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ATLAS Level-1 Endcap Muon Trigger for Run 3

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The LHC is expected to increase its center-of-mass energy to 14 TeV and an instantaneous luminosity to 2.4x10ˆ34 cmˆ-2sˆ-1 for Run 3 scheduled from 2021 to 2023. An upgrade of the ATLAS trigger system is required to cope with the high event rate. The level-1 Endcap Muon trigger system identifies muons with high transverse momentum by combining data from a fast muon trigger detector, TGC. In the ongoing phase-1 upgrade, new detectors called the New-Small-Wheel (NSW) and RPC-BIS78, will be installed in the inner station region for the endcap muon trigger. Excellent granularity track information from the NSW and RPC-BIS78 can be used as a part of the muon trigger logic to enhance the performance significantly. New electronics have been developed to handle data from both TGC and NSW, including the trigger processor board called Sector Logic (SL). The SL board has a modern FPGA to make use of Multi-Gigabit transceiver technology, which will be used to receive data from the NSW. The readout system for trigger data has also been re-designed, with the data transfer implemented with TCP/IP instead of a dedicated ASIC. This new system makes it possible to minimize the use of custom readout electronics and instead use commercial PCs and network switches to collect, format and send the data. This presentation describes the upgrades of the level-1 Endcap Muon trigger system as mentioned above, particularly emphasizing on the new algorithm in Sector Logic as well as the expected trigger performance.

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