

# Spécialité de Master « Optique, Matière, Paris »

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

## Proposition de stage

Date de la proposition : 09/10/2018

<b>Responsable du stage / internship supervisor:</b>			
Nom / name:	Perrin	Prénom/ first name :	Aurélien
Tél :	0149403203	Fax :	
Courriel / mail:	aurelien.perrin@univ-paris13.fr		
<b>Nom du Laboratoire / laboratory name:</b> Laboratoire de Physique des Lasers			
Code d'identification : UMR7538		Organisme : CNRS	
Site Internet / web site: www-lpl.univ-paris13.fr/bec			
Adresse / address: 99 avenue J.-B. Clément, 93430 Villetaneuse			
Lieu du stage / internship place: LPL			

<b>Titre du stage / internship title:</b> Absorption imaging of unidimensional gases
Résumé / summary
<p>In the cold atom domain, absorption imaging allows the measurement of the density distribution of diluted quantum gases. Atoms initially trapped in a magnetic potential are released and undergo a time of flight before being illuminated by a laser beam at resonance with an atomic transition. Finally, an optical objective allows the beam to be imaged on a CCD camera. Comparison of the intensity distribution of the laser beam in the presence of the atoms and that obtained in the absence of the atoms makes it possible to deduce the atomic density. The optical objective is based on the use of two converging lenses leading to a fixed magnification and a resolution limited by the wavelength of the laser. In principle, the addition of additional lenses reduces the size of the lens.</p> <p>On our experimental device, ultracold sodium atoms are magnetically trapped on the surface of an atomchip. The magnetic potential being very anisotropic, the gas reaches the one-dimensional regime for temperatures on the order of hundred nanokelvin. Once released, the properties of the gas can be deduced using an absorption imaging system.</p> <p>The purpose of the internship will be to design and implement such a system on the experimental device. It will start with a simulation of the properties of the optical objective using the Zeemax software and then build it using commercial lenses. The objective will then be experimentally characterized before being installed on the experimental setup. Finally, it will be tested directly on the one-dimensional cold gases produced at the surface of the atomchip.</p> <p>Environment : The intern will be supervised by Aurélien Perrin. In addition to participating in the experiments carried out on the setup, he/she will benefit from weekly bibliography sessions shared with the other teams of the laboratory on the topic of cold atoms.</p>

<b>Ce stage pourra-t-il se prolonger en thèse ? Possibility of a PhD ? : Yes</b>
<b>Si oui, financement de thèse envisagé/ financial support for the PhD: SIRTEQ, CNRS or ED Galilée</b>

Lumière, Matière, Interactions		Lasers, Optique, Matière	
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