

# Computational studies of models for manganites and pnictides.

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The study of strongly correlated electronic materials provides several examples where complex behaviors emerge from systems where the interaction rules, such as the model Hamiltonians, appear to be deceptively simple. In this presentation, the results of computational studies of models for the Mn-oxides with the colossal magnetoresistance (CMR), the manganites, and for the novel superconductors based on Fe, the pnictides, will be presented. In the manganite case, phase competition between a metal and an insulator, with spin, charge, and orbital order, is shown to induce CMR resistivity curves in good agreement with experiments [1]. In the case of the pnictides, the multi-orbital Hubbard models studied at intermediate interaction strengths contain an interesting competition between several phases and pairing channels [2]. Moreover, charge inhomogeneities also emerge in the pnictide systems within mean-field approximations.

[1] *First Order Colossal Magnetoresistance Transitions in the Two-Orbital Model for Manganites*, Cengiz Sen, Gonzalo Alvarez, and Elbio Dagotto, Phys. Rev. Lett. **105**, 097203 (2010), and references therein.

[2] *Orbital-weight redistribution triggered by spin order in the pnictides*, M. Daghofer, Q.-L. Luo, R. Yu, D. X. Yao, A. Moreo, and E. Dagotto, Phys. Rev. B **81**, 180514(R) (2010); *Neutron and ARPES Constraints on the Couplings of the Multiorbital Hubbard Model for the Pnictides*, Qinlong Luo, George Martins, Dao-Xin Yao, Maria Daghofer, Rong Yu, Adriana Moreo, and Elbio Dagotto, arXiv: 1007.1436, and references therein.