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Origins of open circuit voltage hysteresis driven by transverse charge current in ferromagnet/normal metal structures CHRISTOS TENGERIS, PENGKE LI, IAN APPELBAUM, Univ of Maryland-College Park, APPELBAUM LAB TEAM — We quantify the current-induced ensemble spin polarization due to non-equilibrium occupation of the 'spin-momentum locked' surface states in a 3D topological insulator, using the Boltzmann transport formalism in the relaxation-time approximation. Despite these states' high in-plane spin projection, practically achievable spin density polarization is minuscule in linear response. Using an open circuit voltage scheme identical to those used by others to claim observation of unphysically large polarizations in topological insulators, we experimentally demonstrate potential switching and hysteresis on ferromagnetic contacts driven by the charge current in a topologically-trivial metal thin film beneath it. Our comprehensive study includes the effects of varying parameters (such as the current density, thin film thickness, types of metal materials, and temperature) and aims to resolve the different origins that contribute to this phenomenon.

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