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Interplay between the Kondo, Rashba, and Zeeman effects[1]
ARTURO WONG, KEVIN INGERSENT, Department of Physics, University of Florida, NANCY SANDLER, SERGIO ULLOA, Department of Physics and Astronomy, Ohio University — Motivated by proposed optical experiments on semiconductor nanostructures, we investigate the properties of a magnetic impurity in a two-dimensional electron gas with strong Rashba spin-orbit interactions when the system is subjected to an effective magnetic field B that couples only to the host spins. Even in the absence of spin-orbit coupling, this problem departs from the well-studied Kondo physics in a field that couples to the impurity and possibly also to the conduction band. Through a combination of perturbative and numerical renormalization-group analysis, we show that the effect of the magnetic field can be subsumed into a spin-splitting of the impurity level. The impurity magnetization is found to be a universal function of $\Gamma B/FT_K$, where Γ is the hybridization width of the impurity level, T_K is the Kondo temperature in the absence of the field, and F is a function of E_R and of energy scales associated with the impurity. This behavior contrasts with the standard Kondo effect where T_K alone sets the scale for the magnetic-field-induced destruction of the Kondo effect.

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