

The “Laboratoire de Physique des 2 Infinis Irène Joliot-Curie” (IJCLab), joint research unit of CNRS, Université Paris-Saclay and Université de Paris, located on the Orsay campus, search for a 2 years contract, from 1st September 2020

POST-DOCT FOR A MULTI-PASS ENERGY RECOVERY LINAC (ERL): THE PERLE PROJECT M/F

Mission:

The position is at “Laboratoire de Physique des 2 Infinis Irène Joliot-Curie” (IJCLab), in the Beam Instrumentation, Manipulation and Physics team (BIMP) of the Accelerator division of the laboratory.

PERLE is a proposed Powerful Energy Recovery LINAC for Experiments, designed on multi-turn configuration, based on SRF technology, to be studied and later hosted at Orsay, in a collaborative effort with an international collaboration. A part from its experimental program, PERLE will be a unique cutting-edge facility designed to push advances in accelerator technology, to provide intense and highly flexible test beams for component development. In its final configuration, PERLE provides a 500 MeV electron beam using high current (20 mA) acceleration during three passes through 801.6 MHz cavities. A Conceptual Design Report has already been published in 2017 for a 1 GeV version of PERLE [1].

In this context, missions will concern the detailed technical design of the facility in order to propose a reliable configuration to be installed in the existing building at Orsay. The design needs to be integrated with the existing pre-design made by PERLE collaboration. Lattice optimisations and additional functionalities are needed in order to respond to more local scientific needs in terms of applications.

[1] D. Angal-Kalinin, PERLE: Powerful Energy Recovery LINAC for Experiments - Conceptual Design Report, <https://arxiv.org/abs/1705.08783>

Activities:

In collaboration with JLAB, activities will involve detailed studies of the lattice design of the machine, optics specifications and beam dynamic studies. Defining magnets specification will facilitate magnet design and prototyping in collaboration with BINP-Novosibirsk. The first proof-of-principle lattice has been developed by JLAB in the PERLE CDR context and also for the lower energy downgraded version of PERLE (at 500 MeV), which will be the subject of further detailed studies. A carefully study the optics design and a detailed analysis of the collective effects in arcs should be carried out, both in acceleration and energy recovery mode. Furthermore, an impact of injection energy upgrade (from 5MeV up to 7MeV) on the machine optics, especially in the switchyards should be evaluated. Also, the phasing of the machine starting with one acceleration cryomodule will be studied. The optic choices in the switchyards and arcs and their consequences should also be evaluated. The finding of the candidate work will be published in a Technical Design Report (TDR) to be produced by the end of 2022.

Skills:

- Need of high-level skills in the accelerator design and beam optics.
- Skills in accelerator design and beam dynamics tools like MADX, Elegant...
- Ability to communicate and reason, analysis, synthesis and critical thinking
- Ability to learn and develop skills, flexibility and adaptability, creativity
- Languages: French and/or English (written/oral)
- Autonomy, organizational capacity and ability to report

Training and professional experiences:

PhD in the fields of accelerator, or high energy physic up to 3 years post-doctoral positions.

Salary: Between 2693 and 3839 euros gross salary per month, depends of experience.

Context:

IJCLab is a CNRS/IN2P3, Université Paris-Saclay and Université de Paris, laboratory located at the campus of the University Paris-Sud at Orsay. The campus is conveniently located 20 km south of Paris and is easily reachable by regional train (35 mins)

IJCLab is born in January 2020 from the merger of five laboratories (CSNSM, IMNC, IPN, LAL, LPT). The staff consists of almost 560 permanent staff (340 engineers, technicians and administrative staff and 220 researchers and teacher-researchers) and around 200 non-permanent staff, including 120 doctoral students. The laboratory's research themes are nuclear physics, high-energy physics, theoretical physics, astroparticles, astrophysics and cosmology, particle accelerators, energy and the environment and health. IJCLab has very significant technical capacities (around 280 engineers and technicians) in all the major areas required to design, develop / implement the experimental devices necessary for its scientific activity, as well as the design, development and use of instruments.

The BIMP team of the Pole Accelerator is composed to 22 peoples engaged in various domains of the accelerator conception and associated projects like FCC, ThomX, MYRRHA, SPIRAL2, MLL-TRAP...

PERLE project is a collaborative effort with an international participation; as of today: CERN, JLAB, AsTEC Daresbury, Liverpool University and BINP Novosibirsk.

Within this position, a collaboration with JLAB and BINP-Novosibirsk is foreseen. The collaborative effort with JLAB will be on lattice design and optimisation, optics specifications and beam dynamics studies, while the collaboration with BINP-Novosibirsk will focus on the magnets design and prototyping according to the specifications established by the lattice optimisation studies. The later collaboration (with BINP-Novosibirsk) will be carried out in the framework of H2020 CREMLINplus project (<https://cordis.europa.eu/project/id/871072>), established to foster scientific cooperation between the Russian Federation and the European Union in the development and extensive scientific usage of large-scale research infrastructures. The position described here is financed by CREMLINplus program.

An experimental part of the work could be realized during the commissioning of the CBeta facility at Cornell-University US (<https://www.classe.cornell.edu/Research/ERL/CBETA.html>).

Travels in France, Europe and United States are to be expected.

Contact:

Researchers or research engineers interested in the position are requested to submit a motivation letter, a CV to Portail Emploi CNRS : <https://emploi.cnrs.fr/> Ref: UMR9012-SYLPRA0-013

Direct link: <https://bit.ly/38ZSJO>

Support letter(s) to Luc Perrot perrot@ipno.in2p3.fr

More information about IJCLAB : <https://www.ijclab.in2p3.fr/en/home/>

