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Fast, coherent control of the tunable coupling qubit
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We present results of time domain measurements on a tunable coupling qubit (TCQ) coupled to a superconducting coplanar waveguide resonator. The TCQ has the benefit of independently tunable qubit frequency and cavity-qubit coupling. We show that the TCQ's frequency and coupling can be dynamically controlled in tens of nanoseconds by using two on-chip flux control lines. Using this dynamic control, Rabi oscillations were measured at various coupling strengths showing that the coupling can be reduced by a factor greater than 1500. To measure qubit coherence at low coupling, the TCQ was tuned to a high coupling region, excited by a synchronized pi-pulse and then returned to the zero coupling region where the qubit state was measured. Coherence times of several microseconds were measured and are comparable to other superconducting qubits

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