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A The effects of non-linear electron-phonon interactions on superconductivity and charge-density-wave correlations SHAOZHI LI, STEVE JOHNSTON, Department of physics and Astronomy, Univ of Tennessee, Knoxville — Linear treatments of the electron-phonon (e-ph) interaction, derived from Taylor expansions of the lattice potential, often predict large lattice distortions in the strong coupling limit; however, the prediction of large lattice displacements violates the assumptions underlying the linear model, indicating that the higher-order non-linear terms should also be included. In this talk, we examine non-linear e-ph interactions in a two-dimensional Holstein-like model using non-perturbative determinant quantum Monte Carlo. We show that even small non-linear interactions dramatically suppress charge-density-wave formation and s-wave superconductivity that are predicted by the linear e-ph model. These effects are attributed to a combined hardening of the phonon frequency and a renormalization of the effective linear coupling to weaker values.

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