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Quantum oscillation signatures of Fermi arc surface states in Weyl semimetals

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Weyl semimetal states and their crystalline symmetry protected Dirac- analogs have recently been discovered in a variety of materials. These new phases of matter offer an interesting example of topology in the absence of a protecting band- or correlation- gap. The bulk topological character of these materials is revealed upon the application of a magnetic field, which produces chiral Landau level modes that propagate along the field and which mediate inter-valley charge pumping associated with chiral anomaly physics. At a surface, the bulk topology manifests itself in unusual surface states whose Fermi surface consists of disjoint arcs. In this talk, I will describe magnetic field induced quantum oscillation signatures of both the surface and bulk topological features of these materials. These oscillations are associated with unusual magnetic orbits that start on the Fermi arc of one surface, propagate through the bulk on the chiral Landau level, and complete the orbit on the opposite surface. I also will describe some recent experimental evidence for these orbits in Dirac semimetal thin films.