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Catching a quantum jump in mid-flight[1] Z.K. MINEV, S.O. MUNDHADA, E. ZALYS-GELLER, S. SHANKAR, P. RHEINHOLD, L. FRUNZIO, R.J. SCHOELKOPF, Department of Applied Physics, Yale University, M. MIRRAHIMI, Yale Quantum Institute, Yale University and INRIA Paris Rocquencourt, M.H. DEVORET, Department of Applied Physics, Yale University — Quantum jumps provide a fundamental manifestation of the interplay between coherent dynamics and strong continuous measurements. Interestingly, the modern theoretical vantage point of quantum trajectories (Carmichael, 1993) suggests that the jump is not instantaneous, but rather smooth, coherent, and under the right conditions may present a deterministic character. We revisit the original observation of quantum jumps in a V-type, three-level atom (Berquist, 1986; Sauter, 1986), in order to "deterministically" catch the jump in mid-flight. We have designed and operated a V-type superconducting artificial atom with the 3 needed levels: G (for Ground), B (for Bright), and D (for Dark). The atom is coupled to a continuously monitored microwave mode that can distinguish B from the manifold formed by G and D, but without distinguishing G from D. We will present preliminary results showing how this experiment can be realized.

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