Input-Output Analysis of Nonlinear Dissipative Quantum Systems in the Fokker-Planck Approximation

We develop a semiclassical approximation method for calculating correlation functions of the outgoing field of dissipative quantum systems. The method is strictly valid for linear quantum systems, and can be extended consistently to the nonlinear case. It can be used even at bifurcation points where linearization is no longer possible. It is applied to the dc-pumped degenerated Josephson-junction parametric amplifier. We demonstrate that the linearized fluctuation analysis can severely overestimate the maximum obtainable degree of squeezing.

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