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Entanglement of remote transmon qubits by concurrent photon detection - Part 2[1] A. NARLA, S. SHANKAR, M. HATRIDGE, W. PFAFF, Z. LEGHTAS, K.M. SLIWA, E. ZALYS-GELLER, L. FRUNZIO, M.H. DEVORET, Department of Applied Physics, Yale University — One proposed realization for a quantum computer is the modular architecture, which consists of error-corrected quantum memories that are connected via a quantum router. A fundamental requirement for this modular quantum computer is the ability to entangle arbitrary, distant qubits on demand. This can be realized in circuit QED using a protocol inspired by recent experiments based on trapped ions and nitrogen-vacancy centers. First, each qubit is entangled with a single cavity photon (Fock state n=1) using sideband pulses. On their way out of the cavity, the now flying photons interfere on a beam-splitter and are concurrently detected by a novel microwave photo-multiplier that employs a third qubit-cavity system. In this protocol, the presence of losses in the photon flight path only affect the success probability of creating an entangled state but not its fidelity. In this talk, we present experimental results for this protocol and discuss the factors influencing the success probability and the fidelity of the generated entangled states.

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A. Narla
Department of Applied Physics, Yale University

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