



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

## **PHYSICS & ASTRONOMY COLLOQUIUM**

**Date:** Thursday, 12 January 2017  
**Time:** 1:30 p.m.  
**Location:** Physics & Astronomy Seminar Room 100

**Dr. Markus Müller**

Departments of Applied Mathematics and Philosophy  
Western University

***"From physical principles to quantum theory and beyond"***

### **ABSTRACT**

In the past few years, it has become clear that quantum theory is just one possible probabilistic theory among many others. This research, rooted in quantum information theory, has shown that physics could potentially behave very differently, predicting different kinds of correlations or interference patterns. In the talk, I will focus on two aspects of this research. First, I will show how one can derive the Hilbert space formalism of quantum theory from some simple information-theoretic principles. Second, this new perspective will make it clear that the structure of quantum mechanics is tightly linked to the structure of spacetime in several surprising ways. As time permits, I will show one or two rigorous theorems that demonstrate this relationship, for example a result that relates the number of degrees of freedom of a quantum bit to relativity of simultaneity on an interferometer.

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