Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Spin-Orbital texture and magnetic proximity effect of Bi_2Se_3/EuS heterostructure[1] ALEX TAEKYUNG LEE, Columbia Univ, MYUNG JOON HAN, Department of Physics, KAIST, KYUNGWHA PARK, Department of Physics, Virginia Tech — A topological insulator Bi_2Se_3 has gapless Dirac surface states topologically protected by time reversal symmetry with the helical spin texture. The spin texture has a unique orbital dependence and it allows topological insulator hybrid structures to be used for spintronics or spin transfer torque devices. Recently, an interface between a topological insulator Bi_2Se_3 and a ferromagnetic insulator EuS, has been experimentally realized, which provides an opportunity to study effects of magnetic interface on Dirac surface states of Bi_2Se_3. In this talk, we present our study of magnetic proximity effects and spin-orbital texture of the topological surface states of Bi_2Se_3 at the Bi_2Se_3/EuS interface, by using first-principles calculations and an low-energy effective model [A. T. Lee et al., Phys. Rev. B. 90, 155103 (2014)]. We discuss an energy gap opening due to the out-of-plane magnetic moment induced by the EuS, and a new Dirac cone occurring for thick Bi_2Se_3 slabs. Furthermore, we show an interesting coupling between the out-of-plane spin moment and the orbitals caused by broken time reversal symmetry.

[1]Funding from NSF DMR-1206354

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Date submitted: 13 Nov 2014 Electronic form version 1.4