Dynamical properties of topological Kondo insulators

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Topological Kondo insulators (TKIs) are a new class of topological insulators, emerging through the interplay of strong correlations and spin-orbit coupling [1]. In TKIs, the bulk is a narrow band insulator due to the appearance of a localized Kondo resonance near the Fermi level and its hybridization with the conduction band. Additionally, the strong spin-orbit coupling of the localized moments generates a non-local hybridization between the local moments and the conduction band, which results in a topologically nontrivial band structure and gapless surface states. In the past, TKIs have been described predominantly by slave-boson mean-field (SBMF) [2] calculations. Such static methods are unable to capture finite life-time effects of the heavy Kondo quasiparticles. It is therefore not possible to investigate physics at the boundaries, like the dynamical emergence of topological edge states, where SBMF calculations become uncontrolled (e.g. [3]). We design a spin-orbit coupled dynamical mean-field theory (cf. [4]) with an auxiliary-particle conserving approximation (cf. [5]) as an impurity solver. With this, we aim at calculating characteristic, observable quantities, like the surface conductivity, including life-time effects.

References:

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