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Schrodinger's catapult I: coherent launch of multi-photon cavity states C. AXLINE, W. PFAFF, L. D. BURKHART, U. VOOL, P. C. REINHOLD, L. FRUNZIO, L. JIANG, M. H. DEVORET, R. J. SCHOELKOPF, Yale University — Quantum networks are a powerful paradigm for managing complexity in quantum information processing. Here we present a circuit QED tool to control the exchange of quantum information in such a network, dubbed "Schrodinger's catapult". It enables rapid conversion between complex, multi-photon states prepared in a cavity memory and a propagating output mode. Enabled by four-wave mixing in a single Josephson junction, this conversion rate is tunable up to three orders of magnitude faster than the intrinsic memory decay rate. In addition to such a large on/off ratio, we show that the mapping of cavity states to traveling states is faithful and state-independent. Amplitude and phase control of the conversion process anticipates the capture of propagating states using a reciprocal module.

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