ESRF	**Experiment title:** Probing the competition between electron-phonon coupling, sping-phonon coupling and supercnductivity in $La_{2-x}Ba_xCuO_4$	**Experiment number**: HC-1395
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Report:

The discovery of charge density wave (CDW) correlations in essentially all underdoped cuprates triggered extensive study on the interplay between CDW correlation and superconductivity. Motivated by recent inelastic x-ray scattering (IXS) study in $YBa_2Cu_3O_{6+x}$, where a phonon anomaly associated with CDW is observed on the acoustic phonon mode, we are aimed to study the same effect in prototypical stripe ordered $La_{1.875}Ba_{0.125}CuO_4$.

Since the CDW intensity in $La_{1.875}Ba_{0.125}CuO_4$ is presumable strong at L=8.5, we performed the IXS experiment along (H, 0, 8.5). The low temperature IXS spectrum at Q=(0.24, 0, 8.5) is sown in Fig. 1a. Two low-energy phonon modes are clearly resolved. By fitting the spectra at different H, we extracted the temperature dependent lower-energy phonon mode dispersion and show the results in Fig. 1b. Unfortunately we were not be able to observe the CDW induced phonon anomaly at Q_{CDW} in this experiment.

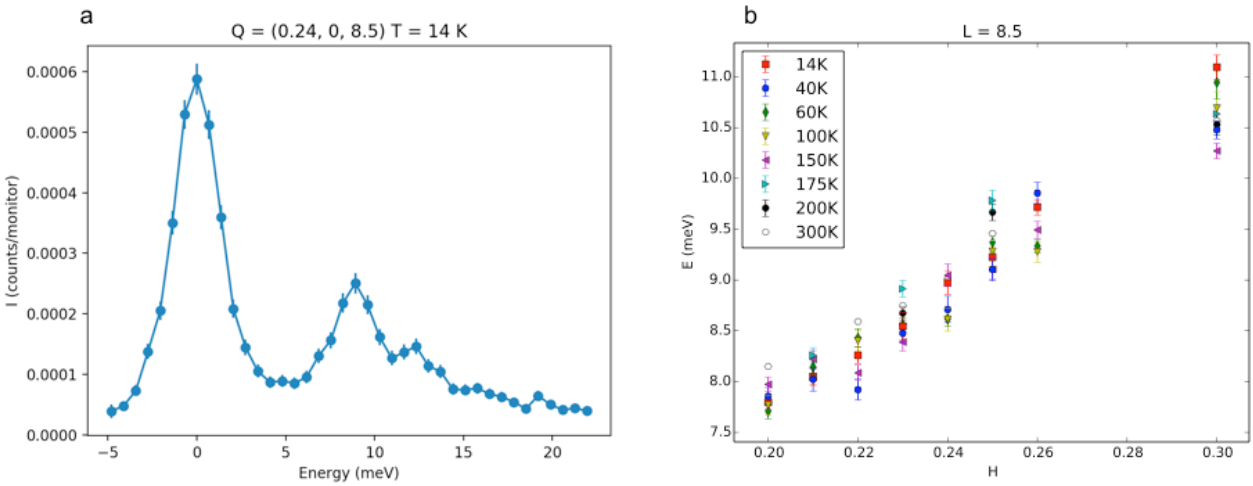

Figure 1: (a) IXS spetrum at Q_{CDW}. (b) Extracted temperature dependent phonon dispersion

According to previous IXS study in $YBa_2Cu_3O_{6+x}$, CDW induced phonon anomaly is less significant on the lower energy phonon mode and maybe beyond our resolving power. Another possibility is that the phonon amomaly is mainly on the higher energy phonon mode which is relatively weak in our data. Since the CDW in $La_{1.875}Ba_{0.125}CuO_4$ is even stronger than $YBa_2Cu_3O_{6+x}$, we believe by improving the energy resolution or beam intensity we should observe the CDW induced phonon anomaly in $La_{1.875}Ba_{0.125}CuO_4$. Recently following these principles, we confirmed our speculations and discovered the phonon anomaly on the higher energy phonon mode.