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Encoding quantum information in a stabilized manifold of a superconducting cavity[1] S. TOUZARD, Z. LEGHTAS, S.O. MUNDHADA, C. AXLINE, M. REAGOR, K. CHOU, J. BLUMOFF, K.M. SLIWA, S. SHANKAR, L. FRUNZIO, R.J. SCHOELKOPF, Department of Applied Physics, Yale University, M. MIRRAHIMI, Department of Applied Physics, Yale University and INRIA Paris Rocquencourt, M.H. DEVORET, Department of Applied Physics, Yale University — In a superconducting Josephson circuit architecture, we activate a multi-photon process between two modes by applying microwave drives at specific frequencies. This creates a pairwise exchange of photons between a high-Q cavity and the environment. The resulting open dynamical system develops a two-dimensional quasi-energy ground state manifold. Can we encode, protect and manipulate quantum information in this manifold? We experimentally investigate the convergence and escape rates in and out of this confined subspace. Finally, using quantum Zeno dynamics, we aim to perform gates which maintain the state in the protected manifold at all times.

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