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Floquet Approach for two-tone cavity optomechanics DANIEL MALZ, ANDREAS NUNNENKAMP, Cavendish Laboratory, University of Cambridge — We develop a Floquet approach to solve time-periodic quantum Langevin equations in the steady state. We show that two-time correlation functions of system operators can be expanded in a Fourier series and that a generalized WienerKhinchin theorem relates the Fourier transform of their zeroth Fourier component to the measured spectrum. We apply our framework to bichromatically driven cavity optomechanical systems, a setting in which mechanical oscillators have recently been prepared in quantum-squeezed states.[1] Furthermore, we find the exact analytical solution of the explicitly time-periodic quantum Langevin equation describing the two-tone backaction-evasion measurement of a single mechanical oscillator quadrature due to Braginsky, Vorontsov, and Thorne beyond the rotating-wave approximation.[2] We show that counterrotating terms lead to extra sidebands in the optical and mechanical spectra and to a modification of the main peak. Our solution of the backaction-evading measurement can be generalized, including to dissipatively or parametrically squeezed oscillators, as well as recent two-mode backaction evasion measurements.

[1]PRA, doi:10.1103/PhysRevA.94.023803
[2]arXiv:1610.00154

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