



Operations and Performance of the ATLAS Tile Calorimeter Phase-II Upgrade Demonstrator in Run 3



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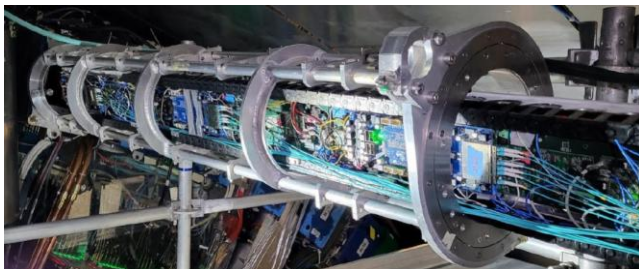
25th IEEE Real Time Conference, May 25-29 2026, La Biodola, Elba, Italy



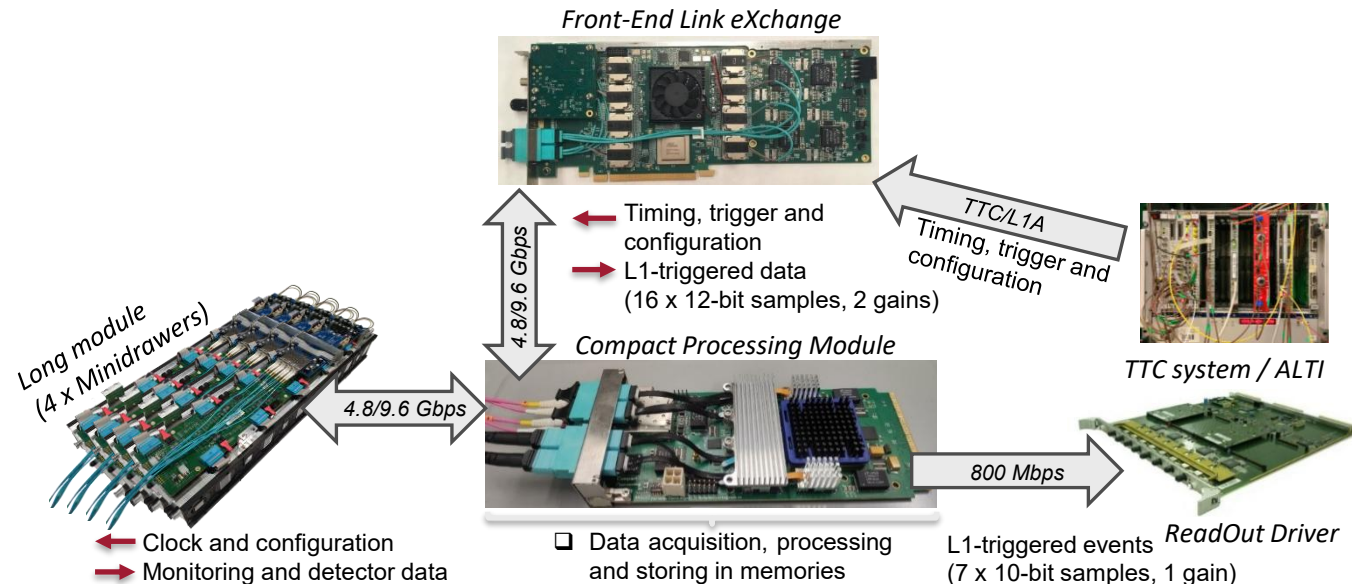
- The ATLAS experiment will undergo a Phase-II Upgrade to meet the requirements imposed by the High Luminosity LHC (HL-LHC), including **higher pile-up, radiation exposure and data throughput**
- The Tile Calorimeter will require a **major upgrade of both its on- and off-detector electronics** to provide calorimeter information to the new Trigger and Data Acquisition (TDAQ) system
- A **hybrid module operating with backward compatibility** with the current TDAQ system was installed in ATLAS in 2019 and successfully operated throughout Run 3 (2022-2026)



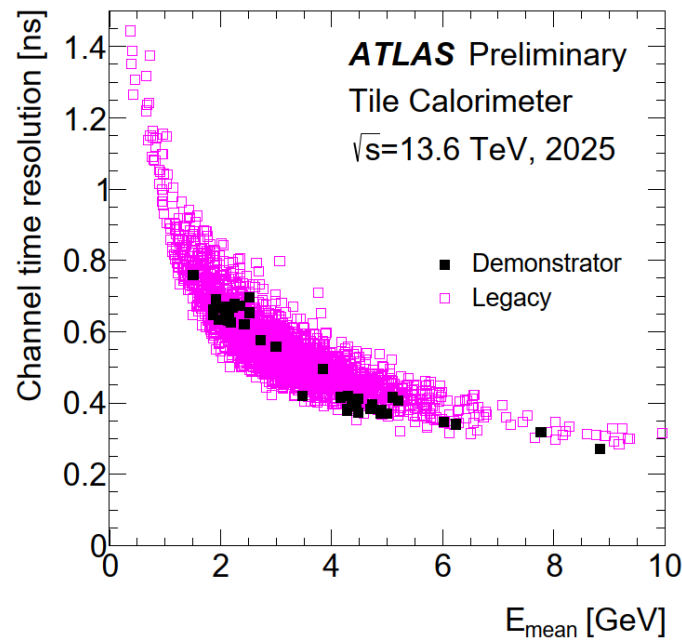
Maintenance in the ATLAS experiment



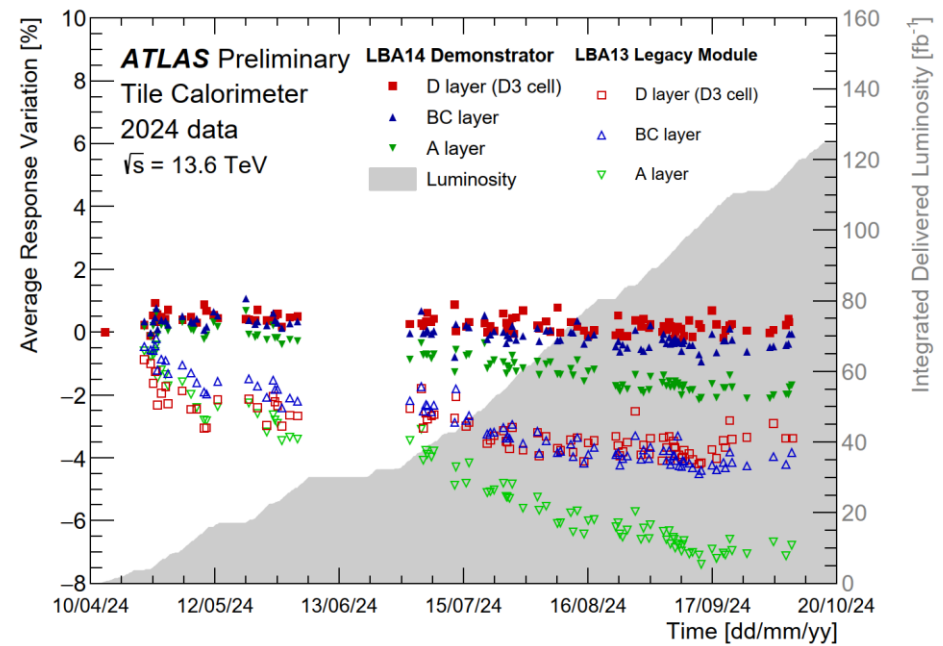
Extracted Demonstrator module during maintenance



- Validation of the clock and readout architecture for the HL-LHC
- Qualification of Phase-II electronics before large-scale production
- Stable timing, calibration, optical links, detector performance and data quality were demonstrated



Time resolution measured with 2025 laser calibration data in the Long Barrel A partition. [1]



Average relative response variation measured in individual TileCal layers in the Demonstrator and a neighbouring legacy module during 2024 [1]

[1] ATLAS Collaboration, Approved Tile Calorimeter Plots. [online]: <https://twiki.cern.ch/twiki/bin/view/AtlasPublic/ApprovedPlotsTile>