

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**Tuning Topological Edge States of Bi(111) Bilayer Film by Edge Adsorption** ZHENGFEEI WANG, University of Utah, LI CHEN, Linyi University, FENG LIU, University of Utah — Based on first-principles and tight-binding calculations, we report that the topological edge states of zigzag Bi(111) nanoribbon can be significantly tuned by H edge adsorption. The Fermi velocity is increased by 1 order of magnitude, as the Dirac point is moved from the Brillouin zone boundary to the Brillouin zone center, and the real-space distribution of Dirac states are made twice more delocalized. These intriguing changes are explained by an orbital filtering effect of edge H atoms, which pushes certain components of the p orbital of edge Bi atoms out of the band gap regime that reshapes the topological edge states. In addition, the spin texture of the Dirac states is also modified, which is described by introducing an effective Hamiltonian. Our findings not only are of fundamental interest but also have practical implications in potential applications of topological insulators. This work is supported by DOE-BES (Grant No. DE-FG02-04ER46148) and NSF-MRSEC (Grant No.DMR-1121252) .

Zhengfei Wang  
University of Utah

Date submitted: 14 Nov 2014

Electronic form version 1.4