

cQED@Tn - "Circuit QED: From Quantum Devices to Analogues on Superconducting Circuits"



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Superconducting qubit readout fidelity at the threshold for quantum error correction without a quantum-limited amplifier

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We present a readout scheme for superconducting qubits that combines a shelving technique, to effectively increase the qubit relaxation time, and a two-tone excitation of the resonator to rapidly distinguish among qubit populations in higher energy levels. Using a machine-learning algorithm to post-process the two-tone measurement results, we further improve the assignment fidelity. We demonstrate single-shot, multiplexed qubit readout, with 140ns readout time, with 99.5% assignment fidelity for two-state readout and 96.9% for three-state readout—without using a quantum-limited amplifier.

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