Abstract Submitted
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Effect of Quantum Correlations on the Vibrational Spectrum of Bosonic Quantum Solids JORGE SOFO, Department of Physics, The Pennsylvania State University — We study the effects of quantum correlations on the vibrational spectrum of solids. In particular, we are interested on the description of delocalized zero point vacancies and systems of light atoms interacting through weak dispersion forces, like Helium. We write the interaction Hamiltonian in a basis set of localized oscillators. A decoupling similar to the Random Phase Approximation of the equations of motion exhibits the dependence on particle correlations of the dispersion relation for phonons and consequently the sound speed. The approximation recovers the normal phonon modes in the case of a system described by an uncorrelated wave function. We show that the onset of correlations, as the temperature is lowered, changes the speed of sound, and the vibrational response of the solid. Implications for recent experimental observations of the supersolid state are discussed.

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