



Contribution ID: 148

Type: Poster

# The ATLAS Tile Calorimeter performance in the LHC Run-2 and its upgrade towards the High-Luminosity LHC

*Monday, 15 July 2019 19:40 (20 minutes)*

The Tile Calorimeter (TileCal) is a sampling hadronic calorimeter covering the central region of the ATLAS experiment. TileCal uses steel as absorber and plastic scintillators as active medium. The scintillators are read-out by the wavelength shifting fibres coupled to the 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 frontend electronics reads out the signals produced by about 10000 channels measuring energies ranging from about 30 MeV to about 2 TeV. Each stage of the signal production from scintillation light to the signal reconstruction is monitored and calibrated. A summary of the performance results using pp collisions from the LHC Run-2 at 13 TeV, including the calibration, stability, absolute energy scale, uniformity and time resolution, will be presented.

The High-Luminosity phase of LHC, delivering five times the LHC nominal instantaneous luminosity, is expected to begin in 2026. TileCal will require new electronics to meet the requirements of a 1 MHz trigger, higher ambient radiation, and to ensure better performance under high pileup conditions. Both the on- and off-detector TileCal electronics will be replaced during the shutdown of 2024-2025. PMT signals from every TileCal cell will be digitized and sent directly to the back-end electronics, where the signals are reconstructed, stored, and sent to the first level of trigger at a rate of 40 MHz. This will provide better precision of the calorimeter signals used by the trigger system and will allow the development of more complex trigger algorithms. Changes to the electronics will also contribute to the data integrity and reliability of the system. The ongoing developments for on- and off-detector systems, together with expected performance characteristics and recent results of test-beam campaigns with the electronics prototypes will be discussed.

**Primary author:** ATLAS COLLABORATION

**Presenter:** NIBIGIRA, Emery (Université Clermont Auvergne (FR))

**Session Classification:** Wine & Cheese Poster Session

**Track Classification:** Detector R&D and Data Handling