

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

The Superconductivity of the Topologically Protected Surface States of Bi_2Se_3 : Experiment IAN DAYTON, NICHOLAS SEDLMAYR, Michigan State University, CAN ZHANG, ERIC HUEMILLER, University of Illinois at Urbana-Champaign, THOMAS CHASAPIS, Northwestern University, ALEX LEVCHENKO, University of Wisconsin-Madison, MERCOURI KANATZIDIS, Northwestern University, DALE VAN HARLINGEN, University of Illinois at Urbana-Champaign, STUART TESSMER, Michigan State University — Placing a 3D topological insulator (TI) in proximity to an s-wave superconductor (S) is predicted to induce 2D p-wave superconductivity into the topologically-protected surface state (TSS). The details of the TI/S interface are critical for the search for Majorana bound states in these systems. In this talk, we will present cryogenic scanning tunneling microscopy measurements of Bi_2Se_3 with nanometer scale islands of Nb and PbBi deposited on the surface. Local density of states measurements are consistent with superconductivity in the top quintuple layer, with a coherence length of about 500 nm. Moreover, we find clear evidence of a reverse proximity effect for which the TSS from the TI leaks back into the local density of states measured on the superconducting islands.

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Date submitted: 11 Nov 2016

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