

ACTIVITY REPORT

(May-August 2023)

Subir Sachdev was elected a Foreign Fellow of the Royal Society.

Senthil Todadri was elected to the prestigious American Academy of Arts and Sciences.

ICTS ACTIVITIES

Summary of Programming Activities (*For details see following pages*) Programs/Discussion Meetings held: 14

Academic visitors to ICTS-TIFR: 55

Seminars and colloquia: (*For details see Annexure – A*)

Summary of Research Activities (*For details see Annexure - B*)

Papers published: 34

arXiv submissions: 31

Ia. PROGRAMS

Statistical Methods and Machine Learning in High Energy Physics

Organizers: Sunanda Banerjee (University of Wisconsin, USA), Satyaki Bhattacharya (SINP, India), Indumathi D (IMSc Chennai, India), Bhawna Gomber (University of Hyderabad, India), Partha Konar (PRL, India), Aruna Kumar Nayak (IOPB, India) and Ritesh Kumar Singh (IISER, Kolkata, India) | 28 August- 8 September 2023

Soft and Living Matter: from Fundamental Concepts to New Material Design

Organizers: Mahesh M Bandi (Okinawa Institute of Science and Technology, Japan) and Ranjini Bandyopadhyay (RRI, India) | 7-25 August 2023

Machine Learning for Health and Disease

Organizers: Gautam Menon (Ashoka University, Sonapat, India), Leelavati Narlikar (IISER Pune, India), Uma Ram (Seethapathy Clinic & Hospital, Chennai, India), Ponnusamy Saravanan (University of Warwick, UK) and Rahul Siddharthan (The Institute of Mathematical Sciences, Chennai, India) | 24 July-4 August 2023

Summer School on Gravitational-Wave Astronomy

Organizers: Parameswaran Ajith (ICTS-TIFR), K. G. Arun (CMI), Bala R. Iyer (ICTS-TIFR) and Prayush Kumar (ICTS-TIFR) | 24 July-4 August 2023

Introduction to Precision Measurements and Quantum Metrology

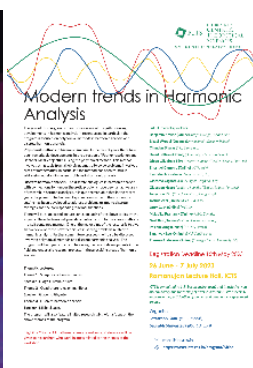
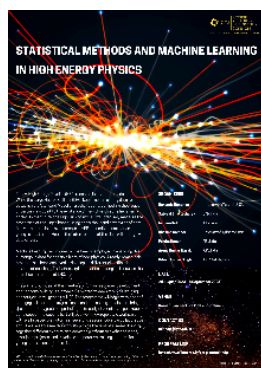
Organizers: Subhadeep De (IUCAA, Pune), Saikat Ghosh (IIT Kanpur), Arup Kumar Raychaudhuri (CGCRI, Kolkata), Kasturi Saha (IIT Bombay, Mumbai), Bijaya Kumar Sahoo (PRL, Ahmedabad) and Anil Shaji (IISER, Thiruvananthapuram) | 10-21 July 2023

Modern trends in Harmonic Analysis

Organizers: Jotsaroop Kaur (IISER Mohali, India) and Saurabh Shrivastava (IISER Bhopal, India) | 26 June – 7 July 2023

Periodically and Quasi-Periodically Driven Complex Systems

Organizers: Jonathan Keeling (University of St Andrews, UK), Manas Kulkarni (ICTS-TIFR, Bengaluru, India) and Aditi Mitra (New York University, USA) | 12-23 June 2023



Summer School for Women in Physics

Organizers: Mahua Ghosh (Mount Carmel College, Bengaluru, India), Kripa Gowrishankar (Azim Premji University, Bengaluru, India), Sushan Konar (NCRA-TIFR, India), Rajaram Nityananda (ICTS-TIFR, India), Sumathi Rao (ICTS-TIFR, India), Joseph Samuel (ICTS-TIFR, India) and Supurna Sinha (RRI, India) | 29 May-9 June 2023

Summer School for Women in Mathematics and Statistics

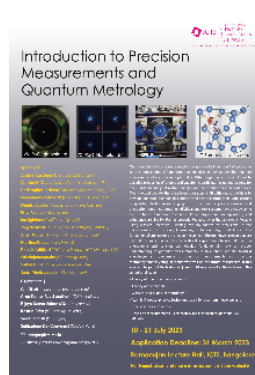
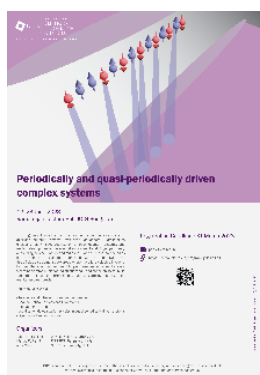
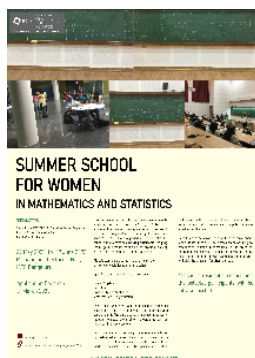
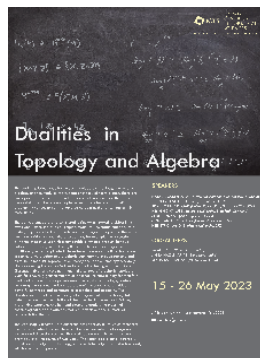
Organizers: Siva Athreya (ICTS-TIFR, ISI-Bengaluru, India), Rhythm Grover (IIT-Guwahati, India) and Dootika Vats (IIT-Kanpur, India) | 29 May-9 June 2023

Dualities in Topology and Algebra

Organizers: Samik Basu (ISI-Kolkata, India), Anita Naolekar (ISI-Bengaluru, India) and Rekha Santhanam (IIT Bombay, India) | 15-26 May 2023

Largest Cosmological Surveys and Big Data Science

Organizers: Shadab Alam (TIFR, Mumbai, India), Girish Kulkarni (TIFR, Mumbai, India), Subha Majumdar (TIFR, Mumbai, India), Surhud More (IUCAA, Pune, India), Aseem Paranjape (IUCAA, Pune, India) and Tirthankar Roy Choudhury (NCRA-TIFR, India) | 1-12 May 2023



1b. DISCUSSION MEETINGS

Data Science: Probabilistic and Optimization Methods

Organizers: Vivek Borkar (IIT Bombay, India), Sandeep Juneja (TIFR, India), Praneeth Netrapalli (Google Research India) and Devavrat Shah (MIT, USA) | 3-7 July 2023

Mathematical Modeling of Climate, Ocean, and Atmosphere Processes

Organizers: Jim Thomas (ICTS-TIFR, India), Ashwin K Seshadri (IISc, India) and Aman Gupta (Stanford University, USA) | 26-30 June 2023

Gravitational-Wave Open Data Workshop

Organizers: Bala Iyer (ICTS-TIFR, India), Mukesh Kumar Singh (ICTS-TIFR, India), Prayush Kumar (ICTS-TIFR, India), Uddeeta Deka (ICTS-TIFR, India) and Parameswaran Ajith (ICTS-TIFR, India) | 16-17 May 2023



1c. LECTURE SERIES

INFOSYS-INFOSYS CHANDRASEKHAR LECTURES

How Materials Can Learn by Themselves

Andrea J Liu (University of Pennsylvania, Philadelphia, USA) | 21-23 August 2023

The Future of Cosmology

Joseph Silk (The Institut d'Astrophysique de Paris, France and Johns Hopkins University, USA) | 1-2 May 2023

INFOSYS-INFOSYS TURING LECTURES

An Alternative View on AI: Collaborative Learning, Incentives, Social Welfare, and Dynamics

Michael I. Jordan (University of California, Berkeley, USA) | 4 July 2023

DISTINGUISHED LECTURES

Statistical Mechanics of Mutilated Sheets and Shells

David R. Nelson (Lyman Laboratory of Physics, Harvard University, USA) | 18 August 2023

A Century after Heisenberg: Discovering the World of Simultaneous Measurements of Noncommuting Observables

Carlton M. Caves (University of New Mexico, USA) | 19 July 2023

The History of Gravitational Lensing in Cosmology

Nick Kaiser (Département de Physique, ENS Paris) | 10 May 2023

Id. VISITS OF SCIENTISTS

The following researchers visited ICTS during May-August 2023.

1. **Kruthi Krishna**, Radboud University, The Netherlands
2. **Prasad Perlekar**, TIFR, Hyderabad
3. **Archisman Ghosh**, Ghent University, Belgium
4. **Mahesh Bandi**, Okinawa Institute of Science and Technology Graduate University, Japan
5. **Arijit Kundu**, Indian Institute of Technology Kanpur
6. **Ajit Kumar Mehta**, University of California, Santa Barbara, USA
7. **Tejaswi Venumadhav Nerella**, University of California, Santa Barbara, USA
8. **Muktajyoti Saha**, IISER Bhopal
9. **Jnanadeva Maharana**, Institute of Physics, Bhubaneswar
10. **Sandipan Manna**, IISER Pune
11. **Digvijay Wadekar**, Institute for Advanced Study (IAS), Princeton, USA
12. **Amin Ahmad Nizami**, Ashoka University, Sonapat
13. **Aakash Kumar**, IISER Bhopal
14. **Hemant Rathi**, Indian Institute of Technology, Roorkee
15. **Roji Pius**, Institute of Mathematical Sciences, Chennai
16. **Sarthak Chandra**, Massachusetts Institute of Technology, Cambridge, USA
17. **Anu Dhoachak**, Shiv Nadar University, Greater Noida
18. **Mukul Bhattacharya**, Penn State University, USA
19. **Mandar Inamdar**, Indian Institute of Technology Bombay, Mumbai
20. **Sourin Das**, IISER Kolkata
21. **Ruchira Mishra**, University of Chicago, USA
22. **Smitha Vishveshwara**, University of Illinois, USA
23. **Ganpathy Murthy**, University of Kentucky, USA
24. **Jeffrey G. Rau**, University of Windsor, Canada
25. **Amit Apte**, IISER Pune
26. **Edward Mazenc**, University of Chicago, USA
27. **Suvir Rathore**, King's College, University of Cambridge, UK
28. **Mohsin Ilahi**, Aligarh Muslim University, Aligarh
29. **Abbas Ali**, Aligarh Muslim University, Aligarh
30. **Rajath Radhakrishnan**, International Centre for Theoretical Physics (ICTP) Trieste, Italy
31. **Aayush Verma**, Jeewan Public School
32. **Kaushik Paul**, Indian Institute of Technology Madras, Chennai
33. **Alan Ranjit Jacob**, Indian Institute of Technology, Hyderabad
34. **Sidharth Thakur**, Banaras Hindu University, Varanasi
35. **Md Arif Shaikh**, Seoul National University, Korea

36. **Kshitij Gajjar**, Indian Institute of Technology, Jodhpur
37. **Tapan Mishra**, NISER, Bhubaneswar
38. **Sreenath Paleri**, University of Wisconsin-Madison, USA
39. **Arnab Sen**, Indian Association for the Cultivation of Science, Kolkata
40. **Nakshatra Kubal**, Centre for Human Genetics, Bengaluru
41. **Jason Picardo**, Indian Institute of Technology Bombay, Mumbai
42. **Prashant M Gade**, RTM Nagpur University, Nagpur
43. **Abhijit Gadde**, Tata Institute of Fundamental Research, Mumbai
44. **Dileep Jatkar**, Harish Chandra Research Institute, Allahabad
45. **Umesh Dubey**, Harish-Chandra Research Institute, Allahabad
46. **Prithvi Narayan**, Indian Institute of Technology Palakkad
47. **Shiraz Minwalla**, Tata Institute of Fundamental Research, Mumbai
48. **Alok Laddha**, Chennai Mathematical Institute, Chennai
49. **Suresh Govindarajan**, Indian Institute of Technology Madras, Chennai
50. **Sayantani Bhattacharyya**, National Institute of Science Education and Research, Bhubaneswar
51. **Dhruva Ganapathy**, MIT Kavli Institute, Cambridge, USA
52. **Vijay Natarajan**, Indian Institute of Science, Bengaluru
53. **Madhu Chandra Kalapureddy**, Indian Institute of Tropical Meteorology, Pune
54. **Kishore Iyer**, Centre de Physique Theorique, Aix-Marseille Universite, France
55. **Abhiram Kidambi**, IPMU Japan

e. NEWS ON GRANTS, AWARDS AND FELLOWSHIPS



RAJESH GOPAKUMAR's publication (in collaboration with Lorenz Eberhardt and Matthias Gaberdiel) titled, *The Worldsheet Dual of the Symmetric Product CFT*, received the **2023 ICBS Frontiers of Science Award**. The award was announced at the inaugural International Congress of Basic Sciences in Beijing.



AJITH PARAMESWARAN's publication (in collaboration with Souvik Jana, Shasvath J. Kapadia, Tejaswi Venumadhav) titled, *Cosmology Using Strongly Lensed Gravitational Waves from Binary Black Holes*, was highlighted as **Editors' Suggestion in Physical Review Letters**.

IIa FACULTY

1. BRATO CHAKRABORTI (currently at Flatiron Institute, New York, USA) will join the ICTS-TIFR faculty from March 2024.
2. RAGHU MAHAJAN (currently at Stanford University, USA) will join the ICTS-TIFR faculty from September 2024.
3. DEBASIS SENGUPTA (previously at CAOS, IISc Bengaluru) will join ICTS-TIFR as Simons Visiting Professor on September 1, 2023.
4. AKSHIT GOYAL (currently at MIT, USA) will join ICTS-TIFR with the DBT- Ramalingaswami Reentry Fellowship on September 15, 2023
5. T.N. VENKATARAMANA (previously at TIFR, Mumbai) joined ICTS-TIFR as DAE Raja Ramanna Chair in May 2023.

IIb STUDENTS

GRADUATE PROGRAM

1. The Summer semester 2023 commenced on May 1, 2023.
2. A 2-credit elective course on *Computational Methods for Quantum Many-Body Physics* was offered by Sthitadhi Roy (ICTS-TIFR) and Arnab Sen (IACS Kolkata)
3. Thirty students joined the graduate studies program 2023 on August 1, 2023. The breakup is as follows:

Program	Number of Students joined
Graduate Studies in Physics	22
Graduate Studies in Mathematics	3
Graduate Studies in Physics of Life	5

4. An orientation session for new students was held on August 3, 2023. As part of the orientation week held during 3-9th August 2023, various research groups offered open hours. The faculty/postdocs had informal chats with new students. Counselor Dr Geetu Hotwani gave an introductory counseling session on August 10, 2023.
5. The Fall 2023 semester began on August 7, 2023 and classes are being conducted in hybrid mode. This semester ICTS-TIFR is offering 16 courses (including both elective and core courses). Please refer to the website for more details:
<https://courses.icts.res.in/course/index.php?categoryid=20>.
 Students from other institutions can also enroll for ICTS courses.

Apart from the ICTS courses, students have registered for courses from IISc, TIFR Colaba, CAM-TIFR, NCBS.

6. Following students registered for their PhD via Datanet 2.0:
 - **Integrated PhD batch:** Godwin Martin, Rajarshi Chattopadhyay, Tamoghna Ray
 - **2022 PhD batch:** Ankur Narendra Barsode, Ashik H, Mayank Kumar Bijay, Vishal Neeraje, Avi Wadhwa, Kaustubh Singhi, Ritwik Mukherjee, Shridhar Vinayak.
 - Animesh Nanda (GS 2015 PhD Batch) defended his thesis on 20 June 2023.
7. Final year students who submitted their thesis:
 - Srikanth Pai B (Thesis advisor: Pranav Pandit)
 - Srashti Goyal (Thesis advisor: P. Ajith)
 - Aditya Vijay Kumar (Thesis advisor: P. Ajith)
 - Pronobesh Maity (Thesis advisor: Rajesh Gopakumar)
 - Sugan Duari Murugan (Thesis advisor: Samriddhi Sankar Ray)
8. Final year students who submitted their synopsis:
 - Varun Dubey (Thesis advisor: Abhishek Dhar)
 - Pinak Mandal (Thesis advisor: Vishal Vasan)
 - Shashank Kumar Roy (Thesis advisor: Samriddhi Sankar Ray)
9. Graduate Studies Admissions 2023:
 - Online interview for the CAM-ICTS Joint PhD Program in Mathematics- 2023 was conducted on 13 April 2023 via TIFR GS, GATE & CSIR-NET stream. Five offers (<https://www.icts.res.in/announcements>) were made, out of which following three students joined the program:

Name	Current Affiliation
Sam K Mathew	IISER Trivandrum
Ritvik Vantipalli	IISER Pune
Shaibal Karmakar	Indian Statistical Institute, Bengaluru

- Offline interview for the Physical Sciences Graduate Program 2023 via TIFR GS stream was conducted on June 1-2. Thirteen offers (<https://www.icts.res.in/announcements>) were made, and nine candidates joined the program:

Name	Current Affiliation
Devadevan M M	IISER Thiruvananthapuram

Anwesha Dey	St Xavier's College, Kolkata
Anjali Kundalpady	Christ University, Bengaluru
Ritesh Harshe	Indian Association for the Cultivation of Science, Kolkata
Naveen Kumar D	Central University of Kerala
Tirthankar Mondal	Asutosh College, University of Calcutta
Shubhadeep Chakraborty	St Xavier's College, Kolkata
Sumukha Srinivasa Adiga	National Institute of Technology, Surathkal, Karnataka
Mohammad Saif Khan	Deshbandhu College, University of Delhi

- Offline interviews for the Physical Sciences Graduate Program 2023 via GATE/ JEST stream were conducted on 27-28 June 2023. Fifteen offers (<https://www.icts.res.in/announcements>) were made, twelve candidates joined the program:

Name	Current Affiliation
Seema	HRI, Allahabad
Sourabh Saini	JNU, New Delhi
Saptarshi Mandal	IIT Kharagpur
Pradeeptha R Jain	IIT Guwahati
Babli Khatun	University of Calcutta
Debanjan Karan	IIT Indore
Jyotirmoy Barman	National Institute of Technology Rourkela
Rahul Metya	Ramakrishna Mission Vivekananda Educational and Research Institute
Rukmani R	Madurai Kamaraj University
Arnab Paul	Jadavpur University
Akash Sarkar	St Xavier's College, Kolkata
Ankan Man	IEST, Shibpur

- Offline interviews for the Physics of Life Graduate Program 2023 via TIFR GS stream were conducted on May 11-12, 2023. Eight offers were made

(<https://www.icts.res.in/announcements>), five candidates have joined the program:

Name	Current Affiliation
Thanmayee Gore	IIT Palakkad
Sanjay Dey	West Bengal State University
Nitesh Kumar Patro	Utkal University
Diksha Arora	Ramaiah Institute of Technology
Mubashira K P	Jamia Milia Islamia University

- Offline interviews for the Physics of Life Graduate Program 2023 via JEST/GATE stream were conducted on 30 June. No students joined via this stream.
- Early offer for PhD/ IPhD program: Students selected for summer research program were provided the opportunity of early offer for PhD/ IPhD program in Physics 2023. **Three** students were shortlisted for written exam and interview based on their performance in their project and presentation, and recommendation letter. The results are yet to be announced.

POSTDOCTORAL PROGRAM

1. Postdoctoral application for the summer cycle is currently at the screening stage: <https://www.icts.res.in/academic/postdoctoral-fellowships>

VISITING STUDENTS PROGRAM

1. Applications were invited for the ICTS Long Term Visiting Students Program 2023. <https://www.icts.res.in/academic/long-term-visiting-student-program>. The following students have joined the program:

Name	Current Affiliation	Faculty Mentor
Abhirami A G	IISER, Kolkata	Vijaykumar Krishnamurthy
Amjad Hasan	IISER Thiruvananthapuram	Jim Thomas
Anushka Doke	IISER, Pune	Prayush Kumar

Bhuvaneshwari Kashi	Jawaharlal Nehru Technological University, Hyderabad	P. Ajith and Prayush Kumar
Namitha N	University of Calicut	Spenta R. Wadia
Neev Shah	IISER, Pune	P. Ajith
Prajwal Jadhav	IISER, Pune	Jim Thomas
Sarthak Girdhar	IIT Bombay	Sumathi Rao
Srishti Iyer	Maharaja Sayajirao University	Prayush Kumar and Pallavi Bhat
Subhadip Chakraborty	IIT Kharagpur	Sthitadhi Roy
Vishnu Prasath Thulasiraman	IISc, Bengaluru	Rama Govindarajan and Pallavi Bhat
Yuvraj Sharma	IISER Bhopal	Prayush Kumar

SUMMER RESEARCH PROGRAM

1. The Summer Research Program 2023 was held between 15 May - 7 July. Seventeen students joined the eight-week long program. For more details, please visit

<https://www.icts.res.in/academic/summer-research-program>

Name	Current Affiliation	Faculty Mentor	Project Title
Abdul Rahman S	Indian Institute of Petroleum and Energy, Vishakhapatnam	Rama Govindarajan	Investigations on the drop size distribution of clouds using doppler radar data.
Aishee Chakraborty	HRI, Allahabad	Pallavi Bhat	Analysing the instabilities occuring in magnetohydrodynamic convection in accretion discs around compact bodies
Amrit Putcha	IIT Madras	Vijaykumar Krishnamurthy	Dynamical triangulated surfaces for models of cell division
Arpan Das	IIT Kanpur	Sthitadhi Roy	Transport and Entanglement in 1D Heisenberg model with disorder
Ishaan Bhadoo	Indian Statistical Institute, Bengaluru	Anirban Basak & Riddhipratim Basu	Percolation on Hyperbolic Graphs

Pallabi Bera	IISER TVM	Rukmini Dey	Introduction to Minimal Surfaces
Prakriti Singh	IIT Kanpur	Ashoke Sen	Surviving in a Metastable state
Pranay Agarwal	IIT Kanpur	Anirban Basak & Riddhipratim Basu	Large Deviations for Random Graphs
Prognadip Majumder	Indian Statistical Institute, Bengaluru	Pranav Pandit	Topological Quantum Field Theory with some exposition to 1+1 Dijkgraaf-Witten Theory
Saraswata Sensarma	Indian Statistical Institute, Bengaluru	Anirban Basak & Riddhipratim Basu	Extrema of Branching Random Walks and Gaussian Free Fields
Sehrish Akhtar	Aligarh Muslim University	Pallavi Bhat	Large - scale dynamos & magnetic helicity
Shivanshi Tiwari	Amity University, Noida	Prayush Kumar	Time-Domain Relative Binning
Sri Krithika Venkatesh	University of Waterloo, Canada	Suvrat Raju	Inflation
Srivatsa B	Indian Statistical Institute	Siva Athreya	The Expected Range of a Perturbed Random Walk
Ujjwal Basumatary	IISc Bengaluru	Suvrat Raju	Cosmological Perturbation Theory
Yenisi Das	University of Calcutta	Siva Athreya	Some observations on self - avoiding walks
Anjali Kumari	IIT Kanpur	Suvrat Raju	Cosmological Inflation: Unveiling the Early Universe.

SUMMER COURSE

One summer course was conducted this year. The course titled, *The Fascinating World of Flows*, was taught by Rama Govindarajan and Samriddhi Sankar Ray. The course had both theoretical and experimental components and was conducted in hybrid mode. 346 students registered for the course, of which 35 were selected for classroom participation. Certificates were issued to participants on successful completion of the course. For more details, please visit <https://www.icts.res.in/lectures/sc-2023-flows>

KAAPI WITH KURIOSITY

The Odyssey of Liquid Crystals, From Carrot to Flat Screen

Michel Mitov (French National Centre for Scientific Research) | 13 August 2023 | J.N. Planetarium, Bengaluru

Conway's Tangles

Michael Lacey (Georgia Institute of Technology) | 2 July 2023 | J.N. Planetarium, Bengaluru

Is Clay a Solid or a Liquid?

Ranjini Bandyopadhyay (Raman Research Institute, Bengaluru) | 17 June 2023 | J.N. Planetarium, Bengaluru

What's the Matter with Primordial Black Holes?

Ravi K. Sheth (University of Pennsylvania, USA) | 14 May 2023 | J.N. Planetarium, Bengaluru

VIGYAN ADDA

Some Tales of Universality from the World of Probability

Riddhipratim Basu (ICTS-TIFR, Bengaluru) | 13 July 2023

MATHS CIRCLE INDIA

ICTS is leading a pan-TIFR effort to seed Maths Circles for talented middle school students across the country. To establish proof of concept, ICTS has conducted 7 online Maths Circle India sessions during May-August 2023.

Session 41

Conducted by: Arghya Chakraborty, Malhar Managoli, Eeshan Modak, Hariharan Narayanan, Piyush Srivastava | **Interactive session:** 11 August 2023

Session 40

Conducted by: Arghya Chakraborty, Malhar Managoli, Eeshan Modak, Hariharan Narayanan, Piyush Srivastava | **Interactive session:** 21 July 2023

Session 39

Conducted by: Ajit Bhand | **Interactive session:** 7 July 2023

Session 38

Conducted by: Pankaj Kapari, Surjeet Singh Choudhary, Atreyee Bhattacharya, Ajit Bhand | **Interactive session:** 23 June 2023

Session 37

Conducted by: Pankaj Kapari, Surjeet Singh Choudhary, Atreyee Bhattacharya, Ajit Bhand | **Interactive session:** 10 June 2023

Session 36

Conducted by: Krishna Menon, Sadhanandha B, Writika Sarkar, Priyavrat Deshpande | **Interactive session:** 19 May 2023

Session 35

Conducted by: Krishna Menon, Sadhanandha B, Writika Sarkar, Priyavrat Deshpande | **Interactive session:** 5 May 2023

ICTS-RRI MATHS CIRCLE

ICTS in collaboration with RRI launched in-person maths circle sessions. These sessions are conducted once every two weeks for Bengaluru students studying in grades 6-10. During May-August 2023, six sessions of maths circle sessions were held at the Raman Research Institute, Bengaluru.

Session 13

Conducted by: Kiran Estake, Kshitij Sharma, Sachchidanand Prasad, Supurna Sinha, Joseph Samuel, Parthanil Roy | **Interactive session:** 12 August 2023 | Raman Research Institute, Bengaluru

Session 11

Conducted by: Ajit Bhand | **Interactive session:** 7 July 2023 | Raman Research Institute, Bengaluru

Session 10

Conducted by: Kshitij Vijay, Kiran Estake, Harshitha K S, Kshitij Gajjar, Jaikumar Radhakrishnan, Supurna Sinha, Joseph Samuel | **Interactive session:** 24 June 2023 | Raman Research Institute, Bengaluru

Session 9

Conducted by: Kiran Estake, Kshitij Vijay, Supurna Sinha, Joseph Samuel | **Interactive session:** 10 June 2023 | Raman Research Institute, Bengaluru

Session 8

Conducted by: Supurna Sinha, Joseph Samuel | **Interactive session:** 27 May 2023 | Raman Research Institute, Bengaluru

Session 7

Conducted by: Kiran Estake, Parthanil Roy, Supurna Sinha, Joseph Samuel, Sachchidanand Prasad | **Interactive session:** 13 May 2023 | Raman Research Institute, Bengaluru

SCIENCE OUTREACH IN SCHOOLS

An online teachers' training program in collaboration with JNP was introduced for Kerala higher secondary physics teachers. One introductory session and four other topic discussion sessions have already been held. Science experiments using ILP science kits were also conducted in ten government schools in Bengaluru.

PRISM 3: Playground Science - the Physics of Soft Materials

Shubha Tewari (University of Massachusetts Amherst, USA) | 10 August 2023 | Chandrasekhar Auditorium Foyer Area, ICTS-TIFR

ANNEXURE - A

The following are the details of seminars and colloquia during the period May-August 2023:

Understanding Climate Variability with Statistical Machine Learning and Artificial Intelligence

Bedartha Goswami (University of Tübingen, Germany) | 29 August 2023

New black hole mergers from a search pipeline for gravitational waves with higher-order harmonics

Digvijay Wadekar (Institute for Advanced Study, USA) | 24 August 2023

Krylov Complexity for Quantum Floquet Dynamics

Amin A. Nizami (Ashoka University) | 23 August 2023

Nonequilibrium Green's Function Formalism for Topological Materials and Some Applications

Junaid Majeed Bhat (ICTS-TIFR, Bengaluru) | 22 August 2023

Revisiting Logarithmic Corrections to BPS Black Entropy in Four and Five Dimensions

Anupam A H (ICTS-TIFR, Bengaluru) | 18 August 2023

Insights from GRBs for Optical Follow-Up of Gravitational-Wave Counterparts

Kruthi Krishna (Radboud University) | 18 August 2023

Standard-Siren Cosmology: Overview of Current Results, Challenges, and Prospects

Archisman Ghosh (Ghent University, Belgium) | 17 August 2023

Quantum Corrections to Near-Extremal Black Hole Thermodynamics

Muktajyoti Saha (IISER, Bhopal) | 16 August 2023

Gravitational-Wave Microlensing as a Probe of Compact Dark Matter

Soumyadip Basak (ICTS-TIFR, Bengaluru) | 16 August 2023

Theory Dependence of Black Hole Interior Reconstruction and Improved Strong Subadditivity

Roji Pius (The Institute of Mathematical Sciences, Chennai) | 14 August 2023

Inradius of Random Lemniscates

Koushik Ramachandran (TIFR Center for Applicable Mathematics, Bengaluru) | 14 August 2023

Almost-Optimal Best Restless Markov Arm Identification with Fixed Confidence

P. N. Karthik (National University of Singapore) | 14 August 2023

A Gravitational-Wave Remedy for the Hubble Problem

Ish Mohan Gupta (Pennsylvania State University) | 10 August 2023

Emergence of Structure in Cortical Circuits Through Bottom-up Dynamical Principles

Sarthak Chandra (Massachusetts Institute of Technology) | 10 August 2023

On Production of Excited Kaluza-Klein States in Large Radius Compactification Scenario

Jnanadeva Maharana (IOP, Bhubaneswar) | 9 August 2023

Geostrophic Turbulence and the Formation of Large Scale Structure

Edgar Knobloch (University of California, Berkeley, USA) | 3 August 2023

Unconventional Symmetries in Quantum Many-Body Physics

Sanjay Moudgalya (Caltech, USA) | 1 August 2023

Heavy Element Nucleosynthesis & Energetic Neutrinos from Highly Magnetized Outflows

Mukul Bhattacharya (Pennsylvania State University, USA) | 1 August 2023

On Gauge-String Dualities and String Amplitudes

Pronobesh Maity (ICTS-TIFR, Bengaluru) | 27 July 2023

Critical Phenomena in Gravitational Collapse

Thomas Baumgarte (Bowdoin College, USA) | 26 July 2023

Pseudo-Goldstone Modes and Order-by-Disorder

Jeffrey Rau (University of Windsor, Canada) | 21 July 2023

Nonlinear Interactions Between Fluid Flows and Evolving Boundaries

Srikanth Toppaladoddi (University of Leeds, UK) | 21 July 2023

Applied Nonrelativistic Conformal Field Theory: Scattering-Length and Effective-Range Corrections to Nuclear Physics

Ruchira Mishra (University of Chicago, USA) | 20 July 2023

On Some Aspects of Dijkgraaf-Witten Theory for Finite 2-Groups

Srikanth Pai B (ICTS-TIFR, Bengaluru) | 20 July 2023

Stability Studies on the Shallow Water Equations

Mukesh Singh Raghav (ICTS-TIFR, Bengaluru) | 19 July 2023

Quantum Condensate Shells: From Ground-Based Lattices to Space

Smitha Vishveshwara (University of Illinois, USA) | 18 July 2023

Numerical Filter Stability, Fokker Planck Equations and Infinite Dimensional Optimization with Deep Learning

Pinak Mandal (ICTS-TIFR, Bengaluru) | 14 July 2023

A Study of Dynamical Instabilities and Filter Stability Using Ensemble Kalman Filters

Shashank Kumar Roy (ICTS-TIFR, Bengaluru) | 13 July 2023

A Unified Treatment of Mean-Field Dynamo and Angular-Momentum Transport in Magnetorotational Instability-Driven Turbulence

Tushar Mondal (ICTS-TIFR, Bengaluru) | 11 July 2023

Approximate Models for Water Waves and an Algorithm for Detection of Bottom Boundary

Manisha Goyal (ICTS-TIFR, Bengaluru) | 7 July 2023

Deriving the Simplest Gauge-String Duality

Edward Mazenc (University of Chicago, USA) | 5 July 2023

Reconstructing Gauge Group from Extended Operators

Rajath Radhakrishnan (ICTP, Trieste) | 30 June 2023

Steady State Flow in Dense Colloidal Suspensions

Alan Ranjit Jacob (IIT Hyderabad) | 23 June 2023

Principle of Holography of Information and Asymptotic Symmetries

Chandramouli Chowdhury (ICTS-TIFR, Bengaluru) | 23 June 2023

Lessons from the Quotient Structure of Spacetime: Flat Space Cosmology Edition

Victoria Martin (University of Iceland) | 21 June 2023

Unconventional Phases and Phase Transitions in Frustrated Magnets

Animesh Nanda (ICTS-TIFR, Bengaluru) | 20 June 2023

Boundary Integral Method for Stokes Flow

Harshit Joshi (ICTS-TIFR, Bengaluru) | 16 June 2023

GW Eccentricity: A Python Package to Measure Orbital Eccentricity from Gravitational Waveforms

Md Arif Shaikh (Seoul National University, Korea) | 15 June 2023

Role of Heterogeneous Ecosystems in Modulating Surface-Atmosphere Transport

Sreenath Paleri (University of Wisconsin-Madison, USA) | 9 June 2023

Utility of the DBI Counter-Term

Dileep Jatkar (Harish-Chandra Research Institute, Allahabad) | 1 June 2023

Towards Classification of Probe Measures of Multipartite Entanglement

Abhijit Gadde (TIFR, Mumbai) | 31 May 2023

Power Laws in Spacetime: Real and Complex Exponents, Self-Organized Criticality and Griffiths Phase, Ising Type Transitions

Prashant M. Gade (RTM Nagpur University) | 31 May 2023

Part -II: Deep Latent Variable Models for Generating High-Dimensional Objects

Sunita Sarawagi (Indian Institute of Technology, Mumbai) | 30 May 2023

Part-I: Deep Latent Variable Models for Generating High-Dimensional Objects

Sunita Sarawagi (Indian Institute of Technology, Mumbai) | 30 May 2023

Tensor t-str and w-str on the Derived Category of the Scheme

Umesh Dubey (Harish-Chandra Research Institute, Allahabad) | 29 May 2023

The Future of Heatwaves Over India

Krishna AchutaRao (Indian Institute of Technology, New Delhi) | 25 May 2023

Mahakala: A Python-Based Modular Ray-Tracing and Radiative Transfer Algorithm for Curved Spacetimes

Aniket Sharma (IISER, Mohali) | 25 May 2023

Some Results in Double Scaled SYK

Prithvi Narayan (Indian Institute of Technology, Palakkad) | 25 May 2023

The Matter with TT -bar + Λ 2

Eva Silverstein (Stanford University, USA) | 24 May 2023

Searching for Pulsars with the MeerKAT Radio Telescope.

Prajwal Voraganti Padmanabh (Max Planck Institute for Gravitational Physics, Hannover) | 24 May 2023

The Endpoint of the Kerr-AdS Super-Radiant Instability

Shiraz Minwalla (TIFR Mumbai) | 19 May 2023

From Avatars of Associahedron to S-matrix of Scalar Field Theories.

Alok Laddha (Chennai Mathematical Institute) | 18 May 2023

Lie algebras from Counting of Dyonic Degeneracies

Suresh Govindarajan (Indian Institute of Technology Madras) | 17 May 2023

Direct and Indirect Measurements in Quantum Mechanics

Varun Dubey (ICTS-TIFR, Bengaluru) | 17 May 2023

Exploring Turbulence Through Particles: Statistical Properties of Spheroids in Turbulent Flows

Enrico Calzavarini (University of Lille, France) | 16 May 2023

Spectral and Eigenstate Correlations in Non-Hermitian Systems

Soumi Ghosh (ICTS-TIFR, Bengaluru) | 16 May 2023

Cloud Radar Observations Showing the Turbulence-Triggered Onset of Warm Rain

Madhu Chandra R. Kalapureddy (Indian Institute of Tropical Meteorology, Pune) | 15 May 2023

Pushing LIGO's Quantum Limits

Dhruva Ganapathy (MIT Kavli Institute) | 15 May 2023

Learning More About the Magic of Wilson's Renormalization Group

Shailesh Chandrasekharan (Duke University, USA) | 11 May 2023

Wheeler-DeWitt States of Black Hole and Cosmological Interiors

Sean Hartnoll (University of Cambridge, UK) | 10 May 2023

Dynamics and Rheology of Glassy Active Matter

Rituparno Mandal (University of Chicago, USA) | 9 May 2023

Nonequilibrium Green's Function Formalism for Topological Materials and Some Applications

Junaid Majeed Bhat (ICTS-TIFR, Bengaluru) | 4 May 2023

Microscopic Origin of the Entropy of Black Holes in General Relativity

Vijay Balasubramanian (University of Pennsylvania, USA) | 3 May 2023

Imagining Space

Vijay Balasubramanian (University of Pennsylvania, USA) | 2 May 2023

Part - II: Connections Between Number Theory and Physics

Abhiram Kidambi (IPMU Japan) | 1 May 2023

COLLOQUIA

Topological Descriptors and Scalar Field Comparison

Vijay Natarajan (Indian Institute of Science, Bengaluru) | 15 May 2023

ANNEXURE - B

PAPERS PUBLISHED – 65

In Journals – 34

1. *Connecting Eigenvalue Rigidity with Polymer Geometry: Diffusive Transversal Fluctuations under Large Deviation*, **Riddhipratim Basu**, Shirshendu Ganguly. *Ann. Inst. H. Poincaré Probab. Statist.* 59 (2), 1040-1073, (2023)
2. *MLE of Jointly Constrained Mean-Covariance of Multivariate Normal Distributions*, **Anupam Kundu**, Mohsen Pourahmadi. *Sankhya B*, 85, 1–32 (2023).
3. *Multispecies Autocatalytic RNA Reaction Networks in Coacervates*, Sandeep Ameta, Manoj Kumar, Nayan Chakraborty, Yoshiya J. Matsubara, Prashanth S, Dhanush Gandavadi, **Shashi Thutupalli**. *Communications Chemistry* 6, 91 (2023)
4. *A Molecular Rotor FLIM Probe Reveals Dynamic Coupling Between Mitochondrial Inner Membrane Fluidity and Cellular Respiration*, Gaurav Singh; Geen George; Sufi O. Raja; Ponnuvel Kandaswamy; Manoj Kumar; **Shashi Thutupalli**; Sunil Laxman; Akash Gulyani, *Proceedings of the National Academy of Sciences*, 120 (24) e2213241120 (2023)
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9. *Self-Induced Flow Over a Cylinder in a Stratified Fluid*, **Jim Thomas** and R. Camassa. *J. Fluid Mech.* 964, A38 (2023)
10. *Cosmography Using Strongly Lensed Gravitational Waves from Binary Black Holes*, **Souvik Jana**, **Shasvath J. Kapadia**, Tejaswi Venumadhav, **Parameswaran Ajith**. *Phys. Rev. Lett.* 130 (26), 261401 (2023) **This publication was featured in Physics and highlighted as Editors' Suggestion.**

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32. *Probing Robustness of Nonlinear Filter Stability Numerically Using Sinkhorn Divergence*, **Pinak Mandal**, **Shashank Kumar Roy**, **Amit Apte**. Physica D: Nonlinear Phenomena 451, 133765 (2023)
33. *Probing lens-induced gravitational-wave birefringence as a test of general relativity*, **Srashti Goyal**, **Aditya Vijaykumar**, Jose Maria Ezquiaga, Miguel Zumalacarregui, Phys. Rev. D 108 (02), 024052 (2023)
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7. *Logarithmic Correction to BPS Black Hole Entropy from Supersymmetric Index at Finite Temperature*, **Anupam A. H., P. V. Athira, Chandramouli Chowdhury, Ashoke Sen**. arXiv:2306.07322
8. *Non-Equilibrium Spin Transport in Integrable and Non-Integrable Classical Spin Chains*, **Dipankar Roy, Abhishek Dhar**, Herbert Spohn, **Manas Kulkarni**. arXiv:2306.07864
9. *Learning Zeros of Fokker-Planck Operators*, **Pinak Mandal, Amit Apte**. arXiv:2306.07068
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11. *Variability of Echo State Network Prediction Horizon for Partially Observed Dynamical Systems*, Ajit Mahata, Reetish Padhi, **Amit Apte**. arXiv:2306.10797
12. *A rapid method for preliminary identification of subthreshold strongly lensed counterparts to superthreshold gravitational-wave events*, **Srashti Goyal**, Shasvath Kapadia, Jean-Rene Cudell, Alvin K. Y. Li, Juno C. L. Chan. arXiv:2306.04397
13. *A Unified Treatment of Mean-Field Dynamo and Angular-Momentum Transport in Magnetorotational Instability-Driven Turbulence*, **Tushar Mondal, Pallavi Bhat**. arXiv:2307.01281
14. *Turbulent Flows are not Uniformly Multifractal*, **Siddhartha Mukherjee, Sugan D. Murugan, Ritwik Mukherjee, Samridhi Sankar Ray**. arXiv:2307.06074
15. *Generating Entanglement by Quantum Resetting*, **Manas Kulkarni**, Satya N. Majumdar. arXiv:2307.07485
16. *Tracer Dynamics in Active Random Average Process*, **Saikat Santra, Prashant Singh, Anupam Kundu**. arXiv:2307.09908

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18. *Tuning the Magnetic Properties in MPS3 ($M = Mn, Fe$, and Ni) by Proximity-Induced Dzyaloshinskii Moriya Interactions*, Suvodeep Paul, Devesh Negi, Saswata Talukdar, Saheb Karak, Shalini Badola, Bommareddy Poojitha, Manasi Mandal, Sourav Marik, R. P. Singh, Nashra Pistawala, Luminita Harnagea, Aksa Thomas, Ajay Soni, **Subhro Bhattacharjee**, Surajit Saha. arXiv:2307.13400
19. *Stochasticity in Returns can Expedite Classical First Passage under Resetting*, Arup Biswas, **Anupam Kundu**, Arnab Pal. arXiv:2307.16294
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22. *Can Majorana Zero Modes in Quantum Hall Edges Survive Edge Reconstruction?* Kishore Iyer, Amulya Ratnakar, **Sumathi Rao**, Sourin Das. arXiv:2308.01980
23. *Time Correlations in KPZ Models with Diffusive Initial Conditions*, **Riddhipratim Basu**, Xiao Shen. arXiv:2308.03473
24. *Local Weak Limits of Potts and Random Cluster Measures on Locally Tree-like Graphs*, **Anirban Basak**, Amir Dembo and Allan Sly. [Submitted]
25. *Strong Coupling of Lattice and Orbital Excitations in Quantum Magnet $Ca_{10}Cr_7O_{28}$: Anomalous Temperature Dependence of Raman Phonons*, **Srishti Pal**, Arnab Seth, Anzar Ali, Yogesh Singh, D. V. S. Muthu, **Subhro Bhattacharjee**, A. K. Sood. 2308.03237
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27. *Ab-initio Insights on the Fermiology of $d1$ Transition metals in Honeycomb lattice : Hierarchy of hopping pathways and spin-orbit coupling*, Manoj Gupta, Basudeb Mondal, **Subhro Bhattacharjee**, Tanusri Saha Dasgupta. arXiv:2308.08526
28. *Crossover in density profiles of confined particles in power-law models with finite range of interaction*, **Saikat Santra**, **Anupam Kundu**. arXiv:2308.12124
29. *Explicit Runge-Kutta algorithm to solve non-local equations with memory effects: case of the Maxey-Riley-Gatignol equation*, **Divya Jaganathan**, **Rama Govindarajan**, **Vishal Vasan**. arXiv:2308.09714
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Consortium - 4

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