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The Kondo effect in the presence of magnetic impurities HUBERT B. HEERSCHÉ, ZEGGER DE GROOT, JOSHUA A. FOLK, LEO P. K. KOUWENHOVEN, HERRE S. J. VAN DER ZANT, Kavli Inst. of Nanoscience, Delft University of Technology, The Netherlands, ANDREW A. HOUCK, JAROSLAW LABAZIEWICZ, ISAAC L. CHUANG, MIT Media Lab, Cambridge MA — We measure transport through gold grain quantum dots fabricated using electromigration, with magnetic impurities in the leads. A Kondo interaction is observed between dot and leads, but the presence of magnetic impurities results in a gate-dependent zero-bias conductance peak that is split due to an RKKY interaction (I) between the spin of the dot and the static spins of the impurities. Both ferromagnetic and anti-ferromagnetic interactions have been observed in different samples. A magnetic field restores the single Kondo peak in the case of an anti-ferromagnetic RKKY interaction, whereas the splitting is enhanced in the case of ferromagnetic interaction. A gate electrode can change the relative interaction strength T_K/I . This system provides a new platform to study Kondo and RKKY interactions in metals at the level of a single spin.

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