

# William Ward, MS, B.Eng.

APPLIED PHYSICS PH.D. CANDIDATE | ELECTRICAL ENGINEER | PHYSICIST

947-260-5298 | wardw@umich.edu | https://quantum-desert.github.io/ | william-ward010101/

## Education

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### University of Michigan

Ann Arbor, MI

PH.D. APPLIED PHYSICS

Sep. 2023 - Current

- Quantum Engineering Laboratory; PI: Dr. Zheshen Zhang
- PhD Candidate as of September 2025

### University of Michigan

Ann Arbor, MI

MS APPLIED ELECTROMAGNETICS AND RF CIRCUITS

Sep. 2023 - April 2025

- Overall GPA 3.96

### McMaster University

Hamilton, Ontario

B.ENG. ENGINEERING PHYSICS

Aug. 2018 - May 2023

- Overall GPA of 3.99

## Skills

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**Lab-Based** Vacuum Systems, Cryogenic Systems, Free-Space + Fiber Optical Alignment, PID Feedback, RF Locking, Single Photon Detection

**Software** Embedded C & C++, Python, Java, C# & .NET, Linux, Git, MATLAB

**Hardware** Cryogenic Mechanical Design, Cryogenic PCB Design, Digital + Analog Electronic Design & Analysis, 3D Printing

**Programs** Keysight ADS, Altium Designer, Autodesk Inventor, D.S. SolidWorks, Fusion360, NI Multisim, Zemax OpticStudio, EasyEDA

**Theory** E&M, Quantum Mechanics, Quantum + Nonlinear Optics, RF E&M, Quantum Information, Resonant MEMs, Color Centers

## Selected Publications

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### Entanglement Enhanced Neyman-Pearson Target Detection

Ann Arbor, Michigan

APPLIED PHYSICS - UNIVERSITY OF MICHIGAN

October 2025

W. Ward, et al. (2025). Physical Review A. <https://doi.org/10.1103/cx19-ljn8>

## Research Experience

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### Quantum Multi-Access Channel

Ann Arbor, Michigan

QUANTUM ENGINEERING LABORATORY - UNIVERSITY OF MICHIGAN

January 2025 - Present

- Led the conception, construction, and characterization of multi-access channel quantum-optics experimental platform, enabling high-precision investigations and discoveries in optical quantum science.

### Quantum Optomechanics

Ann Arbor, Michigan

QUANTUM ENGINEERING LABORATORY - UNIVERSITY OF MICHIGAN

February 2025 - Present

- Conceptualized, built and evaluated cryogenic electromechanical test platform; establishing proficiency in cryomechanical design
- Managed procurement and oversaw end-to-end assembly and validation of a \$600k dilution refrigerator system
- Responsible for continuous operation of Bluefors LD-400 Dilution Refrigerator at base temperature of 7 mK

### Entanglement Enhanced Neyman Pearson Target Detection

Ann Arbor, Michigan

QUANTUM ENGINEERING LABORATORY - UNIVERSITY OF MICHIGAN

June 2023 - January 2025

- Configured and aligned continuous wave entanglement source based on nonlinear crystal

- Designed and implemented lock-in amplification + PID control electrical feedback to stabilize the system

- Developed theory model to accurately predict measurement statistics based on quantum optics principles

- Demonstrated near-optimum quantum advantage in Entanglement-Enhanced Neyman-Pearson target detection scheme

## Industry Experience

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### MIT Lincoln Laboratory

SRP INTERN: OPTICAL & QUANTUM COMMUNICATIONS

Lexington, MA, USA

May 2026 - Aug. 2026

- I will be joining Group 67: Optical and Quantum Communications, to work on cryogenic measurement optimization of silicon vacancy centers in diamond for quantum memory applications

### KLA Corporation - FastScan R&D Group

SOFTWARE ENGINEER INTERN

Milpitas, California

May 2022 - Aug. 2022

- Validated performance of a PN junction detector in an electron-beam column stack to meet custom specifications
- Implemented a multi-threaded application to operate a test bench with Python
- Wrote hardware driver libraries in Python to control coupled linear translation stages, an oscilloscope, a pulse generator, and an optical source
- Developed a baseline understanding of scanning electron microscopy & electron optics
- Assembled laser & associated optical components; performed coarse optical alignment

### Mesomat Inc.

Hamilton, Ontario

CO-OP RESEARCH & DEVELOPMENT SCIENTIST

Sep. 2020 - Sep. 2021

- Designed 15 unique PCBs utilized by Mesomat's data acquisition platform and robotic production line system
- Spearheaded performance analysis of 2 unique event detection algorithms with Python
- Designed & built an automated electromechanical production robot on a \$5k budget
- Increased the reliability & efficiency of the sensor production process by 50%
- Developed desktop application for software version control, decreasing software distribution time by 25% for management team
- Used C# to implement a real time signal processing algorithm for event detection
- Utilized Git for version control of 32 different collaborative software projects
- Improved robustness of existing production robotic system before overhauling the entire system; reduced downtime by 40%

### McMaster Biophotonics Research Group

Hamilton, Ontario

UNDERGRADUATE RESEARCH ASSISTANT

May 2020 - Aug. 2020

- Developed a C++ GUI and associated back-end to control a high power ultra-fast pulsed fiber laser system
- Replaced outdated electronics and associated software controlling the laser system shutter

## Extracurricular Activity

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### McMaster Interdisciplinary Satellite Team (NEUDOSE)

Hamilton, Ontario

COMMAND & DATA HANDLING TEAM LEAD

Aug. 2021 - Jul. 2022

- Managed a team of 7 people + continuous systems engineering integration to facilitate development of satellite flight software
- Led technical development of the Command & Data Handling Finite State Machine with over 180 commits

## Honors & Awards

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2026 **NSF QuEST Student Leader**, University of Michigan, Quantum Research Institute

Ann Arbor, Michigan

2023 **Optics & Photonics Education Scholarship**, SPIE, University of Michigan

Ann Arbor, Michigan

2022 **H.L Hooker Academic Scholarship**, McMaster University

Hamilton, Ontario

2021 - 2022 **Provost's Honour Roll**, McMaster University

Hamilton, Ontario

2019 - 2022 **Dean's Honour List**, McMaster University

Hamilton, Ontario

2019 **NSERC USRA**, McMaster University Biophotonics Group | NSERC

Hamilton, Ontario

2017 **Eagle Scout Award**, Boy Scouts of America

Birmingham, Michigan