

An Unusual Kondo Effect with a Topological Transition in the Honeycomb Kitaev Model

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We have studied¹ the effect of coupling spin- S magnetic impurities to the spin-1/2 Kitaev model in its gapless spin-liquid phase. We find an unusual Kondo effect where an intermediate coupling unstable fixed point separates topologically distinct sectors of the Kitaev model. We show that the strong impurity coupling limit is equivalent to a missing site in the Kitaev system, and is associated with a finite Z_2 flux localized at the defect site. Such finite flux states in the Kitaev model obey non-Abelian anyonic statistics upon exchange. We also show that the massless spinons in the spin-liquid mediate a nondipolar interaction between distant impurities unlike the usual dipolar RKKY interaction noted in various 2D impurity problems with a pseudogapped density of states of the spin bath. Furthermore, this long-range interaction is possible only if the impurities (a) couple to more than one neighboring spin on the host lattice and (b) the impurity spin $S \neq 1/2$. We suggest NMR probes for the detection of the non-Abelian anyons.

¹Kusum Dhochak, R. Shankar and V. Tripathi, Phys. Rev. Lett. **105**, 117201 (2010).