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Conductance of a helical edge liquid coupled to a magnetic impurity YOICHI TANAKA, AKIRA FURUSAKI, Condensed Matter Theory Laboratory, RIKEN, K.A. MATVEEV, Argonne National Laboratory — In a quantum spin Hall system, which can be realized in HeTe/(Hg,Cd)Te semiconductor quantum wells [1], helical edge states carry a current and the conductance takes the universal value of $2e^2/h$. This is because an impurity without internal degrees of freedom cannot backscatter an electron at the edge in the presence of time-reversal symmetry [2]. On the other hand, backscattering by a magnetic impurity is allowed. We study the effect of backscattering from a magnetic impurity on the conductance of a quantum spin Hall system [3], and obtain the correction $\delta G(\omega)$ to the electrical conductance as a function of frequency ω. We find that the correction $\delta G(\omega)$ vanishes in the dc limit ($\omega \to 0$), when our model conserves the total spin S_z. Another interesting transport property is the thermal conductance, which is affected by the coupling to the magnetic impurity even at $\omega \to 0$. We find that the temperature dependence of the thermal conductance shows a non-monotonic behavior with a minimum occurring at the Kondo temperature.

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