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Driven Dynamics and Rotary Echo of a Qubit Tunably Coupled to a Harmonic Oscillator WILLIAM OLIVER, MIT Lincoln Laboratory, Lexington, Massachusetts, SIMON GUSTAVSSON, JONAS BYLANDER, FEI YAN, POL FORN-DIAZ, Massachusetts Institute of Technology, Cambridge, Massachusetts, VLAD BOLKHOVSKY, DANIELLE BRAJE, GEORGE FITCH, MIT Lincoln Laboratory, Lexington, Massachusetts, KHALIL HARRABI, The Institute of Physical and Chemical Research (RIKEN), Wako, Saitama, Japan, DONNA LENNON, JOVI MILOSHI, PETER MURPHY, RICK SLATTERY, STEVEN SPECTOR, BEN TUREK, TERRY WEIR, PAUL WELANDER, MIT Lincoln Laboratory, Lexington, Massachusetts, FUMIKI YOSHIHARA, The Institute of Physical and Chemical Research (RIKEN), Wako, Saitama, Japan, DAVID CORY, Institute for Quantum Computing and Department of Chemistry, University of Waterloo, Ontario, Canada, YASUNOBU NAKAMURA, The University of Tokyo, Komaba, Meguro-ku, Tokyo, Japan, TERRY ORLANDO, Massachusetts Institute of Technology, Cambridge, Massachusetts — We have investigated the driven dynamics of a superconducting flux qubit that is tunably coupled to a microwave resonator. We find that the qubit experiences an oscillating field mediated by off-resonant driving of the resonator, leading to strong modifications of the qubit Rabi frequency. This opens an additional noise channel, and we find that low-frequency noise in the coupling parameter causes a reduction of the coherence time during driven evolution. The noise can be mitigated with the rotary-echo pulse sequence, which, for driven systems, is analogous to the Hahn-echo sequence.

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