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Chiral Majorana fermion edge state in a quantum anomalous Hall insulator-superconductor structure[1] QING LIN HE, LEI PAN, GEN YIN, Electrical Engineering Department, UCLA, XUFENG KOU, ShanghaiTech University, KANG L WANG, Electrical Engineering Department, UCLA — Majorana fermion is a hypothetical fermionic particle which is its own anti-particle. Intense research efforts focus on its experimental observation as a fundamental particle in high energy physics and as a quasi-particle in condensed matter systems. Here we experimentally demonstrate the transport measurement to ascertain the one-dimensional chiral Majorana fermion in a quantum anomalous Hall thin film coupled with a conventional superconductor, Crx(Bi,Sb)2-xTe3 - Nb. A collection of Majorana fermions living in a one-dimensional transport channel at the boundary of such a hybrid system is experimentally realized. Topological phase transitions are controlled by the reversal of the magnetization under a scan of perpendicular magnetic field, where the half-integer quantized conductance plateau (0.5e2/h) is observed as a compelling signature of the Majorana fermion as theoretically predicted. This transport signature can be repeated in many magnetic reversal sweeps, and can be tracked at different temperatures, providing direct evidence of the chiral Majorana edge modes in the system.

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