Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Phonon and magnon dispersions of incommensurate spin ladder compound $Sr_{14}Cu_{24}O_{41}$[1] XI CHEN, Univ of Texas, Austin, DIPANSHU BANSAL, Oak Ridge National Lab, SEAN SULLIVAN, JIANSHI ZHOU, Univ of Texas, Austin, OLIVIER DELAIRE, Oak Ridge National Lab, LI SHI, Univ of Texas, Austin — There are a variety of compounds consisting of two or more interpenetrating sublattices with lattice periods incommensurate at least along one crystal axis. One example is spin ladder compound $Sr_{14}Cu_{24}O_{41}$ consisting of incommensurate spin ladder and spin chain sublattices. It has been predicted that unique phonon modes occur in these compounds due to the relative motion of the sublattices. In the low-wavelength limit, there is only one longitudinal acoustic mode due to the rigid translation of both sublattices. In addition, one extra pseudo-acoustic mode is present due to relative sliding motions of the two sublattices. Although the theoretical aspects of the lattice dynamics of incommensurate compounds have been studied, there have been few experimental investigations on their phonon dynamics. In this work, single crystals of $Sr_{14}Cu_{24}O_{41}$ are grown by the traveling solvent floating zone method. The phonon dispersion of $Sr_{14}Cu_{24}O_{41}$ is studied through inelastic neutron scattering measurements in order to better understand its phonon dynamics. In addition, its magnon dispersion is investigated and correlated to the large directional magnon thermal conductivity. The measurements reveal a wealth of intriguing features on phonons and magnons in the spin ladder compound.

[1]This work is supported by ARO MURI program under Award W911NF-14-1-0016.

Xi Chen
Univ of Texas, Austin

Date submitted: 06 Nov 2015 Electronic form version 1.4