

Physics Specialist
University of Toronto, St. George

✉ fadi.farook@mail.utoronto.ca
🌐 fadifarook.com

EDUCATION

•University Of Toronto, St. George Campus

09/2021-

BSc. Physics Specialist with Mathematics Minor

RESEARCH EXPERIENCE

•Laser Heating and Ablation Research

09/2023 - 08/2024

Supervisor: Dr. R.J. Dwayne Miller

University of Toronto

- Interfaced voltage supplies, oscilloscopes, pulse generators and a Microchannel Plate Detector using SCPI protocols to operate laser ablation-based time-of-flight mass spectrometer
- Developed a user-friendly GUI to automate hardware control and spectral data collection.
- Automated parametric sweeping of voltages, applying Bayesian optimization to enhance intensity and resolution.
- Aligned optics, maintained a Q-switched laser and ablated biological and inorganic samples with nanosecond and femtosecond lasers.
- Modeled breast tumor response to pulsed lasers using COMSOL.
- Analyzed tissue death and heating times, demonstrating faster response compared to equivalent continuous wave lasers.

•Nonlinear Optics Research

06/2023 - 09/2023

Supervisor: Dr. T.J. Hammond

University of Windsor

- Combined Runge-Kutta and Split-Step Fourier methods to simulate femtosecond pulse propagation through crystals and PCF.
- Compared Forward Maxwell's Equation, General Nonlinear Schrödinger Equation and a four-wave mixing equation in the context of Kerr amplification and Raman response. Assessed the accuracy and computation time of each equation.

•Physics Education Research

09/2022 - 04/2023

Supervisor: Dr. Carolyn Sealfon

University of Toronto

- Devised and developed a Just-In-Time teaching tool that clustered student free-responses from teaching surveys, enabling real-time instructional adjustments.
- Leveraged supervised and unsupervised machine learning algorithms like Naive Bayes and K-Means to categorize student responses, identifying key areas of confusion.

•Biophysics Research

06/2022-08/2022

Supervisor: Dr. Anton Zilman

University of Toronto

- Utilized the Gillespie Algorithm to simulate the stochastic kinematics of ligand-receptor interactions.
- Discovered ligand concentrations where simulation results diverged from our theoretical predictions of signal formation.

POSTERS AND CONFERENCE PROCEEDINGS

- Alexander A. C. Wainwright, Khaled Madhoun, **Fadi Farook**, Souren Salehi, Samansa Maneshi, R. J. Dwayne Miller, "Modeling wavelength dependence of laser tumor hyperthermic treatments," Proc. SPIE 12840, Optical Interactions with Tissue and Cells XXXV, 1284008 (12 March 2024); <https://doi.org/10.1117/12.3000396>
- **Fadi Farook**, "Comparison of Pulse-Propagation Equations using Raman Effect and Kerr Instability Amplification" [Poster presentation]. Canadian Association of Physicists Congress. London, Canada (2024, May).
- **Fadi Farook**, "Comparison of Pulse-Propagation Equations using Raman Effect and Kerr Instability Amplification" [Poster presentation]. Photonics Online Meetup (2023, November).

AWARDS AND HONORS

- **University of Toronto Excellence Award** 2024
- **Class of 3T0 and Associates Scholarship in Mathematics and Physics** 2024
- **Birkenshaw Family Scholarship** 2023, 2024
- **Natalia Krasnopolskaia Summer Undergraduate Research Fellowship** 2022
- **Ronald J C McQueen Scholarship** 2022
- **University of Toronto International Scholar Award** 2021-2024

OUTREACH

- **Volunteer for Optics Summer School Program at the University of Toronto** 08/2024
Guided tours of laser facilities for undergraduate students. Other miscellaneous support for the SPIE Student Chapter.
- **Volunteer for Let's Talk Science** 01/2023-
Judged science fairs and led python workshop for high school students

SKILLS

Technical: Soldering, Lathe and Mill Machining

Programming Languages: Python, MATLAB, COMSOL, MySQL

Algorithms: Bayesian Optimization, Binomial Naive Bayes, K-Means, Spectral Clustering

RELEVANT COURSES

PHY385: Optics

PHY407: Computational Physics

PHY408: Time Series Analysis

PHY405: Electronics Lab (Winter 2025)

PHY485: Laser Physics (Winter 2025)

TEACHING EXPERIENCE

- **Teaching Assistant** 09/2023 - 04/2024
University of Toronto
– Teaching during tutorials and holding office hours in MAT135: Calculus I and MAT136: Calculus II
- **Tutor** 01/2023 - 06/2023
Tutor Doctor Toronto
– Tutored Ontario Curriculum and International Baccalaureate physics and mathematics