

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Orbital-order-induced metal-insulator transition in manganites

SANJEEV KUMAR, ARNO KAMPF, University of Augsburg (Germany), PINAKI MAJUMDAR, HRI, Allahabad (India) — We study a two-band double-exchange model with adiabatic Jahn-Teller phonons, weak antiferromagnetic superexchange and quenched disorder. This model for perovskite manganites is studied using a recently developed real space Monte-Carlo method (cond-mat/0406082). We present results for the optical conductivity and the density of states and provide a microscopic picture of the spin and orbital structures. The electron lattice coupling leads to orbital ordering at zero hole doping ($x = 0$), while the magnetism is controlled by the interplay of superexchange and double exchange interactions. We track the evolution upon hole doping of this orbital ordered insulator and locate the critical doping concentrations required for (i) the disappearance of orbital order and (ii) the emergence of the metallic behavior. We compare our results in detail with the experimental data on $La_{1-x}Ca_xMnO_3$ in the low x regime.

Sanjeev Kumar
University of Augsburg (Germany)

Date submitted: 09 Nov 2005

Electronic form version 1.4