

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Signature of Topological Insulators in Conductance Measurements SEOKMIN HONG, VINH DIEP, SUPRIYO DATTA, Purdue University — Following the discovery of spin-polarized states at the surface of three-dimensional topological insulators (TI) like Bi_2Te_3 and Bi_2Se_3 , there are intense interests in possible electrical measurements demonstrating unique signatures of these unusual states. A recent interesting proposal suggests that a signature of TI material should be a change in the conductance measured between a normal contact and a magnetic contact when the magnetization of the latter is reversed. However, the generalized Onsager relation suggests that no such change is expected in two-terminal setups and a multi-terminal set up is needed to observe the proposed effect. We present numerical results using a Non-Equilibrium Green Function (NEGF) based model capable of covering both ballistic and diffusive transport regimes seamlessly. Simple expressions based on a semi-classical picture describe some of the results quite well. Finally, we estimate the magnitude of signal expected in realistic samples that have recently been studied experimentally and have shown evidence of surface conduction.

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Date submitted: 10 Nov 2011

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