

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Observation of phonon softening in Cr near its Neel transition

RUQING XU, Argonne National Laboratory, TAI-CHANG CHIANG, University of Illinois at Urbana-Champaign — Chromium is a classic antiferromagnetic spin-density-wave system, with many unique properties yet to be fully understood despite the extensive experimental and theoretical efforts in the past. For instance, near its two magnetic transitions at 311K and 123K, the elastic constants of Cr have been observed to soften abruptly by ultrasonic experiments, indicating a strong lattice-spin interaction. However, such softening has never been confirmed in previous measurements of Cr's phonon dispersion relations. To address this issue we have carried out studies with inelastic x-ray scattering (IXS) as well as x-ray thermal diffuse scattering (TDS) at temperatures around the Neel transition (311K). While the IXS measurements did not find obvious changes in the overall phonon dispersion relations of Cr, abrupt changes in TDS intensities were clearly observed across the transition at wavevectors close to the Brillouin zone centers, unveiling a softening in the long-wavelength lattice excitations in Cr at the Neel transition.

Ruqing Xu
Argonne National Laboratory

Date submitted: 17 Nov 2010

Electronic form version 1.4