Contribution ID: **70** Type: **Oral**

Towards a Level-1 tracking trigger for the ATLAS experiment

Thursday 5 June 2014 11:20 (20 minutes)

The future plans for the LHC accelerator allow, through a schedule of phased upgrades, an increase in the average instantaneous luminosity by a factor 5 with respect to the original design luminosity.
The ATLAS experiment at the LHC will be able to maximise the physics potential from this higher luminosity only if the detector, trigger and DAQ infrastructure are adapted to handle the sustained increase in particle production rates.

In this paper the changes expected to be required to the ATLAS detectors and trigger system to fulfill the requirement for working in such high luminosity scenario are described. The increased number of interactions per bunch crossing will result in higher occupancy in the detectors and increased rates at each level of the trigger system. The trigger selection will improve the selectivity partly from increased granularity for the sub detectors and the consequent higher resolution. One of the largest challenges will be the provision of tracking information at the first trigger level, which should allow a large increase in the rejection power at this stage of the selection and yet still allow the full physics potential of the experiment to be fulfilled. In particular, the electroweak scale still requires to keep the thresholds on the transverse momenta of particles as low as possible and tracking will provide essential information that could be used to this aim as early as possible in the trigger chain.

Studies to understand the feasibility of such a system have begun, and proceed in two directions: a fast readout for high granularity silicon detectors, and a fast pattern recognition algorithm to be applied just after the Front-End readout for specific sub detectors. Both existing, and novel technologies can offer solutions. The aim of these studies is to determine the parameter space to which this system must be adapted. The status of ongoing tests on specific hardware components crucial for this system to fully satisfy the ATLAS trigger requirements at very high luminosities and increase its potential are discussed.

Author: CERRI, Alex (University of Sussex (GB))

Presenter: CERRI, Alex (University of Sussex (GB))

Session Classification: III.b Trigger & DAQ

Track Classification: Data-processing: 3b) Trigger and Data Acquisition Systems