laboratoire d'optique appliquée

CNRS Research Engineer (permanent position)
Laboratoire d'Optique Appliquée, Palaiseau, France

Scientific project :

LAPLACE (Laser Plasma Acceleration Center) is a research and innovation platform dedicated to laser-plasma accelerators (ALP). Laser-plasma acceleration is an emerging technique for accelerating electron beams through the interaction of an ultra-intense femtosecond laser with an underdense plasma. The electrons are accelerated in the plasma over very short distances (millimeter) and emit X-rays by interaction with the plasma fields (betatron radiation) or laser fields (inverse Compton scattering). This makes it possible to obtain electron and X-ray sources with unique characteristics: compactness, micrometric source size and femtosecond duration, which paves the way to many societal applications (imaging, cancer treatment), in fundamental science (physics, biology), but also for industry (non-destructive testing).

The project, fully funded, has just started in 2023. The host laboratory, LOA, is hiring a CNRS research engineer to participate in the construction of a high-repetition rate laser-plasma accelerator, in the framework of LAPLACE-Haute Cadence. The objective is to develop an accelerator operating at 100 Hz and producing relativistic electrons in the energy range 20-200 MeV, as well as femtosecond X-rays in the range 1-100 keV. The goal of LAPLACE-HC is to bring laser-plasma acceleration to a high level of maturity (TRL 5-6) and to build a true prototype electron accelerator, whose robustness and stability will allow access to applications. There are many challenges to be addressed:
- Implementation, characterization and stabilization of a femtosecond laser with unique performances: duration <25 femtosecond, high energy (1 Joule) operating at high-repetition rate (100 Hz) and high average power (100 W). The laser is developed by Thales.
- R&D on the plasma targets for high-repetition rate and high average power operation.
- Control and characterization of the experimental parameters for a stable operation.
- Implementation of artificial intelligence and machine learning techniques for automated operation of the machine.

Your qualifications :
We are looking for a scientist with a research engineer profile who has a strong interest in experimental physics, experimentation, instrumentation and engineering. The following skills will be particularly appreciated
- Femtosecond lasers, high intensity lasers
- Experience in laser-plasma interaction
- Particle accelerators: transport, operation, diagnostics
- Experience in instrumentation related to lasers, or plasmas or accelerators
- General skills in experimental physics and instrumentation design
- General skills in instrumentation control and man-machine interfaces (Python, Tango, Labview...)

Modalities : Applications open in June, interviews in the fall, job starts in December 2023.
For more information : contact Jérôme Faure, jerome.faure@ensta.fr and/or Stéphane Sebban, stephane.sebban@ensta.fr