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Orbit- and Atom-Resolved Spin Textures of Intrinsic, Extrinsic and Hybridized Dirac Cone States LIN MIAO, Department of Physics and Astronomy, Shanghai Jiao Tong University, ZHENGFEI WANG, Department of Materials Science and Engineering, University of Utah, MENGYU YAO, FENGFENG ZHU, Department of Physics and Astronomy, Shanghai Jiao Tong University, J. HUGO DIL, Swiss Light Source, Paul Scherrer Institute, CHUNLEI GAO, CANHUA LIU, Department of Physics and Astronomy, Shanghai Jiao Tong University, FENG LIU, Department of Materials Science and Engineering,University of Utah, DONG QIAN, JINFENG JIA, Department of Physics and Astronomy, Shanghai Jiao Tong University — Combining first-principles calculations and spin- and angle-resolved photoemission spectroscopy measurements, we identify the helical spin textures for three different Dirac cone states in the interfaced systems of a 2D topological insulator (TI) of Bi(111) bilayer and a 3D TI Bi_2Se_3 or Bi_2Te_3. The spin texture is found to be the same for the intrinsic Dirac cone of Bi_2Te_3 or Bi_2Se_3 surface state, the extrinsic Dirac cone of Bi bilayer state induced by Rashba effect, and the hybridized Dirac cone between the former two states. Further orbit- and atom-resolved analysis shows that S and P_z orbits have the conventional helical spin texture; $P_{\rm x}$ and$P_{\rm y}$ orbits show individually radial spin component, while the sum of the two shows a total in-plane helical spins. The orbit-dependent spin structure is a signature property of spin-orbit coupling, independent of topology.

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