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## Enhancing the ATLAS Level-1 endcap muon trigger with New Small Wheel integration in Run 3

The Level-1 muon endcap trigger in the ATLAS experiment utilises signals from the Thin Gap Chambers (TGCs) located in the outer muon stations. A significant challenge for this system has been the high background rate caused by particles not originating at the interaction point, which increased the Level-1 trigger rate. To address this issue, the New Small Wheel (NSW) detectors, installed at the inner muon stations during Long Shutdown 2, were integrated into the Level-1 endcap muon trigger system for Run3 operations. In 2024, the full integration of the NSW sectors into the Level-1 trigger decision was successfully completed. By cross-checking the consistency between muon candidates identified by TGC signals and those by the NSW, the system achieved a significant improvement in the discrimination between muons and background particles. This advancement reduced the Level-1 trigger rate by approximately 15 kHz, effectively decreasing the load on the Trigger and DAQ systems and substantially enhancing the data-taking efficiency of the ATLAS experiment.

## Secondary track

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