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Effect of static charge fluctuations on the conduction along the edge of two-dimensional topological insulator[1] JUKKA VAYRYNEN, MOSHE GOLDSTEIN, LEONID GLAZMAN, Yale University — Static charge disorder may create electron puddles in the bulk of a material which nominally is in the insulating state. A single puddle – quantum dot – coupled to the helical edge of a two-dimensional topological insulator enhances the electron backscattering within the edge. The backscattering rate increases with the electron dwelling time in the dot. While remaining inelastic, the backscattering off a dot may be far more effective than the proposed earlier inelastic processes involving a local scatterer with no internal structure. We find the temperature dependence of the dot-induced correction to the universal conductance of the edge. In addition to the single-dot effect, we calculate the classical temperature-independent conductance correction caused by a weakly conducting bulk. We use our theory to assess the effect of static charge fluctuations in a heterostructure on the edge electron transport in a two-dimensional topological insulator.

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