

Nikhil S. Mande

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Education and work experience

- Jan 2023– **Lecturer (Assistant Professor)**, *University of Liverpool*, Liverpool, UK.
- Nov 2020–Dec 2022 **Postdoc**, *Algorithms and Complexity group, CWI (Centrum Wiskunde & Informatica)*, Amsterdam, The Netherlands, Host: Ronald de Wolf.
- Dec 2018–Sep 2020 **Postdoc**, *Georgetown University*, Washington D.C., USA, Host: Justin Thaler.
- Aug 2013–Nov 2018 **Ph.D.**, *TIFR (Tata Institute of Fundamental Research)*, Mumbai, India.
Computer Science.
Awarded TIFR Alumni Association-Sasken Best Thesis Award for the Best PhD Thesis in Technology and Computer Sciences
- July 2011–May 2013 **M.Sc.**, *CMI (Chennai Mathematical Institute)*, Chennai, India.
Applications of Mathematics with a specialization in Computational Mathematics.
Awarded CMI Gold Medal of Excellence
- July 2007–May 2010 **B.Math. (Hons.)**, *ISI (Indian Statistical Institute)*, Bengaluru, India.

Theses and projects

- Nov 2018 *Communication Complexity of XOR Functions*, Ph.D. thesis, TIFR Mumbai.
Advisor: Arkadev Chattopadhyay
- May 2013 *Spectral Graph Theory*, M.Sc. thesis, CMI, Chennai.
Advisor: Prajakta Nimbhorkar
- June 2009 *Minimum variance hedging of American and European options using the binomial model*, Summer project, Tata Consultancy Services, Hyderabad.
Advisor: M. Vidyasagar. Sponsored by the Indian Academy of Sciences.

Awards and honors

- 2026 University of Liverpool Faculty of Science and Engineering Learning, Teaching and Student Experience Award for the project “Cutebots for outreach”.
- 2024 University of Liverpool, Guild Awards. I was one of three candidates nominated for Teacher of the Year in the Faculty of Science and Engineering (comprising 10 departments)

- 2019 TIFR Alumni Association-Sasken Best Thesis Award for the Best PhD Thesis in Technology and Computer Sciences
- 2013 CMI Gold Medal of Excellence

Research interests

I am broadly interested in the area of quantum computing and computational complexity theory. More specifically, I have an interest in classical and quantum query complexity and communication complexity, approximation theory, quantum computing, Boolean circuit complexity, Fourier analysis of Boolean functions, and the connections between them.

Professional service

- Program committee member of FSTTCS 2025, ESA 2024, FSTTCS 2023
Reviewer/subreviewer for FOCS, STOC, QIP, FSTTCS, SODA, CCC, ESA, ICALP, STACS, TQC, RANDOM, MFCS, ISAAC, SICOMP, TheoretCS, IEEE Trans. IT, JCSS, ToC, QIC, Comput. Comp., ACM ToCT, Quantum, IPL, DISOPT, DMTCS, The Computer Journal
- 2025- I am the Equality, Diversity, Inclusion, and Wellbeing (EDI&W) lead for the School of Computer Science and Informatics (CS&I) at the University of Liverpool. Our website is [here](#) and is in the process of being updated.
 - 2024-25 I organized regular seminar meetings in the Algorithms, Complexity Theory, and Optimization research group at the University of Liverpool.
 - 2023-25 I am a member of the [CS&I outreach team](#) at the University of Liverpool. Until late 2025, I led this team. As part of that role I used to organize day-long visits from under-represented schools (with students that typically wouldn't go to university) to our department to try to impress upon them that computer science is an interesting and relevant subject to study at a higher level.
 - 2014-18 I was a member of the Science Popularization and Public Outreach Committee of TIFR.
 - 2014-18 Coordinator of the Student Seminar (\approx Theory lunch) in STCS, TIFR

Teaching/supervision experience

- PhD students: I am currently supervising Joe Morris and co-supervising Taha Abdlsalam and [Ziad Ismaili Alaoui](#).
- 2026 COMP702 (M.Sc. project) at University of Liverpool: first supervisor of 7 students and (expected to be) second supervisor of 7 students.
 - 2025-26 Module coordinator for COMP202 (Complexity of Algorithms) at University of Liverpool (roughly 300 students)

- 2025-26 COMP390 (Undergraduate Final-Year project) at University of Liverpool: first supervisor of 7 students and second supervisor of 6 students.
- 2025 COMP702 (M.Sc. project) at University of Liverpool: first supervisor of 7 students and second supervisor of 7 students.
- 2024-25 Module coordinator for COMP202 (Complexity of Algorithms) at University of Liverpool (roughly 275 students)
- 2024-25 Module coordinator for COMP335 (Communicating Computer Science) at University of Liverpool (6 students)
- 2024-25 COMP390 (Undergraduate Final-Year project) at University of Liverpool: first supervisor of 7 students and second supervisor of 9 students.
- 2024 COMP702 (M.Sc. project) at University of Liverpool: first supervisor of 6 students and second supervisor of 6 students.
- 2023-24 Module coordinator for COMP202 (Complexity of Algorithms) at University of Liverpool (roughly 340 students)
- 2023-24 Module coordinator for COMP335 (Communicating Computer Science) at University of Liverpool (8 students)
- 2023-24 COMP390 (Undergraduate Final-Year project) at University of Liverpool: first supervisor of 3 students and second supervisor of 4 students.
- 2023 COMP702 (M.Sc. project) at University of Liverpool: first supervisor of 4 students and second supervisor of 4 students.

Extracurricular activities

I have held several national records in the category of blindfolded speedcubing and solving the Rubik's cube in the fewest number of moves (fewest moves challenge) in the past. My full speedcubing profile is [here](#). I have been associated with the [World Cube Association](#) as a senior delegate for India and South East Asia, and as a member of the WCA Regulations Committee.

Links

- [DBLP](#), [Google Scholar](#)

Grants

- 2025 LMS Computer Science Small Grant "Quantum combinatorial group testing for evaluating Boolean functions", £1,000
- 2025 Faculty of Science and Engineering (University of Liverpool) Learning and Teaching Enhancement Project "Interactive robots for outreach and learning", £1,030
- 2024-26 co-I on Royal Society International Exchanges Grant "Power of Knowledge in Explorable Uncertainty", £12,000

- 2023 University of Liverpool Early Career Researcher and Returners Fund grant “Quantum cryptography through the lens of query complexity”, £1,917.24
- 2016-2018 TCS Research Scholar Fellowship. This fellowship funded my PhD scholarship and provided an annual contingency grant for its duration.

Publications

As is conventional in my area of research, all author lists in the following sections are sorted alphabetically by last name. Publications are listed reverse chronologically in year of publication. All of my papers are available in the public domain: either on [arXiv](#), or on [ECCC](#), or on both.

Journal Publications

- [1] Sourav Chakraborty, Arkadev Chattopadhyay, Peter Høyer, Nikhil S. Mande, Manaswi Paraashar, and Ronald de Wolf. “The Role of Symmetry in Quantum Query-to-Communication Simulation”. In:
Theory of Computing (to appear) (2026).
This paper combines and extends results from [21] and [24].
- [2] Alison Hsiang-Hsuan Liu and Nikhil S. Mande. “Instance Complexity of Boolean functions”. In:
Discrete Mathematics and Theoretical Computer Science (to appear) (2026).
[arXiv preprint](#).
- [3] Nikhil S. Mande and Ronald de Wolf. “Tight Bounds for Quantum Phase Estimation and Related Problems”. In: *Quantum* (to appear) (2026).
Earlier version in **ESA’23**
[arXiv preprint](#).
- [4] Arjan Cornelissen, Nikhil S. Mande, and Subhasree Patro. “Improved Quantum Query Upper Bounds Based on Classical Decision Trees”. In:
Quantum (2025).
Earlier version in **FSTTCS’22**
Presented at **TQC 2022** (workshop track).
[arXiv preprint](#).
- [5] Nikhil S. Mande and Changpeng Shao. “Lower Bounds for Quantum-Inspired Classical Algorithms Via Communication Complexity”. In:
Quantum (2025).
[arXiv preprint](#).
- [6] Nikhil S. Mande and Swagato Sanyal. “On Parity Decision Trees for Fourier-Sparse Boolean Functions”. In:
ACM Transactions on Computation Theory (2024).
Earlier version in **FSTTCS’20**.
[ECCC report](#).
- [7] Arkadev Chattopadhyay and Nikhil S. Mande. “A Short List of Equalities Induces Large Sign Rank”. In:
SIAM Journal on Computing (2022).

Earlier version in **FOCS'18**.

[ECCC Report](#) of an earlier version.

- [8] Mark Bun, Nikhil S. Mande, and Justin Thaler. “Sign-rank Can Increase under Intersection”. In: **ACM Transactions on Computation Theory** 13.4 (2021).
Earlier version in **ICALP'19**.
[ECCC Report](#).
- [9] Arkadev Chattopadhyay, Meena Mahajan, Nikhil S. Mande, and Nitin Saurabh. “Lower bounds for linear decision lists”. In: **Chicago Journal of Theoretical Computer Science** (2020).
[ECCC report](#).
- [10] Arkadev Chattopadhyay, Nikhil S. Mande, and Suhail Sherif. “The Log-Approximate-Rank Conjecture Is False”. In: **Journal of the ACM** (2020).
Earlier version in **STOC'19**.
Invited to SICOMP (STOC special issue)
Invited to ToC
Invited talk at **HALG 2020**.
[ECCC report](#).
- [11] Arkadev Chattopadhyay and Nikhil S. Mande. “Separation of Unbounded-Error Models in Multi-Party Communication Complexity”. In: **Theory of Computing** (2018).
[ECCC report](#).

Conference Publications

Conference publications here exclude those subsumed by journal versions; those appear in the preceding section.

- [12] Arjan Cornelissen, Nikhil S. Mande, Subhasree Patro, Nithish Raja, and Swagato Sanyal. “Quantum Search With Generalized Wildcards”. In: **TQC (to appear)**. 2026.
[arXiv preprint](#).
- [13] Ziad Ismaili Alaoui and Nikhil S. Mande. “Hardness of Finding Kings and Strong Kings”. In: **FSTTCS**. 2025.
[arXiv preprint](#).
- [14] Deepu Benson, Balagopal Komarath, Nikhil S. Mande, Sai Soumya Nalli, Jayalal Sarma, and Karteek Sreenivasaiah. “Sensitivity and Query Complexity under Uncertainty”. In: **MFCS**. 2025.
This paper combines and extends results from [this paper](#) and [this paper](#)
[arXiv preprint](#).
- [15] Arjan Cornelissen, Nikhil S. Mande, and Subhasree Patro. “Quantum Sabotage Complexity”. In: **FSTTCS**. 2024.
[arXiv preprint](#).

- [16] Nikhil S. Mande, Manaswi Paraashar, Swagato Sanyal, and Nitin Saurabh. “On the Communication Complexity of Finding a King in a Tournament”. In: **RANDOM**. 2024.
[arXiv preprint](#).
- [17] Arkadev Chattopadhyay, Yogesh Dahiya, Nikhil S. Mande, Jaikumar Radhakrishnan, and Swagato Sanyal. “Randomized versus Deterministic Decision Tree Size”. In: **STOC**. 2023.
[ECCC Report](#).
- [18] Arkadev Chattopadhyay, Nikhil S. Mande, Swagato Sanyal, and Suhail Sherif. “Lifting to Parity Decision Trees via Stifling”. In: **ITCS**. 2023.
[ECCC Report](#).
- [19] Olivier Lalonde, Nikhil S. Mande, and Ronald de Wolf. “Tight Bounds for the Randomized and Quantum Communication Complexities of Equality with Small Error”. In: **FSTTCS**. 2023.
[ECCC Report](#) of an earlier version.
- [20] Nikhil S. Mande, Manaswi Paraashar, and Nitin Saurabh. “Randomized and Quantum Query Complexities of Finding a King in a Tournament”. In: **FSTTCS**. 2023.
[arXiv preprint](#).
- [21] Sourav Chakraborty, Arkadev Chattopadhyay, Peter Høyer, Nikhil S. Mande, Manaswi Paraashar, and Ronald de Wolf. “Symmetry and Quantum Query-to-Communication Simulation”. In: **STACS**. 2022.
[arXiv preprint](#).
- [22] Nikhil S. Mande, Swagato Sanyal, and Suhail Sherif. “One-way communication complexity and non-adaptive decision trees”. In: **STACS**. 2022.
[ECCC Report](#).
- [23] Sourav Chakraborty, Nikhil S. Mande, Rajat Mittal, Tulasimohan Molli, Manaswi Paraashar, and Swagato Sanyal. “Tight Chang’s-lemma-type bounds for Boolean functions”. In: **FSTTCS**. 2021.
[arXiv preprint](#).
- [24] Sourav Chakraborty, Arkadev Chattopadhyay, Nikhil S. Mande, and Manaswi Paraashar. “Quantum Query-To-Communication Simulation Needs a Logarithmic Overhead”. In: **CCC**. 2020.
Presented at **QIP 2020**.
[ECCC report](#).
- [25] Nikhil S. Mande, Justin Thaler, and Shuchen Zhu. “Improved Approximate Degree Bounds for k-Distinctness”. In: **TQC**. 2020.
[ECCC report](#).

- [26] Andrej Bogdanov, Nikhil S. Mande, Justin Thaler, and Christopher Williamson. “Approximate Degree, Secret Sharing, and Concentration Phenomena”. In: ***APPROX/RANDOM***. 2019. [ECCC Report](#).
- [27] Arkadev Chattopadhyay and Nikhil S. Mande. “A Lifting Theorem with Applications to Symmetric Functions”. In: ***FSTTCS***. 2017. [ECCC Report](#) of an extended version.

Preprints

- [28] Nikhil S. Mande, Swagato Sanyal, and Viktor Zamaraev. *Complexity of Learning Matchings and Half Graphs Via Edge Queries*. 2025. [arXiv preprint](#).
- [29] Arjan Cornelissen, Nikhil S. Mande, Maris Ozols, and Ronald de Wolf. *Exact Quantum Query Complexity of Computing Hamming Weight Modulo Powers of Two and Three*. 2021. [arXiv preprint](#).

References

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