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Cavity Dephasing in Transmon Qubits from Non-equilibrium Noise JEN-HAO YEH, Laboratory for Physical Sciences, College Park, MD and Department of Physics, University of Maryland, College Park, MD, JAY LEFEBVRE, Department of Physics, University of Maryland, College Park, MD, FREDERICK WELLSTOOD, Department of Physics, University of Maryland, College Park, MD and Joint Quantum Institute, University of Maryland, College Park, MD, BENJAMIN PALMER, Laboratory for Physical Sciences, College Park, MD and Department of Physics, University of Maryland, College Park, MD — The dephasing times for transmon qubits in a 3D cavity can be limited by coupling of the cavity input and output lines to non-equilibrium noise from higher temperature stages. In our system, the dominant source of thermal photons in the cavity is the last microwave attenuator in the microwave input line which is mounted on the 20 mK stage. Guided by thermal and microwave simulations, we have fabricated microwave attenuators and tested them in a 3D transmon measurement system. The performance of the attenuators was quantified by measuring the Ramsey decay time of a transmon qubit as a function of the temperature of the mixing chamber and power dissipated in the attenuator. Based on the Ramsey decay times and properties of the transmon-cavity system, we estimate the effective output noise temperature of the attenuator and compare our results to simulations.

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