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The TileCal PreProcessor Interface with the ATLAS Global Data Acquisition System at the HL-LHC

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The Large Hadron Collider (LHC) has envisaged a series of upgrades towards a High Luminosity LHC (HL-LHC) delivering five times the LHC nominal instantaneous luminosity, that will take place throughout 2026-2028, corresponding to the Long Shutdown 3. During this upgrade, the ATLAS Tile Hadronic Calorimeter (TileCal) will replace completely on- and off-detector electronics adopting a new read-out architecture.
Signals captured from the TileCal are digitized by the on-detector electronics and transmitted to the TileCal PreProcessor (TilePPr) located off-detector, which provides the interface with the ATLAS trigger and data acquisition systems.
TilePPr sends the data from the on-detector to the FELIX system. FELIX is the ATLAS common hardware in all the subdetectors designed to act as a data router, receiving and forwarding data to the SoftWare Read-Out Driver (SWROD) computers. FELIX also distributes the TTC signals to the PPr to be propagated to the on-detector electronics.
The SWROD is an ATLAS common software solution to perform detector specific data processing, including configuration, calibration, control and monitoring of the partition.
In this contribution we will introduce the new read-out elements for TileCal at the HL-LHC, the interconnexion between the off-detector electronics and the FELIX system, results from the test beam campaigns, as well as the developments of the preprocessing and monitoring status of the calorimeter modules through the SWROD infrastructure.

Collaboration

Atlas - TileCal

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