Ishaan Kannan

ishaan_kannan@g.harvard.edu | https://ishaan-kannan.github.io/ | https://x.com/Ishaan_Kannan

Education

Harvard University

Ph.D., Quantum Science and Engineering (Theoretical Physics focus) *2025 - present*

- Quantum Information and Computation, Machine Learning. GPA: 4.0/4.0
- Advisor: Jordan Cotler

California Institute of Technology

B.S., Physics (Major), Computer Science (Minor) *2020 - 2024*

- GPA: 4.2/4.3
- Research mentors: John Preskill, Hsin-Yuan (Robert) Huang, Leo Zhou

Publications

** denotes equal contribution. † denotes corresponding authorship on alphabetically-ordered work.*

[1] **I. Kannan***, S. Prabhu*, S. A. Khan, M. M. Sohoni, X. Song, S. Roy, A. Senanian, V. Fatemi, P. L. McMahon, J. Cotler. Exponential quantum advantage for learning signals with a single qubit, 2026. *arXiv:2608.13521 [quant-ph]*.

[2] C. C. V. de Pradenne*, **I. Kannan***, H. Putterman, J. Cotler. Restrictions on non-Clifford fault tolerance and ruling out beyond-SQL quantum metrology, 2026. *arXiv:2607.27342 [quant-ph]*. Under review at *Physical Review Letters*.

[3] N. Romanov, P. Ivashkov, W. Gong, **I. Kannan**, A. Gu, H. Hu, S. Yelin. Learning Arbitrary Lindbladians with Quantum Error Correction, 2026. *arXiv:2606.18188 [quant-ph]*. Under review at *PRX Quantum*.

[4] **I. Kannan***, H. Putterman*, J. Cotler. Exponential speedups in fault-tolerant processing of quantum experiments, 2026. *arXiv:2605.02057 [quant-ph]*. Under review at *Nature Communications*.

[5] J. Cotler, D. L. Danielson, **I. Kannan**†. Quantum Advantage for Sensing Properties of Classical Fields, 2026. *arXiv:2602.17591 [quant-ph]*. To appear in *Physical Review X*.

[6] J. Cotler, W. Gong, **I. Kannan**†. Noisy Quantum Learning Theory. *Nature Communications* 17, 6979 (2026).

[7] **I. Kannan**, R. King, L. Zhou. A Quantum Approximate Optimization Algorithm for Local Hamiltonian Problems, 2024. *arXiv:2412.09221 [quant-ph]*.

[8] H. Zhao*, L. Lewis*, **I. Kannan***, Y. Quek, H.-Y. Huang, M. C. Caro. Learning Quantum States and Unitaries of Bounded Gate Complexity. *PRX Quantum* 5, 040306 (2024).

Awards and Honors

2026 **Hertz Fellowship, Finalist (50/1500)**, Hertz Foundation
NDSEG Graduate Fellow (∼ 100/7000), US Department of Defense
NSF Graduate Research Fellow (declined, 11 awards within subfield), National Science Foundation

2025 **QuICS Lanczos Graduate Fellowship (declined)**, University of Maryland
Cover Feature Article, PRX Quantum
International Year of Quantum Feature Collection, Selected Article, PRX Quantum

2024 **Richard P. Feynman Prize in Theoretical Physics**, California Institute of Technology

2021, 2022 **Summer Undergraduate Research Fellowship**, California Institute of Technology

2019 **National Merit Scholarship Finalist**, NMSC

2019 **Presidential Scholar Nominee**, US Dep. of Education

Presentations

1. "*Making quantum technology useful for scientific discovery*". Invited talk at Cornell University, McMahon Lab, 2026.
2. "*Foundations for quantum speedups in noisy experiments*". Invited talk at Hon Hai (Foxconn), 2026.
3. "*Foundations for quantum speedups in noisy experiments*". Invited talk at the EPFL Workshop on Quantum Sensing, Learning, and Verification, 2026.
4. "*Foundations for quantum speedups in noisy experiments*". Invited talk at Harvard Quantum Initiative, Yelin Lab, 2026.
5. "*Learning from noisy quantum experiments*". Invited talk at the Harvard Theory of Computation Seminar, 2026.
6. "*Foundations for quantum speedups in noisy experiments*". Invited talk at the Harvard Quantum Seminar, 2026.
7. "*Foundations for quantum speedups in noisy quantum experiments*". Invited talk at the MIT Center for Theoretical Physics, 2026.
8. "*Learning quantum states and unitaries of bounded gate complexity*". Poster presentation at Quantum Information Processing (QIP) conferece, 2024.
9. "*Approximate Ground States of the Quantum Heisenberg Model Through a Modified Quantum Approximate Optimization Algorithm*". Caltech SURF Seminar, 2022.
10. "*Star Formation Environments: Clump Properties in Spiral Galaxy NGC 4501*". Caltech SURF Seminar, 2021.

Teaching Experience

2023-24	**Quantum Learning Theory**, Student Instructor (*self-designed course*) **Graduate Quantum Mechanics**, Teaching Assistant	*Caltech*
2022, 2023	**Electromagnetism and Special Relativity**, Teaching Assistant	*Caltech*
2021-24	**Dean's Tutor**, Physics, mathematics, and CS courses	*Caltech*

Other

Peer Review

QCTiP 2025, TQC 2026

Standardized Testing

SAT: 1590/1600

Extracurricular Activities

2020-24	**NCAA Div. 3 Tennis**, First singles, doubles player. National team rank 13 (school record). Western conferences individual rank 8. 2x First-Team All-SCIAC.	*Caltech*
2022-	**Pottery**, Amateur	
2008-	**Music**, 15 years violinist, 12 years pianist	