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New Insights Into the Role of Magnetism in High Temperature Superconductivity SAMUEL EMERY, BARRETT WELLS, HASHINI MOHOTTALA, JOSEPH BUDNICK, University of Connecticut, KIM LEFMANN, NIELS HESSEL ANDERSON, Risoe National Laboratory, CHRISTOF NIEDERMAYER, NIELS CHRISTENSEN, Paul Scherrer Institut, FANG-CHENG CHOU, National Taiwan University — Previous work by our group has determined that the low temperature phase diagram of super-oxygenated, superconducting, La_2CuO_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 our superoxygenated crystal. The oxidation state of our sample is such that we have a low-hole density superconducting phase (T_c= 30K) and a phase with higher hole concentration that has a stripe-like spin density wave (T_m= 40K). Elastic neutron scattering revealed a small field dependent growth of peak intensities, which is different from non-phase separated $La_{2-x}Sr_xCuO_4$. Using inelastic neutron scattering to probe the dynamic magnetism in our sample, we have created a preliminary model that allows us to separate the dynamic contributions of the SC and magnetic phases. This should be key in understanding how magnetic interactions might be responsible for Cooper pair formation.

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