Lakehead UNIVERSITY | Department of Physics

The Department of Physics invites you to attend a Seminar by:

DYLAN MAHLER

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entitled

Quantum Tomography with Limited Resources

ABSTRACT:

Quantum computation --- the use of quantum systems as bits, or qubits, to perform computation --- has been proven to be exponentially faster than what is thought possible with classical computation for several tasks. Quantum computers have the unique ability to store an amount of information that is exponential in the number of constituent particles used to encode that information. This property, which is arguably where quantum computers derive their power, makes it very difficult to characterize quantum systems. In order to fully characterize an unknown quantum state, a series of measurements must be performed on it and the state deduced from the results of those measurements. This process, called quantum tomography, is known to require exponential resources in the number of qubits. Both the number of measurements --- the measurement complexity --- and the number of times each measurement must be repeated --- the sample complexity --- present serious challenges when performing tomography. Here, I will present an experiment which uses the polarization degree of freedom of photons generated by spontaneous parametric downconversion as a logical qubit. In this experiment, optimal sample complexity for quantum state tomography is obtained using adaptivity: the ability to change measurement settings part way through an experiment.

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DATE: **Thursday, NOVEMBER 13, 2014**

TIME: **1:00 pm**

Room: **CB 4056**