Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Vortices and gate-tunable bound states in a topological insulator coupled to superconducting leads[1] AARON FINCK, C. KURTER, Univ of Illinois - Urbana, Y.S. HOR, Missouri University of Science and Technology, D.J. VAN HARLINGEN, Univ of Illinois - Urbana — It has been predicted that zero energy Majorana bound states can be found in the core of vortices within topological superconductors. Here, we report on Andreev spectroscopy measurements of the topological insulator Bi_2Se_3 with a normal metal lead and one or more niobium leads. The niobium induces superconductivity in the Bi_2Se_3 through the proximity effect, leading to both signatures of Andreev reflection and a prominent re-entrant resistance effect. When a large magnetic field is applied perpendicular to the surface of the Bi_2Se_3, we observe multiple abrupt changes in the subgap conductance that are accompanied by sharp peaks in the dynamical resistance. These peaks are very sensitive to changes in magnetic field and disappear at temperatures associated with the critical temperature of the induced superconductivity. The appearance of the transitions and peaks can be tuned by a top gate. At high magnetic fields, we also find evidence of gate-tunable states, which can lead to stable zero-bias conductance peaks. We interpret our results in terms of a transition occurring within the proximity effect region of the topological insulator, likely due to the formation of vortices.

[1]We acknowledge support from Microsoft Project Q.

Aaron Finck
Univ of Illinois - Urbana

Date submitted: 13 Nov 2013 Electronic form version 1.4