

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Polarons and polaron correlations in 40% doped bilayer manganite.¹ S. N. KLAUSEN, S. ROSENKRANZ, R. OSBORN, P. J. CHUPAS, J. F. MITCHELL, Materials Science Division, Argonne National Laboratory, Argonne, IL 606439 — Among the compounds exhibiting colossal magnetoresistance, the bilayer manganites, $\text{La}_{2-2x}\text{Sr}_{1+2x}\text{Mn}_2\text{O}_7$, where x is the hole doping in the MnO_2 layers, are advantageous to study because the reduced dimensionality strongly enhances the spin and charge fluctuations. For the intermediate doping regime ($32\% \leq x \leq 42\%$), the magnetoresistance is strongly enhanced near the combined metal-insulator and ferromagnetic transition. Here, we report on our detailed x-ray scattering investigation of the diffuse scattering associated with lattice distortions around localized charges (polarons) as well as short-ranged polaron correlations present in the paramagnetic phase of the $x = 40\%$ doped compound, both collapsing at $T_C = 112$ K. We have studied in detail the temperature dependence to high temperatures ($T = 50$ K - 500 K) and are able to directly extract a polaron activation energy from the data.

¹This work was supported by the US Department of Energy, Office of Science, under contract no. W-31-109-ENG-38.

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Date submitted: 30 Nov 2005

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