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Spin-orbital Texture in Topological Insulators CHAOXING LIU, Department of Physics, Pennsylvania State University, HAIJUN ZHANG, SHOU-CHENG ZHANG, Department of Physics, McCullough Building, Stanford University — Relativistic spin-orbit coupling plays an essential role in the field of topological insulators and quantum spintronics. It gives rise to the topological non-trivial band structure and enables electric manipulation of the spin degree of freedom. Because of the spin-orbit coupling, rich spin-orbital coupled textures can exist both in momentum and in real space. For three dimensional topological insulators in the Bi2Se3 family, topological surface states with pz orbitals have a left-handed spin texture for the upper Dirac cone and a right-handed spin texture for the lower Dirac cone. In this work, we predict a new form of the spin-orbital texture associated with the px and the py orbitals. For the upper Dirac cone, a left-handed (right-handed) spin texture is coupled to the "radial" ("tangential") orbital textures, whereas for the lower Dirac cone, the coupling of spin and orbital textures is the exact opposite. A spin-resolved and photon polarized angle-resolved photoemission spectroscopy experiment is proposed to observe this novel spin-orbital texture.

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