Soham Chatterjee

soham.chatterjee@tifr.res.in profile sohamch08
sohamcho8.github.io

Education

2024 – current **I-Ph.D Computer Science, Tata Institute of Fundamental Research, Mumbai**
2021 – 2024 **B.Sc. Math and Computer Science, Chennai Mathematical Institute**

Research Intereset

Algorithms and Complexity Theory with Algebraic nature, Error Correcting Codes, Pseudorandomness, Polyhedral Combinatorics, Analysis of Boolean Functions

Research Publications

1 S. Chatterjee, P. Harsha, and M. Kumar, *Deterministic list decoding of reed-solomon codes*, 2025. arXiv: 2511.05176 [cs.CC]. URL: https://arxiv.org/abs/2511.05176.

Talks and Presentations

2026 **BPL $\subseteq$ SC: Nisan's Pseudorandom Generator for BPL**
Course-Work presentation (TIFR): Pseudorandomness. Paper by Noam Nisan, 1992
Slides: [PDF]

Subspace Polynomials and List Decoding of Reed Solomon Codes
Course-Work presentation (TIFR): Topics in Coding Theory. Paper by Eli Ben-Sasson, Swastik Kopparty & Jaikumar Radhakrishnan, 2006.

Universal Optimality of Dijkstra using Fibonacci Priority Queue with Working Set Property
Oral Qualfier Presentation. Paper by Haeupler, Hladík, Rozhoň, Tarjan, Tětek, 2024. FOCS Best Paper.
Slides: [PDF]

$n^{1.62}$ Upper Bound of the Hurwitz Problem
TIFR Student Seminar. Paper by Pavel Hrubesh, 2024

2025 **Super Polynomial Lower Bound on Traveling Salesman Polytope**
Coursework Presentation (TIFR): Combinatorial Optimization. Paper by Fiorini, Massar, Pokutta, Tiwary and Wolf, 2012
Slides: [PDF]

Bounds on Price of Anarchy using LInear and Quadratic Programming
Coursework Presentation (TIFR): Algorithmic Game Theory. Paper by Kulkarni and Mirrokni, 2015.
Slides: [PDF]

Bipartite Matching is in Quasi-NC
TIFR Student Seminar. Paper by Stephen A. Fenner, Rohit Gurjar and Thomas Thierauf, 2016.

2024 **Hensel and Newton Methods in Valuation Rings**
Coursework Presentation (CMI): Algebra and Computatiopn. Paper by J von zur Gathen, 1984

Talks and Presentations (continued)

2023
- **Coursework Presentation (Algorithmic Coding Theory II)**
  Algebraic Geometric Codes, jointly presented by Me and Shree Ganesh S J
  Report: [PDF]
- **Coursework Presentation (Parallel Algorithms anc Complexity)**
  "Iterated Mod Problem" by Karloff and Ruzzo
  Slide: [PDF]

Attended Workshops

2025
- FSTTCS, BITS Pilani
- HDX and Codes, ICTS

2024
- FSTTCS, IIT Gandhinagar

Jan-Apr 2024
- Quantum Computing Semester, CMI

Relevent Courses

- **TIFR Courses**
  - Mathematical Foundations of Computer Science
  - Algorithms
  - Probability
  - Computational Complexity
  - Algebra, Number Theory & Computation
  - Combinatorial Optimization
  - Algorithmic Game Theory
  - Pseudorandomness
  - Topics in Coding Theory
  - Algebraic Complexity Theory
  - Polynomial Methods in Combinatorics
- **CMI Courses**

  Math Courses:
  - Linear Algebra (Algebra 1)
  - Group Theory (Algebra 2)
  - Ring and Field Theory (Algebra 3)
  - Commutative Algebra
  - Real Analysis (Analysis 1)
  - Analysis in Euclidean Space (Analysis 2)
  - Analysis in Metric Space (Analysis 3)
  - Complex Analysis
  - Discrete Mathematics
  - Calculus
  - Probability Theory
  - Topology
  - Differential Equations

  Computer Science Courses:
  - Design and Analysis of Algorithms
  - Theory of Computation
  - Complexity Theory
  - Parallel Algorithms and Complexity
  - Expander Graphs and Application
  - Algorithmic Coding Theory (Two Parts)
  - Algebra & Computation
  - Quantum Algorithmic Thinking
  - Quantum Information Theory
  - Functional Programming with Haskell
  - Advanced Programming with Python
  - Programming Language Concepts (Java, Concurrent Programming, Lambda Calculus)

Research Internships

Summer 2024 — Worked on *Derandomization of Isolation Lemma over Polytopes*
Guide: Dr. Rohit Gurjar, IIT Bombay

Dec'23-Jul'24 — Project on *Quantum Property Testing of Junta Functions and Partially Symmetric Functions*
Guide: Dr. Arijit Ghosh, ISI Kolkata

Summer 2023 — Reading project on *Factorization of Arithmetic Circuits*
Guide: Dr. Nitin Saxena, IIT Kanpur

Dec 2022 — Reading project on *Computational Number Theroy and Algebra for Algebraic Comlexity Theory*
Guide: Dr. Nitin Saxena, IIT Kanpur

Achievements

2024 — Ranked 5 in the Joint Entrance Screening Test I-PhD exam for Theoretical Computer Science.

2021 — Got selected for NISER for Bachelors through the NEST exam.

2020 — Ranked 28 in 12^{th} Statistics Olympiad organised by C R Rao Advanced Institute of Mathematics, Statistics and Computer Science.

Miscellaneous

- Subreviewer for STACKS 2026
- TA Ship: Algorithms, TIFR, 2025 by T. Kavitha

2023 — Coursework Project (Quantum Algorithmic Thinking)
Qiskit Implementation of Quantum Circuit of Modular Exponentiation: Implemented the paper "Quantum Networks for Elementary Arithmetic Operations" by Vedral, Barenco and Artur
Code: [Link]

- Coursework Project (Quantum Algorithmic Thinking)
Qiskit Implementation of Kushlevitz and Mansour Algorithm: Implemented the paper "Learning Decision Trees Using The Fourier Spectrum" by Kushilevitz and Mansour
Code: [Link]

Computer Skills

Languages — LaTeX(Advanced), Python (Intermediate), Qiskit (Intermediate), Haskell (Basic), Java (Basic), C (Basic), Unix/Linux Shell Scripting, HTML (Basic), CSS (Basic).

Tools — Git, Basic works in terminal, VIM, Obsidian