



Contribution ID: 172

Type: **Poster presentation**

Data intercommunication layer and control system of ATLAS High Level Trigger

Friday, June 10, 2016 10:30 AM (1h 35m)

The ATLAS experiment at the LHC is equipped with a sophisticated trigger system capable of reducing the 40MHz LHC collision rate to the 100kHz rate at the Level-1 hardware trigger and to the 1kHz rate at the High Level Trigger (HLT). In the HLT, the Steering Framework manages a few hundred of trigger algorithms: it evaluates every collision event and makes an accept/reject decision using as few resources as possible. Communication among algorithms is facilitated by an underlying data navigation structure, implemented as a di-graph structure, that allows fast discovery of detector regions containing interesting physics objects, as well as selecting

an optimal way to build and traverse the event graph structure. For ATLAS running after the 2013-2014 shutdown, more detailed trigger information is given to physics analysis users thus improving capabilities of trigger aware analyses. Due to size constraints on event data stored for physics analyses, a new algorithm has been implemented that prunes the navigation graph to an acceptable size, while retaining sufficient information for the physics analysis. This poster will present the design and operational experience of the decision steering framework of the HLT, as well as prospects for future development of the HLT navigation data structure.

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Session Classification: Poster Session 2

Track Classification: Trigger Systems