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Phonons in Hubbard Ladders ALEXANDER SEIDEL, DUNG-HAI LEE, Materials Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, HSIU-HAU LIN, Department of Physics, National Tsing-Hua University, Hsinchu 300, Taiwan — The effects of phonons are studied in N-leg Hubbard ladders within the framework of one-loop renormalization group. In particular, we explicitly demonstrate that the role of phonons changes qualitatively even in the simplest two-leg ladder, as compared to the single-chain system. Our numerical results suggest that in the spin-gapped phase of the two-leg ladder, the opening of the spin gap by electron-electron interaction also drives the electron-phonon interaction to strong coupling in a subdominant fashion. Therefore, even though the inclusion of phonons does not alter the phase, their subdominant relevance renormalizes some physical properties strongly below the energy scale of the spin gap. This might shine some light on the recent experiments showing an anomalous isotope effect in high-temperature superconductors.

Alexander Seidel
Lawrence Berkeley National Laboratory

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