Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Phase separation and inhomogeneity in $La_{1-x}Sr_xCoO_3$ single crystals W.G. MOULTON, ROBERT SMITH, MICHAEL HOCH, PHILLIP KUHNS, ARNEIL REYES, GREGORY BOBINGER, National High Magnetic Field Laboratory 32310, JOHN MITCHELL, Materials Science Division, Argonne National Laboratory, Argonne, IL, CHRIS LEIGHTON, Department of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, MN 55455 — Nanoscale inhomogeneity in La_{1-x} Sr_xCoO_3 has been studied in single crystal samples for $0.05 \leq x \leq 0.3$ using ^{139}La NMR as a probe of the internal magnetic field distribution. The results show that phase separation occurs for x near the metal-insulator critical concentration x_C=0.17. The phase separation is confined to a much smaller range of x than that previously found in polycrystalline samples even though the bulk magnetic properties are similar. In single crystals with increasing x large, spin polarized (FM) regions merge into networks while smaller regions, identified as spin polarons, coexist with the larger regions. Insight into phase separation has been obtained by simulating the spectra with statistical model A phase diagram summarizing the evolution of the inhomogeneous internal field distribution with x and T will be presented.

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Date submitted: 04 Dec 2007 Electronic form version 1.4