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Using a qubit to measure photon number statistics of a driven, thermal oscillator AASHISH CLERK, DIAN WAHYU UTAMI, McGill University — We demonstrate theoretically how photon number statistics of a driven, damped oscillator at finite temperature can be extracted by measuring the dephasing spectrum of a two-level system dispersively coupled to the oscillator; previous results only dealt with the purely thermal or zero-temperature driven cases [1][2]. We also consider the fidelity of this scheme– to what extent does the measurement reflect the initial number statistics of the mode? Finally, we make a connection to the theory of full counting statistics in mesoscopic physics. Our results have relevance both to experiments in circuit cavity QED, as well as with quantum nano-electromechanical systems.

[1] M.I. Dykman and M.A. Krivoglaz, Sov. Phys. Solid State 29, 210, (1987).
[2] J. Gambetta et al, Phys. Rev. A 74, 042318 (2006).

Aashish Clerk
McGill University

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