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Concurrent remote entanglement with continuous variables[1] E. ZALYS-GELLER, A. NARLA, S. SHANKAR, M. HATRIDGE, M. SILVERI, K.M. SLIWA, S.O. MUNDHADA, S.M. GIRVIN, M.H. DEVORET, Department of Applied Physics, Yale University — A necessary ingredient for large scale quantum information processing is the ability to entangle distant qubits on demand. In the field of superconducting quantum information, this process can be achieved by entangling stationary superconducting qubits with flying coherent states of microwave light, which are then co-amplified by a Josephson Parametric Converter (JPC). The JPC also serves as a which-path information eraser, causing the probabilistic continuous measurement process to concurrently entangle the qubits. We discuss the sensitivity of the experiment to the loss of quantum information during the flight of the coherent states, as well as strategies to improve which-path information erasure and reduce information loss to the degree required for entanglement generation.

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