

Joint CQSE and CASTS Special Seminar

Weekly Seminar
Jan. 9, 2013 (Wednesday)

TIME Jan. 9, 11:00am
TITLE Microwave quantum optics with an artificial atom in one-dimensional open space
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Abstract

We address the recent advances on microwave quantum optics with an artificial atom [1]. This field relies on the fact that the coupling between a superconducting artificial atom and propagating microwave photons in a one-dimensional open transmission line can be made strong enough to observe quantum coherent effects, without using any cavity to confine the microwave photons.

We investigate the scattering properties in such a system with resonant coherent microwaves. When an input coherent state, with an average photon number much less than 1, is on resonance with the artificial atom, we observe extinction of up to 99% in the forward propagating field. We also study the statistics of the reflected and transmitted beams, which are predicted to be nonclassical states. In particular, we demonstrate photon antibunching in the reflected beam by measuring the second-order correlation function [2]. By applying a second control tone, we observe Autler-Townes splitting and the giant cross Kerr effect [3]. Furthermore, we demonstrate fast operation of a single-photon router [4] using Autler-Townes splitting.

[1] I.-C. Hoi et al. arXiv 1210.4303 (Accepted in NJP, 2012)

[2] I.-C. Hoi et al. Physical Review Letters, 108, 263601 (2012)

[3] I.-C. Hoi et al. arXiv 1207.1203 (2012)

[4] I.-C. Hoi et al. Physical Review Letters, 107, 073601 (2011)

