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Tuning qubit interactions with asymmetric transmons MATTHEW WARE, DANIELA F. BOGORIN, J.D. STRAND, B.L.T. PLOURDE, Syracuse University — Superconducting transmon qubits have been used in numerous key experiments in the field of quantum information processing. We are exploring a variation of this circuit, the asymmetric transmon, where the two Josephson junctions making up the qubit have substantially different critical currents. This results in a second sweet spot with respect to magnetic flux at odd half-integer flux-quantum bias points. The corresponding reduction in energy-modulation depth makes the qubit less sensitive to dephasing due to flux noise for bias points away from the sweet spots. At the same time, the tunability of the qubit energy allows for novel qubit-cavity processes, including flux-driven sideband transitions, as well as adjustable interactions between multiple qubits.

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