Abstract Submitted
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Quantized Intrinsically Localized Modes[1] PETER RISEBOROUGH, Physics Department — We have calculated the quantized $n = 2$ breather spectra of both the β and the α Fermi-Pasta-Ulam lattices. The breather spectra are composed of resonances in the two-phonon continuum and branches of infinitely long-lived excitations. The non-linear attributes of these excitations become more pronounced at elevated temperatures. The calculated $n = 2$ breather and the resonance of the β-lattice hybridize and exchange identity at the zone boundary, and are in reasonable agreement with the results of previous calculations using the number conserving approximation. However, by contrast the breather spectrum the α-lattice couples resonantly with the single-phonon spectrum and cannot be calculated within a number conserving approximation. Furthermore we show that, for sufficiently strong non-linearity, the α-lattice breathers can be observed directly through the single-phonon inelastic neutron scattering spectrum. As the temperature is increased, the single-phonon dispersion relation for the α-lattice becomes progressively softer as the lattice instability is approached. We compare our theoretical results with the recent experimental observation of breathers in NaI by Manley *et al.*

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