

**DEPARTMENT OF PHYSICS AND ASTRONOMY  
JOINT CONDENSED MATTER AND SPINTRONICS  
SEMINAR**

**Friday, September 28<sup>th</sup> 2018**

**3:30 PM, Room 203 Physics**

**Refreshments 3:00 PM Room 242 Physics**



**Professor Ruqian Wu  
University of California - Irvine**

**Spintronics Preeminent Team Seminar: The effect of spin orbit coupling in Spintronics materials: Density Functional Studies**

Quantum materials offer the possibility of information processing with high density, low power consumption, unmatched sensitivity, security, and speed. Density functional simulations are very helpful for the rational design of these materials with emergent properties. In this talk, I will discuss how to effectively imprint the exchange and spin orbit coupling (SOC) of atoms and newly discovered van der Waals (vdW) two-dimensional (2D) magnetic materials into graphene and topological materials to realize the quantum spin Hall effect or the quantum anomalous Hall effect at a reasonably high temperature. I will also discuss how to use the giant electric field at the surface of ferroelectric substrate to manipulate the spin Hall effect, magnetic anisotropy, Rashba SOC and Dzyaloshinskii-Moriya interaction. Most of these studies were done with experimental collaborators, showing the usefulness of synergistic experimental/theoretical collaborations for the exploration of new quantum materials and properties.