Contribution ID : 94 Type : oral

Upgrade of the ATLAS Tile Calorimeter for the High luminosity LHC

Wednesday, May 24, 2017 4:48 PM (0:18)

Content

The Tile Calorimeter (TileCal) is the hadronic calorimeter of ATLAS covering the central region of the ATLAS experiment. TileCal will undergo a major replacement of its on- and off-detector electronics in 2024 for the high luminosity programme of the LHC. The calorimeter signals will be digitized and sent directly to the off-detector electronics, where the signals are reconstructed and shipped to the first level of trigger at a rate of 40 MHz. This will provide a better precision of the calorimeter signals used by the trigger system and will allow the development of more complex trigger algorithms. Three different options are presently being investigated for the front-end electronic upgrade. Extensive test beam studies are being employed to determine which option will be selected. The off-detector electronic is based on the Advanced Telecommunications Computing Architecture (ATCA) standard and is equipped with high performance optical connectors. The system is designed to operate in a high radiation environment and presents a high level of redundancy. Field Programmable Gate Arrays (FPGAs) are extensively used for the logic functions of the off- and on-detector electronics. One hybrid demonstrator prototype module with the new calorimeter module electronics, but still compatible with the present system, is planned to be inserted in ATLAS in one of the next winter shutdown.

This contribution presents the components of the Tile Calorimeter upgrade for the high luminosity LHC, the production and performance of the prototype of the read-out electronics, the results of the test-beam tests at CERN and the plans for the next years.

Summary

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Session Classification : R1-Calorimeters(4)

Track Classification : Calorimeters