

Spécialité de Master « Optique, Matière, Plasmas »

Stage de recherche (4 month minimum, from beginning of Mars)

Proposition de stage

Date de la proposition : 3. 12. 2013

Responsable du stage / internship supervisor:			
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Nom du Laboratoire / laboratory name: Institut for Quantum Matter			
Code d'identification :	Organisme : Universität Ulm		
Site Internet / web site:	http://www.uni-ulm.de/en/nawi/qm.html		
Adresse / address:	Albert-Einstein-Allee 45, 89081 Ulm, Germany		
Lieu du stage / internship place:	Institut for Quantum Matter, Universität Ulm, Germany		

Titre du stage / internship title: Trapping a cold ion with a laser
<p>Résumé / summary</p> <p>The combination of ultracold neutral atoms and trapped laser-cooled ions is a new field in quantum optics. Single ions can for the first time be brought into contact with a cloud of ultracold neutral atoms. The interaction between a neutral atom and an ion differs considerably from the interaction between neutral atoms. It is much stronger and much more long-range. As a consequence, we can carry out new interesting experiments with ions and atoms where, for example, the relative motion of the particles is strongly correlated.</p> <p>Especially of interest are experiments at lowest temperatures, e.g. in the nano-Kelvin regime. Here one gains absolute control over the particles. For example, we can prepare the particles in specific quantum states. Furthermore, we can control on the quantum level how the particles interact/ react with each other.</p> <p>In order to reach this low-temperature regime we are currently setting up a novel trap for ions which is based on a focussed laser beam. Conventional ion traps like the Paul trap are not suitable for reaching the lowest collisional energies as they exhibit intrinsic micromotion. The main goal of the internship will therefore be to demonstrate such an optical trap for an ion. The work will be carried out in a team of highly experienced PhD students. In a first step the ion is laser cooled in a conventional Paul trap. Afterwards a strong laser beam which is focussed on the ion is switched on. The laser focus forms an optical trap for the ion. We will investigate the trap depth, the lifetime of the ion in the trap and the ion temperature. Afterwards we will immerse the ion into a cold cloud of atoms and study atom-ion collisions.</p> <p>Our group is member of the European Training Network COMIQ on cold molecular ions. http://itn-comiq.eu/welcome-to-comiq</p>

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: ITN ComiQ PhD grant http://itn-comiq.eu/welcome-to-comiq/			
Lasers, Optique, Matière	X	Lumière, Matière : Mesures Extrêmes	X
Plasmas : de l'espace au laboratoire	X		

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