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Cold cavity attenuator for reducing thermal photon population in circuit quantum electrodynamics[1] Z. WANG, S. SHANKAR, A. NARLA, U. VOOL, M.H. DEVORET, Department of Applied Physics, Yale University — Dephasing induced by residual thermal photons in the readout resonator has been identified as one of the leading factors limiting the decoherence time of transmon qubits in the circuit QED architecture. This residual thermal population of the order of 10^{-3} is suspected to arise from noise impinging on the resonator from the input and output transmision lines. We have designed and tested a new, ancillary, dissipative brass cavity to protect the readout resonator from input noise. This ancillary cavity, in effect, serves as a narrowband microwave attenuator for superconducting quantum circuits that is well thermalized to the 20 mK stage of the fridge. We study its influence on the thermal photon population in a qubit-3D cavity system by measuring the spectral density of the noise coupled to the transmon qubit using the spin-locking method.

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