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Magnetic properties of the two-impurity Anderson model for a semiconductor host NEJAT BULUT, IMR, Tohoku University and CREST, Japan Science and Technology Agency, YOSHIHIRO TOMODA, KAZUO TANIKAWA, SABURO TAKAHASHI, IMR, Tohoku University, SADAMICHI MAEKAWA, IMR, Tohoku University and CREST, Japan Science and Technology Agency — We study the nature of the magnetic correlations in the two-impurity Anderson model for a semiconductor host using the quantum Monte Carlo technique and the Hartree-Fock approximation. We find that the impurity spins exhibit ferromagnetic correlations with a range which can be much more enhanced than in a half-filled metallic band. In particular, the range is longest when the Fermi level is located above the top of the valence band and decreases as the impurity bound state becomes occupied. In addition, we investigate the magnetic correlations between the impurity moments and the host electronic spins. Comparisons with the photoemission and optical absorption experiments suggest that this model captures the basic electronic structure of $Ga_{1-x}Mn_xAs$, the prototypical dilute magnetic semiconductor (DMS). These numerical results might also be useful for synthesizing DMS or dilute-oxide ferromagnets with higher Curie temperatures.

Nejat Bulut
IMR, Tohoku University and CREST, JST

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