Chennai Mathematical Institute

Annual Report

April 2023–March 2024

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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 close to 35 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. Prof. T.R. Ramadas chairs the Apex Committee of the National Centre for Mathematics. Prof. Rajeeva Karandikar chairs the National Statistical Commission. Dr. B. Srivathsan was elected President of the Indian Association for Research in Computing Science (IARCS) in December, 2023 for a three year term. Prof. Madhavan Mukund has been appointed Chair of the Curricular Area Group in Mathematics by the National Council of Educational Research and Training (NCERT), to guide the development of the next set of school textbooks in mathematics for classes 6–12.

CMI continues to be an attractive home for talented young researchers. During 2023–2024, three new faculty members joined CMI, two in Computer Science and one in Mathematics. One more faculty member in Physics will join in 2024.

CMI's teaching programme remains a benchmark for undergraduate and postgraduate mathematics teaching in the country. 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

Two CMI alumni won academic recognition during 2023–2024. Pranjal Dutta was awarded the ACM India Doctoral Dissertation Award 2023, for the best PhD thesis from India. Ananth Shankar, presently a faculty member at the University of Wisconsin-Madison, USA, was awarded prestigious the Sloan Research Fellowship in 2024.

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.

CMI students are also much sought after in industry, 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.

CMI continues to be a hub of academic activity, organizing research seminars on a regular basis and hosting numerous visiting researchers for academic collaboration. CMI hosted one instructional school and three workshops under the aegis of the National Centre for Mathematics (NCM). CMI also hosted a workshop on analysis of EEG data in collaboration with Krea University, as well as the annual conference on Statistical Methods in Finance. Through the CMI Arts Initiative, a number of talks were organized on topics such as ecology, literature, art and architecture. CMI also hosted two international writers in residence in collaboration with Sangam House.

Several programmes were conducted under the banner of the Dr. F.C. Kohli Centre of Excellence, established in late 2020. The first BIRS-CMI workshop, as part of the collaboration with the Banff International Research Station (BIRS), Canada, was organised in January, 2024. Two more workshops will take place in 2024 and six workshops have been selected for 2025. A workshop on gravity was organized in September 2023. CMI also organized a quantum computing semester from January 2024, consisting of several one week workshops on different aspects of quantum computing. Mini-courses in mathematics were conducted by Patrick Polo, Université Pierre et Marie Curie, Paris, France and Sándor Kovács, University of Washington, Seattle, USA. There is a proposal to formally publish lecture notes based on the material covered in these mini-courses.

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. During 2023–2024, the architects for the new campus were identified and detailed plans were drawn up and submitted for approval. Construction is expected to take place during 2024–2025. The new campus will have facilities to host large scale workshops and conferences, along with a guest house to accommodate visiting participants. There will also be a mathematics museum with activities and exhibits aimed at attracting students at school and college level to pursue the subject.

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 was organized as usual, with a variety of events and activities and a large number of attendees. CMI conducted 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). In the summer of 2023, CMI hosted two residential programmes

for school students in partnership with Raising A Mathematician Foundation's Training Programme (RAM TP). During this year, CMI hosted the training camps for the International Olympiad in Informatics 2023 and the European Girls' Mathematical Olympiad 2024. In 2024, the training camp for the International Mathematics Olympiad will also be hosted by CMI.

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 also receives a number of grants from private individuals to support the academic activities of the Institute.

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 2023–2024. CMI continues to expand its academic activities and establish its status as one of the leading academic centres.

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Computer Science

1. S.P. Suresh (CMI), Chair
2. Manindra Agrawal (IIT, Kanpur)
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Physics

1. V.V. Sreedhar (CMI), Chair
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4. K. Narayan (CMI)
5. R. Rajesh (IMSc)
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Data Science

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2. Tathagata Bandyopadhyay (IIM Ahmedabad)
3. Shibasish Dasgupta (Pfizer)
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5. Madhavan Mukund (CMI)
6. B. Ravindran (IIT Madras)
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8. Ganesh Sankaralingam (Latentview)
9. K.V. Subrahmanyam (CMI)

Undergraduate Studies

1. Upendra Kulkarni (CMI), Chair
2. Krishna Hanumanthu (CMI)
3. Clare D'Cruz (CMI, Chair, Board of Studies in Mathematics)
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5. S.P. Suresh (CMI, Chair, Board of Studies in Computer Science)

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	Govind S. Krishnaswami
	Samir Datta
	K. Narayan
	K. Narayan Kumar
	Partha Mukhopadhyay
	Purusottam Rath
	P. Sankaran
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	S. Senthamarai Kannan
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Assistant Professors

Aditya Karnataki
Pranabendu Misra
Siddhi Pathak
Amit Kumar Sinhababu
Nithin Varma
Anwesh Ray
Sumanta Ghosh
Siddharth Pritam

Visiting Faculty

S. Selvaraja (Until May 2023)
V. Swaminathan
Pascal Weil

Post-doctoral Fellows

Amrutha P
Amit Kumar Singh
Animesh Lahiri (Until Apr 2023)
Arvind Kumar (Until Jul 2023)
Biplab Paul (Until May 2023)
Madhu Misra (Until Oct 2023)
Sajat Ahmad Bhat (Until Jul 2023)
Shibasis Roy (Until Mar 2024)
Sourav Das (Until Mar 2024)
Murugeswari Issakkimuthu (Until Feb 2024)
Pratik Ghosal (Until Apr 2023)
Varun Gupta (Until Jul 2023)
Jayanth Guhan(Until March 2024)
Kajal Singh (Until Nov 2023)
Snehajit Misra (Until Dec 2023)
Arghya Mondal (Until Apr 2023)
Nabanita Ray (Until Jul 2023)
Poulami Dutta Roy
Soumyadip Das (Until Jul 2023)
Suhas B N
Jyothsnaa Sivaraman (Until May 2023)
Kamalesh Saha
Plawan Das
Ankit Rai
Gopal Yadav
Neha Malik
Mohit Upmanyu
Bivas Khan

Chandra Kanta Mohapatra
Sitender Pratap Kashyap
Dimple
Garima Shakya
Shingavekar Pratiksha Satish
Dwaipayan Mazumder
Koushik Brahma
Amit Roy
Kanoy Kumar Das

Adjunct Professors

Manindra Agrawal
V. Arvind
Shibasish Dasgupta
Ghanshyam Date
Ramesh Hariharan
S. Kesavan
T.R. Ramadas
V. Lakshmibai
Usha Mahadevan
H. S. Mani
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Raghav Kulkarni
T. Parthasarathy
Mythily Ramaswamy (Until Apr 2023)
S. Ramanan
R.V. Ramamoorthi
B.V. Rao
Sharad S. Sane (Until Dec 2023)
Nitin Saxena
K. Srilata
Mandayam Srivas
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Research Scholars

Aashish Satyajith
Abhiram Subramanian
Adwitee Roy (Until Dec 2023)
Aisha Negi
Aleek Maity
Ankit Yadav
Archit Chauhan
Arkadev Ghosh
Arnab Sur
Arpan Kumar Bag
Asif Khan
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Cyril J Jacob
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Hitesh Saini
Jagadish Pine (Until Jul 2023)
Kaberi Goswami
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Malay Mandal (Until Dec 2023)
Muthuvelmurugan I
Nirmal Kotal
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Preeti
Pritthijit Biswas
Pritish Sinha
Ramadas N
Sadhanandh Vishwanath B
Sahil Mhaskar
Sanchari Sil
Sayantani Datta (Until Aug 2023)
Sayantan Saha (Until Oct 2023)
Mangala Pandi P
Shanmugapriya P (Until Jan 2024)
Sheikh Shakil Akhtar

Somnath Sudam Dake
Soumodev Mal
Srinidhi N
Sridharan Sankaran
Suhita Hazra
Tejas Shekhar Bhojraj (Until Aug 2023)
Utsab Ghosal
Varun Rajan
Vishwa Prakash H V
Kirubakaran S
Rutuja Vilas Sawant
Rajesh Manna
Pranoy Sarkar
Harsh Vardhan Nahata

Administrative Staff

Venu Santhakumari
V. Vijayalakshmi (Until Apr 2023)
Rajeshwari Nair
Ranjini Girish
Nisha John
B. Godwin
A. Sankaranarayanan
Daniel Lawrence
T. Jothi
Sathishkumar A
N. Vikash

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 Professsor-in-Charge 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

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

Amit Kumar 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 Univesity, 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.

Anwesh Ray

Anwesh Ray received his B.Sc. (Honours) in Mathematics and Computer Science from Chennai Mathematical institute from 2010-2013, M.Sc. in Mathematics from Chennai Mathematical institute from 2013-2015 and Ph.D. in Mathematics at Cornell University from August 2015 - April 2020.

He was a Postdoctoral fellow in Mathematics at University of British Columbia, Vancouver from September 2020 to September 2022 and Simons Postdoctoral fellow at Centre de recherches Montreal, Universite de Montreal from September 2022 to June 2023.

His research interests are: Number theory, Iwasawa theory, Galois representations and arithmetic statistics.

Sumanta Ghosh

Sumanta Ghosh received his B.E. (Computer Science and Technology) from Bengal Engineering and Science University, Shibpur (2011), M.Tech. (Computer Science and Engineering) from IIT Kanpur (2001) and Ph.D. (Computer Science and Engineering) from IIT Kanpur.

He has been a Postdoctoral Fellow, IIT Bombay (October, 2019 - September, 2021) and CMI Postdoctoral Fellow, Caltech, USA (January, 2022 - August 2023).

His research interest is broadly in Theoretical Computer Science, specifically in Computational Complexity, Derandomization, Algebraic Complexity Theory, Parallel Complexity, and Computational Algebra.

Siddharth Pritam

Siddharth Pritam received his Integrated M.Sc. (Mathematics and Computing) from Indian Institute of Technology Kharagpur, Kharagpur, India (2011), M.Sc. and Ph.D. (Computer Science) from Inria, Sophia Antipolis (Université Côte D'azur, Nice) France (2020).

He has been a Postdoctoral Research Associate in team Datashape Inria Sophia Antipolis, France (Oct 2020- May' 2021).

His research interests are Computational Topology, Topological Data Analysis and Computational Geometry

8 Achievements

- CMI students win 4th rank in Simon Marais International Mathematics Competition 2023, Asia-Pacific region.
- Rajeeva Karandikar named Chairperson of National Statistical Commission.
- Pranjal Dutta wins ACM India Doctoral Dissertation Award for 2023.
- B. Srivathsan elected President, Indian Association for Research in Computing Science (IARCS) for 2023-2026.

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.

Specifically, research was carried out on decidability under weak and persistent memory, parametric verification of systems with multiple dimensions of infiniteness, lower bound for the satisfiability problem of string constraints with transducers, on the separability of string constraints, safety games on TSO(Total Store order) and PSO(Partial Store Order), a partial-order reduction method for multi-threaded programs, solving reachability for timed games using zones, making the g-simulation relation better, synthesis problem for LTL with constraints involving regular expressions, local-time semantics for timed automata and timed negotiations, converting Metric Interval Temporal Logic to Generalized Timed Automata, simulations for timed automata, extending suffix-reading automata with a multi-port alphabet, integer parameter synthesis for parametric timed automata, synthesis of small asynchronous automata from regular trace-closed languages, developing weighted temporal logics that are expressively complete for weighted first-order logic, efficient computability of the downward closures of bounded tree-width languages, satisfiability of constraint LTL with remote past access, extensions of linear temporal logic to infinite domains, and formal verification of byzantine fault tolerant consensus protocols, tree modification systems based on tree languages and transducers,

Research in algorithms involved designing new exact, parallel, parametrised, approximation, optimisation, sublinear, and streaming algorithms for many classical problems and graph problems.

Specifically, research was carried out in disjoint rank-maximal matchings, envy-free allocations, epistemic EFX allocations, weighted proportional allocations of indivisible goods and Chore via Matchings, completion of partial allocations to complete fair allocations, counting versions of matroid intersection problem, matching and packing problems, fair clustering, pattern freeness of multivariate functions, tractable algorithm for even path problem in single-crossing-minor-free graphs, sparsification of decomposable submodular functions, parallel depth first search in single crossing minor free graphs. faster Deterministic Algorithms for hypergraph matching, algorithms and complexity for games with imperfect information, and faster FPT algorithms for rainbow matching in general graphs,

In complexity theory, the research was focused on polynomial identity testing and its vari-

ants, circuit complexity, dynamic complexity of group problems, communication complexity, parametrised complexity and derandomization.

Specifically, research was carried out in understanding several PIT results on ROABP depth-3 circuits, cone-closed basis and orbits of sparse and read-once formulas, parallel dynamic complexity of group problems, dynamic complexity of abelian group problems, exact complexity of NP-hard problems, monotone planar circuit value problem in the static and dynamic settings, placing various dynamic problems in DynFOLL, factorization of arithmetic formulas, factor conjecture, polynomial identity testing for diagonal circuits, algebraic independence testing over finite fields, exploring PIT for restricted cases of depth 4 diagonal circuits from the perspective of rank concentration, and understanding other Blackbox proof strategies for ROABP.

In machine learning, research was focused on explainability and interpretability of ML models, exploring the use of expander graphs to do self attention in transformer models, connecting recent work on sandwich varieties with the local model,

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

Mathematics

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

Some of the specific topics studied were complete ideals, Symbolic powers, Rees algebra, complexity of real numbers, the F-threshold of filtrations and the resurgence number of graded families of ideals, F-rationality, Fermionic Gaussian States, grey galaxies, endpoints of Kerr-AdS black holes, BRST quantization for supergravity, study of local models of Shimura varieties via degeneration of moduli stacks of principal bundles, the closed fibre of the moduli stack of principal bundles, study of topology of the desingularization of moduli of principal bundles, K-theory of certain quotients of the exceptional Lie group E_6, K-theory of generalized Dold manifolds fibred by complex Grassmannians, on GIT quotients of Schubert varieties in the Grassmannian modulo one dimensional torus, Seshadri constant on blow up of projective plane and Hirzebruch surface, Seshadri constants and positivity of linear systems on projective varieties, Seshadri constants of vector bundles on projective varieties, questions on linear systems on rational, surfaces, parabolic vector bundles, unexpected hypersurfaces, Seshadri constants on moduli spaces, stability of Syzygy bundles on surfaces, pseudo-effective cones of projective bundles and volume function of line bundle on projective bundle, Newton Okounkov bodies on Projective Bundles, Stochastic Approximation in infinite dimensional spaces, Blockcipher algorithms, understanding the structure of mod p reductions of Galois representations associated to Hilbert modular forms, acquiring background toward O'Grady's Franchetta conjecture, git quotient of Schubert variety for torus action, representation of algebraic group, hyperplane arrangements, topological com-

binatorics, q analogue of FI category, stability of kernel bundles on reducible nodal curves, studying invariants coming from a resolution over a commutative ring and subsequences in binary words, hyperplane arrangements, image Classification problems, air pollution analysis climate change problems, combinatorics of resonance arrangements, Rips complex of groups, temporal graphs, cryptography, Stochastic approximation in infinite dimensions, Doob's theorem on posterior consistency, measure theory, questions on linear systems on rational surfaces, studying Frobenius Betti numbers of prime characteristic rings, symbolic powers, blowup algebras, working on automorphism group of Large Schubert varieties, application of the supersymmetric localization method to theories on anti-de Sitter spacetime, Starobinsky inflation in supergravity, complexity and structure, computing Stiefel-Whitney classes of representations of some finite groups of Lie type, computing seshadri constants on blow-ups of hirzebruch surfaces, figuring out which extension of Ox corresponds to the generator of Ext1 (Ox, ω x), linear relations among values of special functions, quasimodular forms, their L-functions and special values, probabilistic number theory, Diophantine stability, rank stability of elliptic curves, unbounded rank conjecture of elliptic curves, on the Iwasawa invariants of Artin representations, on the reductions of Galois representations associated to modular forms, quantum Gaussian states. algebraic graph theory and root systems, Gödel's Incompleteness Theorem, algebraic groups, representation theory, GIT quotient of Schubert variety, Automorphism groups of large Schubert varieties, Dirichlet series associated to quasi-modular forms, Apery limits, q-analogs of Apery limits, Diophantine stability and ranks of elliptic curves, Diophantine m-tuples over number fields, problems related to binomial edge ideals and the v-number of graded ideals, deformation theory and Iwasawa theory, construction of Galois representations over function fields that have large image, coming from Drinfeld modules, Iwasawa invariants in cubic twist families, Stochastic Approximation, Randomness tests for Block ciphers, Symbolic powers, Rees algebra, reductions of ordinary Galois representations in the Hilbert modular case, distribution of sizes of class groups of number fields and function fields, Seshadri constants on blow-ups of Hirzebruch surfaces, some standard conjectures on linear systems of curves on blow-ups of Hirzebruch surfaces, semistability of the restriction of w-semistable vector bundles over some reducible nodal curve to component curves, Seshadri constants and positivity of linear systems on projective varieties, Seshadri constants of vector bundles on projective varieties, questions on linear systems on rational surfaces, Seshadri constants on moduli spaces and toric varieties, the distribution of shapes of number fields with fixed degree and bounded discriminant, constructing modular Galois representations with large Selmer rank, computing Galois images associated to Drinfeld, Studying distribution questions for the local structure of elliptic curves in various families ordered by height, Algebraic groups, representation theory. GIT quotient of Hessenberg varieties, K-theory of weighted Grassmann orbifolds, quantum cohomology of flag varieties of general Lie type, automorphism groups of large Schubert varieties, GIT quotients of Grassmannian modulo one dimensional torus, GIT quotient of Hessenberg varieties modulo one dimensional torus, Seshadri constants and positivity of linear systems on projective varieties, Seshadri constants of vector bundles on projective varieties, questions on linear systems on rational surfaces, Seshadri constants on moduli spaces and toric

varieties, Symbolic powers, Local cohomology, Topology of temporal networks, irrationality of seshadri constants on blow-ups of Hirzebruch surfaces, computation of seshadri constants for some ample vector bundles on surfaces, minimal free resolutions of Stanley-Reisner ideals of simplicial complexes, independence complex of graphs and its generalizations., relations among values of the digamma function, generalised period polynomials and Ramanujan formulae, symmetric functions, pattern avoidance, the packing problem related to the equality of ordinary and symbolic powers of ideals, the period-index problem for hyperelliptic curves, tropical toric vector bundles on tropical toric varieties, on cohomology of (Phi, tau)-modules in families, on reductions of Galois representations associated to modular forms, characteristic classes of representations, spinoriality of representations of orthogonal group over finite fields, parity distribution problem for isogeny induced Selmer group ranks of elliptic curves, and prime characteristic singularities.

Physics

In Physics, research was carried out in the areas of gravitational wave physics, string theory, quantum gravity, quantum field theory, and nonlinear dynamics

Specifically, research was carried out on constraining the nature of dark compact objects with spin induced octupole moment, resolving the fraction of binary black hole eccentricity distribution with future gravitational wave detectors, eccentricity induced waveform systematics on parametrized test of general relativity from a population of binary black holes, information paradox, finding the periodic orbits born at the infinite cascade of bifurcations in 3-rotor problem, studying the properties of these new periodic orbits and their application in Hamiltonian chaos, PN expansion, statistical bias estimation of TGR parameters, estimation of bias on tidal deformability parameter, PCA analysis and bias due to eccentricity on PCA parameters, quantum instability of black holes, testing general relativity using gravitational wave observations from compact binary mergers, direct measurement of gravitational kick with future gravitational wave detectors, testing the multipole structure of the dynamics of binary black holes using gravitational wave observations, working on the simple model of hierarchical mergers of BBHs in dense star clusters, the principal component analysis in multiparameter test of general relativity, bifurcation cascade self-similarity and duality in the classical three-rotor problem, Level crossing instabilities in inviscid isothermal compressible Couette flow, quantum three-rotor problem, superconducting qubits, integrable systems, de Sitter space extremal surfaces and "time-entanglement", time entanglement and pseudo-entropy, developing a framework to systematically study SU(3)-flavor symmetry breaking in hadronic decays of beauty mesons and baryons, measuring weak phase gamma using bottom baryons, science case for next-generation gravitational wave detectors, classification of GRBs using machine learning, and tests of generation relativity using eccentric binaries, superradiance instability for Kerr-AdS black holes in five and six dimensions, gravitational waves in de Sitter, black hole hair with large AdS3 region, weak measurement, book on modern physics and working on a project on future-past extremal surfaces in de Sitter shockwave geometry, weak measurement, eccentricity-induced systematic error on parametrized tests of general

relativity from a binary black hole population, eccentricity-induced systematic bias on tidal deformability and implications for fundamental physics and cosmology, physical Knot theory, Aharonov-Bohm effect generalization, closed timelike curves, revolving black holes in AdS, gravitational radiation in de Sitter, supertranslation invariant Lorentz charges, complexity in cosmologies, future-past extremal surfaces in shockwave geometry, de Sitter space extremal surfaces and time-entanglement/pseudo-entropy, Schwarzschild de Sitter black holes and quantum extremal surfaces, measurement of black hole kick, 4PN tests of GR, effect of eccentricity on gravitational wave measurements, spectral statistics in the quantum three-rotor problem, level crossing instabilities in inviscid isothermal compressible Couette flow, holographic complexity and chaos in cosmological backgrounds, pole skipping and chaos in holographic QCD, classification of GRBs using machine learning algorithms, rate of GRBs in new generation telescopes, persistence homology of time-series, understanding of protein structures using machine learning, holographic complexity in cosmologies, Krylov complexity, the impact of neglecting eccentricity on tidal deformability — implications for equation of state, cosmology, and binary black hole nature, parametrized test of general relativity for binary black holes in eccentric orbits, thermodynamic (in)stability of black holes, information paradox for Schwarzschild de Sitter black holes and islands, spectral statistics in the quantum three-rotor problem, screwon spectrum and dispersion relation in the quantum Rajeev-Ranken model, tests of general relativity using 4PN phasing, effect of precession and eccentricity on parameter inference and tests of GR, multimessenger astronomy using gravitational waves and gamma-ray bursts, working on complexity and chaos of cosmological spacetimes and de-Sitter space, working on quantum systems that are not isolated but exposed to the environment called open quantum systems and specifically working on short memory evolution of such systems given by the Lindblad Master equation, construction of vertex operators based on DDF method in the pure spinor formalism, hierarchical mergers of black holes, understanding the origin of low mass gap black holes, lax pair and periodic orbits for the anharmonic oscillator formulation of the Rajeev-Ranken model, spectral purification and statistics of the quantum three-rotor problem, testing general theory of relativity with gravitational waves from binary black holes in eccentric orbits, holographic complexity and entanglement for cosmological singularities, holographic complexity in cosmologies, holographic complexity and entanglement entropy in null cosmologies, index for small black holes, de Sitter Teukolsky waves, logarithmic corrections to supersymmetric black holes, non-Abelian Jaynes-Cummins model, Anion thermodynamics, post-Newtonian expansion of inspiral gravitational wave phase, parameter estimation of compact objects, systematic biases due to neglecting eccentricity, quasinormal modes and shadows of different spacetimes, and the complexity in cosmological backgrounds.

10 Publications

Journal Articles

Computer Science

J1 Fedor V Fomin, Petr Golovach, Lars Jaffke, Geevarghese Philip, Danil Sagunov: *Diverse Pairs of Matchings*, Algorithmica.

J2 Vishwas Bhargava , Sumanta Ghosh, Zeyu Guo, Mrinal Kumar, Chris Umans: *Fast Multivariate Multipoint Evaluation Over All Finite Fields*, Journal of the ACM (to appear).

J3 Sarjick Bakshi, S Senthamarai Kannan, K V Subrahmanyam: *Smooth torus quotients of Schubert varieties in the Grassmannian*, Indian Journal of Pure and Applied Mathematics .

J4 Iden Kalemaj, Sofya Raskhodnikova, Nithin Varma: *Sublinear-Time Computation in the Presence of Online Erasures*, Theory of Computing (to appear).

J5 Somnath Dake, S Senthamarai Kannan, K V Subrahmanyam: *Torus quotients of some Flag Varieties*, Proceedings of the Indian Academy of Sciences, Mathematical Sciences.

J6 S. Senthamarai Kannan, Pinakinath Saha: *Minimal parabolic subgroups and automorphism groups of Schubert varieties—II.*

J7 Somnath Dake, S. Senthamarai Kannan, K. Venkata Subrahmanayam: *Torus quotients of some flag varieties*

J8 S. Senthamarai Kannan and Arpita Nayek : *Torus quotients of Richardson varieties in Gr,qr+1*

J9 Indranil Biswas, Krishna Hanumanthu and S. Senthamarai Kannan: *On the Seshadri constants of equivariant bundles over Bott-Samelson varieties and wonderful compactifications*

J10 Meghana Nasre, Prajakta Nimbhorkar, Keshav Ranjan and Ankita Sarkar: *Popular critical matchings in the many-to-many setting.*

J11 Vishwa Prakash HV, Prajakta Nimbhorkar: *Weighted Proportional Allocations of Indivisible Goods and Chores: Insights via Matchings.*

J12 Anand Louis, Meghana Nasre, Prajakta Nimbhorkar and Govind S. Sankar *Online Algorithms for Matchings with Proportional Fairness Constraints and Diversity Constraints.*

Humanities

J13 Usha Mahadevan: *freedom and constraints in translation*, Tamilology International Institute of Tamil studies (to appear).

Maths

J14 Arindam Bhattacharyya, Vishnu Kadiri, Anwesh Ray: *Asymptotic growth patterns for class field towers.*, Documenta Math.

J15 Anwesh Ray: *Iwasawa theory of fine Selmer groups associated to Drinfeld modules* , Mathematika (to appear).

J16 Arindam Bhattacharyya, Vishnu Kadiri, Anwesh Ray: *Asymptotic growth patterns for class field towers*, Documenta Math (to appear).

J17 Nirmal Kotal, Manoj Kummini: *Blow-up rings and F-rationality*, Journal of Commutative Algebra (to appear).

J18 Navnath Daundkar, Priyavrat Deshpande, : *Building planar polygon spaces from the projective braid arrangement*, Forum Mathematicum.

J19 Fred M. Abdelmalek , Priyavrat Deshpande , Shuchita Goyal , Amit Roy , and Anurag Singh: *Chordal graphs, higher independence and vertex decomposable complexes*, International Journal of Algebra and ComputationVol. 33, No. 03, pp. 481-498 (2023) .

J20 Kamalesh Saha: *Cohen-Macaulay Weighted Oriented Chordal and Simplicial Graphs*, Archiv der Mathematik (to appear).

J21 Anwesh Ray: *Constructing Galois representations with large Iwasawa λ-invariant*, Annales Math Quebec.

J22 Anwesh Ray: *Constructing Galois representations with prescribed Iwasawa λ-invariant*, Bull. London Math. Soc (to appear).

J23 Anwesh Ray: *Diophantine equations of the form $Y^n = f(X)$ over function fields*, Bull. Australian Math. Soc. (2023), no. 3, 379–390.

J24 Anwesh Ray, Tom eston: *Arithmetic Statistics for Galois Deformation Ring*, Ramanujan Journal.

J25 Krishna Menon, Anurag Singh: *Dyck paths, binary words, and Grassmannian permutations avoiding identity*, Annals of Combinatorics (to appear).

J26 Indranil Biswas, Shripad Garge and Krishna Hanumanthu: *Effective cone of a Grassmann bundle over a curve defined over the algebraic closure of a finite field*, Indian Academy of Sciences. Proceedings. Mathematical Sciences (to appear).

J27 Indranil Biswas, Shripad Garge and Krishna Hanumanthu: *Effective cone of a Grassmann bundle over a curve defined over the algebraic closure of a finite field*, Indian Academy of Sciences. Proceedings. Mathematical Sciences 134 (2024), no. 1, Paper No. 8.

J28 Aditya Karnataki, Leo Poyeton: *Families of Galois representations and (φ, τ)-modules*, Transactions of the Ametican Mathematical Society (to appear).

J29 Priyavrat Deshpande, Amit Roy, Anurag Singh, Adam Van Tuyl: *Froberg's theorem, vertex splittability and higher independence complexes*, Journal of Commutative Algebra (to appear).

J30 Arkadev Ghosh, S. Senthamarai Kannan: *GIT quotient of Schubert varieties modulo one dimensional torus*, Journal of Ramanujan Mathematical Society (to appear).

J31 S. Senthamarai Kannan, Arkadev Ghosh: *GIT quotient of Schubert variety modulo one dimensional torus*, accepted.

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Ph.D. Thesis

(1) Dharm Veer: Homological Invariants of Hibi Rings and Polyominoes (April 2023).

(2) Sayantani Datta: Multiparameter tests of general relativity using compact binary coalescences (August 2023).

(3) Shanmugapriya P: Black hole hair removal and positivity of microstate degeneracy (October 2023).

(4) Malay Mandal: On the structure of certain non-commutative C^*-algebras (January 2024).

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 2023, the twenty-sixth batch of students was admitted to the undergraduate programme. At the end of the first semester, 29 students opted for B.Sc. in Mathematics and Computer Science. The second year B.Sc. class has 28 students in Mathematics and Computer Science and the third year B.Sc. class has 33 students. Out of the 29 students of the 2020 batch who took their degrees at the convocation in July 2023, several have been placed in very prestigious institutions.

- Abhinav Sapra
  MSc Computer Science, Chennai Mathematical Institute
- Akhoury Shauryam
  MSc Computer Science, Chennai Mathematical Institute
- Arindam Bhattacharyya
  PhD Mathematics, University of Massachusetts, Amherst, USA

- Aryan Agarwala
  Researcher and Doctoral Student in Computer Science, Max Planck Institute in Software Systems, University of Saarland, Germany
- Bharath Rajagopal
  Master of Mathematics, Indian Statistical Institute, Bangalore
- Bimit Mandal
  MSc Mathematics, Chennai Mathematical Institute
- Dhrubajyoti Ghosh
  M1 Parisian Research Master in Computer Science (MPRI), ENS Paris-Saclay
- Diptaksho Palit
  PhD Computer Science, Boston University
- Hardik Kalra
  MSc Computer Science, Chennai Mathematical Institute
- Himanshu Patil
  MSc Computer Science, Chennai Mathematical Institute
- Hrishabh Mishra
  MSc Mathematics, Chennai Mathematical Institute
- Hrishikesh Saikia
  MSc Computer Science, Chennai Mathematical Institute
- Jessica Vipin
  MSc Computer Science, Chennai Mathematical Institute
- Maqbool Manoj
  Integrated PhD Mathematics, Tata Institute of Fundamental Research
- Medha Sridhar Yelimeli
  Masters in Mathematics, Berlin Mathematical School
- Naman Kumar
  PhD in Computer Science, Oregon State University
- Niranjan Kumar
  MSc Mathematics, Chennai Mathematical Institute
- Om Hrishikesh Ambaye
  MSc Data Science, Chennai Mathematical Institute
- Om Sai
  MSc Mathematics, Chennai Mathematical Institute

- Pranav Sanjay Ghorpade Pudipeddi Udit Narayan Sastry
  MSc Mathematics, Leiden University, The Netherlands
- Rajarshi Kanta Ghosh
  MSc Mathematics, Chennai Mathematical Institute
- Rajatadri Venkatasubban
  Master of Mathematics, University of Göttingen, Germany
- Richik Chakraborty
- Rohit Roy
  MSc Data Science, Chennai Mathematical Institute
- Saham Sil
  Integrated PhD, Indian Institute of Science, Bangalore
- Shouvik Ghosh
  MSc Data Science, Chennai Mathematical Institute
- Soumya Dasgupta
  MSc Data Science, Chennai Mathematical Institute
- Surya Deva Eada
  MSc Data Science, Chennai Mathematical Institute
- Tejas Unmesh Oke
  M2 Mathematics (Probability), Institute Fourier, University of Grenoble, France
- T Karthik Rajendran
  MSc Operations Research, IIT Bombay
- Writika Sarkar
  MSc Computer Science, Chennai Mathematical Institute

B.Sc. (Hons.) Mathematics and Physics

Of the 32 students admitted to the undergraduate programme in 2023, 3 students opted for B.Sc. in Mathematics and Physics as the end of the first semester. The second year class has 8 students. The third year class has 7 students. Out of the 6 students of the 2020 batch who took their degrees at the convocation in July 2023, several have been placed in very prestigious institutions.

- Alok Dhar Dubey
  MSc Data Science, Chennai Mathematical Institute

- Amitava Ghosh
  MSc Physics, Indian Institute of Technology Madras
- Dipanjoy Saha
  MSc Data Science, Chennai Mathematical Institute
- Shankhadip Bhattacharjee
  Integrated PhD Physics, TIFR, Mumbai
- Shubhendu Prasad Mandal
  M1 General Physics, Université Paris-Saclay
- Soham Pal
  MSc Mathematics, Chennai Mathematical Institute
- Vishnu Kadiri
  MSc Mathematics, Leiden University and University of Milan

M.Sc. Mathematics

In 2023, 5 students have joined the programme. There are 8 students in the second year of the programme. 8 students who joined the programme in 2021 have completed the programme successfully.

- Aadrita Laha
  PhD Mathematics, University of Chicago, USA
- Abhishek Pradeep Khannur
  PhD Mathematics, LSGNT, Imperial College, London, UK
- Aniruddha Duary
- Devesh Rajpal
  PhD Mathematics, University of Tennessee, Knoxville, USA
- Lakshay Modi
  PhD Mathematics, University of Kentucky, USA
- Pratik Roy
  PhD Mathematics, Northeastern University, Boston, USA
- Saketh Heramb Narayanan
- Tapas Bhowmik PhD Mathematics, University Of South Carolina, USA

M.Sc. Computer Science

In 2023, 15 students have joined the programme. There are 17 students in the second year of the programme. 17 students who joined the programme in 2021 have completed the programme successfully.

- Ajay Krisshan N K
  Associate Data Scientist, Strand Life Sciences
- Ameya Anand Kamat
  Program Associate, Wells Fargo
- Arghadeep Ghosh
  Model Risk Analyst, JP Morgan & Chase
- Chandradeep Dey
  Project Assistant, Indian Institute of Technology Gandhinagar
- Gangamreddypalli Namratha Reddy
  IP Paris Doctoral School PhD Program, École Polytechnique
- Gurdit Singh Siyan
  Program Associate, Wells Fargo
- Hrishikesh Balakrishnan
  PhD Computer Science, University of Illinois Urbana-Champaign
- Ishan Chakraborty Putta Ramlal Srinivas
  Analyst, Standard Chartered
- Putta Ramlal Srinivas
  Analyst, Standard Chartered
- Riddhiman Dutta Roy
  PhD Computer Science and Engineering, Indian Institute of Science Bangalore
- Sagnik Dasgupta
  Data Engineer, Michelin India Private Limited
- Sagnik Dutta
  PhD, Max Planck Institute
- Samiparna Biswas
  Data Scientist, Michelin India Private Limited
- Shankar Ram Vasudevan
  Program Associate, Wells Fargo

- Shweta Bhardwaj
  Researcher PHD Student, University of Maryland, United States
- Harish Chandramouleeswaran
  PhD Computer Science, Chennai Mathematical Institute
- Tejas Shekhar Bhojraj

M.Sc. Data Science

In 2023, third batch of 55 students joined the programme. There are 45 students in the second year of the programme. 45 students who joined the programme in 2021 have completed the programme successfully.

- Abhishek Mishra
  Data Scientist, Michelin India Private Limited
- Aditya Anandkumar
  Associate Data Scientist, IDFC First Bank
- Agnija Ashrita
  Specialist - Data Science, Michelin India Private Limited
- Aman Kumar
  Associate Data Scientist, IDFC First Bank
- Ananya Sankaranarayanan
  Machine Learning Engineer, PayPal
- Aniket Santra
  Program Associate, Wells Fargo
- Anjali Pugalia
  Quantitative Analyst, Wells Fargo
- Ankush Dey
  Management Trainee, American Express
- Ashutosh Maurya
  Associate Software Engineer, Carelon Global Solutions
- Athul Prakash
  Avik Das Program Associate, Wells Fargo

- Ayush Srivastava
  Analyst, Bank of America
- Deepti Kumawat
  Associate Data Scientist, IDFC First Bank
- Dhruvee Mohan Chauhan
  Program Associate, Wells Fargo
- Dona Ghosh
  Data Scientist, Synergy Marine Group
- Ishan Singh
  Jayasooryan C S Associate, Software Engineering, Carelon Global Solutions
- Krishna Gupta
  Program Associate, Wells Fargo
- Kumar Priyank
  Program Associate, Wells Fargo
- Meghna Mondal
  Analyst - MRM, Bank of America
- Mohammed Hashim M
  Machine Learning Engineer, Michelin India Private Limited
- Moumi Roy
  Program Associate, Wells Fargo
- Naheli Bhattacharya
  Program Associate, Wells Fargo
- Neha
  Data Analyst, American Express
- Nevetha N G
  MGG Analyst, JP Morgan Chase
- Pragya Jaiswal
  Data Science Analyst, Accenture
- Prashant Bajpai
  Machine Learning Engineer, PayPal
- Rajas Shashank Vaidya
  Program Associate - Analytics, Wells Fargo

- Raktim Dey
  Program Associate, Wells Fargo
- Ravilla Bharath Kumar
  ML Engineer, LTIMindtree
- Reewa Malik
  Risk Associate, BNY Mellon
- Rishika Tibrewal
  Machine Learning Engineer, PayPal
- Ritirupa Dey
  Associate Data Scientist, IDFC First Bank
- Rohan Milind Dharmadhikari
  Data Scientist, Kantar Analytics
- Shariul Hasan Hashmi
  Data Scientist, Michelin India Private Limited
- Shramana Guin
  Program Associate - Analytics, Wells Fargo
- Shreyansh Rastogi
  Analyst, Standard Chartered Modelling Analytics Centre
- Shyam Krishna P
  Data Scientist, Accenture
- Sinjini Sinha
  MSc Mathematics, IIT Kanpur
- Soham Biswas
  Data Scientist, Netradyne
- Soham Pyne
  Associate Data Scientist, Carelon Global Solutions
- Srijit Saha
  Program Associate, Wells Fargo
- Sucheta Jhunjhunwala
  Data Analyst, Accenture
- Ujjwal Saxena
  Management Trainee FTE, American Express
- Ved Prakash
  Data Scientist, Michelin India Private Limited

Convocation

The 20th Annual Convocation of CMI was held on 29 July 2023. Degrees were awarded to 114 successful candidates at various levels. Of these, 37 were B.Sc. candidates, 70 were M.Sc. candidates and 5 were a Ph.D. candidates. Prof. Vasudevan Srinivas., Distinguished Professor (Retired), Tata Institute of Fundametal Research, Mumbai was the Chief Guest and delivered the convoation address.

For the B.Sc. programmes, the CMI Gold Medal of Excellence was awarded to Bimit Mandal in Mathematics and Computer Science and Soham Pal in Mathematics and Physics for his outstanding performance at the undergraduate level. For the M.Sc. programmes, the CMI Gold Medal of Excellence was awarded to Aadrita Laha in Mathematics, Prashant Bajpai in Data Science and Hrishikesh Balakrishnan in Computer Science.

12 Student Activities

Undergraduate Internships

- Diptaksho Palit did internship at ENS Paris Saclay under Claire Mathieu, Frederic Magniez on "Approximate Maximum Matching in Sublinear Time" during May - June, 2023
- Ankit Gayen did internship at Indian Institute of Science on "Total Domination, Separated Cluster, CD-Coloring: Algorithms and Hardness" during May - July, 2023
- Chandralekha did internship at Indian Institute of Technology Ropar under Tapas Chatterjee on "Ramanujan graphs" during May - July, 2023
- Dhrubajyoti Ghosh did internship at Max Planck Institute for Informatics, Saarbruecken under Christoph Lenzen on "Efficient Synchronous Counting" during May - July, 2023
- Medha Yelimeli did internship at Australian National University under Vigleik Angeltveit on "Homotopy theory" during May - July, 2023
- Rohit Roy did internship at Universite de Bordeaux under Jean-Francois Marckert on "Study of directed animals and percolation in 2D" during May - July, 2023
- Romit Roy Chowdhury
  - did internship at Indian Institute of Technology Kanpur on "Implementation and Testing of Lock-free Structures for Heterogeneous Execution" during May - July, 2023
  - did internship at Indian Institute of Madras (Online) on "Robustness Verification of Concurrent Libraries under Weak Memory" during June - December, 2023
- Writika Sarkar did internship at Institut de Recherche en Informatique Fondamentale (IRIF), Paris under Matthieu Josuat-Verges on "Parking functions and clusters" during May - July, 2023
- Ishaan Verma did internship at Indian Institute of Technology Madras under Rupesh Nasre on "Extending the OpenCL backend for StarPlat Graph Analytics DSL" during May - October, 2023
- Rajatadri Venkatasubban did internship at Indian Institute of Science under Swarnendu Sil on "Sobolev spaces and elliptic PDE" during June - August, 2023
- Vardhan Kumar Ray did internship at Indian Institute of Technology Indore on "Strengthening of Wilf's Bound on Clique Number" during June - August, 2023

- Shubhendu Prasad Mandal did internship at Appasamy Associates (AlgoLabs) under Kavita Sutar on "Corneal Topography" during June 2023 - February 2024
- Sayandeep Shee did internship at Chennai Mathematical Institute under Krishna Hanumanthu on "Commutative Algebra Reading Project" during December 2023 - January 2024
- Riddhi Ram Sonney did internship at Quantom Research Capital, Noida under Shobhit Agrawal on "Equity Trade Research Analyst" during January - September 2024

Graduate student Internships

- Anuraj Kashyap did internship at French Institute of Pondicherry and Chennai Mathematical Institute under Doris Barboni and Sourish Das on "Classification of grapevine pollen grains into wild and domesticated using CNN" during May - July, 2023
- Aryan Kusre did internship at IIT Kanpur on "Algebraic Circuits: Learning the Inherent Structure" during May - July, 2023
- Chenna Sai Sandeep did internship at Cloudcraftz AI on "Synthetic Data Evaluation Metrics" during May - July, 2023
- Harsh Arora did internship at LTIMindtree under Ashwini Balu on "Coreference Resolution" during May - July, 2023
- Nabin Kumar Sahoo did internship at Inria, Saclay under Frédéric Blanqui on "Generating Dedukti proofs from SMT solver proofs" during May - July, 2023
- Rishi Garg did internship at Bank of New York Mellon under Jonathan Lai on "VaR Statistical Modeling - Corporate Treasury" during May - July, 2023
- Rohan Karthikeyan did internship at Strand Life Sciences under Shanmukh Katragadda on "Benchmarking of Strand NGS CNV Calling" during May - July, 2023
- Rohit Roy did internship at LaBRI, University de Bordeaux on "Study of directed animals in 2D" during May - July, 2023
- Saikat Bera did internship at Shree Cement Pvt Ltd under Aviral Suri on "Analytics driven anomaly detection for transactions to reduce capital expenditures " during May - July, 2023
- Sarvesh Pravin Bhandary did internship at Shree Cement Limited under Rajib Nath on "Dealer segmentation" during May - July, 2023
- Shrinidhi T S did internship at LaBRI, Universite de Bordeaux under Adrian Tanasa and Yvan Le Borgne on "Quantum walks" during May - July, 2023

- Shubhangi Sanyal did internship at American Express under Aditi Wadhwa on "Incremental spend in SBS XSell Customers in leading international markets" during May - July, 2023
- Sneha KK did internship at JPMC under Azim Kachwalla on "MRGR intern" during May - July, 2023
- Sulagna Barat did internship at Synergy Marine Group, Chennai under Rohan Rajesh Sharma on "Ship Management 2.0 - Special project" during May - July, 2023
- Writika Sarkar did internship at IRIF, Paris on "Clusters and parking functions " during May - July, 2023
- Dindi Sivamanoj did internship at Mirrar innovation technologies Pvt Ltd under Murthuja on "Software development department" during May - August, 2023
- Anjan Mondal did internship at Metamation under Wolf Wadehn on "Image Recognition for Nozzle Centering" during May - August, 2023
- Bijayan Ray
  - did internship at Chennai Mathematical Institute on "Reading project in Algebraic geometry" during June - July, 2023
  - did internship at Chennai Mathematical Institute on "Summer Project in Computational Complexity Theory: polynomial identity testing" during June - July, 2023
- Balaji Subramoniam did internship at Chennai Mathematical Institute under Sukhendu Mehrotra on "Reading Project on /infty-Categories" during June - August, 2023
- Anirban Ganguly did internship at Tata Institute of Fundamental Research, Mumbai under Onkar Parrikar on "Quantum Complexity and the Growth of Wigner Negativity" during December 2022 - December 2023
- Shouvik Ghosh did internship at Pexilim on "Webdev" during December 2023 - March 2023

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 2023, Bimit Mandal, Diptaksho Palit, Arindam Bhattacharyya and Rajarshi Ghosh visited the ENS.

Interaction of ENS Graduate Student at CMI under the CMI-ENS Exchange Program

Chennai Mathematical Institute (CMI) has an academic exchange agreement with the École Normale Supérieure (ENS) in Paris, fostering collaborations between students and faculty from both institutions.

As part of this exchange program, Leo Gratien, a master's student in Mathematics at ENS, visited CMI in September 2023 for a duration of six weeks. During his stay, he engaged with the CMI academic community by delivering lectures in number theory and related areas and interacting with students and faculty members. This exchange reflects the ongoing commitment of CMI and ENS to enhancing academic interactions and research collaborations between the two institutions.

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 research projects with the ENS faculty.

13 Undergraduate/Graduate Courses

August–November 2023

Advanced Concurrent Programmig	:	K Narayan Kumar
Algorithmic Coding Theory I	:	Amit Kumar Sinhababu
Algorithmic Coding Theory II	:	Amit Kumar Sinhababu
Applied Data Analytics	:	Y Chandramouli
Advanced Algorithms	:	Prajakta Nimbhorkar
Arithmetic of Elliptic Curves	:	D Sinnou
Algebraic Geometry I	:	Anwesh Ray
Algebraic Graph Theory	:	Sharad Sane
Algebra I	:	Senthamarai Kannan
Algebra III	:	Krishna Hanumanthu
Design & Analysis of Algorithms	:	Philip Geevarghese
Advanced Machine Learning	:	Pranabendu Misra
Analysis I	:	B V Rao
Analysis II	:	R Srinivasan
Algebraic Number Theory	:	Aditya Karnataki
Calculus	:	Sukhendu Mehrotra
Commutative Algebra	:	Clare D'Cruz
Classical Mechanics I	:	K G Arun
Classical Mechanics	:	Bala Sathiapalan
Graduate Complex Analysis	:	Siddhi Pathak
Concurrent Programming (Aug-Sep)	:	K Narayan Kumar
Compact Riemann Surfaces	:	Snehajit Misra
Electrodynamics	:	Amitabh Virmani
English	:	Usha Mahadevan
Environment Course	:	Speaker/Movie
Function Field Arithmetic	:	Anwesh Ray
Foundations of Machine Learning	:	K V Subrahmanyam
Topics in Formal Methods & Machine Learning	:	M K Srivas
Financial Modelling Using Python(Online)	:	Mousum Datta
Fourier Analysis(Aug-Sep)	:	Sundari Maddala
Fourier Analysis II(Oct-Nov)	:	Sundari Maddala
Graduate Algebra I	:	Purusottam Rath/Jayanth Guhan
Graduate Analysis I	:	Sundari Maddala
German I	:	Pavithra Ravishankar
Geometry of Flag Varieties	:	Manoj Kummini
Generalised Linear Models	:	M R Srinivasan
Graduate Topology I	:	Upendra Kulkarni/Suhas B N

Implementation of Functional Programming Languages	:	Madhavan Mukund/S P Suresh
Linear Algebraic Groups	:	Amit Kumar Singh
Low Dimensional Topology	:	P Sankaran
Mathematical Logic	:	M Praveen
Mathematical Methods-Analysis	:	Priyavrat Deshpande
Natural Language Processing	:	Ramseshan Ramachandran
Online Convex Optimization	:	K V Subrahmanyam
Optimization Techniques	:	T Parthasarathy
Parallel Algorithms and Complexity	:	Samir Datta
Proofs and Types	:	S P Suresh
Probability and Statistics with R	:	Rajeeva L Karandikar
Programming & Data Structures with Python	:	Madhavan Mukund
Introduction to Programming(Haskell)	:	S P Suresh
Algorithmic Thinking	:	Partha Mukhopadhyay/Krishna Palem
Quantum Mechanics I	:	G Date
Quantum Mechanics	:	K Narayan
RDBMS-SQL(2 credits)	:	Madahvan Mukund
Regression and Classification	:	Sourish Das
Simulation Techniques	:	Rajeeva Karandikar
Stochastic Processes I(online)	:	S Ramasubramaniam
Statistical Inference I	:	V Swaminathan
Statistical Mechanics	:	V V Sreedhar
Topological Data Analysis	:	Siddharth Pritam
Timed Automata	:	B Srivathsan
Theory of Computation	:	V Arvind
Thermal Physics	:	Alok Laddha
Visualization(2 credits)	:	Sourish Das
Values Through Literature	:	Usha Mahadevan

January–April 2024

Algebraic Methods in Algorithms [AACC]	:	Amit Kumar Sinhababu
Approximation Algorithms	:	Pranabendu Misra
Algebraic Complexity I	:	Amit Sinhababu
Algorithm Design Techniques	:	G Philip
Algebraic Geometry II	:	Bivas Khan/Mohit Upamanyu
Algebra II	:	Upendra Kulkarni
Algebra IV	:	T R Ramadas
Algebra & Computation	:	Amit Kumar Sinhababu/Sumanta Ghosh
Applied Machine Learning(Online)	:	Raghav Kulkarni
Topics in Analytic Number Theory	:	Siddhi Pathak
Advanced Programming	:	Ramaseshan Ramachandran
Commutative Algebra II	:	Clare D'Cruz/Kamalesh Saha
Calculus I	:	Krishna Hanumanthu
Complex Analysis	:	Sundari Maddala
Classical Mechanics II	:	K G Arun
Combinatorial Optimization	:	Prajakta Nimbhorkar
Complexity Theory	:	V Arvind
C*-algebras and Spectral Theorems	:	R Srinivasan
Computer Vision	:	Kavita Sutar
Distributed Computing and Big Data(Online)	:	Venkatesh V
Differential Equations	:	Manoj Kummini
Discrete Mathematics	:	Samir Datta
Data Mining & Machine Learning	:	Madhavan Mukund
Data Privacy, Data Quality(Mar-Apr)	:	Chandramouli Y
Distribution of Primes	:	Purusottam Rath
Economics(online)	:	Malathi Velamuri
Expander Graphs and Applications	:	Partha Mukhopadhyay
Extensive Form Games(Mar-Apr)	:	B Srivathsan
Electrodynamics I	:	Alok Laddha
Graduate Algebra II	:	Aditya Karnataki/Neha Malik
Graduate Analysis II	:	B V Rao
Geometric Class Field Theory	:	Sukhendu Mehrotra
German II	:	Pavithra Ravishankar
General Relativity	:	B Sathiapalan
Graduate Topology II	:	S Senthamarai Kannan/Ankit Rai
GW Group Meetings	:	K G Arun
Intro to Distributed Algorithms(Mar-Apr)	:	Narayan Kumar
Intro to Gen AI(Mar-Apr)	:	Dinesh Krithivasan/Pranabendu Misra

Introduction to Group Representations(Jan-Feb)	:	Upendra Kulkarni
Introduction to Linguistics	:	Usha Mahadevan
Information Theory(online)	:	Arun Padakandla
Introduction to Symmetric Functions	:	P Amrutha
Infinite State Verification	:	Narayan Kumar/Prakash Saivasan
Interactive Theorem Proving with Coq 1(Jan-Feb)	:	S P Suresh
Interactive Theorem Proving with Coq 2(Mar-Apr)	:	S P Suresh
Linear Algebra & its Applications	:	Priyavrat Deshpande
Laboratory	:	K G M Nair
Logic, Automata & Games	:	M Praveen
Linear Algebraic Groups II(Mar-Apr)	:	Amit Kumar Singh
Linear Programming(Jan-Feb)	:	B Srivathsan
Introduction to Manifolds	:	V Balaji
Mathematical Methods	:	Govind Krishnaswami
Multivariate Statistics	:	M R Srinivasan
Optics	:	Amitabh Virmani
Optimization in Industry(Mar-Apr)	:	Abhik Giri
Partial Differential Equations	:	Mythily Ramaswamy
Programming Language Concepts	:	Madhavan Mukund/S P Suresh
Probability Theory	:	Rajeeva Karandikar
Quantum Field Theory	:	K Narayan
Quantum Mechanics II	:	G Date
Reinforcement Learning	:	K V Subrahmanyam
Semisimple Lie Algebras(Mar-Apr)	:	Upendra Kulkarni
Statistical Inference II	:	V Swaminathan
The Art of Short Fiction	:	M Usha
Topology of Algebraic Varieties(2 credits)	:	V Balaji
Text Analytics(2 credits)	:	Ramaseshan Ramachandran
Topology	:	P Sankaran
Topics in Quantum Information Theory	:	H S Mani
Time Series Analysis	:	Sourish Das
Undecibility in Algebra and Topology(Mar-Apr)	:	Siddarth Pritam

14 Special Lectures

- Siddhi Pathak: The sphere packing problem: work of Maryna Viazovska (April 2023).
- Somnath Dake: Torus quotient of Richardson varieties (July 2023).
- Tapen Sinha: The Science of Yoga (August 2023).
- Amrutha P: Cyclic characters of alternating group (September 2023).
- Harish Chandramouleeswaran: Product Structure of Planar Graphs (September 2023).
- B. V. Rao : C R Rao: A glimpse of his life and work (October 2023).
- Jayanth Guhan : Local-global principle for hermitian spaces over semi-global fields. (October 2023).
- K Narayan: de Sitter space, extremal surfaces and time entanglement (November 2023).
- Hitesh Saini: Time Entanglement and Pseudo Entropy (November 2023).
- Gopal Yadav: Multiverse in Karch-Randall Braneworld (November 2023).
- Rajeeva Karandikar: Power and Limitations of Opinion Polls (January 2024).
- Rajdeep Ghosh: Counting extensions of number fields (February 2024).
- Ankit Rai: Geometric realization of perverse filtration (March 2024).
- V. Balaji: Development of moduli of principal bundles and representation theory (March 2024).
- Pankaj Saini: Testing general theory of relativity with gravitational waves from binary black holes in eccentric orbits (March 2024).
- Plawan Das: Nonexistence and Finiteness Theorems for Certain Abelian Varieties (March 2024).

15 Data Science Colloquium Series

- Ramesh Babu and Rajesh Anantharaman, Enterprise analytics and data science division, Wells Fargo, Bangalore: Applications of machine learning in banking (April 2023)
- Debajyoti Ghosh, BML Munjal University: Opportunistic problems along the shortest path on road networks (June 2023)
- Prasad Nanisetty, Partner, Nile Capital Group, California, USA: What is Risk?(August 2023)
- Shambhavi Suryanarayanan, Princeton University, USA: Johnson-Lindenstrauss Lemma and its Applications (August 2023)
- Chandra Sekhar, Samsung: Where the deep learning model is looking into and why the decision has been taken with respect to Time series data? (August 2023)
- Abhik Giri, Western Digital, Bengaluru: Operations Research - An Industry Perspective (September 2023)
- Mohammad Arshad Rahaman, IIT Kanupur: Flexible Bayesian Quantile Analysis of Residential Rental Rates (September 2023)
- Abhishek Panda (ML research engineer), Tushar Vaidya (Sr. research scientist), Jio - AI Center for Excellence: Introduction to visual SLAM (October 2023)
- Ben Dias, EasyJet airlines, UK: Applications of Data Science and Analytics in the Airline Industry (October 2023)
- Dinesh Krithivasan, Kantar: A Suite of AI Applications for measuring Advertising Effectiveness (November 2023)
- Mayank Kumari and Pranshu Nagar, Wells Fargo, Bengaluru: Product Management Practice (November 2023)
- Sudhir Kumar, Coriolis Technologies, Pune: The Age of AI (November 2023)
- Anirban Dutta, DWS, Pune: Model Risk: The perils of quantification (January 2024)
- Miheer Dewaskar, Duke University, USA: When to use Linear Regression? Model assumptions, diagnostics, and robustness (February 2024)
- Indranil Mukhopadhyay, ISI Kolkata : PseudoGA: a pseudo time reconstruction method using single-cell RNA-seq data (February 2024)
- Govind Narayanan, HSBC, Bengaluru: Derivative pricing from a quants perspective (March 2024)

- N. Rao Chaganty, Old Dominion University: Range of correlation between two random quantities (March 2024)

16 Conferences/Workshops/Schools

Sl. No.	Date of the Programme	Name of the Programme	Description
1	07-13, May, 2023	CMI - Raising a Mathematician - Training Program	The 10th RAM TP collaborated with Chennai Mathematical Institute, offering participants a unique learning experience and opportunities to interact with experts from academia and industry.
2	16-29, May, 2023	Epsilon	Epsilon India is a summer camp inspired by the original Epsilon Camp in the USA, designed to provide young students with a suitable mathematics exposure.
3	22 May - 03 June, 2023	NCM Workshop - AIS	Aimed at early Ph.D. students in algebraic geometry, this workshop covered topics like divisors, cohomology, rational curves, and the minimal model program.
4	23 May, 2023	Research Science Initiative Programme	An annual research program by PSBB in collaboration with IIT Madras, Sastra University, and CMI, offering 50 students intensive mentorship.
5	06-12, June, 2023	International Olympiad in Informatics Training Camp	An annual research program by PSBB in collaboration with IIT Madras, Sastra University, and CMI, offering 50 students intensive mentorship.
6	12-13, June, 2023	IOITC 2023 Workshop on Theoretical Computer Science	Covered NP-completeness, Hilbert's tenth problem, SAT solvers, polynomial identity testing, and computational problems.

Sl. No.	Date of the Programme	Name of the Programme	Description
7	03-08, July, 2023	Understanding and Modeling Data from EEG	A six-day workshop on EEG analysis, including pre-processing, time-frequency analysis, connectivity estimation, and hands-on EEG acquisition.
8	10-15, July, 2023	NCM Program: Cohen Macaulay Simplicial Complexes in Graph Theory	Focused on topological combinatorics, combinatorial commutative algebra, and various graph-related simplicial complexes.
9	14, July, 2023	CMI-AlgoLabs AI-ML Summit 2023	A forum on Generative AI featuring keynote speakers, industry representatives, and discussions on quantum computing and AI solutions.
10	14-15, July, 2023	CMI-National Academy of Sciences Programme	Talks on neuroscience, chemistry, AI, and gravitational waves by renowned researchers.
11	10 August - 05 September, 2023	Prof. Patrick Polo's Lecture Series	Focused on SGA3, covering reductive groups, maximal tori, and the classification of forms of a split reductive group.
12	07-10, September, 2023	Sage Days 122	A workshop on SageMath, an open-source mathematics software integrating various computational tools.
13	14-15, September, 2023	Young Researchers' Gravity Meeting	A platform for students and postdocs in classical and quantum gravity to present their research.
14	01, 02, 04 November, 2023	Amplitudes@Chennai	Focused on amplitude methods, supersymmetry, Compton amplitudes, and quantum field theory.

Sl. No.	Date of the Programme	Name of the Programme	Description
15	04-09, December, 2023	NCM Workshop - Hida Theory and Iwasawa Main Conjecture over Q	Covered algebraic number theory, Iwasawa theory, and p-adic L-functions for Ph.D. and M.Sc. students.
16	07-13, December, 2023	Prof. Sandor Kovacs's Lecture Series	Lectures on the moduli theory of higher-dimensional varieties, covering stable singularities and moduli of pairs.
17	18-23, December, 2023	NCM Workshop - Representation Theory and Syzygies	Introduced representation-theoretic methods in studying syzygies, including Kempf-Lascoux-Weyman techniques.
18	19, December 2023	Physics Day	A dedicated talk for students in grades VI-VIII to introduce physics concepts in an engaging manner.
19	19-23, December, 2023	Statistical Methods in Finance 2023	A workshop hosted by CMI, ISI, and ISBIS to engage researchers in statistical methods for finance.
20	21-31, December, 2023	European Girls' Mathematical Olympiad Training Camp 2023	A training camp by HBCSE preparing students for the European Girls' Mathematical Olympiad.
21	08-12, January, 2024	BIRS-CMI Workshop	Organized by Banff International Research Station (BIRS) and CMI, focusing on mathematical research themes.

Sl. No.	Date of the Programme	Name of the Programme	Description
22	22-26, January, 2024	Quantum Computing Semester, Boot Camp	Part of a quantum computing semester at CMI, featuring workshops on central areas of quantum computing.
23	05-09, February, 2024	Applied Topology and Complex Networks Workshop	Covered the Borsuk-Ulam theorem and complex networks through lectures on geometry and combinatorics.
24	11-15, February, 2024	Quantum Computing Semester, Quantum Computing and Algorithms	A thematic workshop focusing on algorithms in quantum computing with hands-on coding sessions.
25	04-08, March, 2024	Quantum Computing Semester, Quantum Information	A workshop in the quantum computing semester covering theoretical and practical aspects of quantum information.
26	18-19, March, 2024	International Conference on Game Theory and Optimization	Explored strategic interactions and optimization methods, bringing together experts in the field.

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:

- In collaboration with the Centre for Creative Writing and Translation, Sai University, conducted an online talk "The Fragments We Hold: A Songwriter's Notes on Process" by Akhila Ramnarayan in April 2023.
- Tara Gandhi gave Arts Initiative talk on "Salim Ali and Wildlife Conservation in India" in August 2023.
- Ashmitha Athreya gave Arts Initiative talk on "Heritage and You" in September 2023.
- Oindrila Raychaudhuri gave Arts Initiative talk on "From Artists Studio to Science Institute: The Story of the TIFR Art Collection" in October 2023.
- Benoy K Behl gave Arts Initiative talk on "Tamil Nadu: Land of Temples': Online Talk and Film Screening" in October 2023.
- Arundhathi Subramaniam gave Arts Initiative talk on"The Sacred Feminine: Women Who Wear Only Themselves" in February 2024.
- Perumal Murugan and Nandini Krishnan gave Arts Initiative talk on"Estuary: A Fictional Commentary on Educational Spaces" in February 2024.

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 two writers in residence, Ranbir Sidhu and Dinesh Kafle .

Ranbir Sidhu is an Indian-American writer and novelist. He holds an MFA in creative writing from the University of Massachusetts, Amherst. Sidhu has taught creative writing at various institutions, including New York University and the University of Massachusetts. His fiction and nonfiction have appeared in numerous publications, including The New Yorker, The Nation and The Missouri Review. His debut novel, Deep Singh Blue was published in 2015 and won the PEN/Hemingway Award in 2016.

Dinesh Kafle is a writer-in-residence at the Chennai Mathematical Institute. He is an assistant professor at Kathmandu University and an opinion editor at the Kathmandu Post. At CMI, he is translating Bisheshwar Prasad Koirala's short stories from Nepali to English and working on the first draft of his novel.

18 Conferences, Visits and External Lectures

Aditya Chandrashekhar Karnataki

- Visited IISc in May-June 2023.
- Visited International Center for Theoretical Sciences in September 2023.
- Visited Korea Institute for Advanced Study in July-August 2023 and gave talks.
- Visited RMS annual conference at IIT Guwahati in December 2023 and gave talks.

Aditya Chandrashekhar Karnataki

- Visited Harish-Chandra Research Institute, Prayagraj, July 2023.
- Gave a talk on Stability of kernel bundles over certain reducible nodal curves at HRI Allahabad, July 2023.

C. Aiswarya

- Visited Ecole Normale Superieure Paris - Saclay in April-May 2023 and gave talks.
- Visited Max Plank Institute of Software Systems Kaiserslautern in May 2023 and gave talks.
- Visited Paris Cite University in May 2023 and gave talks.
- Visited Max-Planck Insitute of Software Systems in September-October 2023 and gave talks.
- Visited Max-Plank Institute for Software Systems, Kaiserslautern, germany in September 1 - November 10, 2023 and gave talks.
- Visited Indian Institute of Technology, Mumbai in November 16-December 16, 2023.

Amrutha P

- Visited International Center for Theoretical Sciences in November 2023 and gave talks.
- Attened Sage Days 122 at Chennai Mathematical Institute in September 2023 and gave talks.
- Attened Indian Women and Mathematics (IWM) Annual Conference at IISER Bhopal in July 2023.

- Attened First Meru Combinatorics Conference 2023 at Pondicherry University in May 2023.
- Visited Prof. T.Geetha at Indian Institute of Science Education and Research Thiruvananthapuram, May 2023 and gave talks.
- Attened International Women in Mathematics Day at IMSc in May 2024.
- Attened KSCSTE SPEED Programme for Pratibha Scholars, DREAM 2024 at DUK in May 2024.
- Attened World of Group Craft III in September 2023.
- Attened Groups Representations Conference held at IIT Bombay in July 2023.

Anwesh Ray

- Visited ICTS in first 2 weeks of September and gave talks.
- Attended Alberta Number theory days at Banff, Canada in March 2024.
- Visted University of Waterloo in November 2023 and gave talks.
- Visited University of Calgary, Alberta, Canada in March 2023.
- Visited Alberta number theory days, Banff, Alberta, Canada in March 2023.
- Visited Kuyushu University, Fukuoka, Japan in March 2023 and gave talks.
- Visited Tata Institute of fundamental research in February 2024 and gave talks.

Arkadev Ghosh

- Visited NISER, Bhubaneswar in February 26-March 5, 2024.
- Visited Indian Institute of Technology, Madras in December 11-24, 2023.

Arnab Sur

- Visited University of Bordeaux in June 26 to 30, 2023.
- Visited Aix-Marseille University in June 3 to July 13, 2023.

Ankit Rai

- Attended Workshop on Representation theory of Real Lie groups and Automorphic forms in October 2023.
- Attended Conference on Harish-Chandra's Representation theory and Harmonic analysis in October 2023.
- Attended Geometric realizations of perverse filtration at IMSc in November 2023 and gave talks.
- Attended Cohomology of arithmetic groups at Harish-Chandra lecture series in May 2024 and gave talks.

Arvind Kumar

- Visited Vietnam Academy of Mathematical Sciences in June 18 to 23 , 2023 and gave talks.
- Visited University of Torino and Polytechnico di Torino in May, 2023 and gave talks.
- Visited International Centre of Theoretical Physics Trieste Italy in May 1 to 12, 2023 and gave talks.
- Visited Institute of Mathematics Hanoi, Vietnam in June 23 to 29, 2023 and gave talks.
- Visited University of Messina, Italy in May 24 to 31, 2023.
- Visited University of Genova, Italy in May 13 to 20, 2023.

Amitabh Virmani

- Visited St. Dominic's College Kanjirapally, Kerala in May 2023 and gave talks.
- Visited HBCSE, Mumbai in April 2023 and gave talks.
- Visited NISER, Bhubaneswar in April 2023 and gave talks.
- Visited RRI Bangalore in September 2023 and gave talks.
- Visited TIFR Mumbai in July 2023 and gave talks.
- Visited Vishwa Bharthi University in March 2024 and gave talks.
- Visited IIT Kharagpur in February 2024 and gave talks.
- Visited IACS Kolkata in February 2024 and gave talks.

Clare D'cruz

- Visited IIT-Mombay in June 5-15, 2023.
- Visited ICTP in May 2 - 12, 2023 and gave talks.
- Visited IIT-Kharagpur in July 2 - July 9, 2023.
- Visited RMS2023 at IIT Guwhati in December 22 to 24, 2023 and gave talks.
- Visited IIT Dharwad in September 9 to 10, 2023.
- Visited ICMC-2024 at Kalasalingam Academy of Research and Education (KARE) in January 4, 2024 and gave talks.

Gopal Yadav

- Visited Isaac Newton Institute for Mathematical Sciences in November 27-December 1, 2023.
- Attended Swansea University in December 2023 and gave talks.
- Attended Indian Institute of Technology Bombay in December 2023 and gave talks.
- Attened Strings 2024, CERN, Switzerland in June 2024 and gave talks.
- Attened Swansea University, Swansea, United Kingdom in December 2023.

Govind Krishnaswami

- Visited Science Academies' Refresher Course on Theoretical Physics, Bishop Moore College, Mavelikara, Kerala in 16-25 June, 2023 and gave talks.
- Visited International Conference on Complexity and Nonlinear Dynamics in STEM, IIT Hyderabad in 5-7 June, 2023 and gave talks.
- Visited Government Brennen College, Thalassery, Kerala in September 12-16, 2023 and gave talks.
- Visited IGCAR, Kalpakkam, Tamil Nadu in 4 July 2023 and gave talks.
- Visited Himalaya Senapati at HSBC Bengaluru in December 2023.
- Visited T R Vishnu at Raman Research Institute Bengaluru in December 2023.
- gave a talk on "Integrability and dynamics of the Rajeev-Ranken model" Meeting to celebrate 92nd birth anniversary of Prof C S Seshadri at CMI, March 2024.

Hitesh Saini

- Visited IIT Mandi in July 2023.
- Visited IIT Mandi in July, 2023.
- Visited IIT Bombay in December 10-16, 2023.
- Visited IIT Mandi in July, 2023 .
- Visited IIT Bombay in December 10-16, 2023.

K. Narayan Kumar

- Visited ENS Paris Saclay, Paris, France in May-June, 2023.
- Visited UM6P Benguerir, Morocco in February 2024.
- Visited IIT Delhi in March 2024.

K G Arun

- Attended Astronomical Society of India Meeting, IISc Bangalore in January 2024.
- Attended LIGO-India workshop, ICTS-TIFR in November 2023.
- Attened Electromagnetic Transient Workshop, IIT Bombay in March 2023.

Madhavan Mukund

- Visited FM Update Meet 2023, IIT Goa in June-July 2023 and gave talks.
- Visited ACTS 2023, ENS Paris-Saclay, France in May-June 2023.
- Visited SRM University, Chennai in May 2023 and gave talks.
- Visited Bebras Task Workshop 2023, Hurghada, Egypt in May 2023.
- Visited SSN College of Engineering, Chennai in April 2023 and gave talks.
- Visited Pfizer AI-ML Summit, IIT Madras in 15 September and gave talks.
- Visited Edvention 2023, Coimbatore in 9 September and gave talks.
- Visited Computational Thinking in Schools, Pune in 7-8 July.
- Visited Formal Methods Update Meeting, IIT Goa in 29 June-1 July and gave talks.

Madhu Mishra

- Visited APCTP Pohang, Korea in January 2-8 to January 18-22, 2024 and gave talks.
- Visited Institute of Basic Physics, Daejeon, Korea in January 8-17, 2024.
- Visited APCTP in July 7- 12, 2023 and gave talks.
- Visited Raman Research Institute in September 4-9, 2032.

Sukhendu Mehrotra

- Visited Simons Center for Geometry and Physics in Last week of April, 2023.
- Visited TIFR, Mumbai in Last week of March, 2024.

Usha Mahadevan

- Visited Airports authority of India in 23 August 2023 and gave talks.
- Visited Airports authority of India in 6 October 2023 and gave talks.
- Visited Airports authority of India in 13 March 2024 and gave talks.

K. Narayan

- Visited String Group, U. Kentucky, USA in July 30-August 3, 2023 and gave talks.
- Visited Strings 2023 conference, Perimeter Institute, Canada in July 23 - 29, 2023.
- Visited Indian Strings Meeting ISM2023 IIT Bombay in December 2023.
- Visited Chennai Strings Meeting IMSc in November 2023 and gave talks.
- Visited "Observable algebras in field theory and gravity" conference, IIT Mandi. in 16-17 February, 2024 and gave talks.

Nirmal Kotal

- Visited University of Genoa, Italy in 15-19 May 2023.
- Visited International Centre for Theoretical Physics in 2-12 May 2023 and gave talks.
- Visited Instituto de Matemáticas de la Universidad de Sevilla (IMUS), Spain in January-2024 and gave talks.

- Visited Universitat Politècnica de Catalunya (UPC) Barcelona, Spain in January-2024.
- Visited Stockholm University, Sweden in January-2024 and gave talks.
- Visited University of Sheffield, UK in February-2024 and gave talks.

Prajakta Nimbhorkar

- Visited Max Plank institute of informatics, Saarbrucken, Germany in September 25-30 and gave talks.
- Visited NISER Bhubaneswar in July 25-27 and gave talks.
- Invited talk at workshop on Recent Trends in Algorithms at NISER Bhubaneswar in July 2023.
- Invited talk at workshop on Algorithmic Fairness at IIIT Hyderabad in December 2023.
- Invited talk at 20th Annual Conference of the Academy of Discrete Mathematics and Applications and International Conference on Discrete Mathematics (ADMA-ICDM 2024
- Lectured on Raising a Mathematician Training Program at CIRS, Coimbatore.
- Lectured on Research Science Initiative - Chennai (RSIC).

M Praveen

- Lectured on the usage of Mathematical Principles and Techniques in Computer Science, in Nrupathunga University, Bangalore on October 2023.
- Visited Max Plank institute of informatics, Saarbrucken, Germany in September 25-30 and gave talks.
- Visited NISER Bhubaneswar in July 25-27, 2023 and gave talks.

Rajeeva L. Karandikar

- Visited Aziz Premji University in August 2023 and gave talks.
- Visited IIT, Inodre in August 2023 and gave talks.
- Visited IIM, Indore in August 2023 and gave talks.
- Visited Shiv Nadar University, Delhi NCR in October 2023 and gave talks.

Siddhi Sudhir Pathak

- Visited IISER Tirupati in September 21-22, 2023.
- Visited IISER Tirupati in September 2023.
- Visited IIT Dharwad in December 2023.
- Visited Northwestern University in October 2023.
- Visited University of South Alabama in October 2023 and gave talks.
- Visited IISc Bengaluru in March 14-15 and gave talks.
- Number Theory Seminar, IISc Bengaluru, March 2024.
- General audience lecture on account of Mathematics day, DG Vaishnav College, December 2023.

Sourish Das

- StatFin23 workshop
- Visited Pune University in December 2023 and gave talks.

Vishwa Prakash H V

- Visited University of Tokyo in June 2023 and gave talks.
- Visited IIT Delhi in April 2023 and gave talks.
- Visited University of Tokyo in May 2023 and gave talks.

19 Other Professional Activities

Amitabh Virmani

- "Trusted reviewer" recognition from IOP Publishing for my work with the journal Classical and Quantum Gravity, September 2023.
- Member Editorial board of "General Relativity and Gravitation" (GRG) published by Springer International Publishing AG.
- Pre-ISM discussion meeting at TIFR, Mumbai, December 2023
- Indian Strings Meeting, IIT Bombay, Mumbai, December 2023
- Lectures at "Numerical and Analytical Relativity" workshop at Indian Institute of Information Technology, Allahabad, March 2024
- Current Topics in String Theory and Cosmology, NISER Bhubaneswar, April 2023
- Resource person for Science Academies Refresher Course on "Gravitation and Cosmology" [18 hours], Kanjirappally, Kerala, May 2023.

Amrutha P

- Introduction to Symmetric Functions - Spring 2024

Aditya Chandrashekhar Karnataki

- Associate Director of PROMYS India 2023, a mathcamp held in May-June 2023
- Taught a session of Math Circles India
- Attended a Curriculum Area Group discussion meeting for NCERT syllabus preparation
- Invited to participate as "Special Invitee" in the newly formed Curricular Area Group on Mathematics, tasked with developing the new national mathematics syllabus, textbooks, and other teaching materials
- Organised "Sage Days 122" conference at Chennai Mathematical Institute
- Organised an NCM workshop on Hide Theory and Iwasawa Main Conjecture over Q

C. Aiswarya

- Program Committee of FSTTCS
- Co-organizer of the workshop on Automata, Concurrency and Timed Systems (ACTS 2023)
- Executive committee member of Association of Logic in India (ALI)
- Invited professor at ENS Paris-Saclay for 2 months
- on Sabbatical leave
- Program committee member of the international conference on concurrency theory (CONCUR 2023)

Amit Kumar Sinhababu

- Gave a talk to the IOI training camp participants.
- gave CMI NASI outreach talk

Clare D'cruz

- Editor of Mathematics student and Indian Journal of Pure and Applied Algebra
- Editorial board of Indian Journal of Pure and Applied mathematics
- Reviewed thesis
- Wrote Math Reviews and review of Math Z.
- Wrote review forMathematische Zeitschrift

Dimple

- Conducted an outreach activity for school students to make telescopes at CMI on 19th December 2023
- Defended my thesis
- Delivered an invited talk at Calicut University Uni
- Presented a poster at ASI-2024

- Presented a talk at CMI on "Imaging and photometry in Astronomy" on 27 December 2023
- Reviewer for a paper in Mapana Journals

Govind Krishnaswami

- writing a book on classical mechanics
- Serving on doctoral committees for research scholars at BARC Mumbai, IISER-Pune and SASTRA University, Thanjavur.

H. S. Mani

- 2 day programme for school children in july
- Attended a three day annual session of NASI held at BARC on December 2-5, 2023.
- Did a programme for school children on December 19th Telescope making
- Building radio telescope at N.P.S school
- Particapted in selection of faculty at benares hindu university on 15-16 February 2024.
- Planning for School Children's out reach

K G Arun

- Invited panelist at GW-EM-Nu meeting at TIFR
- Invited talk at the National Physicists Conclave at SRM Institute of Science and Technology
- SOC of GR24
- Contribution to the Science Case Studies of Next-Generation GW detectors white paper
- Invited chair of the panel on testing gr in the LIGO science workshop at ICTS
- Invited talk at the ASI meeting in IISc Bangalore and chaired a plenary session.
- Invited talk in the InPTA meeting at IMsc
- Member of the SOC of GR24
- Organized Young gravity researchers meeting at CMI

- PhD examiner for IISER Kolkata
- Virtual colloquium at Sai university for undergrads
- Decadal Vision Document of Astronomical Society of India, Gravity Chapter
- Member, ISRO Space Science Roadmap team, Gravity and Cosmology.
- Member of the team tasked by LIGO Scientific Collaboration to set up the International Gravitational Wave Network.

Krishna Hanumanthu

- Gave a talk on "Introduction to Algebraic Geometry, via Nagata Conjecture" at VIT, Chennai, February 12, 2024
- Gave a talk on "Seshadri constants on blow-ups of Hirzebruch surfaces" at Bundles 2024 conference, TIFR Mumbai, March 27, 2024
- Lectured on Structure Theorem for finitely generated modules over Euclidean domains at Mathematics Training and Talent Search (MTTS) programme, June 2023, IIT Madras
- Lectured on linear algebra (online) at Vellore Institute of Technology, April 12, 2023
- Lectured on straight lines, conic sections and 3-dimensional geometry at Workshop on Mathematics for Teachers of 11th and 12th standards, Delhi Public Schools on May 29, 2023 at Human Resource Development Centre, Delhi Public School, Greater Noida
- Organized and lectured in "Advanced Instructional School" on Birational Geometry, conducted at CMI, May 22 - June 3, 2023
- Lectured on Algebra at CMI-NASI Third Winter Training Programme in Mathematics on December 20, 2023 at University of Madras, Chennai.

Krishna Menon P

- attended NCM workshop Cohen-Macaulay simplicial complexes in graph theory held at CMI
- attended Sage Days held at CMI
- attended and gave a contributed talk at Meru Combinatorics Conference 2023
- attended and presented a contributed talk at the International Conference on Enumerative Combinatorics and Applications 2023 held virtually

- attended and presented two posters at Permutation Patterns 2023 in Dijon, France

K.V. Subrahmanyam

- Conducted a workshop at CMI on Introduction to AI and ML, for 25 students and faculty members from BVRIT Hyderabad during August 2-6, 2023.
- I was a resource person for the Epsilon camp conducted by RAM-TP at CMI for school children during the month of May.
- Gave an online talk at the Institute of Mathematics, Prague on recent work in GCT
- Instructor at Epsilon India 2023
- Organized and attended three weeks of the quantum semester
- Visited BV Raju Womens college, Hyderabad and gave two talks, P vs NP, An introduction to stochastic gradient descent

Plawan Das

- Organized IOI Training Camp 2023 at CMI, June 2023
- Outreach talk, CMI-NASI lectures, July 2023
- Team Leader, IOI 2023, Hungary, August - September 2023

Madhu Mishra

- Gave a talk at young gravity conference in CMI.
- Gave lecture in refreshers course on general relativity and cosmology
- Gave lectures on general relativity at refreshers course
- Gave my thesis defence
- Gave poster presentation at auantum black hole conference at APCTP
- Gave two talks at APCTP strings seminar
- Participated in academic evaluation of asian physics olympiad 2022-23

Sukhendu Mehrotra

- Gave 4 lectures on NCM workshop on birational geometry at CMI

- Referee for IPJA
- Referee for Journal of Algebra

Usha Mahadevan

- Discussing books at the book clubs
- Helping students to stage plays
- Learning Tiruppavai, the devotional songs of Andal
- Learning the devotional songs of Tirumangai Alwar
- Attending book club meetings
- Attending satsang meetings organised by Sri Aurobindo Society
- Giving online talks on Sri Aurobindo at the meetings of Sri Aurobindo Society
- Learning Nalayira divya prabandam
- Learning the devotional songs of Thirimangai azhwar
- Participating and reviewing books for reader's forum
- Participating in book club
- Studying the different classical dance forms in India
- Teaching Tamizh to non Tamizhs

M. Praveen

- Technical consultancy project for formally verifying the safety of pipelined Moonshot consensus protocol.

Parameswaran Sankaran

- Attended David Hilbert colloquium on "Free groups" at Kerala School of Mathematics, Kozhikode in January 2024 and gave talks.
- Attended Prof. T. Thrivikraman Endowment Lecture on "Cantor set and some wild 3-manifolds" at CUSAT, Cochin in October 2024 and gave talks.
- Attended Refresher Course in Mathematics, Ramanujan Institute, University of Madras in November 2023 and gave talks.

- Lectured on Topology at the Refresher course in Mathematics at Pondicherry University in October 2023.

Priyavrat C Deshpande

- Co-organized a workshop on applied topology and complex networks
- Organized Madhava mathematics compitition in January 2024.
- Organized NCM workshop from 10 - 15 July, titled Cohen-Macualay complexes in Graph Theory
- organized four Maths Circle India sessions
- Organized FC Kohli Center funded workshop titled "Applied topology and complex networks" in February 2024 in CMI.

Plawan Das

- Academic visit to Prof. Fransesc Fite, Universitat de Barcelona, Spain in June, 2024.
- "On a Uniform Version of the Shafarevich Conjecture" in Workshop and Conference on Rational Points on Curves, International Centre for Theoretical Sciences (ICTS) in Bengaluru, 2023.
- "Nonexistence and Finiteness Theorems for Certain Abelian Varieties" at CMI Number Theory Seminar in March 2024.

Priyavrat C Deshpande

- Co-organized a workshop on applied topology and complex networks
- Organized Madhava mathematics compitition in January 2024.
- Organized NCM workshop from 10 to 15 July, 2023 titled Cohen-Macualay complexes in Graph Theory
- Organized four Maths Circle India sessions
- Organized FC Kohli Center funded workshop titled "Applied topology and complex networks" in February 2024 in CMI.

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

- Attened Program committee member for IJCAI 2024 (AI for Social Good track, and Doctoral Consortium), Reviewed papers for Algorithmica Journal, and conferences WG 2024.

Purusottam Rath

- Taught a core course on MSc Complex Analysis
- Teaching a core course

Rajeeva L. Karandikar

- As chairperson, National Statistical Commission, I am invited to speak at National statistics day in Delhi on 29 June by Ministry of Statistics, GOI
- I am the keynote speaker at Statistics Day Celebrations by RBI (Reserve Bank of India) in Mumbai on 30 June 2023

Samir Datta

- Attended MFCS 2023 at Bordeaux
- Hosted research visitors from RU Bochum

Siddhi Sudhir Pathak

- Acted as a coordinator for AOWM activities
- Coordinator for BIRS-CMI Workshop
- Lectured in the INMOTC-Chennai
- Lectured on Linear Algebra in STP-RIASM, Univ. of Madras

- Local organiser for the BIRS-CMI Workshop - New directions in Rational Points
- Mentored a summer student
- Outreach: Talk at DG Vaishnav College on Mathematics Day
- Outreach: Talk to school students under CMI-NASI in December 2023
- Referee for IJNT, IJPA, PMS
- Reviewed papers for MathSciNet
- Reviewer for Math Reviews

Sourish Das

- Co-authored and published a Book on "Computational Finance with R" by Springer
- Committee Service for National Statistics Office, GOI
- Organised Refresher Course work for College Teachers on Statistics and Computation
- AE of Statistics and Applications.
- Associate Editor of Sankhya-B

Suhas B N

- "The stability of kernel bundles over chain-like curves" at Indian Institute of Technology Palakkad, October 2023
- "Hilbert's Nullstellensatz" at the National Seminar on Commutative Algebra held at Maharaja's College, Ernakulam, October 2023.

R. Srinivasan

- Teaching a course on "Quantum Gaussian states"
- Teaching Analysis II to B.Sc II year.
- Gave an optional course "Spectral theorems and C* $-$ $algebras January - April$, 2024.

M Sundari

- Attended biennial conferences Discussion Meetings on Har- monic Analysis(DMHA).

- Attended and chaired a session in the recent 18th DMHA at IIT Guwahati in December 2023.
- Attended Attended the RMS annual conference held at IIT Guwahati in December 2023.
- Attended "WoNiMS (Women of Nepal in Mathematical Sciences) Annual Conference 2023" in November 2023 at Tribhuvan University, Kirtipur, Kathmandu, Nepal.

V. Swaminathan

- Assisted in grading the Data Science entrance exam papers at CMI
- Delivered 3 lectures in "Statistics and Computation Refresher Workshop 2023" at CMI

20 Visitors

- Sreejith AV, Indian Institute of Technology Goa (April 2023).
- Kajal Singh, Harish-Chandra Research Institute, Allahabad (June 2023).
- Peter Wong, Bates College, Lewiston, Maine, United States of America (July 2023).
- A.J. Parameswaran, Tata Institute of Fundamental Research, Mumbai (July 2023).
- T. Mubeena, Calicut University (July 2023).
- Viren Murthy, University of Wisconsin-Madison (August 2023).
- Sayani Bera, Indian Association for the Cultivation of Science. gave talk on "Fatou-Bieberbach domains and attracting basins" (August 2023).
- Patrick Polo, Institut de Mathématiques, Université Pierre et Marie Curie, Paris gave talk on "A probabilistic proof of two combinatorial identities" (September 2023).
- Parvez Rasul, IIT Bombay gave talk on "Irreduciblity of some nested Hilbert schemes" (September 2023).
- Xavier Caruso, CNRS, University of Bordeaux gave talk on "On algebraicity of power series in positive characteristic" (September 2023).
- Abhay Ashtekar, Pennsylvanuia State University gave talk on "The Enigma of black hole horizons" (September 2023).
- Vaishnavi Sundararajan, IIT Delhi (September 2023).
- Anirban Chakraborti, Jwaharlal Nehru University (JNU) (September 2023).
- Suvikranth Gera, BITS, Goa gave talk on "Black holes and their QNMs in degenerate EGB gravity" (October 2023).
- Divesh Aggarwal, National University of Singapore gave talk on "Fine-grained Complexity (of Lattice Problems)" (October 2023).
- Umang Mathur, National University of Singapore gave talk on "Exposing Concurrency Bugs from their Hiding Places" (October 2023).
- Shaunak Deo, IISc Bangalore gave talk on "The Eisenstein ideal of weight k and ranks of Hecke algebras" (October 2023).
- Leo Gratien, ENS, Paris gave talk on "On the finiteness of geometric monodromy in l-adic Laurent series" (October 2023).

- Sreerup Raychaudhuri, TIFR Mumbai (October 2023).
- Suraj Hegde, Technical University, Dresden, Germany (October 2023).
- Ashwin Deopurkar, Gothenburg gave talk on "Weil pairing on twisted curves" (November 2023).
- Nishant Chandgotia, TIFR-CAM Bangalore gave talk on "The Dimer Model in 3 dimensions" (November 2023).
- Vishnu Jejjala, U of Wits, South Africa gave talk on "Approximate Ricci-flat metrics on Calabi–Yau geometries" (November 2023).
- Haripada Sau, IISER Pune gave talk on "Certain affine varieties as a spectral set" (November 2023).
- Ratna Pal, IISER Mohali gave talk on "Henon maps, short $\mathbb{C}^2$ and beyond" (November 2023).
- Subhodip Bandyopadhyay, NISER Bhubaneshwar (November 2023).
- Sudeep Kanav, LMU Munich, Germany (November 2023).
- Pinakinath Saha, IISc, Bangalore (December 2023).
- Sudhir Kumar, Coriolis gave talk on "The Age of AI" (November 2023).
- Mahir Bilen Can, Tulane University gave talk on "Symmetric spaces and Hessenberg varieties" (November 2023).
- Nils Vortmeier , Ruhr University Bochum (December 2023).
- Felix Tschirbs, Ruhr University Bochum (December 2023).
- Pavithran Iyer, Xanadu Quantum Technologies, Canada gave talk on "Quantum error correction: evaluating theoretical guarantees on experimental hardware" (December 2023).
- Gopinath Mishra , National University of Singapore gave talk on "On Coloring problems in Congested Clique and MP" (December 2023).
- Indranil Biswas, Shiv Nadar University (December 2023).
- Abhishek Mohapatra, Technical University, Munich, Germany gave talk on "Born-Oppenheimer Effective Theory for Exotic Quarkonium Hybrids (Exotic XYZ mesons)" (December 2023).
- Saipriya Dubey, IIT Dharwad (December 2023).

- A. J. Parameswaran, TIFR, Mumbai (December 2023).
- Dr. Patricia Bouyer-Decitre, LMF, ENS Paris-Saclay, France (December 2023).
- Ngo Viet Trung, Institute of Mathematics, Hanoi gave talk on "Depth functions of homogeneous ideals" (December 2023).
- Siddharth Mitra, Yale University gave talk on "On the Convergence of Mutual Information for (Strongly) Log-concave Sampling" (December 2023).
- Alexei Skorobogatov, Imperial College, London (January 2024).
- Jean-Louis Colliot-Thelene, University of Paris-Sud (January 2024).
- Deepraj Bhat, MIT, USA gave talk on "SU(2) Representations of Three-Manifold groups" (January 2024).
- Abhishek De, University of Birmingham gave talk on "Proof theory of formal languages" (January 2024).
- Aswin P M, Stony Brook University January 2024).
- Sourav Chakraborty, ISI Kolkata gave talk on "Distinct Elements in Streams and the Klee's Measure Problem" (January 2024).
- Debraj Das, ICTP Trieste, Italy (January 2024).
- Jaikumar Radhakrishnan, ICTS Bangalore (January 2024).
- Patrick Polo, nstitut de Mathématiques, Université Pierre et Marie Curie, Paris gave talk on "Lectures on SGA3" (January 2024).
- Himalaya Senapati, HSBC Bengaluru (January 2024).
- Florent Foucaud, Clermont Auvergne University, France gave talk on "Covering a graph using shortest paths" (January 2024).
- Dipayan Chakraborty, Clermont Auvergne University, France (January 2024).
- Yashonidhi Pandey, IISER Mohali(January 2024).
- Susan Thomas, XKDR Forum (February 2024).
- Miheer Dewaskar, Duke University gave talk on "When to use Linear Regression? Model assumptions, diagnostics, and robustness" (February 2024).
- Prakash Saivasan, IMSC (February 2024).
- Indranil Mukherjee, Indian Statistical Institute, Kolkata (February 2024).

- Prateksh Dhivakar, IIT Kanpur gave talk on "An entropy current and the second law in higher derivative theories of gravity" (February 2024).
- Shuvayu Roy, NISER gave talk on "Local Entropy Current on a Black-Hole Horizon and its Reparametrizations" (February 2024).
- Arnab Saha, IIT Gandhinagar gave talk on "Delta geometry and the characteristic polynomial of the Frobenius" (February 2024).
- Hrishikesh Terdalkar, IIT Kanpur gave talk on "Sanskrit Computational Linguistics: Tools, Annotation and Knowledge Graphs" (February 2024).
- Michelle Gallo, University of Naples, Italy gave talk on "Prof. Michelle Gallo's Lecture Series" (February 2024).
- Bishal Deb, University of Paris gave talk on "Coefficientwise Hankel-total positivity of the Schett polynomials" (March 2024).
- Paul Gastin, ENS Paris-Saclay gave talk on "Cascade Decomposition of Asynchronous Automata" (March 2024).
- Ranbir Sidhu, Freelancer (March 2024).
- Suman Sadhukhan, University of Haifa, Israel gave talk on "Bidding Games on Graphs - In theory and in practice" (March 2024).
- Omkar Shetye, ICTS Bangalore (March 2024).
- Dinesh Kafle, Kathmandu University gave talk on "The life and times of BP Koirala" (March 2024).