

Abstract Submitted  
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**Non-linear Optics Quantum Information Processing with Microwave Photons**<sup>1</sup> PRABIN ADHIKARI, MOHAMMAD HAFEZI, JAKE TAYLOR, University of Maryland, College Park — One approach to quantum information processing<sup>2</sup> is to use photons as quantum bits and rely on the robustness of linear optical elements. However, some optical non-linearity is necessary to enable universal quantum computing. Here we suggest a circuit-QED approach to implementing a deterministic two-photon phase gate for such computing. Our specific example considers an LC resonator coupled to a flux qubit. Using this model, we show how fast two-qubit gates between photons are possible, and compute limitations of these ideas based on current technology.

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<sup>2</sup>“A Scheme for Efficient Quantum Computation with Linear Optics,” E. Knill, R. Laflamme, G.J. Milburn (Nature, Vol 409, 4 January 2001)

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