Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Electrical transport studies in the topological insulator Bi_2Se_3 with exchange induced ferromagnetism[1] PENG WEI, FERHAT KATMIS, Francis Bitter Magnet Lab, MIT, Cambridge, MA, BADIH ASSAF, DONALD HEIMAN, Department of Physics, Northeastern University, Boston, MA, JAGADEESH MOODERA, Francis Bitter Magnet Lab and Department of Physics, MIT, Cambridge, MA — The proximity-induced ferromagnetic order in topological insulator (TI)/ferromagnetic insulator (FI) heterostructures induces ferromagnetism in TI, which breaks local time reversal symmetry that can lead to many exotic properties, such as image magnetic monopole, topological magneto-electric effects, etc.[1] We achieved this novel ferromagnetic order in a TI Bi_2Se_3 through Bi_2Se_3/EuS bilayer structures. Electric transport studies show a dramatic suppression of the weak anti-localization (WAL) effect in Bi_2Se_3/EuS compared to controlled Bi_2Se_3 samples. In contrast to the case of surface doping a TI with magnetic atoms (i.e. Fe), here the WAL cannot be quenched even with a full coverage EuS capping layer, which points that its origin can be the opening of a surface gap rather than a reduction of the magnetic scattering length. The results are analyzed with a theoretical model providing a value for the induced surface exchange gap. Other experimental results, such as the anomalous Hall effect that support the proximity induced ferromagnetism in Bi_2Se_3 will be discussed.

[1] Qi, X.-L. & Zhang, S.-C., Rev Mod Phys 83, 1057-1110, (2011).

[1]Acknowledgements: NSF DMR 1207469, NSF DMR 08-19762 (CMSE-Initiative 2), ONR-N00014-0910177, and NSF-DMR-0907007

Peng Wei
Francis Bitter Magnet Lab, MIT, Cambridge, MA

Date submitted: 18 Nov 2012 Electronic form version 1.4