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Using Non-Equilibrium Dynamics to Probe Competing Orders in a Mott-Peierls System YAO WANG, Stanford University, BRIAN MORITZ, SIMES SLAC National Accelerator Laboratory, CHENG-CHIEN CHEN, Argonne National Laboratory, CHUNJING JIA, SIMES SLAC National Accelerator Laboratory, MICHEL VAN VEENENDAAL, Argonne National Laboratory/Northern Illinois University,, THOMAS DEVEREAUX, SIMES SLAC National Accelerator Laboratory — The competition between ordered phases and the associated quantum criticality are significant in the study of strongly correlated systems. Here we examine one aspect, the non-equilibrium dynamics of a photoexcited Mott-Peierls system, using an effective Hubbard-bond-phonon model and exact diagonalization. Near the quantum phase transition where spin and charge become intertwined, we observe anti-phase dynamics and coupling-strength-dependent suppression or enhancement in the static structure factors. The renormalized bosonic excitations coupled to a photoemitted electron can be extracted from the spin and charge dynamics, providing an approach for characterizing the underlying bosonic modes. The results from this analysis for different electron momenta show uneven softening of bosonic modes due to a stronger coupling near k_F. This behavior reflects the strong link between the fermionic momenta, the coupling vertices, and ultimately the bosonic susceptibilities near a quantum phase transition.

Yao Wang
Stanford Univ

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