Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Spin phonon induced magnetic soft mode in triangular antiferromagnet h-$RMnO_3$ JOOSUNG OH, MANH DUC LE, HASUNG SIM, JE-GEUN PARK, Center for Correlated Electron Systems, Institute for Basic Science & Department of Physics and Astronomy, Seoul National University, T.G. PERRING, ISIS Facility, STFC Rutherford Appleton Laboratory — The relief of geometrical magnetic frustration by spin-lattice coupling is an extensively studied subject: For example, theory shows that in triangular lattice antiferromagnets, the spin-phonon coupling can stabilize a collinear magnet order over the non-collinear 120° order. We report inelastic neutron scattering measurements on the triangular lattice antiferromagnets (Y/Lu)MnO_3, showing evidence of magnon-phonon hybridization at the Brillouin zone boundary. Furthermore, a magnetic soft mode is observed at lower energy at the same momentum transfer. The exchange striction model within the linear approximation qualitatively explains the observed features while the $1/S$ expansion calculation shows that a third of the observed softening is caused by magnon-magnon interactions. Our results demonstrate how the spin-phonon coupling *and* quantum effect cooperatively develops the roton-like minimum in triangular lattice antiferromagnets with a 120° structure.

Joosung Oh
Center for Correlated Electron Systems, Institute for Basic Science
& Department of Physics and Astronomy, Seoul National University

Date submitted: 14 Nov 2014 Electronic form version 1.4