

Abstract Submitted  
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**Design and operation of novel Josephson parametric amplifiers for QND supeconducting qubit readout**<sup>1</sup> A. NARLA, K.M. SLIWA, M. HATRIDGE, S. SHANKAR, L. FRUNZIO, R.J. SCHOELKOPF, M.H. DEVORET, Department of Applied Physics, Yale University — Parametric amplifiers based on Josephson junctions are essential tools in superconducting quantum information experiments. However, their integration with current 3D Circuit QED experiments is made challenging by the need to transition between waveguide, coax and printed circuit boards. Moreover, these amplifiers need auxiliary microwave components, like hybrids and directional couplers, that are sources of spurious losses and/or difficult-to-predict impedance mismatch that can limit measurement efficiency. We develop a new architecture for these parametric amplifiers that eliminates superfluous microwave components and interconnects. This simplifies their assembly and integration into experiments. We present an experimental realization of such a device that demonstrates 20 dB of gain with 17 MHz BW at 11.4 GHz, on par with conventional devices.

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