

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 : 11/2014

Responsable du stage / internship supervisor:	
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Nom du Laboratoire / laboratory name: INSP/GSI dans le cadre du labex Plas@par	
Code d'identification : UMR75 88	Organisme : UPMC - CNRS
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Adresse / address: Tour 22-12, bureau 315, case courrier 840 ; 4, place Jussieu 75005 Paris France	
Lieu du stage / internship place: mainly at GSI- Germany (<i>supervisor: A. Gumberidze</i>)	

Titre du stage / internship title: Elementary collision processes relevant to relativistic plasmas
Résumé / summary <p>Ion-ion collisions are one of the widespread phenomena in the universe. Knowledge of the fundamental mechanisms at stake in such collisions is also motivated by their relevance to ion energy transfer processes at various plasma conditions such as inertial confinement fusion plasmas or stellar and interstellar plasmas.</p> <p>In the recent years, researchers from the Atomic Physics division at GSI started to initiate an experimental program at the experimental storage ring (ESR) ultimately aiming at exploring physics in critical fields of (super)heavy quasimolecules under the clean experimental conditions that prevail at heavy ion storage rings. At the beginning, of specific interest are K-shell processes such as ionization and excitation in relatively slow and symmetric ion-atom collisions where the unified nuclear charge is greater than 100. This is also very interesting and challenging from theoretical point of view, as it requires non-perturbative two-center approaches.</p> <p>This year, an experiment from this program has been successfully carried out at the gas jet target of the ESR observing $Xe^{54+,52+}$ - Xe collisions. In order to obtain information concerning the impact parameter and, in particular, to pick out close collisions which are especially important for observing the quasi-molecular effects, scattered ions, which had undergone close collisions with xenon atoms, were detected by a detector mounted in a specially constructed movable pocket about 3.5m downstream from the target. In addition to the detector for the scattered projectiles, the X-rays emitted from the interaction zone were observed by an array of detectors mounted at different angles with respect to the ion beam direction.</p> <p>During the internship, the student will be involved in the analysis of the data from this experiment. She/he will thus have the possibility to gain experience with handling the event-mode data, processing the experimental spectra (calibration, line identification, intensity determination, etc.), making connection between the experimental setup and the observations as well as interpreting the results.</p> <p>Moreover, depending on the availability of the beamtime at GSI during the internship, the student will have the possibility to actively join tests of the particle detectors which are currently being designed for future experiments on Fast Ion Slow Ion Collisions (FISIC) at SPIRAL2 facility in Caen. Here, we like to note that both the German and the French groups are actively involved in this challenging project and thus such an internship will further promote the collaborative effort. A large part of the internship will be developed in Germany (GSI) while it may be continue with a PhD in our group in France.</p> <p><i>This internship will be supported by the Labex PLAS@PAR.</i></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: will be submitted to PLAS@PAR			
Lasers et matière		Lumière, Matière : Mesures Extrêmes	X
Optique de la science à la technologie		Plasmas : de l'espace au laboratoire	X

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