SEMINAR NOTICE

Preston M. Green Department of Electrical and Systems Engineering

QUANTUM NANOPHOTONICS: CREATING STRONG PHOTON-PHOTON INTERACTION AND QUANTUM INTERFERENCE WITH APPLICATIONS IN PHYSICS AND ENGINEERING

DISSERTATION DEFENSE
By

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Abstract: The field of quantum nanophotonics has recently been attracting a great deal of interest. In quantum nanophotonics, fermionic degrees of freedom such as atoms or quantum dots are coupled to traditional nanophotonic systems. As the fermionic components can only absorb a finite number of photons at a time, the interplay between the fermionic and photonic degrees of freedom can fundamentally alter the transport properties of photons and their correlations.

In many conventional photonic systems, however, atom-photon interactions are too weak to realize efficient devices at ultra-low power levels. We show that through proper design, strong atom-photon interaction can be created to produce efficient devices operating down to the single-photon power level. Specific applications include efficient single-photon frequency conversion and long-term photonic storage using quantum interference. Moreover, we design and optimize cavity quantum electrodynamic geometries wherein strong photon-photon interactions can be induced which allow us to produce signals with shot noise below the classical limit, or to achieve fundamentally secret communication over large distances.

DATE: **Friday April 25, 2014**
TIME: **10:10 a.m.**
PLACE: **Green Hall, Room 0120**

Dissertation advisor:
Dr. Jung-Tsung Shen

This seminar is in partial fulfillment
of the Doctor of Philosophy degree

Washington University in St. Louis
SCHOOL OF ENGINEERING & APPLIED SCIENCE