Nathaniel T. Stemen

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Employment

Member of Technical Staff Unitary Fund   *Mar* 2022–

- Lead developer for the open-source **Python** package `mitiq` (240,000+ downloads, 110+ citations). Drive both technical innovation and strategic roadmap development to enhance performance and adoption of quantum error mitigation.
- Implemented a calibration module for `mitiq` that enables users to calibrate error mitigation techniques to their quantum hardware.
- Directed unitaryHACK 2023, overseeing event planning, issue curation, and participant engagement. Coordinated efforts across 70 hackers to close 99 issues across the quantum open-source ecosystem, distributing over $11,000 in rewards.

Software Developer Overleaf   2017–2021

- Improved LaTeX autocomplete using statistical analysis of open-source documents, enhancing user experience for 300,000+ daily users.
- Maintained and optimized large **Rails** and **Node** applications through bug fixes, performance improvements, and feature delivery.
- Monitored and supported data migration from **PostgresQL** to **MongoDB**, ensuring data integrity throughout the process.

Summer Researcher New York University   2016

- Used **Python** to numerically solve nonlinear Schrödinger equations modeling electromagnetic pulse propagation in nonlinear media.

Summer Researcher Yale University (PROSPECT Experiment)   2014 & 2015

- Built an optical simulation in **C++** to optimize detector design and study light collection and uniformity.
- Implemented pulse-shape discrimination techniques in **Python** to improve neutrino event selection.

Education

University of Waterloo MMath in Applied Mathematics   2020–2022

- Thesis: *Quantum Circuit Compilation from the Ground Up* advised by Joel Wallman

New York University B.Sc. in Mathematics and Physics   2013–2017

- Thesis: *An Investigation of Q-Balls* advised by Luciano Medina

Publications

1. LaRose, R. et al. (Aug. 2022). Mitiq: A software package for error mitigation on noisy quantum computers. *Quantum* 6, p. 774. URL: https://doi.org/10.22331/q-2022-08-11-774.

2. McDonough, B. et al. (2022). "Automated quantum error mitigation based on probabilistic error reduction". In: *2022 IEEE/ACM Third International Workshop on Quantum Computing Software (QCS)*, pp. 83–93. arXiv: 2210.08611 [quant-ph].

3. Ashenfelter, J. et al. (2016). Background Radiation Measurements at High Power Research Reactors. *Nucl. Instrum. Meth.* A806, pp. 401–419. arXiv: 1506.03547 [physics.ins-det].

4. Ashenfelter, J. et al. (2015). Light Collection an Pulse-Shape Discrimination in Elongated Scintillator Cells for the PROSPECT Reactor Antineutrino Experiment. *JINST* 10.11, P11004. arXiv: 1508.06575 [physics.ins-det].

TEACHING

Fundamentals of University Teaching University of Waterloo   2020–2022
- Completed program designed to help graduate students learn evidence-based strategies for teaching through workshops and practice teaching sessions.

Mathematics Teacher NYU Metro Center College Prep Academy   2015–2017
- Independently planned and taught Pre-Calculus course for high school students.
- Facilitated numerous extra-curricular math courses of 30 students as a class assistant by providing additional guidance to students.

SERVICE

SciPy 2025 Reviewer   2025
QED-C mentor   2023–2024
Equity, Diversity and Inclusion Committee University of Waterloo; IQC   2021–2022
Strategic Plan Implementation Working Group University of Waterloo   2021

CONTINUING EDUCATION

CSE 599C: Quantum Learning Theory University of Washington (audit)   *Jan–Mar* 2025
CSE 534: Quantum info. and computation University of Washington (audit) *Sep–Dec* 2024
Quantum Machine Learning Workshop QSciTech-QuantumBC   *Jan–Feb* 2022
Presenting Data and Information Edward Tufte   *Nov* 2019

TOOLS

Languages
- Python, JavaScript, SQL, Ruby, bash, HTML
- English (native), Mandarin Chinese (beginner)