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ICTS Institute of Computational and Theoretical Studies 計算及理論研究所

Institute of Computational and Theoretical Studies/

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Joint Colloquium

Controlling Light at Subwavelength Scales: The Nonlocal and Quantum Tunnelling Effects

Dr. Yu Luo

Research Associate in Physics

The Blackett Lab

Imperial College London

Date: 10 May 2013 (Friday)

Time: 4:00 p.m. – 5:00 p.m.

Venue: Room 905, Sir Run Run Shaw Building

Ho Sin Hang Campus, HKBU, Kowloon Tong

Abstract

Metallic nanoparticles that support localized surface plasmon resonances can harvest light into a deep-subwavelength volume, thereby achieving very large field enhancement. Many emerging nanophotonic technologies rely on the careful control of this field enhancement, including cancer therapy, improved photovoltaic devices, and optical antennas for enhanced light-matter interactions. However, at deep subwavelength scales, classical continuum electrodynamics fails to describe the optical responses of nanoparticles owing to nonlocal screening and the spill-out of electrons. Electron correlations that are driven by these effects require a new model of nonlocal transport, which is crucial in nanoscale optoelectronics. In this contribution, I will present a systematic strategy, based on transformation optics, to study the plasmonic interaction at subnanometer scales. Our approach incorporates radiative, nonlocal, and quantum tunnelling effects, and thus can be applied to design realistically sized plasmonic systems. As an example, I will use this method to elucidate the optimum shape of a nanoparticle that maximizes its absorption and field enhancement capabilities.

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ALL Interested Are Welcome!