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## ATLAS hardware-based Endcap Muon Trigger for future upgrades

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The LHC is expected to increase its center-of-mass energy to 14 TeV with an instantaneous luminosity to  $2 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$  for Run 3 scheduled from 2021 to 2023. The High-Luminosity-LHC (HL-LHC) program is then planned to start the operation in 2026 with an instantaneous luminosity of  $7.5 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$ . In order to cope with the high event rate, continuous upgrades of the ATLAS trigger system are mandatory.

The hardware-based Endcap Muon trigger system identifies muons with high transverse momentum by combining data from a fast muon trigger detector, TGC. In the ongoing upgrade for Run 3, new detectors will be installed in the inner station region for the endcap muon trigger. In order to handle data from various detectors, some new electronics have been developed, including the trigger processor board known as Sector Logic. Finer track information from the new detectors can be used as part of the muon trigger logic to enhance performance significantly.

For HL-LHC, the new hardware muon trigger is required to reconstruct muon candidates with an improved momentum resolution to suppress the trigger rate with keeping the efficiency. The track reconstruction using full-granular information enables to form more offline-like tracks, by Virtex UltraScale+ FPGA with about hundred pairs of transceivers, and with huge memory resources for a pattern matching algorithm.

This presentation describes the aforementioned upgrades of the hardware-based Endcap Muon trigger system. Particular emphasis will be placed on the new electronics design and the firmware. The expected trigger performance will also be discussed.

### Minioral

Yes

### IEEE Member

No

### Are you a student?

No

**Primary author:** MINO, Yuya (Kyoto University (JP))

**Presenter:** MINO, Yuya (Kyoto University (JP))

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