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Doping Dependence of Spin and Phonon Hybridization in $La_{2-x}Ba_xCuO_4$ ¹ JEROD WAGMAN, McMaster University, J.P. CARLO, Villanova University, G. VAN GASTEL, McMaster University, M.B. STONE, J.L. NIEDZIELA, G.E. GRANROTH, A.I. KOLESHNIKOV, L. DEBEER-SCHMITT, A.T. SAVICI, Oak Ridge National Laboratory, Z. YAMANI, Z. TUN, Canadian Neutron Beam Center, Chalk River Laboratories, Y. ZHAO, National Institute of Standards and Technology, A.B. KALLIN, University of Waterloo, E. MAZUREK, McMaster University, H.A. DABKOWSKA, Brockhouse Institute for Materials Research, 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 La-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. Here, we present a series of neutron scattering measurements on single crystals of $La_{2-x}Ba_xCuO_4$ (LBCO), with $0 \leq x \leq 0.095$. This is a doping range that spans the phase diagram from insulating three dimensional commensurate AF to superconducting two dimensional incommensurate AF. Our measurements comprehensively map out the evolution of the spin excitations below ~ 40 meV. In particular, we focus on the rich structures that arise at the many crossings of the highly dispersive spin excitations with the many phonon eigenvectors in this system. The nature of these structures are suggestive of spin-phonon hybridized modes, which seem to pervade the phase diagram of LBCO.

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