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SLUG Microwave Amplifiers for Scalable Superconducting Qubit Readout SHAOJIANG ZHU, DAVID HOVER, GUILHEM RIBEILL, TED THORBECK, ROBERT MCDERMOTT, University of Wisconsin, Madison, UNIVERSITY OF WISCONSIN, MADISON TEAM — We describe a phase-insensitive microwave linear amplifier based on the Superconducting Low-inductance Undulatory Galvanometer (SLUG). The amplifier is well suited to the high fidelity quantum nondemolition measurement of superconducting qubits in a circuit quantum electrodynamics architecture. The amplifier has achieved instantaneous bandwidth greater than 400 MHz and system added noise of order one quantum in the GHz frequency range; moreover, the SLUG -1 dB compression point is around -95 dBm, about two orders of magnitude higher than that achieved with typical Josephson parametric amplifiers. We describe efforts to increase instantaneous bandwidth toward 1 GHz and discuss prospects for simultaneous measurement of multiple superconducting qubits using frequency-domain multiplexing with a broadband SLUG amplifier.

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