Contribution ID: **158** Type: **Oral Presentation**

Implementation and performance of the signal reconstruction in the ATLAS Hadronic Tile Calorimeter

Thursday, 9 June 2011 16:00 (30 minutes)

The Tile Calorimeter (TileCal) for the ATLAS experiment at the CERN Large Hadron Collider (LHC) is currently taking data with proton-proton collisions. The Tile Calorimeter is a sampling calorimeter with steel as absorber and scintillators as active medium. The scintillators are read out by wavelength shifting fibers coupled to photomultiplier tubes (PMT). The analogue signals from the PMTs are amplified, shaped and digitized by sampling the signal every
25 ns. The TileCal front-end electronics allows to read out the signals produced by about 10000 channels measuring energies ranging from ˜30 MeV to ˜2 TeV.
The read-out system is designed to reconstruct the data in real-time fulfilling the tight time constraint imposed by the ATLAS first level trigger rate (100 kHz). The main component of the read-out system is the Digital Signal Processor (DSP) which, using the Optimal Filtering technique, allows to compute for each channel
the signal amplitude, time and quality factor at the required high rate. A solid knowledge of the signal pulse-shapes and of the timing is fundamental to reach the required accuracy in energy reconstruction. Systematic studies to understand the pulse-shape have been carried out using both electronic calibration signals and data collected in the proton-proton collisions at sqrt{s} = 7 TeV.
After a short overview of the TileCal system we will discuss the implementation of Optimal Filtering signal reconstruction highlighting the constraints imposed by the use of the DSP fixed point arithmetic.
We will report also results on the validation of the implementation of the DSP signal reconstruction and on the overall signal reconstruction performance measured in calibration, single beam and collision events.

Primary author: VALERO, Alberto (IFIC - University of Valencia)

Presenter: VALERO, Alberto (IFIC - University of Valencia)

Session Classification: Trigger and DAQ Systems

Track Classification: Trigger and Data Acquisition Systems