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Integration and commissioning of ATLAS New Small Wheel Micromegas detectors with electronics at CERN

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The LHC at CERN plans to have a series of upgrades to increase its instantaneous luminosity to 7.5×1034 cm−2s−1. The luminosity increase drastically impacts the ATLAS trigger and readout data rates. The innermost station of the ATLAS muon spectrometer, the so-called Small Wheels, will be replaced with a New Small Wheel (NSW) system, consisting of Micromegas (MM) and sTGC detectors, which is expected to be installed in the ATLAS underground cavern at the end of 2020. With the final MM quadruplets (modules) already produced from the different construction sites, the integration activities of the modules into the final, fully equipped MM double-wedges, that are then installed on the wheel structure, are currently in full swing in the integration facility at CERN. One crucial part of the integration workflow is the installation, testing and validation of the on-detector electronics & readout chain for a very large system with a more than 2.1 M electronic channels in total. These include ˜4K MM Front-End Boards (MMFE8), custom printed circuit boards each one housing eight 64-channel VMM Application Specific Integrated Circuits (ASICs) that interface with the ATLAS Trigger and Data Acquisition (TDAQ) system through ˜1K data-driver Cards (ADDC & L1DDC, respectively). The readout chain is based on optical link technology (GigaBit Transceiver links) connecting the backend to the front-end electronics via the Front-End LInk eXchange (FELIX), is a newly developed system that will serve as the next generation read out driver for ATLAS. Experience and performance results from the first large-scale electronics integration tests performed at CERN on final NSW MM double-wedges, including system validation tests with cosmic-rays, will be presented.

I read the instructions

Secondary track (number)

Author: VAFEIADIS, Theodoros (CERN)

Presenter: VAFEIADIS, Theodoros (CERN)

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