

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Evolution of the local Jahn-Teller distortion across the phase diagram of $\text{La}_{1-x}\text{Ca}_x\text{MnO}_3$ ($0 \leq x \leq 0.5$) EMIL BOZIN, GIANLUCA PAGLIA, ADAM DECONINCK, SIMON BILLINGE, Dept. of Physics and Astronomy, Michigan State University, MAREK SCHMIDT, PAOLO RADAELLI, ISIS, Rutherford Appleton Laboratory, JOHN MITCHELL, Material Science Division, Argonne National Laboratory, THOMAS PROFFEN, LANSCE, Los Alamos National Laboratory — We report on the most comprehensive study to date of the *local* Jahn-Teller (JT) distortion across the phase diagram of the colossal magnetoresistive (CMR) $\text{La}_{1-x}\text{Ca}_x\text{MnO}_3$ ($0 \leq x \leq 0.5$). The local structure has been measured, using the neutron powder diffraction based atomic pair distribution function (PDF) approach, over the wide temperature and Ca-doping range. These results are compared to the conventional crystallographic results obtained by Rietveld analysis. The results will be compared with both homogeneous and inhomogeneous models of the electronic structure. The magnitude of the *local* JT distortion is quantified over the entire phase diagram. In agreement with earlier work, we see the local JT distortion disappear in the metallic phase. However, in contrast with some earlier studies, we show that in the insulating phases the magnitude of the JT distortion decreases with increasing doping, becoming constant at higher doping. This new result should be incorporated in theoretical models of CMR manganites.

Emil Bozin
Dept. of Physics and Astronomy, Michigan State University

Date submitted: 21 Nov 2005

Electronic form version 1.4