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Electrical control of the ferromagnetism in $Sb_{2-x}Cr_xTe_3$ magnetic topological insulators ZUOCHENG ZHANG, XIAO FENG, MINGHUA GUO, CUICU CHANG, JINSONG ZHANG, Tsinghua University, KANG LI, LILI WANG, Institute of Physics, Chinese Academy of Sciences, XI CHEN, Tsinghua University, KE HE, Institute of Physics, Chinese Academy of Sciences, QIKUN XUE, Tsinghua University, XUCUN MA, Institute of Physics, Chinese Academy of Sciences, YAYU WANG, Tsinghua University, TSINGHUA UNIVERSITY TEAM, INSTITUTE OF PHYSICS, CHINESE ACADEMY OF SCIENCES COLLABORATION — The spin helical Dirac fermions living on the surface of three-dimensional topological insulators (TIs) provide a platform for exploring the coupling between the charge and spin degrees of freedom. In particular, breaking the time reversal symmetry in TIs is expected to create exotic topological magnetoelectric effects. To realize these phenomena and apply them in TI-based spintronic devices, it is desirable to achieve in situ manipulation of the magnetism in TIs via an electrical field. In this talk we present the fabrication and transport studies of Cr doped Sb_2Te_3 magnetic TI thin films. By applying a gate voltage in a field effect transistor device, we can control the coercive force and Curie temperature. The ferromagnetic order is found to be enhanced when more hole-type carriers are injected into the sample. This trend suggests the itinerant bulk holes in TIs can mediate ferromagnetic ordering of local moments in a similar manner as that in the diluted magnetic semiconductors. The electrical control of the ferromagnetism in TIs demonstrated here paves the road for realizing the TI-based devices.

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