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The New Small Wheel Trigger for the ATLAS experiment

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The ATLAS New Small Wheel (NSW) Muon spectrometer upgrade was completed in 2022 and constituted the largest detector upgrade in Phase I among the LHC experiments. The main purpose of NSW is to provide triggering capabilities in the endcap region 1.3 <|η|<2.4 for conMirming muons coming from the interaction point and reject the large fake contribution from the endcap region. It provides also improved muon tracking capability in the endcap, as it is equipped with 2.5 million channels with high spatial resolution of about 100 μm for every one of the 16 layers. The NSW Trigger is based on both the sTGC and the Micromegas technologies that form the basis of the detector operation. It is a Level_1 trigger capable to provide trigger in every Bunch Crossing (BC) at Mixed low latency (44BC). In 2023 the NSW Trigger was integrated in ATLAS offering critical fake rate rejection, reducing thus the overall readout deadtime of the experiment. We will present the architecture of the NSW Trigger system that is based in custom made electronics, capable to collect the trigger information, process it and efMiciently trigger on IP muons. We will concentrate in the sTGC Pad trigger that was fully operational as well as the Micromegas part that was included in the last runs. Performance studies of the NSW Trigger, using pp collisions at 13.6 TeV, will be presented. NSW is capable of operating in the HL-LHC era. The perspectives of the Phase II NSW Trigger upgrade will be given.

Collaboration

ATLAS Muon

Role of Submitter

The presenter will be selected later by the Collaboration

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