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Transport Signatures of the Quantum Anomalous Hall Effect in 3D Topological Insulators[1] BRIAN DELLABETTA, TAYLOR HUGHES, MATTHEW GILBERT, University of Illinois at Urbana-Champaign — The unique physics of spin-orbit coupled topological insulators (TIs) exposed to magnetic moments leads to a quantized conductance known as the quantum anomalous Hall effect (QAHE)[2]. While magnetic disorder has been experimentally shown to open a gap in the surface states of TIs[3], no clear transport signatures of the QAHE have been observed in 3-dimensional TIs. We perform 3D real space calculations using the Non-Equilibrium Green's Function Formalism to show that topological insulators in proximity to arrays of ferromagnets offer a unique environment in which to study this phenomenon. We show that ferromagnetic domain walls on patterned surfaces manifest chiral surface modes with quantized currents that can be altered by changing the configuration of the magnetic arrays. We compare topologically trivial and nontrivial models to show a qualitative difference in the induced transport flow based on ferromagnet orientation, and propose a variety of experimental configurations which yield transport signatures of the QAHE.

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[2]R. Yu et al., *Science* **329**, 5987 (2010).
[3]Y. L. Chen et al., *Science* **329**, 659 (2010).

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