

Implementation of the Control System for the LHCb Muon Detector

Wednesday, 27 September 2006 16:20 (25 minutes)

The Muon Detector of LHCb will be equipped with about 1380 Multi-Wire Proportional Chambers. Within the Framework of the CERN Control System Project, using PVSS as the main tool, we are developing an instrument to manage such a system. Adjustment and monitoring of High and Low Voltage power supplies, on-line diagnostics and fine tuning of the Front-End read-out devices, data acquisition from the gas system and the monitoring of pressure and temperature of the experimental hall are being implemented. The system will also look after long term data archiving and alert handling. The Control System performance is currently under evaluation in a cosmic ray station. Built as a final quality control of the LHCb Multi-Wire Proportional Chambers, allowing acquisition of data from as many as 600 Front-End readout channels, the cosmic ray station is fully managed by means of a Control System prototype.

Summary

In order to manage and monitor the LHCb Muon Detector, a Control System is now being developed and tested. A Finite State Machine architecture has been adopted, following the CERN Joint Controls Project (JCOP) recommendation: "The experiment control systems are modeled as a hierarchy of Finite State Machines (FSM). In this model there is a state/command interface between a parent and its children. Commands are passed from a parent to its children and the states/alarms of the children are passed to the parent who derives its state from those of its children." Each item (Device Unit) is thought of as having a set of stable states. Items can move between their allowed states by making transitions triggered either by commands or state changes of a dependent FSM. After a change of state the Device Unit generates a signal to inform the Control Unit about its state. The main Control Unit is called Muon System. It sends commands and

receives States and Alarms to and from a set of children Control Units (called High Voltage, Low Voltage, Environment Sensors, Electronics and Gas System) which interact with the hardware Device Units. A first down scaled implementation of the Control System is now being used and tested to fully manage a cosmic ray station built for the studies of the LHCb MWPC. The cosmic ray stand is able to house 6 MWP chambers and allows the acquisition of as much as 600 Front-End channels. PVSS programs are now being used to manage high voltage power supplies, front-end readout devices and to monitor the environmental parameters. This system is giving a unique possibility to study in details the different features of the Control System and is an useful tool to test its robustness. In this document it will be described the software tools together some example of the studies performed with the cosmic ray stand. Usage of the tools developed to manage a Cosmic Ray Station, already in use for tests and performance valuation of the LHCb Muon Chambers, makes possible to have a fast feedback on the usefulness of the implemented features and to test for robustness of the Control System itself. Routines for calibration and diagnostics of the front-end electronics and for high voltage setting and monitoring have already shown to work very well and result of great importance for the automation of the Muon Detector Control System.

Primary author: Dr PINCI, Davide (INFN - Sez. Roma)

Co-authors: Mr IACOANGELI, Francesco (INFN - Sez. Roma); Mr CHIODI, Giacomo (INFN - Sez. Roma); ANTUNES NOBREGA, Rafael (Universita di Roma I "La Sapienza"); Mr BOCCI, Valerio (INFN - Sez. Roma); Mr RINALDI, Walter (INFN - Sez. Roma)

Presenter: ANTUNES NOBREGA, Rafael (Universita di Roma I "La Sapienza")

Session Classification: Poster sessions