Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Nonlinear optics quantum computing with circuit QED[1] PRABIN ADHIKARI, MOHAMMAD HAFEZI, Joint Quantum Institute at UMD, JACOB TAYLOR, Joint Quantum Institute at UMD and NIST — One approach to quantum information processing is to use photons as quantum bits and rely on linear optical elements for most operations. However, some optical non-linearity is necessary to enable universal quantum computing. We consider a circuit-QED approach to linear optics quantum computing in the microwave regime, including a deterministic two-photon phase gate. Our model is a hybrid quantum system comprising an LC resonator coupled to a flux or phase superconducting qubit, which will be used to implement a non-linear two photon phase shift operation. Using this model, we show how fast, low-noise two-qubit gates between photons are possible, and discuss limitations of these ideas based on current technology.

[1]This research supported by the Physics Frontier Center at the JQI.

Prabin Adhikari
University of Maryland, College Park

Date submitted: 18 Nov 2011 Electronic form version 1.4