

# JEFFREY LI

## B.A.Sc ENGINEERING PHYSICS UOFT

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Personal Website

### SUMMARY

Hi! I am a third-year undergraduate Engineering Physics student at the University of Toronto, with strong interests in quantum computing, quantum information, and machine learning. I am particularly interested in the integration of quantum hardware to accelerate classical machine learning models.

### SKILL

**Languages:** Java, Python, MATLAB, C/C++, R, L<sup>A</sup>T<sub>E</sub>X

**Libraries:** Scipy, OpenCV, Pandas, Qiskit, Pytorch, PennyLane

**Certificates:** IBM Basics of Quantum Information, Qiskit FallFest 2023, Laser Safety Training Certificate

**Technologies:** COMSOL, CAD, Arduino, PCB Design, Power tools

### PUBLICATION & POSTER

1. H.Chen,J. Li,(Nov. 30, 2023 - March 3, 2024) *Denoising CGI Renderings using Deep Learning*,CUCAI 2024 , Kingston , ON, 2024. [Conference Paper Link]
2. J. Li, B. Braverman,(Aug 23, 2024) *Low-Noise, Vibration Minimized Optical Shutter Using DC Brushed Motor*, UNERD 2024, Toronto, ON, 2024. [Conference Poster Link]
3. J. Li, A. C.B. Greenwood, Li Qian, et al. (Aug 15, 2025) *Photon Pair Generation at 780 and 1560 nm in Periodically Poled Silica Fiber*, CQIQC Research Day, Toronto, ON, 2025. [Conference Poster Link]

### EXPERIENCE

#### 2025.05 - Present | Quantum Information Research Intern

*Qian Lab, UoT*

- Generated hyperentangled photon pairs via type-0 SPDC in pure-silica periodically poled silica fiber.
- Designed and built an optical coincidence counting device using Excelitas SPCM and IDQube single-photon counting modules.
- Programmed a quantum state tomography pipeline in MATLAB and Python, including maximum-likelihood density-matrix reconstruction and entanglement-metric evaluation.
- Designed and fabricated a low-jitter TTL gating circuit for photon detector based on a monostable multivibrator to generate nanosecond-scale timing windows, suppress dark-counts, and increase coincidence-to-accidental ratio.

[Matlab / PCB / Fiber Optics]

#### 2024.05 - 2025.05 | Quantum Optics Research Intern

*Braverman Lab, UoT*

- Simulated Hermite–Gaussian mode propagation through a spatial filtering system to analyze mode purity and phase evolution.
- Optimized filter properties to achieve >95% HG0 mode fidelity using Dual Annealing optimization.
- Constructed a Mach–Zehnder interferometer to perform holography of the filtered spatial mode
- Modeled resonant modes and time-domain light propagation in disordered optical cavities using COMSOL.
- Trained a feedforward neural network to predict output wavelength from the disordered optical cavities, achieving a mean squared error of 1.2nm.
- Designed and fabricated a low-vibration mechanical optical shutter with an 8 ms switching period.

[Scipy / COMSOL / Pytorch / PCB]

#### 2024.09 - Present | UTMIST QuDiffuse Project Lead

*UTMIST, UoT*

- QuDiffuse: Applying the D-Wave quantum annealer to accelerate Denoising Diffusion Probabilistic Model(DDPM) training by employing RBM in Markov chain
- Achieved 10x training speedup on MNIST data set compared to classical DDPM using classical QUBO solver.
- Awarded “Most Innovative Project” at UTMIST 2025 Showcase.

[Pytorch / D-Wave]

#### 2024.05 - Present | Research Supervisor - IYPT Canadian Physics Camp

*IYPT*

- Mentored Canada’s National Physics Team, resulting in two Bronze Medals at IYPT 2024 and 2025.
- Organized the national camp, developed experimental/theoretical guidelines, and delivered undergraduate-level lectures.

[Matlab / COMSOL]

### AWARD & HONOR

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|---|------------------|
| • <b>CQIQC Undergraduate Fellowship</b> - \$10,000 research grant               | 2025.05          |
| • <b>ESROP-UoT Recipient</b> - \$7,000 research grant                           | 2024.05          |
| • <b>Silver Medal</b> , Online International Young Physicist Tournament(O-IYPT) | 2022.07          |
| • <b>2 x International Top 20</b> , Sir Isaac Newton’s Physics Exam             | 2022.04, 2023.04 |