

Nonperturbative effects in self-energy functions of quantum dots coupled to an acoustic phonon reservoir

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Abstract

© Published under licence by IOP Publishing Ltd. The problem of description of the strong interaction of a quantum dot (QD) with an acoustic phonon reservoir is discussed. It is shown that the generalized dynamical equation of motion derived in [Gainutdinov R. Kh. 1989 J. Phys. A: Math. Gen. 22 269] as the most general equation of motion consistent with the current concepts of quantum physics and provides an effective way to solve the problem of the QD in the excitonic regime with the phonon reservoir beyond the perturbation theory. A nonperturbative solution for the exciton self-energy function was found. At temperatures, more than 10 K these self-energy functions differ profoundly from that obtained in the second-Born approximation.

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