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Quasiparticle interference mapping of ZrSiS[1] MICHAEL LODGE, MD MOFAZZLE HOSEN, MADHAB NEUPANE, MASA ISHIGAMI, University of Central Florida, GUOQING CHANG, BAHADUR SINGH, HSIN LIN, National University of Singapore, BENT WEBER, JACK HELLERSTEDT, MARK EDMONDS, MICHAEL FUHRER, Monash University, DARIUSZ KACZOROWSKI, Polish Academy of Sciences — The emergent class of 3D Dirac semimetals presents intriguing new systems in which to study the rich physics of the robust, topologically-protected quasiparticles hosted within their bulk. For example, in nodal-line Dirac semimetals, the conductance and valence bands meet along a closed loop in momentum space and disperse linearly in the vicinity of the resultant line node. This results in novel scattering phenomena, owing to the unique Fermi surfaces and scattering selection rules of these systems. Here, we have performed scanning tunneling microscopy and spectroscopy of ZrSiS, one such nodal-line Dirac semimetal, at 4.5 K. We have visualized quasiparticle scattering using differential conductance mapping. In conjunction with numerical modeling, we identify at least six allowed scattering vectors in the material, which gives insight into the scattering selection rules of these novel materials.

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Michael Lodge
University of Central Florida

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