Abstract Submitted
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The anomalous Hall effect in ultrathin films of gate-tuned Cr-doped (Bi,Sb)2Te3[1] MINHAO LIU, Physics Department, Princeton University, ANTHONY RICHARDELLA, ABHINAV KANDALA, NITIN SAMARTH, Physics Department, Pennsylvania State University, N. P. ONG, Physics Department, Princeton University — The surface states of topological insulator are predicted to display exotic properties in a magnetization field **M**. Quantized anomalous Hall effect was recently observed in Cr-doped (Bi,Sb)2Te3 ultrathin films, in which the surfaces states hybridize with each other. We investigate the situation when surface states are not coupled. SrTiO3 (111) crystals are chosen as the substrate due to its large electric polarization at low temperatures. Large anomalous Hall effect is observed for 8QL-thick films. The anomalous Hall conductance shows a maximum slightly lower than half conductance quanta (0.46e2/h) at 300mK when the Fermi level is tuned close to the neutral point by electric gating. It decreases monotonically as the hole carrier density becomes higher by negative gate voltage. On the electron doping side, the anomalous Hall conductance decreases and then saturates at a value of 0.4e2/h when the gate voltage is higher than 5V. The electron density is pinned at about 3e12/cm2 in the whole positive gate voltage range, only slightly increased (10%) by a gate voltage of 150V. These results shed light on the robustness of the quantized Hall response of magnetically gapped Dirac surface state.

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