Brayden Freitas

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EDUCATION

Graduate

University of Ottawa—Ottawa, ON, Canada—3.97 GPA **2022–2024**

Master of Science in Physics

Student in Experimental Photonics co-supervised by Dr.Jeff Lundeen and Dr.Benjamin Sussman. Focus on quantum imaging through the Canadian National Research Council.

Undergraduate

University of Pittsburgh—Pittsburgh, PA, USA—Cum Laude **2016–2020**

Bachelor of Science in Physics

Senior thesis in soft condensed matter simulation supervised by Dr.Robert Coalson.

Bachelor of Science in Mathematics

Accompanied by a minor in Computer Science.

EXPERIENCE

Professional

The University of Ottawa Physics Department—Ottawa, ON, Canada **2022–2024**

Teaching assistant working under Dr.Lora Rammuno to develop a physics undergraduate course on computational physics. The main language used in the course is Python. Responsibilities include teaching and managing laboratories, developing laboratory assignments, lectures, and take-home assignments, and assisting in the development of the course curriculum. Also assisted in running tutorials for an undergraduate-level advanced quantum mechanics course under Dr.Hang Chi, as well as working as a demonstration coordinator for an introductory physics course under Dr.Zbigniew Stadnik.

The Canadian National Research Council—Ottawa, ON, Canada **2022–2024**

Graduate researcher working in the Joint Center for Extreme Photonics lab. Working towards theorizing, designing, and demonstrating a quantum imaging scheme which utilizes entangled photon pairs generated via SPDC to characterize volumetric turbulent media. Responsibilities also include assisting other lab members in conducting a range of optics experiments and data analysis.

ASML—Wilton, CT, USA **2020–2021**

Integration engineer working on developing quick response algorithms and MATLAB functions for analyzing data from a highly-interconnected, complex system.

The French Alternative Energies and Atomic Energy Commission—Grenoble, France **2019**

Researcher for a theoretical condensed matter group. Worked on developing software for the KWANT quantum simulation Python package relating to electron densities within two-dimensional material stacks.

The University of Pittsburgh Physics Department—Pittsburgh, PA, USA **2017–2019**

Researcher for a computational physical chemistry group. Worked on simulations in the field of computational soft matter physics focusing on the morphology changes in polymer coated colloids when interacting with nanoparticles.

United States Army Medical Research Institute of Chemical Defense—APG, MD **2014–2016**

Intern for a computational biology group as well as an analytical toxicology group.

Selected Awards

Best Thesis in Science Award—University of Ottawa **Nomination — 2024**
This award is intended to acknowledge the best thesis in the sciences school at the University of Ottawa. I was nominated following the defense of my thesis entitled *Toward Improving General Quantum Imaging Algorithms and the Realization of Quantum Recording.*

TA Excellence Award—University of Ottawa **Honorable Mention — 2024**
This award is given every year to acknowledge a TA from across the University community who is a leader in assisting in teaching any course. The winner is chosen by a committee of professors and administrators, and nominations must be made jointly between a professor and the students of the TA. I was awarded an honorable mention in 2024 for my efforts going above and beyond the expectations of a TA in teaching and developing the computational physics course, as well as the quantum mechanics tutorial.

Physics TA Excellence Award—University of Ottawa **Received — 2023**
This award is given every year to acknowledge a graduate student who excels in the area of assisting in teaching Physics courses. The winner is chosen by the professors and lecturers within the department. I was chosen in 2023 for my exceptional TA work in performing/organizing first-year introduction to classical mechanics in-lecture demonstrations, teaching an upper-level-undergraduate quantum mechanics tutorial, as well as developing a first-year introduction to computational physics course.

Notable Course Work

Nonlinear Optics—University of Ottawa **Fall, Masters Year 1**
A graduate course taught by Dr.Bob Boyd focusing on the study of nonlinear effects in optics. Included topics relating to SHG, HHG, SDPC, four wave mixing, Kerr nonlinearity, and similar topics. Focused on both computational and experimental approaches to the topics.

Quantum Optics—University of Ottawa **Spring, Masters Year 1**
A graduate course taught by Dr.Ebrahim Karimi focusing on the theoretical basis of quantum field theory as it relates to optics. Included topics such as quantizing the EM field, coherent states of light, squeezed states of light, Hanbury-Brown-Twiss experiments, Hong-Ou-Mandel effects, and similar topics.

Quantum Physics at the Nanoscale Lab—University of Pittsburgh **Fall, Undergrad Year 3**
A specialized lab course taught by Dr.Sergey Frolov focusing on learning techniques for producing quantum bits with the intent of use in quantum computing. Worked with a small team of five students to produce a nanowire based qubit from design to production to testing.

PUBLICATIONS

Thesis

Toward Improving General Quantum Imaging Algorithms and the Realization of Quantum Recording. 2024. University of Ottawa, Ottawa, ON, Canada.

Selected Papers

Author—Freitas, B., Zhang Y., England D., Lundeen J., & Sussman B.. **Quantum correlated image recording through noisy and turbulent channels**. *Optica Quantum.* 2025, 3, 1, 78-83.

Co-Author—Ozmaian, M., **Freitas, B.**, & Coalson, R.. **Controlling the Surface Properties of Binary Polymer Brush Coated Colloids via Target Nanoparticles**. *J Phys. Chem. B.* 2019, 123, 1, 258-265.

Selected Posters

Quantum correlated recording through turbulent media. *Quantum Measurement and Sensing Winter School.* 2023. Trento, TN, Italy.

Increasing the robustness of quantum correlated imaging to scattering. *Photonics North.* 2023. Montréal, QC, Canada.

Controlling the surface properties of polymer coated colloids via targeted nanoparticles. *PQI's Kauffman Lecture.* 2018. Pittsburgh, PA, USA.