The ATLAS Transition Radiation Tracker (TRT) Detector Control System.

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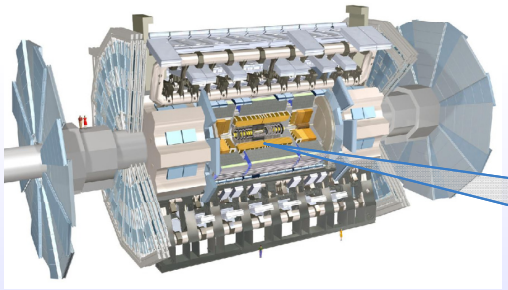
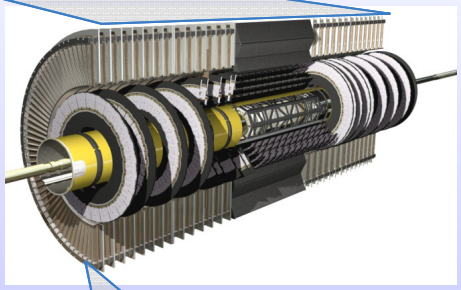
WEMAU005

The Transition Radiation Tracker is:



...a part of ATLAS
- one of the two general purpose detectors developed for Large Hadrons Collider



...an outermost layer of Inner Detector
- a set of tracking detectors

What TRT needs to operate:

- stable active gas mixture to fill straws
- high voltage biasing between straw's walls and gold-plated tungsten wire
- stabilization of gas gain – drifts of active gas pressure, composition and local straws temperature by correcting HV bias
- distribution of low voltage power to front end readout electronics boards
- cooling of electronics readout boards, straws and power cables
- monitoring temperatures of different structures inside detector

...consists of ~300 000 straws (proportional counters) with polypropylene radiator layers between them allowing electron identification.

TRT Detector Control System

Detector Subsystems:

- Low Voltage distribution controls 5376 channels
- Temperatures monitoring monitors 2744 sensors
- High Voltage distribution controls 1980 channels

TRT Infrastructure Subsystems:

- Bulk LV power supplies
- DAQ VME crates
- Hardware Interlock for bulks
- CANbuses power supply units
- Gas Gain Stabilization System
- Active Gas Chromatograph

Subdetector Control Station
TRT FSM integration

ATLAS Infrastructure Subsystems:

- Active Gas System
- Straws Cooling (CO_2)
- FE electronics & Cables Cooling
- Detector Safety System
- Racks monitoring
- PVSS Systems Overview

ATLAS
Global Control Station

ATLAS FSM integration

TRT DAQ System
DDC data exchange

ATLAS Databases

- PVSS Archives
- Configuration DB
- Conditions DB

Data Quality , Offline

TRT DCS Operational Automation and Tools

- **LV safety software interlock**

  when any of temperatures measured on Front End boards exceeds a limit switches off LV lines served by one LV distributor board

- **HV safety software interlock**

  when Active Gas or humidity in HV crates became not safe lowers HV setpoints

- **HV Automatic Trip Recovery**

  when enabled automatically switches HV Cell after it's trip

- **GGSS to HV feedback**

  corrects HV Cells setpoints following GGSS reference voltage and region temperature in a detector

- **LV settings equalization**

  individual LV setpoints are calculated and stored as a recipe to be used during TRT operation

To be done:

Service Tools for Hardware Interventions

when a DCS hardware failure occurs during LHC collisions some recovery actions can be taken without stopping of ATLAS data taking. Dedicated DCS tools need to be developed.