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Edge conduction in monolayer WTe_2 ZAIYAO FEI, TAUNO PALOMAKI, SANFENG WU, WENJIN ZHAO, XINGHAN CAI, BOSONG SUN, PAUL NGUYEN, JOSEPH FINNEY, XIAODONG XU, DAVID COBDEN, Department of Physics, University of Washington — We report evidence for edge conduction in gated monolayer WTe_2, which was recently predicted to be a topologically nontrivial semimetal. We find that at temperatures below about 100 K a gap appears and the two-dimensional bulk becomes insulating near zero gate voltage, while the edges remain conducting. At lower temperatures, the edge conduction is strongly suppressed by in-plane magnetic field, as expected for a helical quantum spin Hall edge. In this regime the conductance is approximately activated with an activation energy proportional to magnetic field. This can be modeled by a Zeeman-type gap opening in the edge mode combined with disorder. The conductance between adjacent contacts remains below the quantum conductance even for the shortest edges (150 nm), but can be of the same order even for 5 micron edges. We will compare and contrast this behavior with that other possible quantum spin Hall systems.

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