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ARPES investigation on the surface vs bulk electronic structures of correlated topological insulators YbB6 and other rare earth hexaborides NAN XU, C.E. MATT, E. POMJAKUSHINA, J.H. DIL, G. LANDOLT, J.Z. MA, X. SHI, R.S. DHAKA, N.C. PLUMB, M. RADOVIC, V. ROGALEV, V. STROCOV, Paul Scherrer Institut, T.K. KIM, M. HOESCH, Diamond Light Source, K. CONDER, J. MESOT, Paul Scherrer Institut, H. DING, Institute of Physics, CAS, MING SHI, Paul Scherrer Insitut — Using ARPES performed in wide photon energy range we systematically studied the bulk and surface electronic structures of a topological mixed- valence insulator candidate, YbB6. The bulk B-2p states are probed with bulk-sensitive soft X-ray ARPES, exhibiting strong three-dimensionality with the band top locating 80 meV below the EF at the X point. The measured bulk Yb-4f states are located at 1 and 2.3 eV below EF, which hybridize with the dispersive B-2p states. The bulk band structures obtained by experiments are substantially different from the first principle calculations, but it can be better described by adding a correlation parameter U = 7 eV, indicating YbB6 is a correlated system. Using surface-sensitive VUV ARPES, we revealed two-dimensional surface states which form three electron-like FSs with Dirac-cone-like dispersions. The odd number of surface FSs gives the first indication that the surface states are topological non-trivial. The spin-resolved ARPES measurements provide further evidence that these surface states are spin polarized with spin locked to the crystal momentum. Recent results on the TI phase in other rare earth hexaborides will also be shown.

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