

Abstract Submitted
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Dynamic range and noise of the Josephson parametric converter¹

FLAVIUS SCHACKERT, BALEEGH ABDO, MICHAEL HATRIDGE, LUIGI FRUNZIO, ROBERT J. SCHOELKOPF, MICHEL H. DEVORET, Yale University — We present recent progress in characterizing key properties of the Josephson parametric converter (JPC): its dynamic range and noise performance. The JPC is a phase-preserving parametric amplifier operating in the microwave regime. It is based on a ring of four Josephson junctions, which provides the non-linearity, coupled to two microwave resonators, which increase the effective interaction between the incoming signal and this non-linearity. The JPC operates with a minimal number of modes, which simplifies its analysis, and is close to the ideal non-degenerate parametric amplifier operating at the quantum limit of noise. Besides having sufficient gain and bandwidth, a practical amplifier useful for e.g. the readout of superconducting qubits will need to exhibit a sufficiently low noise temperature and dynamic range. While dynamic range ensures that an incoming signal does not saturate the amplifier, a low noise temperature is necessary to minimally degrade signal-to-noise ratio.

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Flavius Schackert
Yale University

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