

# CMP Seminar

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*Properties of Wigner Crystal in Two Dimensions as Revealed by  
Quantum Simulation*

Wigner crystals (i.e. a solid composed of only electrons) have been suggested to be stable in semiconductor interfaces, on the surface of liquid helium, and in graphene bilayers. We have performed path integral Monte Carlo (PIMC) simulations for the Boltzmann, spin-polarized and unpolarized homogeneous electron gas in two dimension at low densities and low temperatures and obtain the conditions for stability of the Wigner crystal by directly observing freezing and melting. The phase diagrams show both thermal and quantum melting. The thermal melting is mediated by a hexatic phase. We have also computed the energy to create point defects and the exchange frequencies that give rise to the magnetic properties. We will discuss the methods used to perform these simulations.

Monday, September 23<sup>rd</sup>, 2019 at 4:10 p.m.  
Room 1400 BPS Bldg.  
Host: David Tománek