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 : 23/10/2015

Responsable du stage / *internship supervisor*:

Nom / *name*:	**BATTELIER**	Prénom/ *first name* :	**Baptiste**
Tél :	+33 5 57 01 72 24	Fax :	
Courriel / *mail*:	baptiste.battelier@institutoptique.fr		

Nom du Laboratoire / *laboratory name*: Laboratoire Photonique Numérique Nanoscience

Code d'identification :UMR 5298 Organisme : CNRS/ IOGS/ Université de Bordeaux

Site Internet / *web site*: http://www.lp2n.fr/

Adresse / *address:* Institut d'Optique d'Aquitaine, rue François Mitterrand 33400 Talence

Lieu du stage / *internship place*: Institut d'Optique d'Aquitaine

Titre du stage / *internship title*: **Frequency locking of the laser source within compact cold atoms sensors**

Résumé / *summary*

The Joint Laboratory iQNav brings together the knowledge of a French company of very high technological added value- iXBlue, expert in photonics and inertial navigation of very high performance – and a public laboratory specialized in atom interferometry at the highest worldwide level- LP2N. The goal of the joint laboratory is to bring a technological breakthrough using cold atoms to develop the next generation of inertial sensors for industrial, space and military applications, with an expected improvement of the performances by several orders of magnitude with a device of same size.

The laser system constitutes an essential part of matter wave sensors. Electronics included, this subsystem is very complex and demands a specific and very advanced development for on-board devices. With this avowed goal, LP2N developed an expertise in fibered lasers based on components coming from telecommunication field associated with a frequency doubling stage in order to reach the wavelength of the atomic transition of Rubidium.

With the aim of miniaturizing the laser system and make it more reliable, this internship will focus on the ability of simplifying the servo control of the laser frequency. For our applications, the laser frequency has to be controlled with an accuracy and a stability below 1 MHz. The standard method consists in servo locking the source on a Rubidium cell (after frequency doubling) by saturated absorption. Nevertheless, this apparatus is not easy to implement in our architectures, especially because of the dedicated doubling frequency stage. The goal of this internship will be to servo lock a laser diode emitting at 1560.48 nm with alternative solutions compliant with on-board applications. The student will define the specifications and will have to lead an advanced study on the diode laser stability. Then a review of different solutions will be done including for example servo lock methods on a stabilized cavity, or on a reference gas cell. When the solutions are selected, they will be implemented for an experimental validation.

The candidate will be asked an advanced expertise in the following fields: optics and photonics, laser, electronics, servo lock systems, computer science.

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***: CIFRE IxBlue**

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

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