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Experimentally measurable non-monotonicity for the quantum-classical transition in nonlinear nanoelectromechanical systems (NEMS)
QI LI, ADAM STEEGE, Department of Physics and Astronomy, Carleton College, Northfield, Minnesota 55057, ARIE KAPULKIN, 128 Rockwood Crescent, Thornhill, Ontario L4J 7W1, Canada, ARJENDU PATTANAYAK, Department of Physics and Astronomy, Carleton College, Northfield, Minnesota 55057 — Current experiments are exploring the quantum-classical boundary in nonlinear oscillator systems, that is, exploring the effects of changing size and changing decoherence. One such nonlinear system, the driven damped Duffing oscillator had been previously shown to display non-monotonic behavior in phase space. In this paper, we show how this behavior can be mapped to measurable quantities in experiments. These quantities show that the quantum-classical transition is nonmonotonic in the effective size of $\hbar$. Such a system is within experimental reach possibly for atomic systems and definitely for nanoelectromechanical systems (NEMS).

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