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Magnetotransport in Gate Tunable Insulating Ferromagnet - Topological Insulator Heterostructure Devices ABHINAV KANDALA, ANTHONY RICHARDELLA, ROBERT FRALEIGH, NITIN SAMARTH, Pennsylvania State University — Magnetic perturbations to topological insulator (TI) surface states are predicted to result in a host of exotic effects that are of great fundamental and applied interest. Complementary to magnetic doping, interfacing TI's with an insulating ferromagnets (IF) enables transport studies of magnetism solely at the surface state. In a previous study [A. Kandala et al., Appl. Phys. Lett. 103, 202409 (2013)], we used IF-TI heterostructure devices wherein the chemical potential in the TI was fixed in the bulk conduction band. By using Sb doping and growth on $SrTiO_3$ substrates, we have now fabricated IF-TI devices where the surface states are accessed by back-gate tuning of the chemical potential. Our unique device geometry enables a direct comparison of magneto-conductance in bare (control) and magnetically capped TI channels as the chemical potential is swept through the Dirac point. Analysis of the low-temperature magneto-conductance provides insights into the influence of the magnetic overlayer on quantum corrections to the diffusive transport. Supported by DARPA and ONR.

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