

Spécialité de Master « Optique, Matière, Plasmas »

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

Proposition de stage (**ne pas dépasser 1 page**)

Date de la proposition :

Responsable du stage / internship supervisor:			
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Nom du Laboratoire / laboratory name: Laboratoire Charles Fabry			
Code d'identification :	UMR8501	Organisme :	
Site Internet / web site:	www.lcf.institutoptique.fr		
Adresse / address:	Institut d'Optique, 2 av. Augustin Fresnel 91127 Palaiseau		
Lieu du stage / internship place:	Laboratoire Charles Fabry		

Titre du stage / internship title: Observation of quantum depletion through momentum-space correlations
Résumé / summary
<p>By means of Feshbach resonances and optical lattices, degenerate quantum gases have entered the regime of strongly correlated systems and become suited for the study of many-body quantum physics in an unprecedented controlled manner. Characterizing these novel quantum phases requires new observation methods and in particular methods that allow detection at the single-atom level. Our plan is to use metastable Helium atoms (He^*) loaded in optical lattices to provide measurements of particle-particle correlations in interacting quantum phases using single atom detection. During this internship, the student will study quantum depletion and look for its emblematic signal of correlation $(k,-k)$. A novel dedicated experimental apparatus to cool down to degeneracy He^* atoms has been built in the team of D. Clément at LCF. The team is now working on the final evaporation stages towards Bose-Einstein condensation. The internship will start with the implementation of 3D optical lattices (a periodic potential for the atoms) and its characterization with a Bose-Einstein condensate. The single-atom detector will then be installed and the student will aim at measuring the momentum-space correlation in the depleted part of the condensate. The signal of correlation $(k,-k)$ has never been observed so far.</p> <p>A PhD thesis centered on the study of correlation functions across the superfluid to Mott transition will follow the internship.</p>
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: EDOM			
Lasers, Optique, Matière	x	Lumière, Matière, Interactions	x
Plasmas : de l'espace au laboratoire			

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