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Microwave-controlled generation of shaped photons in circuit QED MAREK PECHAL, CHRISTOPHER EICHLER, SINA ZEYTINOGLU, SIMON BERGER, ANDREAS WALLRAFF, STEFAN FILIPP, ETH Zurich — Techniques for quantum information transfer using photons propagating between distant qubits are often based on the ability to engineer the shape of the emitted photon waveform. For instance, a shape symmetric in time enables a reversal of the emission process leading to efficient reabsorption of the photon by the target qubit [1]. Here, we demonstrate the generation of shaped microwave photons in a superconducting circuit QED system consisting of a standard transmon circuit coupled to a transmission line resonator [2]. We make use of the multi-level structure of the transmon and employ a tunable Raman transition induced by a modulated microwave signal to emit a single shaped photon. This technique known from quantum optics allows us to produce symmetric photons with controllable amplitude and phase using microwave control signals only. The method is easy to implement in standard circuit QED systems because it does not rely on specialized circuit elements [3,4] to tune the transmon-photon coupling.

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[3] Y. Yin *et al.*, Phys. Rev. Lett. **110**, 107001 (2013).
[4] S. J. Srinivasan *et al.*, arXiv:1308.3471.

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