Abstract Submitted
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Discovery of the first Weyl fermion semimetal and topological Fermi arcs in TaAs[1] SUYANG XU, ILYA BELOPOLSKI, NASSER ALIDOUST, Princeton University, MADHAB NEUPANE, Los Alamos National Laboratory, GUANG BIAN, Princeton University, CHENGLONG ZHANG, Peking University, RAMAN SANKAR, National Taiwan University, GUOQING CHANG, National University of Singapore, ZHUJUN YUAN, Peking University, CHI-CHENG LEE, SHIN-MING HUANG, National University of Singapore, HAO ZHENG, Princeton University, JIE MA, Oak Ridge National Laboratory, DANIEL SANCHEZ, Princeton University, BAOKAI WANG, ARUN BANSIL, Northeastern University, FANGCHENG CHOU, National Taiwan University, PAVEL SHIBAYEV, Princeton University, HSIN LIN, National University of Singapore, SHUANG JIA, Peking University, M. ZAHID HASAN, Princeton University — Weyl semimetals have opened a new era in condensed matter physics and materials science. They host Weyl fermions as emergent quasiparticles and admit a topological classification that protects Fermi arc surface states on the boundary. This unusual electronic structure has deep analogies with particle physics and leads to unique topological properties. We report the experimental discovery of the first Weyl semimetal, TaAs. We directly observe Fermi arcs on the surface, as well as the Weyl fermion cones and Weyl nodes in the bulk of TaAs single crystals. We find that Fermi arcs terminate on the Weyl fermion nodes, consistent with their topological character. Our work opens the field for the experimental study of Weyl fermions in physics and materials science.

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