Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

STM/S study of edge states in a large energy gap near the step edges on the surface of $ZrTe_5$ RUI WU, Institute of Physics, Chinese Academy of Sci (CAS) Department of Physics, Tsinghua University, China, XIONG HUANG, RUIZHE LIU, JIAXIN YIN, JUNZHANG MA, SIMIN NIE, LINGXIAO ZHAO, BINGBING FU, PIERRE RICHARD, GENFU CHEN, ZHONG FANG, XI DAI, HONGMING WENG, TIAN QIAN, HONG DING, Institute of Physics, Chinese Academy of Sci (CAS), SHUHENG PAN, Institute of Physics, Chinese Academy of Sci (CAS) Department of Physics and Texas Center for Superconductivity, University of Houston, USA — Despite considerable theoretical efforts in predicting large-gap two-dimensional topological insulator candidates, none of them have been experimentally demonstrated to have a full gap, which is crucial for quantum spin Hall effect. Here, we use low temperature scanning tunneling microscopy/spectroscopy (STM/S) to study the single crystal of $ZrTe_5$, which has a qusi-2D layered structure and is a potential large-gap 2D TI predicted by calculations. The results reveal that $ZrTe_5$ hosts a large full energy gap of ˜100 meV on the surface and a nearly constant density of states within the entire gap at the monolayer step edge. These features are well reproduced by our first-principles calculations, which point to the topologically nontrivial nature of the edge states. The gap position in Brillouin zone and the band structure are demonstrated by angle-resolved photoemission spectroscopy. We also make a study for $HfTe_5$ by using STM/S, which confirms the same behaviors as on $ZrTe_5$.

Rui Wu
Department of Physics, Tsinghua University, China

Date submitted: 11 Nov 2016 Electronic form version 1.4