Development of a New L1 Muon Trigger System and New Readout Electronics for the ATLAS MDT Chambers at High LHC Luminosities

Use of MDT chambers for the L1 trigger

In the Muon Spectrometer the MDT have better position resolution than the corresponding, close-by trigger chambers

Barrel:

RPCs have 30 mm wide pick-up strips $\Rightarrow \sigma \approx 10\,\text{mm}$ along η.

End-cap:

TGC wires are grouped by 6-31 wires $\Rightarrow \sigma \approx$ 10-60 mm along η.

The MDT have a $\sigma < 1\,\text{mm}$ resolution along η!!
The MDT could contribute to sharpen the high-pT threshold at the L1 trigger level

The easiest way:

take RoI information from the trigger chambers (in the same trigger tower) and only look for MDT hits inside the RoI. This reduces readout time and data volume.

- $\Rightarrow$ Needs a communication path between trigger and MDT chambers.
- $\Rightarrow$ Needs extra latency for communication path.
- $\Rightarrow$ This is a project for phase-2, where the L1 latency will be > 6 µs.

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Communication path between trigger and MDT chambers via the “Tower Master” to improve spatial resolution at L1