Fadi Farook

Updated July 2024

Physics Specialist
University of Toronto, St. George

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Education

•University Of Toronto, St. George Campus *09/2021-*

BSc. Physics Specialist with Mathematics Minor

Research Experience

•Laser Heating and Ablation Research *09/2023 -*

Supervisor: Dr. Dwayne Miller University of Toronto

- Simulating breast tumor response to various pulsed lasers using COMSOL
- Quantified tissue death and heating times, comparing them to equivalent continuous wave lasers.
- Aligned optics, maintained a Q-Switched Laser and performed laser ablations of biological and inorganic samples.
- Performed parametric sweeping of voltages to optimize resolution in laser ablation based time of flight mass spectrometer.
- Interfaced voltage supplies, oscilloscopes and pulse generators using SCPI protocols.

•Nonlinear Optics Research *06/2023 - 09/2023*

Supervisor: Dr. T.J Hammond University of Windsor

- Simulated the propagation of femtosecond pulses through crystals and PCF, modelling the nonlinear responses
- Through a combination of the Runge-Kutta method and the Split-Step Fourier Method, compared the accuracy and computation times of various pulse-propagation equations, utilizing Kerr Instability Amplification and the Raman Effect

•Physics Education Research *09/2022 - 04/2023*

Supervisor: Dr. Carolyn Sealfon University of Toronto

- Analyzed student free-responses from surveys and clustered them into useful categories, while identifying the most insightful comments
- Applied both supervised and unsupervised Machine Learning algorithms like Naive Bayes and K-Means

•Biophysics Research *06/2022-08/2022*

Supervisor: Dr. Anton Zilman University of Toronto

- Applied the Gillespie Algorithm and simulated the stochastic kinematics associated with ligand-receptor interactions

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
- Farook, F. (2024, May). Comparison of Pulse-Propagation Equations using Raman Effect and Kerr Instability Amplification [Poster presentation]. Canadian Association of Physicists Congress. London, Canada.
- Farook, F. (2023, November). Comparison of Pulse-Propagation Equations using Raman Effect and Kerr Instability Amplification [Poster presentation]. Photonics Online Meetup.

Awards and Honors

•University of Toronto Excellence Award *2024*

•Class of 3T0 and Associates Scholarship in Mathematics and Physics *2024*

•Birkenshaw Family Scholarship *2023*

•Natalia Krasnopolskaia Summer Undergraduate Research Fellowship *2022*

•Ronald J C McQueen Scholarship *2022*

•University of Toronto International Scholar Award *2021-*

Skills

Technical: Soldering, Lathe and Mill Machining
Programming Languages: Python, MySQL, MATLAB, COMSOL
Algorithms: Bayesian Optimization, Binomial Naive Bayes, K-Means, Spectral Clustering

Relevant Courses

Programming:
CSC108: Introduction to Computer Programming
CSC148: Introduction to Computer Science
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 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

Service and Outreach

•Volunteer for Let's Talk Science *01/2023-*

Outreach in the form of being a judge for science fairs and teaching python to high school students