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**Electrically tuned magnetic order and magnetoresistance in a topological insulator** MINGHUA GUO, ZUOCHENG ZHANG, Tsinghua University, XIAO FENG, Tsinghua University; Institute of Physics, Chinese Academy of Sciences, KANG LI, Institute of Physics, Chinese Academy of Sciences, JINSONG ZHANG, Tsinghua University, YUNBO OU, Institute of Physics, Chinese Academy of Sciences, YANG FENG, Tsinghua University, LILI WANG, Tsinghua University; Institute of Physics, Chinese Academy of Sciences, XI CHEN, Tsinghua University, KE HE, XUCUN MA, Tsinghua University; Institute of Physics, Chinese Academy of Sciences, QIKUN XUE, YAYU WANG, Tsinghua University — Topological insulators (TIs) possess spin-polarized, Dirac-like surface states protected by time reversal symmetry (TRS). Introducing magnetism into TI, which breaks the TRS, is expected to create exotic topological magnetoelectric effects. In particular, it may lead to highly unconventional magnetoresistance (MR) behavior that can find unique applications in magnetic sensing and data storage. In this talk, we present magneto transport studies of Cr doped (Bi,Sb)2Te3 ferromagnetic TI thin film fabricated into a field effect transistor device. We observe an unusually complex evolution of MR when the Fermi level is tuned across the Dirac point by gate voltage. The MR behavior cannot be explained by the simple localization picture, but is closely related to the gate-tuned ferromagnetic order. The underlying physics is the competition between the broken TRS and topological protection in magnetic TI. The simultaneous electrical control of magnetic order and magneto transport facilitates future TI-based spintronic devices.

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