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Observation of Weyl nodes and Fermi arcs in TaP MING SHI, N. XU, Paul Scherrer Institute, Switzerland, H. M. WENG, Institute of Physics, Chinese Academy of Sciences, B. Q. LV, C. E. MATT, J. PARK, F. BISTI, V. N. STROCOV, D. GAWRYLUK, E. POMJAKUSHINA, K. CONDER, N. C. PLUMB, M. RADOVIC, Paul Scherrer Institute, Switzerland, G. AUTS, O. V. YAZYEV, cole Polytechnique Fdrale de Lausanne, Switzerland, Z. FANG, X. DAI, T. QIAN, Institute of Physics, Chinese Academy of Sciences, J. MESOT, Paul Scherrer Institute, Switzerland, H. DING, Institute of Physics, Chinese Academy of Sciences — A Weyl semimetal possesses topologically unavoidable crossings of spin-polarized bands dispersing linearly along all momentum directions, called Weyl nodes, connected by topological surface arcs. The crossing points have fixed chirality and behave the same as massless Weyl fermions, leading to exotic properties like chiral anomaly. To have the transport and other novel properties dominated by Weyl fermions, it is required that Weyl nodes (1) locate nearly at the chemical potential and (2) are well separated in momentum space and enclosed by pairs of individual Fermi surfaces with nonzero Fermi Chern numbers. By investigating the electronic structure of TaP using angle-resolved photoemission spectroscopy and first-principles calculation, we establish that TaP is a Weyl semimetal with only single type of Weyl fermions with well-separated Weyl nodes locating at the chemical potential, distinguished from TaAs where there are two types of Weyl fermions contributing to the low-energy physical properties. We have also observed Fermi arcs on the Ta-terminated surface, which appear in a different pattern from that on the As-terminated surface observed in TaAs and NbAs.

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