



वार्षिक प्रतिवेदन
Annual Report 2016-17

भारतीय विज्ञान शिक्षा एवं अनुसंधान संस्थान तिरुपति
Indian Institute of Science Education and Research Tirupati





Annual Report
2016-17



Correct Citation

IISER Tirupati Annual Report 2016-17
Tirupati, Andhra Pradesh, India

Published by

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Photo Courtesy

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Printed by

United Multicolour Printers Pvt, Ltd.

264/4, Shaniwar Peth, Pune 411 030

Email: unitedprinters@rediffmail.com

Governance

IISER Tirupati Society

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Shri V.S. Oberoi, IAS, Secretary (Higher Education), Ministry of Human Resource Development, Govt. of India, 127-C Wing, Shastri Bhavan, New Delhi

Members

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Prof. Anurag Kumar, Director, Indian Institute of Science, Bengaluru

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Dr. Sekhar Basu, Secretary, Department of Atomic Energy, Anushakti Bhavan, Chatrapati Shivaji Maharaj Marg, Mumbai

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Ms. Darshana M. Dabral, Joint Secretary & Financial Advisor, Ministry of Human Resource Development, Shastri Bhavan, New Delhi

Prof. Vijayalakshmi Ravindranath, Chairperson, Centre for Neuroscience, Indian Institute of Science, Bengaluru

Prof. L.S. Shashidhara, Professor, IISER Pune, Dr. Homi Bhabha Road, Pashan, Pune

Prof. A. Raghuram, Professor, IISER Pune, Dr. Homi Bhabha Road, Pashan, Pune

Secretary

Col. G. Raja Sekhar (Retd.), Registrar, IISER Pune, Dr. Homi Bhabha Road, Pashan, Pune

Since IISER Pune is the mentor Institute of IISER Tirupati, the statutory bodies of IISER Pune, viz. Board of Governors, Finance Committee, Building and Works Committee, and Senate were initially functioning as the respective bodies of IISER Tirupati.

A temporary Board of Governors for IISER Tirupati was constituted by MHRD in January 2017 with the following members.

Board of Governors

Chairperson

Shri V.S. Oberoi, IAS, Secretary (Higher Education), Ministry of Human Resource Development, Govt. of India, 127-C Wing, Shastri Bhavan, New Delhi (up to 01-12-2016)

Shri Kewal Kumar Sharma, IAS, Secretary (Higher Education), Ministry of Human Resource Development, Govt. of India, 127-C Wing, Shastri Bhavan, New Delhi (from 02-12-2016)

Members

Prof. K.N. Ganesh, Director, IISER Pune, Dr. Homi Bhabha Road, Pashan, Pune

Prof. Anurag Kumar, Director, Indian Institute of Science, Bengaluru

Prof. Indranil Manna, Director, Indian Institute of Technology Kanpur, Kanpur

Dr. Sekhar Basu, Secretary, Department of Atomic Energy, Anushakti Bhavan, Chatrapati Shivaji Maharaj Marg, Mumbai

Shri S.P. Tucker, IAS, Chief Secretary, Government of Andhra Pradesh, Hyderabad

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Prof. A. Raghuram, Professor, IISER Pune, Dr. Homi Bhabha Road, Pashan, Pune

Secretary

Col. G. Raja Sekhar (Retd.), Registrar, IISER Pune, Dr. Homi Bhabha Road, Pashan, Pune

The Board of Governors, in its first meeting held on 27 February 2017, approved the constitution of following committees for a period of two years

Building and Works Committee

Chairperson

Prof. K.N. Ganesh, Director, IISER Pune (Mentor Institute)

Members

Prof. L.S. Shashidhara, Professor, IISER Pune

Col. G. Raja Sekhar (Retd.), Registrar, IISER Pune (Mentor Institute) (Ex-officio)

Shri Ramesh Srikonda, Dean, Professor and Head, School of Architecture, Vijayawada

Shri S. Baliga, Former Additional General, CPWD, New Delhi

Shri Mohan Khemani, Former Chief Engineer, CPWD, New Delhi

Secretary

Shri Y.S. Rajput, Superintending Engineer, IISER Pune (Mentor Institute) (Ex-officio)

Finance Committee

Chairperson

Shri Kewal Kumar Sharma, IAS, Secretary (Higher Education), Ministry of Human Resource Development, New Delhi (Ex-officio)

Members

Prof. K.N. Ganesh, Director, IISER Pune (Mentor Institute) (Ex-officio)

Shri Praveen Kumar, Joint Secretary (Administration) MHRD

Ms. Darshana Dabral, Joint Secretary and Financial Adviser, MHRD

Prof. L.S. Shashidhara, Professor & Chair (Biology), IISER Pune

Shri C.P. Mohan Kumar, Registrar, Tata Institute of Social Sciences, Mumbai

Ms. Indumati Srinivasan, Finance Officer, Indian Institute of Science, Bengaluru

Col. G. Raja Sekhar (Retd.), Registrar, IISER Pune (Mentor Institute), (Ex-officio)

Senate

Chairperson

Prof. K.N. Ganesh, Director, IISER Pune (Mentor Institute)

Members

Prof. K.N. Satyanarayana, Director, Indian Institute of Technology Tirupati

Prof. Sudha Deshmukh, Dean, Academic Affairs, IISER Tirupati

Prof. P.C. Deshmukh, IISER Tirupati

Prof. Sankararamanan, Indian Institute of Technology Madras

Prof. P. Sailaja, University of Hyderabad, Hyderabad

Dr. Srinivas Hotha, Professor, IISER Pune

Dr. Bhas Bapat, Associate Professor, IISER Pune

Dr. Sutirth Dey, Associate Professor, IISER Pune

Dr. Baskar Balasubramanyam, Assistant Professor, IISER Pune

Dr. Umeshreddy Kacherki, Dy. Librarian, IISER Pune

Secretary

Col. G Raja Sekhar (Retd.), Registrar, IISER Pune (Mentor Institute)

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Foreword



It gives me great pleasure to present the 2nd Annual Report of IISER Tirupati for the year 2016-17. Having started functioning from August 2015, with a batch of 48 students in the BS MS program, the institute made significant progress in the past one year. During the August 2016 admission cycle, 79 students were admitted to the BS MS program. The research and undergraduate laboratories have been further augmented with additional equipment required for teaching and research activities. More than 10 crore rupees worth of equipment were ordered during the year. The faculty and the administrative staff worked hard to ensure procurement of right type of equipment at a competitive price with minimum

process time. Important equipment added during this period include Atomic Force Microscope, confocal microscope, High Performance Computer Cluster, plant growth chambers, FACS, GCMS, analytical-cum-semi preparatory HPLC, rheometer, CD spectrometer, fluorescence microscope etc.

While the laboratories were in the process of setting up, the faculty were also busy seeking support for research through extramural grants. I am happy to inform that Dr. Sivakumar Vallabhapurapu has been awarded the Wellcome Trust-DBT Intermediate Fellowship which will start from January next year. Other faculty have been able to attract funding for 14 projects from SERB, DST and DBT to the tune of Rs. 2 crores. During this period, with the limited facilities available, the faculty have published 17 research publications in high ranking international journals.

Another important step has been the passing of the NITSER Amendment Act 2017 by the Lok Sabha, which incorporates IISER Tirupati along with other IISERs, paving the way for Gazette Notification on the establishment of IISER Tirupati. MHRD sanctioned the first lot of 20 faculty positions and 34 non-teaching staff positions. Recruitment to the sanctioned faculty positions has been completed and the recruitment for non-teaching staff is in progress. Construction of boundary wall on the permanent campus at Yerpedu has commenced and very soon campus construction will be initiated.

I would like to place on record the continuous support from the IISER Tirupati Society, The Board of Governors and other statutory bodies of IISER Pune, who took important decisions for quickly setting up IISER Tirupati until the temporary Board of Governors and other statutory bodies of IISER Tirupati came into force in early 2017. I also would like to thank the faculty and administrative staff of IISER Pune who have put in tremendous efforts to see that the mentee Institute IISER Tirupati is fully functional in a short span of time. I do hope that next couple of years will see significant developments in the establishment of the campus.

Krishna N. Ganesh
Director

Institute Updates

IISER Tirupati started functioning in August 2015 from a transit campus in Tirupati by hiring a building of about 1,00,000 sqft area from Sree Rama Engineering College. Land admeasuring about 102 hectares(255 acres) was formally handed over to IISER Tirupati in December 2015.

Moving forward, the area earmarked for IISER Tirupati is being enclosed by a boundary wall through state government agencies. Procedure for appointment of an architect has been initiated.

In an another significant development, **NITSER** (National Institutes of Technology, Science Education Research) **Amendment Bill** was passed in the Lok Sabha on 28th March, 2017. In this Amendment, **Indian Institute of Science Education and Research (IISER) Tirupati along with IISER Berhampur** have been included in the Second Schedule of the NITSER Act, 2007. This bill will now go to Rajya Sabha for passing and then a gazette notification will be issued.

Considering the requirement of continuing in transit campus for another couple of years, and to cater to the increasing number of students, and facilities to be created, the management of Sree Rama Group of Educational Institutes has decided to construct a students' hostel, so that the existing building can fully be utilised for teaching and research facilities.

The teaching and research laboratories have been further strengthened by additional equipments. Details of equipment procured in the last two years are given in "Equipment" section.



Teaching and research facilities created at the transit campus



Biology Lab



Biology Lab



Chemistry Lab



Chemistry Lab



Physics Lab



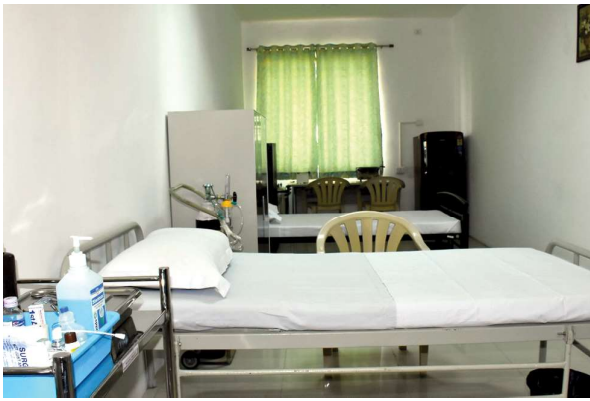
Physics Lab



Computer Lab



Library



Wellness Centre



Gymnasium



Dinning Hall



Outdoor Sports



Daycare

Recreational and welfare facilities at the transit campus

Library and Information Science Services

IISER Tirupati Library started functioning from August 2015 to meet the teaching, learning and research needs of the students, faculty and staff of the Institute. The Library aims to provide knowledge and information services for building excellent communities in the scientific world and promoting each individual to get success in their R&D activities with well-established library facilities.

IISER Tirupati Library is part of the IISER Library Consortium constituted jointly by all IISERs. Efforts are being made to get e-resources through e-ShodhSindhu: Consortium for Higher Education Electronic Resources, an initiative by Ministry of Human Resource Development, Govt. of India and being executed by Information and Library Network Centre (INFLIBNET), Gandhinagar.

Library collection covers general books, text books and reference books such as encyclopedia, dictionaries, laboratory manuals, etc. Library has also started subscribing print & e-journals in the field of basic sciences and allied subjects. It has been providing document delivery services to faculty members and other users to facilitate access to research articles from journals that are not subscribed.

This year Library has procured the titles of following series in Mathematics:

- ◆ Texts and Readings in Mathematics (Hindustan Book Agency)
- ◆ AMS Pure and Applied Undergraduate Texts (American Mathematical Society)
- ◆ AMS/IP Studies in Advanced Mathematics (American Mathematical Society/International Press)
- ◆ Graduate Texts in Mathematics (Springer)
- ◆ Undergraduate Texts in Mathematics (Springer)

More than 1900 books have been added to the Library's collection during the year. Library is using Koha -Library Management Open Source Software for housekeeping operations of the library.

Collection Statistics of the Library as on March 31, 2017

- ◆ Books : 3899
- ◆ Gratis Books : 22
- ◆ Print Journals/Magazines : 46
- ◆ E-Journals : 179
- ◆ E-Databases : 3
- ◆ Library Users : 180

Online journal resources available

- ◆ American Association for Cancer Research
- ◆ American Association for the Advancement of Science

- ◆ American Chemical Society
- ◆ American Institute of Physics
- ◆ American Mathematical Society
- ◆ American Physical Society
- ◆ American Society for Biochemistry and Molecular Biology
- ◆ American Society for Microbiology
- ◆ American Society of Plant Biologists
- ◆ Annual Reviews
- ◆ Cambridge University Press
- ◆ Cold Spring Harbor Laboratory Press
- ◆ Company of Biologists
- ◆ Duke University Press
- ◆ Helder mann Verlag
- ◆ International Press
- ◆ Mathematical Sciences Publishers
- ◆ National Academy of Sciences, U.S.A.
- ◆ Optical Society of America
- ◆ Oxford University Press
- ◆ Rockefeller University Press
- ◆ Springer Nature

Bibliographic online databases

- ◆ MathSciNet
- ◆ SciFinder Scholar

Writing Support Tool

- ◆ Grammarly@edu

BS MS Program

The flagship program of the Institute is the 5 year dual degree BS MS program. During the first year of its inception, in 2015, the institute admitted 48 students in this course. In 2016, following 79 students took admission.

Ramveer Singh	Parvathi S. Gopinath	Rajashekar Pathi
Sayoojya Prakash	Arathy Venugopal	Vishnu P.
Gokul Babu S.	T. Sanjana	Nikhitha Nunavath
Jameela Parvin P.	Vikas Jadhav Y.	Mrugank DevendraDake
Aisha Shigna N.	Subhasree Mal	Nikhil Subash
Sincy P. Varghese	Swapnil Sanjeev Bhagat	M. Shanmukha Sreenivas
Jayesh Dave	Abhijith K.S.	Amrutha M.L.
Anushesh Nigam	Mizna C.K.	Yashwant P.S.
Tushar Ranjan Satapathy	Smriti Sarathi	Uttara Khatri
Revathy Menon	M. Kalyani	Rahamdil Usman
Hariharan D.S.	Niladri Das	Mude Rohith
Ayswarya Vinod	Korde Anand Abhijit	Meera Oonnikrishnan
Nihar S.	Ranjitha R.	Atul Joseph
Amartya Pal	Aditya Sharma	Himanshu
Kiran M.N.	K. Swetha	V. Sandeep
Dibya Saha	Keerthi J.	V.C. Thamarai Valli
Gayathri D.	Riya P. Mamachan	Harsh Ramesh Sonkamble
Akshay Dhan	Omkar Vinayak Nippanikar	Akshara Vincent
Ardra M.	Kapil Patidar	Gayathry R.
Akhila Ajith	Sahil Datke	Rajalekshmi A.R.
Jikson P. Mathew	Anza Suneer R.	Nayana Pradeep
Shilpa Mini George	Jitheesh Joy	Shamila Minnu K.C.
Neethu Abraham	Cheeli Rajesh	Ashish Joy
Manik Koundal	Bhabesh Kumar Tripathy	Pragna Soyam
Ramavath Rajeev Krishna Naik	Veena Shankar Avadhani	Susmitha Issac
Aparna C.K.	Sushree Swateeprajnya Behera	
Subhankar Biswas	Karthika Krishna Kumar	

Subsequently, following, eight students discontinued from the program as they had obtained admission in other courses, leaving 71 students in the 2016 batch.

Ayswarya Vinod, Shilpa Mini George, Mizna C.K., Smriti Sarathi, Korde Anand Abhijit, Keerthi, J., Meera Unnikrishnan, Susmitha Isaac

The channels of admission for these students are as follows:

Stream	No. of students
KVPY	1
JEE	6
SCB	64
Total	71

Category-wise distribution of the students is as follows:

Category	Gender	No. of Students	%
GE	Male	15	46.5
	Female	18	
OBC	Male	10	28.2
	Female	10	
SC	Male	11	16.9
	Female	1	
ST	Male	3	8.4
	Female	3	
Total	Male	39	
	Female	32	
		71	
PD		1	

From the 2015 batch of students, 3 students, viz. Papavat Kalyan (201501034), M. Punith Raj (201501048) and A. Mithun Sai Sundar (201501049) discontinued from the program. Hence, during the academic year 2016-17, there were a total of 116 students: 45 from the 2015 batch and 71 from the 2016 batch.

Cumulative distribution of BS MS students during 2016-17 is given below

Category	Gender	No. of Students
GE	Male	29
	Female	22
OBC	Male	16
	Female	16
SC	Male	13
	Female	6
ST	Male	7
	Female	7
Total	Male	65
	Female	51
Total		116
PD		1

Courses offered during 2016-17

Course Code	Course Title	Faculty	No. of credits	Lecture/Tutorial/
Monsoon 2016				
Semester I				
BIO 111	Introductory Biology I- Basic Principles	Eswarayya Ramireddy Suresh Babu Pakala	3	LT
BIO 112	Biology Lab I- Basic Biology	Vasudharani Devanathan Raju Mukherjee	3	P
CHM 111	General Chemistry	Ragunath Ramabhadran Dibyendu Das	3	LT
IDC 111	Mathematical Methods	P.C. Deshmukh	3	LP
MTH 111	Introduction to Discrete Mathematics	Girja Shankar Tripathi B. Subhash	3	LT

Course Code	Course Title	Faculty	No. of credits	Lecture/Tutorial/
PHY 111	World of Physics I- Mechanics	Sudipta Dutta Dileep Mampallil	3	LT
PHY 112	Physics Lab I	Dileep Mampallil Sudipta Dutta	3	P
Semester III				
BIO 211	Introductory Biology III - Ecology and Evolution	Nandini Rajamani V.V. Robin	3	LP
BIO 212	Biology Lab III- Ecology and Evolution	V.V. Robin Nandini Rajamani	3	P
CHM 211	Chemistry II - Inorganic Chemistry	Raghunath Ramabhadran Sudipta Roy	3	LT
CHM 212	Chemistry Lab II- Inorganic Chemistry	Dibyendu Das Raghunath Ramabhadran	3	P
HSS 211	Critical Reading, Writing, and Communication	Lakshmana Rao	2	L
MTH 211	Linear Algebra and Applications	H.A. Gururaja Anilatmaja Aryasomayajula	3	LT
PHY 211	World of Physics III- Electricity and Magnetism	K.P. Yogendran Thokala Soloman Raju	3	LT
PHY 212	Physics Lab II	Thokala Soloman Raju K.P. Yogendran	3	P
Spring 2017				
Semester II				
BIO 121	Introductory Biology II- Cellular and Molecular Biology	Sivakumar Vallabhapurapu Raju Mukherjee	3	L
BIO 122	Biology Lab II: Biochemistry, Genetics and Molecular Biology	Suresh Babu Pakala Sivakumar Vallabhapurapu	3	P
CHM 121	Chemistry I- Physical Chemistry	Raghunath Ramabhadran	3	LT
CHM 122	General Chemistry Lab I	Sudipta Roy	3	P
IDC 121	Computer Programming	Dileep Mampallil Chitrasen Jena K.P. Yogendran Raghunath Ramabhadran Sudipta Dutta	3	LT
MTH 121	Single Variable Calculus	H.A. Gururaja	3	LT
MTH 122	Linear Algebra and Applications	R. Lakshmi Lavanya	3	LT
PHY 121	World of Physics II- Waves and Matter	Sasmita Mohakud Chitrasen Jena K.P. Yogendran	3	LT
HSS 121	History of Science	K.P. Yogendran	2	L

Course Code	Course Title	Faculty	No. of credits	Lecture/Tutorial/
Semester IV				
BIO 221	Introductory Biology IV: Biology of Systems	Eswarayya Ramireddy Vasudharani Devanathan	3	LT
CHM 221	Chemistry III: Organic Chemistry	Ashwani Sharma	3	LT
CHM 222	Chemistry Lab III: Organic Chemistry	Sudipta Roy	3	P
MTH 221	Introduction to Probability and Statistics	Anilatmaja Aryasomayajula	3	L
MTH 222	Basic Structures in Mathematics	B. Subhash	3	L
PHY 221	World of Physics IV: Quantum Physics	P.C. Deshmukh Thokala Soloman Raju	3	LT
PHY 222	Physics Lab III	Dileep Mampallil Thokala Solomon Raju	3	P



Extramural Funding

S.No.	Title of the project	Principal Investigator	Project No.	Duration	Grant during the year (in lakh rupees)
1	INSPIRE Faculty Award	Dibyendu Das	EMR/INSPIRE/CHE/16/001 30116001	22.05.2013 to 15.08.2015	10.59
2	Targeting metastasis associated protein 1 (MTA-1) modulated histone modifications in triple negative breast cancer (TNBCs)	Pakala Suresh Babu	EMR/SERB/BIO/16/002 30216002	01.04.2016 to 31.03.2018	4.97
3	Computational prebiotic chemistry: Probing abiogenesis via electronic structure theory	Raghunath Ramabhadran	EMR/SERB/CHE/16/003 30216003	29.06.2016 to 28.06.2019	29.68
4	Amphiphilic peptide nanostructures for MoS ₂	Dibyendu Das	EMR/DBT/CHE/16/004 30316004	01.08.2016 to 31.07.2019	12.55
5	INSPIRE Faculty Award	Anilrajma Aryasomayajula	EMR/INSPIRE/MTH/16/005 30116005	28.07.2016 to 27.07.2021	7.00
6	INSPIRE Faculty Award	Sasmitha Mohakud	EMR/INSPIRE/PHY/16/006 30116006	01.08.2016 to 19.08.2020	15.51
7	Atomic sheet based electronic applications: A theoretical perspective	Sudipta Dutta	EMR/SERB/PHY/16/007 30216007	02.09.2016 to 01.09.2019	23.72
8	Surface acoustic wave microfluidics: Micro-particle patterning to biosensors	Dileep Mampallil	EMR/SERB/PHY/16/008 30216008	28.09.2016 to 27.09.2019	30.19
9	Automatic analysis of avian acoustics	Robin Vijayan	EMR/SERB/BIO/16/009 30216009	10.01.2017 to 09.01.2020	5.55
10	Understanding small molecule permeation in Mycobacterium tuberculosis: Towards rational design of drugs with penetrating scaffolds	Raju Mukherjee	EMR/SERB/BIO/16/010 30216010	20.02.2017 to 19.02.2020	18.12

S.No.	Title of the project	Principal Investigator	Project No.	Duration	Grant during the year (in lakh rupees)
11	Synthesis and stabilization of heterodiatomic(0) compounds of main group elements/mixed main group-transition-elements and their applications in homogeneous catalysis	Sudipta Roy	EMR/SERB/CHM/16/011 30216011	03.03.2017 to 02.03.2020	18.00
12	Unravelling the role of root-cap specific mannose-binding lectin proteins in root development and their implications in shaping the plant response to environmental cues	Eswarayya Ramireddy	EMR/SERB/BIO/16/012 30216012	22.03.2017 to 21.03.2020	10.00
13	Does sciurid response to human habitat modifications mimic climate change? A study of demographic response on the highest mountains of Western Ghats	Nandini Rajamani Robin	EMR/SERB/BIO/16/013 30216013	23.03.2017 to 22.03.2020	8.2
14	INSPIRE Faculty Award	Arunima Banerjee	EMR/INSPIRE/PHY/17/014 30116013	10.03.2017 to 13.11.2019	---

Equipment Purchased

During 2016-17, equipment worth more than Rs. 10 crores was procured. List of major equipment installed in the transit campus is given below.

S. No.	Equipment	Make	Value (in lakh rupees)
1	HPC Server	Netweb Pte Ltd, Singapore	21.4
2	VASP Software	Zastra Innovations Pvt Ltd, Bengaluru	8.0
3	HPC Server	Boston Limited, England	20.5
4	Freeze Dryer	SP Scientific, New York, U.S.A.	12.9
5	Immersion Cooler	Julabo GmbH, Germany	7.9
6	Gas Generators	Claind Srl, Italy	20.9
7	Electrochemical workstation	CH Instruments Inc, U.S.A.	11.2
8	Inverted Fluorescence Microscope	Nikon Corporation, Japan	14.8
9	Physics Experiment	Holmarc Opto-Mechatronics Pvt Ltd	5.7
10	Hall Effect Experiment	SES Instruments Pvt Ltd, Uttarakhand	3.3
11	Biot Savart's Law	Osaw Industrial Products Pvt Ltd, Haryana	3.5
12	Atomic Force Microscope	Park Systems Corp, Korea	71.0
13	Shimadzu HPLC System	Shimadzu (Asia Pacific) Pte Ltd, Singapore	18.0
14	Laser Power Meter and Sensor System Kit	Coherent Inc, U.S.A.	1.3
15	Laser	UAB Altechna, Lithuania	4.3
16	Analytical cum Semi Prep HPLC	Waters Ges. MbH, Austria	27.1
17	Precision Weighing Balances	Sartorius	4.5
18	Biosafety Cabinet	Micro Filt India, Pune	7.0
19	Autoclaves	Equitron	2.9
20	Ultrasonic Processor	Sonics & Materials Inc., U.S.A.	2.6
21	Real time PCR & Electroporator	Bio-rad Pacific Ltd, Hong Kong	18.0
22	Temperature Controlled Water Bath	Polyscience, U.S.A.	2.1
23	Non Refrigerated Micro Centrifuge	Eppendorf AG, Germany	8.0
24	CO ₂ Incubator	Eppendorf AG, Germany	11.0
25	Refrigerated Centrifuge	Eppendorf AG, Germany	8.2
26	Incubator Shaker	Eppendorf, U.S.A.	11.4
27	Refrigerated Large Centrifuge	Eppendorf AG, Germany	20.4
28	Thermoscientific Vortex Mixer	Biolinx Labsystems Pvt Ltd	1.3
29	Water Jacketed CO ₂ Incubator	Thermofisher Scientific Hong Kong Limited	7.8

S. No.	Equipment	Make	Value (in lakh rupees)
30	Rheometer	Anton Paar, Austria	26.0
31	-86° Lab Freezer	Eppendorf India Limited, Chennai	12.5
32	-20° Lab Freezer	Bioline Labsystems Pvt Ltd	7.2
33	CD Spectrometer	Jasco International Co. Ltd, Japan	65.0
34	Flash Chromatography	Yamazen Corporation, Japan	20.2
35	PCR Machine	Eppendorf AG, Germany	10.4
36	Table top Refrigerated Centrifuge	Eppendorf AG, Germany	5.5
37	Low Volume Spectrophotometer	Eppendorf AG, Germany	4.0
38	Thermomixers	Eppendorf AG, Germany	9.2
39	Multimode Plate Reader	Biotek Instruments, U.S.A.	16.1
40	Rotary Vacuum Concentrator	Martinchrist, Germany	4.9
41	Spectral Confocal Laser Scanning Microscope	Leica Mikrosysteme Vertrieb GmbH, Germany	188.9
42	Signal Amplifier	Tabor Electronics Limited, Israel	2.9
43	Tissue Homogenizer	MP Biomedicals India Pvt Ltd, Mumbai	5.0
44	Basic Plasma Cleaner	Diener Electric GmbH, Germany	4.9
45	Signal Amplifier	Minicircuits, U.S.A.	1.4
46	GCMS	Agilent Technologies India Pvt Ltd, Bengaluru	4.7
47	Plant Growth Chambers	Percival Scientific Inc, U.S.A.	48.9
48	Fluorescence Microscope	Olympus Corporation, Japan	26.9

The following equipment was purchased during 2015-16

S. No.	Equipment	Make	Value (in lakh rupees)
1	Analog Oscilloscope	Scientific MES Technik Pvt Ltd, Indore	3.34
2	Water Jet Vacuum Pump	Prashant Industries, Pune	3.70
3	Melting Point Apparatus	Sigma Aldrich Chemicals Pvt Ltd, Bangalore	3.92
4	4-Digit Analytical Balance	Chiron Instruments(I) Pvt Ltd, Mumbai	5.33
5	Recirculating Chiller	Siskin Instruments Company(P) Ltd, Bangalore	6.87
6	Power Pack Basic	BioRad Laboratories India Pvt Ltd, Haryana	1.81
7	Elix Kit	Millipore S.A.S. France	4.88
8	Ice Flaking Machine	Castel Mac SPA, Italy	6.14

S. No.	Equipment	Make	Value (in lakh rupees)
9	Water Purifier	Kent Ro Systems Ltd, Noida	3.40
10	Polarimeter	Advance Research Instruments Co, New Delhi	4.26
11	Hot Air Oven	Spire Automation & Innovation, Pune	2.48
12	Horizontal Laminar Flow	Micro Filt India, Pune	3.22
13	Rack Server	Newtab Technologies, New Delhi	6.49
14	Ultrasonic Cleaner	Raut Scientific & General Traders, Pune	5.10
15	Rotary Evaporator	Heidolph Instruments Gmbh, Germany	25.16
16	Michelson Interferometer	Holmarc Optomechatronics Pvt Ltd, Kerla	25.15
17	Potentiometric Titration Unit	Raut Scientific & General Traders, Pune	21.87
18	Aluminium Heating block	Spire Automation & Innovation, Pune	2.19
19	Centrifuge	Hermlelabortechnik Gmbh, Germany	6.14
20	Library Koha Software	First Ray Consulting, Pune	
21	Binocular compound Microscope	Carl Zeiss Microscopy Gmbh, Germany	7.32
22	Digital Block Heater	GE Healthcare Biosciences Ltd, Hongkong	1.03
23	PCR Machine	Eppendorf AG, Germany	7.02
24	UV-VIS Spectrophotometer	Thermo Electron Scientific Instruments LLC, USA	8.19
25	ATIR-FITR Spectroscopy	Bruker Optic, Germany	23.45
26	pH meter	International Trade Links Instrumentation Pvt Ltd, Mumbai	7.78
27	Gel Documentation System	UVITech Limited, UK	5.70
28	UV-VIS Spectrophotometer	Bibby Scientific Ltd, UK	5.12
29	Refrigerated Shaker	Eppendorf Inc, USA	16.92
30	Microscope	DSS Image tech, New Delhi	15.00
31	Stereozoom Microscope	Olympus Corporation, Japan	5.07
32	Vacuum Pumps	HHV Pumps Pvt Ltd, Bangalore	7.80
33	Panasonic Freezer	Scimed Asia Pte Ltd, Singapore	4.20
34	Gunio Meter	Holmarc Optomechatronics Pvt Ltd, Kerla	3.45
35	Spin Coater	Apex Instruments Co. Pvt Ltd, Kolkata	2.51
36	Digital Sonicator	Qsonica LLC, USA	6.00
37	Syringe Pump	Harvard Apparatus Inc, USA	4.25
38	Digital Polarimeter	Anton Paar Opto Tec Gmbh, Germany	12.87
39	Server	Locuz Enterprise Solutions Ltd, Singapore	28.50

Publications

1. Kapil, N., Singh, A., Singh, M. and **Das, D.** (2016). Efficient MoS₂ exfoliation by cross β -amyloid nanotubes for multistimuli responsive and biodegradable aqueous dispersions. *Angew. Chem. Int. Ed.* 55,7772.
2. Singh, A., Kapil, N., Mahesh, Y. and **Das, D.** (2016). Exfoliated sheets of MoS₂ trigger formation of aqueous gels with acute NIR light responsiveness. *Chem. Comm.* 52,14043-14046.
3. Pandey, B., **Dutta, S.** and Pati, S.K. (2016). Breakdown of electron-pairs in the presence of an electric field of a superconducting ring. *J. Physics: Condensed Matter* 28,195601.
4. Shuo Kang, S., Mathwig, K., **Mampallil, D.**, Kostiuchenko, Z. and S. G. Lemay. (2016). Single-molecule electrochemistry in nanochannels: probing the time of first passage. *Faraday Discussions* (2016).
5. **Mohakud, S.**, Andraus, S., Nishino, M., Sakuma, A. and Miyashita, S. (2016). Temperature dependence of the threshold magnetic field for nucleation and domain wall propagation in an inhomogeneous structure with grain boundary. *Phys. Rev. B* 94,054430.
6. Yellapu, N.K., Pulaganti, M., **Pakala, S.B.** (2016). Bioinformatics exploration of PAK1(P21-activated kinase-1) revealed potential network gene elements in breast invasive carcinoma. *J Biomol Struct Dyn.* doi.org/10.1080/07391102.2016.1216894
7. **Raju, T.S.**, Hegde, T.A. and C.N. Kumar. (2016). Unbreakable PT symmetry of exact solitons in inhomogeneous nonlinear optical media". *J. Opt. Soc. Am. B* 33, 35-40.
8. Kaur, H., Pal, R. and **Raju T.S.** and C.N. Kumar, Butterfly-shaped and dromion-like optical waves in a tapered graded-index waveguide with variable group-velocity dispersion. *Annals of Physics* 374, 366-374.
9. **Goyal, A., Raju, T.S.**, C.N. Kumar and Panigrahi, P.K. (2016). The effect of different background beams on the optical rogue waves generated in a graded-index waveguide. *Optics Communications* 364,177-180.
10. Pal, R., Goyal, A., Loomba,S., **Raju, T.S.** and C.N. Kumar (2016). Compression of optical similaritons induced by cubic-quintic nonlinear media in a graded-index waveguide. *Journal of Nonlinear Optical Physics & Materials* 25,1650033.
11. De, K.K., **Raju, T.S.**, Kumar, C.N., Panigrahi, P.K. (2016). Semirational and symbiotic self-similar rogue waves in a (2+ 1)-dimensional graded-index waveguide. *Journal of Modern Optics* 63,1196.
12. Goyal, R. Gupta, **Thokala Soloman Raju**, and C.N. Kumar, Analytical stabilization of modulated optical similaritons in a tapered graded-index waveguide. *J. Phys. Conference Series* 672,012012.
13. Cosme M., **Ramireddy E.**, Schmülling T., Franken P. and Wurst S. (2016). Shoot- and root-borne cytokinin influences arbuscular mycorrhizal symbiosis *Mycorrhiza* 26(7): 709-720

14. Mohan T. C., Castrillo G., Navarro C., Zarco-Fernández S., **Ramireddy E.**, Mateo C., et al. (2016). Cytokinin determines thiol-mediated arsenic tolerance and accumulation in *Arabidopsis thaliana*. *Plant Physiology* 171: 1418–1426.
15. Purushottam, C. and **Robin. V.V.** (2016). Sky Island bird populations isolated by ancient genetic barriers are characterized by different song traits than those isolated by recent deforestation. *Ecology and Evolution* 6: 7334–7343. DOI: 10.1002/ece3.2475
16. Ramachandran, V., **Robin, V.V.**, Krishnapriya T. and Ramakrishnan. U. (2016). Climatic and geographic barriers drive distributional patterns of bird phenotypes within peninsular India. *Journal of Avian Biology* DOI: 10.1111/jav.01278
17. **Roy, S.**, Schürmann, C.J., Mondal, T., Koley, D., Herbst-Irmer, R., Stalke, D., Herbert W. Roesky. H.W. (2016). Activation of Elemental Sulfur at a Two-Coordinate Platinum(0) Center. *Chem. Eur. J.* 36, 12629-12633. **[VIP, selected as Back Cover];** Highlighted in *Chemistry Views*: http://www.chemistryviews.org/details/ezine/9741381/New_PlatinumSulfur_Complexes.html]

Note: Publications of the faculty with affiliation of IISER Tirupati are included here; the work, either partly or fully may have been carried out elsewhere.

Book Chapter

1. Majumdar, G., Mbau, R., Singh, V., Warner, D. F., Dragset, M. and Mukherjee, R. (2016). Genome-wide transposon mutagenesis in *Mycobacterium tuberculosis* and *Mycobacterium smegmatis*. In "In Vitro Mutagenesis: Methods and Protocols". *Methods in Mol. Biol.* 1498, 3321-335.

Invited Talks

Anilatmaja Aryasomayajula

- ◆ *Estimates of automorphic forms and the QUE conjecture* IISER Mohali, September, 2016

Arunima Banerjee

- ◆ *Vertical Structure of Disc Galaxies and their Dark Matter Halos* Physics and Applied Mathematics Unit, Indian Statistical Institute, Kolkata, December 2016

P.C.Deshmukh

- ◆ *Why do things happen the way they do? An introduction to classical and quantum laws of nature for laypersons* 20 Dec. 2016; *complex behavior of simple systems - Rudiments of chaos theory* GLA University, Mathura, Dec 21, 2016
- ◆ *Precession of planetary orbits in General Relativity* Winter School in Astronomy, Hyderabad, Organized by the University of Western Ontario, London, Canada, March 23, 2017

Vasudharani Devanathan

- ◆ Invited talks to Ph.D students, Institute of Mathematical Sciences, Chennai

R. Lakshmi Lavanya

- ◆ *On a few characterisations of the Fourier transform*, IIT Delhi, May 27, 2016

Sasmita Mohakud

- ◆ *Physics behind musical instruments* INSPIRE Science Camp, S. V. Engineering College, Kadappa, 11-14 December, 2016)

Raju Mukherjee

- ◆ Invited talk at International conference on "Recent trends of chemical and biological science in medicine, natural product and drug discovery" at Berhampur University, Berhampur, March 2017

Eswarayya Ramireddy

- ◆ *Root engineering for improvement of agricultural and ecological traits* Repository of Tomato Genomics Resources (RTGR), University of Hyderabad

V.V.Robin

- ◆ *Genetic and bird song differentiation across natural and anthropogenic barriers on Western Ghat Shola Sky Islands*. Landscape Ecology and Wildlife Conservation meeting organized jointly by Wildlife Institute of India, Dehradun, US Fish & Wildlife Service and Pondicherry University. October 4-6, 2017

B.Subash

- ◆ Series of talks on Real Analysis at the Training programme in mathematics, CFS - NISER, May 23 - June 18, 2016
- ◆ Series of talks on covering Spaces at the Annual Foundation School III, IISER Trivandrum, June 20 - July 16, 2016

- ◆ Series of talks on Topology at the Annual Foundation School I, IISER Trivandrum, December 15-25, 2016

Sivakumar Vallabhapurapu

- ◆ Invited to IISER Pune to contribute 10 lectures in Bio-323 Immunology course during April, 2016

Participation in Conferences / Symposia / Workshops

Arunima Banerjee

- ◆ *Mass Modelling of Superthin Galaxies* (contributed talk) PHISSC conference, National Centre for Radio Astrophysics, Pune, February 7, 2017

P.C. Deshmukh

- ◆ Aarthi Ganesan and P. C. Deshmukh *Photoionization study of barium subshells in the region of 4d threshold*; Sourav Banerjee and P. C. Deshmukh *Determination of photoemission time delay using the RRPA – relativistic and non-relativistic results for outer np-subshells of Ar, Kr & Xe*. 21st National Conference on Atomic, Molecular and Optical Physics (NCAMP-XXI), January, 3-6, 2017, Physical Research Laboratory, Ahmedabad, India.
- ◆ A. Mandal, P. C. Deshmukh, V. K. Dolmatov, A. Kheifets, and S. T. Manson. *Angular dependence of Wigner-Eisenbud-Smith time delay in photoionization: A case study on 4f subshell of atomic mercury*; A. Mandal, P. C. Deshmukh, V. K. Dolmatov, A. Kheifets, and S. T. Manson *Confinement effects and angular dependence of Wigner-Eisenbud-Smith time delay*; Aarthi Ganesan, P. C. Deshmukh, A. S. Kheifets V. K. Dolmatov, and S. T. Manson *Photoionization Time delay in atomic Barium*; S. Banerjee, P. C. Deshmukh, A. Kheifets, V. K. Dolmatov, S. T. Manson *Study of angular dependence of photoionization time delay in $nd \rightarrow \epsilon f$ channels for Zn, Cd and Hg using RRPA*. 30th International Conference on Photonic, Electronic and Atomic Collisions (ICPEAC XXX), 26 July to 1 August 2017, Cairns, Australia

Sudipta Dutta

- ◆ *Atomically Thin Nanomaterials: Graphene and Beyond* (Invited talk), IUMRS- ICYRAM- 2016,

Indian Institute of Science, Bengaluru, December 13, 2016

R. Lakshmi Lavanya

- ◆ *On the Fourier transform on algebras of functions on locally compact Abelian groups* (Contributory Talk), Indian Women and Mathematics (IWM) Annual Conference 2016, University of Hyderabad, 29 June – 1 July, 2016

Raju Mukherjee

- ◆ *New inhibitors and screening strategies for anti-tuberculosis drug discovery* (invited talk) at the International conference on “Recent trends of chemical and biological science in medicine, natural product and drug discovery” at Berhampur University, Berhampur, March 5, 2017
- ◆ *New drugs and biomarkers for Tuberculosis* (invited talk) and chaired a session at the National conference on “Omics and Biomarker analysis” at University of Kerala, December 20, 2016, Thiruvananthapuram

V.V. Robin

- ◆ Invited to chair a session at the Annual Research Seminar of the Salim Ali Centre for Ornithology and Natural History (SACON), Ministry of Environment & Forests, May 25, 2016
- ◆ Chaired and moderated a session on *Careers in Conservation* at Student Conference on Conservation Science Bengaluru, Indian Institute of Science, Bengaluru, September 23, 2016
- ◆ *Impacts of landscape connectivity at different spatial and time scales on bird population* (Invited talk & co-chair of a session), National Conference on Geospatial Technologies for Rural Development (NCGARD 2017), Gandhigram Rural Institute – Deemed University, Gandhigram, February 2-3, 2017
- ◆ *Genetic and bird song differentiation across natural and anthropogenic barriers on Western Ghats Shola Sky Islands* (Invited talk) Landscape Ecology and Wildlife Conservation meeting organized jointly by Wildlife Institute of India, Dehradun, US Fish & Wildlife Service and Pondicherry University, October 4-6, 2017
- ◆ *Biodiversity conservation and integrative research: Case studies from the Western Ghats* (Invited talk) Capacity Building Workshop on

Animal Taxonomy for the Post Graduate students and Young Researchers organized by The Department of Aquatic Biology and Fisheries, University of Kerala, in association with Kerala State Council for Science, Technology and Environment (KSCSTE). March 23-24, 2017

Eswarayya Ramireddy

- ◆ *Root/rhizosphere management for crop improvement under constrained conditions* (Invited talk) National conference entitled “Molecular insights in Genetics and Biotechnology- Emerging Trends and Future Prospects” Osmania University, Hyderabad, February 27-28, 2017

Soloman Raju

- ◆ **Thokala Soloman Raju** and C.N. Kumar. *Unbreakable PT symmetry of exact solitons in nonlinear optical media with higher-order diffraction* International Conference on Fibre Optics and Photonics, IIT-Kanpur, India, December 4-8, 2016 (poster presentation) (Published by Optical Society of America)
- ◆ N. Harsh, **Thokala Soloman Raju**, and C.N. Kumar. *Closed form self-similar solutions and scaling laws for Kerr frequency combs.* International Conference on Fibre Optics and Photonics, IIT-Kanpur, India, December 4-8, 2016 (poster presentation) (Published by Optical Society of America)

B. Subhash

- ◆ Attended the workshop in “K theory and its applications” ISI Bangalore, Dec 26, 2016 - Jan 7, 2017

Events Organized

Vasudharani Devanathan

- ◆ Participated in organization of National Science Day 2017 projects

Sudipta Dutta

- ◆ Organized Workshop on Basic Astronomy and Telescope Making from September 11 – 12, 2016
- ◆ Organized Hands-On Training on Telescope Making and Sky-Watching from February 4-5, 2017

Chitrasen Jena

- ◆ Assisted in organizing **2nd phase of the Astronomy workshop** from February 4-5, 2017

R. Lakshmi Lavanya

- ◆ Participated in organization of National Science Day 2017 projects

Dileep Mampallil

- ◆ Organized a Workshop on 'Physics experiments using computer interface' by Dr. Ajith Kumar from Inter-University Accelerator Center, New Delhi. The workshop explained how to interface physics experiments with computer using Python

Eswarayya Ramireddy

- ◆ Assisted in organizing Science day celebrations; distributed cherry tomato seedlings to school children in order to increase awareness of clean and green environment

Membership and Affiliation

Arunima Banerjee

- ◆ Associate, Inter University Centre for Astronomy & Astrophysics, Pune, India
- ◆ Life Member, Astronomical Society of India

P.C. Deshmukh

- ◆ Member, Indian Society of Atomic and Molecular Physics
- ◆ Member, American Physical Society

Sudipta Dutta

- ◆ Editorial Board Member, Materials Science Research India
- ◆ Member, American Physical Society (APS)

R. Lakshmi Lavanya

- ◆ Member, Ramanujan Mathematical Society

Sasmita Mohakud

- ◆ Editorial Board Member, Scientific Federation Journal of Metallurgical Science
- ◆ Member, American Physical Society (APS)

Raju Mukherjee

- ◆ Life member, Proteomics Society of India

Soloman Raju

- ◆ Member, Optical Society of America (OSA)

V.V. Robin

- ◆ Member, International Biogeography Society
- ◆ Member, Bombay Natural History Society, India

Eswarayya Ramireddy

- ◆ Member, German Botanical Society (DBG)
- ◆ Member, International Society of Root Research (ISRR)
- ◆ Member, European Plant Science Organization (EPSO)

Sivakumar Vallabhapurapu

- ◆ Member, American Society of Hematology, U.S.A.

International Visits

Sudipta Dutta

- ◆ Visited the laboratory of Prof. Katsunori Wakabayashi, Kwasei Gakuin University, Sanda, Kobe, Japan during 15-23 May, 2016 for collaborative research

News and Events

Awareness Workshop for Parents and Students

May 1, 2016

A workshop to create awareness among parents and students about basic science teaching and research and opportunities for career in basic science was held on May 01, 2016. Dr. A.A. Natu, Dr. V.S. Rao and Dr. Bhas Bapat interacted with parents and students, in explaining them the need for basic science research, career opportunities, and what institutes like IISERs offer to those who are interested in basic sciences. About 80 people attended the workshop. Parents and students were also taken around the laboratories. Faculty also spent time with students and parents explaining the importance of basic sciences and the way the teaching program is organized in the institute.



Workshop on Basic Astronomy and Telescope Making

September 11-12, 2016

This workshop was organized in collaboration with IUCAA, Pune outreach team. The participants were from IISER Tirupati and IIT Tirupati. During the workshop, there were following talks on basic astronomy including basic optical and radio astronomy, estimation of cosmic lengths, optics of telescope and sky-mapping.

Telescopes: Small & Big by Samir Dhurde

Optics of Telescopes by Nirupam Roy

Making a Telescope by Samir Dhurde

Mapping the Sky by Samir Dhurde

The field of Astronomy for young students by Nirupam Roy

Cosmic Lengths by K.P.Yogendran

Our Universe in different lights by Nirupam Roy

A 6" telescope was assembled during the workshop which is currently being used by the undergraduate students of IISER Tirupati for stargazing and amateur astronomical observations on regular basis.



Inter-IISER Library Meeting

December 20-21, 2016

IISER Tirupati Library hosted 10th meeting of the 'IISER Library Consortium'. Librarians of all IISERs attended the meeting. Important agenda and outcome of the meeting was discussion with publishers and finalization of the subscriptions to various online journals and e-books required for all IISERs.



Visit of Nobel Laureate Prof. Serge Haroche

January 04, 2017

104th Indian Science Congress was held in S.V. University in January 2017, where several Nobel Laureates were invited. IISER Tirupati extended invitation to the Laureates to visit the campus and deliver a science lecture. On Jan 4, 2017, Prof. Serge Haroche (Nobel Prize in Physics 2012) visited the campus and spent half a day lecturing and interacting with our students. Followed by this, he visited the lab facilities.



Hands-On Training on Telescope Making and Sky-Watching

February 4 – 5, 2017

This workshop was organized in collaboration with IUCAA, Pune outreach team. The participants were from IISER Tirupati. During the workshop, there was hands-on training on building a 6" telescope from readily available materials including the grinding and polishing of telescope mirrors. In addition to that, there were sky-watching sessions using the telescope that was made during the workshop along with the one made during the previous workshop in September 2016. This workshop has trained the undergraduate students to build very low-cost telescope that can be used for amateur astronomy.



Measuring the focal Length of the mirror



Grinding of telescope mirror



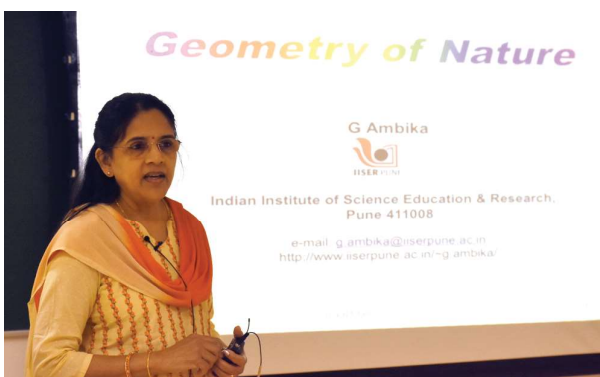
Group photo with two telescopes.
The one to the left was made during the workshop.

National Science Day

February 28, 2017

Several programs were organized to observe National Science Day. Prof. G. Ambika from IISER Pune delivered the Science Day lecture on "The Geometry of Nature". By

quoting several examples she brought forth the point that fractal is a unique concept that is universal and can describe all objects from bacteria to galaxies. Drs. Raghunath Ramabhadran, Sudipta Dutta and Sivakumar Vallabhapurapu, gave talks on the significance of the research that led to the Nobel Prizes 2016 in Chemistry, Physics and Biology, respectively. There was a science quiz program organized by the students. Several models that depict scientific principles were displayed by the students. The Unnati outreach team arranged a visit by the local school children and they were given saplings to spread the message of green and clean environment. In the evening the Astroclub arranged a skywatch program.



Foundation Day

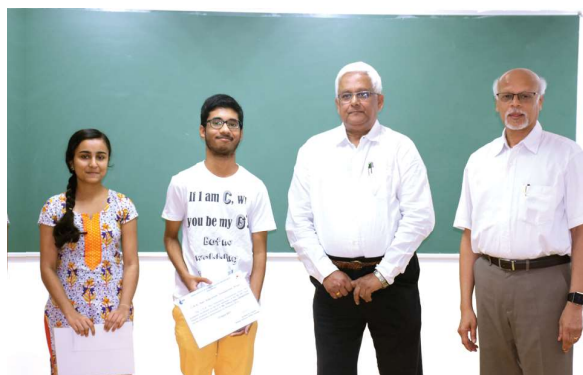
April 12, 2017

As a part of the Foundation Day celebration, the second Foundation Day Lecture was delivered by Dr. Dipankar Chatterji, Honorary Professor, Molecular Biology Unit, Indian Institute of Science, Bengaluru, on the topic "Central Dogma and antibiotic resistance". During this talk, Prof. Chatterji also addressed the importance of basic science research and how it can lead to important applications for the wellbeing of humans. The second issue of "Dhwani", the students' magazine, fully compiled, edited and designed by the students was released on this occasion. The following students who have obtained highest GPA in Spring 2015-16 and Monsoon 2016 were given awards.

CNR Foundation Academic Excellence Award – Ranadeep Roy (Spring 2015-16; 2nd Semester), and Dibya Saha and Karthika Krishna Kumar (Monsoon 2016; 1st Semester).

Academic Excellence Award – Ranadeep Roy (Monsoon 2016; 3rd Semester)

Award for Extracurricular Activities – Kaushal Pillay and V. Thamara Valli



International Day of Yoga

June 21, 2016

International Yoga Day was observed at the Institute by conducting a training session on yoga practices. Shri Shiva Kumar, a well-known yoga practitioner in Tirupati guided the participants in various yoga postures along with their benefits. Faculty, non-teaching staff and students actively participated in this event.



Swachhata Pakhwada

Swachhata Pakhwada was organized at IISER Tirupati during September 1-15, 2016 and consisted of the following activities:

- (i) Banners regarding Cleanliness and Swachhta Pakhwada were displayed at multiple locations in the institute.

- (ii) Mass Pledge on cleanliness was taken by students, and staff and faculty of IISER Tirupati.
- (iii) An essay writing competition was conducted for the students on Cleanliness on September 15, 2016.
- (iv) Inspection of sanitary facilities in the complete campus and the hostel was carried out by the officials.
- (v) “Swachh Day” was observed and cleanliness drive was carried out by the faculty and staff in and around the Institute campus. Similarly, students participated in carrying out cleaning activities and started cleaning their hostel and hostel rooms.
- (vi) The water flow through taps was brought down by adjusting the individual valves.
- (vii) Student-run Environmental Club “Prakriti” organized a discussion on various issues like waste management - collection, processing and recycling and also discussed on proposal for green and energy-efficient campus. Students proposed their ideas on recycling, reuse, waste management, clean and green campus, etc. Dr. V.V.Robin and Dr. Vasudharani Devanathan, faculty members at IISER Tirupati were a part of this activity.



Independence Day

August 15, 2016

Dr. A.A. Natu, Visiting Faculty at IISER Pune was the guest of honor for the Independence Day. He hoisted the national flag on the occasion and addressed the students. An essay writing and poem writing competition and a quiz program on the topic “Freedom Movement of 1857 and the Independence Struggle” was organized for BS MS students.



Republic Day

January 26, 2017

Prof. Sudha Deshmukh, Dean Academic Affairs unfurled the national flag and addressed the students



Colloquia and Seminars

Colloquia

Science, Technology and the Quantum

Prof. Ganapathy Baskaran, Institute of Mathematical Sciences, Chennai

August 12, 2016

Plane Geometries

Prof. S. Kumaresan, University of Hyderabad

August 19, 2016

Life beyond graduate school...snippets from the journey of drug discovery

Dr. V. Balasubramanian, Co-founder and president, R&D, Bug works research India, Bengaluru

August 26, 2016

Fundamental Theorem of Algebra (FTA) through matrices

Prof. Anant Shastri, IIT Bombay

September 2, 2016

Interdisciplinary science from a user perspective

Prof. Gautam Menon, Theoretical Physics and Computational Biology groups, Institute of Mathematical Sciences, Chennai

September 9, 2016

Signaling to chromatin: Tale of SATB family genome organizers

Prof. Sanjeev Galande, IISER Pune

September 16, 2016

Responsive Nano-biomaterials for biomedical applications

Dr. Praveen Vemula, Institute for Stem Cell Biology and Regenerative Medicine (InStem), Bengaluru

October 07, 2016

Fundamentals on nanoelectronics: A theoretical perspective

Prof. Swapan K Pati, JNCASR, Bengaluru

October 28, 2016

Novel Synthetic Strategies for Medicinally Important Molecular Scaffolds

Dr. Maddali L. N. Rao, Department of Chemistry, Indian Institute of Technology Kanpur

November 18, 2016

Group Theory: The Language of Symmetry

Prof. Amritanshu Prasad, Professor, Institute of Mathematical Sciences, Chennai

November 25, 2016

The Tau of Ramanujan

Prof. Eknath Ghate, TIFR, Mumbai

January 05, 2017

Mathematics and Sets

Dr. Nitin Nitsure, TIFR, Mumbai

February 03, 2017

The imprint of the early universe on cosmological observations

Dr. Pravabati Chingangbam, Indian Institute of Astrophysics, Bengaluru

February 10, 2017

Receptor Guanylyl Cyclase C, cGMP and Bacterial Toxins: Getting to the Gut of the Matter

Prof. Sandhya S. Visweswariah, IISc Bengaluru

February 17, 2017

Quiet Time In Stem Cells: The Balancing Act of Reversible Arrest

Prof. Jyotsna Dhawan, CSIR Center for Cellular & Molecular Biology, Hyderabad & Institute for Stem Cell Biology & Regenerative Medicine, Bengaluru

February 24, 2017

Some Questions on Uncertainty Principles in Fourier analysis

Prof. Alladi Sitaram, Indian Statistical Institute, Bengaluru

March 3, 2017

What is the Hodge Conjecture?

Prof. Kapil Paranjape, IISER Mohali

March 10, 2017

The female mate-choice process on an antelope lek

Dr. Kavitha Svaran, Centre for Ecological Sciences, IISc, Bengaluru

March 24, 2017

Methods in the madness: Descriptors and the rational design of materials from first principles

Dr. Shobhana Narasimhan, JNCASR, Bengaluru

April 7, 2017

Seminars

Playing with fire: Reconstructing ancient pyrotechnologies in South India

Praveena Gollapalli, Rhode Island College, U.S.A.

June 23, 2016

Identification of gorget, a novel homeodomain transcription factor that is part of the gene regulatory network that determines primitive eumetazoan body axis

Prof. Sanjeev Galande, IISER Pune

September 17, 2016

Heterobimetallic Complexes – Combining Early and Late Transition metals: Chemistry and Catalysis

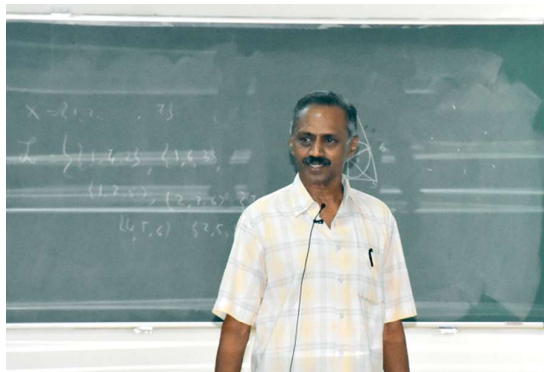
Dr. Kothanda Rama Lakshmanan Pichaandi, University of California, Santa Barbara, U.S.A.

October 3, 2016

The interaction of Radiation with Matter: New Frontiers

Prof. S.T. Manson, Georgia State University, Atlanta, U.S.A.

March 9, 2017



Personnel

During the first year of operations, teaching and non-teaching positions were filled on ad-hoc basis on contractual terms with a consolidated salary. This was necessary to initiate the teaching program and to create necessary facilities for teaching and research program at the temporary campus. During the current year, MHRD has sanctioned 20 faculty positions and 34 non-faculty positions. Fresh recruitments of faculty were made as per the sanctioned strength. Recruitment process for non-teaching posts has been initiated. Personnel details as of 31 March 2017 are given below.

Faculty

Name	Discipline	Date of joining
Associate Professor		
Sivakumar Vallabhapurapu	Biology	10.03.2017
Assistant Professors		
Raju Mukherjee	Biology	07.03.2017
Nandini Rajamani	Biology	07.03.2017
Vasudharani Devanathan	Biology	07.03.2017
Eswarayya Ramireddy	Biology	08.03.2017
Raghunath O. Ramabhadran	Chemistry	06.01.2017
Sudipta Roy	Chemistry	09.01.2017
Ashwani Sharma	Chemistry	11.01.2017
Gopinath Purushothaman	Chemistry	16.02.2017
Sudipta Dutta	Physics	09.01.2017
Dileep Mampallil	Physics	09.01.2017
Chitrasen Jena	Physics	01.02.2017
Arunima Banerjee	Physics	10.03.2017
R. Lakshmi Lavanya	Mathematics	09.01.2017
Girja Shankar Tripathi	Mathematics	09.01.2017
Gururaja H.A.	Mathematics	09.01.2017
N.V.Anilatmaja Aryasomayajula	Mathematics	11.01.2017
Veketasubramanian C.G.	Mathematics	02.03.2017
K.P. Yogendran	Physics	on deputation from IISER Mohali
Project Scientists		
Sasmita Mohakud	INSPIRE Faculty	
Dipti Sharma	SERB-NPDF	

Faculty on contract appointment

B. Subhash
Pakala Suresh Babu
Robin Vijayan
Thokala Solman Raju
Lakshmana Rao Pinninti

Visiting Faculty

Pranawa C. Deshmukh
Sudha Deshmukh

Technical Staff (contractual)

K. Ranjith Kumar	Technical Assistant (on deputation)
V. Srikanth	Technical Assistant (IT)
K. Murugaraj	Library and Information Assistant
Sai Ganesh Srihasam	Technical Assistant
M. Purushotham	Laboratory Technician
C. Geetha	Technical Assistant
Tarachand C.	Teaching Assistant
Kuna Sivakumar	Junior Engineer (electrical)
K. Ramesh Yadav	Technical Assistant
Anup Chandra Pal M	Technical Assistant
Anupama Shirke	Technical Assistant
Shekh Saddam Husein	Technical Assistant
Shekh Hamja	
Sasi Kumar	Technical Assistant
Sujata Katta	Laboratory Assistant

Non-teaching Staff

Mariamamma John	Incharge, IISER Tirupati Cell
Inderpreet Singh Kohli	Assistant Registrar (on deputation)
Chaman Mehta	Assistant Registrar
Nikhilasri Vardi	Office Assistant (Multi-skill)
N. Dileep Kumar	Office Assistant (Multi-skill)
Anuproju Rajesh	Office Assistant (Multi-skill)
Ramesh Karigani	Office Assistant (Multi-skill)
Nagarjuna Paidisetty	Office Assistant (Multi-skill)
K. Vasudeva Naidu	Security Supervisor
Nimmy K. Prasad	Nurse
S. Renuka	Library and Information Assistant (Trainee)
Dattaprasad Gavde	Manager (Guest House and Dining)

Medical Officer (part-time)

I.Vamsi Krishna

Resigned

Dibyendu Das 11-01-2017

1 Biology

1.1 Cancer Biology and Immunology

Bim is a proapoptotic gene that is repressed in different types of cancers. But the expression of *Bim* gene is highly critical to maintain the normal homeostasis as evidenced by the *Bim* knock-out mice which display severe immunological disorders. The molecular mechanism by which the regulated expression of *Bim* is achieved in the immune system, and the mechanism by which the *Bim* gene is repressed in cancer is not completely clear. An insight into the regulation of the *Bim* gene would be helpful to develop strategies to selectively induce the *Bim* gene expression in cancer cells. Towards this end, **Dr. Sivakumar Vallabhapurapu's** lab cloned different regions of the *Bim* promoter into a luciferase reporter plasmid. Further studies would reveal the importance of different promoter regions of the *Bim* gene in its regulation.

1.2 Cell Biology and Molecular Oncology

P21-activated kinase-1 (PAK1) is an enzyme associated with multiple metabolic networks and different types of cancers. Hence, there is a need to study the global network map of PAK1 to understand its role and regulatory mechanisms by means of its significant molecular interactive partners. **Dr. Suresh Babu Pakala** is using bioinformatics tools to explore its global biological functions in breast cancer. The gene expression data-sets of PAK1 were obtained from the Cancer Genome Atlas-cBioportal and Gene Cards databases and found that 91 PAK1-related genes are associated with breast cancer. Gene Ontology and Kyoto Encyclopedia of Genes and Genomes pathway investigations of 91 genes via Database for Annotation Visualization and Integrated Discovery bioinformatics resource revealed that, PAK1, being a major kinase, is associated with several metabolic pathways and involved in phosphorylation, signal transduction, apoptosis, biosynthesis and majorly cancer related cell signalling pathways. The PAK1 interaction network derived from STRING and Cytoscape revealed that the genes Signal-Transducer-and-Activator-of-Transcription-3 (STAT3), Cyclin-D1 (CCND1), Mitogen-activated protein kinase-1 (MAPK1), Ras-Homolog-Family-Member-A (RHOA) and Catenin-beta-1 have high degrees of interaction where CCND1, MAPK1 and RHOA have direct interaction with PAK1. Finally, the global expression map of PAK1 and its related genes was derived as topological frame that helped to explore and investigate PAK1 interactions. Further, the molecular modelling studies of PAK1 with its major interacting partners RHOA and STAT3 helped to explore the key interactive residues of PAK1 structure. This information can be used to develop novel therapeutic and control strategies against breast cancer.

Figure 1. (A) Molecular docking interaction of PAK1 (aqua green) with RHOA (pink); (B) Molecular docking interaction of PAK1 (aqua green) with STAT3 (blue). The interacting interfaces of both the docking complexes are represented in stick model. Both RHOA and STAT3 were observed to bind with the same binding site of PAK1. The complexes are stabilized by hydrogen bonds, Pi bonds and salt bridges which are represented as dotted lines in the complexes (Dr. Suresh Babu Pakala)

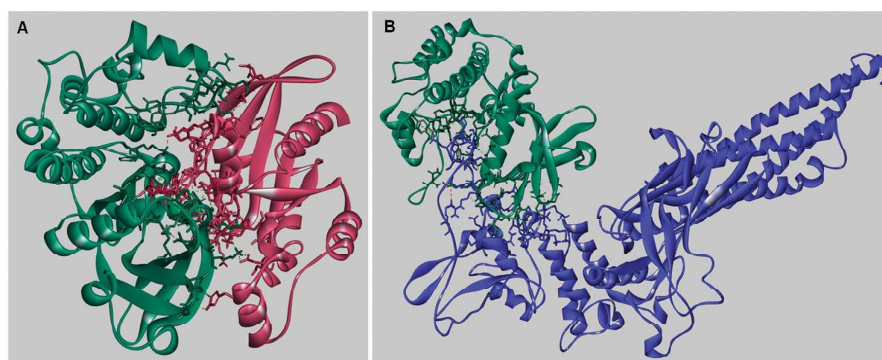
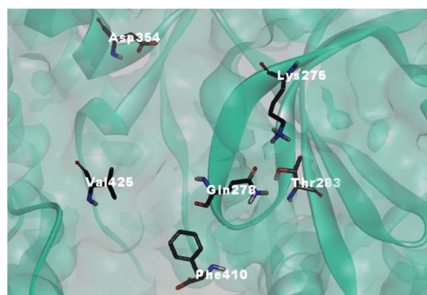


Figure 2. Key functional residues of PAK1 involved in intermolecular interactions with RHOA and STAT3 (Dr. Suresh Babu Pakala)



1.3 Molecular Microbiology

The lipid layer in mycobacteria confers most of the intrinsic resistance against drugs by providing a permeability barrier for both hydrophilic and hydrophobic compounds and lack of the molecular determinants of small molecule penetration across the mycobacterial outer membrane makes it nontrivial to predict the most favorable structural features that are required for efficient uptake of antibiotics. This is the focus of an ongoing project in **Raju Mukherjee's** laboratory, where label free LC-MS based proteomics is employed to identify outer membrane proteins (OMPs) with potential role in permeation of small hydrophilic molecules through the outer membrane, with the aim of identifying the specific class of compounds that are substrates for the OMPs and thus allow categorization of the surface properties of chemical probes that should be prioritized in the critical path for an effective permeation based inhibitor design. A protocol has been standardized and a screen was performed based on negative selection of a MycomarT7 derived Tn mutant library to identify the genes essential for uptake of inorganic nitrate. Presently, the same approach is being employed to identify outer membrane transporters of asparagine, as a part of a project on nutrient uptake in Mtb.

1.4 Plant Biology

In one of the projects, **Dr. Eswarayya Ramireddy** is studying the role of root cap-specific mannose-binding lectin proteins and LEA proteins in root development and their implications in shaping the plant response to environmental cues. The aim of the proposed study is to elucidate the mechanisms behind the role of root cap perception and signal transduction of environmental cues. Since members of jacalin related lectins (JRLs) are specifically expressing in the root cap cells and are regulated by phytohormones like auxin and cytokinin, it is hypothesized that these JRLs might play pivotal role in root cap growth and development and the integration of environmental signals into plant root development. As a first step towards functional characterization of root cap-specific jacalin related lectins (JRLs), promoter fragments of 3 JRLs were cloned and they will be transformed into Arabidopsis.

In another project, Dr. Ramireddy is focusing on research on underutilized/ neglected crops. These crops assume recognition and significance because of their superior nutritional qualities and tolerance of extreme abiotic stresses. Grain amaranth is one such underutilized crop, which tolerates full sun, drought, high temperatures and low soil fertility. Establishing a TILLING/Eco-TILLING platform along with Next Generation Sequencing technologies (NGS) and CRISPR-Cas to identify and screen the mutant population for the desired genes is being addressed with the ultimate goal of transfer the beneficial agronomical traits to crop plants.

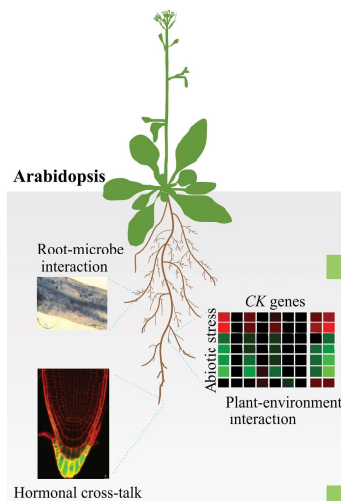
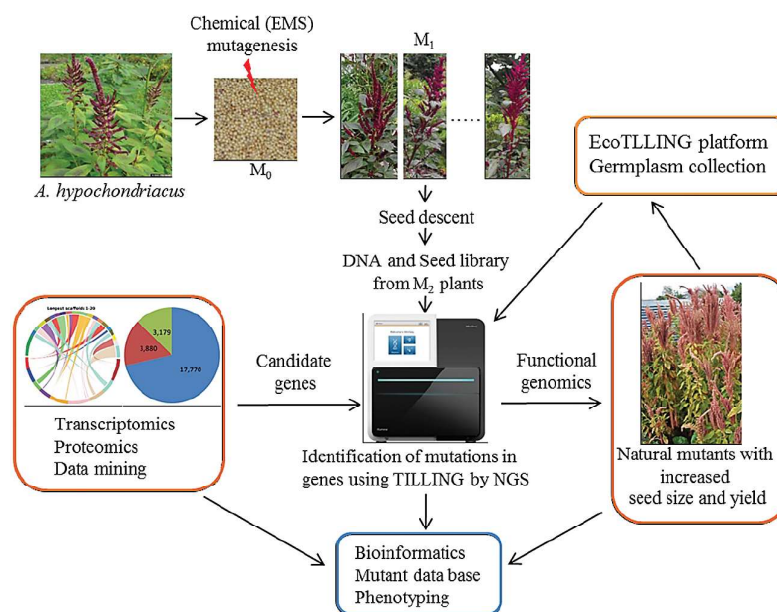


Figure 3: Establishment of grain amaranth (*A. hypochondriacus*) TILLING platform (Dr. Eswarayya Ramireddy)



1.5 Ecology

Dr. V.V. Robin addressed the following areas of research during this period.

A. Landscape change in the Palani hills: In this study conducted with collaborators, landscape changes over four decades from 1970 until recent times were examined. The montane habitat on the Sky Islands of Western Ghats consists of a natural matrix of forests and grasslands, but grasslands have been historically ignored and provided lower protection.

Significant findings of this study are: (1) from 1973 to 2014 timber plantations and agricultural areas increased dramatically by 1097% and 236% respectively; 66% of the grasslands have been lost during this period, (2) based on the analyses of patch sizes, it was concluded that most recent change in timber plantations (highly diffuse and patchy) may have resulted from invasive spread rather than directed planting, while agriculture has increased by expansion of existing patches, and (3) the causes for this change appear to be based on a mix of social, economic and political factors.

B. Automated song identification: This project is funded by DST-SERB and is a collaborative project with human speech engineers (IIT Mandi) to create algorithms to automate detection of native birds. The project has started recently and data collection is in progress.

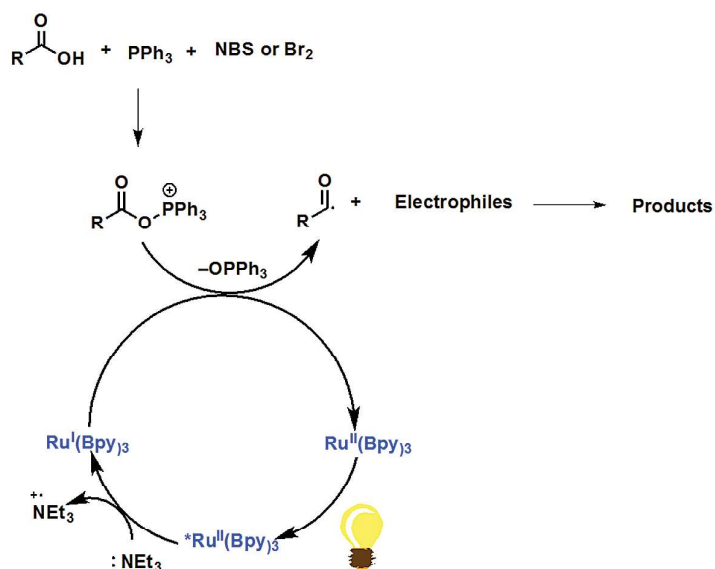
C. Forest owlet project: This project was initiated in collaboration with SACON to examine the genetic and niche relationships of a critically endangered owlet in Central India. A manuscript has been submitted based on this study, and data on the niche models of the species, examining effects of climate change on this endangered bird is being analyzed.

2 Chemistry

2.1 Organic Synthesis

Visible light photoredox catalysis is one of the most rapidly growing fields of organic chemistry. The general principle behind this mode of catalysis is the formation of reactive organic radicals via single electron transfer (SET) from the photosensitizer to

Figure 4: Generation of acyl radicals from acyloxyphosphonium salts using visible light photoredox catalysis (Dr. Gopinath Puroshothaman)

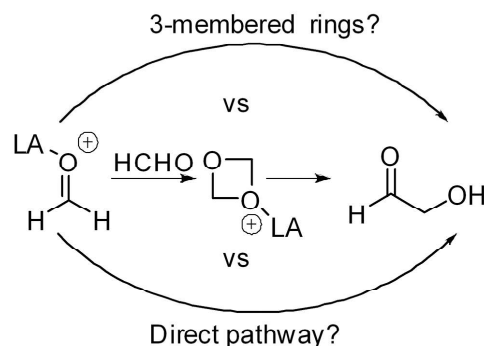


the organic substrates. Research of **Dr. Gopinath Purushothaman** is focused on the generation of acyl radicals and its applications in organic synthesis. Acyl radicals are key species in organic chemistry as they find applications in the formation of many interesting molecular scaffolds via addition reactions. They are most commonly generated from carboxylic acid derivatives using harsh reaction conditions and thus less explored in organic synthesis. Carboxylic acids, which are widely distributed, and cheap raw materials, are generally not used for the generation of acyl radicals directly. Thus, designing a strategy to use these ubiquitous starting materials directly for the generation of acyl radicals is very desirable. Acyloxyphosphonium salts, which can be prepared in situ from carboxylic acids using triphenyl phosphine and bromine/NBS, are reactive intermediates well known for transferring acyl groups. These reactive intermediates will be used for generating acyl radicals via visible light photoredox catalysis as shown in Figure 4. These acyl radicals can then react with appropriate carbon centered electrophiles to form the corresponding ketones.

2.2 Computational and Quantum Chemistry

A significant part of prebiotic chemistry involves the study of how small molecules leading to life were themselves generated under putative abiotic conditions. The formose reaction plays a critical role in this context. It involves the generation of sugars from a very simple precursor – formaldehyde. The widely accepted first step in this reaction is the conversion of formaldehyde to glycolaldehyde. However, despite extensive studies, the mechanism of the first step is entirely unclear. **Dr. Raghunath Ramabhadran** uses electronic structure theory to study the mechanism of this

Figure 5: Possible route for the prebiotic conversion of formaldehyde to glycolaldehyde (Dr. Raghunath Ramabhadran)



reaction under protonic/Lewis acidic/free radical conditions, and to ascertain the plausibility of the various reaction pathways under mesophilic (moderate temperature) and thermophilic (high temperature) conditions.

3 Mathematical Sciences

3.1 Number Theory

In collaboration with Dr. Baskar Balasubramanyam of IISER Pune, **Dr. Anilatmaja Aryasomayajula** is working on deriving optimal qualitative and quantitative estimates of automorphic cusp forms defined over quaternion algebras, using techniques coming from heat kernel theory and geometric analysis. As an application, an average version of the QUE conjecture was derived, when the underlying Shimura variety is compact. Using certain heat kernel analysis, optimal estimates of classical Hilbert modular cusp forms were also derived. In another project, the results of the above project were optimally extended to Picard modular cusp forms.

In the third project, off-diagonal quantitative estimates of the Bergman kernel associated to tensor-powers of the cotangent bundle defined on a hyperbolic Riemann surface of finite volume were derived. The estimates are optimally derived, and depend only on the injectivity radius of the hyperbolic Riemann surface, and the tensor-power of the cotangent bundle.

Using the results described above, further work to using the results from first two projects optimal estimates of individual cusp forms associated to Fuchsian subgroups are being derived. These estimates will be extended to higher dimensions. Methods from heat kernel theory and geometric analysis are also being extended to understand certain Mumford forms, which are also known as Teichmüller forms.

3.2 Harmonic Analysis

In 2009, S. Aleskeret *al* [*Amer. Math. Soc. Transl.*(2) 226 (2009), 11-26] characterized the Euclidean Fourier transform as essentially the only bijection on the class of tempered distributions onto itself which interchanges the convolution and point wise products. **Dr. Lakshmi Lavanya** is interested in checking if the hypotheses involving the class of tempered distributions could be replaced with those involving only the Schwartz class functions. Such a characterization of the Fourier transform on \mathbb{R}^n was obtained and then on the more general class of locally compact Abelian groups. Later similar results were obtained for a more general class of pairs of algebras of functions on locally compact Abelian groups, which we call Fourier twins. This work has been published (online) by the journal *Monatshefte für Mathematik*. These results lead to studying multiplicative bijections on families of functions defined on general locally compact groups, which are not necessarily Abelian. These results have been submitted for publication to an international journal.

Recently, C.L. Williams *et al.* [*Fourier Anal. Appl.* 23, No.3 (2017), 660-678] studied invariance properties of a family of integral transforms on the Euclidean space, which generalizes the Euclidean Fourier transform. It is natural to ask a similar question for generalized integral transforms for functions defined on the Heisenberg group, which is the current focus of research.

3.3 Differential Geometry

The work carried out by **Dr. H.A. Gururaja** proved C^0 -conjugacy rigidity of any Flat Cylinder among two different classes of metrics on the cylinder, namely among the class of rotationally symmetric metrics and among the class of metrics without conjugate points. Current focus is to see whether the no conjugate point condition is redundant.

3.4 Algebra and Geometry

Dr. Girija Shankar Tripathi has been working on two research programs. One is about higher Grothendieck-Witt theory and Witt theory. This research has many focal points that are being studied through various collaborative projects with Amlendu Krishna (TIFR), and Marco Schlichting and HengXie (University of Warwick). The other research program is about chromatic aspects in motivic homotopy theory with algebraic Morava K-theories as central points. This work is in collaboration with Markus Spitzweck (Universitaet Osnabrueck) and Paul Arne Ostvaer (University of Oslo), and at the moment this research project has been successful in providing multiplicative structures on algebraic Morava K-theories over certain fields.

3.5 Topology

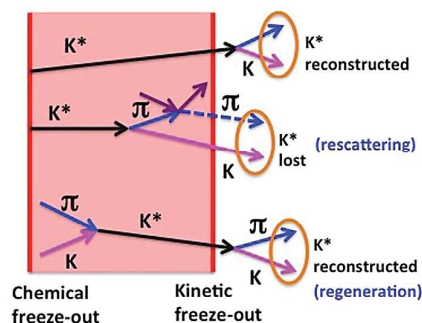
Dr. Subhash's work deals with understanding the vector field problem for manifolds generalising projective Stiefel manifolds called "right generalised projective Stiefel manifolds". These are obtained as quotients of Stiefel manifold by generalising the circle action on the Stiefel manifold. He has also been trying to understand the K - groups of quotient spaces of orthogonal group, which generalises Stiefel manifolds.

4 Physical Sciences

4.1 Experimental High Energy Physics

The main goal of ultra-relativistic heavy-ion experiments at the Relativistic Heavy Ion Collider (RHIC) and Large Hadron collider (LHC) is to create and characterize the new state of matter with partonic degrees of freedom, namely the Quark Gluon Plasma (QGP). The existence of this new state of matter has been predicted by the fundamental theory of strong interactions called Quantum ChromoDynamics (QCD). QGP is also believed to have existed during the first few microseconds after the Big Bang, and understanding of its properties could provide valuable insights on the evolution of our Universe.

Figure 6: Schematics diagram of rescattering and regeneration effects on K^* reconstruction (Dr. Chitrasen Jena)



The study of resonance production, being studied by **Dr. Chitrasen Jena** plays an important role both in elementary and in heavy-ion collisions. In pp collisions, it contributes to the understanding of hadron production as the decay products of resonances represent a large fraction of the final state particles. In heavy ion collisions, resonances are a sensitive probe of the dynamical evolution of the fireball.

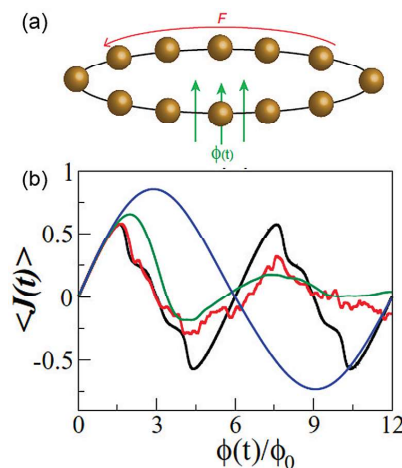
Due to their short lifetime (a few fm/c), a significant fraction of resonances decay inside the hot and dense medium and their hadronic daughters interact with the medium during the fireball expansion. The final reconstructable resonance yields depend on the chemical freeze-out temperature, the scattering cross sections of its decay products, and the timescale during which rescattering and regeneration are active in the hadronic phase, i.e., the time between chemical and kinetic freeze-out. Therefore, the effect of rescattering and regeneration can be studied by comparing resonances with different lifetimes such as K^* and Φ whose lifetimes are 4.16 ± 0.05 fm/c and 46.3 ± 0.4 fm/c, respectively. Figure 6 presents the schematics of the collision evolution where the chemical freeze-out is followed by the kinetic freeze-out and also shows the effect of rescattering and regeneration on reconstruction of K^* . These resonances can also contribute to the systematic study of the enhancement of baryon-to-meson ratios at intermediate P_T and particle species dependence of the partonic energy loss in the deconfined medium at high P_T .

Preliminary results for K^* and Φ production in Pb-Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV using the ALICE detector are very promising.

4.2 Theoretical Condensed Matter Physics

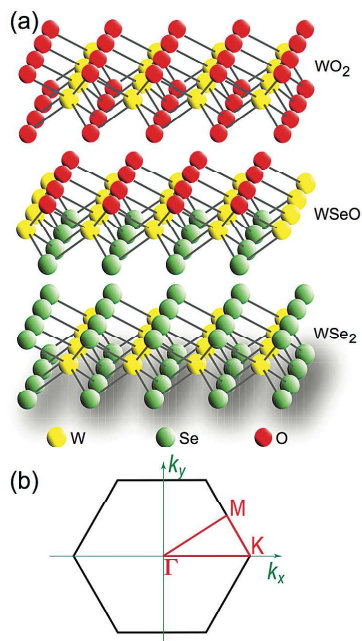
Field induced superconductor to metal transition: **Dr. Sudipta Dutta's** group is investigating the quantum dynamics of quasi-one-dimensional superconducting ring in the presence of an external electric field in terms of time-dependent Aharonov–Bohm flux in the perpendicular direction. Electric field breaks the electron pairs, a signature of the superconducting phase and the system enters into a metallic phase. This phenomenon has been confirmed by flux-quantization of time-dependent current and pair correlation functions.

Figure 7: (a) Schematic of quasi-one-dimensional ring with 12 sites. The time dependent perpendicular AB flux, $\Phi(t)$ generates the circulating electric field, F in the ring. (b) The evolution of current density, $\langle J(t) \rangle$ as a function of AB flux with varying F for attractive Coulomb potential, $U = 1.5$ in Hubbard Hamiltonian. For weak electric field, there exist superconducting phase with formation of electron pairs, as indicated by the double peak. With increase in field strength, the current density shows the extended AB period, a signature of metallic phase (Dr. Sudipta Dutta)



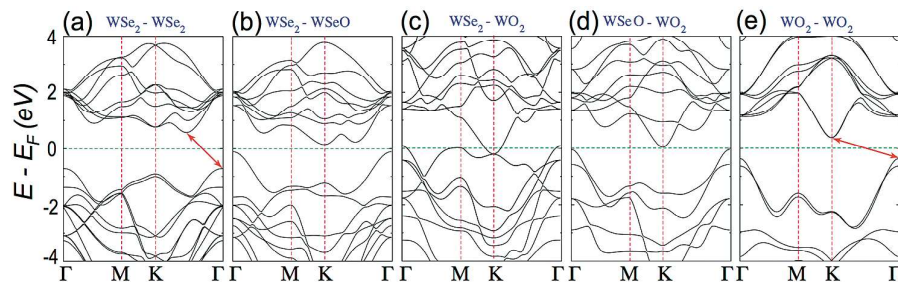
Hole-Doping Through Layer-by-Layer Oxidation of Transition Metal Dichalcogenides: Dr. Dutta's group has investigated the oxidation mechanism of mono and few-layers of transition metal dichalcogenides (TMDs), MoS_2 and WSe_2

Figure 8: (a) The schematic representation of partially oxidized trilayer 2H-WSe₂ with trigonal prismatic structure. In the top layer, all the Se atoms are replaced by O atoms to make it a WO₂ layer. In the middle layer, the Se atoms of the top surface are replaced by O atoms to make it WSeO stoichiometry. The bottom layer remains intact as WSe₂. (b) The hexagonal Brillouin zone of WSe₂ with location of high-symmetric points (Dr. Sudipta Dutta)



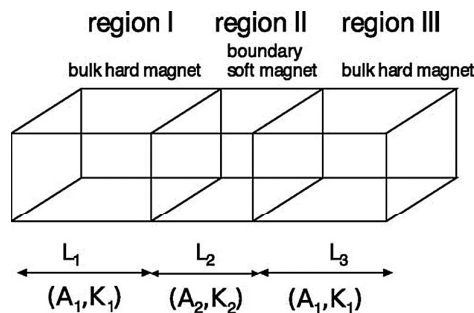
within first-principles calculations. The replacement of sulfur/selenium (S/Se) atoms by oxygen (O) atoms is energetically more favorable. The partially oxidized systems are prone to further oxidation. The self-limiting layer-by-layer oxidation as observed in a previous study (Fig.8(a)), takes place due to screening of oxidizing agents by the amorphous composite over the pristine layers of TMDs. The oxidized layers inject holes to the underlying MoS₂/WSe₂ layers, making the whole system metallic. The partially oxidized TMDs provide a wide range of interesting electronic properties (Fig.9). It can be predicted that existence of positive trions in partially oxidized TMDs, which can be exploited for optoelectronic applications.

Figure 9: The band structures of bilayer (a) WSe₂ – WSe₂, (b) WSe₂ – WSeO, (c) WSe₂ – WO₂, (d) WSeO – WO₂ and (e) WO₂ – WO₂ systems. The horizontal (vertical) dotted lines show the location of Fermi energy (high-symmetric points, as shown in Fig.2 (b)). The arrows show the indirect band gaps in pristine WSe₂ and WO₂ systems (Dr. Sudipta Datta)



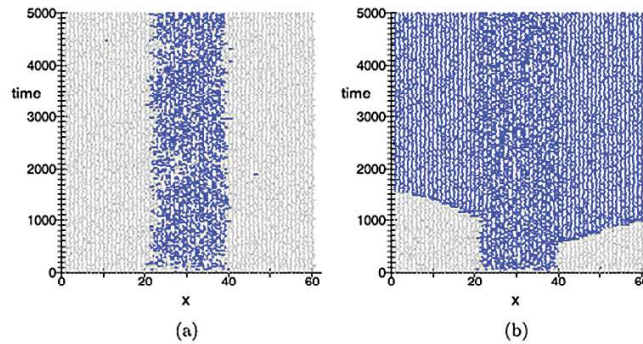
Dr. Sasmita Mohakud is focusing her studies on the dependence of the coercive force of sintered magnets on temperature. Towards this goal, nucleation and domain wall propagation at the grain boundary are studied as rate-determining processes of the magnetization reversal phenomena in magnets consisting of bulk hard magnetic grains contacting via grain boundaries of a soft magnetic material.

Figure 10: Schematic of a system consisting of two bulk hard magnets and a boundary soft magnet. Regions I and III are characterized by A_1 , K_1 , and M_1 , while region II is characterized by A_2 , K_2 , and M_2 . Free boundary conditions are adopted for the lattice model. (Dr. Sasmita Mohakud)



The temperature dependence is studied by making use of the stochastic Landau-Lifshitz-Gilbert equation at finite temperatures. The time evolution of magnetization has been studied varying the magnetic interaction parameters for different temperatures and magnetic fields. The threshold fields for nucleation and domain wall propagation are obtained as functions of ratios of magnetic interactions and anisotropies of the soft and hard magnets for various temperatures. It was found that the threshold field for domain wall propagation is robust against thermal fluctuations, while that for nucleation is fragile.

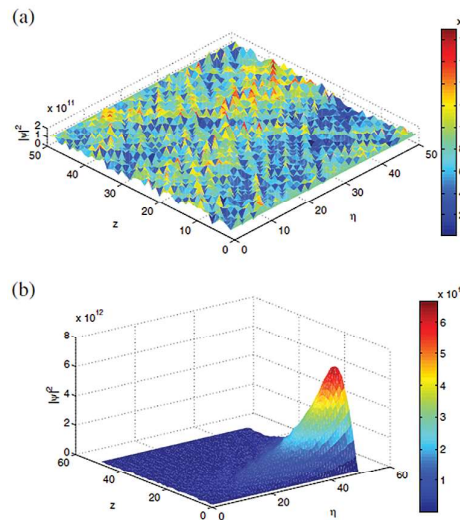
Figure 11: Time evolution of magnetization at threshold fields (a) $h=0.1$ and (b) $h=0.5$ for temperature $(T)=0.5$ and $A_2/A_1 = FK_2/K_1=0.3$. Each row denotes a configuration of spins at the site $(x, 4, 4)$, $x=1...60$. The vertical axis denotes time. The thin gray and blue bar plots represent spins of positive and negative S_z respectively (Dr. Sasmita Mohakud)



4.3 Nonlinear Dynamics

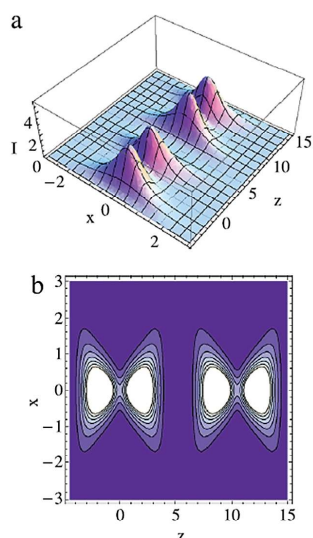
Dr. Solomon Raju's research mainly focused on studying Unbreakable PT symmetry in inhomogeneous nonlinear optical media. He demonstrated analytically and numerically the existence of exact solitons in the form of double kink and fractional transform, supported by a symmetric transversally modulated defocusing nonlinearity acting as a pseudopotential combined with an antisymmetric gain–loss profile. It is demonstrated that the PT symmetry is never broken in the dynamical system under study, even in the absence of any symmetric modulation of linear refractive index, and the transversally modulated defocusing nonlinearity comes in the way as a requirement to establish the ensuing PT symmetry.

Figure 12: Intensity evolution of PT symmetric (a) fractional-transform trigonometric solution and (b) fractional-transform soliton solution. It indicates almost stable evolution (Dr. Soloman Raju)



Butterfly-shaped and dromion-like optical waves in a tapered graded-index waveguide (GRIN) are reported for the first time. The generalized nonlinear Schrödinger equation, which describes wave propagation in GRIN with variable group-velocity dispersion (GVD), nonlinearity, PT symmetric optical potentials, is investigated and analytical solutions for this dynamical system are obtained. The physical effects affecting these waves are explicated in detail. The stability of dromion-like structures is analyzed when the GVD parameter is perturbed. Oscillation structure exhibiting strong interference was observed due to this applied perturbation. For a particular value of the modulation of the GVD parameter, the oscillation structure is transformed into two dromion-like structures. It indicates that the dromion-like structure is unstable, and the coherence intensity is affected by the modified perturbation parameter. The phenomenon of unbreakable PT symmetry of these novel nonlinear waves for three explicit examples is demonstrated.

Figure 13: (a) Butterfly-shaped soliton for Scarf-II complex potential with $d = 1.2$, $a = b = 0.6$. (b) Corresponding contour plot (Dr. Soloman Raju)



4.4 Astrophysics

The focus of **Dr. Arunima Banerjee**'s research has been the formation and evolution galaxies, through modeling the structure and kinematics of late-type galaxies, as determined mainly by HI 21 cm radio observations. In the past one year, Dr. Banerjee constructed mass models for three superthin galaxies: IC5249, UGC7321 and IC2233, using high resolution HI rotation curves. It was found that the best-fit mass models with a pseudo-isothermal dark matter density profile indicate a compact dark matter halo for all the sample galaxies studied.

The local environment of superthins was studied and it was found that the vertical-to-planar axes ratio of their stellar discs are poorly correlated with the density of the local environment at high levels of statistical significance, which imply that environment does not play a dominant role in regulating disc vertical structure in superthin galaxies. -Studies on stability of low surface brightness galaxies against local axisymmetric perturbations, and hence against star formation, by linear stability analysis showed that the gravitational potential of the dark matter halo is primarily responsible for the disc stability.

A dynamical model for the interacting dwarf galaxies in UGC5189, constrained by the observed HI morphology and kinematics was constructed. This showed that UGC5189 may be modeled as an early stage of an unequal mass merger characterized by a progenitor mass ratio $\mu = 2:1$, a fairly prograde passage on a parabolic orbit, a closepericentric approach at ~ 6.1 kpc (3-4 disc scalelengths), with the system being currently ~ 805 Myrs after pericentre.

4.5 Atomic and Molecular Physics

Dr. P.C. Deshmukh's focus is on analysis of angular distributions of photoionization time delay using relativistic many body theory and on time-delay through autoionization resonances and also on time-delay in photodetachment of negative ions.

Accounts at a Glance

Indian Institute of Science Education & Research - Tirupati

Balance sheet as at 31st March 2017

Amount in Rs.

Sources of Funds	Schedule	Current Year 2016-17	Previous Year 2015-16
Corpus / Capital Fund	1	210,394,994	83,698,178
Designated / Earmarked / Endowment Funds	2	-	-
Current Liabilities & Provisions	3	242,209,202	82,251,812
Total		452,604,196	165,949,990

Application of Funds	Schedule	Current Year 2016-17	Previous Year 2015-16
Fixed Assets	4		
Intangible Assets		5,399,572	5,842,543
Capital Works-In-Progress		84,907,341	34,902,666
Investments from Earmarked / Endowment Funds	5		
Long Term		-	-
Short Term			
Investments - Others	6	-	-
Current Assets	7	144,960,712	63,330,189
Loans, Advances & Deposits	8	101,338,055	18,921,623
Total		452,604,196	165,949,990

Significant Accounting Policies	23
Contingent Liabilities and Notes to Accounts	24

For and on Behalf of IISER Tirupati

sd/-
Mariamamma John
Incharge IISER Tirupati Cell

sd/-
Col. G. Raja Sekhar (Retd.)
Registrar

sd/-
Prof. K.N. Ganesh
Director

Place: Pune
Date: 24-05-2017

Indian Institute of Science Education & Research - Tirupati

Income & Expenditure Account for the Year ended 31st March 2017

Amount in Rs.

Particulars	Schedule	Current Year 2016-17	Previous Year 2015-16
INCOME			
Academic Receipts	9	3,508,295	1,112,001
Grants / Subsidies	10	130,000,000	70,000,000
Income from investments	11	3,508,927	2,196,032
Interest earned	12	-	-
Other Income	13	26,270	177,630
Prior Period Income	14	-	-
Total (A)		137,043,492	73,485,663
EXPENDITURE			
Staff Payments & Benefits (Establishment expenses)	15	35,119,705	13,858,257
Academic Expenses	16	6,910,793	6,766,786
Administrative and General Expenses	17	44,476,661	39,277,844
Transportation Expenses	18	1,931,835	499,440
Repairs & Maintenance	19	7,464,418	1,976,379
Finance costs	20	12,257	2,146
Depreciation	4	14,183,301	8,918,023
Other Expenses	21	-	-
Prior Period Expenses	22	-	-
Total (B)		110,098,970	71,298,875
Balance being excess of Income over Expenditure (A-B)		26,944,522	2,186,788
Less: Transfer to / from Designated Fund			
Others - Institute Reserve Fund (Sch 9+Sch 13)		(3,534,565)	
Transfer to Capital Fund		14,183,301	8,918,023
Over Utilization of Grant in Aid for Revenue Exps (Schedule 3C)			
Under Utilization of Grant in Aid for Revenue Exps (Schedule 3C)		37,593,258	11,104,811
Significant Accounting Policies	23		
Contingent Liabilities and Notes to Accounts	24		

For and on Behalf of IISER Tirupati

sd/-
Mariamamma John
Incharge IISER Tirupati Cell

sd/-
Col. G. Raja Sekhar (Retd.)
Registrar

sd/-
Prof. K.N. Ganesh
Director

Place: Pune

Date: 24-05-2017



Transit Campus

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