Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Photon Correlations in a Waveguide Coupled to Multiple Two- and Three- Level Systems[1] YAO-LUNG L. FANG, HUAIXIU ZHENG, HAROLD U. BARANGER, Duke University — We study photon-photon correlations in a waveguide strongly coupled to multiple qubits (up to 10) described by either two-level systems (2LS) or three-level systems (3LS). The calculated second-order correlation function $g_2(t)$ for this "waveguide QED" system has rich structure that is sensitive to the frequency of the incident photons and the separation between the qubits, arising from the interference among photons scattered multiple times by the qubits. In the multiple 2LS case [1], transmitted and reflected photons can both be bunched initially and then oscillate between bunched and anti-bunched for a long time interval that increases as the number of impurities, N, increases (up to 10). For 3LS qubits, when operating at the peak of electromagnetically induced transparency (EIT), the N=2 case generates bunched photons persisting for a long time, comparable to that in the N=10 2LS case. To probe the interplay between the time-delay inherent in the 3LS under EIT conditions and the 2LS-produced correlations, we study the hybrid structures 3LS-2LS-3LS and 2LS-3LS-2LS. [1] For first results see Y.-L. L. Fang, H. Zheng, and H. U. Baranger, arXiv/1308.6551

[1]Work supported by the U.S. NSF (PHY-10-68698)

Yao-Lung L. Fang
Duke University

Date submitted: 14 Nov 2013 Electronic form version 1.4