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Effective three-body interactions of ultracold bosons in anharmonic traps PHILIP JOHNSON, Department of Physics, American University, Washington DC, EITE TIESINGA, Joint Quantum Institute, NIST and University of Maryland — The influence of elastic effective three- and higher-body interactions, induced by virtual excitations of ground-state bosons to excited vibrational states (higher bands in the case of periodic potentials), are seen in a number of experiments with trapped ultracold atoms in optical lattices. One of the most striking signatures, revealed in collapse-and-revival experiments, is a significant modification of the phase dynamics of superfluid bosons. We find, however, a significant deviation between the experimental data for atoms in optical lattices, and theoretical calculations based on harmonic trapping potentials. Using a number of model potentials with varying degrees and types of anharmonicity, we show that effective interaction strengths are highly sensitive to trap shape and anharmonic corrections must be taken into account when analyzing this physics.

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