

Annual Report

April 2022–March 2023

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1 Preface

Chennai Mathematical Institute (CMI) has been a centre of excellence for research and teaching in the mathematical sciences for over 30 years. During this period, CMI has contributed to the growth of mathematics and allied subjects in the country by providing a conducive environment for academic activities at all levels, ranging from school outreach and undergraduate and postgraduate teaching to advanced research.

CMI faculty are all active researchers, comparable to the best in their fields. CMI faculty publish in leading international venues. They are acknowledged internationally as experts in their subject areas and are invited to deliver lectures at major seminars and conferences. Several faculty members are members of national and international academic societies and policy-making bodies. In December 2022, Prof. Rajeeva Karandikar was named Chair of the National Statistical Commission.

CMI has been receiving a steady stream of strong faculty applications in recent years. During 2022–2023, three new faculty members joined CMI, two in Computer Science and one in Mathematics. We look forward to welcoming several more talented young researchers to CMI in the coming years.

2022–2023 marks the 25th year of CMI's highly acclaimed teaching programme. Since 1998, CMI has attracted the best students wishing to pursue mathematics, computer science and physics to its high-quality undergraduate and postgraduate programmes. The undergraduate programmes offered in CMI are B.Sc. Honours in Mathematics and Computer Science, and B.Sc. Honours in Mathematics and Physics. At the Masters level, CMI offers M.Sc. in Mathematics, M.Sc. in Computer Science, and M.Sc. in Data Science. In addition, CMI offers Ph.D. programmes in Mathematics, Computer Science and Physics.

The B.Sc. and M.Sc. programmes in CMI have traditionally had a strong research focus. An overwhelming majority of CMI students go on to join graduate programmes at the best institutions across the world, such as Caltech, Carnegie-Mellon, Harvard, MIT, Princeton and Stanford in USA, Oxford in UK, ENS Paris in France, the Max Planck Institutes and Humboldt University in Germany, as well as IISERs, IMSc, ISI, IISc, IITs and TIFR in India, not to mention CMI itself. The newer M.Sc. Data Science programme has a more applied focus and the response from industry has been highly positive, with an outstanding placement record

CMI has made significant contributions to India's scientific manpower. The number of CMI graduates who are faculty members at institutions such as IISc, ISI, IITs, IISERs, IIMs, TIFR, IMSc and CMI grows steadily each year. In addition, CMI alumni are also researchers in organizations such as Microsoft Research India.

With data-driven decision making becoming ubiquitous across all sectors, CMI students are much sought after for industry placement, thanks to their strong background in mathematics, statistics and computing. Graduates from CMI have joined companies in areas ranging from finance and insurance to manufacturing and retail, as well as startups offering technology solutions that exploit the power of machine learning.

The academic year 2022–2023 saw a welcome return to on-campus academic activities at CMI. The academic schedule for all the teaching programmes returned to normal, with classes beginning at the start of August, as usual. All standard courses were conducted on campus, but CMI took advantage of the flexibility allowed by online teaching to offer a few electives online, thereby extending the variety of courses available to students.

The tradition of hosting visiting researchers for collaboration was resumed. Several research seminars were delivered in person, in addition to a few online talks. CMI hosted one instructional school and two workshops under the aegis of the National Centre for Mathematics (NCM). CMI also hosted a workshop on data science with satellite imagery and the Chennai-Tirupati number theory conference involving researchers from CMI, IMSc, IIT Madras, IISER Tirupati and IIT Tirupati. CMI organized an online school on gravitation and cosmology and an online conference on statistical methods in finance. Two annual endowment lectures — the R.K. Rubugunday Distinguished Lecture and the K. Lakshmanan Memorial Distinguished Lecture — resumed after a gap of three years.

In March 2022, the state government enabled CMI to purchase an additional piece of land at a subsidized price within the SIPCOT IT Park, where CMI is located, a short distance from the present campus. The formal lease for this land was signed in October, 2022.

This land will be used to develop a new campus, largely devoted to hosting activities under the Dr. F.C. Kohli Centre of Excellence, established in late 2020. The campus will also have a Mathematics Museum, with exhibits and activities designed to expose school and college students to a range of ideas and opportunities in areas related to mathematics. The architects for the new campus have been identified and concept drawings have been developed. Construction is expected to start during 2023–2024.

In September 2022, CMI formally became an international partner of the Banff International Research Station (BIRS), a renowned Canadian centre that hosts week-long research workshops to promote collaborations. CMI is the first affiliate centre of BIRS in south Asia. BIRS-CMI workshops will start with a pilot programme in 2024, followed by a full-strength schedule in 2025.

This year also saw the renewal of ReLaX, a joint International Research Laboratory in Computer Science set up by the French National Centre for Scientific Research (CNRS). The partners in ReLaX are CMI, IMSc, the University of Paris-Saclay and the University of Bordeaux. ReLaX was originally established in 2017 and has now been renewed for another five year term.

Activities under the CMI Arts Initiative restarted on campus. After a gap of two years, CMI hosted a writer in residence from the Philippines, in collaboration with Sangam House, Bangalore.

The Institute also maintained its focus on outreach. CMI's students organized their annual nationwide Scholastic Test of Excellence in Mathematical Sciences (STEMS), culminating in an camp at CMI with guest lectures by distinguished speakers. CMI's student festival Tessellate also returned this year, with a variety of events and activities and a large number of attendees. CMI continued its partnership with Raising A Mathematician Foundation's Training Programme (RAM TP) during the summer of 2022, though the programme remained online. CMI resumed on-campus outreach lectures in mathematics and science for school students and teachers from Chennai, in collaboration with the National Academy of Sciences, Allahabad (NASI). During this year, CMI hosted the training camps for the International Olympiad in Informatics 2022 and the European Girls' Mathematical Olympiad 2023.

Over the years, CMI has been well-served by a small and efficient team of administrative staff. Mr. S. Sripathy, who had headed the administration at CMI almost since its inception, stepped down from his role in 2022. He has contributed immensely to the smooth functioning of the Institute and he will be greatly missed. In his place, Ms. Rajeshwari Nair, another long-standing member of the CMI family, has taken over as Registrar, and Mr. Venu Santhakumari has joined as Chief Operating Officer. We look forward to working with them as the Institute continues on its trajectory of growth.

As always, we are very pleased to acknowledge the agencies and organizations that support CMI's activities and sustain its growth. Over the years, CMI has received steady support from the Government, primarily through the Department of Atomic Energy. CMI is fortunate to be the beneficiary of generous support from private sources, including CSR funding from both small and large organizations, notably the Shriram Group Companies, Cognizant Foundation and Trumpf Metamation. CMI has also started receiving grants to support activities of the Dr. F.C. Kohli Centre of Excellence. This year, Mr. Tatineni Prem Kumar and Mrs. Sujatha Kumar have made a substantial contribution to set up the Rajsurya Endowment.

In summary, CMI stands out as a unique public-private partnership, dedicated to the pursuit of international quality research and excellence in teaching in the mathematical sciences. This Annual Report summarizes the Institute's achievements in 2022–2023. CMI's academic activities continue to grow and we expect to achieve even greater heights in the coming years.

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4 Academic Council

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5 Boards of Studies

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- 3. Clare D'Cruz (CMI)
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- 5. Vijay Kodiyalam (IMSc)
- 6. D.S. Nagaraj (IISER Tirupati)
- 7. M. Thamban Nair (IIT, Madras)
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- 9. K. Narayan Kumar (CMI, Chair, Board of Studies in Computer Science)

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- 1. K. Narayan Kumar (CMI), Chair
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- 3. V. Arvind (IMSc)
- 4. Madhavan Mukund (CMI)
- 5. K.V. Subrahmanyam (CMI)
- 6. V. Vinay (LimberLink, Bangalore)
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- 1. V.V. Sreedhar (CMI), Chair
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- 3. H.S. Mani (CMI)
- 4. K. Narayan (CMI)
- 5. R. Rajesh (IMSc)
- 6. J. Samuel (RRI)

Data Science

- 1. Sourish Das (CMI), Chair
- 2. Tathagata Bandyopadhyay (IIM Ahmedabad)
- 3. Shibasish Dasgupta (Pfizer)
- 4. Rajeeva L. Karandikar (CMI)
- 5. Madhavan Mukund (CMI)
- 6. B. Ravindran (IIT Madras)
- 7. Ramaseshan Ramachandran (Cognizant, retired)
- 8. Ganesh Sankaralingam (Latentview)
- 9. K.V. Subrahmanyam (CMI)

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- 1. Upendra Kulkarni (CMI), Chair
- 2. Krishna Hanumanthu
- 3. K. Narayan Kumar (CMI, Chair, Board of Studies in Computer Science)
- 4. Parameswaran Sankaran (CMI, Chair, Board of Studies in Mathematics)
- 5. V.V. Sreedhar (CMI)

6 Institute Members

| Director | Madhayan Multund |
|--------------------------|---|
| Dean of Studies | Maunavan Mukunu |
| Drofossor Emoritus | K.V. Subrahmanyam |
| | Rajeeva L. Karandikar |
| Distinguished Professors | V D-1-:: |
| Professors | v. Dalaji |
| | K.G. Arun |
| | Clare D'Cruz |
| | Govind S. Krishnaswami |
| | Samır Datta |
| | K. Narayan |
| | K. Narayan Kumar |
| | Partna Muknopadnyay |
| | T.D. Domodog (Until Monch 2022) |
| | D. Sonkaran |
| | F. Salikalali Promothonoth Sostry |
| | S Sonthamanai Kannan |
| | S. Senthaliarai Kalilian $V V$ Sroodhar |
| | P. Sripiyasan |
| | S P Suresh |
| | Amitabh Virmani |
| | Manoi Kummini |
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| | Sourish Das |
| | Krishna Hanumanthu |
| | Upendra Kulkarni |
| | Alok Laddha |
| | Sukhendu Mehrotra |
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| | Geevarghese Philip |
| | M. Praveen |
| | B. Srivathsan |
| | M. Sundari |
| | Priyavrat C Deshpande |
| | |

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|-----------------------|---|
| | Aditya Karnataki |
| | Pranabendu Misra |
| | Siddhi Pathak |
| | C Bamya (Until May 2022) |
| | Amit Kumar Sinhababu |
| | Nithin Varma |
| Michigan Especific | Numi varma |
| Visiting Faculty | |
| | Karthikeyan Bhargavan (Until June 2022) |
| | Keshab Chandra Bakshi (Until April 2022) |
| | Kamalakshya Mahatab (Until July 2022) |
| | S. Selvaraja |
| | Raja Sridharan (Until August 2022) |
| | Kavita Sutar (Until July 2022) |
| | V. Swaminathan |
| | Pascal Weil |
| Post-doctoral Fellows | |
| | Abbishek Mathur (Until February 2023) |
| | Amutha P |
| | Amith Shestri K (Until March 2022) |
| | Amiti Masti K (Ontil March 2023) |
| | A i h L h i |
| | Animesh Lahiri |
| | Arvind Kumar (Until February 2023) |
| | Biblab Paul |
| | Chaitanya Ambi (Until December 2022) |
| | Digjoy Paul (Until January 2023) |
| | Madhu Misra |
| | Ritabrata Bhattacharya (Until July 2022) |
| | Sajat Ahmad Bhat |
| | Supraio Das (Until July 2022) |
| | Soumva Dev (Until November 2022) |
| | Ivotirmov Ganguly (Until December 2022) |
| | Murugoswari Issakkimuthu |
| | Dramial Dutta (Until December 2022) |
| | Pranjal Dutta (Until December 2022) |
| | Pratik Ghosal |
| | Vaishnavi Sundararajan (Until March 2023) |
| | Varun Gupta |
| | Sushma Kumari (Until November 2022) |
| | Jayanth Guhan |
| | Jayakrishnan Madathil (Until July 2022) |
| | Nirupama Mallick (Until September 2022) |
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Snehajit Misra Oorna Mitra (Until December 2022) Arghya Mondal Mandira Mondal (Until September 2022) Partha Paul (Until July 2022) Nabanita Ray Mallika Roy (Until June 2022) S.P. Murugan (Until August 2022) Poulami Dutta Roy Sudeshna Roy (Until July 2022) Soumyadip Das Suhas B N Vimal Raj Sharma (Until August 2022) Jyothsnaa Sivaraman Sruthymurali (Until October 2022)

Adjunct Professors

Manindra Agrawal V. Arvind Shibasish Dasgupta Ghanshvam Date Ramesh Hariharan S. Kesavan V. Lakshmibai Usha Mahadevan H. S. Mani Neeraj Kayal Raghav Kulkarni T. Parthasarathy Mythily Ramaswamy S. Ramanan R.V. Ramamoorthi B.V. Rao Sharad S. Sane Nitin Saxena R. Sridharan (Until March 2023) K. Srilata Mandayam Srivas G. Rajasekaran Sundareswaran Ramasubramanian (Until July 2022) Bala Sathiapalan M.R. Srinivasan A. Thyagaraja P.S. Thiagarajan V. Vinay 11

Research Scholars

Aashish Satyajith Abhiram Subramanian Adwitee Roy Aisha Negi Aleek Maity Ankit Yadav Archit Chauhan Arkadev Ghosh Arnab Sur Arpan Kumar Bag Asif Khan Ashwin Bhaskar Akshay Chandrakant Kharade (Until January 2023) Cyril J Jacob Debodirna Ghosh (Until July 2022) Dharm Veer (Until November 2022) G Aravind Adithya Gautham Shenoy R (Until April 2022) Harish Chandramouleeswaran Harsh Hitesh Saini Jagadish Pine Kaberi Goswami Kaustav Giri Keerthan Ravi Khushbu Gulati Krishna Menon Mohammed Rizwan Rawani (Until January 2023) Malay Mandal Muthuvelmurugan I Navnath Daundkar (Until June 2022) Nirmal Kotal Pankaj Saini Parthapratim Mahapatra Pranjal Dutta (Until August 2022) Preeti Pritthijit Biswas Pritish Sinha Ramadas N (Until September 2022) Sadhanandh Vishwanath B Sahil Mhaskar

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S. Sripathy (Until July 2022) Venu Santhakumari V. Vijayalakshmi Rajeshwari Nair Ranjini Girish Nisha John B. Godwin A. Sankaranarayanan Daniel Lawrence T. Jothi

7 Faculty Profiles

Rajeeva L. Karandikar

Rajeeva L. Karandikar received his B.Sc. from Indore University, Indore (1976), M.Stat. form Indian Statistical Institute, Kolkata (1978) and Ph.D. from Indian Statistical Institute, Kolkata (1981).

He has been an Associate Professor at the Indian Statistical Institute, Delhi (1984-89), a Professor at the Indian Statistical Institute, Delhi (1989-2006), a Professor-in-Charge at the Indian Statistical Institute, Delhi (2000-2002), Head, Delhi Center at the Indian Statistical Institute, Delhi (2000-2002), Head, Delhi Center at the Indian Statistical Institute, Delhi (2000) and (2004-2006) and an Executive Vice-President at Cranes Software International Limited.

He received the Shanti Swarup Bhatnagar Award in 1999. He has been awarded the P C Mahalanobis Gold medal by the Prime Minister at the Indian National Science Congress in February 2014. He is a fellow of the Indian Academcy of Sciences and the Indian National Science Academy.

His research interests are: Probability theory and Stochatic Processes, Applications of Statistics and Cryptography.

Madhavan Mukund

Madhavan Mukund received his B.Tech. (Computer Science and Engineering) from the Indian Institute of Technology, Bombay (1986) and his Ph.D. (Computer Science) from Aarhus University, Aarhus, Denmark (1992).

He is a member of the Executive Council and President of the Indian Association for Research in Computing Science (IARCS), as well as a member of the ACM India Council.

His research interests include models for concurrent and distributed systems, formal verification and distributed algorithms.

K.G. Arun

K.G. Arun received his B.Sc. (Physics) from Calicut University, Calicut (1998), M.Sc. (Physics) from Cochin University of Science and Technology (2001) and Ph.D. (Physics) from Raman Research Institute, Bangalore.

He has been a Postdoctoral Research Associate, Washington University in St Louis and VESF Fellow, LAL Orsay & IAP, Paris (2009-2010).

His research interests are Gravitational Wave Astrophysics, Modelling compact binaries, High energy Astrophysics and Cosmology, Tests of General Relativity and Alternative theories of gravity.

V. Balaji

V. Balaji received his B.A. Hons. (Mathematics) from University of Delhi (1982), his M.A. (Mathematics) from University of Delhi (1984), his Ph.D. from University of Madras (1991).

He has been an NBHM Post-doctoral Fellow at the Chennai Mathematical Institute (1989–92).

He received the Shanti Swarup Bhatnagar Award in 2006 and is a Fellow of the Indian Academy of Sciences.

His research interest is Algebraic Geometry.

Clare D' Cruz

Clare D' Cruz received her M.Sc. (Mathematics) from the Indian Institute of Technology, Bombay (1991) and her Ph.D. (Mathematics) from the Indian Institute of Technology, Bombay (1996).

She has been a Post-Doctoral Fellow at the Tata Institute of Fundamental Research, Mumbai (1996–98) and a Visiting Scholar at the Northeastern University, Boston, U.S.A. (1997–98).

Her research interest is Commutative algebra.

Govind S. Krishnaswami

Govind S. Krishnaswami received his B.Sc. (Physics), B.A. (Mathematics) from University of Rochester, U.S.A. (1999), M.A. (Physics), from University of Rochester, U.S.A. (2001) and Ph.D. (Physics) from University of Rochester, U.S.A. (2004).

He has been a Marie Curie Fellow, Spinoza Institute & Institute for Theoretical Physics, Utrecht University, The Netherlands.

His research interests are Quantum Field Theory, Hydrodynamics and Mathematical Physics

Samir Datta

Samir Datta received his B.Tech. (Computer Science and Engineering) from the Indian Institute of Technology, Kanpur (1995), M.S. from Rutgers University (1997) and Ph.D. from Rutgers University (2004).

He has been a Network Architect at Tellium Inc. (2000-03) and a Post Doctoral Fellow at WINLAB, Rutgers University (2004-05).

His research interests are Complexity Theory, Wireless and High Speed Networking.

K. Narayan

K. Narayan received his B.Tech. (Engineering Physics) from the Indian Institute of Technology Bombay, Mumbai (1997), M.S. (Physics) from the Cornell University, U.S.A. (1999) and Ph.D. (Physics) from the Cornell University, U.S.A. (2002).

He has been a Research Assistant at the Cornell University, U.S.A. (1998-2001), a Research Assistant at the Cornell University, U.S.A. (2001-02), a Postdoctoral Research Fellow at the Duke University, U.S.A. (2002-04) and a Postdoctoral Research (Visiting) Fellow at the Tata Institute of Fundamental Research, Mumbai (2004-07).

His research interests are String theory and cosmology, Stringy geometry and D-brane gauge theories.

K. Narayan Kumar

K. Narayan Kumar received his M.Sc. (Tech.) in Computer Science from Birla Institute of Technology and Science, Pilani (1990). He received his Ph.D. from the TIFR/University of Bombay (1997).

His research interests include Logic, Automata theory and Concurrency.

Partha Mukhopadhyay

Partha Mukhopadhyay received his B.E. (Electronics & Telecommunication Engineering) from Jadavpur University, Kolkata (2000), M.Tech. (Computer Science) from the Indian Statistical Institute, Kolkata (2002) and Ph.D. from the Institute of Mathematical Sciences, Chennai (2009).

He has been a Software Engineer at Motorola India Electronics Ltd., Bangalore (2002-2003), a Research Associate at the Indian Statistical Institute, Kolkata (2003-2004) and a Postdoctoral Fellow at Technion, Israel (2009-2010).

His research interests are Complexity Theory and Additive Combinatorics.

Purusottam Rath

Purusottam Rath received his Ph.D. (Mathematics) from Harish Chandra Research Institute, Allahabad (2006).

He has been a Visiting Fellow at the Institute of Mathematical Sciences, Chennai (2006–2007) and a Coleman Research Fellow at Queen's University, Canada (2007–2008).

His research interests are Combinatorial Number Theory, Diophantine Approximation and Transcendental nature of special values of L-functions.

T.R. Ramadas

T.R. Ramadas received his M.Sc. in Physics from the Indian Institute of Technology, Kanpur (1977) and Ph.D. in Mathematics from TIFR/University of Bombay (1982).

He has been a Professor at the School of Mathematics, TIFR till June 2002, a Professor at the University of Montpellier, France (2000-03), a Research Scientist at ICTP (2003-10) and Head, Mathematics Group, ICTP (2010-13).

He has received the Shanti Swarup Bhatnagar Award for Mathematical Sciences (1998). He is a Fellow of the Indian Academy of Sciences.

His research interests are: Differential and Algebraic Geometry.

Parameswaran Sankaran

P. Sankaran received his B.Sc. (Mathematics) degree from the University of Madras (1979), his M.Sc. (Mathematics) degree from I.I.T. Madras (1981) and his Ph.D. from the University of Calgary, Calgary, Canada (1985).

He held Post-Doctoral Fellowships at the University of Calgary (1985-87), and at The Institute of Mathematical Sciences (1987-89). He was as faculty member at CMI since its inception in 1989 till 2000. Since 2000 till 2019, he was at The Institute of Mathematical Sciences, Chennai. He rejoined CMI as Professor in July 2019.

His research interests include: Topology, group theory, Lie groups and representation theory.

Pramathanath Sastry

Pramathanath Sastry received his B.Sc. (Hons) in Mathematics from University of Delhi, New Delhi (1982), M.Stat. from the Indian Statistical Institute, New Delhi (1984) and Ph.D. (Mathematics) from Purdue University, U.S.A. (1990).

He has been a Teaching Assistant, a Research Assistant at Purdue University, U.S.A. (1984-1990), a Visiting Assistant Professor at University of Missouri, U.S.A. (1990-1991), a Visiting Fellow at the Tata Institute of Fundamental Research, Mumbai (1991-1992), a Fellow at SPIC Science Foundation (1992-1995), a Reader at SPIC Science Foundation (1995-1996), a Reader at Harish-Chandra Research Institute, Allahabad (1996-1999), a Reader F at Harish-Chandra Research Institute, Allahabad (1999-2001), a Visiting Assistant Professor at Purdue University, U.S.A. (1999-2001), an Asst. Assoc. Professor (Term) at the University of Toronto, Canada (2001-2006), CLA at McMaster University, Canada (2006) and an Assistant Professor at East Carolina University, U.S.A. (2007-2009).

His research interest is Algebraic Geometry.

S. Senthamarai Kannan

S. Senthamarai Kannan received his B.Sc. from HKRH College, Uthama Palayam (1985–88), M.Sc. from the Madurai Kamaraj University (1988–90) and Ph.D. from the Chennai Mathematical Institute, (1992–98). He has been a Post-doctoral Fellow at the International Centre for Theoretical Physics (1999–2000).

His research interests are Representation Theory and Algebraic Geometry.

V.V. Sreedhar

V.V. Sreedhar received his B.Sc. from Andhra University, Visakhapatnam, M.Sc. (Physics) from the Indian Institute of Technology, Madras and received his Ph.D. (Physics) from Saha Institute of Nuclear Physics, Jadavpur University, Calcutta.

He has been an Assistant Professor in the Department of Physics at the Indian Institute of Technology, Kanpur, a Post-doctoral researcher at the School of Theoretical Physics, Dublin Institute of Advanced Studies, Dublin, Ireland and a Post-doctoral researcher at the Institute for Theoretical Physics, Uppsala University, Uppsala, Sweden.

His visiting positions include stints at the S. N. Bose National Centre for Basic Sciences, Kolkata, Raman Research Institute, Bangalore, Universities of Rochester, New York and Cincinnati, Ohio, U.S.A. and the High Energy Research Organization (KEK), Tsukuba, Japan.

His research interests are Quantum Entanglement, Classical and Quantum Field Theory and Fluid Dynamics.

K.V. Subrahmanyam

K.V. Subrahmanyam received his B.Tech. (Computer Science and Engineering) degree from the Indian Institute of Technology, Bombay (1986) and M.S. from Vanderbilt University, U.S.A. in 1987. He received his Ph.D. from the TIFR/University of Bombay in December, 1995.

His research interests are Circuit Complexity, Algebraic methods in Complexity theory.

Aiswarya Cyriac

Aiswarya Cyriac received her B.Tech. in Computer Science and Engineering from National Institute of Technology (2008), First year of Masters from Institute of Mathematical Sciences, Chennai (2009), Second year of Masters from Master Parisien de Recherche en Informatique (MPRI), Ecole Normale Superieure de Cachan, France (2010) and Ph.D. in Computer Science from Laboratoire Spécification et Vérification, Ecole Normale Superieure de Cachan, France (2014). She has been a Teaching Assistant at ENS, Cachan (2010-13), a Lecturer and a Postdoctoral Researcher at Uppsala University (2014-15).

Her research interests are: Lossy channel systems with data, Gossip beyond channel bounds and Under-approximate analysis of data-centric data-base systems.

Sourish Das

Sourish Das received his B.Sc. (Statistics) from St. Xavier's College, Calcutta (2001), M.Sc. (Statistics) from Calcutta University, Calcutta (2003) and Ph.D. (Statistics) from the University of Connecticut, U.S.A. (2008).

He has been a Postdoctoral Fellow at the Statistical and Applied Mathematical Science Institute (aka SAMSI) (2008-10), A Postdoctoral Associate at Duke University (2008-10) and a Scientist - Analytics at SAS Research & Development, India (2010-13).

His research interests are: Biostatistics, Financial Statistics, Functional Data Analysis and Bayesian Statistics.

Krishna Hanumanthu

Krishna Hanumanthu received his B.Sc. (Mathematics) from the Chennai Mathematical Institute (2001), M.Sc. (Mathematics) from the Chennai Mathematical Institute (2003) and Ph.D. (Mathematics) from the University of Missouri (2008).

His research interests are Algebraic Geometry and Commutative Algebra.

Upendra Kulkarni

Upendra Kulkarni received his B.Tech. (Computer Science and Engineering) from the Indian Institute of Technology Bombay, Mumbai (1992) and Ph.D. (Mathematics) from Brandeis University, U.S.A. (1998).

He has been a Visiting Assistant Professor at the University of Massachusetts Amherst (1998-2000), an Assistant Professor at the Truman State University (2000-05), An Associate Professor at the Truman State University (2005), a Visiting Scientist at the Indian Statistical Institute, Bangalore (2005-06) and a Visiting Fellow at the Tata Institute of Fundamental Research, Bangalore (2006-07).

His research interests are Representations of algebraic groups over the integers and in characteristic p, Algebraic aspects of Lie representation theory including Lie algebras, quantum groups and related combinatorics and in solving elementary challenging problems.

Manoj Kummini

Manoj Kummini has received his B.Tech. (Electronics and Communication Engineering) from the University of Calicut (1999), M.E. (Telecommunication Engineering) from the Indian Institute of Science, Bangalore (2002), M.A. (Mathematics) from the University of Kansas, Lawrence (2005) and Ph.D. from University of Kansas, Lawrence (2008).

He has been a Software Engineer at Sasken Communication Technologies, Bangalore (1999–2000), a Senior Design Engineer (2003) & Design Engineer (2002-2003) at Texas Instruments India, Bangalore, Graduate Teaching Assistant, University of Kansas, Lawrence, KS, U.S.A. (2003-2008), Research Assistant Professor, Purdue University, West Lafayette, IN, U.S.A. (2008-2011) and a Post-doctoral Fellow at Mathematical Sciences Research Institute, Berkeley, CA, U.S.A. (2012).

His research interest is commutative algebra.

Alok Laddha

Alok Laddha received his B.Sc. in Physics from University of Mumbai (1998), M.Sc. in Physics from Indian Institute of Technology (2000) and Ph.D. in Theoretical Physics from Institute of Mathematical Sciences (2008).

He has been a Teaching Assistant at University of Utah, USA (200-03), a Research Fellow at Institute of Mathematical Sciences, Chennai (2004-08), a Postdoctoral Fellow at Raman Research Institute, Bangaloru (2008-10), a Postdoctoral Fellow at Institute of Gravitation and Cosmos, Pensylvania State University (2010-12), and a Ramanujan Fellow at the Chennai Mathematical Institute, Chennai (2012-14).

His research interest is: Loop Quantum Gravity.

Sukhendu Mehrotra

Sukhendu Mehrotra received his B.Sc. (Hons) in Mathematics from Delhi University (1998), M.S. in Mathematics from the University of Delaware (2000) and Ph.D. in Mathematics from the University of Pennsylvania (2005).

He has been a Visiting Assistant Professor at the University of Massachusetts Amherst (2005–2009) and Van Vleck Visiting Assistant Professor at the University of Wisconsin Madison (2009–2012).

His research interests are algebraic geometry and homological algebra—more specifically, derived categories, Bridgeland stability conditions and moduli problems, and string theory.

Prajakta Nimbhorkar

Prajakta Nimbhorkar received her B.E. (Computer Science and Engineering) from Government College of Engineering, Aurangabad (2003), M.Tech. (Information Technology) from Indian Institute of Technology, Bombay (2005) and Ph.D. from The Institute of Mathematical Sciences, Chennai (2010).

Her research interests are Complexity and Algorithms.

Arun Padakandla

Arun Padakandla (Member, IEEE) received the M.Sc. degree in Electrical Communication Engineering from the Indian Institute of Science, Bengaluru in 2008. He went onto receive a M.Sc. degree in Mathematics and the Ph.D. degree in Electrical Engineering:Systems, both from the University of Michigan at Ann Arbor.

Following a brief stint as a Research Engineer at Ericsson Research, San Jose, he joined the NSF Center for Science of Information as a Post-Doctoral Research Fellow in 2015. From 2018 he has been on the Faculty of the Department of EECS, The University of Tennessee, Knoxville, where he is currently on lien.

His research interests lie in quantum and classical information science.

Geevarghese Philip

Geevarghese Philip received his B.Sc. in Physics from St. Berchmans' College, Chenganassery, Kerala (1998), MCA from Regional Engineering College, Kozhikode, Kerala (2001), M.Sc. in Theoretical Computer Science from Institute of Mathematical Sciences, Chennai (2008) and Ph.D. in Theoretical Computer Science from Institute of Mathematical Sciences, Chennai (2011).

He has been Senior Application Developer - Oracle Apps at Oracle India Pvt. Ltd., Bangalore, (2002-06), and a Postdoctoral researcher at Max Planck Institute for Informatics, Saarbruecken, Germany (2011-2015).

His research interest is: Parametrized Algorithms and Complexity.

M. Praveen

M. Praveen received his B.E. in Electronics and Communication Engineering from R.V. College of Engineering, Bangalore University, Bangalore (2001), M.Sc. in Theoretical Computer Science from the Institute of Mathematical Sciences, Homi Bhabha National Institute, Chennai (2008) and Ph.D. in Theoretical Computer Science from the Institute of Mathematical Sciences, Homi Bhabha National Institute, Chennai (2011).

He has been a Software Engineer at Mindtree Consulting Pvt. Ltd., Bangalore (2002-06), a Research Intern at Microsoft Research, Bangalroe (2011), ERCIM Postdoctoral Researcher

at Inria Saclay - Ile de France (2012) and a Postdoctoral Researcher at Laboratoire Bordelais de Recherche en Informatique, France (2013-14).

His research interests are: Computational complexity of modelling and verifying concurrent infinite state systems, logic and parameterized complexity.

R. Srinivasan

R. Srinivasan received his Ph.D. degree in Mathematics from the Indian Statistical Institute and the Institute of Mathematical Sciences (1998).

He has been a Visiting Fellow at the Harish-Chandra Research Institute, Allahabad (1998-2000), a Post Doctoral Fellow at the Indian Statistical Institute (2000-01), a Post Doctoral Fellow at Universite d'Orleans, France (2001-02), a Visiting Scientist at the Indian Statistical Institute (2002-03), a Visiting Fellow at ICTP, Trieste, Italy (2003) and a JSPS Post Doctoral Fellow at University of Tokyo, Japan (2003-2005).

His research interests are Operator Algebras and Operator Theory.

B. Srivathsan

B. Srivathsan received his B. Tech. and M. Tech. (Dual Degree Programme) in Computer Science and Engineering from the Indian Institute of Technology (2009) and Ph.D. in Computer Science from LaBRI, Université Bordeaux 1 (2012).

He has been a Postdoctoral Researcher at RWTH-Aachen (2012-13).

His research interests are: Theoretical foundations of formal verification and Formal langualge theory.

M. Sundari

M. Sundari received her M.Sc. (Mathematics) from the University of Hyderabad, Hyderabad (1988), M.Phil. (Mathematics) from the University of Hyderabad, Hyderabad (1990) and Ph.D. (Mathematics) from the Indian Statistical Institute, Bangalore (1996).

She has been a Visiting Mathematician at the International Center for Theoretical Physics, Trieste, Italy (1996), a Research Associate at the University of New South Wales, Sydney, Australia (1996-97), an Assistant Professor in the Effat College, Jeddah, Saudi Arabia (2000-01), a Faculty member at the ICFAI Institute of Science and Technology, Hyderabad (2003-04) and an Assistant Professor at the Indian Institute of Technology Roorkee, Roorkee (2004-06).

Her research interests are Representation theory of Lie groups, Uncertainty Principles in Harmonic Analysis, Wiener-Tauberian theorems.

S.P. Suresh

S.P. Suresh received his M.C.A. from R.E.C. Trichy (1996), his M.Sc. (by Research) from Anna University (1999), and his Ph.D. from the Institute of Mathematical Sciences (2003).

His research interests are Logic in Computer Science, Reasoning about Security protocols and Classical Indian Epistemology.

Amitabh Virmani

Amitabh Virmani received his M.Sc. degree in Physics from Indian Institute of Technology, Kanpur (2003) and Ph.D. in Physics from University of California, USA (2008).

He has been a Postdoctoral Researcher at Université Libre de Bruxelles and International Solvay Institutes, Belgium (2008-2011), Junior Scientist at Max-Planck-Institut Für Gravitationsphysik, Germany (2011-12), Assistant Professor at Institute of Physics, Bhubaneshwar (2012-2014) and Reader-F at Institute of Physics, Bhubaneshwar (2014-2017).

His research interests are general relativity and gravitational aspects of string theory & classical and quantum aspects of black holes.

Priyavrat Deshpande

Priyavrat Deshpande received his B.Sc. in Mathematics from Pune University, Pune (2000), M.Sc. in Mathematics from Pune University, Pune (2002), M.Sc. in Mathematiacs from the University of Western Ontario (2007) and Ph.D. in Mathematics from the University of Western Ontario, Canada (2011).

Priyavrat Deshpande has been a Junior Research Fellow at Computational Mathematics Lab, Pune (2002-04), a Visiting Lecturer at Institute of Management and Career Courses, Pune (2005), a Lecturer at S.P. College, Pune (2004-06), a Graduate Teaching Assistant at University of Western Ontario, Canada (2006-11), a Lecturer in Mathematics at University of Western Ontario, Canada (2011), a Visiting Research Scholar at Northeastern University, Boston, USA (2011-12) and a Visiting Fellow at the CMI (2012-15).

His research interest are: Topology, Combinatorics and Algebra.

Aditya Karnataki

Aditya Karnataki received his B.Sc.(Hons.) in Mathematics and Computer Science from Chennai Mathematical Institute (2010), M. A.in Mathematics from Boston University (2012) and Ph.D. in Mathematics from Boston University (2016).

He has been a visiting fellow at Tata Institute of Fundamental Research, Mumbai (2016-17), a post doctoral fellow at Beijing International Center for Mathematical Research, Peking

University (2017-21), and a visitor at Beijing International Center for Mathematical Research, Peking University (2021-22).

His research interests are: p-adic Galois representations, p-adic automorphic forms, congruences of automorphic forms.

Pranabendu Misra

Pranabendu Misra received his B.Sc. (Honors) in Mathematics and Computer Science in 2010, and M.Sc. in Computer Science in 2012 from the Chennai Mathematical Institute, India. He received his PhD in Computer Science from the Institute of Mathematical Sciences, HBNI, India in 2017.

He was a Researcher at the Department of Informatics, University of Bergen, Norway from 2016 to 2019. He was a Postdoctoral Fellow at the Max-Planck Institute for Informatics, Saarbrucken, Germany from 2019 to 2021. Since 2021, he is an Assistant Professor in Computer Science at the Chennai Mathematical Institute, India.

His research interests are: Algorithms, Graph Theory and Machine Learning.

Siddhi Pathak

Siddhi Pathak completed BSc in Mathematics and Computer Science (Hons.) from Chennai Mathematical Institute, Chennai (2014), MSc in Mathematics from Queen's University, Canada (2015) and Ph.D. in Mathematics from Queen's University, Canada (2019).

Siddhi Pathak was a S. Chowla Assistant Research Professor at Pennsylvania State University, USA (2019-2021) and an INSPIRE faculty fellow at Chennai Mathematical Institute (August 2021-Dec 2021).

Her research interest is: Number Theory

C. Ramya

C. Ramya received her B.E., in Computer Science and Engineering from Madras Institute of Technology (2013), M.S., Ph.D., in Computer Science and Engineering from the Indian Institute of Technology Madras (IIT Madras), INDIA (2019).

Ramya was a postdoctoral research fellow in the School of Technology and Computer Science at the Tata Institute of Fundamental Research (TIFR), Mumbai (2019-2021). She is also a recipient of the INSPIRE Faculty Fellowship awarded by the Department of Science and Technology (DST) for the period 2021-2026.

Her research interests include Computational Complexity Theory and algorithmic aspects of Algebra.

Amit Sinhababu

Amit Sinhababu received his B.E in Information Technology from IIEST Shibpur (2017-2011), M.Tech in Computer Science from Indian Institute of Technology Kanpur (2012-2014), and Ph.D. in Computer Science from Indian Institute of Technology Kanpur (2015-2019).

He has been a Postdoctoral Researcher at Aalen University, Germany (2019-22).

His research interests primarily lie in computational number theory and algebra, and algebraic complexity theory. His current focus is on polynomial factorization and related problems.

Nithin Varma

Nithin Varma received his B.Tech. in Computer Science and Engineering from National Institute of Technology Calicut (2011), M.Sc. in Computer Science from Tata Institute of Fundamental Research Mumbai (2014), and his PhD in Computer Science from Boston University, USA (2019).

He was a postdoctoral fellow at the Department of Computer Science, University of Haifa, Israel from 2019 to 2021.

His research interests are: Sublinear algorithms, randomized algorithms and approximation algorithms.

8 Achievements

- CMI students win 4th rank in Simon Marais international mathematics competition 2022, Asia-Pacific region.
- Rajeeva Karandikar named Chairperson of National Statistical Commission.
- CMI enters into partnership with Banff International Research Station (BIRS).
- Ilan Newman and Nithin Varma win best paper award at ICALP 2022.
- Sandesh Kamath, Amit Deshpande, K V Subrahmanyam, and Vineeth Balasubramanian win best paper award at CODS-COMAD 2022.

9 Research Activities

Computer Science

Research done by the computer science group is broadly in the areas of formal methods, algorithms, complexity, machine learning and computational biology.

Formal methods research involved formal verification of various paradigms, synthesis of systems from specifications, advances in logics and other specification formalisms, developing techniques with wide applicability in formal methods such as games, partial order reductions, alternate characterisations, development of new mathematical models, algorithmic advances on existing formal mathematical models.

More specifically, work was carried out on formal verification of different paradigms like smart contracts, business artifacts, distributed consensus protocol, and distributed datalog programs. In the field of program verifiation, research was carried out on the verification of programs under weak memory models and under persistency models. In particular, the group worked on the decidability of reachability under the x86 memory model, stateless model checking for reads from equivalence under sequential consistency considering preemption, decidability of safety property of total store order (TSO) games, verification of concurrent programs with unbounded data, reachability in acyclic bounded tree-width pushdown systems, and type-checking problem for tree transductions. There was work on developing formal methods for the insecurity problem for protocols with assertions under more general equational theories (rather than only constructor-destructor theories), on incorporating assertions into the applied pi calculus, and on domain specific language for testing distributed protocol implementations.

Towards synthesis/learning of systems from specifications, there was work on test case generation for VLSI designs, synthesis/verification problem for interface automata, learning expressive decision tables, active learning of context-free languages, and synthesis for logics over infinite domains.

Further the CS group constributed to the development of techniques and algorithms for formal methods. More specifcally, the group worked on bounded partial-order reduction for read-write concurrent programs, separation of temporal logics over trees, realizability problem for constraint linear-time temporal logic (LTL), developing weighted temporal logics that is expressively complete for weighted first-order logic, satisfiability of context-free string constraints with subword ordering and transductions, timed games, timed negotiations, simulations for parametric timed automata, characterising and deciding closeness between transducers in terms of edit distances, zone based algorithms for timed automata inclusion and universality, window expressions for stream processing, and regular abstractions of bounded tree-width languages.

Research in algorithms involved designing new exact, parallel, parametrised, approximation, optimisation, sublinear, and streaming algorithms for many classical problems and graph problems. Specifically, the CS group worked on polynomial time algorithms for even paths in 1) single crossing graphs, 2) single crossing minor-free graphs, and 3) apex graphs, on parallel algorithms for planar graph colouring, on five coloring of planar graphs in parallel models, on improved parallel algorithm for perfect matching in bipartite planar graphs, on the k-shortest disjoint paths problem, on fair variants of rainbow colouring, relaxed stable matchings in the presence of ties in preference lists, on dynamic algorithms for matching, on sublinear algorithms for matching, on streaming algorithms with low sensitivity, on approximation algorithms for 2-coloring. The research work on property testing included erasure-resilient algorithms for monotonicity testing, testing pattern freeness of numerical sequences, and testing chordality of graphs.

In the area of parametrised algorithms there was work on parametrised network design algorithms, faster exact exponential algorithms for variations of chromatic number, polynomial-time algorithms for generalizations of independent set in P_k -free graphs, minimum fill-in parameterized by vertex cover number, maximum induced matching parameterized by treewidth, tournament feedback vertex set parameterized by solution size, fariness in vertex cover, feedback vertex set, optimisation, maximum induced matching, group fairness in matchings, connectivity problems on graphs, exact complexity of Hamiltonian path problem, path-restricted graph homomorphisms, and parameterized analysis of group isomorphism problems.

The algorithms for discrete fair allocations focused on envy-free allocations of indivisible goods, linear programming techniques for allocations, epistemic envy-free-upto-any-good (EFX) allocations, allocations on directed graphs, dynamic allocations of scarce resources with daily quotes and category quotas, exact exponential algorithm for EFX allocations, and fair division of indivisible goods to more than 3 agents.

In complexity theory, the research was focused on polynomial identity testing and its variants, circuit complexity, dynamic complexity of group problems, communication complexity, parametrised complexity and derandomization. In particular, the CS group studied the dynamic complexity of abelian group problems, parameterized analysis of group isomorphism problems, isomorphism of quasi-groups, monotone bounded genus circuit value problem, monotone algebraic complexity, arithmetic circuit lower bounds, orbit closure of binomial, de-bordering depth-3 circuits, results on automatic numbers, polynomial/ rational identity testing, matrix coefficient realization theory, applications of matrix tree theorem, the effects of field extensions on matrix rigidity and circuits, exploring relations between rigidity and polynomial identity testing, multivariate polynomial factoring, algebraic independence testing over finite fields, sparsification of submodular functions, dynamic complexity of planar embedding, and dynamic complexity of matching.

In machine learning, research was focused on explainability and robustness of machine learning models, a new abstraction mechanism for dynamic neural network (DNN) verification based on linear bounds on neurons, approximation for k-means and k-median, and

interpretable machine learning models.

In computational biology, research was carried out on enzyme compartmentalization for optimal glycan synthesis and on optimal decoding of glycan information in single-cells.

Maths

Research in Mathematics spanned various topics such as geometry, number theory, algebra and representation theory, topology, combinatorics, analysis, thermodynamics etc. Further details are as below.

In number theory, research was carried out on *p*-adic Galois representations, *p*-adic Langlands program, variants and applications of Linnik's problem and the Brun-Titchmarsh theorem, Euler-Kronecker constants for number fields, generalization of Euclidean ideal classes, properties of Piatetski-Shapiro primes, the two variable Artin conjecture, failure of the Hasse principle for forms in four variables of degree three, relations among values of the digamma function, linear independence of values of q-analogues of special functions, values of multiple Lerch zeta-function, arithmetic nature of values of modular functions, on the Resnikoff-Saldana conjecture regarding the growth of the Fourier coefficients of Siegel cusp forms, complexity of real numbers in terms of repetitions of digits and probabilistic number theory.

Work in commutative algebra and algebraic geometry covered the topics of modular invariant rings, containment problem of symbolic and regular powers of ideals, resurgence of ideals, epsilon multiplicity, the Shank-Wehalu conjecture in low dimensions, the Hilbert-Kunze density function of tensor product of rings, singularities and test ideals in a commutative ring of prime characteristic, studying the Bass numbers of local cohomology modules over a Stanley-Reisner ring supported on monomial ideals and analyzing behavior of components of graded local cohomology modules in mixed characteristic. Other topics researched in algebra were the symbolic Rees algebra, the F-rationality and F-singularities of the Rees algebra over prime characteristic, finer cones, set theoretic complete intersections, Semigroup C^* algebras, finite inclusions of C^* algebras and planar algebras, image ideals of locally nilpotent derivations on some interesting affine domains, kernels of locally nilpotent derivations on A^2 -fibrations containing field of rationals and image ideals of locally nilpotent derivations on polynomial rings in two or three variables over Noetherian UFD's containing field of rationals.

In algebra and geometric topology, research was carried out regarding the structure of Houghton's groups, automorphisms of infinite Houghton's groups, liftable mapping class groups, projection complex and its applications, combinatorial surgery, reality questions for finite groups, Stiefel-Whitney classes for representations of finite groups, Stiefel-Whitney classes for real representations of GL(n, q), multiplicity freeness for tensor products of representations of finite groups, relative Property (T) for semidirect products, affine two dimensional quotients of reductive groups in positive characteristic, exceptional Lie groups, p-adic analytic groups, non-arithmetic lattices, structure theory of complex analytic groups, deformations of reflection arrangements, Vietoris-Rips complexes of groups, geometric cycles in non-arithmetic locally symmetric spaces and K-theory.

In algebraic geometry, work was done in the geometry of anti-canonical line bundles of Bott-Samelson varieties in the non-simply laced case, anti-canonical line bundle of Bott-Samelson-Demazure-Hansen varieties, cohomology of line bundles on Schubert varieties for non-dominant characters, parabolic vector bundles, application in geometry of a theory of higher Bruhat-Tits group schemes, the theory of compactifications of principal bundles, construction of moduli space of vector bundles on an orbifold curve and homogeneous spaces.

Further work in algebraic geometry included GIT quotients of group compactifications by smaller torus, GIT quotients of Schubert varieties, affine GIT quotients in positive characteristic, Seshadri constants and positivity of linear systems on projective varieties, Seshadri constants of vector bundles on projective varieties, Seshadri constants on moduli spaces, Seshadri constant on blow-up of finite points in the projective plane, questions on linear systems on rational surfaces, unexpected hypersurfaces, on defining a categorical SL_2 action on moduli spaces of sheaves on Abelian surfaces, Plucker coordinates in finite projective geometry, Hodge module techniques in birational geometry, complex geometry, application of affine fibration theory and the theory of exponential maps to translations of lines and planes, structure of the automorphism group of generalized Asanuma threefolds, the Franchetta conjecture on cycles on holomorphic symplectic varieties and presentation of diagram categories.

Research in combinatorics and algebra included algebraic properties of combinatorial objects such as the Koszulness of combinatorial algebras, the Cohen-Macaulay edge ideals and linear quotient of powers of facet ideals of simplicial trees, homological invariants of binomial edge ideals, regularity of powers of path ideals, quadratic ideals associated to polycubes, persistent homology for graph streams and combinatorics of hyperplane arrangements, pattern avoidance, poset partition enumerator, fence posets, subsequences in binary words. Other topics on which work was done were information and coding theory, information inequalities and applications, random walks, graph-theoretic proof of the Amitsur-Levitzki theorem on a matrix commutator identity. In machine learning, work was done on reinforced learning, implementation of random projection for MNIST data, studying generative adversarial networks, the Johnson-Lindenstrauss lemma, stochastic block models and stochastic approximation.

In analysis, the topics such as Quantum Gaussian states, Fermionic Gaussian states, Radon-Nikodym derivative for states of C^* algebras, C^* convexity, Fourier transforms and completely positive maps, convex analysis on Hadamard spaces were researched. Work in thermodynamics focused on deformed supergravity theories and black hole thermodynamics in the deformed setup, sub-leading corrections to the entropy using higher derivative actions based on dilaton Weyl multiplet, and thermodynamics of near-BPS black holes for unequal charges.

Physics

In the area of gravitational wave physics, research was carried out on:

- Developing new way of carrying out multiparameter tests of GR in the context of gravitational waves (GWs), using the technique of Principal Component Analysis (PCA). This was applied to a subset of events detected by LIGO/Virgo. This is currently being reviewed by the LIGO/Virgo collaboration for incorporation into the standard suite of tests performed on future GW detections.
- Studying systematic bias due to the neglect of eccentricity on various tests of GR in connection with the present and future GW observations. It is found that this can lead to severe systematic biases and therefore it is extremely important for the analysis of future GW data.
- Proposing a new test of GR which aims to measure the relativistic periastron precession in eccentric binaries and the projected bounds on deviations from GR from this method are assessed using the Fisher information matrix.
- Applying techniques of Machine Learning to classify the population of Gamma-ray Bursts (GRBs). Five distinct populations of GRBs are found. Interestingly it is found that there are two distinct populations which are associated with Kilonovae, argued to be produced by NS binary mergers. Future GW observations will be crucial in understanding the astrophysical origin of the two populations.
- Studying pre-merger localization ability of the planned space mission LISA in connection with the possibility of pointing electromagnetic telescopes such as Athena (X-ray) and LSST (Optical). Some mechanisms that may produce EM emissions from such mergers are also proposed.
- Studying the ability of current and future GW detectors to detect line-of-sight acceleration in compact binaries. Using the two binary neutron star mergers GW170817 and GW190425 limits were set on this type of acceleration which can arise due to astrophysical environments in which these mergers happen.
- Studying the efficiency of Hierarchical mergers, sequential mergers of BH remnants previously by merger, in a simplified astrophysical setting and comparing the predictions of the model against the mass spectrum from LIGO/Virgo. It was found to be in good agreement. This computationally inexpensive tool can be employed to probe astrophysical environments that facilitate hierarchical mergers.

In the area of string theory, quantum gravity and quantum field theory, research was carried out on:

- Quantum extremal surfaces by extremizing the generalized entropy in 2-dimensional backgrounds (in part upon dimensional reduction) in various families of cosmologies with Big-Crunch singularities, and other cosmologies including de Sitter and FRW cosmologies under certain conditions; the Information paradox for small Schwarzschild de Sitter black holes and resolution via quantum extremal surfaces and islands; de Sitter space, extremal surfaces and "time-entanglement", relations between time entanglement using the time evolution operator and pseudo entropy via the transition matrix.
- M5-branes on Riemann surfaces and string soliton BPS states in N=2 4-dim theories from dimensional reduction of the (2,0) theory.
- Asymptotic symmetries in quantum gravity, flat space holography and geometry of the S-matrix in quantum field theory; information paradox; infrared finite scattering amplitude, S-matrix from Polytopes, infinite dimensional novel symmetries in quantum field theories and relationship between quantum S-matrix and classical scattering observables.
- Positivity of microstate degeneracy for toroidal orbifold compactifications of Type IIB string theory, positivity of discrete information for CHL black holes; a refinement of the negativity puzzle for black hole indices and more examples, 3-dim quantum black holes;

quantum fields on supersymmetric microstate geometries, study of scalar field on a near extremal BTZ black hole background; black holes dual to quantum mechanics; rotating black holes in 3d de Sitter; quantum instability of black holes, thermodynamics of BPS and near-BPS AdS5 black holes.

- Exploring LLM construction under non-Abelian T-duality, cosmic censorship conjuncture, plane waves and Penrose limits.
- Quantum field theory in curved space-time, causal set approach to quantum gravity, quantum thermodynamics.

In the area of nonlinear dynamics, research was carried out on:

• Cascade of isochronous and period doubling bifurcations and self-similarity and duality in the classical three-rotor problem, the three-rotor problem and superconducting flux qubit, integrable systems;

a conservative analogue of the Orr-Sommerfeld equation, instabilities of compressible parallel flows; spectral statistics and dispersion relations in the quantum Rajeev-Ranken model; level crossing instabilities of inviscid compressible Couette flow. In the area of quantum entanglement, research was carried out on:

• Constructing composite fermions from anyons, quantum entanglement of composite particles made up of one-dimensional anyons, efficiency of quantum Otto engine using anyons.

10 Publications

Journal Articles

Computer Science

- J1 Nithin Varma and Yuichi Yoshida: Average Sensitivity of Graph Algorithms, to appear in SIAM Journal on Computing.
- J2 Eric Allender, Archit Chauhan and Samir Datta: Depth-First Search in Directed Planar Graphs, Revisited, to appear in Acta Informatica.
- J3 Fedor V Fomin, Petr A Golovach, Fahad Panolan, Geevarghese Philip and Saket Saurabh: Diverse Collections in Matroids and Graphs, to appear in Mathematical Programming.
- J4 Girija Limaye, Prem Krishnaa, Meghana Nasre and Prajakta Nimbhorkar: *Envy-freeness* and Relaxed Stability: Hardness and Approximation Algorithms, to appear in Journal of Combinatorial Optimization (JOCO).
- J5 V. Arvind, Abhranil Chatterjee, Rajit Datta and Partha Mukhopadhyay: Fast Exact Algorithms Using Hadamard Product of Polynomials, Algorithmica, Vol.84, No.2, p.436-463 (2022).
- J6 Eric Allender, Nikhil Balaji, Samir Datta and Rameshwar Pratap: On the complexity of algebraic numbers, and the bit-complexity of straight-line programs, to appear in Computability.
- J7 Samir Datta, Nutan Limaye, Prajakta Nimbhorkar, Thomas Thierauf and Fabian Wagner: *Planar Graph Isomorphism Is in Log-Space*, ACM Trans. Comput. Theory 14(2): 8:1-8:33 (2022).
- J8 B Srivathsan: *Reachability in timed automata*, ACM Siglog news, Vol. 9, Issue 3, July 2022.
- J9 C. Aiswarya, Vikraman Arvind and Saket Saurabh: *Theory research in India: 2019-2022*, Communications of ACM, 88(11), 88-93, 2022.
- J10 V. Arvind, Abhranil Chatterjee, Rajit Datta, and Partha Mukhopadhyay: Univariate Ideal Membership Parameterized by Rank, Degree, and Number of Generators, Theory of Computing System, Vol.66, No.1, p.56-88, (2022).
- J11 Pranjal Dutta, Mahesh Rajasree and Santanu Sarkar: Weak-keys and key-recovery attack for TinyJAMBU, to appear in Scientific Reports - Nature.
Maths

- J12 Manoj Kummini and Dharm Veer: The Charney-Davis conjecture for simple thin polyominoes, Communications in Algebra, https://doi.org/10.1080/00927872.2022.2140347.
- J13 Priyavrat Deshpande and Krishna Menon: A branch statistic for trees: Interpreting coefficients of the characteristic polynomial of braid deformations, to appear in Enumerative Combinatorics and Applications.
- J14 Arghya Mondal: A_q components of geometric classes in compact Hermitian locally symmetric spaces, Kyoto Journal of Mathematics, 63 (1), 51-66, (February 2023).
- J15 Clare D'Cruz and Shreedevi Masuti: An extension of Rees' theorem and two interpretations of a vector in the joint reduction lattice, to appear in Journal of Algebra and its Applications.
- J16 Huy Tai Ha, A. V. Jayanthan, Arvind Kumar and Hop D. Nguyen: *Binomial expansion* for saturated and symbolic powers of sums of ideals, to appear in Journal of Algebra.
- J17 F. Abdelmalek, P. Deshpande, S. Goyal, A. Roy and A. Singh: *Chordal graphs, higher independence and vertex decomposable complexes*, to appear in International Journal of Algebra and Computations.
- J18 Soumya Dey and Krishnendu Gongopadhyay: Commutator subgroups of singular braid groups, Journal of Knot Theory and Its Ramifications DOI: https://doi.org/10.1142/S021821652250033X.
- J19 S. Gun, O. Ramare and J. Sivaraman: Counting ideals in ray classes, Journal of number theory, Vol.243, 2023, p.13-37.
- J20 Priyavrat Deshpande, Samir Shukla and Anurag Singh: Distance r-domination number and r-indepence complexes of graphs, European Journal of Combinatorics, Vol.102, (2022), 103508, ISSN 0195-6698.
- J21 Suprajo Das: *Epsilon multiplicity for Noetherian graded algebras*, Illinois Journal of Mathematics, Vol.66, No.2, p.245-269 (2022).
- J22 V. Kumar Murty and J. Sivaraman: *Euclidean ideal classes in Galois number fields of odd prime degree*, to appear in Research in Number Theory.
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11 The National Undergraduate Programme

In 1998, CMI initiated an National Undergraduate Programme in the Mathematical Sciences in collaboration with Madhya Pradesh Bhoj Open University with a 3 year course in Mathematics and Computer Science, leading to a B.Sc. Honours degree. In 2001, this programme was extended to the postgraduate level with separate 2 year courses leading to M.Sc. degrees in Mathematics and Computer Science. The scope of the undergraduate programme was expanded in 2003 to incorporate a 3 year course leading to a B.Sc. Honours degree in Physics. CMI commenced a two year course leading to an M.Sc. degree in Applications of Mathematics in 2010.

From 2012, the B.Sc. Physics programme has been restructured as a B.Sc. programme in Mathematics and Physics. There is a common admission to the B.Sc. programmes in Mathematics and Computer Science and Mathematics and Physics and all students do the same courses in the first semester. Students choose their stream at the end of the first semester.

In 2018, MSc Data Science program has been launched, keeping in view the current requirement from the industry.

The undergraduate and postgraduate teaching programmes at CMI are both run in cooperation with the Institute of Mathematical Sciences (IMSc), Chennai. These programmes tap the teaching talent available at the elite research institutes of the country, which are normally outside the university system. Students are thus exposed to lectures by active researchers who bring a very different perspective to the teaching.

B.Sc. (Hons.) Mathematics and Computer Science

In 2022, the twenty-fifth batch of students was admitted to the undergraduate programme. At the end of the first semester, 32 students opted for B.Sc. in Mathematics and Computer Science. The second year B.Sc. class has 45 students in Mathematics and Computer Science and the third year B.Sc. class has 31 students. Out of the 52 students of the 2019 batch who took their degrees at the convocation in July 2022, several have been placed in very prestigious institutions.

- Aadityan Ganesh PhD Computer Science, Princeton University, USA
- Abhinav Kumar Teaching Assistant, Art of Problem Solving, USA
- Amritendu Hait MSc Mathematics, Indian Statistical Institute, Kolkata
- Aniruddhan Ganesaraman Master of Statistics, Indian Statistical Institute, Delhi

- Amik Raj Behera PhD Computer Science, Aarhus University, Denmark
- Anwesha Paul MSc Data Science, Chennai Mathematical Instuitute
- Archi Kaushik MSc Mathematics, EPFL, Switzerland
- Aritra Kundu MSc Mathematics, TU Kaiserslautern, Germany
- Arka Karmakar PhD Mathematics, Northwestern University, USA
- Arpoitri Ghosal MSc Mathematics, Leiden University, Netherlands
- Bhaskar Pandey MSc Computer Science, Chennai Mathematical Institute
- Debmalya Biswas MSc Data Science, Chennai Mathematical Institute
- Devansh Sehta MSc Mathematics, University of Munster, Germany
- Dhivya Prakash Raveendran Vijaya PhD Mathematics, Rutgers University, USA
- Eeshan Banerjee MSc Mathematics, Indian Statistical Institute, Kolkata
- Harsh Arora MSc Computer Science, Chennai Mathematical Institute
- Jyothi Surya Prakash Bugatha Quantitative Researcher, Mathisys Advisors
- Krishnan D MSc Computer Science, Chennai Mathematical Institute
- Nabin Kumar Sahoo MSc Computer Science, Chennai Mathematical Institute
- Niranjan Nair Project Trainee, IIT Madras

- Nilava Metya PhD Mathematics, Rutgers University, Canada
- Paul Mammen PhD Mathematics, LSA, University of Michigan, USA
- Pradyot Mohanty MSc Computer Science, Chennai Mathematical Institute
- Pranav Vijay Sonar MSc Quantitative Economics, Indian Statistical Institute, Kolkata
- Rajat Adak MSc Mathematics and Computing, IIT Hyderabad
- Rishi Garg MSc Computer Science, Chennai Mathematical Institute
- Rishiraj Baul MSc Mathematics, Indian Statistical Institute, Kolkata
- Rohan Bajaj MSc Mathematics, IIT Bombay
- Russell Dcruz Integrated PhD Mathematics, TIFR, Mumbai
- S J Shree Ganesh MSc Computer Science, Chennai Mathematical Institute
- Sagnik Mukherjee PhD Mathematics, University of Minnesota, USA
- Sampad Kumar Kar MSc Computer Science, Chennai Mathematical Institute
- Saswata Mukherjee MSc Computer Science, Chennai Mathematical Institute
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- Senjuti Dutta Subject Matter Expert, Chegg Inc
- Sharv Laad PhD Student, University of California, San Diego

- Shibashis Mukhopadhyay PhD Mathematics, Washington University, St Louis
- Shreyam Banerjee MSc Data Science, Chennai Mathematical Institute
- Shourjya Basu MSc Computer Science, Chennai Mathematical Institute
- Shubhrajit Bhattacharya MSc Mathematics, University of British Columbia, Canada
- Siddhant Chaudhary MSc Computer Science, Chennai Mathematical Institute
- Somnath Bhattacharjee MSc Computer Science, Chennai Mathematical Institute
- Somya Aggarwal Associate Analyst, Sunlife Financials
- Spandan Bhattacharya MSc Computer Science, Chennai Mathematical Institute
- Sumantha.K.S MSc Computer Science, Chennai Mathematical Institute
- Syed Aslah Ahmad Faizi MSc Computer Science, Chennai Mathematical Institute
- Vikram Nadig MSc Mathematics, Universität Regensburg, Germany
- Yajur Phullera MSc Computer Science, ENS Paris-Saclay, France
- Aranya Bhowmick
- Sundarraman Madhusudanan MSc Computer Science, NIT Trichy
- Spandan Poddar MSc Statistics, University of Hyderabad
- Priyakshi Goswami Master's Artificial Intelligence, Vrije Universiteit Amsterdam, Netherlands

B.Sc. (Hons.) Mathematics and Physics

Of the 40 students admitted to the undergraduate programme in 2022, 8 students opted for B.Sc. in Mathematics and Physics as the end of the first semester. The second year class has 7 students. The third year class has 9 students. Out of the 5 students of the 2019 batch who took their degrees at the convocation in July 2022, several have been placed in very prestigious institutions.

- Advait Hemant Phadnis MSc Mathematics, Chennai Mathematical Institute, Chennai
- Atharva Sachin Raje MSc Mathematics, Chennai Mathematical Institute, Chennai
- P Prasanna Venkatesan MSc Physics, IIT Gandhinagar
- Taisanul Haque MSc Theoretical Physics, University of Göttingen, Germany
- Ujjwal Kiran Das MSc Mathematics, Chennai Mathematical Institute, Chennai

M.Sc. Mathematics

In 2022, 8 students have joined the programme. There are 8 students in the second year of the programme. 7 students who joined the programme in 2020 have completed the programme successfully.

- Deepak M S PhD Mathematics, Western University, Canada
- Sayantan Chakraborty PhD Mathematics, Michigan State University, USA
- Writabrata Bhattacharya PGDBA, ISI Kolkata – IIM Kolkata – IIT Kharagpur
- Dianthe Basak PhD Mathematics, Université Paris Cité, Paris
- Abhiram Subramanian PhD Mathematics, Chennai Mathematical Institute

- Agilan Amirthalingam PhD Mathematics, University of Kansas, USA
- Pratik Ashok Jadhav PhD Mathematics, Indian Institute of Science, Bangalore

M.Sc. Computer Science

In 2022, 22 students have joined the programme. There are 17 students in the second year of the programme. 20 students who joined the programme in 2019 have completed the programme successfully.

- Debjit Paria Quant. Researcher, Millenium Management LLC
- Dhruv Nevatia PhD Computer Science, ETH Zürich, Switzerland
- Diganta Mukhopadhyay TCS Research, Pune
- Kapil R Shenvi Pause Crypto Engineer, Panther Protocol
- Akhil Vanukuri Research Intern, National University of Singapore, Singapore
- Amin Falah Research Assistant, University of Colorado Boulder
- Anurag Pandey Analyst, Alphagrep Securities
- Arnab Sur PhD Computer Science, Chennai Mathematical Institute
- Arpan Shivkumar Agrawal Visiting Research Programmar, Univ of Illinois at Urbana-Champaign, USA
- G Aravind Adithya Software Engineer-2, Bigbasket
- Nitish Shukla Data Scientist II, Micron India

- M Pazhamalai Software Development Engineer, JUSPAY
- Ratnakar Medepalli PhD Computer Science, TIFR, Mumbai
- Sabyasachi Ghosh
- Sanyam Agarwal Prof Jum Inc.
- Sathiyanarayana Venkatesan Ramesh PhD Computer Science, MPI Kaiserslautern, Germany
- Sayantan Saha PhD Computer Science, Chennai Mathematical Institute
- Vaishnavi Vishwanath PhD Computer Science, Chennai Mathematical Institute
- Mrinal Dhume Research Associate, Oneirix Labs
- Subham Jaiswal M.Math, Indian Statistical Institute, Kolkata

M.Sc. Data Science

In 2022, third batch of 51 students joined the programme. There are 46 students in the second year of the programme. 45 students who joined the programme in 2020 have completed the programme successfully.

- Aanchal Kandpal Data Scientist, Wells Fargo
- Aditi Kundu Data Scientist, Wells Fargo
- Aditya Narayan Sen
- Animesh Guchhait Synergy Marine group
- Anisha Saha Data Scientist, Micron India

- Anuja Pal Associate Data Scientist, Societe Generale
- Anukriti Jain Analyst-Data Science, American Express, Bangalore
- Arindam Patra Secondary Analyst, OSG Analytics
- Arnab Sen Assistant Software Engineer, Legato Health Technologies
- Aroni Ray Assistant Software Engineer, Legato Health Technologies
- Arpan Biswas Data Scientist, Ushur
- Asif Ikbal Assistant Software Engineer, Legato Health Technologies
- Avirup Das PhD Computer Science, The University of Manchester, UK
- Ayush Thada Wells Fargo
- Chandrashish Prasad Data Scientist, Ushur
- Gourav Biswas
- Hithesh KK Data Scientist, Kantar Analytics
- Kanika Saha
- Lakshya Gupta Assistant Software Engineer, Legato Health Technologies
- Megha Chakraborty Data Scientist, Micron India
- Monalisa Paul Associate Data Scientist, Condé Nast
- Naval Vatsyayan Assistant Software Engineer, Legato Health Technologies

- Oshita Saxena Data Scientist, LTI
- Palemkota Maithresh Data Scientist, LTI
- Pragya Shukla Data Scientist, LTI
- Prasun Agarwal Data Scientist, Micron India
- Prosenjit Dey Data Scientist I, Edelweiss Tokio Life Insurance
- Rahul Jayesh Shah Analytics Scientist, Gain Credit LLC
- Samanta Dey Assistant Software Engineer, Legato Health Technologies
- Samanwita Koley Junior Data Scientist, LTI
- Shashi Satyam Data Analyst, MAN Truck
- Shiuli Subhra Ghosh PhD Electrical Engineering, Rensselaer Polytechnic Institute, USA
- Shreyan Patra Assistant Software Engineer, Legato Health Technologies
- Shubham Parashar Data Scientist, Synergy Maritime
- Sourendu Bagchi Quantitative Researcher, Vista Intelligence Private Limited
- Srijan Bhushan Risk Analyst, The Estée Lauder Companies
- Sucharita Das Management Trainee, American Express
- Suman Roy Data Scientist, Micron India

- Sumeet Milind Suley Quantitative Analyst, CRISIL Irevna UK Limited
- Taher Ismail Azim Management Trainee, Amex
- Tanuj Sur Data Scientist, Micron India
- Thomas Kurian Management Trainee, American Express
- Varun Shirish Kulkarni Associate Advanced Analytics, OSG Analytics
- Yash Jain Senior Computer Vision Engineer, NeoDocs
- Yash Raj Data Scientist, Wells Fargo

Convocation

The 19th Annual Convocation of CMI was held on 23 July 2022. Degrees were awarded to 137 successful candidates at various levels. Of these, 57 were B.Sc. candidates, 72 were M.Sc. candidates and 8 were a Ph.D. candidates. Prof. Ajay K. Sood, F.R.S., Principal Scientific Adviser, Government of India was the Chief Guest and delivered the convoation address.

For the B.Sc. programmes, the CMI Gold Medal of Excellence was awarded to Devansh Sehta in Mathematics and Computer Science for his outstanding performance at the undergraduate level. For the M.Sc. programmes, the CMI Gold Medal of Excellence was awarded to Dianthe Basak in Mathematics, Avirup Das in Data Science and Sathiyanarayana Venkatesan Ramesh in Computer Science.

12 Student Activities

Undergraduate Internships

- Soham Chatterjee worked under Nitin Saxena at IIT Kanpur on "Algebraic Circuits: Learning the Inherent Structure" in December 2022.
- Bijayan Ray

did a reading project on Topics in analysis under the supervision of Professor Manjunath Krishnapur, IISc., online, during the months of June - July 2022.

- Adarsh V did internship at NIT Calicut under Sanjay P K on "Multivariable Calculus" in July 2022.
- Writika Sarkar
 - did internship at LaBRI, University of Bordeaux under Arnaud Casteigts on "Research internship on expressivity of temporal graphs in terms of reachability" during May - July 2022.
 - did internship (online) at IISc, Bangalore under Apoorva Khare on "Reading project on reflection groups and Coxeter groups" during September - November 2022.
- Arindam Bhattacharyya
 - did internship (online) at TIFR (VSRP 2022) under Eknath Ghate on "Modular representations of GL_2 " during June July 2022.
 - did internship (online) at CRM Montreal under Anwesh Ray, on "Iwasawa theory of Hilbert Class field towers" during September 2022 - March 2023.
- Shubhendu Prasad Mandal did internship at Appasamy Associates (via AlgoLabs) under Kavita Sutar on "Development of Ophthalmic Devices" durubg August 2022 February 2023.
- Shankhadip Bhattacharjee did internship on Corneal Topography with Algolabs (the project was for the Appasami Associates.) at CMI under Prof. Kavita Sutar on "Corneal Topography" during May 2022 February 2023.
- T Karthik Rajendran
 - did offline intership at IMSc Chennai under Prof. Sushmita Gupta on "Algorithmic Game Theory" during May July 2022.
 - did internship (online) at TIFR under Prof. Umang Bhaskar on "Algorithmic Game Theory" during May July 2022.

- Ankit Gayen did intership at IIT Guwahati under Prof. Sushanta Karmakar on "Randomized Graph Algorithms" during June - August 2022.
- Rishabh Sharma did internship (online) at IMSc Chennai under Prof. R. Balasubramanian on "Algebraic number theory" during December 2022.
- Milan Paul did internship (online) at IIT Madras under Prof. T. E. Venkata Balaji on "An Introduction to Riemann Surfaces and Algebraic Curves" during June - July 2022.

Graduate student Internships

- Ved Prakash did internship at Strand LS under Nayanala Swetha on "Next genration sequence data analysis" during May August 2022.
- Sucheta Jhunjhunwala
 - did internship at Accenture under Amit Chander Gupta on "Accenture Unified Data Modeling" during May - July 2022.
 - did internship at Ingenium Marine Solutions Private Limited under Sumeet Kapoor on "Automate Collision Avoidance in ships" during August - September 2022.
 - did internship at Coriolis Technologies Pvt. Ltd. under Sudhir Kumar on "Computer Vision" during January - March 2023.
- Rohan Dharmadhikari did internship at Strand Life Sciences (WFH) under Shanmukh Katragadda on "Tumour Region Segmentation in Slide Images" during May August 2022.
- Ajay Krisshan did internship at at IMSc, Chennai under Saket Saurabh on "Graph theory and algorithms" during May July 2022.
- Rishika Tibrewal did internship at PayPal, Chennai under Satyabrata Mishra on using Machine Learning on "Simulated forecast of Stressed Assets" during May July 2022.
- Namratha did internship at Supraoracles (remote work) under M Praveen on "Verification of a blockchain consensus algorithm" during March December 2022.
- Chandradeep Dey did internship at AlgoLabs project for SupraOracles under M Praveen on "Blockchain verification" during April 2022 March 2023.
- Devesh Rajpal did intership at Australian National University under Prof. Ben Andrews on "Ricci flow" during May August 2022.
- Niranjan Kumar did internship at INRIA at University of Lille under Charles Paperman on "Topological methods in timed automata" during May July 2022.

- Aditi Muthkhod did intership at ISI Kolkata under Prof. Sourav Chakraborty on "Certificate games (most probably)" during June July 2022.
- Avik Das did intership at Inforill Technologies, Chennai under Dr. Mohideen Noordeen on "Natural Language Processing" during May July 2022.
- Aniket Santra
 - did intership at Algolabs under Prof. Sourish Das on "House Price Prediction with CRRao in Julia" during May July 2022.
 - did intership (Online) at Vasitum under Sanwar Lal on "Resume Parser" during August - November 2022.
- Aman Kumar did intership at Algolabs under Prof. Sourish Das on "Linear Discriminant Analysis with Julia" during May - July 2022.
- Anjali Pugalia did internship at Strand LS under Swaraj Basu on "Prediction of immuno-therapy treatment response using gene expression data" during May August 2022.
- Ravilla Bharath
 - did intership at Inforill Technologies Adyar, Chennai under Mohideen Noordeen on "NLP(Word embeddings)" during May-July 2022
 - did internship at Coriolis Technologies under Sudhir Kumar on "Computer Vision(Generative AI)" during January - April 2023.
- Neha did internship at American Express under Paresh Avinash Raut on "Factors Predicting FICO change(Data Science)" during May July 2022.
- Ankush Dey
 - did internship at Inforill Technologies under Dr. Mohideen Noordeen on "Natural Language Processing(Creating Word Embedding for Japanese language)" during May - July 2022.
 - did intership at Vasitum under Sanwar Lal on "Natural Language Processing(Resume Parser)" during August - November 2022.
- Ujjwal Saxena
 - did intership at Roni Analytics under Srinivasan on "Creating a model helps in Bitcoin trading and creating a model for detecting fake trading on Bitcoin exchanges" during May - July 2022.
 - did intership at Avarna Capitals under Kunal on "Creating a model for helping in betting on Cricket or other games" during August - November 2022.

- did intership at Algolabs under Suchitra on "Creating a Model on MongoDB and creating a model for Resume Parsing using Spacy" during December 2022 - April 2023.
- Abhishek Mishra did internship at Coriolis Technolgies during May July 2022.
- Aditya Anandkumar did internship at American Express during May July 2022.
- Agnija Ashrita did internship at Roni analytics during May July 2022.
- Ameya Kamat did internship at Coriolis Technolgies during May July 2022.
- Ananya Sankaranarayanan did internship at PayPal during May July 2022.
- Arghadeep Ghosh did internship at JP Morgan Chase during May July 2022.
- Ashutosh Maurya did internship at Legato during May July 2022.
- Athul Prakash did internship at Algolabs during May July 2022.
- Ayush Srivastava did internship at How India Lives during May July 2022.
- Bharath Kumar Ravilla did internship at Inforill Technologies during May July 2022.
- Deepti Kumawat did internship at How India Lives during May July 2022.
- Dhruvee Chauhan did internship at StrandLS during May July 2022.
- Dona Ghosh did internship at Algolabs during May July 2022.
- Gurdit Siyan did internship at Wipro during May July 2022.
- Jayasooryan S did internship at Legato during May July 2022.
- Krishna Gupta did internship at Legato during May July 2022.
- Kumar Priyank did internship at Coriolis Technolgies during May July 2022.
- Meghna Mondal did internship at Coriolis Technolgies during May July 2022.
- Mohammed Hashim M did internship at Coriolis Technolgies during May July 2022.
- Moumi Roy did internship at Inforill Technologies during May July 2022.
- Naheli Bhattacharya did internship at Roni analytics during May July 2022.
- Nevetha N G did internship at JP Morgan Chase during May July 2022.
- Pragya Jaiswal did internship at Accenture during May July 2022.

- Prashant Bajpai did internship at PayPal during May July 2022.
- Rajas Vaidya did internship at StrandLS during May July 2022.
- Raktim Dey did internship at Algolabs during May July 2022.
- Reewa Malik did internship at Algolabs during May July 2022.
- Sahil Singh did internship at Algolabs during May July 2022.
- Shankar Ram Vasudevan did internship at Wipro during May July 2022.
- Shariul Hashmi did internship at Algolabs during May July 2022.
- Shramana Guin did internship at How India Lives during May July 2022.
- Shreyansh Rastogi did internship at Inforill Technologies during May July 2022.
- Shyam Krishna P did internship at Accenture during May July 2022.
- Sinjini Sinha did internship at Algolabs during May July 2022.
- Soham Pyne did internship at Legato during May July 2022.
- Soham Biswas did internship at Legato during May July 2022.
- Srijit Saha did internship at Inforill Technologies during May July 2022.

Student Exchange Programs

Interaction with graduate students from Ecole Normale Supérieure

Chennai Mathematical Institute has an agreement with the Ecole Normale Supérieure in Paris, France, one of the leading institutions in the world for teaching and research in Mathematics. This agreement provides for regular exchange visits by academic members of CMI and ENS, Paris. This includes, in particular, exchanges of visits by undergraduate students between the two institutions.

Every year, the top three students passing out from the B.Sc. Mathematics programme spend 8 weeks at the ENS, where they work on research projects with the ENS faculty. In May–June 2022, Devansh Sehta, Arka Karmakar and Nilava Metya visited the ENS.

Interaction with graduate students from Ecole Polytechnique

Chennai Mathematical Institute has an agreement with the Ecole Polytechnique in Paris, France, one of the leading institutions in the world for teaching and research in Physics.

Every year, the top three students passing out from the B.Sc. Mathematics programme spend 8 weeks at the ENS, where they work on r'esearch projects with the ENS faculty.

13 Undergraduate/Graduate Courses

August–November 2022

Matching and Flow Algorithms Algebraic Geometry I Algebraic Groups Algebra I Algebra III Algebraic Curves Design & Analysis of Algorithms Advanced Machine Learning Analysis I Analysis III Intro to Blockchains(Oct-Nov) Intro to the BGG Category Calculus Commutative Algebra Combinatorial Group Theory Classical Mechanics I **Classical Mechanics** Concurrency Theory Coding Theory Communication Complexity Complexity Theory II Intro to Differential Geometry Enumerative Combinatorics(Oct-Nov) Electrodynamics English Elementary Number Theory Foundations of Machine Learning Financial Modelling Using Python Factoring Polynomials & Integers Graduate Algebra I Graduate Analysis I German I GIT and Moduli Theory Graduate Topology I Homological Algebra Hilbert Spaces and Quantum Probability Information Retrieval(online)

Nithin Varma/Pratik Ghosal V Balaji/Amit Kumar Singh : S Senthamarai Kannan : Upendra Kulkarni Clare D'Cruz ٠ Amith Shastri Samir Datta/G Philip Pranabendu Misra Krishna Hanumanthu Sundari Maddala Madhavan Mukund/S P Suresh Upendra Kulkarni T R Ramadas : Manoj Kummini/Animesh Lahiri : Oorna Mitra : Govind Krishnaswami H S Mani : C Aiswarya : Sharad Sane Prajakta Nimbhorkar/Nithin Varma Partha Mukhopadhyay : Chaitanya Ambi : Privavrat Deshpande : Amitabh Virmani/K G Arun Usha Mahadevan : R Balasubramanian : K V Subrahmanyam Mousum Datta : Amit Sinhababu : Manoj Kummini R Srinivasan/Jyotirmoy Ganguly Pavithra Ravishankar Sukhendu Mehrotra : Parameswaran Sankaran/Snehajit Misra : Arvind Kumar : R Srinivasan : Venkatesh Rao

| Laboratory I (for BScII) | : | M Nair |
|---|---|--|
| Laboratory II (for BScIII) | : | M Nair |
| Mathematical Logic | : | M Praveen |
| Introduction to Manifolds | : | Priyavrat Deshpande/Soumya Dey |
| Mathematical Methods. Analysis | : | Rajeeva L Karandikar |
| Methods in Irrationality & Transcendence | : | Siddhi Pathak |
| Measure Theoretic Probability | : | Rajeeva L Karandikar |
| Mathematical Statistics | : | Sourish Das |
| Optimization Techniques | : | T Parathasarathy/Sujatha Babu |
| Proofs and Types | : | S P Suresh |
| Probability and Statistics with R | : | Sourish Das |
| Programming & Data Structures with Python | : | Madhavan Mukund |
| Introduction to Programming(Haskell) | : | S P Suresh |
| Quantum Mechanics I | : | G Date |
| Quantum Mechanics | : | K Narayan |
| RDBMS and SQL(2 credits) | : | Madhavan Mukund |
| Regression & Classification(online) | : | Ajay Shah |
| Reinforcement learning | : | Murugeswari Issakkimuthu/K V Subrah- manyam |
| Constraint (SMT) Solvers and Deep Neural Networks | : | M K Srivas |
| Stochastic Processes I | : | B V Rao |
| Statistical Inference I | : | V Swaminathan |
| Statistical Mechanines | : | V V Sreedhar |
| Text Analytics(2 credits,Oct-Nov) | : | Ramaseshan Ramachandran |
| Timed Automata | : | B Srivathsan |
| Theory of Computation | : | C Aiswarya/K Narayan Kumar |
| Thermal Physics | : | Alok Laddha |
| Visualization(2 credits) | : | Sourish Das |
| Values Through Literature | : | M Usha |
| | | |

January–April 2023

Algebraic Geometry II Algebra & Computation Algebra II Algebra 4 Design & Analysis of Algorithms Applied Machine Learning Analysis II Advanced Programming Bayesian Data Analysis Complex Analysis **Classical Mechanics II** Coding Theory **Complex Analysis** Complexity Theory Computer Vision Distributed Computing and Big Data(Online) **Differential Equations Discrete** Mathematics Data Mining & Machine Learning Economics (Online) Electrodynamics I Formal Security Analysis Graduate Algebra II Graduate Analysis II Groebner Bases and Applications Geometric Complexity Theory German II Game Theory Games on Graphs General Relativity(IMSc) Graduate Topology II Harmonic Analysis Introduction to Intersection Theory Introduction to Linguistics Introduction to Sieve Methods Infinite State Verification Linear Algebra & its Applications Laboratory

Krishna Hanumanthu/Nabanita Ray Amit Kumar Sinhababu/V Arvind : V Balaji : T R Ramadas Nithin Varma/G Philip : : Raghav Kulkarni Upendra Kulkarni : Samir Datta Durba Bhattacharya Sukhendu Mehrotra : Govind Krishnaswami Sharad Sane Purusottam Rath/Biplab Paul Partha Mukhopadhyay Kavita Sutar Venkatesh V : Siddhi Pathak Amit Kumar Sinhababu/V Arvind Pranabendu Misra/Madhavan Mukund Malathi Velamuri H S Mani • S P Suresh Clare D'Cruz Sundari Maddala S Selva Raja : K V Subrahmanyam : Pavithra Ravishankar T Parthasarathy **B** Srivathsan : Roji Pius Senthamarai Kannan/Soumyadip Das : Arghya Mondal : Barbara Fantecchi : Usha Mahadevan Jyothsnaa Sivaraman Narayan Kumar Privavrat Deshpande : K G M Nair •

| Logic, Automata & Games | : | M Praveen |
|---|---|--------------------------------|
| Lie Groups | : | P Sankaran |
| Linear Programming & Combinatorial Optimization | : | Prajakta Nimbhorkar |
| Mathematical Methods | : | Bala Sathiapalan |
| Model Theory | : | S P Suresh/Manoj Kummini |
| Natural Language Processing | : | Ramaseshan Ramachandran |
| Optics | : | Amitabh Virmani |
| Partial Differential Equations | : | Mythily Ramaswamy |
| Personal Finance(Mar-Apr) | : | Sourish Das |
| Programming Language Concepts | : | Madhavan Mukund/S P Suresh |
| Projection Operator Methods in Physics | : | V V Sreedhar |
| | | |
| Probability Theory | : | B V Rao |
| Quantum Field Theory | : | K Narayan |
| Quantum Gaussian States | : | R Srinivasan |
| Quantum Information Theory | : | Arun Padakandla |
| Quantum Mechanics II | : | G Date |
| Scattering Amplitudes | : | ALok Laddha |
| Statistical Inference | : | V Swaminathan |
| Stochastic Integration | : | Rajeeva Karandikar |
| Stochastic Processes II(Online) | : | S Ramasubramaniam |
| Software Verification & Analysis | : | M K Srivas |
| Syzygies | : | Manoj Kummini |
| The Art of Short Fiction | : | M Usha |
| Topics in Bruhat Tits theory | : | V Balaji |
| Topological Effects in Quantum Mechanics | : | V V Sreedhar |
| Topology | : | Aditya Karnataki |
| Time Series Analysis | : | M Srinivasan |
| Weighted Automata & Transducers | : | Aiswarya C/Jacques Sakarovitch |

14 Special Lectures

- Suprajo Das: Asymptotic behaviour of certain length functions (April 2022).
- Snehajit Misra: Seres of lectures: Learning seminar on "Algebraic Stacks" (April 2022).
- Krishna Menon: A branch statistic for trees (April 2022).
- Suprajo Das: Asymptotic behaviour of certain length functions, Part 2 (April 2022).
- Ghanashyam Date: Black Holes and General Relativity (April 2022).
- Sudeshna Roy: Graded components of local cohomology modules supported on C-monomial ideals (April 2022).
- Pranjal Dutta: A Tale of Hardness, De-randomization & De-bordering in Complexity Theory (May 2022).
- Preeti: Derivation of Quadratic Reciprocity using Linear Algebra (July 2022).
- Rajeeva Karandikar: Two lectures on Introduction to Stochastic Approximation with a focus on Reinforced Learning (September 2022).
- Arghya Mondal: Cohomology of groups and spaces: locally symmetric spaces and higher expanders (September 2022).
- Pratik Roy: Completion of Rings and Hensel's Lemma (October 2022).
- Rajeeva L. Karandikar: Power and limitations of opinion polls (November 2022).
- V. Balaji: Desingularisations of moduli spaces of semistable principal bundles (November 2022).
- Arijit Shaw: Towards Building A Scalable Bitvector Model Counter (January 2023).
- T. R. Ramadas: Symplectic integrals on the moduli space of rank two vector bundles (Fields Medal Lecture) (February 2023).
- Arvind Kumar: Linearity of resolution of powers of facet ideals of simplicial trees (March 2023).

15 Data Science Colloquium Series

- John Samuel Raja, co-founder, How India Lives: How to use public data for decision making (April 2022).
- Aritra Halder, Assistant Professor, University of Virginia: Curvature Processes: Directional concavity in Gaussian random fields (April 2022).
- Megha Patnaik, LUISS University and a research affiliate at CEPR, Italy. Applications of Statistical Learning in Economic Research (August 2022).
- Dinesh Krithivasan, Kantar Analytics, Chennai: Measuring Digital Advertising Effectiveness using Deep Learning (September 2022).
- Monika Gupta, Celonis, New Delhi: Process Mining and AI for Business Process Improvement (October 2022)
- M.R. Srinivasan, Formerly Professor of Statistics, University of Madras: Detection of Multiple Outliers in Multidimensional Data (November 2022).
- Sarang Jagdale and Michael Watson, Lyric, Pune: Reinventing the Supply Chain with Practical AI: Ten Trends and Lessons (January 2023).
- Ranjan Anantharaman, JuliaHub Inc., USA: Approximation of Large Stiff Acausal Models (February 2023).
- Snehasis Mukherjee, Shiv Nadar University: Egocentric Activity Recognition by Subject-Action Relevance (March 2023).

16 Conferences/Workshops/Schools

I First IAGRG School on Gravitation and Cosmology - May 2022

The IAGRG school series aimed to train students and young researchers in the emerging areas of Gravitation and Cosmology. The series was mainly intended for graduate students working (or starting to work) on gravitational physics, cosmology and related areas.

The first school involveed four graduate-level courses on different topics of black hole physics and cosmology. The lectures were given by leading experts on these topics. This School was held online.

It was organized by P Ajith (ICTS Bangalore), Sudipta Das (Visva-Bharati) Archana Pai (IIT Bombay), Sudipta Sarkar (IIT Gandhinagar), Anjan Anjan Sen (Ahmedabad University, CTP JMI) and Amitabh Virmani (CMI, Chennai). The following lectures were held:

- Sumanta Chakraborty, IACS, Kolkata: Causal Structure of Black Holes and Quasi-Normal Modes
- Pedro Cunha, University of Aveiro, Portugal: Black hole shadows and geodesic motion
- Dhiraj Hazra, IMSc, Chennai: Cosmological Perturbations
- Surhud S More, IUCAA, Pune: Weak Lensing

II AIS - Representation Theory (2022) - June-July 2022

An AIS on Representation theory was organized by Amritanshu Prasad, IMSc, Chennai and Upendra Kulkarni, CMI, Chennai. Representation Theory is the study realizations of groups as matrices. Having its origins in algebra and number theory, it is now a vast subject with links to Physics, Harmonic Analysis, Combinatorics, Chemistry, Differential Equations, Complexity Theory, etc. This workshop focussed on the representation theory of finite groups. The following lectures were held:

- Pooja Singla, IIT, Kanpur: Projective representations of finite groups.
- Sumana Hatui, IISc, Bangalore: Groups and their Conjugacy Classes (conjugacy classes in semidirect products, and Heisenberg groups among others).
- K N Raghavan, IMSc, Chennai: Frobenius-Schur indicators.
- S Viswanath, IMSc, Chennai: Basic Character theory (up to Schur orthogonality).
- Upendra Kulkarni, CMI, Chennai: Induction and Clifford theory.
- Amritanshu Prasad IMSc, Chennai: A glimpse of modular representation theory.

III Statistical Methods in Finance 2022 - June to July 2022

The seventh conference and workshop on Statistical Methods in Finance was held. The conference was jointly hosted by Chennai Mathematical Institute (CMI), Indian Statistical Institute, and North Dakota State University on a virtual platform.

The plenary Speakers were

- Jean-Pierre Fouque, University of California, Santa Barbara, USA: Mean Field Game and Mean Field Control Q-Learning
- Per Mykland, University of Chicago, USA: Nonparametric Observed Standard Errors for High Frequency Data
- Avanidhar Subrahmanyam, University of California, Los Angeles, USA" Determinants of Momentum: A Perspective From International Data

In the associated Workshop on Artificial Intelligence in Finance the invited speakers were

- Anindya Chakrabarti,Indian Institute of Management, Ahmedabad: Information comovement and market risk : Inference from high-frequency trading data
- Catherine Forbes, Monash University, Australia: Familial Inference
- Sayar Karmakar, University of Florida, USA: ARCH-GARCH models: Estimation, Inference, Forecasting
- Rustam Ibragimov, Imperial College, London, UK: New Approached to Robust Inference On Market (Non-)Efficiency, Volatility Clustering And Nonlinear Dependence
- Shashi Jain, Indian Institute of Science, Bangalore: A data-driven approach for static hedging of exchange-traded options
- Yoann Potiron, Keio University, Tokyo, Japan: Generating observation times with a hitting-boundary process in high-frequency data
- Mohammad Arshad Rahman, Indian Institute of Technology, Kanpur: Bayesian Quantile Regression in Ordinal Models
- Siuli Mukopadhyay, Indian Institute of Technology, Bombay: Predictive Maintenance of ATMs

The following talks were presented in the contributed session:

• Tatiagoum K. Eric, University of Dschang-Cameroon: Optimal Investment And Option Price

- Suparna Biswas, ISI, Bangalore: Estimation of Spectral Risk Measure for Left Truncated and Right Censored Data
- Mbhense Lindokuhle Sandile, University of Zululand, KwaZulu-Natal: A Comparative Study of the Stylized Facts Of The South African and Indian Stock Market

The student contributions selected for presentation were:

- Vrinda, IIT, Roorkee: Norm constrained minimum variance portfolios with short selling
- Gantasala Naga Vyshnavi, IIT, Tirupati: A Model for Lagged Cross Correlation Matrix from Long Range Dependent Indian Stock Market Data
- Subhojit Biswas, Texas A&M University: Replicating the Performance of a Portfolio of Stocks Using Minimum Dominating Set
- Pavuluri Sushhma Sesh, IISER, Tirupati: Dynamic Portfolio Optimization using Q Learning, Extreme Value Theory and Liquidity Measure for Indian Stocks

IV CMI NASI Outreach Lectures for Schools, 2022 - July 2022

A Lecture series for students of class XI and XII, in association with National Academy of Sciences, Allahabad, held at the Chennai Mathematical Institute. This consisted of the following lectures:

- Namitha C.H., IMSc, Chennai: A journey to infinity
- Nithin Varma, CMI, Chennai: How to multiply numbers fast?
- K. Narayan, CMI, Chennai: Black holes and the information paradox
- Rashi Sanjay Lunia, IMSc, Chennai: Magic with Maths
- Ramya C, IMSc, Chennai: From Euler's puzzle to Google Maps: The enchanting world of Graph Theory
- M.V.N. Murthy, IMSc, Chennai: Mysterios Dark Matter

V Workshop on Maximal Cohen-Macaulay Modules - July 2022

Manoj Kummini, CMI, Chennai and Sarang Sane, IIT Madras, organized a workshop on Maximal Cohen-Macaulty Modules. The following lectures were held:

• Manoj Kummini, CMI, Chennai: Artinian rings, one- and two-dimensional singularities of finite CM type; Graded case.
- Sukhendu Mehrotra, CMI, Chennai: Simple singularities: hypersurface singularities, classification as the ADE singularities. Plane curve singularities, invariants of finite subgroups of SL 2 (C)
- Sarang Sane, IIT Madras: matrix factorisations, Knorrer periodicity, Buchweitz-Greuel-Schreyer theorem.

VI Workshop on Data Science with Satellite Imagery - August 2022

The following lectures were delivered as part of this workshop:

- Hemen Sampat, JP Morgan: Satellite data in the emerging world of alternative data
- Susan Thomas, XKDR Forum: Night lights as direct observation of economic activity
- Carlos Mendes, Nagoya University: Geospatial variation in prosperity: some evidence from satellite images
- Debabrata Ghorai, Dvara E-registry: Satellite imagery as an input to credit access for low income households in agriculture
- Ayush Patnaik, XKDR Forum: The Suomi NPP and Sentinel satellites
- Sudhir Silwal, Aquaconnect: Machine learning and satellite imagery
- Devleena Bhattacharjee, Numer8: Real time application of satellite data
- Ajay Shah, XKDR Forum: Summing up

VII Chennai-Tirupati Number Theory Conference - February 2023

The Chennai-Tirupati Intercity Number Theory Conference was a two-day meeting, initiated by mathematicians from IMSc, CMI, IIT Madras, IISER Tirupati and IIT Tirupati who were working in number theory and related areas. This year is the 4th edition of the conference, and was hosted by the Chennai Mathmetical Institute.

The aim of the meeting was to foster interactions between mathematicians working at academic institutes located in Chennai and Tirupati. It also served as a platform for graduate students and post-docs to announce and communicate their work to experts in the field. The following lectures were held:

• Anup Dixit (IMSc): Lehmer's conjecture for certain infinite extensions

- Harinarayanan G (IISER Tirupati): Sub-convexity estimates for Siegel Hecke eigencusp forms
- Tanmoy Bera (IMSc): On Higher Dimensional Poissonian Pair Correlation
- Pratiksha Shingavekar (IIT Madras): 3-Selmer groups, ideal class groups and the cube sum problem
- Arijit Mukherjee (IISER Tirupati): From modular curves to moduli spaces, the Abel-Jacobi map and some applications
- Sunil Naik (IMSc): Banach density of certain sparse sequences
- Anilatmaja Aryasomayajula (IISER Tirupati): Estimates of Picard cusp forms
- Jean-Marc Deshouillers (University of Bordeaux): Pairwise co-prime consecutive values of some arithmetic functions
- Subhasis Panda (IIT Madras): Algebraic functional equation for Selmer groups
- Jyothsnaa Sivaraman (CMI): Analogues of the Brun-Titchmarsh theorem
- Sayan Goswami (IMSc): Twisted patterns in the product of difference set of primes
- Antareep Mandal (IIT Madras): Uniform sup-norm bound of Siegel cusp forms
- Aditya Karnataki (CMI) Families of phi-tau modules and Galois representations
- Sanjeev Pandey (IISER Tirupati): Structure of Twisted Jacquet modules of representations of symplectic groups over p-adic fields.
- Biplab Paul (CMI): Certain analytic aspects of Siegel forms of degree 2
- Richa Sharma (IMSc): On a family of elliptic curves with rank at least 2
- Lalit Vaishya (IMSc): An upper bound estimate on first ever negative sign of Hecke eigenvalues at integers in sparse set
- Siddhi Pathak (CMI): On values of the q-exponential function

17 CMI Arts Initiative

The objective of the CMI Arts Initiative is to provide a space for students, professionals and anybody else keenly interested in the humanities and arts to interact and learn from experts in these areas. The CMI Arts Initiative is coordinated by K. Srilata, K.V. Subrahmanyam, and Madhavan Mukund. The following programmes were held:

- Dr Chithra Madhavan gave Arts Initiative talk on "An Illustrated Talk on Appreciating Indian Sculpture" in November 2022.
- In collaboration with the Center for Creative Writing and Translation, Sai University, a talk by author and translator Thomas Hitoshi Pruiksma, translator of Avvaiyar and Tiruvalluvar, was held in in November 2022.
- A Workshop on Photography by Rathika Ramasamy in March 2023. The workshop was an introduction to wildlife/nature photography and coverdc among other topics the relationship between human and wildlife, the importance of wildlife/bird life in our neighbourhood, a discussion on habitats, bird identification, field knowledge and birding hotspots in Chennai.
- In collaboration with the Centre for Creative Writing and Translation, Sai University, conducted an online talk on "Sustaining a Flourishing Writing Practice" by the Irish poet and creative coach Anne Tannam in March 2023.

Writers in residence

CMI is proud to host a writers' residency programme in cooperation with Sangam House. Under this programme, CMI supports two international writers each year for a residency of 4–6 weeks. This year CMI Arts Initiative hosted one writer in residence, Rayjinar Anne (Rayji) from Phillipines in March 2023. Rayji de Guia is a fictionist, poet, and illustrator. Her work can be found in Asian Cha, The Deadlands, harana poetry, Journal of English Studies and Comparative Literature, The Pinch, and elsewhere. She has received prizes from the Gémino H. Abad Awards for Poetry and the Carlos Palanca Memorial Awards for Literature. She held a reading of her poems and fiction titled "Among Women: A Literary Reading".

18 Endowment Lectures at CMI

- Howard Straubing, Boston College USA delivered K. Lakshmanan Memorial Distinguished Lecture on "An old problem on automata and first-order logic" (March 2023).
- Barbara Fantechi, SISSA, Italy delivered R.K. Rubugunday Distinguished Lecture on "Enumerative geometry after string theory" (March 2023).

19 Conferences, Visits and External Lectures

Alok Laddha

- Visited Tata Institute of Fundamental Research in May 2022 and gave talks.
- Visited Center for High energy Physics, IISC in October 2022 and gave talks.
- Visited IISER- Bhopal in November 2022 and gave talks.
- Visited International Center for Theoretical Sciences in November 2022.

Arghya Mondal

- Visited Ashoka University in Last two weeks of May 2022.
- Visited Tata Institute of Fundamental Research in First two weeks of May 2022 and gave talks.
- Visited Indian Institute of Science in November December 2022 and gave talks.
- Visited International Centre for Theoretical Sciences in December 2022.

Animesh Lahiri

- Visited IIT, Hyderabad in February 2023 and gave talks.
- Visited IIST, Thiruvananthapuram during February-March 2023 and gave talks.
- Visited ISI, Kolkata in March 2023 and gave talks.

Archit Chauhan

- Visited IIT Bombay in July 2022 and gave talks.
- Visited National Institute of Informatics during March-April 2023.

Arvind Kumar

- Visited Indian Institute of Technology Hyderabad in February 2023 and gave talks.
- Visited Indian Institute of Technology Jammu in February 2023.

Amitabh Virmani

- Visited Graphic Era Hill University in May 2022 for Asian Physics Olympiad work.
- Visited NISER Bhubaneshwar in September 2022 and gave talks.
- Visited IIT Gandhinagar in November 2022 and gave talks.
- Visited IACS Kolkata in December 2022.
- Visited IISER Kolkata in December 2022.

Asif Khan

• Attended FSTTCS 2022 at IIT Madras in December 2022.

B.V. Rao

- Visited IIT Jodhpur (on line) in February 2022 and gave talks.
- Visited IIT Kanpur in March 2023 and gave talks.

Dharm Veer

- Visited SRM Amrawati in July 2022.
- Visited Gebze Technical University, Turkey in August 2022 and gave talks.
- Visited Sabanci university, Turkey in August 2022.

Govind Krishnaswami

- Visited PS Senior Secondary School, Chennai in July 2022 and gave talks.
- Visited Collaboration with Sonakshi Sachdev at Bengaluru in September 2022.
- Visited Himalaya Senapati at Goldman Sachs Bengaluru in September 2022.
- Visited TR Vishnu at Raman Research Institute, Bengaluru in September 2022.
- Visited TR Vishnu at Raman Research Institute Bengaluru in November 2022.
- Visited Himalaya Senapati at Goldman Sachs Bengaluru in November 2022.
- Visited IISER Pune CNSD 2022 in December 2022 and gave talks.

- Visited International Conference on Complex Quantum Systems (ICCQS), BARC Mumbai in January 2023 and gave talks.
- Visited Bal-Fest, Quantum Field Theory in Quantum Spacetime, IMSc Chennai in January 2023.
- Visited Progress in Quantum Science and Technologies (PiQST 2023), CQuICC, IIT Madras, Chennai in January 2023.
- Visited Himalaya Senapati at Goldman Sachs, Bengaluru in February, 2023.
- Visited TR Vishnu at Raman Research Institute, Bengaluru in February, 2023.
- Visited Chennai Strings Meeting, IMSc, Chennai in February, 2023 and gave talks.

H. S. Mani

- Visited St. Joseph College Trichy in June 2022 and gave talks.
- Visited V.I.T. Vellore (online) in September 2022 and gave talks.
- Visited Kamaraj college tuticorin in March 2023 and gave talks.

Jyothsnaa Sivaraman

- Visited BIT Mesra in December 2022 and gave talks.
- Visited Harishchandra Research Institute in December 2022.

Kaberi Goswami

- Visited IIT Indore in mid-2022.
- Visited Institute of basic science in January 2023and gave talks.

K G Arun

- Visited IIT Gandhinagar in November 2022 and gave talks.
- Visited IIT Madras in November 2022 and gave talks.
- Visited ICTS-TIFR in November 2022 and gave talks.
- Visited Pennsylvania State Ubiversity in January-July 2023.

Krishna Hanumanthu

- Visited Pondicherry University in June 2022 and gave talks.
- Visited SRM University, Amaravati, Andhra Pradesh in July 2022 and gave talks.
- Visited IIT Madras in February 2023 and gave talks.
- Visited International Centre for Theoretical Sciences, Bangalore in February 2023.
- Visited TIFR Mumbai in March 2023 and gave talks.

Krishna Menon P

- Visited LaBRI (Laboratoire Bordelais de Recherche en Informatique) in June 2022 and gave talks.
- Visited Indian Institute of Technology Bhilai in December 2022.

K. Narayan Kumar

- Visited Mohammed VI Polytechnique University (UM6P), Benguerir, Morocco during May-June 2022 and gave talks.
- Visited Uppsala University, Sweden in January 2023.
- Visited Mohammed VI Polytechnic University, Morocco during February-March 2023.

Nithin Varma

- Gave an invited talk at IISc Bangalore on testing pattern freeness.
- Gave an invited talk at NIT Calicut on sublinear algorithms.
- Gave outreach talk to schoolchildren on Karatsuba's multiplication algorithm organized by NASI.
- Gave a talk at ICALP 2022.
- Gave a talk at MIT local algorithms seminar on sublinear algorithms for pattern freeness.

Madhavan Mukund

• Visited Kerala School of Mathematics in April 2022 and gave talks.

- Visited Bebras Task Workshop 2022 in May 2022.
- Visited iGEM Indian League in May 2022 and gave talks.
- Visited Computational Thinking in Schools (CTiS) 2022 in July 2022 and gave talks.
- Visited Morgan Stanley QuantFinance Centre of Excellence in September 2022 and gave talks.
- Visited ACM Compute, Jaipur in October 2022.
- Visited SVKM IOT, Dhule in November 2022 and gave talks.
- Visited FSTTCS 2022, IIT Madras in December 2022.
- Visited Raising Learners for India 2040, Chennai in December 2022 and gave talks.
- Visited Uppsala University in January 2023.
- Visited Stella Maris College in March 2023 and gave talks.

Madhu Mishra

- Visited IIT Indore in July 4 July 16 and gave talks.
- Visited APCTP Pohang, Korea in Jan 2- Jan 22 2023 and gave talks.

Manoj Kummini

- Visited SRM University in July 2022 and gave talks.
- Visited CIRM Luminy in January 2023.
- Visited IIT Hyderabad in February 2023 and gave talks.

Usha Mahadevan

- Visited K.R Srinivasa Iyengar memorial lecture at bharatiya vidya bhavan in 1April 2022 and gave talks.
- Visited Sri Aurobindo Ashram, Pondicherry in April 2022 and gave talks.
- Visited Hindu College, Chennai in September 2022 and gave talks.
- Visited National College, Trichy in September 2022 and gave talks.
- Visited Airports authority of India in July and September 2022 and gave talks.

• Visited Airports authority of India during October-November 2022 and gave talks.

K. Narayan

- Visited TIFR Mumbai (online) in October 2022 and gave talks.
- Visited Chennai Strings Meeting 2023, IMSc Chennai in February 2023 and gave talks.

Rajeeva L. Karandikar

- Visited Plaksha University, Mohali in November 2022 and gave talks.
- Visited University of Hyderabad in February 2023 and gave talks.
- Visited C R Rao Institute, Hyderabad in February 2023 and gave talks.

Sajat Ahmad Bhat

- Visited LISA 14 Symposium Talk (online) in July 2022 and gave talks.
- Visited GR23 Conference Talk (online) in July 2022 and gave talks.
- Visited ICTS Bangalore (online Talk) in August 2022 and gave talks.
- Visited IISER Kolkata in December 2022 and gave talks.

Sahil Mhaskar

• Visited FSTTCS, IITM in December 2022.

P Sankaran

- Visited IISER Tirupati in March 2023 and gave talks.
- Visited MGM College, Pollachi in January 2023 and gave talks.
- Visited NISER Bhubaneswar in March 2023 and gave talks.

Sayantani Datta

- Visited ICTS, Bangalore in June 2022.
- Visited ICTS, Bangalore in July 2022.

- Visited IISER Kolkata in December 2022 and gave talks.
- Visited LVK meeting, CIERA (online) in March 2023 and gave talks.

Sheikh Shakil Akhtar

- Attended online workshop on randomisation in paramaterised complexity.
- Visited IIT-M to attend FSTTCS 2022 in December 2022.

Soumya Dey

- Visited Centre International de Rencontres Mathématiques, Marseille in April 2022.
- Visited Institut Henri Poincare, Paris during April July 2022.

Shanmugapriya P

- Visited GEHU, Dehradun as Academic evaluator for Asian Physics Olympiad 2022 during May June 2022.
- Visited IACS Kolkata (online talk) in June 2022 and gave talks.
- Visited Vellore Institute of Technology in September 2022 and gave talks.

Siddhi Sudhir Pathak

- Visited Universita Roma Tre in May 2022 and gave talks.
- Visited Pondicherry University in June 2022 and gave talks.
- Visited IISER Pune in August 2022.

Somnath Sudam Dake

- Attended FSTTCS 2022 conference at IIT Madras in December 2022.
- Attended workshop on fine grained cryptography.
- Attending representation theory workshop.

Sharad S. Sane

- Gave an invited talk at Abhyankar Birthday programme at Bhaskaracharya Pratishthan, Pune, in July 2022.
- Gave an invited talk at Ethiraj College, Chennai, in October 2022.
- Participated in a conference on Geometry, Groups And Mathematical Philosophy (in honour of Ravi Kulkarni 80) conference at Bhaskaracharya Pratishthan, Pune, in May 2022

Soumodev Mal

- Visited IIT Delhi (FMUpdate 2022) in July 2022and gave talks.
- Visited Technion, Haifa (LICS 2022) during August September 2022and gave talks.
- Visited IIT Madras (FSTTCS 2022) in December 2022 and gave talks.
- Visited Oriental Institute of Technology, Bhopal(ARCS/ACM Annual Event 2023) in February 2023 and gave talks.

B. Srivathsan

- Visited ENS Paris-Saclay in September 2022.
- Visited University of Warsaw in September 2022 and gave talks.
- Visited LaBRI, University of Bordeaux in September 2022 and gave talks.

Sruthymurali

- Visited Indian Statistical Institute in April 2022 and gave talks.
- Visited Indian Statistical Institute during July October 2022.

Vishwa Prakash H V

- Visited Indian Institute of Science, Bangalore in December 2022.
- Visited Indian Institutes of Technology, Jodhpur in December 2022 and gave talks.
- Visited IIT Jodhpur in December 2022 and gave talks.
- Visited IIT Delhi during February April 2023 and gave talks.

20 Other Professional Activities

C. Aiswarya

- Organizing committee of ACTS 2023.
- Program Committee of CONCUR 2022.
- Executive committee member of Association of Logic in India (ALI).
- Hosted a PhD student visitor Francesco Di Cosmo (Free University of Bozen-Bolzano) during January March 2023.
- Gave outreach lecture to college students.
- Program committee member of international conference on concurrency theory.

Asif Khan

• Teaching assistant for parallel algorithms

Amitabh Virmani

- Chair for parallel sessions on classical quantum gravity at IAGRG conference IISER Kolkata.
- Asian physics olympiad core and exam setting committee member in May 2022.

Clare D'cruz

- Editor of Indian Journal of Pure and Applied Mathematics.
- Editor of Mathematics student.
- Editorial Board of Indian Journal of Pure and Applied Mathematics.
- Editorial board of Math Student.
- Refereed articles for various journals.
- Refereed one thesis.
- Wrote a review for Mathscinet.

Govind Krishnaswami

- Did project under SERB Core research grant.
- Reviewing a PhD thesis.
- Writing a book on classical mechanics.

H. S. Mani

- Acted as a moderator for the noble prize lecture popular science.
- Arranging childrens programme for CMI NASI chennai chapter.
- Attended CMI NASI programme 2 sessions
- Making problems for the asiad olympiad held in mussori and at Dehrahun during May 2022.
- Conducted outreach programme for girl students by doctors MAV Vidyashram.
- Did Science academy student project on Legget-Garg.
- Teaching classical mechanics to PhD studnets.

Jyothsnaa Sivaraman

- Gave a talk at the PIMS collaborative research group weekly seminar.
- Gave a talk at the Chennai-Tirupati number theory seminar.
- Gave a talk at the number theory working group meeting at IMSc.

K G Arun

- Chair of the ASI vision document, gravity chapter.
- Coorganizer of ICTS school.
- Council member of IAGRG.
- Faculty Selection committee of NIT Calicut.
- Gave invited talk at APPC15 meeting in Korea, spoke virtually.
- Gave invited talk in International Astronomy Context.

• Gave popular talk to School kids ROOTS outreach talk.

Krishna Hanumanthu

- Organized and lectured in Instructional School for Teachers in Algebra at CMI, in December 2022.
- Gave a talk on "Bounded negativity and line arrangements" at the conference "Bundles 2023" at TIFR, Mumbai, in March 2023.
- Gave a talk on "Seshadri constants and positivity in algebraic geometry" at 27th Annual Conference of the Ramanujan Mathematical Society, 5-8 December, 2022
- Gave a talk on "Some results on Seshadri constants" at the conference "Vector bundles in Chennai" at IIT Madras, in February 2023.
- Lectured in UGC Refresher Course on Galois theory, Pondicherry University, in July 2022.
- Lectured in UGC Refresher Course on linear algebra, University of Hyderabad, in September 2022.
- Organized and lectured in "Annual Foundational School I" conducted in Pondicherry University, during May June 2022.

Krishna Menon P

- Attended Sage Days at IMSc, Chennai.
- Attended and presented poster at FPSAC in IISc, Bangalore.

K. Narayan Kumar

- Deputy Leader, Indian Team to IOI 2022, Yogiyakarta, Indonesia.
- PC Member, ATVA 2022.
- PC Member, NETYS 2023, Marrakech, Morocco.

Madhavan Mukund

- Conducted IOI Training Camp at CMI, in June 2022.
- Team Leader, Indian team to IOI 2022 in Indonesia, in August 2022.

Madhu Mishra

- Gave thesis defence.
- Gave two talks at APCTP strings seminar.
- Gave online seminar at ICTS.
- Participated in academic evaluation of asian physics olympiad 2022-23.

Mandira Mondal

- Tutor of the course 'Introduction to Hilbert-Kunz multiplicity' (Instructor: Prof. V. Trivedi) of the above mentioned virtual meeting.
- Attending the ongoing Graduate course 'Tight Closure of Ideals and its Applications', a virtual meeting organized by ICTP , Italy during May July 2022.

Sukhendu Mehrotra

- Gave a lecture in the conference RMS 2022.
- Advising the MSc thesis of Abhishek Kannur.

Manoj Kummini

- Co-organizer, Instructional School for Teachers, CMI.
- Co-organizer, NCM Workshp on Maximal Cohen-Macaulay modules, CMI.
- Co-organizer, Sage Days 114, IMSc, Chennai.

Usha Mahadevan

- Attending and participating in book clubs.
- Conducted book discussions.
- Learning Nalayira divya prabandam.
- Learning Tamil prosody.
- Learning nalayira divya prabandam.
- Reading the history of hindu temples in Tamil Nadu.

- Teaching cursive writing and English grammar.
- Teaching cursive writing to school children.
- Teaching english grammar to school students.

Nirmal Kotal

- Tutorial assistant in Instructional School for Teachers on Algebra held at CMI.
- Teaching Assistant in a annual foundation school held in Pondicherry University during May June 2022.

Nithin Varma

- Awarded best paper at ICALP 2022.
- Contributed an article to Property Testing Review Blog.
- Contributed the entry for the month of November 2022 to PTReview, a blog on sublinear-time algorithms that features monthly posts.
- On the PC of the conference RANDOM 2023.
- Received a SERB Startup Grant.
- Session chair at FSTTCS 2022.
- Supervised external and internal intern students on various reading projects.
- Taught a weeklong workshop on Matrix Algorithms to participants from Raising a Mathematician Foundation.

Pankaj Saini

- Teaching assistantship for BSc classical mechanics course.
- Tutoring in ICTS summer school on gravitational wave.

Priyavrat C Deshpande

- Organized nurture camp for Madhava Mathematics competition winners.
- Organized the training camp for European girls' mathematics olympiad.
- Participated in 34th annual FPSAC conference in IISc, Bengaluru.

Parthapratim Mahapatra

- Reading the paper- "Gravitational waves in scalar-tensor theory to one-and-a-half post-Newtonian order".
- Studying the paper "Tests of General Relativity with GWTC-3".

Prajakta Nimbhorkar

- Gave lecture at an All Girls Maths Nurture Camp organized by Raising a Mathematician Foundation.
- PC member for IJCAI 2023.
- Served on FSTTCS program committee.

M. Praveen

- Did industrial consultation project with Micron for test case generation for VLSI designs.
- Did industrial consultation project with SupraOracles for formal modelling and verification of distributed consensus protocols.

Purusottam Rath

- Organised a number theory conference in February 2023 at CMI.
- Taught a core course on Complex Analysis.
- Teaching a core course.

Sheikh Shakil Akhtar

• Review of FSTTCS 2022 paper.

Shanmugapriya P

• Conducted Quantum Mechanics tutorials online for the Faculty Development Program at VIT.

Siddhi Sudhir Pathak

- Chief guest for Pi-day celebrations at PSBB Siruseri School.
- Delivered online seminar talks at University of Rochester, USA and University of British Columbia, Canada.
- Participated in two conferences in Italy, and gave a talk.
- Referee for IJPA.
- Referee for journals.
- Reviewer for AMS MathSciNet.
- Taught complex analysis to students in the AFS-1 at Pondicherry university in June 2022.
- Visited MAV under the CMI-NAHI initiative, hosted two doctors speaking to girl students regarding health and hygiene.

Sharad S. Sane

- Chaired a session in a conference on Algebra and Discrete Mathematics at the University of Pune, in May 2022.
- Editorial Board Activity: The Mathematical Consortium Bulletin.
- Referee work for "Journal of Combinatorial Designs".
- Referee work for the Bulletin of the Mathematical Consortium of a paper on Introduction to Graph Theory.
- Referee work for the journal Designs, Codes and Cryptography.
- Referee work for the journal "Linear Algebra and Applications".
- Referee work for the journal "The Journal of the Ramanujan.
- Referee work: The Mathematical Consortium Bulletin.

Sudeshna Roy

• Tutor of Graduate Course on Tight Closure of Ideals and its Applications, ICTP.

M.K. Srivas

Topics of Research engaged with students and colleagues

- Srinidhi Nagendra (PhD student) is doing an internship at MPI, Germany with Prof. Rpack Majumdar. Coverage-Guided fuzzing for distributed systems molded in TLA with Srinidhi Nagendra (PhD student), Burcu Ozkan TU Delft (https://burcuku.github.io/home/) and Rupak Majumdar.
- Using Reinforcement learning to develop a guided distributed state space exploration algorithm with Srinidhi Nagendra (PhD student) and Rupak Majumdar.
- Designing, training, and verifying properties of a Transformer model-based machine relearning system for Latex code synthesis with Diganta Mukhopadhyay (TCS Research), Arghodeep Ghost (MS student)
- Exploiting Almost-Linear Substructures in DNNs for Abstraction-Refinement Verification Akhoury Shauryam, CMI, Sanaa Siddiqui, IIT Delhi, Diganta Mukhopadhyay, TCS Research Kumar Madhukar, IIT Delhi, and Mandayam Srivas, CMI

Vishwa Prakash H V

- Teaching assisted ACM workshop on Lowerbounds.
- Won outstanding poster award at IIT Jodhpur.

21 Visitors

- Amit Kumar Sinhababu, Aalen University, Germany. Gave a talk on "Multivariate polynomial factorization: An algebraic complexity perspective" (April 2022).
- Abhisek Sankaran, Cambridge University, UK. Gave a talk on "The Downward Lowenheim-Skolem Property in the Finite" (April 2022).
- Srinivas Bhogle, Honorary Scientist, CSIR-4PI. Gave a series of lectures on "Lectures on The Statistical Innings" (April 2022).
- Loic Merel, University of Paris. Gave a talk on "Higher Ramanujan congruences modulo 691" (April 2022).
- N.D. Hari Dass, Retd. Senior Professor, Institute of Mathematical Sciences, Chennai. Gave a talk on "Simple experiments to probe parity violation in Gravitation, and their theoretical implications" (April 2022).
- Sathya Peri, IIT Hyderabad. Gave a talk on "Dynamic Non-blocking Graph Algorithms" (April 2022).
- V. Gayathri, University of Florida. Gave a talk on "Who ordered LIGO's most massive black hole?" (April 2022).
- Karthikeyan Bhargavan, INRIA. Gave a talk on "Verified Implementations for Real-World Cryptographic Protocols" (May 2022).
- Pratik Roy, IIT Madras. Gave a talk on "Some implications of Quantum Null Energy Condition for AdS_3/CFT_2 " (May 2022).
- Debsoumya Chakraborti, The Institute for Basic Sciences, South Korea. Gave a talk on "Existence of transversal in a Latin rectangle" (May 2022).
- Shivaram Kalyanakrishnan, IIT Mumbai. Gave a talk on "PAC Mode Estimation using PPR Martingale Confidence Sequences" (June 2022).
- Prashanta Garain, Uppsala University, Sweden. Gave a talk on "On the regularity theory for mixed local and nonlocal quasilinear elliptic equations" (June 2022).
- Vivek Tewary, TIFR-CAM. Gave a talk on "Regularity theory for parabolic fractional p-Laplace equations" (June 2022).
- Sunil Chebolu, Illinois State University, USA. Gave a talk on "An overview of Fuchs' problem" (June 2022).
- Krishna Mohan Parattu, Cochin University. Gave a talk on "Exploring the quantum nature of cosmological perturbations" (June 2022).

- Yashonidhi Pandey, IISER Mohali. Gave a talk on "Bruhat-Tits theory over a higher dimensional base" (June 2022).
- Mihir Sheth, IISc, Bangalore. Gave a talk on "The failure of a 1-1 mod p local Langlands correspondence for GL_2 " (June 2022).
- Rahul Gupta, University of Regensburg. Gave a talk on "Bloch's formula with modulus and ramified class field theory" (July 2022).
- Veekesh Kumar, NISER, Bhubaneshwar. Gave a talk on "On some interesting sequences in diophantine approximation" (July 2022).
- Mohan Swaminathan, Stanford University. Gave a talk on "Extending Taubes' Gromov invariant to Calabi-Yau 3-folds" (July 2022).
- Akashdeep Dey, University of Toronto. Gave a talk on "Existence of multiple closed CMC hypersurfaces with small mean curvature" (August 2022).
- Ananth Shankar, University of Wisconsin, Madison. Gave a talk on "Abelian varieties not isogenous to Jacobians" (August 2022).
- P. Vanchinathan, VIT Chennai. Gave a talk on "Relativistic Generalization of Cyclotomic Polynomials" (August 2022).
- Mrinal Kumar, Computer Science Department, IIT Mumbai. Gave a talk on "Some algebraic questions in coding theory" (August 2022).
- Bishal Deb, University College London, UK. Gave a talk on "Combinatorics and Total positivity" (August 2022).
- Amrutha P, IISER Trivandrum. Gave a talk on "On the degrees of representations of groups not divisible by 2^{k} " (August 2022).
- Indranil Chakraborty, IIT Kharagpur. Gave a talk on "Memory effects: studies in exact radiative spacetimes" (August 2022).
- Dimple, Aries, Nainital (July September 2022).
- Indranil Biswas, TIFR, Mumbai (August 2022).
- Kiranmoy Das, Indian Statistical Institute, Kolkata. Gave a talk on "A Bayesian quantile regression approach to multivariate semi-continuous longitudinal data" (September 2022).
- Wolf Wadehn, Trumpf Metamation. Gave a talk on "Mathematical Challenges in Industrial Production at Trumpf Metamation" (September 2022).
- S. Venkitesh, IIT Bombay. Gave a talk in Math-CS joint seminar (September 2022).

- Visvanathan Ramesh, Goethe University, Frankfurt. Gave a talk on "A Transdisciplinary Systems Perspective for Engineering of Intelligence" (September 2022).
- M D Abhishek, HRI, Allahabad. Gave a talk on "Scattering Amplitudes and BCFW recursion in $N = 2^*$ theory" (September 2022).
- Shivaram Kalyanakrishnan, IIT Bombay. Gave a talk on "Towards a Better Theoretical Understanding of Policy Iteration" (September 2022).
- Poulami Dutta Roy, IIT Kharagpur. Gave a talk on "Demonstrating wormholes as black hole mimickers: A perturbation analysis" (September 2022).
- Pritam Gharat. Gave a talk on "Precise and Scalable Interprocedural Analysis" (September 2022).
- Jayanth Guhan, Emory University. Gave a talk on "Local-global principle for hermitian spaces over semi-global fields" (September 2022).
- Dr Suhas B.N., St. Joseph's University, Bangalore (September 2022).
- Pramod Padmanabhan, IIT BBSR. Gave a talk on "Topological quantum computation on supersymmetric spin chains" (October 2022).
- Avik Banerjee, IIT Madras. Gave a talk on "Horizon Cap beyond equilibrium" (October 2022).
- Alapan Mukhopadhyay, University of Michigan, Ann Arbour. Gave a talk on "Frobenius-Poincare Function and Hilbert-Kunz Multiplicity" (November 2022).
- Anand Deopurkar, Australian National University, Canberra. Gave a talk on "Carpentry, geometry, and category theory" (November 2022).
- Amartya Kumar Dutta, ISI Kolkata. Gave a talk on "On a residual coordinate which is a non-trivial line" (November 2022).
- Daciberg Gonçalves, University of São Paulo, Brazil (November 2022).
- Peter Wong, Bates College, USA (November 2022).
- Swarnava Mukhopadhyay, TIFR. Gave a talk on "Graph potentials and mirrors of moduli of rank two bundles on curves" (December 2022).
- Gunjan Kumar, NUS. Gave a talk on "Support size estimation Power of conditioning" (December 2022).
- Soumi Nandi ISI, Kolkata. Gave a talk on "Colorful Helly Theorem for Piercing Boxes with Two Points" (December 2022).

- Ankita Sarkar, Dortmund University. Gave a talk on "Approximation algorithms for continuous clustering and facility location problems" (December 2022)
- Anupa Sunny, IRIF, Paris. Gave a talk on "Certificate Games" (December 2022)
- Rohit Gurjar, IIT Mumbai. Gave a talk on "Approximative closure of symbolic determinant under rank-1 restriction" (December 2022)
- Siddharth Pritam, Shiv Nadar University. Gave a talk on "Topological Data Analysis, Basics, Computation and Applications" (December 2022)
- Vipul Arora, NUS. Gave a talk on "Low Degree Testing over the Reals" (December 2022)
- Anurag Singh, IIT Bhilai (December 2022).
- Patricia Bouyer -Decitre, LMF, ENS Paris-Saclay, France (December 2022).
- Sayan Mukherjee, University of Brussels, Belgium (December 2022).
- Chandrima Kayal, ISI Kolkata (December 2022).
- Rishikesh Gajjala, IISc Bangalore (December 2022).
- Sayantan Sen, ISI Kolkata (December 2022).
- R Govind, IIT Bombay (December 2022).
- Sougata Bose, University of Liverpool. Gave a talk on "Expressiveness of History-Deterministic Timed Automata" (January 2023).
- Ronak Soni, DAMTP Cambridge. Gave a talk on "Explorations of Gravitational Entropy" (January 2023).
- Soham Chanda, Rutgers University. Gave a talk on "Invariance of Floer cohomology under higher mutation via neck-stretching" (January 2023).
- John Mitchell, Stanford University. Gave a talk on "The evolving arc of blockchain technology and Web3" (Joint Seminar, CMI and Sai University) (January 2023).
- Sourav Chakraborty, ISI, Kolkata. Gave a talk on "Estimating the size of union of sets in streaming model" (January 2023).
- Jacques Sakarovitch, CNRS, Télécom Paris, France. Gave a talk on "Equivalence and conjugacy of weighted automata" (January 2023).
- Papri Dey, Georgia Tech. Gave a talk on "Hyperbolic Polynomials in Combinatorics and Optimization" (January 2023).

- Nikhil Balaji, IIT Delhi. Gave a talk on "Testing equality of compressed strings in Randomised NC" (January 2023).
- Akavoor Manu, Institute of Physics. Gave a talk on "Classical Soft factors from Gauge theory Amplitudes" (January 2023).
- Tanay Nag, Uppsala University, Sweden. Gave a talk on "Systematic generation of the dynamical higher-order topological insulator and superconductor phases in three dimensions" (January 2023).
- Rabeya Basu, IISER Pune (January 2023).
- Subham Dutta Chowdhury, University of Chicago. Gave a talk on "Constraining treelevel gravitational scattering" (February 2023).
- K.S. Narain, ICTP Trieste. Gave a talk on "Heterotic Strings on T^3/Z_2 , Nikulin Involutions and M-theory" (February 2023).
- Jacques Sakarovitch, IRIF, CNRS/ Univ. Paris Cité and Télécom Paris, IPP. Gave a talk on "Marvels and mysteries of rational base numeration systems" (February 2023).
- Ankur Das, Weizmann Institute of Science, Israel. Gave a talk on "The Phase Puzzle of $\nu = 0$ Graphene and Beyond" (February 2023).
- Sumanta Ghosh, Caltech, USA. Gave a talk on "Fast Multivariate Multipoint Evaluation over Finite Fields" (February 2023).
- Riddhipratim Basu, ICTS. Gave a talk on "A tale of universality in planar random growth" (February 2023).
- Oscar Garcia-Prada, ICMAT, Madrid. Gave a talk on "Vinberg θ -pairs and Higgs bundles" (February 2023).
- Riddhipratim Basu, ICTS. Gave a talk on "Theory of phase transitions: a glimpse into the mathematics of Hugo Duminil-Copin" (February 2023).
- Dawood Kothawala, IIT Madras. Gave a talk on "Remembering Paddy the fiery explorer of space and time" (Febraury 2023).
- Isa Vialard, Laboratoire Verification et Verification (February 2023).
- Parveen Kumar, Department of Condensed Matter Physics, Weizmann Institute of Science, Rehovot, Israel. Gave a talk on "WEAK MEASUREMENT: A Peephole into the Quantum World" (March 2023).
- Balthazar Charles, Universite Paris-Saclay, France. Gave a talk on "Minimal elements of Shi regions in affine Weyl groups" (March 2023).

- Tanmay Inamdar, University of Bergen, Norway. Gave a talk on "A Tour of Clustering and Geometric Problems" (March 2023).
- TES Raghavan, University of Illinois, Chicago. Gave a talk on "Game theory, Cones and Positive Operators" (March 2023).
- Tanmay Inamdar, University of Bergen, Norway. Gave a talk on "A Tour of Clustering and Geometric Problems" (March 2023).
- Fabien Trihan, Sophia University, Japan. Gave a talk on "Tamagawa Number Conjecture in characteristic p" (March 2023).
- Krishna V. Palem, Rice University. Gave a talk on "Realizing quantum advantage across multiple applications" (March 2023).
- R. Balasubramanian, Institute of Mathematical Sciences, Chennai. Gave a talk on "Difference between consecutive primes" (March 2023).
- T. Raghavasimhan. Gave a talk on "Forgotten Indian Techniques to solve the Pell's equations" (March 2023).
- Priyanka Golia, NUS, Singapore and IIT Kanpur. Gave a talk on "Fusing AI and Formal Methods for Automated Synthesis" (March 2023).
- S. Viswanath, Institute of Mathematical Sciences, Chennai. Gave a talk on "Log-concavity in combinatorics: the work of June Huh" (March 2023).
- Rajendra Kumar, Weizmann Institute of Science, Israel. Gave a talk on "Foundations of Lattice-based Cryptography" (March 2023).
- Susobhan Mandal, IISER Kolkata. Gave a talk on "Equations of state in the curved space-time of compact degenerate stars" (March 2023).
- Sushmita Venugopalan, Institute of Mathematical Sciences, Chennai. Gave a talk on "Counting curves tropically" (March 2023).
- Karthick, Data Patterns (India) Ltd. Gave a talk on "Presentation by Datapatterns about maths, physics and computer science for satellites and defence systems" (March 2023).
- Francesco Di Cosmo, Free University of Bozen-Bolzano (January March 2023).
- Phillipe Schnoebelen, Laboratoire Verification et Verification, Director of Research (February March 2023).
- Paul Gastin, Emeritus-Professor, ENS Paris Saclay (February March 2023).
- Rayjinar Anne Marie, Salcedon (February March 2023).