



Contribution ID: 23

Type: **not specified**

Upgrade of ATLAS Hadronic Tile Calorimeter for the High Luminosity LHC

The Tile Calorimeter (TileCal) is the hadronic calorimeter covering the central region of the ATLAS experiment. The High-Luminosity phase of LHC, delivering five times the LHC nominal instantaneous luminosity, is expected to start in 2029. TileCal will require new electronics to meet the requirements of a 1 MHz trigger, higher ambient radiation, and to ensure better performance under high pile-up conditions. Both the on- and off-detector TileCal electronics will be replaced during the shutdown of 2026-2028. Approximately 10% of the PMTs, those reading out the most exposed cells, will be replaced. 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 40MHz. This will provide better precision of the calorimeter signals used by the trigger system and will allow the development of more complex trigger algorithms. The modular front-end electronics feature radiation-tolerant components and redundant design to minimize single points of failure. The timing, control and communication interface with the off detector electronics is implemented with modern Field Programmable Gate Arrays (FPGAs) and high speed fibre optic links running up to 9.6 Gb/s. The TileCal upgrade program has included extensive R&D and test beam studies. A Demonstrator module equipped with the new electronics but with reverse compatibility with the existing readout system was inserted in ATLAS in August 2019 for testing in actual detector conditions. The status of the various components and the results of test-beam campaigns with the electronics prototypes will be discussed.

Author: SOTTO-MAIOR PERALVA, Bernardo (Universidade do Estado do Rio de Janeiro (BR))

Presenter: SOTTO-MAIOR PERALVA, Bernardo (Universidade do Estado do Rio de Janeiro (BR))

Session Classification: Poster Session

Track Classification: Upgrades