

Microscopic Theoretical study of the Interplay of Ferromagnetism and Charge Ordering in CMR Systems through Conductance Spectra

S. PANDA, P. SAHOO² and G.C. ROUT³

¹Trident Academy of Technology, F2/A, Chandaka Industrial Estate, Bhubaneswar-751024, Odisha, India. Email: saswatip7@gmail.com

²S. S. College, Talpatia, Jharasuguda, Odisha, India.

³Condensed Matter Physics Group, Physics Enclave, Plot No.- 664/4825, Lane-4 A, Shree Vihar, Patia, Bhubaneswar- 751031, Odisha, India. Email: gcr@iopb.res.in. Mob: 09937981694.

Received : 13.12.2015 ; Accepted : 21.01.2016

Abstract. Here we address the role of Kubo-Ohata type double exchange (DE) interaction on the interplay of ferromagnetism (FM) and charge density wave (CDW) interactions in the CMR manganite systems. The CDW ordering is associated with the e_g electrons of the conduction band, while the ferromagnetism is associated with the localized t_{2g} electrons of the core states of the manganese ion. The ferromagnetic magnetization and CDW gap parameters are calculated using Zubarev's Green's function technique and then solved self-consistently and numerically. We study the effect of DE coupling on the interplay of magnetism and CDW interactions and interpret the experimentally observed temperature dependent gap parameters as well as the tunneling conductance spectra by varying the physical parameters of the system.

Keywords. Manganites, charge density wave systems, electron density of states

PACS Nos. 75.47.Lx, 71.45.Lr, 73.20.Fz

[\[Full Paper \]](#)