

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

The emergence of coherent magnetic excitations in the pseudogap state of underdoped superconducting $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ S.M. HAYDEN, O.J. LIPSCOMBE, B. VIGNOLLE, University of Bristol, T.G. PERRING, C.D. FROST, Rutherford Appleton Laboratory — We use inelastic neutron scattering to measure the magnetic excitations in the underdoped superconductor $\text{La}_{2-x}\text{Sr}_x\text{CuO}_4$ ($x=0.085$, $T_c=22$ K) over wider energy ($5 < E < 200$ meV) and temperature ($5 < T < 300$ K) ranges than previously studied. At low temperatures, the magnetic response is highly structured in energy and momentum with peaks in the local susceptibility $\chi''(\omega)$ at 15 and 50 meV and a strongly anisotropic four-peaked structure in \mathbf{q} for $E \approx 185$ meV. Raising from $T = 30$ K $\gtrsim T_c$ to 300 K causes dramatic changes in the response with the observed structure in $\chi''(\mathbf{q}, \omega)$ for $E < 70$ meV disappearing and being replaced with a strongly damped response with a characteristic energy scale $\Gamma \approx 50$ meV. The results are discussed with respect to the pseudogap present for this composition.

Stephen Hayden
University of Bristol

Date submitted: 26 Nov 2008

Electronic form version 1.4