaction diffusion dynamics of reacting ions leads to self assembly of ordered cylindrical nanostructures. *Journal of Chemical Physics*, 138:024905-1 - 024905-9.

108. **Chatterji, A**. and Ghatage, D. (2013). Steady state dynamics of colloids/ polymers in uniaxial extensional flow. *Physical Review E*, 88:043303.

109. Singh, S.P., **Chatterji**, A., Winkler, R.G. and Gompper, G. (2013). Dynamical and rheological behaviour of ultrasoft colloids under shear flow. *Macromolecules,* 46:8026-8036.

110. Satin, S., Parvate, A. and **Gangal, A.D.** (2013). Fokker–Planck equation on fractal curves. *Chaos, Solitons & Fractals,* 52:30-35.

111. Joshi, N. and **Ghosh, P**. (2013). Substrate induced changes in the magnetic and electronic properties of hexagonal boron nitride. *Physical Review B*, 87:235440.

112. Santra, S., Hota, P.K., Bhattacharyya, R., Bera, P., **Ghosh, P.** and Mandal, S.K. (2013). Palladium nanoparticles on graphite oxide: a recyclable catalyst for the synthesis of biaryl cores. *ACS Catalysis,* 3:2776.

113. Joshi, N., Kaul, I., **Ballav, N**. and **Ghosh, P**. (2013). Spin enhancement and band gap opening of ferromagnetic grapheme on fcc-Co(111) surface upon hydrogenation. *AIP Conference Proceedings*, 1512:694-695.

114. **Ghosh, P**., Camellone, M.F. and Fabris, S. (2013). Fluxionality of Au clusters at ceria surfaces during CO oxidation: relationships among reactivity, size, cohesion, and surface defects from DFT simulations. *Journal of Physical Chemistry Letters*, 4:2256.

115. Sarkar, S., **Kabir**, M., Greenblatt, M. and Saha-Dasgupta. T. (2013). Role of oxometallic complex on OH dissociation during water oxidation: A microscopic insight from DFT Study. *Journal of Materials Chemistry A,* 1:10422.

116. Yadav, R.K., **Khare, A.** and Mandal, B.P. (2013). The Scattering amplitude for a newly found exactly solvable potential. *Annals of Physics,* 331:313-316.

117. Malik, R.P. and **Khare, A**. (2013). Novel symmetries in N = 2 supersymmetric quantum mechanical models. *Annals of Physics,* 334:142-156.

118. Samuelsen, M.R., **Khare, A.**, Saxena, A. and Rasmussen, K. (2013). Statistical mechanics of a discrete Schrodinger equation with saturable nonlinearity. *Physical Review E,* 87:044901.

119. Yadav, R.K., **Khare, A**. and Mandal, B.P. (2013). The scattering amplitude for one parameter family of shape invariant potentials related to X_m Jacobi polynomials. *Physics Letters B,* 723:433-435.

120. Sree Ranjani, P., Kapoor, A.K., **Khare, A.** and Panigrahi, P.K. (2013). A QHJ proof of the nodal structure of the wave functions of supersymmetric partner potentials. *Pramana,* 81:237-246.

121. Cuevas, J., Kevrekidis, P.G., Saxena, A. and **Khare, A.** (2013). PT -symmetric dimer of coupled nonlinear oscillators. *Physical Review A*, 88:032108.

122. **Khare, A.** and Saxena, A. (2013). Linear superposition for a class of nonlinear equations. *Physics Letters A*, 377:2761-2765.

123. Sasikala, W.D. and **Mukherjee, A.** (2013). Intercalation and de-intercalation pathway of proflavine through the minor and major grooves of DNA: Role of water and entropy. *Physical Chemistry Chemical Physics*, 15:6446-6455.

124. Kulkarni, M. and **Mukherjee, A.** (2013). Sequence dependent free energy profiles of localized B- to A-form transition of DNA in water. *Journal of Chemical Physics*, 139:155102.

125. Kishore, V., Sonawane, A.R. and **Santhanam, M.S.** (2013). Manipulation of extreme events on scale-free networks. *Physical Review E*, 88:014801.

126. Arunbabu, K.P., Antia, H.M., Dugad, S.R., Gupta, S.K., Hayashi, Y., Kawakami, S., Mohanty, P.K., Nonaka, T., Oshima, A. and **Subramanian, P**. (2013). High-rigidity Forbush decreases: due to CMEs or shocks? *Astronomy and Astrophysics*, 555:A139.

127. Sadhu, A. and **Suneeta, V.** (2013). A naked singularity stable under scalar field perturbations, in IJMPD. *International Journal of Modern Physics D*, 22:1350015.

128. Sunda, A.P. and **Venkatnathan, A**. (2013). Parametric dependence on shear viscosity of SPC/E water from equilibrium and non-equilbrium molecular dynamics simulations, *Molecular Simulation*, 39:728-733.

129. Ramya, K.R. and **Venkatnathan. A.** (2013). Vibrational Raman spectra of hydrogen clathrate hydrates from Density Functional Theory. *Journal of Chemical Physics*, 138:124305.

130. Sunda, A.P., More, M. and **Venkatnathan, A.** (2013). A molecular investigation of nanostructure and dynamics of phosphoric/triflic acid blends of hydrated ABPBI [poly(2,5-benzimidazole)] polymer electrolyte membrane. *Soft Matter*, 9:1122.

131. Sunda, A.P., and **Venkatnathan, A.** (2013). Molecular Dynamics simulations of side chain pendant of perfluorosulfonic acid polymer electrolyte membranes. *Journal of Materials Chemistry A*, 1:557.

132. More, M., Pahari, S., Roy, S. and **Venkatnathan, A.** (2013). Characterization of structure and dynamics of phosphoric acid doped benzimidazole mixtures: A Molecular Dynamics study. *Journal of Molecular Modeling*, 19:109-118.

133. Kumar, M. and **Venkatnathan, A.** (2013). Mechanism of proton transport in ionic-liquid-doped perfluorosulfonic acid membranes. *Journal of Physical Chemistry B*, 117:14449.

134. Ramya, K.R. and **Venkatnathan, A.** (2013). Characterization of interaction energy and vibrational Raman spectra of nitrogen clathrate hydrates. *Computational and Theoretical Chemistry*, 1024:1.

135. Ramya, K.R. and **Venkatnathan, A.** (2013). Density Functional Theory study of oxygen clathrate hydrates. *Indian Journal of Chemistry* Sec A, Special Issue on Complex Chemical Systems, 52A:1061.

136. Ramya, K. R. and **Venkatnathan, A.** (2013). Characterization of methane, hydrogen and oxygen clathrate hydrates: Perspectives from experiments and theory. Special theme in Modelling and Simulation: Molecules to Materials. *ISRAPS Bulletin*, 25(4):74.

Biological Sciences

137. **Banerjee, J.** and Nilsen-Hamilton, M. (2013). Aptamers: multifunctional molecules for biomedical research. *Journal of Molecular Medicine,* 91:1333-1342.

138. Chiang, G.C.K., **Barua, D.**, Dittmar, E., Kramer, E.M., Rubio de Casas, R. and Donohue, K. (2013). Pleiotropy in the wild: the dormancy gene DOG1 exerts cascading control over life cycles. *Evolution*, 67:883-893.

139. Raghavan, R., **Dahanukar, N**., Krishna Kumar, K., Tlusty, M., Rhyne, A., Molur, S. and Rosser, A.M. (2013). Uncovering an obscure trade: threatened freshwater fishes and the aquarium pet trade. *Biological Conservation,* 164:158-169.

140. Pande, S. and **Dahanukar, N.** (2013). Reversed sexual dimorphism and prey delivery: response to Olsen. *Journal of Raptor Research,* 47:81-82.

141. Raghavan, R., Tharian, J., Ali, A., Jadhav, S. and **Dahanukar, N**. (2013). *Balitora jalpalli*, a new species of stone loach (Teleostei: Cypriniformes: Balitoridae) from Silent Valley, southern Western Ghats, India. *Journal of Threatened Taxa,* 5:3921-3934.

142. **Dahanukar, N**., Philip, S., Krishnakumar, K., Ali, A., Raghavan, R. (2013). The phylogenetic position of *Lepidopygopsis typus* (Teleostei: Cyprinidae), a monotypic freshwater fish endemic to the Western Ghats of India. *Zootaxa,* 3700:113-139.

143. John, L., Philip, S., **Dahanukar**, N., Hamsa, P., Ali, A., Tharian, J., Raghavan, R. and Antunes, A. (2013). Morphological and genetic evidence for multiple evolutionary distinct lineages in the endangered and commercially exploited red lined torpedo barbs endemic to the Western Ghats of India. *PLoS One* 8(7):e69741.

144. **Dahanukar, N**., Krutha, K., Paingankar, M.S., Padhye, A.D., Modak, N. and Molur, S. (2013). Endemic Asian chytrid strain infection in threatened and endemic anurans of the northern Western Ghats, India. *PLoS One* 8(10):e77528.

145. Raghavan, R., Philip, S., **Dahanukar, N.** and Ali, A. (2013). Freshwater biodiversity of India: a response to Sarkar et al. (2013). *Reviews in Fish Biology and Fisheries,* 23:547-554.

146. Raghavan, R., Philip, S., Ali, A. and **Dahanukar, N.** (2013). *Sahyadria*, a new genus of barbs (Teleostei: Cyprinidae) from Western Ghats of India. *Journal of Threatened Taxa,* 5(15): 4932-4938.

147. Padhye, A.D., Sayyed, A., Jadhav, A. and **Dahanukar, N**. (2013). *Raorchestes ghatei*, a new species of shrub frog (Anura: Rhacophoridae) from the Western Ghats of Maharashtra, India. *Journal of Threatened Taxa* 5(15): 4913-4931.

148. Raghavan, R., **Dahanukar, N**., Philip, S., Krishnakumar K. and Ali, A. (2013). 'Phantom references' 'Nomina nuda' and the dilemma of freshwater fish taxonomy in India. *Current Science*, 104:1277-1279.

149. Nagaraj, N., Balasubramanian, K. and **Dey, S**. (2013). A new complexity measure for time series analysis and classification. *European Physical Journal Special Topics,* 222:847-860.

150. Sah, P., Paul Salve, J. and **Dey, S**. (2013). Stabilizing biological populations and metapopulations by Adaptive Limiter Control. *Journal of Theoretical Biology,* 320:113-123.

151. Narlikar, L., Mehta, N., **Galande, S.** and Arjunwadkar, M. (2013). One size does not fit all: On how Markov model order dictates performance of genomic sequence analyses. *Nucleic Acids Research,* 41: 1416-1424.

152. Suri, D., Veenit, V., Sarkar, A., Thiagarajan, D., Kumar, A., Nestler, E.J., **Galande, S.** and Vaidya, V.A. (2013). Early stress evokes age-dependent biphasic changes in hippocampal neurogenesis, epigenetic regulation of the bdnf gene, and cognitive behavior. *Biological Psychiatry,* 73:658-666.

153. Sahasrabudhe, A., Vittal, V. and **Ghose, A**. (2013). Peeping in on the cytoskeleton: Light microscopy approaches to actin and microtubule organization. *Current Science,* 105:1562-1570.

154. Kar, M., Tiwari, N., Tiwari, M., **Lahiri, M**. and Sen Gupta, S. (2013). Poly-L-Arginine grafted silica mesoporous nanoparticles for enhanced cellular uptake and their application in DNA delivery and controlled drug release. *Particle & Particle Systems Characterization,* 30:166-179.

155. Shnyrova, A.V., Bashkirov, P.V., Akimov, S.A., **Pucadyil, T.J**., Zimmerberg, J., Schmid, S.L., Frolov, V.A. (2013). Geometric catalysis of membrane fission driven by flexible dynamin rings. *Science,* 339:1433-1436.

156. Neumann, S., **Pucadyil, T.J.** and Schmid, S.L. (2013). Analyzing membrane remodeling and fission using supported bilayers with excess membrane reservoir. *Nature Protocols,* 8:213-222.

157. Khan, U., Mehere, P., Senthilkumar, D. and **Ratnaparkhi**, **G.S.** (2013). The SUMO cycle in Hydra. *Genesis*, 9:619-29.

158. Subramaniam, S., Sreenivas, P., Cheedipudi, S., Reddy, V.R., **Shashidhara, L.S.**, Chilukoti, R.K., Mylavarapu, M. and Dhawan, J. (2013). Distinct transcriptional networks in quiescent myoblasts: A role for Wnt signaling in reversible vs. irreversible arrest. *PLoS One* 8:e65097.

159. Desai, S.J., Upadhya, M.A., Kokare, D.M., **Subhedar, N.K.** (2013). Morphine induced reward is mediated via NPY Y1 receptors in the nucleus accumbens shell. *Behavioral Brain Research,* 247:79-91.

160. Bharne, A.P., Upadhya, M.A., Shelkar, G.P., Singru, P.S., **Subhedar, N.K.** and Kokare, D.M. (2013). Neuroprotective effect of cocaine- and amphetamine-regulated transcript peptide in spinal cord injury in mice. *Neuropharmacology,* 67:126-135.

161. Upadhya, M.A., Kokare, D.M., **Subhedar, N.K**. (2013) Cocaine- and amphetamine-regulated transcript (CART) peptide in the central nucleus of amygdala potentiate behavioral and hormonal responses of the rat exposed to its predator. *Behavioral Brain Research,* 243:129-137.

162. Nakhate, K.T., **Subhedar, N.K.**, Bharne, A.P., Singru, P.S. and Kokare, D.M. (2013). Involvement of cocaine- and amphetamine-regulated transcript peptide in the hyperphagic and body weight promoting effects of allopregnanolone in rats. *Brain Research*, 1532:44-55.

163. Kumbhar, C. and **Watve, M.** (2013). Why antibiotics: comparative evaluation of different hypotheses for the natural role of antibiotics and an evolutionary synthesis. *Natural Science*, 5:26-40.

164. **Watve, M**. and Pramod, P. (2013). Type 2 diabetes: insights obtained from wildlife research. *Current Conservation*, 7:32-37.

Mathematics

165. **Balasubramanyam, B.,** Ghate, E., Vatsal, V. (2013). On local Galois representations associated to ordinary Hilbert modular forms. *Manuscripta Mathematica,* 142:513-524.

166. **Banerjee, D.** (2014). Differential modular forms on the Shimura curves over totally real fields. *Journal of Number Theory*, 135:353-373.

167. **Basu, R.** (2013). An exposition: On the elementary subgroup of GL_n over rings. *Mathematics Newsletter,* Vol. 24 (2013).

168. **Borah, D.** (2013). Remarks on the metric induced by the Robin function II. *Michigan Mathematical Journal*, 62:581-630.

169. **Deshpande, J.V.**, Lam, K.F., Naik-Nimbalkar, U.V., Xu, Y. (2013). Tests for comparing the progression of an epidemic in two groups. *Journal of Indian Statistical Association* (Accepted for Publication).

170. **Goel, P**. and Mehta, A. (2013). Learning theories reveal loss of pancreatic electrical connectivity in diabetes as an adaptive response, *PLoS ONE*, 8(8): e70366.

171. Atar, R., Shwartz, A. and **Goswami, A.** (2013). Risk-sensitive control for the parallel server model. *SIAM Journal of Control Optimization,* 51:4363-4386.

172. Biswas, I. and **Hogadi, A.** (2013). On the fundamental group of a variety with quotient singularities. *International Mathematics Research Notices* (Accepted for Publication).

173. **Mahalanobis, A**. (2013). Are matrices useful in public-key cryptography? *International Mathematical Forum*, 8(39):1939-1953.

174. **Mahalanobis, A**. The MOR cryptosystem and extra-special p-groups. Proceedings of WCC 2012, Castro Urdiales, Spain July 9-13, 2012 & To appear in *Journal of Discrete Mathematics and Cryptography*.

175. **Mahalanobis, A**. (2013). The automorphism group of the group of unitriangular matrices over a field. *International Journal of Algebra,* 7(15):723-733.

176. **Maity, S.**, Arackaparambil, C. and Meyase, K. (2013). A new construction of resilient Boolean functions with high nonlinearity. *Ars Combinatoria,* 109:171-192.

177. **Mishra, R.** (2013). Nodal Parity Invariant for knotted rigid vertex graphs. *Journal of Knot Theory and its Ramifications*. 22(4).

178. **Mishra, R.** (2013). Polynomial Unknotting and Singularity Index. *Kyungpook Mathematical Journal* (Accepted for Publication).

179. **Bhagwat, C.R.** and **Raghuram, A.** (2013). Ratios of periods for tensor product motives. *Mathematical Research Letters,* 20:615-628.

180. **Raghuram, A.** (2013). Comparison results for certain periods of cusp forms on GL(2n) over a totally real number field. To appear in the *Proceedings of the Legacy of Srinivasa Ramanujan* conference, held in New Delhi in December 2012 (Accepted for Publication).

181. **Raghuram, A.** (2013). Special values of the Riemann zeta function: some results and conjectures. To appear in the *Proceedings of the workshop on Bloch-Kato conjecture for the Riemann zeta function for odd positive integers* held at IISER Pune, July 2012 (Accepted for Publication).

182. Bucur, A., Chantal, D., Feigon, B., Lalín, M. and **Sinha, K.** (2012). Distribution of zeta zeroes of Artin-Schreier covers. *Mathematical Research Letters,* 19:1329-1356.

Book Chapters

Satin, S.E. and **Gangal, A.D.** (2013). Random walk and broad distributions on fractal curves. In *Fractional Calculus: Theory and Applications,* Daftardar-Gejji, V. (Ed.) Narosa Publishers.

Parvate, A., Satin, S. and **Gangal, A.D.** (2013). Outline of calculus on fractals and applications. In *Fractional Calculus: Theory and Applications,* Daftardar-Gejji, V. (Ed.) Narosa Publishers.

Mukherjee, A. and Sasikala, W.D. (2013). Drug-DNA intercalation: From discovery to the molecular mechanism. In *Dynamics of Proteins and Nucleic Acids Vol 92, Series: Advances in Protein Chemistry and Structure Biology*, Karabencheva, T. (Ed.) Academic Press, UK. (Invited Review, In Press)

Ranade, D. and **Sengupta, K.** (2013). Nuclear organization of cancer cells. In *Recent Trends in Gene Expression*, Mandal, S.S. (Ed.) pp. 133-146, Nova Science Publishers Inc. (Invited Review).

Journal Special Issue, Guest Editor

Ambika, G. (2013). From solitons and chaos to complex systems- Perspectives and trends. *The European Physical Journal Special Topics* 222.

Ganesh, K.N. and Krishnan, Y. (2013). Nucleic acids − Chemistry and applications. *Journal of Organic Chemistry*, 78:12283-12287.

Patent

Mohite, A.R. and **Bhat, R.G**. Synthesis of (E)-α,β-unsaturated carboxylic acids and esters; *Provisional Patent Applied in India, Application No. 2437/MUM/2013*

Publications of IISER Pune faculty members from research carried out elsewhere

183. **Bagchi, A.** and Grumiller, D. (2013). Holograms of flat space. *International Journal of Modern Physics D,* 22:1342003. (Honourable mention in the Gravity Research Foundation 2013 Awards for Essays on Gravitation)

184. **Bagchi, A.**, Detournay, S., Grumiller, D. and Simon, J. (2013). Cosmic evolution from phase transition of 3-dimensional flat space. *Physical Review Letters,* 111:181301.

185. **Bagchi, A.**, Detournay, S., Fareghbal, R. and Simon, J. (2013). Holography of 3D Flat Cosmological Horizons. *Physical Review Letters,* 110:141302.

186. **Bagchi, A.** (2013). Tensionless strings and Galilean conformal algebra. *Journal of High Energy Physics*, 1305:141.

187. Sarangi, S., Pandey, A., Papa, A.L., Sengupta, P., Kopparam, J., Dadwal, U., **Basu, S**. and Sengupta, S. (2013). P2Y12 receptor inhibition augments cytotoxic effects of cisplatin in breast cancer. *Medical Oncol*ogy, 30:567.

188. Craven, M., Yahya, R., Kozhevnikova, E., **Boomishankar, R**., Robertson, C. M., Steiner, A. and Kozhevnikov, I. (2013). Novel polyoxometalate–phosphazene aggregates and their use as catalysts for biphasic oxidations with hydrogen peroxide. *Chemical Communications,* 49: 349-351.

189. Winkler, R.G., Singh, S.P., Huang, C.-C., Fedosov, D.A., Mussawisade, K., **Chatterji, A.**, Ripoll, M., Gompper, G. (2013). Mesoscale hydrodynamic simulations of particle suspensions under shear flow. *The European Physical Journal Special Topics*, 222:2773.

190. **Chaudhury, S.,** Cao, J. and Sinitsyn, N.A. (2013). Universality of poisson indicator and fano factor of transport event statistics in ion channels and enzyme kinetics, *Journal of Physical Chemistry B*, 117:503-509.

191. Al-Hashimi, H.M., Petzold, K., **Chugh, J**., Mustoe, A.M., Dethoff, E.A. and Brooks III, C. (2013). Predictive understanding of RNA dynamic behavior: Bringing order to disorder. *The FASEB Journal*, 27(96.1) (Conference Abstract)

192. **Dube, S**. (2013). Search for microscopic black holes in a like-sign dimuon final state using large track multiplicity with the ATLAS detector. The ATLAS Collaboration, *Physical Review D* 88:072001. *In addition, Sourabh Dube was an author on 17 papers as a member of the ATLAS collaboration (September 2013 – December 2013)*

193. **Gayathri, P**.*, Fujii, T.*, Namba, K. and Löwe, J. (2013). Structure of the ParM filament at 8.5Å resolution. *Journal of Structural Biology*, 184:33-42. (*Equal authors)

194. **Kalelkar, T.** and Roberts, R. (2013). Taut foliations in surface bundles with multiple boundary components. *Pacific Journal of Mathematics* (Accepted for Publication).

195. Gadgil, S., and **Kalelkar, T.** (2013). A chain complex and quadrilaterals for normal surfaces. *Rocky Mountain Journal of Mathematics,* 43:479-487.

196. Marshall, C., Agarwal, N., **Kalia, J**., Grosskopf, V., McGrath, N., Abbott, N.L., Raines, R.T., and Shusta, E.V. (2013).Facile chemical functionalization of proteins through intein-linked yeast display. *Bioconjugate Chemistry*, 24:1634-1644.

197. **Kalia, J**. and Swartz, K.J. (2013). The design principles of paddle motifs in voltage sensors. *Nature Structural and Molecular Biology,* 20:534-535.

198. **Kalia, J**. and Swartz, K.J. (2013). Exploring structure-function relationships between TRP and Kv channels. *Scientific Reports,* 3:1523.

199. **Kalia J**. and Swartz K.J. (2013). Common principles of voltage-dependent gating for Hv and Kv channels. *Neuron*, 77:214-216.

200. **Khan, S**., Gopakumar, G., Thiel, W. and Alcarazo, M. (2013). Stabilization of a two-coordinate [GeCl]+ cation by simultaneous σ and π donation from a monodentate carbodiphosphorane. *Angewandte Chemie International Edition*, 52:5644-5647.

201. Bagger, J., Lambert, N. and **Mukhi, S.** and Papageorgakis, C. (2013). Multiple membranes in M-theory. *Physics Reports,* 527:1-100.

202. Ivica, N.A., Obermayer, B., Campbell, G.W., **Rajamani, S.**, Gerland, U. and Chen, I.A. (2013). The paradox of dual roles in the RNA world: resolving the conflict between stable folding and templating ability. *Journal of Molecular Evolution*, 77:55-63.

203. Simutis, G., Gvasaliya, S., Månsson, M., Chernyshev, A.L., Mohan, A., **Singh, S.**, Hess, C., Savici, A.T., Kolesnikov, A.I., Piovano, A., Perring, T., Zaliznyak, I., Büchner, B. and Zheludev, A. (2013). Spin pseudogap in Ni-doped $SrCuO_2$. *Physical Review Letters*, 111:067204.

204. Biswas, I. and **Sebastian, R.** (2013). On rationality of moduli spaces of vector bundles on real Hirzebruch surfaces. *Proceedings of Indian Academy of Sciences (Mathematical Sciences),* 123:213-223.

205. **Sebastian, R.** (2013). Smash nilpotent cycles on varieties dominated by products of curves. *Compositio Mathematica,* 149:1511-1518.

Invited Lectures

G. Ambika *Nonlinear dynamics- Application in biological systems* National Colloquium on Applicable Mathematics in Basic Science Education and Research, Srinivasa Ramanujan Institute for Basic Sciences, Trivandrum, April 5-7, 2013 • *Understanding complex systems through networks* National Seminar on Recent Trends in Nonlinear Science and Applications, Cochin College, September 27-28, 2013 • *Novelties of nonlinear dynamics* National Seminar "Science sans Borders" to commemorate the 50th anniversary of the path breaking work of C.N. Ramachandran, November 08, 2013 • *Characterization and time series analysis* 4 lectures in DST SERC school on Nonlinear dynamics, Panjab University, Chandigarh, January-February 2014 • *Environmental effects in dynamics of complex systems* IISER Bhopal, March 28, 2014

Sudarshan Ananth *Spacetime and quantum mechanics* Department of Physics, NIT Surathkal, February 13, 2014 • *Scattering amplitude structures in higher spin theories* Chennai Mathematical Institute, March 6, 2014

Arjun Bagchi *Building flat holography* IISER Pune, June 2013; TIFR Mumbai, June 2013 • *One symmetry to rule them all* International Centre for Theoretical Sciences, Bangalore, September 2013 • *Understanding holography* Indian Institute of Technology, Gandhinagar, November 2013; Physical Research Laboratory, Ahmedabad, March 2014 • *Fun in flat space* International Centre for Theoretical Sciences, Bangalore, February 2014

Sudipta Basu *Targeting cancer by chemical nanobiotechnology* 101st Indian Science Congress, Jammu, 2014

Debargha Banerjee *Differential modular forms on the Shimura curves over totally real fields* Conference on the Local Langlands conjecture and Galois Representation, TIFR, Mumbai, December 26, 2013 • *Eisenstein elements inside the space of modular symbols*, the first Mumbai-Pune Number Theory Seminar, IIT Bombay, April 4, 2014

Anjan Banerjee *RNA transport and stability* Institute of Biological Research (IBR), Rosario, Argentina, December 18, 2013 • *miRNA156- a potential long distance signal that regulates plant architecture and tuberization in potato* INGEBI, Buenos Aires, Argentina, December 19, 2014 • *Why to study plants* for Botanica-2014 an inter college competition organized by Department of Botany, Wadia college, Pune, January 18, 2014 • *Small RNA transport: the emerging trends of long distance communication in plants Concepts and mechanisms in plant development* NCBS, Bangalore, March 20, 2014 • *Phloem mobile signals that control tuberization in potato* UGC-SAP Program, South Campus, Delhi University, March 27, 2014

Deepak Barua *Phenotypic plasticity, foundations of evolutionary biology: The ongoing synthesis* Coorg, February 2014 • *Plant phenology in the Asian tropics* YETI 2013 (Young Ecologists Talk and Interact), Nagaland, December 2013 • *Evolutionary ecology of plant adaptation to the environment. "Tree of Life"* Science Academies Education Program, Jai Hind College, Mumbai, December 11, 2013

Rabeya Basu *Introduction to K-theory* Department of Pure Mathematics, University of Calcutta, August 2013 • *Genesis of Modern Mathematics: Matrix version of Division Algorithm* DST-INSPIRE Camp-2014 at Jaysingpur (Kolhapur), Maharashtra, January 5, 2014

Chandrasheel Bhagwat *Can we hear the shape of a drum*? Fergusson College Pune, December 2013

Ramakrishna Bhat *Trends in Organic Synthesis* Prof. Koppalkar Memorial Lecture, Dr. A.V. Baliga College, Karnatak University, February 2013 • *Science for Sustainable Living* DST INSPIRE, Yashwantrao College of Science, Karad, January 9, 2014

Arijit Bhattacharyay *Statistical physics of mesoscopic systems: Directed transport and non-canonical distribution* IIT Kharagpur, July 22, 2013

Diganta Borah Six lectures in the subject Complex Analysis, Annual Foundation School (AFS) III, University of Pune, Pune, June 3-29, 2013

Harinath Chakrapani Research Seminar at the Department of Chemistry, Keele University, U.K., October 15, 2013 • *The new perspectives of inculcating the different aspects of Chemistry* Department of Chemistry, University of Pune, November 18, 2013

Apratim Chatterji *Creating nano-cigars by self-assembly: A simple model to elucidate experimental observations* Department of Chemical Engineering, IIT Bombay, March 28, 2013 • *Self assembly of ordered cylindrical nanostructures - A simple model to elucidate experimental observations* TCIS Hyderabad, November 26, 2013 • *Ordered by entropy-An introduction to soft matter physics* Presidency College, Kolkata, February 25, 2014

Anisa Chorwadwala *A glimpse of shape optimization problems* Department of Mathematics, University of Delhi, February 15, 2013

Aloke Das *Non-covalent interactions in biomolecules and materials: Gas phase laser spectroscopy and quantum chemistry calculation* Saha Institute of Nuclear Physics (SINP), Kolkata, February 24, 2014 • $n \rightarrow \pi^*$ *interaction: Too weak but can compete with strong hydrogen bonding interaction* Tata Institute of Fundamental Research (TIFR), Mumbai, February 17, 2014 • *Non-covalent interactions in biomolecules and materials: Gas phase laser spectroscopy and quantum chemistry calculations* Meeting on Virtual Atomic and Molecular Data Centre (VAMDC), St. Laurn Towers, Ashram road, Ahmedabad, November 21-22, 2013 • *Non-covalent interactions in biomolecules and materials: Gas phase laser spectroscopy and quantum chemistry calculations* University of Edinburgh, U.K., June 21, 2013

Sutirth Dey *Evolution: A broad overview* Pune University Zoology Department, September 21, 2013 • *Series of talks on Ecology* MS University, Baroda, September 25-27, 2013 • *Critical thinking in science* Outreach program at St. Ann's College, Hyderabad, October 26, 2013

Sourabh Dube *Searches for new phenomena at the LHC* Frontiers in Physics VII, Fergusson College, Pune, January 23, 2014

Krishna Ganesh *Cationic collagen peptides as cell penetrating agents* Department of Chemistry, University of Madras, Chennai, February 2013 • *Making drugs out of Nucleic Acids: The genomic medicine* Indo-German Science Mela, Pune, February 14, 2013 • *Science - Some random thoughts* Lupin R & D Laboratories, Pune February 28, 2013 • *Making drugs out of Nucleic Acids: The genomic medicine* Prof. S.K. Pradhan Endowment Lecture, Institute of Chemical Technology, Mumbai, April 15, 2013 • *Travails of a chemist at crossroads: A sandwalk talk* Indian Institute of Science Education and Research, Pune, May 20, 2013 • *Making drugs out of Nucleic Acids: The genomic medicine* National Institute of Interdisciplinary Science and Technology, Trivandram, June 10, 2013 • *Chemistry: From matter to life* JNCASR, Bangalore, June 30, 2013 • *Making medicines out of nucleic acids: From "Peptide" Nucleic acids (PNA) to "Pune" Nucleic Acids (PuNA)* Sir J C Ghosh Memorial Lecture, IIT Kharagpur, September 20, 2013 • *What is Science and Why do science?* Khalsa College, Mumbai, INSPIRE Camp, September 25 2013 • *"Peptide" Nucleic acids (PNA) to "Pune" Nucleic acids (PuNA): Designs with purpose*, Foundation Day, National Institute of Immunology, New Delhi, October 6, 2013 • *Making medicines out of nucleic acids: PNA analogues* Astra Zeneca R & D Centre, Bangalore, December 17, 2013

Sujit Ghosh Alkyl Amines-ICT Foundation Day Young Scientist Award Lecture, ICT Mumbai, December 21, 2013

H.N. Gopi Department of Chemistry, IIT-Madras, June 19, 2013

Anirban Hazra *The science of sound* Summer Science Workshop, Muktangan Exploratory Science Centre, Pune, April 19, 2013 • INSPIRE Science Camp organized by the Late G.N. Sapkal College of Engineering, Nashik, May 10, 2013

M. Jayakannan *Polymer nano-scaffolds for drug delivery applications* ICT Mumbai, June 12, 2013 • *Polymer based on amino acids plastic materials from bio-resources* NCL Pune, February 11, 2013

Tejas Kalelkar *Taut foliations in surface bundles with multiple boundary components* Indian Statistical Institute, Delhi, March 2014

Krishanpal Karmodiya *Hands-on Training: Implementing NGS for Genomics and Epigenetics Studies,* IISER Pune, February 24-27, 2014

Avinash Khare *Forced Nonlinear Schrödiner Equation with Arbitrary Nonlinearity* Institute of Physics, Bhubaneswar, October 2013 • *Introduction to Chaos* IIT Bhubaneswar, October 2013 *Introduction to Chaos* Nagpur University, Nagpur, January 2014 • *Nobel Prize in Physics 2013* IUCAA, Pune, February 2014

Outreach Lectures: Basic Constituents of Nature New English School, Gadegaon Taluka, Pandharpur; Karmavir Bhaurao Patil Mahavidyalaya, Pandharpur, February 2013; INSPIRE Camp at NIIT Rourkela, June 2013; XI-XII students of small towns of Maharashtra at IISER Pune, July 2013; INSPIRE Camp at KCB Government College, Bhilai, September 2013; Holeshwar Vidyalaya, Hoal, Marathwada, November 2013; Dnyanada English Medium School, Aurangabad, Marathwada, November 2013; Engineering College, Karnataka, December 2013; Bhalerao Science Undergraduate College, Dist. Nagpur, January 2014; Montfort Senior Secondary School, Wardha Road, Dist. Nagpur, January 2014; INSPIRE Camp, HNB Garhwal University, Uttaranchal, January 2014 • *Recent Discovery of Higgs particle,* RN Joshi Memorial Lecture at Willingdon College, Sangli, August 2013

Ayan Mahalanobis *Eighteen coast combinatorics conference* Kailua-Kona, HI, U.S.A., February 18-21 2013

Rama Mishra *Series of Lectures on Knot Homology* Indian Institute of Technology, Ropar, India, April 2013 • Boise State University, Boise, Idaho, U.S.A., September 2013 • *Topology Seminar* University of Illinois at Chicago, U.S.A., September 2013

Sunil Mukhi *Windows Onto Nature* Public Lecture, Homi Bhabha Centre for Science Education, April 20, 2013; Institute of Physics, Bhubaneswar, Foundation Day Lecture, September 4, 2013; "Singularity" Student Festival, IISER Bhopal, February 2, 2014 • *Consistent and symmetric: The evolution of fundamental theory from gauge fields to strings* IISER Pune Colloquium, August 21, 2013; NISER Bhubaneswar Colloquium, September 6, 2013 • Mentor's talk at Ramanujan Conclave, Pune, December 14, 2013 • *Scientific Temper* Science Day, IISER Pune, February 28, 2014

Suhita Nadkarni Young Investigators Meeting (YIM), IndiaBiosciences, Hyderabad, India, February 2014 • Seminar at Center for Modeling and Simulations (CMS) Pune University, November 2013 • Inter-IISER Computational Biology Meeting IISER Mohali and Chail, Himachal Pradesh, June 2013

Angshuman Nag *Colloidal all-inorganic nanocrystals for optoelectronics* Indian Association for the Cultivation of Science, Kolkata, November 16, 2013 • *Colloidal all-inorganic nanocrystals for optoelectronics* Indian Institute of Science Education and Research, Kolkata, November 21, 2013

Sunil Nair *Magnetism at lower dimensions* National Defense Academy, Pune, March 2014

Arvind Natu *Nucleic acid tests for blood safety* Janakalyan Blood bank, Pune • *Biopharmaceuticals discovery* FDP Program, Shirpur • *Fostering scientific temper* Amravati University, Amravati • *Fostering scientific temper in interdisciplinary teaching* Botany Department, University of Pune • *Fostering scientific temper* K.J. College, Pune • *Target validation*, MIT, Pune • *Safer antifungals* International Symposium in Chemical Sciences, Jalgaon • *Industry-Academia*

relations, Modern College, Pune • *Industry-Biotechnology for society*, India-Mexico Workshop, Pune • *Higher education in basic science: Social angle*, Indian Social Science Congress AMU Aligarh • *Enzyme catalysis in drugs* NIUS Program, HBCSE, Mumbai • *Drug discovery*, Teachers' Workshop, KTHM College, Nashik • *Drug discovery* Kholeshwar Mahavidyalaya, Ambejogai • *Drug discovery in antifungals* Garware College, Pune • *Advances in drug discovery* Department of Microbiology, University of Pune; Haryana Science & Technology Mission, G.J. University, Hissar (Haryana) • Talk at Ace Research Foundation, Pune; MMM College of Science, Deccan Gymkhana, Pune; Kholeshwar Mahavidylaya, Ambejogai; Air Force, Lohegaon; Indus Foundation, Pune; MM Junior College, Kalewadi, Pune; Delhi Public School, Pune; KBP Mahavidyalaya, Pandharpur; BVP Nutan Bharat Science College, Pune; S. Kalmadi High School, Pune

Gayathri Pananghat *Introduction to bacterial cytoskeleton* Department of Microbiology, St. Ann's College, Mehdipatnam, Hyderabad, October 25, 2013

Shivprasad Patil *Membrane mechanical properties using atomic force microscope* Discussion Meeting on Biological Membranes, Indian Institute of Science, Bangalore, March 14-15, 2014 • *Atomic Force Microscopy for mechanical response of nano-confined liquids* Electron Microscopy Society of India, West Zone, February 2014 • *Atomic Force Microscopy for mechanical response of nano-confined liquids* Physics Department, University of Basel, Switzerland

Thomas Pucadyil *Kinetic intermediates in dynamin-catalyzed membrane fission* Department of Chemical Engineering and Bioengineering Program, Indian Institute of Science, Bangalore, 2014 • *Reconstitution of clathrin-coated pits* Biochemical Roles of Eukaryotic Cell Surface Macromolecules, Kolkata, 2014

Sudha Rajamani *Origin and replication of informational molecules on prebiotic Earth* IISER Kolkata, April 5, 2013 • *Life in Our Universe: How did it come about* Exciting Science Group (An Initiative of NCL scientists and IISER-P Faculty), NCL Innovation Park, Pune, July 14, 2013

M.S. Santhanam *Extreme events in physical systems and complex networks* TIFR, Mumbai, August 21, 2013 • *Statistical modeling, financial data analysis and applications* Istituto Veneto di Scienze Lettere ed Arti (IVSLA), Venice, Italy, September 11-14, 2013 • *Extreme events in physical systems and complex networks* Colloquium at the Physics department of Birmingham University, September 19, 2013

Ronnie Sebastian *Smash nilpotent cycles on varieties dominated by products of curves; Representation theory of the Lie algebra – sl(2,C) – 1; Representation theory of the Lie algebra – sl(2,C) – 2* IISER Thiruvananthapuram, October 2013

L.S. Shashidhara *Popular/Science Policy Lectures* **:** *Making of a flight appendage: an evolutionary perspective* 9th Francis Crick Memorial Lecture, Hyderabad, December 27, 2013 • *Teaching Biology*, Discussion Meeting on Science Education, SINP, Kolkata, August 20, 2013 • *Scientific Research in India: Policy and Practice*, DST-NIAS workshop on Multidisciplinary Perspectives on Science, Technology and Society. NIAS, Bangalore, July 26, 2013

*Outreach Lectures***:** *Evolution of human cognition* Little Scientists Meeting of Moving Academy, Pune, June 25, 2013 • Vidya Pratishthan's School of Biotechnology, Baramati, August 27, 2013 • DST-INSPIRE Camp Kumta, October 22, 2013 • DST-INSPIRE Camp, Belgaum, October 23, 2013 • DST-INSPIRE Camp Tumkur, December 28, 2013

● DST-INSPIRE Camp, Shimoga, December 29, 2013 ● University of Pune, March 28, 2014 ● *Science Education and Research in 21st Century India: A historical perspective; Career Opportunities in Science and Technology in 21st Century India* : Young Investigator Meeting, Hyderabad, February 8-12, 2014; Fergusson College, Pune, September 21, 2013; IST, Vienna, Austria, June 18, 2013 ● *Model Organisms in Drug Discovery* Advinus, Pune, January 17, 2014

Surjeet Singh *Growth and properties of low-dimensional quantum magnets* Leibniz-Institut (IFW), Dresden, February 20-22, 2013 ● *Functional nanomaterials: Synthesis, charaterization and applications* Department of Physics, University of Pune, January 31-February 2, 2013

Kaneenika Sinha Six lectures on Analytic Number Theory, NBHM-Advanced Instructional School on Analytic Number Theory, KIIT University, Bhubaneswar, June 10-16, 2013 ● *Non-vanishing of central values of the Rankin-Selberg L-series* Analytic Theory of Automorphic Forms, Institute of Mathematical Sciences, Chennai, December 9 - 13, 2013

Steven Spallone *Jugglology* IISER Bhopal, November 15, 2013 ● *Local p-adic dynamics* IISER Bhopal, November 16, 2013

Nishikant Subhedar *Add to your CART: Research in a state level university* Third DBT-Ramaligaswamy Fellows Conclave, JW Marriott Hotel and Convention Centre, Senapati Bapat Road, Pune September 14, 2013 ● *Operant behavior: Understanding the mechanisms of reward and reinforcement* Neurological Disorders and Complimentary Alternative Medicines: Problems and Prospects, Sinhagad College of Pharmacy, Pune, February 2014

Suneeta Vardarajan Field Theoretic Aspects of Gravity FTAG-13, IIT Gandhinagar, September 2013

Arun Venkatnathan *Molecular dynamics simulation study of polymer electrolyte membranes and quantum mechanical study of clathrate hydrates* Department of Physics, Bharathiar University, Coimbatore, May 6, 2013 ● *Recent trends in renewable energy systems and software applications* Maharashtra Institute of Technology, Kothrud, Pune, December 9, 2013 ● *Computer simulations of materials of relevance to alternate energy* 1st National Conference on Energy and Environment, University of Pune, February 21, 2014

Milind Watve *Causes of hyperglycemia in type 2 diabetes,* Oxford Centre for Diabetes and Metabolism, April 5, 2013 ● *From game theory to metabolic syndrome* Max Planck Institute for Evolutionary Biology, Plon, Germany, April 11, 2013 ● *Behavior, brain, blood and beta cell,* Department of Biochemistry, Bremen University, Germany, April 13, 2013 ● *Why type 2 diabetes is incurable: Reflections on research in medicine* TIFR, Mumbai, December 11, 2013

Participation in Conferences, Symposia, Workshops

G. Ambika *Suppression of dynamics in coupled discrete systems in interaction with environment* Perspectives in Nonlinear Dynamics, PNLD 2013, University of Hyderabad, July 15-18, 2013 (*Invited Speaker*) ● *Dynamics of coupled Mackey Glass systems* Conference on Nonlinear Systems and Dynamics, IIT Indore, December 11-14, 2013 (*Invited Speaker*) ● *Small oscillations and normal mode analysis* Lecture Workshop on Dynamical Systems, PSGR Krishnammal College for Women, Coimbatore, December 26-28, 2013 (*Invited Speaker*) ● Mitra, C., Ambika, G. and Banerjee, S. *Phase-flip and amplitude death in time delay systems with delayed*

feedback Conference on Nonlinear Systems and Dynamics (CNSD), IIT Indore, December 11-14, 2013 (*Talk*) • Shah, P. and Ambika, G. *Dynamics of pulsating stars using the One-zone model* CNSD, IIT Indore, December 11-14, 2013 (*Poster Presentation*) • Shekatkar, S. and Ambika, G. *Dynamics of coupled discrete systems in interaction with an extended environment* CNSD, IIT Indore, December 11-14, 2013 (*Poster Presentation*) • *Coupling scheme to control discrete dynamics on regular and random networks* Inter-IISER Physics Meet, March 15-16, 2014 *(Poster Presentation)* • Gupta, K. and Ambika, G. *Amplitude death in coupled slow and fast systems* Inter-IISER Physics Meet, March 15-16, 2014 (*Poster Presentation*)

Collins Assisi *The role of inhibition in the dynamics of networks of neurons* Biophysics Paschim, TIFR, Mumbai, September 14, 2013 (*Invited Speaker*) • *The role of inhibition in the generation of reliable spike sequences* Conference on Computational Neuroscience, Paris, July 2013 *(Poster Presentation)* • *The effect of network topology on the dynamics of neurons* Society for Autonomous Neurodynamics X Conference, IISER Pune *(Talk)* • *Spatiotemporal patterning of neural activity by inhibitory networks (Talk)*, INNNI workshop on Hippocampus: From Synapses to Behavior, IISER Pune, December 2013

Chaitanya Athale *Single particle tracking of fluorescent microtubule asters in Xenopus egg extracts* National Fluorescence Workshop, Bangalore, November 24-28, 2013 (*Invited Speaker*)

Baskar Balasubramanyam *On Local Galois representations associated to ordinary Hilbert modular forms* Asian Mathematical Conference 2013, Busan, South Korea, June 30-July 4, 2013 • *Analytic theory of Automorphic forms* IMSc Chennai, December 9-13, 2013 • Workshop on Local Langlands correspondence and Galois Representations in TIFR Mumbai, December 16, 2013-January 3, 2014

Arjun Bagchi *Understanding holography* Conference on Higher Spins, Strings and Duality, Galileo Galilei Institute, Florence, Italy, May 2013 *(Invited Speaker)* • *Aspects of holography in flat space* Conference: Lecture series for workshop "Asymptotia", Chennai Mathematical Institute, December 2013 *(Invited Speaker)* • *Holographic adventures in flat space* Conference: National Strings Meeting '12", IIT Kharagpur, December 2013 *(Invited Speaker)* • *Holographic adventures in flat space* Conference on Black holes and quantum information, Weizmann Institute, Israel, January 2014 *(Invited Speaker)* • *Building flat holography* Conference on Black holes and quantum information, Weizmann Institute, Israel, January 2014 *(Invited Speaker)* • *One symmetry to rule them all* Mini-Workshop: Stringy Days, IISER Pune, March 2014 (*Organizer*)

Ashna Bajpai *Novel interface effects in binary chrome oxides and their encapsulation in carbon nanotubes* Fifth International Conference on Novel Oxide Materials and Low Dimensional Systems, Indian Institute of Science, Bangalore, December 9-11, 2013 (*Invited Speaker*) • *Encapsulation of multifunctional oxides in carbon nanotubes* DST SERC School on Advanced Functional Magnetic Materials, Goa University, February 3-21, 2014 (*Invited Speaker*) • Ghosh, S. and Bajpai, A. *Synthesis of Fe filled carbon nanotubes*, Science Day at IISER Pune, February 28, 2014 *(Poster Presentation)* • Krishnamurthy, S., Singh, D., Pavan Kumar, G.V. and Bajpai, A. *Probing ferromagnet-antiferromagnet interface using Raman Microscopy* Science Day at IISER Pune, February 2014 *(Poster Presentation)*

Anjan Banerjee *Micro RNA (miRNA) transport: the emerging trend of cell to cell communication in plants* International Conference on Advances in Biotechnology and Bioinformatics (ICABB-

2013) organized by Dr. D.Y. Patil Vidyapeeth, Pune and The Biotech Research Society India in Pune, November 26, 2013 (*Invited Speaker*) • *Long distance transport of miRNAs: the emerging trends of cell communication in plants* in InSDB (Indian Society of Developmental Biology) Annual meeting of Non coding RNAs in Development and Regeneration held in TIFR Mumbai, December 3, 2013 (*Invited Speaker*) • *miRNA156: a potential long distance signal that controls potato development* Inter IISER-NISER Plant Biology Meeting, IISER Pune, December 30, 2013 (*Invited Speaker*)

Boominathan, M. and Banerjee, A.K. *A forward genetic screen to identify the factors regulating apical cell development in moss (Poster Presentation)*, InSDB (Indian Society of Developmental Biology) Annual Meeting, TIFR Mumbai, December 2-4, 2013 • Devani, R.S., Ghadge A., Kanika, K., Banerjee, J., Boominathan, M., and Sinha, S. *Characterization of sexual phenotypes of Coccinia grandis (L.): A potential model system to understand dioecy* InSDB (Indian Society of Developmental Biology) Annual meeting, TIFR Mumbai, December 3, 2013 *(Poster Presentation)* • Bhogale, S., Mahajan, A., Natarajan, B., Rajabhoj, M. and Banerjee, A. *A graft transmissible miRNA that affects plant architechture and tuberization in potato* 10th Solanaceae Conference (SOL 2013), Beijing, China, October 13-17, 2013 (*Poster Presentation*) • Natarajan, B., Godbole, P. and Banerjee, A. *Long distance macromolecular signalling in phloem of potato upon Phytophthora infection* InSDB (Indian Society of Developmental Biology) Annual Meeting, TIFR Mumbai, December 2-4, 2013 *(Poster Presentation)* • Natarajan, B., Godbole, P. and Banerjee, A.K. *Macromolecular signalling in phloem of potato upon Phytophthora infection* 35th Annual Meeting of Plant Tissue Culture Association (India) & National Symposium on Advances in Plant Molecular Biology & Biotechnology, IISER Pune, March 10-12, 2014 *(Won Best Poster Award)* • Mahajan, A.S., Rajabhoj, M.P., Ghate, T.H. and Banerjee, A.K. *KNOX genes, the multipurpose regulators of plant development: From leaves to tuber* InSDB (Indian Society of Developmental Biology) Annual Meeting, TIFR Mumbai, December 2-4, 2013 *(Poster Presentation)* • Mahajan, A.S. and Banerjee, A.K. *KNOX genes in Potato: The multipurpose regulators of plant development* 35th Annual Meeting of Plant Tissue Culture Association (India) & National Symposium on Advances in Plant Molecular Biology & Biotechnology, IISER Pune, March 10-12, 2014 *(Talk)*

Deepak Barua Iyengar, S., Bagchi, S., Mishra, C. and Sankaran, *Facilitative effects of a dwarf shrub increases diversity in an alpine rangeland*. Student Conference on Conservation Science, IISc, Bangalore, September 2013 • Somanathan, H., Barua, D., Arulmalar, E. and Parihar, S. *Floral colour change in Randia dumetorum: a cue for visually guided insect visitors?* International Conference on Invertebrate Vision, Sweden, August 2013 • Barua, D., Arulmalar, E., Parihar, S., Somanathan, H. *Plant pollinator interactions in Randia dumetroum: the effect of flower color and phenology on pollinator visitation and fruit set*. DST-Royal Society London Conference on Biology of Tropical Pollination: From Individuals to Networks, Varkala, February 2013

Rabeya Basu *A journey of fifty years: from Serre's problem to odd unitary groups* K-Theory Conference Chinese Academy of Sciences, Beijing, September 2013 (*Invited Speaker*)

Chandrasheel Bhagwat Conference on *Analytic theory of Automorphic forms* Institute of Mathematical Sciences, Chennai, December 2013

Ramakrishna Bhat International Meeting on Chemical Biology (IMCB-2013), IISER Pune, May 26-28, 2013 • Frontiers in Chemistry & Biology of Oligosaccharides (FCBO2014), January 18-19, 2014

Arijit Bhattacharyay *Statistical Physics of Mesoscopic Systems: Directed Transport and Non-canonical Distribution* NESP-NLD Symposium, IACS Kolkata, January 2-4, 2014 (*Invited Speaker*) • *Equilibrium of structured objects: an alternative approach* ICTS Discussion Meeting at IISc Bangalore, February 1-3, 2014 (*Invited Speaker*) • *Non-Boltzmann probability distribution and possibility of its application in protein folding,* Biophysics Paschim 6, IISER Pune, March 1, 2014 (*Invited Speaker*)

Boomi Shankar *Transition metal chemistry of poly-imido and -amido P(V) ligands: from discrete molecules to functional materials* Modern Trends in Inorganic Chemistry (MTIC)-XV, IIT-Roorkee, December 13-16, 2013 (*Invited Speaker*) • *Functional porous cages and frameworks derived from amino-P(V) scaffolds* National Seminar on Crystallography (43A), IISER Mohali, March 28-30, 2014 (*Invited Speaker*)

Srivastava, A.K., Praveenkumar, B., Mahawar, I.K., Divya, P. and Boomishankar, R. *Cationic* $[Cu^{II}L_2]_n$ *assemblies exhibiting anion dependent structure and ferroelectric properties* Science Day, IISER Pune, February 28, 2014. *(Selected for the best-poster award)* • Deshmukh, M.S., Yadav, A. and Boomishankar, R. *Mechanochromism and Inversion of thermochromism in* $N_{arylsilane}$*-donor stabilized* Cu_6I_6 *cluster MOFs* Science Day, IISER Pune, February 28, 2014 *(Poster Presentation)* • Yadav, A., Srivastava, A.K., Balamurugan, A. and Boomishankar, R. *Cationic MOFs of copper (I) iodide cluster exhibiting unusual ligand assisted thermochromism & selective sensing of picric acid* Science Day, IISER Pune, February 28, 2014 (*Poster Presentation*) • Mahawar, I.K., Srivastava, A.K. and Boomishankar, R. *Coordination Chemistry of an Amino-Functionalized Thiophosphoramide Ligand: From Discrete Molecular Assemblies to Nanoscopic Materials* Science Day IISER Pune, February 28, 2014 (*Poster Presentation)* • Srivastava, A.K., Praveenkumar, B., Mahawar, I.K., Divya, P. and Boomishankar, R. *Cationic* $[Cu^{II}L_2]_n$ *assemblies exhibiting anion dependent structure and ferroelectric properties* National Seminar on Crystallography 43A (NSC-43A) IISER Mohali, March 28-30,2014 *(Selected for the best-poster award of the seminar)*

Diganta Borah Winter School and Workshop in Complex Analysis and Geometry, CIRM, Marseille, France, March 24-29, 2014

Harinath Chakrapani *Legacy of Nitric Oxide discovery: Impact on disease biology – 2013*, Rajiv Gandhi Centre for Biotechnology, Trivandrum, November 5-6, 2013 • Vinayak S. Khodade, *Natural product-based reactive oxygen species (ROS) generators with potent copper-mediated DNA damaging activity* • Kavita Sharma, *INDQ/NO, a bioreductively activated prodrug of nitric oxide (Winner of Best Poster Award)*

Apratim Chatterji Nano-*channel induced advection combined with reaction diffusion dynamics of reacting ions leads to self-assembly of ordered cylindrical nano-structures* Conference on Condensed Matter and Biological Systems-13, BHU, Varanasi, January 11-14, 2013 (*Invited Speaker*) • *Self assembly of nano cigars with an axial pore* 9th Mumbai-Pune Complex Fluids Meeting, IISER Pune, August 17, 2013 (*Invited Speaker*) • *An Introduction to Soft Matter Physics* Ordered by Entropy - A Soft Matter Evening in IISER Pune, October 7, 2013 • *Ordered by entropy-An introduction to soft matter physics* Refresher course on Soft Matter Physics, Department of Physics, University of Pune, November 11, 2013 (*Invited Speaker*)

Invited Speaker at Theoretical Physics Seminar Series in IISER Bhopal, October 18, 2013; Statistical Physics Meeting of India, IISc Bangalore, February 1-3, 2014; Physics and Chemistry of Materials-Computation and Experiments, Kolkata, February 24-25, 2014; IISER Physics Meet-2013, IISER Pune, March 15, 2014; Title: *Self assembly of ordered cylindrical*

nanostructures - A simple model to elucidate experimental observations

Srabanti Chaudhury DAE DRNS Symposium on Current Trends in Theoretical Chemistry, BARC, September 2013 *(Chaired a session)* • Symposium on Multi-Scale Modeling: Celebrating the 2013 Chemistry Nobel Prize, NCL Pune, December 2013 • *Universality of Poisson Indicator and Fano Factor of Transport Event Statistics in Ion Channels and Enzyme Kinetics* Soft Matter Young Investigators Meet, Pondicherry, January 2014 (*Invited Speaker*) • Biophysics Paschim- BPP6, IISER Pune, March 1, 2014

Anisa Chorwadwala ATMW Analysis and Geometry 2014, TIFR-CAM, Bangalore, January 6-10, 2014 • *A glimpse of shape optimization problems through the problem of Queen Dido* Thirteenth Discussion Meeting on Harmonic Analysis (DMHA), IMSc, Chennai, December 16-19, 2013 (*Invited Speaker*) • Advanced Level Workshop on Nonlinear Functional Analysis and its Applications (NFAA 2013), University of Kashmir, Srinagar, October 19-29, 2013 • *A glimpse of shape optimization problems through the problem of Queen Dido* Indian Women and Mathematics (IWM) Symposium, IISER Pune, July 26-28, 2013 (*Invited Speaker*)

Jeetender Chugh *Visualizing transient structures in A-site RNA of the ribosome* NSASST-2014, School of Physics, Sri Ramatirth Marathwada University, Nanded, India, March 21-22, 2014 (*Invited Speaker*) • *Visualizing transient structures in A-site RNA of the ribosome*: *New structures of known molecules for drug target* ISCBC-2014, University of Delhi, Delhi, March 1-4, 2014 (*Invited Speaker*) • *Visualizing Transient Structures in A-site RNA of the Ribosome* India-UK Scientific Seminar on Complementary Approaches in Structural Molecular Biology, IISER Pune, January 27-29, 2014 (*Invited Speaker*) • *Visualizing transient structures in A-site RNA of the ribosome* Biomolecular Simulations and Dynamics, IIT Madras, India, November 28-30, 2013 (*Invited Speaker*) • One Day NMR Symposium at IIT Bombay, Powai, India, February 11, 2014 • International Meeting on Chemical Biology, IISER Pune, May 26-28, 2013

Aloke Das *Tailor made synthesis of T-shaped and π-stacked dimers in the gas phase: Concept for efficient drug design and material synthesis* University of Glasgow-IISER Pune, Dynamics and Structure Meeting, University of Glasgow, U.K., June 18-20, 2013 (*Invited Speaker*) • Singh, S.K., Kumar, S. and Das, A. *Competition between* $n \rightarrow \pi^*$Ar *and conventional hydrogen bonding (N-H...N) interactions: An ab initio study of the complexes of 7-azaindole and fluorosubstituted pyridines*, *Science Day*, IISER Pune, February 28, 2014 *(Poster Presentation)* • Kumar, S., Singh, S.K., Vaishnav, J. and Das, A. *Effect of methyl substitution in the π-hydrogen bonded complexes of indole with methylated benzenes: Interplay among electrostatic, dispersion interactions and steric repulsion* Science Day, IISER Pune, February 28, 2014 *(Poster Presentation)* • Kumar, S., Singh, S.K., Vaishnav, J. and Das, A. *Effect of methyl substitution in the π-hydrogen bonded complexes of indole with methylated benzenes: Interplay among electrostatic, dispersion interactions and steric repulsion* 11^{th} Discussion meeting on Spectroscopy and Dynamics of Molecules and Clusters (SDMC), The Hans Coco Palms, Puri, Orissa, February 20-23, 2014 *(Poster Presentation)* • Singh, S.K., Kumar, S. and Das, A. *Competition between* $n \rightarrow \pi^*$Ar *and conventional hydrogen bonding (N-H...N) interactions: An ab initio study of the complexes of 7-azaindole and fluorosubstituted pyridines* Trombay Symposium on Radiation & Photochemistry, Bhabha Atomic Research Centre (BARC), Mumbai, January 6-9, 2014 *(Poster Presentation)* • Das, A. *Tailor made synthesis of T-shaped and π-stacked dimers in the gas phase: Concept for efficient drug design and material synthesis* 20^{th} International conference on horizons in hydrogen bond research, Antwerp, Belgium, September 15-20, 2013 *(Contributed Talk)*

Shouvik Datta Kanika Bansal *Dielectric Response of light emitting semiconductor junction diodes: frequency and temperature domain study* Session T7.05, Materials Research Society's Fall Meeting, December 1-6, 2013, Boston, Massachusetts, U.S.A. *(Oral Presentation)* • Bansal, K. and Datta, S. *Voltage modulated electroluminescence and forward bias impedance characteristics of light emitting semiconductor devices* 17th International Workshop on The Physics of Semiconductor Devices, December 10-13, 2013, Amity University, Noida *(Poster Presentation)* • Padmashri Patil *Thermal sintering improves the short circuit current of solar cells sensitized with CdTe/CdSe core/shell nanocrystals* 17th International Workshop on The Physics of Semiconductor Devices, December 10-13, 2013, Amity University, Noida *(Poster Presentation)* • Varghese, A. and Datta, S. *Investigating the growth mechanism and optical properties of ordered arrays of CdS nanotubes grown on porous alumina* International Union of Materials Research Societies – International Conference in Asia – 2013 (IUMRS-ICA-2013), Indian Institute of Science in Bangalore, December 16-20, 2013 *(Poster Presentation)*

Sutirth Dey Project Oriented Biology Education, JNCASR, Bangalore, June 7-8, 2013 • *Critical thinking in science* 5 day IISER-NCERT workshop for school students, July 18, 2013 • *Critical thinking in science education* Workshop on Science Education (Sci-Ed 2013), July 27, 2013 • *Extended evolutionary synthesis* Lecture workshop on Evolution 'Tree of Life'. Organized by Indian Academy of Science, Jai Hind College, Mumbai, December 11-12, 2013 • *Phenotypic plasticity, Foundations of evolutionary theory: The ongoing synthesis* Orange County, Coorg, February 23-26, 2014

Sourabh Dube CMS Data Analysis School, Saha Institute of Nuclear Physics, Kolkata, November 7-11, 2013 • *IISER, Pune proposal to join India-CMS and CMS (Presentation),* India-CMS meeting, TIFR, Mumbai, January 2014 • *Recipes for interpreting search results (Presentation),* Inter-IISER Physics Meet, IISER-Pune, Pune, March 15-16, 2014 • Anshul Kapoor, Kunal Kothekar: *Supersymmetric searches at LHC* Science Day, February 28, 2014 *(Poster Presentation)* • Anshul Kapoor Inter-IISER Physics Meet *(Poster Presentation)* • Shubhanshu Chauhan, *Workflow of an EHEP analysis* Science Day, February 28, 2014

Sanjeev Galande International workshop on Unraveling the developmental regulatory network in early animals, Evangelische Akademie Tutzing, Germany, September 23-25, 2013

Krishna Ganesh *Cationic collagen peptides and peptide nucleic acids as cell penetrating agents* Emerging Trends in Drug Discovery and Development, Delhi University, January 22-23, 2013 • *Conformational potpourri in 4-aminoproline peptides and polypeptides: From triple helix to PPII and β–structures* Chemical Biology Symposium, Indian Institute of Chemical Biology, January 27-29, 2013 • *Cationic collagen peptides and peptide nucleic acids as cell penetrating agents* RSC Meeting, SP College, Pune, February 9, 2013 • *DNA in a material world: From Genetics and generics*, Chemistry Symposium, Indian Institute of Technology, Mumbai, May 2013 • *From "PNA" to "PuNA": "Pune Nucleic Acid" analogues for functional delivery into cells* Chemistry Frontiers Meeting (JNCASR-IIT-NCL), Goa, August 28-30, 2013 • *4(R/S)-Amino/ Guanidinoproline peptides: Conformational diversity and cell penetrating properties* International Conference on Interdisciplinary Chemical Sciences, Panjab University-INST, Chandigarh, October 30, 2013 • *Making medicines out of nucleic acids: From "Peptide" Nucleic acids (PNA) to "Pune" Nucleic Acids (PuNA)*, Sinhagad College of Pharmacy, Teachers Workshop, December 15, 2013

Aurnab Ghose *Neuronal circuits: development, organization and function* TIFR NSF Colloquium, Tata Institute of Fundamental Research (TIFR), Mumbai, India *(Invited Speaker)* • Lecturer, SERB School in Neurosciences, 7th Edition, University of Hyderabad *(Upon Invitation)* • *Light microscopy in neuronal cell biology* ACTREC Microscopy workshop, ACTREC, Mumbai, India, 2013 • *Emergent responses of the cytoskeleton: regulatory physical forces in the growth one and axons* Emerging Concepts on Neuronal Cytoskeleton, Maitencillo, Chile, 2013 • Sahasrabudhe A., Ghate K. and Ghose A. (2013) *Formin-2 in neuronal development* American Society for Cell Biology (ASCB) Annual Meeting 2013, New Orleans, U.S.A. • Ghose, A. *Nucleating actin in the neuronal growth cone: powering motility* XXXVII All India Cell Biology Conference (AICBC 2011), Bangalore, 2013 • Ghose, A. *FORMINg neural circuits: a role for actin nucleators* Advanced Microscopy and Imaging Techniques workshop, Regional Centre for Biotechnology, Gurgaon, 2014 • Ghose, A. *Fishing for food: neuromodulatory mechanisms in behavioral state stability and transitions* Recent Trends in Biology organized by Department of Zoology, University of Pune, Pune, 2014

Prasenjit Ghosh *Induction and manipulation of spin moments in graphene: Effect of substrate and chemical functionalization* From Carbon Nanotubes to Graphene: The Key Materials of the Future? Brescia, Italy, September 30-October 1, 2013 (*Invited Speaker*) • Current Trends in Theoretical Chemistry, BARC Mumbai, September 26-28, 2013 (*Chaired a Session*) • School and Discussion Meeting on Strongly Correlated Systems: from Models to Materials, IISc, Bangalore, January 6-17, 2014 • *Catalytic activity of ultranano metal clusters in gas phase and on active supports* International Symposium on clusters, Cluster Assemblies and Nano-scale Materials – III, Harish Chandra Research Institute, Allahabad, March 11-14, 2014 (*Invited Speaker*) • Niharika Joshi *Induction and manipulation of spin moments in graphene: Effect of oxygen intercalation and chemical functionalization* (*Poster Presentation, won the best poster award, shortlisted for an oral presentation*) Winter School-2013 on Frontiers in Material Science, JNCASR, Bangalore, December 2-6, 2013 • Nandha Kumar *Density functional study of small bimetallic clusters on MgO (100) surface* International Symposium on Clusters, Cluster Assemblies and Nano-scale Materials – III, Harish Chandra Research Institute, Allahabad, March 11-14, 2014 (*Poster Presentation*)

Sujit Ghosh Modern Trends in Inorganic Chemistry (MTIC-XV) IIT Roorkee, December 13-16, 2013 (*Invited Speaker*) • 7th Biennial International Conference on Materials for Advanced Technologies ICMAT 2013, Singapore, June 30-July 5, 2013 (*Invited Speaker*) • 79th Annual Meeting of the Indian Academy of Sciences, Chandigarh, IISER Mohali, November 8-10, 2013 (*Invited Speaker*) • Chemical Research Society of India (CRSI) Mid-year Symposium. National Institute of Technology, Surathkal, Karnataka, July 12-13, 2013 (*Invited Speaker*) • Biplab Manna, Modern Trends in Inorganic Chemistry (MTIC-XV), IIT Roorkee, December 13-16, 2013 (*Poster Presentation*) • Biplab Joarder, Sanjog S. Nagarkar: 16th CRSI National Symposium in Chemistry, IIT Bombay, February 7-8, 2014 (*Poster Presentations*)

Pranay Goel *Using the Dual Oscillator Model (DOM) to study bursting in pancreatic islets* Conference on Nonlinear Dynamics and Stochastic Methods: From Neuroscience to Other Biological Applications (held in honor of G. Bard Ermentrout's 60th birthday), University of Pittsburgh, Pittsburgh, U.S.A., March 10, 2014 (*Invited Speaker*) • *Introduction to Mathematical Neuroscience*, 7th Lecture series in Microbiology on Applications of Mathematics and Statistics in Biology, Modern College of Arts Science and Commerce, Pune, February 5, 2014 • *Excitability in the pancreatic islets of Langerhans* and *Homogenized models of calcium and*

electrical signaling in pancreatic islets of Langerhans 2013 NCTS Conference on Mathematical Physiology, National Center for Theoretical Sciences, Hsinchu, Taiwan, November 1, 2013 (*Invited Speaker*) • *Type I and II dynamics in models of neural spiking (3 lectures)* Workshop on Nonlinear Differential Equations: Dynamics of complex systems, University of Calcutta, Kolkata, September 25-26, 2013 (*Invited Speaker*) • *Synchronization and frustrated waves in homogenized models of electrical bursting in pancreatic islets of Langerhans* The 10th Annual Meeting of the Society for Autonomous Neurodynamics (SAND X), IISER Pune, August 6, 2013 (*Invited Speaker*) • *Excitability in the pancreatic islets of Langerhans* Perspectives in Nonlinear Dynamics 2013 (PNLD 2013), University of Hyderabad, Hyderabad, July 18, 2013 (*Invited Speaker*) • *Physiology* Workshop on Nonlinear Dynamics in Biology, Indian Institute of Science, Bangalore, July 10, 2013 (*Invited Speaker*) • *Thresholds of oxidative stress in Indian diabetics* IISER Pune Annual Talks in Biology 2013, IISER Pune, July 31, 2013 • *Thresholds of oxidative stress in Indian diabetics* Pune Bio Modeling Group, Pune, June 21, 2013 • *Mathematical Modelling in Diabetes* Seminar on Computational Biology @ IISERs, IISER Mohali, June 9, 2013 (*Invited Speaker*) • *Mathematics Primer (2 lectures)* SERC School: Introduction to Systems and Synthetic Biology for Scientists and Engineers, IIT Bombay, Mumbai, April 23, 2013 (*Invited Speaker*)

Anindya Goswami *Risk-sensitive cost for a Markovian multiclass queue with priority* Young European Queuing Theorists VII - Workshop on Scheduling and Priorities in Queueing Systems, Eurandom, Eindhoven, The Netherlands, November 6, 2013 (*Invited Speaker*) • *Marginalization for rare event simulation in switching diffusions* ICMTEA 2013, Department of Mathematics, Graphic Era University, Dehradun, India, October 24, 2013

Anirban Hazra Conference on Current Trends in Theoretical Chemistry, Bhabha Atomic Research Centre, Mumbai, September 26, 2013 • Discussion Meeting on Spectroscopy and Dynamics of Molecules and Clusters (SDMC), Puri, February 20, 2014 • *Theoretical chemistry beyond the Born-Oppenheimer approximation* Theoretical and Computational Modeling Group Meeting, National Chemical Laboratory, Pune, March 19, 2014 • Avdhoot Datar *Modelling nonadiabatic dynamics at the molecule-metal interface* Discussion meeting on Spectroscopy and Dynamics of Molecules and Clusters (SDMC), Puri, February 20, 2014 *(Poster Presentation)* • Mahesh Gudem *Mechanistic investigation of chemiluminescence using ab initio methods* Discussion Meeting on Spectroscopy and Dynamics of Molecules and Clusters (SDMC), Puri, February 20, 2014 *(Poster Presentation)*

Partha Hazra Light in Chemistry, Materials and Biology (LCMB 2014) Chemistry Department, IIT Kharagpur, February 2014 (*Invited Speaker*) • CRSI-2014 in IIT Mumbai; ICONSAT 2014, Chandigarh; and FCS-2014, IISc, Bangalore (*Poster Presentations*)

M. Jayakannan *Bio-inspired supramolecular and polymer assembly, tailor-made polymer vesicles for dual drug delivery platforms* Bilateral Indo-US Workshop, December 15-17, 2013 • *Polymer based on amino acids: Development of new high temperature condensation chemistry* University of Hyderabad, July 24, 2013 • *Solid state assemblies of -conjugated system: Unlock the hidden secrets* MACRO-2013 International Conference on Polymers, IISc Bangalore, May 15-18, 2013

Mukul Kabir *Materials modeling toward sustainable energy applications* Recent Trends in Renewable Energy Systems and Software Applications, MIT College of Engineering, Pune, December 09-12, 2013 (*Invited Speaker*) • *Formation and diffusion mechanism of gas clathrate hydrates* Physics and Chemistry of Materials: Computation and Experiments, S. N. Bose National Center for

Basic Sciences, Kolkata, February 24-25, 2014 (*Invited Speaker*) • *Surface and bulk diffusion of methane in clathrate hydrate* International Symposium on Clusters, Cluster Assemblies and Nano-scale Materials-III, Harish-Chandra Research Institute, Allahabad, March 11-14, 2014 (*Invited Speaker*) • School and Discussion Meeting on Strongly Correlated Systems: From Models to Materials, ICTS, Bangalore, January 10-13, 2014

Tejas Kalelkar Advanced Instructional School on Classical Groups, IISER Pune, December 2013

Jeet Kalia *Chemical Biology: Bioconjugation, Ion channels and Lipids* Biology Annual Talks, IISER Pune, July 29-31, 2013 • *Biophysics-Paschim 6 Conference*, IISER Pune, March 1, 2014

Krishanpal Karmodiya Annual Meeting of Centre of Excellence in Epigenetics, CCMB, Hyderabad, June 4-5, 2013

Saikrishnan Kayarat *Structural studies on ATP-dependent restriction-modification enzyme LlaGI* 42nd National Seminar in Crystallography AIIMS, New Delhi, November 21-23, 2014 (*Invited Speaker*) • *Structural studies on ATP-dependent restriction-modification enzyme LlaGI*, International Meeting on Chemical Biology (IMCB-2013) at IISER Pune, May 26-28, 2013 • Complementary Approaches in Structural Molecular Biology, India-UK Scientific Seminar IISER Pune, January 27-29, 2014 • International Symposium on Proteins - Structure, Function and Dynamics, January 30, 2014

Shabana Khan 5th Humboldt Kolleg on Surface Science and Engineered Surfaces, Convention Centre, Lavasa, February 14-16, 2014 *(Poster Presentation)*

Avinash Khare *Introduction to Quantum and Statistical Mechanics of Anyons* International School on Ultra Cold Atoms and Anyons, Berlin, Germany, September 2013 *(3 Invited Talks)* • *Introduction to Chaos* National Conference On Nonlinear Dynamics, Darjeeling Govt. College, November 2013 (*Invited Speaker*) • *Forced Nonlinear Schrödinger equation with arbitrary nonlinearity* International Workshop on Quantum Integrable Systems, S.N. Bose Center for Basic Sciences, Kolkata, December 2013 (*Invited Speaker*) • *PT-symmetric dimer of coupled nonlinear oscillators* 8th Conference on Nonlinear Systems and Dynamics (NCNSD), IIT Indore, December 2013 (*Invited Speaker*) • *Pt-symmetric dimer of coupled nonlinear oscillators* Workshop on Nonequilibrium Statistical Physics and Nonlinear Dynamics, Indian Association of Cultivation of Science (IACS) Kolkata, January 2014 (*Invited Speaker*) • *Supersymmetry in quantum mechanics* Workshop on Nonlinear Physics, Bishop Herber College, Tiruchinapalli, January 2014 (2 Lectures) • *Hamiltonian dynamics and integrable systems* SERC School on Nonlinear Dynamics, Panjab University, Chandigarh, January 2014 (5 Lectures) • *PT symmetric dimer of coupled nonlinear oscillators* International Conference on Nonlinear Integrable Systems and Applications, February 2014 (*Invited Speaker*) • *PT symmetric dimer of coupled nonlinear oscillators* 3rd International Symposium on Complex Dynamical Systems and Application, March 2014 (*Invited Speaker*)

Raghavendra Kikkeri *Cyclodextrin based multitask smart materials to assess carbohydrate mediated interactions* New Investigator Carbohydrate Symposium, Bangalore, 2014 (*Invited Speaker*) • *Cyclodextrin based smart materials* - Frontiers in Chemistry & Biology of Oligosaccharides, Pune, 2014 (*Invited Speaker*) • Chaudhari, P. and Kikkeri, R. *Development of peptidomimic analogues for the recognition of sialic acid glycans* International Carbohydrate Symposium, Bangalore, 2014 • Sangabhatuni, S. and Kikkeri, R. *Polyglycosyl β-cyclodextrin complex with*

adamantyl collagen peptide: An oligovalent probe for glyco-protein interactions International Carbohydrate Symposium, Bangalore, 2014 • Yadav, R. and Kikkeri, R. *Glycobiology-effect of sialic acid orientation on ligand-receptor interaction* International Carbohydrate Symposium, Bangalore, 2014 Gordon Conference, Portland, U.S.A., June 22-26, 2013

G.V. Pavan Kumar *Nano-optics and spectroscopy with surface plasmons* DST Nanoscience Center, IIT-Madras, July 2013 (*Invited Speaker*) • *Nanowire photonics with plasmons and excitons* Focused Discussion Meeting on Metamaterials and Nanophotonics, IIT Kanpur, August 2013 (*Invited Speaker*) • *Nanowire plasmonics* Nanophotonics section, IUMRS Conference, Bangalore, December 2013 (*Invited Speaker*) • *Nano-optical sensors;* Keynote lecture, Bangalore-Nano 2013, December 2013 (*Invited Speaker*) • *Surface Enhanced Raman Scattering* National workshop on FCS and Raman scattering, IISc-JNCASR, Bangalore, December 2013 (*Invited Speaker*) • *Plasmonic nanowire antenna* Regional Conference on Radio Science (RCRS-2014), Symbiosis Institute of Technology, Pune, January 2014 (*Invited Speaker*) • *Photonics with excitonic nanowires; Single-molecule surface enhanced Raman scattering microscopy* Poster Presentations from the group at National Workshop on FCS and Raman scattering, IISc-JNCASR, Bangalore, December 2013 • *Nanowire nonlinear photonics; Optical energy-momentum spectroscopy of plasmonic metamaterials* Poster Presentations from the group at Focused Discussion Meeting on Metamaterials and Nanophotonics, IIT Kanpur, August 2013

Mayurika Lahiri *N-nitroso-N-ethylurea activates DNA damage surveillance pathways and induces neoplastic transformation in mammalian cells* International Conference on Advances in Biotechnology & Bioinformatics & X Convention of The Biotech Research Society, India (ICABB), Hotel Le Meridien, Pune, November 25-27, 2013 (*Invited Speaker*) • Bodakuntla, S. Anandi, L.V., Sural, S. Trivedi, P. and Lahiri, M. *Alkylation damage activates checkpoint signaling pathway in mammalian cells* GRC on Cell Growth and Proliferation, Mount Snow Resort in West Dover, VT, U.S.A., June 23-28, 2013 (*Poster Presentation*)

M. Jeganmohan *Ruthenium-catalyzed chelation-assisted C-H bond functionalization of aromatics, alkenes and heteroaromatics* 8th CRSI – RSC Joint Symposium In Chemistry, IIT Bombay, *Bombay*, 2014 *(Invited Speaker)* • Kishor, P. and Jeganmohan, M. *Ruthenium-catalyzed chelation-assisted transformation of an unreactive ortho C-H bond of aromatics to C-C or C-O bonds via C-H bond activation* IX J-NOST Conference, IISER Bhopal, India, 2013 *(Poster Presentation)* • Kishor, P. and Jeganmohan, M. *Ruthenium-catalyzed chelation-assisted transformation of an unreactive ortho C-H bond of aromatics to C-C or C-O bonds via C-H bond activation CRSI-2014:* 16th CRSI National Symposium in Chemistry, IIT Bombay, *2014 (Poster Presentation)* • Ravikiran, C.G. and Jeganmohan, M. *Ruthenium-catalyzed oxidative cyclization and functionalization of aromatics and heteroaromatics via C-H bond activation: An easy route to heterocyclics synthesis* IX J-NOST Conference, IISER Bhopal, India, 2013 *(Invited Speaker)*

T.S. Mahesh 13th Asian Quantum Information Science Conference, IMSc, Chennai, August 2013 (*Invited Speaker*) • CQIQC Conference on Quantum Simulations, IISc, Bangalore, September 2013 (*Invited Speaker*) • Meeting on Quantum Information Processing and Applications, HRI, Allahabad, December 2013 (*Invited Speaker*) • NMR Society Meeting, Tejpur University, Assam, February 2014 (*Invited Speaker*) • Inter-IISER Physics Meeting, IISER Pune, March 2014 • ENC conference, Boston, U.S.A., March 2014 (*Invited Speaker*)

Soumen Maity 37th National System Conference, Center for Excellence in System Science, IIT Jodhpur, December 5-7, 2013 (*Steering Committee Member)* • International Conference on

Mathematics and Computing, HIT, December 26-29, 2013 (*Program Committee member for Track Computing*)

Vivek Mallick ATM Workshop on singularity categories in algebraic geometry and commutative algebra, January 2-12, 2013 • ATM Workshop on Classical and non-stable algebraic K-Theory, TIFR Mumbai, July 15-24, 2013 • Workshop on quadratic forms, TIFR Mumbai, December 9-12, 2013

Rama Mishra *Basic knot theory* Advanced Training School for Researchers Harish Chandra Research Institute, Allahabad, India, December 2013 (*Invited Speaker*) • Advanced School and Discussion Meeting on Knot Theory and its applications, IISER Mohali, India, December 2013 (*Invited Speaker*) • Topology Discussion Meeting, Institute of Mathematical Sciences, Chennai, May 2013 (*Invited Speaker*) • National Seminar on Algebra, Topology and their Application held at Ayya Nadar Janaki Ammal College, Sivakasi, March 2013 (*Invited Speaker*) • EKOOK Seminar at Osaka City University, Japan February 2013 (*Invited Speaker*)

Sunil Mukhi Workshop on Ultracold Atoms and Gauge Theories, ICTP Trieste, May 13-17, 2013 • *Gauge Fields,* Advanced School on Ultracold Atoms for Fundamental Science and Enabling Technologies, IISER Pune, December 19, 2013 (2 Lectures) • Prof. Mukunda and Group Representations, Conference on Nine Pursuits in Science in honor of Prof. Mukunda on his 75th birthday, IMSc Chennai, January 25, 2014 • *From Gauge Fields to Strings* Raman Memorial Conference, Pune University, February 7, 2014 • *Particle Physics and Gravity, Future Perspectives* Inter-IISER Physics Meet, March 16, 2014 • K. Sri Haritej *Novel Higgs Mechanism* Inter-IISER Physics Meet, March 15-16, 2014 (*Poster Presentation*) • Sagar F. Lokhande *Worldsheet approach to gravity effective action* Inter-IISER Physics Meet, March 15-16, 2014 (*Poster Presentation*) • *Strings 2013* Seoul, Korea, June 24-29, 2013

Suhita Nadkarni Organization for Computational Neuroscience, Paris, France, 2013 *(Poster Presentation)* • Annual Fellows Meeting, Wellcome-DBT India Alliance, October 2013, Hyderabad • 7th edition of Science and Engineering Research Board (SERB) sponsored school in Neuroscience, Hyderabad, December 2013

Angshuman Nag *Colloidal, all-inorganic nanocrystals for optoelectronics and surface functionalization* Glasgow-IISER Pune Dynamics and Structure meeting, University of Glasgow, U.K., June 2013 (*Invited Speaker*) • M. Jagadeeswara Rao *Ligand-free colloidal quantum dots: Synthesis, surface modification, and applications,* Indo-US Symposium on Molecular Materials, Indian Institute of Science, Bangalore, July 15-17, 2013 *(Poster Presentation)* • Abhishek Swarnkar *Organic-free colloidal quantum dots as luminescent sensors for metal ions and nitroaromatic explosives* International Union of Materials Research Societies–International Conference in Asia–2013 (IUMRS-ICA-2013), Indian Institute of Science, Bangalore, India, December 16-20, 2013 *(Oral Presentation)* • M. Jagadeeswara Rao *Colloidal ligand-free metal sulfide nanocrystals for optoelectronics* International Conference on Nano Science and Technology (ICONSAT), Institute of Nano Science and Technology, Mohali, March 3-5, 2014 *(Poster Presentation)* • G. Shiva Shanker *Solution-processed film of bulk semiconductors employing oriented attachment of colloidal nanocrystal precursors* International Conference on Nano Science and Technology (ICONSAT), Institute of Nano Science and Technology, Mohali, March 3-5, 2014 *(Poster Presentation)* • Abhishek Swarnkar *Organic-free colloidal quantum dots as luminescent sensors for metal ions and nitroaromatic explosives* International Conference on Nano Science and

Technology (ICONSAT), Institute of Nano Science and Technology, Mohali, March 3-5, 2014 *(Poster Presentation)*

Sunil Nair *The quest for new multiferroics* Meeting on Structure & Dynamics, University of Glasgow, June 2013 • *Neutron Scattering investigations of some new Multiferroics* Conference on Neutron Scattering (CNS 2014), IISER Pune, February 2014 • *$Cu_3Nb_2O_8$: a new ferro-axial multiferroic* Seventh India-Singapore Symposium on Experimental Condensed Matter Physics, IIT Mumbai, February 2014 • *Unconventional Superconductors; Multiferroics & Crystal Growth; Spin Caloritronics* DST-SERB School on Advanced Functional Magnetic Materials, Goa University, February 2014 (*Invited Speaker*)

Rejish Nath *Ultra cold dipolar gases* School on Ultra Cold Atoms, IISER Pune, India, December 20, 2013 *(Invited Speaker)* • *Novel perspectives in quantum magnetism using ultra cold atoms/ions* Random Interactions Seminar at TIFR, Mumbai, India, November 20, 2013 *(Invited Speaker)* • *Novel perspectives in quantum magnetism using ultra cold atoms/ions* Workshop on Physics of Cold Atoms, HRI, Allahabad, India, February 15, 2014 *(Invited Speaker)* • *Novel perspectives in quantum magnetism using ultra cold atoms/ions* Physics Colloquium IISER Pune, India, March 10, 2014 *(Invited Speaker)*

Gayathri Pananghat *Mechanism of plasmid segregation by ParM, a bacterial actin* International Conference on Mechanical Manipulations and Responses at the Scale of Cell and Beyond, National Centre for Biological Sciences, Bangalore, India, April 19-21, 2013 *[Presented a talk as one of the Abstract-selected Speakers]* • 42nd National Seminar on Crystallography, Jawaharlal Nehru University, New Delhi, November 21-23, 2013 • India-UK Scientific Seminar Meeting on Complementary Approaches in Structural Molecular Biology, Organized by IISER Pune and University of Bath, U.K., IISER Pune, January 27-29, 2014 • Conference on Electron Microscopy – Frontiers in Bioimaging, National Centre for Biological Sciences, Bangalore, February 3-5, 2014

Shivprasad Patil *Atomic Force Microscopy for mechanical response of nano-confined liquids* International Conference on Electron Microscopy, Kolkata July 3-5, 2013 • *A novel instrument for rheology of nanoconfined liquids and some first results* International Soft Matter Conference, Rome, Italy, September 15-19, 2013 *(Poster Presentation)*

Thomas Pucadyil Kushwah, M.S. and Pucadyil, T.J. *Analyzing the function of Eps15 homology domain protein 1 (EHD1) in endocytic recycling* Xth International Symposium on Biochemical Roles of Eukaryotic Cell Surface Macromolecules, Kolkata, 2014 *(Poster Presentation)*

Mrinalini Puranik *Molecules with a view: Tryptophan and substrates as intrinsic reporters of local interactions in proteins* Glasgow-IISER Pune Meeting at the University of Glasgow, June 2013 • *Raman intensity analysis to measure ultrafast dynamics,* Teaching Seminar, Fluorescence Correlation Spectroscopy Workshop, Indian Institute of Science, Bangalore, November 2013 • *Excited State dynamics from raman intensity analysis* Research Seminar, Fluorescence Correlation Spectroscopy Workshop, Indian Institute of Science, Bangalore, November 2013 • *Distortion of small molecules within protein environments measured through vibrational spectra* International Conference on Biomolecular Simulation and Dynamics, Indian Institute of Technology, Chennai, November 2013 • *Substrate distortion by enzymes of the purine salvage pathway* Indo-UK Seminar on Complementary Approaches to Structural Molecular Biology, IISER Pune, January 2014 • *Purine recognition and distortion by enzymes of the purine salvage*

pathway India-UK Scientific Seminar on Experiments, Theory and Simulation of Complex Biochemical Systems, Institute of Mathematical Sciences, Chennai, February 24-26, 2014

Sudha Rajamani *Synthesis of informational polymers by guided polymerization reactions in liquid crystalline matrices of lipids* Albany 2013: The 18th Conversation, conference at the State University of New York at Albany, Albany, NY, U.S.A., June 11-15, 2013 (*Invited Speaker*) • *Origin and replication of informational polymers on prebiotic Earth* Soft Matter Young Investigators Meeting in Pondicherry, India, January 5-7, 2014 (*Invited Speaker*) • Chaitanya Mungi *Nonenzymatic oligomerization in liquid crystalline matrices of lipids: Implications for emergence of informational molecules on prebiotic earth* International Meeting on Chemical Biology, IISER Pune, May 26-28, 2013 *(Poster Presentation)* • Niraja Bapat *Prebiotic relevance of molecular crowding in nonenzymatic polymerization of nucleotides* International Meeting on Chemical Biology, IISER Pune, May 26-28, 2013 *(Poster Presentation)* • Chaitanya Mungi *Nonenzymatic oligomerization in liquid crystalline matrices of lipids: Implications for emergence of informational molecules on prebiotic earth* Mini Symposium on Cell Biology organized by the National Center for Cell Sciences, Pune, May 18, 2013 *(Best Poster award winner)* • Niraja Bapat *Nonenzymatic template-directed primer extension reactions on prebiotic Earth* Science Day, IISER Pune, February 28, 2014 *(Poster Presentation)* • Chaitanya Mungi *Characterization of lipid assisted nonenzymatic polymerization reaction of 5'-nucleoside monophosphates* Science Day, IISER Pune, February 28, 2014 *(Poster Presentation)*

Raghav Rajan *Where's my cheese – mechanisms of stereo odor localization by rats, Executing a complex learned movement sequence - what songbirds have taught us about Tendulkar's straight drive* SERB School in Neuroscience (Edition VII), held at the Center for Neural and Cognitive Sciences, Hyderabad, December 2013 *(Invited Speaker)* • Workshop on Evolution of Human Cognition, IISER Pune, November 2013 • Workshop titled Hippocampus: From Synapses to Behavior, IISER Pune, December 2013

Umakant Rapol Brain Storming Meet on Atom Interferometer Sensors, RCI, DRDO, Hyderabad, November 30, 2013 • School and Workshop on Physics of Cold Atoms, Harish-Chandra Research Institute, Allahabad, February 10-16, 2014 (*Invited Speaker*) • Indo French Conference, CEFIPRA and CNRS France, Indian Institute of Science, Bangalore, March 18-21, 2014 (*Invited Speaker*)

Richa Rikhy *Onset of epithelial like plasma membrane architecture in Drosophila embryogenesis*, Indian Society for Developmental Biology, TIFR, Mumbai, December 2013 (*Invited Speaker*) • *Developmental control of mitochondrial morphology*, TIFR-Mahabaleshwar Meeting Mitochondrial Metabolism and Energetics January 2014 (*Invited Speaker*) • *Cellular architecture formation during development and differentiation of epithelial cells*, Pune Biology Meet, NCCS, January 2014 (*Invited Speaker*) • Sayali Chowdhary, *Mitochondrial morphology characterization during embryogenesis in Drosophila:* TIFR-Mahabaleshwar meeting Mitochondrial metabolism and Energetics January 2014; ICTS Conference on Mechanical Manipulations and Responses at the scale of the cell and beyond NCBS Bangalore, April 2013 *(Poster Presentations)* • Aparna Sherlekar *Role of F-Bar domain containing protein syndapin in plasma membrane polarity formation during Drosophila embryogenesis* ICTS Conference on Mechanical Manipulations and Responses at the scale of the cell and beyond, NCBS Bangalore, April 2013 *(Talk)* • Aparna Sherlekar *Role of F-Bar Domain containing protein Syndapin in plasma membrane polarity formation during Drosophila embryogenesis* EMBO Young

Investigators Meeting, Bangalore November 2013; Indian Society for Developmental Biology, TIFR, December 2013 *(Poster Presentations)* • Darshika Tomer *Regulation of mitochondrial morphology during follicle cell development by the EGFR signaling pathway* Indian Society for Developmental Biology, TIFR, December 2013; TIFR-Mahabaleshwar Meeting on Mitochondrial Metabolism and Energetics, January 2014 *(Poster Presentations)* • Tirthasree Das *Onset of plasma membrane polarity during Drosophila embryogenesis* Indian Society for Developmental Biology, TIFR, December 2013 *(Poster Presentation)*

M.S. Santhanam *Nonlinear dynamics* SERC School on Nonlinear Dynamics, Punjab University, Chandigarh, February 3-5, 2014 (*Lectures and Computer Lab Sessions*)

Ronnie Sebastian *Smash nilpotent cycles on varieties dominated by products of curves* Ramanujan Mathematical Society meeting in Bangalore, June 2013 (*Invited Speaker*) • Workshop on Local Langlands Correspondence in TIFR Mumbai, December, 2013

Kundan Sengupta *Nuclear structure-function relationships in cancer cells* National Conference titled Physics-Biology Meeting 2013, Bangalore University, Bangalore, August 30-31, 2013 (*Invited Speaker*) • *Impact of transcriptional deregulation on gene expression levels and nuclear organization of candidate genes in colorectal cancer cells* 17th Transcription Assembly Meeting, Jawaharlal Nehru Center for Advanced Scientific Research (JNCASR), Bangalore, March 17-18, 2014 (*Invited Speaker*) • *To move or not to move is the question? Chromosome and gene loci dynamics* National Seminar on Recent Trends in Biology 2014, Department of Zoology, University of Pune, March 28-29, 2014 (*Invited Speaker*)

L.S. Shashidhara *Making of a flight appendage: An evolutionary perspective* Bi-annual Indian *Drosophila* Meeting, BHU, Varanasi, March 12-13, 2014 • *Making of a flight appendage: An evolutionary perspective* Annual Meeting of the Indian Society of Developmental Biology, TIFR Mumbai, December 1-4, 2013 • *Shaping of an organ: the role of Fat/Hippo pathway* 9th National Research Scholars Meeting, ACTREC, Mumbai, December 19-20, 2013 • *Differential development of wing and haltere in Drosophila* 2nd Asia-Pacific Drosophila Conference, Seoul, May 13-15, 2013

Steven Spallone *Signs for self-dual representations* AIS Workshop on Chevalley Groups, May 22, 2013 • *Elliptic Curves* NCM School on Riemann Surfaces and Algebraic Curves, IISER Pune June 20-21, 2013 (2 Lectures) • *Residues of intertwining operators: Elliptic terms* Automorphic Forms Seminar, Purdue University, U.S.A. January 16, 2014

S.G. Srivatsan *Posttranscriptional chemical functionalization of RNA by bioorthogonal reactions* International Conference on Chemical Biology, Hyderabad, February 6-8, 2014 (*Invited Speaker*) • *The Science and Art of Sustainability*: Workshop by DAAD-Humboldt, Pune Chapter, NCL Pune, September 6-7, 2013 (*Invited Speaker*) • Sabale, P. and Srivatsan, S.G. *Synthesis and photophysical properties of base-modified fluorescent PNA oligomers* International Conference Chemical Biology, Hyderabad, February 6-8, 2014 • Sawant, A. and Srivatsan, S.G. *Posttranscriptional chemical modification of ribonucleic acids by Click and Staudinger reactions* International Conference Chemical Biology, Hyderabad, February 6-8, 2014 • Ashok, N. and Srivatsan, S.G. *Base-modified fluorescent nucleoside amphiphiles: Synthesis and self-assembling properties, IX J-NOST*, IISER Bhopal, December 4-6, 2013 • Sabale, P. and Srivatsan, S.G. *Synthesis and photophysical properties of base-modified fluorescent PNA oligomers*, IX J-NOST, IISER Bhopal, December 4-6, 2013 • Tanpure, A.A. and Srivatsan, S.G. *Fluorescence detection*

of RNA abasic site by using an emissive nucleoside analogue International Meeting on Chemical Biology, IISER Pune May 26-28, 2013

Nishikant Subhedar International Conference on Comparative Endocrinology and Physiology, RTM Nagpur University, Nagpur, October 21-23, 2013

Pinaki Talukdar *Development of fluorescent chemosensors for detection of thiol species* 1st International Conference on Chemical Biology, IICT Hyderabad, February 6-8, 2014 (*Invited Speaker*) • International Meeting on Chemical Biology, Indian Institute of Science Education and Research, Pune, May 26-28, 2013 • Kand, D., Chauhan, D. and Talukdar, P. *δ-Unsaturated γ-amino acids: enantiodivergent synthesis and cell imaging studies* International Meeting on Chemical Biology, IISER Pune, May 26-28, 2013 *(Poster Presentation)* • Kand, D., Saha, T., Roy, A. and Talukdar, P. *Cascade reaction based fluorescent turn-On probe for selective detection of hydrogen sulfide* 1st International Conference on Chemical Biology, IICT Hyderabad, India February 6-8, 2014 *(Poster Presentation)* • Kand, D., Saha, T., Roy, A. and Talukdar, P. *Cascade reaction based fluorescent turn-on probe for selective detection of hydrogen sulphide* Science Day, IISER Pune, February 28, 2014 *(Poster Presentation)* • Saha, T., Roy, A., Gening, M., Nifantiev, N.E. and Talukdar, P. *Revisiting the immutable indentation of cyclodextrin: Cyclo-(1→ 6)-β-D-Glucosamine based channels for tunable ion transport* International Meeting on Chemical Biology organized by IISER Pune, May 26-28 2013 *(Poster Presentation)* • Saha, T., Roy, A., Gening, M., Nifantiev, N.E. and Talukdar, P. *Cyclo-oligo-(16)-β-D-Glucosamines: Indispensable scaffolds to design tunable artificial ion channels* 1st International Conference on Chemical Biology, IICT Hyderabad, February 6-8, 2014 *(Poster Presentation)*

Suneeta Vardarajan Amruta Sadhu, Inter-IISER Physics Meet, IISER Pune, March 2014 (*Poster Presentation*)

Arun Venkatnathan *Computer simulation of polymer electrolyte membranes and clathrate hydrates* IISER Pune-UKIERI Symposium, University of Glasgow, U.K., June 18-20, 2013 • *Computer simulation of polymer electrolyte membranes and clathrate hydrates* Department of Chemistry, Edinburgh University, U.K., June 21, 2013

Seema Verma Bala Gopal, M. and Verma, S. *Fluorescent magnetic mesoporous silica nanocomposites for biomedical applications* 3rd International Conference on Advanced Nanomaterials and Nanotechnology (ICANN-2013), IIT Guwahati, December 1-3, 2013 (*Poster Presentation*) • Venu Madhav, A. and Verma, S. *Multifunctional silver nanowires coated with magnetic nanoparticles as SERS nanoprobes* 3rd International Conference on Advanced Nanomaterials and Nanotechnology (ICANN-2013), IIT-Guwahati, December 1-3, 2013 (*Poster Presentation*) • Venu Madhav, A. and Verma, S. *One-pot synthesis of monodispersed multifunctional magnetic-plasmonic nanohybrids* 6th International Conference on Nano Science and Technology (ICONSAT) NST, Chandigarh, Punjab, March 3-5, 2014 *(Poster Presentation)*

Milind Watve Conference on Prediabetes and Metabolic Syndrome 2013, Vienna, Austria, April 18-20, 2013 *(2 Poster Presentations)* • *Multilevel selection on a quantitatively selfish trait leads to a rock-paper-scissor like situation* Being Social: An interdisciplinary Conference on Social Behavior, June 26-28, 2013 *(Invited Paper Presentation)* • *Sexual selection, maternal investment and insulin* One-day Seminar on Sexual selection, IISc, Bangalore, July 8, 2013 *(Invited Speaker)* • *Evolution of aging and death: Insights from bacteria* One-day Symposium on Celebrating

Wallace, NCBS, Bangalore, November 7, 2013 *(Invited Speaker)* • *Behavioral strategies: the missing link in our understanding of complex disorders* and *Sexual selection, maternal investment and insulin* Tree of life: Seminar on Evolution, Jaihind College, Mumbai, December 12, 2013 *(2 Invited Talks)*

Academic Events Organized

G. Ambika Organized Inter IISER Physics Meet, March 15-16, 2014

Collins Assisi Co-organized the INNNI workshop on Hippocampus: From Synapses to Behavior, December 1-3, 2013 • Co-organized the Society for Autonomous Neurodynamics X Conference, 2013

ArjunBagchi Co-organized Stringy Days, a mini-workshop on String Theory, March 6-7, 2014

AshnaBajpai Organized the Science Academies Refresher Course in Experimental Physics, December 9-24, 2013

Anjan Banerjee Coordinator for DBT's IISER-NISER network program initiative (Plant Biology) and organized a one day conference on Frontiers in Plant Sciences and organized a meeting of Plant Biologists from all IISERs and NISER, December 30, 2013 • Coordinator for IISER-Ohio State University (OSU) undergraduate students exchange program for interdisciplinary research on cancer and related areas • Organized the 35th Annual meeting of PTCA (India) and a National Symposium of Advances in Plant Molecular Biology and Biotechnology, March 10-12, 2014

Rabeya Basu Organized a one-day symposium on K-Theory, May 15, 2013

Apratim Chatterji 9th Mumbai-Pune Complex Fluids Meeting, August 17, 2013 • Ordered by Entropy-Soft Matter evening in IISER Pune, October 7, 2013 • Soft Matter-Young Investigators Meet, January 5-7 2014, Pondicherry

Srabanti Chaudhury Organized a Theoretical and Computational Modeling Group (TCMG) between IISER Pune and NCL

Sutirth Dey Was a Session Organizer at the Indo-American FOS Symposium, April 7-10, 2013, Agra • Organized Euraxess-IISER-Pune Science Slam, September 29, 2013 • Co-organized Foundations of Evolutionary Theory: The Ongoing Synthesis? February 23-26, 2014, Orange County, Coorg

C.V. Dharmadhikari Organized a workshop on Innovation: Brokering Nanotechnology, Creating Capacity, March 27-28, 2014

Sanjeev Galande Organized a workshop on NGS Analysis along with Persistent Systems Ltd., February 24-27, 2014

Pranay Goel IASCT-IISER Pune workshop on Applications of Bayesian Statistics in Clinical Trials and Biology, November 16, 2013

Anindya Goswami Organized a mini course of five lectures on Introduction to Markov chains and Brownian motion by Prof. K.B. Athreya, January 27-30, 2014

Anirban Hazra Co-organized along with Sutirth Dey and L.S. Shashidhara Euraxess-IISER-Pune Science Slam, September 29, 2013 • Was a Faculty Advisor for Mimamsa, February 15, 2014

Saikrishnan Kayarat Co-organized India-UK Scientific Seminar Complementary Approaches in Structural Molecular Biology, January 27-29, 2014

Vivek Mallick Co-organized Advanced Instructional School on Algebraic Curves with Prof. Nitin Nitsure of TIFR, June 3-22, 2013

Rama Mishra Organized a symposium on Indian Women and Mathematics, July 2013 • Member of Organizing Committee and Scientific Committee for the Advanced School and Discussion Meeting on Knot Theory and its Applications, IIT Ropar and IISER Mohali, December, 2013

Sunil Mukhi Organized an international workshop with Keshav Dasgupta (McGill University) and Mark van Raamsdonk (UBC Vancouver) on Modern Developments in M-theory, Banff International Research Station, Canada, January 12-17, 2014

Suhita Nadkarni Co-organized the INNNI workshop on Hippocampus : From Synapses to Behavior, December 1-3, 2013 • Co-organized the Society for Autonomous Neurodynamics Conference, 2013

Sunil Nair Conference on Neutron Scattering (CNS 2014) sponsored by the Board of Research in Nuclear Sciences (BRNS), organized with the Bhabha Atomic Research Centre (BARC), Mumbai, and the Neutron Scattering Society of India (NSSI), February 10-12, 2014

Rejish Nath Organized the second Winter School on Ultra Cold Atoms for Fundamental Science and Enabling Technologies, December 15-20, 2013

Arvind Natu KVPY Interview • International Meeting on Chemical Biology • Safety & Health Care Workshop

Umakant Rapol Organized Indo-UK Industry-Academia Symposium funded by British Council, October 28-29, 2013 • Organized the second Winter school on Ultra Cold Atoms for Fundamental Science and Enabling Technologies, December 15-20, 2013

Richa Rikhy Partly organized Mahabaleshwar Meeting on Mitochondrial Metabolism and Energetics, January, 2014

M.S. Santhanam Organized on December 14, 2013 a topical mini-symposium on Extreme events and Applications as part of the Conference on Nonlinear Systems and Dynamics (CNSD), Indian Institute of Technology Indore, December 12-15, 2013

L.S. Shashidhara Organized a workshop on Evolution of Human Cognition, November 17-19, 2013

S.G. Srivatsan Organized International Meeting on Chemical Biology (IMCB-2013), May 26-28, 2013

Suneeta Vardarajan Scientific Organizer for 27th meet of the Indian Association for General Relativity and Gravitation (IAGRG), Srinagar, Uttarakhand, March 2013 • Organized Inter-IISER Physics Meet, March 15-16, 2014

Memberships and Affiliations

G. Ambika Life Member, Indian Science Congress • Member, Indian Association of Physics Teachers • Member of Academy of Physics Teachers

V.G. Anand Life Member, Chemical Research Society of India (CRSI) • Member, International Advisory Board, *Macroheterocycles*

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

Collins Assisi Member, Organization of Computational Neuroscience • Member, Society for Neuroscience

Chaitanya Athale Member, Biophysical Society of U.S.A.

Ramana Athreya Member, Arunachal Pradesh State Wildlife Advisory Board • Trustee, EcoSystems-India, Guwahati, India (a conservation NGO)

Arjun Bagchi Junior Member, Isaac Newton Institute of Mathematical Sciences, Cambridge, U.K. • Visiting Professorship, University of Santiago de Compostela, Spain through Research Excellence Award 2014

Sudipta Basu Member, The Indian Science Congress Association

Nagaraj Balasubramanian Member, American Chemical Society

Nirmalya Ballav Editorial Board Member of the Journal *ISRN Spectroscopy* • Member, American Chemical Society • Visiting Scientist in the group of Prof. Thomas A. Jung at Paul Sherrer Institute (ETH Domain), Switzerland

Ramakrishna Bhat Life Member, Chemical Research Society of India

Anjan Banerjee Member, All India Cell Biology Association • Member, Plant Tissue Culture Association of India • Member, American Society of Plant Biologists (ASPB)

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

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

Harinath Chakrapani Life Member, Chemical Research Society of India

Aloke Das Life Member, Chemical Research Society of India • Life Member, Indian Society for Radiation and Photochemical Sciences

Shouvik Datta Member, Ad-hoc Board of Studies on Nanoscience and Nanotechnology, Shivaji University, Kolhapur

Sourabh Dube was approved to join the India-CMS collaboration as a step towards joining the CMS collaboration

Sanjeev Galande Life Member, Society of Biological Chemists, India • Honorary Associateship of the Sydney Medical School, Sydney, Australia 2013-16

Krishna Ganesh President, Division of Organic and Bimolecular Chemistry, Division-III, IUPAC (2012-2013) • Chairman, FIST Expert Committee in Chemical Sciences, DST, New Delhi (2012-2015) • Member, FIST Advisory Board (FISTAB), DST, New Delhi • Chairman, Programme Advisory Committee in Organic Chemistry, DST, New Delhi • Honorary Professor, JNCASR, Bangalore • Member, Board of Directors, Venture Centre, NCL Innovation Park, Pune • Member, Nanoscience Advisory Group, DST, New Delhi (2011-2014) • Chairman, Indian Advisory Committee, Lady Tata Memorial Trust, Mumbai • Member, Research Council, CSIR-Institute of Genomics & Integrative Biology (IGIB), New Delhi • Member, Empowered Committee, Science and Engineering Research Board (SERB), DST New Delhi • Member, Board of Governors, YASHADA, Pune • Member, Maharashtra State Innovation Council (MSInC) • Member, DBT-IISc Partnership Program's Scientific Advisory Committee • Chairman, DBT Task Force on Human Resource Development • Member, Oversight/Umbrella Committee for DBT's Bioenergy Centres and New Centre (Pan-IIT) • Member, Nano Mission Council (NMC), DST, New Delhi

Membership of Editorial Boards of Journals

Journal of Organic Chemistry (ACS–International Editorial Advisory Board)
Chemistry – An Asian Journal (Wiley, Germany) Member International Advisory Board
Beilstein Journal of Organic Chemistry (Germany)
Artificial DNA:PNA, XNA (Landbiosciences, U.S.A.)
Oligonucleotides (Mary Ann Liebert Inc, U.S.A.)
Nature: Scientific Reports (Nature Publishing Group)

Aurnab Ghose Life Member, Indian Society for Cell Biology • Life Member, Indian Academy of Neurosciences • Life Member, Society for Neurochemistry (India) • Member, Society for Neuroscience (U.S.A.)

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

Sujit Ghosh Life Member, Chemical Research Society of India

Anirban Hazra Member, Indian Society for Radiation and Photochemical Sciences

Partha Hazra Life Member, Chemical Research society of India

M. Jayakannan Life Member, Society for Polymer Science India (SPSI) • Chemical Research Society of India (CRSI) • Member, Royal Society of Chemistry (RSC)

M. Jeganmohan Life Member, Chemical Research Society of India

Krishanpal Karmodiya Member, Malaria Research and Reference Reagent Resource Center (MR4)

Saikrishnan Kayarat Member, Biochemical Society • Member, Indian Crystallographic Association

Avinash Khare Associate Editor, *Pramana (Journal of Physics)*, Indian Academy of Science, Bangalore

Raghavendra Kikkeri Life Member, Chemical Research Society of India

Sulabha Kulkarni Fellow, Asia Pacific Materials Society (2013)

G.V. Pavan Kumar Life Member, Optical Society of India • Member, Optical Society of America

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

Ayan Mahalanobis International Association for Cryptologic Research • American Mathematical Society

T.S. Mahesh Member of NMR Society, India

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

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

Rama Mishra Member, Editorial Board for the *American Journal of Mathematical Analysis*, Science Education Publishing, U.S.A. • Member, Mathematical Reviews

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

Suhita Nadkarni Member, The Society for Neuroscience • Member, Organization for Computational Neurosciences

Arvind A. Natu Senate Member, SVNIT, Surat • Academic Council, DY Patil University, Pune • Scientific Advisory Committee, ICMR, Belgaum • Member, International Junior Science Olympiad • UGC-SAP Committee, Chemical Sciences • PMC of DRDO HEMRL Panel • Board of Directors, PCMC Science Park, Pune • Chairman, URDIP, Admission Committee • Editorial Board, Indian Drugs • Board of Studies, Rani Channamma University, Belgaum

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

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

V.S. Rao Member, Institutional Biosafety Committee of Syngenta, Pune • Member, Monitoring and Assessment Committee of USERS program, DST, New Delhi • Member, Task Force on "Accelerated Crop Improvement Program", DBT, New Delhi • Adjunct Visiting Professor, University of Pune • Member, Research Advisory Committee, Directorate of Wheat Research (ICAR), Karnal • Life Member, Indian Society of Genetics and Plant Breeding and Indian Society for Plant Biochemistry and Biotechnology

M.S. Santhanam Member, Editorial Board of Physics Education • Member, Vidyalaya Management Committee, Kendriya Vidyalaya, Ganeshkhind, Pune

Ronnie Sebastian Member, Ramanujan Mathematical Society

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

L.S. Shashidhara Member, National Advisory Committee, IISER Kolkata • Member, Apex committee of DST-INSPIRE • Member, Research Advisory Council of National Institute of Immunology • Member, Selection Committee, DBT Ramalingaswamy Fellowships-2010

onwards • Member, Asia Pacific *Drosophila* Board-2010 onwards • Member, Taskforce on Seribiotechnology, DBT, New Delhi-2006 onwards • Member, Board of Studies, Centre for Integrated Studies, HCU-2009 onwards

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

Pinaki Talukdar Life Member, Chemical Research Society of India

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

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

International and National Visits

Collins Assisi Participated in the Inter–IISER computational biology and biophysics initiative in Kolkata and helped draft a proposal on modeling neurobiological systems across scales, October 2013

Chaitanya Athale Inter-IISER Network Meeting on Computational Biology, Raichak, West Bengal

Anjan Banerjee Presented and discussed research work during a visit to INGEBI, Buenos Aires, Argentina as a part of Indo-Argentine Science and Technology Cooperation during December 16-24, 2013 • Visited Prof. Javier Palatnik (a renowned scientist and expert in small RNA research) at the Institute of Biological Research (IBR) Rosario, Argentina on December 19, 2013 and presented research work at IBR • Visited Prof. S. Sinha at the Department of Botany, Tripura University to discuss and prepare the DBT's Twinning Project during August 12-17, 2013 and gave a talk in the Department of Botany at Tripura University

Deepak Barua IISER/NISER Ecology Group Meeting, IISER Kolkata, October 2013

Harinath Chakrapani Visited Keele University U.K. as a part of U.K.-India Education and Research Initiative (UKIERI) project in Medicinal Chemistry between IISER Pune and Keele University, U.K. during October 13-16, 2013

Krishna Ganesh Visited U.S.A. to attend the Annual Meeting of the Editorial Advisory Board of the *Journal of Organic Chemistry* took place during the ACS National Meeting in New Orleans, Louisiana, April 6-10, 2013 • Visited Germany to attend the IUPAC meeting at Frankfurt, April 19-21, 2013 • Visited Germany to attend the Glasgow-IISER Pune Dynamics and Structure Meeting held at the University of Glasgow, June 17-21, 2013 • Visited Istanbul, Turkey to attend IUPAC Meeting, August 8-16, 2013 • Visited Berlin, Germany to participate in the Teachers' Workshop organized in the context of the 47th Annual Meeting of the European Petrochemical Association (EPCA). This workshop was organized in the scope of the promotion of STEM education (science, technology, engineering and mathematics) in schools and at universities in order to cover the skill's gap that exists in industrial segments inclusive of the chemical industry. October 7-10, 2013

Sanjeev Galande Visited Institute Pasteur, Paris France to work on collaborative project funded by CEFIPRA, September 16-October 11, 2013

Prasenjit Ghosh Visited Condensed Matter and Statistical Physics Section of The Abdus Salam International Centre for Theoretical Physics as Regular Associate, May 16-June 20, 2013

Avinash Khare Gave lectures at International School, Berlin, Germany, September, 2013

G.V. Pavan Kumar Visited Glasgow University and Edinburgh University as part of a delegation, July 2013

Sunil Nair The Photon Factory Synchrotron Source, Tsukuba, Japan May, 2013 • The ISIS Neutron Source, Rutherford Appleton Laboratories, Oxford, U.K. June, 2013 • University of Glasgow and University of Edinburgh, U.K., June 2013

Arvind Natu Visited W. Germany & Hungary to visit X Lab and to deliver two lectures

Umakant Rapol Visited University of Birmingham for executing a Knowledge economy partnership program funded by the British Council, June 19-28, 2013

M.S. Santhanam Visited Birmingham University, U.K. as part of Indo-U.K. Knowledge Transfer project, September, 2013 • Visited University of Bath, University of Leicester, The Open University (all in the U.K.) as part of a delegation led by the Ministry of Human Resources Development, Govt of India and The British Council to understand the technology enhanced learning methodologies in U.K. universities, October, 2013

Kundan Sengupta Visited as senate member of interview panel of Lupin Research Park for selecting PhD candidates for Ascent PhD Program of Lupin, Pune, February 7, 2014

L.S. Shashidhara Visited as organizer and speaker second Asia-Pacific Drosophila Conference, Seoul, South Korea, May 13-15, 2013 • Visited Biozentrum, Wurzburg, Germany as invited seminar speaker, June 13-15, 2013 • Annual Meeting of American Geophysics Union, San Francisco, December 9-13, 2013 • Visited IST Vienna, Austria as invited seminar speaker, June 17-19, 2014

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

Steven Spallone Visited University of Oklahoma for research collaboration, January 6-11, 2014 • Visited Purdue University for research collaboration, January 14-22, 2014

Arun Venkatnathan Visited Bharathiar University, Coimbatore, May 6, 2013 • University of Glasgow, U.K., June 18-20, 2013 and Edinburgh University, U.K., June 21, 2013

Milind Watve Visited and had discussion meetings in U.K., March-April 2013: University of Glasgow, Edinburgh, Oxford Centre for Diabetes and Metabolism (OCDEM) and Cambridge and University College, London • Visit and discussion meetings at Max Plank Institute of Evolutionary Biology, Plon, Department of Biochemistry, University of Bremen, Germany, April, 2013 • Visit and discussion meetings at ETH, Zurich, Switzerland, April 2013

Conferences, Symposia, Workshops

ATM Workshop on Chevalley Groups

May 13-25, 2013

An ATM workshop on Chevalley groups was organized by Dr. Anupam Singh, IISER Pune and Dr. Shripad Garge, IIT Bombay. There were 40 participants with 7 resource persons and 3 tutors invited to the workshop. The aim of the workshop was to learn Chevalley groups using the Yale lecture notes on the same topic by Robert Steinberg and Carter's book "Simple groups of Lie type". The details of the topics covered by speakers are as follows:

"Lie Algebras and Root Systems" by Anuradha Garge (University of Mumbai); "Universal enveloping algebra", "PBW theorem", "Chevalley basis and definition of Chevalley Groups" by Preena Samuel (Hyderabad Central University); "Representation of Chevalley Groups" by Upendra Kulkarni (CMI Chennai); "Structure of Chevalley Groups and Algebraic Groups" by K.N. Raghavan (IMSc Chennai); "Orders, isomorphisms and automorphisms of Chevalley groups" by R.P. Shukla (University of Allahabad); "Steinberg groups, generators and relations and K-theory of Chevalley groups" by B. Sury (ISI Bangalore); and "Twisted Chevalley groups" by Maneesh Thakur (ISI Delhi).

The organizers conducted tutorials with the help of tutors Anuradha Ahuja (IITB Mumbai), Anirban Bose (ISI Delhi) and Pratyusha Chattopadhyay (ISI Kolkata).

On May 24 and 26, a short conference on Groups and Representations supported by IISER Pune was held. Six young researchers presented their work and four senior colleagues gave expository lectures on topics of current interest. The presentations by young researchers were:

Anuradha Ahuja (IITB): "Schur-Weyl duality for special orthogonal groups"; Anirban Bose (ISID): "The compact Lie group F4 is bireflectional"; Pratyusha Chattopadhyay (ISIK): "Equality of linear and symplectic orbits"; Dilpreet Kaur (IISERM): "Strongly real special 2 groups"; Sandip Singh (TIFR): "Arithmetic monodromy groups"; Pooja Singla (IISc): "Unramified principal series of GL(3) over non-archimedean local field"

The expository lectures were: "R-equivalence and Kneser-Tits problem" by Amit Kulshrestha and Maneesh Thakur; "Classical invariant theory and standard monomial theory" by K.N. Raghavan and "Galois cohomology and algebraic groups" by Dipendra Prasad.

International Meeting on Chemical Biology (IMCB-2013)

May 26-28, 2013

IMCB-2013 is an initiative by IISER Pune to foster interest amongst Indian scientific community in the emerging field of Chemical Biology. The conference was inaugurated by Prof. C.N.R. Rao. Leading and pioneering researchers from both academia and industry from around the world showcased the challenges and latest developments in the field of Chemical Biology. The sessions were nicely balanced with a wide range of topics covering biomolecular structure and function to therapeutics. There were 28 invited talks and several poster presentations. A special session was also arranged to commemorate the 60th anniversary of the discovery of the DNA double helix structure. The meeting was coordinated by Dr. Srinivas Hotha and Dr. Srivatsan.

Advanced Instructional School on Algebraic Curves

June 3-22, 2013

An Advanced Instructional School on Algebraic Curves was organized by Dr. Vivek Mallick along with Prof. Nitin Nitsure of TIFR, Mumbai. There were 32 participants along with a few local participants. The workshop consisted of a few mini-courses given by Prof. Nitin Nitsure (TIFR), Prof. S.M. Bhatwadekar (Bhaskaracharya Pratisthana), Dr. Amit Hogadi (TIFR/IISER Pune), Dr. Steven Spallone (IISER Pune) and Dr. Vivek Mallick (IISER Pune).

Workshops on Scientific Inquiry for School Children

May 19-23, 2013; June 17-21, 2013

Two workshops were arranged during the summer of 2013. The first workshop, held in May 2013, was meant for school students in Pune who had completed Class IX. A total of 30 students participated in the workshop. The second one, held in June 2013, was a residential workshop for scholarship holders of the National Talent Search in which 33 students had participated.

The goal of these workshops was to help students develop the capacity to engage in critical thinking and inquiry across different disciplines and specializations. The participants had an opportunity to learn how to identify interesting scientific questions; gather information/data relevant to the questions; come up with observational generalizations, formulate them, and test them; how to come up with theories to explain the generalizations; evaluate and choose between theories; and so on. These abilities act as the foundations for the broader thinking and inquiry abilities. Both the workshops were conceptualized and conducted by Prof. K.P. Mohanan.

Symposium on Indian Women and Mathematics-2013

July 26-28, 2013

A symposium on Indian Women and Mathematics-2013 was organized at IISER Pune with funding from NBHM. The symposium was attended by around 100 women college and university teachers in addition to young women at various stages in academics. The focus of this meeting was to introduce new mathematics and also to enable the participants showcase their expertise. This was facilitated by having two mini-courses on two emerging and largely unexplored areas in mathematics, viz. Mathematical Biology and Non-Commutative algebras. The plenary talks focused on different aspects of mathematics: study of groups via analysis and geometry, enumeration problems, nonlinear analysis and other areas. The concluding session was devoted to an open-house discussion by the participants. The importance of bringing the teachers in the forefront in advancing their knowledge-base and skills in mathematics was emphasized in the context of improving education at the undergraduate level in the country, especially at college and

universities in smaller towns. The symposium was inaugurated by Dr. Indira Parikh, FLAME Institute, Pune and concluded with a vote of thanks by the Convener, Profs. Rama Mishra (IISER, Pune) and Shantha Bhushan (FLAME Institute, Pune).

Principles of Autonomous Neurodynamics: The 10th Annual Meeting of the Society for Autonomous Neurodynamics (SAND)

August 5-7, 2013

This meeting had an interesting mix of talks that spanned mathematical modeling of neurological disorders, spatial navigation, neuroepistomology and the 'art brain'. It was an out of the box meeting that allowed the visiting scientists and students (from Poland, USA and Canada) to have long and interesting interactions with the faculty and students of IISER Pune. The meeting was coordinated by Dr. Suhita Nadkarni.

9th Mumbai-Pune Complex Fluids Meeting

August 17, 2013

In the Mumbai-Pune region the soft matter community has been active in organizing informal day-long meetings at six-month intervals. These meetings are well attended by theorists, experimentalists and modeling folks, from several academic departments, and have nucleated collaborations between researchers with complementary skill sets. The 9th meeting was organized in August 2013 at the Institute and was coordinated by Dr. Apratim Chatterji.

Indo-U.K. Industry-Academia Symposium

October 28-29, 2013

The Indo-U.K. Industry-Academia Symposium funded by the British Council had eight speakers from industry and six speakers from the Academia. There were 10 industry participants and 30 faculty members and students from IISER Pune. The meeting was also attended by officials from the Indian Government, British Government and British Council. The event was inaugurated by Prof. K.N. Ganesh, Director IISER Pune and Sam Harvey, British Council.

The outcome of the panel discussion during the first day and consequent dinner meetings and following meetings on the second day of the symposium led to identification of key steps to take industry-academia collaboration forward in an international context.

Workshop on Applications of Bayesian Statistics in Clinical Trials and Biology

November 16, 2013

This workshop was organized by Dr. Jayant Deshpande and Dr. Pranay Goel in collaboration with the Indian Association for Statistics in Clinical Trials (IASCT). The goal of the workshop was to introduce the participants to the Bayesian philosophy of statistical inference. Applications of the Bayesian methodology to early and late-phase clinical development were discussed using examples to show how the flexibility of the Bayesian method can allow for designing clinical trials with desirable properties and for making meaningful inferences based on current and past studies. There was also a session on how the Bayesian framework can be applied to problems in mathematical biology related to modelling and statistical analysis. Following were the resource persons: Prof. Madhuchhanda Bhattacharjee, Department of Mathematics and Statistics, University of Hyderabad; Dr. Jayanti Gupta, Founder, Parinita, Treasurer @ IASCT; Dr. Debjit Biswas, Vice President, Primal Enterprises Ltd and Vice President @ IASCT.

Symposium on Evolution of Human Cognition

November 17-19, 2013

The nature of human cognition is one of the oldest and greatest unsolved mysteries. With the agenda of discussing current ideas and generating new testable hypotheses to understand the evolution of human cognition, a select group of researchers working on various aspects of cognition met at a symposium on Evolution of Human Cognition at IISER Pune in November 2013. The meeting, coordinated by Prof. L.S. Shashidhara, consisted of an introductory session, 11 discussion sessions and a closing session. In order to promote greater interaction, each discussion session consisted of a 45 minute talk by one of the researchers, followed by 30 minutes of discussion on the subject of the lecture and its relation to the broader questions on the origins of the human mind.

Speakers included Sumantra Chattarji, NCBS, Bangalore; Nicholas Humphrey, London School of Economics, London & Darwin College, Cambridge; Patricia Kuhl, Institute for Learning and Brain Sciences, University of Washington, Seattle; Tetsuro Matsuzawa, Primate Research Institute, Kyoto University, Japan; Andrew Meltzoff, Institute for Learning and Brain Sciences, University of Washington, Seattle, U.S.A.; Thomas Metzinger, Johannes Gutenberg-Universitat Mainz, Mainz, Germany; Aditya Murthy, Centre for Neuroscience, Indian Institute of Science, Bangalore; Govindan Rangarajan, Department of Mathematics, Indian Institute of Science, Bangalore; Carel van Schaik, Anthropological Institute and Museum, Universitat Zurich, Zurich; Anindya Sinha, National Institute of Advanced Studies, Bangalore; Ajit Varki, San Diego, La Jolla, California.

Hippocampus: From Synapses to Behavior

December 1-3, 2013

This international workshop was sponsored by the Indian National Node for Neuroinformatics (INNNI), an International Neuroinformatics Coordinating Facility during December 1-3, 2013 and was co-organized by Dr. Collins Assisi and Dr. Suhita Nadkarni. Several international experts who study hippocampus gave fascinating talks over three days. Due to its pedagogical structure, it was attended by more than 200 participants. As an outreach effort by the IISER Pune Science Media Center, interviews of the visiting eminent scientists were broadcast on IISER Science radio program on Vidyavani 107.4 FM.

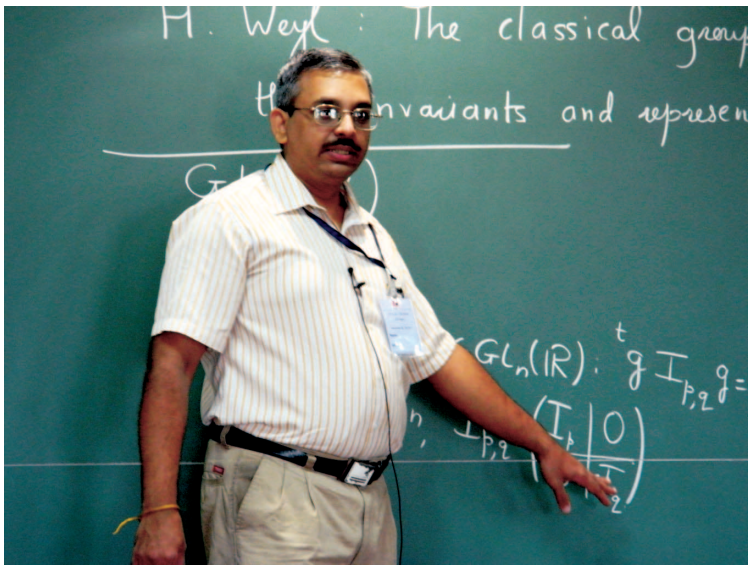
Advanced Instructional School on Classical Groups and Introduction to K-Theory

December 5-26, 2013

This School was jointly organized by Dr. Shripad Garge, IITB Mumbai and Dr. Anupam Singh, IISER Pune and was financed by NCM. The aim of the workshop was to learn classical groups using from the group theoretic point of view in line with the well known book Geometric Algebra by Emil Artin. The details of the topics covered by speakers are as follows:

General linear and symplectic groups by Anupam Singh (IISER Pune); Bilinear forms by Anuradha Garge (University of Mumbai); Orthogonal geometry and orthogonal groups by Amit Kulshreshtha (IISER Mohali); Clifford algebras and spin groups by Upendra Kulkarni (CMI, Chennai); Unitary spaces and unitary groups by Shripad Garge (IIT, Mumbai); Introduction to K-theory- I by B. Sury (ISI, Bangalore) and Introduction to K-theory- II by Pratyusha Chattopadhyay (ISI, Bangalore). The tutorials were conducted by Anupam Singh and Shripad Garge with the help of speakers for each topic.

Distinguished mathematicians were invited as guest speakers for this program and for interaction with the participants. They were: K.N. Raghavan, IMSc, Chennai- BN-pairs and Bruhat decomposition; G. Lusztig, MIT, - Bruhat decomposition and conjugacy classes in algebraic groups; Dipendra Prasad, TIFR, Mumbai- Maximal subgroups of classical groups; M. S. Raghunathan, IIT, Mumbai- Kneser-Tits problem; Ivan Panin, St. Petersburg- On a Grothendieck and Serre conjecture on principal G-bundles over regular local rings containing an infinite field; Anupam Singh, IISER, Pune - Classical groups and algebras with involution.



On the last day, there were brief presentations by three young participants viz. Pratyusha Chattopadhyay (ISI, Bangalore), Dilpreet Kaur (IISER, Mohali), and A.A. Ambily (ISI, Bangalore).

Winter School on Ultra Cold Atoms for Fundamental Science and Enabling Technologies

December 15-20, 2013

This School was jointly organized by IISER Pune and Midlands Ultra-cold Atom Research Centre (MUARC, a close collaboration between the Universities of Birmingham and Nottingham), U.K. This school was targeted towards training students who aspire to pursue research career in the area of ultra cold atoms and their applications in fundamental and applied Science. There were a series of talks and seminars on the rapidly developing field of ultra cold atoms. The School covered areas such as atom traps, precision measurements, atom chips, Bose Einstein condensates, dipolar gases and gauge fields. Speakers were from United Kingdom, Germany and India and the participants included Masters and doctoral students and post-docs from various universities/institutes across India. The School was coordinated by Dr. Umakant Rapol and Dr. Rejish Nath.

Science Academies' Refresher Course in Experimental Physics

December 9-24, 2013

This Course was organized at IISER Pune in December 2013 as part of an initiative by the Science Academies of India. The Course comprised of extensive lectures and laboratory sessions using a low cost experimental kit designed for physics experiments on the initiative of the three academies of sciences in India. This is done with the aim to improve laboratory programs in universities and colleges and to drive home the importance of experimental skills in physics, which is often neglected in our physics curricula. 26 students and 4 teachers attended the course. Prof. R. Srinivasan, Dr. T.G. Ramesh, Dr. Elankumaran Kannan, Dr. Manohar Nyayate, Prof. S.M. Sadique, Dr. Efrem D'Sa, Dr. K.R. Priolkar, Prof. S.B. Ogale, Prof. C.V. Dharmadhikari, and Prof. Arvind Gupta were the resource persons for the course. The practical sessions were entirely handled by Prof. Srinivasan. Two experimental kits developed by the Indian Academy of Sciences were given as prizes to two best participants selected by the course director for use at their respective institutions. The entire workshop was recorded and is being edited. It is proposed to distribute the DVD to various colleges. The course was directed by Prof. R. Srinivasan and coordinated by Dr. Ashna Bajpai.

Satellite Meeting of the Frontiers in Chemistry and Biology of Oligosaccharides (FCBO-2014)

January 18-19, 2014

The topics covered were (a) approaches to understanding the structure, dynamics and function of oligosaccharides, (b) glycoconjugates and carbohydrate vaccines, (c) challenges in the synthesis of glycoconjugates and (d) biomolecular self-assemblies. There were 25 invited talks. Some of the speakers were: Alexei Demchenko,University of Missouri, St. Louis, U.S.A.; Amit Basu, Brown University, U.S.A., Joseph Barchi Jr. National Cancer Institute, Frederick, U.S.A.; Cristobel Lopez, Instituto de quimica Organica General, Juan de la Cierva 3, Madrid, Spain; Daniel Werz, Technische Universitaet Braunschweig, Germany; Hien Nguyen, University of Iowa, U.S.A.; B. Maria Pinto, Simon Fraser University, Vancouver, Canada; Mikael Bols, Kemisk Institut, Copenhagen, Denmark; Monica Palcic, Carlsberg Laboratory, Copenhagen, Denmark; Ole Hidsgaul, Carlsberg Laboratory, Denmark; George Oodoherty, Northeastern University, Boston, U.S.A.; Francesco Nicotra, University of Milano-Bicocca, Italy; Shang-Cheng Hung, Academia Sinica, Taipei, Taiwan; Todd Lowary, University of Alberta, Edmonton, Canada; Hermen Overkleeft, Leiden Institute of Chemistry, Leiden, Sweden; Aloysius Serianni, CNRS Research (HDR), France; and Anthony Serianni, University of Notre Dame, Indiana, U.S.A. Speakers from India were: Chitra Mandal, IICB, Kolkata; Dilip Dhavale, University of Pune; Raghavendra Kikkeri, IISER Pune; Chepuri Ramana, NCL, Pune; Suvarn Kulkarni, IIT, Bombay; Srinivas Hotha, IISER Pune; B. Venkateswara Rao, IICT, Hyderabad; and Kana Sureshan, IISER, Thiruvananthapuram. Over 160 participants registered for this meeting which was organized by Dr. Srinivas Hotha.

International Workshop on Modern Developments in M-Theory

January 12-17, 2014

This international workshop was organized by Prof. Sunil Mukhi together with Keshav Dasgupta (McGill University) and Mark van Raamsdonk (University of British Columbia, Vancouver, Canada) and held at Banff International Research Station, Canada. The workshop had the following focus areas: the definition of M-theory, the construction of the effective action of M-theory, the world-volume field theory on M2-branes, the world-volume field theory on M5-branes, the relation between M5-branes and superconformal theories, the development of generalized geometry, the relationship between knot theory and branes, and the study of wall-crossing.

Indo-U.K. Scientific Seminar on Complementary Approaches in Structural Molecular Biology

January 27-29, 2014

The aim of this seminar coordinated by Dr. Saikrishnan Kayarat was to discuss the latest developments in the field of structural biology and to promote interaction, collaboration and networking amongst researchers from India and U.K. The 20 participating researchers shared their expertise in diverse yet complementary fields of research applied for understanding the structure and function of biomolecules. The fields included X-ray crystallography, electron cryomicroscopy, spectroscopic techniques such as NMR and resonance Raman, super-resolution microscopy, and computational and systems biology.

Course on Introduction to Markov Chains and Brownian Motion

January 27-30, 2014 and February 4, 2014

A mini course of 5 lectures on "Introduction to Markov chains and Brownian motion" by Prof. K.B. Athreya was organized by Dr. Anindya Goswami. In this series of talks, the theory of Markov chains with countable state space both in discrete time and continuous time is developed. Irreducibility, positive and null recurrence, stationary distributions and convergence to stationary distribution are discussed. Furthermore, definition of standard Brownian motion, discussion of the three important martingales, reflection principle and hitting probabilities, geometric Brownian motion in math finance, no arbitrage opportunities, discount rate, and derivation of Black -Scholes formula for option pricing were carried out. More than 30 participants including internal and external students attended the course.

International Symposium on Protein Structure, Function and Dynamics

January 30, 2014

This international symposium was co-organized by IISER Pune, NCL and NCCS. Eminent structural biologists and protein chemists from India and U.K. presented their research work to an audience of researchers and students from IISER Pune, NCL, NCCS, University of Pune, IIT Mumbai and colleges from Pune.

Conference on Neutron Scattering 2014

February 10-12, 2014

Sponsored by the Board of Research in Nuclear Sciences (BRNS), this conference was organized in association with the Bhabha Atomic Research Centre (BARC), Mumbai, and the Neutron Scattering Society of India (NSSI). The conference covered all important aspects of neutron scattering including facilities, science and applications. A particular emphasis was given on the application of neutron scattering in the topics of strongly correlated electron systems, functional materials, soft matter and biological systems, thin films and multilayers, and nanomaterials. There were more than 125 participants including 9 invited speakers from abroad (France, U.K., Italy, Switzerland, Japan and Korea). There were 31 invited talks and about 100 poster presentations. The event was coordinated by Dr. Sunil Nair.

Workshop on NGS Analysis

February 24-27, 2014

A workshop on NGS Analysis was organized along with Persistent Systems Ltd. This comprehensive workshop was aimed to provide hands-on genomics data analysis to biologists with none or limited basic bioinformatics experience. Workshop provided an introduction to data analyses and quality control, and tools and resources for genomics and transcriptomics analysis of NGS data. The workshop had a balanced mix of lectures and discussion with case studies from life science research by eminent scientists working in the area of genomics and computer-based

practical sessions. 30 participants from industry and academia attended the workshop and gave very good feedback. The entire event was covered by IISER Radio and was broadcast on University of Pune's community radio Vidyavani 107.4 FM. The workshop was coordinated by Prof. Sanjeev Galande and Dr. Farhat Habib.

Asian Conference on Raptor Research

February 6-7, 2014

The 8th Asian Raptor Research Conservation Network (ARRCN) Symposium was held during February 6-7, 2014 at the Institute. This is the first Symposium to be held in India and was organized by Ela Foundation, Pune and ARRCN with the theme "Raptor Conservation and Culture". IISER Pune provided the logistic support for accommodation and conference facilities for this Symposium. The Symposium was inaugurated by Shri Rishad Naoroji, Director, Raptor Research and Conservation Foundation. Department of Posts, Govt. of India released a special cover on this occasion. More than 70 delegates from 20 countries participated in this symposium.

Biophysics Paschim 6

March 1, 2014

Dr. Chaitanya Athale and Dr. Aurnab Ghose jointly organized a Working Group Meeting "Biophysics Paschim 6" between IISER Pune, TIFR Bombay, NCL Pune, IIT-Bombay, University of Pune and ACTREC Mumbai on March 1, 2014. This meeting included seminars by researchers from the participating institutes, short talks by PhD students and posters. The meeting was attended by 150 delegates and saw some exciting new results presented, ranging from protein folding (Arijit Bhattacharyay, IISER Pune) to cell mechanics in development (Maythreyi Narasimha, TIFR, Bombay).

Stringy Days: Mini-workshop on String Theory

March 6-7, 2014

Stringy Days was a mini-workshop on string theory organized by Prof. Sunil Mukhi and Dr. Arjun Bagchi. There were two colloquium talks by Prof. Atish Dabholkar (LPTHE, Paris) and Prof. Sandip Trivedi (TIFR, Mumbai). There was a session of technical seminars on March 7 which included speakers from IISc Bangalore, ICTS Bangalore, TIFR Mumbai and IISER Pune. The seminars focused on current trends of string theory with a particular emphasis on studies of the gauge-gravity duality.

National Symposium on Advances in Plant Molecular Biology and Biotechnology

March 10-12, 2014

National Symposium on Advances in Plant Molecular Biology and Biotechnology was organized in conjunction with the 35th Annual Meeting of PTCA (India). Dr. Anjan Banerjee was the convener and organizer. In all, there were 230 participants in this meeting. A number of eminent plant biologists attended this meeting and delivered talks. A special session on plant growth and development was also organized during this symposium. The symposium was inaugurated by Prof. K.N. Ganesh, Director, IISER Pune and Prof. J.P. Khurana gave the PTCA Secretary's address. The keynote address was delivered by Prof. K. Veluthambi, Madurai Kamaraj University on "Gene targeting in rice by positive/negative selection knockout of the *OsMADS1* gene". There were 51 oral presentations and 108 poster presentations.

Inter- IISER Physics Meet

March 15-16, 2014

The Second Inter- IISER Physics Meet held at IISER Pune was coordinated by Prof. G. Ambika. Faculty and students of all IISERs and NISER Bhubaneshwar attended this meeting. There were 14 sessions of 40 invited talks and presentations, including a common session for discussing academic practices, academic programs and curriculum across all the IISERs and NISER. The poster sessions consisted of 34 posters which showcased the recent trends and areas of research in each institute.

Several diverse topics on fundamental and applied Physics like Higgs Physics, quantum dots, quantum wells, qubits, magnetic domains, frustrated lattices, Raman scattering, solar cells, plasmons, nano structures, inflatory universe, gamma ray bursts, black holes, complex systems, quantum gravity, quantum heat engine, and optical tweezers and interdisciplinary topics like biomolecules, polymers, metal-organic complexes, spider silks, and quorum sensing were discussed.

The meet provided an opportunity to interact on topics of overlapping research interests, start collaborative research and share the experiences and ideas on courses and teaching Physics under the IISER structure.

Workshop on Innovation: Brokering Nanotechnology, Creating Capacity

March 27-28, 2014

This workshop was organized at IISER Pune during March 2014 on behalf of the Maastricht University Science and Technology Studies research group under the umbrella of the NWO-funded Nanotechnologies for Development Project led by Prof. dr. ir. Wiebe E. Bijker of the Faculty of Arts and Social Sciences at Maastricht University, The Netherlands. The workshop was coordinated by Prof. C.V. Dharmadhikari.

This two-day workshop brought together a wide range of experts, including nanoscientists and engineers, social scientists, policy researchers, and civil society activists focusing on various aspects of innovation using their experience with nanoscience and technology as a starting point. Topics of discussion at the workshop included cultures of innovation, institutional challenges to innovation, inclusive and participatory innovation, and teaching innovation, as well as a key-note address by Dr. Murali Sastry, former member of the National Nano-Mission, and currently Director, Innovation, DSM India.

The workshop highlighted several aspects that need attention by various stakeholders towards developing innovative policies and products in contemporary Indian contexts, some of which are related to successfully scaling-up innovations and developing institutional spaces in which cross-disciplinary exchanges can take place.

News and Events

Convocation

May 25, 2013

The 2nd Convocation of the Institute was organized on May 25, 2013. Dr. K. Kasturirangan, Member (Science), Planning Commission, Govt. of India was the Chief Guest on the occasion and delivered the convocation address. At this convocation, the first Honorary Doctorate Degree of the institute was conferred on Prof. C.N.R. Rao, Linus Pauling Research Professor, Honorary President JNCASR and Chairman, Scientific Advisory Committee to the Prime Minister of India. During the convocation, 44 students of BS MS program received the dual degrees of BS MS, while three students received their PhD degree. Prof. G. Ambika, Dean Graduate Studies was the anchor during the proceedings.

First Research Conference of Little Scientists

June 25-26, 2013

IISER Pune joined hands with Moving Academy of Medicine and Bioscience (MAMB), Pune in organizing the first research conference for young students who have a leaning towards learning science. MAMB, with the objective of nurturing science talent in the rural setting, has been conducting hands-on science programs in village schools. "Discovering Little Scientists" is a two-month summer vacation research program for class X-XII students. The conference was organized with the aim of providing an opportunity for the students to interact with distinguished scientists. Apart from students who were part of the summer program, 40 students from different schools participated in the event. Interactive sessions were conducted with Prof. K.N. Ganesh (Excitements in Chemistry); Prof. L.S. Shashidhara (Excitements in Biology); Prof. K.P. Mohanan (Becoming a Rational Inquirer); Prof. Avinash Khare (Excitements in Physics); and Dr. Rajiv Sarin (Cancer Genetics). About 37 platform presentations were made by the students. Parents were invited for the valedictory function and were given information on careers in science.

EURAXESS Science Slam India 2013

September 29, 2013

EURAXESS LINKS is a European organization for fostering collaborative research between European scientists and scientists from other countries. Science Slam is a contest in which researchers present their work in a language a non-specialist can understand. From the preliminary round consisting of a seven minute video presentation of the student's PhD research work, four students were selected for the final round which was held at IISER Pune. They were: Shraddha Karve of IISER Pune, Anupama Engineer and Prasad Bhagwat of Agharkar Research Institute and Binita Shah of NITIE Mumbai. The jury consisted of Dr. R. Gopichandran, Director of Vigyan Prasar, Dr. Megha of NCBS, Dr. Ashok Rao (Mysore), and Dr. Guruswamy Kumaraswamy (NCL). The contestants were given a 10 min slam, followed by a 10 min of questions by the audience and 10 min of questions by the jury. Ms. Shraddha Karve of IISER Pune was awarded both the audience and critics' prize. She received a gift voucher and an invitation to present at the EURAXESS Researchers Conference on November 21, 2013 at Brussels, Belgium.

NAMASTE Program Kick-off Meeting

November 11-12, 2013

IISER Pune has received the distinction of becoming Joint Coordinator, with Goettingen University as a coordinator, of a new initiative of European Union called NAMASTE (Networking and Mobility Actions for Sustainable Technology and Environment in India) under Erasmus Mundus Action-2. NAMASTE attempts to enhance bilateral cooperation in education and research, thus providing important scientific and technological cooperation, political, educational and economic links between the EU and India. The consortium consists of 20 Higher Education Institutes: 8 from EU countries and 12 from India. In the role of joint coordinator, IISER Pune will act as the liaison between Indian and EU partners. A total of 155 mobilities of students and staff from India to EU will be organized.

To initiate the project, a kick-off joint meeting of all the participating institutes' representatives was conducted in November at IISER Pune. The aim of this meeting was to get to know the partners and discuss the timelines and committees to run the project successfully.

Inter-IISER Sports Meet 2013

December 10, 2013

IISER Pune hosted the 2nd Inter-IISER Sports Meet-2013 which was held at the institute campus ground. All the five IISERs and NISER, Bhubaneshwar participated in the event. More than 400 students participated in this 5-day event. Mr. Abhijit Kunte, Indian Chess Grandmaster, was the chief guest at the opening ceremony. Games like basketball, volleyball, badminton, football, Kho Kho and track events like running, relay etc were organized. The team championship was won by IISER Pune team with a big margin, especially with the girl students putting up an excellent performance and winning gold in all team and individual events.

2nd Conclave of Ramanujan Fellows

December 13-14, 2013

The second meeting of the Ramanujan Fellows was held at IISER Pune on December 13-14, 2013. The purpose of the meeting is (a) to provide an opportunity for all Fellows to meet, share their experiences and network, (ii) to provide an opportunity for the Senior Fellows to present their research work carried out during the fellowship, (iii) to resolve any issues in the effective implementation of the fellowship scheme, (iv) to mentor Fellows in their scientific career and provide them information on various funding opportunities, and (v) to seek suggestions to further improve and expand the scheme. The meeting was attended by over 90 Fellows. The meeting started with a welcome talk by Prof. K.N. Ganesh, followed by a talk by Dr. T. Ramasami, Secretary, DST on the genesis and philosophy of the scheme. Keynote address was given by Prof. C.N.R. Rao, Chairman, Scientific Advisory Committee to Prime Minister of India. About 23 Senior Fellows presented their work. There were two panel discussions on (1) best management and institutional practices of the fellowship, and (2) funding and careers, and mentors' talks by Prof. Dipankar Banerjee and Prof. Sunil Mukhi.

Felicitation of Prof. C.N.R. Rao

December 13, 2013

In a unique function, Prof. C.N.R. Rao, Linus Pauling Professor and Honorary President of JNCASR, Bengaluru and Chairman, Scientific Advisory Committee to Prime Minister of India was felicitated on being conferred the Bharat Ratna, the highest civilian honor of the country. This function was jointly organized by IISER Pune, NCL, IITM, NCCS and University of Pune. In response to the felicitation, Prof. Rao gave an account of his journey as a scientist and expressed the hope that the scientific community of the country will have a bright future in the coming years.

Mimamsa

February 15-16, 2014

Mimamsa is developing into one of India's biggest science quizzes. It is conducted every year by IISER Pune, with the written prelims in January and the finals, or "Mimamsa Mains" in February. This year the prelims were conducted on January 12, 2014 in 7 cities (Pune, Mumbai, Bangalore, Chennai, Delhi, Hyderabad and Kolkata). Of the 161 teams that participated, Indian Institute of Science (IISc) Bangalore, Indian Institute of Technology (IIT) Bombay, UM-DAE Centre for Basic Sciences (CBS) Mumbai and St. Xavier's (autonomous) College, Kolkata emerged as the contestants for the finals.

The finals were held at IISER Pune during February 15-16, 2014. The quiz consisted of four innovative rounds in Biology, Chemistry, Physics, and Mathematics. In addition, each team had to prepare a 30 minute exposition on a scientific topic of their choice. After all the rounds, IISc Bangalore team was declared winner (they also won last year). The first runner up was St. Xavier's College, followed by IIT Bombay and CBS Mumbai. Prof. Sunil Mukhi, Dean, Student Activities, IISER Pune gave away the prizes. This pan-India quiz was entirely conceptualized and managed by IISER Pune students and mentored by Dr. Anirban Harza.

National Science Day

February 28, 2014

Fostering Scientific Temper was the theme for this year's Science Day. The day-long program was inaugurated by Prof. K.N. Ganesh, Director of the Institute. There were two talks by Dr. Mrinalini Puranik (with PhD student Sayan Mondal and BS MS student Arya Thampi) and Dr. G.V. Pavan Kumar (with BS MS student Rohit Chikkaraddy and Integrated PhD student Adarsh Vasista) on "Remembering C.V. Raman". This was followed by a theme talk by Prof. Sunil Mukhi on "Fostering Scientific Temper". The other activities during the day were:

1. Poster competitions for BS MS and PhD students of the institute: In all, 136 posters were presented in this category.
2. Poster competitions for post-graduate students of Pune from College / University / Institutes outside IISER Pune: there were 13 entries in this category.
3. Essay competition for administrative staff of IISER Pune, NCL, IITM and NCCS:
   The topics were: a) How science research/education would contribute towards India's economic development (b) Challenges in science administration / How administration in science is different (c) Administration is also a science (d) *Rojachya vyavaharatil vidnyan* (Hindi) and *e) Sanshodhan, khel ani vigyan* (Marathi)
4. Dr. Shabana Khan from chemistry group set up a live demonstration of nearly 15 simple Chemistry Experiments. Nearly 150 school students from schools in Pune participated in this demonstration.
5. In another unique initiative, a public lecture in Marathi by Prof. Milind Watve, on *Vidnyan: Chehere ani Mukhavate* was held at the MES Garware College, Pune. This was attended by about 300 persons.
6. Four book suppliers participated in the science book exhibition. Faculty members and students visited the book exhibition and either purchased or recommended books to the library.

Lifetime Achievement Award to Dr. Natu

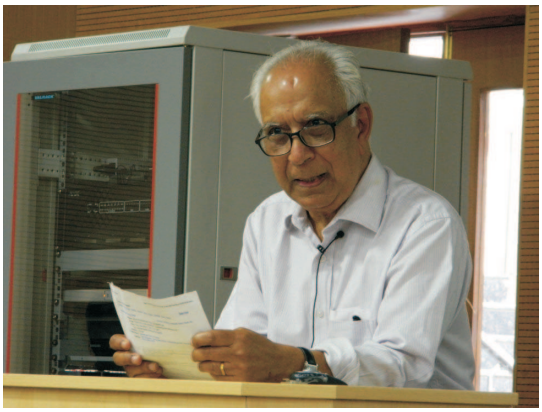
February 2014

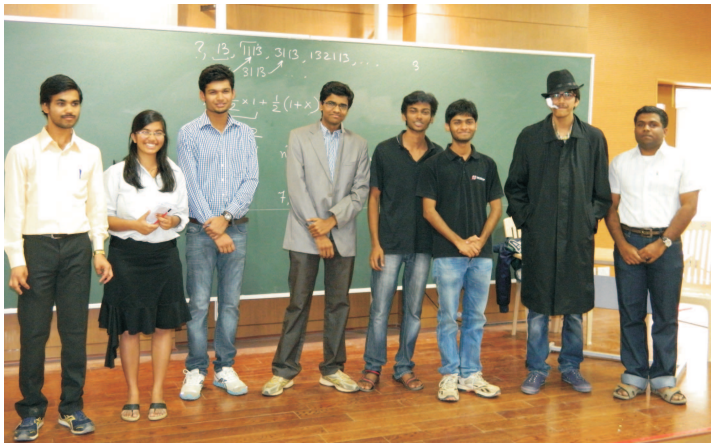
Dr. Arvind Natu has been conferred Lifetime Achievement Award for his contribution to research, teaching and to the development of chemical industry by the School of Chemical Sciences of the North Maharashtra University (NMU). Dr. Sudhir Meshram, vice-chancellor, NMU handed over the award to Dr. Natu during a conference on 'Global Opportunities for Latest Developments in Chemistry and Technology'.

Mathematics Day

March 8, 2014

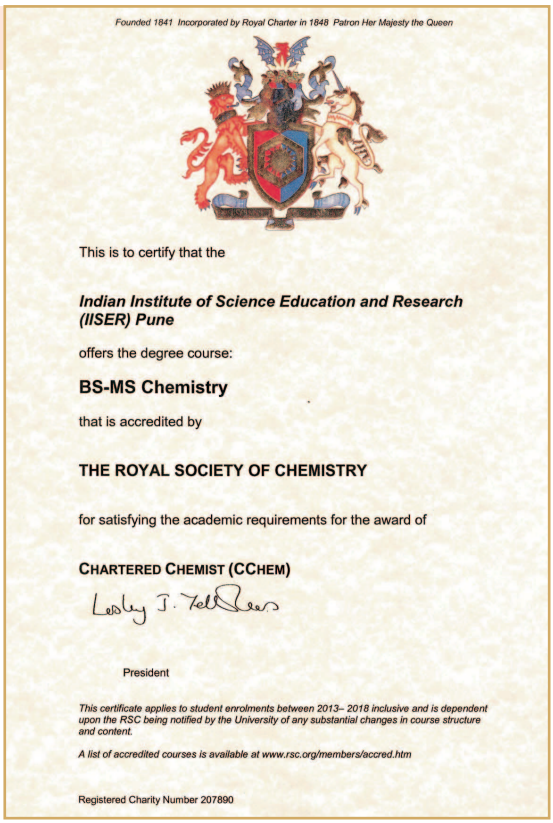
Mathematics Day was organized on March 8, 2014 and the day started with the launching of IISER Pune Math Club and unveiling online of the Mathematics Faculty Profile. This was followed by a series of mathematics fun games which were open to students of colleges in Pune. A poster presentation was arranged showcasing the life and work of women mathematicians around the world. Four posters were selected for oral presentations and were awarded prizes. A skit on Sherlock Holmes was enacted by the students of the Institute. Prof. M.S. Narasimhan, IISc, Bengaluru gave a special lecture on “Mathematical Research in India after Independence: The Early Years".





Accreditation of Chemistry Undergraduate Program by the Royal Society of Chemistry

The Royal Society of Chemistry has accredited the chemistry undergraduate program of the Institute. IISER Pune is the first institute in India to receive this recognition. The process of accreditation consisted of a thorough study of the curriculum, practical sessions, teaching methodologies and content, process of evaluation of students and grading. The officials of the Royal Society visited the institute twice and studied the chemistry program very closely, including independent feedback from students, before awarding the recognition.



Founded 1841 Incorporated by Royal Charter in 1848 Patron Her Majesty the Queen

This is to certify that the

Indian Institute of Science Education and Research (IISER) Pune

offers the degree course:

BS-MS Chemistry

that is accredited by

THE ROYAL SOCIETY OF CHEMISTRY

for satisfying the academic requirements for the award of

CHARTERED CHEMIST (CCHEM)

President

This certificate applies to student enrolments between 2013– 2018 inclusive and is dependent upon the RSC being notified by the University of any substantial changes in course structure and content.

A list of accredited courses is available at www.rsc.org/members/accred.htm

Registered Charity Number 207890

Foundation Day

April 2, 2014

The Foundation Day of the Institute was celebrated on April 2, 2014. Prof. P. Balaram, Director, Indian Institute of Science, Bangalore, was the chief guest on the occasion. He delivered the 4th Foundation Day lecture on "Chemistry on the Fringes of Biology". He highlighted the thin boundary between biology and chemistry through several examples. He also inaugurated the biology laboratory building "G1". During the function, he unveiled the student magazine *Kalpa*, which was compiled, edited and designed entirely by students. He distributed prizes and cash awards to meritorious students of the year 2013 (Fall and Spring 2013) and also to the staff in appreciation of their contributions to the growth and functioning of the institute.

Inauguration of Hostel-2

April 2, 2014

A new hostel building was inaugurated on April 2, 2014 by Dr. B.N. Goswami, Director, Indian Institute of Tropical Meteorology, Pune. This building has been built with 450 single-bed rooms and mainly intended for PhD students and visiting students. The rooms have been furnished with all basic living amenities. On this occasion, Prof. K.N. Ganesh, Prof. L.S. Shashidhara, Prof. Sunil Mukhi, Prof. A. Raghuram and Prof. G. Ambika were present. Dr. B.N. Goswami and Prof. Sunil Mukhi planted saplings around the hostel building.

Director hoisted the National Flag in front of HR 4 on the Independence Day on 15-8-2013

Director unfurled the National Flag in front of the Lecture Hall Complex on the Republic Day on 26-1-2014

Visitors

Prof. David Gross, Permanent Member and Frederick W. Gluck Chair in Theoretical Physics at the Kavli Institute for Theoretical Physics & Professor of Physics at University of California, Santa Barbara, U.S.A. and Nobel Laureate in Physics (2004) for the discovery of asymptotic freedom, made a brief visit to the Institute on April 11, 2014. He interacted with staff and students of the Institute and planted a sapling in front of HR4.

Deputy Head of the European Union (EU) delegation to India, Mr. Pavel Svitil, visited IISER Pune on September 13, 2013. He made this courtesy visit to the Institute that has emerged as a leading institution in the consortium that takes a decision on the award of Erasmus Mundus scholarships. IISER Pune is the Joint Coordinator in the newly funded project NAMASTE (Networking and Mobility Actions for Sustainable Technology and Environment in India) under Erasmus Mundus Action-2.

Mr. Svitil mentioned that collaboration between EU and India in the area of higher education is one of the priorities in EU's foreign aid expenditure. He emphasized the role of networking and collaboration between academic institutions in exchange programs for more inclusive scientific and cultural development. He was impressed with the progress of IISER Pune which had made its mark in a relatively short span of 6 years.

Smt. Amita Sharma, Additional Secretary, Technical Education, Ministry of Human Resource Development, Govt. of India visited the institute on June 15, 2013. Prof. Ganesh, Director, IISER Pune made a presentation of the progress of the Institute and took her on a visit to the campus. Smt. Sharma expressed satisfaction with the way the institute has developed the academic activities and the speed with which the campus is getting ready.

Shri Ashok Thakur, Secretary, Department of Higher Education, Ministry of Human Resource Development, Govt. of India visited the Institute on September 19, 2013. He was taken around the campus and was apprised of the time-lines for completion of the campus construction. Shri Thakur assured full support from the ministry for achieving the mandate and goals set for the Institute.

Dr. Abdel Bendahmane, Vice-Director, URGV-Plant Genome Research, Evry, INRA, France and Dr. Manash Chatterjee, Director and Founder, Bench Bio Pvt. Ltd. Vapi, Gujarat, visited on September 24, 2013 to discuss possible collaboration in plant genome research. They evinced keen interest in the work on sex determination in *Coccinia*.

Dr. R. Chidambaram, Principal Scientific Advisor to the Govt. of India and Chairman, Scientific Advisory Committee to the Cabinet visited the Institute on December 10, 2013. He was taken round the institute facilities by the Director. Dr. Chidambaram also interacted with faculty members and students.

Dr. Tiziano Camporesi (CERN, incoming Spokesperson of the CMS experiment) and Dr. Ajit Mohanty (BARC, Spokesperson of India-CMS) visited IISER Pune on December 17, 2013. The visit was in connection with the possibility of IISER Pune joining the India-CMS and eventually the CMS in Geneva. During his colloquium talk, Dr. Camporesi was highly appreciative of the facilities at the Institute and assured that he will support IISER Pune's application for joining CMS in Geneva.

A delegation of five scientists from New Mexico State University (NMSU), Las Cruces, U.S.A. visited the institute from January 8-10, 2014. Institute has previously signed an MoU with NMSU for academic collaboration. The delegation was led by Prof. Vimal Chaitanya, Vice-president, Research. The other members were Prof. R. Staffeldt, Dr. Jeff Arterburn, Prof. Brad Shuster and Dr. Jay Mishra. These scientists presented their work to faculty members and identified mutual interests.

Prof. Marinda Wu, President, American Chemical Society, U.S.A. visited the institute on February 12, 2014. She made a presentation on the activities of ACS and interacted with faculty and students of the Institute.

Two senior officials of the Alexander von Humboldt (AvH) Foundation Dr. Klaus Manderla (Head, Asia Division) and Ms. Janina Longwitz (Program Officer, Asia Division) visited the institute on February 13, 2014 and interacted with faculty members and research students. Dr. Manderla also made a presentation regarding the AvH Foundation fellowship program and sponsorship possibilities. Faculty members who are Humboldt Fellows and those who wanted to make use of the facilities of AvH interacted with the visitors.

Prof. Michael Gait, MRC Laboratory of Molecular Biology, U.K., visited the institute on February 5, 2014

Dr. Andrew Shaw, Associate Professor of Physical Chemistry, Exeter University, U.K. visited on February 5, 2014

Colloquia

April 10, 2013
Life and the Brain
Vijayalakshmi Ravindranath, Chairperson, Centre For Neuroscience, Indian Institute of Science, Bangalore

August 21, 2013
Consistent and Symmetric: The Evolution of Fundamental Theory from Gauge Fields to Strings
Sunil Mukhi, Chair (Physics), IISER Pune

August 28, 2013
Composite Fermions: The Magical Beauty of Emergence
Jainendra K. Jain, Erwin W. Mueller Professor of Physics, Pennsylvania State University, U.S.A.

September 18, 2013
Opinion Polls in the Context of Indian Parliamentary Democracy
Rajeeva Karandikar, Director of Chennai Mathematical Institute, Chennai

October 09, 2013
Lipid Induced Inflammation, Disruption of Insulin Sensitivity and Innate Immunity are Associated Events
Samir Bhattacharya, INSA Senior Scientist, Department of Zoology, Visva-Bharati (Central University)

October 23, 2013
Michelangelo, the Great Genius
Madhavi Mehendaley, Director of Prakash Eye Hospital, Pune

December 17, 2013
High Energy Physics: Understanding How Our Universe Works
Tiziano Camporesi, CERN, Geneva, Switzerland

December 20, 2013

Structural Analysis of Acetylcholine Binding Proteins to Understand Ligand Binding in Nicotinic Acetylcholine Receptors

Titia Sixma, Head, Division of Biochemistry, Netherlands Cancer Institute

January 08, 2014

Antibiotics and the Cell's Protein Factory

Venkatraman Ramakrishnan, Nobel Laureate, MRC Laboratory of Molecular Biology, Cambridge, U.K.

January 29, 2014

Drivers in Biodiversity Patterns: Beyond Stamp Collection and Cataloguing

Mewa Singh, Ramanna Fellow, and Life-Long Distinguished Professor Department of Psychology, University of Mysore

March 05, 2014

Genetic Counseling and Research to Tackle Cancer

Rajiv Sarin, Director of Advanced Centre for Treatment Research and Education in Cancer (ACTREC), Tata Memorial Centre, Mumbai

March 19, 2014

Atomic Radiation from Astronomy to Cancer Research

Anil Pradhan, Ohio State University, U.S.A.

March 26, 2014

Latest Developments in Missile Technology in India

V.K.S. Saraswat, DAE Homi Bhabha Chair and Former Director General of DRDO

Research Seminars

Investigating beyond standard model
Jaydeep Chakraborty, Physical Research Laboratory, Ahmedabad, April 04, 2013

Role of Semaphorin 3D in cardiovascular development and disease
Manvendra Singh, University of Pennsylvania, U.S.A., April 05, 2013

Molecular mechanisms of human T helper cell differentiation
Ritta Lahesmaa, Turku Centre for Biotechnology, Turku, Finland, April 05, 2013

Deformation, from Hooke to quantum metallurgy
Surajit Sengupta, Tata Institute of Fundamental Research, Hyderabad, April 08, 2013

Holography and hydrodynamics
Nabamita Banerjee, IACS Kolkata, April 10, 2013

Ring of invaraints under a finite group
Geometric invariant theory
Schubert varieties
S. Senthamaraikannan, Chennai Mathematical Institute, Chennai, April 10-12, 2013

Ultrasonic production of responsive polymer microspheres for targeted delivery
Gareth Price, Department of Chemistry, University of Bath, U.K., April 11, 2013

The Cheerios effect, curved interphases and Landau-Levich problem
Harish N. Dixit, University of British Columbia, Canada, April 12, 2013

Cosmos revealed by Planck: simplicity or duplicity?
Tarun Sauradeep, IUCAA, Pune, April 15, 2013

Neural ensemble activity required for learning and memory
Shantanu Jadhav, University of California, San Fransisco, U.S.A., April 15, 2013

Molecularly imprinted polymers: what are they and how do they work
Rina Arad Yellin, Weizmann Institute of Science and Semorex Technologies Ltd., Israel, April 15, 2013

Controlled optical similaritons and self-similar rogue waves in nonlinear fibre optics
Amit Goyal, Department of Physics, Panjab University, Chandigardh, April 16, 2013

Metabolic sensing/network and aging/age-related diseases: insights into Sirtuins dependent inter-organelle and inter- tissue communication
Ullas Kolthur, Department of Biological Sciences, Tata Institute of Fundamental Research, Mumbai, April 18, 2013

The dynamics of symbiont mediated crop protection by attine ants
Ruchira Sen, Purdue University, U.S.A., April 22, 2013

Genetics and genomics of insect symbionts
Rhitoban Ray Choudhury, Purdue University, U.S.A., April 23, 2013

Cell and tissue mechanics in Zebrafish gastrulation
Carl-Phillipp Heisenberg, Institute of Science and Technology, Klosterneuburg, Austria
April 24, 2013

Dissecting the molecular, synaptic and circuit mechanisms of learning and memory
Jai Polepalli, Stanford University, U.S.A., May 01, 2013

Strong interaction phase diagram and high energy heavy ion collisions
Bedangadas Mohanty, NISER Bhubaneswar, May 06, 2013

Immunity "on demand": Inducible GBP GTPases and antimicrobial defence
Avinash Shenoy, Yale University, U.S.A., May 06, 2013

Novelty, convention and scientific impact
Satyan Mukherjee, Western University, U.S.A., May 13, 2013

Metabolomics: bridging the gap between basic and translational chemical biology
Soumen Manna, National Cancer Institute, U.S.A., May 16, 2013

Inositol pyrophosphates in cell and animal physiology
Rashna Bhandari, CDFD, Hyderabad, May 24, 2013

Regualtion of motor proteins by tubulin carboxy-terminal tails
Minhaj Sirajuddin, Department of Cell and Molecular Pharmacology, University of California, San Fransisco, U.S.A., June 03, 2013

Searches for supersymmetry with jets and missing transverse momentum
Seema Sharma, Fermlab, U.S.A., June 10, 2013

Protein glycosylation: from force field development to applications
Sairam Swaroop Mallajosyula, Department of Pharmaceutical Sciences, University of Maryland School of Pharmacy, Baltimore, Maryland, U.S.A., June 26, 2013

Exploring molecular spectroscopy via quantum chemistry
Venkatesan S. Thimmakondu, Department of Chemistry and Biochemistry, University of Texas at Austin, U.S.A., June 28, 2013

Detection of contaminants in the environment and prediction of their transport in the subsurface environment
Gopala Krishna Darbha, Institute for nuclear waste disposal, Karlsruhe Institute of Technology, Karlsruhe, Germany, June 28, 2013

Special values of gamma, zeta functions and algebraic structures
Dinesh Thakur, Arizona University, U.S.A., July 05, 2013

Mechanistic analysis of heterochromatin assembly: tales of self-recognition and division of labor
Geeta Narlikar, Biochemistry and Biophysics Dept., University of California, San Fransisco, U.S.A., July 10, 2013

Directed cell motility- using physical models to decipher the mechanisms
Herbert Levine, Rice University and University of California, San Diego, U.S.A., July 11, 2013

Decomposition of unipotents: recent advances (alias Paghi Uno, Prendi Tre)
Nikolai Vavilov, St Petersburg State University, Russia, July 12, 2013

Binary radio pulsars: prospects and problems
Manjari Bagchi, University of West Virginia, U.S.A., July 16, 2013

Optical control of cell behavior
N Gautam, Professor of Anesthesiology and Genetics, Washington University School of Medicine, St Louis, MO, U.S.A., July 17, 2013

Action groupoids and a remark on generalizing Gelfand Naimark theorem
Rohit Dilip Holkar, Mathematisches Institut, University of Goettingen, Germany, July 18, 2013

Mrg receptors and TRP channels: novel therapeutic targets for pain management
Medha Gautam, Head of Pharmacology, Southern Illinois University, U.S.A., July 18, 2013

Circadian behavior in Drosophila
Shailesh Kumar, University of Pennsylvania, U.S.A., July 22, 2013

Novel states at magnetic instability
Jeevan Hirale, University of Goettingen, Germany, July 22, 2013

Cross ratios and surface groups
Francois Labourie, Universite Paris-Sud at Orsay, France, July 25, 2013

Microscopic mechanism of strain localization in amorphous materials
Ratul Dasgupta, Weizmann Institute of Science, Israel, July 25, 2013

Nanopore biophysics: from gene sequencing to gene silencing
Gautam V. Soni, Kavli Institute of Nanoscience, Dept of Bionanoscience, TUDelft, The Netherlands, July 26, 2013

Projective module and various avatars of the Euler characteristic
Sarang Sane, University Kansas, U.S.A., July 29, 2013

Restrictions on sending classical information using quantum states
R. Prabhu, HRI, Allahabad, July 30, 2013

NMR and I1/4SR investigations on some strongly correlated electrons systems: local magnetic susceptibility, magnetic order ad low energy spin dynamics
Rajib Sarkar, TU, Dresden, Germany, August 01, 2013

Taut foliations of punctured surface bundles
Tejas Kalelkar, University of Washington, U.S.A., August 02, 2013

Inverting arrows and derived categories
Satyagopal Mandal, Department of Mathematics, University of Kansas, Lawrence, U.S.A., August 02, 2013

Materials for building better batteries for electrical energy storage
Aninda J. Bhattacharyya, SSCU, IISc, Bengaluru, August 05, 2013

Electronic structure of iron-based high-temperature superconductors probed by angle-resolved photoemission spectroscopy
Rajendra S. Dhaka, Department of Physics and Astronomy, Iowa State University, Ames, Iowa, U.S.A., August 06, 2013

Systems biology approach to dissect biochemical and molecular responses to stresses
Ramakrishna Wusirika, Department of Biological Sciences, Michigan Technological University, U.S.A., August 06, 2013

Age, sperm competition and the evolution of male reproductive investment
Sumit Dhole, University of North Carolina, Chapel Hill, U.S.A., August 08, 2013

Electronic phase diagram of cuprate high temperature superconductors
Utpal Chatterjee, University of Virginia, U.S.A., August 09, 2013

Stratospheric ozone and interactions with climate change
Jayanarayanan Kuttippurath, CNRS/LATMOS, University of Pierre and Marie Curie, Paris, France, August 12, 2013

Simulating quantum dynamics of lattice guage theories
Debasish Banerjee, University of Bern, Switzerland, August 14, 2013

Imaging the same neural population in mice over weeks during the learning of a visual and olfactory cross-modal task
Adil Ghani Khan, University College of London, U.K., August 14, 2013

Investigating redox signaling in Mycobacterium tuberculosis
Amit Singh, ICGEB, New Delhi, August 16, 2013

Law of large numbers for queues under earliest
Anup Biswas, Technion:Israel Institute of Technology, August 20, 2013

Semilinear elliptic equations and the generalized boundary trace
Mousami Bhakta, Technion:Israel Institute of Technology, August 21, 2013

Fun with cold atoms: ferromagnetic response of a "High Temperature" quantum antiferromagnet
Rajdeep Sensarma, Tata Institute of Fundamental Research, Mumbai, August 26, 2013

Developing tools and technologies to make biology easy to engineer
Vivek K. Mutalik, Physical Biosciences Division, Lawrence Berkeley National Laboratory, Berkeley, California, U.S.A., August 26, 2013

Structural and magnetic properties of Ni-Mn-Ga ferromagnetic shape memory alloys
Sanjay Singh, "Photon factory", Tsukuba, Japan, August 26, 2013

From Hofstadler to Chem
Jainendra Jain, Penn State University, U.S.A., August 28, 2013

Yielding and flow of soft amorphous materials
Pinaki Chaudhuri, Institute for Theoretical Physics, University of Duesseldorf, Germany, August 29, 2013

Structure of entropy solutions for conservation laws
Adimurti, TIFR-CAM, Bengaluru, August 30, 2013

From chromatin to wiring
Adrian Moore, Brain Science Institute, RIKEN, Japan, September 02, 2013

Are you connected? Detecting connectivity patterns in networks
G. Rangarajan, IISc, Bengaluru, September 02, 2013

Holonomy Group Group Scheme
Sanjay Singh, Tata Institute of Fundamental Research, Mumbai, September 03, 2013

Geometry of Eigen curve at critical Eisenstein series of weight 2
Dipramit Majumdar, ISI Bengaluru, September 06, 2013

Perception of nonrigid 3D shapes and motion
Anshul Jain, SUNY college of Optometry, New York, September 06, 2013

Hyperbolic surfaces with small eigen values
Sugata Mondal, IMT, Toulouse, France, September 10, 2013

A construction of a universal connection
Indranil Biswas, Tata Institute of Fundamental Research, Mumbai, September 10, 2013

A typology for quantum hall liquids
Siddarth Parmeswaran, University of California, Berkeley, California, U.S.A., September 12, 2013

Soft colloids at ultra-high effective volume fractions
Priti Mohanty, Lund University, Sweden, September 12, 2013

An Avian midbrain model for the role of gamma oscillations in sensory coding and selective attention
Sridhar Devarajan, Boahen Lab, Brains in silico, Stanford University, U.S.A., September 13, 2013

The Bergman Kernel
Gadadhar Misra, IISc, Bengaluru, September 13, 2013

How to build a mitotic spindle
Ron Vale, HHMI investigator & Vice-chair, Cellular and Molecular Pharmacology, Univ. of California, San Fransisco, U.S.A., September 13, 2013

Real and complex multiplication lattices
Kapil Paranjape, IISER Mohali, September 16, 2013

Complex projective varieties
D.S. Nagaraj, Institute of Mathematical Sciences, Chennai, September 17, 2013

The dynamics of age in populations of Saccharomyces cerevisae
Varun Prabhakar, Edo Kussel Lab, New York University, U.S.A., September 20, 2013

Grassmann varieties
Jacobian varieties
C.S. Seshadri, Chennai Mathematical Institute, Chennai, September 19 & 20, 2013

Tomographic imaging of the interior of the Earth
Shyam Rai, National Geophyisical Research Institute, Hyderabad, September 23, 2013

Trait improvement, population mutagenesis – from theory to success
Abdel Hafid Bendahmane, INRA, Evry, France, September 24, 2013

Quantum control of photons: atoms and spins
Chinmay Belthangady, Harvard Smithsonian Centre for Astrophysics, Harvard University, U.S.A., September 24, 2013

A graph-theoretical approach to the analysis and model reduction chemical reaction networks
Shodhan Rao, Groningen University, The Netherlands, September 25, 2013

NMR as a local probe of magnetism ad spin dynamics
Pachanan Khuntia, Max Planck Institute for Chemical Physics of Solids, Dresden, September 25, 2013

Higher spins as savior of the quantum universe
Rudranil Basu, CHEP, IISc, September 26, 2013

Optimal control problems
Mythily Ramaswamy, TIFR-CAM, Bengaluru, September 27, 2013

Stability and pattern formation in rapid granular flows
Priyanka Shukla, IISER Kolkata, September 30, 2013

Galaxy evolution: an interplay between stars and dark matter
Kanak Saha, Max-Planck Institute of extraterrestrial Physics, Garching, Germany, October 01, 2013

Intense laser matter interaction
Sudipta Mondal, INRS-EMT, Varennes, Quebec, Canada, October 03, 2013

Projective modules and zero cycles
S.M. Bhatwadekar, Bhaskaracharya Pratishthana, Pune, October 08, 2013

Quantum criticality and BEC scenario in quasi 1-D Antiferromagnets – Signatures in the spin dynamics
Sutirtha Mukhopadhyay, Laboratoire National des Champs Magnetiques Intenses, LNCMI-CNRS, Grenoble, France, October 08, 2013

Some monotonicity results for gamma distribution
Neeraj Misra, Indian Institute of Technology, Kanpur, October 11, 2013

Implications of 125 GeV iggs for the SM and the BSM
Rohini Godbole, IISc, Bengaluru, October 14, 2013

Degeneration to regeneration – role of homones in the nervous system
Anusha Jayaraman, University of Southern California, U.S.A., October 17, 2013

Synge's theorem
Ravi Aithal, University of Mumbai, October 17, 2013

Hadronic diffraction at Tevatron and the LHC
Arnab Pal, Tata Institute of Fundamental Research, Mumbai, October 17, 2013

The information hidden in the shape of the cosmic microwave background spectrum
Rishi Khatri, Max-Planck Gesellschaft, Muenchen, October 18, 2013

Micro-organization and plasticity of auditory cortical circuits
Sharba Bandopadhyay, National Brain Research Centre, Manesar, October 21, 2013

The light intensity frontier
G. Ravindra Kumar, Tata Institute of Fundamental Research, Mumbai, October 21, 2013

Carbon Nanotube optoelectronics and plasmonics
Padmanabh Rai, University of Bourgogne , France, October 22, 2013

"Omics" in cancer research
Jonas Cicenas, Swiss Institute of Bioinformatics, Geneva, Switzerland, October 23, 2013

Nematic tori-Breakup, stabilization and textures
Jayalakshmi, Georgia Institute of Technology, U.S.A., October 24, 2013

Orbital ordering in transition metal oxides- a route to high polarization multiferroics
Priya Mahadevan, SN Bose National Centre for Basic Sciences; Kolkata, October 25, 2103

Constructions of cryptographically significant Boolean functions
Sumanta Sarkar, Indian Statistical Institute, Kolkata, October 25, 2013

Deep inside data and distributions in dimensions, one, two three,-----, Infinity
Probal Chaudhuri, Indian Statistical Institute, Kolkata, October 25, 2013

Magnetic domains, domain walls and their dynamics
Subhankar Bedanta, NISER, Bhubaneswar, October 25, 2013

Molecular beam microwave spectroscopy: understanding hydrogen Bonding and defining carbon bonding
E. Arunan, Department of Inorganic and Physical Chemistry, Indian Institute of Science, Bengaluru, October 28, 2013

Chiral-9-substituted anthracene templates in asymmetric synthesis
Simon Jones, Department of Chemistry, University of Sheffeild, October 30, 2013

Understanding multiply-charged molecular ions through their Break-up
Bhas Bapat, Physical Research Laboratory, Ahmedabad, October 30, 2013

Microlocal analysis of transforms in synthetic aperture radar Imaging
Venky Krishnan, TIFR-CAM, Bengaluru, October 31, 2013

Quantum measurement and feedback with superconducting circuits
R. Vijayaraghavan, Tata Institute of Fundamental Research, Mumbai, November 04, 2013

Construction of Grassmanian, flag manifolds and Schubert Subvarieties
A.J. Parameswaran, Tata Institute of Fundamental Research, Mumbai, November 06, 2013

Membranes from monopole operators in ABJM theory
Stefano Kovacs, Dublin Institute for Advanced Studies, November 06, 2013

Systemic signaling in plant defense
Pradeep Kachroo, University of Kentucky, U.S.A., November 07, 2013

Rescue the b-cell!! Novel anti-apoptic targets for diabetes therapy
Kathrin Maedler, Head of Islet Laboratory, University of Bremen, Germany, November 11, 2013

HEE-how? Derivations of entanglement entropy
Aninda Sinha, IISc, Bengaluru, November 11, 2013

Mechanism of polycomb recruitment on KNOX loci in differentiating Arabidopsis leaves
Mukesh Lodha, Cold Spring Harbour Lab, U.S.A., November 11, 2013

Topological insulators from exotic particles to spintronics
Nitin Samarth, Penn State University, U.S.A., November 11, 2013

Primordial germ cell development in Drosophila embryo
Girish Deshpande, Department of Molecular Biology, Princeton University, U.S.A., November 12, 2013

Introducing SModelS: a tool for testing LHC results using simplified models
Suchita Kulkarni, LPSC, Grenoble, Paris, November 12, 2013

Tubulin posttranslational modifications as regulators of microtubule Functions
Carsten Janke, Institut Curie, Paris, France, November 12, 2013

Photo-alligned ferroelectric liquid crystals: A new generation of the Photonic and display devices
A.K. Srivastava, Hong Kong University of Science and Technology, November 12, 2013

Disordered semiconductors: The TIFR story
Pratap Raychaudhuri, Tata Institute of Fundamental Research, Mumbai, November 15, 2013

Persistence of memory: What do you see and what can you remember or forget
Sabyasachi Battacharya, Tata Institute of Fundamental Research, Mumbai, November 18, 2013

Structure, magnetism and superconductivity in Fe-based Superconductors
Shibabrata Nandi, Juelich, Germany, November 20, 2013

Challenging the dogmas: in the search for a cure for cancer
Shiladitya Sengupta, Harvard Medical School, Brigham and Women's Hospital, Boston, U.S.A., November 22, 2013

Spinning gold into nanocrystals
Shobhana Narasimhan, JNCASR, Bengaluru, November 27, 2013

On Fuglede's conjecture
Shobha Madan, IIT Kanpur, November 27, 2013

Mumford stability and its ramifications
M.S. Narasimhan, TIFR-CAM, Bengaluru, November 28, 2013

Moser-Trudinger type inequalities
K. Sandeep, TIFR-CAM, Bengaluru, November 28, 2013

Competing risks model
Isha Dewan, ISI, New Delhi, November 29, 2013

Organic based magnets: New magnets for your future
Joel S. Miller, University of Utah, U.S.A., December 02, 2013

On mod-2 invariants of G_2 and F_4
Maneesh Thakur, ISI, New Delhi, December 03, 2013

Self-assembly of colloidal rafts
Prema Sharma, Brandeis University, December 11, 2013

Passive and active transport
Sekhar Burada, University of Goettingen, Germany, December 12, 2013

B-N pairs and Bruhat decomposition
K.N. Raghavan, IMSc, Bengaluru, December 13, 2013

Bruhut decomposition and conjugacy classes in classical groups
G. Lustig, Massachusets Institute of Technology, U.S.A.

Metric measure spaces and random matrices
Siddhartha Gadgil, IISc Bengaluru, December 18, 2013

On a Grothendiek andSerre conjecture on principal C-bundles over regular local Rings containing an infinite field
Ivan A. Panin, Petersburg Department of Steklov Institute of Mathematics, December 19, 2013

Structural analysis of acetylcholine binding proteins to understand ligand binding in nicotinic acetylcholine receptors
Titia Sixma, Netherlands Cancer Institute, Netherlands, December 20, 2013

H Infinity feedback boundary stabilization of two dimensional Navier Stokes' Equation
Dharmatti Sheetal, IISER Thiruvananthapuram, December 26, 2013

Recurrence, stability and invariant measure for the solutions of stochastic Differential equations
V. Mandrekar, Michigan State University, U.S.A., January 03, 2014

Classical reciprocity laws: a reaction
C.S. Dalawat, Harish-Chandra Research Institute, Allahabad, January 04, 2014

Phenotypic constraints drive the architecture of biological networks
Areejit Samal, International Centre for Theoretical Physics, Trieste, Italy
January 06, 2014

Atomic clocks: the frequency standards in India
Subhadeep De, National Physical Laboratory, New Delhi, January 06, 2014

Identifying dark matter interactions in monojet searches at the LHC
Vikram Rentala, Michigan State University, U.S.A., January 07, 2014

Localized quantum walks as secured quantum memory
Chandrashekar Madaiah, Okinawa Institute of Science and Technology, Japan, January 07, 2014

Structural biology of translational elongation cycle
Venki Ramakrishnan, MRC Laboratory of Molecular Biology, Cambridge, U.K., January 07, 2014

Synapse formation regulated by ubiquitination and deubiquitination
Cheng-Ting Chein, Academica Sinicia, Taiwan, January 08, 2014

Metal-Organic-Frameworks (MOFs), a new candidate for electronic materials
Sung-Hwan Han, Department of Chemistry, Hanyang University, Seoul, South Korea
January 08, 2014

Planck's view on the Galactic interstellar medium
Tuhin Ghosh, Institute d' Astrophysique Spatiale, France, January 08, 2014

Pathogenesis of severe malaria
Donatella Taramelli, Facolta di Scienze del Farmaco, Dipartimento di Scienze Farmacologiche e Biomoleculari, Universita di Milano, Via Pascal, Milano, Italy, January 09, 2014

Regulation and mechanics of cell division
C. Shuster, Department of Biology, New Mexico State University, Las Cruces, NM, U.S.A.
January 09, 2014

New paradigm of solar magnetic activity
Dhrubaditya Mitra, NORDITA, Stockholm, Sweden, January 09, 2014

Robust control for a class of uncertain dynamical systems
R. Sakthivel, Sri Ramakrishna Institute of Technology, January 10, 2014

Mechanistic explorations in vitamin biosynthesis: studies on Vitamin B1 and Vitamin B12
Amrita Hazra, University of California, Berkeley, U.S.A., January 10, 2014

Mechanistic understanding of nanocrystal nucleation and growth
N. Ravishankar, Material Research Center, Indian Institute of Science, Bengaluru, January 13, 2014

It's a zoo in there! How does neuronal activit encode
Sachin Ranade, Kepecs Lab, Cold Spring Harbour Laboratories, U.S.A., January 17, 2014

The search for gravitational waves
John T. Whelan, Rochester Institute of Technology, U.S.A., January 20,2014

Publishing at Nature Chemical Biology
Catherine Goodmann, Senior Editor, Nature Chemical Biology, January 21, 2014

RSC publishing and India: an Editor's advice on publishing in high-impact journals
Philip Earis, Managing Editor, RSC Journals, January 23, 2014

Biology at the nanometer level
Rahul Roy, Dept. of Chem. Engg., IISc, Bengaluru, January 29, 2014

Cameras we cannot picture
Ravindra Athale, Office of Naval Research, U.S.A., January 29, 2014

Membrane contact sites and lipid transfer in neuronal signaling
Raghu Padinjat, NCBS, Bengaluru, January 30, 2014

Introduction to Markov chains and Brownian motion
Krishna B. Athreya, Iowa State University, U.S.A., January 27-30, 2014

Supramolecular assemblies: on the origin of catalytic potential of ionic liquids and other system
A.K. Chakraborti, NIPER, Mohali, January 31, 2014

Two coloring uniform hypergraphs: bounds and algorithms
Saswata Shannigrahi, Indian Institute of Technology, Guwahati, February 03, 2014

Reactions of halogens (F,Cl, Br, I, F2, Cl2) with water and the water dimer
Henry F. Schaefer, University of Georgia, Athens, U.S.A., February 04, 2014

Realising the potential of electron cryomicroscopy
Richard Henderson, FRS, MRC Laboratory of Molecular Biology, Cambridge, U.K.
February 05, 2014

PNA and PMO oligonucleotides for RNA targeting towards therapeutic applications
Michael Gait, Medical Research Council, Laboratory of Molecular Biology
Cambridge, U.K., February 05, 2014

The transitional choreography of IRF4 and IRF8 in the immune system
Harinder Singh, Dept. of Immunobiology, Cincinnati Children Hospital, U.S.A.
February 07, 2014

How electron cryotomography is opening a new window into bacterial cell biology
Grant Jensen, HHMI, Caltech, U.S.A. February 07, 2014

On ladder representations
Arnab Mitra, Ben-Gurion University of Negev, February 07, 2014

Scattering in string theory: beyond perturbation theory
Axel Kleinschmidt, Albert Einstein Institute, Postdam, Germany, February 10, 2014

Penalization based approach in the spiking problem for the estimation of shape restricted functions
Jayanta Kumar Pal, Indian Institute of Technology, Patna, February 10, 2014

Some generalizations of the Wiener-Tauberian theorem
Harish-Chandra: a mathematician's mathematician
Alladi Sitaram, IISc, Bangalore, February 11 & 13, 2014

The Higgs discovery and what lies ahead at LHC
Gagan Mohanty, Tata Institute of Fundamental Research, Mumbai, February 14, 2014

Exploring molecular association through weak interactions in star-shaped disc-like polyalkynil and polyakenyl arenes
S. Sankararaman, Dept of Chemistry, IIT Madras, February 14, 2014

Protein structural similarities, differential dynamics and ligand interactions: the NMR structural biology route to drug discovery
Rajagopalan Bhaskaran, Claflin University, Orangeburg, SC, U.S.A., February 19, 2014

Chord diagrams and real rational planar quartics
Shane D'Mello, Stonybrook University, U.S.A., February 24, 2014

Mathematical perspective of control theory- A glimpse
Mohan C. Joshi, IIT, Gandhinagar, February 25, 2014

From starvation to satiety: how sulphur aminoacids control cell fates
Sunil Laxman, Dept of Biochemistry, UT Southwestern Medical Centre, Dallas, Texas, U.S.A., February 26, 2014

Sniffing to decide: temporal aspects of olfactory information processing
Nixon Abraham, Dept. of Basic Neurosciences, University of Geneva, February 27, 2014

Is the Copernican principle violated in the sky?
Ashok Singal, Physical Research Laboratory, Ahmedabad, March 03, 2014

Light-matter interaction using Quantum Dots and photonic crystal cavities at room temperature
Shilpi Gupta, University of Maryland, College Park, U.S.A., March 04, 2014

Solutions concentrating on S1 orbits
P.N. Srikanth, TIFR-CAM, March 04, 2014

Cortical processing of voices and faces: linking neural computations to mechanisms
Srivatsun Sadagopan, Laboratory of Neural Systems, The Rockefeller University, U.S.A. March 05, 2014

Pre-solar grains: clues to stellar nucleosynthesis
Maitrayee Bose, Arizona State University, U.S.A., March 06, 2014

Quantum black holes: A window into the short-distance structure of quantum gravity
Atish Dabholkar, LPTHE, Paris, March0 6, 2014

Diffusion approximation to adaptive MCMC
Gopal Basak, ISI, Kolkata, March 07, 2014

Gravity and condensed matter physics: the beginning of a dialogue?
Sandip Trivedi, Tata Institute of Fundamental Research, Mumbai, March 07, 2014

Galois representations
Ravi Ramakrishna, Cornell University, March 07, 2014

Mathematical research in India after independence: the early years
M.S. Narasimhan, IISc, Bengaluru, March 08, 2014

Bacterial gene-regulation by riboswitches and small RNAs
Arati Ramesh, Dept of Biophysics, UT Southwestern Medical Centre, Dallas, U.S.A. March 10, 2014

The profinite completion of knot groups
The geometrization theorem for 3-manifolds
Stefan Friedl, University of Regensburg, March 5, 10, 12 & 14, 2014

Existence problems in Set systems
Amitava Bhattacharya, Tata Institute of Fundamental Research, Mumbai, March 21, 2014

Single cell measurements of DNA damage responses for yiest to mice, with high content and resolution imaging
Aprotim Mazumder, Dept. of Biological Engineering, Massachusetts Institute of Technology Cambridge, U.S.A., March 24, 2014

Kinetic schemes for convection-diffusion and Navier-Stokes equations
Praveen C., TIFR-CAM, Bangalore, March 25, 2014

Aprotic Li-O2 battery
Muhammed Musthafa Ottakam Thotiyl, St Andrews University, Scotland, U.K., March 26, 2014

Discovery of primordial gravitational waves
Subhabrata Majumdar, Tata Institute of Fundamental Research, Mumbai, March 26, 2014

Single-molecule studies on forced-unfolding of proteins and protein elasticity
Sri Rama Koti Ainavarapu, Tata Institute of Fundamental Research, Mumbai, March 26, 2014

Novel therapeutic opportunities via allosteric modulation of CB 1 cannabinoid receptor
Ganesh Thakur, Northeastern University, Boston, U.S.A., March 27, 2014

Precision measurements of optical constants using spectroscopic ellipsometry
Stefan Zollner, New Mexico State University, March 27, 2014

Outreach Activities

Science Popularization

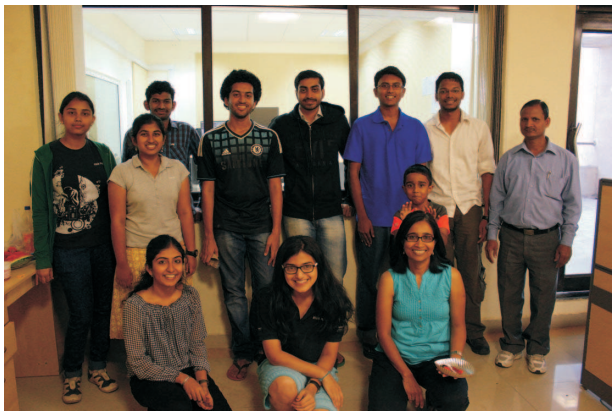
Several faculty members were invited to attend the KVPY and INSPIRE camps conducted in various colleges in Maharashtra and Karnataka. Independent of this, members visited various schools and spoke about excitements in science to motivate the students for taking up a career in science.

Dr. Shabana Khan has organized demonstration of chemistry experiments (e.g., invisible ink, silver mirror, artificial coke, artificial wine, artificial beer, Landolt experiments, gas explosion, Pt catalyst oxidation, flashing blue light etc) to school students who had visited the institute on February 28, 2014 as part of Science Day celebration, to 7^{th}-9^{th} class students at Hutatma Balvir School, Shivaji Nagar, Pune on March 22, 2014 and to students at K.C. Thackeray School, Daruwala Pul, Pune on March 29, 2014.

Science Media Centre

IISER Pune initiated setting up of a Science Media Centre with partial support from NCSTC, Department of Science and Technology in 2012 with the following objectives:

(a) run courses and hands-on workshops to acquaint researchers and students with the basics of media production; (b) create sufficient opportunities for them to produce their own video clippings, such that they come to a level of familiarity with the medium; and (c) contribute to education by creating teaching/learning materials as well as to the mainstream media by producing exciting science programmes for generating interest in science.



During 2013-14, the Science Media Centre has seen expansion of both its activities as well as its infrastructure. Besides video, the centre has begun activities involving radio, web and print media.

Studio equipment and facilities were acquired for (a) training unit, (b) the media lab, (c) studio with facilities for recording interviews, panel discussions, talks and demonstrations, and (4) production unit.

Activities during the year were as follows:

1. Workshops
    a. Workshop on Researching and Writing Scientific Content for TV
    b. Workshop on Science Video Production
    c. Workshop on Radio Production
2. Productions
    a. Teaching/Learning Materials: Physics, Scientific Inquiry
    b. Research Reporting
    c. Interviews
3. Research Reporting: JoVE
4. Scientific Events Coverage
5. Science Radio slot in Vidyavani, the community radio of University of Pune
6. Weblog on Science News
7. Print Media: Contributions to Current Science
8. Projects funded by Vigyan Prasar and INSPIRE program of DST

Workshops for Teachers

An Experimental Physics workshop was conducted for post-graduate teachers during May 13-14, 2013. Participants included 11 teachers from 9 colleges. Prof. C.V. Dharmadhikari, Dr. Shivaprasad Patil, Dr. G.V. Pavan Kumar and Dr. Ashna Bajpai from the institute participated in the workshop. About 13 hands-on experiments were carried out involving the following concepts/demonstrations/measurements: Rydberg constant, Millikan's oil drop method, Michelson interferometer, Black body radiation, Thermionic emission, e/m by Thomson's method, Electron diffraction, Franck-Hertz experiment, Zeeman effect,

Gamma ray spectroscopy, Magnetic susceptibility measurement (Gouy's Method), Measurement of skin depth, and Constant deviation spectrometer.

An Experimental Biology workshop for postgraduate teachers was conducted on May 14-16, 2013. Participants included 15 teachers from 10 colleges. A laboratory manual was given to each participant. Prof. Sanjeev Galande inaugurated the workshop and gave an overview of research in biology at the institute. Hands-on training in the following techniques was given to the participants: Plasmid DNA extraction, RE digestion, agarose gel electrophoresis, colony PCR, transformation, antibiotic screening, SDS PAGE, western blot, 2-D gel electrophoresis (demo), maintenance and experiments with *Drosophila* as a model system for genetic, developmental and behavioral studies, Zebra fish as a model system for developmental and behavioral studies, maintenance and experiments with *Hydra* as a model system for regeneration studies, protoplast isolation and transfection, plant cultures of algae, tobacco and potato, and preparation and observation of protein crystals for X-Ray crystallography. Use of the following advanced equipment was demonstrated: Flow cytometer, Scanning Electron Microscope, confocal microscope, X-ray crystallography equipment, and laser capture micro-dissection microscope.

Disha

Disha is a voluntary organization of IISER Pune students working for a social cause. Disha activities are primarily aimed at helping the school students with their curriculum, teaching in innovative ways using hands-on activities and games, conducting projects involving learning of new skills and also employment-generating activities. Disha volunteers conduct "Abhyasikas" in two hamlets adjacent to IISER Pune campus: Lamanwasti and Someshwarwadi. The weekend Science Nurture Program is meant for brighter students in Lamanwasti and Sanjay Gandhi Vasahat (near Someshwarwadi) and is aimed at not only helping the children in the school curriculum but also to

enhance their skills. The activities include Marathi and English reading sessions, arts and crafts, mathematics and social sciences, drama sessions, sports sessions and science experiments.

Vigyan Mela was organized during January 18-19, 2014. It consisted of elocution and drawing competitions, science demonstration, clay-modelling, maths puzzles and fun games. The Mela was inaugurated by Prof. N.K. Subhedar and prize distribution was done by Dr. Guruswamy of NCL. Spread the Smile is another activity of Disha organized in January and February 2014. This was aimed at spreading the joy of science and inspiring children. The program was conducted in seven villages around Pune: Mangdhari, Male, Kadadhe, Kanewari, Kurungi, Kusgaon and Kondanpur with the help of volunteers from 10 colleges.

A group of six volunteers from Disha also travelled to Kashmir-Leh Ladakh area during May 7-22, 2013 and conducted science workshops for students from 12 schools in this remote area.

Prarambh

Prarambh is a volunteer-run non-profit organization aimed at improving the lives of less-privileged children by helping them with basic life education. This program happens every Sunday for half a day. Children coming to this initiative are residents of various bastis around Ambedkar chowk of Pune. The children study in municipal schools but are lacking in English and math skills. Prarambh focuses on bridging this gap. Dr. Nagaraj Balasubramanian and Dr. Sudarshan Ananth manage this activity along with volunteers from outside and with students of the Institute.

PhD Program

During the year 2013-14, with August 2013 and January 2014 sessions put together, 59 students enrolled for the PhD program at IISER Pune. With this, the number of research students pursuing research toward PhD degree has gone up to 261 (181 Male, 80 Female). In addition, in August 2013 the institute has admitted the third batch of post-BSc Integrated PhD students. The subject-wise distribution of PhD students is as follows:

Biology
Kulkarni Aboli Satish
Amit Kumar
Bipasha Dey
Devika Andhare
Devika Sudhir Bodas
Kriti Chaplot
Maithilee Sanjay Khot
Natasha Nandkishore Buwa
Raunaq Deo
Sameer Thukral
Shrikant Ramdas Harne
Yashraj Deepak Chavan
Visakha Karnawat

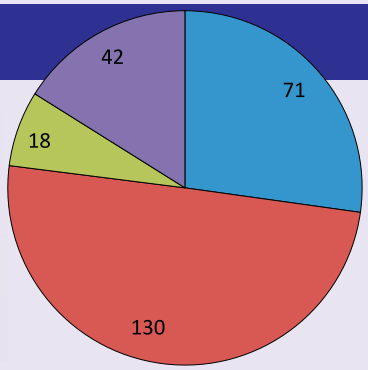
Chemistry
Debasis Saha
Himani Rawat
Neha Kathewad
Nilesh Deshpande
Partha Samanta
Rakesh Pant
Ramasamy Manoharan
Shiva Shankar G.
Yashwant Kumar
Shiv Pal
Anil Yadav
Chandramouli Ghosh
Chethan D. S.
Joshi Niharika Hemant
Veeresh K.
Mullangi Dinesh
Neha
Neralkar Mahesh Renukadas
Paithankar Harshad Vaijanath
Rajasekar P.
Roy Bibhisan
Satpathi Sagar
Shahila Muhammed
Shammi Rana
Shelake Tushar Pandurang
Vijayakanth T.
Warankar Avinash Manohar

Mathematics
Ayesha Fatima
Debasish Karmakar
Girish Kulkarni
Jyotirmoy Ganguly
Milan Kumar Das
Tathagata Mandal
Debangana Mukherjee
Sawant Gaurav Prabhakar

Physics
Abhijit Suhas Pendse
Avirup De
Debnath Talukdar
Namrata Pattanayak
Pulastya Parekh
Sarath Kumar Thadeti
Shubhanshu Chauhan
Sudheer Kumar C. S.
Turmoli Neogi
Vinayak Kulkarni
Amit Bhunia

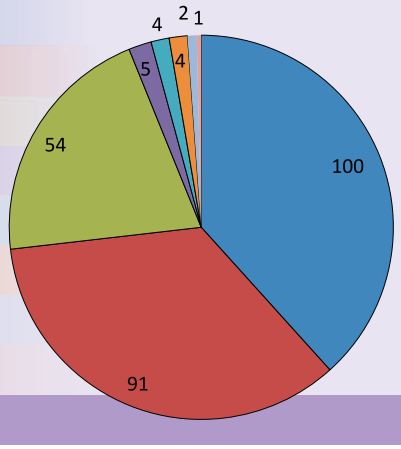
Discipline-wise Distribution of PhD Students

Subject	No of Students
Biology	71
Chemistry	130
Mathematics	18
Physics	42



Source of Fellowship for PhD Students

Fellowship	No of Students
IISER Pune	100
CSIR	91
UGC	54
DBT	5
INSPIRE	4
NBHM	4
PM Fellowship	2
ICMR	1
Total	261



In the year 2013, 3 students were awarded PhD Degree. Details are as follows:

Sr No	Name of the Student	Discipline	Supervisor	Title of Thesis
1	Anupam Bandyopadhyay	Chemistry	H. N. Gopi	Synthesis and utilization of naturally occuring functionalized gamma amino acids in the design of hybrid peptide foldamers
2	Soumya Singha Roy	Physics	T.S Mahesh	Nuclear spins as quantum testbeds: Singlet state,Quantum correlations and delayed choice experiments
3	Mahima Goel	Chemistry	M. Jayakannan	Supramolecular assemblies of π-conjugated phenylenevinylenes in solid state

In addition, 5 students (3 from Biology & 2 from Chemistry) have successfully completed thesis defense and have become eligible for the award of PhD Degree.

Undergraduate Program

The BS MS admission process for the year 2013-14 was coordinated by IISER Bhopal. Dr. Arnab Mukherjee represented IISER Pune in the Joint Admission Committee. During this year, 136 students took admission in IISER Pune. Of these, 26 were from IIT-JEE stream, 4 from KVPY and the rest from State and Central Boards.

List of Students Admitted in 2013

Vishakha Kasherwal	Ghevade Akash Dattatraya
Murli Kartik Maurya	Avinash Singh
Nived V.N.	Bhumkar Purva Bandurao
Jithin K.	Nila Nandha K.
Kanade Manil Suresh	Sameer Kumar Jagirdar
Aakash Verma	Nandini Hazra
Arvind B.	Mokashi Shriniwas Sudhir
Zilpelwar Sharvari Sudhir	Athul R.S.
Abhishek Gupta	Mayank Kumar
Parijat Banerjee	Jazleena P.J.
Vikash Kumar	Lokahith Narendra Agasthya
Jesil Jose	Banoth Kalyan Singh
Reddy Pranavi	Athira Vijayan
Rajat Kumar Sonkar	Swathi Krishna S.
Anjana Sathyan	Spandan Choudhury
Priyanshu Chandra	Anu Pradeep
Shashank Pratap Singh	Rubiya Mohammed
Shelke Rohit Pandurangrao	Siddhartha Sohoni
Nitin Kumar	Govind S.
Sharafudheen P.C.	Mundhe Gayatri Shreedhar
Korwar Mrunal Prashant	Sohan Pal Meena
Gollapalli Jaswanth Reddy	Anup Anand Singh

Gajbe Karan Chandrakant	Kadam Saurabh Vasant
Shreeya Behera	Mangesh Avinash Sonawane
Ayush Gupta	Isha Dhami
D.V.S. Datta	Manish Kumar Tekam
Keerthana T.V.	Biradar Rahul Gunwant
Sudhir Kumar	Abhinash Palai
Shubham Kumar	S. Vignesh
Ashley Sreejan	Malpathak Shreyas Vijay
Abhishek Das	Timane Chinmay Ajay
Majmudar Khilav Jayesh	Addanki Nagarjuna Chary
Prashant Uniyal	Jawale Yash Kiran
Alma Mathew	Arpith Ramakrishna Shanbhag
Rajeev Singh Rathour	V. Naven Narayanan
Aathira Gopinath P.	Arkajyoti Ghoshal
Ankit Kumar	V.P. Gokul
Amruta Priyadarshini Nayak	Rahul Patidar
Tanushree Bharat Shah	Susmita Singh
Vrushali Rao G.	Sourav Mukherjee
Amit Sahu	Singh Manish Kumar
Vaidya Ieshan Atul	Amanagi Amey Shankar
K. Nidhi Sudhir	Yawatkar Vishruta Prashant
Swetha Jos	Bodkhe Swapnil Shankar
Faseela E.E.	Linge Abhilash Bhimrao
Urmi Poddar	Vaibhav Madhav Khambalkar
Jewel Ann Maria Xavier	Divya Singh
Kezia J. Ann	Kabra Aditya Mahesh
Kumar Mekhala	Vighnesh Digamber Vernekar
Khanapurkar Swanand Milind	Chhajed Shubham Sohanlal
Upendra Arya	Muddapoogu Lakshman Teja
Kadam Snehal Girish	Karthik Prabhu P.
Zadey Siddhesh Gajanan	Pund Rugved Prashant
Chaitanya Erady	Aswin P.K.
Datar Prathamesh Madhav	Joshi Mukta Suhas

Bharath Krishnan	Varhade Swapnil Digambar
Harshita Soni	Tanmaya Sethi
Jadhav Ashwini Anandrao	Pratyush Ramakrishna
Rohit Bhagchandani	Lakshya Agarwal
Ira Phadke	Satvika Bandarupally
Nabha Shah	Kapshikar Upendra Shamrao
Atul Chaudhary	Prashastha Mishra
Moghe Prachiti Pradeep	Dheerendra Singh
Kanade Chaitanya Kaluram	Thakur Atul Chudaman
Wagh Vaibhav Prakash	Bhupendra Charan
Choksi Bhavin Yogesh	Nancy Verma
Kushtagi Sri Rama Chandra	Gonde Samruddha Sunil
Shinde Prachi Balasaheb	Aman Kumar
Harsh Gakhare	

After the end of academic year 2012-13, 11 students left the program. The net student strength of UG program during 2013-14 is 514.

The distribution of students enrolled in 2013 and overall distribution are given below:

	GE	OBC	SC	ST	PD	Total
Male	47	23	13	9	0	92
Female	24	15	5	0	0	44
Total	71	38	18	9	0	136

Total Student Strength during 2013-14

Batch	Male	Female	Total
2007	2	0	2
2008	5	1	6
2009	77	22	99
2010	53	36	89
2011	50	26	76
2012	70	36	106
2013	92	44	136
Total	349	165	514

Overall Distribution of Existing BS MS Students

Category	Male	Female	Total	%
GE	179	86	265	52
SC	44	23	67	13
ST	25	2	27	5
OBC	98	55	153	30
PD	2	0	2	0.4
Total	348	166	514	

Details of the 5th year Projects done by the Outgoing Students during 2013-14

Sr. No.	Name of the Student	Supervisor	Place of Project Work	Project Title
1	Siddharth Bharath Iyengar 20081001	Mahesh Sankaran	NCBS, Bangalore	Facilitative Effects of a Dwarf Shrub in an Alpine Rangeland
2	Apurv Kulkarni 20081010	Girish Ratnaparkhi	IISER Pune	Role of MADF-BESS Domain Protein Family in Gene Regulation and Wing Development in *Drosophila melanogaster*
3	Ritesh Raghavan 20081016	Anita Damodaran	Hindustan Unilever, R &D Bangalore	*In Vitro* Studies On Lipid Metabolism in Keratinocytes of Different Racial Origin
4	Ankita Jha 20081024	Gautam Banerjee	Hindustan Unilever R & D, Bangalore	The Role of Inflammation in Type-2 Diabetes Mellitus and Its Correlation with Endothelial dysfunction
5	Amita G. Ghadge 20081029	Anjan Banerjee	IISER Pune	Characterization of *Coccinia grandis* As a Model System to Study Sex Determination in Plants
6	Jagruti Jagadish Pattadkal 20081034	Aurnab Ghose	IISER Pune	A Study of Neuronal Response to Mechanical Tension
7	Pooja Naik 20081036	Richa Rikhy	IISER Pune	Analysis of Mitochondrial Metabolism Control on Organism Development

Sr. No.	Name of the Student	Supervisor	Place of Project Work	Project Title
8	Roshni Bano 20081042	Thomas Pucadyil	IISER Pune	Mechanical Responses of Membranes Probed with Force Spectroscopy
9	Krithika Mohan 20081048	S.P. Arun	Centre for Neuroscience, IISc, Bangalore	Visual Categorization: The Nature of Category Templates
10	Ramya Balaji 20081049	Richa Rikhy	IISER Pune	Molecular Characterization of Inception of Polarity in the Plasma Membrane During early *Drosophila* Embryogenesis
11	Soumitra Athavale 20081053	Sanjeev Galande	IISER Pune	Protein Engineering with Zinc Fingers and TALs
12	Mihir Sadanand Umarani 20081056	Deepak Barua	IISER Pune	Study of Effects of Ecological Determinants on Morphological Variations of *impatiens* in Species North Western Ghats
13	Piyush Agarwal 20071057	Leeor Kronik	Wiezmann Institute Israel	Pair-wise Dispersive Corrections of an Optimally-tuned Range-Separated Hybrid Functional
14	Sumeet Kumar Singh 20081005	H.N. Gopi	IISER Pune	Probing the Stability of Designed Coiled-coil Motifs using Small Synthetic Fluorescent Amino Acids
15	Nishant Singh 20081007	Vijay Gadgil	Hindustan Unilever, R & D Bangalore	Design and Synthesis of J and H Aggregates of Glycyrrhetinic Acid Esters as Low Molecular Weight Organogelators
16	Shreyas Supekar 20081013	Arnab Mukherjee	IISER Pune	Sequence Dependent Localized Distribution of Various Water Dynamics in the Grooves of DNA

Sr. No.	Name of the Student	Supervisor	Place of Project Work	Project Title
17	Anup Ingole 20081023	Partha Hazra	IISER Pune	Study of Interaction between Fluorescent dyes and Cucurbituril Host in Aqueous Solution
18	Amit Kumar 20081043	Ashish Vaidya	Hindustan Unilever R & D Bangalore	Synthesis, Properties and Photochemistry of Organomodified Polymers
19	Iti Kapoor 20081044	Srinivas Hotha	IISER Pune	A Diversity Oriented Synthesis Pathway for Leodoglucomide Analogues
20	Rohan Kumbhare 20081050	Harinath Chakrapani	IISER Pune	Design, Synthesis and Evaluation of Scaffolds for Thiol-mediated Tunable Drug Release
21	Uma Sridhar 20081051	M. Jayakannan	IISER Pune	Dextrin Vesicles and their Encapsulation Capabilities for Drug Delivery
22	Suhas Shahaji Gawali 20081052	Sudipta Basu	IISER Pune	Synthesis and Characterization of Inhibitor Loaded Nanoparticles for Temporal Targeting of PI3K signalling
23	Hardik Gajera 20081011	Ayan Mahalanobis	IISER Pune	On Improvements of r-Adding Walks to Solve The Discrete Logarithm Problem
24	Vivek Pradhan 20071027	Saket Saurabh	IMSc Chennai	Graph Algorithms using Rank and Determinant
25	Jeeten Patel 20081032	Anindya Goswami	M/s Ventura Securities Ltd	Pricing and Hedging in a GBM market with Markov Switching: A Survey
26	Gaurav Prabhakar Sawant 20081033	K.T. Joseph	TIFR-CAM, Bengaluru	On Solutions of Nonlinear First-Order PDEs
27	Ankur Paliwal 20081039	Soumen Maity	IISER Pune	Transversal Hypergraphs

Sr. No.	Name of the Student	Supervisor	Place of Project Work	Project Title
28	Kumar Vasumitra Singh 20081041	Soumen Maity	IISER Pune	Erdos-Ko-Rado Theorem and Kruskal-Katona Theorem
29	Behlool Sabir 20071004	M.S. Santhanam	IISER Pune	Record Statistics and Random Walks in Financial Time Series
30	Ankur Sharma 20071042	Ashish Arora	Escorts Ltd Faridabad	Noise Attenuation Techniques for Gas Exhaust from Heat Engines
31	Md. Noaman 20081002	Umakant Rapol	IISER Pune	Atoms in Optical Potentials: The Levy-Kicked Rotor
32	Anees Ahmed 20081006	Arijit Bhattacharyay	IISER Pune	Dynamical Mean Field Approach to Phase Transitions in Falicov-Kimball Model
33	Harshavardhan Ashok Gaonkar 20081021	Dr. Ram Rajgopal	Hindustan Uniliver R&D Bangalore	Study of Light Transport in Diffuse Media
34	Swetha Bhagwat 20081022	Dr. Sanjit Mitra	IUCAA Pune	Data Analysis Techniques in Gravitational Wave Astronomy
35	Paritosh Kumar 20081025	Harsh Chaturvedi	IISER Pune	Kinetic and Photon Induced Effects in Single Walled Carbon Nanotube Solutions
36	P. Sruthi 20081027	G.V. Pavan Kumar	IISER Pune	Plasmonic and Organic Nanostructures in Evanescent Optical Field
37	Sindhu Jammi 20081028	Umakant Rapol	IISER Pune	Design of Zeeman Slower for Strontium Atoms
38	Kaustubh Sudhir Deshpande 20081030	J.V. Narlikar	IUCAA Pune	Action-At-A-Distance and Cosmology
39	Madhusudan Raghunathan 20081035	Rajaraman Ganesh	IPR Gandhinagar	Study of Nonlinear Landau Damping and Formation of Bernstein-Greene-Kruskal Structures for Collisionless, 1D Plasmas

Sr. No.	Name of the Student	Supervisor	Place of Project Work	Project Title
40	Bhargava T. 20081037	T.S. Mahesh	IISER Pune	Dynamical Decoupling on Multi-Qubit Systems
41	Anirban Ch Narayan Chowdhury 20081038	Prasanta K. Panigrahi	IISER Kolkata	Quantum Measurements with Post-Selection
42	Ravi Shankar 20081046	T.S. Mahesh	IISER Pune	Simulation of a Quantum Particle using NMR
43	Tushar Sanjay Shrotriya 20081057	Jayaram N. Chengalur	NCRA Pune	Physical Models for the 21cm Emission and Absorption Spectra from the Galactic Interstellar Medium
44	Amartya Singh 20081058	Christian Hess	IFW Dresden	Investigation of Physical Properties of a Quasi-1D Quantum Magnet

List of Courses

Fall 2013

Semester I

Code	Course	Coordinator* and Participating Faculty	Credits
BIO 101	Introductory Biology I	Kundan Sengupta*, L.S. Shashidhara, Milind Watve	3
CHM 101	General Chemistry	R. Vaidhyanathan*, K.N. Ganesh, R.G. Bhat	3
MTH 101	Single Variable Calculus	Pranay Goel	3
PHY 101	World of Physics I - Mechanics	Rajaram Nityananda	3
MTH 100	Introduction to Proof	Ayan Mahalanobis	2
BIO 121	Practical: Basic Biology	P. Gayathri*, Krishanpal Karmodiya	2
PHY 121	Physics Lab I	Aparna Deshpande*, Harsh Chaturvedi, Sulabha Kulkarni	2
HSS 103	Communication, Creative & Technical Writing	K.P. Mohanan*, Kaumudi Bhave, K.P. Madhu	2

Code	Course	Coordinator* and Participating Faculty	Credits
Semester III			
BIO 201	Introductory Biology III	Sutirth Dey	3
CHM 201	Inorganic Chemistry	S.K. Ghosh*, Nirmalya Ballav	3
MTH 201	Linear Algebra	A. Raghuram	3
PHY 201	World of Physics III - Electricity & Magnetism	Surjeet Singh	3
BIO 221	Practical: Ecology and Evolution	Neelesh Dahanukar	2
CHM 221	Chemistry Lab II	Shabana Khan*, Seema Verma, Angshuman Nag	2
PHY 221	Physics Lab II	Prasad Subramanian, *Shivprasad Patil, Prasenjit Ghosh	2
IDC 204	Thermodynamics	Arijit Bhattacharyay	2
TDC 201	Rational Enquiry II	K.P. Mohanan	2
Semester V & VII			
BIO 310	Biostatistics	Ramana Athreya *, Farhat Habib	4
BIO 311	Advanced Cell Biology	Nagaraj B.*, Thomas Pucadyil	4
BIO 313	Advanced Molecular Biology	Mayurika Lahiri*	4
BIO 314	Bioinformatics	M.S. Madhusudhan*, Farhat Habib	4
BIO 320	Genetics	Richa Rikhy*, Girish Ratnaparkhi	4
BIO 322	Biophysics I	Chaitanya Athale*	4
BIO 410	Advanced Biochemistry I	Sudha Rajamani*, G.P. Manjunath	4
BIO 411	Ecology I	Deepak Barua*	4
BIO 301	Lab Training/Theory Project	Akanksha Chaturvedi*	3
BIO 334	Neurobiology I	Suhita Nadkarni*, Richa Rikhy	3
BIO 401	Lab Training/Theory Project	Akanksha Chaturvedi*	3
BIO 431	Epigenetics	Sanjeev Galande*	3
BIO 452	Plant Biology II	Anjan Banerjee*	3
BIO 454	Structural Biology	Saikrishnan Kayarat*	3
BIO 491	Literature Review	Aurnab Ghose*	3

Code	Course	Coordinator* and Participating Faculty	Credits
CHM 311	Physical Organic Chemistry	Harinath Chakrapani*	4
CHM 312	Main Group Chemistry	R. Boomi Shankar*	4
CHM 320	Symmetry and Group theory	Pankaj Mandal*, Anirban Hazra	4
CHM 410	Advanced Molecular Spectroscopy	Aloke Das*, Mrinalini Puranik	4
CHM 411	Organic Synthesis II	Srinivas Hotha*, Sudipta Basu	4
CHM 413	Bioinorganic Chemistry	V.G. Anand*	4
CHM 301	Lab Training/Theory Project	Sudipta Basu*	3
CHM 331	Self Assembly in Chemistry	Pinaki Talukdar*, K.N. Ganesh	3
CHM 332	Separation Principles and Techniques	M. Jeganmohan*, A.A. Natu	3
CHM 340	Advanced Organic Chemistry Lab	Jeet Kalia *, Dimpy Kalia, R.G. Bhat	3
CHM 401	Lab Training/Theory Project	Sudipta Basu*	3
CHM 430	Advanced Physical Chemistry Lab	G.V. Pavan Kumar*, Arun Venkatnathan, Jeetender Chugh	3
CHM 431	Chemical Biology	Raghavendra Kikkeri *, S.G. Srivatsan	3
CHM 432	Solid State Chemistry	Seema Verma*, Angshuman Nag	3
CHM 436	Molecular Modeling and Simulation	Arun Venkatnathan*	3
MTH 310	Group Theory	Chandrasheel Bhagwat*	4
MTH 311	Analysis	Diganta Borah*	4
MTH 312	Elementary Geometry	Vivek Mallick*	4
MTH 313	Combinatorics and Number Theory	Rabeya Basu*	4
MTH 314	Statistics	Jayant Deshpande*	4
MTH 410	Galois Theory	Anupam Singh*	4
MTH 411	Measure Theory and Integration	Kaneenika Sinha*	4
MTH 412	Differential Geometry	Anisa Chorwadwala*	4
MTH 413	Algorithms	Jaikumar Radhakrishnan*, Soumen Maity	4

Code	Course	Coordinator* and Participating Faculty	Credits
MTH 414	Partial Differential Equations	Steven Spallone*	4
MTH 301	Lab Training/Theory Project	Anupam Singh*	3
MTH 401	Lab Training/Theory Project	Anupam Singh*	3
PHY 310	Mathematical Methods in Physics	Suneeta Vardarajan *	4
PHY 311	Classical Mechanics	Shouvik Datta*	4
PHY 312	Electrodynamics	G. Ambika*	4
PHY 410	Physics Lab VI	C.V. Dharmadhikari *, Ashna Bajpai	4
PHY 411	Quantum Mechanics II	Avinash Khare*	4
PHY 412	Condensed Matter Physics I	Mukul Kabir*	4
PHY 301	Lab Training/Theory Project	Shivprasad Patil*	3
PHY 330	Physics Lab IV	Umakant Rapol *, T.S. Mahesh	3
PHY 334	Astronomy & Astrophysics	Ramana Athreya*	3
PHY 340	Methods of Experimental Physics	Sunil Nair*	3
PHY 401	Lab Training/Theory Project	Shivprasad Patil*	3
PHY 433	Statistical Mechanics II	Anil Gangal*	3
PHY 441	Quantum Information	Anil Shaji (IISER TVM) via NKN, T.S. Mahesh*- local co-ordinator	3
PHY 453	Computational Physics	M.S. Santhanam*, Prasenjit Ghosh	3
		Spring 2014	
Semester II			
BIO 102	Introductory Biology II	Sudha Rajamani* & Nagaraj B.	3
CHM 102	Chemistry I - Physical Chemistry	Pankaj Mandal *, Partha Hazra	3
MTH 102	Multi Variable Calculus	Diganta Borah	3
MTH 103	Introduction to Computing	Vivek Mallick	3 (2L+1P of 2 hrs)
PHY 102	World of Physics II - Waves and Matter	M.S. Santhanam*, Shouvik Datta	3

Code	Course	Coordinator* and Participating Faculty	Credits
CHM 121	Chemistry Lab I - Physical Chemistry	Mrinalini Puranik*, Jeetender Chugh, Janardan Kundu, B.S.M. Rao	2
BIO 122	Biology Lab II	Neelesh Dahanukar*, Saikrishnan Kayarat, Sanjeev Galande	2
IDC 104	Mathematical Methods	Sudarshan Ananth	2
TDC 102	Rational Inquiry I-Scientific Inquiry	K.P. Mohanan	2
Semester IV			
BIO 202	Introductory Biology IV	Aurnab Ghose* & Collins Assissi	3
CHM 202	Chemistry III - Organic Chemistry	H.N. Gopi*, R. Kikkeri	3
MTH 202	Probability and Statistics	Jayant Deshpande	3
MTH 200	Introduction to Proofs	Supriya Pisolkar	3
PHY 202	World of Physics IV - Quantum Physics	Sourabh Dube*, Sunil Mukhi	3
PHY 222	Physics Lab III	Umakant Rapol*, Surjeet Singh, Harsh Chaturvedi, Apratim Chatterji	2
CHM 222	Chemistry Laboratory III - Organic Chemistry	Harinath Chakrapani*, H. N. Gopi, Pinaki Talukdar, M. Jayakannan	2
HSS 202	Practice of Science: Ethics, Safety & Communication	L.S. Shashidhara*, Sunil Mukhi	2
Semester VI &VIII			
BIO 312	Animal Physiology I	Nishikant Subhedar*	4
BIO 321	Plant Biology I	Anjan Banerjee*	4
BIO 323	Immunology I	Akanksha Chaturvedi*	4
BIO 412	Microbiology	Milind Watve* , P. Gayathri	4
BIO 420	Developmental Biology	Girish Ratnaparkhi*, Richa Richy	4
BIO 422	Evolution	Sutirth Dey* & Milind Watve	4
BIO 423	Ecology II	Deepak Barua	4
BIO 302	Lab Training/Theory Project	Farhat Habib*, Thomas Pucadyil	3

Code	Course	Coordinator* and Participating Faculty	Credits
BIO 402	Lab Training/Theory Project	Thomas Pucadyil *, Farhat Habib	3
BIO 335	Animal Behavior	Raghav Rajan	3
BIO 351	Biology and Disease	Mayurika Lahiri*, Kundan Sengupta	3
BIO 442	Computational Biology	Collins Assissi*, Suhita Nadkarni, M.S. Madhusudan	3
BIO 491	Literature Review	Chaitanya Athale	3
BIO 413	Mathematical Biology	Pranay Goel	4
CHM 310	Quantum Chemistry	Anirban Hazra* & Sourav Pal	4
CHM 321	Organic Synthesis-I	R.G. Bhat* & H.N. Gopi	4
CHM 322	Transition Metal Chemistry	S.K. Ghosh*& Shabana Khan	4
CHM 302	Lab Training/Theory Project - II	Pinaki Talukdar	3
CHM 334	Physical Chemistry of Solutions	Seema Verma* & Angshuman Nag	3
CHM 351	Bioorganic Chemistry	Sudipta Basu* & K.N. Ganesh	3
CHM 360	Advanced Inorganic Chemistry Lab	Seema Verma & Angshuman Nag*	3
CHM 420	Structural Methods and Analysis	Jeetender Chugh*, S.G. Srivatsan	4
CHM 421	Polymer Chemistry	M. Jayakannan*, Britto Sandanaraj	4
CHM 422	Statistical Thermodynamics	Arnab Mukherjee, Srabanti Chaudhury*	4
CHM 423	Medicinal Chemistry	Srinivas Hotha * & Jeet Kalia	4
CHM 402	Lab Training/Theory Project - IV	Pinaki Talukdar	3
CHM 433	Photochemistry	Partha Hazra* & R.G. Bhat	3
CHM 441	Advanced Material Science	R. Vaidhyanthan*, Nirmalya Ballav	3
CHM 442	Organometallic Chemistry: Principles and Applications	M. Jeganmohan	3
MTH 320	Vector Spaces, Rings and Modules	Amit Hogadi	4
MTH 321	Measure Theory & Integration	Chandrasheel Bhagwat	4

Code	Course	Coordinator* and Participating Faculty	Credits
MTH 322	Point Set Topology	Rama Mishra	4
MTH 323	Graph Theory	Ayan Mahalanobis	4
MTH 324	Ordinary Differential Equations	Steven Spallone	4
MTH 302	Lab Training/Theory Project	Chandrasheel Bhagwat	3
MTH 420	Algebraic Number Theory	Debargha Banerjee	4
MTH 428	Functional Analysis	Anindya Goswami	4
MTH 422	Algebraic Topology	Rabeya Basu	4
MTH 423	Cryptography	Baskar Balasubramanyam	4
MTH 427	Mathematical Biology	Pranay Goel	4
MTH 402	Lab Training/Theory Project	Chandrasheel Bhagwat	3
PHY 320	Physics Lab V	Shivprasad Patil, Sunil Nair*	4
PHY 321	Quantum Mechanics I	Arijit Bhattacharyay	4
PHY 322	Statistical Mechanics I	A.D. Gangal	4
PHY 341	Physics at Nano Scale	Sulabha Kulkarni	3
PHY 342	Nonlinear Dynamics	G. Ambika	3
PHY 351	Gravitation and Cosmology	Suneeta Vardarajan	3
PHY 302	Lab Training/Theory Project	Prasenjit Ghosh	3
PHY 420	Atomic and Molecular Physics	T.S. Mahesh	4
PHY 421	Classical and Quantum Optics	G.V. Pavan Kumar	4
PHY 422	Nuclear and Particle Physics	Avinash Khare	4
PHY 434	Physics Lab VII	C.V. Dharmadhikari*, Ashna Bajpai	3
PHY 454	Condensed Matter Physics II	Mukul Kabir	3
PHY 461	Quantum Field Theory	Arjun Bagchi	3
PHY 462	Plasma Physics	Prasad Subramanian	3
PHY 402	Lab Training/Theory Project	Prasenjit Ghosh	3

Academic Achievements of Students

- Ms. Arushi Bodas and Mr. Aditya Rajagopalan attended the Asian Science Camp held at Tsukuba, Japan during August 25-30, 2013.
- In the NGPE 2014 conducted on January 19, 2014, Varun Srivastava, Anup Anand Singh, Karthik Prabhu P. and Akshay S. were placed in top 10% of the 1311 candidates from Maharashtra that appeared in the examination.
- C.N.R. Rao Education Foundation prizes for 2013 were awarded to Mr. S. Akshay for Spring 2013 and to Shubham Sohanlal Chajed and Nabha Shah for Fall 2013
- Prizes for Academic Excellence were awarded to the following students of BS MS program

Spring 2013		Fall 2013	
Semester 4	Santpur Sai Neha	Semester 1	Spandan Choudhary
Semester 6	K. Hariram Shiva Chidambaram	Semester 3	Akshay S. Patankar Tanmay
Semester 8	Rohit Chikkaraddy Akash G.	Semester 5	Sanjay Arjun Vijeta
Semester 7	Abhishek Mishra		

International Visits and Summer Internship

- Mr. Upendra Singh was selected for summer internship under the DAAD-WISE program.
- Ms. Meghana Raghunandan was selected for summer internship under the FUB-INSPIRE Programme, funded jointly by DST and Freie Universität, Berlin. She did a project entitled 'Spin orbit coupling in Bose-Einstein condensates' under Priv.-Doz. Dr. Axel Pelster from May 6, 2013 to July 29, 2013.
- Mr. Sharad Joshi and Amey Anant Apte were selected for doing a summer project in University of Surrey under the UKIERI program. Amey did his project work with Prof. S. Ravi P Silva at the Advanced Technology Institute on "Fabrication and study of optical properties of subwavelength hole arrays on silver thin films" during May-July 2013. Sharad worked with Prof. Ben Murdin on the project "Laser interaction with a 3 level system (quantum optics) from June 14, 2013 to August 18, 2013.
- Mr. Shada Arun Dixit Reddy was selected for summer internship under the exchange program of Ohio State University, Columbus through Pelotonia Fellowship Program. He was mentored by Prof. Ching-Shih Chen, College of Pharmacy on "Synthesis of in-house focused compound library for a Novel Integrin-Linked Kinase Inhibitor"
- Monica Dash, a 4th year BS MS student, did a summer project at CERN, Geneva, Switzerland, under the guidance of Joao Martins Guilherme Correia on the project "Use of Perturbed Angular Correlation (PAC) spectroscopy to optimize cleaning of polluted waters of heavy metal ions using specifically functionalized magnetite nanoparticles" from June 10, 2013 to August 10, 2013.

A total of 44 students (42 from 2008 batch and 2 from 2007 batch) have completed the requirements for award of BS MS degree in May 2013. The Board of Governors, on the recommendation of the Senate, has declared these students as having completed the BS MS program and approved award of degree. These students were awarded degree in the 2nd Convocation of the Institute held on May 25, 2013. The following students have been declared passed with distinction: Siddharth Bharath Iyengar, P. Sruthi, Deshpande Kaustubh Sudhir, Pattadkal Jagruti Jagadish, Pooja Naik, Roshni Bano, Iti Kapoor, Krithika Mohan, Ramya Balaji and Shrotriya Tushar Sanjay.

The Institute Gold Medal for best academic performance was awarded to Mr. Siddharth Bharath Iyengar.

Equipment Procured during 2013-14
(costing above Rs 25 lakhs)

Sr. No.	Description	Manufacturer	₹ in lakhs
	IISER Pune		
1	Variable Pressure Vapor Adsorption Instrument	Bel Japan Inc, Osaka	47.03
2	Table-top Atomic Force Microscope	Nanosurf AG, Switzerland	28.53
3	Dielectric Spectrometer	Novocontrol Technologies GmbH, Germany	35.39
4	Luminiscent Image Analyzer	GE Healthcare Bio-Sciences Ltd, Hong Kong	75.36
5	Audio Video Set-up	Broadcast Engineering Consultants India Ltd	36.81
6	Accessories for Confocal Microscope	Carl Zeiss Meditec, Germany	32.28
7	High Performance Liquid Chromatograph (HPLC)	Agilent Technologies Singapore Pte Ltd, Singapore	60.52
8	High Speed Floor Centrifuge	Beckman Coulter International Switzerland	29.8
9	High Performanance Steady State Fluorometer	Horiba Instruments Inc, U.S.A.	27.72
10	Automated Protein FPLC system	GE Healthcare Bio-sciences Ltd Hong Kong	69.96
11	Glovebox & Solvent Purification System	M Braun Inertgas-Systeme Germany	70.57
12	Single Crystal X-Ray Diffractometer	Bruker AXS GmbH, Germany	344.43

Sr. No.	Description	Manufacturer	₹ in lakhs
13	High Performance Digital NMR Spectrometers	Bruker Biospin AG Switzerland	912.87
14	Nikon Eclipse Ti-E Motorised Research Microscope	Nikon Corporation, Japan	48.05
15	Steady State Fluorescence Spectrometer	Edinburg Instruments, U.K.	93.25
16	Automated Flash Chromatography System	Yamazen Corporation, Japan	25.05
17	Inverted Microscope	Carl Zeiss Microscopy GmbH Germany	26.17
18	Ultracentrifuge	Beckman Coulter India Pvt Ltd	47.52
19	High Performance Cluster	Agilent Technologies Pte Ltd, Singapore	44.22
20	SAN Storage Solutions	Locuz Enterprise Solutions Singapore	112.87
	Projects		
21	High Performance Cluster	Netweb Pte Ltd, Singapore	38.58
22	High Performance Computing Cluster	Boston Limited, England	36.65
23	Semiconductor Characterization System and Accessories	Tektronix Asia Ltd, U.S.A.	38.41
24	High Performance Cluster	Wipro Ltd, Singapore	26.49

Personnel

Faculty

Director & Professor
K.N. Ganesh

Professors
L.S. Shashidhara
Milind Watve
Sanjeev Galande
A. Raghuram
Sunil Mukhi
G. Ambika

Associate Professors
Rama Mishra
Ramana Athreya
M. Jayakannan
Suneeta Vardarajan
Srinivas Hotha
Mrinalini Puranik
Prasad Subramanian
M.S. Santhanam
Steven Spallone
Soumen Maity
R.G. Bhat
T.S. Mahesh
V.G. Anand
H.N. Gopi
Aloke Das
M.S. Madhusudhan
Sudarshan Ananth
Amit Hogadi
Shivprasad Patil

Assistant Professors
Sutirth Dey
Aurnab Ghose
Mayurika Lahiri
Partha Hazra
Girish Ratnaparkhi
Arijit Bhattacharyay
Shouvik Datta
Anjan Banerjee
Anupam Kumar Singh
Arun Venkatnathan
Deepak Barua
S.G. Srivatsan
Apratim Chatterji
Pranay Goel
Ayan Mahalanobis
Sujit Kumar Ghosh
Pinaki Talukdar
Harinath Chakrapani
Chaitanya Athale
Umakant Rapol
Arnab Mukherjee
Surjeet Singh
Saikrishnan Kayarat
R. Parthasarathi (up to 10.05.2013)
G.V. Pavan Kumar
Richa Rikhy
Kundan Sengupta
Rabeya Basu
Baskar Balasubramanyam
Pankaj Mandal
Nagaraj Balasubramanian
Prasenjit Ghosh
Thomas Pucadyil
Jeganmohan Masilamani
Raghavendra Kikkeri
Boomishankar Ramamoorthy
Nirmalya Ballav
Sunil Nair

Anirban Hazra
Aparna Deshpande
Anindya Goswami
Ramanathan Vaidhyanathan
Sudha Rajamani
Collins Assisi
Vivek Mohan Mallick
Mohammad Mukul Kabir
Kaneenika Sinha
Akanksha Chaturvedi
Anisa Chorwadwala
Shabana Khan
Jeetender Chugh
Srabanti Chaudhury
Jeet Kalia
Sourabh Dube
Rejish Nath
Debargha Banerjee
Tejas Kalelkar
Diganta Borah
Supriya Pisolkar
Britto Sandanaraj

Asst. Professor (on contract)

Sreekar Shastry (up to 29.04.2013)

Visiting Faculty

A.A. Natu
Nishikant Subhedar
V.S. Rao
B.S.M. Rao
Anil Gangal
Avinash Khare, DAE Raja Ramanna Fellow
C.V. Dharmadhikari
K.P. Mohanan
Jayant Deshpande
Sheela Donde
Rajaram Nityananda (up to 31.01.2014)
Aditi Deo

IISER Fellows

Seema Verma
Priya Iyer (up to 07.02.2014)
Janardan Kundu
Diganta Borah (up to 23.12.2013)
Deepti Gholap (up to 30.04.2013)
Harsh Chaturvedi, Ramanujan Fellow, DST
Angshuman Nag, Ramanujan Fellow, DST
Ashna Bajpai, Ramanujan Fellow, DST
G.V. Pavan Kumar, Ramanujan Fellow (up to 08.10.2013)
Sudipta Basu, Ramalingaswamy Fellow, DBT
Raghav Rajan, Ramalingaswamy Fellow, DBT
Suhita Nadkarni, WT-DBT IA Intermediate Fellow
Ashwin Kelkar, WT-DBT IA Early Career Fellow
Shital Sarah S. Ahaley, WT-DBT IA Early Career Fellow (from 06.05.2013)
Neelesh Dahanukar, INSPIRE Faculty
Chandrasheel Bhagwat, INSPIRE Faculty
Gayathri Pananghat, INSPIRE Faculty
Ronnie Mani Sebastain, INSPIRE Faculty
Arjun Bagchi, INSPIRE Faculty
Krishanpal Karmodiya, INSPIRE Faculty

Non-teaching Staff

Col. G. Raja Sekhar (Retd.), Registrar (from 01.05.2013)
V.S. Rao, Registrar (Officiating) (up to 30.04.2013)
Mariamma John (Dy. Registrar-Finance and Accounts)
Santosh Nevse, Assistant Registrar (Admin)
Salim Shaikh, Assistant Registrar (Stores & Purchase)
Deepali Dalvi, Assistant Registrar (Academic)
Umeshareddy Kacherki, Deputy Librarian
Neeta Deo, System Administrator
Avinash Abhale, Chief Security Officer
Suresh Nair, Office Superintendent
Beena Subhash, Office Superintendent

Ramesh Mohite, Private Secretary
Manoj Chaudhari, Personal Assistant
Mahesh Rote, Personal Assistant
Tanuja Sapre, Library and Information Assistant
Namrata Shinde, Library and Information Assistant
Snehal Gaikwad, Accountant
Prabhas Patankar, Accountant
Shraddha Visal, Accountant (from 16.09.2013)
Nayana Shirole, Office Assistant
Mayuresh Kulkarni, Office Assistant
Anil Jadhav, Office Assistant
Prabhakar Anagare, Office Assistant
Vrushali Harchekar, Office Assistant
Sandeep Sankpal, Office Assistant
Tushar Kurulkar, Office Assistant
Suvarna Gharat, Office Assistant
Deepa Jain, Nurse
Swapnil Bule, Physical Education Instructor
Roshan Mohite, Car Driver
Sanjay Gomale, Attendant
Vitthal Shejwal, Attendant

Engineering Section

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

Technical Staff

Parveen Nasa, Sr. Technical Officer (Instrumentation)
Nilesh Dumbre, Technical Officer
Mrinalini Virkar, Technical Officer
Mahesh Jadhav, Technical Officer
Saurabh Butolia, Technical Officer (IT)
Sureshchandra Prajapat, Scientific Assistant
Prashant Kale, Technical Assistant
Vijay Vittal, Technical Assistant
Anil Prathamshetti, Technical Assistant
Nitin Dalvi, Technical Assistant
Rupali Jadhav, Technical Assistant
S. Suresh Kumar, Technical Assistant (IT)
Shabnam Patil, Laboratory Technician
Devpalsingh Rajput, Laboratory Technician
Narendra Khandekar, Laboratory Technician
Yatish T.S., Laboratory Technician
Tejal Vadgama, Laboratory Technician
Santosh Khilare, Laboratory Assistant
Megha Paygude, Laboratory Assistant
Sudhir Lone, Laboratory Assistant
Kalpesh Thakare, Laboratory Assistant
Piyush Gadekar, Laboratory Assistant
Yashwant Pawar, Laboratory Assistant
Ganesh Dimber, Laboratory Assistant

Academic/Technical Staff on contractual basis

Susmita Mahapatra, Technical Officer (up to 14.08.2013)
Tejasvi Wadkar, Teaching Assistant
Mahendra Patil, Teaching Assistant
Deepali Jadhav, Teaching Assistant
Hemlata Phadke, Teaching Assistant
Ayesha Fatima, Teaching Assistant (up to 30.04.2013)
Kaumudi Bhave, Teaching Assistant (up to 15.04.2013)
Swati Dixit, Teaching Assistant
Kapil Kumar Gupta, Technical Assistant (up to 30.06.2013)
Pooja Lunawat, Research Assistant
Archana Jogdand, Project Assistant
Swati Shendage, Technical Assistant (up to 29.11.2013)
Bhairavi Naik, Technical Assistant
Samir Choudhary, Technical Assistant

Niharika Joshi, Project Assistant (up to 31.12.2013)
Sujatha Varadarajan, Teaching Assistant
Jeeten Patel, Teaching Assistant
Nayna Nikam, Technical Assistant
Prashant Badgujar, Technical Assistant
Chaitanya Ambi, Project Fellow

Project Scientists

Sulabha Kulkarni, UGC Professor
K.P. Madhu, Incharge, Media Centre
Farhat Habib, Scientist D
Krishanpal Karmodiya, Scientist D (up to 01.09.13)
Sonam Mehrotra, Scientist D (from 02.01.2014)
A. Nagbhushana, Scientist C
G.P. Manjunath, Scientist C
Jayeeta Banerjee, DST Young Scientist (up to 02.01.2014)
Smita Chaturvedi, Project Scientist, WOS-B, DST
Tressa Jacob, Project Scientist, BIOCaRE, DBT

Academic Consultants

Shanti Kalipatnapu, Senior Consultant, Publications
Naresh Sharma, Advisor, Academics
Nita Beliappa, Science Media Consultant

Post-Doctoral Fellows/Research Associates

Mitali Tiwari, DBT Research Associate (upto 30.04.2013)
Shital Sarah S. Ahaley, Research Associate (up to 05.05.13)
Ram Kulkarni, Post-Doctoral Fellow (up to 28.02.2014)
Anju Sharma, Research Associate (up to 15.03.2014)
V. Resmi, Research Associate (up to 02.02.2014)
Raghavendra Murty, Research Associate
Poornima Chandran, DBT Research Associate (from 01.07.2013)
Ketki Tulpule, DBT Research Associate (from 01.07.2013)
Preeti Chaudhary, CSIR Research Associate (from 24.09.2013)
P. Chandramouli Reddy, DBT Research Associate (from 25.09.2013)
Kirtikumar Kondhare, DBT Research Associate (from 01.01.2014)
Amlan Barua, Post Doc. Research Associate (from 08.03.2014)
Anup Pillai, Post Doc. Research Associate (from 19.03.2014)
Vijay Kumar Muley (up to 28.08.2013)
Vimal Kishore
Milan Kumar (up to 29.11.2013)
Saikat Chattopadhyay

Project Fellows

R. Sankar
Prajakta Godbole
Sreeja Thampi
Abhijeet Andhalkar
Ruchira Shah
Amol Kolte
Rohan Pandit
Ashwini Keskar
Abhishek Rale
Shreya Krishnamurthy
Parmeshwar Singh
Neha Deshpande
Apoorva Kulkarni
Ramya Ravindranathan
Sujit Manmode
Madhusudhan Ingale
Arun Babu K.P.
Vikram Bakaraju
Prachi Richa
Sagar Gore
Ramana Murthy Appala
Radhika Korrane
Arvind Kumar Gupta

Shaikh Ziya Iqbal
David Vartak
Kiran Kadlag
Prangya Mishra
Kiran Nilangekar
Bhagyashree Joshi
Sohan Patil
Chintan Sheth
G. Madhusudhana
Arif Iqbal
Dhanashree Nevgi
Kaweri Uttarwar
Shivsmriti Koul
Priya Mohan Bharate (up to 20.06.2013)
Sandeep Pimparkar
Jamuna Vaishnav
Saurabh Pradhan
Progya Mukherjee (up to 15.03.2014)
Ajit Sagare (up to 21.03.2014)
Madhav Vipradas
Santosh Botre
Kritika Saxena
Janavi Rambhatla
Pavan Iyengar
Sachit
Parthsarthi Chaudhury
Uttara Lele
Vijay Kumar Charaka

Administrative and Support Staff on contractual basis

Chandrakant Bhoyar, Executive Engineer-Civil
Varsha Hoshing, Executive Engineer-Electrical
Goldi Mishra, Chief Technology Officer (IT)
Shrikrishna Ayala (Consultant, Engg. Support Service (Civil)
S.H. Yadav, Consultant (Engineering Support Service)
G.K. Marar, Senior Consultant
S.K. Kelkar, Consultant (up to 30.04.2013)
Abhijit Kulkarni, Consultant (IT)
Sachin Behra, Sr. Tech. Assistant (IT)
M.M. Jana, Consultant (Horticulture)
S. Giridhar, Guest House Manager
V.V. Sinha, Administrative Staff
Anita Mishra, Resident Warden (Girls)
Archana Pawar, Office Assistant
Smita Kondhalkar, Office Assistant
Varsha Jain, Office Assistant
Remya Radhakrishnan, Office Assistant
Shakti Tiwari, Office Assistant
Aparna Shimpi, Office Assistant
Rupali Mane, Office Assistant
Ankita, Receptionist
Ketan Kakade, Office Assistant
Ramlal Choudhary, Hostel Manager
Vijay Kale, Security Supervisor
Mangal Kamble, Athletic Coach
Santosh Bhosale, Gym Instructor
Alom Hossain, Admin. Supervisor
Monica Bansode, Office Assistant
Pathan Yusuf Khan, Security Supervisor
Manish Rajiwade, Office Assistant
Sanjeev Gaikwad, Office Assistant
C. Hema Bindu, Office Assistant
Anjali Kuliye, Office Assistant
Sreejit Marar, Office Assistant

Part-time Medical Officers

V.S. Savaskar
Priti Chhajed
Aarti Rapol

Counsellors

Rebecca Desouza
Vrinda Walimbe

Appointments during the year 2013-14

Srabanti Chaudhury	17.04.2013
Jeet Kalia	17.06.2013
Sourabh Dube	02.09.2013
Rejish Nath	28.10.2013
Debargha Banerjee	01.11.2013

Tejas Kalelkar	02.12.2013
Diganta Borah	24.12.2013
Supriya Pisolkar	26.12.2013
Britto Sandanaraj	12.02.2014
Amlan Barua	21.06.2013
Sonam Mehrotra	02.01.2014
Tejal Vadgama	22.04.2013
Deepa Jain	21.10.2013
Swapnil Bule	29.10.2013
Yashwant Pawar	01.11.2013
Saurabh Butolia	28.11.2013
Mahesh Jadhav	02.12.2013
Rupali Jadhav	12.12.2013
Amit Hogadi	26.12.2013
Suvarna Gharat	17.02.2014
Jeeten Patel	01.08.2013
Nayna Nikam	20.12.2013
Ganesh Dimber	10.03.2014
Parveen Nasa	21.03.2014
Gayathri Pananghat	01.04.2013
Sujatha Varadarajan	16.04.2013
Ronnie Mani Sebastian	25.04.2013
Raghav Rajan	01.05.2013
Arjun Bagchi	04.06.2013
Smita Chaturvedi	14.10.2013
Tressa Jacob	21.10.2013
Madhuri Wangala	01.01.2014
Poornima Chandran	01.07.2013
Preeti Chaudhary	24.09.2013
Kirtikumar Kondhare	01.01.2014
Anup Pillai	17.03.2014
Ketki Tulpule	01.07.2013
Aditi Deo	03.02.2014
Smita Kondhalkar	03.07.2013
Prashant Badgujar	03.03.2014
Varsha Jain	04.07.2013
Janardhan Kundu	04.07.2013
Remya Radhakrishnan	08.07.2013
Shakti Tiwari	22.07.2013
Aparna Shimpi	25.07.2013
Rupali Mane	05.08.2013
Chaityana Ambi	03.09.2013
Ankita	19.09.2013
Ketan Kakade	01.10.2013
Ramlal Choudhary	09.11.2013
Vijay Kale	20.11.2013
Mangal Kamble	12.09.2013
Santosh Bhosale	21.11.2013
Alom Hossain	05.12.2013
Monica Bansode	09.12.2013
Yusuf Khan	10.12.2013
Manish Rajiwade	11.12.2013
Sanjeev Gaikwad	24.01.2014
Chandrakant Bhoyar	01.02.2014
C. Hema Bindu	06.02.2014
Varsha Hoshing	10.02.2014
Goldi Mishra	14.02.2014
Anjali Kuliye	17.02.2014
Sreejit Marar	27.03.2014

CSIR SRF (Direct)

Abhigyan Sengupta
Sanjog Nagarkar
Biplab Joarder

CSIR JRF/SRF

Kanika Bansal
Sneha Bhogale
Shivaji Thadke
Sacchidanand Mali
Abhishek Sahasrabuddhe
T.T. Shree Harsha
Mithila Handu
Amar Mohite
Aniruddha Sastry
Maroti Pawar
D. Senthil Kumar
Anupam Sawant
T.Y. Gopal Krishna
Satish Malwal
Vijay Kadam
Shraddha Karve
Arun Tanpure
Dnyaneshwar Kand
Satish Ellipilli
Smita
S. Anantraj
Sumit Kumar
Mothukuri Ganesh Kumar

Sharad Garud-Deshmukh
Biplab Manna
Sunil Kumar
Rahul Kumar Jangid
Abhinav Parivesh
Rashmi Kulkarni
Devika Ranade
Archana Pawar
C.G. Ravikiran
Dinesh Chauhan
Venkateshwararao Boddu
Yasmeen Shameem Akhtar
Sachin Holkar
Kishore Padala
Vinayak Khodade
Aparna Sherlekar
Rini Shah
Santosh Panchal
Balu Navale
Shrishti Dar
M Boominathan
Harikrishna Bavireddi
Ayantika Sengupta
Pramod Sabale
Rajendra Aluri
Bhagyashree Kaduskar
Maidul Islam
Sangabathuni Sivakoti
Barun Dhara
Ashok Yadav
Mallu Chenna Reddy
Indumati Patta
Sushil Bhunia
Pralhad Shinde
Tushar Khopade
Manidipa Pal
Naganath More
Devani Ravi (SPM)
Nandha Kumar
Bhagyashree Kulkarni
Shahaji More
Rajkumar Mishra
Sudhir Pujahari
Abhik Malik
Makarand Sarnobat
Ayesha Fatima
Gaurav Sawant
Neha Nirwan
Trimbak Mete
Jyoti Barnwal
Sopan Shinde
Niraja Bapat
G. Ravikumar
Jagadeeswararao Metikoti
R. Manikandan
Kriti Chaplot
Sudipta Tung
Bipasha Dey
Abhijit Pendse
Shubhanshu Chauhan
Pulastya Parekh
R. Manoharan
Visakha Karnawat
Sameer Thukral
Raunaq Deo
Anil Yadav
Chandarmouli Ghosh

UGC JRF

A. Dharmaraja
Anurag Sunda
Kiran Reddy Baddigam
Bapurao Surnar
Lakshmi VR Babu Shyamala
Kavita Sharma
Snehal Shekatkar
Nitin Bansode
Vallari Shukla
Rafeeq Ahmed Mir
Rohan Yadav
Hitesh Raundal
Sushil Benke
Arundhati Roy
Sohini Sarkar
Kajari Gupta
Darshika Tomar
Karnati Narasimha

Manu Krishnan Unni
Kundansingh Pardeshi
Tanmoy Saha
K. Rajkumar
Ishtiyaq Ahmad Khan
Mahesh Deshmukh
Yettapu Gurivi Reddy
Nuthanakanti Ashok
Prabhat Kumar Kushwaha
Bijoyanand Mishra
Anushree Chaphalkar
Madhuri Gade
Reman Kumar Singh
Prabhakar Pawar
Sandeep Palvai
Sudeshna Manna
Srilata Arra
Arun Neru
Tanushree Kundu
Amit Kumar
Devika Andhare
Neha Kathewad
Partha Samanta
Shiv Pal
Girish Kulkarni
Milan Kumar Das
Debnath Talukdar
Turmoli Niyogi
Vinayak Kulkarni
Nilesh Deshpande
Mahesh Neralkar
P. Rajasekar
T. Vijayakant
Aditya Mehra
G. Shiv Shankar
Manish Kushwaha
Sanku Paul

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

INSPIRE JRF
Libi Anandi
Kunalika Jain
Danveer Singh
Amit Bhunia

NBHM JRF
Jatin Majithia
Neha Prabhu
Debasish Karmakar
Jyotirmoy Ganguly

ICMR JRF
Manasi Gangan

PM's Fellowship Scheme
Aparna Banerjee
Shyamapada Nandi

IISER Research Fellows
Prakash Sultane
Savita Singh
A.V. Ramana Murthy
Arthur Varghese
Padmashri Patil
Madhusudan Ingle
K.P. Arun Babu
Abhishek Shukla
Indu Kaul
P.S. Pramod
Minal Pednekar
Santosh Gadekar
D.S. Wilbee
K.R. Ramya
Koushik Karmakar
N. Bhavani
Manasi Kulkarni
Swathi Hegde
S.K. Mubeena Bano
Arivindam Dasgupta
Sayan Mandal

Arvind Gupta
Abhijeet Bayani
Mandar Kulkarni
Krishna Gavvala
Trupti Thite
Soumya Mukherjee
Anantkumar Srivastava
B. Madhangopal
Sudeb Ghosh
Partha Pritam Patra
Ranguwar Rajendra
Rakesh Gaur
Manasi Mungi
A. Shweta
Avishek Karmakar
Sampada Mutalik
Mahesh Gudem
Sathish Dasari
Avdhoot Datar
Shatarupa Ganguly
Manawa Diwekar
Vibha Singh
Souparna Chakrabarty
Sappati Subrahmanyam
Praveen Kumar
Sonashree
Plavan Kumar Jha
Gunja Sachdeva
Shalini
Debraj Roy
Nishtha Sachdev
Sai Harshini Tekur
Shishir Sankhyayan
Ravi Tripathi
Rabindranath Bag
S.K. Rejaul
Kunal Kothekar
Rohit Kumar
Amandeep
Soumendra Nath Panja
Rohit Babar
Gunjan Varma
Neelesh Soni
Rohit Joshi
Aboli Kulkarni
Devika Bodas
Maithilee Khot
Natasha Buwa
Shrikant Harne
Yashraj Chavhan
Himani Rawat
Tathagata Mandal
Avirup De
Namrata Pattanayak
Sarath Kumar Thadeti
C.S. Sudheerkumar
Rakesh Pant
Debasis Saha
Yashwant Kumar
Debangana Mukherjee
Dinesh Mullangi
D.S. Chetan
Niharika Joshi
Neha
Harshad Paithankar
Bibhisan Roy
Sagar Satpathi
Shahila Muhammed
Shammi Rana
Tushar Shelke
Avinash Warankar
K. Veeresh

Post-BSc Integrated PhD

Sayali Choudhary
Roopali Pradhan
Ketakee Ghate
Shubhankar Kulkarni
Chaitanya Mungi
Ajay Labade
Anindita Adak
Aamod Desai
Amruta Sadhu
Supratik Sarkar
Srikrishna Sekhar
Mahendra Prasad Mali
Ankita Shetty
Sukrut Kamerkar
Neha Khetan
Aditi Maduskar
Dyanesh Dubal
Mukul Rawat

Ashish Surana
Jerrin Thomas George
Sneha Banerjee
V.M. Hridya
Rahi Masoom Reja
Aditi Nandi
Amogh Kulkarni
Abhishek Swarnkar
Meghna Manae
Prachi Telang
Chetan Kumar Vishwakarma
Sanjay Ashok
V. Anusha
Tomin James
Dhanya Menon
Mainak Ghosh
Amarendra Soory
Divya Rao
Akhila Gungi
Neeladri Sen
Aditi Dixit
Anish Rao
Mehak Malhotra
Shivani Sharma
Sandip Varkey George
Adarsh Vasista
Charu Garg
Deepak Khurana
G.A.R.S.R.K. Kashyap
Jay Mangaonkar
Dhriti Nagar
Harpreet Singh Kalsi
Bharat Tandon
Anshul Kapoor
Swati Sharma
Ron Sunny

Grants Received during 2013-14

Sr. No.	Name of the Project	Project Leader	Code	Sanctioning Authority	Duration	Amount Received during 2013-14 (₹ in lakhs)
On-going Projects						
1	Ramanujan Fellowship	Sudarshan Ananth	GAP/DST/PHY-08-0004 30108004	DST	01-08-2008 to 24-07-2013	20.00
2	Theoretical Physics - Max Planck	Sudarshan Ananth	GAP/DST-MRG/PHY-09-0006 30309006	DST and Max Planck Gesellschaft (DST-MPG)	15-3-2009 to 14-3-2014	0
3	Nano Science Unit	M. Jayakannan	GAP/DST/PHY-09-0009 30109009	DST	16-11-2009 to 15-11-2014	0
4	Structural studies on NTP-dependent restriction - modification enzymes	Saikrishnan Kayarat	GAP/WT-DBT/BIO-09-0015 30710015	Wellcome Trust - DBT India Alliance	04-01-2010 to 03-01-2015	50.72
5	Characterization of the novel interaction between check point protein TopBP1 and anti-apoptotic protein Api5	Mayurika Lahiri	GAP/DBT/BIO-10-0016 30810016	DBT	11-01-2010 to 10-07-2013	0
6	Biomechanics of synaptogenesis: the role of mechanical tension	Aurnab Ghose & Pramod A. Pullarkat	GAP/DBT/BIO-10-0017 30810017	DBT	14-01-2010 to 13-01-2013	0
7	Development of green chemical melt transuretane reaction for polyurethanes	M. Jayakannan	GAP/DST/CH-10-0022 30110022	DST	20-04-2010 to 19-04-2013	0
8	Investigation of gamma and hybrid gamma helical peptides as HIV-I fusuin inhibitors	Hosahudya Gopi	GAP/DST/CH-10-0023 30110023	DST	20-04-2010 to 19-04-2013	0
9	The MOR cryptosystem and special *p*-groups	Ayan Mahalanobis	GAP/DAE/MTH-10-0024 30910024	DAE	08-04-2010 to 07-04-2013	0

Sr. No.	Name of the Project	Project Leader	Code	Sanctioning Authority	Duration	Amount received during 2013-14 (₹ in lakhs)
10	Virtual Centre of Excellence on Epigenetics	Sanjeev Galande	GAP/DBT/BIO-10-0027 30810027	DBT	19-03-2010 to 18-03-2015	117.82
11	Transcription regulation in heterochromatin : Role of MADF - BESS domain proteins	Girish Ratnaparkhi	GAP/DBT/BIO-10-0028 30810028	DBT	06-05-2010 to 05-05-2013	4.65
12	Modulation of the innate immune response by SUMOylation	Girish Ratnaparkhi	GAP/WT-DBT/BIO-10-0029 30710029	Wellcome Trust - DBT India Alliance	15-06-2010 to 14-06-2015	36.48
13	Theoretical and emprical investigation on the interaction of asymmetric migration and intristic growth rate on the dynamics of laboratory metapopulation of *Drosophila melanogaster*	Sutirth Dey	GAP/DBT/BIO-10-0030 30810030	DBT	31-05-2010 to 30-05-2013	0
14	Ramanujan Fellowship	Harsh Chaturvedi	GAP/DST/PHY-10-0031 31110031	DST - SERB	01-07-2010 to 31-06-2015	11.00
15	Development of novel microsopic techniques for nano-bio-mechanics	Shivprasad Patil	GAP/DST/PHY-10-0032 30110032	DST - SERB	27-07-2010 to 26-07-2013	0
16	Emergent dynamics on growing networks with comparable time scales	G. Ambika	GAP/DST/PHY-10-0033 30110033	DST - SERB	03-08-2010 to 02-02-2014	3.00
17	Data integration to identify biomarkers to diagnose and monitor Type I diabetes and other inflammatory diseases	Sanjeev Galande	GAP/DBT/BIO-10-0034 30810034	DBT	17-09-2010 to 16-09-2013	
18	Swarnajayanti Fellowship : Capturing the active chromatin in mammalian cell nucleus : comprehensive and large scale mapping of interactions between genomic elements	Sanjeev Galande	GAP/DST/BIO-10-0035 31210035	DST	29-8-2008 to 28-08-2013	0
19	Coordination of actin and microtubule dynamics in neuronal pathfinding : Role of Formin-2	Aurnab Ghose	GAP/DBT/BIO-10-0036 30810036	DBT	27-09-2010 to 26-09-2013	15.70

Sr. No.	Name of the Project	Project Leader	Code	Sanctioning Authority	Duration	Amount Received during 2013-14 (₹ in lakhs)
20	Molecular characterization of the BEL-1 like homologs in potato and their role in long distance signaling of tuberisation	Anjan Banerjee	GAP/DST/BIO-10-0037 30110037	DST - SERB	07-10-2010 to 06-10-2013	7.00
21	Glucose sensing mechanisms in the brain of teleost fish : identification, characterization and physiological significance	N.K. Subhedar	GAP/DST/BIO-10-0038 30110038	DST - SERB	19-10-2010 to 18-10-2013	5.00
22	Development on aptamer mediated TRAP (targeted reversibly attenuated probes) for in vivo imaging of mRNA	Jayeeta Banerjee	GAP/DST/BIO-10-0040 30110040	DST - SERB	11-11-2010 to 10-11-2013	0
23	Ramanujan Fellowship	G.V. Pavan Kumar	GAP/DST/PHY-10-0041 31110041	DST - SERB	01-11-2010 to 31-10-2015	14.60
24	Role of chromatin architecture in cellular senescence	Sanjeev Galande	GAP/IFCPAR/BIO-10-0042 31410042	IFCPAR	01-04-2010 to 31-03-2014	2.47
25	Mechanistic analysis of endocytosis of the amyloid precursor protein	Thomas Pucadyil	GAP/WT-DBT/BIO-11-0043 30711043	Wellcome Trust - DBT India Alliance	01-01-2011 to 31-12-2015	25.87
26	Molecular mechanisms of nuclear structure - function relationships in cancer	Kundan Sengupta	GAP/WT-DBT/BIO-11-0044 30711044	Wellcome Trust - DBT India Alliance	01-01-2011 to 31-12-2015	40.22
27	Micro-cantilever based calorimetric biosenor for decentralized diagnostics and drug discovery using a novel detection mechanism	Shivprasad Patil	GAP/WT-DBT/BIO-11-0045 30711045	Wellcome Trust - DBT India Alliance	15-01-2011 to 14-01-2016	14.81
28	Swarnajayanti Fellowship : Cascade glycosylations : A novel strategy for carbohydrate epitopes and glycoarrays	Srinivas Hotha	GAP/DST/CHE-11-0046 31211046	DST	17-01-2011 to 16-01-2016	0
29	Raja Ramanna Fellowship	A.V. Khare	GAP/DAE/PHY-11-0047 30911047	DAE	08-10-2010 to 19-06-2015	3.13

Sr. No.	Name of the Project	Project Leader	Code	Sanctioning Authority	Duration	Amount Received during 2013-14 (₹ in lakhs)
30	J.C. Bose Fellowship	L.S. Shashidhara	GAP/DST/BIO-11-0048 31511048	DST - SERB	01-02-2011 to 31-01-2016	08.00
31	Development of Napthalenediimide and naphthaleneimide based d-glucose selective synthetic probes	Pinaki Talukdar	GAP/DAE/CHE-11-0049 30911049	DAE	22-03-2011 to 21-03-2014	17.44
32	Molecular and genetic characterization of Drosophila and mouse Ataxin-2 binding protein1 in the context of spinocerebrellar Ataxia type 2	L.S. Shashidhara	GAP/DST/BIO-11-0050 30111050	DST - SERB	01-09-2010 to 31-08-2013	147.57
33	Organic sources of gasesous entities with physiological relevance	Harinath Chakrapani	GAP/DST/CHE-11-0051 30111051	DST - SERB	07-03-2011 to 06-03-2014	26.00
34	Design and synthesis of functional framework materials based on P-N and P-O building blocks	Boomi Shankar	GAP/DST/CHE-11-0052 30111052	DST - SERB	31-12-2008 to 30-12-2011	19.68
35	RNAi based genetic screen to identify interactors of Dvap33 and their role in Vapb Mediated Amyotrophic Lateral Sclerosis (Als8)	Girish Ratnaparkhi	GAP/DBT/BIO-11-0053 30811053	DBT	09-03-2011 to 08-03-2015	8.02
36	Neurobiology of fear : Involvement of CART neuropeptide	Nishikant Subhedar	GAP/DBT/BIO-11-0054 30811054	DBT	16-03-2011 to 15-03-2014	17.76
37	Carbohydrate capped nanoparticles as tumor specific drug delivery systems	Raghavendra Kikkeri	GAP/DST-MPG/CHE-11-0055	DST and Max Planck Gesellschaft (DST-MPG)	01-04-2011 to 01-04-2014	24.71
38	Development and functional studies of homochiral inorganic - organic hybrid Materials	Sujit K. Ghosh	GAP/DAE/CHE-11-0056 30911056	DAE	16-08-2011 to 15-08-2014	4.08
39	Chiral lanthanide carbohydrate clusters for studying carbohydrate - protein interactions	Raghavendra Kikkeri	GAP/DAE/CHE-11-0057 30911057	DAE	16-08-2011 to 15-08-2014	7.77

Sr. No.	Name of the Project	Project Leader	Code	Sanctioning Authority	Duration	Amount Received during 2013-14 (₹ in lakhs)
40	Total synthesis of natural benzo(c) phenanthridine alkaloids by metal-catalyzed cyclization or C-H bond activation reaction as a key step	Masilamani Jeganmohan	GAP/DAE/CHE-11-0058 30911058	DAE	16-08-2011 to 15-08-2014	1.99
41	Integrin-dependent regulation of anchorage independence in cancers	Nagaraj Balasubramanian	GAP/WT-DBT/BIO-11-0059 30711059	Wellcome Trust - DBT India Alliance	01-09-2011 to 31-08-2016	53.68
42	Directed assembly of poly-nuclear Ru (II) complexes on carbon nanostructures : A prospective organic photovoltaic cells	Raghavendra Kikkeri	GAP/DST/CHE-11-0061 30111061	DST - SERB	27-09-2011 to 26-09-2013	19.44
43	Study of transmembrane ion channel activity of cyclo-(1-6)-B-D-glucosamine derivatives and evaluation of their antibacterial potential	Pinaki Talukdar	GAP/DST/CHE-11-0062 30111062	DST - SERB	29-09-2011 to 28-09-2013	3.00
44	Quantum information processing by nuclear magnetic resonance : Oriented spin systems as large quantum registers	T.S. Mahesh	GAP/DST/PHY-11-0063 30111063	DST - SERB	31-10-2011 to 30-10-2014	5.00
45	A transcriptomic approach to decipher the alarm signals in phloem of wild Solanum species in response to pathogen challenge	Anjan Banerjee	GAP/DBT/BIO-11-0064 30811064	DBT	03-11-2011 to 02-11-2014	0
46	New insight of Flavin-Aptamer recognition process with the help of biophysical studies	Partha Hazra	GAP/CSIR/CHE-12-0065 30512065	CSIR	01-01-2012 to 31-12-2014	9.32
47	Conformation of microhydrated peptides : Laser-desorption jet-cooled studies	Aloke Das	GAP/DST/CHE-12-0066 30112066	DST - SERB	01-03-2012 to 28-02-2015	0

Sr. No.	Name of the Project	Project Leader	Code	Sanctioning Authority	Duration	Amount Received during 2013-14 (₹ in lakhs)
48	DBT-IISER Partnership : Facilitation of research collaboration in emerging areas of biology - Phase I	L.S. Shashidhara	GAP/DBT/BIO-12-0067 30812067	DBT	17-02-2012 to 16-08-2013	0
49	Epigenetics of the fetal odor learning	Ram S. Kulkarni	GAP/DST/BIO-12-0068 30112068	DST - SERB	29-02-2012 to 28-02-2014	0
50	Two-dimensional metal - organic coordination networks	Nirmalya Ballav	GAP/DAE/CHE-12-0069 30912069	DAE	05-03-2012 to 04-03-2015	1.15
51	Surface enhanced Raman Scattering in holographic optical trap	G.V. Pavan Kumar	GAP/DST/PHY-12-0070 30112070	DST - SERB	09-03-2012 to 08-03-2015	4.00
52	Chimeric nanoparticle: A novel nanoplatform for signaling pathway driven cancer chemotherapy (Ramalingaswami Fellowship)	Sudipta Basu	GAP/DBT/BIO-12-0073 31312073	DBT	06-02-2012 to 05-02-2017	14.90
53	Hypoxia-Activated prodrugs of nitric oxide	Harinath Chakrapani	GAP/DBT/BIO-12-0074 30812074	DBT	01-04-2012 to 31-03-2015	0
54	Science Media Centre	L.S. Shashidhara	GAP/DST/S&T-12-0075 30112075	DST	16-04-2012 to 15-04-2015	9.33
55	The role of SATB proteins in the structure and function of the inactive X	Ashwin Kelkar	GAP/WT-DBT/BIO-12/0076 30712076	Wellcome Trust - DBT India Alliance	01-05-2012 to 30-04-2016	42.72
56	INSPIRE Faculty Award	Chandrasheel Bhagwat	GAP/DST/INSPIRE-12-0077 31812077	DST	01-03-2012 to 28/02/2017	16.92
57	Ramanujan Fellowship	Ashna Bajpai	GAP/DST/PHY-12-0078 31112078	DST - SERB	09-03-2012 to 08-03-2017	0

Sr. No.	Name of the Project	Project Leader	Code		Sanctioning Authority	Duration	Amount Received during 2013-14 (₹ in lakhs)
58	SanGeniX: A comprehensive Next Generation Sequence (NSG) data anlysis solution	Sanjeev Galande	GAP/DBT/BIO-12-0079	30812079	DBT	16-03-2012 to 15-03-2015	0
59	Modeling and observations of CME propogation associated radio bursts and cosmic ray forbush decreases at the earth	Prasad Subramanian	GAP/ISRO/PHY-12-0081	30612081	ISRO	06-06-2012 to 05-06-15	5.40
60	Palladium catalyzed chelation assisted C-H Bond functionalization of aromatics, alkenes and alkanes	M. Jeganmohan	GAP/DST/CHE-12-0082	30112082	DST-SERB	03-07-2012 to 02-07-2015	0
61	Functional studies of novel inorganic-organic hybrid frameworks with guest accessible sites	Sujit Kumar Ghosh	GAP/DST/CHE-12-0083	30112083	DST-SERB	05-07-2012 to 04/07/2015	2.00
62	Role of network topology in the generation of coordinated neuronal activity	Collins Assisi	GAP/WT-DBT/BIO-12-0084	30712084	Wellcome Trust - DBT India Alliance	01-09-2012 to 31-08-2017	13.74
63	Investigating the role of intracellular calcium signal remodelling in the pathogenesis of Alzheimer's disease	Suhita Nadkarni	GAP/WT-DBT/BIO-12-0085	30712085	Wellcome Trust - DBT India Alliance	01-08-2012 to 31-07-2017	32.09
64	Development and application of theoretical methods for mechanistic understanding of ultrafast photoinduced molecular processes	Anirban Hazra	GAP/DST/CHE-12-0086	30112086	DST-SERB	03-08-2012 to 02-08-2015	0
65	Enovex Technology Ltd	R. Vaidhyanathan	IND/ENOVEX/CHE-12-0087	31912087	Enovex-IISER Pune Agreement	01-04-2012 to OPEN ENDED	40.84
66	Elevational species diversity patterns in the eastern Himalayas(Arunachal Pradesh)	Ramana Athreya	GAP/DST/BIO-12-0088	30112088	DST-SERB	21-08-2012 to 20-08-2015	5.00

Sr. No.	Name of the Project	Project Leader	Code	Sanctioning Authority	Duration	Amount Received during 2013-14 (₹ in lakhs)
67	Study of Wildlife issue in general and the Schedule I (WPA) endangered Blyth's Tragopan in particular in West Kameng District against Diversion of 78.45 Ha forest laud for implementation of 96MW Nafra Hydroelectric project	Ramana Athreya	GAP/Arunachal/BIO-12-0089 32012089	Govt. of Arunachal Pradesh	22-05-2012 to 31-12-2014	0
68	Redox-directed mycobacterial therapeutics	Harinath Chakrapani	GAP/DBT/CHE-12-0090 30812090	DBT	28-09-2012 to 27-09-2015	56.70
69	DNA damage surveillance and repair:characterising the interaction between TopBP1 and Msh2-Msh6 complex	Mayurika Lahiri	GAP/DBT/BIO-12-0091 30812091	DBT	09-11-2012 to 08-11-2015	75.83
70	Interacting networks to model and control dynamics of complex systems	G. Ambika	GAP/DST/PHY-12-0092 30112092	DST Indo-German (DST-DAAD) Project	21-09-2012 to 20-09-2014	1.62
71	Electronic, magnetic & non-magnetic doping of quantum spin chains	Surjeet Singh	GAP/DST/PHY-12-0093 30112093	DST	24-09-2012 to 23-09-2014	0
72	Ramanujan Fellowship	Anshuman Nag	GAP/DST/CHE-13-0094 30113094	DST-SERB	29-10-2012 to 28-10-2017	13.50
73	Study on the impact of the project on wildlife of the area for construction of 780 MW Nyamjang Chhu HEP in Twang District of Arunachal Pradesh	Ramana Athreya	GAP/Arunachal/BIO-13-0095 32013095	Govt. of Arunachal Pradesh	01-01-2013 to 31-12-2015	0
74	INSPIRE Faculty Award	Neelesh Dahanukar	GAP/DST/INSPIRE-12-0096 31812096	DST	16-10-2012 to 15-10-2017	
75	Fluorescent nucleoside based amphiphiles : synthesis, self assembly properties and applications	Seerghazhi G. Srivatsan	GAP/CSIR/CHE-12-0097 30512097	CSIR	01-11-2012 to 30-10-2015	2.52

Sr. No.	Name of the Project	Project Leader	Code	Sanctioning Authority	Duration	Amount Received during 2013-14 (₹ in lakhs)
76	FIST Program-2012	K.N. Ganesh	GAP/DST/FIST/CHE-13-0098 30113098	DST	07-01-2013 to 06/01/2018	0
Projects initiated during 2013-14						
77	Structural descriptors of protein-protein and protein-ligand binding sites and knowledge-based design of new interfaces and ligands	M. Madhusudhan	GAP/WT-DBT/BIO-13-0100 30713100	Wellcome Trust - DBT India Alliance	01-04-2013 to 31-03-2018	154.69
78	J.C. Bose Fellowship	Sunil Mukhi	GAP/DST/PHY-13-0101 31513101	DST		11.00
79	INSPIRE Faculty Award	Gayathri Pananghat	GAP/DST/INSPIRE-13-0102 31813102	DST	01-04-2013 to 31-03-2018	19.00
80	Research for AOARD 134057 "Initiation and propagation of Earth directed Coronal Mass Ejection	Prasad Subramanian	GAP/AOARD-US/PHY-13-0103 32113103	AOARD-US	02-04-2013 to 01-01-2015	35.85
81	Role of RNA binding proteins in Hedgehog signalling	Sheetal Sarah Ahaley	GAP/WT-DBT/BIO-13-0104 30713104	Wellcome Trust - DBT India Alliance	01-05-2013 to 30-04-2018	34.37
82	INSPIRE Faculty Award	Ronnie Sebastain	GAP/INSPIRE/MTH-13-0105 31813105	DST	25-4-2013 to 24-4-2018	19.00
83	Ramalingaswamy Fellowship	Raghav Rajan	GAP/DBT/BIO-13-0106 31313106	DBT	01-05-2013 to 30-04-2018	19.90
84	INSPIRE Faculty Award	Arjun Bagchi	GAP/INSPIRE/PHY-13-107 31813107	DST	04-06-2013 to 03-06-2018	19.00
85	Fabrication of optical gate based on bacterio-Rhodopsin functionalized with single walled carbon nanotubes	Harsh Chaturvedi	GAP/DST/PHY-13-0108 30113108	DST - SERB	07-06-2013 to 06-06-2015	42.90

Sr. No.	Name of the Project	Project Leader	Code	Sanctioning Authority	Duration	Amount Received during 2013-14 (₹ in lakhs)
86	Ramanujan Fellowship - Research Grant	Mukul Kabir	GAP/DST/PHY-13-0109 31113109	DST - SERB	13-06-2013 to 12-06-2018	5.60
87	Dynamical effects in the mechanism of intercalation of anti-cancer drugs	Arnab Mukherjee	GAP/DST/CHE-13-0110 30113110	DST - SERB	13-06-2013 to 12-06-2016	45.25
88	Peripherally functionalized siloxane scaffolds for the assembly of multi-metallic cages, clusters and supramolecules	R. Boomi Shankar	GAP/DST/CHE/13-0111 30113111	DST - SERB	13-06-2013 to 12-06-2016	37.00
89	Design, synthesis and characterization of modified dipyrrins and its complexes	V.G. Anand	GAP/DST/CHE/13-0112 30113112	DST - SERB	17-06-2013 to 16-06-2016	28.00
90	INSPIRE Film	L.S. Shashidhara	GAP/INSPIRE/BIO-13-113 31813113	DST	22-04-2013 to 22-10-2013	20.00
91	Studies on non-covalent modulation of gating and selectivity of synthetic ion channels	Pinaki Talukdar	GAP/DST/CHE-13-0114 30113114	DST - SERB	01-07-2013 to 30-06-2016	34.00
92	Deciphering the transcriptional and miRNA mediated control of calcium dependent protein kinases *StCDPK in potato tuber development	Anjan Banerjee	GAP/DST/BIO-13-0115 30113115	DST - SERB	22-02-2013 to 21-02-2016	4.50
93	Crystal growth of the newly discovered high-temperature iron-arsenide superconductors AFe_2As_2	Surjeet Singh	GAP/DST/PHY-13-0116 30113116	DST - SERB	30-07-2013 to 29-07-2016	15.00
94	Dielectric response of a lasing medium in frequency domain	Shouvik Datta	GAP/DST/PHY-13-0117 30113117	DST - SERB	30-07-2013 to 29-07-2016	48.00
95	Optoelectronic and Plasmonic Properties of all-Inorganic Sn Doped In_2O_3 (ITO) Nanocrystals	Angshuman Nag	GAP/DAE/CHE-13-0118 30913118	DAE/BRNS	01-08-2013 to 31-07-2016	9.83

Sr. No.	Name of the Project	Project Leader	Code	Sanctioning Authority	Duration	Amount Received during 2013-14 (₹ in lakhs)
96	Origin of plasma membrane polarity during embryogenesis	Richa Rikhy	GAP/DBT/BIO-13-0119 30813119	DBT	23-08-2013 to 22-08-2016	19.47
97	INSPIRE Faculty Position	Diganta Borah	GAP/INSPIRE/MAT-13-120 31813120	DST	21-08-2013 to 20-08-2018	19.00
98	Molecular motor driven centrosomal microtubule mobility: mechanics and spatio-temporal organization (RGYI)	Chaitanya Athale	GAP/DBT/BIO-13-0121 30813121	DBT	03-09-2013 to 02-09-2016	5.88
99	Systems modelling and experimental testing of cytoskeletal polarisation in cellular pattern formation	Chaitanya Athale	GAP/DBT/BIO-13-0122 30813122	DBT	03-09-2013 to 02-09-2016	57.18
100	Developmental control of mitochondrial morphology (RGYI)	Richa Rikhy	GAP/DBT/BIO-13-123 30813123	DBT	04-09-2013 to 02-09-2016	10.90
101	Molecular modelling and simulation of nanostructure and dynamics of ionic liquid doped polymer electrolyte membrane fuel cells	Arun Venkatnathan	GAP/SERB/CHE-13-124 30113124	DST-SERB	05-09-2013 to 04-09-2016	44.50
102	Engineering novel supramolecular nanoplatform for paclitaxel delivery in cancer	Sudipta Basu	GAP/DST/CHE-13-126 30113126	DST-SERB	06-09-2013 to 05-09-2016	9.30
103	INSPIRE Faculty Award	Krishanpal Karmodiya	GAP/INSPIRE/BIO-13-127 31813127	DST	02-09-2013 to 01-09-2018	19.00
104	Learning and memory in aggression: Identifying the neurogenetic substrates and memory traces of a complex social behaviour	Aurnab Ghose	GA/DST/BIO-13-129 30113128	DST - SERB	17-10-2013 to 16-10-2016	20.41
105	Women Scientist Scheme - A	Smita Chaturvedi	GAP/DST/PHY-13-129 30113129	DST	07-10-2013 to 06-10-2016	9.72

Sr. No.	Name of the Project	Project Leader	Code	Sanctioning Authority	Duration	Amount Received during 2013-14 (₹ in lakhs)
106	Understanding the functional paralogs and their interaction with developmental pathways during dermis formation using Zebrafish as a model organism	Tressa Jacob	GAP/DBT/BIO-13-130 30813130	DBT	17-10-2013 to 16-10-2016	15.53
107	Stabilizing the dynamics of laboratory populations of *Drosophila melanogaster* using limiter control	Sutirth Dey	GAP/CSIR/BIO-13-131 30513131	CSIR	11-10-2013 to 10-10-2016	11.97
108	Optical effects in functionalized single walled carbon nanotubes	Harsh Chaturvedi	GAP/DST/BIO-13-132 30113132	DST - SERB	16-09-2013 to 15-09-2016	39.95
109	National network for mathematical and computational biology	L.S. Shashidhara	GAP/DST/BIO-13-0133 30113133	DST - SERB	30-10-2013 to 29-10-2016	
110	Role of neuropeptide Y in zebrafish olfaction	Aurnab Ghose	GAP/DST/BIO-13-0134 30113134	DST - SERB	03-12-2013 to 02-12-2016	17.83
111	To set up Maharashtra Gene Bank in Maharashtra State	Milind Watve	GAP/GoM/BIO-14-0135 32214135	Govt. of Maharashtra	09-01-2014 to 09-01-2019	53.74
112	Capacity building among village youth for self study and self employment along western boundary of Tadoba,Andhari Tiger Reserve, Maharashtra	Milind Watve	GAP/DST/BIO-13-0136 30113136	DST	06-11-2013 to 05-11-2016	4.79
113	Ligand-free colloidal all-inorganic semiconductor nanocrystals: Synthesis, photophysics and optoelectronic application	Angshuman Nag	GAP/DST/CHE-13-0137 30113137	DST- SERB	30-12-2013 to 29-12-2016	14.00
114	Understanding dioecy by exploring floral organ identity genes (OIGs) in *Coccinia grandis*- a new model for study	Anjan Banerjee	GAP/DBT/BIO-13-0138 30813138	DBT	03-03-2014 to 02-03-2017	16.10
115	DISC-B Denmark-India *in vivo* screen for cancer biomarkers	L.S. Shashidhara	GAP/DBT/BIO-13-0139 30813139	DBT	27-02-2014 to 26-02-2019	29.55

Scientific Report

1. Chemical Biology

1.1 Chemical Nanobiotechnology

Nanovectors are emerging as outstanding tools in cancer therapy to improve the pharmacokinetic and pharmacodynamic properties of small molecule drugs and proteins through enhanced permeability and retention (EPR) effect.

To address the issues of biocompatibility, biodegradability and non-toxic nature of the nanovectors, **Dr. Sudipta Basu**'s group is developing vitamin D3 and lithocholic acid based novel nanovectors for drug delivery in cancer.

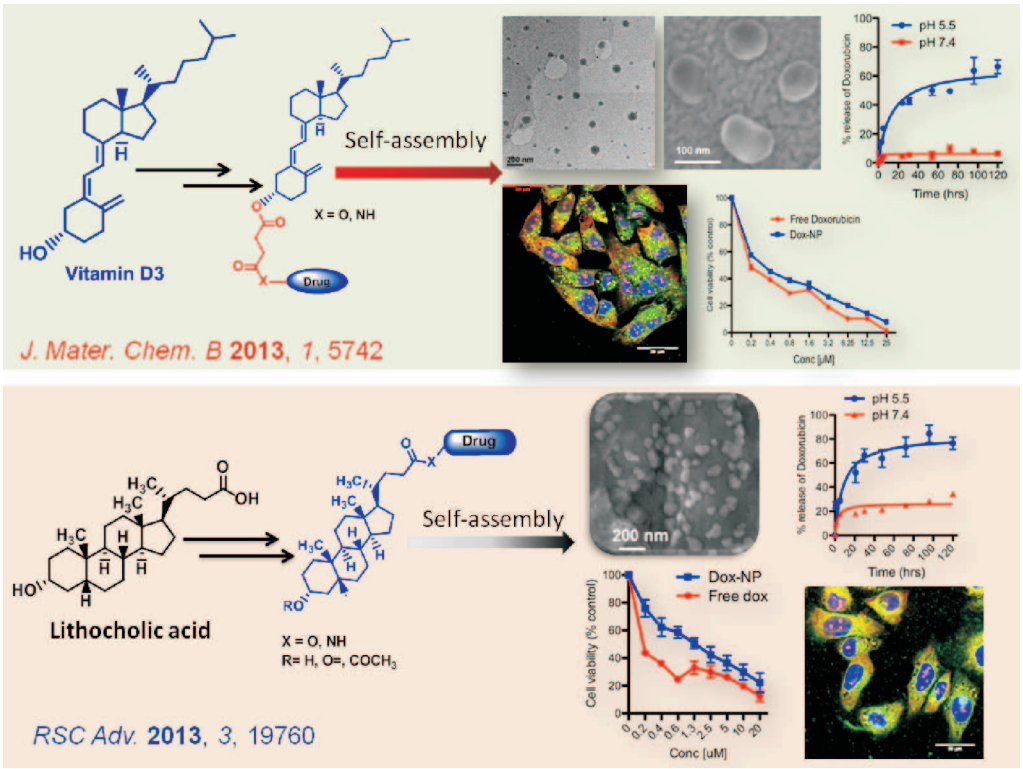


Figure 1: Synthesis and characterization of drug loaded vitamin D3 and lithocholic acid NPs for cancer therapy (Sudipta Basu)

The widely used cytotoxic drugs (doxorubicin and paclitaxel) and phophatidyl-inositol-3-kinase (PI3K) inhibitor were conjugated with vitamin D3 and lithocholic acid. These conjugates self-assembled into sub 200 nm particles (ideal for tumor homing by EPR effect), which were found to release the drugs in a pH dependent sustained manner over a 120 h period. These nanoparticles induced HeLa cervical cancer cell death in a dose dependent manner demonstrating a potential for cancer therapeutics.

1.2 Synthesis of *α*,β-Unsaturated Acids, Amines and Cross-coupled Alkynes

Dr. Ramakrishna G. Bhat's research laboratory has developed novel synthetic methodologies based on the transition metal catalysis for asymmetric synthesis of α,β-unsaturated acids, amines and cross coupled alkynes.

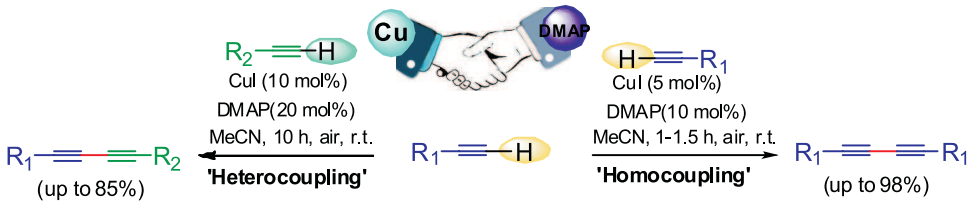


Figure 2: A catalytic system for oxidative homo- and heterocoupling of terminal alkynes (R.G. Bhat)

A mild and efficient chemoselective *N*-deacetylation using the Schwartz reagent enables orthogonal *N*-deacetylation in the presence of common protecting groups (*viz*. Boc, Fmoc, Cbz, Ts).

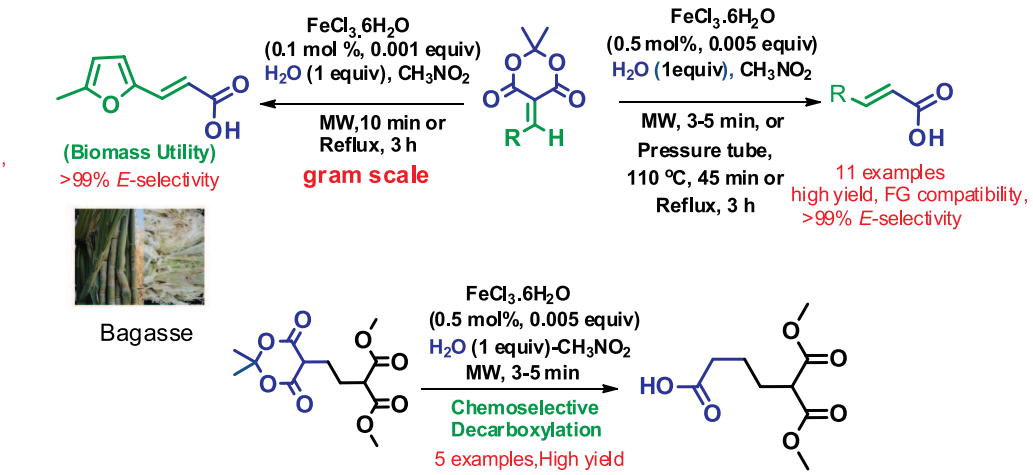


Figure 3: Synthesis of *α, β*-unsaturated acids with high *E*-stereoselectivity (R.G. Bhat)

His group has developed a practical and convenient catalytic protocol using $FeCl_3.6H_2O$ and H_2O for the rapid synthesis of *α, β*-unsaturated acids with high *E*-stereoselectivity. Biomass derived molecules have been converted into corresponding *α, β*-unsaturated acids which are potential fuel additives.

1.3 Controlled Generation of Reactive Species for Therapeutic Applications

Maintenance of redox homeostasis is essential for cellular survival and growth. Highly diffusible reactive oxygen species (ROS), reactive nitrogen species (RNS) and reactive sulfur species are perhaps the most important in such processes. But these reactive species are also capable of causing extensive damage to biomacromolecules including DNA, proteins and lipids. **Dr. Harinath Chakrapani**'s research group designs, synthesizes and evaluates organic compounds that can produce reactive species in a spatiotemporally controlled manner as tools for biochemical and cell biological studies.

The group has developed a new methodology for generating reactive sulfur dioxide species. These compounds have the ability to release sulfur dioxide and have been demonstrated to be useful as surrogates for this reactive species. The RNS sources that the group has developed were found to be activated under bioreductive conditions frequently encountered in tumors and found to be potent inhibitors of colon cancer cells in culture, acting through inducing DNA damage. In another project the group is developing small molecules based on secondary metabolites with ROS generating capability; several potent inhibitors of methicillin-resistant infectious pathogen *Staphylococcus aureus* (MRSA) have been identified and currently being evaluated.

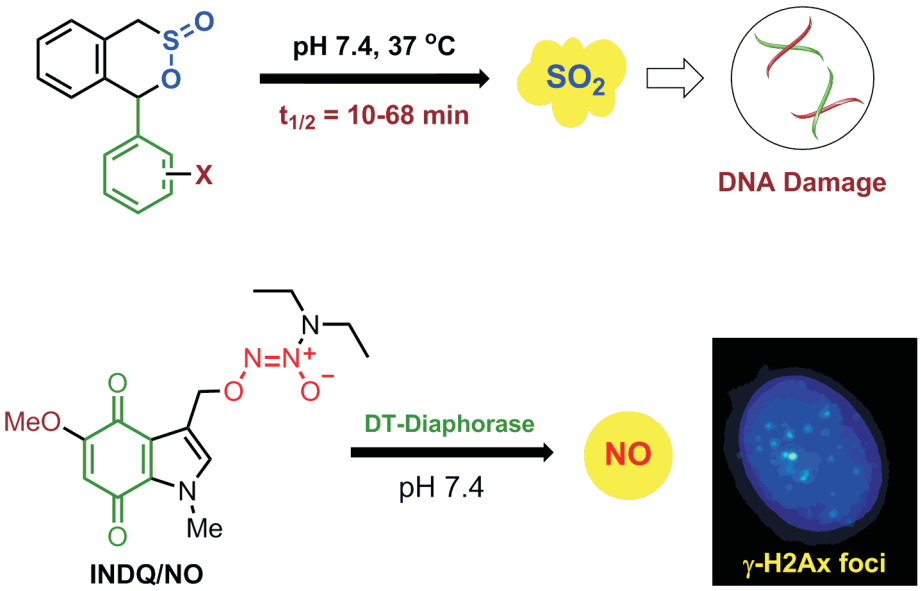


Figure 4: (Top panel) A benzosultine series of organic compounds synthesized by the group have the ability to generate reactive sulphur species in a controlled manner; (Bottom panel) INDQ/NO, a bioreductively activated nitric oxide prodrug synthesized by the group when added to HeLa cervical cancer cells has been found to cause histone protein foci formation, an essential step for signaling the recruitment of appropriate repair enzymes (Harinath Chakrapani)

1.4 Hybrid Peptides: Synthesis, Structure and Applications

Research in **Dr. H.N. Gopi**'s group is focused on the design and synthesis of hybrid peptides and miniproteins composed of non-natural, functionalizable γ-amino acids and their applications in pharmaceuticals and materials science. Continuing the earlier work, the group has now designed

and analyzed conformations of hybrid peptide with 12-helices (Figure 5A) containing α- and γ-amino acids. The folding patterns of α/γ-hybrid peptides from x-ray studies show them to be mimics of α-peptide helices (Figure 5B). Dr. Gopi's group has also designed various α/γ-hybrid peptides gp41 fusion inhibitors, the target protein was cloned, expressed and purified for the binding studies of hybrid peptides to gp41.

Dr. H.N. Gopi's laboratory has developed a new methodology for synthesizing peptides containing statins for developing statin based inhibitors of Dengue protease. In another project, the group has observed that antimicrobial properties of peptide containing *E*-vinylogous amino acids show better activities than their α-peptide counterparts and the mechanism of the action of these hybrid peptides against infectious bacteria and fungi is under investigation.

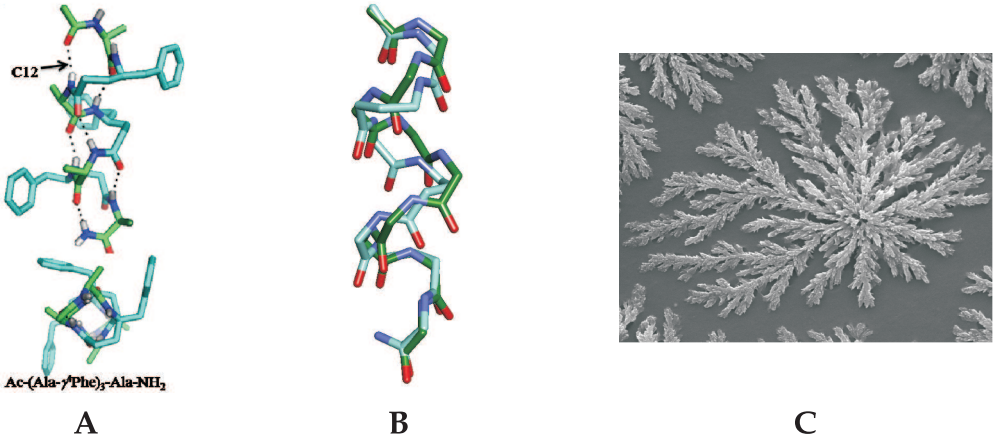


Figure 5: **A**. α, γ-hybrid 12-Helix. **B**. Superposition of α,γ-hybrid peptide 12-helix over -helix. **C**. SEM image of α-, and α,β-unsaturated γ-amino acids containing short hybrid lipopeptide (H.N. Gopi)

1.5 Ion Channels, Lipids, and Bioconjugation

Research in **Dr. Jeet Kalia**'s laboratory is focused on tetrameric cation channels, especially voltage-activated potassium (Kv) channels and voltage-activated sodium (Nav) channels, and Transient Receptor Potential (TRP) ion channels (Figure 7A). The mechanisms of opening and closing of these channels, synthetic small molecules and peptide ligands are being studied.

The group aims to develop new methods of studying lipids in cells involving subtly modified lipid head groups, endowing with elaborated function.

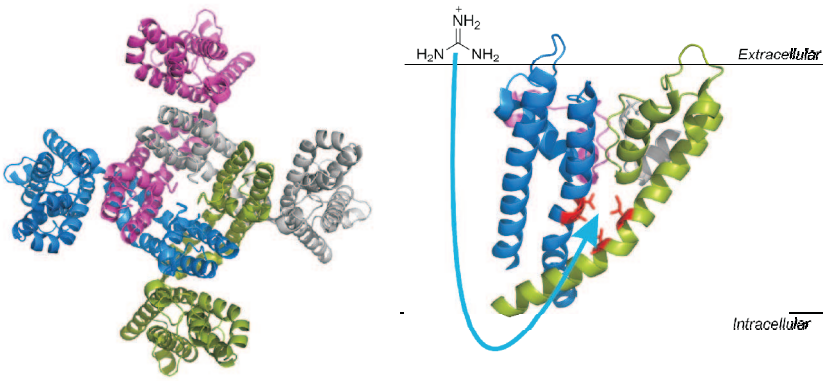


Figure 6: (Left) Structure of a tetrameric cation channels visualized from an extracellular vantage point showing individual subunits in different colours (shown here is the Kv1.2-Kv2.1 chimera: PDB Accession Code 2R9R); (Right) The binding site of guanidine on a Kv channel. (Jeet Kalia)

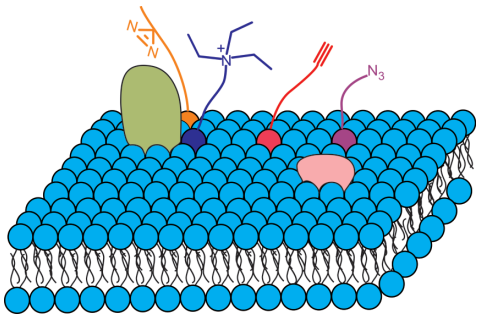


Figure 7: Incorporation of non-natural lipids in cell membranes displaying functional groups of interest: crosslinkable diazirine (orange), ethyl choline "mutant" of choline (dark blue), and bioorthogonal functional groups such as alkyne (red), and azide (purple). Native phospholipid headgroups are shown in cyan blue. (Jeet Kalia)

1.6 Glycans in the Study of Neuronal Growth

The importance of glycans in nervous system physiology is highlighted by the recent discovery that mental retardation, neurologic diseases and neurodegenerative pathologies are associated with congenital or age-related alterations in glycosylation. **Dr. Raghavendra Kikkeri**'s group aims at conceptualizing the complex structure–function relationships of simplified neoglycosylated matrices in the modulation of neuronal differentiation. Glycans, that increase metabolic stability and receptor avidity (multivalency) are being conjugated to suitable matrices (PCL, collagen and peptides derived thereof) for studying their contribution to modulation of neuronal growth and differentiation.

1.7 Structure-Function Relationship in Proteins and Nucleic Acids

The research goal of **Dr. Mrinalini Puranik**'s laboratory is to understand the design principles of proteins in the context of their function.

a) A specific CH-pi interaction in the native structure of a protein, Barstar that defines its core: Dr. Puranik's group has used Barstar as a model protein and tryptophan as an intrinsic probe of local structure. They have found that a unique CH-pi interaction is formed between core residues of the protein, with a Phe stacking on top of a Trp, restraining it to a single conformation. In further developments, the group is using the spectral signature identified above to follow core formation and consolidation during folding of the protein.

b) Recognition of small molecules by enzymes: The function and dynamics of nucleic acid binding enzymes from DNA repair and the purine salvage pathway is being studied in terms of the enzyme's ability to recognize multiple substrates while still retaining specificity of the chemical catalysis step. Fpg/Mut M of the Base excision repair pathway; an *in-situ* DNA repair demethylase, AlkB; and purine recycling pathway enzymes (HGPRT and ADSS) are being studied using molecular biology and spectroscopic studies.

1.8 Functionalized Nucleobase Analogues for Studying Nucleic Acid Structure and Function

Dr. Seergazhi G. Srivatsan and his group are developing functionalized nucleoside analogues that can be easily incorporated into DNA and RNA oligonucleotides to study the nucleic acid recognition process by fluorescence and crystallography (*Bioconjugate Chem.* (2013) 24:1367-1377).

The environment-sensitive fluorescent nucleoside analogues can be used to study oligonucleotide dynamics in cell-like confined environment (*J. Phys. Chem. B* (2013) 117:14273-14282) to detect G-rich sequences in nucleic acids by fluorescence spectroscopy (*ChemBioChem* (2014) 15:1309-1316).

1.9 Synthesis, Self-Assembly and Sensing

Dr. Pinaki Talukdar and his group have developed cyclo-(1→6)-β-*D*-glucosamine based amphiphilic molecules for ion channel studies. The group has developed a series of fluorescence probes for the detection of biothiols, arylthiols and fluorides with a response time < 1 minute. NBD-Cl has been developed by the group as a selective probe for the detection of Cys; it works on a two step process of SNAr reaction followed by Smiles rearrangement. Another NBD probe provided fluoride sensitivity up to 120-fold while a carboxyfluorescein based probe displayed a fast response ($t_{1/2}$ = 2.41 min) and a 550-fold fluorescence enhancement.

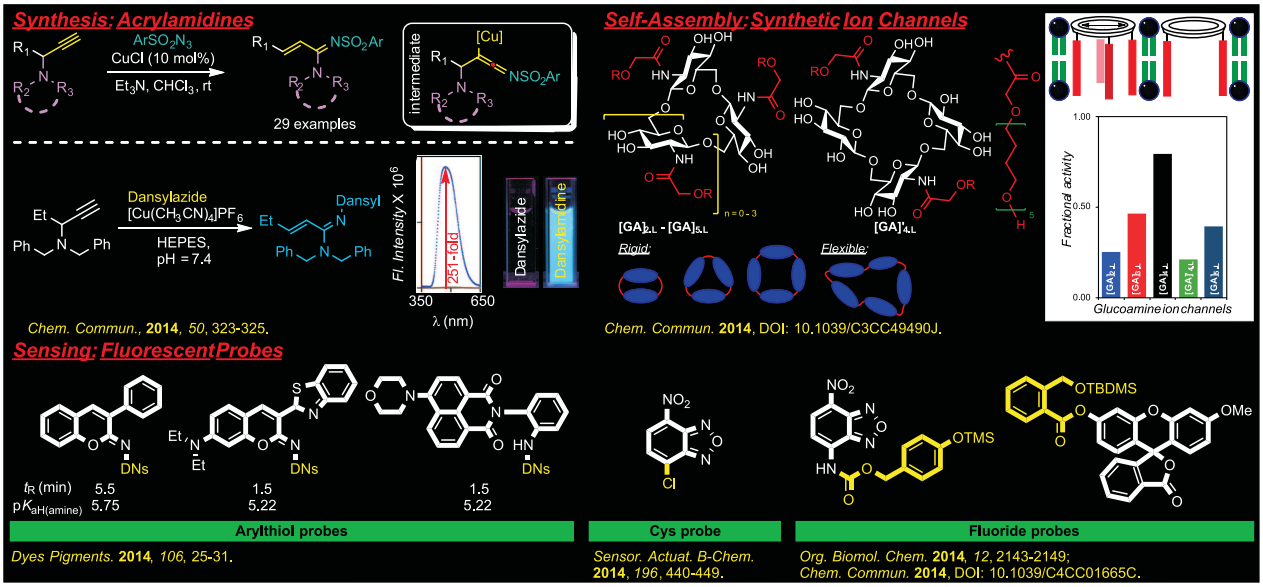


Figure 8: Representation of research activities for synthesis, self-assembly and sensing applications (Pinaki Talukdar)

1.10 Peptide Nucleic Acids and Polypeptides

Research work in **Prof. Krishna Ganesh**'s group is focused on the study of newer analogues of peptide nucleic acids which are cell permeable and on investigation of the secondary structures adopted by collagen type polypeptides, from a functional perspective. In the case of PNA analogues, the group has synthesized, characterized and studied the DNA complementation of clickable Cγ-substituted methylene (azm)/butylene (azb) azido PNAs. These analogues enhanced the stability of the derived PNA:DNA duplexes and fluorescent PNA oligomers synthesized by their click reaction with propyne carboxyfluorescein were seen to accumulate around the nuclear membrane in 3T3 cells.

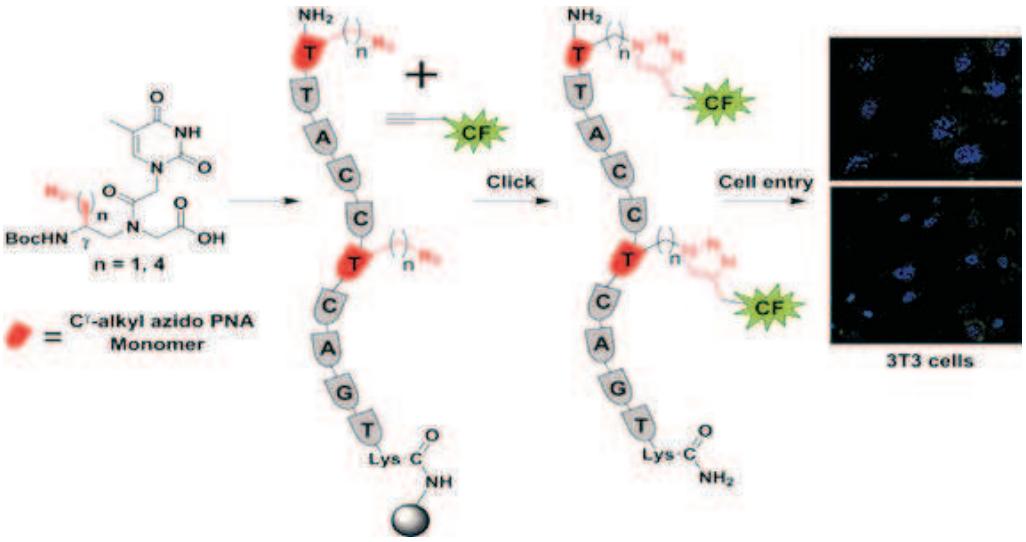


Figure 9: Fluorescent peptide nucleic acid (PNA) oligomers synthesized via click chemistry were found to accumulate around the nuclear membrane in 3T3 cells (Krishna Ganesh)

Extending this work to the corresponding Cγ-substituted alkylamino and guanidine PNA analogues, they have shown that these cationic PNA analogues are even better in stabilizing the cDNA/RNA sequences and permeate the cell more efficiently. Further, there was an asymmetric distribution in their localization around the nuclear membrane.

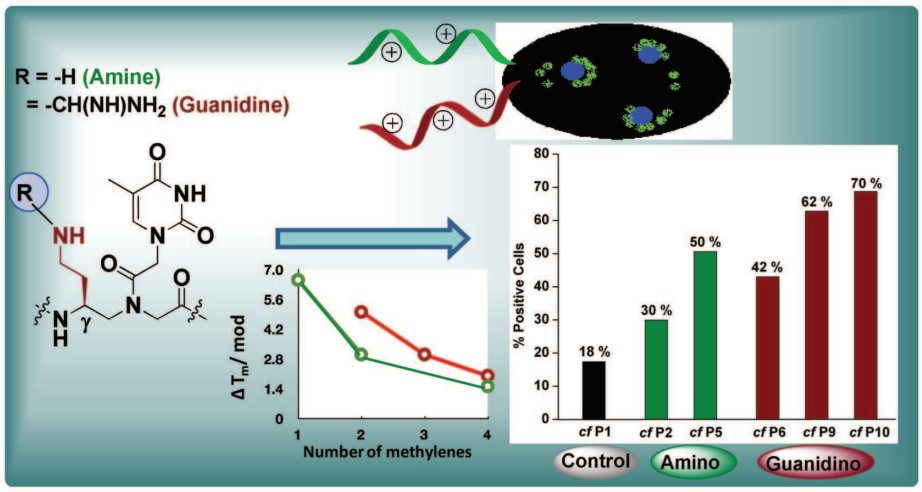


Figure 10: Ability of Cγ-substituted alkylamino and guanidine PNA analogues to stabilize cDNA/RNA sequences and to permeate cells (Krishna Ganesh)

Continuing their earlier work on (2S,4S)-aminoproline polypeptides, which showed β-structure in specifically in trifluoroethanol, but not in water, they have now shown that the (2S,4S)-hydroxyproline polypeptides also exhibit similar behavior, confirming the importance of

intraresidue and interchain H-bonding in dictating the formation of observed structures. Interestingly, the analogous (2R,4R)-hydroxyproline polypeptides showed a mirror image β-structure, which is hitherto unknown. These results have importance in designing new functional peptidomimetic systems.

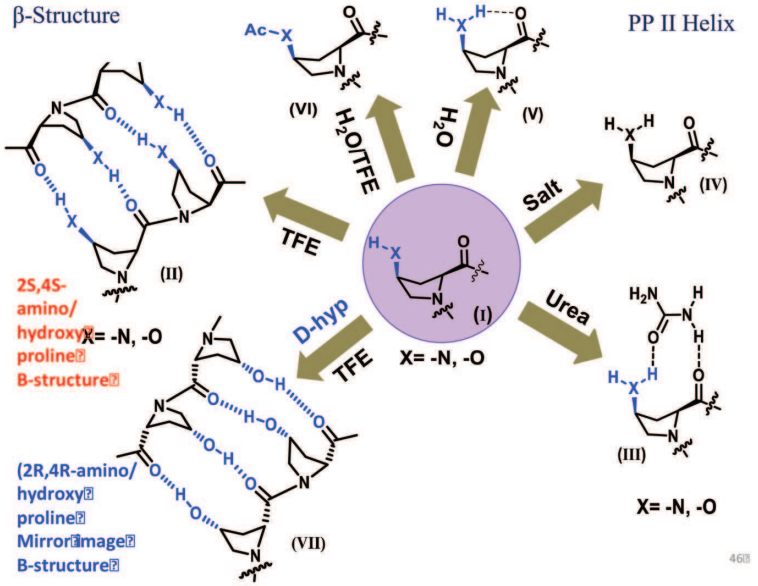


Figure 11: Intra and inter molecular H-bonding in 4R/S-amino/hydroxyl proline polypeptides dictates β-structure and PP II helix secondary structure (Krishna Ganesh)

2 Materials Science and Nanoscience

2.1 Synthesis and Reactivity of Stable Antiaromatic Macrocycles

To synthesize expanded isophlorins, **Dr. V.G. Anand**'s group has introduced ethylene bridges in 32π antiaromatic molecules. These macrocycles display a planar structure with rare F···S, F···Se, and F···π intermolecular interactions.

The synthesis of such antiaromatic macrocycles has been extended to pyrrole based systems with the possibility of metal ligation with N-confused dipyrrin. In the presence of metals, they cyclize into macrocycles with unconventional C-N bridges between adjacent pyrrole rings, which are novel isomers of porphyrin structure and referred to as norroles or Neo-confused porphyrins.

This work is the first example of expanded antiaromatic norroles with six- and eight-membered pyrrole macrocycles.

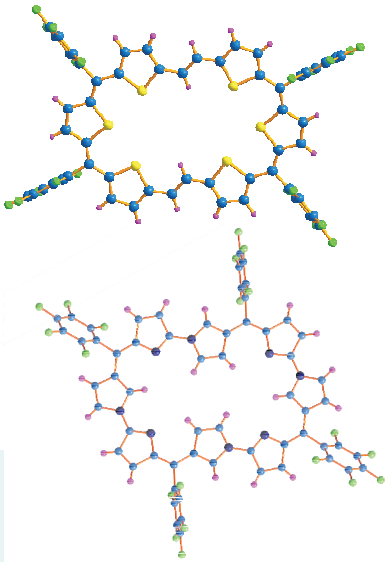


Figure 12: Norroles, novel isomers of porphyrin structure, with six and eight membered pyrrole macrocycles (V.G. Anand)

2.2 Main-Group, Organometallic and Materials Chemistry

Dr. R. Boomi Shankar's group is developing tailor-made functional framework solids derived from main-group elements focusing on phosphorus derivatives such as phosphines, phosphine oxides and phosphonium salts.

Employing peripherally functionalized pyridylamino P(V) scaffolds in multi-metallic assemblies in cluster, cage and framework architectures have been obtained. These materials show interesting functional properties such as selective solvent sorption, stimuli-responsive photophysical behavior and explosive sensing. The group has found that using a flexible, less symmetric phosphoric diamide ligand featuring neutral pyridyl N-donor sites (L), anion dependant structural assemblies of composition $\{[CuL_2]_n[A]_{2n}\}$(**1**: n = , A = (ClO_4^-) and **2**: n =4, A = (NO_3^-)) can be obtained. Counter anions such as perchlorate or nitrate ions control the structural architectures and alter the physical properties associated with them.

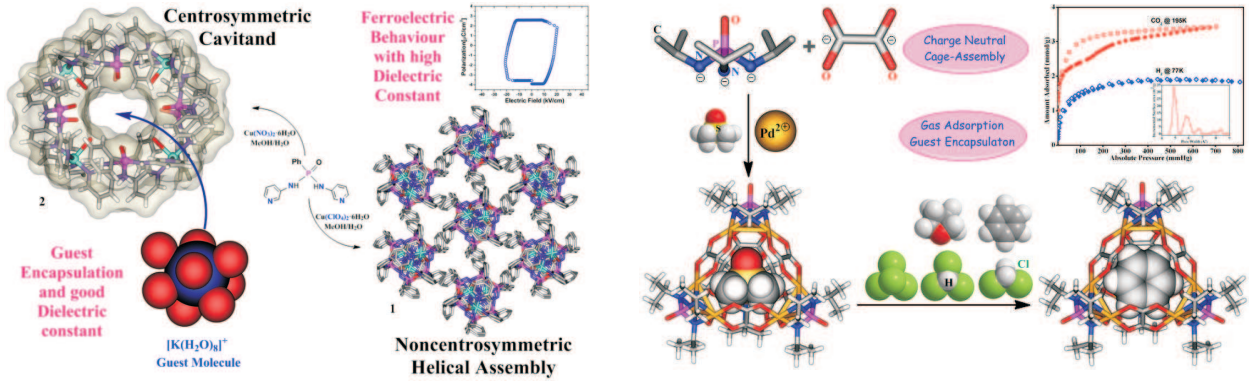


Figure 13: (Left) The hydrophilic central cavity in compound **2** selectively encapsulates a hydrated potassium cation and excludes other cations such as Na^+ or Cs^+ ion; (Right) A new method to exclusive generation of large charge neutral discrete cages that exhibit selective gas adsorption and guest solvent encapsulation (R. Boomi Shankar)

Using a tripodal pyridyl functionalized phosphoric triamide ligand, nanoscopic $[M_6L_8]^{12+}$ type cationic cage assemblies have been obtained. These cages, which upon step-wise anionic displacement reactions lead to the formation of 1D and 2D-polymeric assemblies featuring connected cages, could have potential applications in catalysis.

2.3 Metal-Organic Frameworks

Dr. Sujit Ghosh's laboratory is working in the field of functional porous materials, mainly porous coordination polymers (PCP) or metal-organic frameworks (MOF) that are of interest for their potential applications in gas storage, separations, sensors, and catalysis.

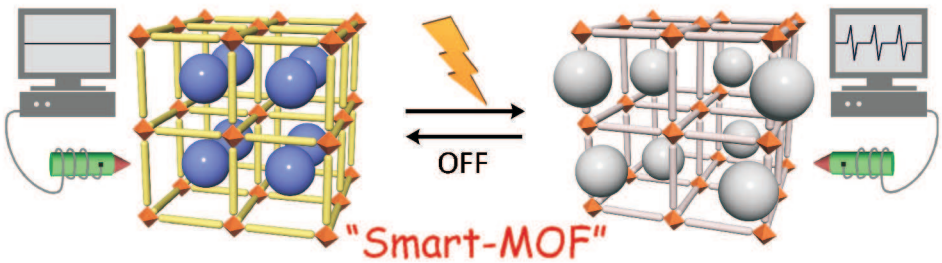


Figure 14: Schematic illustration of stimulus responsive metal-organic framework or Smart-MOF (Sujit Ghosh)

Dr. Sujit Ghosh's laboratory correlates structural features with physical properties and designs synthetic methods to prepare functional materials and to tune their structures and properties. Synthetic methods from both inorganic and organic chemistry are used to prepare novel materials based on coordination compounds and their structure and properties are studied using a wide variety of techniques.

Among the many potential uses of MOFs, chemical separation has great importance in industrial applications. Separation of xylene isomers still prevails to be one of the most important challenges in chemical industry, due to the large amount of commercial use of *p*-xylene in the production of beverage bottles, fibers and films. The group has designed and synthesized a novel Zn(II)-based dynamic coordination framework based on flexible ether-linkage exhibiting selective adsorption of *p*-xylene over its congener C8-alkyl aromatic isomers at ambient conditions.

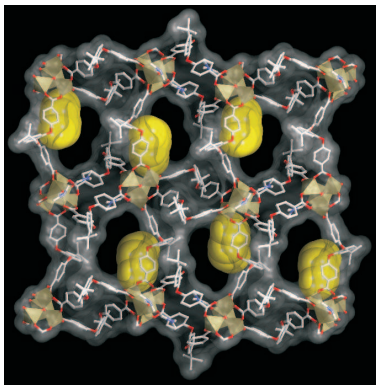


Figure 15: A Zn(II) based metal-organic framework with *p*-xyleye guests inside the framework (Sujit Ghosh)

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

The controversy over "how free the trivalent silicon cation is" has led to emphasis on their spectroscopic and crystallographic characterization and to the understanding of the role of *s* or *p* Lewis basic molecules culminating in the discovery of innocent, that is *non-coordinating*, anions.

Silylium ions are extremely strong Lewis acids due to the electron sextet at the silicon atom and these electron deficient compounds are promising reagents in catalysis.

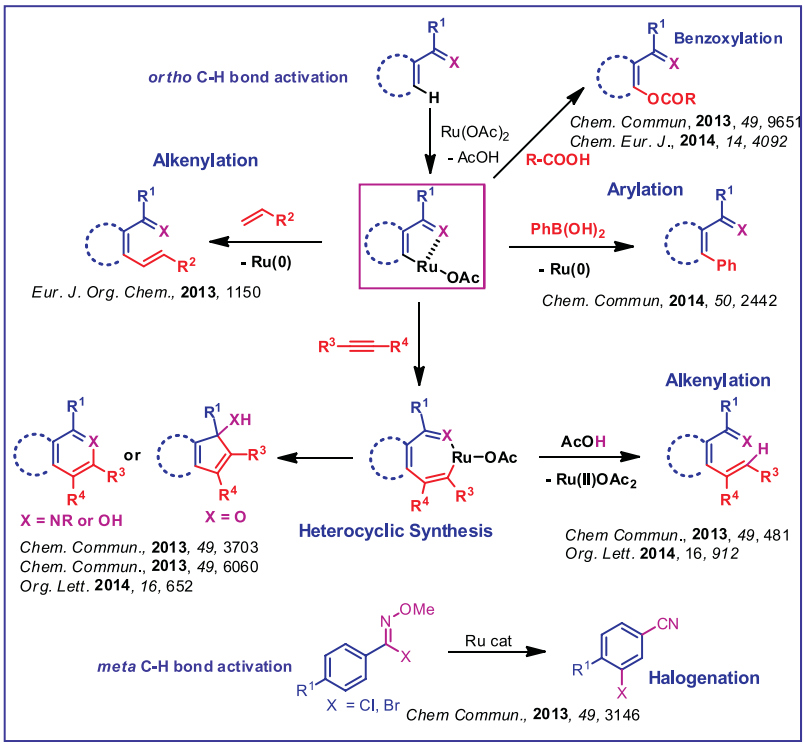
The major drawback of model (designed) catalysts is inadequacy of turnover numbers due to the instability of the counteranion. To overcome the limitation, and to design powerful catalysts, **Dr. Shabana Khan**'s group is working on using $[B_{12}Cl_{12}]^{2-}$ (as non-coordinating anion) which can be synthesized in multi-gram scale in the laboratory.

2.5 Metal-catalyzed C-H Bond Activation

An important problem being addressed by **Dr. M. Jeganmohan**'s group is transition metal-catalyzed chelation-assisted functionalization of inactivated C-H bond of aromatics, heteroaromatics, and alkenes using ruthenium complexes as catalysts.

Unprecedented aerobic oxidative cyclization of aromatic and heteroaromatic nitriles with alkynes in the presence of catalytic amount of $[\{RuCl_2(p\text{-cymene})\}_2]$, KPF_6 and $Cu(OAc)_2{\cdot}H_2O$ gave isoquinolone derivatives.

Chelation-assisted alkenylation at ortho C-H bond of aryl carbamates with alkynes in the presence of ruthenium catalyst, $AgSbF_6$ and pivalic acid yielded highly substituted alkene derivatives in a highly regio- and stereoselective manner. A ruthenium-catalyzed regioselective intermolecular



multi-step homo and hetero dimerization of substituted propiolates provided α-pyrone-5-carboxylates and α-pyrone-6-carboxylates. Several transformations have been carried out using Ru catalyst in combination with other reagents.

Figure 16: Chemical transformations through metal mediated C-H bond activation (M. Jeganmohan)

2.6 Responsive Polymer Vesicles for Oral Drug Delivery

Dr. M. Jayakannan's group has recently developed new carboxylic functionalized poly(caprolactone) (PCL) block copolymer vesicles as novel dual drug delivery pH responsive vehicle for oral administration under GI tract, which is of great challenge.

Carboxylic functionalized caprolactone monomer was polymerized under controlled ROP to yield copolymers which were completely water soluble and self-organized into 80-250 nm vesicular assemblies. These vesicles could uptake both hydrophilic molecules (rhodamine B) and hydrophobic drugs (Ibuprofen and camptothecin) in the core and layer, respectively. These pH responsive PCL vesicles, stable in strongly acidic conditions (pH <2, stomach), rupture under neutral or basic pH (7.0 pH, similar to that of small intestine) to release the loaded cargoes. These PCL vesicles open up a new area of pH stimuli responsive polymer vehicles for delivering multiple drugs in oral drug delivery, which are yet to be explored for biomedical applications (*Biomacromolecules* (2013) 14:4377-4387).

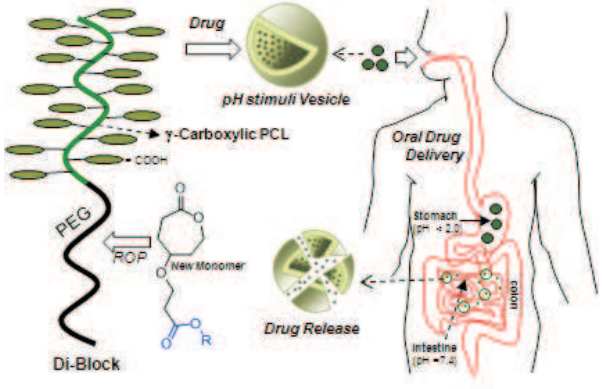


Figure 17: Responsive polymer vesicles for oral drug delivery (M. Jayakannan)

2.7 Multi-Functional Magnetic Nanoparticles

Using suitable surfactants, **Dr. Seema Verma**'s group is working on synthesizing highly monodispersed multifunctional magnetic nanocrystals that are dispersible in both water as well as organic solvents. The group has reported a strategy to obtain a stable thin film of magnetic nanocrystals at the air/water interface utilizing Langmuir-Blodgett (LB) method. The magnetic thin film is subsequently transferred to cadmium arachidate modified glass substrate at controlled rates. This strategy can be extended to any similar systems.

The group is also focusing on designing multifunctional magnetic-plasmonic hybrid nanostructures by utilizing novel synthetic routes. Emphasis is given to get mesoporous magnetic-plasmonic hybrid materials, suitable for biomedical applications and in active plasmonic devices. As an example, the group has developed a technique to obtain a stable mesoporous silica encapsulated $CoFe_2O_4$-Ag nanohybrid. Further work is going on to obtain nanohybrid structures suitable for SERS applications.

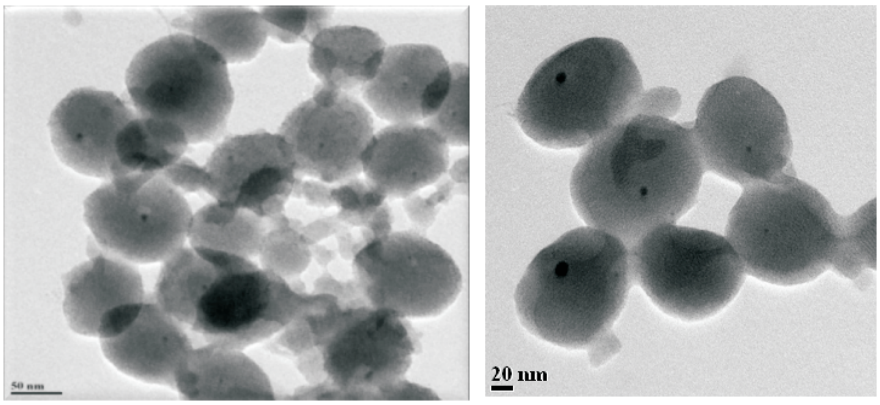


Figure 18: TEM of $CoFe_2O_4$-Ag@mesoporous silica core-shell structure (Seema Verma)

2.8 Physics and Chemistry at the Nanoscale using Theoretical Tools

a) Palladium nanoparticles on graphite oxide: a recyclable catalyst for the synthesis of biaryl cores

Applying density functional theory based calculations on graphene oxide (GO) supported palladium (Pd) nanoparticles used to prepare core moieties of drug molecules, **Dr. Prasenjit Ghosh**'s group has identified the important interactions between the Pd NP and the GO sheet that results in a high stability of the catalyst. Strong multicentered bonding interaction with Pd nanoparticles and GO hold the Pd nanoclusters from leaching during catalysis.

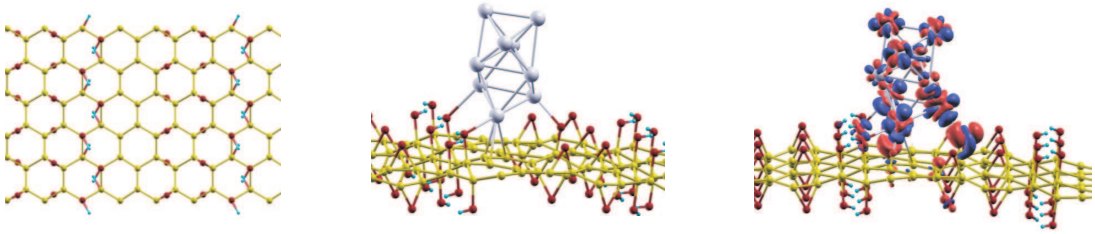


Figure 19: Ref: Santra, S., Hota, P.K., Bhattacharyya, R., Bera, P., Ghosh, P. and Mandal, S.K. (2013). Palladium nanoparticles on graphite oxide: a recyclable catalyst for the synthesis of biaryl cores. *ACS Catalysis* 3:2776 (Prasenjit Ghosh)

b) Substrate-induced changes in the magnetic and electronic properties of hexagonal boron nitride

Ferromagnet-insulator interfaces have been an area of active research because of their potential applications as electronic devices in data storage technology. In this context, two-dimensional hexagonal boron nitride (h-BN), an sp2 hybridized network of covalently bonded boron (B) and nitrogen (N) atoms in a honeycomb lattice] grown on Ni(111) surface, has attracted attention. Using *ab initio* density functional theory, **Dr. Prasenjit Ghosh**'s group studied the structure and electronic properties of hexagonal BN (h-BN) on Ni(111) and Co(0001) surfaces and showed that while dispersion interactions stabilize h-BN on the Ni(111) surface, it is primarily covalent interactions that are involved on the Co(0001) surface.

c) Fluxionality of Au clusters at ceria surfaces during co oxidation: Relationships among reactivity, size, cohesion, and surface defects from DFT simulations

Density functional theory (DFT) calculations have been used to identify correlations among reactivity, structural stability, cohesion, size, and morphology of small Au clusters supported on stoichiometric and defective CeO_2 (111) surfaces. **Dr. Prasenjit Ghosh**'s group has identified Au3 as the smallest stable nanoparticle that can sustain catalytic cycles for CO oxidation without incurring structural/morphological changes that jeopardize its reactivity. These findings provide key guidelines for engineering more efficient metal−oxide interfaces in catalysis.

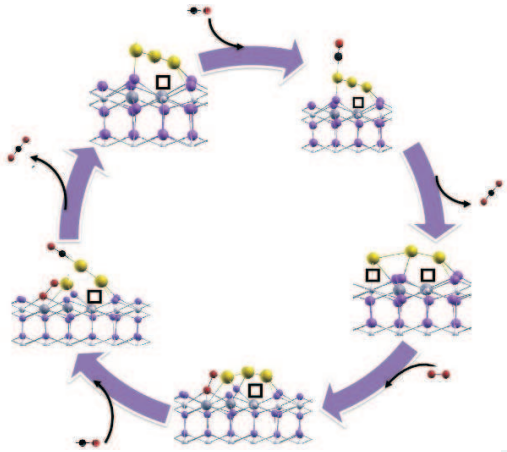


Figure 20: Ref: **Ghosh, P.**, Camellone, M.F. and Fabris, S. (2013). Fluxionality of Au clusters at ceria surfaces during CO oxidation: relationships among reactivity, size, cohesion, and surface defects from DFT simulations. *J. Phys. Chem.. Lett.* 4:2256 (Prasenjit Ghosh)

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

Dr. Nirmalya Ballav's laboratory is working on the potential use of aromatic dithiol for the easy preparation of controllable and well-defined nanostructures of gold nanoparticles (Au NPs).

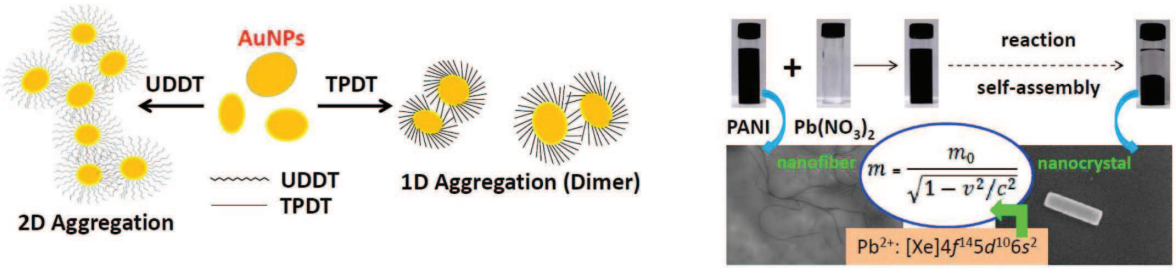


Figure 21: (Left) Discriminative response of aliphatic (UDDT) and aromatic (TPDT) di-thiols in the self-assembly of Au NPs; (Right) Relativistic inert-pair effect of Pb^{2+} ion in the hierarchical assembly with polyaniline (Nirmalya Ballav)

An oxidized form of polyaniline made in the presence of lead nitrate shows remarkable morphological transformation of nanofibers to nanocuboids, indicating a spontaneous and hierarchical self-assembly. This work paves the way toward new designs of self-assembled materials accompanied by removal of heavy metal ions from aqueous solution.

2.10 Colloidal Nanocrystals: Optoelectronics, Surface Modification and Photophysics

Research in **Dr. Angshuman Nag's** laboratory focuses on developing functional inorganic materials using solution processed nanocrystalline modules.

The group has reported (*J. Phys. Chem. Lett.* (2013) *4*:1676) a generic strategy to prepare colloidal metal sulfide nanocrystals where no capping ligand is used. Ligand-free nanocrystals exhibit enhanced electronic coupling in their film and would therefore be appropriate for integration into an optoelectronic device.

Origin of luminescence in $(ZnS)_{1-x}(AgInS_2)_x$ nanocrystals was shown to be due to the participation of delocalized valence/conduction band in the luminescence, in contrast to the prior suggestion of donor-acceptor based luminescence (*J. Phys. Chem. Lett.* (2014) *5*:167). In collaboration, the group has prepared ligand-free $AgInS_2$ nanocrystal sensitized solar cell (*CrystEngComm* (2014) 16:3605-3612). The group has also shown that the exposed surfaces of organic-free colloidal semiconductor nanocrystals could act as generic luminescent sensors for metal ions and nitroaromatic explosives.

3 Spectroscopic Sciences

3.1. Gas Phase Laser Spectroscopy

Dr. Aloke Das's group is focusing on molecular level understanding of weak non-covalent interactions responsible for the stabilization of specific structures of biomolecules and their interactions. This is done in the isolated gas phase (supersonic jet) employing UV (Ultaviolet) and IR (Infrared) laser based spectroscopic techniques performed by using a home-built REMPI (Resonantly Enhanced Multiphoton Ionization) jet-cooled Laser Desorption Time of Flight Mass spectrometer.

a) $n\rightarrow\pi^*$ interaction : Too weak but can compete with strong hydrogen bonding ($n\rightarrow\sigma^*$) interaction

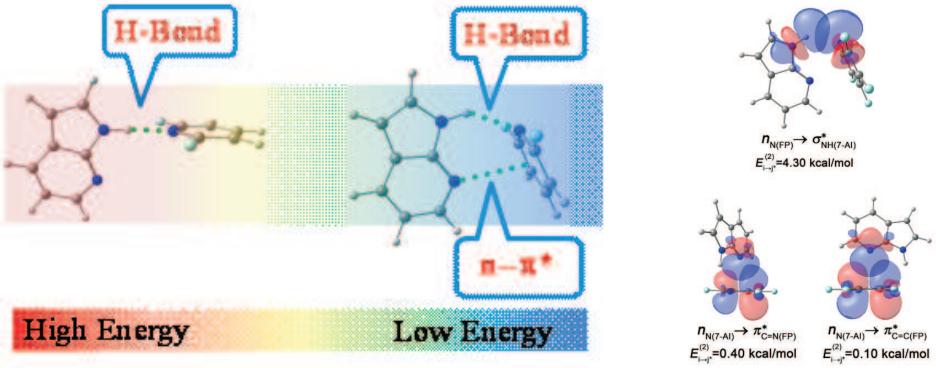


Figure 22: (Left) azaindole…2-fluoropyridine dimer with a very strong hydrogen bond (N-H…N) is less stable than that with a combination of distorted N-H…N hydrogen bond and very weak $n\rightarrow\pi^*$ interaction; (Right) Natural bond orbitals in 7-azaindole...2,3,4,5,6-pentafluoropyridine complex showing N-H...N hydrogen bonding ($n\rightarrow\sigma^*$) and $n\rightarrow\pi^*_{Ar}$ interactions (Aloke Das)

Dr. Das's group has observed a subtle competition between a very weak $n \rightarrow \pi^*_{Ar}$ and a very strong hydrogen bond (N-H...N) interactions present in the complexes of 7-azaindole with a series of 2,6-substituted fluoropyridines. Binding energies of these individual complexes calculated using MP2 as well as dispersion corrected DFT calculations indicated that the strength of the N-H...N interaction in these complexes decreases with increasing fluorination in the fluoropyridine ring while the proximity between the nitrogen atom in 7-azaindole and the aromatic ring of fluoropyridine increases. Dispersion effect is mostly responsible for the attractive $n \rightarrow \pi^*_{Ar}$ interaction: this is the first observation of the $n \rightarrow \pi^*_{Ar}$ interaction in the presence of a conventional strong hydrogen bonding interaction in the molecular system.

3.2 Terahertz Spectroscopy

Dr. Pankaj Mandal's group is exploring the "Terahertz (THz) gap" (0.1 to 10 THz (3 to 330 cm^{-1}) in the electromagnetic spectrum, opening new avenues of probing matter at ultrafast time scales and at the nanoscale. THz frequencies span the range of low-energy excitations in electronic materials, low-frequency vibrational modes of condensed phase media, and vibrational and rotational transitions in molecules. Time-resolved THz spectroscopy is used to study the carrier and spin dynamics in nanoparticles and dynamics in solvated biomolecules.

Dr. Mandal's group has built the Time-Domain THz (THz-TDS) set-up, which allows the study of the following problems: 1) Probing multiple exciton generation (MEG) in semiconductor nanocrystals, 2) THz induced magnetization dynamics in magnetic naomaterials and molecular magnets, and 3) Hydrogen-bond dynamics in liquid water and water-biomolecule network.

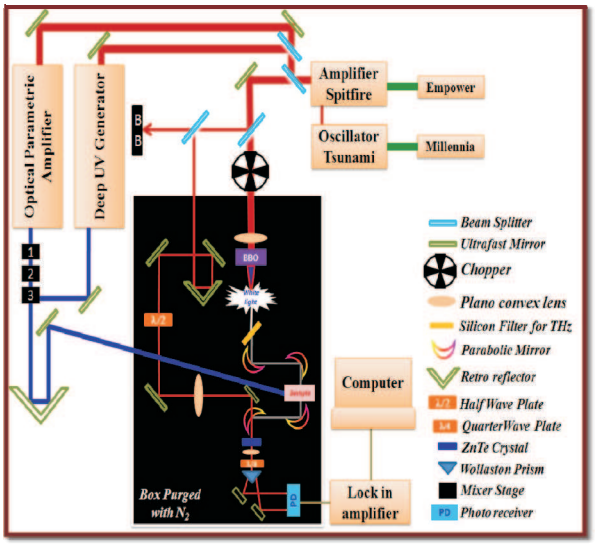


Figure 23: (Left) Ultrafast laser systems; (Right) Schematic of the Time-resolved THz set-up (Pankaj Mandal)

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

Dr. Jeetender Chugh's laboratory has been actively engaged in setting up high-throughput, large-scale purification of $^{13}C^{15}N$-labeled RNA samples using *in vitro* transcription for NMR studies of RNA-protein interactions.

3.4 Spectroscopic Studies of Biological Systems

Dr. Partha Hazra's group is studying the mode of binding of Topotecan (TPT), an anti-cancer drug that interacts with DNA Topoisomerase-I and inhibits DNA replication process. Steady state, time resolved fluorescence, circular dichroism and thermal melting studies of TPT binding with synthetic polynucleotides ($(dA\text{-}dT)_{15}$, $(dG\text{-}dC)_{15}$) indicated groove binding of drug with DNA.

In another project, the group has shown that the fluorescence of a heart medicine, milrinone, switches from UV to visible (cyan color) as a result of complexation with cucurbit[7]uril and this switch is attributed to the increased pK_a of protonation of pyridine nitrogen.

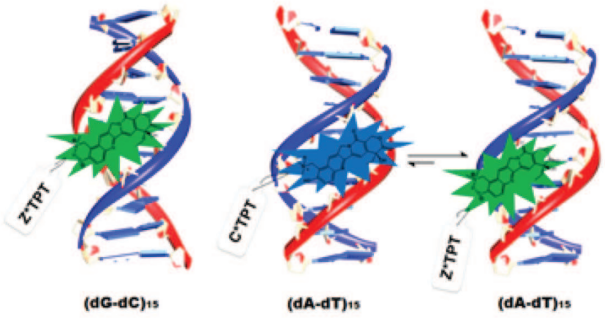


Figure 24: Pictorial representations of excited state binding modes of topotecan (TPT), a potential anti-cancer drug, with ds-DNA (poly(dA-dT), poly(dG-dC)) (Partha Hazra)

4 Theoretical and Computational Chemistry

4.1 Stochastic Processes

Dr. Srabanti Chaudhury and her group is aiming to understand biological processes at the cellular level and how the stochasticity that is inherent to the dynamics of such systems can be characterized and treated mathematically.

(a) Modeling the effect of transcriptional noise on switching in gene networks in a genetic bistable switch

Gene regulatory networks in cells allow transition between gene expression states under the influence of both intrinsic and extrinsic noise. A new theoretical method is proposed to study the dynamics of switching in a two state gene expression model with positive feedback by explicitly accounting for the transcriptional noise. In this theoretical framework, a semi-classical path integral technique is used to calculate the mean switching time starting from either active/inactive promoter state. Analytical predictions are being tested with Monte Carlo simulations and experimental observations.

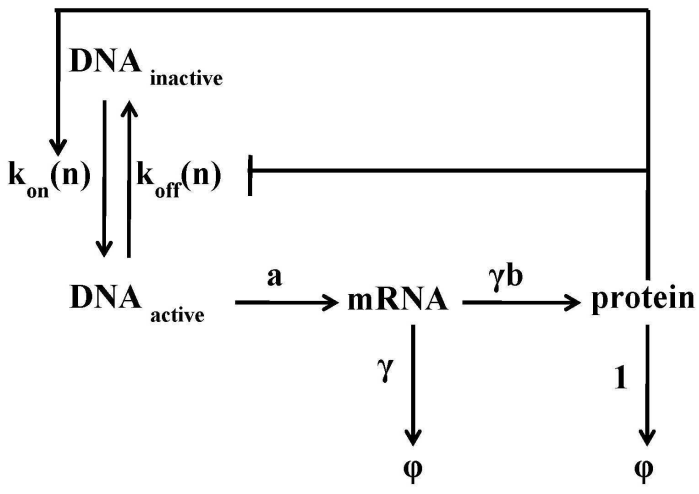


Figure 25: Model for positive feedback network (Srabanti Chaudhury)

b) Modeling the effect of allosteric inhibition in single molecule enzyme kinetics

Understanding the interconnection between the specificity of an enzyme, the architecture of the active site and the kinetic mechanism of a reaction is of major importance. The turnover statistics of a single enzyme in the presence of inhibitors for different types of enzyme inhibitors will be studied. A theoretical formalism is being developed based on the passage time distribution and its effect on temporal fluctuations on the reaction rate in the presence of inhibitors at the single molecule level. This will be used to study enzymatic inhibition by product molecules. Bulk enzymology experiment results as compared to a single molecule experiment will provide important insights into enzyme mechanisms.

4.2 Theoretical Studies of Ultrafast Photoinduced Molecular Processes

The theme of **Dr. Anirban Hazra**'s research involves theoretical investigation of excited state molecular phenomena using quantum chemistry and nuclear dynamics methods. Excited state processes constitute a large class of phenomena in nature. Several of these phenomena like photoinduced electron transfer, photodissociation and fluorescence quenching occur at the ultrafast or femtosecond timescale and play important roles in living organisms and in atmospheric phenomena. The detailed mechanistic understanding of such processes is of basic scientific interest and is also important for its technological implications in solar-based renewable energy devices, particularly the conversion of solar energy to chemical energy.

Two major lines of investigation of his research group are: (1) developing a general theoretical model to understand the coupled electronic-vibrational dynamics of a molecule scattering from a metal surface and (2) detailed understanding of the process of chemiluminescence – the production of light from a chemical reaction.

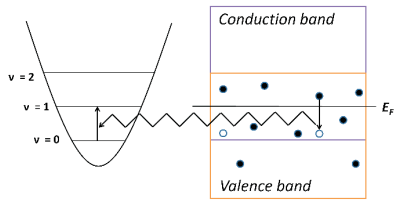


Figure 26: A proposed mechanism of energy transfer in the the process of scattering of a molecule from a metal surface leading to a change in its vibrational distribution (Anirban Hazra)

4.3 Modeling and Simulation of Materials

Dr. Arun Venkatnathan's group has examined proton-transport pathways in a triethylammonium-triflate (TEATF) ionic liquid (IL)-doped side chain of a polymer electrolyte membrane using quantum chemistry calculations. The calculations predict that proton transfer from a tertiary amine cation ($TEAH^+$) to a tertiary amine (TEA) occurs only with an interaction with an anion (TFA^-), which increases its basicity, promoting proton transfer. Results have a bearing on the experimental choice of IL to provide enhanced proton conduction in polymer electrolyte membrane environments.

The group has also characterized the structure and dynamics of Ammonium based benzyl-NX_3 (X=Methyl, Ethyl) trifluoromethanesulfonate ionic liquids using Molecular Dynamics simulations and ionic conductivity using Electro-chemical Impedance Spectroscopy (EIS) at varying temperature and Relative Humidity (RH). The BzTMA cations show both C-H/Ph and cation-Ph interactions, whereas BzTEA cations show only strong cation-Ph interactions.

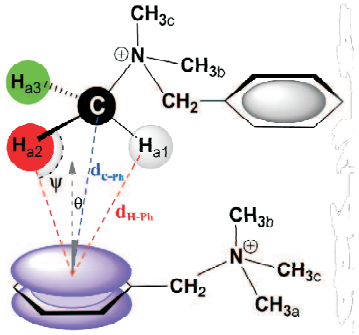


Figure 27: Schematic representation of C-H/Ph interaction in BzTMA cations (Arun Venkatnathan)

4.4 Single Water Entropy and its Application in Hydrophobicity and Drug Design

Dr. Arnab Mukherjee's group is currently working to develop a method to calculate the entropy of a single water molecule which may reside either in the cavity of a protein or around a small drug. The method is general enough that it can be applied to any system of choice. Using this method, they showed that how entropy of water depends on the distance from a particular hydrophobic solute. Moreover, the hydrophobic crossover, from entropy loss to entropy gain around bigger hydrophobic solutes, was captured in this study at a single water level. They applied the method to the cavity of a well-known protein, streptavidin and showed the entropy loss of individual water molecule that forms a pentagonal structure. This method will be subsequently used for drug designing application.

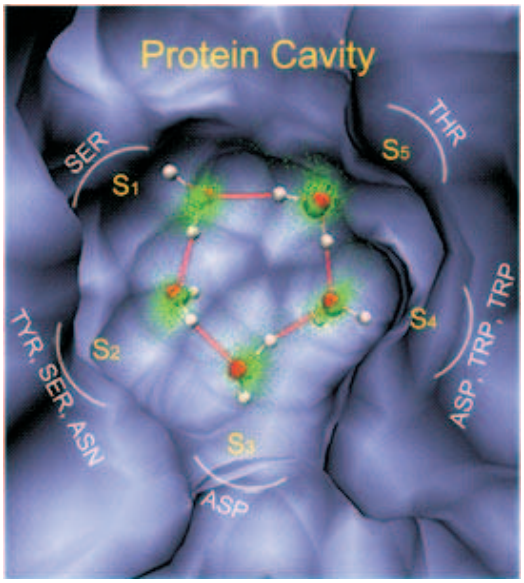


Figure 28: Water forming five-membered ring in the streptavidin cavity. Some of the amino acid residues in the cavity are shown. Green dots indicate position of the water oxygen over different time. S1 to S5 denote different values of the entropy for each of these water molecules (Arnab Mukherjee)

5 Condensed Matter, Statistical Physics and Materials

5.1 Nanospintronics

Dr. Ashna Bajpai's current research interests are in the field of spintronics with a focus on the synthesis of bulk and nano scale magnetic materials and study of their magnetization and transport properties. Dr. Bajpai's group has recently synthesized Fe filled carbon nanotubes (CNT) using pyrolysis of metalloscene and is working to improve the reproducibility and scalability. This synthesis technique usually requires a dual zone furnace with two independent temperature controllers, the sublimation temperature (T_s- ranging from 200 to 300°C) and pyrolysis temperature (T_p- ranging from 600 to 1000° C). They converted a routine single zone furnace to a dual zone, using a Wilson seal arrangement to transfer the sample in the sublimation zone. Conditions for the formation of Fe filled CNT by variations in parameters such as rate of Argon gas flow, T_p and T_s have been optimized.

A new dual zone furnace has been acquired recently and this can help in synthesizing some functional transition metals and their oxides inside the CNT and fabricating nano-spintronic devices.

Dr. Ashna Bajpai's laboratory is also working on Raman microscopy studies on the core shell material which is a micron size crystal of CrO_2 with Cr_2O_3 surface layer of about 2-3 nm thickness. Here CrO_2 is a ferromagnet with a large spin polarization and Cr_2O_3 is a magnetoelectric antiferromagnet, in which magnetization can be manipulated by both electric and magnetic fields. Temperature variation of Raman spectrum on the single micro crystal has been recorded and compared with that of the bulk. The group has found some interesting stress induced effects in the Raman spectra, arising due to lattice mismatch at the interface. This also correlates with some new features seen in the magnetization and magneto transport studies in the same sample.

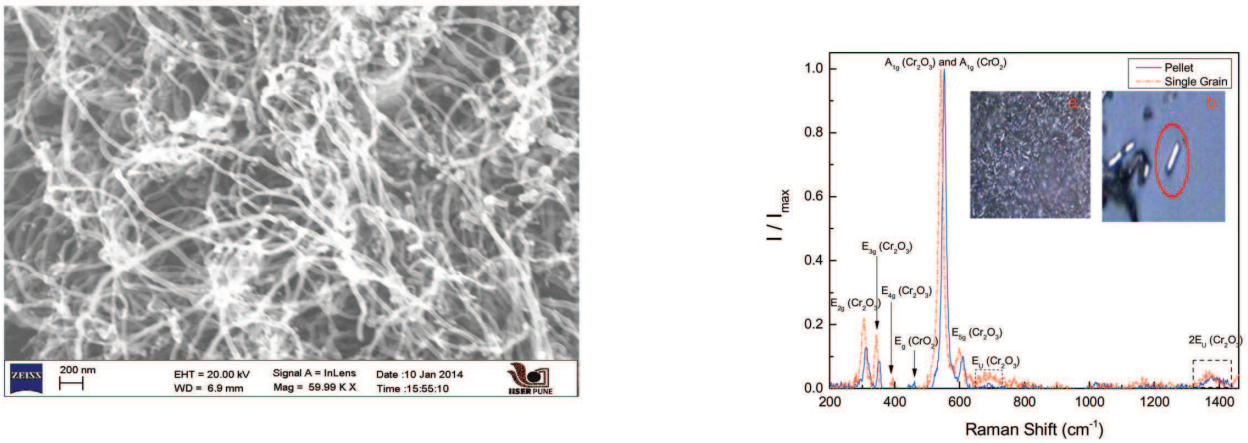


Figure 29: (Left) SEM picture of Fe Filled Carbon nanotubes; (Right) Raman Spectra of CrO_2/Cr_2O_3 core shell material (Ashna Bajpai)

5.2 Synthesis and Analysis of Nanoparticles

Prof. Sulabha Kulkarni's group is working on multiferroics and core-shell particles. The group is also synthesizing anisotropic gold nanoparticles. They have observed interesting self assembled nanostructures (vertically aligned gold nanorods) which were used as SERS substrates for the high sensitivity (~ 10^{-18} M) detection of glucose and TNT. Some fractals and flower-like assemblies have been observed with gold nanorods.

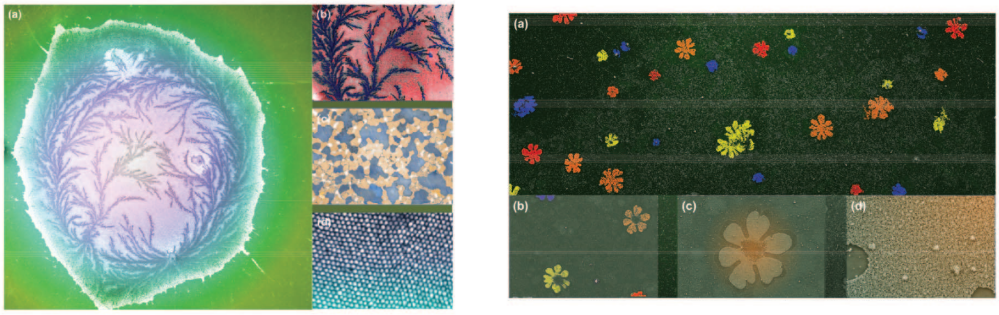


Figure 30: Fractals and flower-like assemblies have been observed with gold nanorods (Sulabha Kulkarni)

5.3 Magnetism in Graphene

Research in **Dr. Mukul Kabir**'s group is focused on predictive materials modeling using theories at different length and time scales, where they use density functional theory, transition state sampling, and kinetic Monte Carlo methods. These levels of theories are applied to study a plethora of problems in magnetism in graphene, defect diffusion in graphene, carbon nanotube and FeCr alloys, and in catalysis.

Although infinite graphene is nonmagnetic, the presence of vacancy defects, transition-metals, and (zigzag) edges brings in magnetism. Recently, the group has explored edge magnetism in neutral and carrier doped small sized hexagonal graphene nanoflake using density functional theory, supplemented with on-site Coulomb interaction. It has been found that that the intrinsic magnetism crucially depends on the carrier doping (hole or electron), which can be experimentally achieved via gate voltage. For certain carrier doping, the long-range magnetic ordering at the edges become ferromagnetic, which is otherwise antiferromagnetic for charge neutral flakes. Finite temperature has similar effect on the magnetism. The present findings could have important technological consequences in spintronic device applications, and will also help understanding varied experimental results. Another route to get magnetism in graphene is via transition-metal (TM) doping. Here the group is investigating the interaction of 3d TMs with various types of intrinsic defects in infinite graphene lattice, and their effect on the resultant magnetism. This type of systems will also have great implications in spintronic device applications.

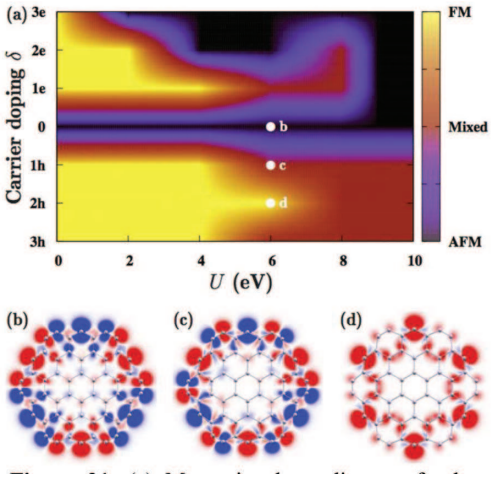


Figure 31: (a) Magnetic phase diagram for bare nanoflake with varied on-site Coulomb repulsion U and carrier density. (b) AFM, (c) mixed, and (d) FM configurations (Mukul Kabir)

5.4 Strongly Correlated Electron Systems

Research activity in **Dr. Sunil Nair**'s group is primarily centered on strongly correlated electron systems. In the past year, they have started the synthesis of a number of different material classes

with the aim of trying to come up with systems with potentially useful physical properties. A major focus of their work pertains to the synthesis of potential multiferroic oxides. To this end, they are working on a number of systems which could have polar and magnetic orders. These include systems such as rare earth tantalates of the form $Mn_4Ta_2O_9$, brownmillerites of the form $Sr_2Ba_2O_{5.12}$, cuprates like $BiCuO_4$ and related systems, and Swedenborgites of the form $Ho_{1-x}Ca_xBaCo_4O_7$. These systems were chosen due to the fact that they exhibit weak ferromagnetism (as a consequence of an antisymetric exchange interaction, which is also known to promote polar order) or the fact that they stabilize in non-centrosymmetric space groups. All the above systems are relatively un-investigated at least as far as their magnetism is concerned, and preliminary measurements indicate that they undergo multiple magnetic phase transitions as a function of temperature. Single crystal growth of these material classes are in progress using a number of different routes. Crystals could be successfully grown using the self-flux method in the case of Bi_2CuO_4.

Work is in progress on a number of Indium and Tin based oxides as a potential test-bed for viable oxide based thermoelectrics. Accordingly, specimens of $KInO_2$, $NaInO_2$, and $LiInO_2$ have been prepared using the solid state reaction, and reactive flux techniques. Perovskite stannates of the form $BaSn_{1-x}Fe_xO_3$ have also been synthesized, and are currently being investigated.

Investigations of this nature rely on the availability of sophisticated magnetic and physical property measurement systems. A Magnetic Property Measurement System (MPMS) squid magnetometer was installed in October 2013 and has been used to measure the magnetic properties of various systems. In addition, a di-electric spectrometer has been procured and is currently being coupled with a Closed Cycle Refrigerator (CCR) to enable temperature dependent dielectric measurements.

5.5 Magnetism and Superconductivity

Ongoing research in **Dr. Surjeet Singh**'s laboratory focuses on understanding elementary excitations in one-dimensional (1D) quantum magnets which comprises systems having chain and/or ladders of antiferromagnetically coupled spin-½ entities. Compared to their 2D relatives (for example, high-temperature superconductors) these systems are simpler and allow analytical and/or numerical solutions. During the current year the group focused on two prototypical 1D quantum magnets: $SrCuO_2$ (spin-½ chains) and $Sr_{14}Cu_{24}O_{41}$ (layered structure with alternating planes consisting of spin-½ ladders and chains) and their doped variants containing "dilute" magnetic and non-magnetic impurities. The motivation for undertaking this work is two-fold: first, "dilute" doping can help realize newer ground states and second, the impurities can act as a "probe" to understand the parent system. Since both these compounds melt non-congruently – a melting behavior that renders ineffective traditional crystal growth techniques of obtaining large crystals from a corresponding stoichiometric melt – Dr. Singh's group employed the traveling solvent floating-zone technique in an image furnace to grow large single crystals useful for inelastic neutron scattering technique. This work has been recently published in the ACS journal *Crystal Growth & Design*.

Further experiments on these crystals showed that Zn (spin s = 0) impurities effectively cut the chain into segments inducing staggered magnetization at the impurity sites. The effect of Co (s = ½) impurities is found to be more subtle, resulting not only in a large magnetic anisotropy but also a magnetic phase transition at low temperatures (around T = 5 K). The nature of the phase transition is further enumerated using neutron scattering (in collaboration with Prof. Christian Ruegg of Paul

Scherer Institute, Switzerland under a joint Indo-Swiss project) and frequency dependent magnetization studies. Meanwhile, in a collaborative work with teams from ETH Zurich and IFW Dresden, Dr. Surjeet Singh's group showed that presence of 1 % Ni (s = 1) impurities results in a spin-gap of ~ 8 meV in an otherwise gapless spin excitation spectrum of pristine $SrCuO_2$.

To summarize, the focus is on understanding how 'complex' magnetic behaviors emerge in an otherwise 'simple' spin-chain upon induction of 'tiny' amounts of impurities. Research in Dr. Surjeet Singh's group has shown that the exact nature of the ground state in the presence of impurities depends sensitively on the nature of the impurity.

5.6 Electronic Origin of Light Emission and Lasing

Investigation of the electronic origin of light emission, onset of lasing and coherence in semiconductor lasers using a variety of electrical and optical techniques in frequency, time and temperature domains have been among the main thrust areas of **Dr. Shouvik Datta**'s research group. Experiments were designed to probe the role of bound states of electron-hole pairs or excitons in lasing within such quantum structures. So far these excitonic quasi-particles have been studied using optical techniques alone. Dr. Datta's group has proposed an alternative method (Bansal, K. and Datta, S. (2014) arXiv:1312.7259) for investigating the rich physics of excitons based on electronic transport measurements. The group plans to extend these investigations to lower temperatures and with higher electrical modulation frequencies (few GHz) at varying degree of carrier concentrations. Due to their lower effective mass, excitons and exciton-polaritons can undergo Bose-Einstein like condensation at much higher temperatures of few K or even at room temperature. Therefore the group also plans to study such exotic condensed phase matter with a combination of electrical and optical tools in collaboration with the research group of Prof. M. Henini in University of Nottingham, U.K. with expertise in growing high quality single crystals of III-V semiconductor quantum heterostructures using Molecular Beam Epitaxy (MBE).

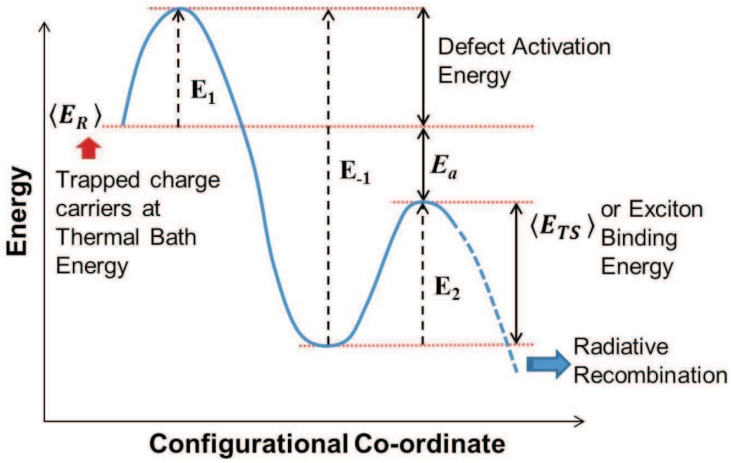


Figure 32: Configuration diagram for an excitonic bound state having negative activation energy (Shouvik Datta)

5.7 Toward Development of a Biosensor for Decentralized Diagnostics

A new tuning-fork based biosensor is being developed by **Dr. Shivprasad Patil**'s group for diagnostics applications. This methodology uses microcantilevers coated with glucose oxidase in combination with tuning fork electrodes and an amplifier. When exposed to glucose in solution, the stress developed due to glucose oxidase-glucose enzymatic reaction can translate to measuring glucose levels.

In another project, the group is developing a new methodology to map the energy landscape of single proteins and changes therein upon interaction with other proteins using force spectroscopy. The group has built a fiber based interferometer which can measure pico-meters of cantilever displacements (in comparison, commercial AFM cannot measure displacements smaller than an angstrom). The new interferometer will now be used to measure changes in amplitude in micro-cantilever during protein unfolding.

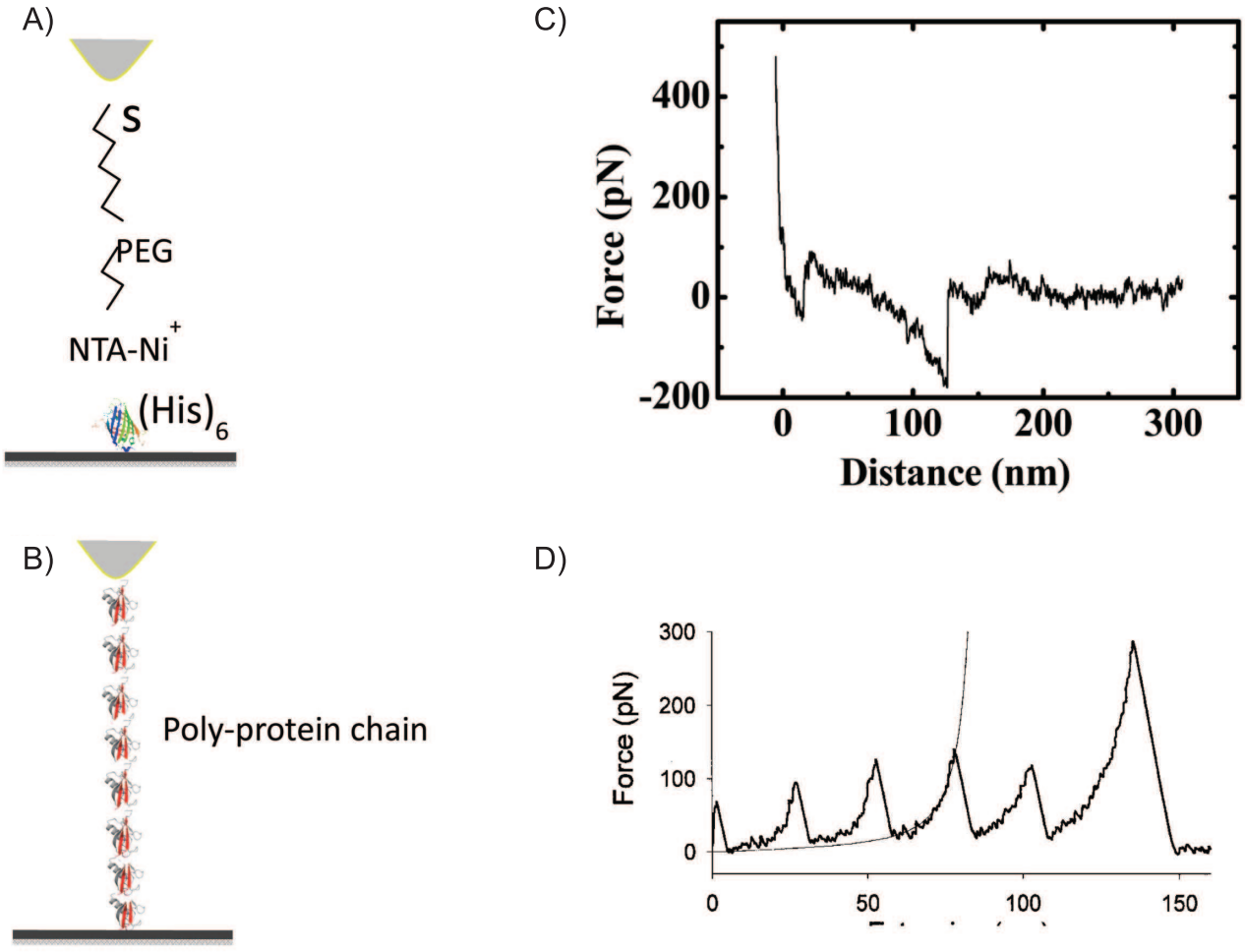


Figure 33: A) and B) Two methods used in force spectroscopy of single molecules. In A) a PEG linker of a known length is used to identify protein unfolding event in a force curve shown in C). In B), multiple repeats of same proteins are used. The saw-tooth pattern in D) is the result of measurements on such a poly-protein (Shivprasad Patil)

5.8 Matter at the Atomic Scale

The local electronic properties of pure Bi_2Se_3 and Fe-doped Bi_2Se_3 are being investigated by **Dr. Aparna Deshpande** with PhD student S.K. Rejaul using the commercial ultrahigh vacuum, low temperature scanning tunneling microscope (UHV-LT-STM) installed in June 2013.

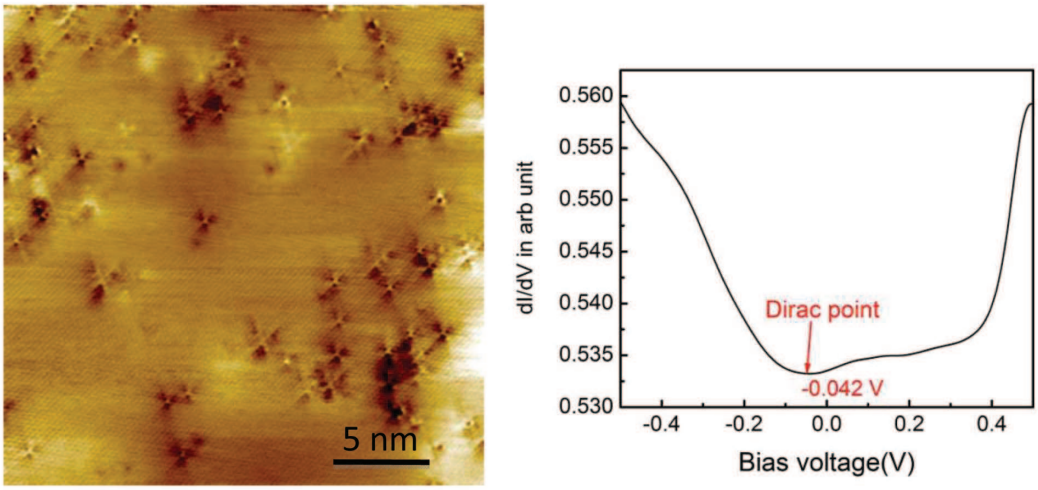


Figure 34: (Left) STM image of a Bi_2Se_3 particle grown by wet chemical synthesis. The dark and bright spots are the atomic scale defects imaged on the surface of the Bi_2Se_3 particle. Imaging parameters are V = 240 mV, I= 80 pA; (Right) Point spectroscopy dI/dV taken at the center of the image. The spectrum shows the Dirac point at -0.042 V. The data are taken at 77 K (Aparna Deshpande)

5.9 Statistical Physics, Complex Systems

Research in **Dr. Arijit Bhattacharyay**'s group over the last year has been carried out in the following two broad areas:

a) Developing an alternative approach for the equilibrium of a system over an inhomogeneous space: This is the initiation of a new approach to understand the equilibrium of complex molecules like proteins, colloids etc. This approach is now being extended and developed to understand the equilibrium of mesoscopic objects. Some of this work is being done along with undergraduate student Avik Biswas from IISER Bhopal and a paper has been submitted arXiv:1312.7075 (2013).

b) Understanding the role of nonlocal interactions in a Bose-Einstein condensate in the context of Analogue Gravity and condensed matter physics

Along with PhD student Supratik Sarkar, Dr. Bhattacharyay has shown that taking into account a nonlocal s-wave scattering between the particles in a Bose-Einstein condensate, it is possible to have a rapid variation in the healing length of the system which can play a crucial role in the context of BEC being used as an analogue gravity system. (*J. Phys. A: Math. Theor.* 47 (2014) 092002).

In the same system, working along with PhD student Abhijit Pendse, the group is trying to understand super-solid phase in BEC induced by nonlocal interactions. They plan to explore the properties of such a novel phase in BEC using theoretical tools developed by them and to use the same mechanism to understanding the vortex lattice and its various instabilities.

5.10 Soft Matter Physics

a) Along with a PhD student **Dr. Apratim Chatterji** is in the process of completing a project on the self assembly of nanoparticles in a matrix of nematic polymer chains and is about to submit a mansucript on the above topic.

b) With a 5th year BS-MS project student, Dr. Apratim Chatterji has developed a new simulation method to investigate the dynamics of soft matter systems confined within fluctuating boundaries. The development of the method took a year of work, and right now they are studying the effects of fluctuating boundaries on the dynamics of a single polymer chain. They plan to use the method to study other soft matter systems of interest.

c) In collaboration with the group of Dr. Ashish Lele of NCL, Dr. Apratim Chatterji has used computer simulations to study the network forming gelation of star polymers of poly-lactic acid with the tips of the star-polymer arms having been replaced by a dipolar molecule. This was to complement the experimental work of Dr. Lele's group in NCL, Pune.

Dr. Ashish Lele has developed methods for the synthesis of plastic sheets (similar to polythene) of the biodegradable poly-lactic acid (PLLA) which can be made to have a 6-armed star polymer architecture. Presence of dipoles at the end of the star polymer arms enables the formation of networked gels of star polymers, which gives extensile strength to the bulk plastic-like sheets of PLLA. One hopes that one can replace poly-ethelene plastics by bio-degradable PLLA plastic in the future.

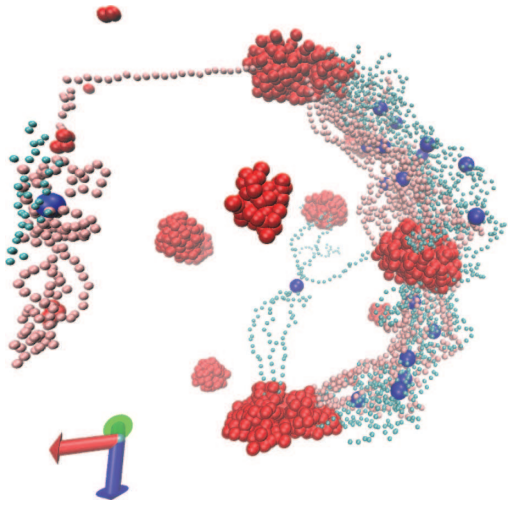


Figure 35: The figure shows just 18 of the 354 star polymers which were modeled and simulated in a cubic box. The red spheres denote the dipolar star arm tips. The blue spheres are the star polymer centers. Each star polymer has 6 arms with 25 monomers per arm; the 24th and 25th monomer are colored red (Apratim Chatterji)

6 Atomic and Molecular Physics, Optics and Quantum Information

6.1 NMR and Quantum Information Processing

Dr. T.S. Mahesh's group carried out an experimental study of the Leggett-Garg inequality (ELGI) which places a bound on the statistical measurement outcomes of dynamical observables describing a macrorealistic system. This work has been performed using a two-qubit nuclear magnetic resonance (NMR) system. The experimental results showed a clear violation of ELGI by over four standard deviations. These results agreed with the predictions of quantum theory. The violation of ELGI is attributed to the fact that certain joint probabilities are not legitimate in the quantum scenario, in the sense they do not reproduce all the marginal probabilities. By considering sequential measurement of a dichotomic dynamical observable at three different time intervals, it was explicitly demonstrated that the moments and the probabilities are inconsistent with each other. Experimental results using a nuclear magnetic resonance system are reported to corroborate

these theoretical observations. In another work, ancilla assisted quantum state tomography was performed. It was shown that in the presence of ancilla qubits, it is possible to minimize the number of independent experiments required to tomograph the complete density matrix of system qubits. Experimental demonstration of a single-scan quantum state tomography was performed.

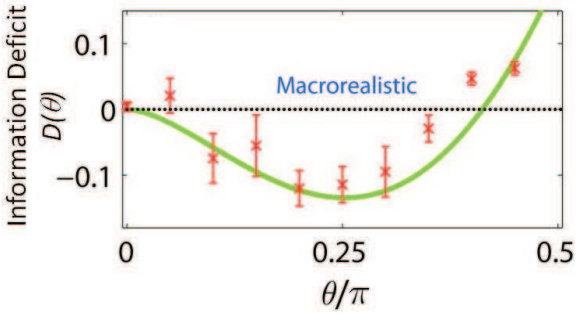


Figure 36: Experimental information deficit (crosses) versus phase evolution. Negative deficit indicates nonclassical correlations (T.S. Mahesh)

6.2 Ultracold Atoms

Dr. Umakant Rapol's group works on developing new platforms for entangling isolated particles and for using quantum-optic or atomic systems for precision spectroscopy and simulation of condensed matter systems. These new platforms will be developed using either the combination of a variety of techniques with the use of ultra-cold and dense sample of neutral atoms, plasmonic arrays, ultra-high quality factor optical cavities and ions trapped in electro-dynamic traps.

The direction of current research is towards a) creating ultra-strong electromagnetic coupling between neutral-atom pairs using localized plasmons and neutral atoms b) looking for novel phases in condensed matter systems using a Bose-Einstein Condensate (BEC), namely the supersolid phase and the quantum Hall effect. The first set of these experiments will utilize ultra-cold dense samples of neutral alkali atoms prepared at temperatures and densities where quantum degeneracy can be achieved. The second set of experiments will use a sample of BEC in which long-range forces are tailored using Rydberg dressing and the use of synthetic gauge fields.

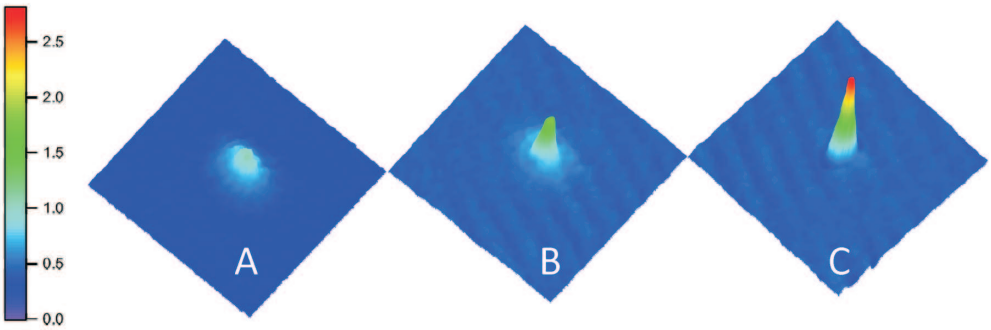


Figure 37: Typical images of the ultracold cloud of atoms taken after 21 ms of expansion under gravity (A) Thermal cloud at temperature about 211 nK (final rf frequency 1.94 MHz) (B) bimodal density distribution at temperature 171 nK (final rf frequency 1.93 MHz) showing the emergence of a sharp peak at the center with a condensate fraction of 23%. (C) Almost pure condensate at final rf frequency 1.919 MHz, the condensate fraction is 97% (Umakant Rapol)

An experimental setup for generating BEC of ultracold ^{87}Rb atoms has been made operational. This setup uses ^{87}Rb that are evaporatively cooled in a magnetic trap. A novel approach has been employed for preparing a Bose-Einstein condensate (BEC) of ^{87}Rb atoms using electro-pneumatically driven transfer of atoms into a Quadrupole-Ioffe magnetic trap (QUIC Trap).

6.3 Plasmonics and Raman Spectroscopy

a) *Surface plasmon nanophotonics in linear- and non-linear optical regimes:*

Confinement and tuning of optical radiation below diffraction limit is one of the important problems in nanophotonics and optical nanoscopy. Achieving tunable, nanoscale electromagnetic hotspots at the junction of plasmonic nanoparticles are vital to probe the aforementioned problem. **Dr. G.V. Pavan Kumar**'s research group at IISER Pune has been involved in the design and development of such tunable plasmonic hotspots.

b) *Physics and applications of single-molecule surface enhanced Raman scattering (SERS):*

Optical fields at sub-wavelength scales can be created at the vicinity of a metallic nanostructure due to localized surface plasmons. Radiative processes such as Raman scattering of molecules and materials can be strongly influenced in presence of this localized field. Dr. G.V. Pavan Kumar's group has been studying electromagnetic enhancement mechanism in single-molecule SERS of plasmonic nano-systems. One of the important questions is what is the influence of optical nano-antennas on the radiation pattern of Raman scattering.

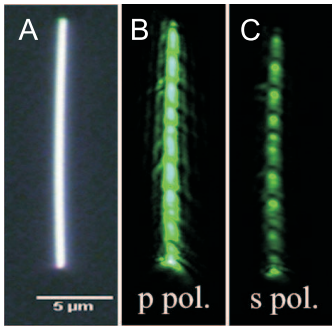


Figure 38: (a) Dark-field optical image of an isolated plasmonic silver nanowire (diameter ~ 300 nm); Evanescent-field laser illumination (532nm) of the same nanowire with (b) p-polarized light and (c) s-polarized light.

6.4 Quantum Simulation of Condensed Matter Models

Research in **Dr. Rejish Nath**'s group is focused on the quantum simulation of condensed matter models with emergent gauge fields. Particular cases under study are a spin ice set-up in a square lattice and plaquette interactions in a Kagome lattice. For the spin ice set-up, ultra cold atoms loaded in an optical lattice are used and the complex pattern of spin-spin interactions are obtained via Rydberg-Rydberg interactions. The system is characterized with an emergent U(1) gauge field, symbolizing artificial electromagnetism. In addition, various exotic quantum magnetic phases have been predicted such as a resonant valence bond state, arising as a result of order by disorder phenomenon. In the Kagome lattice one can realize an exactly solvable Balents-Fisher-Girvin model, which exhibits a Z_2 quantum spin liquid as its ground state. The BFG model will be implemented in an ion crystal, in which the spin-spin interactions are mediated through crystal phonons. A great advantage with this system is that the range and the strength of the interactions can be controlled using laser fields in a very precise manner.

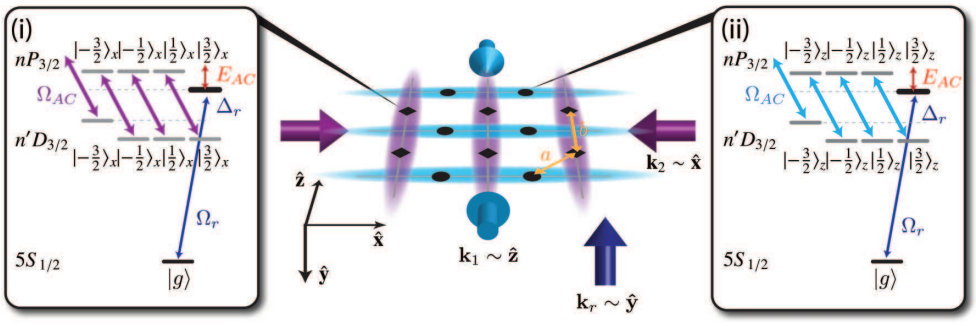


Figure 39: Spin ice set-up using ultra cold Rydberg atoms (Rejish Nath)

In addition to the studies mentioned above involving strongly interacting systems, the group also works on weakly interacting Bose Einstein condensates (BEC); in particular, BEC of dipolar atoms. In an ongoing project the focus is on the dynamical behavior of dipolar condensates in optical lattices. The studies are mainly aimed to understand atomic currents and Landau-Zener tunneling between the bands in dipolar condensates loaded in optical lattice. It is expected that the anisotropic and long range nature of dipolar interactions would substantially affect these dynamics.

7 Particle Physics and Gravity

7.1 Higher Spin Fields

Research in **Dr. Sudarshan Ananth**'s group has focused on aspects of higher spin theories. The primary motivation is that a consistent description of interacting higher spin fields ($\lambda > 2$) is fraught with difficulties, mostly stemming from higher-derivative structures. Comprehensive investigations of higher spin theories are at the level of the equations of motion and hence on-shell. The group is interested in an off-shell formulation of these theories, with a Lagrangian description. Infinite-dimensional gauge symmetries underlying massless higher spin theories could result in surprising ultra-violet properties, thus making these theories interesting to study.

One formal question is whether theories of higher spin fields are well defined and if so in what backgrounds. Another is in understanding whether the perturbative ties that link Yang-Mills (spin 1) to Gravity (spin 2) also hold for higher spins (spin $\lambda>2$).

A Lagrangian study of these theories has earlier been initiated (Ananth, S. *J. High Energy Phys.* 1211 (2012) 089) where the work of the Swedish group, from the 1980s, on massless higher spin fields from the point of view of the spinor helicity formalism (SHF) was revisited. The SHF provided many hints that the perturbative amplitude structures that appear in the MHV Yang-Mills theory also appear in higher spin theories.

In a recent paper on this subject with an undergraduate student (Akshay, Y.S. and Ananth, S. *J.Phys. A: Math.Theor.* A47 (2014) 045401), the group has derived from first principles the fact that: In momentum space, the coefficient of the cubic interaction vertex for a spin λ field is equal to the corresponding Yang-Mills (spin=1) coefficient, raised to the power λ. This result was obtained only for Lagrangians that contain a cubic interaction vertex involving three spin λ fields, in four-dimensional flat spacetime.

It is technically challenging to extend the results of the paper above to the quartic interaction vertex and higher. Nevertheless, this is one of the present aims of the group.

7.2 Gravitation and Quantum Effects

Dr. Suneeta Vardarajan's group has been working on the following four different projects:

1. Features of a class of two dimensional quantum field theories (nonlinear sigma models) from a geometric point of view: This work, which is interdisciplinary to an extent, shows how recent results in the field of geometry may be used to better understand these quantum field theories.

2. Issues in classical stability and stability in quantum gravity of black hole and other singular spacetimes are being addressed along with PhD student Amruta Sadhu.

3. Stability of spacetimes sourced by anisotropic fluids: Anisotropic fluids can describe the interior of realistic stars, and as well, have been used in cosmology. Dr. Vardarajan, along with MS thesis student Bhavesh Khamesra, is systematically discussing how to study stability, and their formalism is being used both for the stellar interior problems and for cosmology.

4. Along with Integrated PhD student Dhanya Menon, Dr. Vardarajan is exploring the issue of which asymptotically anti-de Sitter (AdS) spacetimes are unstable and why. This is in light of some very exciting results that emerged in the last few years on the nonlinear instability of AdS. A gravitational theory in AdS is expected to be dual to a condensed matter system, and therefore it is of interest to understand what such instabilities mean in this dual correspondence.

7.3 String Theory and Quantum Field Theory

The following research projects were initiated by **Dr. Sunil Mukhi**: (i) a study of worldsheet non-linear sigma models to all orders in the string-length parameter, with the goal of formulating physical quantities of interest such as the Wald entropy of black holes in worldsheet language. This would allow to go beyond the low-order expansions in derivatives that are typically used to understand the entropy of black holes, (ii) a study of the novel Higgs mechanism (first discovered in 2008 in collaboration with Costis Papageorgakis) in 2+1 d Chern-Simons field theory. Some aspects of this mechanism have not yet been completely understood, such as its description for general gauge groups and Higgs expectation values, its applicability in gravity and higher-spin theories, and its relevance for novel self-coupled Yang-Mills theories in 2+1 dimensions. Additionally, a project on the description of M5-branes using timelike Hopf reduction was continued during this period. Finally, a major portion of a forthcoming textbook "The Standard Model" was written. The book, co-authored with Rohini Godbole, is to be published by the Cambridge University Press.

7.4 String Theory and Holography

Dr. Arjun Bagchi's group works on understanding aspects of the quantum theory of gravity by looking at the Holographic Principle, which states that a theory of gravity in a particular spacetime is completely equivalent to a theory without gravity living on the boundary of that spacetime. This has concretely been exemplified in string theory via the celebrated AdS/CFT correspondence. In order to use holography to understand quantum gravity, it is essential to formulate holography for spacetimes other than AdS. Much of Dr. Bagchi's recent efforts have been trying to formulate holography in the apparently simpler but practically much more challenging flat spacetimes. Over the past year, along with collaborators, significant contributions have been made to building the basics of such a correspondence.

Holography in AdS backgrounds have been principally explored in the regime where the bulk side is approximated by the supergravity limit of string theory and this is used to understand the strong coupling region of the dual field theory. The other limit which links free QFTs to strongly interacting gravity has not been exploited much till recently. Of late there has been a substantial interest in understanding holographic dualities that explore higher spin theories in the bulk and link them to weakly interacting or free theories on the boundary. This sector of holography has previously been linked to the tensionless limit of string theory. Toward the goal of making this connection more concrete, the symmetries of tensionless strings have been explored.

Another principal avenue of research in the past year achieved the marriage of both themes above by constructing, for the first time, a theory of higher spins in 3 dimensional flat spacetimes.

7.5 Experimental High Energy Physics

Dr. Sourabh Dube joined IISER Pune in September 2013. The focus of the last few months has been to lay the groundwork for an experimental high energy physics (EHEP) group at IISER Pune with the intention of joining the CMS collaboration at CERN. As a preliminary step, IISER Pune was approved to become a member of India-CMS in March, 2014 following a presentation made by Dr. Dube at the India-CMS meeting in TIFR in January.

The primary research of the EHEP group will be carried out as members of CMS. In preparation for this, the students in the group were trained in the tools of the trade (analysing ntuples using ROOT among other things). As part of this training, Shubhanshu Chauhan worked on interpreting ATLAS multilepton search results in the context of models of doubly-charged Higgs ($H^{\pm\pm}$) production. He produced exclusion contours for decaying to final states involving tau-leptons. Other research work focused on exploring the supersymmetric searches carried out the CMS collaboration (Kunal Kothekar) along with understanding the basics of lepton reconstruction and identification using the CMS detector (Anshul Kapoor).

In addition, three undergraduate students did semester-long projects with Dr. Sourabh Dube during the Spring semester. Sai Neha Santpur worked on measuring isolation efficiencies using a tag-and-probe method, Abhijith Gandrakota worked on probing the sensitivity of the ATLAS dimuon black hole search to model parameters, and Utkarsh Giri worked on comparisons of jet quantities from LO and NLO event generators.

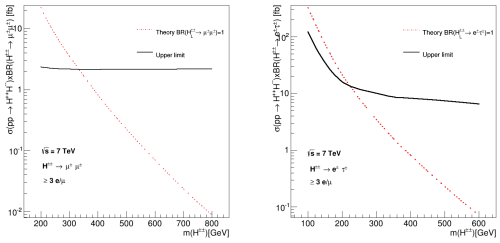


Figure 40: The figure shows the experimental constraints obtained on doubly-charged Higgs production using the method described in arXiv:1211.6312 [hep-ex]. The ATLAS results are reproduced for validation (left), and new constraints are placed on $H^{\pm\pm} \to e^{\pm}\tau^{\pm}$ (Sourabh Dube)

8 Complex Systems

8.1 Nonlinear Dynamics and Complex Systems

a) Complexity and connectivity measures from time series

The modified box counting algorithm developed along with collaborators is applied to hyper-chaotic time series and two scaling regions are observed in the correlation sum. This work from **Prof. G. Ambika**'s group provides a new method to study chaos-hyper chaos transition. Along with studies on Lypaunov exponents from such time series, cluster like structures in a hyper chaotic attractor are established for the first time.

b) Dynamics of Dengue infection

Prof. Ambika's group has introduced a micro epidemic model for the primary and secondary

infection of Dengue incorporating time delays in the antibody response. A correlation factor between different serotypes and a dynamic switch that accounts for antibody dependent enhancement of virus are the novel contributions in the model. The confinement and control of the infection and minimum eradication programs are the targeted outcomes.

8.2 Chaos and Extreme Events

a) Kicked Kronig-Penney model

Kronig-Penney model is fundamental to our understanding of electronic conduction in crystalline solids. Under certain circumstances such as when the on-site potentials are random, the conduction is suppressed by quantum interference effect as shown by the well-known Anderson model. The kicked rotor is a well-studied model in quantum chaos and displays an analogue of Anderson localisation in the energy basis when the corresponding classical system is dominantly chaotic in nature. In this work, we plan to study a kicked particle in a Kronig Penney potential. The kicking action leads to chaotic dynamics for certain parameter values and quantum mechanically localisation sets in but is modulated by the so-called non-KAM type classical chaos in the system. **Dr. M.S. Santhanam**'s group explores both the quantum and semi-classical implications for the dynamics in this model. The ultimate aim is to understand the interplay between dynamics, localization and disorder.

b) Random walks and time-varying networks

Study of random walks on networks is useful not only as a model for diffusion phenomenon but has implications for many useful products such as the search engines we use today. Dr. Santhanam's group aims to study how random walks on networks vary in time access various nodes on the network. The study of networks has become an important part of statistical physics in the last 15 years. While static networks have been the subject of most investigations until now, in reality most networks vary in time to varying extents. This work would study how random walkers interact with the networks when the network parameters are varying in time.

8.3 Nonlinear Dynamics

One of the hallmarks of linear science is the linear superposition principle. Superposition is not valid in nonlinear theories because of nonlinear terms. However, **Dr. Avinash Khare**'s group has recently shown that for those nonlinear theories (either discrete or continuous) for which periodic solutions are known in terms of Jacobi elliptic functions "cn" and "dn", their linear superposition is also a solution of such theories. Further, if a nonlinear theory admits solution in terms of "dn^2 " then dn^2+cn dn and dn^2-cn dn is also a solution of these theories.

The group have also been investigating several nonlinear theories, either Hermitian or complex but satisfying PT-symmetry to know if such theories possess stable bright and dark soliton solutions since such solitons are expected to be great importance in fast propagation through optical fibers.

Since the birth of quantum mechanics, one of the important problems has been to discover new analytically solvable potentials since they are expected to be of immense help in studying the spectrum of realistic potentials. In this context, the ideas of supersymmetry and shape invariance has proved invaluable in last 30 years. Recently, with the discovery of new exactly solvable potentials the field has become wide open. Various aspects of these newly discovered potentials, like their scattering matrix, the spectrum of corresponding complex but PT-symmetric potentials are being studied.

9 Astronomy and Astrophysics

9.1 Physics of the Solar Corona

Dr. Prasad Subramanian and his students have worked on a range of problems related to turbulence in the solar wind and on transients in the solar wind conditions near the Earth. Some of these transients are caused by ejections of plasma from the solar corona that are aimed at the Earth, and their effects are collectively termed space weather disturbances. Such disturbances are capable of wreaking havoc on several technologies we routinely depend on. PhD student K.P. Arunbabu has drawn interesting conclusions regarding the enhancement of near-Earth solar wind turbulence levels during space weather disturbances. PhD student Madhusudan Ingale has been working on estimates of the power contained in turbulent density irregularities using observations of angular broadening of distant celestial sources seen against the solar wind scattering screen. As part of her PhD thesis, Nishtha Sachdeva has started to work on a detailed examination of the influence of solar wind aerodynamic drag on the dynamics of coronal mass ejections from the Sun as they propagate outwards.

9.2 Astrophysics at Low Radio Frequencies

Dr. Ramana Athreya is currently involved in developing three long-term research projects along with two PhD students and a BS MS student. While the topics form an eclectic mix they are connected by the thread of high sensitivity radio imaging on which Dr. Athreya has been working for the last seven years.

a) Spectral index maps of galaxy cluster radio halos

Radio halos are enigmatic objects whose source of energy is still unclear. They occur in large galaxy clusters as diffuse emission spanning more than a Megaparsec. Hitherto, most studies have focused on the integrated properties averaged over the whole source because of the very low surface brightness. In this project Dr. Ramana Athreya's group is attempting to map the spatial details with halo sources to possibly discern the location of the site of energisation of the synchrotron electron responsible for the radio emission.

b) The nature of the off-pulse emission from pulsars

Pulsars are fast rotating ultra compact objects whose emission reaches us in the form of temporal pulses which are highly localized in time. Dr. Ramana Athreya's group has earlier succeeded in convincingly detecting off-pulse emission from pulsars, a quest which had eluded the pulsar research community for over three decades. They are now in the process of trying to understand the mechanisms responsible for the same by making observations at higher time resolution and sensitivity.

c) Search for OH giga masers at high redshifts

Galactic-sized giga masers are spectral line sources of very high intensity which are currently known only in the nearby Universe. Their detection at higher redshift would open the way for attempting to answer several important questions in cosmology. Along with an undergraduate student, Dr. Ramana Athreya is working to detect such sources through very high sensitivity imaging using the GMRT.

10 Ecology, Evolution and Biodiversity

10.1 Plant Physiological Ecology

Work in **Dr. Deepak Barua's** group focuses on understanding causes and consequences of variation in plant traits. Current work includes:

a) A review and synthesis of plant phenology

Results show low sampling, lack of standardized methodology, uneven coverage, and highlight the need for an integrated effort in monitoring phenology in India. Seasonality is found to be important in determining the importance of light versus water in driving community phenology. Based on preliminary findings the group is testing a novel hypothesis that optimizing water transport efficiency versus safety may be crucial for seasonally dry environments.

b) Plant phenology and species interactions

Ongoing work explores plant phenology and interactions with pollinators/herbivores. 1) Pollinator interactions in *Randia dumetorum* - the group is investigating the effect of flowering phenology and flower color on pollinator visitation and fruit set. 2) Leafing phenology, functional traits and herbivory - the relationship between phenology, leaf traits and herbivory is being examined to test whether escape from herbivory explains the paradoxical observation where leaf flushing occurs during the dry summer.

c) Plant responses to high temperature stress

Other work in the lab involves studying the relationship of leaf functional traits to responses to temperature stress in tropical trees.

10.2 Population Biology

Dr. Sutirth Dey's laboratory works on the following major areas.

a) Theoretical and empirical studies on the effects of fluctuating environment on the evolution of asexual populations

Temporally fluctuating environments are predicted to select for populations that have greater fitness across the entire range of conditions. Though some empirical studies have demonstrated such evolution of Generalists, only two studies till date have assessed the performance of Generalists in novel environments and neither of them makes an explicit attempt at assessing the Generalists under uncorrelated environments. Dr. Dey's group defines the Generalist phenomenon in the context of the performance of the bacterial populations in several uncorrelated environments. Three major questions are asked using *E. coli* as a model system: i) can temporally fluctuating environment select for Generalists, ii) is there a long-term cost to Generality, and c) what underlying mechanisms can give rise to such Generalists?

b) Theoretical and empirical studies on stabilizing spatially-structured and unstructured populations

Although a large number of methods have been proposed to stabilize chaotic dynamics, very few of these can be actually applied to stabilize biological populations. Recently Dr. Sutirth Dey's group has proposed one such control method, whose performance was verified on the dynamics of laboratory populations and metapopulations of *Drosophila melanogaster*. In a related manuscript (under review), they have shown that the method is robust to several biological realities. In an another manuscript (under review), the group compared six different control methods in the literature and show that the performance of the control methods is rather context-specific and no one method is typically superior under all conditions.

10.3 Evolutionary Biology in Behavior, Health and Metabolism

a) *Evolutionary medicine*: Through a collaboration with Raj Bhopal (The University of Edinburgh, College of Medicine and Veterinary Medicine, Centre for Population Health Sciences), **Prof. Milind Watve** is carrying out hypothesis based comparative analysis of Pune and Scotland data. Simultaneously, preparation for a clinical trial addressing effects of behavioral intervention on metabolism and endocrine state is underway.

b) *Bacterial ecophysiology*: Work from Prof. Watve's group has shown that many parameters related to aging, cell division strategy and protein aggregation in bacteria are responsive to the nutritional environment and are evolvable. A novel finding that members of the genus *Streptomyces* are predatory has been published in January 2014.

c) *Wildlife and Conservation biology*: Studies and theoretical development by Prof. Watve's laboratory on the problem of crop depredation by wild animals led to a novel compensation scheme which is included as a suggestion by the 2013 report on crop damage by the Forest Department of Government of Maharashtra. Plans are underway to implement this scheme on an experimental basis in a suitable area.

Maharashtra Gene Bank Program: With support from Rajeev Gandhi Science and Technology Commission, Govt of Maharashtra, a Gene Bank Program involving 21 organizations was launched which will be coordinated from IISER Pune. Prof. Milind Watve's research group will undertake exploration of marine microorganisms, particularly one associated with soft bodied sedentary or slow moving invertebrates.

11 Cell and Developmental Biology

11.1 DNA Damage and Maintenance of Genome Integrity

Maintenance of genome integrity is critical for survival of an individual. The cell has a surveillance mechanism called "cell cycle checkpoints" that check for any damage incurred to the cell. In mammalian cells, the sensor kinases ATM (Ataxia-telangiactesia-mutated) and ATR (ATM and Rad3-related) play critical roles. Activated ATM or ATR transduce the signal to effector kinases Chk2 and Chk1 respectively via a number of mediator proteins that act as scaffolding proteins to amplify the signal.

Dr. Mayurika Lahiri's group is studying the novel interaction between checkpoint protein, TopBP1 and two protein interactors, anti-apoptotic protein, Api5 and mismatch repair complex, Msh2-Msh6 following DNA damage. Current research focuses on structure-function analysis studies between TopBP1 and Api5 as well as TopBP1 and Msh2-Msh6 complex after damage in both *in vitro* and *in vivo* systems. Functional studies using siRNA knock-down are being performed to reveal the relevance of the interaction.

Another area of research of the Lahiri group is to investigate how alkylation damage induces transformation in three-dimensional breast acini cultures of non-malignant breast epithelial cells. Loss of cellular architecture and polarity of breast tissue is one of the early markers for onset of breast cancer. This loss in cellular morphology has been phenocopied using three-dimensional (3D) cultures of human mammary epithelial cells, MCF10A. Using this model system, the group is interested in studying early events of chemical-induced transformation.

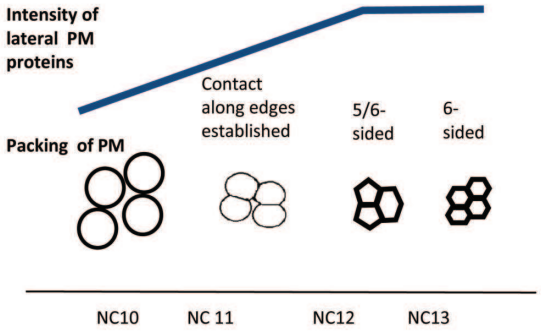
11.2 Development of Cell Morphology

The first morphologically distinct cell type to arise during embryo development is an epithelial cell. It has an apical plasma membrane and a basolateral plasma membrane separated by junctional barriers. **Dr. Richa Rikhy**'s group is interested in understanding cellular mechanisms responsible for epithelial cell architecture formation and determination using the transparent *Drosophila* embryo model system.

a) Onset of plasma membrane polarity in embryogenesis

The early syncytial *Drosophila* embryo has polarized plasma membrane domains even in the absence of complete cells. The apical and lateral plasma membrane domains contain distinct morphological elements and protein composition. In order to assess how early on during embryo development the plasma membrane begins to show polarity, Dr. Rikhy's group has carried out systematic imaging of fluorescent-tagged proteins in the syncytial embryo.

Polarity is established in the PM by cycle 11



Polar domains in the plasma membrane along the X-Z direction

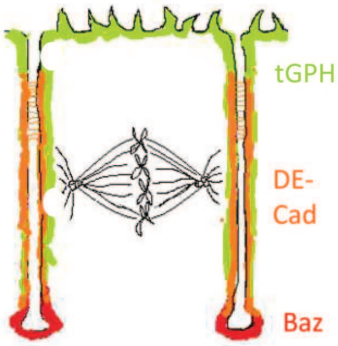


Figure 41: Hexagonal packing of epithelial like cells is visible in cycle 12 and 13 of the syncytial *Drosophila* embryo with the formation of at least 3 polarised domains in nuclear cycle 13 (Richa Rikhy)

b) Role of mitochondria in follicle epithelial cell differentiation

Earlier studies have found that growth factor signaling pathways regulate mitochondrial morphology and dynamics during *Drosophila* follicle cell differentiation. The effect of altering growth factor signaling pathways and electron transport chain on mitochondrial morphology is being probed. An attempt is being made to identify better reagents to describe mitochondrial morphology during oogenesis.

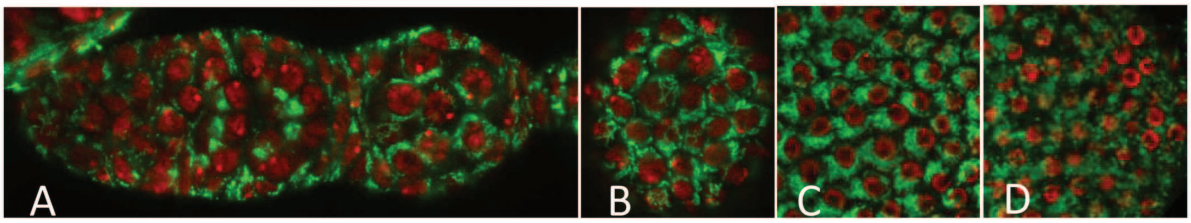


Figure 42: Mitochondrial distribution visualized during follicle cell differentiation by antibody to ATPb. Anti-ATPb (green) and DNA (red). Progressive stages of differentiation are shown: germline stem cell and follicle cell stem cell stage (A), mitotic stages of follicle cells (B), main body follicle cells (C) and Posterior follicle cells (D) (Richa Rikhy)

11.3 Evolutionary Developmental Biology

The *Hox* genes are highly conserved throughout metazoan evolution and code for homeodomain containing transcription factors that control specific developmental pathways. Some of the ongoing projects in **Prof. L.S. Shashidhara**'s laboratory aim at identifying functional and molecular mechanisms by which the Hox gene *Ultrabithorax (Ubx)* regulates genes/pathways to modulate expression of wing-patterning genes to specify haltere morphology.

To understand how *Ubx* has evolved to specify haltere development, the group has identified targets of *Ubx* from *Apis* and *Bombyx,* crustacean arthropods that are evolutionarily related to *Drosophila*, and compared the same to targets of *Ubx* in *Drosophila* (identified earlier).

One of the interesting observations that the group has made through this study is that *Ubx*'s function could have evolved at the level of target genes (and not through evolution of *Ubx* protein sequence). Also, in spite of several common *Ubx* targets between *Apis*, *Bombyx* and *Drosophila,* the evolution of enhancer sequences around the *Ubx*-binding sites in the *Drosophila* lineage could have made the *Drosophila* system more sensitive to regulation by *Ubx*.

Targets that are common to *Apis* and *Drosophila* appear to be evolving at a faster rate compared to species-specific targets. This divergence of protein sequences may have resulted in new functions during *Drosophila* wing/haltere development.

12 Biochemistry and Biophysics

12.1 Cell Motility and Bacterial Cytoskeleton

Cell motility is a fundamental process in biology. In many organisms, movement is mediated by appendages like cilia, flagella and pili. In addition, motility is also driven by the dynamics of assembly of cytoskeletal filaments, as in eukaryotic cell crawling. Research in bacterial cell biology has identified a few novel modes of motility based on the bacterial cytoskeleton. **Dr. Gayathri Pananghat**'s research focus is on understanding the molecular mechanism of motility based on the bacterial cytoskeleton using *Spiroplasma* and *Myxococcus xanthus* as model systems.

Dr. Pananghat's group has initiated work on *in vitro* characterization of the motility machinery in these model systems. The project aims to characterize the macromolecular complexes involved in motility, using structural biology (mainly X-ray crystallography and electron cryomicroscopy) to study the three-dimensional architecture, and biochemical and biophysical techniques including single-molecule fluorescence microscopy to understand the dynamics of assembly.

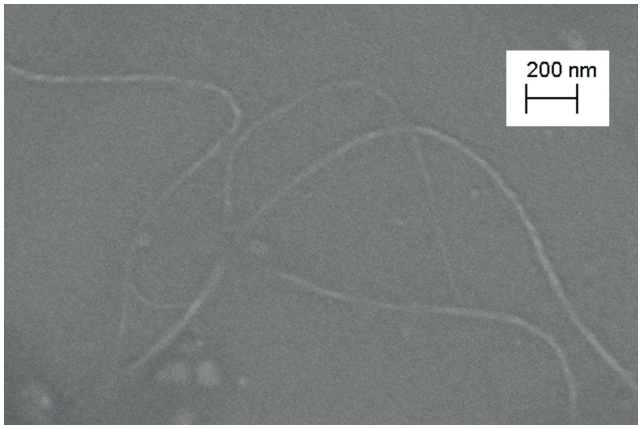


Figure 43: Field emission scanning electron microscope image of purified Fib protein, the cytoskeletal protein of *Spiroplasma,* demonstrate that the heterologously expressed protein is functional and forms filaments *in vitro* (Gayathri Pananghat)

12.2 Self Organization and Cell Morphogenesis

The research goal of **Dr. Chaitanya Athale**'s laboratory is to discover physical principles that underlie the dynamics of cell shape by combining simulation and experiment. The group is working on the role of cytoskeleton in cell shape using the following systems:

a) Simulating polarization of searching microtubules in neurons and mitosis

Dr. Chaitanya Athale's group has developed a novel biophysical model of microtubules dynamics in neurons with a retrograde actin flow coupled with spatial dynamic instability, which predicts the physical limits to neuronal growth cone sensing during axon guidance.

b) In vitro reconstitution of microtubule motility

The movement of centrososomal arrays in *Xenopus* egg extracts was measured and compared to simulations. They are now designing an *in vitro* assay to test the detailed predictions of this model in an *in vitro* system consisting of purifying goat brain tubulin and yeast minimal dynein proteins, to better understand the collective mechanical properties.

c) 'Noise' in Bacterial cell size in a population

Dr. Chaitanya Athale's group has previously developed a program to automatically analyze *E. coli* cell lengths using differential interference contrast (DIC) microscopy. They are working on a theoretical model of cell division and replication to explain the observed effects in cell length 'noise' in populations.

12.3 Structural Biology of NTP-Dependent Restriction-Modification Enzymes

NTP-dependent restriction-modification enzymes are complex multifunctional protein machines that recognize and bind to a specific DNA sequence, perform sequence-specific methylation (modification), translocate DNA by hydrolysis of NTP and nucleolytically cleave it (restriction). Modification of host DNA protects it from restriction, while unmodified foreign DNA (bacteriophage DNA) is cleaved. The molecular basis of this fascinating interplay and regulation of the activities of the R-M enzymes is not well understood. **Dr. Saikrishnan Kayarat**'s group is working toward obtaining a molecular framework for the enzyme in atomic detail by carrying out X-ray crystallographic studies and understanding its mechanism of action using complementary biochemical and biophysical techniques. The group is currently completing the refinement of the first atomic structure of an NTP-dependent restriction-modification enzyme. This structure has provided fresh insights and new hypotheses into the working of the enzyme. Using DNA-binding studies, nuclease assays and single molecule magnetic tweezer assays, these hypotheses are being validated.

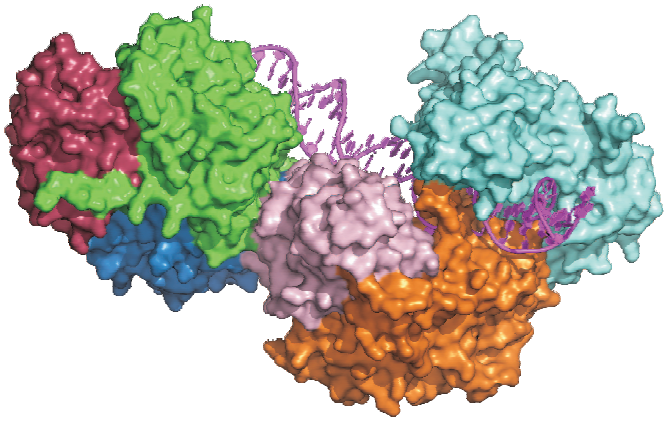


Figure 44: High-resolution crystal structure of an NTP dependent restriction-modification enzyme (Saikrishnan Kayarat)

12.4 Reconstitution of Cargo-Sorting during Coated-Vesicular Transport

Cells utilize coated-vesicular transport pathways to sort integral and membrane-anchored proteins (together referred to as cargo) across different compartments. Self-assembling proteinacious coats are recruited to the membrane by the simultaneous recognition of cargo and lipids to form coated pits that mature by budding out from the plane of the membrane. Using a reconstitution approach with purified components on model membrane systems, **Dr. Thomas Pucadyil**'s research is aimed at understanding how the protein machinery associated with coated vesicular transport pathways manages cargo sorting and membrane budding and fission with high fidelity.

Dr. Pucadyil's group has devised a novel model membrane system consisting of parallel arrays of membrane tethers. The group is currently employing this system to measure kinetics of membrane fission and to analyze the late-stage involving membrane fission.

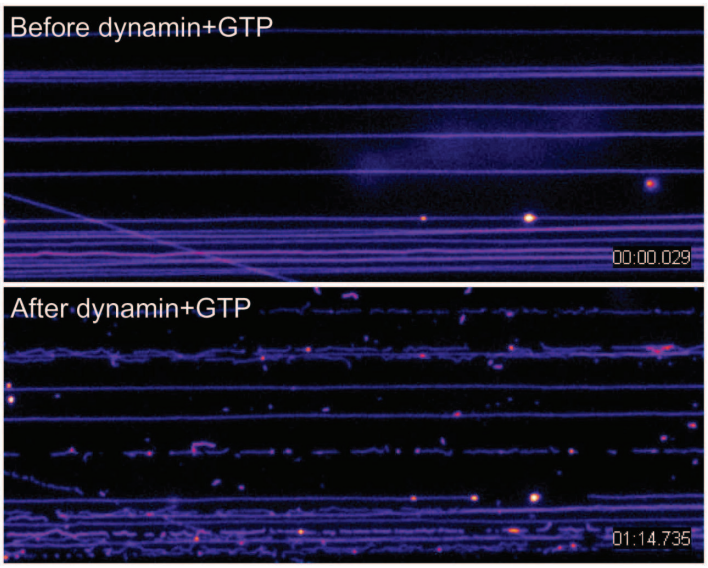


Figure 45: Novel model membrane system to analyze membrane fission. The fluorescence micrograph represents a model membrane system of parallel membrane tubes or tethers (blue lines). The panel below shows membrane fission catalyzed by the large GTPase dynamin resulting in the breakage of the tethers in to numerous pieces (Thomas Pucadyil)

12.5 Origins and Early Evolution of Life

Research pursued in **Dr. Sudha Rajamani**'s laboratory has implications for gaining basic understanding of how life chemically came about on prebiotic Earth. The focus is on delineating processes by which polymers capable of catalysis and replication emerged and propagated on early Earth. Nonenzymatic oligomerization reactions that might have enabled the formation of informational molecules such as nucleic acids and peptides are being characterized in liquid crystalline matrices of lipids. Recent results indicate that non-activated monomers undergo polymerization assisted by lipids which result in the formation of RNA-like oligomers. These reactions are possible within certain constraints and, importantly, these results have crucial implications for understanding the information carrying capacity of these oligomers. The group is also looking at a possible additive catalytic effect resulting from combining clays with lipids and the mechanism/kinetics of such reactions. An intriguing question of how efficient replication could have occurred on prebiotic Earth despite high intrinsic mutation rates is also being addressed.

13 Epigenetics and Immunology

13.1 Macromolecular Transport and Long Distance Signaling in Plant Development

Tuberization (potato development) is a complex process involving formation of a specialized underground stem (stolon), which further develops into a mature tuber through a series of developmental stages. This complex process is governed by different environmental, biochemical and genetic factors. Toward determining the regulatory mechanism in the transition to a tuber, **Dr. Anjan Banerjee's** group has recently shown that miR156 functions as a graft transmissible signal and modulates plant architecture and tuberization in potato (Bhogale *et al.* 2014 *Plant Physiol.* 164:1011-1027). In collaboration with Prof. Rita Ulloa, INGEBI, Argentina, the group is carrying out analysis that indicates that the circuit of tuberizations and the trail of tuber transitions are indeed under control of miRNAs, the master regulators of gene regulation.

In addition, the group is using potato-Phytophthora interaction as a model system to quest for the resistance priming signal (long distance macromolecular signal) that lends defense to pathogens in the phloem of plants (Natarajan *et al*. 2014, MS in preparation). The third major interest in Dr. Anjan Banerjee's group is to understand how SAM (Shoot Apical Meristem) has evolved in land plants. The group is looking at the hormonal and transcription factor network of the gametophytic shoot development of the *Physcomitrella patens* (Bryophyte).In another line of work, his team, in collaboration with Prof. Sinha, Tripura University, has characterized *Coccinia grandis* in their laboratory to be used as a model system in the study of dioecy (Ghadge *et al*. 2014 under review).

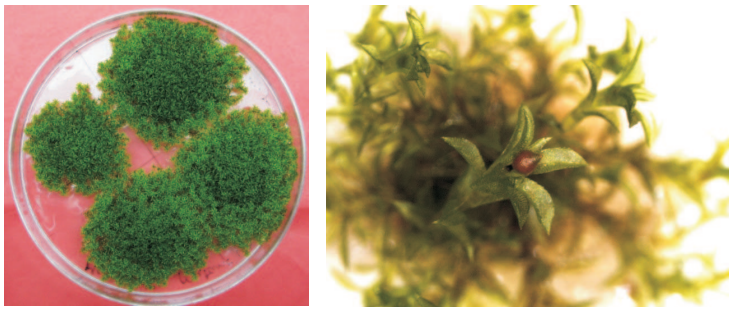


Figure 46: (Left) Two month old *Physcomitrella patens* in culture medium; (Right) Mature *P. patens* gametophore bearing sporophyte (Anjan Banerjee)

13.2 SATB1 in Peripheral CD4$^+$ T Cells

Peripheral CD4$^+$ T cells differentiate into various T helper lineages in response to TCR signals, cytokine milieu and other ligands in the microenvironment. **Prof. Sanjeev Galande**'s laboratory aimed to determine the expression levels of SATB1 in response to TCR signals *in vitro*.

Mouse CD4$^+$ T cells were activated in the presence of plate-bound anti-CD3 or anti-CD28 or together with anti-CD3 plus anti-CD28. Immunostaining of SATB1 in CD4$^+$ T cells activated in the presence of anti-CD3 or anti-CD3 plus anti-CD28 revealed the characteristic cage-like nuclear substructure as seen in thymocytes. In contrast, cells activated in the presence of only anti-CD28 exhibited poor induction of SATB1 expression. In activated CD4$^+$ T cells highly compacted chromatin is seen as pockets of densely DAPI stained heterochromatic regions in the nucleus. SATB1 is localized exclusively in the lightly stained euchromatic regions and is virtually absent in the heterochromatic regions. In naïve CD4$^+$ T cells SATB1 expression is almost undetectable and the prominent heterochromatic blobs as seen in activated nuclei are also not observed indicating that the gross chromatin organization could be very different. Immunoblot analysis indicated that SATB1 expression was induced within 2 h post anti-CD3 or anti-CD3/CD28 treatment and was

sustained until 24 h of activation. In contrast, activation with only anti-CD28 antibody did not induce the expression of SATB1 in $CD4^+$ T cells. Notably, kinetics of SATB1 expression is steep in cells activated by TCR (anti-CD3) alone in comparison to cells activated with TCR and co-stimulatory signals (anti-CD3 and anti-CD28). Further, $CD4^+$ T cells cultured under control conditions do not exhibit significant induction of SATB1 expression. These results suggested that SATB1 expression is induced in peripheral $CD4^+$ T cells in response to TCR signaling.

13.3 Epigenetics and Transcriptional Regulation in *Plasmodium falciparum*

Epigenetics and transcriptional regulation is an underexplored area in malaria parasites, which control vital virulence processes such as host cell invasion and cytoadherence. **Dr. Krishanpal Karmodiya** aims to provide genome-wide chromatin landscape of various histone modifications and chromatin modifiers using next generation sequencing. The group is developing an integrative epigenomic map of various histone modifications and RNA Polymerase II at different stages of *Plasmodium* life cycle. Preliminary analysis suggests that genes which are associated with vital virulence processes in *Plasmodium* have differential epigenetic signatures. This work, further extended to mapping Histone Acetyl Transferases (HATs) and Histone Deacetylases (HDACs) in *Plasmodium*, will provide insights into how genomic elements are regulated, and will serve as a resource for future experimental investigations of genome structure and function.

In another study, Dr. Karmodiya's laboratory has identified a novel family of active KATs (Lysine Acetyltransferases) that is specific for histone H4 acetylation, exhibits perinuclear localization and essential for zebrafish development (Karmodiya, K. et al., 2014, *Sci. Rep.* (in press)).

13.4 Chromosome Biology

The genome of higher organisms is non-randomly organized in the nucleus. High-resolution imaging studies using fluorescently labeled chromosomes have revolutionized our view of the genome from an entangled mass of disorganized chromatin to a highly organized but dynamic nucleus. It is well established that gene rich chromosome territories (CT19) occupy the nuclear center while gene poor chromosome territories (CT18) are proximal to the nuclear periphery in the interphase nucleus of higher organisms. However, the molecular mechanisms that regulate non-random chromosome positioning are unclear. Furthermore, even gene loci (~10^4 fold lower in DNA content than chromosome territories (~100 Mbp)), also exhibit a non-random organization in the interphase nucleus, as gene loci are typically "looped-out" of their chromosome territories upon transcription activation.

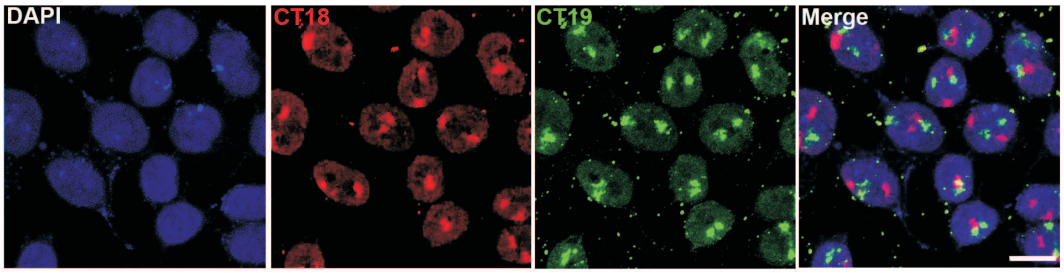


Figure 47: Chromosome territories in interphase nuclei: Confocal images of 3-Dimensional Fluorescence In situ hybridization (3D-FISH) of Chromosome Territories 18 (CT18) and 19 (CT19) in the interphase nucleus (DAPI labeling – blue) of DLD-1 colorectal cancer cells. Scale bar: ~5 µm. (Image credit: Devika Ranade, PhD student, IISER Pune) (Kundan Sengupta)

Dr. Kundan Sengupta's laboratory addresses the molecular mechanisms of nuclear structure-function relationships in cancer cells. The group employs a targeted approach of knocking down key factors such as Lamin group of proteins and Fibrillarin1 that maintain nuclear architecture to examine the consequences of perturbing nuclear structure on function.

14 Neurobiology

14.1 Computational Neuroscience

The goal of the research in **Dr. Collins Assisi**'s lab is to understand how the cellular properties of different types of neurons and the topology of the networks they form constrain the dynamics of neuronal networks. The spatiotemporal patterns generated by neuronal networks, in turn, play a role in all perception, movement and memory. In order to address this problem, the lab focuses on two paradigmatic systems in Neuroscience, namely the olfactory system and the hippocampus.

Each of these projects address questions that span several spatial and temporal scales – from the stochastic opening and closing of individual ion channels to spatiotemporal patterns that emerge from network interactions and lasts for seconds. The modus operandi consists of constructing detailed and idealized computational models of subcellular features, single neuron dynamics and large–scale networks of neurons.

During the year 2013–2014, Dr. Assisi's lab focused on understanding the role of oscillations in initiating and stabilizing spatiotemporal patterns in neuronal networks in the presence of inevitable environmental noise. Results from large scale simulations of the antennal lobe and the mushroom body of insects suggest that sequential waves of excitation and inhibition are timed in a manner that maximizes the separation between the neural representations of similar odors. Further, simulations of the neuronal networks in the entorhinal cortex suggest that theta oscillations (4–10Hz) can be used to restrict the dynamics of the network to one (or a few) of many neural sequences that are possible and consequently, ensure that nearly the same response is generated in spite of noisy variations in input and random perturbations of the phase of the theta oscillation.

14.2 Neural Circuits and Behavior

Dr. Aurnab Ghose's group explores the ontogeny of neural circuits and their emergent properties, like simple behaviors. The specific questions currently being investigated are:

a) Cytoskeleton regulators in neuronal development

Dr. Ghose's group has demonstrated that the formin class of cytoskeleton regulators has a key role in neuronal morphogenesis. Knockdown experiments performed by the group suggested that members of the formin family have conserved functions in neuronal development in multiple vertebrate species.

b) Mechanical forces in neurons

Active mechanical tension in axons is being explored as a possible mediator of long distance signalling in high-aspect ratio cellular structures like neurites. A microcontact printing based assay has been developed to evaluate this along with employing a highly sensitive force measurement device developed Dr. P. Pullarkat, RRI, Bangalore.

c) Mechanisms of circuit plasticity in innate behaviors

Innate behaviors, like those mediating aggression, hunger, thirst, etc., have a strong innate component but are also malleable to experience. Several such behaviors show bistable states like sleep-wake, aggression-tranquility, hunger-satiety etc. The group is investigating neuropeptide-based modulatory influences that switch and maintain behavioral bistability.

14.3 Synaptic Transmission in Normal and Pathological States

Key ongoing projects in **Dr. Suhita Nadkarni**'s lab explore the aberration in intracellular calcium dynamics as a basis of changes in Long-term potentiation. This has been seen as a first pathological signature in animal models of Alzheimer's Disease (AD). Most presynaptic CA3-CA1 synapses have endoplasmic reticulum (ER) that acts as a secondary store of calcium for the synapse. However contribution of calcium release via presynaptic ER to synaptic transmission has not been characterized thus far. Dr. Nadkarni's work shows that the presence of ER calcium store changes the short-term plasticity profile of the synapse. Calcium release from the ER takes place under sustained stimulus protocol that lasts several seconds. The resulting increase in base level of calcium leads to increased vesicle release via the asynchronous sensor and facilitation.

Interestingly, it turns out that ER calcium in the 'presynaptic terminal' mediated by RyRs and IP_3Rs is crucially implicated in Presenilin model of AD. However the exact mechanism could not be quantified. Using detailed computational experiments, Dr. Nadkarni's lab shows that the lowered Paired Pulse Facilitation (PPF) when stores are blocked mimics those as seen Presenilin model of AD. The difference is shown to arise due the additional buffering of calcium provided by the stores machinery (SERCA Pumps, RyR and IP_3 receptors).

14.4 Neurobiology of Movement Initiation

Movements are a ubiquitous part of our lives. We carry out so many different movements each day, that we hardly notice initiating them. The importance of movement initiation is more apparent in diseases like Parkinson's disease, where movement initiation becomes increasingly difficult (Cunnington, R. et al. 1997). Research, in humans and in other animals, has shown that all movements are preceded by changes in neural activity that begin well before movement onset (Kornhuber and Deecke, 1965; Churchland, M.M. *et al*, 2010). Disrupting this "preparatory" activity delays movement onset (Day, B.L. *et al*. 1989, Churchland, M.M. and Shenoy, K.V., 2007). Thus, while this activity is clearly important for movement initiation, how it helps initiates movements and what happens in disease conditions is poorly understood. **Dr. Raghav Rajan**'s laboratory addresses these questions using songbirds as their model system.

The song of an adult zebra finch is a well studied example of a highly precise, learned, motor sequence with many similarities to human speech (Doupe, A.J. and Kuhl, P.K., 1999). The core learned portion of an adult bird's song, the motif, comprises a stereotyped sequence of acoustic elements (syllables) separated by silent gaps ('a', 'b', 'c' and 'd' in Figure). Each song bout typically starts with a variable number of short syllables called introductory notes (INs; 'i' in Figure), prior to singing one or more repetitions of the motif.

Previous work by Dr. Rajan suggested that INs reflect a process by which the brain gets "ready" for singing (Rajan, R. and Doupe, A.J., 2013). Current work examines the function of INs using various behavioral experiments and plans to use electrophysiological recordings of individual neurons and pharmacological manipulations of specific areas of the zebra finch brain during singing.

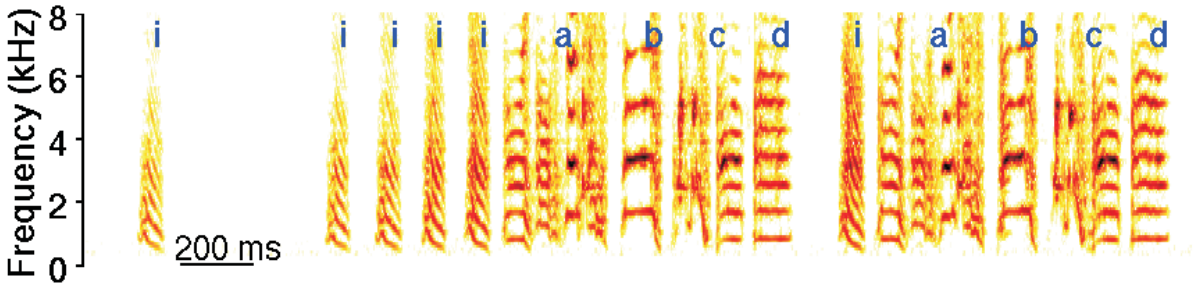


Figure 48: Spectrogram representation of one song bout of an adult male zebra finch. One song bout is shown as a spectrogram with frequency on the y-axis and time on the x-axis. The darkness represents the power in the particular time-frequency band. Individual sounds are called syllables and given character labels as shown in blue on the spectrogram. This example bout begins with 5 repetitions of a short syllable called an introductory note (IN, represented by the letter 'i'). The motif consists of a stereotyped sequence of 4 syllables (represented by 'a', 'b', 'c' and 'd') interleaved by silent periods (gaps). In this bout, the bird repeats his motif twice. (Raghav Rajan)

14.5 Neuropeptides in Behavior

Abundance of CART neuropeptide in the limbic areas like the olfactory system, central nucleus of amygdala (CeA), ventral bed nucleus of stria terminalis (vBNST) and the hypothalamus strongly suggests a role for the peptide in emotive conditions. Fear is a strong emotion with profound survival value. **Prof. Nishikant Subhedar**'s group examines the role of CART in processing of fear; an emotion that can be objectively evaluated in standard behavioral assays. In their study, rats were exposed to 2,4,5-trimethyl-3-thiazoline (TMT), a contextual predator related cue extracted from fox feces. The resultant behavior was observed and levels of CART and c-Fos expression were analyzed in the limbic areas. Based on the results obtained, the group suggests that the CART circuitry across central nucleus of amygdala, paraventricular nucleus (PVN) and vBNST may play an important role in generating the odor-evoked fear, while CART in the PVN might play a role in eliciting neuroendocrine response to predator stress.

15 Algebra and Number Theory

15.1 Special Values of L-Functions Associated to Automorphic Forms

Dr. Baskar Balasubramanyam's work has shown that the special value of the adjoint L-function associated to an automorphic form for GL(n) over a number field is algebraic after normalizing by certain periods (joint project with Prof. Raghuram). This result is further used to construct congruences between automorphic forms.

15.2 Arithmetic Geometry and Automorphic Forms

Research in **Dr. Debargha Banerjee**'s group lies in the intersection of algebra, analysis and geometry. In arithmetic geometry, the group studies the integral solutions of polynomial equations using the theory of automorphic forms. Automorphic forms are generalization of periodic functions like sine and cosine. These are the objects from classical analysis which are the subject of much interest from the beginning of the last century. Modular forms are famous for their

remarkable connections with a huge range of other areas in pure mathematics and physics. The most celebrated is, of course, the role they played in the proof of Fermat's last theorem, through the conjecture of Shimura-Taniyama-Weil that elliptic curves (algebraic objects) are modular. They also occur in group theory amongst other things. Therefore there is much current interest in the theory of modular forms.

Dr. Banerjee's group is also interested in the motives (geometric objects) attached to automorphic forms with a focus on understanding several invariants attached to these geometric objects.

Modular symbols, which are bridges between various cohomology theories and special values of L-functions, is another area the group is interested in. Dr. Banerjee has previously determined modular symbols corresponding to Eisenstein series (the most naturally occuring modular forms) and plans to extend these results to non-commutative settings. He has also developed the theory of differential modular forms for Shimura curves over totally real fields. The differential modular forms were invented by Buium and his collaborators. These are modular forms obtained by applying the arithmetic jet space functor (adjoint to the Witt vector functor) to the ring of modular forms. Dr. Banerjee's group plans to understand various geometric objects and to express them as zero set of modular forms.

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

Dr. Chandrasheel Bhagwat has been working on a problem about determination of the full Laplace spectrum of a compact Riemannian manifold from a relatively smaller subset of eigenvalues. One of the problems he worked on during his thesis answers this question through proving an analogue of strong multiplicity one property. His current work is about establishing a different version of this result. There are analogous results in the area of compact Riemann surfaces by Buser and in the theory of modular forms by Atkin, Lehner, M. Ram Murthy among others.

His joint work with Prof. Raghuram includes a motivic interpretation of the classical algebraicity results of Shimura from the perspective of the famous Deligne conjecture which is described as the common umbrella for all algebraicity results for values of L-functions at critical points.

Given a motive **M**, there are two special objects called periods associated to it. A relation has been established between periods of motives **M, M'** and the motive obtained by taking their tensor product. Following the long tradition as in works of Blasius, Yoshida, Harris, and Panchishkin, results from the present work can be related to the special values of automorphic L-functions (*Math. Res. Lett.* (2013) 20:615-628).

Another short project has been completed based on this theme which included a computation of Deligne periods for the tensor product of motives. This work gives an analogue to the results proved by Prof. Raghuram.

15.4 Analytic Number Theory and Arithmetic of Modular Forms

Dr. Kaneenika Sinha's group is working on fundamental questions related to analytic properties of L-functions of modular cusp forms and their arithmetic interpretation.

For a positive prime number q and a positive even integer $k,$ let $S_k(q)$ denote the linear space of cusp forms of "weight" k and "level" q. Generally speaking, these are complex-analytic

functions which satisfy certain transformative conditions (parametrized by k and q) and appropriate growth conditions. Such forms play an extremely important role in number theory and carry fundamental information about points of elliptic curves over finite fields, values of the partition function, class numbers and representations of integers by quadratic forms.

Corresponding to certain special kinds of cusp forms called newforms, one constructs appropriate L-functions and studies them as functions of complex variables. A central theme in number theory is to study the analytic properties of these L-functions, including their analytic extension, points of singularity and their order of vanishing at critical points. In the case k=2, this last issue, namely the order of vanishing of an L-function at what we call the critical point has important geometric implications: by the Birch and Swinnerton-Dyer conjectures, it directly yields information about ranks (over the rationals) of Jacobian varieties of modular curves. Dr. Kannenika Sinha's current research centers around such questions and their generalizations to Rankin-Selberg L-functions.

15.5 Representation Theory and Canonical Forms

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

In another project, Dr. Spallone works on the Langlands-Shahidi method of L-functions for residues of intertwining operators of induced p-adic representations. A certain residue packs a wealth of arithmetic information (via L-functions), if one can only evaluate it. Using the integration formula, this residue is simplified and given the first evaluation of it in some low-rank cases.

15.6 Number Theory, Representation Theory and Automorphic Forms

Along with Günter Harder, **Prof. Raghuram** studies rank-one Eisenstein Cohomology for GLn over a totally real field and uses this to prove rationality results for ratios of critical values for Rankin-Selberg L-functions. The key idea is to interpret Langlands's constant term theorem in terms of the cohomology of arithmetic groups. An announcement of early versions of their results was published in 2011; the long version of the paper will be submitted for publication in 2014.

15.7 Number Theory, Galois Cohomology, Arithmetic Aspects of Symmetric Spaces

For i = 1, 2, consider the absolutely almost simple algebraic groups Gi and the compositum say Fi of splitting fields of the characteristic polynomials of the strongly regular elements of Zariski dense subgroups Γi w.r.t. the adjoint representation of Gi. **Dr. Supriya Pisolkar** (with Dr. C.S. Rajan) considers the question of how different are these fields depending upon the structure of the corresponding Weyl groups. The questions are in analogy to the work of Gopal Prasad and A.S. Rapinchuk, where they consider the corresponding question for fields generated by lengths of closed geodesics on Riemannian locally symmetric spaces.

Dr. Pisolkar (with Dr. Chandrasheel Bhagwat) is looking at the question about the co-compactness

of two lattices in an absolutely almost simple real algebraic groups given that these lattices are characteristically equivalent -the notion that they have introduced in their previous work with C.S. Rajan.

15.8 Conjugacy Questions and Representation Theory of Groups

Dr. Anupam Kumar Singh is characterizing real and strongly real conjugacy classes in Spin groups with PhD student Sushil Bhunia. His group is also interested in proving how big is the subgroup generated by certain two elements which are described using simple roots and is exploring certain decomposition over Euclidean ring which can be used to compute K_1 of classical groups. In another project, Dr. Singh's group plans to explore conjugacy classes of centralisers using the description of these groups as an automorphisms of central simple algebras with involution.

15.9 K_1 Stabilization of General Quadratic and General Hermitian Groups

Dr. Rabeya Basu's group has established an analog of Quillen-Suslin's local-global principle for the general quadratic and the general Hermitian groups. It has been proved that the structure of the K_1 group of the general Hermitian is nilpotent-by abelian, which generalizes the previous results of A. Bak, N. Vavilov, R. Hazrat.

The aim of this work is to show that to establish K_1 stabilization of the general quadratic groups of quadratic modules (or any other classical type groups), it is enough to study the problem for the free module case, by using the local-global principle for the transvection subgroup of the general quadratic groups.

16 Analysis and Applicable Mathematics

16.1 Several Complex Variables, Potential Theory and Differential Geometry

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

Recently, he has studied holomorphic sectional curvature, L^2-cohomology and geodesics of the Robin metric (appeared in *Michigan Mathematical Journal*). Currently, he is studying some finer properties of the geodesics of the Robin metric. In his article "On the geodesics of the Bergman metric", G. Herbort proved the existence of geodesic spirals of the Bergman metric on a strongly pseudoconvex domain in C^n whose universal cover is infinitely sheeted. Here, by a geodesic spiral, we mean a geodesic that is defined for all the time, lives in a compact subset, and is not closed. Motivated by Herbort's work, Dr. Borah asked whether a similar result holds for the Robin metric also and has obtained an affirmative answer to this question.

16.2 Shape Optimization Problems

It is known that the torsional rigidity for a punctured ball, with the puncture having the shape of a ball, is minimum when the balls are concentric and the first eigenvalue for the Dirichlet Laplacian for such domains is also a maximum in this case.

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

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

Dr. Chorwadwala, along with collaborators, has also proved a generalized version of a famous conjecture made by Lord Rayleigh. The conjecture was as follows: The first eigenvalue of the Laplacian on an open domain of given measure with Dirichlet boundary conditions is minimum when the domain is a ball and only when it is a ball. This conjecture was proved simultaneously and independently by Faber and Krahn. The group dealt with the p-Laplacian version of this Theorem.

16.3 Mathematical Biology

The focus of **Dr. Pranay Goel**'s group is on studying Type II diabetes using both experiments and mathematical modeling. It is well recognized that the two approaches complement each other: Modeling helps us understand data better and design new experiments, and experiments in the lab are carried out with the intention of building mathematical models that can serve as coherent theories of the phenomena we study.

The group collaborates with Dr. Saroj Ghaskadbi at the University of Pune and has also received help from Dr. C.S. Yajnik of KEM Hospital in Pune.

The group constructs and analyzes models of the pancreatic islets of Langerhans to understand glucose-stimulated insulin secretion (GSIS). With graduate student Rashmi Kulkarni, Dr. Goel is working on testing the interesting hypothesis that oxidative stress (OS) is central to the development of diabetes because it is the locus of the development of both insulin resistance as well as impaired beta-cell secretion. In a project analyzing human diabetic data (collected at KEM and University of Pune) in terms of OS, the group has proposed a new method to assess the recovery of newly-diagnosed diabetics on antidiabetic medication.

16.4 Math Finance

In mathematical finance, Vega is an important Greek to understand the resulting change in derivative price due to a change in the volatility of underlying risky asset. But volatility itself is unobserved and has to be estimated. Such estimation, for obvious reasons, depends on the assumptions of underlying asset dynamics. Another project aims to extend the notion of Vega and implied volatility for a wider class of market models.

17 Geometry and Topology

17.1 Low-Dimensional Topology: 3-Dimensional Manifolds

Every 3-manifold has a foliation by surface leaves. In order to read off useful topological properties from them, **Dr. Tejas Kalelkar**'s group focuses on studying a special class of foliations called taut foliations. A foliation of a 3-manifold is taut if there exists a simple closed curve in the manifold that intersects each leaf of the foliation transversally.

A surface bundle over a circle is the simplest example of a 3-manifold with a taut foliation. Every 3-manifold can be obtained from a surface bundle by Dehn filling the boundary components. Dr. Tejas Kalelkar's previous work with Dr. Rachel Roberts had proved that the fiber structure of a surface bundle can be perturbed to taut foliations realizing all rational boundary slopes in a neighbourhood of the boundary slopes of the fiber. This allowed them to prove that 3-manifolds obtained by Dehn-filling a surface-bundle along slopes sufficiently close to the slopes of the fiber produce closed 3-manifolds that contain taut foliations. In other words, closed 3-manifolds that are 'near' closed surface bundles (in terms of the Dehn-filling slopes) also have taut foliations. They also showed that the contact structure supported by these taut foliations is weakly symplectically fillable and hence universally tight.

The current project is to pin down the precise interval of boundary slopes realized by the boundaries of these taut foliations in terms of the pseudo-anosov monodromy of the surface bundle. Surface bundles with pseudo-anosov monodromies are particularly interesting as they are hyperbolic manifolds.

Dr. Tejas Kalelkar's broad research objective is to better understand foliations of 3-manifolds and the intimate relation they have with both contact structures and with open-book decompositions.

17.2 Intersection Theory, Derived Categories and T-Varieties

In a project with Dr. Umesh Dubey IISc, **Dr. Vivek Mallick**'s group has made some progress in extending the results of Prof. Paul Balmer from triangulated categories to dg categories. As Bondal and Kapranov mention, triangulated categories have some theoretical shortcomings as they lose a lot of information in the process of abstraction. A better abstract model for most homological algebraic application would be to consider dg categories. It is an evolving area of research and the group is trying to extend some results that we know for triangulated categories to these exotic structures.

The group is studying categories with graded-commutative Homs, which might answer problems regarding the Balmer Spec of the triangulated category of stable modules of a finite group over a

finite field. Another project (with Dr. Amit Hogadi) involves motivic cohomology and A^1-homotopy and studying the behavior of the well-known constructions over general base fields.

17.3 Knot Theory

Dr. Rama Mishra has been trying to study the topology of the space of all polynomial knots in a given fixed degree. Within this space her group has observed that certain knots which are equivalent as knots may lie in different path components, thus providing stronger mode of distinguishing knots. They have produced beautiful examples of polynomial knots up to degree 7.

17.4 Algebraic Geometry

The motivic spectral sequence relates motivic cohomology of smooth varieties over a perfect field with algebraic *K*-theory. The goal of this project by **Dr. Amit Hogadi** (with Lars Hesselholt) is to verify that this spectral sequence is multiplicative with the multiplication on the E2 term coinciding with the cup product in motivic cohomology. The main and perhaps the only published tool for verifying whether a spectral sequence is multiplicative is a result of W. Massey published in 1955. However, as spotted by Dold, this paper has a mistake. This mistake was recently rectified (unpublished) by a student of Hesselholt by introducing the notion of multiplicative Cartan Eilenberg systems. The main work in this project is to show that the filtration of the *K*-theory spectrum defined by Grayson is multiplicative in a suitable sense and hence gives rise to a multiplicative Cartan Eilenberg system.

Motivicco homology has been defined for smooth varieties over a perfect field *K*. This definition starts by constructing a category Cork whose objects are smooth projective varieties and morphisms from *X* to *Y* are finite correspondences and defining the notion of a Nisnevich sheaf with transfers. In order to make the results work for imperfect fields, one needs to know that an $\mathbf{A}^1$-invariant sheaf with transfers is strongly $\mathbf{A}^1$-invariant, i.e., all its cohomology presheaves are $\mathbf{A}^1$-invariant. In this project Dr. Amit Hogadi, along with Dr. Vivek Mallick, is trying to overcome the technical hurdles by working with a category where finite correspondences are replaced by finite flat coherent sheaves. The idea is to work with all regular k-schemes and try to construct a Gersten complex for $\mathbf{A}^1$ invariant sheaves in question.

17.5 Algebraic Geometry

Dr. Ronnie Sebastian has been trying to get new results related to smash nilpotent cycles and at the same time have been working on problems related to number theory. In collaboration with Prof. A. Raghuram, he is presently working on a problem related to special values of L-functions.

18 Discrete Mathematics

18.1 Public Key Cryptography

Dr. Ayan Mahalanobis works at the intersection of group theory and cryptography. The MOR cryptosystem uses the discrete logarithm problem in the automorphism group of a finite group. This cryptosystem is a natural generalization of the most prolific cryptosystem of all times, the

ElGamal cryptosystem. In this project, in collaboration Anupam Singh and Baskar Balasubramanyam, Dr. Mahalanobis is looking at the MOR cryptosystem with Chevalley groups and other solvable groups.

In another project, Dr. Mahalanobis had previously shown that circulant matrices have very interesting cryptographic properties, as opposed to a long standing result of Menezes and Wu. The follow-up work is now being carried out in collaboration with the center of interdisciplinary computing, University of Pune.

In an NBHM supported project, Dr. Mahalanobis studies finite p-groups for the MOR cryptosystem. In this case his work proved that the best case scenario for finite p-groups using p'-automorphisms is the extra-special p-groups. The case of p-automorphisms is still open.

18.2 Combinatorics, Hypergraph Theory

Dr. Soumen Maity and his group are mostly interested in combinatorial problems that have applications and require expertise in hypergraph theory and combinatorial designs. The projects in which they are currently involved are: New generalizations of covering arrays for software testing applications, covering arrays with row limit.

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

Covering arrays with row limit, CARLs for short, are a new family of combinatorial objects introduced as a generalization of group divisible designs and covering arrays. Group divisible designs were introduced as statistical experiment designs; on the other hand covering arrays model test suites in software testing. As with any covering problem, two central questions in the study of CARLs are: what the minimum size of covering is and how to construct a covering of the minimum size. They have initiated working on construction of strength three covering arrays with row limit and group divisible covering designs with block size five.

IISER Pune Library

Institute Library provides essential and specialized information resources and services to meet the academic and research needs of the IISER community. Library adopts state-of-art technologies to facilitate access to online and print resources to its users. Major international journals and online resources in the disciplines of basic sciences and its allied subjects have been subscribed.

Library is part of 'IISER Library Consortium' constituted jointly by all IISERs. E-journal archives from Annual Reviews, Institute of Physics, Nature Publishing Group, Oxford University Press, Springer-Verlag and American Geophysical Union (AGU) have been made available through the consortium. Library also has a membership of national level consortia like INDEST-AICTE Consortium established by the Ministry of HRD, Govt. of India and UGC INFONET Digital Library Consortium.

Automated biometric based Kiosk has been installed in the library for self-help circulation of print books, which enables users to issue, return and renew books by themselves. Circulation Kiosk is operational from 8 am to 11 pm on all days including holidays. Library is subscribing to iThenticate, a plagiarism checking web tool, which allows researchers compare their content against a massive database before publication to ensure the work is original.

Over 1600 print books, 70 electronic books and many more online resources have been added to the library's collection during the last financial year.

Collection Statistics of the Library as on March 31, 2014

- *Print Books: 16164*
- *Gratis Books: 506*
- *e-Books: 6070*
- *Print Journals / Magazines: 50*
- *e-Journals: 3000*
- *Full-Text Databases: 10*
- *Bibliographic Databases: 5*
- *Records in IISER Digital Library (IDL): 220*
- *Users of the Library: 1021*

Important Online Full-Text Resources available

- *ACS Web Edition + Legacy Archive*
- *American Institute of Physics (AIP) + Archives*
- *American Physical Society (APS)*
- *Annual Review's Publications + Archives*
- *Institute of Physics (IOP) + Archives*
- *Journal of Visualized Experiments (All Sections)*
- *JSTOR*
- *Nature Publishing Group (NPG) + Archives*
- *OSA's Optics Infobase*
- *Project Euclid's Prime Collection*
- *Royal Society of Chemistry (RSC) + Archives*
- *Science Direct*
- *Society for Industrial and Applied Mathematics (SIAM)*
- *SPIE: International Society for Optics and Photonics*
- *Springer Online Journals + Archives*
- *Wiley Interscience*

Important Online Bibliographic Resources available

- *Faculty of 1000: Post-publication peer review database*
- *MathSciNet*
- *SciFinder Scholar*
- *Synfacts*
- *Web of Knowledge*

Balance Sheet as on March 31, 2014

(Amount in ₹)

Sr. No.	Liabilities / Assets	Schedule No.	Current Year 2013-2014	Previous Year 2012-2013
	CORPUS / CAPITAL FUND AND LIABILITIES			
I	CORPUS / CAPITAL FUND	1	4,25,87,11,683	3,05,63,39,996
II	RESERVED AND SURPLUS	2	12,04,73,596	8,21,93,188
III	EARMARKED / ENDOWMENT FUNDS	3	52,55,98,253	57,74,08,541
IV	SECURED LOANS AND BORROWINGS	4	-	-
V	UNSECURED LOANS AND BORROWINGS	5	-	-
VI	DEFERRED CREDIT AND LIABILITIES	6	-	-
VII	CURRENT LIABILITIES AND PROVISIONS	7	5,40,09,216	3,89,06,919
	TOTAL LIABILITIES		**4,95,87,92,749**	**3,75,48,48,644**
	ASSETS			
I	FIXED ASSETS - NET BLOCK	8	1,26,34,76,897	95,62,30,943
	WORK IN PROGRESS	8	2,99,52,34,786	2,10,01,09,052
II	INVESTMENTS - FROM EARMARKED / ENDOWMENT FUNDS	9	-	-
III	INVESTMENTS - OTHERS	10	10,89,24,938	6,41,73,992
IV	CURRENT ASSETS, LOANS AND ADVANCES	11	59,11,56,126	63,43,34,655
	MISCELLANEOUS EXPENDITURE (to the extent not written off or adjusted)			
	TOTAL ASSETS		**4,95,87,92,749**	**3,75,48,48,643**
	SIGNIFICANT ACCOUNTING POLICIES AND	24	0	0
	NOTES ON ACCOUNTS	25		

For and on behalf of IISER Pune

sd/-	sd/-	sd/-
(Mariamma John)	(Col. (Retd.) G. Raja Sekhar)	(Prof. K.N. Ganesh)
Dy. Registrar (F&A)	Registrar	Director

Place: Pune
Date: 16.05.2014

Income & Expenditure Statement for the Period ended March 31, 2014

(Amount in ₹)

Sr. No.	Particulars of Income & Expenditure	Schedule No.	Current Year 2013-2014	Previous Year 2012-2013
I	**INCOME**			
	INCOME FROM SALES / SERVICES	12	-	-
	GRANTS / SUBSIDIES (REVENUE)	13	52,68,33,000	54,87,26,000
	FEES / SUBSCRIPTIONS	14	1,66,13,445	1,37,98,602
	INCOME FROM INVESTMENTS	15	-	-
	INCOME FROM ROYALTY, PUBLICATION	16	-	-
	INTEREST EARNED	17	2,75,76,625	3,67,20,835
	OTHER INCOME	18	68,72,662	44,64,761
	INCREASED / (DECREASED) IN STOCK OF FINISHED GOODS AND WORK IN PROGRESS	19	-	-
	FOREIGN EXCHANGE FLUCTUATION GAIN		-	-
	DEFERRED INCOME FOR THE YEAR (In proportion to Depreciation charged)		18,97,26,909	15,13,35,789
	TOTAL INCOME		**76,76,22,641**	**75,50,45,987**
II	**EXPENDITURE**			
	ESTABLISHMENT EXPENSES	20	16,48,91,405	12,98,10,623
	OTHER ADMINISTRATIVE EXPENSES	21	42,19,02,864	34,71,79,336
	FOREIGN EXCHANGE FLUCTUATION LOSS		4,205	6,883
	EXPENDITURE ON GRANTS, SUBSIDIES	22	-	-
	INTEREST	23	-	-
	DEPRECIATION FOR THE YEAR	8	18,97,26,909	15,13,35,789
	TOTAL EXPENDITURE		**77,65,25,383**	**62,83,32,631**
	PRIOR PERIOD INCOME		14,374	1,10,232
	PRIOR PERIOD EXPENSES		7,01,619	10,41,953
	EXCESS OF INCOME OVER EXPENDITURE		**-95,89,987**	**12,57,81,635**
	Less: TRANSFERRED TO INSTITUTE RESERVE FUND (Income from Fees and Other Income, Schedule 14 & 18 respectively)		**2,34,86,107**	**5,50,94,430**
	BALANCE BEING UNSPENT CARRIED FORWARD TO EARMARKED AND ENDOWMENT FUND		**-3,30,76,094**	**7,06,87,205**
III	**SIGNIFICANT ACCOUNTING POLICIES AND NOTES TO ACCOUNTS**	**24 25**		

For and on behalf of IISER Pune

sd/-	sd/-	sd/-
(Mariamma John)	(Col. (Retd.) G. Raja Sekhar)	(Prof. K.N. Ganesh)
Dy. Registrar (F&A)	Registrar	Director

Place: Pune
Date: 16.05.2014

Lecture Hall Complex, IISER Pune

Indian Institute of Science Education and Research (IISER), Pune
Dr. Homi J. Bhabha Road, Pashan, Pune - 411008, India
Phone : +91 20 25908001 Fax: +91 20 25908186
Web: www.iiserpune.ac.in