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Shaping the Spontaneous Emission Pulse from a Superconducting Qubit[1] SRIKANTH SRINIVASAN, YANBING LIU, GENGYAN ZHANG, Princeton University, TERRI YU, Yale University, JAY GAMBETTA, IBM T.J. Watson Research Center, STEVEN GIRVIN, Yale University, ANDREW HOUCK, Princeton University — We report on measurements of spontaneous emission in a circuit quantum electrodynamics system. A superconducting qubit with tunable coupling to a coplanar waveguide cavity is operated in a regime where the qubit relaxation time, and consequently the spontaneous emission rate, is dominated by the interaction strength. This fast control knob on the coupling strength is used to shape the emitted single photon's wavepacket. The independent control over the coupling allows the dressed qubit frequency to remain truly constant during the emission. The wavepacket shape becomes important in experiments where quantum information needs to be transported between various nodes in a quantum network. The transfer can happen with a very high fidelity if the wavepacket is time-symmetric, since emission by the source and absorption by the destination become time reversed processes.

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