Spécialité de Master « Optique, Matière, Paris »

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

Proposition de stage (ne pas dépasser 1 page)

Date de la proposition : 21/11/2017

Responsable du stage / *internship supervisor*:			
Nom / *name*:	Perrin	Prénom/ *first name* :	Aurélien
Tél :	149403203	Fax :	149403200
Courriel / *mail*:	aurelien.perrin@univ-paris13.fr		
Nom du Laboratoire / *laboratory name*: Laboratoire de physique des lasers			
Code d'identification :	Organisme : CNRS / Université Paris 13 UMR 7538		
Site Internet / *web site*: http://www-lpl.univ-paris13.fr/bec			
Adresse / *address:* 99 avenue JB Clément, 93430 Villetaneuse			
Lieu du stage / *internship place*: au LPL			

Titre du stage / *internship title*: Fluorescence imaging of cold atoms

Résumé / *summary*

Dilute gas fluorescence imaging is based on the measurement of scattered photons during the interaction of a laser beam with atoms, where it is thus possible to resolve their position using well adapted optical lenses. The main limitation of this technique comes from the Brownian random walk of the atom in momentum space during its interaction with light. This effect ultimately limits the spatial solution of the system. A way to circumvent this limitation is to confine the atom during the time it inracts with the resonant light. The optical system resolution then only depends on the quality of the imaging objective.

On our experimental device, ultra-cold atoms of sodium are magnetically trapped at the surface of an atom chip. We would like to install a fluorescence detection system based on the use of a light sheet that will allow to detect atoms after a time of flight of about fifty milliseconds. The light sheet will be formed by two orthogonal pairs of contra-propagating beams. It will thus constitute a two-dimensional optical lattice that will ensure the trapping of the atoms during their free fall.

The purpose of the internship will be to design and implement such a system on the experimental device. The work will start by modelling the interaction of the atoms with the light sheet in order to define its optimal parameters before its construction. In a second stage, the student will focus on optimizing the properties of the imaging objective and its construction. The next step consists in installing the EMCCD camera, which will ensure the detection of scattered photons by the atoms. Finally, the complete system will be tested on the sodium atoms available on the experimental device.

Environment: The student will be supervised by Aurélien Perrin and Romain Dubessy. In addition to his/her participation in the experiments conducted on the setup, he/she will benefit from weekly journal club sessions shared with the other groups in the laboratory dealing with cold atoms.

Toutes les rubriques ci-dessous doivent obligatoirement être remplies

Ce stage pourra-t-il se prolonger en thèse ? *Possibility of a PhD* **? : Eventuellement**
Si oui, financement de thèse envisagé/ *financial support for the PhD*: **Appels d'offre**

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

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