

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Doping dependent intrinsic line width of the Cu-O bond-stretching phonon with $q=(0.25\ 0\ 0)$ in $La_{2-x}Sr_xCuO_4$
S.R. PARK, University of Colorado at Boulder, A. HAMANN, L. PINTSCHOVIOUS, KIT, D. LAMAGO, KIT; Laboratoire Leon Brillouin, CEA-Saclay, G. KHALIULLIN, MPI, M. FUJITA, K. YAMADA, Tohoku University, G.D. GU, J.M. TRANQUADA, Brookhaven National Laboratory, D. REZNIK, University of Colorado at Boulder — We have recently found that the charge inhomogeneities provide significant broadening in the Cu-O bond stretching phonon of $La_{2-x}Sr_xCuO_4$, and the line shape of the phonon at zone boundary is well reproduced by the simple model which takes charge inhomogeneous effect into account [1]. The question is, now, how large intrinsic line width of the phonon at $q=(0.25\ 0\ 0)$, where the giant phonon softening and broadening exist [2], is apart from the charge inhomogeneous effect on the line width. In this talk, we will show the doping dependence of the intrinsic line width of the phonon from $x=0.05$ to $x=0.30$. Interestingly, the intrinsic line width as a function of doping follows the superconducting transition temperature. We will discuss relationship between the phonon and the superconductivity in $La_{2-x}Sr_xCuO_4$.

[1] S. R. Park et al., accepted for publication in PRB (2011).

[2] D. Reznik et al., Nature **440**, 1170 (2006).

S. R. Park
University of Colorado at Boulder

Date submitted: 13 Dec 2011

Electronic form version 1.4