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Abstract for an Invited Paper
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A strand of a surface code fabric with superconducting qubits[1]

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Quantum error correction will be a necessary component towards realizing scalable quantum computers with physical qubits. Theoretically, it is possible to perform arbitrarily long computations so long as the error rate is below a threshold value. The two-dimensional surface code permits relatively high fault-tolerant thresholds at the $\sim 1\%$ level, and only requires a latticed network of qubits with nearest-neighbor interactions. I will discuss our implementation of a sub-section of the larger fabric using three transmon qubits and two linking microwave resonators. We demonstrate high-fidelity control over the sub-section surface code strand, verified via quantum prcoess tomography and randomized benchmarking experiments. Our fixed-frequency qubit approach relies on the two-qubit cross-resonance microwave driving interaction, which is now one of many microwave-based entangling gate protocols. I will also discuss the prospects to scale to surface code plaquette level experiments.

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