

Abstract Submitted
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Coherent electron-phonon states in suspended quantum dots: decoherence and dissipation effects¹ LUIS G.C. REGO, Univ. Fed. Santa Catarina, Department of Physics — The dynamics of coherent electron-phonon (el-ph) states is investigated for a suspended quantum dot structure. Exact quantum dynamics calculations reveal that electron and phonons (comprising a thermal bath) couple quantum mechanically to perform coherent oscillations with periods in the range of tens of nanoseconds, despite the finite temperature of the phonon bath. Mechanical energy dissipation due to clamping loss is taken into account in the calculations. Although the lifetime of the coupled el-ph states decreases with the temperature, well defined Rabi oscillations are obtained for temperatures up to 100 mK. The dynamics of the coupled electron-phonon state is susceptible to various forms of external control. For instance, a weak external magnetic field can be used to control the dynamics of the system, by decoupling the electron from the phonon bath. The results cast light upon the underlying physics of a yet unexplored system that could be suitable for novel quantum device applications.

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Luis G.C. Rego
Univ. Fed. Santa Catarina, Department of Physics

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