POST TITLE

Accelerator Physicist for the CERN Injectors

Requesting Unit

BE-ABP-HSI

Associated Benchmark Job

Applied Physicist

Grade

6 or 7

Job description

Introduction

Are you an Accelerator physicist or Engineer with experience in beam dynamics, and, in particular, incoherent multi-particle effects, combining academic excellence and technical coordination skills? Are you interested in taking an active role in the commissioning of the CERN's Hadron Synchrotrons after the major upgrades carried out in 2019-20? Join a dynamic team of applied physicists developing accelerator physics theory and performing advanced beam dynamics simulations and beam measurements and impact the performance of operating synchrotrons, guide their upgrade and design the next generation of future machines. Work at the heart of beam physics and operation, at the largest particle physics laboratory in the world: CERN. Take part!

You will join:

The Accelerators and Beam Physics (ABP) group, part of the Beams department (BE), is in charge of beam performance over the complete CERN accelerator chain, from the source to the Large Hadron Collider (LHC). The Group carries out Research & Development (R&D) activities on the upgrade of the LHC and its injectors, on the Compact Linear Collider (CLIC), and Future Circular Colliders study (FCC) as well as on novel acceleration techniques (AWAKE). Click here for an animation of the CERN accelerator network.

The Hadron Synchrotron’s Incoherent effects (HSI) Section is responsible for theoretical, numerical and experimental studies of incoherent linear and non-linear multi-particle effects, affecting the performance of present and future hadron synchrotrons and of their mitigation.

The performance of hadron rings in particular at the highest intensity and brightness frontier heavily depends on the control and mitigation of concurrent incoherent multi-particle effects, such as space-charge and Intra-beam Scattering (IBS) and their combination with magnet imperfections, noise and other machine non-linearities. Their accurate estimation, through numerical simulations and their experimental verification under realistic operational conditions is of paramount importance for minimising beam losses and guaranteeing the beam emittance preservation.

Functions

As accelerator physicist of the HSI section of the ABP group, you will study beam intensity and brightness limitations in the LHC injectors, with an emphasis to incoherent effects for high-intensity and high-brightness beams. In particular, you will:

- Actively participate during the commissioning phase of the CERN injector hadron rings, during LHC Run III, in order to reach the LHC injector upgrade (LIU) goals, for proton and ion beams.
- Contribute to the improvement of operational performance of the CERN injectors for the fixed target and LHC beams, including taking the role of machine supervisor.
- Conduct linear and non-linear beam dynamics studies including space-charge and IBS for improving the intensity and brightness preservation of proton and ion beams through the injector complex.
- Conduct beam measurements, analyse the data collected, and implement the necessary adjustments to obtain the expected performance.
- Contribute to the development of numerical tools for simulating incoherent multi-particle effects and in particular for space-charge and IBS.
Qualifications
Master’s degree or PhD in Physics or engineering (or equivalent).

Experience
The experience required for this position is:

- Demonstrated experience of work in a scientific environment preferably in the design and/or operation of particle accelerators.
- Experience in accelerator physics with demonstrated ability to compute beam optics.
- Experience with beam optics and non-linear dynamics simulation codes (e.g. MADX-PTC, SIXTRACK).
- Experience with multi-particle simulation codes for incoherent effects such as space-charge, IBS and/or beam-beam.
- Experience of experimental techniques and analysis of data from beam measurements.

The following experience would be considered an asset:

- Experience of massive numerical simulations with modern simulations codes.
- Experience with one of the following codes: MAD-X, PyORBIT, ORBIT-PTC.

Technical competencies

- Knowledge and application of transverse single-particle dynamics.
- Knowledge and application of collective effects (beam-beam, space charge, intra beam scattering).
- Simulation, design and development of particle accelerators.
- Analysis and optimization of accelerator performance.

Behavioural competencies

- Managing self: taking initiative beyond regular tasks and making things happen; working well autonomously.
- Working in teams: building and maintaining constructive and effective work relationships; participating fully and taking an active role in team activities.
- Communicating effectively: demonstrating a pro-active approach to resolving differences; expressing opinions, ideas and suggestions with conviction and in a logical/structured manner; keeping to the point.
- Achieving results: Having a structured and organized approach towards work; following through on new ideas and innovations; Able to set priorities and plan tasks with results in mind.
- Demonstrating accountability: taking responsibility and being accountable for own actions.

Language skills
Spoken and written English or French: ability to understand and speak the other language in professional contexts. Ability to draw-up technical specifications and/or scientific reports and to make oral presentations in at least one of the two languages.

Additional information

Eligibility
Diversity has been an integral part of CERN’s mission since its foundation and is an established value of the Organization. Employing a diverse workforce is central to our success. We welcome applications from all Member States and Associate Member States (CERN: Member States).

This vacancy will be filled as soon as possible, and applications should normally reach us no later than xx.xx.xx. By applying here, you allow CERN to consider your application for any position it considers relevant with respect to your profile. Please ensure you update your profile regularly with any relevant information and that you inform the Recruitment Service if you wish your file to be removed from the database.

Employment Conditions
We offer a limited-duration contract for a period of 5 years. Limited-duration contracts shall terminate by default on their date of expiry. Subject to certain conditions, holders of limited-duration contracts may be granted an indefinite contract.

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