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Magneto-transport at the crossover of the three-dimensional topological insulator to the two-dimensional limit in proximity with a ferromagnetic insulator[1] DAVID RAKHMILEVITCH, Massachusetts Institute of Technology, CUI-ZU CHANG, Massachusetts Institute of Technology, Pennsylvania State University, WEIWEI ZHAO, MOSES H. W. CHAN, Pennsylvania State University, JAGADEESH S. MOODERA, Massachusetts Institute of Technology — The spin-momentum locked electrons on the Dirac surface states of topological insulators (TIs) allow the observation of novel magneto-transport effects. Specifically, combining a TI with a ferromagnetic (FM) perturbing medium can lead to many exotic quantum phenomena. Here, we investigate hetero-structures of FM insulator on top of intrinsic TIs, with the TI film thickness at the crossover of a three-dimensional (3D) TI into a two-dimensional (2D) limit. Taking advantage of an effective electrostatic gating influence on the chemical potential, we systematically investigate the transport properties of such hetero-structures as a function of applied magnetic field and successfully isolate the surface-dominated magneto-transport effects. Our findings shed light on the different contributions of orbital and spin degree of freedoms in magnetized TIs and highlight the role of the Dirac surface states on magneto-transport.

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David Rakhmilevich
Massachusetts Institute of Technology

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