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Operation and Performance of the ATLAS Tile Calorimeter and its readiness for Run 3

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The ATLAS Tile Calorimeter (TileCal) is the central section of the hadronic calorimeter of the ATLAS experiment. It provides essential information for reconstructing hadrons, jets, hadronic decays of tau leptons and missing transverse energy. This sampling calorimeter uses steel plates as an absorber and scintillating tiles as the active medium. The light produced by the tiles is transmitted by wavelength shifting fibers to photomultiplier tubes (PMTs). PMT signals are then digitized at 40 MHz and stored on the detector, and are only transferred off detector once the first level trigger acceptance has been confirmed (at a rate of 100 kHz at maximum). The readout is segmented into about 5000 cells (longitudinally and transversally), each being read out by two PMTs in parallel. A set of calibration systems is used to calibrate and monitor the stability and performance of each element of the readout chain during the data taking. The TileCal calibration system includes Cesium radioactive sources, laser, charge injection elements and an integrator-based readout system. Combined information from all systems allows monitoring and equalizing the calorimeter response at each stage of the signal production, from scintillation light to digitization.

A large sample of proton-proton collisions was used to study the detector's performance, including pile-up's influence on the detector noise levels and time resolution. Cosmic ray muons, collision high momentum muons and isolated hadrons were used as probes to study the response of the calorimeter.

This presentation will show the TileCal operation, its performance during Run 2, and its readiness for LHC Run 3 after an extended LHC shutdown.

In-person participation

Yes

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