



Contribution ID: 136

Type: Oral Presentation

Online energy reconstruction on ARM for the ATLAS TileCal sROD co-processing unit

Friday, 3 July 2015 12:10 (20 minutes)

**Abstract content
 (Max 300 words)
Formatting &
Special chars**

Modern Big Science projects such as the Large Hadron Collider at CERN generate enormous amounts of raw data which presents a serious computing challenge. After planned upgrades in 2022, the data output from the ATLAS Hadronic Tile Calorimeter (TileCal) will increase by 200 times to over 40 Tb/s. This increase requires more advanced processing on the raw data in order to harness a larger quantity of good quality physics data. An algorithm called optimal filtering is currently used in the TileCal front-end for online energy reconstruction of the digitised photo-multiplier tube signals and is currently implemented on Digital Signal Processors (DSPs) and Field Programmable Gate Arrays (FPGAs) which are difficult to program and expensive. It is proposed that a cost-effective, high data throughput and general purpose Processing Unit (PU) can be developed by using several commodity ARM processors while maintaining minimal software design difficulty for the end-user. This PU could be used for a variety of high-level algorithms other than optimal filtering on the high data throughput raw data to combat the issue of out of time pile-up and for online data quality testing. Optimal filtering and histogram algorithms have been implemented in C++ and several ARM platforms have been tested and shown to have good CPU to external I/O balance.

**Apply to be
 considered for a student
 award (Yes / No)?**

yes

**Level for award
 (Hons, MSc,
 PhD, N/A)?**

msc

**Main supervisor (name and email)
and his / her institution**

Bruce Mellado (bruce.mellado@wits.ac.za) Wits

**Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?**

yes

**Please indicate whether
this abstract may be
published online
(Yes / No)**

yes

Primary author: Mr COX, Mitchell (University of the Witwatersrand)

Presenter: Mr COX, Mitchell (University of the Witwatersrand)

Session Classification: NPRP

Track Classification: Track B - Nuclear, Particle and Radiation Physics