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A Metal-Insulator Transition in the Kondo Chain

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Abstract:

We study the low energy physics of a Kondo chain where 1d electrons interact with magnetic moments via an anisotropic exchange interaction. We demonstrate that the anisotropy gives rise to two different phases which are separated by a quantum phase transition. In the phase with easy plane anisotropy, Z_2 symmetry between sectors with different helicity of the electrons is broken. As a result, gapless excitations are immune to localization effects and the dc transport becomes symmetry protected. This effect is similar to the protection of the edge transport in time-reversal invariant topological insulators. The phase with easy axis anisotropy corresponds to the Luttinger liquid with a pronounced spin-charge separation. The charge density waves is pinned by the potential disorder.