Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Quantum interference near a photonic band edge beyond the weak field approximation PAUL M. ALSING, DAVID A. CARDIMONA, DANHONG H. HUANG, Air Force Research Laboratory — We investigate spontaneous emission and quantum interference effects involving a three level atom in the vicinity of a photonic band edge, beyond the weak driving field approximation. We consider two different three-level atoms, each subject to a probe field from the ground state, and each embedded within a different photonic crystal (PhC). The first atom has the two excited states separated by a dipole transition in the optical frequency range, with this frequency being close to the surrounding PhC's band edge. The probe field couples the ground state and the highest excited state, and is well outside the PhC bandgap. If a coupling field is applied between the two upper levels, Electromagnetically Induced Transparency (EIT) may occur, depending on the position of the band edge. The second atom has the two upper levels each dipole-coupled to the ground state, and close enough that the emissions from each can coherently interfere. This atom is embedded within a PhC whose band edge lies near the lower of the two excited states, and a probe field is applied that lies just beyond this band edge. This atom exhibits a quantum interference phenomenon related to EIT called Field-Induced Transparency (FIT), again depending on the position of the band edge relative to the lower excited state.

Paul M. Alsing
Air Force Research Laboratory

Date submitted: 26 Nov 2007 Electronic form version 1.4