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Spin Exchange Interaction between Localized and Itinerant Carriers[1] GUY RAMON, THOMAS REINECKE, Naval Research Laboratory, LU SHAM, Department of Physics, University of California San Diego — The exchange interaction between localized and itinerant carriersis a key requirement in indirect spin coupling mechanisms. These interactions have been investigated intensively due to their potential applications in spintronics and in implementations of gates for quantum computation. A quantitative evaluation of spin coupling effects requires an accurate description of this exchange interaction, which has not been available to date. Here we present a microscopic formulation of the spin exchange interaction between localized and itinerant carriers. The effects of correlation and hybridization of continuum and localized states are included by performing a set of nested canonical transformations on an Anderson-type Hamiltonian, bringing it to an s-d spin exchange form. These results are extended to address the problem of spin exchange interaction between a localized electron and an itinerant exciton. This formulation also facilitates the understanding of magnetic properties of Kondo systems. In particular we address the interplay between RKKY and Kondo interactions.

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