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cQED readout error from leakage to a neighboring qubit
MOSTAFA KHEZRI, JUSTIN DRESSEL, ALEXANDER N. KOROTKOV, University of California, Riverside — In a circuit QED setup, we consider the readout error of a dispersively measured superconducting qubit caused by its coupling to a detuned neighboring qubit. This readout error is significant if the logical qubit is encoded in the bare basis, but can be substantially reduced by encoding the logical qubit in the eigenbasis. The process of measurement leads to quantum jumps in the eigenbasis. As a result, the excitation of the measured qubit may switch between the two qubits at a rate that depends on the qubit-qubit detuning and coupling, as well as the linewidth of the readout resonator. The switching produces readout misidentification error, which cannot be eliminated with a longer measurement. However, we show that this error can be made negligible by using a readout resonator with a sufficiently narrow linewidth.

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