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Quantum dot as a magnetic impurity in a helical edge: a source of resistance weakly dependent on temperature JUKKA VAYRYNEN, Yale University, MOSHE GOLDSTEIN, Tel Aviv University, YUVAL GEFEN, Weizmann Institute of Science, LEONID GLAZMAN, Yale University — The bulk of a doped two-dimensional topological insulator may accommodate spontaneously-formed quantum dots (charge puddles). We show that a Coulomb blockaded quantum dot hosting an odd number of electrons acts as a magnetic impurity effective in backscattering of electron moving along the helical edge. The exchange interaction between the dot and the edge, derived from a microscopic Hamiltonian, is anisotropic in general. The exchange anisotropy makes the dot spin an efficient backscatterer. The resulting negative correction to the helical edge conductance may exhibit a broad plateau in its temperature dependence. Being averaged over the Fermi level position, the correction to the ideal conductance becomes logarithmic in temperature. The effect of external magnetic field on transport is also discussed, and a connection to recent experiments is made.

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