

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Extended phonon collapse in the charge density wave compound NbSe₂ S. ROSENKRANZ, F. WEBER, J.P. CASTELLAN, R. OSBORN, A. SAID, Argonne National Laboratory, R. HOTT, R. HEID, Karlsruhe Institute of Technology, D. REZNIK, Univ. Colorado at Boulder — The soft-phonons in the charge density wave (CDW) compound NbSe₂ were investigated using high-resolution inelastic X-ray scattering. As the CDW transition at $T_C=33\text{K}$ is approached from high temperature, we observe a breakdown of the dispersion with the phonons becoming overdamped over an extended region around the CDW wavevector. This is in contrast to the cusp in the phonon dispersion expected from the commonly invoked electronic nesting scenario of the CDW transition. Instead, our results, combined with *ab initio* calculations, show that the wavevector of the CDW order is dictated by the momentum dependence of the intrinsic electron-phonon coupling. The strong influence of electron-phonon matrix-elements could also be of importance to other systems, where CDW-like correlations have been attributed to unusual physical properties.

Work supported by US DOE BES-DMS DE-AC02-06CH11357.

Stephan Rosenkranz
Argonne National Laboratory

Date submitted: 19 Nov 2010

Electronic form version 1.4