

Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Second-order correlation of an optomechanical oscillator¹ HY-OJUN SEOK, Department of Physics Education, Kongju National University, DONGYEL KANG, School of Basic Sciences, College of Engineering, Hanbat National University — We investigate an optomechanical oscillator quadratically coupled to a single-mode cavity field in the regime in which the cavity dissipation is a dominant source of damping. The mechanical oscillator experiences effective cubic nonlinear interaction following the dynamics of the cavity field adiabatically. We show that the mechanical oscillator is coupled to an effective optical reservoir in addition to its own mechanical heat bath. It is shown that the effective optical reservoir leads to nonlinear cooling of the mechanical oscillator in the thermal limit and antibunching of the phonon field in the quantum regime. We find the condition of the transition from bunching to antibunching of the phonon field both numerically and analytically.

¹NRF 2015R1C1A1A01052349

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Date submitted: 03 Feb 2017

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