

Doctoral student for gas systems project –Applied Physics, Engineering and Chemistry

Description

The candidate will join the team in the EP-DT-FS section responsible for the maintenance, operation and developments of gas systems for the LHC experiments.

The LHC gas systems are complex apparatus that extend over several hundred meters and ensure an extremely high reliability in terms of stability and quality of the gas mixture delivered to the detectors. Indeed, the gas mixture is the detector's sensitive medium and a correct and stable composition is a basic requirement for good and safe long-term operation. Given this high importance, it is fundamental to monitor the gas mixture composition, quality and stability over-time. Furthermore, it is also crucial to understand how possible changes in the gas systems could affect the gas mixture composition and finally the detector performance. The PhD student will take part in the complex process of performing gas analysis and monitoring of the LHC gas systems. In addition, the PhD student will participate to gas analysis (O₂, H₂O, gas chromatography, mass spectrometry, ...) campaigns performed by the team for different CERN experiments.

The gas mixture used by some of the LHC particle detector systems contains greenhouse gases (GHG) with high global warming potential and therefore subject to the European phase down policy. Unfortunately, these gases dominate the overall GHG emission from particle detectors at the LHC experiments, but their use cannot be avoided because they are needed for achieving specific detector performance. The reduction of GHG usage is an objective of paramount importance for CERN. The candidate will be involved in the ongoing R&D activities for development and optimization of new gas recuperation systems as well as in the operation and optimization of the existing ones. The candidate will work in all the phases of the projects: theoretical conception, design, construction, test of prototype, development of final system, commissioning and operation.

The PhD student will have to study possible chemical effects related to the use of new environmentally friendly gas mixtures for LHC gas systems particle detectors.

Considering the activities in which the candidate will be involved, he/she should have a very good knowledge of general and analytical chemistry.

The PhD student will learn about

- LHC gas systems
- Gas recuperation systems
- impact of gas systems operation on particle detectors
- commissioning, maintenance and operation of gas systems
- gas analysis techniques (O₂ and H₂O specific analysers, gas chromatography and mass-spectrometry analysis, ...)