



**Western University**  
**Department of Physics and Astronomy**

## **PHYSICS & ASTRONOMY COLLOQUIUM**

**Date:** **Thursday, 2<sup>nd</sup> February 2017**  
**Time:** **1:30 p.m.**  
**Location:** **Physics & Astronomy Seminar Room 100**

### **Dr. Bruce D. Gaulin**

Brockhouse Institute for Materials Research  
McMaster University

### ***"Quantum Ground States in Real Frustrated Magnets"***

#### **ABSTRACT**

The pyrochlore lattice, a network of corner-sharing tetrahedra, is one of the most pervasive crystalline architectures in nature that supports geometrical frustration. We and others have been interested in a family of rare earth pyrochlore magnets, that can display quantum  $S=1/2$  magnetism on such a lattice. The ground states for these materials may be described by a model known as "spin ice," a model with the same frustration and degeneracy as solid ice (the kind you skate on), as well as by a quantum version of this model known as "quantum spin ice" that possesses an emergent quantum electrodynamics. I'll describe how this comes about and how we can understand these materials, with an emphasis on modern neutron scattering. I'll also briefly discuss how fragile some of these quantum ground states seem to be with respect to weak quenched disorder, which is hard to avoid in real materials.

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