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RKKY interaction in graphene with Rashba spin-orbit coupling[1]

DIEGO MASTROGIUSEPPE, Instituto de Fisica Rosario, SERGIO ULLOA, Ohio University — We present a study of the Ruderman-Kittel-Kasuya-Yosida (RKKY) interaction between magnetic impurities embedded in graphene in the presence of Rashba spin-orbit coupling (SOC). It is well known that a combination of SOC and broken inversion symmetry results in an anisotropic exchange interaction between magnetic species, including a twisted Dzyaloshinskii-Moriya (DM) component [1]. In graphene, a large Rashba SOC can be induced with Au intercalation in Ni or BN substrates [2]. Using the Matsubara Greens function formalism, we calculate the RKKY interaction at zero and finite temperature. We present results for varying SOC strength and graphene Fermi energy, paying special attention to the case where the Fermi level lies close to the secondary band edge. We provide angular dependent factors that modulate the interaction for different relative orientation of the impurities. We also compare our results to those of bilayer graphene without SOC [3], which features similar band structure as our system, with the interlayer hopping parameter playing the role of the Rashba parameter. Our results can be tested by spin polarized STM experiments. [1] PRB 69, 121303 (2004) [2] Nat. Commun. 3, 1232 (2012); PRL 117, 076603 (2016) [3] PRB 92, 205414 (2015)

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