



Electrical Sciences and Computer Engineering (ESCE) Seminar

THz Range Electrodynamics of Topological Insulators

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Abstract:

Topological insulators (TIs) are a recently discovered state of matter characterized by an “inverted” band structure driven by strong spin-orbit coupling. One of their most touted properties is the existence of robust “topologically protected” surface states. I will discuss what topological protection means for transport experiments and how it can be probed using the technique of time-domain THz spectroscopy applied to thin films of Bi₂Se₃. By measuring the low frequency optical response, we can follow their transport lifetimes as we drive these materials via chemical substitution through a quantum phase transition into a topologically trivial regime. I will then discuss our work following the evolution of the response as a function of magnetic field from the classical transport regime to the quantum regime.

Speaker Bio:

N. Peter Armitage has been on the faculty of the Department of Physics and Astronomy at Johns Hopkins University since 2006. He received his bachelor’s degree in Physics from Rutgers University in 1994 and his Ph.D. from Stanford University in 2002. He is a physicist whose research centers on material systems which exhibit coherent quantum effects at low temperatures, like superconductors and “quantum” magnetism. Dr. Armitage's principal scientific interest is understanding how is it that large ensembles of strongly interacting, but fundamentally simple particles like electrons in solids act collectively to exhibit complex emergent quantum phenomena. He is exploiting (and developing) recent technical breakthroughs using very low frequency microwave and THz range radiation to probe these systems at their natural frequency scales. The material systems of interest require new measurement techniques as their relevant frequencies typically fall between the range of usual optical and electronic methods. He has been the recipient of a DARPA Young Faculty Award, an NSF Career Award, a Sloan Research Fellowship, was a three time Kavli Frontiers Fellow, the William Spicer Award from the Stanford Synchrotron Radiation Laboratory, the William L. McMillan Award from the University of Illinois and 2016 Genzel Prize. He was also the co-chair of the 2014 Gordon Research Conference in Correlated Electron Systems.

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2:00 PM

B&H Room 190

Refreshments served at 1:30 PM