

Danesh Morales Hashemi

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EDUCATION

University of Waterloo May 2025 - April 2027
Masters of Mathematics - **Applied Mathematics (Quantum Information)**
University of Waterloo September 2020 - April 2025
Bachelor of Mathematics - **Mathematical Physics** - Pure Mathematics Minor

RESEARCH EXPERIENCE

Undergraduate Research Assistant September 2024 – April 2025
Institute for Quantum Computing (IQC) Waterloo, ON

- Participating in the PHYS 437A/B: Research Project courses  under the supervision of **Joseph Emerson**.
- Working on developing **an efficient and scalable protocol** for estimating the fidelity of quantum circuits.
- Authoring a paper titled **“Demonstrating Circuit Benchmarking for Scalable and Efficient Fidelity Estimation”**, which is currently in progress for publication.

USEQIP Student May 2024 – August 2024
Institute for Quantum Computing (IQC) Waterloo, ON

- Accepted into the **Undergraduate School on Experimental Quantum Information Processing (USEQIP)**, a one-week program on the theoretical and experimental study of quantum information.
- Received the **Undergraduate Research Award (URA)** to conduct research at the IQC.
- Conducted research under the guidance of **Joseph Emerson**, focusing on the **theory of open quantum systems, quantum error characterization, and quantum error suppression**.

Undergraduate Research Assistant September 2023 – December 2023
University of Waterloo - Department of Applied of Mathematics Waterloo, ON

- Researched about the **bilinear controllability** of the 1-dimensional **Fokker-Planck equation**.
- Learned about **control theory, partial differential equations, functional analysis** with programming skills essential for investigating the controllability of the Fokker-Planck equation.

RESEARCH PROJECTS

1. Introduction to Randomized Compiling (in progress) 
Summary: The goal of this project is to understand the RC protocol step-by-step and explain why it works.
2. Introduction to Superoperator Representations and Characterization of Completely Positive Maps 
Summary: In this project, we the different superoperator representations and its properties.
3. Understanding the Impact of Error in Quantum Computers 
Summary: This project consists of a brief introduction to randomized compiling and circuit benchmarking.

RELEVANT COURSES

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|-----------------------------|-------------------------|---------------------------|
| • Calculus 1/2/3/4 | • Linear Algebra 1/2 | • Probability/Statistics |
| • Computational Mathematics | • ODEs 1/2/3 and PDEs 1 | • Differential Geometry |
| • Quantum Theory 1/2/3 | • Complex/Real Analysis | • Groups and Ring Theory |
| • Quantum Information | • Comp. Methods for DEs | • Galois and Field Theory |
| • Quantum Devices | • General Relativity | • Representation Theory |

AWARDS

- Institute for Quantum Computing **Undergraduate Research Award (URA)** (\$16,000 CAD)
- University of Waterloo **President’s Scholarship** 2020. (\$2,500 CAD)
- Full Undergraduate Educational Excellence Scholarship 2019** (\$250,000 USD)
National Secretary of Science and Technology of Panama