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About

I have two degrees, in physics and computer science, from the University of Maryland. Additionally a minor degree in German language. Interested in DSP, learning/simulation models, and compilers for optics, computing platforms, and CAE.

Work Experience

- (2023-2025) MITRE/Naval Research Lab Plasma Physics division intern
- (Fall 2024-2026) National Institute of Standards and Technology Gaithersburg Quantum Measurements Division intern
- (Jun.-Jul. 2025) Bike tour leader Teen Treks, New York. I lead a bike tour adventure for a group of high school students from NYC to Montreal.
- (2026) Fraunhofer Heinrich Hertz Institute, research assistant, DSP for Photonic Networks

Research

- (Fall 2022) Color mapping python library project for optics research under Dr. Luke A. Johnson. Plotting package for complex amplitude of axial Schrödinger equation solutions. Used ideas from metric spaces (mathematical structure) on human perception of colors to enable clear plotting of optical amplitudes.
- (2023-2025) MITRE/Naval Research Lab built an experiment for Shack-Hartmann wavefront controlled partially-coherent optical system utilizing a deformable mirror. Wrote accompanying simulation and correlated field sampling software. Resulted in a first author peer-reviewed paper. Two key insights: identified a pair of partially coherent uniform correlation functions which are relatively simple and experimentally distinguishable and the beam quality behaves simply even in turbulent or nonlinear media. Experimental data we present make theory results applicable. Poster
- (Fall 2024-Current) NIST Gaithersburg, custom built numerical methods (Runge-Kutta-Fehlberg, arbitrary precision, shooting method) for optimization of torsion balance flexure for mechanical oscillator experiments on gravitational entanglement. First author research paper submitted on our novel numerical approach. Researchers at NIST and separately at Shantou University (mentioned in their 2025 publication) struggled to simulate thin flexure elements without our approach.
- (Spring 2024-Spring 2025) Combinatorial enumeration research under Dr. William Gasarch, established operator counting and periodicity for constrained permutations. Resulted in a first author paper, novel combinatorial proof method key insight: combinatorial counting problems on tie-allowed permutations, partitions, and regular permutations which are difficult even for advanced students can be made simple using counting arguments which use simple linear operators. Poster

Publications

- Schreyer, Benjamin; Younis, Daniel; Kaganovich, Dmitri; Johnson, Luke; Antonsen, Thomas; Hafizi, B. (2025). *Realization of Nontrivial Partial Spatial Coherence by Deformable Mirror.* Applied Optics https://doi.org/10.1364/AO.557755
- *Realization of phase perturbations by deformable mirror towards testing statistical nonlinear optics* Proceedings Volume 12939, High-Power Laser Ablation VIII; 129390V (2024) https://doi.org/10.1117/12.3012409 B. Schreyer, D. Younis, D. Kaganovich, L. A. Johnson, B. Hafizi, T. M. Antonsen Jr. (Feb 2024)
- Benjamin Schreyer, *Rigged Horse Numbers and their Modular Periodicity,* journal article, (Aug. 2024)

Publications under rev/submitted

Stable numerical technique to calculate the bending of flexures with extreme aspect ratios

Presentations/Lectures

- Weekly lecture: Intro Computational Fourier Optics (Fall semester 2024) (code and notes)
  - Gave lectures and assignments for a student led course on Fourier optics and associated computational methods/error analysis for physics students. Weekly lecture, supporting office hours, and graded work. Students were capable of completing a final project I designed to simulate a visible laser cavity with a simple gain medium.
- Undergraduate Colloquium *Shift Symmetry in Physics and Combinatorics* (October 2024)

- Presented my work in *Progress Report on Statistical Nonlinear Optics Projects* at a Naval Research plasma physics meeting (October 2023)
- University of Maryland Physics Undergraduate Colloquium *Perturbing Laser Initial Conditions with Deformable Mirror* (March 2024)
- University of Maryland Undergraduate Conference CU2MIP presentation of poster *Realization of phase perturbations by deformable mirror towards testing statistical nonlinear optics* (April 2024)

Education

BSC physics at the University of Maryland.
BSC computer science at the University of Maryland.
Minor in German language and literature at the University of Maryland.
One year at Montgomery College, courses in STEM.
University of Maryland total: GPA 3.7

Selected awards/service

- SPIE Mirror Technology Conference volunteer (Nov. 2024)
- SPIE Optics and Photonics Scholarship, potential contributions in optics spie.org (2024)
- Maryland Space Grant Scholarship, adaptive optics and partial coherence (2023, 2024)
- University of Maryland Bardasis Fellowship, on communication and DEI in physics (2022-2024)
- Referee for two papers, American Journal of Physics
- Computer Science Departmental Scholarship (2022-2023)
- Tutor with university physics society (2021-2022, 2025)
- Online Encyclopedia of Integer Sequences contribution

Undergraduate Work

- (Fall 2022-Spring 2023) Teaching assistant, wave physics course. Grading, and working with students in discussion
- (2021) Montgomery College, learning assistant for a class on proofs and discrete math

(2018-2022) Private tutor, most recently in university intro. physics

Personal Projects

- (Fall 2025) Parakraft/Parametro project- Integration of finetuned LLM agents and interoperation for Fusion, Onshape, and SolidWorks mechanical CAD
- ESP32 RTOS LED audio visualizer grid, parallelized microphone readout/processing and display control on embedded C platform to control LED spectrogram, web server control interface
- C++, OpenGL rendering engine and parallelized simulation of sphere collisions using spatial hashing

Languages: German language minor degree

Skills: Technical Writing, Teaching, Numerical Methods, Mechanical Simulation, Fourier Optics, Discretized Statistics, RTOS, Python, MATLAB, C++, AWS, SolidWorks; Fusion; OnShape API, Control Systems, Modeling Based Optimization.