IISER TIRUPATI

INDIAN INSTITUTE OF SCIENCE
EDUCATION AND RESEARCH TIRUPATI

भारतीय विज्ञान शिक्षा एवं अनुसंधान संस्थान तिरुपत

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Prof Santanu Bhattacharya, Director
IISER Tirupati, Srinivasapuram, Yerpedu (M),
Tirupati Dist, Andhra Pradesh, India 517619
Telephone: +91 8772500400 Fax: +91 8772500250
Website: www.iisertirupati.ac.in

Editorial Team
Dr Nandini Rajamani
Dr Nirmala Krishnamurthy
Mr K Murugaraj
Dr Rakesh Singh
Dr Girja Shankar Tripati
Dr Nihar Sahoo
Dr Anand Kumar Singh
Lt Cdr KH Shekhar (Retd)

Editorial Assistance
Mr Rakesh Muni
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Ms Swati Udayraj

Hindi Translation
Ananya Edu-Tech Consultancy Services

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Ms Manini Bansal

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ansonorama@gmail.com

IISER Tirupati

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Research

Society

Campus

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IISER
TIRUPATI
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మరియు పరిశోధన సంస్థ తిరుపతి
भारतीय विज्ञान शिक्षा एवं
अनुसंधान संस्थान तिरुपति
Indian Institute of Science
Education and Research Tirupati

IISER Tirupati

Growth and diversification

In the past year (2023-2024), IISER Tirupati has grown in size and scope, with a radiating circle of impact. The institute was formally dedicated to the nation, following its move to the permanent campus at Yerpedu.

Director's Report

I am happy to present this Annual Report of the activities and progress at IISER Tirupati during the year 2023-2024. I am delighted to inform you that on 20th February, 2024, IISER Tirupati has been formally dedicated to the nation by the Hon'ble Prime Minister, Shri Narendra Modi. IISER Tirupati offers three main academic programs, viz. 1. a flagship BS-MS dual degree program, attracting bright and motivated high-school students; 2. an Integrated MS-PhD program, aimed at outstanding Bachelor's degree holders and 3. a regular doctoral program that offers PhD degrees in diverse disciplines. As an indication of trendy advancement, the Institute is launching its maiden Professional Master's programs in two streams, i.e., Biological Data Sciences and Data Science & Artificial Intelligence.

Starting in 2015, with the first batch of 35 BS-MS students, the Institute has now grown to 1077 students: *i.e.*, 789 BS-MS students, 269 PhD candidates, & 19 Post-doctorates. Come August 2024, with the fresh batch of admissions this year for about 275 new BS-MS students, we may have 1350 students on campus. After induction of new faculty recently, the current faculty strength rose to about 70 still much below the DPR approved 1:10 ratio, while the admin, & support staff are still languishing at a measly sum of 40.

The 4th Convocation of IISER Tirupati was held on 18th July 2023. Former Director of the Indian Institute of Science, Prof P Balaram was the Chief Guest in this Convocation, presided over by Prof J B Joshi, Chairperson, Board of Governors, wherein 122 students with BS-MS, 1 student with MS, 4 students with BS, 3 students with B.Sc. & 6 PhD students received corresponding degrees and 3 students graduated with BS & MS degrees with distinction.

This academic year, the Institute has implemented the salient features of the NEP-2020 reforms and has executed a fully-restructured BS-MS curricula. These students are now provided with an opportunity to select their Major & Minor in semester IV through a curriculum that has 1.5 years of Foundational, 2.5 years of Elective courses and 1-year of a rigorous research program. Further the institute curriculum infuses a blend of societally-relevant topics such as Indian Knowledge Systems, Intellectual Property Rights and Professional Communication to enhance the student's real-life skills.

The Institute constantly nurtures innovations and scientific excellence advanced by its faculty & students reflecting the commitment to encourage fundamental, innovative and translational research. During the academic year 2023-24, ~180 research papers were published from the Institute in reputed journals. The cumulative number of research papers is ~900, with an h-index of ~50 & cumulative citations reaching ~12,000. Journals featuring these publications include ACS Infectious Diseases, Analytical Chemistry, Angewandte Chemie, Biophysical Journal, Bio-microfluidics, BMC Plant Biology, Ecology & Evolution, Forum Mathematicum, Journal of the American Chemical Society, Journal of Chemical Education, Journal of Chemical Physics, Journal of Mathematical Analysis and Applications, Journal of Proteome Research, Langmuir, Lithos, Nature Commun., Organic Lett., Phys. Rev. Lett., and several others. The extramural research funding granted to the institute is Rs. 15.54 crores during 2023-24. Six patents have so far been filed this year. As a metric of the advancement in research output, Nature Index 2023 places IISER Tirupati at an All-India 30th rank among research institutes, and is sailing into the league of well-established Institutes.

During this academic year, the institute organized numerous colloquia, and special lectures, and workshops in various disciplines. Eminent speakers from India and abroad who delivered lectures include Prof Ramanarayan Krishnamurthy from the Scripps Research Institute, La Jolla, CA; Prof Arumugam Manthiram, U. Texas, Austin; Prof B. Gopal, Molecular Biophysics, IISc; Prof Vibha Tandon, CSIR-IICB, Kolkata; Prof G Bhaskaran, IMSc, Chennai; Prof Suresh Valiyaveetil, NUS-Singapore; Prof John McGrady, Oxford U.; Prof Sujatha Ramdorai from the U. British Columbia, Canada; Prof Roderick Bates from NTU-Singapore; Prof Gadadhar Misra, ISI Bangalore etc. Prof Sharmila Mande, Advisor, TCS, delivered a lecture on topics to bridge academic-industry partnership. A one-day workshop entitled "IPR and Entrepreneurship Development" was held to enhance understanding and fostering innovation among faculty, which featured Dr Magesh, Head IPR Cell from NCL, Pune, and Dr Praveen Kumar Vemula, from inStem, Bengaluru, who shared valuable tips into the patenting process and strategies for entrepreneurship. Institute also organized Biology Day, Chemistry Day, Mathematics Day, and Physics Day, as dedicated events to celebrate the immense impact of the fundamental Sciences and Mathematics toward building a futuristic knowledge society. Notable Guests of such events included, Prof Anis Ghosh, TIFR Bombay, Prof Chandan Dasgupta, IISc and Dr Dasaradhi Palakodeti, NCBS Bangalore. The Institute also hosted very distinguished scientists from India: Dr G Satheesh Reddy, Scientific Advisor to Raksha Mantri (22nd December 2023) spoke on Skill Development and Incubation Centre and Prof Sekhar C Mande, Former DG, CSIR & Honorary Faculty, Savitribai Phule Pune University (4th April 2024) addressed the students and faculty of the Institute.

Center focusing on atomic, molecular, optical science & technology, named as CAMOST hosted jointly by IISER Tirupati and IIT Tirupati, the two institutes which share history of their genesis, actively collaborate on several missions. A CAMOST-G20-S20 consortium seminar series was organized on Disruptive Sciences & Technologies, supported by Indian National Science Academy, G20, and S20 groups. This series featured quantum technology experts from both national and international academic circles. The seminars were held from August 16th to October 27th, 2023. The Indian Association of Physics Teachers collaborated as the Outreach Partner. The event concluded with a panel discussion on October 28th, 2023. Science day, 2024 was celebrated with great enthusiasm and wherein ~500 high school children witnessed about 50 different experimental displays at our Institute campus. Prof L S Shashidhara (National Centre for Biological Sciences, Bengaluru) and Prof Tanusri Saha Dasgupta (S N Bose National Centre for Basic Sciences, Kolkata) delivered scintillating lectures. Lantana elephants, a symbol of conservation and ecology, were on display. Departments of Biology, Chemistry & Physics conducted multiple outreach activities, including the Yusuf Hamied Chemistry Camp, co-sponsored by the Royal Society of Chemistry and the Institute. After the announcement of Nobel Prizes each year, the Institute conducts, the 'Nobel evening lectures' 'and the Institute faculty delivered them on 6th of November, 2023. Institute observed its Foundation day on 28th March, 2024. Prof M M Sharma, FRS graced the occasion as the Chief Guest and Prof S. Chandrasekaran, IISc was present as the special guest.

IISER Tirupati has an ongoing MoU with the University of Melbourne, Australia, by which PhD students perform research at collaborators' laboratories through funded visits. As a part of this MoU, a faculty team represented our Institute at the Melbourne-India Postgraduate Academy Conference (MIPAC) and also visited Australian National University, Canberra in Nov. 2023. In turn, the U. Melbourne together with IISER Tirupati conducted an open panel discussion on Smart Cities at our campus in April 2024. The Institute generated a funded bilateral project program called BIOSANTEX with ENS de Lyon. In addition, IISER Tirupati received a CEFIPRA grant to conduct a workshop on Improving plant growth and productivity under changing

climatic conditions at ENS de Lyon in May 2024. Several faculty colleagues visited a number of French Institutions as a part of this.

Students of IISER Tirupati excelled in various International competitions. The International Genetically Engineered Machine (iGEM) team from the institute comprising 13 dedicated 2nd-year BS-MS students worked on a ground-breaking project titled "Anthrafelix - a novel probiotic therapeutic for Irritable Bowel Syndrome-D" and earned a GOLD medal at the iGEM 2023 competition for the fifth successive time. Three students received prestigious Khorana fellowship for summer programs in the USA. Asma Shirin, BS-MS 2020 batch was selected to attend the Nobel laureates' meeting in Lindau, Germany. Mr R Vigneswaran from BS-MS 2020 batch received a DAAD summer fellowship. Mr Yash Wath from BS-MS 2019 batch received Future Research Talent Award 2023, by the Australian National University. Faizee Ali Khan, a BS-MS 2019 student received Chapman Collection's Award from the American Museum of Natural History. Devidutta Samantaray, a PhD student received Fulbright Fellowship to conduct research at Penn State Univ, for a period of 9-months. Several students received MS Thesis research project fellowships as well as short term internships from the Max Planck Institutes and ENSs as part of the umbrella MoU with these globally reputed institutes.

On August 10th 2023, the students celebrated the 100th month since foundation of IISER Tirupati, by organizing various cultural activities. As part of SPIC MACAY events institute organized Koodiyattam & Kalarippayattu, traditional performing art forms of Kerala and Carnatic vocal concerts on campus. Various students' activities encouraged by the Ministry were conducted, *viz*. National Sports Day, National Education Day, Constitution Day & Yoga week and others. In Phase-IV of Yuva Sangam, a fifty-membered contingent comprising students and faculty from NIT Agartala were hosted at IISER Tirupati. The team was taken to Kalamkari workshop, NARL and SHAR to expose them to five P's Paryatan (Tourism), Parampara (Tradition), Pragati (Development), Prodyogik (Technology) and Paraspar Sampark (People-to-people connect). As an exchange, the student contingent from Andhra Pradesh visited Tripura where the Governer of State of Tripura addressed the students. Inter IISER Cultural Meet 2023, held at IISER Mohali, witnessed few winning positions by students of the Institute including a gold medal for book cover designing contest. Cultural events of the Institute, like Melam, Ganesha utsav, Saraswati puja were organized as part of Ek Bharat Shreshtha Bharat programs at IISER Tirupati. Sports activities conducted on campus culminated in multiple gold and silver medals in athletics, bronze in women's basketball, bronze in women's football and silver in women's kho-kho events at the Inter-IISER sports meet 2023 held at IISER Thiruvananthapuram.

It is gratifying to note that nearly half of our students at IISER Tirupati are girls and the institute takes care and particular pride in setting an environment for their continued excellence. To celebrate the Gender Equality day on Aug. 26th, 2023, Prof Bharathi Harishankar, Vice-Chancellor, Avinashilingam Women's University, Coimbatore, spoke on issues that helps advance women's careers and personalities. The International women's Day was celebrated on Feb 11, 2024, where girl PhD students presented their research work to a group of school students who attended the event on campus.

National Service Scheme (NSS) wing of the institute conducted various activities both on campus and also in the nearby villages. On Oct 01, 2023, the institute conducted *Swachhata Hi Seva* - a campaign in-line with the mission of the Ministry of Housing and Urban Affairs to make India garbage free. The NSS unit led team to clean Sreenivasapuram, Yerpedu, where the students, and staff, participated in the event along with the villagers. Rashtriya Ekta Diwas - Meri Maati Mera Desh campaign was conducted between Oct 07-14th 2023. A Unity Run – was organized by both the NSS and the sports units of IISER Tirupati on Oct 31st 2023. Mera Pehla Vote Desh Ke Liye - campaign called by the Ministry of Education, Ministry of Youth Affairs & Sports, Ministry of Information and Broadcasting, was conducted on March 13th 2024. The Sports & NSS teams organized International Yoga Day between June 14th and 20th 2024, with Yoga training and competitions, where students, and staff participated actively. With a service-oriented theme in mind, the graduate students initiated “Unmochan” where they engaged in giving education to the kids of construction workers around the campus.

This year, Institute appointed 3 full Professors, with 1 each in Physics, Chemistry and Biology respectively. The Institute appointed this year a total of 18 Assistant Professors, 2 in Physics, 2 in Chemistry, 7 in Biology, 3 in Earth & Climate Sciences and 4 in Humanities & Social Sciences. In the Merit-Based Faculty Career Advancement drive, 7 Assistant Professors were promoted to Associate Professor level in Chemistry, 3 in Biology and 3 in Physics Departments. 1 Associate Professor was promoted to the rank of a Full Professor. Dr Raju Mukherjee from Biology received the Ignite Life Science Foundation award for research on Antimicrobial resistance (AMR). Prof Rajesh Viswanathan

received the Chirantan Rasayan Sanstha (CRS) Silver Star Award, for research, teaching and overall accomplishments. Drs. Shibdas Bannerjee and Sudipta Roy received Thieme Journal Awards. Faculty members also received internships from DAAD, Alexander von Humboldt, Biosantexc and Japan Society for the Promotion of Science (JSPS).

The Institute places on record the relentless facility of Shri Sanjay Murthy, Secretary, MoE; Shri Sunil Barnwal, Addl. Secretary, MoE; Smt. Saumya Gupta, Jt. Secretary, MoE; Shri Priyank Chaturvedi, Dy. Secretary, MoE; and the Integrated Finance Division, MoE for their support of the Institute and in particular for their efforts in securing the approval for the new faculty positions. Finally, the Institute also expresses its gratitude to Prof J. B. Joshi, the past Chairman, Board of Governors, for his leadership and to all Members of the Board of Governors, Finance Committee, Building & Works Committee and Senate for their advice in the governance of the Institute.

Prof Santanu Bhattacharya
Director, IISER Tirupati

Governance

Board of Governors

Chairperson

Prof Jyeshtharaj Bhalchandra Joshi, Emeritus Professor, ICT Mumbai (up to 6th September 2023).

Officiating Chairperson

Prof Santanu Bhattacharya, Director, IISER Tirupati (from 20th October 2023).

Members

Ms Saumya Gupta, Joint Secretary (TE), Higher Education, Ministry of Education, Govt. of India.

Prof KN Ganesh, Director, IISER Tirupati (till 18th April 2023 forenoon).

Prof Santanu Bhattacharya, Director, IISER Tirupati (from 19th April 2023).

Prof Govindan Rangarajan, Director, IISc Bengaluru.

Prof KN Satyanarayana, Director, IIT Tirupati.

Dr N Kalaiselvi, Secretary (DSIR) and DG, CSIR.

Dr M Ravichandran, Secretary, Ministry of Earth Sciences.

Shri KS Jawahar Reddy, Chief Secretary, Andhra Pradesh.

Prof DS Nagaraj, Professor, IISER Tirupati (till 27th June 2023)

Prof Prasenjit Sen, Professor, IISER Tirupati (from 6th Nov 2023)

Prof Vijayamohanan K Pillai, Professor, IISER Tirupati.

Shri Sanjog Kapoor, JS & FA, Ministry of Education, Govt. of India.

Secretary

Dr CP Mohan Kumar, Officer on Special Duty, IISER Tirupati (till 20th July 2023)

Prof Vijayamohanan K Pillai, Professor and Registrar in-charge, IISER Tirupati (from 24th July 2023)

Finance Committee

Chairperson

Prof Jyeshtharaj Bhalchandra Joshi, Emeritus Professor, ICT Mumbai (till 6th September 2023).

Officiating Chairperson

Prof Santanu Bhattacharya, Director, IISER Tirupati (from 20th October 2023)

Members

Ms Saumya Gupta, Joint Secretary (TE), Higher Education, Ministry of Education, Govt. of India.

Prof KN Ganesh, Director, IISER Tirupati (till 19th April 2023 Forenoon)

Prof Santanu Bhattacharya, Director, IISER Tirupati (from 19th April 2023 afternoon)

Shri Sanjog Kapoor, JS & FA, Ministry of Education, Govt. of India.

Col G Raja Sekhar, Registrar, IISER Pune.

Dr R Premkumar, Former Registrar, IIT Bombay.

Secretary

Dr CP Mohan Kumar, Officer on Special Duty, IISER Tirupati (till 21st July 2023).

Prof Vijayamohanan K Pillai, Professor and Registrar in-charge, IISER Tirupati (from 24th July 2023)

Senate

Chairperson

Prof KN Ganesh, Director, IISER Tirupati (till 18th April 2023 Forenoon)

Prof Santanu Bhattacharya, Director, IISER Tirupati (from 19th April 2023)

Members

Prof DS Nagaraj, Professor, IISER Tirupati.

Prof Vijayamohanan K Pillai, Professor, IISER Tirupati.

Prof Guruswamy Kumaraswamy, Professor, IIT Bombay.

Prof Somdatta Sinha, Professor, IISER Kolkata/Mohali.

Prof A Raghurama Raju, IIT Tirupati.

Dr Rajesh Vishwanathan, Professor, IISER Tirupati. (Associate Dean Graduate Studies and acting Dean Academics from 19th July 2023)

Dr Sudipta Dutta, Associate Professor, IISER Tirupati (Associate Dean Undergraduate Studies)

Dr Raju Mukherjee, Associate Professor, IISER Tirupati (Doctoral Studies)

Dr Vasudharani Devanathan, Associate Professor, IISER Tirupati (Student activities)

Dr CG Venketasubramanian, Assistant Professor, IISER Tirupati (Examinations/Evaluation) (till 18th June 2023)

Dr Aniket Chakrabarty, Associate Professor, IISER Tirupati (Examinations/Evaluation) (from 19th June 2023)

Dr E Balaraman, Associate Professor, IISER Tirupati.

Dr Lakshmi Lavanya, Assistant Professor, IISER Tirupati.

Dr Sreenivas Chavali, Associate Professor, Biology, IISER Tirupati.

Dr Chitrasen Jena, Associate Professor, Physics, IISER Tirupati.

Dr Aniket Chakrabarty, Associate Professor, IISER Tirupati (till 18th June 2023)

Dr Ashwani Sharma, Associate Professor, IISER Tirupati (from 19th July 2023)

Dr Arunima Banerjee, Associate Professor, IISER Tirupati. (till 31st December 2023)

Dr Jessy Jose, Associate Professor, IISER Tirupati (from 1st January 2024)

Secretary

Dr CP Mohan Kumar, Officer on Special Duty, IISER Tirupati (till 21st July 2023).

Prof Vijayamohanan K Pillai, Professor and Registrar in-charge, IISER Tirupati (from 24th July 2023)

Building and Works Committee

Chairperson

Prof KN Ganesh, Director, IISER Tirupati (till 18th April 2023 Forenoon)

Prof Santanu Bhattacharya, Director, IISER Tirupati (from 19th April 2023 afternoon)

Members

Prof Vijayamohanan K Pillai, Professor and Registrar i/c, IISER Tirupati.

Dr CP Mohan Kumar, Officer on Special Duty, IISER Tirupati (till 20th July 2023).

Dr Ramesh Srikonda, Dean, Professor and Head, School of Planning and Architecture, Vijayawada.

Shri Sushant Baliga, Addl. Director General (Retd.) CPWD, New Delhi.

Shri Mohan Khemani, Retd. Chief Engineer (E), CPWD, New Delhi.

Secretary

Shri PV Narayana Rao, Superintending Engineer, IISER Tirupati. (till 27th February 2024)

Prof Vijayamohanan K Pillai, Professor & Registrar i/c, IISER Tirupati (from 29th February 2024)

Meetings of Governance held during 2023-24

Meeting of Governance	Date of Meeting	Venue
23rd Meeting of Board of Governors	03.05.2023	Online
24th Meeting of Board of Governors	09.06.2023	Through Circulation
25th Meeting of Board of Governors	04.09.2023	Online
26th Meeting of Board of Governors	14.11.2023	Through Circulation
27th Meeting of Board of Governors	21.12.2023	Online
28th Meeting of Board of Governors	27.12.2023	Online
19th Meeting of Finance Committee	03.05.2023	Online
20th Meeting of Finance Committee	05.06.2023	Through Circulation
21st Meeting of Finance Committee	04.09.2023	Online
22nd Meeting of Finance Committee	27.12.2023	Online
19th Meeting of Senate	16.05.2023	Online
20th Meeting of Senate	24.08.2023	Online
21st Meeting of Senate	26.12.2023	Online
17th Meeting of Building and Works Committee	08.08.2023	Online
18th Meeting of Building and Works Committee	25.09.2023	Online
19th Meeting of Building and Works Committee	01.12.2023	Online
20th Meeting of Building and Works Committee	26.03.2024	Through Circulation

Dedication to the Nation

The Honorable Prime Minister of India, Shri Narendra Modi dedicated the IISER Tirupati campus to the nation on 20th February through a mass conferencing event. The campus presently has about 1100 students, 61 faculty and 43 administrative staff. The Institute offers BS-MS programs and PhD programs in the areas of Biology, Chemistry, Earth and Climate Sciences, Mathematics and Physics in addition to carrying out cutting edge research. Dr Gurumurthy, Honourable Member of Parliament of Tirupati and Shri Lakshmi Shah, IAS, the Collector of Tirupati graced the occasion and wished all the students and faculty on this momentous event. Prof Santanu Bhattacharya, the Director of IISER Tirupati, expressed his gratitude and well wishes for the Founder Director, Padmashree Dr K N Ganesh and the previous Registrar Dr Mohan Kumar, and to the entire Department and staff for their undaunted efforts in making the new campus infrastructure a world class model by itself.

Academics

Building scholarship

IISER Tirupati offers three main academic programs, including the flagship BS-MS dual degree program, an Integrated MS-PhD program, and a doctoral program that offers PhD degrees in diverse disciplines. Our high performing scholars routinely win fellowships and awards, carry out cutting-edge research and publicise our science in national and international platforms.

Academic Program

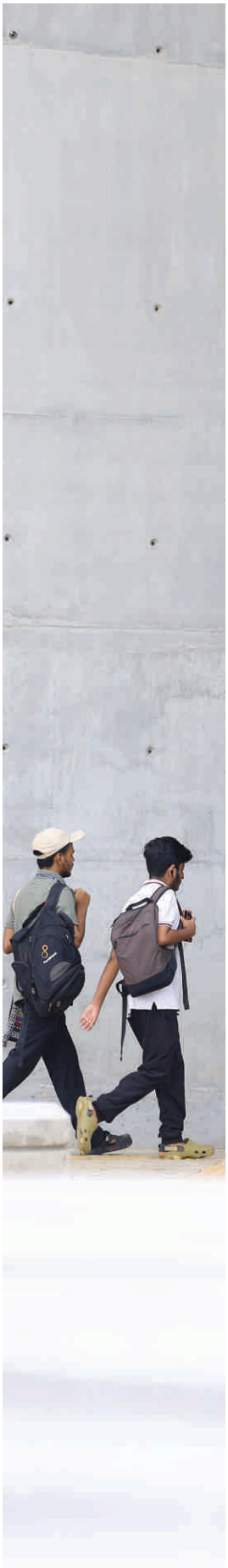
BS-MS Students

The academic program at IISER Tirupati is designed to educate and prepare students for a career in scientific research, and we offer programs for students at various stages. The five-year-long BS-MS program is the flagship of the IISER family and allows students to experience and participate in research first-hand.

IISER Tirupati has seen a steady increase in the number of students admitted over the years, and the intake of the BS-MS batch of 2023 comprised 184 students, with 86 girls and 98 boys. 153 of the incoming batch students held fellowships; 113 students had Inspire fellowships, and 40 had NSP fellowships.

Students in the incoming BS-MS batch of 2023

Aadya Jaggi
Adithya M
Adithyan Puthupura
Aditya Jain
Aditya Sharma
Adrija Banerjee
Akshara Goyal
Akshayaa Thiyagarajan
Amirthavalli S K
Amratash Tripathi
Amritha C
Anagha Babu
Aniruddha Y S
Anjana Anilkumar
Ankan Mallik
Annada Agrawal
Ansuia Kaul
Anuradha
Anwika P
Apurba Mondal
Aradhana Sonowal
Arnab Chatterjee
Arti Devi
Arya M
Aryan
Ashish
Ashmita Acharyya
Avanthika Ranjith
Ayanabha Banerjee
Ayisha Minha
Basim Basheer N
Bhadane Anaya Nitinrao
Bhadra K P
Bhadraa Byju
Bhoomi Salar
Bhukya Shiri
Brajakrushna Sahoo
Chamak
Chikte Pranit Sanjay
Chintal Shailesh Janardhan
Chintalapati Vaishnavi
Chirag Chandak
Chirumamilla Jai Abhinay Prakash
Dakshinesh S M
Darshak Dinesh V K
Devjit Prasad Majhi
Dhananjay U
Dhanavath Mythri
Dharavath Ravindhar
Dipal Manharbhai Parmar
Dishari Biswas
Dishita Roy Choudhury
Divya Prakash
Diya A
Diya B
Durai Renganatha Athithan S
E Madhimalar
Eeturu Pranava
Falguni Bagh
G Nandana
G. Harshit
Gaurav Agarwal
Gaurav Mishra
Gayathri R
Gopika Krishna
Gourika Menon
Gowri Prakash M
Gyandeep Das
Hamsini V
Hardikdivyansh Singh Rathore



Harikrishnan S
Harinath Reddy C S
Imayavarman Nandhivarman
Jai Parashar
Jayabrata Pal
Kachhadia Angel Shailesh
Kanna Chandra Prakash
Karan Gupta
Karan Upreti
Keerthi Shri R
Keshav Mishra
Krishna Ashok Meel
Kumar Abhinandan
Laasya Anand
Laksharaj Singh Rao
Lean Chainani
Likhitha Sri P
Malavika M Nair
Mallikarjun.M.Kallapur
Manasvi Raina
Manoj Shrriram D
Maurya Shani Shridhar
Meghamala Mallick
Monica R
Mote Prathamesh Vilas
Mrinmoy Ghosh
Mudavath Charan Singh
Muhammed Hazil K
Mullapudi Gokul Saketh
Munothu Sai Charan
Nandan Pratim Kashyap
Nandana Pradeep
Nandhana Kishor
Nayana Rose V J
Neenu Elizabeth Mathew
Neha Shal
Nihal K
Niranjana Raju
Nirmalya Saha
Nitin Jangir
Niyathi R
Paarth Wardhan
Panda Snehasuman Samarkant
Patil Abhijeet Harish
Piyush Singare
Pragya Gupta
Pragya Nandan
Pramod Tegur
Pranav Krishna
Prateeksha Ganesh
Pratham Chourasia
Prince
Purohit Ananya Atul
R Vishanth
R. Karthika Bharathi
Rahul Kumar Gupta
Rakesh D H
Ramzi Moolakudavan
Reesha R Shenit
Riddhi Sunil Dakhole
Rohit Bhimrao Rithe
Rupanjana Sengupta
S Karthikeyan
Sagnik Bhattacharya
Sagnik Bhattacharyya
Samarjeet Singh Sidhu
Samprit Das
Santhosh S
Sarthak Kanojia
Saurabh
Sharanya Chakraborty
Sharon S Titus
Sharvari C V
Shashank M Pandey
Shivani Kumari
Shobhit Pal
Shreyansh Dwivedi
Shruthika M
Shubhangam Shukla
Siddhant Kumar
Sinchan Ghatak
Siya Singh
Sneha Das
Sneha Gupta
Sneha Sebastian
Sohamm Kashinath Kapte
Somayadeep Chowdhury
Soumya Nagalikar
Soumyadip Saha
Sourabh
Sridhara Venkata Sai Praneeth
Subash Mohan
Subhrajit Pal
Sudharshini Arul
Sunayana Gupta
Sure Vasantha
Suryaja M R
Swapnonil Sarkar
Tetar Shivraj Gajanan
Thombare Nivedita Dhananjay
Trishit Chakraborty
Udita Sharma
Umang Kumar
Vadthya Sandeep
Vaisakh Sarma K V
Vaishnavi Mahadeo Kavitkar
Varshini H
Varun Ramanathan Alagappan
Vedant Vaibhav Bhatt
Velpula Anupama
Vidrit Misra
Vinod Achintya Sachin
Yash Kumar Gupta
Zabana Azeem S

Details of all enrolled PhD students at IISER Tirupati during 2023-24

	Biology	Chemistry	Mathematics	Physics	ECS	Total
Male	37	34	7	28	4	110
Female	45	32	4	11	1	93
Total	**82**	**66**	**11**	**39**	**5**	**203**

Details of all enrolled PhD students at IISER Tirupati during 2023-24

	Biology	Chemistry	Mathmatics	Physics	ECS	Total
Male	6	9	2	15	0	32
Female	16	11	2	4	0	33
Total	**22**	**20**	**4**	**19**	**0**	**65**

Fellowship details – PhD and IPhD

Fellowship	PhD		Int PhD		Total
	Male	Female	Male	Female	
CSIR	7	8	1	4	20
UGC	14	11	1	2	28
PMRF	4	8	3	3	18
DBT	3	0	1	2	6
DST-INSPIRE	4	6	0	0	10
Project	3	5	0	0	8
Institute	38	26	13	10	87
Total	**73**	**64**	**19**	**21**	**177**

Post Doctoral Research Fellows 2022-23

The Post Doctoral community at IISER Tirupati is growing, with a few new scholars joining the program each year.

	Biology	Chemistry	Mathematics	Physics	ECS	Total
Male	2	7	4	2	0	15
Female	3	1	0	0	0	4
Total	**5**	**8**	**4**	**2**	**0**	**19**

Course Listings

The BS-MS program offers courses in all the basic sciences for the first four semesters (I-IV) of the program. This is followed by advanced courses at the MS level in semesters V-VIII where students can choose their courses based on their interests and inclination. The advanced courses are of two types: 4 credits and 3 credits, and they can be lecture/lab (experimental/computer courses). Four credit courses are core courses with 40 lectures /contact hours per semester. They are aimed at providing a basic and in-depth understanding of the subject. Courses with 3 credits get 30 lectures/contact hours in one semester, and they can be interdisciplinary or advanced, or specialized in content.

The advanced courses are open to students In the Integrated PhD program, where students choose courses as per the requirements in each discipline. Some of the advanced level courses are open to PhD students also. In addition, a set of courses called Modular Courses have been introduced to impart focused training and skill development in specialized topics to research students.

The list of courses offered in Monsoon 2023 and Spring 2024 are listed below with their details.

Semester - I BS-MS program

Course Code	Course Title	Coordinator/Instructor	Credits
BIO110	Basic Biology	Dr Viji Subramanian* Dr Sanjay Kumar	0
MTH110	Basic Mathematics	Dr Venketasubramanian C G*	0
HSS110	Functional English	Dr Baburam Upadhaya	0
BIO111	Foundations of Biology I: Basic Principles	Dr Eswarayya Ramireddy Dr Vasudharani Devanathan	3
BIO112	Biology Lab I: Basic Biology	Dr Swarup Roy Choudhury* Dr Sanjay Kumar	3
CHM111	Organic Chemistry	Dr Rajesh Viswanathan Dr Kiran Kumar Pulukuri*	3
MTH111	Calculus	Dr Gururaja H A	3
PHY111	Foundations of Physics I: Mechanics and Waves	Dr Chitrasen Jena Dr Sudipta Dutta	3
IDC111	Mathematical Methods	Dr Rakesh S Singh	3

Semester - II BS-MS program

BIO121	Introductory Biology II: Genetics & Molecular Biology	Dr Viji Subramanian Dr Hussain Bhukya	3
BIO122	Biology Lab II: Biochemistry & Molecular Biology	Dr Sivakumar Vallabhapurapu* Dr Santanu Paul	3

Course Code	Course Title	Coordinator/Instructor	Credits
CHM121	*(Chemistry II)* Elementar Inorganic Chemistry	Dr Arun Kumar Bar Dr Pankaj Kumar Koli	3
CHM122	Chemistry Lab-I	Dr Janardan Kundu* Dr Nirmala Krishnamurthy Dr Pankaj Kumar Koli	3
MTH121	Linear Algebra & Applications	Dr Girja Shanker Tripathi* Dr Subhash B	3
PHY121	Foundations of Physics II: Electricity, Magnetism & Optics	Dr Jessy Jose* Dr Eswaraiah Chakali	3
PHY122	Basic Physics Lab I	Dr Eswaraiah Chakali * Dr Sunil Kumar Dr Sudipta Dutta Dr Sambuddha Sanyal Dr Aradhana Singh Dr Jessy Jose	3
HSS121	Critical Reading, Writing and Communication in English	Dr Baburam Upadhaya	2
		Total Credits	**23**

Semester - III BS-MS program

BIO211	Foundations of Biology III: Evolution and Ecology	Dr V V Robin	3
CHM211	Chemistry III	Dr Arun Kumar Bar* Dr Raghunath O Ramabhadran Dr Gopinath Purushothaman	3
CHM212	Chemistry Lab II	Dr Pankaj Kumar Koli* Dr Ashwani Sharma Dr Soumit Sankar Mandal	3
MTH211	Probability and Statistics	Dr Souradeep Majumder	3
PHY211	Foundations of Physics III: Electricity & Magnetism	Dr Sunil Kumar	3
PHY212	Basic Physics Lab II	Dr Chitrasen Jena Dr Ravi Kumar Pujala Dr Eswaraiah Chakali Dr Srabani Kar	3

Semester - IV BS-MS program

BIO221	Biochemistry	Dr Raju Mukherjee	4
BIO222	Cell Biology	Dr Sanjay Kumar	4

Course Code	Course Title	Coordinator/Instructor	Credits
CHM221	Organic Chemistry	Dr Shibdas Banerjee* Dr Gopinath Puroshothaman	4
CHM222	Inorganic Chemistry	Dr Sudipta Roy* Dr Arun Kumar Bar	4
CHM223	Physical Chemistry	Dr Jatish Kumar	4
ECS221*	Fundamentals of Earth and Climate Sciences	Dr K Saikranthi* Dr Aniket Chakrabarty Dr Utpal Saikia	3
MTH221	Introduction to Abstract Algebra	Dr Souradeep Majumder	4
MTH222	Introduction to Real Analysis	Dr Venketasubramanian C G	4
PHY221	Mathematical Methods in Physics	Dr Srabani Kar	4
PHY222	Classical Mechanics I	Prof Prasenjit Sen	4
PHY245	Advanced Physics Lab I	Dr Kanagasekaran* Dr Ravi Kumar Pujala	3
HSS221*	History of Science	Dr Nirmala K* Prof Vijayamohanan Pillai	3

Semester - V, VII BS-MS program & I, III Integrated PhD & PhD

Course Code	Name of the Course	Name of the Instructor/s	Credits	Sem open in for	
				BSMS	PhD
Biology					
BIO311/611	Immunology	Dr V Sivakumar	4	V, VII	Y
BIO312/612	Biochemistry##	Dr Raju Mukherjee* Dr Hussain Bhukya	4	V##	Y
BIO313/613	Evolution	Dr Nandini Rajamani	4	V, VII	Y
BIO314/614	Neurobiology	Dr Vasudharani Devanathan	4	V, VII* (*only for 2020 batch)	Y
BIO315/615	Molecular Plant Physiology	Dr Swarup Roy Choudhury	4	V	Y
BIO318/618	Genetics##	Dr Viji Subramanian	4	V##	Y
BIO331/631	Pandemics-Disease and Prevention	Dr Ambrish Saxena* Dr Suchi Goel and Guest Lecturers	3	V, VII	Y

Course Code	Name of the Course	Name of the Instructor/s	Credits	Sem open in for	
				BSMS	PhD
BIO339/639 (CHM332/632)	Separation Science and Techniques	Dr Shibdas Banerjee* Dr Nirmala Krishnamurthy	3	V, VII	Y
BIO410	Semester Project	Dr Annapurna Devi Allu	3	VII	--
BIO412/712	Animal Developmental Biology	Dr Ramkumar Sambasivan	4	VII	Y
BIO413/713	Big Data in Biology	Dr Sreenivas Chavali	4	VII	Y
BIO416/716 (CHM415/715)	Biophysical Chemistry	Dr Soumit Sankar Mandal Prof K N Ganesh	4	VII	Y
BIO417/717	Advanced Ecology	Dr V V Robin	4	VII	Y
BIO435/735	Infection Biology	Dr Suchi Goel* Dr Raju Mukherjee Dr Eswarayya Ramireddy	3	VII	Y
BIO433/733	Plant Stress Biology	Dr Annapurna Devi Allu	3	VII	Y
BIO441/741	Biophysics	Dr Hussain Bhukya	3	VII	Y
BIO714	Communicating Biology	Dr Sreenivas Chavali* Dr Ramkumar Sambasivan	2	--	Y
BIO715	Biodiversity and Conservation (*from IIT*)	Dr Nandini Rajamani	4	--	Y
BIO434/734 CSA434/734 CHM434/734 ECS434/734 PHY434/734	Data Science I	Dr Arunima Banerjee* Dr Lakshmi Lavanya *Guest Lec: Dr Debasish Koner*	4	VII	Y

[##] - Mandatory in Sem V, for Students specializing in Biology
BIO314 is allowed for Sem VII in Monsoon 2023 only, for 2020 BSMS batch.

Chemistry

CHM311/611	Quantum Chemistry I	Dr Padmabati Mondal	4	V, VII	Y
CHM312/612	Physical Organic Chemistry	Dr Kiran Kumar P* Dr Shibdas Banerjee	4	V, VII	Y
CHM313/613	Main Group Chemistry	Dr Sudipta Roy* Dr Arun Kumar Bar	4	V, VII	Y
CHM315	Forensic Science	Dr Nirmala Krishnamurthy* Dr Ashwani Sharma	4	V	--
CHM331/631	Solid State Chemistry	Dr V Aravindan	3	V, VII	Y

Course Code	Name of the Course	Name of the Instructor/s	Credits	Sem open in for	
				BSMS	PhD
CHM332/632 (BIO339/639)	Separation Science & Techniques	Dr Shibdas Banerjee* Dr Nirmala Krishnamurthy	3	V	Y
CHM341	Advanced Chem Lab I	Dr Sudipta Roy* Dr Kiran Kumar P Dr Janardan Kundu	4	V	--
CHM410	Semester Project	Dr V Aravindan* Dr Gopinath Purushothaman	3	VII	--
CHM411/711	Molecular Symmetry and Spectroscopy	Dr Jatish Kumar	4	VII	Y
CHM412/712	Medicinal Chemistry	Dr Ashwani Sharma* Dr Rajesh Viswanathan	4	VII	Y
CHM413/713	Bio-Inorganic Chemistry	Dr Pankaj Kumar Koli* Dr E Balaraman	4	VII	Y
CHM414/714	Transition Metal Chemistry	Dr E Balaraman* Dr Sudipta Roy	4	VII	Y
CHM415/715 (BIO416/716)	Biophysical Chemistry	Dr Soumit Sankar Mandal Prof K N Ganesh	4	VII	Y
CHM416/716 (PHY411/711)	Advanced Statistical Mechanics	Dr Tapan C. Adhyapak	4	VII	Y
CHM432/732 (PHY432/732)	Materials Science	Dr Janardan Kundu* Prof Vijayamohanan Pillai	3	VII	Y
CHM433/733	Organic Spectroscopy	Dr Gopinath Purushothaman	3	VII	Y
BIO434/734 CSA434/734 CHM434/734 ECS434/734 PHY434/734	Data Science I	Dr Arunima Banerjee* Dr Lakshmi Lavanya *Guest Lec: Dr Debasish Koner*	4	VII	Y

Earth and Climate Science

ECS311	Solid Earth Geophysics	Dr Utpal Saikia	4	V, VII	----
ECS410	Semester Project	Dr Aniket Chakrabarty	3	VII	---
ECS411/711	Atmospheric thermodynamics and cloud physics	Dr K Saikranthi	4	VII	Y
ECS412/712	Advanced Mineral Science	Dr Aniket Chakrabarty	4	VII	Y

Course Code	Name of the Course	Name of the Instructor/s	Credits	Sem open in for	
				BSMS	PhD
BIO434/734 CSA434/734 CHM434/734 ECS434/734 PHY434/734	Data Science I	Dr Arunima Banerjee* Dr Lakshmi Lavanya *Guest Lec: Dr Debasish Koner*	4	VII	Y
PHY439/739 ECS439/739	Complex systems	Dr Aradhana Singh	3	VII	Y

Mathematics

MTH311	Group Theory	Dr Shalini Bhattacharya	4	V, VII	---
MTH312	Real Analysis	Dr Venketasubramanian C G	4	V, VII	---
MTH313	Topology	Dr Subhash B	4	V, VII	---
MTH314	Linear Algebra	Dr Girja Shanker Tripathi	4	V, VII	---
MTH331	Elementary Number Theory	Dr Souradeep Majumder*	3	V, VII	---
MTH410	Semester Project	Dr Souradeep Majumder	3	VII	---
MTH411	Fields and Galois Theory	Dr Anilatmaja Aryasomayajula	4	VII	---
MTH412	Functional Analysis	Dr R Lakshmi Lavanya	4	VII	---
MTH413	Introduction to Algebraic Topology	Prof Nagaraj D S	4	VII	---
MTH414	Ordinary Differential Equations	Dr Anilatmaja Aryasomayajula* Dr Joydev Halder (instructor)	4	VII	---
MTH416*	Probability Theory (IIT Tirupati)	(Instructor to be finalized by IIT Tirupati) LC: Dr Gururaja H A*	4	VII	---
MTH611	Algebra I	Dr Anilatmaja Aryasomayajula	4	---	Y
MTH612	Analysis I	Dr R Lakshmi Lavanya	4	---	Y
MTH613	Topology I	Prof Nagaraj D S	4	---	Y

Physics

PHY311/611	Classical Mechanics	Dr Murari Singh (IIT Tirupati, NKN) LC: Dr Chitrasen Jena*	4	V, VII	Y
PHY312/612	Electrodynamics	Dr Arunima Banerjee	4	V, VII	Y
PHY313	Quantum Mechanics I	Dr Sudipta Dutta	4	V, VII	---

Course Code	Name of the Course	Name of the Instructor/s	Credits	Sem open in for	
				BSMS	PhD
PHY314/614	Mathematical Methods in Physics	Dr Srabani Kar	4	V, VII	Y
PHY315/615	Astrophysics	Dr Eswaraiah Chakali	4	V, VII	Y
PHY331	Electronics	Dr T Kanagasekaran	3	V, VII	---
PHY335	Advanced Physics Lab 1: Electronics	Dr T Kanagasekaran* Dr Sunil Kumar	3	V, VII	---
PHY410	Semester Project	Dr Jessy Jose	3	VII	---
PHY411/711 (CHM416/716)	Advanced Statistical Mechanics	Dr Tapan C Adhyapak	4	VII	Y
PHY413/713	Atomic & Molecular Physics	Dr Vinay P Majety (IIT Tirupati, NKN) LC: Dr Sunil Kumar*	4	VII	Y
PHY415	Advanced Physics Lab III	Dr Dileep Mampallil* Dr Jessy Jose	4	VII	---
PHY416/716	Experimental Methods in Physics	Dr Dileep Mampallil	4	VII	Y
PHY417/717	Computational Methods in Physics	Dr Rakesh S Singh* Dr Sambuddha Sanyal Dr Tapan C Adhyapak	4	VII	Y
PHY432/732 (CHM432/732)	Material Science	Dr Janardan Kundu* Prof Vijayamohanan Pillai	3	VII	Y
PHY433/733	Quantum Field Theory	Dr Sambuddha Sanyal	3	VII	Y
BIO434/734 CSA434/734 CHM434/734 ECS434/734 PHY434/734	Data Science I	Dr Arunima Banerjee* Dr Lakshmi Lavanya *Guest Lec: Dr Debasish Koner*	4	VII	Y
PHY439/739 ECS439/739	Complex systems	Dr Aradhana Singh	3	VII	Y

SDC courses

SDC311	Essentials of Professional Communication	Dr Bhanusree Reddy	2	V	Y
SDC411/711	Introduction to Intellectual Property Rights (IPR)	Dr Ambrish Saxena	2	VII	Y
SDC312	Introductory German	Dr Hamsa Arniker (Guest Lec) LC: Dr Baburam Upadhaya*	0	V,VII	Y
SDC313	Introductory Sanskrit	Dr OGP Kalyana Sastry LC: Dr Baburam Upadhaya*	0	V,VII	Y

Semester- VI, VIII BS-MS program & II, IV IPHD

Course Code	Name of the Course	Name of the Instructor/s	Credits	Sem open in for	
				BSMS	PhD
Biology					
BIO321/621	Microbiology	Dr Suchi Goel	4	VI,VIII	Y
BIO322/622	Elements of Structural Biology	Dr Hussain Bhukya* Dr Nibedita Pal	4	VI	Y
BIO324/624	Animal Physiology	Dr Ramkumar Sambasivan	4	VI	Y
BIO325/625	Plant Developmental Biology	Dr Swarup Roy Choudhury* Dr Eswarayya Rami Reddy	4	VI	Y
BIO328/628	Advanced Molecular Biology	Dr Hussain Bhukya* Dr Annapurna Devi Allu Dr Sivakumar Vallabhapurapu	4	VI, VIII	Y
BIO329/629	Behavioural Ecology	Dr Nandini Rajamani	4	VI,VIII	Y
BIO341	Cell Biology	Dr Sanjay Kumar	4	VI	N
BIO420	Semester Project	Dr Swarup Roy Choudhury	3	VIII	N
BIO426/726	Applied Plant Biology	Dr Eswar Rami Reddy* Dr Annapurna Devi Allu	4	VIII	Y
BIO427/727	Bioinformatics Lab	Dr Sreenivas Chavali	4	VIII	Y
BIO443/743 (CHM443/743)	Fluorescence in Biology	Dr Nibedita Pal	3	VIII	Y
BIO444 /744 CHM444 /744	Chemical Biology	Dr Ashwani Sharma	3	VI,VIII	Y
BIO445/745	Advanced Neuroscience	Dr Vasudharani Devanathan	3	VIII	Y
BIO462/762 PHY462/762/ CSA462/762/ CHM462/762/ ECS462/762	Data Science II	Dr Arunima Banerjee* Dr Debasish Koner (Guest Faculty)	3	VIII	Y
BIO446/746 CHM446/746	Drug Discovery and Development	Dr Ambrish Saxena* Dr Rajesh Viswanathan	4	VIII	Y
Chemistry					
CHM321/621 & PHY322	Statistical Thermodynamics	Dr Tapan Adhyapak* Dr Janardan Kundu	4	VI, VIII	Y
CHM322/622	Organic Synthesis I	Dr Kiran K P* & Dr Shibdas B	4	VI, VIII	Y

Course Code	Name of the Course	Name of the Instructor/s	Credits	Sem open in for	
				BSMS	PhD
CHM323/623	Organometallic Chemistry	Dr Balaraman Dr Sudipta Roy	4	VI, VIII	Y
CHM325/625	Chemical Kinetics and Surface Chemistry	Dr Soumit Sankar Mandal * Dr Padmabati Mondal	4	VI, VIII	Y
CHM326/626	Electrochemistry	Dr Aravindan V Prof Vijayamohanan Pillai	4	VI, VIII	Y
CHM341	Food Chemistry	Dr Nirmala Krishnamurthy	3	VI, VIII	N
CHM342	Advanced Chem. Lab II	Dr Ashwani Sharma* Dr E Balaraman Dr Janardan Kundu	3	VI	N
CHM420	Semester Project	Dr Aravindan V	3	VIII	N
CHM421/721	Quantum Chemistry II	Dr Raghunath O R	4	VIII	Y
CHM422/722	Organic Synthesis II	Dr Rajesh Vishwanathan* Dr Gopinath Purushottam	4	VIII	Y
CHM424/724	Supramolecular Architectures to Molecular Machines: Fundamentals & Applications	Prof CP Rao (SRM University) Dr E Balaraman (Local Coordinator)	4	VIII	Y
CHM443/743	Fluorescence in Biology	Dr Nibedita Pal	3	VIII	Y
CHM444/744 (BIO444/744)	Chemical Biology	Dr Ashwani Sharma	3	VIII	Y
CHM441/741	Inorganic Spectroscopy	Dr Pankaj K* Dr E Balaraman	3	VIII	Y
CHM464/764	Astrochemistry	Dr Raghunath O Ramabhadran	3	VIII	Y
CHM426/726 [PHY426/726]	Simulation & Modelling	Dr Rakesh S Singh* Dr Padmabati Mondal	4	VIII	Y
CHM462/762 PHY462/762/ CSA462/762/ BIO462/762/ ECS462/762	Data Science II	Dr Arunima Banerjee* Dr Debasish Koner (Guest Faculty)	3	VIII	Y
CHM446/746 (BIO446/746)	Drug Discovery and Development	Dr Ambrish Saxena	3	VIII	Y

Earth and Climate Science

ECS321	Introduction to Earth and Climate Science	Dr Aniket Chakrabarty* Dr K Saikranthi	4	VI	N
ECS421/721	Igneous Petrology	Dr Aniket Chakrabarty	4	VIII	Y

Course Code	Name of the Course	Name of the Instructor/s	Credits	Sem open in for	
				BSMS	PhD
ECS422/722	Atmospheric Dynamics	Dr K Saikranthi	4	VIII	Y
ECS423/723	Geophysical Inverse Theory	Dr Utpal Saikia	4	VI, VIII	Y
ECS420	Semester Project	Dr Aniket Chakrabarty	3	VIII	N
ECS462/762 (PHY462/762/ CSA462/762/ CHM462/762 /BIO462/762)	Data Science II	Dr Arunima Banerjee* Dr Debasish Koner (Guest Faculty)	3	VIII	Y

Skill Development Course

SDC321	Essentials of Professional Communication	Dr Bhanusree Reddy	3	VI,VIII	N

Computer Science & Applications

CSA462/762 (PHY462/762/ ECS462/762/ CHM462/762 /BIO462/762)	Data Science II	Dr Arunima Banerjee* Dr Debasish Koner (Guest Faculty)	3	VIII	Y
CSA327/627 (MTH327/627)	Introduction to Algorithms	Dr R Lakshmi Lavanya	4	VI, VIII	Y

Mathematics

MTH321	Rings and Modules	Dr Venketasubramanian C G Dr Aditya Subramaniam (Instructor)	4	VI, VIII	
MTH322	Complex Analysis	Dr Girja Shanker Tripathi	4	VI, VIII	
MTH323	Analysis in Euclidean Spaces	Dr Anilatmaja Aryasomayajula	4	VI, VIII	
MTH324	Measure Theory and Integration	Dr Gururaja H A	4	VI, VIII	
MTH/CSA327/ 627	Introduction to Algorithms	Dr R Lakshmi Lavanya	4	VI, VIII	Y
MTH420	Semester Project	Dr Gururaja H A	3	VIII	
MTH421	Commutative Algebra	Dr Shalini Bhattacharya	4	VIII	
MTH423	Algebraic Topology	Dr Subhash B	4	VIII	

Course Code	Name of the Course	Name of the Instructor/s	Credits	Sem open in for	
				BSMS	PhD
MTH424	Partial Differential Equations	Dr Anilatmaja Aryasomayajula Dr Joydev Halder (Instructor)	4	VIII	
MTH428	Representation Theory of Finite Groups	Prof D S Nagaraj	4	VIII	
MTH427	Numerical Analysis (IIT Tirupati)	Prof Panchatcharam Mariappan (IIT Tirupati), Dr Souradeep Majumder (Local Coordinator)	4	VIII	
MTH621	Algebra II	Dr Shalini Bhattacharya	4		Y
MTH623	Topology II	Dr Subhash B	4		Y
MTH624	Representation Theory	Prof D S Nagaraj	4		Y

Physics

PHY321/621	Quantum Mechanics II	Dr Sudipta Dutta	4	VI	Y
PHY322 [CHM321/621]	Statistical Thermodynamics	Dr Tapan C Adhyapak Dr Janardan Kundu	4	VI	N
PHY323/623	Optics	Dr S Sunil Kumar	4	VI, VIII	Y
PHY324	Solid State Physics	Dr Ravi Kumar Pujala	4	VI, VIII	N
PHY326/626	Nonlinear Dynamics	Dr Aradhana Singh	4	VI, VIII	Y
PHY341/641	Fluid Dynamics	Dr Dileep Mampallil, Dr Tapan C Adhyapak, Dr Eswaraiah Chakali	3	VI, VIII	Y
PHY342/642	Quantum Information	Dr Aravindan S (IIT Tirupati) LC: Dr Sambuddha Sanyal	3	VI, VIII	Y
PHY345	Advanced Physics Lab II	Dr Srabani Kar Dr Jessy Jose	3	VI	N
PHY420	Semester Project	Prof Prasenjit Sen	3	VIII	N
PHY421/721	Nuclear and Particle Physics	Dr Chitrasen Jena	4	VIII	Y
PHY423/723	Gravitation & Cosmology	Dr Arunima Banerjee	4	VIII	Y
PHY424/724	Advanced Condensed Matter Physics	Dr Sambuddha Sanyal	4	VIII	Y
PHY425	Advanced Physics Lab IV	Dr Dileep Mampallil Dr Chitrasen Jena	4	VIII	N

Course Code	Name of the Course	Name of the Instructor/s	Credits	Sem open in for	
				BSMS	PhD
PHY426/726 [CHM426/726]	Simulation & Modelling	Dr Rakesh S Singh Dr Padmabati Mondal Prof Prasenjit Sen	4	VIII	Y
PHY441/741	Photonics	Dr T Kanagasekaran	3	VIII	Y
PHY443/743	Soft Matter Physics	Dr Ravi Kumar Pujala* Dr Rakesh Singh	3	VIII	Y
PHY462/762 BIO462/762/ CSA462/762/ CHM462/762/ ECS462/762	Data Science II	Dr Arunima Banerjee* Dr Debasish Koner (Guest Faculty)	3	VIII	Y

Fourth Convocation

The fourth convocation of IISER Tirupati was held on 18th July 2023 at Srinivasapuram, Yerpedu in the Permanent Campus. Six PhD Students and hundred and twenty-two students of BS-MS who completed all the academic requirements in May 2023 were conferred their Doctor of Philosophy and Bachelor of Science and Master of Science degrees respectively. In addition, four students were awarded a BS degree, three students were awarded a BSc degree, and one student was awarded a MS degree.

Prof Jyeshtharaj Bhalchandra Joshi, Chairperson, Board of Governors, presided over the function and introduced the Chief Guest. Prof J B Joshi, Emeritus Scientist, Institute of Chemical Technology, Mumbai is a Fellow of the Indian Science Academies, and Member of National Academy of Engineering, USA. Prof Joshi received the third highest civilian honour, the Padma Bhushan, in 2014 for his services to the field of Chemical Engineering.

Prof Padmanabhan Balaram, FTWAS, FNA, FASc, currently a Chair Professor at the National Centre for Biological Sciences, was the Chief Guest for the 4th Convocation at IISER Tirupati. He delivered an inspiring convocation speech starting with the evolution of science, mankind and how science brought in change to human life. He also talked about the MRI, the role of chemistry in day-to-day life, mathematics as a divine Language and evolutionary biology innovations and their impact in our life.

Prof Santanu Bhattacharya, as Chairperson, Senate, awarded the Doctoral, BS and MS degrees to the graduating students. He along with Prof Padmanabhan presented the Institute Gold Medal for Academic Excellence to Prarthana Agrawal (Physics), the Institute Silver medals to Gopika Sundar (Chemistry), Swarup Packirisamy (Mathematics) and Anita P Saju (Biology). The prize for the best graduating student of 2023 was awarded to Yukta Ajay.

Institute Gold Medal 2023: BS-MS program Physics

Prarthana Agrawal has completed her BS-MS program with the DST Inspire scholarship, securing the highest CGPA of 9.7 among students with a specialization in Physics. She has also received the prize for academic excellence in seven semesters and the C.N.R Rao Education Foundation Prize twice.

Institute Silver Medal 2023: BS-MS program Chemistry

Gopika Sundar P. D completed the BS-MS program with the highest CGPA of 9.3 among students with a specialization in Chemistry. She joined IISER Tirupati with a DST INSPIRE-SHE scholarship and has received the prize for academic excellence in four semesters.

Institute Silver Medal 2023: BS-MS program Mathematics

Swarup Packirisamy completed the BS-MS program with the highest CGPA 9.0 among students with specialization in Mathematics. He received the prize for academic excellence in one semester.

Institute Silver Medal 2023: BS-MS program Biology

Anita P Saju completed the BS-MS program with the highest CGPA 8.8 among students with specialization in Biology. She joined IISER Tirupati with a DST INSPIRE scholarship.

Best Graduating Student 2023: BS-MS program

Yukta Ajay completed the BS-MS program with a CGPA of 8.5 with a specialization in Physics. She joined IISER Tirupati with a DST INSPIRE-SHE fellowship.

Theses and Dissertations

88 fifth-year BSMS students from IISER Tirupati carried out Thesis projects during 2023-2024.
Details of the titles, departments and supervisors are below.

Sl. No.	Name of the Student & Roll No.	Title	Department	Supervisor
1	**Routhu Yashwanth Yeti Rajan** 201701028	Broadband Detection of Visible Spectrum Using Tetracene Based Photo-transistors	Physics	Dr T Kanagasekaran
2	**Triptesh Kumar Roy** 201801002	Photoinduced Regio- and Diastereo-selective Hydrocarboxylation of Alkenes Using CO2 : The Unique Dual faceted Reactivity of Supersilane	Chemistry	Prof Debabrata Maiti, IIT Bombay
3	**Sai Thejas B** 201801004	Elucidating the role of phytochromes in the development and response of wheat and barley plants to canopy shade	Biology	Dr Thorsten Schnurbusch, Leibniz Institute of Plant Genetics and Crop Plant Research, Germany
4	**Rahul Rai** 201801005	Liquid-Liquid Phase Separation in Evaporating PEG-Dextran Drops	Physics	Dr Dileep Mampallil
5	**Shubham Kumar** 201801006	Experiments and Simulations of transport phenomena in paper-based microfluidic systems	Physics	Dr Pranab Kumar Mondal, IIT Guwahati
6	**Bora Bhargava Naidu** 201801008	Studies Directed Towards the 10,11-dehydro Streptomyces coelicolor γ-butyrolactone 1 (SCB1)	Chemistry	Dr Kiran Kumar Pulukuri
7	**Tejas Borkar** 201801010	Delineating the roles of major microcephaly protein WDR62 in cancer and neural stem cell	Biology	Dr Pavithra L Chavali, CSIR-CCMB, Hyderabad
8	**Pendharkar Rujuta Ashutosh** 201801011	Investigating the interaction of BRCA1 protein with different conformations of human telomeric G-quadruplex and the effect of oxidative stress	Biology	Dr Nibedita Pal
9	**Nimbalkar Sonali Manohar** 201801012	Effect of additives on shear thickening behavior and viscoelasticity of cornstarch suspensions	Physics	Dr Ravi Kumar Pujala
10	**Akash Kumar Singh** 201801013	Encoder for CSS Codes using Measurement-based Quantum Computing	Physics	Dr Ankur Raina, IISER Bhopal
11	**Rachit Patil** 201801016	Investigating the transcription regulation in bafilomycin biosynthesis of Kitasatospora setae	Biology	Dr Hussain Bhukya
12	**Mahajan Ved Santosh** 201801018	Exploring the microscopic mechanism of amylin dimerization using computer simulations	Physics	Prof Biman Bagchi, IISc, Bengaluru
13	**Amogh Desai** 201801020	The Evolution of Cheating: Can cheating form a long-term evolutionary strategy?	Biology	Prof Samuel P Brown, Georgia Institute of Technology, Atlanta, USA

Sl. No.	Name of the Student & Roll No.	Title	Department	Supervisor
14	**Abhinav Krishna Jha** 201801023	Variational Aspects of the Yamabe Problem	Mathematics	Dr Ved V Datar, IISc, Bengaluru
15	**Stephin Sebastian** 201801025	Catalytic C(sp3)-H Functionalization of 9H-Fluorenes via Borrowing Hydrogen	Chemistry	Prof Vijayamohanan K Pillai
16	**Bhavana** 201801027	Neutrino Mass and Leptogenesis in Left Right Symmetric Models with A4 Flavour Symmetry	Physics	Dr Sudhanwa Patra, IIT Bhilai
17	**Sandipani Ghosh** 201801028	Growth and Characterization of Transition Metal Oxides for Spintronics and Optoelectronics Applications	Physics	Dr Kartik Ghosh, Missouri State University, USA
18	**Riya Batra** 201801029	Understanding and functionalizing the variome using computational prediction algorithms	Biology	Dr Marc Vidal, Dana-Farber Cancer Institute and Harvard Medical School, Boston, MA, USA
19	**Dalavai Udbhav Mallanna** 201801030	Parametric link for COM-Poisson Regression model	Mathematics	Dr Ishapathik Das, IIT Tirupati
20	**Kirtimayee Mallick** 201801033	Characterization of an apicoplast marker protein of Plasmodium falciparum	Biology	Dr Suchi Goel
21	**Adla Zubair** 201801034	Decoding Multivariate EEG pattern between dream and no dream from High density PSG data	Biology	Dr Arun Sasidharan, NIMHANS, Bengaluru
22	**Abirami Menath** 201801035	Natural History and Behavioral Ecology of Himalayan Myrmica species (Formicidae: Myrmicinae)	Biology	Prof Himender Bharti, Punjabi University, Patiala
23	**Aparna K** 201801037	Detection of Nitric Oxide using a Fluorescence-based molecular Probe	Chemistry	Dr Soumit Sankar Mandal
24	**P Gayathri Vinod** 201801039	Development of Kidney Model for Studying the Dynamics and Kinetics of Blood Flow	Physics	Prof Sai Siva Gorthi, IISc, Bengaluru
25	**Madasu Sumana Sree** 201801040	Quantifying and Mitigating Bias in Machine Learning Applications through Debiasing Word Embeddings	Mathematics	Dr Kripabandhu Ghosh, IISER Kolkata
26	**Shashank V** 201801043	Curvature and Invariants	Mathematics	Prof Siddhartha Gadgil, IISc, Bengaluru
27	**Yukta Ajay** 201801044	Multiwavelength studies of nuclear transients	Physics	Dr Dheeraj R Pasham, MIT, Cambridge, MA, USA
28	**Susmitha Sasikumar** 201801045	GPM Observations of Tropical Cyclones: Dominant Microphysical Processes in the Eyewall, Inner and Outer Rainbands Before and After Landfall	Physics	Dr Basivi Radhakrishna, NARL, Gadanki, Tirupati, AP
29	**Gopika Sundar P D** 201801046	Design of miniproteins for the inhibition of p53-MDM2 interaction	Chemistry	Dr Jayanta Chatterjee, IISc, Bengaluru
30	**Gayathri K** 201801050	Study of Topological Data Analysis and its application for the analysis of fMRI data	Mathematics	Dr S Sumitra, IIST, Thiruvananthapuram

Sl. No.	Name of the Student & Roll No.	Title	Department	Supervisor
31	**Arnab Lahiry** 201801051	Dissecting the Information Content of the Large-scale Structures of the Universe using Machine Learning	Physics	Dr Francisco Villaescusa Navarro, Flatiron Institute, Simons Foundation, New York, USA
32	**Kruthika Avadhani** 201801052	Force Field Development for the Active Site Interactions in Tryptophan Hydroxylase	Chemistry	Dr Padmabati Mondal
33	**Athul Krishnan P S** 201801053	Low-Valent Base Metal Catalyzed (De)Hydrogenation Chemistry	Chemistry	Dr E Balaraman
34	**Yashaswini Pobbati** 201801054	Identifying the Prion binding domains of Caspr1	Biology	Dr Vasudharani Devanathan
35	**Sriyukta G Cheeranghat** 201801056	Characteristics of mixed-phase Hydrometeors and Associated Radar Bright Band Over Indian Subcontinent	Earth and Climate Science	Dr K Saikranthi
36	**Harikrishnan R** 201801058	Adverse Events to New Indications: A GPCR-Centric Approach to Drug Repurposing	Biology	Dr Rohit Suratekar, Inference labs, Bengaluru
37	**Uddeshya Pandey** 201801059	Applications of Machine Learning for Mass Spectrometry-based Disease Diagnostics	Biology	Dr Debasish Koner, IIT Hyderabad
38	**Vajeeha U K** 201801060	Active lanthanide complexes towards carbon fixation and slow-magnetic relaxation: design, synthesis and characterization	Chemistry	Dr Arun Kumar Bar
39	**Ujwal Reddy P** 201801061	Studying the Magnetic Field in PGCC G89.75-2.16 using HINSA Zeeman observations with FAST	Physics	Dr Eswaraiah Chakali
40	**Md Adil Aman** 201801062	Optimization of the CBM-Muon System at FAIR	Physics	Dr Subhasis Chattopadhyay, VECC, Kolkata
41	**Harish Upadhyaya D** 201801063	Elliptic Regularity Theory and The Yamabe Problem	Mathematics	Dr Swarnendu Sil, IISc, Bengaluru
42	**Akanksha Shrihari Khurd** 201801064	Higher-order interactions in the Kuramoto model with inertia and Applications to power grids	Physics	Prof Sarika Jalan, IIT Indore
43	**Surjit** 201801068	Impact and spreading Dynamics of drop on lubricant-coated surfaces	Physics	Dr Dileep Mampallil
44	**Amna Ameer Kottam Tharammel** 201801071	Optical Closure Modelling of Black Carbon Aerosol	Earth and Climate Science	Prof Hugh Coe, University of Manchester, UK
45	**Yogeshwari Asaram Kshirsagar** 201801074	Genome-wide identification of Jacalin-Related Lectins and their response to biotic stress in Solanum lycopersicum	Biology	Dr Eswarayya Ramireddy
46	**Haritha K Sasi** 201801076	Density Functional Theory Investigations to Understand Regioselectivity in Bio-Mimetic Prenylation Reactions	Chemistry	Dr Raghunath O Ramabhadran
47	**Anjaly S Menon** 201801077	Investigation of Percolation of Colloidal Clusters in an Active Bath of Bacteria	Physics	Dr Vijayakumar Chikkadi, IISER Pune

Sl. No.	Name of the Student & Roll No.	Title	Department	Supervisor
48	**Hrudya Sundaresan** 201801078	Mercury contamination in Kodaikanal: Establishing a baseline in the Palani hills	Biology	Dr V V Robin
49	**Joe George** 201801079	Investigating the role of cytokinin in root senescence or ageing in A. thaliana	Biology	Dr Eswarayya Ramireddy
50	**Hemanth K N** 201801080	Towards the Total Synthesis of Lycibarbarines A, B and C	Chemistry	Dr Chepuri V Ramana, CSIR-NCL, Pune
51	**Aaradhya Vaze** 201801081	Dynamics and Databases of Spiking Neural Networks	Physics	Prof Tim Vogels, Institute of Science and Technology, Austria
52	**Mohammed Shafeeullah** 201801082	Chemical reactions of atomically precise nanoclusters with transition metal chalcogenides	Chemistry	Prof T Pradeep, IIT Madras
53	**Harshit Makhija** 201801086	Morse Theory and its Applications	Mathematics	Dr B Subhash
54	**Sushmita Halder** 201801088	Analyzing The Therapeutic Efficacy Of Output Combinations For The Cancer-Targeting Gene Circuit	Biology	Dr Ming-Ru Wu, Dana-Farber Cancer Institute and Harvard Medical School, Boston, MA, USA
55	**Alisha B S** 201801091	Modulating emission by dopant incorporation in low-dimensional hybrid halides	Chemistry	Dr Janardan Kundu
56	**Parthasarathi Behera** 201801092	Functional Variomics of Protein Arginine Methyltransferases	Biology	Dr Sreenivas Chavali
57	**Swarup Packirisamy** 201801093	Kato's Inequality and its extensions	Mathematics	Dr Suman Kumar Tumuluri, University of Hyderabad
58	**Prarthana Agrawal** 201801096	Strain engineering of quantum spin liquids	Physics	Prof Matthias Vojta, Technische Universität Dresden, Germany
59	**Niloufer Shanavas** 201801098	The cellular origin of pial collaterals and the role of Cxcr4 in collateral remodeling and maintenance	Biology	Dr Soumyashree Das, NCBS, Bengaluru
60	**R Raajalakshmi** 201801102	Unraveling the epigenetic mechanisms underlying acquired thermotolerance in Arabidopsis thaliana	Biology	Dr Annapurna Devi Allu
61	**Yashwant Shankarrao Lanjewar** 201801105	Characterizing Chaos in Thermalized Many-Body Systems: A Classical and Quantum Approach	Physics	Dr Sambuddha Sanyal
62	**Atharva Uday Phanse** 201801107	Coppersmith method in cryptanalysis and its applications	Mathematics	Dr Santanu Sarkar, IIT Madras
63	**Athira Anil** 201801112	The Differential Transcriptional Regulation by The LEF-1 Motif Across HIV-1B and C	Biology	Prof Ranga Udaykumar, JNCASR, Bengaluru

Sl. No.	Name of the Student & Roll No.	Title	Department	Supervisor
64	**Sanket Ajay Munishwar** 201801116	Rapid Sky Localization Of Electromagnetic Counterparts In GW Astronomy	Physics	Prof Anand Sengupta, IIT Gandhinagar
65	**Nida Fathima** 201801117	Engineering of RNA motifs for nanotechnology applications by utilizing light-up aptamer	Chemistry	Dr Ashwani Sharma
66	**Shamil Hussain** 201801120	Reciprocity Laws and Equations over Finite Fields	Mathematics	Prof Nagaraj D S
67	**Sneha Prakash Yechuri** 201801122	Novel Modelling of Real-Time Dynamics of Bacterial Gene Regulatory Networks	Physics	Prof Andre S Ribeiro, Tampere University, Finland
68	**Poluru Snehith Surya Teja Hanuman** 201801124	Accessing C7 olefinated indoles using a dual transition metal-photoredox strategy	Chemistry	Dr Gopinath Purushothaman
69	**Shrihari M G** 201801126	Understanding the survival strategies of cytosolic Salmonella enterica serovar Typhimurium in host Macrophages	Biology	Prof Dipshikha Chakravortty, IISc, Bengaluru
70	**Ajeet Kumar** 201801127	Role of ZBP1 in the activation of necroptosis mediated by RNA viruses	Biology	Dr Kesavardana Sannula, IISc, Bengaluru
71	**Jishnu R** 201801128	Modelling the emergent collective behaviour of interacting market agents using strategic decision-making	Physics	Prof Sitabhra Sinha, IMSc, Chennai
72	**Siyad R** 201801129	Development of Composites of 2D Materials for EMI Shielding and Stealth	Physics	Dr Suwarna Datar, Pune
73	**Aghila G** 201801130	Dynamics of self-propelled and self-assembled colloids at fluid interfaces	Physics	Dr Dilip K Satapathy, IIT Madras
74	**Chaitanya Chawak** 201801131	Cosmology with Multiple Galaxies	Physics	Dr Francisco Villaescusa Navarro, Flatiron Institute, Simons Foundation, New York, USA
75	**Parvathy Jayan** 201801132	Synthesis of Hierarchical SnO2 Nanostructures as Alloy Anode for Building High-performance Dual-ion Batteries	Chemistry	Dr V Aravindan
76	**Shaurya Pratap Singh** 201801134	Cooperative Phenomena in Complex Systems	Physics	Dr Marco Alberto Javarone, CREF Rome, UCL
77	**Khushi Dani** 201801135	The Analytic and Numerical Study of a Non-linear Age-dependent Population Model	Mathematics	Dr Suman Kumar Tumuluri, University of Hyderabad
78	**M Nithyassree** 201801136	Engineering and Characterization of an antiCTLA4/antiPD1 bispecific antibody	Biology	Dr Wayne A Marasco, Dana-Farber Cancer Institute and Harvard Medical School, Boston, MA, USA
79	**Amarkrishna A S** 201801137	Plant on a Chip: Microfluidics for studying root exudates in response to root-borne fungal pathogen Fusarium oxysporum	Pysics	Dr Dileep Mampallil

Sl. No.	Name of the Student & Roll No.	Title	Department	Supervisor
80	**Lakshmi M V** 201801138	Decarbonized Indices: A tool to hedge climate risks	Mathematics	Dr Rituparna Sen, ISI, Bengaluru
81	**Hari Madhav B** 201801139	Calculation of four point correlation function for Dynamic Heterogeneity using fluorescence correlation spectroscopy	Physics	Dr Shivprasad Patil, IISER Pune
82	**E Lakshmi** 201801140	Studies on Mannose-6-Phosphate Receptor pathway using lysosomal hydrolase trafficking reporter	Biology	Dr Ravi Manjithaya, JNCASR, Bengaluru
83	**Akshaya K** 201801141	Template-Assisted Chiral Emission in Luminescent Nanoparticles	Chemistry	Dr Jatish Kumar
84	**Anagha P** 201801142	Mimicking and Exploring the Functional Model of Carbonic Anhydrase and its Mechanistic aspect	Chemistry	Dr Pankaj Kumar Koli
85	**Safa Nasrin V Z** 201801143	Investigating the meiotic behavior of rearranged chromosomes	Biology	Dr Vijayalakshmi V Subramanian
86	**Devika G** 201801144	Role of Autophagy in Pancreatic Cancer	Biology	Dr Ravi Manjithaya, JNCASR, Bengaluru
87	**Serene Rasheed** 201801145	Fréchet Distance and its Applications	Mathematics	Dr Sasanka Roy, ISI, Kolkata
88	**Jesmal Jalal** 201801146	Optically Pumped Organic Semiconductor Laser Based on BP2T Single Crystals	Physics	Dr T Kanagasekaran
89	**R Anirudh** 201801147	Using radiative transfer models and cosmological simulations to map the emission of cold gas within galaxies	Physics	Dr Gergö Popping & Dr Melanie Kaasinen, European Southern Observatory, Garching, Germany
90	**Umesh Chandra Pandey** 201801148	Representation Theory of Compact Lie groups and Sunada's method	Mathematics	Dr Chandrasheel Bhagwat, IISER Pune
91	**Riya Gogte** 201801149	Design, synthesis & evaluation of second-generation non-nucleoside inhibitors of Ribonucleotide Reductase	Chemistry	Dr Rajesh Viswanathan
92	**S Nanditha** 201801150	Characterization of a storage ion source	Physics	Dr S Sunil Kumar
93	**Manaswini Manisha Mohapatra** 201801151	Role of lncRNAs in memory formation	Biology	Dr Sourav Banerjee, NBRC, Manesar
94	**Putta Divya** 201801153	Carbene-Phosphinidenides as Novel Ligands Towards Stabilization of Aminoborane Functionalized Phosphaalkenes and Mixed Main Group/Transition-Metal Compounds	Chemistry	Dr Sudipta Roy
95	**Shubham Singh** 201801154	Estimating hadron cascade time in heavy-ion collisions using machine learning	Physics	Prof Raghunath Sahoo, IIT Indore

Sl. No.	Name of the Student & Roll No.	Title	Department	Supervisor
96	**Preet Bhanjan Pati** 201801155	Disentangling the prompt and non-prompt production of J/ψ in proton+proton collisions at the LHC: a machine learning approach	Physics	Prof Raghunath Sahoo, IIT Indore
97	**Shekhar Bhanudas Patil** 201801156	Patterning of mesoderm during early mammalian development	Biology	Dr Ramkumar Sambasivan
98	**Bhosale Suraksha Anil** 201801157	Fabrication and study of non-equilibrium phase transitions of active colloids	Physics	Dr Ravi Kumar Pujala
99	**Akash Das** 201801159	Synthesis of Substituted Chromanes via Gold-Catalyzed Aryl-Alkenylation of Alkenes	Chemistry	Dr Nitin T Patil, IISER Bhopal
100	**Aiswarya M H** 201801160	Synthesis of seven-membered cyclitols and fused cyclitols for biological studies	Chemistry	Prof Kana M Sureshan, IISER Thiruvananthapuram
101	**Velpumadugu Vaishnavi** 201801162	Molecular and functional characterisation of novel gene(s) in phosphate deficiency response	Biology	Dr Ashverya Laxmi, NIPGR, New Delhi
102	**Joshin John Bejoy** 201801163	Using state-of-the-art Machine Learning techniques to derive high-resolution precipitation projections over the Indian region in a warming climate	Physics	Dr Chirag Dhara, Krea University, Sri City, AP
103	**Anita P Saju** 201801164	Systems-level understanding of different biological forms of Fungi	Biology	Dr Sreenivas Chavali
104	**Esha S Babu** 201801165	Exploring C-5 & C-7 Functionalization of Indoles via Photoredox Catalysis	Chemistry	Dr Gopinath Purushothaman
105	**Ashwin A Pillai** 201801166	Theoretical Explorations of Defect and Impurity Induced Magnetic Interactions in Low-Dimensional Systems	Physics	Dr Sudipta Dutta
106	**Arunangshu Bora** 201801167	Matrix Entanglement and Holographic Locality	Physics	Dr Chethan Krishnan, IISc, Bengaluru
107	**Haritha N** 201801168	Topological K Theory and its Applications	Mathematics	Dr B Subhash
108	**Nandana P** 201801169	Numerical Simulations for Time-of-Flight Mass Spectrometry using 16-Pole/16-Wire Ion Traps	Physics	Dr S Sunil Kumar
109	**Davin Mathews David** 201801170	Source parameter and tectonic implications of small earthquakes originating in South India	Earth and Climate Science	Dr Utpal Saikia
110	**Mangesh Digambar Ladke** 201801173	Drying Patterns of Colloidal Dispersions in Confined Droplets	Physics	Dr Ravi Kumar Pujala
111	**Arathy Thambi P** 201801174	Transport of active Brownian and run-and-tumble particles in ratchet potential	Physics	Dr Ronald Benjamin, CUSAT, Kochi
112	**Arghya Chakraborty** 201801175	Multi-Wavelength analysis of the interacting galaxy pair Arp 297	Physics	Dr Kanak Saha, IUCAA, Pune

Sl. No.	Name of the Student & Roll No.	Title	Department	Supervisor
113	**Anjali Singh** 201801176	Investigating the role of Mitochondrial fission protein (Fis1) in Ovarian cancer	Biology	Dr Sanjay Kumar
114	**Parvathy S Nair** 201801177	Potential Role of Radical Pairs in NMDA Receptor Activity in the Presence of Magnetic Fields	Physics	Prof Christoph Simon, University of Calgary, Canada
115	**Swastik Neelam Dilip Shinde** 201801178	Magmatic and fenite syenite conundrum: Insights from the Sevattur carbonatite complex, India	Earth and Climate Science	Dr Aniket Chakrabarty
116	**Srushti Patil** 201801179	Solving Optimization and Classification Problems on a Quantum Computer	Physics	Prof Prasanta Panigrahi, IISER Kolkata
117	**Merin Babu** 201801180	Nickel Catalysed Selective Hydrogenation of Epoxides to Alcohols at Room Temperature	Chemistry	Dr Ekambaram Balaraman
118	**Suyambulingam S** 201801181	Viscoelasticity of Single domain Protein: An Investigation using Atomic Force Microscopy and Computational Methods	Physics	Dr Shivprasad Patil, IISER Pune
119	**Purva Atul Naik** 201801182	Inference of Gene Regulatory Networks in the developing leaf of Cardamine hirsuta	Biology	Dr Stefan Laurent, Max Planck Institute of Plant Breeding Research, Cologne, Germany
120	**Fardeen Barkat Khan** 201801183	To investigate how metabolic stress regulates Api5 in cells	Biology	Dr Mayurika Lahiri, IISER Pune
121	**Ayush Yadav** 201801184	Study of Two Particle Correlations in proton-proton collision at s = 13 TeV using PYTHIA8	Physics	Prof Sadhana Dash, IIT Bombay
122	**Namitha Madhusudanan** 201801185	Stochastic Thermodynamics of Brownian Heat Engine	Physics	Dr Ronald Benjamin, CUSAT, Kochi

18 PhD students from IISER Tirupati completed their PhD Dissertations during 2023-2024. Details of the titles, departments and supervisors are below.

Sl. No.	Name of the Student & Roll No.	Title	Department	Supervisor
1	**Subramanyan K** 20183213	Investigation of Electrodes and Electrolytes for Sodium Ion Batteries	Chemistry	Dr V Aravindan
2	**Roshni Willita Pereira** 20183212	Computational Chemistry of the Proton: Development of a new Method to compute aqueous pKas and the Application of Born-Oppenheimer Molecular Dynamics to Study Proton Assisted Fluxionality in Transition Metal Oxide Clusters	Chemistry	Dr Raghunath O Ramabhadran
3	**Sandip Das** 20183206	Base-Induced Nitric Oxide Monooxygenation Reactions and Their Mechanistic Aspects	Chemistry	Dr Pankaj Kumar

Sl. No.	Name of the Student & Roll No.	Title	Department	Supervisor
4	**Souren Adhikary** 20173403	Inducing New Functionalities in Two-dimensional Materials by Elemental Substitutions	Physics	Dr Sudipta Dutta
5	**Arka Bhattacharya** 20173402	Charge Transport in Organic Semiconductors: A Combined Theoretical and Experimental Investigation with Applications to Devices	Physics	Dr Kanagasekaran T
6	**Ekta Nag** 20183204	Chemistry of Carbene-Anchored Mono-Atomic Phosphorus Anion with Main Group Elements and Coinage Metals	Chemistry	Dr Sudipta Roy
7	**Mahesh Yenuganti** 20183205	Nitric Oxide Oxidation (NOO) Chemistry of Metal-Oxygen and Metal-Nitrosyl Adducts	Chemistry	Dr Pankaj Kumar
8	**Kulbir** 20193219	Nitrite Reduction to Nitric Oxide on Transition Metals: Mimicking Biological Nitrite Reductase (NiR) Reactions	Chemistry	Dr Pankaj Kumar
9	**Krishna K. Das** 20183107	Unravelling the role of root cap in shaping the *Arabidopsis* response towards abiotic stress	Biology	Dr Eswarayya Ramireddy
10	**Gopu Maheshwar Reddy** 20193409	Droplets on Surfaces: Wetting, Evaporation and Pattern Formation Dynamics	Physics	Dr Dileep Mampallil
11	**Patil Saniya Tanaji** 20173102	Outer membrane proteins in *Mycobacterium tuberculosis* and their role in small molecule permeation	Biology	Dr Raju Mukherjee
12	**Kandluri Geethika** 20183209	Investigation of the DNA Compaction Mechanism in Crenarchaeota	Chemistry	Dr Soumit Sankar Mandal
13	**Sivakumar G** 20193218	Transition-Metal Catalyzed Acceptorless Dehydrogenation and Related Reactions in Sustainable Chemical Synthesis	Chemistry	Dr E Balaraman
14	**Jobin Varughese** 20183108	Biodiversity of a Tropical Mountain in Landscapes Dominated by Invasive Timber Species	Biology	Dr V V Robin
15	**Liz Thomas** 20183112	Role of Chromatin Remodeler MORC2 in the Regulation of E-cadherin Gene Expression and Function in Breast Cancer	Biology	Dr Pakala Suresh Babu
16	**Kale Onkar Kamlakar** 20183303	Constructible Witt theory of schemes	Mathematics	Dr Girja Shanker Tripathi
17	**Dyuti Roy** 20183302	Estimates of Bergman kernels on Picard modular varieties	Mathematics	Dr Anilatmaja Aryasomayajula
18	**Sonia M** 20193216	Unravelling the Origin of Chirality at the Nanoscale: Exploring Optical Activity in Plasmonic Nanomaterials and Carbon Nanodots	Chemistry	Dr Jatish Kumar

Academic Activities of Scholars

Individual publications of scholars and staff with non-IISER Tirupati faculty are included in the following list.

BS-MS Students

Journal Articles

Alagarasan, Ganesh

1. **Alagarasan, G.** (2024). Duality of jacalin-related lectin: Master regulator and chaperone. *Plant Communications*, *5*(2). https://doi.org/10.1016/j.xplc.2024.100825

Arvind, Chiti

2. Narwade, S. S., Prabhu, M., Shaikh, P., Karulkar, A., **Arvind, C.,** & Rahmani, A. R. (2023). Monthly variation in waterbird count of wetlands behind NRI Colony and TS Chanakya in Navi Mumbai, Maharashtra, India. *Journal of the Bombay Natural History Society, 120*(3). https://doi.org/10.17087/jbnhs/2023/v120/165119

Bajaj, Mayur

3. **Bajaj, M.,** Asokan, V., Mishra, P., Reddy, S. K., Irle, H., Rajbangshi, N., Firdose, S., Vaishnavi, S., & Banerjee, P. (2024). Reaching the Goldilocks zone: A novel implant coating based on fish peptide stimulate superior osteogenicity compared to contemporary materials. *Materials Chemistry and Physics*, *315*. https://doi.org/10.1016/j.matchemphys.2024.128985

Balasubramanian, Deevitha

4. **Balasubramanian, D.,** Borges Pinto, P., Grasso, A., Vincent, S., Tarayre, H., Lajoignie, D., & Ghavi-Helm, Y. (2024). Enhancer–promoter interactions can form independently of genomic distance and be functional across TAD boundaries. *Nucleic Acids Research*, *52*(4), 1702-1719. https://doi.org/10.1093/nar/gkad1183

Bhardwaj, Prabhakar

5. Sriramadasu, V. K., Kommula, B., **Bhardwaj, P.,** & Bhattacharyya, S. (2023). Understanding the role of dominant crystal facets on heterogeneous catalytic activity of BiOBr nanomaterials: Boosting catalytic efficiency through Fe (III)/Fe (II) incorporation. *Journal of Alloys and Compounds*, *967*. https://doi.org/10.1016/j.jallcom.2023.171814

Bhattacharjee, Saunak

6. **Bhattacharjee, S.,** Dixit, A. B., & Saikia, D. (2024). An effective bound for generalised diophantine *m*-tuples. *Bulletin of the Australian Mathematical Society*, *109*(2), 242-253. https://doi.org/10.1017/S0004972723001077

Chakraborty, Sujoy

7. **Chakraborty, S.,** & Paul, A. (2024). Real structures on root stacks and parabolic connections. *Geometriae Dedicata*, *218*(2). https://doi.org/10.1007/s10711-023-00880-1

Chawak, Chaitanya

8. Echeverri-Rojas, N., Villaescusa-Navarro, F., **Chawak, C.,** Ni, Y., Hahn, C., Hernández-Martínez, E., Teyssier, R., Anglés-Alcázar, D., Dolag, K., & Castro, T. (2023). Cosmology with one galaxy? The ASTRID model and robustness. *Astrophysical Journal*, *954*(2). https://doi.org/10.3847/1538-4357/ace96e

Chutani, Namita

9. **Chutani, N.,** Ragula, S., Syed, K., & Pakala, S. B. (2023). Novel insights into the role of chromatin remodeler MORC2 in cancer. *Biomolecules*, *13*(10). https://doi.org/10.3390/biom13101527

Dhali, Prasad

10. **Dhali, P.,** & Mondal, R. (2024). Theory of tensorial

Gilbert damping in antiferromagnets. *Journal of Physics: Condensed Matter*, *36*(25). https://doi.org/10.1088/1361-648X/ad353a

Ghatage, Prajakta

11. Nerlekar, N., Patil, P., Khot, S., **... Ghatage, P.** et al. (2024). Cold maceration extraction of wild fruit *Terminalia bellirica* (Gaertn.) Roxb.: Exploring its bioactives for biomedical applications. *Preparative Biochemistry & Biotechnology*, *54*(7), 982-1000. https://doi.org/10.1080/10826068.2024.2313632

Goyal, Naman

12. Dhanda, A., Hubbard, L., & **Goyal, N.** (2024). Digest: Habitat and competition drive diversification in Gondwanan fish. *Evolution*, *78*(5), 1020-1021. https://doi.org/10.1093/evolut/qpae023

Goyal, Naman; Warudkar, Ashwin

13. **Goyal, N., Warudkar, A.,** Kolipakam, V., Pant, B., Kuppusamy, S., Singh, P., Qureshi, Q., & Nair, M. V. (2023). Revisiting the systematic position of the enigmatic Nicobar Bulbul (*Ixos nicobariensis*). *Ibis, 166*(3), 1059-1063. https://doi.org/10.1111/ibi.13297

Joseph, Sneha L.

14. Sharma, G. K., **Joseph, S. L.,** & James, N. R. (2024). Recent progress in poly (3,4-ethylene dioxythiophene): Polystyrene sulfonate based composite materials for electromagnetic interference shielding. *Advanced Materials Technologies*, *9*(1). https://doi.org/10.1002/admt.202301203
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Meenath, Abirami

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Munishwar, Sanket

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Muralikrishnan, Balaji

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Nair, Parvathy S.

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Ravindranath, Ranjitha

24. Deiana, M., Andrés Castán, J. M., Josse, P., Kahsay, A., Sánchez, D. P., Morice, K., Gillet, N., **Ravindranath, R.,** Patel, A. K., Sengupta, P., Obi, I., Rodriguez-Marquez, E., Khrouz, L., Dumont, E., Abad Galán, L., Allain, M., Walker, B., Ahn, H. S., Maury, O., … Sabouri, N. (2023). A new G-quadruplex-specific photosensitizer inducing genome instability in cancer cells by triggering oxidative DNA damage and impeding replication fork progression. *Nucleic Acids Research*, *51*(12), 6264-6285. https://doi.org/10.1093/nar/gkad365

Sajeev-Sheeja, Akash

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Sarkar, Suman

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Saxena, Sanskriti

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Sharma, Anchita

29. Bangarh, R., Khatana, C., Kaur, S., **Sharma, A.,** Kaushal, A., Siwal, S. S., Tuli, H. S., Dhama, K., Thakur, V. K., Saini, R. V., & Saini, A. K. (2023). Aberrant protein glycosylation: Implications on diagnosis and Immunotherapy. *Biotechnology Advances*, *66*. https://doi.org/10.1016/j.biotechadv.2023.108149

Sharma, Sharang Rav

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Shukla, Vishnu

31. Meena, V., Kaur, G., Joon, R., **Shukla, V.,** Choudhary, P., Roy, J. K., Singh, B., & Pandey, A. K. (2024). Transcriptome and biochemical analysis in hexaploid wheat with contrasting tolerance to iron deficiency pinpoints multi-layered molecular process. *Plant Physiology and Biochemistry*, *207*. https://doi.org/10.1016/j.plaphy.2024.108336
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Singh, Shaurya Pratap

33. Alberto Javarone, M., & **Singh, S. P.** (2024). Strategy revision phase with payoff threshold in the public goods game. *Journal of Statistical Mechanics: Theory and Experiment*, *2024*(2). https://doi.org/10.1088/1742-5468/ad2449

Subramaniam, Aditya

34. Karmakar, R., Sarkar, R., & **Subramaniam, A.** (2024). Algebraic properties of binomial edge ideals of Levi graphs associated with curve arrangements. *Journal of Pure and Applied Algebra*, *228*(9). https://doi.org/10.1016/j.jpaa.2024.107665

Suresh, Akhil Dev

35. Narang, U., Juneja, K., Upadhyaya, P., Salunke, P., Chakraborty, T., Behera, S. K., Mishra, S. K., & **Suresh, A. D.** (2024). Artificial intelligence predicts normal summer monsoon rainfall for India in 2023. *Scientific Reports*, *14*(1). https://doi.org/10.1038/s41598-023-44284-3

Thomas, Liz; Chutani, Namita

36. **Thomas, L., Chutani, N.,** R, K., Nair, A. S., Yellapu, N. K., Karyala, P., & Pakala, S. B. (2023). Microrchidia 2/histone deacetylase 1 complex regulates E-cadherin gene expression and function. *Biochemical Journal*, *480*(20), 1675-1691. https://doi.org/10.1042/BCJ20230304

Book Chapters

Kumar, Shubham

37. Behera, P. P., **Kumar, S.,** Kumari, M., Mondal, P. K., & Arun, R. K. (2024). Gold nanoparticle-antibody bio-probe analysis: Synthesis, conjugation, characterization and dot blot assay on paper. In K. M. Singh et al. (Eds.), *Fluid Mechanics and Fluid Power, Volume 4* (pp. 643-653). Springer Nature. https://doi.org/10.1007/978-981-99-7177-0_54

Nithish, G. S.

38. Pruthvi, G. R., Apoorva M. R., Anuthilakesh, T., Bhargavi, K., **Nithish, G. S.,** Achar, R. R. (2023). Food polyphenols: Antioxidant properties and health benefits. In M. Rudrapal (Ed.), *Polyphenols: Food, Nutraceutical, and Nanotherapeutic Applications*, (pp. 1-20). Wiley. https://doi.org/10.1002/9781394188864.ch1

Non-Teaching Staff

Journal Articles

Mayarambakam, Sasikumar

39. Sekar, K., Marasamy, L., **Mayarambakam, S.,** Selvarajan, P., & Bouclé, J. (2024). Highly efficient lead-free silver bismuth iodide (Ag_3BiI_6) rudorffite solar cells with novel device architecture: A numerical study. *Materials Today Communications*, *38*. https://doi.org/10.1016/j.mtcomm.2024.108347

40. **Mayarambakam, S.,** Busireddy, M. R., Sekar, K., & Rao, V. J. (2023). Facile synthesis of A-π-D-π-A architecture organic small molecules. Experimental and theoretical investigation of the effect of a π-conjugated spacer. *Asian Journal of Organic Chemistry*, *12*(5). https://doi.org/10.1002/ajoc.202300058

41. Sekar, K., Marasamy, L., **Mayarambakam, S.,** Hawashin, H., Nour, M., & Bouclé, J. (2023). Lead-free, formamidinium germanium-antimony halide ($FA_4GeSbCl_{12}$) double perovskite solar cells: The effects of band offsets. *RSC Advances*, *13*(36), 25483–25496. https://doi.org/10.1039/D3RA03102K

Awards of Scholars

BS-MS Students

Ms Asma Shirin, BS-MS student, 2020 batch

Selected to attend the Nobel laureates' meeting in Lindau, Germany.

Mr Vigneshwaran, from BS-MS student, 2020 batch

DAAD summer fellowship.

Mr Yashwath, BS-MS student, 2019 batch

Future Research Talent Award 2023, by the Australian National University

Mr Faizee Ali Khan, a BS-MS student, 2019 batch

Chapman Collection's Award from the American Museum of Natural History

Aditya Panigrahy, BS-MS 2020 batch

MITACS Globalink Research Internship (May to July, 2023), MITACS, Canada

Anchita Sharma, BS-MS student, 2019 batch

Eiffel scholarship, May-24, Campus France, French government

Dakhole Riddhi, BS-MS student, 2023 batch

INSPIRE Scholarship, September 2023

Malavika Rajesh, BS-MS student, 2019 batch

International Max Planck Research School for Living Matter, Germany

Durai Renganatha Athithan, BS-MS student 2023 batch

Scholarship for Higher Education (SHE) under INSPIRE programme, December 2023

Rohit Rithe, BS-MS student, 2023 batch

NSP Scholarship, Central Government under National Scholarship Programme (NSP), March 2023

PhD Students

Namita Chutani, PhD Student, 2018 batch

CSIR SRF-Direct Fellowship, May 2024 CSIR

Sharang Rav Sharma, PhD Student, 2019 batch

Best Young Student Researcher Award August 25, 2023MATE Institute of Technology, Gyöngyös, Hungary

Supratim Mondal, PhD Student, 2018 batch

Best Poster Presentation award 8th November 2023, INST Mohali

Mr Devidutta Samantaray, PhD student

Fulbright Fellowship to conduct research at Penn State University, USA

iGEM IISER Tirupati 2023

The International Genetically Engineered Machine (iGEM) team from the Indian Institute of Science Education and Research (IISER) in Tirupati comprised 13 dedicated 2nd-year undergraduate students who passionately and collectively worked on a groundbreaking project titled "Anthrafelix - a novel probiotic therapeutic for IBS-D" during the year 2023. The team's unwavering efforts and innovative approach culminated in being awarded a prestigious Gold Medal at the iGEM 2023 competition.

The iGEM team set out to tackle irritable bowel syndrome with Diarrhea predominance (IBS-D), a prevalent subtype of Functional Gastrointestinal Disorders (FGIDs). Through extensive research and consultation with experts, the team identified an excess of serotonin, a neurotransmitter, in the colon as the root cause of IBS-D. In response, they devised a regulated conversion pathway of serotonin to Melatonin, leveraging a Quorum Sensing (QS) molecule originally found in the bacterium *Turicibacter sanguinis*. With its myriad positive effects, Melatonin emerged as a promising therapeutic agent for alleviating IBS-D symptoms. Its potential benefits include acting as an analgesic, modulating sleep, and other positive gut health effects.

iGEM IISER Tirupati team 2023


NORSON

Research

Fostering solutions and innovation

Research at IISER Tirupati is carried out by six departments: Biology, Chemistry, Earth and Climate Sciences, Mathematics, Physics, and Humanities & Social Sciences. The diversity of scientific research carried out is considerable, ranging from nano-particles to galaxies. The focus is on both discovery as well as application science, which synergistically create a better educated and more conscious planet.

Biology Department

The Department of Biology at IISER Tirupati is committed to fostering a culture of innovation and collaboration, including cutting-edge research opportunities and resources. The department's faculty conducts research across diverse areas, ranging from molecules to ecosystems. This year, seven more new faculty members joined the biology department to strengthen the diversified areas the department is working on. With both new and existing faculty members covering a wide range of research interests, the department is well-prepared to address interdisciplinary challenges in biology.

During the current year, the members of the biology department have continued to make significant contributions to various national and international scientific bodies. Some are esteemed members, while others serve as secretaries of these societies. Additionally, several faculty members have garnered global recognition. For instance, Dr Vasudharani Devanathan was honoured with the Fulbright Nehru Academic Professional Excellence award and was featured in the Compendium of Inspirational Stories of Women in STEM by the Confederation of Indian Industries (CII). Meanwhile, Dr Annapurna Devi Allu received a visiting fellowship from the French Embassy and French Institute in India. Regarding sponsored funding for research programs, the biology department maintains its tradition of attracting funding from national public funding bodies, private companies, and philanthropic foundations. In the current academic year, Dr Vasudharani, Dr Robin V V, Dr Sreenivas Chavali, and Dr Swarup Roy Choudhury secured funding from DST-SERB, while Dr Ramkumar and Dr Eswar Ramireddy received funding from DBT. Notably, Dr Robin V V secured funding from the Rohini Nilekani Foundation, and Dr Raju Mukharjee received the Ignite Life Science Foundation Research Grant Award. The department's success in obtaining funding underscores its strong relationships with external organisations. In terms of publications, the department has consistently published research articles, of high standard and quality. They are, in total, 39 publications in international peer-reviewed journals, such as Nature Communications, Cell Reports, Plant Communications, The Lancet Infectious Diseases, PLOS Genetics, etc. In addition to publications, biology faculty were invited to several international and national conferences and symposiums to deliver invited talks, indicating recognition by their peers at the international and national levels.

The biology department is also dedicated to strengthening the BS-MS program, the flagship academic program on campus. In the year 2024, 33 students out of a batch of 129 students from the 2019 BSMS batch were awarded BS-MS degrees with a major in Biology and four students were awarded PhD degrees in Biology. Mr Nooruddeen Jabbar was awarded the prestigious Prime Minister's Research Fellowship in the 11th cycle of PMRF.

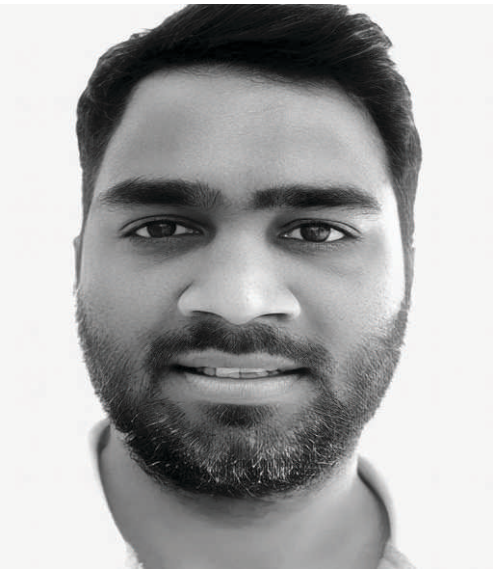
Over the year, the Department has hosted several events of various kinds - seminars and colloquia/meetings, and several of these events saw the presence of notable scientists from both India and abroad. We also hosted our annual internal Biology Day event in February 2023, which brought together faculty, students, and the public to celebrate the accomplishments of the biology department.

Faculty

Dr Anand Kumar Singh
Dr Annapurna Devi Allu
Dr Eswarayya Ramireddy
Prof Guruprasad R Medigeshi
Dr Hussain Bhukya
Dr Nandini Rajamani
Dr Nibedita Pal
Dr Pavithra L Chavali
Dr Rajeswari Appadurai
Dr Raju Mukherjee
Dr RamKumar Sambasivan
Dr Robin V V
Dr Sanjay Kumar
Dr Santanu Paul
Dr Sivakumar Vallabhapurapu
Dr Sreenivas Chavali
Dr Suchi Goel
Dr Swarup Roy Choudhury
Dr Vasudharani Devanathan
Dr Vijayalakshmi V Subramanian

Visiting Faculty

Prof B J Rao



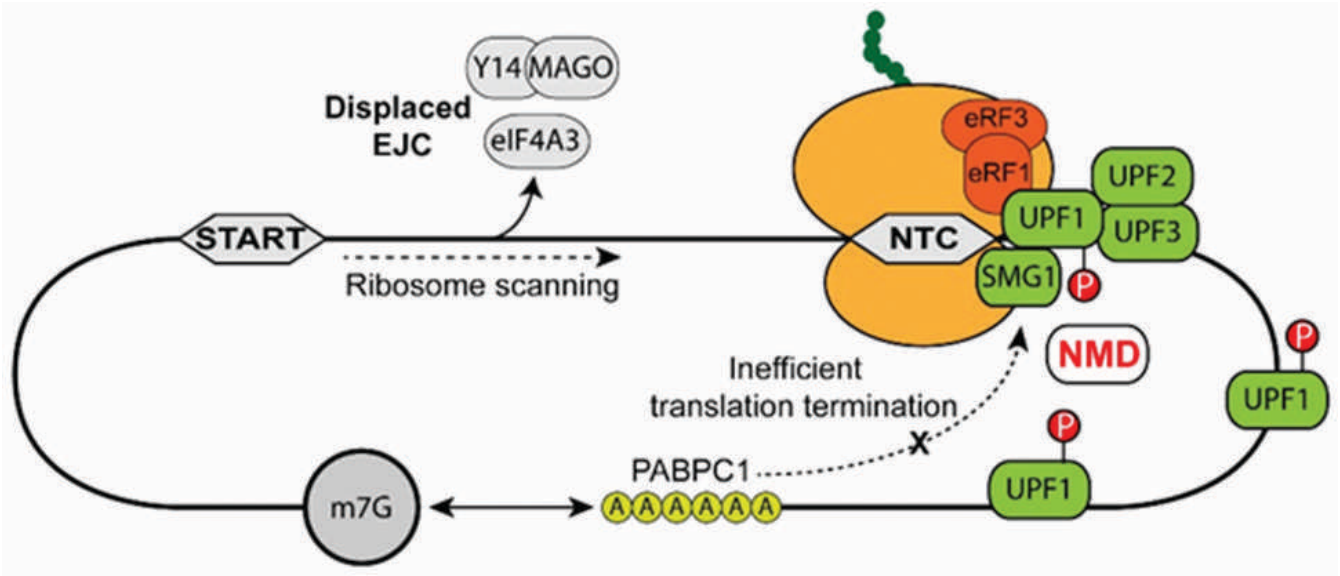
Dr Anand Kumar Singh

Biology
Cell and Developmental Biology

nonsense-mediated mRNA decay(NMD) | LncRNA | neurodegeneration

RNA quality control is essential to ensure faithful gene expression in the eukaryotic cells. Nonsense-mediated mRNA decay (NMD) is a translation-dependent RNA quality-control process that selectively degrades aberrant mRNAs to stop them from synthesizing potentially toxic truncated proteins. We use cytological and molecular biology approaches to study the molecular mechanism and impact of NMD-dependent degradation of defective transcripts.

Long noncoding RNAs (lncRNAs) emerged as a potential regulator of epigenetic, transcriptional and posttranscriptional gene expression processes. Many lncRNAs sequester RNA-binding proteins (RBPs) in nuclear bodies to regulate their availability for RNA processing. We study the molecular mechanism of lncRNA-RBP interaction in nuclear bodies and its impact on development, stress response, and disease.



Biology
Plant Sciences

heat stress | priming | stress resilience

Dr Annapurna Devi Allu

Our research focuses on unravelling the molecular mechanisms underlying plant stress responses. In this direction, her group works on three broad themes aiming at (i) deciphering the regulatory mechanisms underlying plant response to a combination of drought and heat stress (ii) decoding the molecular regulation governing priming-mediated acquired stress tolerance and (iii) improving plant stress resilience using alternative technologies.

(i) Global warming and the associated climate change are threatening crop productivity. A combination of drought and high temperature is more detrimental than the singular stresses. However, plant response to the combination of stresses is poorly understood. We screen large germplasm to identify the genotypes, genes and molecular markers associated with combined drought and heat stress response. (ii) Priming (pre-exposure to mild stress) has been shown to improve plant tolerance to subsequent stress(es). We have identified transcription factors, epigenetic factors that regulate such priming-induced stress response and are currently invested in unravelling the molecular mechanisms. (iii) Our group is currently doing field-level analysis to introduce priming as an agricultural management practice to retain crop productivity under challenging environmental conditions.

Publications

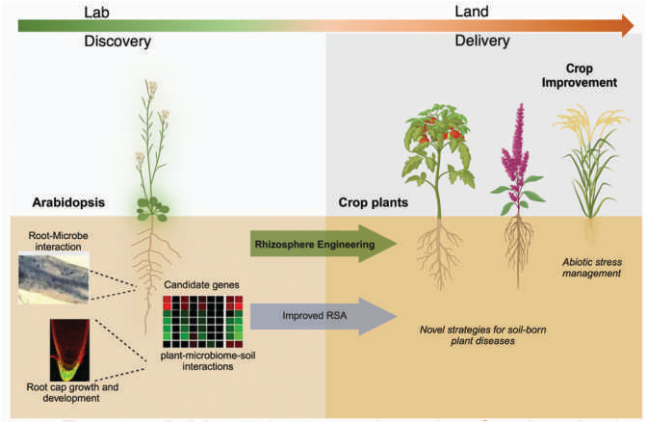
Viswanathan, R., & Krishnamurthy, N. (2023). Engaging students through active learning strategies in a medicinal chemistry course. Journal of Chemical Education, 100(12), 4638-4643. https://doi.org/10.1021/acs.jchemed.3c00647

Dr Eswarayya Ramireddy

Biology
Plant Biology

root and rhizosphere engineering | plant root-microbe interaction | climate-resilient agriculture

Our research is primarily centered around three key enquiries: What are the molecular and cellular mechanisms that drive the development of root and shoot systems in plants, and how do these systems react to environmental stimuli? Additionally, how can we enhance the productivity of plants for improved agricultural yield in a climate change scenario? By uncovering the underlying mechanisms, we can engineer plants that are better equipped to thrive in changing environmental conditions. We primarily utilize Arabidopsis as our primary model for investigating plant development at the cellular and organ levels, specifically focusing on root and shoot meristems and their interactions with the environment. For instance, we are keen on understanding the mechanisms through which soil-borne pathogens infiltrate root systems and how plants mount cellular and individual cell-type defenses against their entry. We leverage insights from *Arabidopsis* to improve crops such as rice, tomato, amaranth, and millet by employing gene editing tools to enhance crop performance in natural agricultural settings.



Root and rhizosphere engineering for developing climate- resilient crops

Publications

Das, K. K., Mohapatra, A., George, A. P., Chavali, S., Witzel, K., & Ramireddy, E. (2023). The proteome landscape of the root cap reveals a role for the Jacalin-associated lectin JAL10 in the salt-induced endoplasmic reticulum stress pathway. *Plant Communications, 4*(6). https://doi.org/10.1016/j.xplc.2023.100726

Eragam, A., Mohapatra, A., Shukla, V., Kadumuri, R. V., George, A. P., Putta, L., Akkareddy, S., Chavali, S., Vemireddy, L. R., & Ramireddy, E. (2023). Panicle transcriptome of high-yield mutant indica rice reveals physiological mechanisms and novel candidate regulatory genes for yield under reproductive stage drought stress. *BMC Plant Biology, 23*. https://doi.org/10.1186/s12870-023-04507-1

Biology
Infectious Diseases

antivirals | dengue | immune response

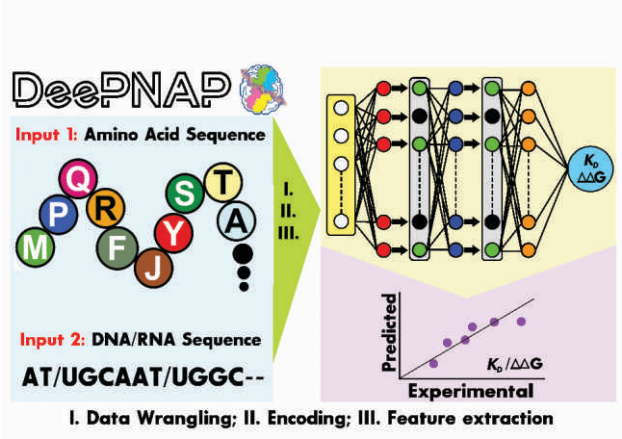
Dr Guruprasad R Medigeshi

I have over 20 years of experience in host-pathogen interactions and my research group primarily focuses on flaviviruses and we are interested in the molecular mechanisms of virus replication, immune response to infection and antiviral development. We are interested in determining how the immune response at the population level influences replication fitness, evolution and serotype dynamics of dengue virus. I am one of the core members of the consortium of dengue researchers in India and we have established research platforms for translational outcomes. Together with ICGEB-Emory Vaccine Centre and All India Institute of Medical Sciences, New Delhi, we have established a hospital-based and community-based cohorts to isolate and characterize the circulating dengue viruses, evaluate the immune response in primary and secondary dengue infections and characterize the factors that influence inflammatory response in severe dengue. Our long-term goal is to identify the molecular signatures that contribute to disease progression in dengue and also to identify the correlates of protection. In order to augment the vaccine development efforts for Dengue, we have harnessed drug repurposing strategies to identify inhibitors for dengue that are currently being validated in animal models.

Dr Hussain Bhukya

Biology
Structural Biology

directed natural product biosynthesis | plant immunity | AI-ML



DeePNAP: A Deep Learning Method to Predict Protein–Nucleic Acid Binding Affinity from Their Sequences.

Predicting the protein-nucleic acid (PNA) binding affinity solely from their sequences is of paramount importance for the experimental design and analysis of PNA interactions (PNAIs). A large number of currently developed models for binding affinity prediction are limited to specific PNAIs while also relying on the sequence and structural information of the PNA complexes for both training and testing, and also as inputs. As the PNA complex structures available are scarce, this significantly limits the diversity and generalizability due to the small training data set. Additionally, a majority of the tools predict a single parameter, such as binding affinity or free energy changes upon mutations, rendering a model less versatile for usage. Hence, we propose DeePNAP, a machine learning-based model built from a vast and heterogeneous data set with 14,401 entries (from both eukaryotes and prokaryotes) from the ProNAB database, consisting of wild-type and mutant PNA complex binding parameters. Our model precisely predicts the binding affinity and free energy changes due to the mutation(s) of PNAIs exclusively from their sequences. While other similar tools extract features from both sequence and structure information, DeePNAP employs sequence-based features to yield high correlation coefficients between the predicted and experimental values with low root mean squared errors for PNA complexes in predicting K_D and $\Delta\Delta G$, implying the generalizability of DeePNAP. Additionally, we have also developed a web interface hosting DeePNAP that can serve as a powerful tool to rapidly predict binding affinities for a myriad of PNAIs with high precision toward developing a deeper understanding of their implications in various biological systems. Web interface: http://14.139.174.41:8080/

Selected Publications

Pandey, U., Behara, S. M., Sharma, S., Patil, R. S., Nambiar, S., Koner, D., & Bhukya, H. (2024). DeePNAP: A Deep Learning Method to Predict Protein–Nucleic Acid Binding Affinity from their sequences. *Journal of Chemical Information and Modeling, 64*(6), 1806-1815. https://doi.org/10.1021/acs.jcim.3c01151

Patel, M., Bhavyesh, D., Kumar, N., Bhukya, H., & Dholakiya, B. Z. (2024). Microwave-assisted cross-coupling of nitroarenes with aryl Boronic acids. *Asian Journal of Organic Chemistry*. https://doi.org/10.1002/ajoc.202400064

Biology
Ecology and Evolution

adaptations | small mammals | citizen science

Dr Nandini Rajamani

Small mammals are diverse and play critical roles in ecosystems, impacting functioning and structure. Many species respond rapidly to changes in their environments, like anthropogenic activities and climate change. In this research group, we study the adaptations and behaviours of squirrels, some of which are uniquely adapted to their ecosystems. In the last year, we published a novel database of squirrel occurrences across South Asia, spanning 34 species and 13 countries. Analyses reveal that some species are strongly commensal and respond well to urbanisation, while others are on the verge of disappearance. Other research on small mammals in the trans-Himalayas reveals that species use a variety of strategies to adapt to the extreme cold – some traits show distinct phylogenetic history, while other behavioural traits show more plasticity. We have generated novel genomic data for over nine species in India and are exploring the genetic underpinnings of specific behavioural and morphological adaptations of species. In conjunction with experimental and observational data from the field, this will allow us to detect signals of species response and rapid evolution.

Publications

Swati, U., D'Souza, S., Aravind, P. S., Muni, R. K., & Rajamani, N. (2023). A comprehensive database of squirrel distribution and occurrence in South Asia. *Biodiversity Data Journal*, 11. https://doi.org/10.3897/bdj.11.e109946

Nivetha, M., D'Souza, S., Shijisha, A. C., Ligon, R. A., & Nandini, R. (2023). Multifunctional evolution of palm squirrel coat colour and pattern. *bioRxiv*, 2023.09.15.557893.https://doi.org/10.1101/2023.09.15.557893

Dr Nibedita Pal

Biology
Structural Biology

DNA nanostructures | DNA-protein complex | single-molecule biophysics

Last year, my lab primarily worked on higher-order DNA structure Holliday Junction (HJ). HJ is an important intermediate for DNA double strand break repair through homologous recombination. Using various fluorescence-based spectroscopic tools, we have shown that HJ prefers to adopt a stacked conformation in a confined environment (*Chemical Physics Impact*, 2023, 7, 100322). The conformational heterogeneity, an inherent characteristic of HJ, decreases systematically with the increase in confinement (Fig 1(a)). Using molecular modeling and molecular dynamics simulations, we further investigated the interaction of the DNA binding domain of the tumor suppressor protein BRCA1 with an HJ. We found that mostly charged and polar amino acids stabilize the complex. Interestingly, many of these amino acids are places for missense changes in human BRCA1 protein (Fig 1(b)).

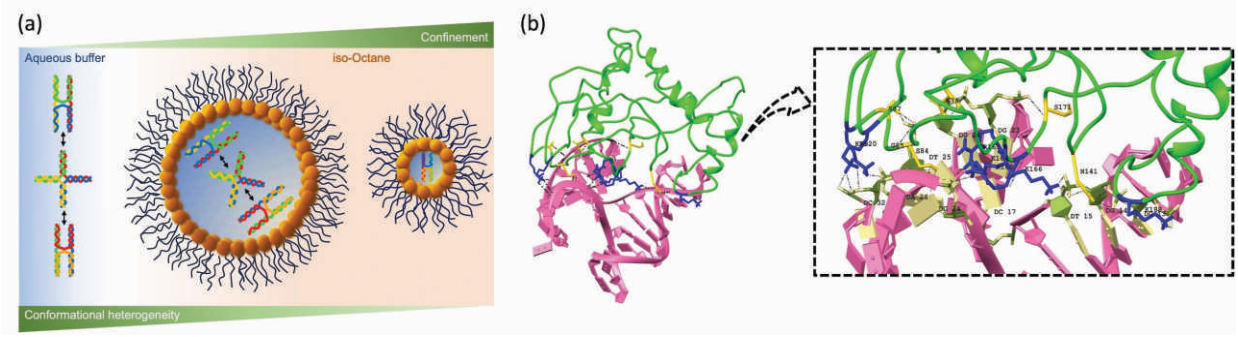


Fig 1: (a) Schematic description of the effect of confinement on HJ conformation. (b) H-bonds between HJ and DNA binding of BRCA1 protein. Polar uncharged residues are in yellow, positively charged residues are in blue, and negatively charged residues are in red.

Publications

Pal, N., & Walter, N. G. (2023). Using single-molecule FRET to evaluate DNA nanodevices at work. In J. Valero (Ed.), *DNA and RNA Origami: Methods and protocols* (pp. 157-172). Series: Methods in molecular biology, 2639. Humana Press. https://doi.org/10.1007/978-1-0716-3028-0_10

Dr Pavithra L Chavali

Biology
Development and Cancer biology

neural cancer | 3D organoids | neurodevelopment

Our group focusses on understanding cell cycle regulatory mechanisms underlying normal development and disease manifestation. For this we study genes (i) with mutations linked to microcephaly (small brain) and (ii) whose dysregulation/dysfunction is associated with neural cancers. We use state-of-the-art cell and molecular biology approaches in neural cancer /stem cells and brain organoids, to establish the spatio-temporal roles of such developmentally important proteins.

Biology
Computational and Data Sciences

intrinsically disordered proteins | molecular dynamics simulations | machine learning

Dr Rajeshwari Appadurai

Our lab in IISER-Tirupati specialises in computational biophysics, employing cutting-edge molecular simulations in combination with diverse experimental data, bioinformatics and machine learning to understand and manipulate complex biomolecular structures such as metamorphic and intrinsically disordered proteins. These proteins defy the conventional structural stability of folded proteins, exhibiting exceptional shape-shifting capabilities. As a result, they play key roles in cellular decision-making and contribute to devastating diseases when dysregulated. Despite their significance, unfortunately, studying them at sufficient resolution is extremely challenging because they change conformations so quickly. Our integrative strategy overcomes these challenges and provides high-resolution insights into the complete conformational ensemble of these molecules. We investigate fundamental questions related to their design principles, functional mechanisms and the implications of dysregulation while exploring their potential for therapeutic targeting.

Biology
Infectious Diseases

Mycobacterium | Proteomics | Metabolomics

Dr Raju Mukherjee

Dr Raju Mukherjee 's group is working on understanding drug permeation in *Mycobacterium tuberculosis* that can be useful for rational design of future drugs with better penetration. The group aims to identify and characterize the key outer membrane proteins including 'porins' that are essential for nutrient and antibiotic uptake. Towards this they employed two screens involving high-density transposon mediated mutagenesis followed by massively parallel sequencing and mass spectrometry based proteomics and have characterized 12 potential outer membrane proteins and identified ProX and LpqY in permeation of streptomycin. His group is also studying the mechanism of the development of drug tolerance that precedes resistance. They have identified signatures of metabolic adaptations referred to as intrinsic resistance which mycobacteria use to tolerate drugs before permanently showing drug resistance. In the process they have also identified a new mechanism of antibiotic action where they have found antibiotics (fluoroquinolones and aminoglycosides) induce a burst in ATP levels causing cidality in mycobacteria.

Publications

Palande, A., Patil, S., Veeram, A., Sahoo, S. S., Lodhiya, T., Maurya, P., Muralikrishnan, B., Chugh, J., Mukherjee, R. (2024). Proteomic Analysis of the Mycobacterium tuberculosis Outer Membrane for Potential Implications in Uptake of Small Molecules. *ACS Infectious Diseases, 10*(3), 890-906. https://doi.org/10.1021/acsinfecdis.3c00517

Balasubramanian, D., & Mukherjee, R. (2023). Vaccine development: Perspectives from life-history traits. *Current Science, 124*(9), 1039-1052. Link: https://www.currentscience.ac.in/Volumes/124/09/1039.pdf

Desai, A., Mahajan, V., Ramabhadran, R. O., & Mukherjee, R. (2024). Binding order of substrate and cofactor in sulfonamide monooxygenase during sulfa drug degradation: in silico studies. *Journal of Biomolecular Structure and Dynamics*. https://doi.org/10.1080/07391102.2024.2306495

Omkar Mohapatra, Maheshwar Gopu, Rahail Ashraf, Jijo Easo George, Saniya Patil, Raju Mukherjee, Sanjay Kumar, Dileep Mampallil. (2024) Spheroids formation in large drops suspended in superhydrophobic paper cones. Biomicrofluidics 18 (2)

Biology
Cell and Developmental Biology

embryonic development | stem cells | organoids

Dr Ramkumar Sambasivan

The plan for constructing the animal body is laid early during the embryonic development. Our knowledge of the mechanisms laying the body plan in mammals is poor since the embryos are small and inaccessible at the early stages. Using mouse embryonic stem cell-based self-organizing 3D 'embryo organoids' as models for early mammalian embryos, we have discovered a fundamental mechanism generating information along the anterior (head) – posterior (tail) axis. This information instructs the embryonic tissue to form the progenitors of heart, facial and neck muscles on the anterior side, and the progenitors of vertebral column and associated muscles, kidney etc. to form towards the posterior side. Leveraging the knowledge created from our discovery, we have generated stem cell-based self-organizing 3D heart organoids, which have great potential to impact medicine and disease research.

Publications

Wurmser, M., Madani, R., Chaverot, N., ... Sambasivan, R. et al. (2023). Overlapping functions of SIX homeoproteins during embryonic myogenesis. *PLOS Genetics, 19*(6). https://doi.org/10.1371/journal.pgen.1010781

Dr Robin V V

Biology
Ecology and Evolution

shola sky islands | bioacoustics| biogeography

This lab uses birds as model organisms to answer questions at the intersection of evolution, bioacoustics, behavioural ecology and landscape ecology. They study several bird species' genetic connectivity and population structure in peninsular India across different biogeographic regions resulting in a better assessment of biodiversity with genetic tools. The lab also uses bioacoustics - sounds of birds, recorded manually or with automated recorders to understand cultural diversity across a landscape. This data, with AI-ML techniques, also help detect bird species from their sounds, including the Critically Endangered Jerdons Courser. While they use remote sensing data to map the birds' habitat, these products aid the State Forest Departments to strategise restoration of natural forests. We also conduct various public outreach about local birds and other biodiversity involving local schools, colleges, and other enthusiasts to collect large-scale biodiversity data using citizen science platforms.

Selected Publications

Lele, A., Arasumani, M., Vishnudas, C. K., Koparde, P., Joshi, V., & Robin, V. V. (2024). Ecological niche modelling reveals an elevated threat status for the Nilgiri Pipit (Anthus nilghiriensis). *Journal of Ornithology, 165*(2), 415-427. https://doi.org/10.1007/s10336-023-02133-0

Robin, V. V. (2024). Editorial: Population genetics of animals in the wild to aid conservation: Uma Ramakrishnan - Recipient of the 2023 Molecular Ecology Prize. *Molecular Ecology, 33*(5). https://doi.org/10.1111/mec.17290

Biology
Cancer Biology

mitochondrial dynamics | angiogenesis | disease biology

Dr Sanjay Kumar

We explored the role of mitochondrial fusion and its activity in human ovarian cancer stem cells. We determined that Mfn1 is overexpressed in cancer stem-like cells and regulates the cancer stemness properties of CSCs. Aberrant expression of Mfn1 mediates mitochondrial fusion and enhances oxidative phosphorylation and stem-like functions in ovarian cancer stem cells. Silencing Mfn1 results in reduced oxidative phosphorylation and impaired cancer stemness. We also demonstrated that 2DG induces oxidative phosphorylation by increasing Mfn1 expression and regulates cancer stemness properties of ovarian cancer stem cells through Mfn1. Collectively, Mfn1 is overexpressed in ovarian cancer stem cells and promotes mitochondrial fusion that induces oxidative phosphorylation, and maintains stem-like properties.

Publications

Kumar, S., Raina, M., Tankay, K., & Ingle, G. M. (2023). Patient-derived organoids in ovarian cancer: Current research and its clinical relevance. *Biochemical Pharmacology, 213*. https://doi.org/10.1016/j.bcp.2023.115589

Ahmed, T., Ramonett, A., Kwak, E-A., Kumar, S. et al. (2023). Endothelial tip/stalk cell selection requires BMP9-induced βIV-spectrin expression during sprouting angiogenesis. *Molecular Biology of the Cell, 34*(7). https://doi.org/10.1091/mbc.E23-02-0064

Biology
Cancer Biology

tumorigenesis | oxidative stress | therapeutics

Dr Santanu Paul

The elementary research interest of Paul's lab is to broadly understand the regulation of cancer stem cells (CSCs) or tumor-initiating cells (TICs) in tumor progression and cancer metastasis of various cancer types common in India like lung, breast, gastric, and others. We emphasize the therapeutic aspects of tumorigenesis with findings of targets by small molecule inhibitors, phytochemicals, and/or synthetic drugs. Our lab is currently studying the role of NADPH oxidase-dependent oxidative stress and its role in tumor microenvironment complexity in various cancer models. We also focused on the cell death processes of cancer cells based on microtubule catastrophe as one of the targets for cancer interventions. Our laboratory is also interested in specific research questions in other non-communicable diseases (NCDs) like Diabetes, Neuro, COPD, etc., and is open to collaborating with distinguished laboratories. Numerous techniques or tools are implicated in the area of cell & molecular biology, immune biology, and several omics techniques, which are utilized to study our research hypothesis in vitro and in vivo. Our lab has expertise in animal tumorigenesis and other disease models to validate in vitro examinations.

Publications

Laha, A., Sarkar, S., Sengupta, S., Das, A., Paul, S., & Bhattacharyya, S. (2024). Unraveling the potential of Acinetobacter calcoaceticus for arsenic resistance and plant growth promotion in contaminated lentil field. *South African Journal of Botany, 168*. https://doi.org/10.1016/j.sajb.2024.03.005

Biology
Cancer Biology

NF-kB | JAK-STAT | Cancer

Dr Sivakumar Vallabhapurapu

Our lab works on gaining mechanistic insights into regulation of NF-kB and other signal transduction pathways and their role in cancer and the immune system. Focusing on survival strategies operated in cancer cells, we searched for novel gene-regulatory complexes that repress pro-apoptotic genes Bim and BMF. Repression of these genes is essential for survival of hematological malignancies and anoikis resistance of metastatic solid tumors. In this connection, the RelA-YY1 complex (previously reported by us) was shown to play a key role in anoikis resistance. In addition, we found a novel gene-regulatory complex that acts as a downstream effector for the JAK-STAT pathway in the survival of multiple-myeloma cells and anoikis resistance of solid tumors. Further, we found a novel NF-kB regulated nuclear-factor that represses Bim and is essential for Multiple-Myeloma survival and anoikis resistance. Finally, we found a potential tumor suppressive role for NF-kB which limits expression of another oncogenic factor.

Biology
Computational and Data Sciences

genomics | systems biology | AI-ML

Dr Sreenivas Chavali

Abnormal trinucleotide-repeat expansions in the coding region, and corresponding single amino acid repeats (homorepeats; HRs e.g. polyGln) in proteins, cause several neuro-muscular degenerative diseases. Individual amino acid HRs are known to be associated with different molecular functions. However, little is known as to how HRs of different amino acid types co-existing in the same protein affect molecular outcomes. To address this, Dr Sreenivas Chavali's group developed a novel method based on co-occurrence of HRs at different evolutionary time-scales and classified human HR-pairs as (i) segregated, wherein two HRs in a psrotein can influence different molecular outcomes independently, (ii) concerted-disjunct, wherein both HRs affect protein functionality but without directly influencing each other's functions and (iii) concerted-conjunct, wherein both HRs affect protein functionality by influencing each other. While very few pairs are categorized as segregated, instances from literature exemplify concerted-conjunct HR-pairs. They conducted molecular investigations on the polyGly-polyPro pair of a human RNA helicase classified as concerted-disjunct by their classifier, and observed that indeed polyPro affects abundance and polyGly affects sub-cellular localization and both together affect molecular interactions of the protein. This work lays the foundation for mapping the functional landscape of co-occurring amino acid repeats in proteins.

Selected Publications

Das, K. K., Mohapatra, A., George, A. P., **Chavali, S.**, Witzel, K., & Ramireddy, E. (2023). The proteome landscape of the root cap reveals a role for the Jacalin-associated lectin JAL10 in the salt-induced endoplasmic reticulum stress pathway. *Plant Communications, 4*(6). https://doi.org/10.1016/j.xplc.2023.100726

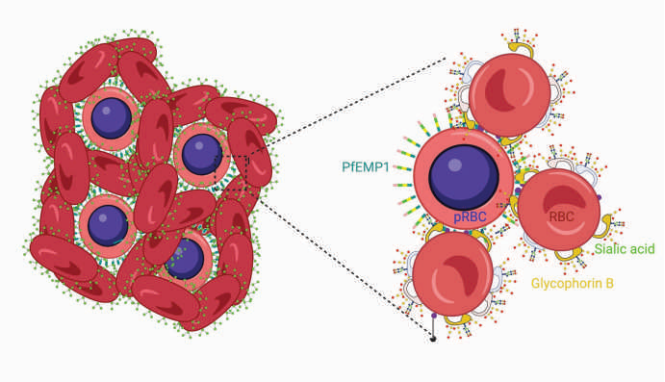
Eragam, A., Mohapatra, A., Shukla, V., Kadumuri, R. V., George, A. P., Putta, L., Akkareddy, S., **Chavali, S.**, Vemireddy, L. R., & **Ramireddy, E.** (2023). Panicle transcriptome of high-yield mutant indica rice reveals physiological mechanisms and novel candidate regulatory genes for yield under reproductive stage drought stress. *BMC Plant Biology, 23*. https://doi.org/10.1186/s12870-023-04507-1

Dr Suchi Goel

Biology
Infectious diseases

sequestration of malaria parasites | host-pathogen interactions | exosomes

Dr Suchi Goel's research focuses on pathogenesis of severe malaria parasites where adhesion of parasites in the microvasculature leads to activation of stress signaling pathways in the human host. *Plasmodium falciparum* causes the most lethal form of malaria due to its ability to bind many uninfected RBCs forming rosettes in the microvasculature. This leads to sequestration of parasites, resulting in blockage of blood flow and causing death of humans in severe cases. The major parasite protein family, *Plasmodium falciparum* Erythrocyte Membrane Protein 1 (PfEMP1) expressed on the infected erythrocyte binds to heparan sulfate, sialic acid, blood groups on RBCs or host serum proteins such as IgM, α2-macroglobulin and increase the severity of disease. Our recent studies highlighted that the *P. falciparum* strain 3D7A can form large rosettes irrespective of binding to human plasma proteins. We identified a novel PfEMP1 variant PfEMP1(Pf3D7_0412900) bound to RBCs through its CIDrγ2 domain and mediates rosetting. Overall, our studies reflect the diverse nature of host-pathogen interactions indicating the co-evolution of parasites and humans.



Publications

Deb, B., Das, A., Vilvadrinath, R., Jangra, A., Shukla, M. S., Akhouri, R. R., & Goel, S. (2024). Glycophorin B-PfEMP1 interaction mediates robust rosetting in Plasmodium falciparum. *International Journal of Biological Macromolecules, 262*. https://doi.org/10.1016/j.ijbiomac.2024.129868

Akhouri, R. R., Goel, S., & Skoglund, U. (2023). Cryo-electron microscopy of IgM-VAR2CSA complex reveals IgM inhibits binding of *Plasmodium falciparum* to Chondroitin Sulfate A. *Nature Communications, 14*(1). https://doi.org/10.1038/s41467-023-41838-x

Biology
Plant Sciences

signaling networks | root nodule symbiosis | drought tolerance

Dr Swarup Roy Choudhury

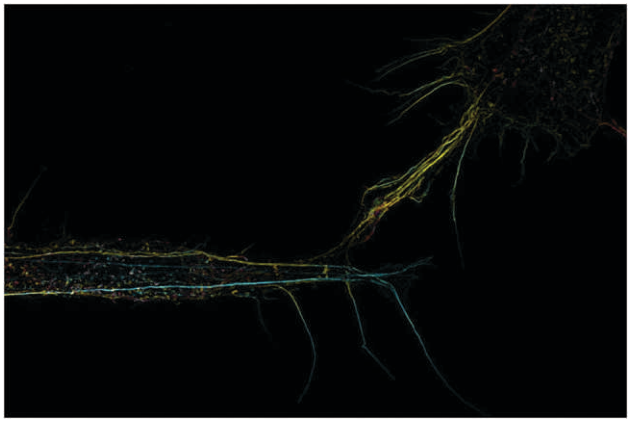
Leguminous plants form a symbiotic association with nitrogen-fixing rhizobia. Legumes and rhizobia initiate this mutual association with an exchange of molecular signals. The rhizobia release NOD factors (NFs) that trigger a cascade of signaling events by inducing nod factor receptors (NFRs) of the host. This receptor-mediated signaling mechanism that controls root nodule development is perplexing in groundnut. A comprehensive dissection of NFR-mediated signaling will increase our understanding of root nodule symbiosis, which is essential to enhance biological nitrogen fixation as well as the yield of groundnut. Drought, a major threat to global food security, is a key environmental challenge for crop yield. A specific group of plants, called desiccation tolerant plants, possess exceptional survival potential against desiccation. We used a multi-omics approach combining physiological, biochemical, transcriptomic, and metabolomic analyses to understand the role of prolonged desiccation on the recovery of *Selaginella bryopteris*.

Dr Vasudharani Devanathan

We focus on understanding how glucose and oxygen levels regulate the expression of cell adhesion molecules, with a particular focus on Caspr1/Paranodin. Caspr1, a key component in maintaining the structural and functional integrity of neurons, plays a crucial role in neuron-glia interactions and the formation of the paranodal junctions essential for proper nerve conduction. Disruptions in neurite formation processes contributes to the early stages of neurodegenerative diseases by compromising the stability of neural networks.

Biology
Cell and Developmental Biology

metabolic stress in neurons | neurodegeneration | organoid/retinoid



Publications

Nimgampalle, M., Chakravarthy, H., Sharma, S., Shree, S., Bhat, A. R., Pradeepkiran, J. A., & Devanathan, V. (2023). Neurotransmitter systems in the etiology of major neurological disorders: Emerging insights and therapeutic implications. *Ageing Research Reviews, 89*. https://doi.org/10.1016/j.arr.2023.101994

Biology
Cell and Developmental Biology

meiosis | chromosome size bias | meiotic checkpoints

Dr Vijayalakshmi V Subramanian

Infertility, spontaneous fetal loss and birth defects in humans result mainly from mistakes in chromosome inheritance during meiosis, the cell division that forms eggs/sperm. Faithful inheritance in meiosis requires links between homologue pairs that are created by induction of numerous programmed DNA breaks, and repair of these breaks as crossovers. Consequently, proper distribution of DNA breaks to all chromosomes and appropriate repair are critical for fidelity of their inheritance and therefore preservation of fertility. We are interested in investigating the mechanisms that promote fidelity of chromosome inheritance as well as genome integrity during meiosis using budding yeast as a model organism. DNA break and repair mechanisms in meiosis are fundamentally conserved and findings in model organisms will have a direct impact on understanding of chromosome inheritance in humans. These studies will have an impact on the understanding of mechanisms of genetic diversity and fertility.

Publications

Subramanian, V. V. (2023). Preprint Highlight: Age-dependent loss of cohesion protection in human oocytes. *Molecular Biology of the Cell, 34*(5). https://doi.org/10.1091/mbc.P23-04-0011

Subramanian, V. V. (2023). Preprint Highlight: Cohesin mediates DNA loop extrusion and sister chromatid cohesion by distinct mechanisms. *Molecular Biology of the Cell, 34*(5). https://doi.org/10.1091/mbc.P23-03-0010

Chemistry Department

The Department of Chemistry is dedicated to advancing several key areas of cutting-edge research. Our focus includes sustainable chemistry, green energy, advanced/smart materials (such as 2D hybrids, quantum dots, perovskites, chiral, and magnetic materials), machine learning/AI, and diagnostic tools, all in alignment with our national missions. We are committed to achieving carbon neutrality, hydrogen generation from biomass derivatives, and recycling lithium batteries as part of the circular economy to create a better future. Our department also explores the interface of chemistry and biology, developing innovative analytical tools for disease diagnosis and therapeutics. We emphasize fundamental sciences, including chemical biology, supramolecular chemistry, astrochemistry, natural product synthesis, electrochemistry, and the mechanistic understanding of biological systems using advanced experimental and computational tools. Another thrust area of research involves the development of robust and selective catalytic systems for synthesizing new materials, APIs/KSMs, and life science molecules. Additionally, our theoretical chemistry team provides detailed insights into the functions of diverse molecular and extended systems.

Faculty

Dr Anees Palapuravan
Dr Arun Kumar Bar
Dr Ashwani Sharma
Dr Ekambaram Balaraman
Dr Gopinath Purushothaman
Dr Janardan Kundu
Dr Jatish Kumar
Dr Kiran Kumar Pulukuri
Dr Padmabati Mondal
Dr Pankaj Kumar Koli
Dr Raghunath O Ramabhadran
Prof Rajesh Viswanathan
Dr Rakesh S Singh
Dr Rana Saha
Prof Santanu Bhattacharya
Dr Shibdas Banerjee
Dr Soumit Sankar Mandal
Dr Sudipta Roy
Dr Vanchiappan Aravindan
Prof Vijayamohanan K Pillai

Visting Faculty

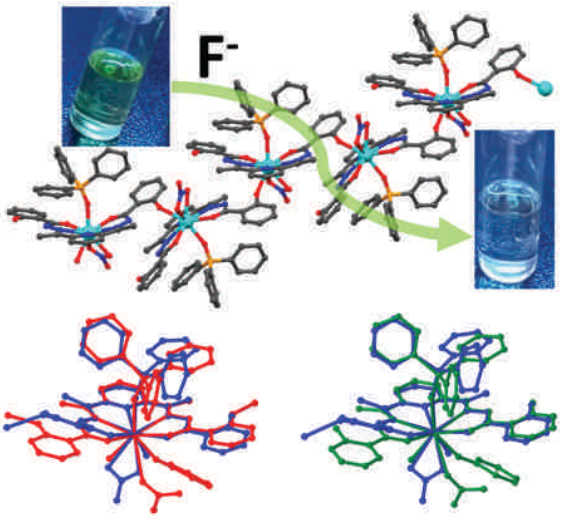
Prof KN Ganesh

Dr Arun Kumar Bar

Chemistry
Inorganic Chemistry

coordination chemistry | organometallic chemistry | molecular magnetism

The research group of Dr Arun Kumar Bar focusses on multi-pronged synthetic strategies for 3d/4f metal-based multi-functional molecular and supramolecular materials. The exotic properties like, single-molecular magnetism, small molecule activation, chemosensing behaviours and photophysical behaviours, are investigated intensively. Predesigned ligands are used to tune coordination geometry and crystal-field topology to tailor these exotic properties. A subtle structural and/or chemical variation in the coordination complexes can bring about remarkable change in these properties. To cite such an example, treatment of 2,6-diacetylpyridine bis-salicylhydrazone (DAPS) with hydrated $Ln(NO_3)_3$ salts (Ln stands for lanthanide) with 1:1 molar ratio in the presence of Et_3N as a base and triphenylphosphine oxide (TPPO) as co-ligand results in a series of one-dimensional (1D) coordination polymers (CP's). These 1D CPs render intramolecular proton transfer upon treatment with fluoride (F^-) ion, which intern exhibits decolorization from their bright yellow colour. The chemosensing behaviour is found to be extremely sensitive and selective to F^-.



Publications

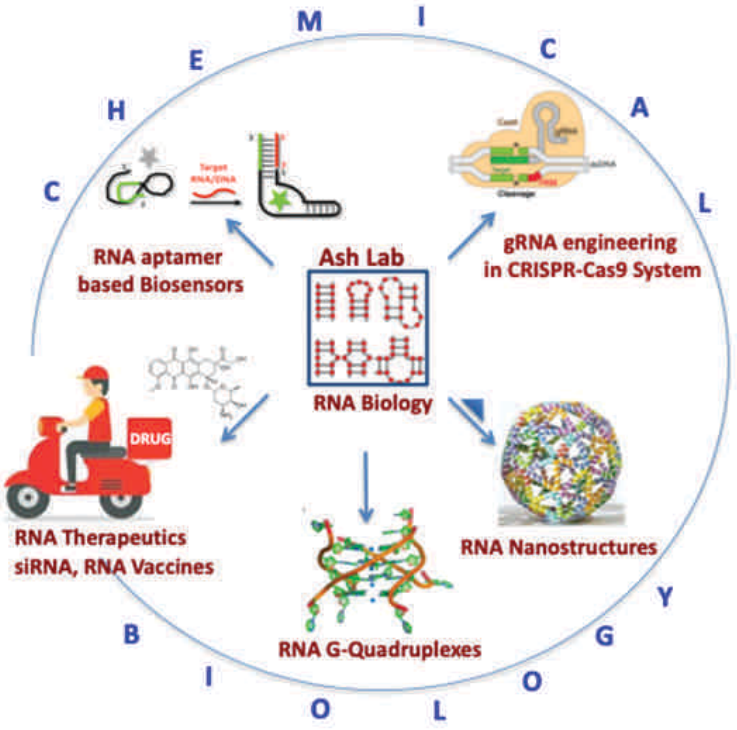
Singh, V.,

Suresh, L. T., Sutter, J.-P., & Bar, A. K. (2024). Selective fluoride sensing by a novel series of lanthanide-based one-dimensional coordination polymers through intramolecular proton transfer. *Dalton Transactions, 53*(17), 7436-7449. https://doi.org/10.1039/D4DT00598H

Dr Ashwani Sharma

Chemistry
Chemical Biology

The main focus of the Ash Lab is to develop label free fluorescence-based RNA biosensors for disease detection and to develop nucleic acid-based therapeutics. The lab has recently developed RNA based sensors for macromolecules such as miRNA, ions such as silver and small molecules such as cysteine, GSH etc. The future aim is to make the RNA sensor that can work in cells for miRNA detection and is also genetically encodable. In addition, Ash Lab lab is also trying to engineer single guide RNA (sgRNA) in CRISPR-Cas9 system for efficient genome editing and for genome imaging. Lab is also engineering RNA that can form highly stable junctions that could be useful for RNA nanotechnology applications for targeted drug delivery in cancer.



Dr Ekambaram Balaraman

Chemistry
Inorganic Chemistry

Our group works in the area of sustainable catalysis. Our research primarily focuses on generating resources for green energy and recycling atmospheric waste. Specifically, we work on the design and development of catalytic materials for hydrogen generation from feedstocks, sustainable chemical synthesis, and conversion of CO_2 to value-added products. Our explorations on 'catalytic materials for sustainability' facilitate reducing imports, clean chemical synthesis from feedstocks, and achieving the goal of making manufacturing an eco-benign process at reduced costs. These conceptual developments have significantly impacted various indigenous industries.

Selected Publications

Kumar, R., Srivastava, A. K., Nagarasu, P., Madhu, V., & Balaraman E. (2024). A general and expedient amination of alcohols catalysed by a single-site (NN)Co(ii)-bidentate complex under solventless conditions. *Catalysis Science & Technology, 14*(1), 98-109. https://doi.org/10.1039/D3CY00809F

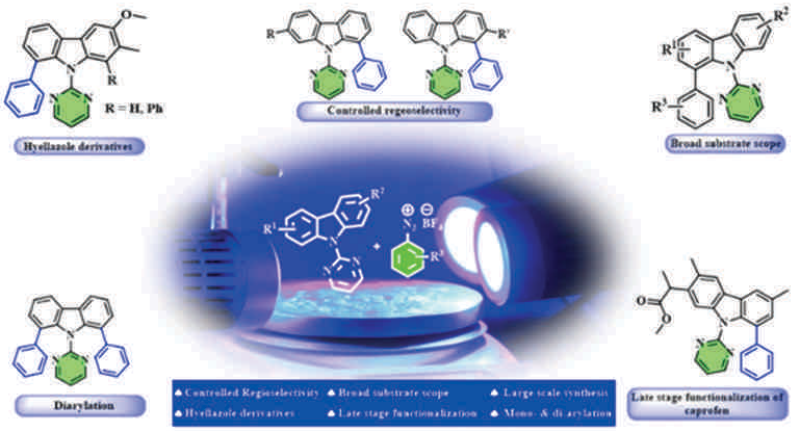
Roy, T. K., Babu, R., Sivakumar, G., Gupta, V., & Balaraman, E. (2024). Olefins from alcohols via catalytic acceptorless dehydrogenation coupling reactions. *Catalysis Science & Technology, 14*(8), 2064-2089. https://doi.org/10.1039/D3CY01800H

Nandakumar, T., Pal, S. K., Vinu, R., Ramar, P. M., Pant, K. K., Kumar, S., & Balaraman, E. (2024). Graphene-Encapsulated Transition Metal@N/C Catalysts for Catalytic Copyrolysis of Biomass and Waste Plastics: Production of Linear α-Olefins and Aromatics. *ACS Sustainable Chemistry & Engineering, 12*(13), 5283-5299. https://doi.org/10.1021/acssuschemeng.4c00279

Dr Gopinath Purushothaman

Chemistry
Organic Chemistry

Gopinath's research group is mainly interested in the development of new synthetic methods using sustainable routes and their applications in the synthesis of drugs & natural product using catalysis as the main tool with particular emphasis on photoredox catalysis, transition metal catalysis and dual catalysis. One of his research focuses is achieving regioselective C-H functionalization of various heterocycles such as indoles, carbazoles, etc. In this direction, his research group recently reported stseric and electronics controlled regioselective arylation and acylation of various carbazole derivatives (J. Org. Chem. 2023, 88, 13686-13698; Org. Biomol. Chem. 2024, 22, 753-758). Similarly, his research group also reported Rh(III) catalyzed redox-neutral C–H activation/[5 + 2] annulation of aroyl hydrazides with sulfoxonium ylides as safe carbene precursors (Org. Lett. 2023, 25,8361–8366).



Publications

Shahid, M., Muthuraja, M., & Gopinath, P. (2024). Substituent-controlled regioselective arylation of carbazoles using dual catalysis. *Organic & Biomolecular Chemistry, 22*(4), 753-758. https://doi.org/10.1039/D3OB01827J

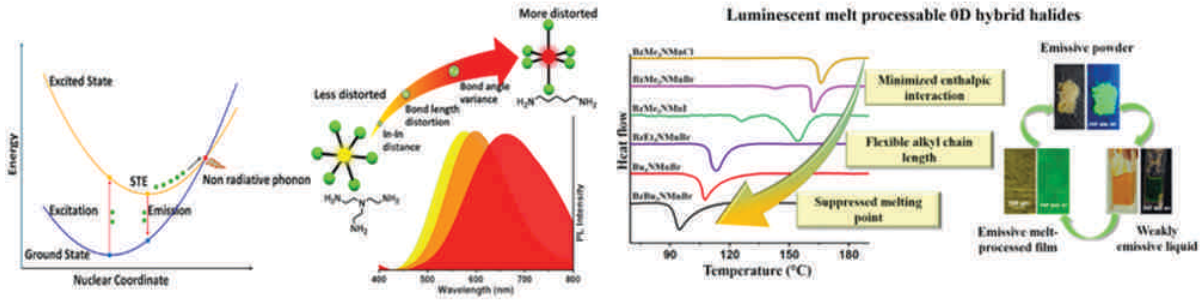
Shahid, M., Punnya, A. J., Babu, S. S., Sarkar, S., & Gopinath, P. (2023). Dual palladium-photoredox-mediated regioselective acylation of carbazoles and Indolines. *Journal of Organic Chemistry, 88*(19), 13686-13698. https://doi.org/10.1021/acs.joc.3c01350

Muthuraja, P., Akhtar, M. S., Gopinath, P., & Lee, Y. R. (2023). Maleimide-controlled formation of Indanonylpyrrolinediones and Spiroindanonylpyrrolinediones via Rh(III)-Catalyzed C–H activation of Sulfoxonium Ylides. *Advanced Synthesis & Catalysis, 365*(24), 4595-4602. https://doi.org/10.1002/adsc.202301010

Dr Janardan Kundu

Chemistry
Materials Science

Our group focuses on emissive properties of low dimensional metal halide hybrids. Currently, we have been working on various synthetic aspects of such materials and understanding their emissive properties. We have put major research efforts into deciphering the structure property correlation in these hybrid systems. We have been able to show the effect of local metal halide distortion on the luminescence properties (emission wavelength, emission efficiency) invoking the ground and excited state structures. Such understanding is being extended to higher dimensional systems. We have been working on unraveling the design principles of suppressing the melting temperatures of the low dimensional hybrids for their applications in melt-processability. We have been able to showcase the utility of rational choice of the organic cation in controlling their melting temperatures. We have shown the balancing effect of enthalpy and entropy on suppressing the melting temperature relying on the flexibility of the utilized organic cations (aromatic/aliphatic) for low dimensional Mn based metal halide hybrids.



Publications

Ahmed, M. S., Sireesha, L., Nayak, S. K., Bakthavatsalam, R., Banerjee, D., Soma, V. R., Kundu, J., & Raavi, S. S. K. (2023). Tunable near-infrared emission and three-photon absorption in lanthanide-doped double perovskite nanocrystals. *Nanoscale, 15*(21), 9372-9389. https://doi.org/10.1039/D3NR00988B

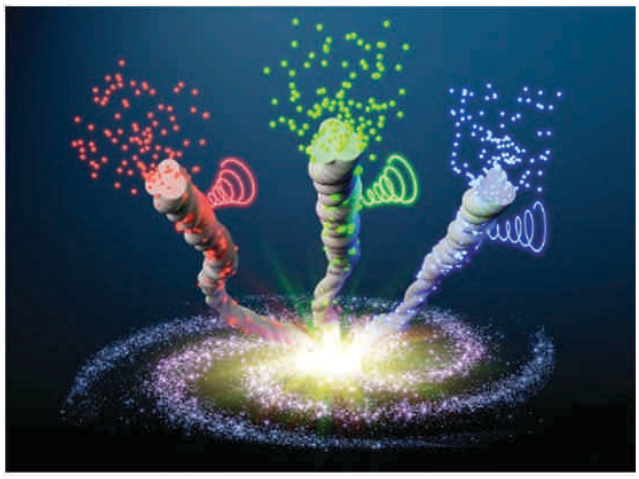
Marayathungal, J. H., Puthuparambil, N., Das, D. K., Kalyani, M., Bakthavatsalam, R., & Kundu, J. (2023). Bulk coassembly of zero-dimensional heterometallic halide hybrids for broadband white light emission and optical thermometry. *Journal of Physical Chemistry C, 127*(37), 18474-18484. https://doi.org/10.1021/acs.jpcc.3c03645

Kudlu, A., Das, D. D., Bakthavatsalam, R., Sam, J., Ray, S., Mondal, P., Dutta, S., ... & Kundu, J. (2023). Strong Dopant–Dopant electronic coupling in emissive codoped two dimensional metal halide hybrid. *Journal of Physical Chemistry Letters, 14*. 4933-4940. https://doi.org/10.1021/acs.jpclett.3c00902

Dr Jatish Kumar

Chemistry
Materials Science

Chirality exists at various length scales ranging from sub atomic particles to large galaxies. Understanding the fundamental aspects of chirality has relevance to the understanding of homochirality and subsequently the origin of life. The work in the group is focussed towards the design, synthesis and characterization of chiral organic, plasmonic and luminescent nanomaterials. The ground and excited state chirality is investigated using circular dichroism (CD) excited state and circularly polarized luminescence (CPL), respectively. While plasmonic materials are used for the investigations on ground state chirality, metal clusters, carbon nanodots, up-conversion nanophosphors and organic supramolecular assemblies are used for the CPL investigations. Focus is towards demonstrating chiral emission both through up-conversion and down-conversion mechanisms. The potential of the synthesized materials for application as luminescent inks in anticounterfeiting, active material in OLEDs and as bioimaging agents will be tested.



Publications

Venugopal, G., Kumar, V., Jadhav, A. B., ... Kumar, J., & Babu, S. S. (2024). Boron- and oxygen-doped π-extended helical nanographene with circularly polarized thermally activated delayed fluorescence. *Chemistry - A European Journal, 30*(19). https://doi.org/10.1002/chem.202304169

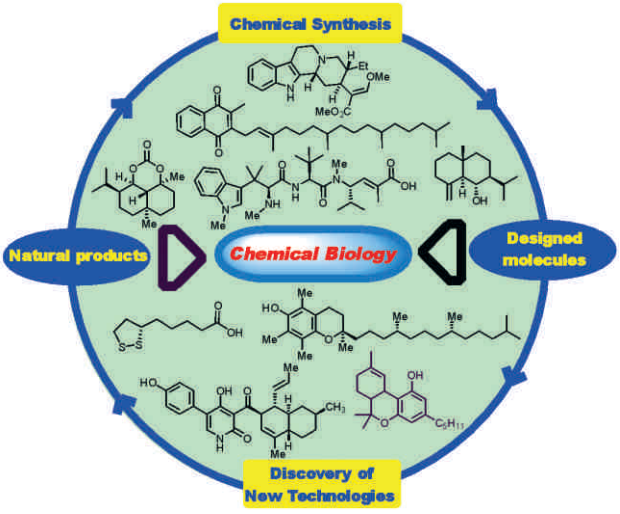
Dutta, C., Maniappan, S., & Kumar, J. (2023). Delayed luminescence guided enhanced circularly polarized emission in atomically precise copper nanoclusters. *Chemical Science, 14*(21), 5593-5601. https://doi.org/10.1039/D3SC00686G

Pattam, H. K., Jadhav, A. B., Cheran, A., Marydasan, B., & Kumar, J. (2023). Zinc selective interactions of porphyrins aid conversion of nanoaggregates into luminescent microstructures: Toward the development of a sensing platform. *Journal of Physical Chemistry C, 127*(35), 17584-17591. https://doi.org/10.1021/acs.jpcc.3c03543

Dr Kiran Kumar Pulukuri

Chemistry
Organic Chemistry

Natural products are an essential source for identifying new therapeutic targets and developing new therapeutic molecules and targets. Despite their clinical importance, a sudden decline in natural product research was observed in the recent times mainly due to their limited supply from natural sources. Dr. Kiran group focuses on developing the scalable synthesis of natural products, which has high clinical significance. So far, his group has made significant progress in the synthesis of anti-cancer agent hemiasterlin, ilicicolin H, and antibiotic arylomycine and completed the total synthesis of ten eudesmane sesquiterpenoid and formal synthesis of indole alkaloids hirsutine and coryanthadiene.



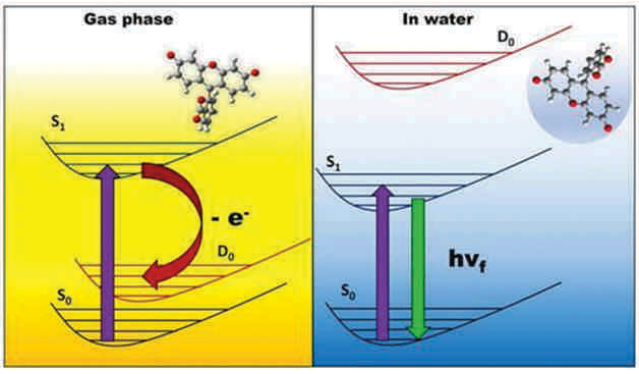
Publications

Panigrahy, A., and Pulukuri, K. K. (2023) Streamlined Synthesis of Eudesmane Sesquiterpenes through Site Selective Functionalization strategy. ChemRXIV. 2023, DOI: 10.26434/chemrxiv-2023-3fldg-v2.

Chemistry
Theoretial and Computational Chemistry

Dr Padmabati Mondal

Our group is intensely involved in understanding light-induced phenomena happening in biologically relevant organic chromophores and organometallic complexes using quantum chemical approach and computational tools. Along this line, one of the investigations we have carried out is to solve the mystery of solvation dependence fluorescence in fluorescein dianion. Fluorescein, one of the brightest fluorescent dye molecules, is a widely used fluorophore for various applications from biomedicine to industry. The dianionic form of fluorescein is responsible for its high fluorescence quantum yield. Interestingly, the molecule was found to be nonfluorescent in the gas phase. This characteristic is attributed to the photodetachment process, which out-competes the fluorescence emission in the gas phase. In this work, we show that the calculated vertical and adiabatic detachment energies of fluorescein dianion in the gas and solvent phases account for the drastic differences observed in their fluorescence characteristics. The functional dependence of these detachment energies on the dianion's microsolvation was systematically investigated. The performance of different solvent models was also assessed. The higher thermodynamic stability of fluorescein dianion over the monoanion doublet in the solvent phase plays a crucial role in quenching photodetachment and activating the radiative channel with a high fluorescence quantum yield. Another major research highlight is that we have come up with a light-induced spin-crossover mechanism for organometallic complex based on potential energy surface and spin-orbit coupling strength between low-spin, intermediate spin and high-spin states.



Publications

Hamerla, C., Mondal, P., Hegger, R., & Burghardt, I. (2023). Controlled destabilization of caged circularized DNA oligonucleotides predicted by replica exchange molecular dynamics simulations. *Physical Chemistry Chemical Physics, 25*(38), 26132-26144. https://doi.org/10.1039/D3CP02961A

K. G., Verma, A., Mondal, P., & Mandal, S. S. (2023). Molecular contacts in the Cren7-DNA complex: A quantitative investigation for electrostatic interaction. *Biophysical Journal, 122*(9), 1701-1719. https://doi.org/10.1016/j.bpj.2023.03.041

Roy, A., Samanta, S., Ray, S., Kumar, S. S., & Mondal, P. (2024). Unraveling the mystery of solvation-dependent fluorescence of fluorescein dianion using computational study. *Journal of Chemical Physics, 160*(3). https://doi.org/10.1063/5.0180218

Dr Pankaj Kumar Koli

Chemistry
Inorganic Chemistry

biomimetic systems/chemistries | homogeneous catalysis | small molecule activation

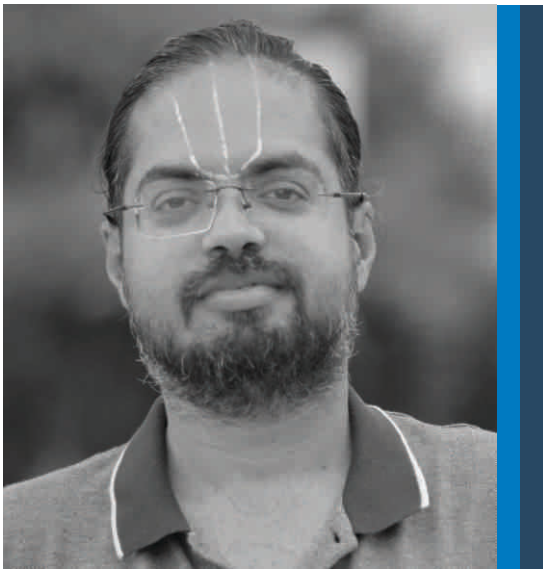
We work primarily on biomimetic systems and bio-inspired Catalysis. We design new ligand frameworks and prepare their complexes with transition metals to develop biomimetic systems. Activation of small molecules with transition metal complexes to mimic the active sites of Metalloenzymes. Further, we explore newly developed intermediate species in various catalytic reactions to mimic different biological reactions and scale the mechanistic insights. In addition, we examine the possibilities of developing new catalysts for various organic transformations (Oxidation, C-H activation, epoxidation, hydroxylation, etc.). We are broadly working in the following research areas.

Publications

Das, S., & Kumar, P. (2024). Exploring the carbonic anhydrase-mimetic $[(PMDTA)_2Zn\ II_2(OH^-)_2]^{2+}$ for nitric oxide monooxygenation. *Dalton Transactions, 53*(14), 6173-6177. https://doi.org/10.1039/D4DT00407H

Kulbir, Keerthi, C. S. A., Beegam, S., Das, S., Bhardwaj, P., Ansari, M., Singh, K., & Kumar, P. (2023). Nitric oxide oxygenation reactions of cobalt-peroxo and cobalt-nitrosyl complexes. *Inorganic Chemistry, 62*(19), 7385-7392. https://doi.org/10.1021/acs.inorgchem.3c00639

C. S., A. K., Das, S., Kulbir, Bhardwaj, P., Sk, M. P., & Kumar, P. (2023). Mechanistic insights into nitric oxide oxygenation (NOO) reactions of $\{CrNO\}^5$ and $\{CoNO\}^8$. *Dalton Transactions, 52*(44), 16492-16499. https://doi.org/10.1039/D3DT03177B

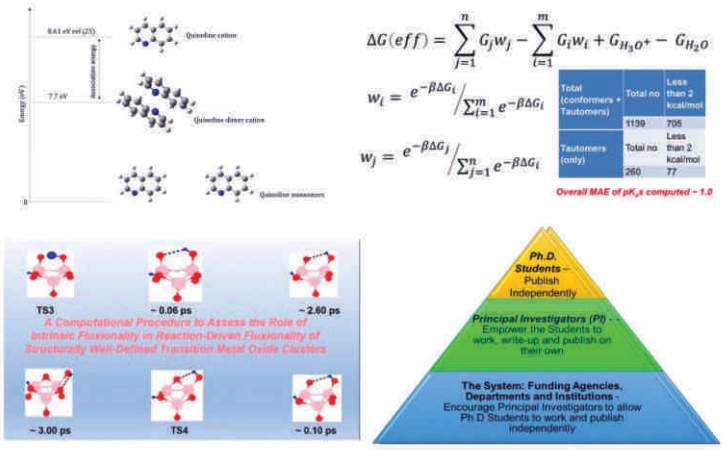


Dr Raghunath O Ramabhadran

Chemistry
Theoretial and Computational Chemistry

space science | interstellar medium | chemical education

In the area of computational astrochemistry, we collaborated with a PAN India team (PRL, BARC, , IISER Tirupati and IIT Madras) to work on proposing how larger Nitrogen containing molecules could have formed from smaller molecules. Our pivotal role from IISER Tirupati was to posit the role of aromaticity in driving molecular evolution in space. In our work on computational thermochemistry, we highlighted the role of conformers and tautomers in the accurate computation of acidity constants. Further, in the realm of cluster chemistry, we highlighted the role of dynamics in the reaction driven fluxionality of clusters. Lastly, in the area of chemical education, we enunciated how chemical education ought to be systematically improved at the doctoral level by empowering PhD students to publish independently. Our works in the past year were published in several reputed journals including Science Advances, The Journal of Physical Chemistry A, and ACS Symposium Series (Chemical Education Division).



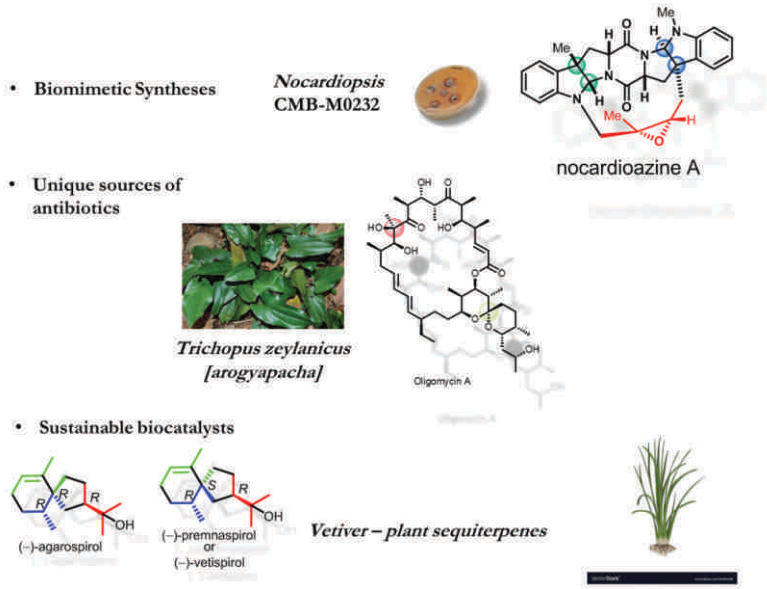
Publications

Ramabhadran, R. O. (2023). Chemical education at the doctoral level: Strategies to empower Ph.D. students to publish research papers independently. In D. J. Nelson (Ed.,). *Chemical education research during COVID: Lessons learned during the pandemic* (pp. 107-125). ACS Symposium Series, 1448. American Chemical Society. https://doi.org/10.1021/bk-2023-1448.ch008

Prof Rajesh Viswanathan

Our group's research on biosynthesis of medicinally valuable natural products lead us to novel therapeutic leads against cancer and COVID-19 viruses. New biomimetic syntheses and sustainable biocatalysts emerge from our research findings. Our work has led to the discovery of new enzymes that afford scalable production of fine chemicals and drug leads. Some of the recent work includes peptidomimetic inhibitors synthesized in lab are applied as anticancer agents and COVID-19 virus-life-cycle disruptors.

Chemistry
Chemical Biology



Publications

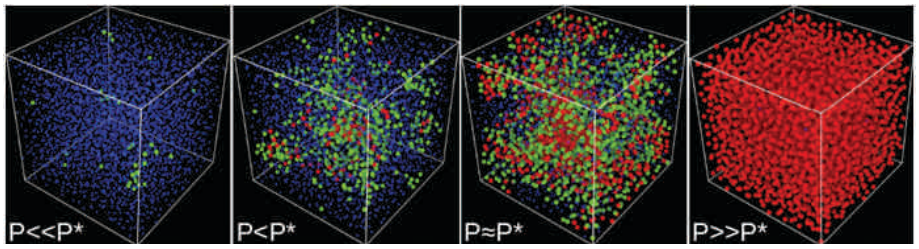
Deletti, G., Green, S. D., Weber, C., Patterson, K. N., Joshi, S. S., Khopade, T. M., ... Viswanathan, R., & Lane, A. L. (2023). Unveiling an indole alkaloid diketopiperazine biosynthetic pathway that features a unique stereoisomerase and multifunctional methyltransferase. *Nature Communications, 14*(1). https://doi.org/10.1038/s41467-023-38168-3

Viswanathan, R., & Krishnamurthy, N. (2023). Engaging students through active learning strategies in a medicinal chemistry course. *Journal of Chemical Education, 100*(12), 4638-4643. https://doi.org/10.1021/acs.jchemed.3c00647

Chemistry
Chemical Physics

Dr Rakesh S Singh

In recent years, much attention has been devoted to understanding the pathways of phase transition between two equilibrium condensed phases (such as liquids and solids). However, the microscopic pathways of transition involving non-equilibrium, non-diffusive amorphous (glassy) phases still remain poorly understood. We recently investigated the microscopic pathways of transition between the two glassy (or, amorphous) — low-density amorphous (LDA) and high-density amorphous (HDA) — phases of water. A structural order parameter capable of unambiguously identifying the LDA- and HDA-like local environments is a prerequisite for probing the microscopic mechanism of transition. However, this is an extremely difficult task as both these phases (LDA and HDA) lack global order (unlike liquid to solid transition). Using persistence homology and machine learning, we introduced a new order parameter that unambiguously identifies the LDA- and HDA-like local environments. Unlike the prevailing belief, we found that the LDA phase transitions continuously and collectively into the corresponding HDA phase via a pre-ordered intermediate phase during the isothermal compression. In addition to this work, we have also investigated the effects of impurities of different surface morphologies on the nucleation mechanism and kinetics. Nucleation is a common phenomenon in nature, and the presence of impurities is inevitable in both real-world and experimental systems.



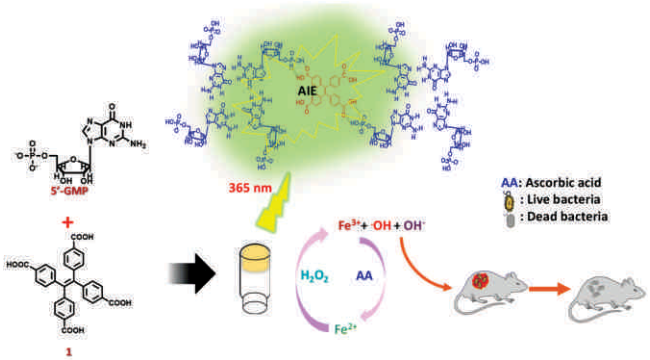
Prof Santanu Bhattacharya

Chemistry
Chemical Biology

biomedical therapeutics | biomolecular sensors | supramolecular chemistry

Prof Santanu Bhattacharya's lab is engaged in diverse areas of chemical biology, encompassing biomedical therapeutics, biomolecular sensors, supramolecular chemistry, nanoscience, and nanotechnology. In the field of biomedical therapeutics, the lab has developed several new molecular entities targeting non-Watson-Crick nucleic acid structures. Notably, they have synthesized novel xanthone analogs that target G-quadruplex binders for anti-cancer therapy, as well as xanthone derivatives conjugated with various heterocyclic substituents, which act as G-quadruplex stabilizing ligands. These ligands exhibit selective cytotoxicity towards cancer cells over healthy cells. Additionally, the lab has explored polymers conjugated with drugs like penicillin and chloramphenicol to combat uropathogenic bacterial colonization.

In the realm of biomolecular sensors, the lab has introduced a variety of stimuli-responsive platforms, such as dual-emitting covalent organic frameworks (COFs) for the detection of highly corrosive acids and hydrogel nanocomposites for sensing metal ions and spermine in biomedical and food sampling applications. They have also reported Co(II)-porphyrin/[2,1,3]-benzothiadiazole (BTD)-based COFs as efficient single-atom catalyst systems for O_2 electrocatalysis. In the area of nanoscience and nanotechnology, the lab has developed dipeptide-based piezo-organogels for dual circularly polarized luminescence, as well as mechanically stable, self-healing Fe(II)-GMP hydrogels with antibacterial properties. Furthermore, pH and thermo-responsive cyto-compatible hydrogels have been designed for the sustained release of doxorubicin and other anti-cancer drugs, particularly for colon cancer treatment.

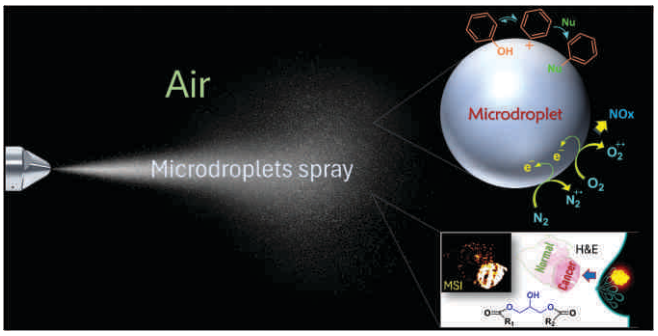


Dr Shibdas Banerjee

Chemistry
Organic Chemistry

air-water interface chemistry | mass spectrometry | label-free tissue imaging

Water is ubiquitous and regarded as a benign solvent when it is found in bulk quantities. However, when transforming into tiny microdroplets, water becomes a wonder chemical, driving many unusual reactions at the air-water interface. The understanding of chemistry in microdroplets is still in its early stages. Dr Shibdas Banerjee's group is actively investigating water microdroplets to reveal any previously unknown properties that significantly impact chemical reactivity at the interface. In a recent report, the group showed that water microdroplets exhibit high reactivity due to a high electric field at the air–water interface, enabling the cleavage of the phenolic Csp^2–OH bond, forming Ph^+. The phenyl cation (Ph^+) remains in equilibrium with phenol as deciphered by mass spectrometry. The team has proposed an eco-friendly, cost-effective, and catalyst-free approach for synthesizing various value-added chemicals from phenols by directly activating or breaking the C-O bond of phenols. Moreover, Dr Banerjee's group has recently made an intriguing finding that micron-sized water droplets generated from various spray sources can spontaneously produce nitrogen oxides. In addition, Dr Banerjee's group has been actively involved in utilizing microdroplets to intercept disease-specific marker molecules from dissected human tissue specimens



Selected Publications

Mondal, S., Nandy, A., Dande, G., Prabhu, K., Valmiki, R. R., Koner, D., & Banerjee, S. (2024). Mass Spectrometric Imaging of Anionic Phospholipids Desorbed from Human Hippocampal Sections: Discrimination between Temporal and Nontemporal Lobe Epilepsies. *ACS Chemical Neuroscience, 15*(5), 983-993. https://doi.org/10.1021/acschemneuro.3c00693

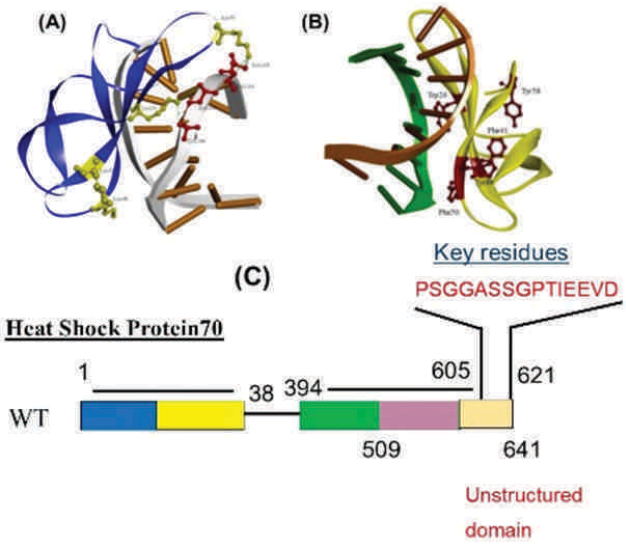
Jin, Y., Petrovic, P. V., Huang, S., Banerjee, S., Nandy, A., Anastas, P.T., Lam, J. C-H. (2024). Carbocation mechanism revelation of molecular iodine-mediated dehydrogenative aromatization of substituted cyclic ketones to phenols. *Journal of Organic Chemistry, 89*(5), 3226-3237. https://doi.org/10.1021/acs.joc.3c02691

Kumar, A., Mondal, S., & Banerjee, S. (2023). Efficient desorption and capture of reactive carbocations from positively charged glass surface bombarded with high-speed water microdroplets. *Journal of Physical Chemistry C, 127*(14), 6662-6669. https://doi.org/10.1021/acs.jpcc.2c08226

Chemistry
Physical Chemistry

Dr Soumit Sankar Mandal

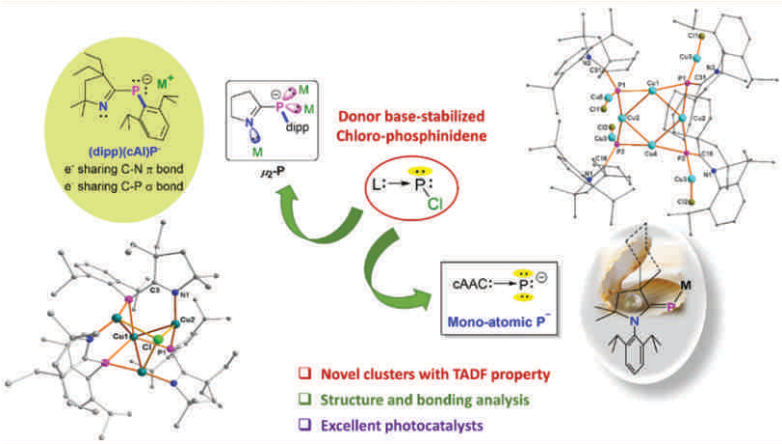
Our research group at IISER Tirupati has been working on understanding the phenomenon of DNA compaction inside the cells using model DNA-binding proteins. We have attempted to understand the role of polar and hydrophobic residues (Fig1 A and B) in Cren7, a Crenarchaeal DNA-bending observed that specific residues contribute to the structural stability of proteins, sequence-specific DNA binding, and stabilizing the final protein-DNA complex. They intercalate to different extents on the DNA, leading to different bending angles. We are also investigating the phase separation of biomolecules. The soluble proteins get converted to insoluble gels and finally to solids. This phenomenon is associated with neurodegenerative diseases. We are examining the role of molecular chaperones such as heat shock proteins in this phenomenon. Amino acids in the chaperone proteins play a crucial role in modulating this phenomenon.



Dr Sudipta Roy

Chemistry
Inorganic Chemistry

Our group primarily focusses on designing of the novel ligand systems based on cyclic alkyl(amino) carbene (cAAC)-supported chloro-phosphinidenes to stabilize exotic transition metal-based and structurally well-defined nano-clusters exhibiting thermally activated delayed fluorescence or phosphorescence with the long-term goal of developing potential photo-redox catalysts for various carbene transfer reactions. Along this direction, we have established the syntheses and stabilization of mono-atomic phosphorus anions, and (aryl) (cyclic alkyl(imino)) phosphides as the two excellent ligands leading to the solid-state isolation of various coinage metal clusters with different nuclearities exhibiting excellent redox and photophysical properties.



Selected Publications

Nag, E., Patra, A., Francis, M., Patra, U., & Roy, S. (2024). Monoanionic phosphorus-supported air stable Cu(I)8, Ag(I)7, and Ag(I)5 nanoclusters exhibiting TADF: A novel photocatalyst for stereoselective carbene transfer reactions. *Advanced Optical Materials, 12*(9). https://doi.org/10.1002/adom.202301256

Nag, E., Francis. M., & Roy, S. (2024). Reactivity Studies of Cyclic Alkyl(Amino) Carbene (cAAC)-Supported Phosphinidenide with AuCl. *European Journal of Inorganic Chemistry, 27*(4). https://doi.org/10.1002/ejic.202300485

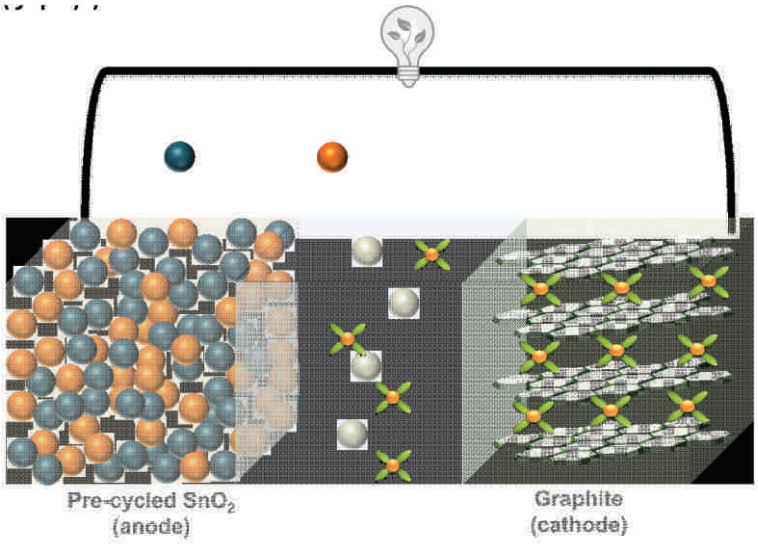
Francis, M., Nag, E., & Roy, S. (2024). Coordination Chemistry of Bis-Cyclic Alkyl(Amino) Carbene (cAAC)-Supported Di-Phosphorus (P2): An Efficient Route to Elusive Di-Phosphorus-Monoxide(P2O)-Gold Complex. *Chemistry - An Asian Journal, 19*(2). https://doi.org/10.1002/asia.202300882

Dr Vanchiappan Aravindan

Chemistry
Materials Science

coordination chemistry | organometallic chemistry | molecular magnetism

Dual-ion batteries (DIBs) are considered promising energy storage devices in which graphite serves as both anode and cathode. In contrast to conventional lithium-ion batteries (LIBs), DIBs reversibly store the cations and anions in the anode and cathode via redox reactions, respectively. The electrolyte is the only source for both cations and anions, so the choice of electrolyte plays a crucial role. Accordingly, the DIB is fabricated with the graphite cathode recovered from the spent LIBs and SnO_2 nanostructure as an alloy anode under balanced loading conditions. The SnO_2 anode is pre-cycled prior to the fabrication of the DIB, owing to the large irreversibility in the first cycle. The SnO_2/RG-based DIB delivered a maximum discharge capacity and energy density of 380 mAh g^{-1} and ~143 Wh kg^{-1}.



Schematic representation of the typical Dual-ion Batteries

Selected Publications

Jayan, P., Anjali, A., Park, S., Lee, Y-S., & Aravindan, V. (2024). Controlled synthesis of SnO_2 nanostructures as alloy anode via restricted potential toward building high-performance dual-ion batteries with graphite cathode. *Small, 20*(5). https://doi.org/10.1002/smll.202305309

Subramanyan, K., Jyothilakshmi, S., Ulaganathan, M., Lee, Y-S., & Aravindan, V. (2024). An efficient upcycling of graphite anode and separator for Na-ion Batteries via solvent-co-intercalation process. *Carbon, 216*. https://doi.org/10.1016/j.carbon.2023.118525

Akshay, M., Jyothilakshmi, S., Lee, Y-S., & Aravindan, V. (2024). High-performance Li-ion and Na-ion capacitors based on a spinel $Li_4Ti_5O_{12}$ anode and carbonaceous cathodes. *Small, 20*(15). https://doi.org/10.1002/smll.202307248

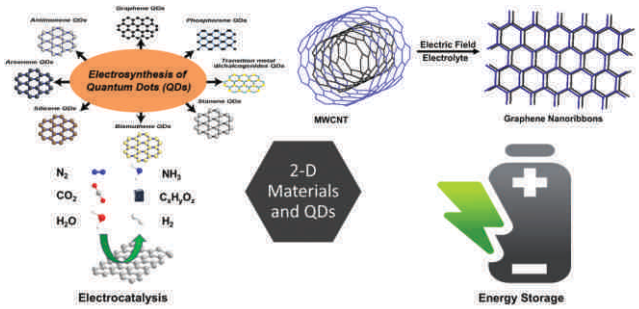
Prof Vijayamohanan K Pillai

Chemistry
Materials Science

2-D materials | quantum dots | energy storage

Prof Vijayamohan's research focuses on a wide range of intriguing challenges at the intersection of materials science and electrochemistry. His research group is particularly captivated by the physical chemistry in developing materials of various dimensions. His work includes synthesizing different types of Quantum Dots, such as graphene, phosphorene, stanene, bismuthene, and carbon nitride, and creating their heterostructures. These materials hold great promise for numerous applications, from serving as highly efficient electrocatalysts for energy storage solutions like fuel cells and batteries to forming self-assembled monolayers and multilayers for advanced biosensors and molecular electronics. Extensive research on graphene, including innovative approaches like the electrochemical unzipping of multi-walled carbon nanotubes using suitable electrolytes to produce graphene nanoribbons, is also underway progress. The functionalization of graphene oxide to enhance the performance of sodium-ion batteries is another area of ongoing research in his lab.

Prof Vijayamohan's research group aims to push the boundaries of material synthesis and electrochemical performance to develop novel materials with unique properties that can be tailored for specific applications. Through this, he strives to contribute to the advancement of sustainable energy technologies and the development of cutting-edge electronic and sensing devices. Overall, his research group is expanding the fundamental understanding of these materials and paving the way for their practical implementation in future technologies.



Earth and Climate Sciences Department

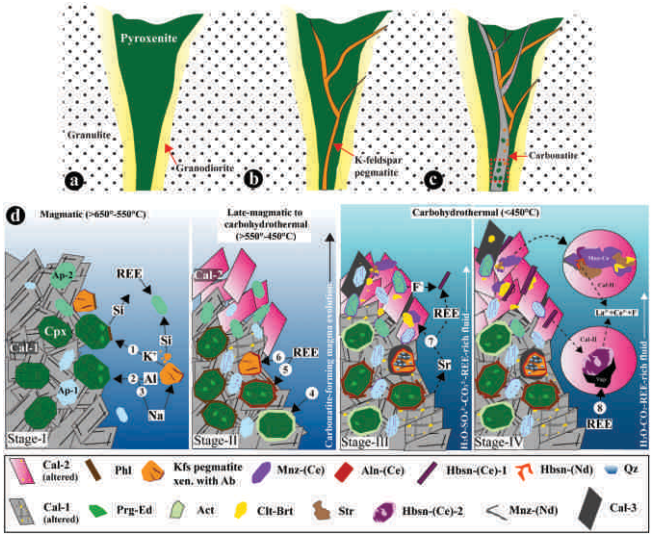
The Department of Earth and Climate Sciences has made significant strides over the past year, continuing to offer a rigorous, science-based program designed to prepare students for a diverse range of careers in geological, geophysical, and climate sciences. The department's curriculum covers a wide array of topics within geology, geophysics, and climate science, ensuring that students acquire in-depth knowledge of fundamental earth processes. Research is at the heart of the Department of Earth and Climate Sciences and spans a wide range of topics, with a particular emphasis on mineralogy and the exploration of rare earth elements (REEs) and rare metal potentials in alkaline rocks. This area has become a cornerstone of the department's expertise, contributing significantly to the knowledge of these geologically and economically vital resources. In addition, the department is heavily engaged in seismic studies. This includes efforts to better understand earthquake mechanics and contribute to developing early warning systems, which are vital for mitigating the impacts of seismic events. Furthermore, the department maintains a strong focus on climate science, addressing the multifaceted challenges of global climate change and working towards solutions that support environmental sustainability. Recently, the department has expanded its research scope to include economic geology and environmental toxicology. Research in economic geology focuses on improving the exploration and extraction of earth materials essential for modern industries. At the same time, environmental toxicology research addresses the effects of industrial pollutants on ecosystems and human health. By adopting an interdisciplinary approach, the department is developing strategies to reduce the impacts of environmental pollution, particularly in regions disproportionately affected by industrial waste and climate change. Looking ahead, the department remains dedicated to advancing research and education, contributing both to academic knowledge and

Dr Aniket Chakrabarty

Earth and Climate Sciences

mineralogy | mantle dynamics | kimberlites and carbonatites |

Current research in our group is focused on the intricate domains of mineralogy and geochemistry, with a particular emphasis on deciphering the evolutionary pathways of alkaline rocks, notably carbonatites. These distinctive geological formations are rich in rare minerals, including pyrochlore, bästnaesite, synchysite, parisite, monazite, allanite, and apatite. These minerals are distinguished by their high concentrations of high-field strength elements such as titanium (Ti), zirconium (Zr), niobium (Nb), tantalum (Ta), and especially rare earth elements (REE). The significance of this investigation lies in the substantial economic implications associated with alkaline complexes across India. A thorough exploration and understanding of these formations are crucial for identifying potentially lucrative mineral deposits. These complexes, which originate from the depths of the mantle, provide invaluable insights into the lower crust and subcontinental lithospheric mantle. The presence of diamonds and garnet peridotite mantle xenoliths within these rocks offers a unique opportunity to understand the complex processes governing mantle dynamics and evolution. By meticulously analyzing the mineralogical and geochemical compositions of these alkaline complexes, our research aims to unravel their evolutionary histories and delineate potential pathways for the formation of economically viable mineral resources. This work promises to advance our understanding of Earth's geological processes while informing strategic decisions in resource exploration and exploitation.



A schematic diagram showing the sequence of pyroxenite, K-feldspar pegmatite emplacement, and carbonatite intrusion in the granulite country rock at Hogenakkal.

Publications

Bhattacharjee, S., Chakrabarty, A., Mitchell, R. H., Patel, S. C., Kozlov, E. N., Fomina, E. N., Dey, M., & Pal, S. (2024). The role of magmatic-to-carbohydrothermal processes in rare earth mineralization in Hogenakkal carbonatites, India. *Lithos*, 464-465. https://doi.org/10.1016/j.lithos.2023.107431

Faculty

Dr Aniket Chakrabarty

Dr Chandan Kumar B

Dr K Saikranthi

Dr Sukhmeen Kaur Kohli

Dr Utpal Saikia

Dr Chandan Kumar B

Our research mainly focuses on understanding the role of magmatism in the crustal evolutionary processes, especially in the Western Dharwar Craton. Investigating the sources of magmatic melts that resulted in rocks that are older than 1000 million years comprises the prime objective of our studies. We are currently employing the same methodologies to investigate the sources of ore bearing fluids of gold deposits in Western Dharwar Craton.

Earth and Climate Sciences

Understanding the role of magmatic and metamorphic processes in gold metallogenesis

gold mineralization | magmatism | Isotopic investigations |

Dr K Saikranthi

Earth and Climate Sciences

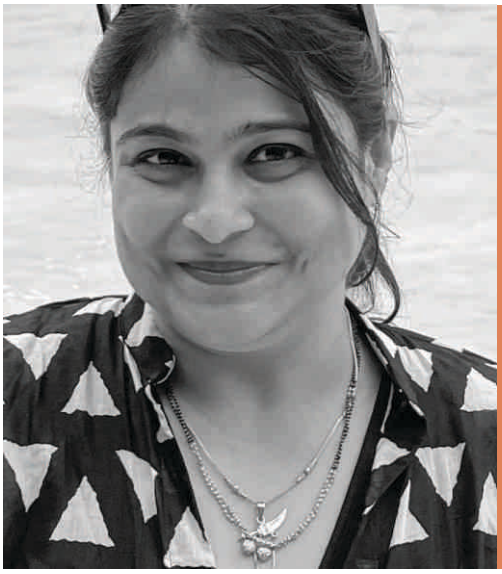
precipitating systems | spaceborne radar measurements | climate change |

Our group is working on understanding the variation of raindrop size distribution at different temporal scales over India and adjoining oceans. Global precipitation measurement dual-frequency precipitation radar observations during 2014–2021 are used for the first time to infer the dominant microphysical processes responsible for the seasonal variations in mass weighted mean diameter (D_m) in different regions of the Indian subcontinent. Seasonal differences in mean D_m estimated using stratified rain rates for deep systems is pronounced in continental and Western Ghats, while marginal in maritime and Myanmar coast regions. The mean D_m values are larger in pre-monsoon (PM) than in other seasons in all the regions due to prevalence of deepest storms and evaporation. Seasonal differences in D_m observed at the near-surface are originated at raindrop formation altitude (1.5 km below the 0°C isotherm) and are magnified during the descent of raindrops due to more evaporation in PM over the Arabian Sea, Western Ghats, and Myanmar coast. Raindrop size show contrasting features at the formation altitude and at the near surface in southwest monsoon (SWM) and northeast monsoon (NEM) over Bay of Bengal, foothills of Himalayas, Northwest India, and southeast peninsular India. The breakup of raindrops in NEM results in small D_m at the near surface in NEM than in SWM over the Bay of Bengal and southeast peninsular India. Higher occurrence of convection over Western Ghats, evaporation over foothills of Himalayas and northwest India in NEM results in large D_m values than in SWM. D_m values of shallow rain show considerable seasonal variations over the Arabian Sea and Western Ghats and marginal differences in the Bay of Bengal and Myanmar coast.

Publications

Vignesh, V. G., Jain, C. D., Saikranthi, K., & Ratnam, M. V. (2023). Spatial variability of trace gases (NO2, O3 and CO) over Indian region during 2020 and 2021 COVID-19 lockdowns. *Environmental Monitoring and Assessment, 195*(6). https://doi.org/10.1007/s10661-023-11318-2

Saikranthi, K., Radhakrishna, B., & Rao, T. N. (2023). Seasonal differences in raindrop size and causative microphysical processes in continental, orographic and oceanic regions of the Indian subcontinent. *Atmospheric Research, 281.* DOI: 10.1016/j.atmosres.2022.106501



Earth and Climate Sciences

plant resilience | environmental stress | seed priming |

Dr Sukhmeen Kaur Kohli

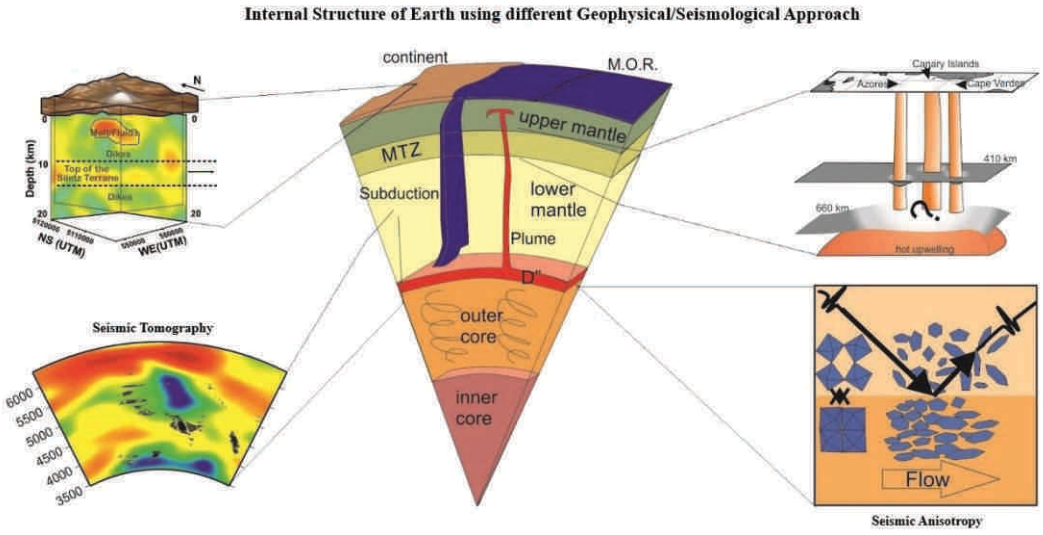
Our group is focused on navigating nature's challenges, and specifically focuses on understanding plant resilience under environmental stress. We are tackling a critical issue: decoding how plants respond to diverse environmental stresses, specifically focusing on heavy metals, salinity, and microplastics, threats impacting plant health and ecosystem stability. We delve into the physio-biochemical, molecular, and regulatory mechanisms underlying plant resilience and aim to unveil their ability to combating these challenges. We are exploring the potential of seed priming as a strategic intervention to boost stress tolerance and enhance phytoremediation capabilities.

Dr Utpal Saikia

Our research focus is to seismically image the Earth's internal structure from the earth crust to the mantle along with earthquake hazard. Based on the fine structure of Earth, we are trying to understand the linkage between the physical and chemical properties of Earth material with the earthquake and the tectonics of the region. Additionally, we are also interested in the evolutionary history of the continent and plate dynamics of the ocean lithosphere.

Earth and Climate Sciences

mantle dynamics | Seismic velocity variation | earthquakes |



Internal Structure of Earth using different Geophysical/Seismological Approach

Publications

Das, R., Saikia, U., & Saha, G. K. (2023). The crust and upper mantle structure beneath the Bangladesh and its effects on seismic hazard. In Sandeep et al. (Eds.), *Geohazards: Analysis, modelling and forecasting* (pp. 39-50). Series: Advances in natural and technological hazards research, 53. Springer. https://doi.org/10.1007/978-981-99-3955-8_3

Humanities and Social Sciences Department

The goal of the Department of Humanities and Social Sciences at IISER Tirupati is to situate science within the broader context of society to create infinite possibilities for our students. As an academic unit, we are an eclectic group with divrese disciplinary training. As a result, our research explorations often span disciplinary boundaries and contribute to making fundamental changes in our specialties. As a brand new department at IISER Tirupati, we have two permanent and two visiting faculties with plans to expand our faculty numbers and strengthen the disciplinary diversity. Currently, the areas of research represented in the department include energy economics and environmental sustainability, metaphors and figurative language, science education and pedagogy and scientific entrepreneurship. Inspired by the vision and the values at IISER Tirupati, the department offers various courses to our science students, promotes innovative thinking and entrepreneurial mindset and coordinates teacher training programs. This report provides a summary of our department's research activities.

Faculty

Dr Raghutla Chandrashekar
Dr Nirmala Krishnamurthy
Dr Doreswamy
Dr Abhijit Chakraborty

Visiting Faculty

Dr Baburam Upadhaya
Dr D Bhanu Sree Reddy

Dr Raghutla Chandrashekar

Humanities and Social Sciences
Energy Economics

macroeconomic modeling | international trade and finance | energy economics |

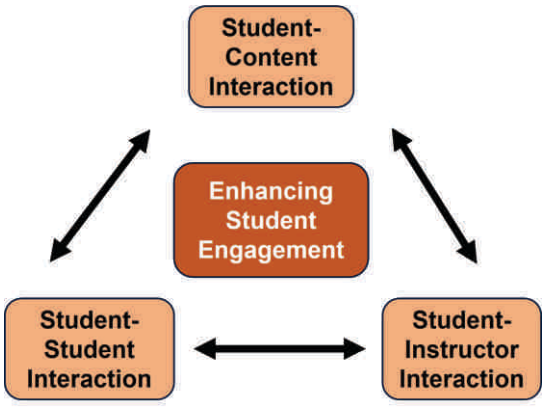
Our primary research focuses on energy economics and the environment for sustainability. We are also interested in emerging energy technologies and look forward to focusing on research areas that can directly extend the availability and usefulness of technology and its advancement to our society. In addition, our research also explores policy-relevant questions in the field of economics.

Dr Nirmala Krishnamurthy

Humanities and Social Sciences
Pedagogy

pedagogical innovations | active learning strategies | science education |

Our research involves development of an innovative Outcome-based Enhanced Learning (ObEL) program with implementation of tech-enhanced pedagogical tools that result in higher student engagement and learning. Our current work involves active learning strategies that engage students productively in the process of learning through problem-solving activities and discussions. This involved the redesign of a medicinal chemistry course by augmenting traditional lectures with active learning sessions to engage students in higher-order cognitive skills and promote student engagement. Interactive activities were designed to incorporate three modes of interaction for the students: with the course content, with their peers and with the instructor. Analysis of student survey results provided valuable insights into the effectiveness of active learning strategies on student engagement and their understanding of course material. Overall, this work on active learning pedagogy will guide faculty and other instructors as they design their courses to achieve student engagement and learning.



Three modes of interaction for enhancing student engagement

Publications

Viswanathan, R., & Krishnamurthy, N. (2023). Engaging students through active learning strategies in a medicinal chemistry course. Journal of Chemical Education, 100(12), 4638-4643. https://doi.org/10.1021/acs.jchemed.3c00647

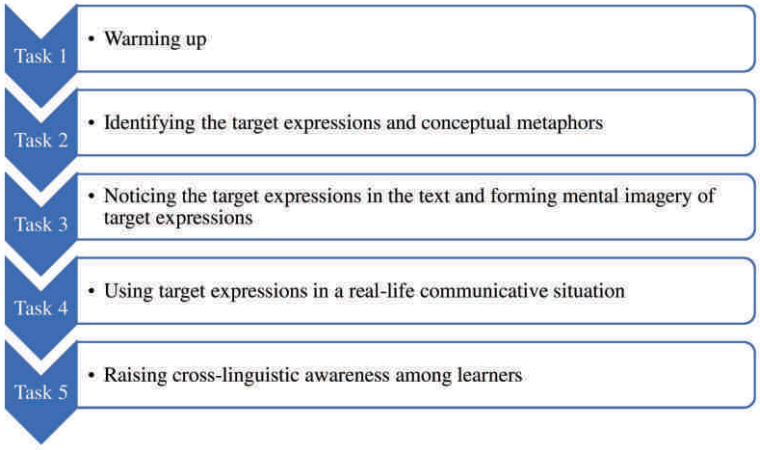
Dr Doreswamy

Dr Baburam Upadhaya

Humanities and Social Sciences
English language

english as second language | materials development | metaphors and figurative language |

Developing materials to enhance students' learning of idiomatic expressions using the conceptual metaphor theory can be highly effective in improving language comprehension and usage. Conceptual metaphor theory suggests that people understand abstract concepts through more concrete experiences. By using this theory as a framework, educational materials can be designed to help students grasp the underlying meanings of idiomatic expressions, which often involve figurative language that isn't immediately clear from the individual words. Materials that incorporate real-life scenarios and various interactive exercises based on conceptual metaphors can make these idioms more relatable and easier to understand. As a result, students are likely to develop a deeper appreciation of idiomatic expressions and use them more naturally and confidently in their everyday communication.



Sequence of tasks involved in creating supplementary materials for teaching and learning idiomatic expressions

Humanities and Social Sciences
Scientific Entrepreneurship

entrepreneurship | innovation | Design Thinking |

Dr D Bhanu Sree Reddy

Science entrepreneurship combines scientific knowledge with entrepreneurial skills to foster innovation, commercialize scientific discoveries, and contribute to the economic development of the nation. I work with IISER students to develop their entrepreneurial mind set so that they play a role through their innovative thinking. I also create awareness in design thinking and development of prototypes. In addition, I coordinate various teacher training programs at IISER Tirupati.

Mathematics Department

Research in the department is focused on topics in number theory, complex analytic geometry, algebraic geometry, differential geometry, algebraic topology, harmonic analysis, representation theory. Some very interesting new results obtained by the members of the departments are:

1) Estimates of Bergmen kernels associated to Picard modular cusp forms,

2) Sub-convexity estimates of Siegel modular cusp forms in genus 2,

3) Results on equivariant algebraic K-theory in motivic homotopy theory,

4) Results on constructible Witt theory,

5) Classification complete hypersurfaces of constant isotropic curvatures in space forms

Faculty

Dr Anilatmaja Aryasomayajula

Dr Girja Shanker Tripathi

Dr Gururaja H A

Dr Lakshmi Lavanya R

Prof Nagaraj D S

Dr Shalini Bhattacharya

Dr Souradeep Majumder

Dr Subhash B

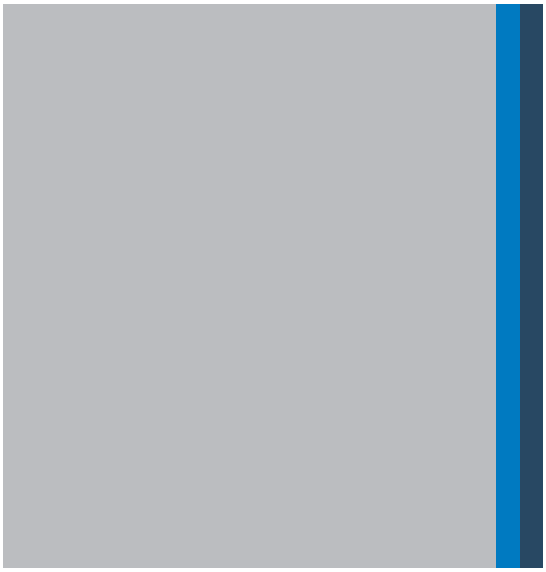
Dr Venketasubramanian C G

Mathematics

automorphic forms | Bergman kernels

Dr Anilatmaja Aryasomayajula

The major result from last year is estimates of Picard modular cusp forms associated to SU(n,1). This is in collaboration with Dr Baskar Balasubramanyam (Associate Prof IISER Pune). We also derive estimates of the Bergman metric on compact and nonimpact Picard varieties. We also worked on estimates of the Bergman metric associated to symmetric products of a non-compact hyperbolic Riemann surface, which is in collaboration with my then postdoc Dr Arijit Mukherjee. In another project, we also derived optimal estimates of Jacobi forms, which is in collaboration with Prof. Jurg Kramer (Humboldt University of Berlin) and Dr Anna von Pippich (University of Konstanz).



Dr Girja Shanker Tripathi

Mathematics

Dr Gururaja H A

Mathematics

Isometric immersion | scalar curvature | minimal surfaces | space forms

My research interests lie primarily in differential geometry. My current research focus is submanifold geometry; in particular, the local and global aspects of submanifolds with nonnegative scalar curvature in space forms.

Dr Lakshmi Lavanya R

Mathematics

Harmonic Analysis on the Heisenber group | Abstract Harmonic Analysis | Algorithmic Complexity

Dr Nagaraj D S

Mathematics

Projective variety | vector bundle | Picard rank | stable vector bundles | Morphisms

My broad area of research is in algebraic geometry and in algebraic number theory; in particular, the study of various aspects of projective varieties including the following.

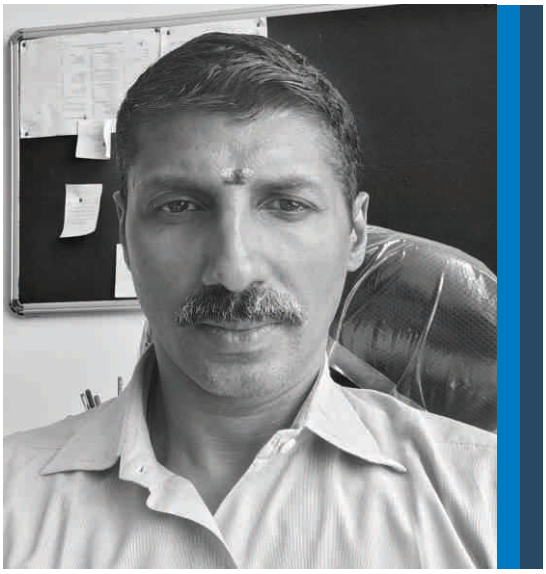
1. Vector bundles on Projective variety, various properties of vector bundles, stability, nefness, bigness of the bundles.
2. Morphism between projective varieties,
3. Study of properties which are preserved by morphisms.
4. Projective bundles associated to vector bundles.
5. Study of picard rank two projective non-sigular varieties.

Mathematics

Vector bundles | parabolic bundles | moduli space

Dr Souradeep Majumder

We studied orthogonal and symplectic connections in the parabolic context and deduced Biswas-Borne type correspondence. We are investigating parabolic bundles over a base with positive characteristic. As part of this project, we have constructed the moduli stack without using GIT techniques. In the future, we would like to study various geometric properties of this moduli stack, such as irreducibility, smoothness, Picard group, and non-emptiness, to name a few. In another work, the generalization of Seshadri Constants over non - algebraically closed fields is studied. In particular, we deduced a relation between the SHGH Conjecture and the Nagata's Conjecture in this setting. In certain cases, this leads to counterexamples of SHGH Conjecture.



Dr Subhash B

Mathematics

almost complex structures | parallelizability | quandles

I try to understand structures on various manifolds. Some of the topics of interest are the following.

i) To study Sphere bundles -

a) where the base is a complex projective space, to understand when they admit an almost complex structure.

b) over complex manifolds.

ii) To study manifolds generalising product projective spaces to understand the parallelizability, almost complex structure, K-rings.

iii) To study Topological quandles and applications to knots.

Mathematics

p-adic groups | principal series representations twisted Jacquet modules

Dr Venketa subramanian C G

We worked on computation of twisted Jacquet modules of principal series representations induced from maximal parabolic subgroups of the symplectic group Sp(4) over a p-adic field and finite field. Let P and Q denote respectively the Siegel and Klingen parabolic subgroups of Sp(4) with respective Levi decompositions P=MN and Q=LU. For an irreducible representation of the Levi subgroups M or L, consider the corresponding parabolically induced representation of Sp(4). We obtained the structure of the twisted Jacquet module of principal series representations of Sp(4) taken with respect to N and a degenerate character of N corresponding to a rank one quadratic form.

Physics Department

The Department of Physics at IISER Tirupati embodies a sense of motivation through its young and dynamic faculty members who have already established themselves at the forefront of their respective research fields. Cutting-edge research is being done in Astronomy and Astrophysics, High Energy Physics, Soft and Active Matter Physics, Condensed Matter Physics and Material Science, Atomic and Molecular Physics, Photonics, Ultra-fast Spectroscopy, and Non-linear Dynamics and Complex Systems.

With regular contributions to high-impact journals and conferences, the Physics Faculty has already carved a niche for itself in the national and international arena of research, and is often in the limelight. In the year 2023-2024, there were 65 publications from Physics in international peer-reviewed journals including The Astrophysical Journal, Physical Review Letters, and Soft Matter among others. Dr Eswaraiah Chakali and Dr Sambuddha Sanyal were awarded the SERB-CRG research grants, Dr Sunil Kumar S an ISRO-RESPOND grant, and Dr Arunima Banerjee a CSIR-ASPIRE research grant in Physical Sciences. Dr Jessy Jose was featured in the Compendium of Inspirational stories of Women in STEM, by Confederation of Indian Industries (CII) and Dr Ravi Kumar Pujala was awarded a Visiting Professorship from CNRS, France, at the University of Paris-Saclay.

We are also dedicated to strengthening the BS-MS program, the flagship program of IISER, integrating research with undergraduate curriculum. In the year 2024, 49 students out of a batch of 129 students from the 2019 BSMS batch were awarded BSMS degrees with a specialisation in Physics. Mr Ainesh Sanyal, the student with the highest Cumulative Grade Performance Award (CGPA) from the batch, also with a specialisation in Physics, was awarded the Institute's Gold Medal for 2024. Mr Asma Shirin T, BSMS student from the 2020 batch, was selected to participate in the 73rd Lindau Nobel Laureate Meeting for Physics at Lindau, Germany from 30 June – 5 July, 2024. The other academic programs of the department include Integrated PhD, PhD and the Postdoctoral program. 6 students were awarded their doctoral degrees in Physics in 2023-24. Mr Biju Saha was awarded the prestigious Prime Minister's Research Fellowship in the 11th cycle, in August 2024. Ms Priyanshi Sinha won one of the best poster awards at DAE-BRNS Symposium on Nuclear Physics-2023 at IIT Indore during 9-13 December 2023. Mr Sharang Rav Sharma received Best Young Student Researcher award at the 52nd International Symposium on Multiparticle Dynamics (ISMD) 2023 in Hungary, and also the Session Presenter Award for his presentation in the EMMI Workshop at GSI in Germany.

In 2024, the Department of Physics organised 15 research seminars and 2 colloquiums, inviting speakers from across the country. Prof Chandan Dasgupta talked about “Glassy Dynamics and Jamming in Dense Persistent Active Matter” as the invited speaker on “Physics Day” celebrated on November 4, 2023.

Faculty

Dr Ankur Das

Dr Aradhana Singh

Dr Arunima Banerjee

Dr Chitrasen Jena

Dr Dileep Mamapallil

Dr Eswaraiah Chakali

Dr Jessy Jose

Dr T Kanagasekaran

Dr Nihar Ranjan Sahoo

Prof Prasenjit Sen

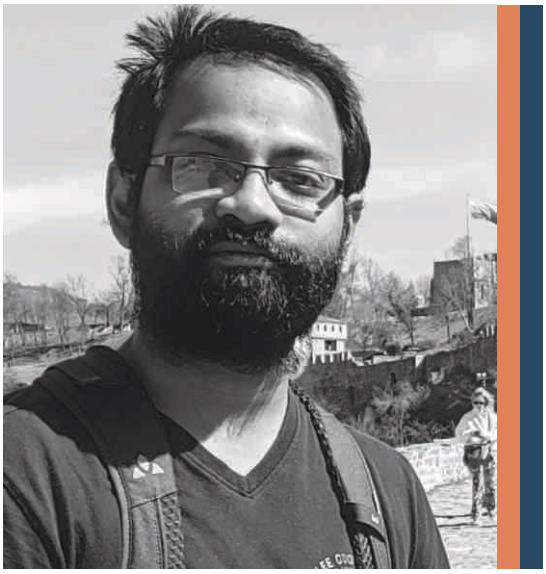
Dr Ravi Kumar Pujala

Dr Sambuddha Sanyal

Dr Sudipta Dutta

Dr Sunil Kumar S

Dr Tapan Chandra Adhyapak



Dr Ankur Das

Physics
Condensed Matter

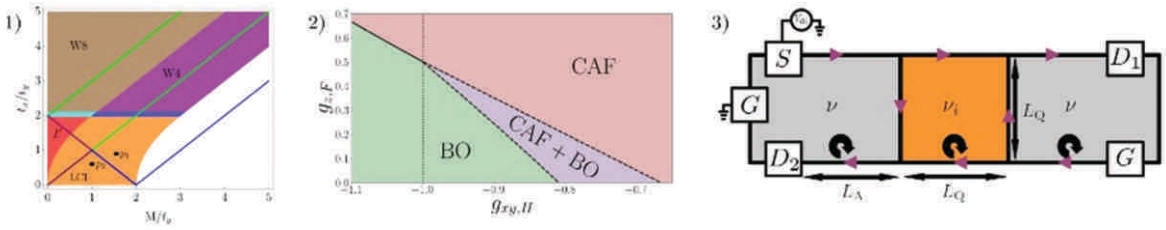
topological insulator | quantum hall | phase transition

My interest is understanding topological systems in quantum Condensed matter physics. This includes the Quantum Hall Effect, Mesoscopic Physics, Topological Insulators and Semimetals, Graphene, etc. My interests can be categorized into three sectors,

1) Topological classification and properties of semimetals: Till now full understanding of the existence of different topological semimetals is incomplete. This includes the recently found Nexus semimetals, which needed additional topological invariants previously unknown.

2) Phase transitions in Graphene quantum Hall bulk: Due to its very special band structure and topological properties of the monolayer, few-layer graphene has had a lot of interest in the past decade. I work on finding the phase diagram in both the integer and the fractional regime using different numerical and theoretical techniques.

3) Non-abelian topology and their experimental manifestation: The fraction Quantum Hall Effect in Graphene has many interesting results which are not well understood, specifically ν=2/3, 5/3, 5/2, 12/5, etc. I am interested in mesoscopics of complicated fillings.



Dr Aradhana Singh

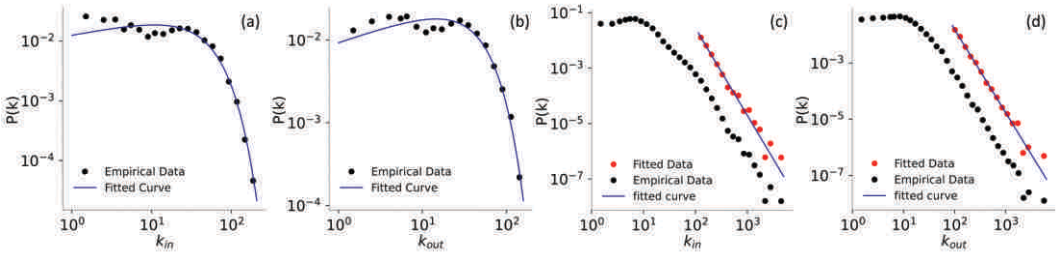
Physics
Computational Physics

brain | network | core

Our group studies the dynamics and topology of complex systems, with a primary focus on the following areas:

Brain Networks: The brain is one of the most intricate systems, and fully comprehending its structure and dynamics is still an ongoing pursuit. Utilizing network theory and advanced data analysis techniques, we attempt to unravel the structures and dynamics of the brain. One of our studies delves into the intricate developmental transitions within the fruit fly brain from larval to adult stages. This development includes neuronal death, reorganization, and the emergence of adult-specific neuronal connectivity, collectively shaping the topology of brain rewiring. While some universal network characteristics, such as sparsity and modular organization, are preserved throughout development, there are notable differences in topology across the developmental stages [Figure shown at bottom].

Network Dynamics and Synchronization: Our research also focuses on the intertwined dynamics of these networks, particularly in exploring synchronized cluster patterns. Synchronization is a crucial phenomenon the brain uses to regulate emotions, manage sleep-wake cycles, and enable communication between different brain regions. Efficient information interpretation and processing in the brain depend heavily on synchronization.



The in-degree and out-degree distribution of the larval and adult brain networks on a log-log scale.

Publications

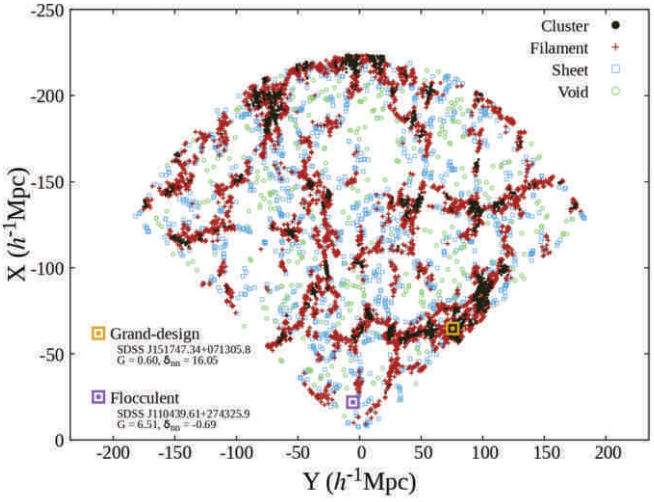
Yadav, P., Shinde, P., and Singh, A. Brain rewiring during developmental transitions: A Comparative Analysis of Larva and Adult *Drosophila melanogaster* bioRxiv 2024.05.01.592061; doi: https://doi.org/10.1101/2024.05.01.592061

Dr Arunima Banerjee

Physics
Astronomy and Astrophysics

galaxy dynamics | dark matter | machine learning

Dr Banerjee's group focuses on the cosmic web environment in the vicinity of grand-design and flocculent spirals with local geometric index. Spiral galaxies can be classified into *Grand-designs* and *Flocculents* based on the nature of their spiral arms. The *Grand designs* exhibit almost continuous and high-contrast spiral arms and are believed to be driven by stationary density waves, while the *Flocculents* have patchy and low-contrast spiral features and are primarily stochastic in origin. Dr Suman Sarkar, a postdoctoral fellow, and Mr Ganesh N, a PhD student characterized the local cosmic environment of a combined set of 367 grand-design and 619 flocculent spiral galaxies. They introduced a novel estimator called the \textit{local geometric index}, which classifies the local environment of galaxies into voids, sheets, filaments, and clusters. We find that grand-designs are mostly located in dense environments like clusters and filaments ($\sim 78\%$), while the flocculents mostly lie in sparse environments like voids and sheets ($ > 10\%$). A p-value $<$ $10 ^{-3}$ from a Kolmogorov-Smirnov test indicates that our results are statistically significant at 99.9% confidence level. They further noted that dense environments with large tidal flows are dominated by the grand-designs. On the other hand, low-density environments such as sheets and voids favor the formation of flocculents.



The background galaxy distribution after classification, as projected on the X-Y plane for a $10 \hmpc$ slice on the Z-axis.

Publications

Sarkar, S., Narayanan, G., & Banerjee, A. (2023). Analyzing the cosmic web environment in the vicinity of grand-design and flocculent spirals with local geometric index. *Journal of Cosmology and Astroparticle Physics, 2023.* https://doi.org/10.1088/1475-7516/2023/08/044

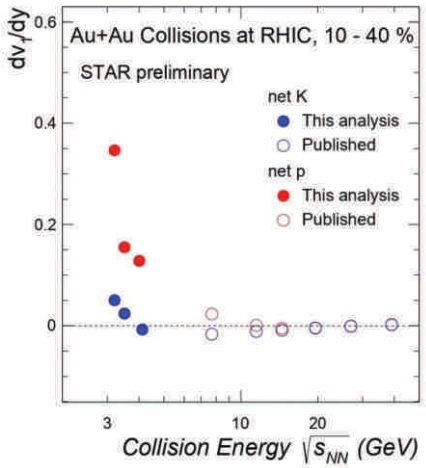
Aditya, K., Banerjee, A., Kamphuis, P., Mosenkov, A., Makarov, D., & Borisov, S. (2023). H i 21cm observations and dynamical modelling of the thinnest galaxy: FGC 2366. *Monthly Notices of the Royal Astronomical Society, 526*(1), 29-42. https://doi.org/10.1093/mnras/stad2599

Dr Chitrasen Jena

Physics
High Energy Physics

quantum chromodynamics | quark-gluon plasma | heavy ion collision

Dr Jena and his research group primarily focus on the study of identified hadrons, resonances, and light nuclei to understand the properties of Quantum Chromodynamics (QCD) matter and explore the QCD phase diagram using Beam Energy Scan (BES) data from the Relativistic Heavy Ion Collider (RHIC). The flow anisotropy parameters (v_n) provide insights into the collective hydrodynamic expansion and transport properties of the produced medium at higher collision energies, while at lower collision energies, they are sensitive to the compressibility of nuclear matter and the nuclear equation of state. Directed flow (v_1) describes the collective sideward motion of produced particles in heavy-ion collisions and is sensitive to the details of the expansion during the early stages of the collision. A minimum in directed flow has been proposed as a signature of a first-order phase transition between hadronic matter and Quark-Gluon Plasma (QGP). In our recent measurements, we observed a minimum in the slope of v1 for net-protons and net-kaons, though at different collision energies, as shown in the figure below. This observation may provide important insights into the phase transition from hadronic matter to QGP.



Collision energy dependence of v_1 slope (dv_1/dy) for net-proton and net-kaon in Au+Au collisions at RHIC.

Selected Publications

M. I. Abdulhamid, C. Jena et al. (STAR Collaboration), Reaction plane correlated triangular flow in Au + Au collisions at √sNN = 3 GeV, Phys. Rev. C 109 (2024) 4, 044914.

P. Sinha, V. Bairathi, K. Gopal, C. Jena and S. Kabana, Effect of nuclear structure on particle production in relativistic heavy-ion collisions using a multiphase transport model, Phys. Rev. C 108 (2023) 2, 024911.

M. I. Abdulhamid, C. Jena et al. (STAR Collaboration), Beam Energy Dependence of Triton Production and Yield Ratio (Nt x N*p* /N*d*2)in Au+Au Collisions at RHIC, Phys. Rev. Lett. 130 (2023) 202301.

Physics
Soft Matter

microfluidics | droplets | liquid-liquid phase separation

Dr Dileep Mamapallil

Evaporative Liquid-liquid phase separation (LLPS): We perform phase separation polymer mixture drops driven by evaporation. We study the dynamics of the nucleated microdroplets at the drop edge, which act analogous to active microdroplets. We particularly study how convective flows influence the dynamics of active-like polymer microdroplets.

Microfluidics for studying Aerosol transmission of pathogens: One area that we are investigating is the mechanism of the viability of pathogens in aerosols. Aerosols are tiny droplets that can carry pathogens. It is not very well understood how pathogens survive extreme salt conditions in aerosols as these tiny droplets undergo solvent removal by evaporation. Here, we study the survival of bacteria in confined and evaporating systems such as microdroplets.

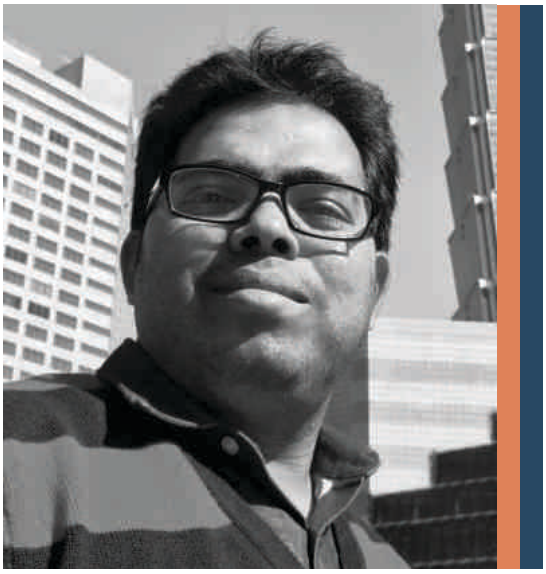
Active microsystems: We study the dynamics of active particles such as bacteria, electrically-driven particles, or catalytically-driven nanoparticles. We study how these systems can behave collectively and in confined states.

Selected Publications

Kumar, M., Gopu, M., Parameswaran, S. P., Joshi, P., & Mampallil, D. (2024). Evaporative phase separation in polymer microdroplets with confinement and internal flow. *JCIS Open, 13.* https://doi.org/10.1016/j.jciso.2023.100101

Ghosh, C., Ghosh, S., Chatterjee, A., Bera, P., Mampallil, D., Ghosh, P., & Das, D. (2023). Dual enzyme-powered chemotactic cross β amyloid based functional nanomotors. *Nature Communications, 14*(1). https://doi.org/10.1038/s41467-023-41301-x

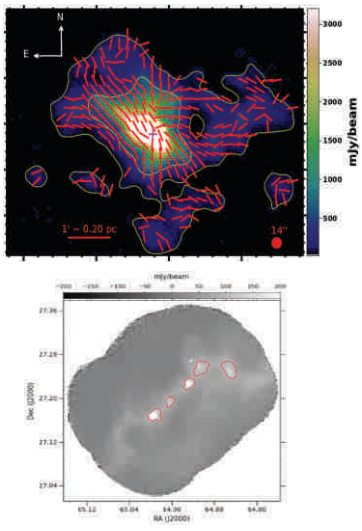
Yerrapragada, M. R., Kunnambra, B. F., Pillai, V. K., & Mampallil, D. (2024). Electrochemical IFN-γ immunosensor based on a nanocomposite of gold nanorods and reduced graphene oxide. *Journal of Applied Electrochemistry, 54,* 127-135. https://doi.org/10.1007/s10800-023-01946-4



Dr Eswaraiah Chakali

Physics
Observational Astronomy & Astrophysics

interstellar medium | magnetic fields | multiwavelength polarimetry



Top: Magnetic field (red segments) traced using JCMT SCUBA-2/POL-2 towards a massive clump Cep A forming massive protostellar cluster. Bottom: Dust emission map of POL-2 of Taurus B213 filamentary cloud.

Magnetic fields (B-fields) permeate the entire interstellar medium (ISM), and they govern crucial processes in the different phases of the ISM, including the accumulation of material over large-scale and low-density diffuse ISM to form molecular clouds. However, it is not well understood how the B-fields collaborate with other key agents, such as gravity, turbulence, gas flows, and stellar feedback, and govern the formation of spectacular cloud structures known as filaments, their fragmentation into clumps and cores, and further their collapse to form stars with different masses. Moreover, B-fields also govern the formation of circumstellar disks and protostellar outflows.

"The Interstellar Medium and Cosmic Magnetic Fields" group uses national and international observational telescopes and polarimetric instruments to conduct multi-wavelength polarization observations. The following are the key science goals: (a) To use these polarization data to delineate the magnetic fields in various densities and scales of molecular clouds, (b) to quantify magnetic field strengths from polarimetry, and extract nonthermal velocity dispersion from molecular lines and column density maps from continuum maps; and to investigate whether magnetic fields are predominant compared to turbulence and gravity, (c) to understand the cloud fragmentation process through the comparison of the measured core masses and separation between them with those from prediction. Through this, we test whether B-fields are essential in addition to the thermal pressure and turbulence to the fragmentation of filaments into cores, and finally (d) by employing machine learning and AI techniques, our team also focuses on tracing B-fields and dust polarization properties in three dimensions (3D) with the help of polarization, distance, and dust extinction data sets.

Selected Publications

Rawat V., Samal M.~R., Eswaraiah C., Wang J.-W., Elia D., Panigrahy S., Zavagno A., et al., 2024, MNRAS, 528, 1460. The Giant Molecular Cloud G148.24+00.41: gas properties, kinematics, and cluster formation at the nexus of filamentary flows; doi:10.1093/mnras/stae053

Anirudh R., Eswaraiah C., Jiao S., Jose J., 2023, JApA, 44, 59. Role of magnetic fields in the fragmentation of the Taurus B213 filament into Sun-type star-forming core; doi:10.1007/s12036-023-09948-6

Xu F.-W., Wang K., Liu T., Goldsmith P.~F., Zhang Q., Juvela M., Liu H.-L., et al., including Eswaraiah C., 2023, MNRAS, 520, 3259. TOMS: ALMA Three-millimeter Observations of Massive Star-forming regions - XV. Steady accretion from global collapse to core feeding in massive hub-filament system SDC335; doi:10.1093/mnras/stad012

Physics
Observational Astronomy & Astrophysics

brown dwarfs | free-floating plantes | protoplanetary disks

Dr Jessy Jose

The formation of planets is closely tied to the temporal evolution of protoplanetary discs. Metallicity is a crucial parameter in the protoplanetary disk evolution studies. The low metal abundance may impede the production of planetesimals, especially if low-metallicity discs have shorter lifetimes. However, the role of metallicity in shaping protoplanetary disk evolution remains poorly explored. The Milky Way has a negative metallicity gradient with increasing Galactocentric distance, making the outer part of the Milky Way a laboratory of low-metallicity disk formation and evolution. We have analyzed the disk fraction of 18 young (0.9-2.1 Myr) and sub-solar metallicity (0.34-0.83 Z_{Odot}) clusters with Galactocentric distances between 10 and 15 kpc. Using NIR photometry, the calculated inner disk fraction values for a complete population of low-mass stars (0.2-2 M_{Odot}) ranged from 42% to 7%. Our analysis reveals a consistent trend of lower disk fractions in low-metallicity clusters, approximately half that of solar metallicity clusters. This reduction is attributed either to an inherently lower initial disk fraction or to accelerated disk dissipation during a very early stage. We also observe a positive correlation between cluster disk fraction and metallicity for two age groups of 0.3-1.4 and 1.4-2.5 Myr. We emphasize that both cluster age and metallicity significantly affect the fraction of stars with evidence of inner disks.

Selected Publications

Ashraf, M., Jose, J., Lee, H-G., Pena, C. C., Herczeg, C., Liu, H., Johnstone, D., & Lee, J-E. (2024). An outburst and FU Ori-type disk of a former low luminosity protostar. *Monthly Notices of the Royal Astronomical Society, 527*(4), 11651-11663. https://doi.org/10.1093/mnras/stad3900

Guo, Z., Lucas, P. W., Kurtev, R. G., ... Jose, J. et al. (2024). Multiwavelength detection of an ongoing FUOr-type outburst on a low-mass YSO. *Monthly Notices of the Royal Astronomical Society: Letters, 529*(1), L115-L122. https://doi.org/10.1093/mnrasl/slad201

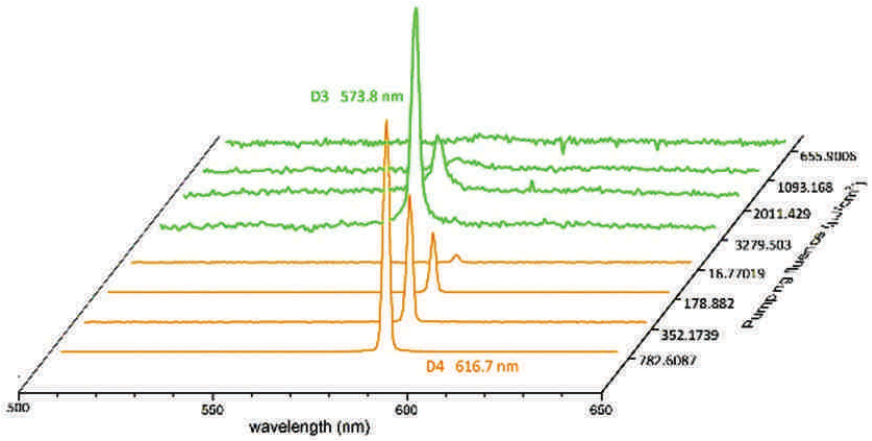
Gupta, S., Jose, J., et al. (2024). Search for brown dwarfs in IC 1396 with Subaru HSC: Interpreting the impact of environmental factors on substellar population. *Monthly Notices of the Royal Astronomical Society, 528*(4), 5633-5648. https://doi.org/10.1093/mnras/stae369

Dr T Kanagasekaran

Physics
Materials Science

Organic Electronics | Laser device | Semiconductor sensors

Since the discovery of laser, organic fluorescent materials have been favored by most of the researchers due to their high photo-luminescence quantum yield (PLQY), easy and low-cost crystal growth/thin-film fabrication and possibility to develop bio-friendly devices. Particularly, organic single crystals (OSCs) with long range crystalline order, almost parallel crystal facets and high refractive index is highly preferred, as they give rise to the inherent Fabry-Perrot resonator cavity for light amplification. So, with a minimal setup and creative strategies to adjust the physical dimensions of the single crystal, the Amplified stimulated emission (ASE) can be tuned. To be specific, the thickness of the material has a direct impact on the emission wavelength of the ASE in the present work, we have demonstrated the crystal thickness dependent wavelength tuning in two well-known thiophene/phenylene derivatives. It has been observed that with a proper choice of crystal thickness it is possible to tune the emission upto 20 nm in the case of BP2T and up to 40 nm in the case of BP3T.



Emission intensity variation plot for BP3T single crystal.

Selected Publications

Praveen, P. A., Saravanapriya, D., Bhat, S. V., Arulkannan, K., & Kanagasekaran, T. (2024). Comprehensive analysis of DFT-3C methods with B3LYP and experimental data to model optoelectronic properties of tetracene. *Materials Science in Semiconductor Processing, 173.* https://doi.org/10.1016/j.mssp.2024.108159

Bhattacharya, A., Praveen, P. A., Bhat, S. V., Dhanapal, S., Kandhasamy, A., & Kanagasekaran, T. (2023). Theoretical insights on pyrene end-capped thiophenes/furans and their suitability towards optoelectronic applications. *Computational and Theoretical Chemistry, 1225.* https://doi.org/10.1016/j.comptc.2023.114135

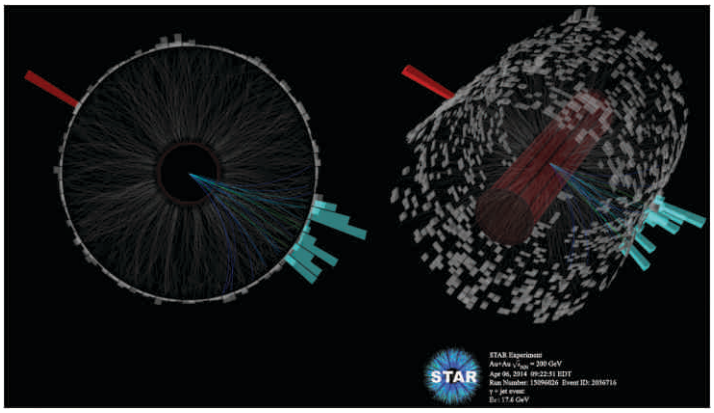
Bhattacharya, A., Praveen, P. A., R., Y. Y. R., & Thangavel, K. (2023). A combined theoretical and experimental approach to deduce the role of dielectric layer on interface trap density in single crystal organic field-effect transistors. *Crystal Research and Technology, 58(7).* https://doi.org/10.1002/crat.202200263

Dr Nihar Ranjan Sahoo

Physics
High Energy Physics

quark-gluon plasma | jet quenching | jets in QCD

Dr Sahoo's group focuses on jet quenching measurements using the STAR detector at the RHIC facility, Brookhaven National Laboratory, USA. Jet quenching is a key signature of the Quark-Gluon Plasma (QGP), which filled the universe microseconds after the Big Bang. Jets, collimated showers of hadrons produced in high-energy collisions at RHIC and LHC, help to study the hot-dense QCD matter. Jet quenching, first observed at RHIC and later confirmed at LHC, remains a crucial indicator of QGP. Direct-photon tagged jets serve as a "golden probe" for QGP studies at RHIC and LHC, as photons bypass the QCD medium, while their recoil jets interact with it. This allows direct photon+jet measurements to reveal QGP properties under extreme conditions. In the STAR experiment, He is one of the world's expert on direct photon+jet measurements in heavy-ion and p+p collisions. Recently, he developed new methods using the STAR detector system to enhance these measurements. The figure below shows the direct photon jet in gold-gold



Rare direct photon + jet event in Au+Au collisions at center of mass energy of 200 GeV recorded using STAR detector at RHIC facility. Description: a direct photon deposits energy onto the red tower, while the colorful tracks and towers indicate the presence of a jet on the opposite side.

Prof Prasenjit Sen

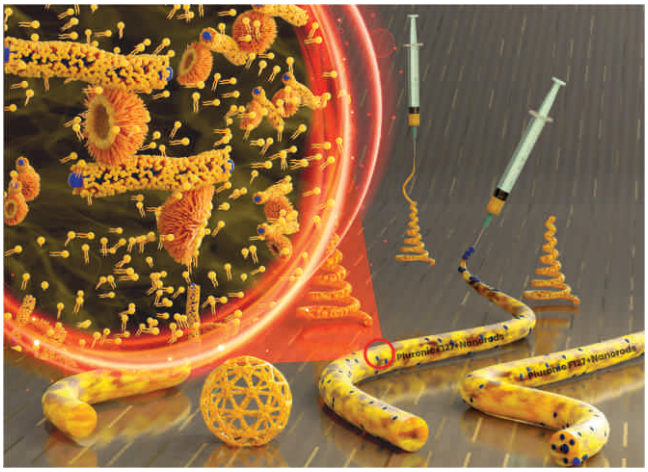
Dr Ravi Kumar Pujala

Physics
Soft Matter

soft and active matter | micromotors | multifunctional materials

Dr Pujala's experimental group focuses on "studying physics of soft matter systems both passive and active systems; fabricating new mesostructured materials by self-assembly. The ultimate goal is to develop new functional soft materials with reconfigurable structures at the nano and meso-scales". Currently, their lab is aiming at four major themes: (i) Fabricating the model synthetic micromotors and exploring non-equilibrium phases of active matter; (ii) Bio-inspired Cellulose-based photonic materials; (iii) Colloidal assembly under confinement and (iv) Smart materials from renewable resources.

They designed novel thermoresponsive hydrogels with the combination of magnetic nanopartides (β-FeOOH NRs) and PF127 to develop simple, cost-effective, and biocompatible hydrogels with multiple stimuli-responsive characteristics. For the first time, β-FeOOH NRs are used as a primary component in a hydrogel. A phase diagram is proposed based on rheological tests and visual observations. As a function of NRs loading, a novel non-monotonic behavior for all rheological parameters (storage modulus/gel strength, yield stress, fragility, and characteristics time scale) in the 20% PF127 gel was observed. To comprehend the phase behavior, we proposed a physical mechanism based on the interactions of colloidal particles. Even at small concentrations, the presence of β-FeOOH NRs can modify the strength and flexibility of PF127 gels. The composite hydrogels are soft and showed enhanced injectability compared to the PF127 gels, which may find applications in industry, drug delivery, tissue engineering and pharmaceutical formulations.



Composite hydrogels containing small amounts of paramagnetic akaganeite (β-FeOOH) nanorods in PF127 triblock copolymer.

Selected Publications

Archana, S., Devika, V. S., More, P., Pujala, R. K., & Dhara, S. (2024). Electrophoretic propulsion of matchstick-shaped magnetodielectric particles in the presence of external magnetic fields in a nematic liquid crystal. *Soft Matter, 20*(3), 535-545. https://doi.org/10.1039/D3SM01382K

Tom, C., Paineau, E., & Pujala, R. K. (2024). Investigating the phase behaviour of binary suspensions of cellulose nanocrystals and montmorillonite with nonlinear rheology, SAXS and polarized optical microscopy. *Colloids and Surfaces A: Physicochemical and Engineering Aspects, 683*. https://doi.org/10.1016/j.colsurfa.2023.132972

Sangitra, S. N., & Pujala, R. K. (2023). Effect of small amounts of akaganeite (β-FeOOH) nanorods on gelation, phase behaviour and injectability of thermoresponsive Pluronic F127. *Soft Matter, 19*(31), 5869-5879. https://doi.org/10.1039/D3SM00451A

Physics
Condensed Matter

fractons | fractionalization | quantum matter

Dr Sambuddha Sanyal

We worked on projective symmetry group (PSG) approaches to construct all the symmetry-preserving fractionalised states in quantum spin liquids. This year we have developed an original and novel algorithm to compute all possible fermionic parton mean field solutions for spin liquids in a generic frustrated magnet. We have used various aspects of this algorithm to calculate possible parton mean field states in dipolar -octupolar pyrochlore magnets that have been of great topical interest. We have also extended our approaches in other frustrated magnets such as bilayer systems. In a parallel development we have recently predicted a novel bilocal spin model that can host fracton phases, which is known to be a topological excitation and a strong candidate in topological quantum computing. While such phases were studied in obscure toy models, our work brings these ideas in the realm of physical models of quantum magnets. We have studied localisation transition in a class of quasi-periodic systems that has two competing periodic scales. We have shown that this class of systems shows a re-entrant localisation transition where the energy scale of transition is set by the periodicities of these two scales. Furthermore, we show dynamical properties in these systems exhibit various kinds of critical dynamics including sub-diffusive, super-diffusive and diffusive spread of an initially localized wave-packet.

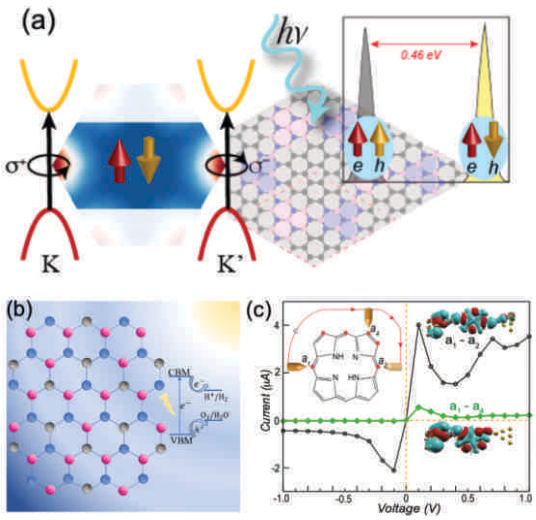
Selected Publications

Sanyal, S., Wietek, A., & Sous, J. (2024) Unidirectional subsystem symmetry in a hole-doped Honeycomb-Lattice Ising magnet. *Physical Review Letters, 132*(1). https://doi.org/10.1103/PhysRevLett.132.016701

Dr Sudipta Dutta

Physics
Condensed Matter

Condensed matter | low-dimensional system | quantum phase transition



Research Accomplishments:

Low-dimensional materials that can be exploited for energy harvesting and for information processing have been of sustained interest due to their huge application possibilities in recent era. Our Quantum Theory of Nanomaterials (QTN) group explores the quantum phenomena in such materials within various theoretical and computational frameworks in view of their potential applications.

Valley pseudospins in semiconducting materials can couple selectively with circular polarized lights of defined chirality, enabling two valley exciton qubits for information processing through valley-Hall device. Based on interacting quasiparticle description for excitons, we propose new pathways of inducing valley-polarization and stable triplet exciton formation in 2D honeycomb superlattices (Fig.a). We further investigated the photocatalytic ability of metal-free 2D borocarbonitride materials. These are capable of depositing heavy metal ions, hydrogen fuel generation and carbon dioxide sequestration through photo-electrocatalysis (Fig.b). Further study shows the hydrogen storage ability of g-BC_6N up to 11.11 wt%, which greatly surpasses 6.5 wt% target set by the US Department of Energy. We further perform non-equilibrium Green's function calculations integrating with the DFT and tight-binding Hamiltonian to explore the transport properties of porphine molecule with varying contact geometry (Fig.c). Such transport properties regulated by the quantum confinement effect can guide to realize *I-V* characteristic-based sensor device applications.

Selected Publications

Souren Adhikary, Sasmita Mohakud and Sudipta Dutta, "*Valley polarization and stable triplet exciton formation in two-dimensional lateral heterostructure of Kagome h-BN and graphene*", Phys. Rev. B 108 (19), 195429 (2023).

Koushik Ranjan Das and Sudipta Dutta, "*Asymmetric electronic transport in porphine: Role of atomically precise tip-electrode*", Physica Status Solidi – Rapid Research Letters, pssr.202300431 (2024); Selected in the "Hot Topic: Organic Electronic".

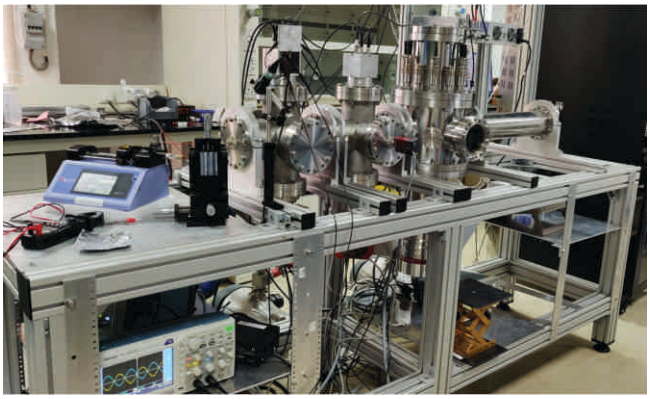
Sreejani Karmakar, Ashwin A. Pillai and Sudipta Dutta, "*Pristine BC6N monolayer as highly efficient reversible hydrogen storage material under ambient temperature and pressure*", International Journal of Hydrogen Energy 53, 193 (2024).

Dr Sunil Kumar S

Physics
Atomic & Molecular Physics

molecular biophysics | laboratory astrophysics | astrochemistry

In the area of Molecular Biophysics, our current work delves into studying the photostability of molecular ions crucial to biophysics. This investigation aims to understand how photostability influences the selection of molecular species fundamental to life. To achieve this, we have developed an ion trap spectrometer designed to confine gas-phase molecular ions in a small region where they interact with lasers, allowing us to observe their response to irradiation. We've innovated an approach that integrates simulations with an existing technique to measure the absolute photodetachment cross-sections of molecular ions. This method drastically reduces the time required for such measurements. Our upcoming experiments will focus on measuring the absolute photodetachment cross-sections of deprotonated nucleotides, providing insights into the impact of photostability on the building blocks of DNA/RNA. Additionally, we are pioneering the development of an ion-trap setup coupled with a high-finesse optical cavity to detect weak fluorescence emissions from gas-phase biomolecular ions, a first in the field that promises to illuminate the photophysics of intrinsic biomolecules. In the area of Laboratory Astrophysics/ Astrochemistry, we explore the photostability of molecular ions in the interstellar medium and investigate the formation mechanisms of new molecular ions in space. Our current efforts include upgrading our experimental setup to generate molecular ions relevant to astrophysics and integrating a cryogenic system to cool the ion trap, simulating interstellar conditions within our laboratory environment.



Ion trap spectrometer at the AstroBioLab, IISER Tirupati

Selected Publications

Pattathadathil, N., & Kumar, S. S. (2023). Numerical analysis of pulsed extraction of ions from a 16-Pole / 16-Wire ion trap for time-of-flight mass spectrometry. *Physica Scripta, 98*(9). https://doi.org/10.1088/1402-4896/ace93e

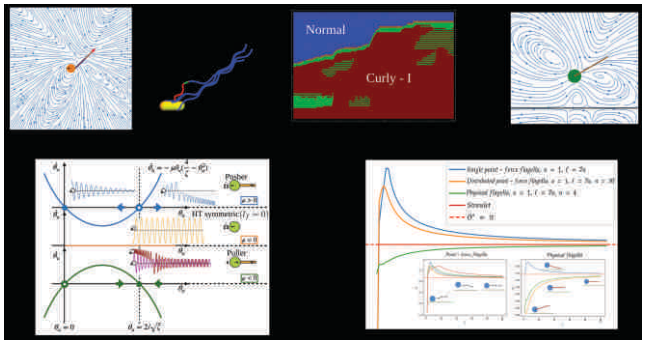
Salvi, M., Uma, N. N., Dinesan, H., Roy, A., & Kumar, S. S. (2023). A versatile 16-pole ion trap setup for investigating photophysics of biomolecular ions. *Review of Scientific Instruments, 94*(9). https://doi.org/10.1063/5.0160407

Roucka, S., Rednyk, S., Tran, T. D., Kumar, S. S. et al. (2023). Enthalpy of the $N^+ + H_2 \rightarrow NH^+ + H$ Reaction—Experimental study of the reverse process. *Astrophysical Journal, 959*(2). https://doi.org/10.3847/1538-4357/ad0bea

Dr Tapan Chandra Adhyapak

Physics
Soft Matter

active matter | microswimmer hydrodynamics | non equilibrium ordered phases



Flagellated microswimmer hydrodynamics capturing striking dynamics in imposed flows and near substrates.

(a) Our study on the dynamics of non-axisymmetric, flexible microswimmers in imposed shear flows reveals novel controls over the population of flagellated bacteria in microchannels. The shape of many commonly studied suspended active particles breaks the fore-aft symmetry. This, along with any possible flexibility, results in a strong coupling of the active self-propulsion flows to the particles' own dynamics. Our results show striking implications of these couplings on swimmer dynamics in an imposed flow and reveal strong contrasts with the previously reported works on rigid axisymmetric swimmers. (b) In another study, we have derived the complex hydrodynamic flows of flagellated microswimmers near a solid substrate or confined within a thin fluid layer. The detailed dynamics show that microswimmers tend to move toward solid substrates actively. This effect can strongly alter the previously known attraction towards solid surfaces due to active flows alone. (c) Lastly, in our work on the dynamics of colloids suspended in an active nematic, we investigate the interplay of solvent elasticity, activity, and topological defects influencing the properties of the system. We observed a surprising emergent polar order with memory in a system previously considered apolar. Furthermore, in apolar nematics with motile activity, colloids experience significant attractions or repulsions in configurations that experience neither in the corresponding passive systems. Salient results from studies (a) and (b) are summarized in the figure below.

Faculty and Staff Turnover

Faculty and Staff who joined IISER Tirupati in 2023-2024

Sr No	Name	Designation	Date of Joining
1	Prof Santanu Bhattacharya	Director	19/04/2023
2	Prof Prasenjit Sen	Professor	21/09/2023
3	Dr Hussain Bhukya	Assistant Professor	26/12/2023
4	Dr Sanjay Kumar	Assistant Professor	26/12/2023
5	Dr Sukhmeen Kaur Kohli	Assistant Professor	26/12/2023
6	Dr K Nirmala	Assistant Professor	26/12/2023
7	Dr Saikranthi K	Assistant Professor	26/12/2023
8	Dr Raghutla Chandrashekar	Assistant Professor	29/12/2023
9	Dr Santanu Paul	Assistant Professor	29/12/2023
10	Dr Anand Kumar Singh	Assistant Professor	03/01/2024
11	Dr Nihar Ranjan Sahoo	Assistant Professor	29/01/2024 (A/N)
12	Prof Guruprasad R Medigeshi	Professor	14/02/2024
13	Dr Chandan Kumar B	Assistant Professor	14/02/2024
14	Dr Doreswamy	Assistant Professor	04/03/2024
15	Dr Pavithra L Chavali	Assistant Professor	04/03/2024
16	Dr Anees P	Assistant Professor	11/03/2024
17	Dr Rana Saha	Assistant Professor	14/03/2024
18	Dr Rajeswari A	Assistant Professor	18/03/2024
19	Dr Ankur Das	Assistant Professor	26/03/2024

Staff who have left IISER Tirupati in 2023-2024

Sr No	Name	Designation	Date of Relieving
1	Mr Arunsairam Sekaran	Technical Assistant (IT)	05/04/2023
2	Prof K N Ganesh	Director	18/04/2023
3	Mr Mohan Mukesh Malviya	Technical Assistant (Biology)	13/06/2023
4	Prof D S Nagaraj	Professor	31/07/2023
5	Mr Jadhav Satish Ramdas	Technical Assistant (IT)	25/09/2023
6	Mr Katta Vamsi	Technical Assistant (Chemistry)	18/10/2023
7	Mr P V Narayana Rao	Superintending Engineer	28/02/2024
8	Dr Shalini Bhattacharya	Assistant Professor	26/03/2024

Scientific Activities of Faculty

Research Publications

Journal Articles

Allu, Annapurna Devi; Chavali, Sreenivas

1. Samantaray, D., Vankanavath, A. B., Kadumuri, R. V., Ramadurai, D., Chavali, S., & **Allu, A. D.** (2023). Thermopriming mitigates the effects of heat stress by modulating the expression of Heat shock factors in Brassica juncea (Indian mustard). *Environmental and Experimental Botany, 211.* https://doi.org/10.1016/j.envexpbot.2023.105371

Ambika, Gouri

2. Tamhane, V., & **Ambika, G.** (2023). Structure and stability of the Indian power transmission network. *Journal of Physics: Complexity, 4*(2). https://doi.org/10.1088/2632-072x/acd611
3. George, S. V., Kachhara, S., & **Ambika, G.** (2023). Early warning signals for critical transitions in complex systems. *Physica Scripta, 98*(7). https://doi.org/10.1088/1402-4896/acde20

Aravindan, Vanchiappan

4. Jayan, P., Anjali, A., Park, S., Lee, Y-S., & **Aravindan, V.** (2024). Controlled synthesis of SnO_2 nanostructures as alloy anode via restricted potential toward building high-performance dual-ion batteries with graphite cathode. *Small, 20*(5). https://doi.org/10.1002/smll.202305309
5. Subramanyan, K., Jyothilakshmi, S., Ulaganathan, M., Lee, Y-S., & **Aravindan, V.** (2024). An efficient upcycling of graphite anode and separator for Na-ion Batteries via solvent-co-intercalation process. *Carbon, 216*. https://doi.org/10.1016/j.carbon.2023.118525
6. Akshay, M., Jyothilakshmi, S., Lee, Y-S., & **Aravindan, V.** (2024). High-performance Li-ion and Na-ion capacitors based on a spinel $Li_4Ti_5O_{12}$ anode and carbonaceous cathodes. *Small, 20*(15). https://doi.org/10.1002/smll.202307248
7. Ryu, J-G., Balasubramaniam, R., **Aravindan, V.,** Park, S., Cho, S. J., & Lee, Y-S. (2024). Synthesis and characterization of the new $Li_{1+x}Al_1+xSi_{1-x}O_4$ (x = 0–0.25) solid electrolyte for Lithium-ion batteries. *ACS Applied Materials & Interfaces, 16*(1), 761-771. https://doi.org/10.1021/acsami.3c15221
8. Anjali, A., Jayan, P., Akshay, M., Lee, Y-S., & **Aravindan, V.** (2024). SnO_2 as an alloy anode for Li-based dual-ion battery with enhanced performance. *Next Materials, 2*. https://doi.org/10.1016/j.nxmate.2024.100117
9. Jyothilakshmi, S., Meshram, P., Abhilash, Lee, Y-S., & **Aravindan, V.** (2024). Graphite from dead Li-ion batteries: A "Powerful" additive for fabrication of high-performance Li-ion capacitors. *Advanced Materials Technologies, 9*(7). https://doi.org/10.1002/admt.202301000
10. Sreedeep, S., Lee, Y-S., & **Aravindan, V.** (2024). Functional AlF_3 modification over 5.3 V spinel $LiCoMnO_4$ cathode for Li-ion batteries. *Composites Part B: Engineering, 277*. https://doi.org/10.1016/j.compositesb.2024.111365
11. Jyothilakshmi, S., Subramanyan, K., Lee, Y-S., & Aravindan, V. (2023). Scalable synthesis of bulk TiO2 hybrids toward efficient Li-storage performance in "Rocking-Chair" type full-cell assembly with high voltage $LiNi_{0.5}Mn_{1.5}O_4$ cathode. *Advanced Materials Technologies, 8*(12). https://doi.org/10.1002/admt.202202036
12. Akshay, M., Jayaraman, S., Ulaganathan, M., Lee, Y-S., & **Aravindan, V.** (2023). Interphase stabilized electrospun SnO_2 fibers as alloy anode via restricted cycling for Li-ion capacitors with high energy and wide temperature operation. *Journal of Colloid and Interface Science, 646*. 703-710. https://doi.org/10.1016/j.jcis.2023.05.091
13. Sreedeep, S., Lee, Y-S., & **Aravindan, V.** (2023). Probing enhanced electrochemical performance of poly (3,4-ethylenedioxy Thiophene) encapsulated 5.3 V spinel $LiCoMnO_4$ cathode for Li-ion batteries. *Advanced Sustainable Systems, 7*(12). https://doi.org/10.1002/adsu.202300267

14. Subramanyan, K., Palmurukan, M. R., Lee, Y-S., & **Aravindan, V.** (2023). Exfoliated Graphene Oxide @ Sb_2O_3 Octahedrons as Alloy-Conversion Anode for High-Performance Na-Ion Batteries with P2-Type $Na_{2/3}Ni_{1/3}Mn_{2/3}O_2$ Cathode. *Electrochimica Acta, 470*. https://doi.org/10.1016/j.electacta.2023.143308
15. **Aravindan, V.,** Oschatz, M., Schutjajew, K., & Sevilla, M. (2023). Editorial: Shaping the future of hybrid ion capacitors. *Sustainable Energy Fuels, 7*(23), 5442-5444. https://doi.org/10.1039/D3SE90082G

Aryasomayajula, Anilatmaja

16. **Aryasomayajula, A.,** Roy, D., & Sadhukhan, D. (2024). Estimates of Bergman kernels and Bergman metric on compact Picard surfaces. *Journal of Mathematical Analysis and Applications, 534*(2). https://doi.org/10.1016/j.jmaa.2023.128069
17. **Aryasomayajula, A.,** Balasubramanyam, B., & Roy, D. (2024). Estimates of Picard modular cusp forms. *Forum Mathematicum*. https://doi.org/10.1515/forum-2023-0079

Balaraman, Ekambaram

18. Kumar, R., Srivastava, A. K., Nagarasu, P., Madhu, V., & **Balaraman E.** (2024). A general and expedient amination of alcohols catalysed by a single-site (NN)Co(ii)-bidentate complex under solventless conditions. *Catalysis Science & Technology, 14*(1), 98-109. https://doi.org/10.1039/D3CY00809F
19. Roy, T. K., Babu, R., Sivakumar, G., Gupta, V., & **Balaraman, E.** (2024). Olefins from alcohols via catalytic acceptorless dehydrogenation coupling reactions. *Catalysis Science & Technology, 14*(8), 2064-2089. https://doi.org/10.1039/D3CY01800H
20. Nandakumar, T., Pal, S. K., Vinu, R., Ramar, P. M., Pant, K. K., Kumar, S., & **Balaraman, E.** (2024). Graphene-Encapsulated Transition Metal@N/C Catalysts for Catalytic Copyrolysis of Biomass and Waste Plastics: Production of Linear α-Olefins and Aromatics. *ACS Sustainable Chemistry & Engineering, 12*(13), 5283-5299. https://doi.org/10.1021/acssuschemeng.4c00279
21. Subaramanian, M., Padhy, S. S., Gouda, C., Das, T., Vanka, K., & **Balaraman, E.** (2024). Nickel-catalyzed tandem conversion of paraformaldehyde: Methanol to hydrogen and formate/chemo- and stereoselective hydrogenation of alkynes under neutral conditions. *Catalysis Science & Technology, 14*(10), 2779-2793. https://doi.org/10.1039/D3CY01699D
22. Nallagangula, M., Subaramanian, M., Kumar, R., & **Balaraman, E.** (2023). Transition metal-catalysis in interrupted borrowing hydrogen strategy. *Chemical Communications, 59*(51), 7847-7862. https://doi.org/10.1039/D3CC01517C
23. Subaramanian, M., Sivakumar, G., Landge, V. G., Kumar, R., ... & **Balaraman, E.** (2023). General and selective homogeneous Ru-catalyzed transfer hydrogenation, deuteration, and methylation of functional compounds using methanol. *Journal of Catalysis, 425*. https://doi.org/10.1016/j.jcat.2023.06.035
24. Babu, R., Padhy, S. S., Kumar, R., & **Balaraman, E.** (2023). Catalytic amination of alcohols using diazo compounds under manganese catalysis through hydrogenative N-alkylation reaction. *Chemistry - A European Journal, 29*(61). https://doi.org/10.1002/chem.202302007
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Book Chapters

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Invited Lectures

Aniket Chakrabarty

- Unlocking the Future: Sustainable Rare Earth Element Mineralization in India's Carbonatites, The Faculty of Geology, University of Warsaw, Poland

Anilatmaja Aryasomayajula

- Invited Speaker at Inter IISER-NISER Math-meet, September 2023.
- Invited Speaker at Departmental colloquium at IISER Pune, October 2023.
- Invited Speaker at SV University, on the occasion of the Ramanujan' birthday, December 2023.
- Invited speaker at an international symposium on “Arakelov Theory and Automorphic forms”, ICTS Bangalore, March 2024.

Annapurna Devi Allu

- Delivered an invited talk at the National Conference on “Novel Processes and their Applications in Biology”, Acharya Nagarjuna University, Guntur, India (February 2024).
- Delivered an invited talk at The Commonwealth Scientific and Industrial Research Organisation (CSIRO), ACT, Australia (December 2023).
- Delivered an invited talk at “the 20th International Symposium on Rice Functional Genomics (ISRFG 2023), Bangalore, India (November 2023).
- Delivered an invited talk at RDP, ENS de Lyon, Lyon, France (October 2023).

Aravindan Vanchiappan

- Presented an invited talk titled “Li-ion capacitors & Recycling Li-ion batteries” at the International Conference on Sustainable Nanomaterials Integration and

Organization for Energy and Environment (iSNIOE2)," held on March 20-23, 2024, at Shiv Nadar Institution of Eminence Deemed to be University, Delhi NCR.

- Delivered an Invited talk titled "Li-ion Capacitors and Recycling Li-ion batteries" at the International Conference on Advanced Functional Materials (AFMD-24) organized by Nanotechnology Research Centre, SRM, held on 26 -29th February 2024.
- Invited talk titled "Na-ion batteries with recovered graphite and polypropylene separator from spent Li-ion batteries" at the 18th Asian Conference on Solid State Ionics held on February 19 – 22nd, 2024, in Meenakshi College for Women, Chennai.
- Invited talk titled "Recovered Graphite as an Active Material for Na-ion Storage" at the SRM, Chennai, organized by Society for Advancement of Electrochemical Science and Technology (SAEST), CECRI, Karaikudi, held on 4 -5th January 2024.
- Delivered an invited talk titled "Recycling of Spent Li-ion Batteries" at the Department of Physics, IIT Roorkee, held on 7 -10th December 2023.
- Presented a virtual talk titled "Essentials of Li-ion Battery Recycling" at the School of Chemical Engineering, Chonnam National University, Gwang-Ju, South Korea, held on 31st July 2023.
- Delivered a talk titled "Nanostructured Materials for Li-ion Batteries and its Recycling" at Centre for Nanoscience and Technology, Pondicherry University, Pondicherry on 27th June 2023.
- Invited lecture titled "Recycling of Spent Li-ion Batteries" at the International Conference on Energy Conversion and Storage (IC-ECS –2023) held at Amrita Vishwa Vidyapeetham, Coimbatore on 21st to 23rd June 2023.

Arun Kumar Bar

- Trends in Lanthanide-Based Air-Stable Molecular Magnets: Challenge and Strategy, Department of Chemistry, IISER Mohali, India,3rd Jul 2023.

Ashwani Sharma

- Invited lecture at International conference ICON-BIO-2023 on April 19, 2023 on "Genetically encodable fluorescent RNA sensors" at Chennai.

Bhanu Sree Reddy D

- "Design Thinking for Innovation" hosted by "State Level Atal Tinkering Labs (ATL) Teachers Meet in Andhra Pradesh" at Vijayawada on 22nd November, 2023.
- "Design thinking in Agriculture Innovations" hosted by ANGARU, Agriculture college Rural Research centre, Tirupati on 12th December, 2023.

Dileep Mampallil

- Nov. 13: Talk in Govt. Arts and Science College, Calicut, Microfluidics basics to applications.
- Nov. 14: Talk in NIT Calicut. Evaporation of drops: Physics and Applications
- Nov. 20, Talk in Women's College Trivandrum. Microfluidics Basics to Applications.
- Dec. 20, Talk IIT Madras, CompFlu conference 2023.

Ekambaram Balaraman

- Catalyst Development for Sustainable and Affordable Chemical Synthesis (4th Feb 2023), Anthem Biosciences, Bangalore.
- The Give and Take of Alcohol Activation for Sustainable and Affordable Chemical Synthesis (02 & 03 Feb 2024). International Conference on Pure and Applied Chemistry (IconPAC 2024) organized by the Department of Chemistry, K L University, Guntur, Andhra Pradesh, India.
- Catalytic (De)hydrogenation Reactions for Sustainable Chemical Synthesis (15-17th Jan 2024). Indo-French Fostering Catalysis for Societal Benefit (FCSB)-2024 Conference, School of Chemistry, University of Hyderabad.
- Catalytic (De)hydrogenation Reactions for Sustainable Chemical Synthesis (18-19th Jan 2024). Organic Chemistry Symposium on "Synthesis, Catalysis and Chemical Biology", Department of Chemistry, Institute of Chemical Technology, Mumbai.
- Catalytic Dehydrogenation of Alcohols (30th Nov to 2nd Nov 2023). International Conference on Organometallics and Catalysis, Goa.
- Non-Noble Metal Catalysis for Sustainable Development (3rd Nov 2023). A symposium on the "Catalysis for a Sustainable Society" was organized as part of the Annual Meeting of the Indian Academy of Sciences at the BITS-Pilani, Goa.
- Our Odyssey with Dehydrogenation Chemistry for Sustainable Development (26-27th October 2023), 2nd International Conference on Frontiers in Chemical Sciences (ICFCS-2023), Karunya Institute of Technology and Sciences, Coimbatore, Tamil Nadu.
- N-graphitic modified metal-nanoparticles supported on graphene for dehydrogenation catalysis (09-11th, Dec 2023). 3rd International Symposium on Main-group Molecules to Materials (MMM-III), IIT-Hyderabad.

- Our Odyssey with Dehydrogenation Chemistry for Sustainable Chemical Synthesis (8th Sep 2023), Department of Chemistry, NISER Bhubaneswar.
- N-graphitic modified metal-nanoparticles supported on graphene for dehydrogenation and related reactions (04-05 March 2023). Emergent Materials for Energy and Environment (EMEE-2023) conference, IIT Roorkee.

Eswaraiah Chakali

- Invited talk on "The interplay between magnetic fields, turbulence, and gravity and its significance", Star Formation Studies in India (SF-2024), 08-11 January, 2024; S. N. Bose National Centre for Basic Sciences (SNBNCBS), Kolkata, India
- Online seminar talk, "Multi-wavelength polarimetric observations to investigate the magnetic fields in the formation and evolution of molecular clouds", 11 January 2024, IIT Palakkad
- Invited review talk on "Multi-wavelength polarimetry and role of magnetic fields" at 41th Astronomical Society of India (ASI), 1-5 March 2023, IIT-Indore
- Online seminar talk, "Multi-wavelength polarimetric observations to decipher the role of magnetic fields", 18 March 2023, IISER-Mohali
- Faculty presentation, "Unveiling the importance of magnetic fields in the formation and evolution of molecular clouds", 04 November 2023, IISER, Tirupati

Eswarayya Ramireddy

- Participated and delivered a talk as a representative from IISER Tirupati in the SICI's. Bi-National (Indo-Canadian) Agri Cluster Workshop 2024 held during 22nd & 23rd February 2024 organized by the Tamil Nadu Agricultural University, Coimbatore, India.
- Gave an invited and expert lecture at the workshop Re-designing Smart Crops for Sustainable Agriculture: Dynamics of CRISPR-Cas breeding, NGS and beyond (RCSA-2023) organized by ICGEB, New Delhi from 06-10th November 2023.
- 20th International Symposium on Rice Functional Genomics (ISRFG 2023), held from 3-5, November 2023, in GKVK Campus Bangalore.

Gopinath Purushothaman

- Talk titled "New Strategies for the synthesis of diverse molecular scaffolds using catalysis" - UGC-HRDC – Bharathiar University – R.C. in Chemistry – July 6th, 2023, Bharathiar University, Coimbatore, India. - Invited
- "Photomediated Cascade Reactions for Accessing Diverse Molecular frameworks via Radical-Polar Crossover approach" at the Inter IISER-NISER Chemistry Meet, February 23-25, 2024 at IISER Kolkata.
- "Shining Light Enhances Radical Cascade Reactions: Accessing Functionalized Heterocycles" at the MTCS-2024 Symposium - 16-17 Feb 2024 at IIT Tirupati. - Invited
- "Enhancing Radical Cascade Reactions for Accessing Functionalized Heterocycles by Shining Light" at the International Conference on "Emerging Trends in Catalysis & Synthesis" IC-ETCS – 2024 – March 7th – 9th, 2024, IIT Kharagpur.
- Photoredox catalysis: A modern trend in organic synthesis – National Science Day celebration at Padmavati university – Feb 28th, 2024, Tirupati.

Janardan Kundu

- International Conference on Hybrid Halide Perovskite – 2023; 22nd to 23rd December, at IACS Kolkata
- Inter IISER-NISER Chemistry Meet 2024; February 23-25, 2024 at IISER Kolkata

Jatish Kumar

- Invited speaker at the International Conference on Emerging Trends in Photodynamics and Photochemistry (ETPP-2024) organized by IISER Mohali during March 26-28, 2024.Title of the talk: Unravelling Nanoscale Optical Activity: Probing Chirality in the Ground and Photoexcited States.
- Invited talk at the international conference on Emerging Trends in Supramolecular Science and Technology (ETSST) organized by the Department of Chemistry, SRM University-AP during March 07-08, 2024. Title of the talk: Supramolecular Polymerization as an Efficient Strategy for Enhanced Chirality at the Nanoscale.
- Invited talk at the Inter IISER NISER Chemistry Meet (IINCM 2024) organized by the Department of Chemical Sciences, IISER Kolkata during February 23-25, 2024.Title of the talk: Intrinsic Chirality at the Nanoscale: Understanding the Ground and Excited State Optical Activity.
- Invited talk at National Seminar on Frontiers in Chemical Sciences (FCS 2024) organized by the Department of Chemistry, University of Calicut during February 13-15, 2024. Title of the talk: Intrinsic Chirality at the Nanoscale: Exploring Ground and Excited State Optical Activity.
- Invited speaker at the two-day National Seminar on

Recent Advances in Nanomaterials (RAN 2023), organized by the post graduate and research department of Chemistry, Government College Kattappana, Kerala, on 23rd November 2023.Title of the talk: Introduction to the Chiral world: From Molecules to Materials

- Invited speaker at the three-day National Seminar on Functional Polymers for Material Applications (PolyMAT-2023) organized by the Government College Attingal, Kerala on 17th November 2023.Title of the talk: Chiral Functional Nanomaterials: A Twist into the Nanoworld
- Invited talk at the National Seminar on Spectro analytical Techniques and Modelling organized by the School of Chemical Sciences, Kannur University in association with Indian Society of Analytical Scientists (ISAS), from October 4-6, 2023.Title of the talk: Chiral Nanomaterials for Biodetection and Therapy.
- Invited talk at the 33rd International Symposium on Chirality held in University of Rome, Italy, from July 24-27, 2023.Title of the talk: Intrinsic Nanoscale Chirality in Plasmonic and Luminescent Nanomaterials.
- Invited talk at the conference on Sustainable and Applied Nanotechnology for Agriculture and Health (SANTAH) organized jointly by the Department of Chemical Engineering and the Department of Applied Mechanics and Biomedical Engineering, IIT Madras, from July 19-21, 2023. Title of the talk: Optical Activity at the Nanoscale: From Chiral Light Absorbing to Chiral Light Emitting Nanomaterials.
- As an invited resource person at the Refresher Course in Chemistry for the University and College Teachers organized by the Bharathiar University, Coimbatore on 6th July 2023. Title of the talk: Light Matter Interactions: Raman Effect and Recent Advances

Jessy Jose

- Distinguished Alumni Lecture (invited), Host Institution & Dates: Christ University Bangalore, Feb 2024, Title: The birth of stars and planets- Mysteries unfolded by JWST and others
- Invited Talk during a Conference on Star formation Studies in India ,Host Institute & Dates SNBNCBS, Kolkata, Jan 2024, Title: Protoplanetary disk evolution: Role of external factors
- Contribute Talk, Annual meeting of European Astronomical Society, Host Institute & Dates: ICE Krakow Conference Centre, Poland, July 2023,Title: Decoding the environmental factors in the form of IMF-outer Milky Way versus solar neighbourhood
- Two Invited lectures during Summer camp for School children sponsored by IUCAA, Pune, Host Institute & Dates: Mount Carmel School, Kerala, May 2023, Title 1. Up Above the World so high, Like a diamond in the sky: The James Web Space Telescope, Title 2: Life cycle and evolution of Stars

Kanagasekaran T

- Nobel Laureate Seminar series and 12 th India-Japan Science Technology seminar (Online) organized by Indian JSPS Alumni Association. 9-10, December 2023.
- Recent Advances and Innovations in Solar Energy (RAiSE), an online international conference organized by the DST-IITM Solar Energy Harnessing Centre (DSEHC). 20-22, June 2023.

Kiran Kumar Pulukuri

- Invited speaker at the International Conference on Nature Inspired Initiatives in Chemical Trends (NIICT-2024) organized by IICT-HYDERABAD during March 7-9, 2024. Title of the talk: Total Synthesis of Eudesmane Sesquiterpenoids through Site-selective Olefin Functionalization Strategy
- Invited speaker at the International Conference on Emerging Trends in Catalysis & Synthesis (ETCS-2024) organized by IIT-KHARAGPUR during March 7-9, 2024. Title of the talk: Total Synthesis of Eudesmane Sesquiterpenoids through Site-selective Olefin Functionalization Strategy

Nagaraj D S

- “On big and nef example of Ramanujam” Universtity of Lille 1
- “On some Picard rank two rational Varieties.” IIT Gandhi Nagar

Nandini Rajamani

- Invited lecture series (6 lectures) on Evolutionary Ecology at SACON-WII (Salim Ali Centre for Ornithology and Natural History - Wildlife Institute of India), October 2023.

Nirmala K

- MS DEED-Level 2 Workshop: IISER Pune, May 2023. Title: Enhancing Student Engagement and Learning through Pedagogical Strategies
- ACS Outreach Summit, November 8, 2023, New Delhi.

- Title: Science Outreach and Communication

Padmabati Mondal

- Invited talk in mini-symposium of theoretical physical chemistry and chemical physics (MSTPCCP)-2023, IIT Bombay on 28-29th July, 2023.
- Delivered invited lecture in Workshop on modelling and synthesis: Molecules and Macromolecules, NIT Rourkella 25-30th September, 2023.
- Delivered invited talk in the Department of Chemistry, IIT Hyderabad, 2nd August, 2023.
- Invited faculty poster presentation in Spectroscopy and Dynamics of Molecules and Clusters 2024 in Kaziranga, Assam organized by IIT Guwahati.

Pankaj Kumar Koli

- Invited Speaker at ICOC-2023 at Goa. (30th Oct. – 2nd Nov. 2023)
- Invited Speaker at Goa University Chemistry Department Colloquium, Goa. (November 2nd 2023)
- Keynote Speaker at AF-IRCST-23 Online Short Term Training Program organized by Department of Chemistry, Vardhaman College of Engineering (November 22nd, 2023)
- Invited talk in the online meeting at DS Degree College – Aligarh (Outreach activity), November 2023.
- Invited Speaker at 6th Symposium on Advanced Biological Inorganic Chemistry (SABIC-2024), Kolkata. (January 7-11, 2024)
- Invited Speaker at Inter IISER-NISER Chemistry Meet 2024 (SICS 2024) February 23-25, 2024.
- Invited Speaker at Chemistry Department students Meet (DS Collage Aligarh) March 11th, 2024.
- Invited Colloquium seminar talk at Chemistry Department, Allahabad University (13/03/2024)
- Attended Annual Meeting of the Alexander von Humboldt Foundation, Hotel Berlin, Berlin, 28-30th June 2023

Lakshmi Lavanya R

- Delivered lectures at the Annual Foundation School(AFS) – II, held at Mepco Schlenk Engineering College, Sivakasi, 22 May – 02 June, 2023.
- Delivered lectures at the Mathematics Training & Talent Search(MTTS) Programme, held at IIT Dhanbad, 12 - 24 June, 2023.

Raghunath O Ramabhadran

- "pK-Yay: Illustrating how to Accurately Compute a Macroscopic Thermodynamic Property (Aqueous pKas) via Microscopic Computations (Static Quantum Chemistry Calculations)" 60th Foundation Day of Indian Photobiology Society, IISER Kolkata (July 2023)
- "Prochirality in the interstellar medium: the role of metal ions in bringing together interstellar gas and dust chemistry", Astrochemistry Symposium, American Chemical Society Meeting, San Francisco (August, 2023)
- "Chemical education at the doctoral level – an underexplored area with rich opportunities" Research in Chemical Education Symposium, American Chemical Society Meeting, San Francisco (August, 2023)
- "The Significance of Ground State Chemistry in the Genesis and Evolution of Organic Molecules in the Interstellar Medium", 1st Organics in Space Symposium, Indian Institute of Space Technology (IIST) (January 2024)
- "Interstellar Molecular Complexity", Astronomical Society of India Annual Meeting, Bengaluru (February 2024)
- "Correcting Inconsistencies in Thermodynamics Chapters in Leading Internationally Renowned Physical Chemistry Textbooks", Inter IISER-NISER Chemistry Meet, IISER Kolkata (February, 2024)

Raghutla Chandrashekar

- Delivered lecture on "Trends in International Finance and Its implications for India" during 27th and 28th March 2024. University of Hyderabad.
- Invited for research discussion meeting on the Econometric models to execute the major research project, funded by ICSSR, New Delhi. Pondicherry Central University during 8th and 9th February 2024.

Rajesh Viswanathan

- CRS Silver Star Award Lecture, Organized at IISER Kolkata Title of the talk: Biomimetic Synthesis of Medicinal Agents Based on Microbes & Plants.
- Invited talk at the international conference on NOST Bhubaneshwar, organized by NOST, Conference held at Bhubaneshwar, India, March 2024 Title of the talk: Biogenesis of Plant and Marine Natural Products – A Template for Biomimetic Synthesis.

Raju Mukherjee

- "Invited lecture at the IISER-ENS Biosantex meeting on

"Complex mechanism of action of anti - mycobacterial agents and drug tolerance" at IISER Pune on May 22, 2023.

- Invited lecture at the Transcription meeting at IISER Bhopal on "Identifying mechanism of antibiotic tolerance in Mycobacterium smegmatis." July, 25, 2023
- Seminar in the Dept. of Bioengineering at IISc on "Complex mechanism of action of anti - mycobacterial agents" on Oct 23, 2023.
- Invited lecture at the Indo-French symposia on antimicrobial resistance (Dept. of Microbiology, IISc) on "Different mechanisms of drug resistance in Mycobacterium" on March 5, 2024.

Rakesh S Singh

- Non-Classical Pathways of Phase Transition, Society of Physical Chemistry (SoPhyC) Meeting, October 29 - 31, 2023 at IIT Kanpur, India.
- Anomalies and Criticality in Supercooled Water: An Energy Landscape Perspective, Liquids, Glasses and Other Adventures in Thermodynamics and Statistical Mechanics, June 2023, Princeton University, Princeton, NJ, USA.

Ramkumar Sambasivan

- 'Tracing the embryonic developmental sequence to create complex cardiac organoids', International Cardiovascular Medicine Summit, InStem, Bangalore, 04/03/2024
- 'Mechanism of early mesoderm patterning in early mammalian embryos', Indian Society of Developmental Biologists meeting, NCBS-InStem, Bangalore, 21-25 Feb 2024
- 'Mechanism of early mesoderm patterning in early mammalian embryos', Cellular and Molecular Mechanisms of Development and Regeneration, Shiv Nadar IoE, Delhi-NCR, 15-17 Feb 2024
- 'Embryo organoids: cutting-edge models to study embryonic development', National Workshop on Fluorescence Microscopy Techniques, Sri Venkateswara University, Tirupati, 08/02/2024
- 'Mechanism triggering bilateral symmetry breaking and left-right patterning in mammals', La Vida series of IISER Berhampur, 02/07/2023

Ravi Kumar Pujala

- Invited talk on the "Novel hydrogels for improved injectability, in CompFlu 2023 at the Indian Institute of Technology Madras, Chennai, India during December 18-20, 2023.
- Invited talk on "Shear Induced crystallization of colloidal glass", at University of Paris-Saclay, on 22 September 2023.
- Invited talk on the "Self-assembly of anisotropic colloids", at L2C, University of Montpellier on 26 October 2023.
- Invited talk on the "Self-assembly of nematic colloids", Lyon 1 et l'Université Jean Monnet Saint-Etienne, 18 October 2023.

Robin V V

- Invited lecture - Next Generation Sequencing SERB Karyashala at NCBS, TIFR, Bengaluru 24 August 2023.
- Conservation genetics module taught at Salim Ali Centre for Ornithology and Natural History, Coimbatore, Ministry of Environment and Forests. 27-28 September 2023
- Guest lecture on Shola habitat and restoration challenges. ACF Training Programme, AIWCTE, Tamil Nadu Forest Department. 13 October 2023.
- Invited Lecture - Shola birds and their habitats. NilgiriScapes meeting at Udhagamandalam, 17-19 August
- Invited Lecture - Avian Malaria in the Shola habitat. Sun Pharma Foundation meeting at THSTI, Bhubaneswar, 8-10 Feb 2024
- Invited Lecture - Range contractions and expansions in Shola birds. Association of Avian Biologists in India. Dehradun. 23 - 26 March 2024
- Invited Lecture - Role of female song in the Sholicola. International Society of Avian Endocrinologists meeting at Meerut, India. 18-27 March 2024.
- Invited talk - What do Sky Islands tell us today? Public talk at Wild Garden Cafe, Amethyst, Chennai, 29 March 2024 at the launch of magazine 'Sky Islands".
- Invited lecture in the workshop on Emerging Infectious Diseases: Ecology and Evolution by The International Centre for Theoretical Sciences (ICTS) held from July 1-12, 2024 .
- Lecture on study design and what not to do in Bioacoustic research in The Primer to Bioacoustics workshop conducted by IISER Tirupati from 14-21 July
- Use of genetics and bioacoustics in conservation. June 20-21. Lectures to fresh batch of IFS trainees and mid-career IFS officers at the Indira Gandhi National Forest Academy, Dehradun

Santanu Bhattacharya

- Attended MI-6, G20 meeting held at Goa followed by Two Days Science 20 (S-20) summit at Coimbatore, Tamil Nadu held on 21st and 22nd July 2023 in order to prepare draft document on clean energy by INSA, New Delhi. Prof Pillai also attended "Technology Advisory Group" for ETG meets to discuss "Carbon Capture, Alternate Battery Technology, and Artificial Intelligence" convened by Prof Ajay Kumar Sood, Principal Scientific Advisor to the Govt. of India on 29th July 2023 in New Delhi.
- Delivered National Science Day lecture on 28th February 2023 on "Future of Science & Technology & Innovation (STI) Energy, Education, Skills & Work" held in Amarkantak Central University.
- Attended G20 Research and Innovation Initiative Gathering (RIIG) Conference on Materials for Sustainable Energy held at Ranchi and delivered a lecture on "Materials for Sustainable Energy Storage: Need for Intelligent/Smart Materials".
- Delivered an invited talk on Clean Energy and Green Environment: Will Electrochemistry help for a better Future? on 26th March 2024 at Christ University, Bengaluru.
- Attended a workshop on Electrochemistry, Calicut University and delivered a talk on "Materials characterization using Electrochemical methods (with an emphasize on electrode kinetics)" on 20th March 2024 held at Calicut University.
- Attended the International Conference on Sustainable Nanomaterials Integration and Organization for Energy and Environment (iSNIOE2) conference as an invited Speaker held at Shiv Nadar Institution of Eminence (SNIoE) Deemed to be University, Delhi NCR in March 2024

S Sunil Kumar

- Multipole radiofrequency ion traps – A versatile tool to unravel mysteries in astrophysics! – Organics in Space, IIST Thiruvananthapuram, Kerala, January 18-20, 2024
- Collision-induced dissociation (CID) in an electrospray - ion funnel interface, Max-Planck-Institute for Nuclear Physics, Heidelberg, 18 July 2023.

Sambuddha Sanyal

- Parton construction for Dipolar-Octupolar spin liquids in pyrochlore - A Conference on Recent Trends In Condensed Matter Physics Related to Quantum Materials, organised by IACS, Kolkata, February 2024.
- Parton construction for Dipolar-Octupolar spin liquids in pyrochlore- International Conference on Highly Frustrated Magnets, organised by IIT Madras, Chennai, January 2024.
- Parton construction for Dipolar-Octupolar spin liquids in pyrochlore - QMAT-2023 (Quantum Matter), National Conference on Quantum Condensed Matter organised by NISER Bhubaneshwar, Bhubaneshwar, November 2023.
- An excursion in quantum matter - CAMOST-G20-S20 consortium seminar series on Disruptive Sciences and Technologies, CAMOST, IIT Tirupati, October, 2023.
- The quantum frontier-National Initiative on Undergraduate Science camp, Mumbai 2023, Organised by HBCSE/TIFR-Mumbai, July 2023.
- Quantum Matter in frustrated magnets - Physics Department Seminar, IIT Bombay, Mumbai, July, 2023.
- Dipolar lineons in a hole-doped collinear antiferromagnet-International Conference on Quantum Information and Quantum Technology - 2023 at IISER Kolkata, May 2023.

Sanjay Kumar

- Biology Day 2023, IISER Tirupati 3rd February 2024
- Third Dalhousie-India Student Research Symposium (Online) April 3-4 2024 (Online mode)

Shibdas Banerjee

- "Stabilizing Reactive Intermediates in Water Microdroplets",Frontiers in Sustainable Catalysis, University of Delhi, January 20, 2024
- "Emergence of Microdroplet Chemistry", DCS Annual Meet, TIFR Mumbai, December 1, 2023
- "Chemical Wizardry of Microdroplets: From Reaction Vials to Human Tissues", DBT-STAR lecture, Wilson College, Mumbai, December 2, 2023
- Chemical Wizardry of Microdroplets: From Reaction Vials to Human Tissues, SAIF/CIL Lecture, Panjab University, November 9, 2023
- Label-free Mass Spectrometry Imaging of Surgical Specimens for Disease Diagnosis", Trends in Emerging Nano Science: Energy, Healthcare &Quantum Materials (TENS-2023), INST Mohali, November 7, 2023
- "Chemical Wizardry of Microdroplets: From Reaction Vials to Human Tissues", ChemDay-2023, IIT Roorkee, November 4, 2023
- "Chemical Wizardry of Water Microdroplets", ICOC-2023 Goa, Goa, November 2, 2023

- “Chemical Wizardry of Microdroplets: From Reaction Vials to Human Tissues”, Loquitur 2023, IISER Berhampur, September 29, 2023
- “Stabilizing Reactive Intermediates in Water Microdroplets”, TFCS-2023, NIT TIRUCHIRAPPALLI, August 11, 2023
- “Stabilizing Reactive Intermediates in Water Microdroplets”, CRSI NSC-31, NIT Rourkela, July 7, 2023

Sivakumar Vallabhapurapu

- February 8 and 9 2024: Application of fluorescence microscopy in Biology: Invited Lecture and National Workshop on New Horizons of FluorescenceMicroscopy Techniques Sri Venkateswara University , Tirupati.

Soumit Sankar Mandal

- Investigation of the protein functions using single molecule and bulk spectroscopic tools, Seoul National University, South Korea, May 17, 2023
- Investigation of the DNA bending kinetics by the Crenarchaeal proteins, Tohoku University, Japan, April 22,2023

Souradeep Majumder

- Invited talks on 26 th and 28 th February at Pondicherry University, National Seminar on
- Algebra and Analysis – An Introduction to Intersection Theory.

Sreenivas Chavali

- Invited lecture at Special seminar event, titled 'Design principles underlying functionality of proteins with amino acid repeats' at Department of Biotechnology, Pondicherry University, Puducherry, India (March 18, 2024)
- Invited lecture at Contemporary Perspectives in Computational Biology, titled 'Design principles underlying functionality of proteins with amino acid repeats' at The Institute of Mathematical Sciences, Chennai, India (February 19-20, 2024)
- Invited lecture at Faculty Development Programme on Synthetic Biology and Biomimetic applications, titled 'Systems Biology to Synthetic Biology', at Sir M. Visvesvaraya Institute of Technology, Bengaluru, India (January 8-13, 2024)
- Invited lecture titled 'Unravelling the design principles underlying protein functionality' at The Commonwealth Scientific and Industrial Research Organization (CSIRO), Black Mountain, Canberra, Australia (November 13, 2023)
- Invited lecture titled 'Understanding protein functionality' at Proteomics workshop at Department of Botany, University of Kashmir, India (June 22-23, 2023; Webinar)

Subhash B

- Series of 4 lectures as resource person for Curves and Surfaces,
- Annual Foundation School - II, 2023, held at Mepco Schlenk Engineering College, Sivakasi, during May 22 - June 17 2023.
- A Lecture as part of the Second NISER Outreach Teachers' Training Workshop held at NISER during 8th to 10th April 2024.

Suchi Goel

- "Invited speaker in International conference on ' Frontiers of Biological Sciences' NIT Rourkela, 05-07th October
- Invited speaker in ICGEB meet from 24th November 2023

Sudipta Dutta

- Sudipta Dutta, “Tunable magnetic states in two-dimensional materials” Dept. of Physics, Sri Venkateswara University, June 30, 2023.
- Sudipta Dutta, “Valley polarization in two-dimensional borocarbonitride systems” CAMOST-G20-S20, IIT Tirupati, October 26, 2023.
- Sudipta Dutta, “Designing two-dimensional non-centrosymmetric systems for valley polarization” Dept. of Physics, IISER Tirupati, January 18, 2024
- Sudipta Dutta, “Valley polarization in non-centrosymmetric systems” Dept. of Computer Science, IIT Kharagpur, February 11, 2024.
- Sudipta Dutta, “Computational designing of two-dimensional photocatalysts for energy harvesting and environmental sustainability” Dept. of Physics, Sri Venkateswara College of Engineering, March 15, 2024.

Sudipta Roy

- Title of the Invited Talk: Cyclic Alkyl(Amino) Carbene (cAAC)-Anchored Monoanionic Phosphorus: An Emerging Ligand for Stabilization of Exotic Main-Group

Compounds, and Novel Transition Metal-Clusters, TFCS-2023 (Transcending Frontiers in Chemical Sciences), National Institute of Technology Tiruchirappalli, NIT Trichy, 11-12 August 2023

- Title of the Invited Talk: Carbene-Supported Monoatomic Phosphorus Anion: An Excellent Ligand for Stabilization of Coinage Meal Nano-Clusters Exhibiting Thermally Activated Delayed Fluorescence; A Novel Photocatalyst at the Doorstep, IFSC-2023 (Indo-French Seminar on Catalysis for Sustainability) ,Jointly organized by IISER-TVM, IIT-Kanpur & LCC-Toulouse, 10-13 December 2023
- Title of the Invited Talk: Unprecedented Reductive Thermal Rearrangements of Carbene-Chloro-Phosphinidenes, MTIC-2023 (Modern Trends in Inorganic Chemistry), IISC Bangalore, December 14-17, 2023
- Title of the Invited Talk: A Journey from Bench-Stable Reagents to Functional Materials: Monoanionic Phosphorus-Supported Coinage Metal Clusters Exhibiting Thermally Activated Delayed Fluorescence (TADF) ,MTCS-2024 , IIT TIRUPATI, February 14-17, 2023

Swarup Roy Choudhury

- ICGEB-DBT International conference and hands-on workshop on redesigning crops for smart agriculture (8th November 2023), International Centre For Genetic Engineering and Biotechnology (ICGEB), New Delhi
- SEC meeting for consolidation of the Strategic Road Map for Biomanufacturing 'Emerging Agri-Biologicals' driven Climate Resilient Agriculture (3rd October 2024) International Centre For Genetic Engineering and Biotechnology (ICGEB), New Delhi, in hybrid mode

Tapan Chandra Adhyapak

- "Controlled dynamics of microbes in a channel – how to exploit shape and flexibility, Invited talk in the conference Active Matter and Beyond, ICTS Bengaluru, Nov 6-10, 2023.
- Active-flow coupled dynamics of non-axisymmetric, flexible microswimmers, Complex Fluids Symposium 2023, IIT Madras, Dec 18-20, 2023.
- Active-flow coupled dynamics of non-axisymmetric, flexible microswimmers. Invited talk at the conference CMDays 2023, Tezpur University, Jan 22-24, 2024.
- How fascinating is a career in research: a peek through my window, Invited talk in Pandu College, Assam, Jan 29, 2024.
- Physics of active particles: how important is fully resolved hydrodynamics, Invited talk in the conference Chennai Soft Matter Days 2024, IMSc., Feb 23-24, 2024.
- Physics of active particles: how important is fully resolved hydrodynamics, 9th Indian Statistical Physics Community Meeting 2023, ICTS Bengaluru, April 3-5, 2024.
- Young Birder Camp 2023, Dec 24, 2023, IISER Tirupati, Workshop for advanced school children, Invited talk.

Vasudharani Devanathan

- Invited lecture, “To grow or not to grow: Influence of Glucose on Neurons” Department of Neuroscience, Washington University at St. Louis, USA, April 6th, 2023.
- Special lecture, Institute Innovation council talk, Neurobiology-Synthesis and mechanisms of Neurotransmitters, 16th September 2023, SPMVV Mahila University, Tirupati https://www.linkedin.com/posts/vasudharanidevanathan_iisertirupati-tirupati-activity-7108876207156318208-t7I1/
- Invited speaker: “To grow or not to grow: Influence of Glucose on Neurons”. Brain: Chemistry to Cognition, 41st Indian academy of neurosciences meeting, held in Gwalior – 4-6 October, 2023
- Invited speaker: “To Grow or Not to Grow - Metabolism Induced Alterations in Neurite Outgrowth” Institute of Biochemistry and Pathobiochemistry Molecular Cell Biology, Ruhr Universitaet Bochum, 18th October, 2023
- Invited speaker: “To Grow or Not to Grow - Metabolism Induced Alterations in Neurite Outgrowth” Institute of Pharmacology and toxicology, Universitaet Tuebingen, 20th October, 2023"

Venketasubramanian C G

- Invited speaker for a lecture in a conference on “Groups and Representations” at IIT Bombay organized by IIT Bombay, July 03-08, 2023.
- Invited speaker for a series of lectures at Vellore Institute of Technlogy from December 14, 2022 to December 15, 2022(Organized jointly by IMSc, CMI and Indian Academy of Sciences).
- Invited Resource Person for Linear Algebra in Refresher Course for Mathematics Lecturers conducted by Bharathidasan University, Tiruchirappalli via Online mode, October 30-Nov, 01, 2023.
- Invited Resource Person for Mathematics in Refresher Course for College Lecturers conducted by Kannur University, Kannur via Online mode, December 01, 2023.

Vijaymohanan Pillai

- Attended MI-6, G20 meeting held at Goa followed by Two Days Science 20 (S-20) summit at Coimbatore, Tamil Nadu held on 21st and 22nd July 2023 in order to prepare draft document on clean energy by INSA, New Delhi. Prof Pillai also attended "Technology Advisory Group" for ETG meets to discuss "Carbon Capture, Alternate Battery Technology, and Artificial Intelligence" convened by Prof Ajay Kumar Sood, Principal Scientific Advisor to the Govt. of India on 29th July 2023 in New Delhi.
- Delivered National Science Day lecture on 28th February 2023 on "Future of Science & Technology & Innovation (STI) Energy, Education, Skills & Work" held in Amarkantak Central University.
- Attended G20 Research and Innovation Initiative Gathering (RIIG) Conference on Materials for Sustainable Energy held at Ranchi and delivered a lecture on "Materials for Sustainable Energy Storage: Need for Intelligent/Smart Materials".
- Delivered an invited talk on Clean Energy and Green Environment: Will Electrochemistry help for a better Future? on 26th March 2024 at Christ University, Bengaluru.
- Attended a workshop on Electrochemistry, Calicut University and delivered a talk on "Materials characterization using Electrochemical methods (with an emphasize on electrode kinetics)" on 20th March 2024 held at Calicut University.
- Attended the International Conference on Sustainable Nanomaterials Integration and Organization for Energy and Environment (iSNIOE2) conference as an invited Speaker held at Shiv Nadar Institution of Eminence (SNIoE) Deemed to be University, Delhi NCR in March 2024.

Vijayalakshmi V Subramanian

- EMBO workshop: DNA damage response, Feb 2024
- Sri Venkateswara University (Tirupati), Feb 2024
- Mei-India conference (online), Sep 2023

Conferences Attended

Annapurna Devi Allu

- National Conference on "Novel Processes and their Applications in Biology", Acharya Nagarjuna University, Guntur, India (February 2024)
- Biology Day, Indian Institute of Science Education and Research (IISER) Tirupati, Yerpedu, Tirupati, India (February 2024)
- 20th International Symposium on Rice Functional Genomics (ISRFG 2023), Bangalore, India (November 2023)
- Melbourne India Postgraduate Program and Melbourne India Postgraduate Academy Conference (MIPPAC 2023) (December 2023)
- BIOSANTEXC Kick-off meeting (ENS, France-IISER network), Indian Institute of Science Education and Research (IISER) Pune, India (May 2023)

Aradhana Singh

- Devanarayanan P, Aradhana Singh, "Better to be one-to-one", Complexity and Nonlinear Dynamics in Science, Engineering, Technology, and Mathematics (NLDS-2023) Jun 5-7, 2023, IIT Hyderabad, India, Presented by Mr. Devnarayanan (Best Poster award recipient).

Arun Kumar Bar

- The 9th Asian Conference on Coordination Chemistry (ACCC9), Bangkok, Thailand;Impact of the peripheral ligand modificatons on the SIM behavior of Dy(III) in PBP coordinaton,19th-22nd Feb 2024

Arunima Banerjee

- A.K. Raychaudhuri Centenary symposium, Division of Physical Sciences, IACS, Kolkata (June 2023) 42nd Meeting of the Astronomical Society of India (February 2024)

Ashwani Sharma

- FORCE-IICS Meeting, September 28 to October 1, 2023 at Kathmandu, Nepal.

Dileep Mampallil

- Dec. 20, Talk IIT Madras, CompFlu conference 2023

Ekambaram Balaraman

- Participated in the World Hydrogen Day Event organized by MNRE (7th Oct 2023).
- 20th International Conference on Modern Trends in Inorganic Chemistry (MTIC-XX) Indian Institute of Science, Bangalore (14-17 Dec 2023).

- Ms. Soumya Sree Samal and Mr. Sivakumar participated as Teacher Mentors, and Mr. Chandrakant Gouda and Mr. Abhijith K S participated as Facilitators at the Yusuf Hamied Chemistry Camp organized by the Royal Society of Chemistry held at IISER Tirupati on July 28-30, 2023.
- Mr. Abhijith K S, Gopika G, and Salini S attended the Chem Career workshop held at IIT Tirupati, organized by the Royal Society of Chemistry (RSC) on March 11, 2024.
- Ms. Soumya Sree Samal, Ms. Smruti Rekha Padhy, Mr. Abhijith K S, Mr. Palmurukan M R, Ms. Gopika G, Ms. Anuja Joy, and Ms. Salini S attended the IPR workshop held at IISER Tirupati on February 17, 2024.

Eswaraiah Chakali

- 41th Astronomical Society of India (ASI), 1-5 March 2023, IIT-Indore, India
- Star Formation Studies in India (SF-2024), 08-11 January, 2024; S. N. Bose National Centre for Basic Sciences (SNBNCBS), Kolkata, India
- Conference on "Magnetic Fields from Clouds to Stars (Bfields-2024)", 25-29 March, 2024, Mitaka Campus, National Astronomical Observatory of Japan (NAOJ), Tokyo, Japan

Eswarayya Ramireddy

- Conducted International symposium, 20th International Symposium on Rice Functional Genomics (ISRFG 2023), 3-5, November 2023, in GKVK Campus Banglore, India.

Gopinath Purushothaman

- Nurturing Future Leadership Program' under the aegis of Malaviya Mission Teacher Training Programme (MMTTP), March 11th- 15th, 2024, IIT Madras

Hussain Bhukya

- Understanding the Breathing of Biomolecules: Recent Advances in Cryo-EM and Chemical Biology, IIT Bombay, March 7-9, 2023.

Jessy Jose

- 42nd Annual Meeting of the Astronomical Society of India, Host institute: IISc Bangalore, Feb 1-5th, 2024
- Conference on Star & Planet Formation Studies in India ,Host Institute & Dates SNBNCBS, Kolkata, Jan 8-11th 2024"

Kanagasekaran T

- Short visit (28-02-2023 to 08-03-2023) to Japan for the continuation of the collaborative research work at Tohoku University.

Nandini Rajamani

- Adhithi Balaji, Rakesh Muni, Shivani Jadega & Nandini Rajamani. To eat or not to eat: How three-striped palm squirrels (Funambulus palmarum) respond to novel food setups and items across urban and rural areas. Poster at the 14th Students Conference for Conservation Science, Coimbatore, 09-12 October 2023.
- Kavitha Unni K K, Swati Udayraj, Deval Kadam, Senan D'Souza, Jehan Bhujwala, Shomita Mukherjee & Nandini Rajamani. Co-occurrence of sympatric carnivores across a matrix of habitat types. Poster at the 14th Students Conference for Conservation Science, Coimbatore, 09-12 October 2023.
- Manzoor Dar, Harsha Kumar, Nandini Rajamani, & Manzoor Shah. Phytoliths reveal diet of the critically endangered Hangul (Cervus hanglu hanglu) in Kashmir. Talk at the 59th Annual Meeting of the Association for Tropical Biology and Conservation, Coimbatore, 02-06 July 2023.
- Jeevan X Kodiyan, Prachi Thatte, Abi Tamim Vanak, Harsha Kumar, Uma Ramakrishnan, Shomita Mukherjee, & Nandini Rajamani. Comparative study of Jungle cat (Felis chaus) diet and habitat characteristics in Central India. Talk at the 59th Annual Meeting of the Association for Tropical Biology and Conservation, Coimbatore, 02-06 July 2023.
- Kavitha Unni K K, Swati Udayraj, Deval Kadam, Senan D'Souza, Jehan Bhujwala, Shomita Mukherjee & Nandini Rajamani. Co-occurrence of sympatric carnivores across a matrix of habitat types. Poster at the 59th Annual Meeting of the Association for Tropical Biology and Conservation, Coimbatore, 02-06 July 2023.
- Swati Udayraj, Aravind P S, Senan D'Souza, Rakesh Muni, Anupama M, Rithika S, Debarpita Das, H S Sushma & Nandini Rajamani. Investigating the impacts of urbanisation on the three-striped palm squirrel across a forest-to-urban gradient. Talk at the 59th Annual Meeting of the Association for Tropical Biology and Conservation, Coimbatore, 02-06 July 2023.
- Aravind P S, Dhanesh P, Senan D'Souza & Nandini Rajamani. Nesting behaviour of a commensal squirrel in a highly modified landscape of the Western Ghats. Speed talk at the 59th Annual Meeting of the Association for Tropical Biology and Conservation, Coimbatore, 02-06 July 2023.

- Rakesh Kumar Muni, Swati Udayraj, Aravind P S, Senan D'Souza & Nandini Rajamani. Understanding niche use and character displacement in closely related palm squirrel species in allopatry and sympatry. Poster at the 59th Annual Meeting of the Association for Tropical Biology and Conservation, Coimbatore, 02-06 July 2023.
- Nivetha M, Senan D'Souza, Shijisha AC, Russel Ligon and R Nandini. Evidence for multi-functional selection of coat color and pattern in palm squirrels. Talk at the 59th annual meeting of the Association for Tropical Biology and Conservation, Coimbatore, 02-06 July 2023.
- Nandini Rajamani. Morphology and behavior allow predator avoidance in palm squirrels. Understanding Behaviour, IISER Kolkata. 27-30 June, 2023.
- Swati Udayraj, Aravind P S, Senan D'Souza, Rakesh Muni, Anupama M, Rithika S, Debarpita Das, H S Sushma & Nandini Rajamani. Occupancy and abundance of the three-striped palm squirrel across an urbanisation gradient in a rapidly developing city in southern India. Poster at the 4th Annual Conference of Indian Society of Evolutionary Biology, Ahmedabad University, 9-11 February 2023.
- Nivetha M, Senan D'Souza, Shijisha AC, Russel Ligon and R Nandini. Multi-functional evolution of palm squirrel coat color and pattern. Talk at the 4th Annual Conference of the Indian Society of Evolutionary Biology, Ahmedabad University, 9-11 February 2023.
- Harsha Kumar, Senan D'Souza & Nandini Rajamani. Evolution of lifestyle and associated behavioural traits in Lagomorphs. Poster at the 4th Annual Conference of Indian Society of Evolutionary Biology, Ahmedabad University, 9-11 February 2023.

Nirmala K

- MS DEED-Level 2 Workshop May 22-26, 2023. IISER Pune ,Invited to deliver lecture and conduct program on pedagogical strategies for participants (college teachers) across Maharashtra
- ACS Outreach Program: November 6-9, 2023, INSA, New Delhi
- Participated in the workshop conducted by American Chemical Society (ACS) and Jigyasa

Padmabati Mondal

- CRSI meeting July, NIT Rourkella,6-8 July,2023
- Mini-symposium of theoretical physical chemistry and chemical physics (MSTPCCP-2023), IIT Bombay,28-29 July,2023
- Workshop on modelling and synthesis: Molecules and Macromolecules, NIT Rourkella,28th Sept,2023
- Theoretical Chemistry Symposium 2023 organized by Department of Chemistry, IIT Madras,7-10th December,2023
- Spectroscopy and Dynamics of Molecules and Clusters 2024 organized by IIT Guwahat,22-25th February
- Modern Trends in Chemical Sciences 2024 organized by Department of Chemistry, IIT Tirupati,16-17th February,2024"

Lakshmi Lavanya R

- Modern Trends in Harmonic Analysis, ICTS, 26 June – 1 July, 2023
- NCM Workshop titled 'Groups and Computations', Krea Universtiy, 3-8 July, 2023.
- An Indo-German Workshop on Data Mathematics and Scientific Computing, IIT Tirupati, 8th Sept. 2023.
- Winter School in Deep Learning, Online mode, organised by ISI Kolkata, 12 Jan. – 10 March, 2024 (sessions on Friday afternoons, Saturdays & Sundays)

Raghunath O Ramabhadran

- Webinar on “Biology to Astrophysics - How to Leverage the Best of IISER Tirupati's Emphasis on Academic Interdisciplinarity” by IISER Tirupati Alumnus, Ms. Yukta Ajay on behalf of the Alumni Association

Raju Mukherjee

- Invited lecture on “Complex mechanism of action of anti - mycobacterial agents and drug tolerance”, IISER-ENS Biosantex project kick-off meeting, IISER Pune on May 22, 2023.
- Invited lecture on “Identifying mechanism of antibiotic tolerance in Mycobacterium smegmatis,” Indian Transcription meeting at IISER Bhopal, July, 25, 2023.
- Invited lecture on “Different mechanisms of drug resistance in Mycobacterium”, Indo-French symposia on antimicrobial resistance,IISc Dept. of Microbiology, March 5, 2024.

Rakesh S Singh

- Liquids, Glasses and Other Adventures in Thermodynamics and Statistical Mechanics, June 15-17, 2023, Princeton University, Princeton, NJ, USA.
- Society of Physical Chemistry (SoPhyC) Meeting, October 29 - 31, 2023 at IIT Kanpur, India.

RamKumar Sambasivan

- International Cardiovascular Medicine Summit, InStem, Bangalore, 04/03/2024
- The biennial meeting of the Indian Society of Developmental Biologists, NCBS-InStem, Bangalore, 21-25 Feb 2024
- Cellular and Molecular Mechanisms of Development and Regeneration, Shiv Nadar IoE, Delhi-NCR, 15-17 Feb 2024
- National Workshop on Fluorescence Microscopy Techniques, Sri Venkateswara University, Tirupati, 08/02/2024

Ravi Kumar Pujala

- “CompFlu 2023 at the Indian Institute of Technology Madras, Chennai, India during December 18-20, 2023.
- SOFT MATTER YOUNG INVESTIGATORS MEET 2023 14-17 June 2023.

Robin V V

- National Symposium of Avian Biology held on Feb 23-25,2024 in Dehradun conducted by Graphic Era.
- Indian Wildlife Ecology Conference held on June 14-16, 2024 in NCBS, Bangalore

S Sunil Kumar

- Effect of supersonic expansion on collisional dissociation in a capillary - ion-funnel interface, Uma N N, Salvi M, Hemanth D., S. Sunil Kumar, Physics Day 2023
- Collision-induced fragmentation of biomolecules inside an ion funnel, Uma N N, Salvi M, Hemanth D., Abheek Roy, S. Sunil Kumar, APS Meeting 2023
- Cavity enhanced laser-induced fluorescence spectroscopy: an experimental approach, Dibyasha Panda, Abheek Roy, Hemanth Dinesan, Arijit Sharma, and S. Sunil Kumar, Topical Conference (TC) – 2024, PRL Ahmedabad. 15-17 Feb 2024.
- Unravelling the mystery of solvation-dependent fluorescence of fluorescein dianion: A computational study, Abheek Roy, Suvadip Samanta, Soumyadip Ray, Padmabati Mondal, and S Sunil Kumar, Topical Conference (TC) – 2024, PRL Ahmedabad. 15-17 Feb 2024

Saikranthi K

- Attended the five days “Nurturing Future Leadership Program” under the aegis of Malaviya Mission Teacher Training Programme (MMTTP) held at IIT Chennai during 10th March 2024 to 15th March 2024.

Sambuddha Sanyal

- Conference on "Recent Trends In Condensed Matter Physics Related To Quantum Materials", organised by IACS, Kolkata, February 2024
- International Conference on Highly Frustrated Magnets, organised by IIT Madras, Chennai, January 2024.
- Conference on Fractionalization and Emergent Gauge Fields in Quantum Matter , organised by ICTP Trieste, Italy, December, 2023
- QMAT-2023 (Quantum Matter), National conference on Quantum Condensed Matter organised by NISER Bhubaneshwar, Bhubaneshwar, November 2023.
- CAMOST-G20-S20 consortium seminar series on ""Disruptive Sciences and Technologies"", CAMOST, IIT Tirupati, October, 2023.
- National Initiative on Undergraduate Science camp, Mumbai 2023, Organised by HBCSE/TIFR-Mumbai, July 2023.
- International Conference on Quantum Information and Quantum Technology - 2023 at IISER Kolkata, May 2023.

Shibdas Banerjee

- “Stabilizing Reactive Intermediates in Water Microdroplets”,Frontiers in Sustainable Catalysis, University of Delhi, January 20, 2024
- “Emergence of Microdroplet Chemistry”,DCS Annual Meet, TIFR Mumbai, December 1, 2023
- “Label-free Mass Spectrometry Imaging of Surgical Specimens for Disease Diagnosis”,Trends in Emerging Nano Science: Energy, Healthcare &Quantum Materials (TENS-2023), INST Mohali, November 7, 2023
- “Chemical Wizardry of Microdroplets: From Reaction Vials to Human Tissues”,ChemDay-2023, IIT Roorkee, November 4, 2023
- “Chemical Wizardry of Water Microdroplets”,ICOC-2023 Goa, Goa, November 2, 2023
- “Stabilizing Reactive Intermediates in Water Microdroplets”,TFCS-2023, NIT TIRUCHIRAPPALLI, August 11, 2023
- “Stabilizing Reactive Intermediates in Water Microdroplets”,CRSI NSC-31, NIT Rourkela, July 7, 2023

Sivakumar Vallabhapurapu

- February 8 and 9 2024: Application of fluorescence microscopy in Biology: Invited Lecture and National Workshop on New Horizons of FluorescenceMicroscopy Techniques Sri Venkateswara University , Tirupati.

Souradeep Majumder

- National Seminar on Algebra and Analysis, 26/02/2024 – 28/02/2024, Pondicherry University

Sreenivas Chavali

- Contemporary Perspectives in Computational Biology, The Institute of Mathematical Sciences, Chennai, India (February 19-20, 2024)
- Modelling and Tackling Complex Biological Systems, The Institute of Mathematical Sciences, Chennai, India (October 13-14, 2023)

Suchi Goel

- ICGEB for alumni meet

Sudipta Dutta

- NSCTMS-2023, Dept. of Physics, Sri Venkateswara University, Tirupati; June 30, 2023
- CAMOST-G20-S20 ,Dept. of Physics, IIT Tirupati; October 26, 2023
- Hands-on Workshop on High Performance Computing in Bioinformatics,Dept. of Computer Science, IIT Kharagpur; February 11, 2024
- ETHPS-2024,Dept. of Physics, S. V. Engineering College; March 15, 2024

Sudipta Roy

- TFCS-2023 (Transcending Frontiers in Chemical Sciences), NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI, NIT TRICHY, 11-12 August 2023
- IFSC-2023 (Indo-French Seminar on Catalysis for Sustainability), Jointly organized by IISER-TVM, IIT-Kanpur & LCC-Toulouse, 10-13 December 2023
- MTIC-2023 (Modern Trends in Inorganic Chemistry), IISC Bangalore, December 14-17, 2023
- MTCS-2024 , IIT TIRUPATI, February 14-17, 2023

Tapan Chandra Adhyapak

- Active Matter and Beyond, Nov 6-10, 2023, ICTS Bengaluru; national conference, presented an invited talk.
- Complex Fluids Symposium 2023, Dec 18-20, 2023, IIT Madras; international conference, presented talk.
- Condensed Matter Days 2023, Jan 22-24, 2024, Tezpur University, Assam; national conference, presented an invited talk.
- Career in Science workshop, Jan 29, 2024, Pandu College, Assam; presented an invited talk.
- Chennai Soft Matter Days 2024, Feb 23-24, 2024, IMSc, Chennai; international conference, presented an invited talk.
- 9th Indian Statistical Physics Community Meeting 2023, April 3-5, 2024, ICTS Bengaluru; national conference; presented a talk.
- Young Birder Camp 2023, Dec 24, 2023, IISER Tirupati, Workshop for advanced school children, Invited talk.

Utpal Saikia

- American Geophysical Union Fall Meeting, USA, San Francisco, Dec 11-15, 2023. (Attended via online)
- Indian Geophysical Union, Kerala, India, 22-24 Nov, 2023

Vasudharani Devanathan

- Invited speaker: Brain: Chemistry to Cognition, 41st Indian Academy of Neurosciences meeting, held in Gwalior – 4-6 October, 2023

Venketasubramanian C G

- Particpated in the conference Groups and Representations at IIT Bombay organized by IIT Bomaby, July 03-08, 2023.
- Particpated in the conference held in honour of Harish-Chandra's centenary year held at Harish-Chandra Research Institute, Prayagraj, October 09-16, 2023

Vijayalakshmi V Subramanian

- Mei-India Conference,22 Sep 2023, online,Organized in collaboration with IITH and NIAB
- EMBO: Evolution and diversity of DNA damage response,Feb 19-23, 2024. Amby Valley, Maharashtra;Selected talk, chaired a session
- Mayosis 2023,May 4-Jun1, 2023 (every Thursday), Online, international meiosis conference,Participation"

Awards and Honours to Faculty

Aniket Chakrabarty

- Excellence Initiative – Research University program Grant, The Faculty of Geology, University of Warsaw, Poland

Anilatmaja Aryasomayajula

- Membership of Ramanujan Mathematical Society
- Thesis referee for Ms. Rasi Lunia, IMSc (later chief examiner for the Defense committee).
- Reviewed an article for “Results in Mathematics”
- Set the question paper for VIT's entrance examination

Annapurna Devi Allu

- Associate Fellow, Andhra Pradesh Akademi of Sciences

Arunima Banerjee

- Awarded CSIR-ASPIRE Award in Physical Sciences (2023-24)
- Elected Member of the International Astronomical Union

Ekambaram Balaraman

- Editorial Advisory Board, Syntett, Thieme Publishers
- Editorial Advisory Board, Tetrahedron/Tetrahedron Letters, Elsevier Publishers
- Editorial Advisory Board – Chemistry Open, Wiley Publisher
- Associate Editor for Frontiers in Chemistry (Catalytic Reactions and Chemistry)
- Fellow of the Royal Society of Chemistry (FRSC)
- Humboldt Research Fellowship for Experienced Researchers
- Visiting Faculty, Leibniz Institute for Catalysis, Rostock, Germany
- Board of Studies (BOS) members in Krishna University, Machilipatnam
- Board of Studies (BOS) members in Karunya University, Coimbatore
- RSC-ChemComm's Pioneering Investigators - 2023

Eswarayya Ramireddy

- TEC member for DBT Agricultural Biotechnology

Eswaraiah Chakali

- "Best Reviewer Award" in recognition of outstanding contributions as a reviewer for the Journal of Astrophysics and Astronomy, 2023, By Indian Academy of Sciences

Gopinath Purushothaman

- AvH (Alexandre von Humboldt) experienced researcher fellowship, 2024-2026

Jatish Kumar

- Nominated as Early Career Advisory Board Member for the ACS journal *ACS Materials Letters*
- Nominated as Editorial Advisory Board Member in the ACS journal *ACS Applied Optical Materials*

Jessy Jose

- 9th Foundation Day Award for Faculty Excellence, IISER Tirupati
- Featured in the Compendium of Inspirational Stories of Women in STEM, by Confederation of Indian Industries (CII), Dec 2023
- Scientific High-Level Visiting Fellowship 2024, awarded by the Embassy of France in India and the French Institute in India

Pankaj Kumar

- Humboldt Experienced Research Awards (Alexander von Humboldt (AvH) Foundation of Germany) 2021-2024

Raghunath O Ramabhadran

- Work in the Chemical Education Division of the American Chemical Society (ACS) ACS Symposium Series featuring first ever PIs from India, 2023 (manuscript in revision)

- Invited speaker Astrochemistry Symposium at the Prestigious American Chemical Society (ACS) meeting (faculty from India very rarely get invited to be speakers at ACS symposia), 2023
- Presented the second ever talk by an IISER faculty in American Chemical Society's chemical Education Division, ACS Fall 2023 Meeting – San Francisco
- Institute Foundation Day Award for excellent contribution to teaching, research and institute building (IISER Tirupati, March 2024)

Rajesh Viswanathan

- CRS Silver Star Award 2023-24: For exceptional contributions to Science, Teaching and Administration
- Visiting Professor at Univ. of North Florida, Dept. Of Chemistry (Courtesy)
- Invited contributor to CSIR Expert panel
- Invited member of Pan-IISER JAC Expert Panel
- Evaluator and Panelist – DBT Experts on Biotechnology grants (Constituted by MoE through ANRF)
- Editorial Board: Journal of Biosciences, IAS Bengaluru and Springer

Raju Mukherjee

- Ignite LifeScience Foundation Research Grant Award on Antimicrobial Resistance, 2024
- Member of JGEEBILS PhD entrance examination (TIFR-NCBS) coordination committee since 2017
- Life member of Proteomics Society of India since 2016
- Breakthrough Science Society, Kolkata since 2019

Ravi Kumar Pujala

- Emerging Soft Matter Investigator by RSC
- Visiting Professor award by CNRS at University of Paris-Saclay (August to November 2023)
- Review Editor for Frontiers in Soft Matter (since 2021)

Shibdas Banerjee

- Merck Young Scientist Award (runner-up) (2023)
- Thieme Chemistry Journals Award (2024)
- Early Career Board of *Analytical Chemistry*, American Chemical Society (2024-2026)

Sivakumar Vallabhapurapu

- Invited by Sri Padmavathi Womens Degree and PG college to be part of Board of Studies for Biotechnology Programme
- Editorial Board Member for the Journal "Cancer Cell International"

Soumit Sankar Mandal

- JSPS invitational Fellowship to Gifu University, 2024
- Travel grant by Biophysical Society USA, 2023

Sudipta Roy

- Thieme Chemistry Journal Award 2024

Sunil Kumar S

- Member of National Work Group of "Organics in Space"

Tapan Chandra Adhyapak

- Received grant under STARS IISc, with two experimental collaborators from IIT Kanpur

Vasudharani Devanathan

- Fulbright Nehru Academic Professional Excellence (Research category) for four months research at Harvard Medical School 2024-2025 round
- CII Compendium: Featured in Women in STEM, "STEMSPIRATION" compendium by confederation of Indian Industry, December 2023

Venketasubramanian C G

- Foundation Day Faculty Award for services to Institute, March 2024

Vijayalakshmi V Subramanian

- Wellcome trust/ DBT India Alliance intermediate fellowship (2022-2026)

Memberships, Fellowships & Affiliations of Faculty

Aniket Chakrabarty

- "Honorary Life Membership" of the Mineralogical Society of Great Britain and Ireland
- Associate Editor, Mineralogical Magazine
- Indian Geological Congress

Anilatmaja Aryasomayajula

- Member, Ramanujan Mathematical Society

Annapurna Devi Allu

- Scientific High-Level Visiting Fellowship by the French Embassy and French Institute in India (2023)
- Life Member, Indian Society for Plant Physiology
- Life Member, Innovation, Science and Technology Forum, Tirupati

Aradhana Singh

- DST-INSPIRE Fellow 2022-2027

Aravindan Vanchiappan

- Editor, Journal of Industrial and Engineering Chemistry, Elsevier
- Editorial Advisory Board, Energy Technology, Wiley
- Life Member at the Indian Society for Electroanalytical Chemistry (ISEAC)
- Life Member at the Society for Advancement of Electrochemical Science and Technology (SAEST)
- Life Member at Chemical Research Society of India (CRSI)
- Life Member at Materials Research Society of India (MRSI)

Arun Kumar Bar

- Member of Topical Advisory Board of the Journal Magnetochemistry

Arunima Banerjee

- Life Member, Astronomical Society of India
- Visiting Associate, Inter University Centre for Astronomy & Astrophysics (IUCAA), Pune, India
- Member of the International Astronomical Union

Ashwani Sharma

- Lifetime Member, International Society of Aptamers (INSOAP), UK

Bhanu Sree Reddy D

- Confederation of Indian Industry, Chennai Chapter
- IWN- CII Indian Women Network, Tirupati Chapter

Chitrasen Jena

- Council member of the STAR Collaboration at Brookhaven National Lab, New York
- Council Member of ePIC Collaboration at EIC at Brookhaven National Lab, New York
- Associate member of the ALICE Collaboration at CERN, Geneva
- STAR Coordinator for STAR-ALICE-India Collaboration

Ekambaram Balaraman

- Fellow of the Royal Society of Chemistry (FRSC)
- Fellow of the Indian Chemical Society (FICS)
- Associate Fellow of Andhra Pradesh Akademi of Sciences" (APAS)
- Affiliate Member of the International Union of Pure and Applied Chemistry (IUPAC)
- Associate Member of the National Academy of Sciences, India
- Member of the American Association for the Advancement of Science (AAAS)
- Member of the Israel Chemical Society
- Member of the German Chemical Society
- Member of the German Catalysis Society (GeCatS)
- Member of The Asian and Oceanian Photochemistry Association (APA)

- Member of the Chemical Research Society of India (CRSI)
- Member of the Catalysis Society of India
- Member Material Research Society of India (MRSI)
- Member Society for Materials Chemistry (SMC)
- Member of The Society for Polymer Science, India
- Member of the Indian Association of Chemistry Teachers (IACT)

Eswaraiah Chakali

- Astronomical Society of India (ASI)
- Ramanujan Fellowship by DST/SERB, 2021-2026

Gopinath Purushothaman

- Editorial board member of Tetrahedron and Tetrahedron letters - Invited
- Indian JSPS Alumni Association – Lifetime member
- American Chemical Society (ACS) - Member
- Chemical Research Society of India (CRSI) – Lifetime member

Janardan Kundu

- American Physical society (APS) - Member
- Chemical research society of India (CRSI) – Lifetime member

Jatish Kumar

- Member, Chemical Research Society of India (CRSI)
- Member, Materials Research Society of India (MRSI)
- Member, Japan Society for Promotion of Science (JSPS) Alumni, India.
- Member, Marie Curie Alumni Association, India

Jessy Jose

- Member, International Astronomical Union (IAU)
- Astronomical Society of India (ASI)
- American Astronomical Society (AAS)
- Associate of IUCAA, Pune

Lakshmi Lavanya Ramamurthy

- Member, Ramanujan Mathematical Society

Nagaraj D S

- Fellow, Indian Academy of Sciences (IASc), Bengaluru
- Fellow, Indian National Science Academy (INSA), New Delhi

Nandini Rajamani

- American Society of Mammalogists
- IUCN SSC Small Mammal Specialist Group
- International Society for Ecological Economics

Nibedita Pal

- Lifetime Membership, Fluorescence Society of India

Nirmala Krishnamurthy

- Member, American Chemical Society (ACS)
- Member, Iota Sigma PI: The National Honor Society for Women in Chemistry, USA

Padmabati Mondal

- Member of Swiss Chemical Society
- Member of European Photochemistry Association
- Member of Chemical Research Society of India

Pankaj Kumar Koli

- Member of Asian Bioinorganic Chemistry Society (AsBIC)

Raghutla Chandrashekar

- Telangana Economic Association

Rajesh Viswanathan

- Member, Chemical Research Society of India (CRSI)
- American Chemical Society, member since 2002 (# 2309117)
- American Society of Pharmacognosy, member since 2014 (# 8561585), serving on their editorial website committee
- International Society for Cyanophyte Research
- Faculty member, Alpha Chi Sigma (AXΣ), Cleveland Chapter

Raju Mukherjee

- Life member of Proteomics Society of India since 2016
- Breakthrough Science Society, Kolkata since 2019

Ramkumar Sambasivan

- Secretary, Indian Society of Developmental Biology

Ravi Kumar Pujala

- Member, Indian Society of Rheology

Robin V V

- Member, Bombay Natural History Society - BNHS
- Member, Society for Evolutionary Biologists
- Member, Association of Avian Biologists of India
- Member, Ecological Society of America
- Member, International Biogeography Society
- Member, International Society for Behavioural Ecologists

Saikranthi K

- Life membership in Innovation, Science and Technology Foundation (ISTF) -Tirupati

S. Sunil Kumar

- Executive committee member of the Indian Society of Atomic and Molecular Physics
- Member of the Inter-University Centre for Astronomy and Astrophysics
- Member of the National Working Group "Organics in Space"
- Program coordinator of CAMOST

Sanjay Kumar

- Lifetime member, Association of Microbiologists of India
- Lifetime member, Indian Association of Cancer Research
- Lifetime member, Indian Society of Cell Biology
- Lifetime member, Society for Mitochondrial Research and Medicine-India)

Santanu Paul

- Indian Association of Cancer Research

Shibdas Banerjee

- Member of Proteomics society of India (PSI)
- Member of Indian society for mass spectrometry (ISMAS)
- Member of Chemical Research Society of India (CRSI)

Sivakumar Vallabhapurapu

- Active Member of American Society of Hematology (A highly prestigious society of scientists and physicians working in hematology and hematological cancers)
- Member of Indian Immunology Society

Soumit Sankar Mandal

- Membership of Biophysical Society, USA
- Membership of Protein society, USA
- Membership of Biophysical Society of Japan

Souradeep Majumder

- Member, Innovation, Science & Technology Foundation - Tirupati (ISTF-Tirupati)

Subhash B

- Member American Mathematical Society

Sudipta Roy

- CRSI - Life member
- American chemical society (ACS) – Member
- GDCH - Member
- DAAD - Alumni

Sreenivas Chavali

- Life member, International Society for Computational Biology
- Member, Society of Molecular Biology and Evolution

Tapan Chandra Adhyapak

- Member, Innovation, Science & Technology Foundation (ISTF), Tirupati

Utpal Saikia

- American Geophysical Union (AGU), United Stated
- European Geophysical Union (EGU), European Union
- Indian Geophysical Union (IGU), India

Vasudharani Devanathan

- Indian Academy of Neurosciences, Society for Neuroscience, USA

Vijayalakshmi V Subramanian

- Reviewing editor, eLife
- Early career editor, Molecular Biology of the cell
- Member, Genetics Society of America

Extramural Projects

Details of ongoing extramural projects during the financial year 2023-24

SN	Title of the Project	Project Investigator	Funding Agency	Project Code	Period	Grant received during the year (Amount in INR)
1	Ramanujan fellowship Award	Dr Gopinath Purushothaman	SERB	30217020	19.02.2018 to 18.02.2023	71771
2	Investigation of Kruppel-like factor 8 (KLF8) as a Novel Therapeutic Target for Ovarain Cancer	Dr Sanjay Kumar	DBT - Ramalingaswamy Fellowship	30318024	05.06.2018 to 04.06.2023	0
3	SERB - Ramanujan Fellowship Award	Dr Shibdas Banerjee	SERB - Ramanujan Fellowship Award	30218025	14.05.2018 to 13.05.2023	0
4	IndiaAlliance DBT wellcome	Dr Sivakumar Vallabhapurapu	India Alliance DBT wellcome	30318026	01.09.2018 to 30.09.2024	9144515
5	"Where are geographic barriers to avian geneflow across peninsular India: Testing hypotheses on biogeography genetic connectivity & evolution" (Bird Biogeography)	Dr Robin V Vijayan	SERB	30218028	06.10.2018 to 05.10.2021	578551
6	"Non-Transgenic crop improvement of grain amaranth (A. hypochandriacus) for determinate growth, enhanced seed yield and oil by establishment of TILLING by sequencing platform"	Dr Eswarayya Ramireddy	DBT	30318037	21.02.2019 to 20.02.2022	864
7	Removal of Invasive Alien Species and resytoration of native grass land in kodaikanal division TANNI (tamil Nade Innovative Intiatives Scheme)	Dr Robin V Vijayan	Tamilnadu Forest Department	30518043	NA	50000
8	Systems -level understanding of the specificity of interactions and molecular functions of intrinsically disorderd proteins	Dr Sreenivasa Chavali	DBT-Ramalingaswami Re-entry Fellowship	30319047	08.11.2019 to 07.11.2024	0
9	The Dhuleep Matthai Nature Conservantion Trust (DMNCT)-Conservation action with Forest Departments on Montane Shola Habitats	Dr Robin V Vijayan	Terms of Reference between DMNCT & IISER Tirupati	30519049	01.04.2020 to 31.03.2023	100000
10	INSPIRE Faculty Fellowship	Dr Shalini Bhattacharya	INSPIRE Faculty Fellowship	30119050	15.07.2019 to 26.03.2024	0

SN	Title of the Project	Project Investigator	Funding Agency	Project Code	Period	Grant received during the year (Amount in INR)
11	Rufford Foundation, UK	Dr Robin V Vijayan	Rufford Foundation, UK	30419052		0
12	Deciphering the functional role of receptor-like kinases to modulate the symbiotic nitrogen fixation in chickpea	Dr Swarup Roy Choudhury	Ministry of Science & Technology- DBT	30319054	18.10.2019 to 17.10.2024	1350000
13	Synthetic control on reduction of dimensionality in lead halide perovskites for efficient broad-band emission"	Dr Janardan Kundu	SERB	30220063	06.02.2020 to 05.08.2023	200000
14	Scheme on R & D for Conservation & Development	Dr Robin V Vijayan	MoEF	30520066	05.03.2020 to 31.03.2024	1523169
15	Ligand-confinement driven ordering of magnetic anisotropy in multinuclear complexes to tailor single-molecule magnetic toroicity	Dr Arun Kumar Bar	The Royal Society, UK	30420069	NA	0
16	Improved root nodule formation in groundnut by overexpressing genes linked with receptor-mediated signalling	Dr Swarup Roy Choudhury	STARS (MHRD)	30520070	14.08.2020 to 09.06.2024	1820596
17	Chemical tuning of crystal-field topology around the f-element ions to tailor single -molecule magnetism	Dr Arun Kumar Bar	STARS (MHRD)	30520071	24.02.2020 to 31.03.2024	1142247
18	Biodiversity Assessment	Dr Nandini Rajamani	MoU with Andhra Pradesh Mineral Development Corp. Ltd	30520073	NA	700000
19	Synthesis and evaluation of PNA-GalNAc conjugates	Prof Ganesh K N	Alnylam Pharmaceuticals, Boston, USA	30520074	NA	0
20	1st India Bioscience Outreach grant	Dr Robin V Vijayan	India Bioscience	30520076	NA	14634
21	Building Better Batteries: Development of dual carbon and Ai-ion battery prototypes from spent Li-ion battery	Dr V Aravindan	SERB	30220080	18.12.2020 to 17.12.2025	600000
22	Non-innocent Ligands for catalysis with Earth-Abundant Metals	Dr E Balaraman	SERB	30220081	19.12.2020 to 18.12.2025	0
23	Inspire Faculty Fellowship Program	Dr Debasish Koner	Inspire Faculty	30120082	19.10.2020 to 30.11.2022	638282

SN	Title of the Project	Project Investigator	Funding Agency	Project Code	Period	Grant received during the year (Amount in INR)
24	Biomimetic Total Synthesis of Complex Diketopiperazines as Unique Leads to Overcome Drug Resistance	Dr Rajesh Viswanathan & Dr Suchi Goel	SERB	30220086	09.12.2020 to 08.12.2023	0
25	CSIR	Dr E Balaraman	CSIR	30520090	NA	0
26	Testing Anthropause in soundscapes of natural and urban habitats across india's cities	Dr Robin VV	National Geographic Society	30520091	NA	0
27	Energy conservation through electron bifuraction at the thermodynamic limits of life: An insight from methanogenesis in archaea	Dr Mousumi Banerjee	DBT	30320092	01.03.2021 to 29.02.2024	187996
28	GAIL-Research	Dr E Balaraman	GAIL-Research	30520093	22.02.2021 to 31.03.2025	1000000
29	Tailored microswimmers: tuning dynamics and non-equibrium phase behavior	Dr Ravikumar Pujala & Dr Tapan	SERB	30220095	17.02.2021 to 16.02.2024	0
30	Inspire Faculty	Dr Hussain Bhukya	Inspire Faculty	30120096	01.01.2021 to 31.12.2025	2295955
31	Microfluidic Confinement of Bacteria: Implications in behaviour and antibiotic tolerance	Dr Dileep Mampallil	SERB	30220097	22.03.2021 to 21.03.2024	750000
32	Early mesoderm patterning	Dr Ramkumar S	DBT	30321099	13.08.2021 to 12.08.2024	2861800
33	Ramanujan Fellowship Award	Dr Eswaraiah Chakali	Ramanujan Fellow	30221101	01.07.2021 to 30.06.2026	2380000
34	Mechanistic Insights of Nitrite Reductase (NiR) & Nitric Oxide Monooxygenation (NoM) Reactions: Exploring the Interconversion of Nitric Oxide and Nitrite	Dr Pankaj Kumar	SERB	30221105	28.12.2021 to 27.12.2024	500000
35	Nanostructured materials for next generation energy conversion and storage devices	Dr V Aravindan & Dr Gopinath P	DST	30121106	10.01.2022 to 09.01.2027	807056
36	Ordering ofmagnetic anisotropy in multi-nuclear single-molecule nano-magnets employing magnetic building-blocks	Dr Arun Kumar Bar	SERB	30222109	21.01.2022 to 20.01.2025	1200000

SN	Title of the Project	Project Investigator	Funding Agency	Project Code	Period	Grant received during the year (Amount in INR)
37	DBT wellcome	Dr V Subramanian Vijayalakshmi	DBT wellcome	30322110	01.01.2022 to 31.12.2026	0
38	Investigate the choice of repair template in meiosis	Dr V Subramanian Vijayalakshmi	SERB	30222111	27.01.2022 to 26.01.2025	1354000
39	Deciphering miRNAs present in extracellular vesicles as biomarker for severe malaria	Dr Suchi Goel	DBT	30322113	03.01.2022 to 02.01.2025	1100000
40	Recycling of Graphite from spent lithium-ion Batteries for high energy Li-Ion capacitors	Dr V Aravindan	DST	30122114	05.03.2022 to 04.03.2025	82736
41	Hydrodynamic simulation and experiments on dense suspensions and near surface trapping of flagellated bacteria	Dr Tapan Chandra & Dr Ravikumar Pujala	SERB	30222115	10.03.2022 to 09.02.2025	0
42	Theoretical and Computational Exploration of Low- Dimensional Functional Materials for Optoelectronics and Energy Harvesting	Dr Sudipta Dutta	SERB	30222116	05.03.2022 to 04.03.2025	0
43	Coordinative clipping strategy to stabilize Lanthanide-Ions in Pseudo-Two Coordinate Geometry to tailor slow-magnetic relaxation and small molecule activation	Dr Arun kumar Bar	SERB	30222117	15.03.2022 to 14.03.2025	1000000
44	Developing molecular probes for the detection of signalling gases in the cells	Dr Pankaj Kumar	SERB	30222118	22.03.2022 to 21.03.2025	650000
45	Towards development of fluorophores of predicated fluoscence: A comprehensive investigation of fluorescence of characteristic of fluorescin	Dr Sunil Kumar	SERB	30222119	22.03.2022 to 21.03.2025	800000
46	Establishing a Regional Biosafety laboartory (BSL-3) at Tirupati for research and diagnostics in infectious diseases: tuberculosis and virology	Dr Raju Mukherjee	SERB	30222120	25.03.2022 to 24.03.2025	0
47	Indian Participation in the ALICE experiment at CERN	Dr Chitrasen Jena	DST	30122121	03.11.2021 to 02.11.2026	1561230

SN	Title of the Project	Project Investigator	Funding Agency	Project Code	Period	Grant received during the year (Amount in INR)
48	Shola Bird Ecology	Dr V V Robin	National Geography	30422123	NA	0
49	Hydrogen Mediated (Asymmetric) C-C and C-N Bond Formation	Dr E Balaraman	CSIR	30522124	03.08.2021 to 02.08.2024	0
50	Carbene-Stabilized Low Valent Group 13-15 Compounds as Novel Light Emittting Materials: Syntheses, Bonding Analysis and thermally activated delayed fluorescence (TADF) studies	Dr Sudipta Roy	SERB	30222126	18.07.2022 to 17.07.2025	989330
51	Tata steel plant	Dr E Balaraman	Tata steel plant	30522127	25.07.2022 to 24.07.2025	1991900
52	Design and synthesis of Chiral Luminescent Upconversion nanophosphors for application in Security printing	Dr Jatish kumar	CSIR	30522128	01.04.2022 to 31.03.2025	0
53	Protoplanetary disk evolution under diverse star forming conditions	Dr Jessy Jose	SERB	30222130	26.09.2022 to 25.09.2025	410000
54	Unravelling histone deacetylase (HDAC)-modulated regulatory mechanisms underlying priming-mediated acquired thermotolerance in Arabidopsis thaliana	Dr Annapurnadevi Allu	SERB	30222131	30.09.2022 to 29.09.2025	1500000
55	Deciphering the relay between the transcription factor AP2 and its target genes that drive sexual development in plasmodium falciparum	Dr Suchi Goel	SERB	30222132	11.10.2022 to 10.10.2025	0
56	INSPIRE FACULTY FELLOWSHIP	Dr Aradhana Singh	INSPIRE	30122133	28.09.2022 to 27.09.2027	3429166
57	Harnessing the Chemistry of aryl carbocations in aqueous microdroplets	Dr Shibdas Banerjee	SERB	30222134	27.12.2022 to 26.12.2025	400000
58	A Multicomponent cascade Addition cyclization coupling strategy for carbofunctionalization of Enzynes-A Dual Nickel photocatalytic approach	Dr Gopinath Purushothaman	SERB	30222135	27.12.2022 to 26.12.2025	500000
59	Single guide RNA (sgRNA) engineering of CRISPR-Cas9 system for enhanced genome editing and imaging	Dr Ashwani Sharma	SERB	30222136	02.01.2023 to 01.01.2026	0

SN	Title of the Project	Project Investigator	Funding Agency	Project Code	Period	Grant received during the year (Amount in INR)
60	CarbonDioxide Enabled Bisfunctionalization of Alkenyl Amines using First-row Transition Metals: Sustainable Access to Functionalized Amines and Diverse Heterocycles	Dr Ekambaram Balaraman	SERB	30222137	13.01.2023 to 12.01.2026	0
61	INSPIRE FACULTY FELLOWSHIP	Dr Srabani Kar	INSPIRE	30122138	27.10.2022 to 26.10.2027	3345976
62	Flexible Tetracene/Pentacene Based Multilayer organic phototransistors for UV-B Detection	Dr Kanagasekaran	SERB	30222139	30.01.2023 to 29.01.2026	0
63	Circularly polarised luminesence as a new tool for the early diagnosis of amylod formation	Dr Jatish Kumar	DST-Indo japan travel	30522140	17.01.2023 to 16.01.2025	275000
64	Ramanujan fellowship	Utpal Saika	SERB	30222141	13.03.2023 to 12.03.2028	2490000
65	United States Department of Agriculture Foreign Agricultural Service AWARD	Dr Annapurnadevi Allu	USDA FAS project	30523142	09.01.2022 to 31.08.2024	476270
66	Dynamics of galactic bars and spiral arms: Open problems	Dr Arunima Banerjee	SERB	30223143	30.05.2023 to 29.05.2026	915000
67	How does cultural diversity in bird song correlate with genomic and ecological differences across a landscape	Dr Robin V Vijayan	SERB	30223144	19.06.2023 to 18.06.2026	2337500
68	(Tirupati-Chennai-Bengaluru Cluster) For development and production of key starting materials, intermediates and raw materials that are required by the Health care sector	Dr Balaraman E & Co-PI : Dr Gopinath & Dr Kiran Kumar	DST	30123145	24.05.2023 to 23.05.2024	11000000
69	Teachers Associateship for Research Excellence	Dr Sivakumar Vallabhapurapu	SERB-Mentor for Dr. Satyanarayana Swamy Cheekatla	30223146	04.11.2022 to 03.11.2025	335000
70	Yusuf Hamied Chemistry camp	Dr Balaraman E	Royal Society of Chemistry, Bangalore	30523147	28.07.2023 to 30.07.2023	550000
71	Photodissociation cross section measurements of nucleotides to understand the photostability of DNA and RNA building blocks	Dr Sunil Kumar	DST-Indo Austria travel	30523148	06.07.2023 to 05.07.2025	660000

SN	Title of the Project	Project Investigator	Funding Agency	Project Code	Period	Grant received during the year (Amount in INR)
72	Development of Electrochemical process for making P-Anisic Aldehyde (pAA) from p-Cresyl Methyl ether (pCME)	Dr Kiran Kumar	ATUL Ltd and IISER AGREEMENT	30523149	01.04.2023 to 31.03.2024	600000
73	Industrial training for faculty for AP Polytechnic Faculty at IISER Tirupati	Dr Bhanu Sree	Industrial training	30523150	2023-24	1504303
74	CAMOST 2023	Dr Sunil Kumar	CAMOST 2023	30523151	2023-24	0
75	Young Birders camp	Dr Robin VV	Young Birders camp	30523152	2023-24	482000
76	Patterning the left-right asymmetry of vertebrate body: The role of mesoderm T-box factor Tbx6	Dr Ramkumar & Dr Annapurnadevi Allu	DBT	30323153	19.09.2023 to 18.09.2026	2004880
77	Airport invoice	Dr Robin VV	Airport invoice	30523154	2023-24	72662
78	Unravelling the microphysics of precipitation in heavy rainfall events during the monsoons and their link with surface/sub-surface meteorological parameters	Dr Sai Kranthi	SERB-SRS	30223155	11.10.2023 to 10.10.2025	1400000
79	Casprl as a Regulator of Neuritogenesisin Adult retinal Neurons under Altered Metabolic conditions: Implications of Diabetic Retinapathy	Dr Vasudharani D	SERB-CRG	30223156	13.10.2023 to 12.10.2026	2271960
80	Carbene-Phosphinidenides as Stabilizing Ligands for the Isolation of Mixed-Valence Transition Metal Clusters and their Applications in Catalysis and Light Emitting Materials	Dr Sudipta Roy	STARS -3668	30523157	26.09.2023 to 25.09.2026	2394000
81	Deriving a Structure Property Correlation for Enhanced Chiral Light Emission from Functional Molecules and Supramolecular Assemblies: Towards Development of Circularly Polarized Organic Light Emitting Devices	Dr Jatish Kumar	STARS -3668	30523158	26.09.2023 to 25.09.2026	2470000
82	Development of Assymmetric copper NHC catalysed Domino 1,4-Michael Addition-Aldol reaction for the synthesis of Eudesmane family of Natural Products.	Dr Kiran Kumar	CSIR-1827	30523159	06.10.2023 to 05.10.2026	144750

SN	Title of the Project	Project Investigator	Funding Agency	Project Code	Period	Grant received during the year (Amount in INR)
83	Targeted editing of light and hormone signaling for generating novel alleles regulating agronomically beneficial traits in tomato	Dr Eswar Ramireddy	DBT-0150	30323160	30.11.2023 to 29.11.2026	2264444
84	Eastern Ghats Bio diversity-Outreach and Capacity building	Dr Robin V Vijayan	DMNCT	30523161	01.12.2023 to 30.12.2025	400000
85	Investigating the potential of inositol phosphate kinase, ITPK1 in augmenting plant heat stress acclimation	Dr Padmabati Mandal	STARS-3668	30523162	07.10.2023 to 06.10.2025	630000
86	Investigation of liquid-liquid phase separation associated with heat shock protein 70 and their role in regulating neuro generative disease	Dr Soumit S Mandal	SERB-EEQ	30223163	10.01.2024 to 09.01.2027	2290000
87	Rohini Nilekani Philanthropies Foundation Grant	Dr Robin V Vijayan	Rohini Nilekani Grant	30523164	19.01.2024 to 18.01.2026	2200000
88	A Multiscale study of photoswitchable Drugs for Optimal control of G-Protein Coupled Receptors	Dr Padmabati Mondal	SERB-CRG	30223165	30.01.2024 to 29.01.2027	1934943
89	Unravelling design criteria for engineering tunable multi-excitonic emission in low dimensional metal halide hybrids through doping/co-doping synthetic strategy	Dr Janardan Kundu	SERB-CRG	30223166	14.02.2024 to 13.02.2027	5570463
90	Computational and machine learning investigation of interface-driven self-assembly and polymorph selection in soft colloidal systems	Dr Rakesh S Singh	SERB-CRG	30223167	17.02.2024 to 16.02.2027	2626000
91	Raptor Research foundation	Dr Robin VV		30523168	01.01.2024 to 31.01.2025	644700
92	Project Advisory Committee (PAC) on Chemical Sciences	Dr Vijayamohanan K Pillai	DST	30523169	2023-24	648800
93	Deciphering the Sequence	Dr Sreenivas Chavali	SERB	30223171	12.03.2024 to 11.03.2027	2510000

SN	Title of the Project	Project Investigator	Funding Agency	Project Code	Period	Grant received during the year (Amount in INR)
94	Decipher nodule inception (NIN)-mediated molecular mechanisms during root nodule symbiosis in peanut"	Dr Swarup Roy Choudhury	SERB	30223172	12.03.2024 to 11.03.2027	863999
95	Ignite life Science foundation	Dr Raju Mukherjee	Ignite life Science foundation	30523173	01.03.2024 to 31.05.2025	650000
96	Investigate the role of biomolecular condensates as protective reservoirs for the treatment of neurodegenerative diseases	Dr Soumit S Mandal	SERB	30223174	20.03.2024 to 19.03.2027	4013000
97	Understanding the sources of Ore-Forming Fluids in Orogenic Gold Deposits: A Comparative study of Gadag and Hutti Schist Belts in the Dharwar craton	Dr Chandan Kumar	SERB-EEQ	30223175	28.08.2024 to 27.03.2027	1050000
98	IGeM 2020				NA	192447
99	JC BOSE Grant-Prof Vijayamohanan K Pillai	Prof Vijayamohanan K Pillai	SERB	JC BOSE Grant	04.11.2020 to 22.05.2024	1100000
100	JC BOSE Grant-Prof Santanu Bhattacharya	Prof Santanu Bhattacharya	SERB	JC BOSE Grant	01.09.2023 to 22.04.2026	3000000
101	National Post Doctoral Fellowship (NPDF)-Dr Aranganathan V	Dr Aravindan V	SERB	NPDF Grant	27.03.2024 to 26.03.2026	670097
102	National Post Doctoral Fellowship (NPDF)-Dr Madhu Nallagangula	Dr Balaraman E	SERB	NPDF Grant	16.11.2022 to 15.11.2024	960000
103	National Post Doctoral Fellowship (NPDF)-Dr Titir Guha	Dr Annapurnadevi Allu	SERB	NPDF Grant	01.04.2024 to 31.03.2026	669633
104	Prime Minister Research Fellowship (PMRF)-Prof Vijayamohanan K Pillai	Prof Vijayamohanan K Pillai	PMRF	PMRF Grant	NA	26245367
	TOTAL					14,25,48,992.00

Colloquia and Seminars

Institute Colloquia

Date	Speaker	Affiliation	Title
30/08/2023	Prof Balasubramanian Gopal	Professor, Division of Biological Sciences, Indian Institute of Science, Bengaluru	Understanding Biological Molecular Machines-Order, Intrinsic Disorder and Allosteric Determinants
04/04/2024	Prof Shekhar C Mande	Honorary Distinguished Faculty, Bioinformatics Centre, Savitribai Phule Pune University, Pune	Electron transfer and free radical transfer mechanisms in ribonucleotide reductase complex of M. tuberculosis
05/05/2024	Prof Sharmila Mande	Advisor to Life Sciences R&D at TCS Research, Visiting Guest Professor, IIT-Gandhinagar & IIT-Kanpur	Microbiome: A new age health-descriptor for health and wellness
30/10/2023	Prof Ramanarayanan Krishnamurthy	Scripps Research, USA	Understanding the Emergence of RNA and DNA in terms of Structure-Function in the Context of Origins of Life Studies
21/02/2024	Prof Arumugam Manthiram	George T. and Gladys H. Abell Endowed Chair of Engineering, University of Texas at Austin (UT-Austin), USA	A Path Toward Sustainable Battery Technologies
11/10/2023	Prof Devendra Ojha	TIFR	Observational understanding of star formation in the Milky Way and infrared instrumentation
20/03/2024	Prof Bhaskaran G	IMSc	Quantum Spin Liquids
20/10/2023	Jaya N Iyer	IMSc	Chow Lefschetz theorems for smooth hypersurfaces on smooth varieties

Departmental Seminars

Biology

Date	Speaker	Affiliation	Title
11/04/2023	Dr Vatsala Thirumalai	National Centre for Biological Sciences, Tata Institute for Fundamental Research, Bellary Road, Bangalore	Great expectations of larval zebrafish
19/07/2023	Prof Anjan K Banerjee	IISER Pune	Developmental dynamics of the 4th most important food crop of the planet
01/08/2023	Dr Nagaraj Balasubramanian	IISER Pune	Adhesion-dependent organelle regulation: Insights from the Golgi
05/10/2023	Dr Santanu K Ghosh	Department of Biosciences and Bioengineering, IIT Bombay	Remodels the Structure of Chromatin (RSC) remodeler in fungal pathogen
09/11/2023	Dr Ghanshyam Swarup	CSIR-Centre for Cellular and Molecular Biology, Hyderabad	Molecular mechanisms of neurodegeneration caused by mutations of optineurin
23/11/2023	Prof Maitrayee DasGupta	Department of Biochemistry, Calcutta University	Symbiosis Receptor Kinase (SYMRK) guides the intracellular symbiosis between plants and diazotrophs
13/02/2024	Dr Devyani Haldar	Staff Scientist-VI, Head, Laboratory of Chromatin Biology & Epigenetics, CDFD, Uppal, Hyderabad	How cells protect their DNA from damage: role of epigenetic mechanisms in maintenance of genomic integrity
15/02/2024	Prof Trevor Price	Professor, Department of Ecology and Evolution, University of Chicago	Organisers of Himalayan Biodiversity
20/02/2024	Prof Ian Owens	Director, Cornell Lab of Ornithology, Cornell University	The revolution is here: artificial intelligence, citizen science and the future of conservation
30/04/2024	Dr Kavita Babu	Associate Professor, Centre of Neuroscience, IISc, Bangalore	Cool behaviours that can be studied using the little worm

Chemistry

Date	Speaker	Affiliation	Title
17/04/2023	Prof Venkata Krishnan	School of Chemical Sciences, IIT Mandi	Green Chemistry and Heterogeneous Catalysis to Achieve Sustainable Development Goals
02/06/2023	Dr P C Ravikumar	School of Chemical Sciences, NISER Bhubaneswar	Carbon-Carbon bond Functionalization of Strained Carbocyclic
05/06/2023	Prof V Chandrasekhar	Director, TIFR Hyderabad	The Utility of Phosphorus-based Ligands in Molecular
20/06/2023	Prof M Sankar	Department of Chemistry, IIT Roorkee	Metalloporphyrins for Solar Cell, Sensing and Catalytic Applications
10/07/2023	Dr Damodara Reddy N	Senior Scientist, CSIR-CDRI, Lucknow	Molecular Editing and Scaffold Diversification of Therapeutic Peptides and Salicylanilides
01/08/2023	Prof Vibha Tandon	Special Centre for Molecular Medicine, JNU, New Delhi	Odyssey of Small Molecules as Therapeutic Agents to Combat Critical Human Diseases: A Way forward
31/08/2023	Dr Ananya Mishra	University of Bristol, UK	Programmable Protocells: Synthetic Compartments to Functional Cytomimetic Materials
15/09/2023	Dr Prasenjit Das	TU Berlin, Germany	Design and Development of Pore Functional Metal and Covalent Organic Frameworks for Energy and Environmental Applications
27/10/2023	Dr Barun Kumar Maity	The Chong Laboratory, Caltech, USA	Super-resolution Imaging by Peptide-PAINT and Multivalent LCD-LCD Interaction in Regulating PAX3FOXO1 Transcription in Rhabdomyosarcoma
12/12/2023	Prof Suresh Valiyaveettil	Department of Chemistry, National University of Singapore	Plastic pollution – Challenges, Environmental Impact and Solutions
16/02/2024	Dr Dibyendu Das	Dept of Chemical Sciences and CAFM, IISER Kolkata, India	Feedback Driven Non-Equilibrium Synthetic Systems
20/02/2024	Prof Takuya Nakashima	Department of Chemistry, Graduate School of Science, Osaka Metropolitan University, Japan	Making Atomically Precise Metal Clusters Luminescent
29/03/2024	Dr Subhajit Bhunia	University of Texas at El Paso, USA	Dynamic Covalent Chemistry: A Fascinating Way to Heterogenize Molecular Active Site Choosing Different Topology

Mathematics

Date	Speaker	Affiliation	Title
01/09/2023	Dr Aditya Subramaniam	IISER Tirupati	Some results on Seshadri constants
08/09/2023	Dr Anil N	Bits Hyderabad	Robust and accurate meshfree adjoint approach for aerodynamic shape optimization
22/09/2023	Dr Anup Dixit	IMSc Chennai	A uniqueness theorem of Dirichlet series
29/09/2023	Dr Sujoy Chakraborty	IISER Tirupati	Real Structures on Root Stacks and Parabolic Connections
11/10/2023	Prof G P Rajaekhar	IIT Kharagpur	Boundary integral methods for fluid flow problems
13/10/2023	Prof G P Rajaekhar	IIT Kharagpur	Mathematical modelling of tumor growth and mechanical behaviour
27/10/2023	Dr Manjunath Krishnapur	IISc, Bengalore	Log-concavity of certain probability distribution
03/11/2023	Dr Anilatmaja Aryasomayajula	IISER Tirupati	Estimates of Mumford forms
10/11/2023	Dr Subhajit Ghosh	Bar-Ilan University Israel,	Aldous-tupe spectral gap results for the complete monomial group
15/11/2023	Prof K N Raghavan	IMSc	Log-concavity of certain polynomials
17/11/2023	Dr Debanjana Mitra	IIT Bombay	Stabilisation of Period flows

Physics

24/08/2023	Prof Basavaraj M	IITM	Drying Drops of Colloidal Dispersions
14/09/2023	Prof Priya Mahadevan	S.N. Bose centre	Why do twisted bilayers behave differently from their untwisted counterparts?
05/10/2023	Dr Sandeep Chatterjee	IISER Berhampur	Tracking the charges in relativistic heavy ion collisions
12/10/2023	Dr Dileep Mampallil	IISER Tirupati	Evaporating Drops: Exploring the Boundary Between Physics and Biology

Date	Speaker	Affiliation	Title
19/10/2023	Dr Rakesh S Singh	IISER Tirupati	Non-Classical Pathways of Phase Transition: An Energy Landscape Perspective
26/10/2023	Prof Kamaraju N	IISER Kolkata	Exploring Physics in Condensed Matter Systems Using Ultrafast and Terahertz Pulses
04/11/2023	Prof Chandan Dasgupta	IISc/ ICTS	Glassy Dynamics and Jamming in Dense Persistent Active Matter
09/11/2023	Dr S Sunil Kumar	IISER Tirupati	Study of light-matter interaction in the gas phase and beyond using a home-built multipurpose tool
12/12/2023	Prof John McGrady	University of Oxford	Computational cluster chemistry: from growth to catalysis
18/01/2024	Dr Sudipta Dutta	IISER Tirupati	Designing two-dimensional noncentrosymmetric systems for valley-polarization
14/03/2024	Prof Bhas Bhapat	IISER Pune	Electromagnetic radiation: Its influence on fundamental research and Society
19/03/2024	Prof G Bhaskaran	IMSc	Resonating Valence Bond States as Abode of Ambient Temperature Superconductivity
28/03/2024	Dr Tapan Chandra Adhyapak	IISER Tirupati	Physics of active particles: how important is fully resolved hydrodynamics
04/04/2024	Prof Ethayaraja Mani	IIT Madras	Unconventional methods for destabilization of emulsions
18/04/2024	Prof Maheswar Gopinathan	Indian Institute of Astrophysics	Distance and Dynamics of Molecular Clouds
25/04/2024	Prof Amit Ghosal	IISER Kolkata	Enigma of two-dimensional melting in a disordered environment

Humanities and Social Sciences

16/03/2024	Mr Nagaraju	Nippo Batteries, Tada, Chennai	Innovative thinking for today's Industry

Scientific Events on Campus

There are typically many academics events that are hosted on campus, and these can be department or domain specific, or be about science in a holistic sense. The last year saw many events on campus, and some of them are listed below.

Physics Day

The Department of Physics, IISER Tirupati organized the annual event of "Physics Day" on November 4, 2023. The theme of the event this year was Statistical Physics. Prof Chandan Dasgupta, Department of Physics, Indian Institute of Science, Bangalore and International Centre for Theoretical Sciences, Tata Institute of Fundamental Research, Bangalore, kindly consented to be the Guest-of-Honour and gave a lecture on "Glassy Dynamics and Dense Persistent Active Matter". In addition, faculty members and doctoral students showcased the research work done in the department in the form of talks and posters.

Meet the Editors from the Royal Society of Chemistry Event

The Chemistry Department at IISER Tirupati, together with the Royal Society of Chemistry (RSC), a professional body for chemical scientists with a worldwide community, arranged an insightful event titled "Meet the Editors: Indian Institute of Science Education and Research, Tirupati" on December 13, 2023, at IISER Tirupati. The event aimed to provide researchers with a platform to interact and engage with the RSC's leading experts in the field of chemistry.

The event commenced with introductory remarks from Dr Santanu Bhattacharya (Director, IISER Tirupati) and was taken forward by Dr Aparna Ganguly, RSC, who introduced the RSC India South activities, which support scientists at all stages of their careers. The event was filled with introductions to some of the exciting research, interactive discourse, and scientific writing sessions to immerse students in the world of chemical research and innovation. RSC's journal editors and board members, such as Dr Chilla Malla Reddy (Associate Editor and Professor at IISER Kolkata), who introduced his work on the mechanics of flexibility and self-healing of crystals, and Dr Subi J George's (Associate Editor and Professor at JNCASR) work on expanding the structural diversity in dynamic supramolecular polymers and chirality, were a great highlight of the event; and finally, the research talks concluded with Dr Akhila Kumar Sahoo's (Associate Editor

and Professor at the University of Hyderabad) work on the regioselective dicarbofunctionalization and cyclization diversity of unsymmetrical alkynes, which sparked quite an interest among our scholars. "Their use of C-H bond activation instead of coupling reagents to access the molecules was truly fascinating. We learned how there can be different perspectives or modified methods on how to answer a research question.", said Sivakumar G., PhD scholar at IISER Tirupati.

Dr Sally Howells-Wyllie's talk titled "The publication process demystified: writing research papers for maximum impact" on research writing and the editorial process was very informative. She provided valuable insights on how to effectively communicate research findings and navigate the publication process. Her tips on structuring a paper and addressing reviewer comments will definitely assist scholars in boosting their research communication skills. "We got to know how to properly write research papers so that they reach a wider audience regardless of their background.", said Camelia Dutta, IPhd Scholar at IISER Tirupati.

The speakers provided valuable insights into cutting-edge research and its potential applications. Overall, the event was a great success and served as a platform for students to gain a deeper understanding of chemical research.

Math events

In addition to regularly hosting eminent visitors, the Mathematics Department at IISER Tirupati has initiated lively and topical seminars to further collaboration among the members of the mathematical community at IISER Tirupati and nearby institutions. Last semester, the department restarted the tradition of the biweekly Graduate College Seminar Series, where graduate students and postdoctoral scholars give talks on a niche topic within their domain of mathematics. The current focus is on Moduli Problems in Vector Bundle Theory, a sub-domain of algebraic geometry in which India has been a world leader for the past four decades. In addition to these lectures, PhD student Aarthy Venugopal gave a series of lectures in 'Number Theory Seminar'. Her talks focused on Class Field Theory, one of the foundational theories in algebraic number theory. All of these talks are open to all. Dr D S Nagaraj, emeritus professor from IMSC Chennai and visiting professor at IISER Tirupati, comments that seminars like these ignite discussions and consequently broader interest in mathematics, while simultaneously allowing for a deeper understanding of challenging concepts.

Foundation Day

On 28th March, IISER Tirupati celebrated its Foundation Day, marking a significant milestone in its journey. The event featured two esteemed scientists, with Prof M M Sharma delivering the keynote lecture on “Innovations in Chemical Industry: Chemistry Driven” and Prof S Chandrasekaran presenting a thought-provoking talk titled “Organic Synthesis: Quo Vadis” enriching the scientific discourse of the day. The foundation day also served as a platform to honour student achievements in both academics and extracurricular activities. The prestigious Prof CNR Rao Award was awarded to the first-semester topper, alongside recognition for all batch toppers with academic awards. This year, the Dean's Office and the Committee of Student Activities (COSA) expanded the awards for extracurricular excellence from two to six categories. These included Leadership (2), Science, Culture, Sports, and Social, celebrating students who have excelled in various domains. In addition, faculty from various departments and staff were recognized for their exceptional contributions to the Institute. The event concluded with the release of the annual student magazine, Dhwani, by the Director, Prof Santanu Bhattacharya, along with the chief guest, special invitee and students, highlighting the vibrant contributions of the student community.

Inter-IISER Ecology meeting

The Inter-IISER and allied institutional meeting on ecology was attended by members of the faculty and students from several premier research and educational institutions across India, including the IISERs, CCMB, TIFR Hyderabad, and Krea University. With 85 participants, a wide range of topics were discussed. The event was organised at IISER Tirupati between 26th-28th January 2024.

Most IISERs have an urgent requirement to strengthen the current academic and research programmes in ecology and evolution. This requires that advanced courses be made available to PhD scholars in these subjects, as well as to senior undergraduate students. There was consensus to develop and deliver a set of additional advanced courses for students in ecology and evolution to render them competitive with the Ecology-Evolution departments at international universities. The attending faculty formed a Teaching Consortium that will leverage the diverse expertise available across institutions to offer a basket of advanced courses. The first courses are set to start in January 2025.

The group identified potential for bringing research synergies by assisting or facilitating using the network of campuses of IISERs to facilitate field-based research. They also identified several administrative challenges that ecologists face in conducting field research that require resolution through further discussion. Students had a parallel, breakout group meeting and they agreed to rotate hosting of the Inter-IISER meetings at different locations each year.

Biology Day

The department of Biology, IISER Tirupati organized the annual Biology Day on 3rd February 2024. The event featured a captivating keynote lecture by Dr Dasaradhi Palakodeti, InStem, Bangalore, whose research on pluripotency and regeneration in Planaria provided deep insights into the mechanisms behind these biological processes. Three student talks were presented by Mayur Bajaj, Rahail Ashraf, and Lohitha Cheenepalli, highlighting their cutting-edge research in diverse areas of biology. The event also featured a poster session, with 28 posters from various students in the department, fostering scientific dialogue and collaboration. The department also gave best poster awards to seven participants in recognition of their research contributions. The event was sponsored by Care Biosystems India Pvt. Ltd., DSS, Indian Scientific Company, Himedia, Unique Life Sciences, and Eppendorf, whose support was essential in making the event a success. Overall, Biology Day 2024 was an inspiring event, promoting knowledge exchange and showcasing innovative research from students and professionals alike.

Tripartite Ecological Research Seminar

This was organised between Cornell University, Chicago University and IISER Tirupati on 20th February. The Cornell Lab of Ornithology is arguably one of the world's leading Ornithology research centres, with various independent groups functioning within it. This includes the K Lisa Yang Centre for Conservation Bioacoustics which is supported by a USD 24 million philanthropic donation. The director of the Cornell Lab of Ornithology, Prof Ian Owens was also joined by a group leader on Citizen Science and a postdoctoral researcher. Prof Trevor Price, Chicago University was also at IISER as part of his Fulbright Fellowship in India and gave lectures at IISER Tirupati during his visit. Students from IISER Tirupati conducted joint fieldwork with Prof Price in Andhra Pradesh on birds in the landscape prior to the meeting. On 20th February, we conducted a tripartite research seminar with presentations from faculty and students and faculty. A set of 14 talks and 10 posters were presented through the day, and Prof Ian Owens and Prof Trevor Price also gave Biology Department Seminars during their stay here.

Pl. give Filler


KIPSTA

Societal Impacts

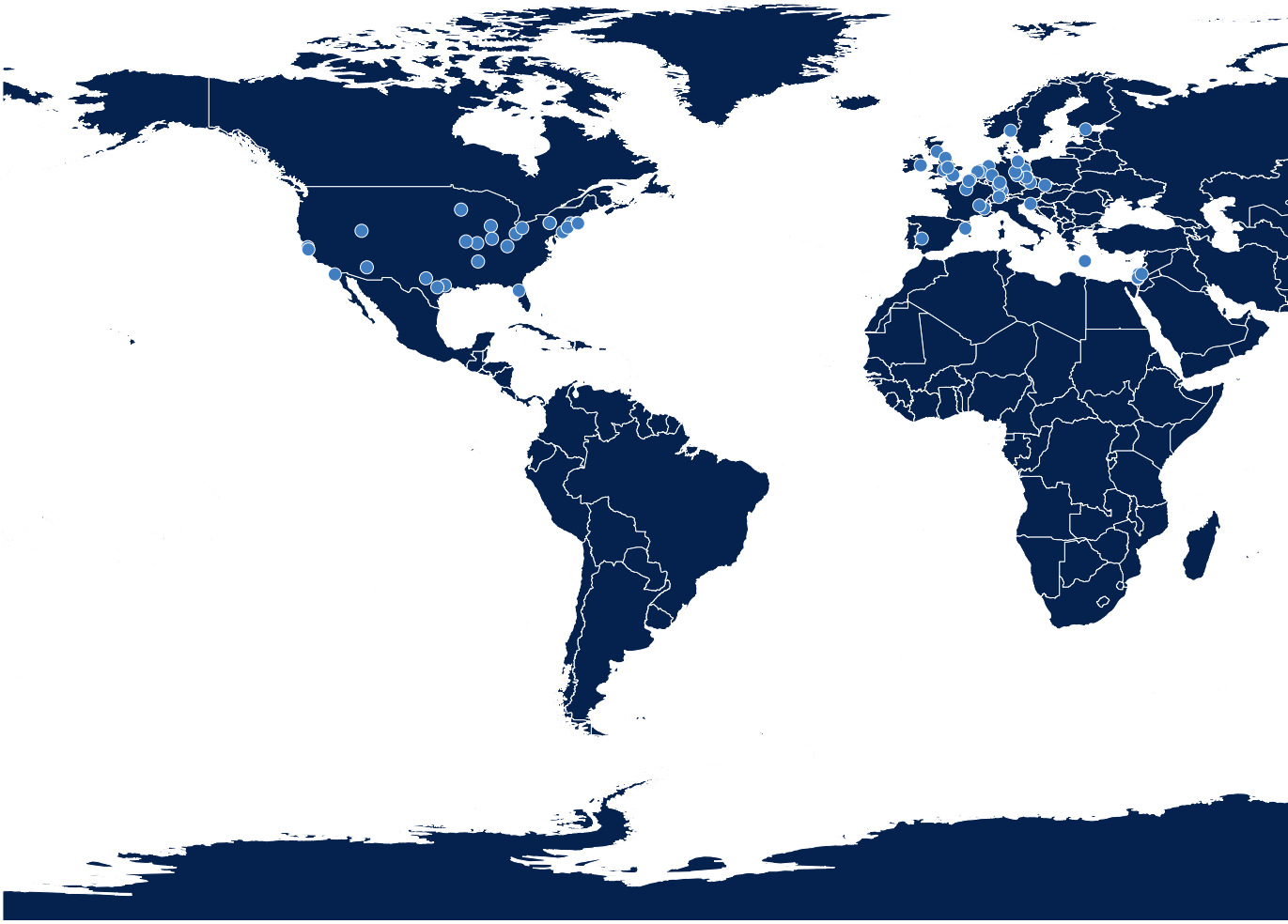
Engaging with society

In the past year (2023-2024), IISER Tirupati increased the scope of its engagement with society, furthering dialogue with industry, government and civic society. We work at the regional, national and international levels and initiatives include a patent program, industry connections, teacher skilling workshops, middle school science camps, and engaging with government.

Research Collaborations

International

Faculty at IISER Tirupati collaborate with several renowned institutions for research and education



Aalto University
American Museum of Natural History
Bar-Ilan University
Biotechnical Faculty, University of Ljubljana
Brookhaven National Laboratory
Case Western Reserve University
Charles University
Chonnam National University
Columbia University
Cornell University
Dublin Institute for Advanced Studies
Duke University
ENS de Lyon
ENS Paris Cite
Freie Universität Berlin
German Center for Neurodegeneration
Goethe University Frankfurt
Harvard Medical School
Harvard School of Engineering and Applied Sciences
Harvard University
Humboldt University of Berlin
Icahn School of Medicine
IESL FORTH, University of Crete
IGZ, Grossbeeran
Kavli Institute for Astronomy & Astrophysics
Kwansei Gakuin University
Lawrence Berkeley National Laboratory
Leibniz Institute for Catalysis e. V (LIKAT), Germany

Leiden University
Martin Luther University Halle-Wittenberg
Max Planck and University of Bochum
Max Planck Institute of Microstructure Physics
Max-Planck Institute for Complex Systems
Max-Planck Institute for Nuclear Physics
Monash University
Museum für Naturkunde
Nanyang Technological University
National Astronomical Research Institute of Thailand
National Central University
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Nottingham University
NUS-DUKE Medical Center
Ohio State University
Okinawa Institute of Science and Technology (OIST)
Osaka Metropolitan University
Purple Mountain Observatory
Regional Centre of Advanced Technologies and Materials, Palacky University
Rose Hulman Institute
SanDiego State University
Singapore University
Stanford University
Technical University of Darmstadt
Technion
Tel-Aviv, University
TelHai Academic College
Texas A&M University
The University of Melbourne
The University of Missouri
Tohoku University
Tokyo Institute of Technology
TU Berlin
Uni Surrey
Universitat Pompeu Fabra
University Hospital in Zurich
University of Amsterdam
University of Arizona
University of Artois
University of Birmingham
University of California Davis
University of California, Davis
University of Chicago
University of Edinburgh
University of Extremadura
University of Florida
University of Grenoble
University of Groningen
University of Heidelberg
University of Kentucky, Lexington
University of Lille1
University of Mannheim
University of Massachusetts
University of Memphis
University of Minnesota
University of Oslo
University of Paris-Saclay
University of Texas, MD Anderson Cancer Centre
University of Texas@Austin
University of the Arts
University of Tuebingen
University of Western Sydney
Utrecht University
Warwick University
Washington University in St Louis
Weizmann Institute of Science, Israel
Yale School of Medicine
Yeungnam University

National

Researchers from IISER Tirupati collaborate and publish with organisations across India

Amrita Vishwa Vidyapeetham
Acharya N G Ranga Agricultural University
ARIES
Ashoka University
ATREE
Banaras Hindu university
Central Electro Chemical Research Institute
Central Agricultural University
Centre for Cellular and Molecular Biology
Centre for DNA fingerprinting and Diagnostics
CSIR Institute of Genomics and Integrative Biology
GAIL (India) Limited
Institute of Bioinformatics and Applied Biotechnology
International Centre For Genetic Engineering And Biotechnology
Indian Institute of Science
IISER Bhopal
IISER Kolkata
IISER Mohali
IISER Pune
IIT Bombay
IIT Delhi
IIT Goa
IIT Hyderabad
IIT Jammu
IIT Kanpur
IIT Kharagpur
IIT Madras
IIT Roorkee
IIT Roorkee
IIT Tirupati
The Institute of Mathematical Sciences
International Centre for Theoretical Physics TIFR
Indian Statistical Institute Bengaluru
Indian Statistical Institute Kolkata
Keystone Foundation
Krea University
L V Prasad Eye Institute
National Agri-Food Biotechnology Institute
National Centre for Biological Sciences TIFR
Nature Conservation Foundation
National Brain Research Centre
National Chemical Laboratory
Nizam Institute of Medical Sciences
National Institute of Mental Health and Neurosciences (NIMHANS)
Physical Research Laboratory
Pondicherry University
Reliance Industries Limited
S N Bose National Centre for Basic Sciences
Salim Ali Centre for Ornithology and Natural History (SACON-WII)
Shiv Nadar University
SV University College of Agriculture
Sardar Vallabhbhai National Institute of Technology
Tata Steel Limited
Tezpur University
TIFR Hyderabad
TIFR Mumbai
University of Hyderabad
University of Kashmir
Wildlife Conservation Society
Wildlife Institute of India
Wildlife Research and Conservation Foundation
World Wildlife Fund for Nature

Industry and the Start-up Ecosystem

Introduction

IISER Tirupati is rapidly evolving as a center of excellence for learning and research. Over the years, the institute has carved a niche for itself; it has brought academia closer to industry, created a spirit of entrepreneurship, and generated major contributions national scientific and technological growth. IISER Tirupati collaborates strategically with leading industries and start-ups to solve real-world challenges, develop new technologies, and nurture the next generation of scientists and entrepreneurs.

Major Industry Collaborations

Critical collaborations with some of the leading companies in the industry have strongly established IISER Tirupati as a hub of cutting-edge research and innovation. Of these, one is with **Tata Steel** in which the institute leads a development process for a catalytic system to produce carbonaceous material from carbon dioxide without an external supply of hydrogen. This is one of the initiatives displaying the commitment of the institute towards **sustainable industrial practices**. Continuing on the same lines, IISER Tirupati, is involved in a significant project with **GAIL (India) Limited** on the direct conversion of carbon dioxide into polycarbonate (diol) wherein an advanced catalyst and sophisticated process development methodologies are being employed, as the institute is also concerned with **environmental sustainability and its application in industrial processes.**

Another significant collaboration is with **Reliance Industries Ltd. (RIL),** where IISER Tirupati is involved in the synthetic design of electron donors for Ziegler-Natta polymerization catalysis. The outcome is expected to be **new processes and products,** showcasing the capability of the contribution of the institute toward advanced industrial applications. In the pharma sector, an important collaboration of IISER Tirupati is with **Atul Pharmaceuticals.** Under Dr Kiran Kumar's leadership, the institute is developing a novel electrochemical way of converting p-Cresyl methyl ether to p-Anisaldehyde, which is a value-added product and important fine chemical.

Amara Raja Batteries Pvt Ltd is collaborating with IISER Tirupati on a DST-sponsored project relating to recycling graphite from spent lithium-ion batteries under the **waste management** and appropriate development of technology mandate. The collaboration with **Tata Consultancy Services (TCS)** in the area of **quantum computing** helps in knowledge sharing and leads to the advancements of this frontier area.

In the area of **ecology,** IISER Tirupati has been conducting surveys and carrying out educational programs at the **Andhra Pradesh Mineral Development Corporation's** Bartyes Mine in Mangampet. Now into the fourth year, the project, headed by Dr Nandini Rajamani, has reemphasized the commitment by the institute toward the saving of the environment.

Another initiative in the domain of **ecology** is an initiative with the aviation industry to understand, predict and eventually prevent bird hits on aeroplanes. Such hits are known to cause serious technical and financial losses to the industry. Dr Robin V V's group currently works with three GMR airports (Delhi, Goa, Hyderabad), which provide biological samples of bird strikes from planes. IISER Tirupati researchers then conduct molecular analyses to identity the bird or bat species. This together with the metadata of the flight paths and timings will eventually enable the group to come up with predictive pattern analysis to prevent damage to both birds and aeroplanes.

Support for the Start-up Ecosystem

The institute does not only work with large industry houses in the sector but is also deeply associated with support for the start-up ecosystem for innovation and entrepreneurship. For instance, IISER Tirupati is very closely associated with a chemical synthesis start-up, **CHEMICEA,** where the faculty are able to **offer expert consultation on some of the most complex chemical processes.** This collaboration helps CHEMICEA get over technical bottlenecks and move ahead with the development of specialty chemicals and API intermediates. The major strategic collaboration has been with Boston-based synthetic biology start-up **Ginkgo Bioworks Inc.** wherein IISER Tirupati's Dr Rajesh Viswanathan acts as a consultant regarding strategic advice on technical scalability, problem-solving, and market alignment of the company in the competitive biotech landscape.

The institute has also entered into a collaboration with Cancrie, a Rajasthan-based start-up that works in new energy storage technologies. The work is on the development of high surface area activated carbon from coconut shells for lithium-ion capacitors. This goes on to show that IISER Tirupati not only collaborates with a cutting-edge research project, but it also opens up scopes for joint patent filings, thereby further cementing the relationship between academia and the start-up community.

Entrepreneurship Development Initiatives

IISER Tirupati is actively fostering an entrepreneurial spirit within its community. The institute regularly conducts workshops and seminars to promote entrepreneurship

among students and faculty members. A recent highlight was the one-day workshop on "Entrepreneurship Development" held on February 17, 2024. This workshop was crucial in expanding knowledge and encouraging innovation within the faculty and student community. The event featured Dr Praveen Vemula from inSTEM, Bengaluru, who provided valuable insights into the patenting process and strategies for effective entrepreneurship. By organizing such events, IISER Tirupati ensures that emerging start-ups benefit from the institute's expertise and resources.

Conclusion

IISER Tirupati is on a path to making meaningful contributions to scientific research, technological development, and sustainable progress. Through its strategic collaborations with leading industries and its active support of the start-up ecosystem, the institute is committed to fostering innovation and entrepreneurship at all levels. These partnerships and initiatives address real-world problems while paving the way for future discoveries. As IISER Tirupati continues to grow, it stands as a driving force for scientific and technological advancement, bridging the gap between academia and industry.

Fostering Innovation and IPR

We are committed to building an environment at IISER Tirupati that fosters innovation, entrepreneurship, and industry collaboration. In keeping with this vision, IISER Tirupati's Industry Connection, Entrepreneurship, and Intellectual Property Rights Program, which is steered by Dr Ambrish Saxena, serves as a catalyst for academic research into previously unknown cutting-edge technologies and commercial success, thereby benefiting both scientists and students. Our program is about more than just protecting inventions; it is also about empowering our community to take the lead and have a worldwide impact in developing a knowledge-based economy.

IPR Cell and Innovation

With the help of IPR cell we support our faculty and scientists through every process that involves protecting their intellectual property. We have also been successful in filing six patents within just seven months, ranging from inventions of breakthrough chemical synthesis to sustainable battery design. All these highlight our commitment towards research to push science beyond the limits. By making the process of patenting smoother with a very understandable Invention disclosure form and unequivocal Institutional IP Policy, the number of patents are increasing.

We also take pride in our collaborations with industry leaders such as Reliance India and GAIL, with whom we have filed joint patents. This, along with support from the institute in financial terms, is pushing for stronger links of academia to industry and driving technological innovation.

Along with such collaborative efforts, we have been successful with the patenting of breakthrough innovations. The portfolio includes the electrochemical process for the selective conversion of CO2 to 1,2-diol, the process for preparation of selective β-deuterated branched ketones, and many more in the areas of sustainable energy storage and catalytic processes. These patents clearly point out the role which IISER plays in not only advancing science but applying it to benefit industry and society.

The IPR Cell also organizes workshops aimed at promoting innovation and entrepreneurship. On February 17, 2024, we conducted an IPR workshop with Dr Magesh from NCL, Pune. With more than 120 participants, this program was able to generate a good exposure to the basics of patenting and entrepreneurship, setting the community much more lively with an innovative culture.

Skill Development for the Future

In alignment with the National Education Policy (NEP), IISER Tirupati has launched skill development courses in the areas of Intellectual Property Rights and Drug Development. The course on IPR equips the students with the tools to be able to protect their invention and manoeuvre through the complexity of IP—capital skills required by any scientist or prospective entrepreneur. Also this opens up the avenue of an alternate career for our students. Our course is based on the concept that training in Drug Discovery and Development will aid students in attaining advanced training in emerging therapeutic areas to be competitively successful in the pharmaceutical industry.

Saamarthya, a workshop on Career Development was organized on 4th and 5th of May 2023. This initiative aimed at the graduating batches of 2023 and 2024 explored existing job opportunities as well prepared students to master social networking for occupational growth. We further gave on-the-spot training in drafting the SOPs and résumés and mock interviewing for upgrading the interviewing skills of the students. Their response was overwhelming; in excess of 75 students attended the event. Feedback highlighted that the workshop was useful in preparation for postgraduate employment opportunities. We also kept our assistance alive by having numerous one-on-one counselling sessions in place that helped reassure the students and provide them with personal advice according to their aspirations for a certain career.

Conclusion: A Future Driven by Innovation

Innovation is not just the end goal at IISER Tirupati; it forms the fabric that binds our existence. In other words, through our IPR Cell, skill development courses, and strategic industry tie-ups, we are fostering a culture where scientific discoveries translate into solutions that touch real lives. As we continue adding to the portfolio of patents and to the breadth of our workshops, IISER Tirupati emerges as an institution with a commitment to innovation that will definitely lead to breakthroughs and have a lasting impact on the scientific community and society at large.

Upskilling and Training Initiatives

In 2023-24, IISER Tirupati has launched a series of new programs to train and upskill the education community outside its walls, and our programs in the past year have focused both on teachers and students. IISER Tirupati has a teaching program par excellence, and our faculty are keen to engage with and serve to train the larger society.

Andhra Pradesh Polytechnic College Teacher Training Programs

IISER Tirupati launched a new series of activities in 2023- training teachers from colleges across the state. We established a relationship with the Directorate of Technical Education, Andhra Pradesh, which is the regulatory body overseeing polytechnic colleges all across the state. Polytechnic colleges offer a wide range of diploma degrees in a specified field of study (engineering, technology, computer science, healthcare, business, etc.). They focus on practical, hands-on training, enabling students to enter the work force with practical skills in addition to theoretical knowledge. IISER Tirupati conducted two teacher training workshops focusing on physics and chemistry, respectively. Dr Bhanu Sree Reddy coordinated the programs, working closely with the Physics and Chemistry departments at IISER Tirupati and the state Polytechnic colleges. Each workshop was attended by 30 teachers from polytechnic colleges across Andhra, with the closest college being in Chittoor and the farthest in Srikakulam. The three-week-

long residential training programs focused on three areas: a refresher course on the latest research concepts in the subject domain, exposure to modern pedagogical methods and tools, and experiential learning sessions (hands-on training in laboratory experiments and set-up). The IISER team, composed of the organisers from the Humanities and Social Sciences department and all faculty members from Physics and Chemistry (17 and 18 respectively), conducted sessions. Graduate students and staff from the two departments also played supportive roles. Participants were taken on field trips around Tirupati, to the nearby NARL, Amararaja Batteries, and even to the SV Zoological Park, to expose them to the collaborations that IISER Tirupati has with these organisations.

Training module for Andhra Pradesh Forest Department Officers

The State Forest Academy at Rajahmundry facilitated a 3-day orientation program for these newly recruited officers and requested IISER Tirupati to support them with training on the identification of birds. A total of 150 officers in multiple batches were trained by Mr Raja Sekhar Bandi, and multiple in-house sessions were conducted at the Forest Academy. Also, a batch of 38 Range officers in training from Central Academy from State Forest Service Burnihat, Assam were engaged at Kolleru Bird Sanctuary and introduced to the conservation of wetland birds and their habitats. In collaboration with the WWF India office, a three-day long orientation session was conducted at the Telangana State Forest Academy in Hyderabad for Range Officers from the state of Maharashtra.

Teaching teachers Innovation

Dr Bhanu Sree Reddy, Professor-Visiting has represented IISER Tirupati as a special Guest for “State Level Atal Tinkering Labs (ATL) Teachers Meet in Andhra Pradesh” at Vijayawada. This meet was organized by Samagra Shiksha, Andhra Pradesh Department of School Education which hosted 577 ATL Teachers across Andhra Pradesh. She led a session on Design Thinking for the teachers who attended this State level meet.

Young Birders Camp

India has a growing community of birdwatchers, and surprisingly, many of these are young school children and teenagers. While some of them have built impressive skills in identifying bird species, calls, and associated habitats, most lack exposure to scientific research being conducted in India and worldwide. IISER Tirupati hosted a first-of-its-kind, 3-day residential camp for talented young birders between the ages of 14 and 18 years to demonstrate that the adoption of critical thinking can turn simple bird observations into very useful scientific data. The focus of the Young Birders Camp, held between December 22-25, 2023 at the IISER Tirupati Yerpedu's Campus introduced students to the scientific method and key concepts in ornithology, while including field activities as well as hands-on sessions on nature journaling and artwork. 20 young birders were selected after two rounds of screening over 200 applicants from all across India. The organizers also offered full camp scholarships to two participants and a partial scholarships to one participant who showed remarkable potential during the interviews. IISER researchers and faculty taught

ornithology masterclasses, which introduced concepts of natural history, taxonomy, morphology, functional diversity, evolution and acoustics. Students were trained in using hand-held acoustic recorders to record bird calls on the IISER campus and later analyze them in RAVEN software. They were also taught an art masterclass by artist Rupa Samaria, an external resource person. Students also got the opportunity to meet other IISER faculty from Biology, Physics, and Chemistry, and learnt of their research programs.

Engaging with the Government

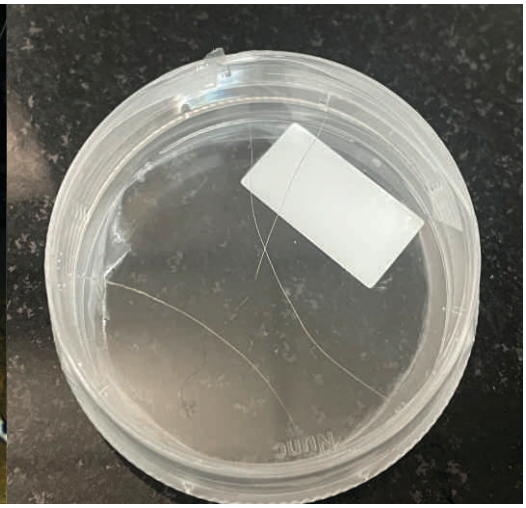
IISER Tirupati engages with governments and government organisations at various levels, and faculty serve on committees, engage with policy creation and provide services whenever possible. In the past year, we have served at the regional and national levels across India, in various capacities.

High-profile wildlife conflict in Tirupati

In a tragic human-wildlife conflict incident in Tirupati in August 2023, a young girl was attacked and partially consumed by a wild carnivore along the Tirumala-Alipiri footpath to the Tirumala temple. IISER Tirupati was consulted by the Andhra Pradesh Forest Department to unravel the identity of the exact animal involved in the conflict through meticulous examination of evidence coupled with state-of-the-art gene sequencing techniques that were not known to be employed earlier in similar conflicts in the country. IISER researcher team, led by Dr Nandini Rajamani worked closely and rapidly with the Andhra Pradesh State Forest Department and the TTD board to provide a solution to the crime within three months, with sequential results being submitted every few weeks. These results were used in the active management of the situation, and enabled a science-based resolution of the problem. The identity of the animal responsible was confirmed, and communicated in confidence to the Forest Department authorities. Being locally based around the forests of the Seshechalam Biosphere Reserve, IISER Tirupati hopes to be a critical stakeholder in protecting the delicate balance of ecosystems, fostering a future where the local communities, pilgrims, and wildlife can coexist in mutual respect and harmony.

Invasive species and the Madras High Court Advisory Committee

The spread of invasive species is a globally recognised threat and is estimated to cost billions of dollars in economic loss. The Madras High Court, while hearing some cases related to invasive species, formed a committee on invasive species to provide scientific information. Dr Robin V V's group has documented the spread of various invasive species across various high altitude regions of Tamil Nadu with high-resolution satellite images. They submitted their data to the High Court, indicating areas for conservation prioritisation and restoration action. This was subsequently conveyed to the Tamil Nadu government by the High Court, resulting in active restoration of habitats on the ground.



Monitoring restoration in Kerala and Tamil Nadu

Following the widespread impacts of the Kerala floods of 2018 and the recent Public Interest Litigations in Tamil Nadu indicating that landscape change has impacted drinking water availability, the Governments of both states have started taking targeted measures to restore habitats to a natural state in the high-elevation areas of the Western Ghats, which comprise of Shola forests and grasslands. Dr Robin V V's group has collated detailed remote sensing data that examines such change and used this to advise the Kerala Forest Department of specific locations in the Munnar landscape to conduct restoration activities. The Tamil Nadu Forest Department requested IISER Tirupati to conduct biodiversity assessments of potential areas they planned to restore, and also to monitor some of the areas where they had already conducted restoration. The IISER research team assisted four forest divisions in conducting such assessments to help plan and monitor restoration.

Framing International Policy on Ecological Networks

The Bureau of Indian Standards is the National Standards Body of India, a governmental organisation that develops and publishes across various sectors of industry and government in India to ensure quality assurance. It works to create uniformity regarding terminology, product specifications, protocols, and procedures followed. They work in tandem with the International Organization for Standardization, which is an independent, non-governmental, international standard development organization composed of representatives from the national standards organizations of member countries.

Dr Nandini Rajamani is a member of a Study Group working with the Service Sector Division Council to develop a Technical Report on Ecological Connectivity and Networks, in coordination with the International Organization for Standardization over two years. This report will lay the foundation for developing formally accepted standards on Ecological Networks, and these will be adopted both nationally and globally.

Science and Society Program

IISER Tirupati has an active Outreach Program that spreads scientific knowledge and temper to organisations around Tirupati and Andhra Pradesh, simultaneously focusing on communities as well as schools and universities in the neighbourhood.

Reaching Tirupati Schools on Science Day

Scientific institutions all over India celebrate National Science Day by inviting the public into their campuses and laboratories. Every year, IISER Tirupati has celebrated Science Day with gusto, and laboratories set up stalls with activities that demonstrate and educate. Over 550 school students from over 6 schools walked around the exhibits and stalls that were set up around the LHC courtyards (ground floor and first floor), corridors and classrooms. Student clubs showcased exhibits across all sciences, and some clubs used scientific principles to create fun games or illustrate issues of relevance to health and safety. Two eminent guests, Prof Tanusri Saha Dasgupta from IACS Kolkata, and Prof LS Shashidhara from NCBS, Bengaluru started off the celebrations of the day with research talks. Another highlight of the day was the presence of two life-size *Lantana* elephants in the courtyard of the LHC. *Lantana*elephants are part of a conservation initiative that aims to create awareness about coexistence between wild animals and humans. These life-size Elephants are constructed from an invasive weed called *Lantana camara* and crafted by a team of 150 indigenous artisans from across South India, many of whom experience daily negotiation with nature first-hand.

Student exchange programs across India

Yuva Sangam is the Government of India's fully-funded youth exchange student program mandates that students are exposed to tourist attractions (Paryatan), traditions (Parampara), development activities (Pragati), local technology (Prodyogik) and communities (Paraspar Sampark) of the state they are visiting. IISER Tirupati and NIT Agartala were partnered together to play hosts and chaperons to exchange contingents of students between Tripura and Andhra Pradesh. 50 students (undergraduate, graduate and PhD) from each state were selected through state-wide open application processes, giving priority to those who hadn't travelled out of their states before, while also ensuring balanced gender and district representation. The Tripura contingent arrived at IISER Tirupati on 9th March 2024, and spent five days in Andhra Pradesh. They were warmly welcomed by Director Prof Santanu Bhattacharya as well as the student community, who showcased traditional dance performances like Kuchipudi and Bharatanatyam. In the following days, they were taken

to SHAR, NARL and Sri City, and IIT Tirupati. For historic and cultural exposure, they visited Tirumala temple and Gudimallam (a historic temple preserved as an archaeological site), and participated in a Kalamkari workshop by a renowned local artist, Dr Niranjen. They also visited the nearby SOS village, and interacted with the District Collector, who highlighted the uniqueness of Andhra Pradesh and its products.

Teaching children of migrant workers

A group of PhD and BS-MS students at IISER Tirupati (Team Unmochan) initiated a structured program to educate the children residing in the construction workers' labour colony on the campus. This team of educators, comprising 30 committed PhD students and about 25 BS-MS student volunteers, teaches forty-five children six days a week, conducting two sessions each day, one in the morning and another in the afternoon. The children range in age from 3 years to 12 years, and they are divided into three batches based on their abilities to read and write. The IISER Tirupati student team teaches the students basic literacy and math skills, using Hindi, English, Bengali and occasionally Telugu as their mediums of instruction. With the assistance of the IISER Tirupati authorities, the children have been provided essential materials such as slates, chalk, books, notebooks, pens, pencils, erasers, sharpeners, drawing colours, and pencil boxes.

Biodiversity Outreach and Citizen Science Program

IISER Tirupati continues to have a vibrant and growing biodiversity outreach and Citizen Science Program, which organises events and provides training in awareness of biodiversity around Tirupati and Andhra Pradesh. IISER Tirupati is uniquely positioned in being located at the foothills of the Seshachalam hills and the Eastern Ghats, and our biodiversity outreach program aims to highlight the unique ecological value of the landscape. Listed below are some of the activities of the program in the past year.

A Biodiversity Outreach program based out of Dr Robin V V's lab has conducted more than 20 nature walks with about 470 citizens were participated and trained in basic bird identification. Multiple walks for citizens and students have been conducted at SPMVV campus, SV Zoo, and Nagaravanam, a park managed by the AP Forest Department. IISER Tirupati channelled the energy of citizen birders of the state, and organised Andhra Pradesh's first state birders meet at Maredumilli in March 2024. We also organised the first Papikonda Bird Survey, working with citizens to survey the lesser known avifauna of Papikonda National Park. IISER Tirupati has also initiated Campus Biodiversity Registers at campuses other than our own, including IIT Tirupati, Sree Venkataeshwara University and Sri Padmavati Mahila University.

Connecting with our Alumni

The IISER Tirupati Alumni Association, established in 2023, brings together faculty members and graduates from the institute with Alumni members. In the past year, the Association celebrated the achievements of five graduating cohorts, many of whom have pursued doctoral degrees at prestigious global institutions, including Ivy League universities. The official launch of the Alumni Association was on the 2023 Foundation Day. Faculty members from various departments were nominated to be Alumni Association members, with Prof Vijayamohan Pillai as President, Dr Vasudharani Devanathan as Vice President, Dr Gopinath Purushotham as Treasurer and Dr Subhash B as Secretary. Members include Prof Rajesh Viswanathan, Dr Aniket Chakraborty, Dr Arunima Banerjee, Dr Raghunath Ramabhadran and Dr Jatish Kumar.

The first in-person alumni meet was held on January 6, 2022, in the transit campus. Twenty alumni members participated in the event. The second meeting was held on January 13, 2023. During these gatherings, alumni shared their diverse experiences and professional journeys from around the world. They reflected on their overall BS-MS program and the diverse aspects of their curriculum and student activities that shaped them to build a career and to achieve their dreams. The alumni also hosted sessions focused on career opportunities following a BS-MS degree at IISER Tirupati, providing valuable insights to current students and recent graduates. The Association aims to foster a strong community and support network among its members, enhancing collaboration and connection within the global scientific and academic landscape. In addition to these two meetings, an oversees Alumni meet was held in Munich on October 2023.


IISER
TIRUPATI

Campus Life

A vibrant community

The campus at IISER Tirupati is a vibrant and dynamic space, with diverse student activities modern campus facilities.

Student Activities

At IISER Tirupati, we encourage and foster the holistic development of students. The young adults who enter our campus are nurtured towards becoming responsible global citizens. They are provided with ample opportunities to develop their creative, team building and leadership building skills. Activities carried out by student clubs and other collective student activities ensure this development. Over the last 9 years IISER Tirupati has had close to thirty student clubs which conduct meetings and events. Club activities include student-student sessions on specific thematic areas related to the clubs, sometimes inviting distinguished speakers. Sometimes clubs collaborate together and present an annual activity, such as the Abhiprajna, a National Student Science Quiz where students from other institutions are invited to participate. The Associate Dean of Students, the Committee Of Student Activities (COSA) and the Sports Committee oversee all student activities outside academics and research. The members of SAC body are the Cultural Secretary, Science Secretary, Sports Secretary, Hostel and Dining Committee Secretary. Both BS-MS and PhD students are represented in these committees.

This year, all student activities were conducted in the permanent campus (Yerpedu). Students participate in several kinds of events: cultural activities, club activities, creative activities, scientific activities, sports events, inter-institute competitive activities on and off campus and civic activities.

Cultural events

Cultural events organized in 2023-2024 included Melam (Onam), Manonmay (Ganesh Utsav) and Saraswati Puja. These were all part of Ek Bharat Shreshtha Bharat programs at IISER Tirupati bringing students from various states together to learn and appreciate the cultural diversity of the nation.

SPIC MACAY Event

On 7th October 2023 IISER Tirupati hosted a SPIC MACAY event featuring a performance by Vidushi Sikkil Mala Chandrashekar, an accomplished Carnatic music flutist. SPIC MACAY (Society for the Promotion of Indian Classical Music And Culture Amongst Youth) events are mandated by the UGC to promote Indian classical music and culture.

Club activities

List of clubs on campus

1. Astronomy Club (celestic)
2. Biowissen (Bioclub)
3. Shroedinger's kitten (Physics Club)
4. Synergy (Chemistry club)
5. Math club
6. Shemushi (Quiz Club)
7. Quantum club
8. Petrichor (Geoclub)
9. ECS club
10. Unnati (Outreach club)
11. Prakriti (Conservation Science Club)
12. Classical Arts Club (Anubhuti)
13. Sports Club
14. Photography Club (Fovea)
15. Birding and Trekking Club
16. Creative Filming Club
17. Movie Club
18. Literary Club
19. Arts Club
20. Dance club
21. Yoga club
22. Philosophy club
23. Rainbows
24. Coding club (PaCODEah)
25. Cubing club
26. Chess club (64 squares)

Selected Club Events

Aetherium Astrofest 2.0

A collaborative astronomy festival conducted jointly by IISER Tirupati and IIT Tirupati students took place on 21-22 October 2023, and featured various astronomy activities, competitions, debates and a skywatch session.

Math Club

The club organised a beginner's crash course on broad fields of Mathematics titled 'Graduate Seminar series on Geometry and Number Theory -- From the Bottom up' featuring lectures from several outgoing BS-MS 2019 batch students.

The club also celebrated organised a day-long seminar titled 'Celebrating Women in Mathematics' featuring guest speakers, alumni, and distinguished women faculty from Azim Premji University. Events included a mathematical fair, problem solving sessions, a movie screening and a panel discussion.

BIO Wissen

The club organised 'The Summer Laboratory (TSL)', an event where creativity and scientific inquiry converged. The event developed a sense of questioning and innovative thinking among the participants and not only showcased creativity but also ignited curiosity in attendees.

Prakriti club

The conservation science club conducted meetings to discuss a wide range of issues from sustainability issues on the campus to the global energy consumption rate. The club members also wrote articles on sustainable architecture, insect diversity, and created posters for Snake Safety and Environment Day. All awareness activities are coordinated on social media to reach a wider audience. The club is also a part of the All IISER Conservation Committee comprising clubs from other IISERs, IISc and NISER, which discuss and collaborate on the same issues. A Tri-Club Gathering was hosted on 16 October 2023.

Unnati and Shemushi Clubs

The clubs jointly organised an event on the occasion of the International Day for Women and Girls in STEM. The one-day event featured presentation of research by women doctoral students to school students. The objective of the event is to motivate young school students to enter the STEM areas, in particular Physics, Mathematics and other areas of science where there is lower representation of women.

Creative Activities

Scintillate magazine

The first edition of IISER Tirupati's science magazine-Scintillate, was published this year. With over a hundred pages, the magazine brings together the efforts of the entire IISER Tirupati community and also highlights talent from beyond our community. Featuring articles from not just the students of IISER Tirupati but also faculty, alumni, and friends from other institutes, it has a wide selection of articles covering a range of topics across all of science.

Dhwani magazine

In the first quarter of every year, students release the annual issue of the college magazine. During Science Day 2024, Dhwani was released by the Director Prof Santanu Bhattacharya and the Chief Guest Prof LS Shashidhara. https://www.iisertirupati.ac.in/students-club/

Scientific Activities

100 Months of IISER Tirupati

The enthusiastic student body organized cultural events and celebrated the 100th month of IISER Tirupati's existence on 10th January 2024. IISER Tirupati started to function on 10th August 2015, on the temporary campus at Mangalam. Director Prof Santanu Bhattacharya presided over the celebrations.

Inter-Institute Competitive Events IICM

The annual Inter-IISER Cultural Meet (IICM) event conducted amongst students from leading research institutions across the country was hosted this year by IISER Mohali at their campus in Mohali. The event was scheduled from 18th December to 20th December and this year's event saw participation from all of the IISER's, NISER, IISC and CEBS. The IISER Tirupati contingent included 65 BS-MS and iPhD students who traveled to the IISER Mohali campus to participate in various events. This year, the squad came out successfully winning medals in Editor's Spree, Book Cover Designing, Synchro Dance, Group Dance, Dance Battle etc. Mr Mukesh Kumar from BSMS 2020 was the contingent head and cultural secretary.

Sports at IISER Tirupati and IISM

The sports club of IISER-T is the institute's ongoing and consistent effort to encourage and establish a healthy, respectful and competitive sporting community within the institute. Members of the club belong to a tightly knit community of student athletes, recreational players and highly experienced sports faculties. The primary goal of the club is to build a long-lasting culture of high-level sports, training and participation which we believe is crucial and necessary for everyone. 2023 was by far the biggest year for IISER-T in terms of sports. We regularly participate in friendly matches against Institutes all over Tirupati in various events. Led by an enthusiastic organising team, we have taken part in two major sporting events this year, Sanyog, organized by IIT Tirupati and the IISM 23 (Inter IISER Sports Meet 2023). Our exceptionally talented table tennis team were crowned champions in this year's edition of Sanyog out of 10 participating universities. The IISM meets which serve as the biggest motivation for our efforts all year round, and this years IISM has been particularly rewarding. Having secured multiple gold and silver medals in athletics, bronze in women's basketball, bronze in women's football and silver in women's kho-kho alongside valiant efforts throughout all sports, this year marks our highest final position in IISM yet and we firmly believe this is just the beginning. The contingent was led by Mr Senthilvel, BS-MS student 2020 batch.

Civic Activities

The NSS (National Service Scheme) unit of IISER Tirupati conducts many government-mandated activities including the 'Swachhatha Pakhwada' and the 'Mera Pehla Vote Desh Ke Liye' events. In the year 2023-2024, the NSS unit organized various activities both on campus and also in the nearby villages.

Some of these are listed below:

Swachhata Hi Seva, a campaign by the Ministry of Housing and Urban Affairs, Government of India to make India garbage-free. The event was organised at Sreenivasapuram, Yerpedu on 1st October 2023, with banners carrying the slogans 'Ek tareekh Ek ghanta Ek Saath', 'Ek kadam swachhata ki or'. The Director, Registrar, Dean Faculty, students, teaching and non-teaching staff, and villagers participated in the event.

Rashtriya Ekta Diwas was celebrated to honour the 'Meri Maati Mera Desh' campaign by the Government of India from 7th to 14th October 2023. Students and non-teaching staff planted 200 trees on the permanent campus.

A Unity Run was organized by both the NSS and the sports units of IISER Tirupati on 31st October 2023.

Mera Pehla Vote Desh Ke Liye', a campaign initiated by the Ministry of Education, the Ministry of Youth Affairs and Sports, and the Ministry of Information and Broadcasting, Government of India was honored through an event on 13th March 2024. Students and (non)-teaching staff recited the required pledge during the event.

National Celebrations

In the year 2023-2024, IISER Tirupati celebrated several days of national importance organizing events of various kinds. Some details of the days celebrated are given below

World Bicycle Day: The Institute organized a Cycling Event on the occasion of World Bicycle Day to create awareness of physical activities on 3rd June 2023 (Saturday). The faculty, staff & students actively participated in the event.

Yoga training program: The institute organized a five-day yoga training program from 16th to 20th June 2023 to celebrate International Yoga Day-2023, as "cultural pride" under Azadi ka Amrit Mahotsav. The faculty, staff & students actively participated in the training program.

International Yoga Day 2023: The Institute observed International Yoga Day on 21st June 2023 as "cultural pride" under Azadi ka Amrit Mahotsav.

Women's Equality Day: To celebrate gender equality day on 26th August 2023, the Vice Chancellor of Avinashilingam Women's University in Coimbatore, Prof Bharathi Harishankar addressed the campus.

National Sports Day was organized at the Institute on 29th August 2023 on the occasion of the birthday of hockey legend Major Dhyan Chand. The following events were conducted for students and staff from 23rd – 28th August 2023: Volleyball, Badminton, Carrom, Chess, Basketball, Football, Table Tennis, and Three Km Run.

Hindi Workshop: The Institute organized a Hindi Workshop on 15th September 2023. The faculty, staff & students actively participated in the event.

Hindi Pakwada: The institute organized Hindi Pakwada from 18th to 27th September 2023 to promote official language in the Institute. The faculty and staff actively participated in the various activities and competitions held as part of the programme.

Vigilance Awareness Week: The institute observed Vigilance Awareness Week for the year 2023 from 30th October to 5th November 2023. The Director administered The Integrity Pledge to all the employees on 30th October 2023.

Constitution Day was observed on 26th November 2023. Dr. Madhuri Paradesi, Associate Professor and Chair, Department of Law, Sri Padmavati Mahila Visvavidyalayam, Tirupati delivered a special talk focusing on Indian Constitution on 28th November 2023.

75th Republic Day: IISER Tirupati celebrated the 75th Republic Day on 26th January 2024 in the Permanent Campus and the 100 feet flag was hoisted by the Director.

Support Structure and Facilities

IISER Tirupati is run by a competent administrative setup comprising several sections that is growing in strength to meet the needs of our expanding campus. This dedicated team manages both the permanent and temporary campuses at Yerpedu and Mangalam, respectively. They also work with the Engineering teams to execute the ongoing construction of the permanent campus.

Finance and Accounts Section

The Finance and Accounts section handles the preparation of budget estimates, payments of vendor bills, monitoring of expenses under various account heads, internal audit of payments and disbursements, tax compliances, preparation of the Annual Accounts, and interaction with the audit team of CAG (Comptroller and Auditor General of India). The Accounts Section comprises of Mr Damarla Ramesh, Deputy Registrar (F&A), Mrs Bharathi Kalakota & Mr Rajesh R, Office Assistants.

Administration Section

The Administration section is led by the Registrar and comprises of Mr Inderpreet Singh Kohli, Deputy Registrar (Admin & Purchase), Mr Tanati Naveen Kumar Reddy and Mr V Deepak Chodipalli, Assistant Registrars, Mr Dattaprasad Ganesh Gavde, Office Superintendent, Mr Dileep Kumar N, Mr Ajaykumar Gunuru, Mr Venkatarathnam N & Mr A C Kartheek, Office Assistants. The Administration section is responsible for all daily administrative activities involved in managing both campuses, correspondence with the Ministry, processing of claims, recruitment of personnel to regular positions and under various research projects, maintaining personal records, service books, and Annual Performance Appraisal Reports. They are also in charge of training staff and managing security, housekeeping, and transport services for both campuses.

The Purchase section of the Institute looks after the regular procurement, Inventory Management and issuance of material required for the entire institute and finalizes the rate contract, maintenance, and service-related tenders. The procurement process is managed through the Central Public Procurement Portal (CPPP) and Government eMarket (GeM). The Purchase Section comprises of Mr Inderpreet Singh Kohli, Deputy Registrar (Admin & Purchase), Mr Meesala Vamsidhar, Mr Palagiri Maulana Azad & Mr Shinde Ramchandra Anil, Office Assistants.

The housekeeping services at the Institute are managed by Mr Anthony Arokia Raj, Senior Housekeeper Supervisor and Mr Damarapakam Narasimhulu, Housekeeper Supervisor.

Security services at the Institute are managed by Mr K Vasudeva Naidu, Security Supervisor.

Academic Section

The Academic section handles all aspects pertaining to the student admission process, timetable and classroom requirements, conducting exams, and maintaining student records. The Academics Section comprises of Lt. (Cdr.) Himanshu Shekhar, Deputy Registrar (Academics), and Mr M Kedarinath & Mrs Vardi Nikhilasri, Office Assistants.

IT Section

IT section manages IT services, networking, hardware maintenance, website maintenance, intranet and internet services besides the ERP system. The IT Section is headed by Mr V Srikanth, Technical Officer.

Engineering Section

The Engineering Section oversees the entire construction activities on the permanent campus and attends to the Repair & Maintenance activities on the transit campus. They also handle the civil construction works required by the Institute and are in charge of the estate activities on the campus. The Engineering Section comprises of Mr George

Srujan Veeravalli, Executive Engineer (Electrical) and Mr Kuna Sivakumar and Mr Antony Joe C V, who are Assistant Engineers (Electrical & Civil).

The Instrumentation Section is responsible for recording, upkeep and maintenance of all the academic and research equipment on the campus. Presently, the section is handled by a Mr Nandam Jayasurya, Technical Officer and Mr Satish Mutyam, Technical Assistant.

Departmental Support

Teaching Assistants assist with teaching support, laboratory and administrative support within the larger departments, Biology, Chemistry and Physics. Within Biology, Mr Anup Chandra Pal M is a Technical Assistant and Mr Purushotham Mabbu is a Laboratory Technician who provide primary support. In Chemistry, Mrs C Geetha, Mr M Sasi Kumar and Mr Katta Vamsi are Technical Assistants and Mr Saride Nagateja is a Laboratory Technician. In the Physics Department, Mr Kolli V V Nagarjun, Mr Sivaraju Donempudi and Mr Alastin V P are Technical Assistants and Mr Vankara Pradyumnu is a Laboratory Technician.

Library

The GN Ramachandran Library houses a good collection of textbooks, general books and reference books such as encyclopedias, dictionaries, laboratory manuals etc. The library also provides online access to various journals and bibliographic and full-text databases in the field of basic sciences and allied subjects. The Library is a member of the e-ShodhSindhu and IISER Library Consortium. The library uses the Koha Integrated Library Management System, an open-source software, for maintaining records of materials in circulation.

Over 500 books have been added to the library collection during the last financial year. The collection statistics of the Library as of March 31, 2023, include 8583 books, 567 Gratis books, 25 print journals/magazines, 2297 online journals and 9 online databases. Much of the online material can be accessed via the remote access software MyLOFT (My Library on FingerTips), which can be installed on computers and mobile devices.

In addition, the library also manages campus-wide access to Grammarly, an online writing assistant that helps users correct spelling and grammar while improving clarity in writing. The library also conducts plagiarism checks for all theses and dissertations written on campus, using Urkund, a plagiarism detection software provided by INFLIBNET through ShodhShuddhi.

The Library Section comprises of Mr Murugaraj K, Assistant Librarian & Mr Vivek Kumbar, Library Information Assistant.

Wellness Clinics

IISER Tirupati operates two wellness clinics - one on each of its campuses, in Mangalam (temporary) and Yerpedu (permanent). All students and staff members can avail themselves of medical facilities like consultation, random blood sugar checks, intravenous therapy, vaccination, oxygen support, nebulization, routine health checks and first aid and emergency care at the Wellness Clinics. A Medical Officer is available for consultation across both campuses, and each campus has a full-time nurse. IISER Tirupati has tie-ups with local hospitals and provides referral services. A 24×7 emergency ambulance service is available on Campus to transport students and employees in cases of emergency.

The Clinic also facilitates reimbursements for regular medications for employees and dependents as permissible under CGHS rules. During the Covid-19 pandemic, the clinic sent out regular health advisories to all on campus with detailed instructions to avoid the spread of the pandemic. The clinic also coordinated the availability of Covid-19 vaccines for those who required this and recommended local clinics that they could contact.

The Wellness Clinic is headed by Dr Archana Arijilli, Medical Officer and Mrs Nimmy K Prasad, Nurse.

Physical Education Section

The Physical Education Section at IISER Tirupati is committed to fostering a culture of wellness, sportsmanship, and disciplined conduct among its students. The department emphasizes the importance of a healthy lifestyle through structured inter-class competitions, systematic institute team training, and rigorous practice sessions across a diverse range of sports and games. The Physical Education Department is headed by Dr Gajendra K, Physical Education Instructor.

Living on campus

IISER Tirupati operates hostels for both boys and girls on both the Mangalam and Yerpedu campuses. Over the past year, all BS-MS students have been accommodated in the new hostel blocks on the permanent campus at Yerpedu. PhD students are also provided with hostel accommodation, and there are two blocks dedicated for them.

Sports facilities – On the Yerpedu campus, sports facilities include a large outdoor field with basketball and football grounds, wellness exercise machines, and indoor sports facilities. There is also a Sports Coordinator who actively helps with organizing sports and facilities.

Dining Facilities

There is a functional mess that operates within the hostel block, which serves all meals. All customers can avail of the pay and eat system. The student Dining Committee plays an active role in menu choice and operations of the mess. In addition, there are two canteens, one on each campus, which provide snacks and food on demand during daytime hours. The Dining facilities at the Institute are managed by Mr Dattaprasad Ganesh Gavde, Office Superintendent.

Guest House

The Guest House is managed by Mr Dattaprasad Ganesh Gavde, Office Superintendent.

Appendix

Accounts

Indian Institute of Science Education & Research - Tirupati

Balance Sheet as at 31st March 2024

SOURCES OF FUNDS	Schedule	2023-24	2022-23
CORPUS/CAPITAL FUND	1	869,37,25,176	612,31,06,178
DESIGNATED/ EARMARKED / ENDOWMENT FUNDS	2	5,84,58,350	4,21,79,374
CURRENT LIABILITIES & PROVISIONS	3	73,85,14,239	120,50,58,372
TOTAL		**949,06,97,765**	**737,03,43,924**

APPLICATION OF FUNDS	Schedule	2023-24	2022-23
FIXED ASSETS	4A		
Tangible Assets (A+D)		110,45,87,776	98,88,63,638
Intangible Assets (C)		45,92,856	1,39,26,101
Capital Works-In-Progress (B)		607,27,79,499	368,51,68,806
HEFA Fixed Assets	4D	113,64,03,186	115,55,17,849
INVESTMENTS FROM EARMARKED / ENDOWMENT FUNDS	5	5,29,76,182	4,21,79,374
INVESTMENTS - OTHERS	6	28,33,74,360	20,24,00,000
CURRENT ASSETS	7	25,83,94,049	23,71,62,958
HEFA CURRENT ASSETS	7A	0	15,58,039
LOANS, ADVANCES & DEPOSITS	8	57,75,89,857	104,35,67,159
TOTAL		**949,06,97,765**	**737,03,43,924**
Significant Accounting Policies	23		
Contingent Liabilities and Notes on Accounts	24		

For and on behalf of IISER Tirupati

sd/-	sd/-	sd/-
CMA CS Ramesh Damarla	Prof K Vijayamohanan Pillai	Prof Santanu Bhattacharya
Dy Registrar (F&A)	Registrar (i/c)	Director

Place : Tirupati
Date :

Indian Institute of Science Education & Research - Tirupati

Income & Expenditure Account for the Year Ended on 31.3.2024

Particulars	Schedule	2023-24	2022-23
(A) INCOME			
Academic Receipts	9	7,40,92,517	6,12,34,946
Grants / Subsidies	10	78,23,84,429	59,25,18,125
Income from Investments	11	49,81,311	60,67,444
Interest earned	12	5,07,636	10,64,781
Other Income	13	1,21,16,433	95,72,003
Prior Period Income	14	3,90,103	6,59,434
TOTAL (A)		**87,44,72,429**	**67,11,16,733**

Particulars	Schedule	2023-24	2022-23
(B) EXPENDITURE			
Staff Payments & Benefits (Establishment expenses)	15	25,47,51,559	24,84,49,412
Academic Expenses	16	24,64,44,566	16,80,25,348
Administrative and General Expenses	17	20,67,52,926	13,98,19,229
Transportation Expenses	18	65,02,511	38,37,865
Repairs & Maintenance	19	3,16,61,788	2,19,57,661
Finance costs	20	8,139	18,833
Depreciation	4	16,02,65,245	14,16,68,380
Other Expenses	21	0	0
Prior Period Expenses	22	3,62,62,940	2,24,96,981
TOTAL (B)		**78,23,84,429**	**60,46,05,329**
Balance being excess of Income over Expenditure (A-B)		9,20,88,000	6,65,11,404
Less: Transfer to Institute Reserve Fund (i.e Internal Receipts)		8,65,99,053	7,08,06,949
Less: Transfer of Interest to IRF (i.e Balance after providing for interest on unspent grant of Ministry and External projects)		54,88,947	71,32,225
Over Utilization of Grant in Aid (Charged from Opening unspent balance) for Revenue Expenditure.		0	-1,14,27,770
Under Utilization of Grant in Aid for Revenue Exp.		0	0

For and on behalf of IISER Tirupati

sd/-	sd/-	sd/-
CMA CS Ramesh Damarla	Prof K Vijayamohanan Pillai	Prof Santanu Bhattacharya
Dy Registrar (F&A)	Registrar (i/c)	Director

Place : Tirupati
Date :

Sree Rama Engineering College,
Rami Reddy Nagar
Karkambadi Road, Mangalam,
Tirupati 517507 (Andhra Pradesh)
Tel +91 877 250 0400
Website: www.iisertirupati.ac.in