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Quantum correlations in microwave frequency combs[1] THOMAS WEISSL, SHAN W. JOLIN, DAVID B. HAVILAND, KTH- Royal Institute of Technology, Stockholm, DEPARTMENT OF APPLIED PHYSICS TEAM — Non-linear superconducting resonators are used as parametric amplifiers in circuit quantum electrodynamics experiments [1]. When a strong pump is applied to a non-linear microwave oscillator, it correlates vacuum fluctuations at signal and idler frequencies symmetrically located around the pump, resulting in two-mode squeezed vacuum. When the non-linear oscillator is pumped with a frequency comb, complex multipartite entangled states can be created as demonstrated with experiments in the optical domain [2, 3]. Such cluster states are considered to be a universal resource for one-way quantum computing. With our microwave measurement setup it is possible to pump and measure response at as many as 42 frequencies in parallel, with independent control over all pump amplitudes and phases. We show results of two-mode squeezing for of pairs of tones in a microwave frequency comb. The squeezing is created by four-wave mixing of a pump tone applied to a non-linear coplanar-waveguide resonator. [1] E. Tholén et al., Appl. Phys. Lett. 90, 253509 (2007) [2] M. Chen et al., PRL **112**, 120505 (2014) [3] J. Roslund et al., Nat. Phot. 2013.340 (2013)

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