Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Scanning Tunneling Spectroscopy and Imaging of Topological Kondo Insulators MICHAEL YEE, YANG HE, ANJAN SOUMYANARAYANAN, Department of Physics, Harvard University, DAE-JEONG KIM, ZACHARY FISK, Department of Physics and Astronomy, University of California, Irvine, JENNIFER E. HOFFMAN, Department of Physics, Harvard University — Topological insulators host spin-polarized surface states which robustly span the band gap and hold promise for novel applications. Recent theoretical predictions have suggested that topologically protected surface states may similarly span the hybridization gap in some strongly correlated heavy fermion materials, particularly SmB_6. Scanning tunneling spectroscopy (STS) is a powerful tool for studying topological materials because it is directly sensitive to the surface states of interest, and their scattering processes. Here we present the first atomic resolution spectroscopic study of the cleaved surface of SmB_6 [1]. Using a combination of real space imaging and filled and empty state spectroscopy, we reveal a robust hybridization gap that universally spans the Fermi level on four distinct surface morphologies despite shifts in the f band energy. Using a cotunneling model, we separate the density of states of the hybridized bands from which the predicted topological surface states must be disentangled. Our technique lays the groundwork for understanding the first strongly correlated topological insulator, and implements a generally applicable method to quantitatively understand a wider class of Kondo insulators.

[1] arXiv:1308.1085

Michael Yee
Harvard University, Department of Physics

Date submitted: 15 Nov 2013 Electronic form version 1.4