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Extended coherence times of superconducting transmon qubits[1]
ERIK LUCERO, MATTHIAS STEFFEN, JAY GAMBETTA, DAVID ABRAHAM, ANTONIO CORCOLES, IBM T. J. Watson Research Center, IBM QUANTUM COMPUTING TEAM — As part of the IBM quantum computing effort, we are building on the pioneering work [1] and recent advances [2] on transmon qubits enclosed in three-dimensional cavities ("3D qubits"). To continue the advance of superconducting qubit architectures for surface code implementations it is clear that we must understand what is limiting coherence times and work to mitigate its effects. By leveraging the reduced fabrication requirements (compared to two-dimensional qubits) and full-device electromagnetic simulation, 3D qubits provide an insightful experimental test-bed to help determine the participation of decoherence mechanisms (e.g. materials, surfaces, radiation) in superconducting qubits. We report on coherence times that go beyond those reported recently [2], making 3D qubits a viable architecture for a prototype quantum processor. [1] Paik, et al., Phys Rev. Lett. 107 240501 [2] Rigetti et al., Phys. Rev. B 86, 100506

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