

BRANDON FRIEND

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EDUCATION

Ph.D. in Physics, University of Wisconsin-Madison

August 2025 - Present

Research Focus: Quantum Computing Theory

B.S. in Physics, B.S. in Mathematics, University of Arizona

May 2025

Honors Thesis: "Quantum Computing of A Nuclear Lattice Model"

Overall GPA: 4.0 / 4.0

RESEARCH EXPERIENCE

Laser-Plasma Acceleration — NNSA MSII¹

June - August 2025

Research Intern, BELLA Center, Lawrence Berkeley National Laboratory

Mentor: Robert Jacob

- Restored Hundred Terawatt Thompson beamline performance and installed and calibrated an imaging spectrometer for a user experiment
- Developed analysis and visualization tools for plasma-density-profile diagnostics and correlation code relating density parameters to electron-beam charge and energy
- Established a proof-of-concept pipeline to search for correlations linking tunable experimental parameters, plasma density, and beam qualities; presented results and authored documentation for future users

Quantum Computing of Nuclear Physics

January 2024 - May 2025

Undergraduate Researcher

Advisor: Sean Fleming

- Conducted research on quantum computation and nuclear physics to establish a foundation for simulating large nuclei using quantum computers
- Simulated a helium nucleus in a nuclear lattice model using a qubit representation and produced a formal Honors Thesis, titled "Quantum Computing of A Nuclear Lattice Model," based on this project
- Authored a grant proposal and received the Dr. Lee Compton Exploratory Mini-Grant from the W.A. Franke Honors College to fund this research initiative

Attosecond Transient Absorption Project

August 2022 - August 2023

Undergraduate Research Assistant

Advisor: Arvinder Sandhu

- Enhanced experimental setup by installing new chambers, connecting water and gas lines, and defining optical paths
- Adapted experimental setup to address challenges associated with using liquid samples
- Implemented heating and cooling systems, improved gas line infrastructure, and integrated electronic sensing for improved experimental control

PROFESSIONAL EXPERIENCE

Graduate Teaching Assistant - Physics of Sports

August - December 2025

Department of Physics, University of Wisconsin-Madison

Instructor: Jim Reardon

- Assisted with course instruction by delivering occasional lectures and leading discussion sections to reinforce core physics concepts
- Held regular office hours to provide one-on-one academic support and address student questions
- Graded assignments and exams, ensuring timely, fair, and consistent evaluation

¹National Nuclear Security Administration Minority Serving Institutions Internship Program

College of Science Ambassador
College of Science, University of Arizona

August 2023 - May 2025

- Represented the Physics and Mathematics Departments during College of Science outreach events.
- Interacted with prospective students, providing information about College of Science programs.
- Facilitated College of Science events including New Student Welcome and Graduation.

Undergraduate Teaching Assistant - Vector Calculus
Department of Mathematics, University of Arizona

August - December 2023
Mentor: Arvind Suresh

- Prepared and delivered a lecture to prepare for a career in education. This required the creation of comprehensive teaching materials, organization for student understanding, and fielding questions during the lecture.
- Created written homework solutions and developed grading rubrics, ensuring fair and consistent evaluation.
- Conducted exam review sessions to aid students in their preparation.

Physics Preceptor - Introductory Mechanics and E&M
Department of Physics, University of Arizona

January - December 2023
Mentor: Samyukta Krishnamurthy

- Facilitated group discussions, guided students in grasping complex mechanics and electromagnetism concepts.
- Refined my teaching skills by leading small group sessions, connecting classroom theories to real-world problem-solving, and addressing general questions stemming from lectures.

PRESENTATIONS

Quantum Computing of A Nuclear Lattice Model
New York, New York

QSim Conference, August 2025

- Presented a research poster on simulating a nucleus with four nucleons on a quantum computer. Based on Pionless Effective Field Theory, a few qubits were used to model the interactions between nucleons. The simulation successfully produced a bound state, though the binding energy did not match experimental values.

Quantum Computing of Nuclear Physics Problems
University of Arizona W.A. Franke Honors College

Franke Honors Pinnacle, April 2024

- Presented a research poster on replicating previous results for computing the Deuteron binding energy on a quantum computer. The harmonic oscillator basis Hamiltonian was translated onto the quantum computing basis, and using the variational quantum eigensolver, the binding energy of the deuteron was estimated, yielding results on the correct order of magnitude.

PROFESSIONAL DEVELOPMENT

Numerical Methods in Quantum Information Science Summer School
UMass Amherst

August 2024

- Gained proficiency in coding with Julia and explored numerous Julia packages relevant to quantum information science.
- Developed confidence in applying numerical methods to research problems in quantum science.

Institute for Robust Quantum Simulation Summer School
University of Rhode Island and NSF Quantum Leap

August 2024

- Learned about quantum simulations using neutral atom arrays, ion traps, and superconducting transmon qubits, along with techniques like quantum tomography and tensor network simulations.
- Gained clarity on personal interests within quantum information science, inspired by advanced lectures on quantum algorithms and analog quantum simulations.

University of Wyoming Quantum Summer School

June 2024

- Examined condensed matter applications to quantum science, including spin liquids as topological quantum computers and solid-state qubits for quantum sensing.
- Heard from industry leaders in the Mountain West including speakers from Quantum Machines, Atom Computing, and Maybell Quantum.

Arizona Quantum Bootcamp

June 2024

University of Arizona

- Explored the fundamentals of quantum computing, including the use of universal gate sets in qubit state manipulation.
- Attended sessions on advanced topics such as Quantum Machine Learning, Quantum Materials, Nanophotonics, and Quantum Opto-mechanics.

Real-World Quantum Computing Workshop

May 2024

Lawrence Livermore National Laboratory

- Connected to the *Livermore Quantum Design and Integration Testbed (QuDIT)* to engage with cutting-edge superconducting qubit systems and perform experiments to establish quantum gates.
- Conducted qubit spectroscopy to characterize qubit frequency and enable quantum state readout.

AWARDS AND HONORS

Outstanding Senior Award in Physics

2025

Department of Physics, University of Arizona

Honored as the department's top graduating senior for excellence in research, academic achievement, and science community outreach.

John A. Leavitt Experimental Physics Prize

2025

Department of Physics, University of Arizona

Awarded the Experimental Physics Prize as the top student in the Physics Department's Advanced Lab Sequence for exceptional performance in several foundational physics experiments.

Program Award for Technical and Higher Education Scholarship

2024

National Nuclear Security Administration, U.S. Department of Energy

Dr. Lee Compton Exploratory Mini Grant

2024

W.A. Franke Honors College

Weaver Award for Undergraduate Research

2022-2023

Department of Physics, University of Arizona

SCHOLARSHIPS

Frank and Daphna Lederman Galileo Circle Scholarship

2024

College of Science, University of Arizona

Dr. Roger Haar Memorial Scholarship

2024

Department of Physics, University of Arizona

Lusk Scholarship Award

2024

Department of Mathematics, University of Arizona

Krider Endowed Scholarship in Atmospheric Sciences and Physics

2024

Department of Hydrology & Atmospheric Sciences, University of Arizona

Salomon and Carr Morgan Galileo Circle Scholarship <i>College of Science, University of Arizona</i>	2022
National Eagle Scout Association Scholarship <i>National Eagle Scout Association</i>	2022
Robert and Lesley Goldfarb Galileo Circle Scholarship <i>College of Science, University of Arizona</i>	2021
National Merit Scholarship <i>National Merit Scholarship Corporation</i>	2021-2024