

Chez Pierre

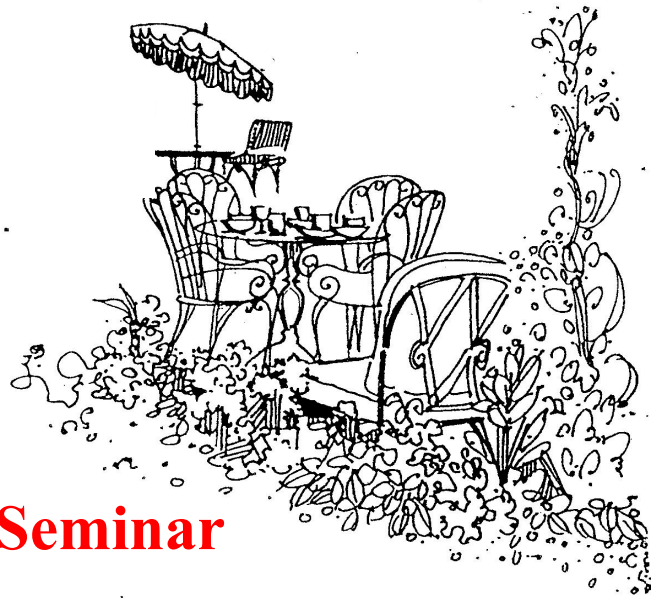
Presents ...

Monday, February 12, 2018

12:00pm Noon

MIT Room 4-331

Chez Pierre Seminar



Su-Yang Xu – Massachusetts Institute of Technology

“Probing quantum geometry and topology by low energy, nonlinear optoelectronic measurements”

An important goal of condensed matter physics is to study new quantum phases of matter in novel quantum materials. Many exotic properties of today’s forefront materials arise from the interplay among symmetry, topology, quantum geometry and correlations. Thus their characterization requires probing multiple aspects of the materials. We introduce low energy, nonlinear optoelectronic measurements as a new, highly symmetry sensitive way to study the quantum geometry and topology of the low energy electron states of a wide range of nontrivial metallic/semimetallic materials. First, I will show that, with mid-infrared circularly polarized photocurrent microscopy, we observe an electrically switchable Berry curvature texture in the monolayer topological insulator WTe_2 . The Berry curvature arises from nontrivial electron wavefunctions near its inverted gap edge. Second, with a similar approach, we are able to directly detect the chirality of Weyl Fermions, which is essentially the sign of the topological invariant for a Weyl node, in a prototypical Weyl semimetal TaAs. If time allows, we will briefly the detection of a gyrotropic order parameter in the charge-density wave phase of a transition-metal dichalcogenide system.