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Characterization of superconducting qubits in a planar lattice[1]
SRIKANTH SRINIVASAN, ANTONIO CORCOLES, EASWAR MAGESAN, NICHOLAS BRONN, JARED HERTZBERG, JAY GAMBETTA, MATTHIAS STEFFEN, JERRY CHOW, IBM T.J. Watson Research Center — The surface code is a promising implementation for quantum computing because of its relatively lenient thresholds for fault tolerance. The physical layout contains two general classes of qubits, code and syndrome, arranged in a planar lattice. In this talk we present complete characterization of a four qubit planar lattice and discuss the experimental challenges for achieving high fidelity. This includes integrating four independent readouts using parametric amplifiers, gate calibration procedures, and sample design. Careful device design is required for efficient signal delivery without deleterious microwave crosstalk. The low crosstalk is validated through measurements of simultaneous randomized benchmarking on both single and two-qubit entangling gates. This work is a step towards realizing the surface code on a planar lattice.

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