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Imaging currents in HgTe quantum wells in the quantum spin Hall regime KATJA NOWACK, ERIC SPANTON, MATTHIAS BAENNINGER, MARKUS KÖNIG, JOHN KIRTLEY, Stanford University, BEENA KALISKY, Stanford University; Bar-Ilan University, CHRISTOPHER AMES, PHILIPP LEUBNER, CHRISTOPH BRÜNE, HARTMUT BUHMANN, LAURENS MOLENKAMP, Wuerzburg University, DAVID GOLDHABER-GORDON, KATHRYN MOLER, Stanford University — Dissipationless edge channels are a key feature of the quantum spin Hall (QSH) state, which was predicted and experimentally demonstrated to exist in HgTe quantum wells. The existence of the edge channels has been inferred from local and non-local transport measurements. Here we image the current in Hall bars made from HgTe quantum wells by probing the magnetic field generated by the current using a scanning superconducting quantum interference device. We observe that the current flows mainly along the edge of the device in the QSH regime, and furthermore that an identifiable edge channel exists even in the presence of disorder and considerable bulk conduction as the device is gated and its temperature is raised. Our results represent a versatile method for the characterization of new quantum spin Hall materials systems.

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