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High-Fidelity Qubit Measurement using a Superconducting Low-Inductance Undulatory Galvanometer Microwave Amplifier TED THORBECK, DAVID HOVER, SHAOJIANG ZHU, GUILHEM RIBEILL, University of Wisconsin, Madison, DANIEL SANK, RAMI BARENDS, JOHN MARTINIS, University of California, Santa Barbara, ROBERT MCDERMOTT, University of Wisconsin, Madison — We describe a high-fidelity dispersive measurement of a superconducting Xmon qubit using a microwave amplifier based on the Superconducting Low-inductance Undulatory Galvanometer (SLUG). We will show a qubit measurement fidelity of 99% in 700 ns with the SLUG, compared to 60% without the SLUG. The SLUG amplifier has a gain of 19 dB at 6.6 GHZ. It also improves the signal-to-noise ratio by 9 dB, compared the same circuit without the SLUG. Also, the SLUG amplifier has a large dynamic range, with an input saturation power corresponding to around 600 photons in the readout cavity. All of these properties make the SLUG a promising microwave amplifier for more complex quantum circuits.

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