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Experimental investigation of a nonequilibrium delocalization-localization transition of photons in circuit quantum electrodynamics JAMES RAFTERY, DEVIN UNDERWOOD, WILLIAM SHANKS, SRIKANTH SRINIVASAN, ANTHONY HOFFMAN, HAKAN TURECI, ANDREW HOUCK, Princeton University — Strong photon-qubit coupling in the circuit quantum electrodynamics architecture may lead to quantum phase transitions of light. Recent theoretical and experimental efforts have been made toward examining such quantum phase transitions in large systems; however, interesting crossovers may also exist in significantly smaller and more controllable systems. A sharp nonequilibrium self-trapping transition of light has been predicted in a system comprising two coupled resonators each containing a single qubit. A delocalized regime, where photons coherently oscillate between the two cavities, transitions via dissipation into a localized regime, where photons cannot tunnel. We realized this system experimentally using two capacitively coupled superconducting microwave coplanar waveguides each containing a single transmon qubit. We present our experimental investigation of the system using time and frequency domain measurements to probe its dynamics.

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