Western University
Department of Physics and Astronomy

PHYSICS & ASTRONOMY COLLOQUIUM

Date: **THURSDAY, 18th January 2018**
Time: **1:30 p.m.**
Location: **Physics & Astronomy Seminar Room 100**

Dr. Arash Akbari-Sharbaf
Institut Quantique
Université de Sherbrooke

"Tunable magnetic phase from antiferromagnetic order to quantum spin liquid in Mo_3O_{13} cluster magnets"

ABSTRACT

One of the most sought after magnetic phases is the so-called quantum spin liquid (QSL), with the remarkable property that the spins form a highly-entangled quantum ground state that supports fractional excitations known as spinons, as well as other emergent quasi-particles. A study of a tunable phase from an antiferromagnetic order to a QSL phase will be presented for the family of compounds $Li_2In_{1-x}Sc_xMo_3O_8$ (with x= 0.2, 0.4, 0.6, 0.8, 1). The crystal structure of this series of compounds can be viewed as Mo_3O_{13} magnetic clusters arranged on a triangular lattice, or alternatively, as Mo ions arranged on a asymmetric Kagome lattice with two different Mo-Mo bond lengths. These magnetic Mo plans are separated by nonmagnetic layers composed of Li, In, and Sc ions. Substituting Sc with In induces a chemical pressure that alters the ratio of the two Mo-Mo bond lengths, allowing us to tune the localization of unpaired electrons and the magnetic phases in this system. The primary experimental technique we used for exploring the magnetic phases in this series of compounds was muon spin rotation (μSR), and therefore an introduction of the technique will be presented. μSR measurements will be accompanied by other complementary characterization techniques. In order to shed light on our experimental results, a theoretical description of the behaviour of electrons on the asymmetric Kagome lattice will also be presented using an extended Hubbard model.

COFFEE + light snacks will be available in the Atrium, 2nd floor, at 1:15 p.m.