

Abstract Submitted
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Magnetoconductance crossover and non-linear Hall effect in MBE-grown Cr-doped $\text{Bi}_2\text{Te}_2\text{Se}$ ¹ BADIH A. ASSAF, Physics Dept. Northeastern University, PENG WEI, FERHAT KATMIS, JAGADEESH S. MOODERA, MIT, Francis Bitter Magnet Lab, DON HEIMAN, Physics Dept. Northeastern University — Recent predictions have shown that the magnetoconductance (MC) of a topological insulator should show a crossover from negative MC to positive MC when time-reversal symmetry is broken [1]. Observations of this crossover have been reported in 3 QL thick Cr- Bi_2Se_3 [2] in the quasi-2D regime where surface hybridization is not negligible. We report magneto-transport results on 15 QL thick Cr-doped and undoped $\text{Bi}_2\text{Te}_2\text{Se}$ films grown on Si (111) substrates by MBE. The undoped film exhibits weak anti-localization at low temperatures. In the Cr-doped film, a crossover from negative to positive MC is observed versus temperature at $T=12$ K. SQUID measurements show that the sample is ferromagnetic in this temperature range. In addition, a non-linear Hall voltage is observed despite the large bulk carrier concentration. This paves the way for further experiments on $(\text{Bi,Cr})_2\text{Te}_2\text{Se}$ in our search for the quantum anomalous Hall effect. [1] H.Z. Lu et al. Phys. Rev. Lett. **107**, 076801(2011). [2] M.Liu et al. arXiv 1103.3353(2011).

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