Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Noise Characteristics of Superconducting Low-Inductance Undulatory Galvanometer WENSHUO LIU, MAXIM VAVILOV, ROBERT MCDERMOTT, University of Wisconsin - Madison — We describe theoretical studies of the Superconducting Low-Inductance Undulatory Galvanometer (SLUG), a nonreciprocal gain element based on Josephson junctions. We use both analytical and numerical methods to calculate various properties of the SLUG, including power gain, added noise and back-action in both the thermal and quantum regimes. We derive the distribution functions of the output signals in the presence of classical noise using the Fokker-Planck equation. We also discuss optimal matching of the SLUG amplifier so that gain, bandwidth and noise performance can meet the criteria of high-fidelity multiplexed qubit readout.

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Date submitted: 14 Nov 2014 Electronic form version 1.4