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**Arbitrary Control of Entanglement between Two Superconducting Resonators** FREDERICK STRAUCH, Williams College, Williamstown, MA, KURT JACOBS, University of Massachusetts Boston, MA, RAYMOND SIMMONDS, National Institute of Standards and Technology, Boulder, CO (USA) — We consider the problem of synthesizing an arbitrary entangled state of two superconducting resonators. We show that this problem can be solved efficiently for entangled superpositions of photon number (Fock) states, utilizing a coherent interaction of each resonator with a single artificial atom. We theoretically analyze this approach for synthesizing high NOON states using existing technology.

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