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ATLAS LAr Calorimeter Commissioning for LHC Run-3

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The Liquid Argon Calorimeters are employed by ATLAS for all electromagnetic calorimetry and for hadronic calorimetry in the region from $|\eta|$ = 1.5 to $|\eta|$ = 4.9. It also provides inputs to the first level of the ATLAS trigger. After successful period of data taking during the LHC Run-2 the ATLAS detector entered a long shutdown period starting 2019. In 2022 the LHC Run-3 should see an increased pile-up of 80 interactions per bunch crossing. To cope with this harsher conditions, a new trigger path have been installed during the long shutdown. This new path should improve significantly the triggering performances by increasing by a factor of ten the number of available units of readout at the trigger level.

The installation of this new trigger chain required the update of the legacy system to cope with the new components. It is more than 1500 boards of the precision readout that have been extracted from the ATLAS pit, refurbished and re-installed. For the new system 124 new on-detector boards have been added. Those boards are able to digitize at 40 MHz the calorimeter signal in a radiative environment. The digital signal is then processed online to provide the measured energy for each unit of readout which corresponds to 31Tbps of data. To minimize the triggering latency the processing system had to be installed underground. There the limited space available imposed the need of a very compact hardware structure. For this large FPGAs with high throughput have been mounted on ATCA mezzanine boards. Given that modern technologies have been used compared to the previous system, all the monitoring and control infrastructure had to be adapted.

This contribution should present the challenges of such installation, what have been achieved and the first results with the new system including calibration and data taking performance.

Collaboration

ATLAS

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