



THE CHINESE UNIVERSITY OF HONG KONG
Department of Physics
SEMINAR

Near-field Enhancements of Optical Cavities Based on Plasmonic Nanostructures

by

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ALL INTERESTED ARE WELCOME

Abstract

Plasmonic nanostructures can concentrate light into deep subwavelength scale and exhibit high near-field enhancements, which have been widely applied in Raman spectroscopy, fluorescence, Purcell factor, single-emitter strong coupling, and so on. This presentation mainly focuses on the role of near-field enhancements of plasmonic structures in the single-emitter strong couplings. It discusses how to construct strong near-field enhancement in optical cavities based on plasmonic nanostructures, including pure plasmonic systems and dielectric-plasmonic hybrid systems. The dielectric-plasmonic hybrid system can exhibit relatively stronger field enhancement. However, in terms of strong couplings, not only the near-field enhancements but also the extinction cross-section responses play a crucial role. The combination of field enhancement and extinction is similar to the common parameter of mode volume which is widely used in strong coupling systems. Based on this, we found that the increased near-field enhancement of the dielectric-plasmonic hybrid system cannot facilitate the coupling strength between light and a single emitter. To achieve stronger coupling, it may be more meaningful to carry out optimizations in pure plasmonic systems.