Physics
AT QUEENS COLLEGE

Colloquium Notice

Stephen Holler

Thermo Fisher Scientific

Microcavity Photonics: Molecular communication, Cavity QED & Biosensing

Dielectric microcavities have garnered much interest in recent years to study a myriad of physical phenomena including cavity QED effects, lasing, non-linear processes and sensing. Of particular interest are spherical microcavities which possess a high degree of symmetry and support high-Q whispering gallery modes implicated in a variety of physical phenomena. Whispering Gallery Mode (WGM) resonances are efficient conduits for photon transport and may be used to enhance both linear and non-linear optical processes while simultaneously serving as sensitive probes of the local environment. This presentation will examine the role whispering gallery mode resonances of spherical microcavities have played in our research to elucidate physical phenomena such as intermolecular energy transfer far beyond the Forster range, cavity mode selection as a means for molecular characterization, and fluorescence lifetime modification. In addition, our recent work on ultrasensitive biomolecular sensors has demonstrated an optical tractor beam capable of pulling nano-particles into orbit. This carousel mechanism provides a novel means for particle transport and separation in addition to acting as a tool for surface potential characterization. These advances in microcavity photonics pave the way for a myriad of studies that have the potential to offer new insights into biomolecular systems, result in novel laser and micro-photonic geometries, and enhance Homeland Security and clinical diagnostics through advanced biological and chemical sensor platforms. The broad applicability of microcavity photonic devices to both fundamental and applied areas of research in physics, chemistry, and biology make them truly diverse, interdisciplinary, and important scientific tools.

Monday
March 22, 2010
Starts at 12:15 PM
Coffee at 12:00 PM
Physics Conference Room, SB B326