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Magnetically doped topological materials tuned by electron irradiation[1] ZHIYI CHEN, HAIMING DENG, SHIHUA ZHAO, INNA KORZHOVSKA, City College of New York, MARCIN KONCZYKOWSKI, Ecole Polytechnique, LIA KRUSIN-ELBAUM, City College of New York — We have recently demonstrated that irradiation of topological materials, such as Bi_2Te_3 and Ca:Bi_2Se_3, with high energy (2.5 MeV) electron beams can sweep Fermi level E_F across the bulk gap to charge neutrality point (CNP) [1]. Here we show that such irradiation technique applied to magnetically doped topological insulators (TIs) can be used to tune anomalous Hall effect (AHE). We performed irradiation experiments on a series of Mn-doped Bi_2Te_3 crystals, $(Bi_{1_x}Mn_x)_2Te_3$, using both p- and n-type starting materials. All materials, displayed magnetic hysteresis loops consistent with ferromagnetic order present. However, in transport the two conductivity types were found to be surprisingly different. While the p-type crystals did convert to n-type across CNP, no trace of AHE was detected. In contrast, n-type materials showed pronounced hysteretic anomalous Hall resistance, consistent with magnetization. In the latter case, charge density has decreased and the zero-field Hall signal increased after irradiation. We will discuss how AHE in irradiated magnetically doped TIs can be fine tuned by electrostatic gating in the vicinity of CNP. [1]L. Zhao *et al*, *Nat. Comm.* **7**, 10957 (2016)

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