Measuring Work and Heat Statistics in Superconducting Quantum Circuits

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Abstract

Owing to the large detection efficiency of microwave amplifiers and to the controllability of superconducting circuits, it is now possible to follow the state a a quantum system in a single realization of an experiment instead of average quantities only. After measuring a large number of these quantum trajectories, one has access to the distribution of various thermodynamics quantities such as heat, work and entropy.

In our experiment, we perform weak and continuous measurement of superconducting qubits and access more than 30% of the total information leaking from the system. In the experiment, we measure both the fluorescence emitted by the qubit and the population of the excited state of the qubit in time. We will highlight the impact of the detector type on the distribution of heat and work as a function of time. By tuning the strength of the population measurement we should observe a continuous transition between two kinds of heat and work distributions.

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