The ALFA Detector Control System

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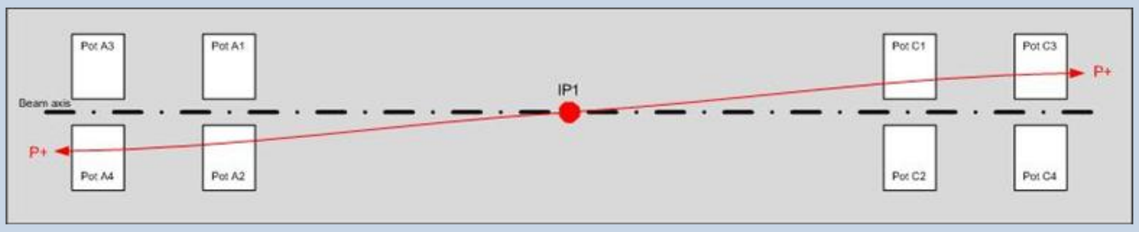
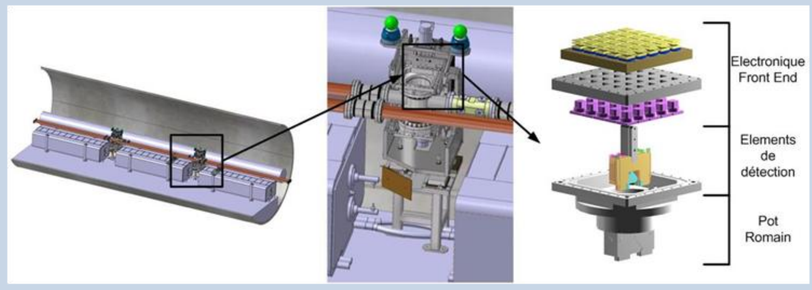


Forward detection of elastically scattered protons at ATLAS interaction point (IP1)

The ALFA detector (Absolute Luminosity For ATLAS) aims to determine the absolute luminosity of the LHC beam at the interaction point of the ATLAS detector. The approach for the luminosity calculation consists in the detection of the elastically scattered protons and the determination of their deviation angle down to the coulomb region, where the electromagnetic interaction has the same order of magnitude than the nuclear interaction.

The ALFA detector consists in four stations installed in the forward regions of ATLAS (+/- 240 m from the interaction point (IP1)). Each station is equipped with two so-called “Roman Pot” which approach the beam from up and down to track the elastically scattered protons with scintillating fibres.
This poster shows the overall scheme of the ALFA detector and reflects the architecture of its control system which provides the interactions with the services of the detector and allows its operation with remote control and monitoring applications.



Zoom on a “Roman Pot” station in the LHC tunnel

WEB server

Publication of web panels giving the status of the detector

ATLAS Centralized DAQ System

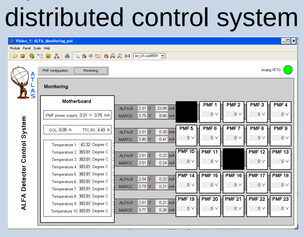
ATLAS Central Databases

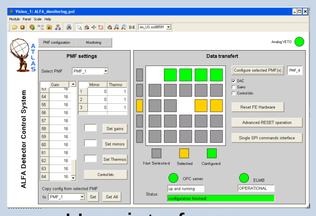
Storage of online values and sets of configuration data

ATLAS Control Room (ACR)

Global Control System

Operation of the detector and connection to the ATLAS distributed control system





User interfaces

LHC control room (CCC)

LHC Control System

ATLAS counting rooms

DAQ Front-End

ALFA Local Control Station

Control and monitoring application on a production computer running PVSS (SCADA: Software for Control And Data Acquisition)

Movement control (PXI)

Beam Interlock

High Voltage

Low Voltage

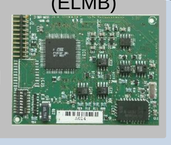
Pumping System

Front-End electronics

Motherboard

- Interface to the FE readout chips (MAROC) for data readout and configuration
- Equipped with an ELMB for the monitoring of the local parameters (voltages, currents, temperatures) and for the configuration of the FE (DAQ threshold, PMT gains)

Embedded Local Monitoring Board (ELMB)



MAROC chip

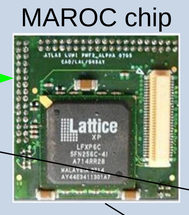
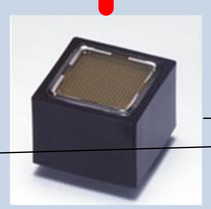
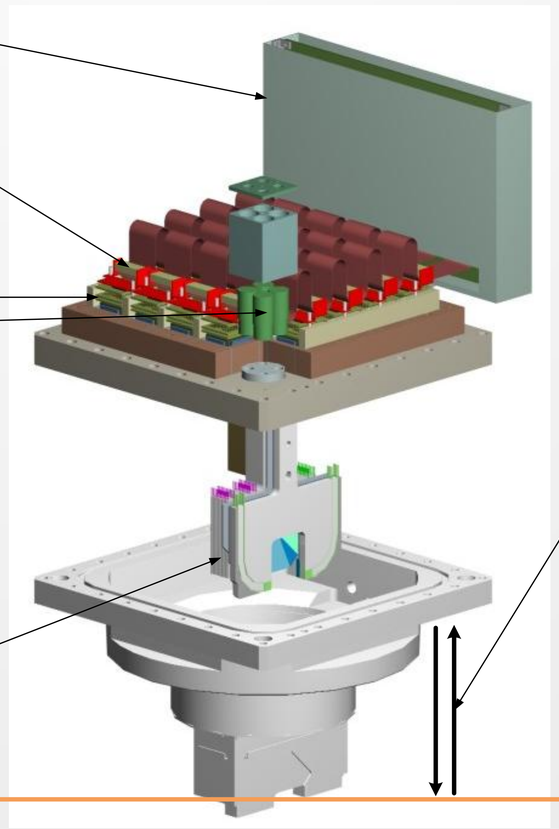


Photo Detection

Hamamatsu R7600 Single channel



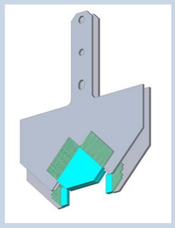
Hamamatsu R5900 64 channels



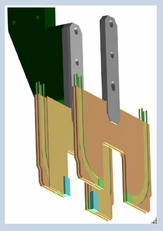
Motor, LVDS

End-switches

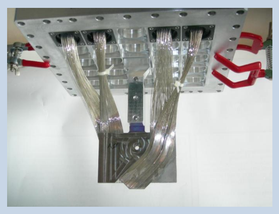
Trigger



Overlap Detector



Main Detector



Legend

- Light
- Analog signals (sensors readout)
- Digital signals (CAN, ModBus, Filar)
- Ethernet (Distributed system, DIM)
- Power (LV, HV, motor drivers)

Beam axis

Roman Pot Station in the LHC tunnel

The ALFA detector is in its final development state. The four Roman Pot stations are built and some part will be installed in the tunnel before the LHC restarts this year while the hardware for particle detection is being constructed. The services of the detector and the control architecture must be ready for its first operation which is most likely foreseen after the next shut down period of the LHC. The Detector Control System (DCS) is being implemented and several components have been validated and already used in the last test beam like the configuration of the FE or the monitoring of the local parameters. The motor control is being tested and the communication between its computing system and the ALFA DCS is being implemented. The global operation layer will be developed at the same time as the detector commissioning in order to integrate the ALFA detector in the ATLAS control and data acquisition centralized frames.