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Mapping quantum state dynamics of spontaneous emission MAHDI NAGHILOO, NEDA FROUZANI, DIAN TAN, KATER MURCH, Washington University, St. Louis — Controlling the dynamics of spontaneous emission for quantum emitters is relevant to many novel applications in quantum computation and quantum optics. In this work we use homodyne measurements of the spontaneous emission of a superconducting qubit to track its quantum evolution. A resonant pulse is used to prepare the qubit in the excited state and the emission from the system into this environment is monitored with a near-quantum-limited Josephson parametric amplifier acting as a homodyne detector. By an appropriately chosen phase of amplification, we execute weak measurements in the σ_x basis of the qubit. We use the measurement results to track individual quantum trajectories as the qubit evolves from its excited to ground state, revealing rich dynamics that occur in the process of spontaneous emission.

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