



# Condensed Matter Theory Center Seminar

**Jens Bardarson**  
(Berkeley)

Tuesday, June 15  
11:00 AM-12:30 PM  
2202 Physics Building

## “Aharonov-Bohm Oscillations in Disordered Topological Insulator Nanowires”

A direct signature of electron transport at the metallic surface of a topological insulator is the Aharonov-Bohm oscillation observed in a recent study of Bi<sub>2</sub>Se<sub>3</sub> nanowires [Peng et al., Nat. Mat. 9, 225 (2010)] where conductance was found to oscillate as a function of magnetic flux  $\phi$  through the wire, with a period of one flux quantum  $\phi_0 = h/e$  and maximum conductance at zero flux. This seemingly agrees neither with diffusive theory, which would predict a period of half a flux quantum, nor with ballistic theory, which in the simplest form predicts a period of  $\phi_0$  but a minimum at zero flux due to a nontrivial Berry phase in topological insulators. In this talk I will show how  $h/e$  and  $h/2e$  flux oscillations of the conductance depend on doping and disorder strength, provide a possible explanation for the experiments, and discuss further experiments that could verify the theory. Ref: arXiv:1005.3762.