Spécialité de Master « Optique, Matière, Plasmas »

Stage de recherche (4 mois minimum, à partir de début mars 2012)

Proposition de stage pour l'année 2011-2012 (ne pas dépasser 1 page)

Date de la proposition :

Responsable du stage / *internship supervisor*:

Nom / *name*:	KNOOP	Prénom/ *first name* :	Martina
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Nom du Laboratoire / *laboratory name*:

Code d'identification : PIIM – UMR 6633 Organisme : CIML

Site Internet / *web site*: http://sites.univ-provence.fr/ciml

Adresse / *address:* Univ Aix-Marseille. Centre Saint-Jérôme, Case C21. 13397 Marseille cedex 20

Lieu du stage / *internship place*: Marseille

Titre du stage / *internship title*: Laser interrogation of a single ion

Résumé / *summary*

A frequency standard (atomic clock) in the optical domain consists of an ultra-stable single-frequency laser locked onto an ultra-narrow atomic transition. In our experiment, the reference is the forbidden transition (E2) of a single Ca^+ ion stored in a miniature trap. The natural linewidth of this transition lies below 1 Hz, it can be resolved by carefully eliminating different sources of line broadening (Doppler, Zeeman, Stark effect, …). The single ion is stored for hours in a miniature radiofrequency trap and laser-cooled to the Doppler limit; emission and absorption probabilities are measured by building a histogram using the quantum jump technique.

A new experimental set-up has been built to assure advanced control of the experimental conditions, to guarantee the spatial control of the ion's position on a nanometric scale, and to allow multiple laser axes for the realisation of novel interrogation protocols. One foreseen additional option is to use adaptive optics in the set-up of the cooling laser, is a means to obtain a non-distorted wavefront and to reduce background light due to scattering and diffusion.

Ultimate stabilisation of the clock laser, a lab-built TiSa laser at 729 nm, is under way and would be the core of the 4-months internship. A very high-finesse reference cavity is set up. Maximal isolation of this cavity from environmental, thermal, acoustic or vibrational fluctuations qualifies it as ultra-stable frequency reference for a time-scale below one second.

The candidate will work in a team of experimental physicists. We are looking for a student with a background in atomic physics and quantum optics, as well as a pronounced motivation for experimental physics.

A student willing to stay for a PhD would then have the opportunity to play with all aspects of the experimental set-up, from the clock laser to the single ion trap.

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***: Allocation Recherche**

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

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