Sourav Chakraborty

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Research Interests: My field of research is Theoretical Computer Science. My focus has been in the classical and quantum complexity of Boolean functions, in Property Testing, in graph algorithms, in algorithmic game theory, and in machine learning.

Personal Information

- Date of Birth: 28th August, 1982.
- Nationality: Indian
- Gender: Male
- Marital Status: Married

Job Experience

- Currently Professor in the Advanced Computing and Microelectronics Unit (ACMU) at Indian Statistical Institute, Kolkata, India, from July 2023.
- Associate Professor in the Advanced Computing and Microelectronics Unit (ACMU) at Indian Statistical Institute, Kolkata, India, from July 2018 to June 2023.
- Associate Professor at Chennai Mathematical Institute, India, from August 2012 to June 2018.
- Visiting Faculty at Centrum Wiskunde & Informatica (CWI), Amsterdam, Netherlands, from January 2017 to December 2017.
- Visiting Faculty at Rice University, Houston, USA from March 2015 to May 2015.
- Visiting Associate Professor at University of California, San Diego, USA from January 2014 to June 2014.
- Assistant Professor at Chennai Mathematical Institute, India, from September 2010 to July 2012.
- Post Doctorate at the Algorithms and complexity Department in Centrum Wiskunde & Informatica (CWI), Amsterdam, Netherlands, from September 2009 to August 2010.
- Post Doctorate (Lady Davis Fellow) at the Computer Science Department in Technion - Israel Institute of Technology, Haifa, Israel, from October 2008 to August 2009.

Education

- Ph.D., June 2008
  Computer Science, The University of Chicago, Chicago, USA.
  Thesis Advisor: László Babai
  Thesis Title: Models of Query Complexity for Boolean Functions.

- Master of Science (M.Sc.), 2005
  Computer Science, The University of Chicago, Chicago, USA.
  Thesis Advisor : László Babai
  Thesis title: *Sensitivity, Block Sensitivity and Certificate Complexity of Boolean Functions*

- Bachelor of Science (Honours), 2000-2003 Mathematics
  Chennai Mathematical Institute, Chennai, India.
  Cummulative Grade Point Average: 9.43 (out of 10).

- Higher Secondary Degree (Class XII), 2000
  West Bengal Council of Higher Secondary Education.
  Result Division: First Class
  Percentage Marks Scored: 77.4 %.
  School: Bidhan Chandra Institution, Durgapur, India (1998-2000)

- Secondary Degree (Class X), 1998
  Indian Certificate of Secondary Education (ICSE).
  Percentage Marks Scored: 85.17 %.
  School: St. Xaviers School, Durgapur, India (1986-1998)

Honours and Awards

- Invited speaker at numerous universities, conferences and workshops around the world.
- Keynote speaker at The Third Workshop on Kernelization (WorKer 2011).
- Invited to attend/talks at a number of prestigious workshops including:
  - Invited to number of Dagstuhl Seminars including seminar on "Algebraic and Combinatorial Methods in Computational Complexity," 2012, 2014 and Seminar on "Graph Isomorphism," 2015 and Dagstuhl Seminar on "Computational Complexity of Discrete Problems", 2017, 2018, 2019, 2022, 2023.
  - Invited to Mysore Park Workshop - Recent Trends in Algorithms and Complexity, 2011, 2012, 2013, 2016.
  - Invited to the "Combinatorics, Groups, Algorithms, and Complexity" - Conference in honor of Laci Babai's 60th birthday, March 2010.
  - Invited to China Theory Week 2008, as one of the top phd graduates in the year 2008.
- Received the Chairman's Fellowship in 2003-04 and 2004-05 from The Department of Computer Science, The University of Chicago, Chicago, USA.

- Visited École Normale Supérieure (ENS) in Paris, France, during May-June 2003, as a part of the exchange programme between ENS, Paris and Chennai Mathematical Institute (CMI), Chennai, India.
- One of twenty award winners in the *Indian National Mathematical Olympiad (INMO) 1999*, National Board of Higher Mathematics (NBHM), India. Selected to attend the *Indian National Mathematical Olympiad Training Camp* in 1999 and 2000.

Students Adviced

Former Phd Students:

- Sayantan Sen.
  Thesis Title: Sample and Query Complexities of Some Extimation Problems.
  Defended in October 2023.
  Degree awarded by: Indian Statistical Institute (ISI).
- Manaswi Paraashar.
  Thesis Title: Quantum query complexity through the lens of communication complexity and exact learning.
  Defended in February 2022.
  Degree awarded by: Indian Statistical Institute (ISI).
- Rameshwar Pratap (co-advised with Samir Datta).
  Thesis Title: Some Problems in Sublinear Algorithms.
  Defended in January 2014.
  Degree awarded by: Chennai Mathematical Institute (CMI).
- Nitesh Jha.
  Thesis Title: Finding Transitive Subgraphs and Counting Popular Matchings.
  Defended in July 2017.
  Degree awarded by: Chennai Mathematical Institute (CMI).

Current Phd Students: (all registered at ISI) Chandrima Kayal, Soumi Nandi (jointly with Arijit Ghosh), Avijeet Ghosh (jointly with Sujata Ghosh), Swarnalipa Datta (jointly with Arijit Ghosh), Arnab Ray, Uddalok Sarkar, Smiha Samanta.

Former Masters Students: Sandipan Bhattacharyya (CMI), Biswaroop Maiti (CMI), Pranabendu Misra (CMI), Shion Samadder Chaudhury (CMI), Rupam Acharyya (CMI), V. Vivek (CMI), Shayak Chakraborty (jointly with Ansuman Banerjee) (ISI 2019), Suyash Bhutada (ISI 2020), Aritra Bhaduri (ISI 2020), Madhumita Kundu (jointly with Saket Saurabh, IMSC) (ISI 2020), Sanchari Sil (ISI 2020), Ankit Gupta (ISI 2021), Sudipta Ghosh (ISI 2021), Diptiman Ghosh (ISI 2021), Uddalok Sarkar (jointly with Ansuman Banerjee) (ISI 2022)

Teaching Experiences

I have taught quite a few courses in various institutes across the world and to different kind of audiences and also taught online courses and through television programs. Below I list the course that I have taught.

Courses taught at Indian Statistical Institute:

- **MTech Courses:** Discrete Mathematics, Design and Analysis of Algorithms, Coding and Information theory, Computational Complexity, Formal Languages and Automata Theory.
- **BStat Courses:** Discrete Mathematics, Design and Analysis of Algorithms

Courses taught at Chennai Mathematical Institute:

- **Basic Level Courses:** Discrete Mathematics, Theory of Computation and Algorithms.
- **Advanced Courses:** Cryptography and Information Theory, Coding Theory, Probabilistic Methods, Randomized Algorithms, Combinatorial Optimization, Approximation Algorithms, Property Testing, Algorithmic Game Theory.

Courses taught at University of California, San Diego:

- A short course in Discrete Mathematics (CSE20), Winter and Spring 2014. (This was a basis discrete mathematics course attended by over 400 students from across various departments of the university).
- Mathematics for Algorithms and Systems Analysis (CSE21), Winter 2014. (This was an advanced discrete mathematics course for students with computer science major. Over 200 students took the course.)

Courses through mass media:

- NPTEL Course on "Discrete Mathematics", in 2016. (Over 500 students participated in the course.)
- E-lectures for the UGC on "Introduction to Algorithms". A set of 30 lecture that were broadcasted vis the Gyan Darshan Channel.

Courses for College Teachers and People from Industry: I have participated in a number of faculty development programs (FDP) that are held in different part institutes in India and also taught at various workshops meant for people working in the industry. The following is a proper subset of such talks:

- Taught "Machine Learning" at the refresher course on "Data analytics" organized by Calcutta University in January 2019.
- Taught "Linear Algebra" at the outreach program "Workshop on Algorithm, Optimization and Learning" organized by Indian Statistical Institute, Kolkata, in January 2019..
- Taught at the Faculty Development Program (FDP) on "Design and Analysis of Algorithm" at SSN college, 2016, 2015.

- Taught at the tutorial workshop on "Predictive Modelling" organised by AlgoLabs, 2015.
- Talked at the "Tutorial Workshop on Randomness" (targeted towards college students and students from various colleges in Chennai) at IMSc, 2012.
- Taught at the Faculty Development Program (FDP) on "School for Graph Algorithms" at the Karnataka University, Dharwad, 2011.

Professional Experience, Skills

- Served as a member of the Program Committee for the following conferences:
  - Conference on Neural Information Processing Systems (NeuRIPS), 2023
  - Association for the Advancement of Artificial Intelligence (AAAI), 2021
  - Xerox Research Center India (XRCI) Open, 2015.
  - 32nd International Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2012)
  - 38th International Conference on Current Trends in Theory and Practice of Computer Science (SOFSEM 2012).
  - International Conference on Game Theory, Operations Research and their Applications (GTORA 2012).
- Workshops/Conferences Organized:
  - Organiser of *Workshop on Analysis of Boolean Functions* held at Indian Statistical Institute Kolkata, February 2020.
  - Joint organiser of *Workshop on Algorithms, Optimization and Learning* held at Indian Statistical Institute, Kolkata, 2019.
  - Joint organiser of *Mysore Park Workshop on Algorithms and Complexity*, 2016.
  - Joint organiser of *Chennai Theory Day*, 2013 and 2016.
  - Joint organiser of *Workshop on Pseudorandomness*, 2011 at CMI.
  - On the advisory board of *WorKer 2011 – The Third Workshop on Kernelization.*
- Refereed papers for various conferences including FOCS, STOC, SODA, AAAI, NeuRIPS, AIStats, IJCAI, ITCS, CCC, ICALP, COLT, RANDOM, STACS, FSTTCS, FCT, WG, EC, SOFSEM and WALCOM and also for various journal including the journal of Theory of Computation (TOC), the journal of Algorithmica, the journal of Transactions on Algorithms (TALG) and the journal of Random Structures and Algorithms, Journal of Combinatorial Optimization (JOCO), Discrete Mathematics & Theoretical Computer Science (DMTCS) and Transactions on Computation Theory (ToCT), Theory of Computing Systems (TOCS).
- Served in various committee (both academic and adminstrative) at the CMI and ISI.
- Was the "faculty advisor" for the masters students in Computer Science from 2011 to 2014 and for the Phd students in Computer Science from 2014 to 2016 at the CMI.
- Have been involved in setting question papers for various competitive exams in India.

Thesis and Publications

All my publications and thesis can be found on my webpage:
(http://www.cmi.ac.in/∼sourav/webpage/Publications.html)

- Thesis
  - Phd Thesis: *Models of Query Complexity for Boolean Functions*, Department of Computer Science, The University of Chicago, 2008.
  - Masters Thesis: *Sensitivity, Block Sensitivity and Certificate Complexity of Boolean Functions*, Department of Computer Science, The University of Chicago, 2005.

- Publications in Peer Reviewed Journal Proceedings

1. *Linear-time Recognition of Proper Tagged Probe Interval Graph* - joint work with Shamik Ghosh, Sanchita Paul, and Malay Sen. Accepted in Contributions to Discrete Mathematics (CDM) (2022).
2. *Disjointness through the Lens of Vapnik-Chervonenkis Dimension: Sparsity and Beyond* - Joint with Anup Bhattacharya, Arijit Ghosh, Gopinath Mishra and Manaswi Paraashar. Computational Complexity 31(2): 9 (2022).
3. *The Balanced Connected Subgraph Problem* - Joint work with Sujoy Bhore, Satyabrata Jana, Joseph S. B. Mitchell, Supantha Pandit and Sasanka Roy. Discrete Applied Mathematics 319: 111-120 (2022).
4. *Improved Bounds on Fourier Entropy and Min-Entropy* - Joint work with Srinivasan Arunachalam, Michal Kouck, Nitin Saurabh and Ronald de Wolf. ACM Transactions on Computation Theory (ToCT), 13(4): 22:1-22:40 (2021).
5. *Two New Results About Quantum Exact Learning* - Joint work with Srinivasan Arunachalam, Troy Lee, Manaswi Paraashar and Ronald de Wolf. Quantum 5: 587 (2021).
6. *Helly-Type Theorems in Property Testing* - joint work with Rameshwar Pratap, Sasanka Roy and Shubhangi Saraf. International Journal of Computational Geometry and Applications (IJCGA) $28(4) : 365 - 379$ (2018).
7. *Property Testing of Joint Distributions using Conditional Samples* - joint work with Rishiraj Bhatyacharyya. ACM Transactions on Computation Theory (ToCT) $10(4) : 16 : 1 - 16 : 20$, (2018).
8. *Testing Uniformity of Stationary Distribution* - joint work with Akshay Kamath and Rameshwar Pratap. Information Processing Letters (IPL) $116(7) : 475 - 480$, (2016).
9. *Upper Bounds on Fourier Entropy* - joint work with Raghav Kulkarni, Satya Lokam and Nitin Saurabh. Theoretical Computer Science $654 : 92 - 112$ (2016).
10. *On the Power of Conditional Samples in Distribution Testing* - joint work with Eldar Fischer, Arie Matsliah and Yonatan Goldhirsh. SIAM Journal of Computing (SICOMP) $45(4) : 1261 - 1296$ (2016).
11. *Property Testing of Isomorphism under a Permutation Group Action* - joint work with László Babai. To appear in The ACM Transactions on Computation Theory (ToCT).

12. *Query Complexity Lower Bounds for Reconstruction of Codes* - joint work with Eldar Fischer and Arie Matsliah. Theory of Computation (TOC) $10 : 515 - 533$ (2014).
13. *Nearly Tight Bound for Testing Function Isomorphism* - joint work with Noga Alon, Eric Blais, David Garcia-Soriano and Arie Matsliah. SIAM Journal of Computing (SICOMP) $42(2) : 459 - 493$ (2013).
14. *Monotonicity Testing and Shortest-Path Routing on the cube* - Joint work with Jop Briët, David García-Soriano and Arie Matsliah. Combinatorica $32(1) : 35 - 53$ (2012).
15. *On the Sensitivity of Cyclically-Invariant Functions* - Journal of Discrete Mathematics and Theoretical Computer Science (special issue celebrating László Babai's 60th birthday) $13(4) : 51 - 60$ (2011).
16. *Hardness and Algorithms for Rainbow Connectivity* - joint work with Eldar Fischer, Arie Matsliah and Raphael Yuster. Journal of Combinatorial Optimization (JOCO) $21(3) : 330 - 347$ (2011).

- Publications in Peer Reviewed Conference Proceedings

1. *Tight Lower Bound on Equivalence Testing in Conditional Sampling Model* - joint work with Diptarka Chakraborty and Gunjan Kumar. To appear in ACM-SIAM Symposium on Discrete Algorithms (SODA), 2024.
2. *Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques* - joint work with Eldar Fischer, Arijit Ghosh, Gopinath Mishra and Sayantan Sen. The Thirty Sixth Annual Conference on Learning Theory, COLT, pages- 3065–3136, 2023.
3. *On Simple Expectations and Observations of Intelligent Agents: A Complexity Study* - joint work with Avijeet Ghosh, Sujata Ghosh and Francois Schwarzentruber. 20th International Conference on Principles of Knowledge Representation and Reasoning, KR, pages - 136–145, 2023.
4. *On the Composition of Randomized Query Complexity and Approximate Degree* - joint work with Chandrima Kayal, Rajat Mittal, Manaswi Paraashar, Swagato Sanyal and Nitin Saurabh. Approximation, Randomization, and Combinatorial Optimization. Algorithms and Techniques (APPROX/RANDOM), 63:1-63:23, 2023.
5. *Engineering an Efficient Approximate DNF-Counter* - joint work with Mate Soos, Divesh Aggarwal, Kuldeep Meel and Maciej Obremski. 32nd International Joint Conference on Artificial Intelligence (IJCAI) 2023.
6. *Approximate Model Counting: Is SAT Oracle More Powerful than NP Oracle?* - joint work with Diptarka Chakraborty, Gunjan Kumar and Kuldeep Meel. 50th EATCS International Colloquium on Automata,Languages and Programming, (ICALP) 2023
7. *Testing of Horn Samplers* - joint work with Ansuman Banerjee, Shayak Chakraborty, Kuldeep Meel, Uddalok Sarkar and Sayantan Sen. 25th International Conference on Artificial Intelligence and Statistics (AISTATS), 2023.
8. *Certificate Games* - Joint work with Anna Gl, Sophie Laplante, Rajat Mittal and Anupa Sunny. Innovations in Theoretical Computer Science (ITCS),: $32 : 1 - 32 : 24$, 2023.
9. *Exploring the Gap Between Tolerant and Non-Tolerant Distribution Testing.* - Joint with Eldar Fischer, Arijit Ghosh, Gopinath Mishra, Sayantan Sen. International Conference on Randomization and Computation (RANDOM), $27 : 1 - 27 : 23$ (2022).

10. *On Quantitative Testing of Samplers* - Joint work with Mate Soos, Priyanka Golia and Kuldeep S. Meel. 28th International Conference on Principles and Practice of Constraint Programming, (CP) $36:1-36:16$, 2022.
11. *Distinct Elements in Streams: An Algorithm for the (Text) Book* - Joint work with Kuldeep S. Meel and N. V. Vinodchandran. 30th Annual European Symposium on Algorithms, (ESA), $34:1-34:6$, 2022.
12. *Separations Between Combinatorial Measures for Transitive Functions* - Joint work with Chandrima Kayal and Manaswi Paraashar. The 49th International Colloquium on Automata, Languages and Programming (ICALP) $36:1-36:20$ (2022).
13. *A Scalable t-wise Coverage Estimator* - Joint work with Eduard Baranov, Axel Legay, Kuldeep S. Meel and N. Variyam Vinodchandran. IEEE/ACM 44th International Conference on Software Engineering, (ICSE) $36-47$ (2022).
14. *On Verifying Expectations and Observations of Intelligent Agents* - Joint work with Avijeet Ghosh, Sujata Ghosh and Franois Schwarzentruber. Proceedings of the Thirty-First International Joint Conference on Artificial Intelligence, (IJCAI) $2568-2574$, 2022,
15. *Estimation of the Size of Union of Delphic Sets: Achieving Independence from Stream Size* - Joint work with Kuldeep S. Meel and N. V. Vinodchandran. Proceedings of the 41sr ACM SIGMOD-SIGACT-SIGAI Symposium on Principles of Database (PODS), $41-52$, 2022.
16. *Symmetry and Quantum Query-To-Communication Simulation* - Joint work with Arkadev Chattopadhyay, Peter Hyer, Nikhil S. Mande, Manaswi Paraashar and Ronald de Wolf. International Symposium on Theoretical Aspects of Computer Science, (STACS) $20:1-20:23$, 2022.
17. *Estimating the Size of Union of Sets in Streaming Models* - Joint work with Kuldeep S. Meel and N. V. Vinodchandran. Proceedings of the 40th ACM SIGMOD-SIGACT-SIGAI Symposium on Principles of Database (PODS), $126-137$, 2021.
18. *Interplay Between Graph Isomorphism and Earth Mover's Distance in the Query and Communication Worlds* - Joint work with Arijit Ghosh, Gopinath Mishra and Sayantan Sen. International Conference on Randomization and Computation (RANDOM), $34:1-34:23$ (2021).
19. *Designing Samplers is Easy: The Boon of Testers* Joint work with Priyanka Golia, Mate Soos, and Kuldeep S. Meel. Formal Methods in Computer-Aided Design (FMCAD), 2021.
20. *Tight Chang's-lemma-type bounds for Boolean functions* - Joint work with Nikhil S Mande, Rajat Mittal, Tulasimohan Molli, Manaswi Paraashar and Swagato Sanyal. Foundations of Software Technology and Theoretical Computer Science (FSTTCS), 2021.
21. *On Testing of Samplers* - Joint work with Kuldeep Meel and Yash Pote. Annual Conference on Neural Information Processing Systems (NeurIPS), 2020.
22. *Disjointness through the Lens of Vapnik-Chervonenkis Dimension: Sparsity and Beyond* - Joint work with Anup Bhattacharya, Arijit Ghosh, Gopinath Mishra and Manaswi Paraashar. International Conference on Randomization and Computation (RANDOM), $23:1-23:15$ (2020).

23. *Quantum Query-To-Communication Simulation Needs a Logarithmic Overhead* - Joint work with Arkadev Chattopadhyay, Nikhil S. Mande and Manaswi Paraashar. Computational Complexity Conference (CCC), $32:1-32:15$ (2020). A preliminary version was presented in Quantum Information Processing (QIP 2020).
24. *Improved Bounds on Fourier Entropy and Min-Entropy* - Joint work with Srinivasan Arunachalam, Michal Kouck, Nitin Saurabh and Ronald de Wolf. Symposium on Theoretical Aspects of Computer Science (STACS), $45:1-45:19$ (2020).
25. *Two New Results About Quantum Exact Learning* - Joint work with Srinivasan Arunachalam, Troy Lee, Manaswi Paraashar and Ronald de Wolf. The 46th International Colloquium on Automata, Languages and Programming (ICALP) $16:1-16:15$ (2019).
26. *Characterization and recognition of proper tagged probe interval graphs* - Joint work with Sanchita Paul, Shamik Ghosh and Malay Sen. Intelligent Computing (CompCom 2019). Advances in Intelligent Systems and Computing (AISC), Vol 998, Pages:$62-75$ (2019).
27. *The Balanced Connected Subgraph Problem* - Joint work with Sujoy Bhore, Satyabrata Jana, Joseph S. B. Mitchell, Supantha Pandit and Sasanka Roy. 5th Annual International Conference on Algorithms and Discrete Applied Mathematics (CALDAM) $201-215$ (2019).
28. *On testing of Uniform Samplers* - Joint work with Kuldeep Meel. Association for the Advancement of Artificial Intelligence (AAAI) $7777-7784$ (2019).
29. *Fourier Entropy-Influence Conjecture for Random Linear Threshold Functions* - Joint work with Sushrut Karmalkar, Srijita Kundu, Satyanarayana Lokam and Nitin Saurabh. 13th Latin American Theoretical INformatics Symposium (LATIN 2018) Pages: $275-289$.
30. *Exact Algorithms for Maximum Transitive Subgraph Problem* - Joint work with Nitesh Jha. 15th Cologne-Twente Workshop on Graphs & Combinatorial Optimization (CTW 2017), Pages: $49-52$.
31. *Maximal and Maximum Transitive Relation Contained in a Given Binary Relation* -joint work with Shamik Ghosh, Nitesh Jha and Sasanka Roy. International Computing and Combinatorics Conference (COCOON 2015), Pages: $587-600$.
32. *Upper Bounds on Fourier Entropy* - joint work with Raghav Kulkarni, Satyanarayana V. Lokam and Nitin Saurabh. International Computing and Combinatorics Conference (COCOON 2015), Pages: $771-782$.
33. *Property Testing Bounds for Linear and Quadratic Functions via Parity Decision Trees* - joint work with Abhishek Bhrushundi and Raghav Kulkarni. The 9th International Computer Science Symposium in Russia (CSR 2014), Pages: $97-110$.
34. *Counting Popular Matchings in House Allocation Problems* - joint work with Rupam Acharya and Nitesh Jha. The 9th International Computer Science Symposium in Russia (CSR 2014), Pages: $39-51$.
35. *Helly-Type Theorems in Property Testing* - joint work with Rameshwar Pratap, Sasanka Roy and Shubhangi Saraf. Latin American Theoretical INformatics Symposium. (LATIN 2014), Pages: $306-317$.
36. *Testing Uniformity of Stationary Distribution* - Joint work with Akshay Kamath and Rameshwar Pratap. European Conference on Combinatorics, Graph Theory and Applications (EuroComb 2013). Also presented at the 12th Cologne-Twente Workshop on Graphs & Combinatorial Optimization (CTW 2013), Pages: $47-50$.

37. *On the Power of Conditional Samples in Distribution Testing* - joint work with Eldar Fischer, Yonatan Goldhirsh and Arie Matsliah. Innovations in Theoretical Computer Science (ITCS 2013), Pages: 561 – 580.

38. *Junto-symmetric functions, hypergraph isomorphism, and crunching* - joint work with Eldar Fischer, David García-Soriano and Arie Matsliah. 27th Annual IEEE Conference on Computational Complexity (CCC 2012), Pages: 148 – 158.

39. *Improved Competitive Ratio for the Matroid Secretary Problem* - joint work with Oded Lachish. ACM-SIAM Symposium on Discrete Algorithms (SODA 2012), Pages: 1702 – 1712.

40. *Efficient Sample Extractors for Juntas with Applications.* - joint work with David García-Soriano Arie Matsliah. International Colloquium on Automata, Languages and Programming (ICALP 2011), Pages: 545 – 556.

41. *Cycle Detection, Order Finding and Discrete Log with Jumps* - joint work with David García-Soriano and Arie Matsliah. Innovations in Computer Science (ICS 2011), Pages: 284 – 297.

42. *Query Complexity Lower Bounds for Reconstruction of Codes* - joint work with Eldar Fischer and Arie Matsliah. Innovations in Computer Science (ICS 2011), Pages: 264 – 274.

43. *Tight Bounds for Testing Function Isomorphism* -joint work with David García-Soriano and Arie Matsliah. ACM-SIAM Symposium on Discrete Algorithms (SODA 2011), Pages: 1683 – 1702.

44. *Quantum Query Complexity for Testing Distribution* -joint work with Eldar Fischer, Arie Matsliah and Ronald de Wolf. 30th International Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2010), Pages: 145 – 156.

45. *Market Clearance Pricing in a Metric* -joint work with Nikhil Devanur and Chinmay Karande. The Sixth Workshop on Internet & Network Economics (WINE 2010), Pages: 496 – 504.

46. *Monotonicity Testing and Shortest-Path Routing on the cube* -joint work with Jop Briët, David García-Soriano and Arie Matsliah. 14th International Workshop on Randomization and Computation (RANDOM 2010), Pages: 462 – 475.

47. *Two-phase algorithms for the parametric shortest path problem* - joint work with Eldar Fischer, Oded Lachish and Raphael Yuster. 27th International Symposium on Theoretical Aspects of Computer Science (STACS'10), Pages: 167 – 178. .

48. *Improved Algorithms for Multi-unit Auction with unknown supplies* - joint work with Nikhil Devanur. The Fifth Workshop on Internet & Network Economics (WINE 2009), Pages: 79 – 88. Preliminary version appeared at the Forth Workshop on Ad Auctions 2008.

49. *Hardness and Algorithms for Rainbow Connectivity* - joint work with Eldar Fischer, Arie Matsliah and Raphael Yuster. 26th International Symposium on Theoretical Aspects of Computer Science (STACS'09), Pages: 243 – 254.

50. *Testing st-Connectivity* - joint work with Eldar Fischer, Oded Lachish, Arie Matsliah and Ilan Newman. 11th International Workshop on Randomization and Computation (RANDOM 2007), Pages: 380 – 394.

51. *Zero Error List-Decoding Capacity of the $q/(q-1)$ Channel* - joint work with Jaikumar Radhakrishnan, Nandakumar Raghunathan and Prashant Sasatte. 26th International Conference on Foundations of Software Technology and Theoretical Computer Science (FSTTCS 2006), Pages: $129 - 138$.
52. *Bounds for Error Reduction with few Quantum Queries* - joint work with Jaikumar Radhakrishnan and Nandakumar Raghunathan. 9th International Workshop on Randomization and Computation (RANDOM 2005), Pages: $245 - 256$.
53. *On the Sensitivity of Cyclically-Invariant Functions* 20th Annual IEEE Conference on Computational Complexity (CCC 2005), Pages: $163 - 167$.

- Works in Progress and Pre-prints

1. *PPCheck: Verifying the Equivalence of Probabilistic Programs* - Joint work with Alexandru Dinu and Kuldeep Meel.
2. *Testing Fourier sparsity over product of finite fields* - Joint work with Pranjal Dutta, Arijit Ghosh, Swarnalipa Datta and Swagato Sanyal.
3. *Streaming Klees Measure Problem in High Dimension and its Generalizations* - Joint work with Arijit Ghosh, Kuldeep Meel, Mridul Nandi, Soumit Pal and N. V. Vinodchandran.
4. *Colorful Helly-Type Result for Multi-Piercing Axis-Parallel Boxes* - Joint work with Arijit Ghosh and Soumi Nandi.
5. *Minimizing Assumptions for Local Decoding against a Computationally Bounded Adversary* - Joint work with Rishiraj Bhattacharyya.
6. *Constant Query Locally Decodable Codes against a Computationally Bounded Adversary* - Joint work with Rishiraj Bhatyacharyya.

- Published Articles in Popular Science Magazines

1. *Point Set Topological Proof of 'no-retraction' Theorem for 2 and 3 Dimensional Cases* Resonance, journal of science education, Vol 8, No. 10, Pages 63-68.
2. *Two Steps Forward, One Step Back - The Problem of Graph Isomorphism* Bhavana, A publication of The Indian Mathematics Consortium, Vol 1, Issue 2. (An article on the Graph Isomorphism Problem and its recent break through by László Babai.)

Projects

- Internal Projects (Internal to Indian Statistical Institute)
  1. *Verifying the Equivalence of Probabilistic Programs* Ongoing : 2022-2025.
  2. *Testers for Checking Correctness of Samplers* Past: 2019-2022.
- External Projects
  - Ongoing Projects
    1. *Towards Fourier Entropy Influence Conjecture* from Science and Engineering Research Board (SERB), MATRICS grant. Budget - 6 lakh. Duration: March 2022 to March 2025.
    2. *Subcube Conditional Sample and Testing Properties of Probability Distributions* to EPSRC Early Caree Researcher International Collaboration Grants. Jointly with Rishiraj Bhattacharyya (University of Birmingham).
  - Applied Projects
    1. Submitted *VeiFAI: A formal verification framework for certifying AI tools* to DRDO's Research Service Qualitative Requirement (RSQR). Jointly with Ansuman Banerjee. Budget: 19 lakh.
    2. Submitted *Verified Deep Learning: A Formal Methods perspective* to Joint Research Project India-Taiwan. Jointly with Suman Ghosh (ISI), Ansuman Banerjee (ISI) and Tsung-Yi Ho (National Tsing Hua University, Taiwan). Budget: 64 lakh.
    3. Submitted *Verification of Machine Learning Software: A Formal Methods approach* to DRDO. Jointly with Ansuman Banerjee. Budget: Approx 3cr.