Performance, calibration and optics robustness of the ATLAS Tile Calorimeter

The Tile Calorimeter (TileCal) is a sampling hadronic calorimeter covering the central region of the ATLAS experiment, operating at the Large Hadron Collider (LHC) at CERN. TileCal is made of steel as absorber and plastic scintillators as active medium. The scintillators are read-out by wavelength shifting fibres coupled to photomultiplier tubes (PMTs). The analogue signals from the PMTs are amplified, shaped, digitized by sampling the signal every 25 ns and stored on detector until a trigger decision is received. The TileCal front-end electronics reads out the signals produced by about 10000 channels measuring energies ranging from about 30 MeV to about 2 TeV. During LHC runs, high-momentum isolated muons have been used to study and validate the electromagnetic scale, while hadronic response has been probed with isolated hadrons. The calorimeter time resolution has been studied with multi-jet events. Besides, the integrated cells signals from minimum bias events provide auxiliary information on the response stability from the whole detector during proton-proton collisions. The calibration systems are used to estimate the radiation damage suffered by the active media of the detector, the scintillators and the wavelengths shifting optical fibres that collect the light into the photodetectors readout. First results using early LHC Run-3 data will be shown. A summary of the performance results, including the calibration, stability, absolute energy scale, uniformity, time resolution and the plastic scintillators light output loss due to integrated dose will be presented.

Workshop topics

Detector systems

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