

SEMINAR NOTICE

*Department of Physics and Engineering Physics
University of Saskatchewan*

SPEAKER: Dr. Kaori Tanaka
Department of Physics & Engineering Physics

TOPIC: *Majorana Strikes Back*

DATE: Tuesday, January 10, 2017

TIME: 3:30-4:30 p.m.

PLACE: Physics 103

ABSTRACT:

During his short scientific career, Ettore Majorana made significant contributions to quantum physics. Shortly before he mysteriously disappeared in 1938, he published one of his masterpieces, a modification to the Dirac equation that shows the existence of what we now call Majorana fermions. Majorana fermions -- charge-neutral spin-1/2 particles which are their own antiparticles -- play a central role and have long been sought after in the areas of neutrino physics, supersymmetry, and dark matter. The detection of Majorana fermions as elementary particles, however, remains elusive to this day.

Due to the discovery of topological insulators and superconductors in recent years, there is now the possibility that Majorana fermions can emerge as elementary excitations in condensed matter systems. Majorana fermions are protected by topology inherent in the system and obey the non-Abelian exchange statistics, opening the door to new and powerful methods for quantum information processing. Thus, creating and controlling Majorana fermions in condensed matter systems will not only be a breakthrough in fundamental physics, but also potentially lead to realization of scalable, fault-tolerant topological quantum computation. In this talk, I will introduce the concept of topology governing material properties and discuss our recent work on the vortex lattice in a two-dimensional topological superconductor -- one of the most promising systems proposed so far as platforms for realizing topological quantum computation.

Coffee and Cookies will be served in the Physics lounge at 3:00 p.m. for those attending the seminar.