

ICTS Seminar

Title : Quantum Optics with 1D Waveguides

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Date : Monday, April 15, 2019

Time : 11:00 AM

Venue : Emmy Noether Seminar Room, ICTS Campus, Bangalore

Abstract : In this talk we introduce a recently developed formalism based on a time-dependent wavefunction ansatz to study the dynamics of interactions among a small number of propagating photons in a one dimensional (1D) waveguide. The required nonlinearity for the photons to interact is provided by the two-level quantum emitters embedded in the waveguide. We show that for a large number of emitters, substantial photon-photon interaction can be generated even for weak individual coupling of the emitters with the waveguide. As a crucial application of our formalism we model the filtering of two-photon components, an experimental requirement for enhancing single photon purity of a twolevel source like a quantum dot. Modelling such filtering via quantum regression is next to impossible owing to evaluation of four point correlation functions in time. Furthermore, we use our formalism to study two-photon emission from a system of N -emitters, chirally coupled to a 1D waveguide and driven well below saturation. We also introduce an asymptotic theory to analytically compare with our simulation results based on the wavefunction ansatz for such chiral systems.