Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Superconducting Low-Inductance Undulatory Galvanometer Microwave Amplifier: Theory DAVID HOVER, GUILHEM RIBEILL, YUNG-FU CHEN, SHAOJIANG ZHU, ROBERT MCDERMOTT, University of Wisconsin-Madison — We present numerical studies of a phase-insensitive microwave linear amplifier based on the Superconducting Low-Inductance Undulatory Galvanometer (SLUG). Direct integration of the junction equations of motion provides access to the full scattering matrix of the SLUG element. We discuss the optimization of SLUG amplifiers and calculate amplifier gain and noise temperature in both the thermal and quantum regimes. The microwave SLUG amplifier is expected to achieve noise performance approaching the standard quantum limit in the frequency range from 5-10 GHz, with gain around 15 dB for a single-stage device and instantaneous bandwidth of order hundreds of MHz. We compare our numerical model with measured performance of state-of-the-art devices.

David Hover
University of Wisconsin-Madison

Date submitted: 10 Nov 2011 Electronic form version 1.4