Columbia Optics and Quantum Electronics Seminar

"Nanophotonic Technologies for Quantum Optics and Metrology"

Date/Time: January 30th (Monday), 11 am to 12 noon
Location: 7th floor Interschool Laboratory, Schapiro

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Abstract: The ability to fabricate chip-based optical structures that manipulate the propagation and confinement of light at the wavelength-scale has opened up exciting new technologies for quantum optics and metrology. In the first part of this talk, I will describe our efforts to develop quantum light sources based on single epitaxially-grown semiconductor quantum dots. High-confinement waveguides, gratings, and microcavities are used to control the quantum dot's radiative properties and create high brightness single photon sources, which are post-processed through nonlinear wave mixing and amplitude modulation to control the wavelength and shape of the single photon wavepackets. Such techniques find application in interfacing disparate quantum systems and for sensitive light detection.
In the second part of the talk, I will describe new force and displacement sensors we are developing based on cavity optomechanics. Here, we take advantage of the long photon lifetimes and large field gradients produced in nanophotonic resonators to develop a near-field sensor for atomic force microscopy, demonstrating sub-femtometer/sqrt(Hz) sensitivity with GHz bandwidth and high dynamic range. I will describe progress towards implementation of sensors that are integrated with electrostatic actuators for controlling cantilever motion and on-chip waveguides for optical readout.

Biography: Kartik Srinivasan has been a Project Leader in the Nanofabrication Research Group at the NIST Center for Nanoscale Science and Technology since September 2007. He received B.S., M.S., and Ph.D. degrees in Applied Physics from the California Institute of Technology, where his graduate research was supported by a Fannie and John Hertz Foundation Fellowship. After completing his Ph.D., he continued at Caltech as a Postdoctoral Fellow at the Center for the Physics of Information. His work in nanophotonics has been recognized with the Sigma Xi Young Scientist Award for 2011 and a Presidential Early Career Award in Science and Engineering (PECASE).

Hosted by Prof. Chee Wei Wong • For further information: call 854-4462