

Spécialité de Master « Optique, Matière, Plasmas »

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

Proposition de stage (ne pas dépasser 1 page)

Date de la proposition : 25-10-2012

Responsable du stage / internship supervisor:			
Nom / name:	DUTIER	Prénom/ first name :	Gabriel
Tél :	01 49 40 33 69	Fax :	
Courriel / mail:	gabriel.dutier@univ-paris13.fr		
Nom du Laboratoire / laboratory name: Laboratoire de Physique des Lasers, équipe OIA			
Code d'identification :	UMR 7538	Organisme :	Université Paris 13 / CNRS
Site Internet / web site:	http://www-lpl.univ-paris13.fr		
Adresse / address:	99 av J-B Clément		
Lieu du stage / internship place:	Villetaneuse		

Titre du stage / internship title: Cold atoms with nanostructures

Résumé / summary

Our team build a new experiment of cold metastable Argon. These atoms will be sent on different nanostructures regarding to the physic we are interested in.

Argon metastable atoms are interesting because they have big internal energy of 12eV, giving them two main properties. The first is their ability to be detected with high quantum efficiency (range of 70%) with micro channel plates (ultra precise time – position detector). Such high detection efficiency allows measurement of extremely low signal, and so, complex phenomenon. The second property is directly linked to the related high electronic level, making the atoms very sensitive to any electromagnetic field than for standard alkaline.

The cold atomic source will be created from a magneto optical trap (MOT) after which a pushing laser beam creates a slow atomic beam of a velocity close to 10m/s. At this velocity correspond a de Broglie wavelength of few nanometres, which is in a range of the size of the nanostructures we want to investigate:

- Transmission gratings (pitch 100 nm). There are perfect tools for atomic interferometry researches. Especially for a remarkable effect that we have demonstrated: the atom surface van der Waals interaction is able, for an atom at a few nanometres from the surface, to couple any of its atomic levels creating then a giant atomic beam splitter which could rise to futuristic gyrometer atomic chip.

- Suspended graphene. It is the first perfect 2D device on which nobody has ever measured the van der Waals and/or Casimir Polder potential. These potentials are expected to be much sharper than usual ones and look promising for fundamental physics.

- Near field probe. Atoms, and particularly Argon metastable, are very sensitive to electromagnetic fields and may be used as ultra precise probe for nanostructures. The range of nano Tesla might be achieved on an extremely small area regards to standard techniques. The interferometric picture gives also plenty of information on the devices that are not accessible with standard detectors. The abundance of prospective will certainly give rise to unusual phenomenon.

Toutes les rubriques ci-dessous doivent obligatoirement être remplies

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

Si oui, financement de thèse envisagé/ financial support for the PhD: école doctorale Galilée

Lasers et matière	X	Lumière, Matière : Mesures Extrêmes	X
Optique de la science à la technologie	X	Plasmas : de l'espace au laboratoire	

Fiche à transmettre (fichier pdf **obligatoirement**) sur le site <http://stages.master-omp.fr>