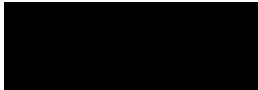



Internship proposal 2011-2012

Laboratory : Laboratoire de Photonique Quantique et Moléculaire Address : ENS Cachan, 61 av. du Président Wilson 94235 Cachan cedex Laboratory director :	
Internship supervisor : Bruno PALPANT Phone : 01 41 13 16 26 e-mail: bruno.palpant@ecp.fr	

Ultrafast optical response of cavity-confined metal nanoparticles

Scientific project :

Context

Thanks to the localized plasmon resonance phenomenon, stemming from the interaction of an electromagnetic wave and the electrons confined in metal nanoparticles, one can efficiently and very quickly inject energy in the latter. From the series of the subsequent exchange and relaxation mechanisms the optical properties of the composite medium where these nanoparticles are spread are modified in a fast transient way. By playing together with these nanoscale photo-induced modifications and the processing of the composite medium in wavelength-scale structured devices, one may conceive optically controlled photonic functions.

Aim of the research internship

The geometry of the multiscale photonic device is an optical cavity at the middle of which nanoparticles are set. The high electromagnetic energy density confined in the cavity enables to amplify the transient response of the latter, and even to generate nonlinear optical effects. The internship will aim at:

- carrying out optical measurements by conventional spectrometry in the stationary regime and by pump-probe spectroscopy in the ultrafast transient regime on samples elaborated by the *Instituto de Optica* in Madrid,
- optimizing the device thanks to the analysis of the results obtained.

The internship will take place in *Ecole Centrale Paris*, Châtenay-Malabry.

Techniques in use :

Femtosecond laser spectroscopy setup in a pump-probe scheme, spectrophotometry, thin optical film simulation and analysis software.

Applicant skills :

The applicant has a good knowledge in condensed matter physics, in nanosciences and if possible in optics. Beyond, autonomy, sociability and sense of initiative will be qualities required.

Granted internship : yes (436.05 €/month)
C'nano IdF laboratory (France only) : yes
Possibility for a thesis : yes (type of grant : Ministry of Research)