Arkopal Dutt

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Education

Massachusetts Institute of Technology (MIT), Cambridge, MA, USA **Feb. 2018 - Dec. 2023**

Ph.D. in Mechanical Engineering, Advisor: Isaac L. Chuang

Thesis: Accelerating Learning of Quantum Systems using Prior Information

Massachusetts Institute of Technology (MIT), Cambridge, MA, USA **Sep. 2015 - Feb. 2018**

S.M. in Mechanical Engineering

Thesis: High Order Stochastic Transport and Lagrangian Data Assimilation

Indian Institute of Technology Bombay (IITB), Mumbai, MH, India **July 2011 - May 2015**

B.Tech. in Aerospace Engineering (Honors) with Minor in Mathematics

Research Experience

Research Scientist, IBM Quantum, IBM Research Cambridge	Jan. 2024 – Now
Research Assistant, Center for Ultracold Atoms, Research Laboratory of Electronics, MIT	Jan. 2019 – Dec. 2023
Long-time visitor at Institute for Pure and Applied Mathematics (IPAM), UCLA	Oct., 2023
Part-time Quantum Researcher CO-OP Intern, IBM Research, Cambridge	Oct. 2022 – Apr., 2023
Research Intern, IBM T.J Watson Research Center Mentors: Antonio Mezzacapo and Sarah Sheldon	Jun. – Aug., 2022
Research Intern, IBM T.J Watson Research Center Mentors: Antonio Mezzacapo and Sarah Sheldon	Jun. – Aug., 2021
Research Intern, IBM T.J Watson Research Center Mentors: Lev Bishop and Sarah Sheldon	Jun. – Aug., 2020
Research Intern, Los Alamos National Laboratory Mentors: Andrey Lokhov and Marc Vuffray	Jun. – Aug., 2018
Research Assistant, MSEAS Lab, MIT	Sep. 2015 – Aug. 2018
Research Intern, Space Science and Engineering Center, University of Wisconsin, Madison, USA Mentor: Sanjay S. Limaye	May – Jul., 2014

Selected Publications

[1] Full list available on Google scholar

1. Tomography of quantum states with bounded extent. $^{(\alpha)}$S. Arunachalam, & **A. Dutt**
   2026, [arXiv:2606.07425]
2. Tomography of quantum states with bounded extent. $^{(c)}$**A. Dutt**, A. Chowdhury, K. Temme, & H. Krovi
   2026, [arXiv:2604.26945]
3. Learning stabilizer structure of quantum states. $^{(\alpha)}$S. Arunachalam, & **A. Dutt**
   STOC 2026 (To appear), [arXiv:2510.05890]
4. Testing and learning structured quantum Hamiltonians. $^{(\alpha)}$S. Arunachalam, **A. Dutt**, & F. E. Gutierrez.
   Comm. Math. Phys. (2026), STOC 2025, TQC 2025 Talk. [arXiv:2411.00082.]
5. Classical and Quantum Polynomial Freiman-Ruzsa Algorithms.
   $^{(\alpha)}$S. Arunachalam, D. Castro-Silva, **A. Dutt**, & T. Gur.
   ITCS 2026 Talk and Proceedings. QIP 2026 Talk (joint submission with J. Briët). [arXiv:2509.02338]
6. Efficiently learning depth-3 circuits via quantum agnostic boosting.
   $^{(\alpha)}$S. Arunachalam, D., **A. Dutt**, A. Gheorghiu & M. de Oliveira.
   COLT 2026 (To appear), QIP 2026 Talk. [arXiv:2509.02338]

[1] Author listings are in alphabetical order $^{(\alpha)}$ as is typical in TCS or ordered by contribution $^{(c)}$ as is typical in physics and ML.

7. Polynomial-time tolerant testing stabilizer states. $^{(\alpha)}$S. Arunachalam, & **A. Dutt**
STOC 2025, QIP 2026 Talk [arXiv:2408.06289]

8. Krylov diagonalization of large many-body Hamiltonians on a quantum processor.
$^{(c)}$N. Yoshioka, M. Amico, W. Kirby, P. Jurcevic, **A. Dutt**, B. Fuller, S. Garion, H. Haas, I. Hamamura, A. Ivrii, R. Majumdar, Z. Minev, M. Motta, B. Pokharel, P. Rivero, K. Sharma, C. J. Wood, A. Javadi-Abhari, & A. Mezzacapo.
Nature Communications (2025). [arXiv:2407.14431]

9. Learning low-degree quantum objects. $^{(\alpha)}$S. Arunachalam, **A. Dutt**, F. E. Gutierrez, & , C. Palazuelos
Mathematische Annalen (2025), ICALP 2024 [arXiv:2405.10933.]

10. Practical Benchmarking of Randomized Measurement Methods for Quantum Chemistry Hamiltonians.
$^{(c)}$**A. Dutt**, W. Kirby, R. Raymond, C. Hadfield, S. Sheldon, I. L. Chuang, & A. Mezzacapo.
2023, [arXiv:2312.07497.]

11. Power of sequential protocols in hidden quantum channel discrimination.
$^{(c)}$S. Sugiura, **A. Dutt**, W. J. Munro, S. Zeytinoğlu, & I. L. Chuang.
Phys. Rev. Lett. (2023). [arXiv:2112.14553]

12. Active Learning of Quantum System Hamiltonians yields Query Advantage.
$^{(c)}$**A. Dutt**, E. Pednault, C. W. Wu, S. Sheldon, J. Smolin, L. Bishop, & I. L. Chuang.
Phys. Rev. Research (2023). [arXiv:2112.14553]

13. Optimal algorithms for learning quantum phase states.
$^{(\alpha)}$S. Arunachalam, S. Bravyi, **A. Dutt**, & T. J. Yoder.
TQC 2023 Talk and Proceedings. [arXiv:2208.07851]

14. Bootstrap Embedding on a Quantum Computer.
$^{(c)}$Y. Liu, O. R. Meitei, Z. E. Chin, **A. Dutt**, M. Tao, T. Van Voorhis, & I. L. Chuang
Journal of Chemical Theory and Computation (2023). [arXiv:2301.01457]

15. Exponential Reduction in Sample Complexity with Learning of Ising Model Dynamics.
$^{(c)}$**A. Dutt**, A. Y. Lokhov, M. Vuffray, & S. Misra.
ICML 2021 Long oral presentation and proceedings. Youth in High Dimensions 2021 Poster. [arXiv:2104.00995]

Selected Oral and Poster Presentations

1. Learning stabilizer structure of quantum states (based on *arXiv:2510.05890*)
   - ▷ Invited talk at Department of Computer Science Seminar, University of Chicago, March, 2026.
   - ▷ Invited talk at Department of Computer Science Seminar, UIUC, March, 2026.
   - ▷ Invited talk in "HQI group meeting" at Harvard, December, 2025.

2. Efficiently learning depth-3 circuits via quantum agnostic boosting (based on *arXiv:2509.02338*)
   - ▷ Contributed talk at QIP 2026, February, 2026.

3. Tolerant testing of stabilizer states (based on *arXiv:2408.06289*)
   - ▷ Contributed talk at QIP 2026, February, 2026.
   - ▷ Contributed talk at STOC 2025, June, 2025.
   - ▷ Invited talk in "QIP Group Meeting" at MIT, June, 2025.
   - ▷ Invited talk in "Quantum information on graphs" session at CanaDAM, Ottawa, May 19-23, 2025
   - ▷ Invited talk at QIT Thinking Seminar, Worcester Polytechnic Institute, MA, February 11, 2025.
   - ▷ Invited talk at AMS Fall Eastern Sectional Meeting, Albany, NY, October 19, 2024.

4. Optimal algorithms for learning quantum phase states (based on *arXiv:2208.07851*)
   - ▷ Contributed talk at TQC 2023, Aveiro, Portugal, July 24-28, 2023.
   - ▷ "Learning beyond Cliffords: states and circuits". Regular talk at QIP 2023, Ghent, Belgium, February 4-10, 2023.
   - ▷ Invited talk at Triangle Quantum Computing Seminar, October 14, 2022.
   - ▷ Poster presentation at C2QA Workshop, October 6, 2022. (*Awarded best theory poster*)

5. Power of sequential protocol in hidden channel discrimination (based on *arXiv:2112.14553*)

- ▷ Poster presentation at TQC 2024, Okinawa, Japan, September, 2024.
- ▷ Poster presentation with Sho Sugiura (NTT Research) at QIP 2023, Ghent, Belgium, February 4-10, 2023.
- ▷ Poster presentation at Coherent Network Computing 2022, October 24-26, 2022.

6. Exponential Reduction in Sample Complexity with Learning of Ising Model Dynamics (based on *arXiv:2104.00995*)
   - ▷ Long oral presentation at ICML 2021, July 22, 2021.
   - ▷ "Efficient Learning of Ising Models from Glauber Dynamics". Contributed poster at Youth in High Dimensions, ITCP, June, 2021.
7. Active learning of quantum system Hamiltonians (based on *arXiv:2112.14553*)
   - ▷ "Experimental Evaluation of Active Learning of a Two Qubit Cross-Resonance Hamiltonian". Contributed talk at APS March Meeting, March, 2021.
   - ▷ "Active Learning of Hamiltonians". Contributed talk at APS March Meeting, March, 2020.
   - ▷ "Active Learning for Hamiltonian Tomography". Contributed talk at Physics Informed Machine Learning Workshop, January 15, 2020.

Honors and Awards

Director's Postdoctoral Fellowship, Los Alamos National Laboratory (declined)	Aug., 2023
James C. Keck Travel Award from Department of Mechanical Engineering, MIT for TQC 2023	2023
MIT GSC Conference Grant for TQC 2023	2023
MIT Great Dome Award	2023
Physics Informed Machine Learning 2020 Travel Grant	2019
Applied Machine Learning Fellowship, Los Alamos National Laboratory	2018
SIAM Student Chapter Certificate in recognition of outstanding service and contributions	2018, 2021
American Geophysical Union (AGU) Fall Meeting Student Travel Award	2017
Undergraduate Research Award for undergraduate thesis at IITB	2015
Institute Academic Prizes for academic excellence at IITB	2013, 2014
S.N. Bose Scholarship (IUSSTF) for summer internship at University of Wisconsin, Madison	2014
Prestigious Indian Government Fellowship - Kishore Vaigyanik Protsahan Yojana (KVPY)	2010

Leadership and Professional Development

Institute for Artificial Intelligence and Fundamental Interactions, Speaker Selection Committee	2021 – 2023
Society of Industrial and Applied Mathematics (SIAM), MIT Chapter, President	2018 – 2021
Sidney-Pacific Graduate Residence, Vice-President of Resources and Treasurer	2017 – 2018

Professional Service

Conferences

- Program Committee: QCTiP (2026), COLT (2026), NeurIPS (2026)
- Subreviewer: QIP (2024, 2026), TQC (2023–25), SODA (2025, 2026), ITCS (2026), QTML (2025), ICML AI4Science (2022), NeurIPS AI4Science (2022)

Journal review: Nature Physics, PRX Quantum, Nature Communications, SICOMP, npj Quantum Information, Journal of Chemical Theory and Computation, Quantum, Quantum Information and Computation (Rinton Press), Digital Discovery

Teaching Experience

Kaufman Teaching Certificate Program (KTCP), MIT	Spring 2023
Co-instructor, Practical Computer Science for Computational Scientists, MIT	IAP 2019
Teaching Assistant, 2.003 Dynamics, MIT	Fall 2018
Teaching Assistant, 2.29 Numerical Fluid Mechanics, MIT	Spring 2017
Teaching Assistant, AE625 Particle Methods for Fluid Flow Simulation, IITB	Spring 2015
Teaching Assistant, AE333 Aerodynamics, IITB	Fall 2014

Technical Skills

Programming: Python, Julia, MATLAB, HTML, LaTeX
Software: Git, TensorFlow, Qiskit