



Contribution ID: 238

Type: **Oral Presentation**

## Online Determination of the LHC Luminous Region with the ATLAS High Level Trigger

*Monday, 13 June 2011 14:00 (25 minutes)*

During stable-beams operations of the LHC, the ATLAS High Level Trigger (HLT) offers the fastest and most precise online measurement available of the position, size and orientation of the luminous region at the interaction point. Taking advantage of the high rate of triggered events, a dedicated algorithm is executed on the HLT processor farm of several hundred nodes that uses tracks registered in the silicon detectors to reconstruct event vertices. The distribution of these vertices is aggregated across the farm and its shape is extracted through fits every 60 seconds. A correction is applied online to adjust for the intrinsic vertex resolution by examining the displacement of split vertices. The location, widths and tilts of the luminosity distribution are fed back to the LHC operators in real time. The transverse luminous centroid mirrors variations in the IP orbit, while its position along the beam axis is sensitive to the relative RF phase of the two beams. The time evolution of the luminous width tracks the emittance growth over the course of a fill. The HLT measurements can be correlated with data from machine instrumentation such as beam-position monitors, wire scanners and synchrotron-light monitors. Beginning in 2011, the HLT beam spot measurement also started reconstructing the parameters of each individual filled bunch. This gives rise to a study of single-bunch distributions and opens a window to understanding dynamical features such as electron-cloud effects. We will briefly describe how the measurement is performed and discuss the results and observations of the luminous region parameters and their time evolution during the high luminosity running in 2011.

**Primary author:** BARTOLDUS, Rainer (SLAC)

**Co-authors:** MILLER, David (SLAC); SU, Dong (SLAC); STRAUSS, Emanuel (SLAC); COGAN, Josh (SLAC)

**Presenter:** BARTOLDUS, Rainer (SLAC)

**Session Classification:** Machine Det. Interface and Beam Instr.

**Track Classification:** Machine Detector Interface and Beam Instrumentation