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Exploration of a qubit assisted quantum optomechanical system

STEPHEN KELLY, ANDREW JACOBS, JAMES CLEMENS, Miami University
— The field of quantum optomechanics has been studied with a focus upon the dynamics of an optical cavity field coupled to a mechanical oscillator. We consider here the scenario of a two-level atom qubit within the optical cavity. In this case, there are three systems coupled together: the qubit, the electromagnetic radiation field within the cavity, and the vibrational states of the oscillator. The occupation of states of the atom, cavity photon number, and mirror phonon number is found to be dependent upon the coupling between them, along with the driving radiation entering the cavity. We present results for the probe spectrum of the system in the steady state.

James Clemens
Miami University

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