Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Quantum Oscillations from Fermi-Arcs in Weyl and Dirac Semimetals ANDREW POTTER, ITAMAR KIMCHI, ASHVIN VISHWANATH, UC Berkeley — Weyl semi-metals exhibit unusual surface-states whose Fermi-"surface" is not actually a surface, but rather consists of disjoint line segments. Such Fermi-arcs are a fingerprint of the topological aspects of the bulk band-structure. Magnetic field induced quantum oscillations of the density of states have traditionally enabled one to experimentally map out a material's Fermi-surface. On their own, the disjoint nature of surface Fermi-arcs does not permit closed semi-classical orbits in a magnetic field, naively rendering them inaccessible to quantum oscillatory probes. However, a slab of Weyl semi-metal has counter-propagating Fermi-arcs on both the top and bottom surfaces, which together could support closed orbits. Can such orbits which span a a non-local Fermi-surface give rise to quantum oscillations? If so, what happens to these oscillations as the top and bottom surfaces are increasingly isolated in progressively thicker slabs? This talk will address these questions, and apply the results to closely related and recently discovered 3D Dirac semi-metals.

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Date submitted: 14 Nov 2013 Electronic form version 1.4