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Experimental approaches to improve the single shot measurement fidelity of a superconducting charge qubit YANBING LIU, SRIKANTH SRINIVASAN, ANTHONY HOFFMAN, ANDREW HOUCK, Princeton University — We discuss various experimental approaches to improve the single shot measurement fidelity of a superconducting charge qubit. Dispersive readout is optimized on a transmon coupled to a superconducting coplanar waveguide resonator. Measurement parameters, such as microwave power and frequency are varied. Also control theory is adapted to construct a genetic algorithm which optimizes the shape of the drive pulse. Additionally, we attempt to reduce noise and increase SNR by employing a SLUG amplifier. Using these techniques, we discuss the feasibility of reaching the measurement fidelity needed for scalable quantum computation with superconducting circuits.

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