CMP Seminar
Michigan State University

Mei-Yin Chou
Georgia Institute of Technology

Nanomaterials in Two Dimensions: From Graphene to Few-Layer Graphene and Beyond

It has become possible in recent years to fabricate and manipulate two-dimensional (2D) nanomaterials in the laboratory that are as thin as one to few atomic layers. A well-known example is graphene, where the Dirac-Weyl Hamiltonian for massless fermions describes the low-energy quasiparticles. The reduced dimensionality gives rise to unique physical and chemical properties that differ from those of traditional bulk materials, and intriguing physics has been found in these few-layer systems. In this talk, I will focus on our recent theoretical and computational studies of a few representative systems. In particular, the quasiparticle states in rotated bilayer graphene systems act as massless fermions with two "flavors", and interlayer coupling induces neutrino-like oscillations and anisotropic transport. In addition, a rare fractal-like Hofstadter "butterfly" arises in the energy spectrum of twisted bilayer graphene under an external magnetic field. It is expected that many of the unique electronic properties of graphene can also be realized in other 2D systems of group IV elements. I will also discuss our first-principles calculations of silicene on graphene in order to understand the effect of substrate interaction on the physical properties of these systems.

Monday, April 27, 2015
4:10 p.m.
BPS 1400
Prof. David Tomanek - Host