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Engineering Non-Classical Light with Non-Linear Microwaveguides ARNE GRIMSMO, Univ of Sherbrooke, AASHISH CLERK, McGill University, ALEXANDRE BLAIS, Univ of Sherbrooke — The quest for ever increasing fidelity and scalability in measurement of superconducting qubits to be used for fault-tolerant quantum computing has recently led to the development of near quantum-limited broadband phase preserving amplifiers in the microwave regime. These devices are, however, more than just amplifiers: They are sources of high-quality, broadband two-mode squeezed light. We show how bottom-up engineering of Josephson junction embedded waveguides can be used to *design* novel squeezing spectra. Furthermore, the entanglement in the two-mode squeezed output field can be imprinted onto quantum systems coupled to the device's output. These broadband microwave amplifiers constitute a realization of non-linear waveguide QED, a very interesting playground for non-equilibrium many-body physics.

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