Emil Khabiboulline

3100 Atlantic Building, Room 3353; University of Maryland; College Park, MD 20742; USA
ekhabibo@umd.edu | ekhabiboulline.me

Employment

National Institute of Standards and Technology &
University of Maryland College Park
(Joint Center for Quantum Information and Computer Science) September 2023 - Present
National Resource Council Postdoctoral Associate *Gaithersburg & College Park, MD*

Harvard University, Department of Physics February - May 2023
Postdoctoral Fellow *Cambridge, MA*

Amazon Quantum Computing June - September 2022
Research Scientist Intern *Pasadena, CA*

Kavli Institute for the Physics and Mathematics of the Universe June - August 2013
Visiting Researcher *Kashiwa, Japan*

Fermi National Accelerator Laboratory June - August 2011, June - July 2012
Seasonal Employee *Batavia, IL*

Education

Harvard University August 2016 - December 2022
Ph.D. and M.A. in Physics *Cambridge, MA*

- *Dissertation:* Quantum Communication and Thermalization, From Theory to Practice.
- *Committee:* Mikhail Lukin (chair), Aram Harrow, Daniel Jafferis, Ashvin Vishwanath.
- *Funding:* National Science Foundation Graduate Research Fellow.

California Institute of Technology September 2012 - June 2016
B.S. in Physics *Pasadena, CA*

- *Funding:* Stamps Scholar, Dunham Scholar, Fermi Research Alliance Scholar.
- *Honors:* Frank Teruggi Memorial Award, Lucy Guernsey Service Award, SanPietro Travel Prize.

Illinois Mathematics and Science Academy August 2009 - June 2012
High School Diploma *Aurora, IL*

- *Honors:* National Merit Finalist, National AP Scholar.

Patents

- E. T. Khabiboulline, J. S. Sandhu, M. U. Gambetta, M. D. Lukin, and J. Borregaard. Efficient quantum voting with information-theoretic security, U.S. Ser. No. 18/069,179.

Publications

- A. M. Dalzell, S. McArdle, M. Berta, P. Bienias, C.-F. Chen, A. Gilyén, C. T. Hann, M. J. Kastoryano, E. T. Khabiboulline, A. Kubica, G. Salton, S. Wang, and F. G. S. L. Brandão. *Quantum Algorithms: A Survey of Applications and End-to-end Complexities*. Cambridge University Press, Cambridge, April 2025.
- T. Schuster, B. Kobrin, P. Gao, I. Cong, E. T. Khabiboulline, N. M. Linke, M. D. Lukin, C. Monroe, B. Yoshida, and N. Y. Yao. Many-Body Quantum Teleportation via Operator Spreading in the Traversable Wormhole Protocol. *Phys. Rev. X*, 12:031013, July 2022.
- E. T. Khabiboulline, J. S. Sandhu, M. U. Gambetta, M. D. Lukin, and J. Borregaard. Efficient Quantum Voting with Information-Theoretic Security, arXiv:2112.14242. In revision for *PRX Quantum*.
- E. T. Khabiboulline, J. Borregaard, K. De Greve, and M. D. Lukin. Quantum-assisted telescope arrays. *Phys. Rev. A*, 100:022316, August 2019.
- E. T. Khabiboulline, J. Borregaard, K. De Greve, and M. D. Lukin. Optical Interferometry with Quantum Networks. *Phys. Rev. Lett.*, 123:070504, August 2019.
- S. Peng, R. Zhang, V. H. Chen, E. T. Khabiboulline, P. Braun, and H. A. Atwater. Three-Dimensional Single Gyroid Photonic Crystals with a Mid-Infrared Bandgap. *ACS Photonics*, 3(6):1131–1137, 2016.
- E. T. Khabiboulline, C. L. Steinhardt, J. D. Silverman, S. L. Ellison, J. T. Mendel, and D. R. Patton. Changing Ionization Conditions in SDSS Galaxies with Active Galactic Nuclei as a Function of Environment from Pairs to Clusters. *The Astrophysical Journal*, 795(1):62, 2014.
- E. J. DiMarco, E. Khabiboulline, D. F. Orris, M. A. Tartaglia, and I. Terechkine. Superconducting Solenoid Lens for a High Energy Part of a Proton Linac Front End. *IEEE Transactions on Applied Superconductivity*, 23(3):4100905, June 2013.

Presentations

- *Talk:* Journal Club of Quantum Information Group at NIST Boulder (July 31, 2025).
- *Talk:* Quantum Networking Seminar at NIST Boulder (July 29, 2025).
- *Poster:* Robust Quantum Simulation Workshop 2025.
- *Poster:* 32nd Annual NIST Sigma Xi Early-Career Poster Presentation (2025).
- *Talk (by coauthor):* APS Global Physics Summit 2025.
- *Poster:* Quantum Information Processing 2025.
- *Talk (Invited):* NIST Quantum Networking Seminar (December 17, 2024).
- *Poster:* Advancing Quantum Computation Beyond Gate-Model 2024.
- *Poster:* Theory of Quantum Computation, Communication and Cryptography 2024.
- *Talk:* Friday Quantum Seminar at the University of Maryland College Park (October 27, 2023).
- *Talk (Invited):* JQI-QuICS Special Seminar at Joint Center for Quantum Information and Computer Science (July 26, 2023).
- *Talk (Invited):* Liang Jiang's Group Meeting at University of Chicago (virtual) (March 31, 2023).
- *Talk:* Dissertation Defense at Department of Physics, Harvard University (December 2, 2022).
- *Poster:* Quantum Information Processing 2021.
- *Talk (Invited):* Dinner Seminar at Cosmic Dawn Center (July 21, 2020).
- *Talk (Invited):* Provocateur Presentation at Quantum Leap Challenge: Quantum Sensing Ideas Lab (May 18, 2020).
- *Talk (Invited):* Quantum Computing Seminar (January 13, 2020) at Brookhaven National Laboratory.
- *Talk:* American Physical Society March Meeting 2019 – Focus Session on Distributed Quantum Computation, Networking, and Information Security.
- *Poster:* Quantum Information Processing 2019.

- *Talk (Invited):* Lunch Seminar (November 8, 2018) at Institute for Theoretical Atomic, Molecular, and Optical Physics (Harvard).
- *Poster:* Quantum Science Gordon Research Conference 2018.
- *Talk:* John Preskill's Group Meeting at Caltech (May 23, 2018).
- *Talk:* Workshop on Quantum Information (April 23-24, 2018) at Center of Mathematical Sciences and Applications (Harvard).
- *Talk:* American Physical Society March Meeting 2016.
- *Poster:* International Conference on Quantum, Atomic, Molecular, and Plasma Physics 2015.
- *Poster (Chambliss Astronomy Achievement Student Award):* 223rd Meeting of the American Astronomical Society.
- *Poster (Special Award from CERN):* Intel International Science and Engineering Fair 2011.

Service

- *Reviewer:* Phys. Rev. A.
- *Reviewer:* EPJ Quantum Technology.
- *Reviewer:* Proceedings of the National Academy of Sciences (PNAS).
- *Reviewer:* npj Quantum Information.
- *Referee:* YQIS 2024.
- *Referee:* QIP 2023.
- *Referee:* QCrypt 2022.
- *Reviewer:* IEEE Transactions on Computers.
- *Referee:* Quantum Computing Theory in Practice 2020.

Instruction

- *Teaching Fellow:* Harvard Computer Science 127/227 (Cryptography), Fall 2021.
- *Teaching Fellow:* Harvard Physics 271 (Topics in the Physics of Quantum Information), Fall 2020.

Coding

- *Languages:* C++, Python, Julia.