

**Tuesday, November 3, 2:30 pm**

**Speaker:** Jiji Fan

**Institution:** Brown University

**Title:** Fantastic dark matter and where to find it

**Abstract:** Most of the universe we reside in is dark. Only a small fraction (15%) of the total matter is ordinary matter, which is extremely complicated. Our knowledge of ordinary matter is vast, deep and still growing fast. Yet when it comes to the remaining 85% of the matter in the universe, our knowledge is embarrassingly little. We know that it doesn't emit light and cannot be seen directly. That's why it is called "dark matter". In addition, we know that it interacts with gravity just like ordinary matter.

Given the little knowledge we have about dark matter, there exists a huge zoo of possible dark matter scenarios. I will discuss two fun non-minimal dark matter scenarios I have worked on. In the first possibility, the dark world could be similarly complex as the visible one, full of structures, forces, and matter that are invisible to us. In one concrete realization, the "double-disk dark matter" scenario, a small fraction of all dark matter has dissipative dynamics causing it to cool into a disk within the Milky Way galaxy. This will lead to many testable novel observational consequences. In another possibility, the so-called axion dark matter would behave collectively as waves. I will discuss interesting phenomenology it could lead to, such as forming dark boson stars and modifying the Hubble diagram at late times.