Chez Pierre

Presents ...

Monday, October 31, 2016

12:00pm Noon

MIT Room 4-331

Chez Pierre Seminar

Haim Beidenkopf – Weizmann Institute

"Weyl semimetals make waves"

A defining property of a topological material is the existence of surface bands that cannot be realized but as the termination of a topological bulk. In a Weyl semi-metal these surface states are in the form of Fermi-arcs. Their open-contour Fermi-surface curves between pairs of surface projections of bulk Weyl cones. Such Dirac-like bulk bands, as opposed to the gapped bulk of topological insulators, land a unique opportunity to examine the deep notion of bulk to surface correspondence. We study the intricate properties both of inversion symmetry broken and of time-reversal symmetry broken Weyl semimetals using scanning tunneling spectroscopy. We visualize the Fermi arc states on the surface of the non-centrosymmetric Weyl semi-metal tantalum arsenide (TaAs) [1]. Using the distinct structure and spatial distribution of the wavefunctions associated with the different topological and trivial bands we detect the scattering processes that involve Fermi arcs. Each of these imaged scattering processes entails information on the unique nature of Fermi arcs and their correspondence to the topological bulk. We further visualize the magnetic response of a candidate magnetic Weyl semimetal conjugating magnetism and topology.

1. R. Batabyal et al., Science Advances 2, e1600709 (2016)