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Friedel oscillations due to Fermi arcs in Weyl semimetals PAVAN HOSUR[1], Department of Physics, University of California at Berkeley — Weyl semimetals harbor unusual surface states known as Fermi arcs, which are essentially disjoint segments of a two-dimensional Fermi surface. We describe a prescription for obtaining Fermi arcs of arbitrary shape and connectivity by stacking alternate two-dimensional electron and hole Fermi surfaces and adding suitable interlayer coupling. Using this prescription, we compute the local density of states–a quantity directly relevant to scanning tunneling microscopy–on a Weyl semimetal surface in the presence of a point scatterer and present results for a particular model that is expected to apply to pyrochlore iridate Weyl semimetals. For thin samples, Fermi arcs on opposite surfaces conspire to allow nested backscattering, resulting in strong Friedel oscillations on the surface. These oscillations die out as the sample thickness is increased and Fermi arcs from the opposite surface retreat and weak oscillations, due to scattering between the top surface Fermi arcs alone, survive. The surface spectral function, accessible to photoemission experiments, is also computed. In the thermodynamic limit, this calculation can be done analytically and separate contributions from the Fermi arcs and the bulk states can be seen.

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