Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Investigations of Topological Surface States in Sb (111) Ultrathin Films by STM/STS Experiments and DFT Calculations ZIYU LUO, GUANGGENG YAO, WENTAO XU, YUANPING FENG, XUE-SEN WANG, National Univ of Singapore — Bulk Sb was regarded as a semimetal with a nontrivial topological order. It is worth exploring whether the Sb ultrathin film has the potential to be an elementary topological insulator [1]. In the presence of quantum confinement effect, we investigated the evolution of topological surface states in Sb (111) ultrathin films with different thickness by the scanning tunneling microscopy/ spectroscopy (STM/STS) experiments and density functional theory (DFT) calculations [2]. By comparing the quasiparticle interference (QPI) patterns obtained from Fourier-transform scanning tunneling spectroscopy (FT-STS) and from DFT calculations, we successfully derive the spin properties of topological surface states on Sb (111) ultrathin films. In addition, based on the DFT calculations, the 8BL Sb (111) ultrathin film was proved to possess up to 30% spinseparated topological surface states within the bandgap. Therefore, the highquality 8BL Sb (111) ultrathin film could be regarded as an elementary topological insulator. [1] F.C. Chuang et al., App. Phy. Lett.102, 022424 (2013) [2] G Yao et al., Sci. Rep. 3, 2010 (2013)

Ziyu Luo
National Univ of Singapore

Date submitted: 14 Nov 2013 Electronic form version 1.4