Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Dirac Surface State of Metamagnetic Topological Insulators Y.S. HOR, S.H. LEE, J.E. MEDVEDEVA, Missouri University of Science and Technology, M. IAVARONE, Temple University, U. CHATTERJEE, Argonne National Laboratory, W. RATCLIFF, NCNR — We report the observation of metamagnetism in iron-doped bismuth selenide topological insulators. The structural, magnetic, and transport properties of the materials were investigated both computationally and experimentally. First-principles density functional calculations are employed to determine the most favorable site location of the iron atoms in the bismuth selenide lattice and to analyze the magnetic properties of the resulting structures. Magnetization measurements showed the system is anisotropic with a magnetic phase transition at $\sim$ 100 K. However, this magnetic-doped topological insulator did not show an opening of a surface gap in ARPES data at temperatures below the transition temperature. This is due to the antiferromagnetic ground state of the system. With an applied magnetic field greater than 300 Oe, the system becomes ferromagnetic. In addition, Shubnikov-de Haas oscillations were observed in the longitudinal resistivity measurements under the applied magnetic fields up to 9 T.

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Date submitted: 19 Nov 2012 Electronic form version 1.4