

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 : 3-10-2017

Responsable du stage / internship supervisor:			
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Code d'identification :	UMR7538	Organisme :	Université Paris 13
Site Internet / web site:	http://www-lpl.univ-paris13.fr:8082/		
Adresse / address:	99 avenue Jean Baptiste Clément, 93430 Villetaneuse		
Lieu du stage / internship place:	LPL		

Titre du stage / internship title: Achieving sub mGauss magnetic field control for quantum magnetism experiments
Résumé / summary We propose an experimental internship dedicated to the improvement of magnetic field control, for experiments in the field of quantum dipolar gases. In such systems, the dipole-dipole interactions between the atoms provides long range and anisotropic coupling, offering a natural platform for quantum magnetism when atoms are loaded in 3D optical lattices. Stability of the magnetic field is required for example to study resonant processes involving band excitations [1], or (close to $B=0$) to trigger spontaneous depolarization of the gas [2]. The student will be in charge of developing and testing a new chain of control of the B field, based on active stabilization: a 3D sensor close to the atomic sample provides measurements of the B field components, and feedback is provided through current flow in three pairs of large coils. We aim at realizing control in the 0.1 mG range. Compared to our present setup, improvement is expected in terms of noise and robustness of the locking. The former will be addressed by careful choice of the electric power supplies, ground loops cancellations, and optimal choices of components (e.g. transistors). For the latter, the critical point is to manage the control of a low B field during a dynamic of a few milliseconds, while the entire experimental sequence is 15 seconds long and involves rather large B fields: feedback has to be triggered softly. After development and tests, the new system will be implemented on the experiment. The student will be associated to data taking in the final part of its internship. [1] Resonant demagnetization of a dipolar BEC in a 3D optical lattice A. de Paz et al, Phys. Rev. A, 87, 051609 (R) (2013) [2] Spontaneous demagnetization of a dipolar spinor Bose gas at ultra-low magnetic field B. Pasquiou et al, Phys. Rev. Lett. 106, 255303 (2011)
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: Ecole Doctorale Paris 13	
Lumière, Matière, Interactions Yes	Lasers, Optique, Matière Yes

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