Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Heterostructure of a Topological Insulator and a Ferromagnetic Insulator bi-layer[1] VALERIA LAUTER, Oak Ridge National Laboraory, FERHAT KATMIS, Francis Bitter Magnet Lab, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, USA, BADIH ASSAF, Department of Physics, Northeastern University, Boston, Massachusetts 02115, USA, JAGADEESH MOODERA, Francis Bitter Magnet Lab, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139, USA, SNS COLLABORATION, MIT COLLABORATION, SNSMIT COLLABORATION — The short-range nature of magnetic proximity coupling with a ferromagnetic insulator (FI) induces ferromagnetic interactions in the TI surface state with the symmetry breaking right at the interface. Here we investigate Bi_2Se_3/EuS heterostructures and the mechanism to induce ferromagnetic order at the surface of Bi_2Se_3 thin films by using the FI EuS. SQUID measurements demonstrated excessive magnetic moment for the EuS film alone, thus indicating that EuS might induce a magnetization in Bi_2Se_3. Using PNR we reveal that EuS induces a significant magnetic moment in the Bi_2Se_3 films. Thus, it creates broken time-reversal symmetry and should appear as magnetic signatures in electrical transport. The ferromagnetism of EuS and the coupling between EuS and Bi_2Se_3 have to be strong to signify surface magnetization effect. These findings may be used to investigate interesting emergent phenomena, because the local time-reversal symmetry breaking is essential for inducing a quantized topological magnetoelectric response.

[1]PNR work done at SNS at ORNL are sponsored by U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy.

Valeria Lauter
Oak Ridge National Laboraory

Date submitted: 15 Nov 2013 Electronic form version 1.4