

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Quantum optomechanics in the strong-driving, strong-coupling regime MARC-ANTOINE LEMONDE, WEI CHEN, AASHISH CLERK, McGill University, Ca, Qc — There is considerable interest in trying to develop quantum optomechanical systems where the coupling is appreciable at the level of a single photon and single phonon. Theoretically, such strongly-coupled optomechanical systems have been largely studied using a polaron transformation in the regime of very weak optical driving. We present here a theoretical approach based on the Keldysh technique that describes single-photon strong coupling physics in an optomechanical system in the presence of a strong optical drive. We show that strong driving can be used to dramatically enhance the effects of the single-photon nonlinearity, leading to striking modifications to the usual linearized optomechanical theory. We discuss the resulting strong modifications of the optomechanically-induced transparency (OMIT) spectrum, a quantity easily accessible in experiment.

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Date submitted: 09 Nov 2012

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