

# *Chez Pierre*

Presents ...

**Monday, October 23, 2023**

**12:00pm noon- 1:00 pm**

**Duboc Room 4-331**



## **Chez Pierre Seminar**

**Victor Brar, University of Wisconsin-Madison**

### **“Imaging charge carrier motion through multiple phase transitions in graphene.”**

I will discuss how scanning tunneling potentiometry (STP) and Kelvin probe force microscopy (KPFM) can be used to measure the electrochemical profile of graphene as the quasiparticles transition through different electronic phases. It will be shown first how these measurements can reveal the profiles of in-plane electrostatic potentials of a surface both with and without a current bias. I will then demonstrate how the scanned probe tip can be used to draw electrostatic barriers in the device which act to locally perturb the current flowing through the graphene sheet. STP measurements of the current profile around circular barriers and through constrictions reveal that at low temperatures the flow is ballistic, but as the temperature is raised it becomes viscous due to a phase transition of the charge carriers in the graphene. In the viscous regime, interesting features in the flow can be observed including greater-than-ballistic conductance through narrow channels, and Landaur residual resistivity dipoles with reduced magnitude. Measurements with applied magnetic fields, meanwhile, show clear changes in carrier trajectories that can be associated with a transition into a non-equilibrium state.