Abstract Submitted
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Tunneling tuned spin modulations in ultrathin topological insulator films[1] MADHAB NEUPANE, S.-Y. XU, N. ALIDOUST, I. BELOPOLSKI, CHANG LIU, Department of Physics, Princeton University, D.M. ZHANG, A. RICHARDELLA, Department of Physics, Penn State University, J. SANCHEZ-BARRIGA, D. MARCHENKO, A. VARYKHALOV, O. RADER, BESSY II, Germany, M. LEANDERSSON, T. BALASUBRAMANIAN, MAX-Lab, Sweden, L.A. WRAY, ALS, LBNL, T.-R. CHANG, National Tsing Hua University, Taiwan, H.-T. JENG, National Tsing Hua University and Academia Sinica, Taiwan, H. LIN, A. BANSIL, Department of Physics, Northeastern University, N. SAMARTH, Department of Physics, Penn State University, M.Z. HASAN, Department of Physics, Princeton University — Understanding the spin behavior of boundary modes in ultrathin topological insulator films is critically essential for the design and fabrication of functional nano-devices. We report tunneling-dependent evolution of spin configuration in topological insulator thin films across the metal-to-insulator transition. We observe that for a given film thickness of the prototype topological insulator Bi_2Se_3 ultrathin films, the spin polarization is large for larger wave-vectors or for momenta far from the center of the surface Brillouin zone. In addition, the polarization is observed to decrease significantly with enhanced tunneling realized systematically in thin insulating films. We present theoretical model calculations that qualitatively capture the delicate relationship between quantum tunneling and Fermi surface spin polarization.

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