

RKKY interaction between adsorbed magnetic impurities in graphene: Symmetry and strain effects - DTU Orbit (09/11/2017)

RKKY interaction between adsorbed magnetic impurities in graphene: Symmetry and strain effects

The growing interest in carbon-based spintronics has stimulated a number of recent theoretical studies on the Ruderman-Kittel-Kasuya-Yosida (RKKY) interaction in graphene, with the aim of determining the most energetically favorable alignments between embedded magnetic moments. The RKKY interaction in undoped graphene decays faster than expected for conventional two-dimensional materials, and recent studies suggest that the adsorption configurations favored by many transition-metal impurities may lead to even shorter-ranged decays and possible sign-changing oscillations. Here, we show that these features emerge in a mathematically transparent manner when the symmetry of the configurations is included in the calculation. Furthermore, we show that by breaking the symmetry of the graphene lattice, via uniaxial strain, the decay rate, and hence the range, of the RKKY interaction can be significantly altered. Our results suggest that magnetic interactions between adsorbed impurities in graphene can be manipulated by careful strain engineering of such systems.

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