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Photoelectron spin-flipping and texture manipulation in a topological insulator CHRIS JOZWIAK, Advanced Light Source, Lawrence Berkeley National Lab, CHEOL-HWAN PARK, Department of Physics and Astronomy, Seoul National University, KENNETH GOTLIEB, Graduate Group in Applied Science and Technology, University of California, Berkeley, CHOONGYU HWANG, Materials Sceinces Division, Lawrence Berkeley National Lab, DUNG-HAI LEE, STEVEN G. LOUIE, Department of Physics, University of California, Berkeley, JONATHAN D. DENLINGER, Advanced Light Source, Lawrence Berkeley National Lab, COSTEL R. ROTUNDU, Materials Sciences Division, Lawrence Berkeley National Lab, ROBERT J. BIRGENEAU, Department of Physics, University of California, Berkeley, ZAHID HUSSAIN, Advanced Light Source, Lawrence Berkeley National Lab, ALESSANDRA LANZARA, Department of Physics, University of California, Berkeley — A hallmark characteristic of the recently discovered topological insulators is their protected metallic surface states. Electrons in these surface states are spin polarized with their spins governed by their momentum, resulting in a helical spin texture in momentum space. Spin- and angle-resolved photoemission spectroscopy has been the only tool capable of directly observing this central feature with simultaneous energy, momentum, and spin sensitivity. By using an innovative photoelectron spectrometer with a high-flux laser, we found that the spin polarization of the resulting photoelectrons exhibits rich phenomena previously unobserved. These surprising results provide insight into the physics of these fascinating materials and the use of spin-resolved photoemission in general.

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