Spin-Fermion Models for Manganites and Diluted Magnetic Semiconductors: A Dynamical Mean Field Study

FLORENTIN POPESCU, Florida State University, GONZALO ALVAREZ, Oak Ridge National Laboratory, ELBIO DAGOTTO, University of Tennessee and Oak Ridge National Laboratory

— Using Dynamical Mean Field Theory (DMFT) we derive general expressions for the Curie Temperature ($T_c$) of a spin-fermion model for any coupling constant $J$ and any concentration of localized spins $x$. In the case of manganites, we compare these results with those obtained previously for the case of an infinite Hund’s coupling $J_H$. In the case of diluted magnetic semiconductors (DMS) we discuss the dependence of $T_c$ on model parameters and the effect of the inclusion of a more realistic band structure. We show that DMFT is a powerful tool to study spin-fermion models for DMS in the weak coupling regime.