

Dynamic RKKY interaction in grapheme

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The growing interest in carbon-based spintronics has stimulated a number of recent theoretical studies on the RKKY interaction in graphene, based on which the energetically favourable alignment between magnetic moments embedded in this material can be calculated. The general consensus is that the strength of the RKKY interaction in graphene decays as $1/D^3$ or faster, where D is the separation between magnetic moments. Such an unusually fast decay for a 2-dimensional system suggests that the RKKY interaction may be too short ranged to be experimentally observed in graphene. Here we show in a mathematically transparent form that a far more long ranged interaction arises when the magnetic moments are taken out of their equilibrium positions and set in motion. We not only show that this dynamic version of the RKKY interaction in graphene decays far more slowly but also propose how it can be observed with currently available experimental methods.