A new portable test bench for the ATLAS Tile Calorimeter front-end electronics certification

J. Alves1, F. Carrié2, H. Y. Kim3, I. Minashvili4, P. Moreno5, R. Reed6, V. Schettino6, A. Shalyugina7, C. Solana2, J. Souza2, G. Usai4, A. Valero3

1-LIP Portugal, 2-IFIC-UV Spain, 3-UTA USA, 4-JINR Russian Federation, 5-UIW South Africa, 6-UFJF Brazil, 7-CERN

Motivation
- At the present time there are three available units. A fourth one is required for the long shutdown of 2013 to test the four barrels at the same time.
- There is no replacement for some old VME modules.
- Aim for a reduction of size with a total weight.
- Evaluation of new technologies for future upgrades.

Architecture
- An embedded system, some programmable logic and custom electronic boards replace the functionality of the VME modules of the previous system.

The Motherboard
- The motherboard is a Xilinx ML507 evaluation platform, equipped with a Virtex-5 FPGA.
- Pattern's resources:
  - PowerPC 440 RISC microprocessor
  - 4.25 Gbps GTX transceivers
  - 10/100/1000 Mbps ethernet
  - 256 MB of DDR2 RAM
- Configuration storage, such as platform flash devices or a Compact Flash card-based system configuration controller (System ACE Controller).

The Embedded System
- Implemented in the Virtex-5 FPGA available on the motherboard.
- Operating System: Basixgus Linux version with kernel 2.6
- An automatic boot of the whole system (lsbinit + kernel + root file system): from the Compact Flash using the System ACE Controller.
- The ELDK 4.3 (Embedded Linux Development Kit) cross compiler tools: building the Linux OS image and for developing the applications.

The Software
- The software of the MobiDICK has a client-server architecture.
- A glue software replaces the VME Libraries from the previous system.

ADC Board
- Digitizer analog trigger outputs of the super-drawer with a 40 MHz local oscillator.

SFP Module
- Small Factor Pluggable Transceiver that provides communication with the interface board of the super-drawer.

Power Supply Distribution
- Two commercial adapters and a custom cable is used to convert the RS232 ports of the motherboard to the CAN bus interface of the super-drawer.

HY and LED Boards
- HY board: provides a 400 V power supply to the PMTs of the super-drawer.
- LED board: provides a 20 V pulses required to calibrate the readout channels of the super-drawer.

MobiDICK Tests

ADC Board Results
- The plot shows the response measured by the ADC board in ADC counts versus the injected charge in pC. The ADC board is capable of reconstructing signals up to 200 pC from the tower signals from the super-drawer.

Mechanics, Assembly and the First Prototype
- Size: 35 x 40 x 20 cm
- Weight: about 4 kg
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Previous Version

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