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Building Transmon Qubits in the ReZQu Architecture JULIAN KELLY, R. BARENDS, J. BOCHMANN, B. CHIARO, Y. CHEN, M. LENANDER, E. LUCERO, M. MARIANTONI, A. MEGRANT, C. NEILL, P. O'MALLEY, P. ROUSHAN, D. SANK, A. VAINSENCHER, J. WENNER, T. WHITE, Y. YIN, ANDREW CLELAND, JOHN M. MARTINIS, UC Santa Barbara — Transmon qubits are promising candidates for use in a superconducting quantum computer because of their long coherence times, but traditionally involve a difficult measurement scheme. By reading out each transmon through a phase qubit, we are able to take advantage of the single shot and multiplexed readout technologies already in use. This allows us to drop transmons into the ReZQu architecture. However, fabricating a transmon and phase qubit on the same chip comes with its own set of challenges. We present fabrication techniques and preliminary data as we move toward our next generation of qubits.

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