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Exotic surface Dirac fermions in Cerium-based compounds NASSER ALIDOUST, Department of Physics, Princeton University, SATYA KUSHWAHA, Department of Chemistry, Princeton University, ARIS ALEXANDRADINATA, Department of Physics, Princeton University, MINGGANG ZENG, Department of Physics, National University of Singapore, SUYANG XU, MADHAB NEUPANE, CHANG LIU, ILYA BELOPOLSKI, GUANG BIAN, DANIEL SANCHEZ, PAVEL SHIBAYEV, Department of Physics, Princeton University, HSIN LIN, Department of Physics, National University of Singapore, B. ANDREI BERNEVIG, Department of Physics, Princeton University, ROBERT J. CAVA, Department of Chemistry, Princeton University, M. ZAHID HASAN, Department of Physics, Princeton University — Cerium-based compounds have received considerable attention due to their complicated antiferromagnetic (AFM) phase transitions at low temperatures as well as their large Kerr rotation angles. Here, we use angle-resolved photoemission spectroscopy (ARPES) to study the detailed electronic structure of some of these compounds, and find unusual intercalating topological Dirac surface states in them. These exotic surface Dirac fermions appear to be very anisotropic, with protected degeneracy at the high symmetry Kramers' points. We also present a theoretical model to account for the observed topological surface states. Our finding of these unusual Dirac surface states in this class of strongly correlated materials calls for more in-depth investigations of topological properties of strongly correlated systems, and more elaborate theoretical work on the origin of such phases.

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