Kondo effect in the presence of the spin accumulation and non-equilibrium spin currents

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The Kondo effect is related to a screening of the quantum dot (or impurity) spin by nearby free electrons. In the view of spintronics the important issue is the Kondo screening in the presence of spin effects due to e.g. magnetic field, ferromagnetic leads and non-equilibrium spin accumulation. We present a theoretical description of the influence of the spin accumulation in metallic Fermi leads on the Kondo effect in quantum dots and Kondo alloys. We discuss the interplay of the spin accumulation, magnetic field, and ferromagnetic leads spin polarization on the Kondo spin-dependent densities of states, conductance and resistance. The presence of the above-mentioned factors by breaking the spin symmetry leads to the suppression of the Kondo effect. However, these effects can, for appropriately selected parameter values, compensate each other, which may lead to the restoration of the Kondo effect in the analyzed systems. We show the correctness of our model by comparing it with the experimental data [1].

References:

[1] K. Hamaya, T. Kurokawa, S. Oki, S. Yamada, T. Kanashima, and T. Taniyama, Phys. Rev. B 94, 140401 (2016).

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