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# The 1st Result of Global Commissioning of the ATLAS Endcap Muon Trigger System in ATLAS Cavern

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We will report on the ATLAS commissioning run from the view point of the Thin Gap Chamber (TGC), which is the ATLAS end cap muon trigger detector. So far, a half of TGC chambers with on-detector electronics have been already installed to the ATLAS cavern. To integrate all sub-detectors before the physics run starting from early 2008, the global commissioning run together with other sub-detectors has been performed from June 2007. We have evaluated the performance of the complete trigger chain of the TGC electronics and provide the trigger signal using cosmic-ray to the sub-systems in the global run environment.

## Summary

Before starting a physics run from early 2008, all sub-detectors including their front-end electronics should be installed and tested synthetically in-situ.
The thin gap chamber (TGC) is used for the muon-endcap trigger system. The muon-endcap system covers the both endcaps of the detector (1.05<abs(eta)<2.4) to detect isolated muons and give the level-1 muon trigger signal with two ranges of the transverse momentum (pt) of low-pt > 6 GeV/c and high-pt > 20 GeV/c.
As at least three measurement points per track is necessary to identify a muon with even such coarse momentum estimation, there are three TGC wheels per endcap (one has three layers with triplet chambers, and the other two wheels have two layers each with doublet chambers).
Each wheel has the radius of about 10 meter, for example pivot doublet wheel has the radius of 11m, and due to this huge detector size, the number of channels become about 320,000 in total. Every wheel has commonly twelve sectors. This 1/12 sector is a construction unit for the trigger muon-endcap system for both the chambers and electronics. The sector is also the unit for the trigger and readout system.
The analog signals from the detector are fed into the ASD (Amplifier-Shaper-Discriminator) ASIC. There are three chains for the TGC electronics system. The first chain is the level-1 trigger decision logic. Candidate signals of more than 6GeV/c muon are selected by three modules (timing adjustment, bunch ID and coincidence ASICs). These modules are mounted on the sector. The muon candidates with more than 20GeV/c are classified by high-pt decision ASIC mounted nearby the sector. The r-phi coincidence and the 6 classifications of pt information are performed by the FPGA mounted in the ATLAS counting room. The resulting trigger information is sent to the Muon Central Trigger Processor Interface (MUCTPI) in a standard format. The second chain is for the data readout. It consists of the pipeline buffers, derandomizers and parallel/serial converters ICs. The third chain is used for the initialization, monitoring and controlling of the modules. The functionality of all on-detector modules and their cablings has been inspected at the surface building before installing to the ATLAS cavern. So far, a half of TGC chambers with on-detector electronics have been already installed to the cavern.
In order to integrate all sub-detectors before the physics run starting from early 2008, the ATLAS commissioning run will be performed from June 2007. The main goal of the global commissioning run from the view point of Level-1 Endcap Muon Trigger System is to confirm the functionality of the complete chain of the TGC trigger electronics. Before the commissioning run, the trigger signal of the events with cosmic ray will be generated by using standalone TGC system itself, and then provided

to the sub-systems during the ATLAS commissioning run.
The scope of this presentation is the result of the global commissioning run,
especially from the viewpoint of TGC system.

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