DOUBLE EXCHANGE MODEL IN CUBIC VANDATES

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Following the idea of the double exchange (DE) mechanism, we pose a question how the C-type antiferromagnetic (AF) order (ferromagnetic chains staggered in two other directions) of undoped $LaVO_3$, stabilized by the superexchange spin-orbital model [1], is modified under doping. In particular, we investigate the role of the DE mechanism for stability of *metallic and antiferromagnetic* phase, which was observed experimentally in $La_{1-x}Sr_xVO_3$ in the range of doping $0.178 < x < 0.26$. The DE model treats electrons in d_{xy} orbitals as classical $S = 1/2$ spins, which interact by Hund's exchange J_H with $d_{yz/zx}$ electrons in partly filled t_{2g} orbitals. Including the orbital degeneracy of doped holes and strong Coulomb repulsion U between t_{2g} electrons, we investigate the magnetic interactions and determine the phase diagram of the model using mean-field approximation and slave boson method. We demonstrate that C-type AF and metallic phase can be stabilized. The generic role of degenerate t_{2g} orbitals in the present DE model with orbital degeneracy is discussed and contrasted with the conventional DE model, which involves partly filled e_g orbitals and is used to describe doped manganites.

[1] G. Khaliullin, P. Horsch, and A. M. Oleś, Phys. Rev. Lett. **86**, 3879 (2001).

9.7 cm

13.4 cm

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