Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Direct Observation of the Fermi Arc Surface State in the Three-Dimensional Dirac Semimetal Na_3Bi AIJI LIANG, ZHIJUN WANG, CHAOYU CHEN, YOUGUO SHI, HEMIAN YI, YA FENG, ZHUOJIN XIE, SHAOLONG HE, JUNFENG HE, YINGYING PENG, XU LIU, YAN LIU, LIN ZHAO, GUODONG LIU, JUN ZHANG, Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, Chinese Academy of Sciences, Beijing 100190, China, M. NAKATAKE, M. ARITA, K. SHIMADA, H. NAMATAME, M. TANIGUCHI, Hiroshima Synchrotron Radiation Center, Hiroshima University, Hiroshima 739-8526, Japan, ZUYAN XU, CHUANGTIAN CHEN, Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, Beijing 100190, China, XI DAI, ZHONG FANG, XINGJIANG ZHOU, Beijing National Laboratory for Condensed Matter Physics, Institute of Physics, Chinese Academy of Sciences, Beijing 100190, China
— The three dimensional (3D) Dirac semimetals have linearly dispersive 3D Dirac nodes where the conduction and valence bands connect to each other. Here we report the direct observation of the linearly dispersive 3D bulk Dirac points at the natural (001) cleaving surface of Na_3Bi single crystal by high resolution ARPES. In addition, we have directly observed two separated 3D bulk Dirac nodes by elaborately cleaving Na_3Bi samples at a non-natural-cleavage (100) crystalline surface. We further unveil the unusual Fermi-arc surface states connecting the two 3D Dirac nodes. At this unique (100) crystalline surface, the identification of the 3D Dirac semimetal state in Na_3Bi paves the way for systematically exploring rich exotic topological physics such as topological insulator and Weyl semimetal state.

Aiji Liang
Beijing National Laboratory for Condensed Matter Physics,
Institute of Physics, Chinese Academy of Sciences,
Beijing 100190, China

Date submitted: 13 Nov 2014 Electronic form version 1.4