Spécialité de Master « Optique, Matière, Paris »

Stage de recherche (4 mois minimum, à partir de début mars)

Proposition de stage

Date de la proposition : 27/09/2017

Responsable du stage / internship supervisor:			
Nom / name:	Mivelle	Prénom/ first name :	Mathieu
Tél :		Fax :	
Courriel / mail:	mathieu.mivelle@insp.upmc.fr		
Laboratoire / laboratory:			
Code d'identification : UMR 7588	Organisme : INSP		

Site Internet / web site: http://www.insp.jussieu.fr/

Adresse / address: 4 place Jussieu, tour 22, 75005 Paris

Lieu du stage / internship place: INSP Institute

Role of quenching in plasmonic nanogaps, from electric to magnetic dipoles

It is known that a single electric emitter (like a fluorescent molecule) in close proximity to a metal nanoparticle will see its energy partially absorbed my the metal. This phenomenon, called quenching, gets stronger the closer the emitter is from the metal.

Recently, it was postulated that the losses induced by the metal could be counterbalanced by a strong increase of the radiative decay channels of the emitter (i.e. by increasing the amount of radiated photons), when the emitter was placed in a tiny gap (less than 5 nm) separating a metal particule and a metallic mirror (figure 1b).

Still under debate, these findings would open the way to complete new scientific paradigms and applications like strong coupling of single emitters, fast and efficient single photon sources and so on.

By extension, one might wonder if the same effect could be found not with electric but magnetic emitters, as the interaction between magnetic light and matter is becoming of extreme importance in several fields as diverse as nanophotonics, plasmonic circuits, spintronics, molecular chiral science, to name a few.

In this master project, the successful candidate will numerically study the coupling of both electric and magnetic dipoles to several gold nanophotonic structures such as single nanoparticules, nanoparticle on mirror and dimers (two nanoparticles) (figure 1). The simulations will be performed using FDTD (Finite Difference Time Domain) code, which is a reliable and easy to apprehend numerical technique mastered in our group.

At the end of her/his stay, the successful candidate will be then supported and encouraged to apply to PhD fellowships if she/he ambitions to start a research career.

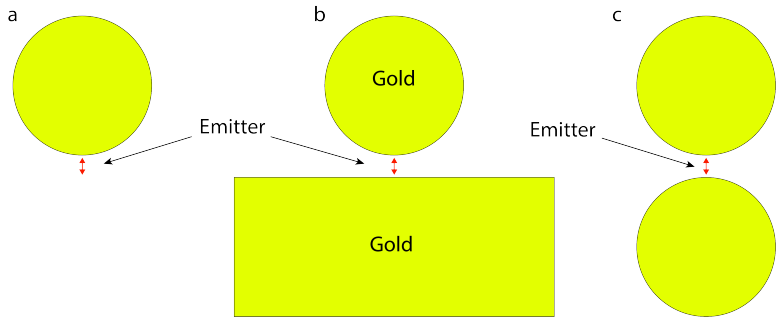

Figure 1. Schematic of the foreseen simulations. A single emitter (electric or magnetic) is coupled to **a.** a gold nanoparticle, **b.** a gold nanoparticle-mirror cavity, and **c.** a gold dimer.

Ce stage pourra-t-il se prolonger en thèse ? Possibility of a PhD **? : oui**

Si oui, financement de thèse envisagé/ financial support for the PhD**: Ecole doctorale**

Lumière, Matière, Interactions	X	Lasers, Optique, Matière	X