

Gregory R. Steinbrecher

Ph.D. Candidate, Electrical Engineering and Computer Science

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1 Education

- **Massachusetts Institute of Technology 2008-2012**

Bachelor of Science, Physics; Bachelor of Science, Electrical Engineering; Mathematics Minor

- **Massachusetts Institute of Technology 2012-2013**

Master of Engineering in Electrical Engineering and Computer Science

Advisors: Professor Jeffrey Shapiro (MIT) and Dr. Eric Dauler (MIT Lincoln Laboratory)

Masters Thesis (link to pdf): [Indium Arsenide Quantum Dots for Single Photons in the Communications Band](#)

- **Massachusetts Institute of Technology 2013-Present**

Ph.D. Candidate, Electrical Engineering and Computer Science

Advisor: Professor Dirk Englund

1.1 Relevant Graduate Courses

- **6.262** Discrete Stochastic Processes
- **6.267** Heterogeneous Networks: Architecture, Transport, Protocols, and Management
- **6.335J/18.336J** Fast Methods for Partial Differential & Integral Equations
- **6.450** Principles of Digital Communication
- **6.453** Quantum Optical Communication
- **6.728** Applied Quantum & Statistical Physics
- **6.840J/18.404J** Theory of Computation
- **18.369** Mathematical Methods in Nanophotonics

2 Research Papers

- Nicholas C Harris, Darius Bunandar, Mihir Pant, Greg R Steinbrecher, Jacob Mower, Mihika Prabhu, Tom Baehr-Jones, Michael Hochberg, and Dirk Englund. Large-scale quantum photonic circuits in silicon. *Nanophotonics*, 5(3):456–468, 2016b
- Jacob Mower, Nicholas C Harris, Gregory R Steinbrecher, Yoav Lahini, and Dirk Englund. High-fidelity quantum state evolution in imperfect photonic integrated circuits. *Physical Review A*, 92(3):032322, 2015a
- Nicholas C Harris, Gregory R Steinbrecher, Jacob Mower, Yoav Lahini, Mihika Prabhu, Tom Baehr-Jones, Michael Hochberg, Seth Lloyd, and Dirk Englund. Bosonic transport simulations in a large-scale programmable nanophotonic processor. *arXiv preprint arXiv:1507.03406*, 2015b
- Yoav Lahini, Gregory R Steinbrecher, Adam D Bookatz, and Dirk Englund. Quantum logic with interacting bosons in 1d. *arXiv preprint arXiv:1501.04349*, 2015
- Catherine Lee, Zheshen Zhang, Gregory R Steinbrecher, Hongchao Zhou, Jacob Mower, Tian Zhong, Ligong Wang, Xiaolong Hu, Robert D Horansky, Varun B Verma, et al. Entanglement-based quantum communication secured by nonlocal dispersion cancellation. *Physical Review A*, 90(6):062331, 2014b

3 Conference Papers

- Jelena Notaros, Jacob Mower, Mikkel Heuck, Nicholas Harris, Gregory Steinbrecher, Darius Bunandar, Cosmo Lupo, Tom Baehr-Jones, Michael Hochberg, Seth Lloyd, et al. Tunable-coupling resonator arrays for chip-based quantum enigma machines. In *CLEO: QELS_Fundamental Science*, pages FTh4C–4. Optical Society of America, 2016
- Catherine Lee, Darius Bunandar, Zheshen Zhang, Gregory Steinbrecher, P Ben Dixon, Franco N Wong, Jeffrey H Shapiro, Scott Hamilton, and Dirk R Englund. High-rate large-alphabet quantum key distribution over deployed telecom fiber. In *CLEO: QELS_Fundamental Science*, pages FTh3C–7. Optical Society of America, 2016
- Nicholas Harris, Gregory Steinbrecher, Jacob Mower, Yoav Lahini, Mihika Prabhu, Tom Baehr-Jones, Michael Hochberg, Seth Lloyd, and Dirk Englund. Controlling quantum transport with a programmable nanophotonic processor. In *APS Meeting Abstracts*, 2016a
- Jacob Mower, Nicholas C Harris, Gregory R Steinbrecher, Faraz Najafi, Yoav Lahini, Tom Baehr-Jones, Michael Hochberg, Karl K Berggren, and Dirk Englund. Quantum information processing using active silicon photonic integrated circuits. In *The European Conference on Lasers and Electro-Optics*, page CK_4b.1. Optical Society of America, 2015b

- Nicholas C Harris, Gregory R Steinbrecher, Jacob Mower, Yoav Lahini, and Dirk Englund. Quantum random walks in a programmable nanophotonic processor. In *2015 Conference on Lasers and Electro-Optics (CLEO)*, pages 1–2. IEEE, 2015a
- Gregory Steinbrecher, Nicholas C Harris, Jacob Mower, Mihika Prabhu, and Dirk R Englund. Programmable nanophotonic processor for arbitrary high fidelity optical transformations. In *CLEO: QELS_Fundamental Science*, pages FW4A–2. Optical Society of America, 2015
- Catherine Lee, Zheshen Zhang, Jacob C Mower, Greg Steinbrecher, Hongchao Zhou, Ligong Wang, Xiaolong Hu, Robert Horansky, Varun B Verma, Michael Allman, et al. High-dimensional time-energy entanglement-based quantum key distribution using dispersive optics. In *CLEO: QELS_Fundamental Science*, pages FM4A–3. Optical Society of America, 2014a
- Jacob C Mower, Nicholas C Harris, Greg Steinbrecher, Yoav Lahini, and Dirk Englund. An integrated programmable quantum photonic processor for linear optics. In *CLEO: QELS_Fundamental Science*, pages FM2A–3. Optical Society of America, 2014
- Gregory R Steinbrecher. Cross-layer design to maintain earthquake sensor network connectivity after loss of infrastructure. In *MILITARY COMMUNICATIONS CONFERENCE, 2012-MILCOM 2012*, pages 1–6. IEEE, 2012

4 Patents and Patent Applications

- Jacob C Mower, Nicholas C Harris, Dirk R Englund, and Greg Steinbrecher. Methods, systems, and apparatus for programmable quantum photonic processing, April 29 2016. US Patent App. 15/143,450

5 Teaching

- Teaching Assistant for *6.267: Heterogeneous Networks: Architecture, Transport, Protocols, and Management* in Fall 2015
Professors: Vincent Chan and Robert Gallager