

Master 2: *International Centre for Fundamental Physics*

INTERNSHIP PROPOSAL

(One page maximum)

Laboratory name: Laboratoire Aimé Cotton – team SIEC

CNRS identification code:

Internship director's surname: Yan Picard

e-mail: yan.picard@universite-paris-saclay.fr

Phone number:

Web page:

Internship location: Campus d'Orsay, bât 221 / bât 505

Thesis possibility after internship: YES

Funding:

Very high resolution ionic imaging and implantation via ion-electron correlation

How to know and correct in real time the trajectory of each ion coming from a source?

We have developed a new type of ion beam source from a laser ionized atomic jet. This source called SIEC (Source of Ions and Electrons in Coincidence) is developed in the 'single particle' regime where the number of charged particles produced is exactly determined and where the spatial and energetic characteristics of each particle can be determined and individually corrected (Real-Time Trajectory Control of Deterministically Produced Ions, C. Lopez, A. Trimèche, D. Comparat and YJ Picard, Phys. Rev. Applied 11, 064049, 2019). This can be done by the coincident measurement of each ion-electron pair resulting from ionization using time and position sensitive detectors. This source achieves focusing performance and aberration correction beyond the limits of standard ion optics.

The objective now, which is the subject of the PHD thesis, is to transpose this type of 'deterministic' source with high spatial and energy resolutions in a column of ions focused for experiments of implantations of atoms in solids at the nanometric scale as well as for very high resolution imaging and engraving applications.

Please, indicate which speciality(ies) seem(s) to be more adapted to the subject:

Condensed Matter Physics: YES

Soft Matter and Biological Physics: NO

Quantum Physics: YES

Theoretical Physics: NO