Qubit reconfigurability and sequence customization in exchange-only qubits

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All solid-state qubit technologies face the reality of finite device yield, necessitating operating strategies that can tolerate imperfections in a fabric of connected qubits. Exchange-only silicon heterostructure spin qubits constitute a platform with multiple avenues to work around such defects. One such opportunity comes from the ability to define qubits and inter-qubit interaction boundaries “in software”, without the constraint of a qubit definition remaining static with respect to the underlying physical electrodes. Additional flexibility is afforded in the construction of encoded gate operations, permitting sequence customization for reduced sensitivity to quasi-static noise sources in single qubit gates, decoupling sequences immune to certain error channels, and 2Q entangling gates that prevent the spread of qubit state leakage. In this talk, progress and experimental realizations of the above will illustrate the benefits offered by the customizable nature of this qubit platform.