# ORBITAL POLARIZATION IN DOPED MANGANITES

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Using finite-temperature diagonalization we investigate the optical conductivity, the resistivity and the spin-orbital dynamics in the colossal magnetoresistance (CMR) regime of manganites. Our study is based on an orbital degenerate Kondo lattice model including orbital polarization effects due to Coulomb interaction and the coupling of carriers to breathing phonons. The characteristic activated behavior of resisitivity in the paramagnetic phase, and its dramatic decrease in the ferromagnetic phase, follows in a natural way as a combined effect of orbital polaron formation and spin disorder. The activated behavior of resistivity is reflected by the evolution of a pseudogap in the optical conductivity. At low temperature the spin dynamics is characterized by ferromagnetic spin waves with strong damping induced by temporal fluctuation of exchange interactions due to the orbital dynamics.

Although currently phase separation scenarios seem to dominate the CMR literature, we argue here in favour of an intrinsic explanation of CMR. To our knowledge our study is the first numerical simulation of the dynamics and thermodynamics of a realistic model for manganites, i.e., including spin-, orbital-, charge-, and to some extent also the lattice degrees of freedom.

9.7 cm

13.4 cm

**Subject category :**

6. Theory of Magnetism

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