Phonon Softening in $BaFe_2As_2$

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One of the key issues among iron pnictide superconductors is the understanding of the origin of structural and magnetic phase transition. These transitions are suppressed with electron/hole doping and completely disappear for the optimally doped condition indicating the close connection between these transitions and superconductivity. It has also been shown that these transitions shift upward upon the application of uniaxial pressure along orthorhombic b axis.

If the structural transition is second order and phonon driven, then there must be a phonon mode that softens during the transition. We performed inelastic neutron scattering experiment on C-5 spectrometer in CNBC on $BaFe_2As_2$ single crystal in presence of uniaxial pressure along b-axis. Our goal was to see the phonon softening effect on the increased structural phase transition temperature in presence of uniaxial pressure.

With the current data, our study is still inconclusive and we are working on follow up experiments.