Quantum Physics

The Equations of Quantum Feedback Control in the Regime of Good Control

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We derive the equations of motion describing the feedback control of quantum systems in the regime of "good control", in which the control is sufficient to keep the system close to the desired state. One can view this regime as the quantum equivalent of the "linearized" regime for feedback control of classical nonlinear systems. Strikingly, while the dynamics of a single qubit in this regime is indeed linear, that of all larger systems remains nonlinear, in contrast to the classical case. As a first application of these equations, we determine the steady-state performance of feedback protocols for a single qubit that use unbiased measurements.

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