

Brayden Freitas

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EDUCATION

Graduate

University of Ottawa—Ottawa, ON—3.97 GPA

2022–Current

Doctorate of Philosophy 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—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 Canadian National Research Council—Ottawa, Ontario, Canada

2022–Current

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

The University of Ottawa Physics Department—Ottawa, Ontario, Canada

2022–2023

Teaching assistant working under Dr. Zbigniew Stadnik as a demonstration coordinator for introductory physics courses. Tasks included repairing, preparing, and performing a wide range of classical physics experiments as demonstrations to accompany first year physics lectures relating to Newtonian mechanics, rotational dynamics, and electromagnetism.

ASML—Wilton, Connecticut

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, Pennsylvania

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.

Notable Course Work

Nonlinear Optics—University of Ottawa

Fall, PhD 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, PhD 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, Junior Year

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.

TECHNICAL SKILLS

Languages

Programming—Java, C++, Rust, C, VBA

Scripting—Python, MATLAB, Shell, Mathematica, C#

Markup— \LaTeX , Markdown, HTML

Packages—SciPy, KWANT, Matplotlib

Computer programs

Software—Microsoft Office, Teams, Siemens Teamcenter, VSCode, Vim, Git, SolidWorks, Jupyter

Operating systems—Linux, Windows, Unix

Laboratory techniques

Clean Room—Class 100 clean room training, nanofabrication, characterization, nanowire placement.

Dry Lab—Working with high-powered pulse lasers, custom optical setups, e-beam lithography.

Wet Lab—Thin film deposition, animal handling.

Fabrication—Extensive woodworking expertise, some metal machining.

PUBLICATIONS

Papers

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.

Posters

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

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

Docking multiple proteins into botulinum toxin type A using computational methods. *Science and Math Academy Gallery Walk.* 2016. Aberdeen, MD.

Other

Author—**Freitas, B.**, McDonough, L., & Mead, J.. **34BF1.14 WSSP Duckweed cDNA Library Landoltia Puncata cDNA Similar to ADP-ribosylation factor, mRNA Sequence.** *NCBI* 2015.