Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Topological surface states in Kondo insulator SmB_6 via planar tunneling spectroscopy* WAN KYU PARK, LUNAN SUN, ALEX NODDINGS, University of Illinois at Urbana-Champaign, LAURA GREENE, National High Magnetic Field Laboratory and Florida State University , DAE-JEONG KIM, ZACHARY FISK, University of California, Irvine — Samarium hexaboride (SmB_6) belongs to a class of materials called Kondo insulators in which the hybridization between itinerant electrons and local moments leads to an emergent state of matter. With inherently large spin-orbit coupling along with strong correlation, SmB_6 has been recently predicted to be topological meaning that topologically robust conducting states should exist at its surfaces. Although extensive investigations have provided growing evidence for the existence of such states, corroborative spectroscopic evidences are still lacking unlike in the weakly correlated counterparts. We adopt planar tunneling spectroscopy to unveil their detailed nature and behavior utilizing its inherently high energy resolution. Measurements of tunneling conductance on two different crystal surfaces (001) and (011) reveal the expected linear density of states for two and one Dirac cones, respectively. Moreover, it is found that these topological states cease to be protected well before they merge into the bulk states at the gap edges. Microscopic modeling of the tunneling processes accounting for the interaction with spin excitons as predicted by a recent theory [1] provide consistent explanations for all the observed features, corroborating the proposed picture on the incompletely protected surface states in SmB_6. [1] Kapilevich *et al.*, Phys. Rev. B **92**, 085133 (2015). *The work at UIUC is supported by the NSF DMR 12-06766.

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Date submitted: 06 Nov 2015 Electronic form version 1.4