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The ATLAS New Small Wheel new Muon Stations Ready for LHC Run3

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After ten years of intense work, the two New Small Wheels (NSW) for the upgrade of the Atlas Muon Spectrometer are now installed in the experiment and ready for final commissioning and to collect data in LHC Run3, starting March 2022.

The NSW is the largest phase-1 upgrade project of ATLAS. Its challenging completion and readiness for data taking is a remarkable achievement of the Collaboration.

The two wheels (10 meters in diameter) replace the first muon stations in the high-rapidity regions of ATLAS and are equipped with multiple layers of two completely new detector technologies: the small strips Thin Gap Chambers (sTGC) and the Micromegas (MM). The latter, belonging to the family of Micro Pattern Gaseous Detectors (MPGD), for the first time used in such a large scale in HEP experiments. Each of the detector technology will cover more than 1200 m² of active area.

The new system is required to maintain the same level of efficiency and momentum resolution of the present detector, in the expected higher background level in view of the ongoing series of LHC luminosity upgrades. As well as keeping an acceptable muon trigger rate with the same muon momentum threshold.

In this presentation the motivation of the NSW upgrade and the steps from construction to assembly and surface commissioning will be reviewed, with particular focus on the main challenges, the adopted solutions and measured performance of the system. First results will be reported from commissioning data and first cry in the experiment.

Collaboration

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