

Single-photon opto-mechanics in the strong coupling regime

U. Akram,¹ N. Kiesel,² M. Aspelmeyer,² and G. J. Milburn¹

¹*Department of Physics, School of Mathematics and Physics,
The University of Queensland, St Lucia, QLD 4072, Australia*

²*Faculty of Physics, Quantum Optics,
Quantum Nanophysics and Quantum Information, University of Vienna, Austria*

Abstract

We give a theoretical description of a coherently driven opto-mechanical system with a single added photon. The photon source is modeled as a cavity which initially contains one photon and which is irreversibly coupled to the opto-mechanical system. We show that the probability for the additional photon to be emitted by the opto-mechanical cavity will exhibit oscillations under a Lorentzian envelope, when the driven interaction with the mechanical resonator is strong enough. Our scheme provides a feasible route towards quantum state transfer between optical photons and micromechanical resonators.

PACS numbers: 42.50.Wk, 42.50.Lc, 07.10.Cm