

Spécialité de Master « Optique, Matière, Paris »

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

Proposition de stage

Date de la proposition : 17 Octobre 2017

Responsable du stage / internship supervisor:		
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Nom du Laboratoire / laboratory name: Laboratoire de Physique des Lasers		
Code d'identification :	UMR 7538	Organisme : CNRS, Université Paris 13
Site Internet / web site:	http://www-lpl.univ-paris13.fr:8082/	
Adresse / address:	Université Paris Nord, 99 avenue J.-B. Clément, 93430, Villetaneuse	
Lieu du stage / internship place:	LPL- Institut Galilée	

Titre du stage / internship title: Optical dipole trapping of strontium for the production of large spin quantum gases
Résumé / summary <p>Our group is setting up a new experiment requiring the production of ultra-cold strontium gases in the quantum degenerate regime, for studies of quantum magnetism in periodic potentials (optical lattices). The large spin of a fermionic isotope of this species (9/2) will enable studies of magnetism in original settings, where the combined roles of spin length and potential geometry will be tested. Furthermore, this species possesses narrow optical transitions offering original possibilities for manipulating and probing, the first of these being laser cooling almost down to the quantum degenerate regime.</p> <p>The present internship is about one of the last stages of construction of our new experimental apparatus. We presently laser cool our sample on a broad transition (30 MHz), and the next stage of laser cooling on a narrow transition (7 kHz) will start in the upcoming months. The intern will have as main objective the implementation of a conservative trap induced by a far-off-resonance laser – called optical dipole trap. He will work with a continuous infrared (1070 nm) laser with 50W power and a variety of optical and optomechanical elements to shape two beams with precisely characterized dimensions, crossed and focussed onto the atoms, and with continuously adjustable powers. Once this installation built on our setup, the intern will work on the loading phase of this new dipole trap, from the narrow-line laser cooling stage, searching for the best protocole to obtain a sample as close as possible from the degenerate regime (Bose Einstein condensate for the bosonic isotopes, Fermi sea for the fermionic isotope). In the longer term, and depending on the internship duration and the progresses achieved, we may further test the use of one isotope, laser cooled on the narrow transition, as a buffer thermal gas to control the temperature of another isotope manipulated with the dipole trap.</p> <p>Our group operates two experiments on quantum magnetism, contrasting the dissimilar interaction properties of chromium and strontium. For these two projects, we are 3 university professors and associate professors, two CNRS researchers, one CNRS engineer, one PhD student and two post-doctoral researchers. We host on the strontium experiment each year one or two internships. For each we offer an individualized work to the intern, that he can develop autonomously while in contact with the entire team and its longer-term scientific projects.</p> <p>This internship can be extended into a PhD on the strontium apparatus, funded by the doctoral school (bourse fléchée). More information on the project can be found at: http://www-lpl.univ-paris13.fr:8082/AF/StrontiumProject.htm</p>

Ce stage pourra-t-il se prolonger en thèse ? Possibility of a PhD ? : Oui / Yes			
Si oui, financement de thèse envisagé/ financial support for the PhD: Ecole Doctorale – bourse fléchée			
Lumière, Matière, Interactions	oui	Lasers, Optique, Matière	oui