Abstract Submitted
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Observation of a topological 3D Dirac semimetal phase in high-mobility Cd_3As_2[1] M. NEUPANE, S.-Y. XU, Princeton University, USA, R. SANKAR, National Taiwan University, Taiwan, N. ALIDOUST, G. BIAN, CHANG LIU, I. BELOPOLSKI, Princeton University, USA, T.-R. CHANG, National Tsing Hua University, Taiwan, H.-T. JENG, National Tsing Hua University & Institute of Physics, Academia Sinica, Taiwan, H. LIN, National University of Singapore, Singapore, A. BANSIL, Northeastern University, USA, FANGCHENG CHOU, National Taiwan University, Taiwan, M.Z. HASAN, Princeton University & Princeton Center for Complex Materials, PRISM, USA — Experimental identification of three-dimensional (3D) Dirac semimetals in solid state systems is critical for realizing exotic topological phenomena and quantum transport. Using high-resolution angle-resolved photoemission spectroscopy, we performed systematic electronic structure studies on well-known compound Cd_3As_2. For the first time, we observe a highly linear bulk Dirac cone located at the Brillouin zone center projected onto the (001) surface, which is consistent with a 3D Dirac semimetal phase in Cd_3As_2. Remarkably, an unusually high Dirac Fermion velocity is seen in samples where the mobility far exceeds 20,000 cm^2/V.s suggesting that Cd_3As_2 can be a promising candidate as a hypercone analog of graphene in many device-applications, which can also incorporate topological quantum phenomena in a large gap setting.

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