

Posting Date: 26 March 2020

DEPARTMENT OF PHYSICS
University of Toronto
JOB POSTING – POSTDOCTORAL FELLOW

Area of Research: Quantum Optics, Experimental and Theoretical

Description of duties: *Frontiers in Continuous Variable Quantum Computation*

The University of Toronto Department of Physics, in collaboration with Xanadu (www.xanadu.ai), a full-stack quantum computing startup company in Toronto, is initiating a joint research program into frontier projects on continuous variable quantum optics, in particular, the generation and characterization of non-Gaussian and Gaussian states. Within this project there are a variety of roles, from pure theory through to device engineering. Within the experimental efforts, skillsets involving both conventional bulk optical techniques, as well as integrated photonics, are being sought. As such, both theorists and experimentalists will be considered. Successful candidates will meet the criteria below.

Founded in 1827, the University of Toronto has evolved into Canada's leading institution of learning, discovery, and knowledge creation. It is widely recognized to be one of the world's top research-intensive universities, driven to invent and innovate. In the physical sciences, the University has a long history of world-class research in quantum physics, optics, information and computing, coordinated through the interdisciplinary CQIQC, the Centre for Quantum Information and Quantum Control.

Xanadu is a venture-backed startup company, located in Toronto, Canada. Xanadu designs and integrates quantum silicon photonic chips into existing hardware to create truly full-stack quantum computing. Xanadu has a world-class team of R&D professionals developing the theory, hardware and software for our unique style of photonic quantum computing. The company currently has more than 40 PhDs from leading institutions around the world, and is continuing to steadily grow its technical team. In June 2019, Xanadu publicly announced a Series A financing round, worth \$32M CAD, from the largest venture investors in Canada.

The company has built a multi-million dollar, fully functional optics lab at its headquarters in Toronto, and works with a number of different suppliers internationally for key components like photon-number-resolving detectors, high performance laser light sources, and photonic integrated circuit fabrication.

Experimental work will be performed primarily at the Xanadu labs, while theory work will be carried out primarily at the University. The Xanadu labs are about a ten minute walk from the Department of Physics. This project is supported in part by the MITACS Elevate program, project IT15614.

Salary: \$62,500 annually, plus benefits

Required qualifications:

- PhD or higher in relevant field of physics or engineering
- Proven track record of excellence in their research domain of expertise
- For experimental applicants, experience with continuous variable protocols is an asset, but not required, including techniques like:
 - Homodyne detection (time domain data acquisition)
 - Photon counting and heralded state preparation experiments
 - Parametric nonlinear optics
- Interest in close collaboration between theory and experimental teams

Application instructions

All individuals interested in this position must submit a complete academic CV and short cover letter/email to sipe@physics.utoronto.ca by the closing date.

Closing date: when filled

Supervisor: Professor John Sipe

Expected start date: As soon as possible

The initial appointment will be for one year, with renewal for a second year contingent on appropriate progress in the first year.

FTE: 1.0

The normal hours of work are 40 hours per week for a full-time postdoctoral fellow (pro-rated for those holding a partial appointment) recognizing that the needs of the employee's research and training and the needs of the supervisor's research program may require flexibility in the performance of the employee's duties and hours of work.

Employment as a Postdoctoral Fellow at the University of Toronto is covered by the terms of the CUPE 3902 Unit 5 Collective Agreement.

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The University of Toronto is strongly committed to diversity within its community and especially welcomes applications from racialized persons / persons of colour, women, Indigenous / Aboriginal People of North America, persons with disabilities, LGBTQ persons, and others who may contribute to the further diversification of ideas.