

BENJAMIN STREKHA

<https://bstrekha.github.io> ♦ US Citizen

EDUCATION

- Princeton University** August 2019 – July 2024
Doctor of Philosophy in Electrical and Computer Engineering
Dissertation: Fundamental Bounds on Electromagnetic Phenomena
Keywords: computational photonics; numerical optimization; inverse design (topology optimization); performance limits; FDFD electromagnetic solver; fluctuational electrodynamics;
- University of Illinois Urbana-Champaign** August 2017 - May 2019
Master of Science in Physics
- University of Pennsylvania** August 2013 - May 2017
Bachelor of Arts in Physics, *summa cum laude*

WORK EXPERIENCE

- Quantum Transistors, Inc.** October 2024 –
Photonics Design Engineer
- Designed new photonic devices and systems on chip operating at the quantum level [used Ansys FDTD, MODE (EME, FDE), HFSS, and Flexcompute Tidy3D].
 - Maintained an active library of components and internally developed photonic process design kits aimed at a photonic foundry (used GDSFactory, KLayout).
 - Developed and ran automated data collection routines for large-scale wafer-level testing of photonic devices.
 - Performed statistical analysis on collected data and built confidence models of measured physical parameters of optoelectronic devices.

PUBLICATIONS

- Amaolo, A., Chao, P., **Strekha, B.**, Clarke, S., Mohajan, J., Molesky, S. and Rodriguez, A.W., Maximum Shannon Capacity of Photonic Structures. arXiv:2409.02089
- Strekha, B.**, Amaolo, A., Mohajan, J., Chao, P., Molesky, S. and Rodriguez, A.W., 2024. Limitations on bandwidth-integrated passive cloaking. *Physical Review A*, 110(6), p.063513.
- Strekha, B.**, Chao, P., Defo, R.K., Molesky, S. and Rodriguez, A.W., 2024. Suppressing electromagnetic local density of states via slow light in lossy quasi-one-dimensional gratings. *Physical Review A*, 109(4), p.L041501.
- Strekha, B.**, Krüger, M. and Rodriguez, A.W., 2024. Trace expressions and associated limits for equilibrium Casimir torque. *Physical Review A*, 109(1), p.012813.
- Strekha, B.**, Molesky, S., Chao, P., Krüger, M. and Rodriguez, A.W., 2022. Trace expressions and associated limits for nonequilibrium Casimir torque. *Physical Review A*, 106(4), p.042222.
- Chao, P., **Strekha, B.**, Kuate Defo, R., Molesky, S. and Rodriguez, A.W., 2022. Physical limits in electromagnetism. *Nature Reviews Physics*, 4(8), pp.543-559.

RESEARCH EXPERIENCE

- Princeton University** January 2020 – July 2024
Ph.D. Candidate

- Dissertation Adviser: Alejandro Wong Rodriguez, Ph.D.
- Proficient with scripting workflows on Linux-based high-performance computing clusters (ran jobs on Princeton's Adroit and Della clusters using SLURM). Ran large-scale electromagnetic simulations and topology optimization of photonic devices with respect to associated performance figures of merit.
- Experience with finite difference frequency/time domain electromagnetic solvers, numerical computing, and optimization theory.
- Knowledge of Python ecosystem for scientific computing.
- Familiarity with software engineering best practices (version control, cluster management, code profiling, and unit testing) due to contribution to the group's internal electromagnetic simulation code and QCQP solver.
- Deep familiarity with electromagnetism, photonics, semiconductor devices, and condensed matter theory more broadly.

TEACHING EXPERIENCE

Princeton University

September 2020 – May 2024

Assistant in Instruction

- Preceptor for COS 126 - Computer Science: An Interdisciplinary Approach (Spring 2023, Spring 2024).
- AI for ECE 453 - Optical and Quantum Electronics (Fall 2021).
- AI for ORF 363 / COS 323 - Computing and Optimization for the Physical and Social Sciences (Spring 2021, Spring 2022, Fall 2022).
- AI for MAT 340 - Applied Algebra (Fall 2020, Fall 2023).

University of Illinois

August 2017 – June 2019

Teaching Assistant

- Discussion TA for Physics 211 - University Physics: Mechanics (Spring 2019).
- Discussion TA for Physics 212 - University Physics: Elec & Mag (Fall 2018).
- Discussion TA for Physics 214 - University Physics: Quantum Physics (Summer 2018).
- Grader for Physics 569 - Emergent States of Matter (Spring 2018).
- Lab TA for Physics 212 - University Physics: Elec & Mag (Fall 2017).

University of Pennsylvania

January 2016 – May 2017

Teaching Assistant

- Recitation TA for Physics 102 - General Physics: Electromagnetism, Optics, and Modern Physics (Spring 2017 - Professor Douglas Durian).
- Grader for Physics 401 - Thermodynamics (Fall 2016 - Professor Douglas Durian).
- Grader for Physics 151 - Introduction to Electricity and Magnetism (Spring 2016 - Professor Joshua R. Klein).

TECHNICAL STRENGTHS

Computer Languages

Python (NumPy, SciPy, mpmath, CVXPY, NLOpt, Pydantic, Tidy3D), Java, MATLAB (CVX), C, Julia.

Software & Tools

Ansys Lumerical, Mathematica, L^AT_EX, Adobe Illustrator