

## Department of Physics and Astronomy Colloquium Series

**Tuesday, February 20, 2024 at 2:30pm in PSE 317**

**Speaker:** Miriam Diamond

**Institution:** University of Toronto

**Title:** Solid State Detectors for Low-Mass Dark Matter Searches

### **Abstract:**

We are faced with convincing evidence that approximately a quarter of the universe is composed of something whose gravitational effects can be seen in a variety of astrophysical phenomena, but which we have been unable to detect and identify in the laboratory. Most physicists agree that this "dark matter" (DM) consists of new subatomic particle(s); the quest to discover its exact nature is among the foremost missions in modern physics and the greatest treasure hunts in history. Direct DM searches over the past few decades have been largely focused on Weakly Interacting Massive Particles in the  $\sim 10$  GeV - 1 TeV mass range. The absence of any conclusive discovery, along with various theoretical developments and certain astrophysical observations, has recently motivated the direct detection community to broaden our experimental program to search for DM candidates in the  $< 10$  GeV mass range. Solid-state detectors provide many advantages for such searches. This talk will summarize recent advances in phonon- and ionization-based semiconductor crystal experiments such as SuperCDMS and EDELWEISS, cryogenic scintillating calorimeter experiments such as CRESST, and Charge-Coupled Device experiments such as DAMIC and SENSEI. It will also discuss future prospects and discovery potential for solid-state detectors with respect to various low-mass DM candidates, including dark photons, axion-like particles, and lightly-ionizing particles.