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Precise quantization of anomalous Hall effect near zero magnetic field ANDREW BESTWICK, ELI FOX, Stanford University, XUFENG KOU, LEI PAN, KANG WANG, University of California, Los Angeles, DAVID GOLDHABER-GORDON, Stanford University — The quantum anomalous Hall effect (QAHE) has recently been of great interest due to its recent experimental realization in thin films of Cr-doped $(Bi, Sb)_2Te_3$, a ferromagnetic 3D topological insulator. The presence of ferromagnetic exchange breaks time-reversal symmetry, opening a gap in the surface states, but gives rise to dissipationless chiral conduction at the edge of a magnetized film. Ideally, this leads to vanishing longitudinal resistance and Hall resistance quantized to h/e^2, where h is Planck's constant and e is the electron charge, but perfect quantization has so far proved elusive. Here, we study the QAHE in the limit of zero applied magnetic field, and measure Hall resistance quantized to within one part per 10,000. Deviation from quantization is due primarily to thermally activated carriers, which can be nearly eliminated through adiabatic demagnetization cooling. This result demonstrates an important step toward dissipationless electron transport in technologically relevant conditions.

Andrew Bestwick
Stanford Univ

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