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Multi-Transmon circuit QED using local and fast flux biasing

LEONARDO DICARLO, JERRY CHOW, Yale University, JOHANNES MAJER, Vienna University of Technology, LUIGI FRUNZIO, Yale University, JAY GAMBETTA, University of Waterloo, ALEXANDRE BLAIS, Universite de Sherbrooke, STEVEN GIRVIN, ROBERT SCHOELKOPF, Yale University — We report local and fast flux tuning of Transmon qubits in circuit QED by means of proximal short-circuited coplanar waveguides. We characterize the effect of these additional microwave channels on qubit lifetime. We demonstrate one-qubit Z -gates and time-domain control of two-qubit interaction via virtual photon exchange. Gate performance is characterized by process tomography and compared to gating by AC Stark shift as previously investigated by the Yale cQED team [1]. Research supported by NSF, NSA and ARO. [1] Majer *et al.*, *Nature* **449**, 443 (2007).

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