SOHAM CHATTERJEE

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EDUCATION

– **Chennai Mathematical Institute**	**2021 – 2024**
B.Sc. - Mathematics and Computer Science	*Chennai, India*
– **Baranagar Narendranath Vidyamandir**	**2018 – 2020**
Higher Secondary (12th Standard) Education	*Kolkata, India*
– **Baranagar Ramakrishna Mission Ashrama High School**	**2008 – 2018**
Secondary (12th Standard) Education	*Kolkata, India*

ACADEMIC ACHIEVEMENTS

– **GS Exam, I-PhD, Computer Science, 2024**	**TIFR Mumbai, India**
Nation wide entrance exam in Computer Science for Tata Insititute of Fundamental Reseach. Only 2 people got selected.	
– **JEST, I-PhD, Theoretical Computer Science, 2024 - Rank 5**	**IMSC, India**
Nation wide entrance exam in Computer Science for Insitute of Mathematical Sciences	
– **NEST, B.Sc., 2021**	**NISER, India**
Nation wide bachelors entrance exam for National Institute of Science Education and Research	
– **WBJEE, B.Tech, 2020 - Rank 1893**	**WBJEEB**
Joint Entrance exam for B.Tech for West Bengal state	
– **12th Statistics Olympiad, 2020 - Rank 28**	**AIMSCS**
Organised by C R Rao Advanced Institute of Mathematics, Statistics and Computer Science	

INTERNSHIPS

– **Polyhedral Combinatorics and Derandomization of Isolation Lemma**
Supervisor: Rohit Gurjar, IIT Mumbai　　　　　　　　　　　　　　　　　*May - Jul, 2024*

- I read the paper 'Bipartite Perfect Matching is in QUASI-NC' by Fenner Gurjar Thierauf

- In addition I learned about Matroid Polytopes and Their Properties from the paper 'Linear Matroid Intersection Is in QUASI-NC' by Gurjar and Thierauf and the generalization of the idea of using cycles with nonzero circulations in case of polytopes

- I also read the paper 'Fractional Linear Matroid Matching is in QUASI-NC which generalizes this idea further more by allowing half-integral vertices in the matroid matching polytope.

- Additionally I read about isolating a path connecting the source vertex and sink vertex in a black-box layered graph from the paper 'Derandomizing Isolation in Space-Bounded Settings' by Melkebeek and Prakriya.

– **Quantum Property Testing of Junta Functions and Partially Symmetric Functions.**
Supervisor: Arijit Ghosh, Indian Statistical Institute, Kolkata　　　　　　　　*Dec, 2024 – Going on*

- I read the survey 'Quantum boolean functions' by Ashley Montanaro, Tobias J. Osborne and learned about Fourier analysis of boolean functions in Quantum setting and Testing and Learning algorithms for Stabilizer states

- I learned about Classical Junta Testing from Eric Blais' paper Testing Juntas Nearly Optimally and then read about Quantum Junta Testing Algorithm from 'Testing and Learning Quantum Juntas Nearly Optimally' by Thomas Chen, Shivam Nadimpalli, Henry Yuen

- Also learned about Partially Symmetric Boolean Functions and it's classical algorthm of testing partially symmetric functions from the paper 'Partially Symmetric Functions are Efficiently Isomorphism-Testable' by Eric Blais, Amit Weinstein, Yuichi Yoshida

– **Factorization of Arithmetic Circuits in Algebraic Complexity Theory**
Supervisor: Nitin Saxena, IIT Kanpur　　　　　　　　　　　　　　　　　*May - Jul, 2022*

- I read 'Discovering the roots: Uniform closure results for algebraic classes under factoring' by Pranjal Dutta, Nitin Saxena and Amit Sinhababu where I learned how to factorize arithmetic circuits and why VP is closed under factorization. Also leanred how Polynomial Identity Testing and Multivariate Factorizations are equivalent from 'Equivalence of Polynomial Identity Testing and Deterministic Multivariate Polynomial Factorization' by Swastik Kopparty, Shubhangi Saraf, Amir Shpilka

- Also read the Kaltofen's proof of VP closed under factorization.

- I also read how VBP is closed under factorization from Amit Sinhababu and Thomas Tierauf's paper 'Factorization of Polynomials given by Arithmetic Branching Programs'

- I also learned about the difficulties about proving factor closure for VF from the above mentioned two papers

- I read about factorization of formulas with individual degree bounded form the paper 'Factors of low individual degree polynomials' by Rafael Oliveira and we were trying to remove the condition for formulas

- **Computational Number Theroy and Algebra for Algebraic Comlexity Theory.**
  Supervisor: Nitin Saxena, IIT Kanpur   *Dec - Jan, 2022*

  - I learned about Computational Number Theory and Algebra from Nitin Saxena's Course and read the book 'Modern Computer Algebra' by Von Zur Gathen and Jurgen Gerhard
  - Also I learned about Arithmetic Circuits from Amir Shpilka's Survey and Ramprasad Saptharishi's Survey on Arithmetic Circuits.

- **Ramanujan's work on theta functions and q-series and their connections with number theory.**
  Supervisor: Rupam Barman, IIT Guahati   *May - Jul, 2022*

  - I read the book 'Number Theoryin the Spirit of Ramanujan' by Bruce C Berndt
  - Also read the paper Matching coefficients in the series expansions of certain q-products and their reciprocals' by Nayandeep Deka Baruah, Hirakjyoti Das

RELEVANT COURSE WORK

Math Courses:

Algebra
- Linear Algebra (Algebra 1)
- Group Theory (Algebra 2)
- Ring and Field Theory (Algebra 3)
- Commutative Algebra

Analysis
- Real Analysis (Analysis 1)
- Analysis in Euclidean Space (Analysis 2)
- Analysis in Metric Space (Analysis 3)

Other Math Courses
- Complex Analysis
- Calculus
- Probability Theory
- Topology

Computer Science Courses:
- Discrete Mathematics
- Design and Analysis of Algorithms
- Theory of Computation
- Complexity Theory
- Expander Graphs and Application
- Parallel Algorithms and Complexity
- Algorithmic Coding Theory (Two Parts)
- Quantum Algorithmic Thinking
- Quantum Information Theory

WORKSHOP, CONFERENCES ATTENDED

- **Quantum Semester Online**   **Chennai Mathematical Institute**
  Chennai, India   *2024, Jan-May*
- **Sage Days 122**   **Chennai Mathematical Institute**
  Chennai, India   *2024, Jan-May*
- **p-adic Number Theory Lecture Series: Ram Murty**   **Chennai Mathematical Institute**
  Chennai, India   *2024, Jan-May*

COMPUTER SKILLS

- **Programming Languages:** C (Basic), Python (Basic), Qiskit (Intermediate), Haskell (Basic), Java (Intermediate), Unix/Linux Shell Scripting, HTML, CSS
- **Technical Skills:** LaTeX (Advanced), Markdown, Git, Basic works in terminal, VIM, Obsidian