Abstract Submitted
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Entanglement in Quantum Harmonic Chains[1] NOEL KLINGLER, NATHAN HARSHMAN, American University — We study interparticle entanglement in finite chains of coupled harmonic oscillators as a function of the vibrational mode, excitation number, and bipartition of oscillators. Harmonic chains are used as a model in quantum information theory for ion traps and simple solid state systems, and our results extend previous work for the Gaussian ground state to excited states. Entanglement is analyzed by calculating the purity of the reduced density matrix of the combined wavefunctions of the oscillators in the chain tracing, over subensembles. We present analytic and numerical results for a varying effective spring constants between the particles and number of particles in the chain. Our entanglement results show interesting correlations between the symmetries of the modes and the symmetries of the partitions.

[1]The District of Columbia NASA Space Grant Consortium

Noel Klingler
American University

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