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ARPES study on a stable three-dimensional topological Dirac semimetal Cd3As2 ZHONGKAI LIU, Diamond Light Source Ltd, JUAN JIANG, Fudan University, BO ZHOU, Oxford University, ZHIJUN WANG, Chinese Academy of Sciences, YI ZHANG, Lawrence Berkeley National Laboratory, HONGMING WENG, Chinese Academy of Sciences, DHARMALINGAM PRABHAKARAN, Oxford University, SUNG-KWAN MO, Lawrence Berkeley National Laboratory, HAN PENG, Oxford University, PAVEL DUBIN, TIMUR KIM, MORITZ HOESCH, Diamond Light Source Ltd, ZHONG FANG, XI DAI, Chinese Academy of Sciences, ZHI-XUN SHEN, Stanford University, DONGLAI FENG, Fudan University, ZAHID HUSSAIN, Lawrence Berkeley National Laboratory, YULIN CHEN, Oxford University — Three-dimensional topological Dirac semimetal (TDS) is a new state of quantum matter recently proposed and has attracted increasing attention in physics and material science. A 3D TDS not only is a bulk analogue of graphene, but also shows non-trivial topology in its electronic structure. A TDS can also be driven into other novel states with symmetry breaking, making it a unique "mother compound" for the study of these states. By performing angle-resolved photoemission spectroscopy, we directly observed a pair of 3D Dirac fermions in Cd3As2, proving that it is a model 3D TDS. Comparing to other 3D TDSs, Cd3As2 is stable and have much higher Fermi velocities. Furthermore, by in-situ doping, we were able to tune its Fermi-energy, making it a flexible platform for exploring exotic physical phenomena and application potentials.

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