Abstract Submitted
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Lower limit on the achievable temperature in resonator-based sideband cooling[1] M. GRAJCAR, RIKEN, Japan, and Comenius Univ., Slovakia, S. ASHHAB, J.R. JOHANSSON, F. NORI, RIKEN, Japan, and Univ. of Michigan, Ann Arbor, USA — A resonator with eigenfrequency ω_r can be effectively used as a cooler for another linear oscillator with a much smaller frequency $\omega_m \ll \omega_r$. A huge cooling effect, which could be used to cool a mechanical oscillator below the energy of quantum fluctuations, has been predicted by several authors. However, here we show that there is a lower limit T^* on the achievable temperature, given by $T^* = T_m\ \omega_m/\omega_r$, that was not considered in previous work and can be higher than the quantum limit in realistic experimental realizations. We also point out that the decay rate of the resonator, which previous studies stress should be small, must be larger than the decay rate of the cooled oscillator for effective cooling. M. Grajcar, S. Ashhab, J.R. Johansson, F. Nori, Lower limit on the achievable temperature in resonator-based sideband cooling, Phys. Rev. B 78, 035406 (2008). URL: http://link.aps.org/abstract/PRB/v78/e035406

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