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Localization of Edge Electrons in a 2D Topological Insulator

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Abstract:

Helical electrons moving along the 1D edge of a 2D topological insulator are protected from the backscattering at the usual potential disorder and thus avoid the Anderson localization. However, we show that the backscattering and, therefore, localization of electrons can take place in the presence of spin (Kondo) impurities distributed along the edge. The mechanism of the localization is the spontaneous breaking of the time-reverse symmetry in the spin subsystem caused by random anisotropy of electron-spin couplings.