

# Emil Khabiboulline

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## EMPLOYMENT

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**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

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**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

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- 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

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- Z. Liu, W. DeRocco, S. Gu, E. T. Khabiboulline, S. Choi, A. M. Childs, A. Hook, A. V. Gorshkov, and D. Gottesman. Measuring gravitational lensing time delays with quantum information processing, arXiv:2510.07898.
- 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

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- *Poster*: Quantum Information Processing 2026.
- *Talk (Invited)*: Seminar at Fermilab SQMS Center (January 8, 2026).
- *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

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- *Reviewer*: ACM Transactions on Quantum Computing.
- *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

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- *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

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- *Languages*: C++, Python, Julia.
- *Software*: Mathematica, MATLAB, COMSOL Multiphysics.