

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

An indirect RIXS study of roton excitation in triangular lattice antiferromagnet TRINANJAN DATTA, Georgia Regents University, CHENG LUO, DAO-XIN YAO, Sun Yat-Sen University — The antiferromagnetic triangular lattice is characterized by the presence of roton excitations. We propose that the K-edge indirect resonant inelastic x-ray scattering (RIXS) spectrum of a triangular lattice antiferromagnet can serve as a novel spectroscopic tool to detect the presence of roton excitations. By considering self-energy corrections to the spin-wave spectrum and magnon decay rates in its ordered coplanar three-sublattice 120 degree magnetic state, we find that a single-peak RIXS spectrum forms at the roton momentum, Luo et. al. Phys. Rev. B 92, 035109 (2015). The single peak feature is in sharp contrast to the other high symmetry points where the RIXS spectrum splits into a multipeak structure. It is this contrast which can be utilized as an experimental signature to detect the presence of rotons. We also investigate the effect of XXZ spin anisotropy, orthorhombic spatial anisotropy, and DM interaction in the triangular lattice and find that the roton peak is affected.

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Date submitted: 05 Nov 2015

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