



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

## **PHYSICS & ASTRONOMY COLLOQUIUM**

**Date:** THURSDAY, 29<sup>th</sup> March 2018  
**Time:** 1:30 p.m.  
**Location:** Physics & Astronomy Seminar Room 100

### **Dr. Niayesh Afshordi**

Department of Physics and Astronomy  
University of Waterloo  
and Perimeter Institute for Theoretical Physics

### ***“Quantum Black Holes in the Sky: from Quantum Gravity to Astrophysics and Cosmology”***

#### **ABSTRACT**

In classical General Relativity (GR), an observer falling into an astrophysical black hole (BH) is not expected to experience anything dramatic as she crosses the event horizon. However, tentative resolutions to problems in quantum gravity, such as the cosmological constant problem or the black hole information paradox, invoke significant departures from classicality in the vicinity of the horizon. I outline theoretical and phenomenological arguments for these departures. I will then discuss the tentative observational evidence for Planck-scale structure near BH horizons, seen as “echoes” in gravitational wave observations, which has now been found by three independent groups. Finally, I show how gravitational wave echoes can teach us about the fate of the binary neutron star merger, recently discovered by gravitational wave and electromagnetic observations.

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