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Laser calibration of the Atlas Tile calorimeter

The ATLAS Tile Calorimeter (TileCal) is the central section of the hadronic calorimeter of the ATLAS experiment at CERN's Large Hadron Collider. This sampling calorimeter uses steel plates as absorber and scintillating tiles as active medium.
The light produced by the passage of charged particles is transmitted by wavelength shifting fibres to photomultiplier tubes (PMTs) located on the outside of the calorimeter.
High performance stability of the ATLAS Tile calorimeter is achieved with a set of calibration procedures.
One step of the calibration procedure is based on measurements of response stability to laser excitation of the PMTs that are used to readout the calorimeter cells. A facility to study in lab the PMT stability response is operating in the PISA-INFN laboratories since 2015. Goals of the tests in lab are to study the time evolution of the PMT response to reproduce and to understand the origin of the response drifts seen with the PMTs mounted on the Tile calorimeter in its normal operation during LHC Run 1 and Run 2.
A new statistical approach was developed to measure the drift of the absolute PMT gain. This approach was applied to both the ATLAS laser calibration data and to the data collected in the Pisa local laboratory. The preliminary results from these two studies are presented.

Experimental Collaboration

ATLAS

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