Optimization of single shot readout of a transmon qubit using a SLUG microwave amplifier\textsuperscript{1} YANBING LIU, SRIKANTH SRINIVASAN, Princeton University, DAVID HOVER, ROBERT MCDERMOTT, University of Wisconsin, Madison, ANDREW HOUCK, Princeton University — We report on measurement of a superconducting transmon qubit using a number of optimization techniques and a low noise amplifier. Optimization is performed over power and frequency, and a genetic algorithm is employed to optimize the readout fidelity as a function of the measurement pulse shape. In addition, a superconducting low-inductance undulatory galvanometer (SLUG), a SQUID-based microwave amplifier, is used to reduce system noise. The SLUG amplifier has very high dynamic range and low noise over a relatively wide frequency range. Both the SLUG amplifier and genetic algorithm lead to improved readout fidelity over analytic pulse shaping and HEMT amplification.

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