

Abstract Submitted
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Universal control of an oscillator with dispersive coupling to a qubit¹ STEFAN KRASTANOV, REINIER HEERES, PHILIP REINHOLD, VICTOR V. ALBERT, CHAO SHEN, CHANG-LING ZOU, BRIAN VLASTAKIS, ROBERT SCHOELKOPF, LIANG JIANG, Yale University — We investigate quantum control of an oscillator mode that dispersively couples to an ancillary qubit. In the strong dispersive regime, we may drive the qubit conditioned on the selected number states of the oscillator, which enables selective number-dependent arbitrary phase (SNAP) operation and universal control of the oscillator. We provide explicit constructions for arbitrary state preparation and arbitrary unitary operation of the oscillator. Moreover, using optimal control techniques, we develop fast and efficient pulse sequences to achieve high fidelity unitary gates. This universal control scheme of the oscillator can readily be implemented using superconducting circuits.

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