Phase Separation and Magnetism in High Tc Superconductors\textsuperscript{1}

SAMUEL EMERY, BARRETT WELLS, HASHINI MOHOTTALA, JOSEPH BUDNICK, WILLIAM HINES, Univ. of Connecticut, LINDA UDBY, KIM LEF-MANN, NEILS HESSEL ANDERSEN, Risoe National Laboratory, CHRISTOF NIEDERMAYER, NIELS CHRISTENSEN, ETH Zurich and Paul Scherrer Inst., JEFFREY LYNN, NIST, FANGCHENG CHOU, National Taiwan Univ. — Previous work by our group has determined that the low temperature phase diagram of super-oxygenated, La\textsubscript{2}CuO\textsubscript{4} consists of only a few line phases that are either superconducting (SC) or magnetic. Samples with doping levels between the stable phases will segregate into separate domains; this raises the question as to the nature of the interaction between SC and magnetic domains. We have begun a neutron scattering study of the magnetic behavior of two such crystals. The oxidation states vary such that in one sample we have a phase separation between a low Tc (30K) SC phase and a striped magnetic phase, while the other features a high Tc (40K) SC phase and striped magnetic phase. Elastic neutron scattering reveals little field dependence of the magnetic peaks in the former, but in the latter we see an enhancement of the magnetic intensity. We also are deriving a method for separating contributions to the inelastic magnetic scattering by the SC and magnetic phases.

\textsuperscript{1}Work supported by the DOE grant DE-FG02-00ER45801