Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Universal signatures of Fermi arcs in quasiparticle interference on the surface of Weyl semimetals STEFANOS KOURTIS, JIAN LI, ZHI JUN WANG, B. ANDREI BERNEVIG, Department of Physics, Princeton University, Princeton, NJ 08544, USA — Weyl semimetals constitute a newly discovered class of three-dimensional topological materials with linear touchings of valence and conduction bands in the bulk. The most striking property of topological origin in these materials, so far only observed in photoemission experiments, is the presence of open constant-energy contours in the boundary density of states — the so-called Fermi arcs. In this work, we establish the universal characteristics of Fermi-arc contributions to surface quasiparticle interference. Using a general phenomenological model, we determine the defining interference patterns stemming from the existence of Fermi arcs in a surface band structure. We then trace these patterns in both simple tight-binding models and realistic ab initio calculations. Our results show that definitive signatures of Fermi arcs can be observed in existing and proposed Weyl semimetals using current scanning tunneling spectroscopy setups.

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Date submitted: 06 Jan 2016 Electronic form version 1.4