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Phase diagram of the one dimensional 1/2-filled Hubbard-Holstein model R. T. CLAY, Mississippi State University, R. P. HARDIKAR, Mississippi State University — We present a detailed numerical study of the Hubbard-Holstein model in one dimension at half filling, including full finite-frequency quantum phonons within the numerically exact Stochastic Series Expansion quantum Monte Carlo method. At half filling, the effects of the electron-phonon and electron-electron interactions compete, with the Holstein phonon coupling acting as an effective negative Hubbard onsite interaction U that promotes on-site electron pairs and a Peierls charge-density wave state. Most previous work on this model has assumed that only Peierls or $U > 0$ Mott phases are possible. However, there has been speculation that a third metallic phase exists between the Peierls and Mott phases, with possible superconducting correlations. We present results confirming the intermediate metallic phase, and show that the Luttinger liquid correlation exponent $K_\rho > 1$ in this region, indicating dominant superconducting correlations. We further present the full phase diagram as a function of onsite Hubbard U, phonon coupling constant, and phonon frequency.

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