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Josephson Parametric Converter saturation and higher order effects GANGQIANG LIU, XI CAO, TZU-CHIAO CHIEN, OLIVIA LANES, EDAN ALPERN, MICHAEL HATRIDGE, Department of Physics and Astronomy, University of Pittsburgh — The Josephson Parametric Converter (JPC), which provides quantum-limited amplification or conversion of microwave photons through a non-degenerate three-wave mixing process, has become widely used in superconducting quantum information. The device's operating frequency can be tuned by varying the applied flux and microwave pump frequency and amplitude, with accompanying complex effects on saturation power and frequency response. In this talk, we present numerical and experimental studies of the optimal bias conditions for a given signal frequency. We identify novel features in the saturation behavior of the amplifier which point to the influence of higher order Hamiltonian terms. These are relevant for both conventional devices and especially the emerging class of multiply pumped directional amplifiers and circulators based on three-wave mixing with Josephson junctions.

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