Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Quasiparticle Dynamics in Reshaped Helical Dirac Cone of Topological Insulators DONG QIAN, MIAO LIN, JINFENG JIA, Shanghai Jiao Tong University, ZHENGFEI WANG, FENG LIU, University of Utah — Topological insulators (TIs) and graphene present two unique classes of materials which are characterized by spin polarized (helical) and non-polarized Dirac-cone band structures, respectively. The importance of many-body interactions that renormalize the linear bands near Dirac point in graphene has been well recognized and attracted much recent attention. However, renormalization of the helical Dirac point has not been observed in TIs. Here, we report the experimental observation of the renormalized quasiparticle spectrum with a skewed Dirac cone in a single Bi bilayer grown on Bi2Te3 substrate, from angle-resolved photoemission spectroscopy. First-principles band calculations indicate that the quasi-particle spectra are likely associated with the hybridization between the extrinsic substrate-induced Dirac states of Bi bilayer and the intrinsic surface Dirac states of Bi2Te3 film at close energy proximity. Without such hybridization, only single-particle Dirac spectra are observed in a single Bi bilayer grown on Bi2Se3, where the extrinsic Dirac states Bi bilayer and the intrinsic Dirac states of Bi2Se3 are well separated in energy. The possible origins of many-body interactions are discussed. Our findings provide a means to manipulate topological surface states.

Dong Qian
Shanghai Jiao Tong University

Date submitted: 12 Dec 2012 Electronic form version 1.4