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Phonon renormalization of the Nèel transition in $KCuF_3$[1] J.C.T. LEE, S. YUAN, University of Illinois, Urbana-Champaign, A. RUSYDI, National University of Singapore, S. SMADICI, S.L. COOPER, E. FRADKIN, P. ABBAMONTE, University of Illinois, Urbana-Champaign — Critical magnetic fluctuations in the one-dimensional antiferromagnet $KCuF_3$, in the form of diffuse scattering around the magnetic (001) Bragg peak, have been studied with resonant soft x-ray scattering. Using x-rays near the Cu L_3 edge to exploit the $2p \rightarrow 3d$ dipole transition, the (001) was directly observed at temperatures ranging from 23K to above the transition temperature ($T_N \approx 43$K). Notably, the phase transition exhibits hysteresis, with T_N sensitive to whether the sample was cooled or heated prior to measurement. This suggests that the phase transition is weakly first order, as might be expected by a transition renormalized by phonons. The temperature dependence of the coherence length and the diffuse scattering, as well as the role played by Jahn-Teller phonons in the transition are discussed.

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James Lee
University of Illinois, Urbana-Champaign

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