Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

**Measuring Coexisting Phases in $La_{0.35}Pr_{0.275}Ca_{0.375}MnO_3$**[1] MARK H. BURKHARDT, SIMES, SLAC National Accelerator Laboratory and Stanford University, M.A. HOSSAIN, S. SARKAR, H.A. DÜRR, J. STÖHR, SIMES, SLAC National Accelerator Laboratory, Y.-D. CHUANG, A.G. CRUZ GONZALEZ, A. DORAN, A. SCHOLL, A.T. YOUNG, Advanced Light Source, Lawrence Berkeley National Laboratory, Y.J. CHOI, S.-W. CHEONG, Rutgers Center for Emergent Materials and Department of Physics & Astronomy — Manganite compounds in the $La_{0.625-y}Pr_yCa_{0.375}MnO_3$ series are known for exhibiting phase separation over a large temperature range. We combined the x-ray photoemission electron microscopy (PEEM) and resonant elastic soft x-ray scattering (RSXS) techniques to study the interplay between the low-temperature ferromagnetic and intermediate temperature charge-ordered/antiferromagnetic phases, respectively, in $La_{0.35}Pr_{0.275}Ca_{0.375}MnO_3$. We found that the system is driven by glassy polarons, which are present above the curie temperature $T_C$ in many ferromagnetic metallic manganites. They stunt the growth of the ferromagnetism on cooling: we clearly observe the onset of small, strained ferromagnetic domains almost 30 K above the temperature where ferromagnetism fully sets in, and the ferromagnetism has a very unconventional temperature dependence even below $T_C$. This relationship could explain the need for such high magnetic fields to induce colossal magnetoresistance.

[1]This research and the ALS are supported by U.S. Department of Energy, Office of Basic Energy Science.

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Date submitted: 21 Nov 2011 Electronic form version 1.4