Post-doctoral position in laser based Ion Acceleration

Advertiser:*Centre d'Etudes Nucléaires de Bordeaux Gradignan*, France
Duration: 24 months, starting september 2021.
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Scientific context

Laser-plasma acceleration has attracted considerable interest over the last decade due to the outstanding brevity and peak intensity of the particle bunches it offers. New large laser facilities (APOLLON, ELI, VEGA3, etc..) are providing now PW laser pulses at high repetition rate (up to 1 Hz). These high repetition rates are mandatory to unlock some applications of laser accelerated particle beams (radioisotope production, medical imaging, etc.). They also open new perspectives for the investigation of nuclear processes which are out of reach of present accelerator facilities such as key nuclear reaction studies in astrophysical plasma conditions[1,2].
Major issues for laser plasma acceleration studies at high repetition rates concern the interaction targets and the detectors. Up to now solid targets convenient at the cadence of former high power laser generations (1 shot/hour) were used to accelerate ions. Debris generation with such targets is a major problem at high repetition rates (HRR). The second issue concerns the high background generated by the electromagnetic pulse (EMP) and the X-ray flash during a laser shot, prohibiting the use of standard real time ion detectors.

Objectives

The project aims at developing real time innovative methods to characterize "on shot" ion accelerated in laser plasma interactions at high repetition rate and optimized targets for these interactions. Cryogenic, liquid and gaseous targets are being investigated world wide. Our group is exploring a solution based on high density gas jet targets [**https://doi.org/10.1063/1.5116337**].
The candidate will pursue the experimental investigations of the project. He will have the opportunity to develop his (her) own direction. Specific tasks may include:
- Further development of targets suitable for laser HRR operation
- Development of new dedicated real time ion detectors for thomson parabola, with access to simulation tools (e.g. GEANT4).
- Contribution to numerical laser-plasma interaction simulations (PIC code SMILEI).
- Commissioning and first benchmarking experiments on HRR laser facilities, with the possibility to test designed targets and spectrometers.
- Evaluation of radioisotope production with the accelerated ion beams

Requirements

PhD degree or a postdoctoral experience in plasma, nuclear, or particle physics. Experience in coding and numerical simulation would be desirable. Knowledge of French language is not required. Applicants should send a cover letter (1 page max.), a CV (2 pages max.) and a list of publications.

Skills:

PhD degree or a postdoctoral experience in Laser Plasma Acceleration, Plasma and or Nuclear physics.
Experience in coding and numerical simulations, optical diagnostics and instrumentation are welcome.
Knowledge of French language is not mandatory.

Working conditions:

Experiments with up to 4 weeks duration will take place at national and international high power and high intensity laser facilities (LULI Palaiseau, GSI Darmstadt, CLPU Salamanca…). The successful candidate will be also encouraged to propose, design and perform experiments on other facilities.

Place of work: CENBG, Bordeaux, France

Interested candidates should contact us for further details