



INSTITUTE FOR THEORETICAL ATOMIC, MOLECULAR AND OPTICAL PHYSICS
at the Harvard-Smithsonian Center for Astrophysics and Harvard Physics Department, Cambridge MA USA

HARVARD Quantum Optics Center

Joint Quantum Sciences Seminar

Wednesday | Sept 19 | 4:00 pm
Jefferson 250

Mark Brongersma

Associate Professor, Stanford University

"Electrically Driven Plasmonic Nanocircuits"

The laser has long been established as the best possible optical source for fundamental studies and applications requiring high field intensity, single-mode operation, a high degree of coherence, a narrow linewidth and short pulses. This notion is worth reanalyzing for chip-scale optoelectronic systems that impose severe constraints on the power efficiency and footprint of optical sources. Recent work has demonstrated the exciting possibility to shrink lasers to nanoscale dimensions with the use of metals. Unfortunately, smaller cavities tend to exhibit increased optical losses that make the realization of power-efficient, electrically-pumped nanolasers at room temperature extremely challenging. I will describe experimental realizations of electrically-driven, metal-clad nano-light-emitting-diodes that offer a practical alternative to chip-scale nanolasers by exploiting the Purcell effect to facilitate efficient emission into a single mode waveguide with a cross-sectional area of $0.016\lambda^2$ and to allow for fast optical modulation. With this source, electrically-driven subwavelength optical nano-circuits for routing, splitting, free-space coupling, and directional coupling can be realized. I will discuss the basic physics and engineering challenges in realizing these circuits and discuss our first results.

Student Presentation by Tsung-Li Liu, Hu Lab
"Deterministically Defined Plasmonic Nanocavities "

Student Presentation will begin promptly at 4:00 PM
Guest Presentation will begin promptly at 4:30 PM