

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Non-Markovian spontaneous emission and photon localization in a atom-waveguide system¹ TING CHEN, REN-BAO LIU, Department of Physics, The Chinese University of Hong Kong, Shatin, N.T., Hong Kong, China — Waveguides can serve as a quantum channel for transporting photon qubits. Here we study the dynamics of a two-level atom in a single-mode waveguide, in particular, the spontaneous emission near the stop-off frequency of the waveguide. We found that even when the atomic transition frequency lies above the stop-off frequency of the waveguide, the emission is not complete due to the formation of a bound polariton state. Rabi oscillation due to splitting between the bound state and a resonance with finite lifetime is observed. This non-Markovian emission near the stop-off frequency reveals the strong coupling between the atom and the continuum. The trapped polariton makes the optical system behave like a cavity without mirror with the density-of-state singularity in a waveguide mimicking a discrete state in a cavity.

¹This work was support by Hong Kong RGC CUHK402207.

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Date submitted: 01 Dec 2009

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