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Kondo effect in the helical edge liquid of the quantum spin Hall state JOSEPH MACIEJKO, Stanford University, CHAOXING LIU, Center for Advanced Study, Tsinghua University / Stanford University, YUVAL OREG, Weizmann Institute of Science, XIAO-LIANG QI, Stanford University, CONGJUN WU, University of California, San Diego, SHOU-CHENG ZHANG, Stanford University — Following the recent observation of the quantum spin Hall (QSH) effect in HgTe/CdTe quantum wells, an important question is to understand the effect of impurities on transport in the QSH regime. Using linear response and renormalization group methods, we calculate the edge conductance of a QSH insulator in the presence of a single magnetic impurity. At high temperatures, due to Kondo scattering we find a logarithmic temperature dependence consistent with current experiments. At low temperatures, for weak Coulomb interactions in the edge liquid the conductance is restored to unitarity with unusual power-laws due to the formation of the Kondo singlet, while for strong interactions transport proceeds by weak tunneling through the impurity where only half an electron charge is transferred in each tunneling event. We propose scanning gate and shot noise experiments to search for these effects.

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