

Abstract Submitted  
for the MAR16 Meeting of  
The American Physical Society

**Characterization of the resonator induced phase gate<sup>1</sup>** ANTONIO MEZZACAPO, H. PAIK, M. O. SANDBERG, D. T. MCCLURE, B. ABDO, O. E. DIAL, A. W. CROSS, A. D. CORCOLES, S. SHELDON, E. MAGESAN, S. J. SRINIVASAN, J. M. CHOW, J. M. GAMBETTA, IBM T.J. Watson Research Center, Yorktown Heights, NY 10598, USA, D. BOGORIN, B. L. T. PLOURDE, Department of Physics, Syracuse University, Syracuse, New York, 13244 - 1130, USA — The Resonator induced phase (RIP) gate is a versatile microwave gate that can perform collective qubit operations. We characterize the performance of the RIP gate using various drive powers and detunings in a 4-qubit superconducting system. We find a good agreement between the experimental results and the theoretical predictions in the gate rate and minimum gate time. The minimum gate time is limited by residual photons in the bus cavity caused by a non-adiabatic response to the drive. We measure the multi-qubit interactions and analyze how the rates depend on the cavity-qubit coupling and the detuning to the drive and how these interactions can be used for quantum information processing.

<sup>1</sup>We acknowledge support from IARPA under contract W911NF-10-1-0324

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Date submitted: 06 Nov 2015

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