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Two Dimensional Incommensurate Spin Excitations and Lattice Fluctuations in $La_{2-x}Ba_xCuO_4$[1] J.J. WAGMAN, McMaster University, J.P. CARLO, Villanova University, G. VAN GASTEL, McMaster University, Y. ZHAO, National Institute of Standards and Technology, A.B. KALLIN, E. MAZUREK, H.A. DABKOWSKA, Brockhouse Institute for Materials Research, A. SAVICII, G.E. GRANROTH, Oak Ridge National Laboratory, Z. YAMANI, Z. TUN, National Research Council, Canadian Neutron Beam Centre, Chalk River Laboratories, B.D. GAULIN, McMaster University — 'Hour-glass' shaped dispersions of antiferromagnetic (AF) spin fluctuations are a robust feature common to many high temperature superconductors. In 214 cuprates, these phenomena are well known to display a strong dependence on the concentration of holes that are introduced into the copper oxide planes by doping. The incommensurability (IC) of the two dimensional magnetic order in this system is sensitive to hole concentration. Here, we present a series of neutron scattering measurements on single crystals of $La_{2-x}Ba_xCuO_4$ (LBCO), with $0.035 \leq x \leq 0.095$, a doping range that spans the transition from diagonal to parallel IC ordering wavevectors, and from non-superconducting to superconducting ground states. Our measurements map out the evolution of the spin excitations for energies below ~ 50 meV, and focus on an enhancement in the scattered intensity centered in the 17-20 meV at the AF IC positions. This regime corresponds to the approximate crossing of very dispersive spin excitations and weakly dispersive low lying optic phonons in LBCO.

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