Trainee's Project Report

Job Code	PH2603
Department	PH
Discipline	Experimental Applied Physics
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Description

Calibration of the ATLAS Tile calorimeter.

ATLAS is one of the experiments that operate at the CERN LHC collider, where proton-proton collisions take place at unprecedented high energies opening a new frontier in particle physics studies.

Tilecal is the hadronic calorimeter of ATLAS and one of its main purposes is the measurement of the energy of jets. Tilecal is made of scintillating material embedded in an iron matrix. Wavelength shifting optical fibres collect the light from the scintillators and guide it to photomultipliers (PMTs). Tilecal is built in three cylindrical sections, two 3 m long sections and one 6 m long section. Each cylinder is built by joining 64 modules. The total number of cells is about 5000 and each cell is readout by 2 PMTs.

The context of this job offer is to be integrated in the team in charge of the calibration of the calorimeter. There are 3 systems used in the calibration and monitoring of the Tilecal cells: a movable cesium source used to inter-calibrate the several cells, a laser system used to monitor the gain of the PMTs and the respective electronic chain, and a charge injection system used to calibrate the electronic chain response.
The candidate will learn the details of each of the calibration systems and the way they are integrated in the global calibration chain of Tilecal. This calibration approach is complemented with methods that use the LHC physics events to calibrate the global calorimeter of ATLAS. The candidate will develop calibration software tools, that access the databases where calibration parameters are stored and will implement calibration algorithms. The final goal is to obtain the calibration parameters and the magnitude of the systematic and/or statistical errors in the determination of the energy scale.

Special Requirements

Degree in physics, physics engineering or electronics engineering with interest in detector development

Training Value

Gain experience in practical aspects of calibration of a detector