Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

**Beyond anharmonicity: signature of spin-phonon coupling at the surface of $BaFe_2As_2$**[1] CHEN CHEN, JING TENG, YIMIN XIONG, JIANDI ZHANG, RONGYING JIN, E.W. PLUMMER, Louisiana State University — High Resolution Electron Energy Loss Spectroscopy (HREELS) has been used to investigate the temperature dependence of the lattice dynamics of cleaved single crystals of $BaFe_2As_2$, one of the parent compounds of Fe-based superconductors. Both the phonon frequency as well as phonon linewidth of the intense 32 meV out-of-plane Fe/As mode ($A_{2u}$) and the 24 meV out-of-plane As vibration mode ($A_{1g}$) show a dramatic temperature dependence and anomalous behavior below ∼150K. The anomalous behavior is associated with the coupled elasto-magnetic transition in the bulk but occurs appreciably higher at the surface than in the bulk (∼138 K). The anharmonicity at the surface is considerably larger than that in the bulk for the orthorhombic phase, but is significantly less in the tetragonal phase. A detailed discussion is given in terms of the interplay between the spin and lattice in this novel system.

[1]Supported by NSF DMR-1002622

Chen Chen
Louisiana State University

Date submitted: 11 Nov 2011 Electronic form version 1.4