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**Quantum optics with nonlinearly coupled superconducting resonators** VADIRAJ A.M., C.W.S. CHANG, POL FORN-DIAZ, C.M. WILSON, Institute for Quantum Computing, University of Waterloo, Waterloo, Canada — Superconducting circuits provide a robust platform for studying fundamental aspects of light-matter interaction in the circuit QED architecture. Here, we study a novel circuit that couples two superconducting resonators via a nonlinear interaction mediated by a superconducting quantum interference device (SQUID). The interaction hamiltonian has a form analogous to optomechanical systems with the photon number in one resonator coupling to the current in the other. However, the nonlinear coupling constant can be many orders of magnitude larger than in typical optomechanical systems. This can potentially bring the system into a new regime of single-photon coupling between the resonators, enabling novel physics. We will present preliminary results in this direction.

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