Contribution ID: **10** Type: **not specified**

Application for front end intelligence in gaseous pixel detectors for triggering

Thursday, 3 May 2012 11:30 (30 minutes)

The combination of gaseous detectors with pixel readout chips gives unprecedented hit resolution (improving from O(100 um) for wire chambers to 10 um), as well as high-rate capability, low radiation length and giving in addition angular information on the local track. These devices measure individually every electron liberated by the passage of a charged particle, leading to a large quantity of data to be read out. Typically an external trigger is used to start the read-out.

We are investigating the addition of local intelligence to the pixel read-out chip. A first level of processing detects the passage of a particle through the gas volume, and accurately determines the time of passage. A second level measures in an approximate but fast way the tilt-angle of the track. This can be used to trigger a third stage in which all hits associated to the track are processed locally to give a least-squares-fit to the track. The chip can then send out just the fitted track parameters instead of the individual electron coordinates.

This self-triggering capability could have a major application in the level-1 track trigger proposed for the ATLAS upgrade for the sLHC. I will briefly summarise the track trigger requirements for the ATLAS Upgrade and highlight the advantages of a gaseous detector for this application, followed by discussing one approach to the local intelligence needed to realise such a trigger.

Summary

This talk presents the possibilities of using local intelligence in a pixel readout chip coupled to a gaseous detector for trigger purposes. It could have applications in fast track triggers at the LHC detector upgrades.

Primary author: Dr HESSEY, Nigel (NIKHEF (NL))

Co-authors: VAN DER GRAAF, Harry (NIKHEF (NL)); VERMEULEN, Joseph (NIKHEF (NL))

Presenter: Dr HESSEY, Nigel (NIKHEF (NL))

Session Classification: Application of intelligent detectors / Coupled sensors and monolithic architectures

Track Classification: Applications of intelligent detectors