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Implementing quantum optics with parametrically driven superconducting circuits

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Parametric coupling has received much attention, in part because it forms the core of many low-noise amplifiers in superconducting quantum information experiments. However, parametric coupling in superconducting circuits is, as a general rule, simple to generate and forms the basis of a methodology for interacting microwave fields at different frequencies. In the quantum regime, this has important consequences, allowing relative novices to do experiments in superconducting circuits today that were previously heroic efforts in quantum optics and cavity-QED. In this talk, I'll give an overview of some of our work demonstrating parametric coupling within the context of circuit-QED as well as some of the possibilities this concept creates in our field.