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, EME, FDE, MODE, 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, LaTeX, Adobe Illustrator