SEMINAR NOTICE

Preston M. Green Department of Electrical and Systems Engineering

ULTRA HIGH QUALITY FACTOR MICRO RESONATOR FOR SENSING AND NOVEL APPLICATIONS

PhD Preliminary Research Examination

Bo Peng
PhD Candidate

Preston M. Green Department of Electrical and Systems Engineering
Washington University in St. Louis

Abstract: Whispering-gallery-mode optical resonators with the microscale mode volumes and high quality factors have been widely used in different areas ranging from sensing to opto-mechanics. Due to the ultra-high quality factor and the micro-scale mode volume, the intra-cavity can build up very high optical energy density, which enhances the interaction between light and environment material. This feature makes WGM microcavity a great candidate for low threshold nonlinearity excitation, cavity opto-mechanics, and ultrahigh sensitive sensor. Also, modification of the modes in these resonators has been of considerable interest for their potential applications and underlying physics. Two or more coupled resonators form a compound structure—photonic molecule (PM)—in which interactions of optical modes create supermodes. This molecular analogy stems from the observation that confined optical modes of a resonator and the electron states of atoms behave similarly. Thus, a single resonator is considered as a "photonic atom," and a pair of coupled resonators as the photonic analog of a molecule. Studying the interactions in PMs is critical to understand their resonance properties and the field and energy transfers to engineer new devices such as phonon lasers and enhanced sensors. Further modification of the compound structure with gain mechanism such as rare-earth dopants makes the coupled cavities a novel Parity-Time symmetric device with balanced gain-loss ratio.

We propose to utilize the on-chip microtoroid resonator to design the compound structure for nova application such as the on-chip Parity-Time symmetric micro cavity system for isolation in lightwave application. We are also working on cavity enhanced Raman signature detection as well as some acoustic sensing project.

DATE:	Friday, September 6, 2013
TIME:	10:00 a.m.
PLACE:	Green Hall, Room 0120

Thesis advisor:
Dr. Lan Yang

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

Washington University in St. Louis
School of Engineering & Applied Science