Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Pinning quantum phase transition of photons in a hollow-core fiber MING-XIA HUO, Centre for Quantum Technologies, National University of Singapore, DIMITRIS G. ANGELAKIS, Centre for Quantum Technologies, National University of Singapore; Science Department, Technical University of Crete, Chania, Crete, Greece — The Bose-Hubbard and sine-Gordon models have been extremely successful in describing a range of quantum many body effects and especially quantum phase transitions. We show that a pinning transition for photons could be observed in a hollow-core one-dimensional fiber loaded with a cold atomic gas. Utilizing the strong light confinement in the fiber, a range of different strongly correlated polaritonic and photonic states, corresponding to both strong and weak interactions can be created and probed. We analyze the relevant phase diagram corresponding to the realizable Bose-Hubbard (weak) and sine-Gordon (strong) interacting regimes and conclude by describing the measurement process. The latter consists of mapping the stationary excitations to propagating light pulses whose correlations can be efficiently probed once they exit the fiber using available optical technologies.

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Date submitted: 12 Nov 2012 Electronic form version 1.4