Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Bulk and surface electronic structure of hexagonal structured $PtBi_2$ studied by angle-resolved photoemission spectroscopy QI YAO, Fudan Univ, YONGPING DU, Nanjing University, XIAOJUN YANG, YI ZHENG, Zhejiang University, DIFEI XU, XIAOHAI NIU, XIAOPING SHEN, Fudan Univ, HAIFENG YANG, Shanghai Institute of Microsystem and Information Technology,Chinese Academy of Sciences, PAVEL DUDIN, TIMUR KIM, MORITZ HOESCH, Diamond Light Source, Harwell Science and Innovation Campus, United Kingdom, IVANA VOBORNIK, CNR-IOM, TASC Laboratory AREA Science Park-Basovizza, Italy, ZHU-AN XU, Zhejiang University, XIANGANG WAN, Nanjing University, DONGLAI FENG, Fudan Univ., DAWEI SHEN, Shanghai Institute of Microsystem and Information Technology,Chinese Academy of Sciences — $PtBi_2$ with a layered hexagonal crystal structure was recently reported to exhibit an unconventional large linear magnetoresistance. Using angle-resolved photoemission spectroscopy, we present a systematic study on its bulk and surface electronic structure. Through comparison with first-principle calculations, our experiment distinguishes the low-lying bulk bands from entangled surface states. We find significant electron doping in $PtBi_2$, implying a substantial Bi deficiency induced disorder therein. Intriguingly, we discover a Dirac-cone-like surface state without topological protection on the boundary of the Brillouin zone. Our findings exclude linear band dispersion in the quantum limit as the cause of the unconventional large linear magnetoresistance but put support to the classical disorder model from the perspective of the electronic structure.

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Date submitted: 11 Nov 2016 Electronic form version 1.4