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Expanding the ATLAS TileCal Phase-II Control and Monitoring System and Validation of Tile GbE Switch Electronics for the High-Luminosity LHC

The High-Luminosity Large Hadron Collider (HL-LHC) will significantly increase the instantaneous luminosity of the Large Hadron Collider (LHC), requiring major upgrades to the ATLAS detector electronics to ensure reliable data acquisition, detector control, and long-term operational stability. As part of the ATLAS Tile Calorimeter (TileCal) Phase-II upgrade. This contribution presents two complementary activities supporting the commissioning and operation of the upgraded system. First, an existing control and monitoring framework, previously developed for the TileCal off-detector electronics, is expanded to incorporate the on-detector electronics, providing a unified platform for real-time monitoring, configuration, and diagnostics of the upgraded TileCal readout system. Second, the functionality and performance of the newly manufactured Tile Gigabit Ethernet (GbE) Switch Printed Circuit Board (PCB) and Tile GbE Switch Motherboard PCB are being validated through comprehensive electrical, communication, and system integration tests. The validation program will be carried out at the University of Johannesburg using dedicated test facilities and subsequently at CERN to verify compatibility and performance within the TileCal Phase-II test environment. Together, these developments strengthen the readiness of the upgraded TileCal electronics for HL-LHC operation by improving detector monitoring capabilities and ensuring the reliability of critical readout hardware prior to detector deployment.

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