Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Towards spin injection from silicon into topological insulators[1]
CLAUDIA OJEDA-ARISTIZABAL, MICHAEL S. FUHRER, IAN APPELBAUM, Center for Nanophysics and Advanced Materials, University of Maryland, College Park, MD 20742, USA, IAN APPELBAUM TEAM — Attempts to uncover evidence of spin-momentum coupling in a topological insulator (TI) using transport measurements are hampered by many challenges. Most importantly, injection of a spin polarized current from a ferromagnet that is in contact or close proximity to a topological insulator can easily give rise to anisotropic magnetoresistance signals or planar Hall effect from stray fields, which have the same symmetry and hence are indistinguishable from any signal coming from the spin-momentum-locked surface states. Here we propose a scheme to remove this difficulty by injecting spin-polarized electrons from undoped silicon into the TI surface states. In addition to providing a long-distance transport region to separate the ferromagnetic spin source from the TI by several hundred microns or even millimeters, this approach will also allow spin precession measurements (necessary for unambiguous identification of spin signals) whereas direct injection does not. Detection is provided by differential measurement from two ballistic current contacts on the topological insulator. We will describe our progress in fabrication and measurement of devices with exfoliated crystals of TI Bi_2Se_3, including the determination of the silicon-Bi_2Se_3 Schottky barrier height of 0.34 eV

[1]This work is supported by the University of Maryland NSF-MRSEC under Grant No. DMR 05-20471 and the ONR.

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Date submitted: 12 Dec 2011 Electronic form version 1.4