

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Exotic Bilayer Manganite Phase Diagram near $x=0.6$ Hole Doping.¹ KENNETH GRAY, HONG ZHENG, QING'AN LI, JOHN F. MITCHELL, STINE NYBORG ANCONA, STEPHAN ROSENKRANZ, RAY OSBORN, Argonne National Laboratory — Important modifications to the phase diagram of the bilayered manganites have been discovered through combined measurements of conductivity, magnetization and neutron and x-ray diffraction. The previously reported phase diagram for the CE-type orbital and charge order in $\text{LaSr}_2\text{Mn}_2\text{O}_7$ crystals (near hole doping of $x=0.5$) is qualitatively reproduced and graphically demonstrated for the bi-stripe (BIS) orbital and charge order in $\text{La}_{0.8}\text{Sr}_{2.2}\text{Mn}_2\text{O}_7$ crystals near $x=0.6$. Individual crystals, taken along the compositional gradient of a single boule made by the floating-zone technique with nominal composition $x=0.61$, display a large fraction of the phase diagram. As in the case of $x=0.5$, we find (1) crystals that enter the BIS phase at 240-300 K and reenter into an in-plane metal, A-type antiferromagnetic phase, and (2) crystals that retain BIS order down to at least 5 K. Surprisingly, the BIS state seems somewhat more stable than the CE state.

¹This research was supported by the U.S. Department of Energy, Basic Energy Sciences-Materials Sciences, under contract # DE-AC02-06CH11357.

Kenneth Gray
Argonne National Laboratory

Date submitted: 17 Nov 2006

Electronic form version 1.4