Peruri Sourabh

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Education

Indian Institute of Science (IISc) — *Bangalore, India*
BS-MS in Mathematics (Integrated) — *Nov 2021 – Exp. Jul 2026*
CGPA: 9.0 / 10.0

Research Interests

Post-Quantum Cryptography, Lattice-based Cryptography, Zero-Knowledge Proofs, Rational Cryptography, Algorithms, Complexity Theory

Research Experience

Optimizing TreeKEM in the MLS Standard — *Oct 2024 – Present*
Mentor: Prof. Sanjit Chatterjee (IISc)

- Designed and validated novel algorithms to reduce communication overhead in group messaging, with emphasis on the post-quantum setting (Kyber KEM).
- Formalized initial findings in a Bachelor's Thesis (Apr 2025)
- Currently extending this work by refining theoretical models and preparing a manuscript for submission to a cryptography conference.

Modal Logic and Proof Theory — *May 2024 – Feb 2025*
Mentor: Prof. Dirk Pattinson (Australian National University, Canberra)

- Established systematic correspondence between sequent and resolution calculi for modal logics in a generalized framework.
- Proved the soundness and completeness of the translated resolution calculi, using only minimal assumptions of cut and weakening admissibility.

Multi-layer Cake Cutting (Directed reading) — *Mar 2024 - Apr 2024*
Mentor: Prof. Siddharth Barman (IISc)

- Analyzed protocols for the envy-free division of multi-layered, heterogeneous resources, focusing on the algorithm presented by Igarashi and Meunier.

Rational Cryptography (Directed Reading) — *May 2023 – Jul 2023*
Mentor: Prof. Bhavana Kanukurthi (IISc)

- Conducted a literature review on game-theoretic security notions in Multi-Party Computation (MPC), focusing on incentive compatibility and C-Immunity.

Publications

From Modal Sequent Calculi to Modal Resolution — *2025*
Dirk Pattinson, Cláudia Nalon, **Sourabh Peruri**
Proceedings of the 30th International Conference on Automated Deduction (CADE-30), Springer, LNCS.

Relevant Coursework

Cryptography
Theoretical Foundations of Cryptography (A+), Applied Cryptography (*audit*)

Theory & Algorithms

Design and Analysis of Algorithms (A), Complexity Theory (A)

Mathematics
Algebraic Number Theory (*ongoing*), Algebraic Topology (*ongoing*), Algebra I & II, Linear Algebra (A), Probability Theory (A), Stochastic Processes (A+), Measure Theory, Multivariate Calculus, Complex Analysis

Technical Skills

Programming: Python, C++, C (*Proficient*); Rust (*Familiar*)
Tools: Git/GitHub, LaTeX, MySQL

Honors and Awards

KVPY Fellowship (Funded by DST, Govt. of India) *2021 – Present*
Joint Entrance Examination (Advanced), All India Rank 354 *2021*
KVPY (SX), All India Rank 61 *2021*
NTSE Scholarship (Awarded by NCERT, Govt. of India) *2019 – 2021*

Leadership and Extracurriculars

Coordinator - Killer Instinct (Pravega X) *Jan 2023 - Jan 2024*
Managed a 15-person team to organize a murder mystery event for 500+ participants during the Pravega X undergraduate festival.

Spark - Startup Incubation Program *Jul 2023 - Oct 2023*
Selected for a four-month startup incubation program at ARTPARK @ IISc, funded by India's Dept. of Science & Technology.

MIT Solve - Youth Innovation Challenge *Jan 2023*
Co-developed and presented a healthcare innovation targeting Hospital-Acquired Infections for the MIT Solve Youth Innovation Challenge.