The ATLAS MDT Control System

G. Bobbink, H. Boterenbrood, R. Hart, NIKHEF, Amsterdam, Netherlands
S. Zimmermann, Physics Institute, Freiburg University, Germany

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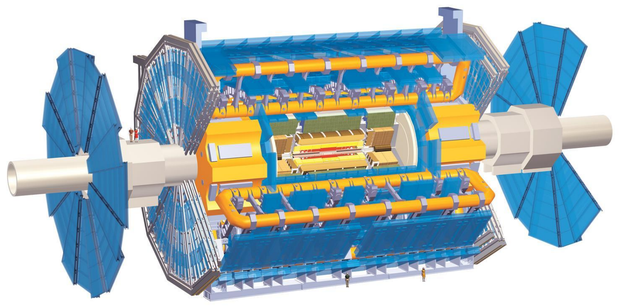
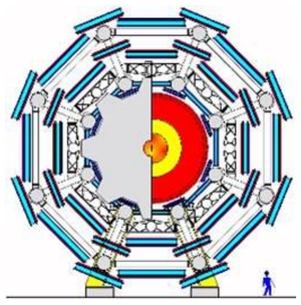
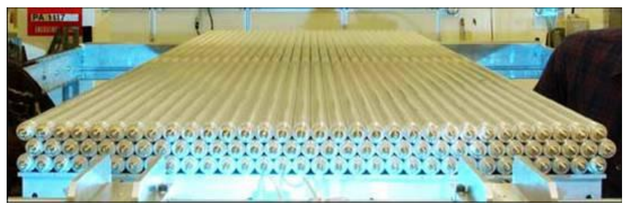
MDT Sub-Detector

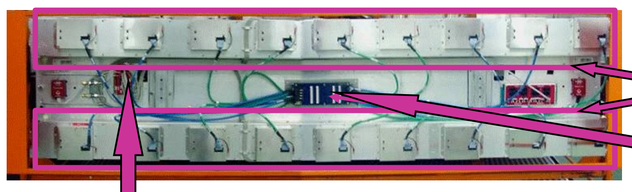




Monitored Drift Tubes
- 1200 Chambers (various shapes/sizes)
- Barrel & Endcap: 3 layers (Inner, Middle, Outer)
- number of tubes: ± 400,000



BOL–chamber under construction

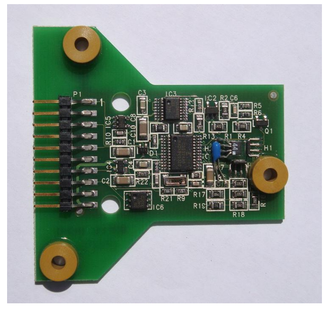


MDT-chamber: Read-out (RO) side

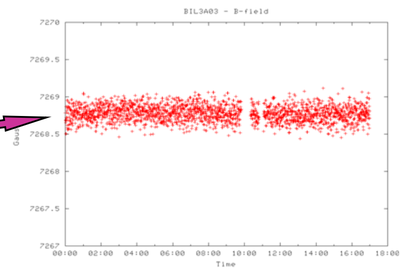
Mezzanines: physics readout

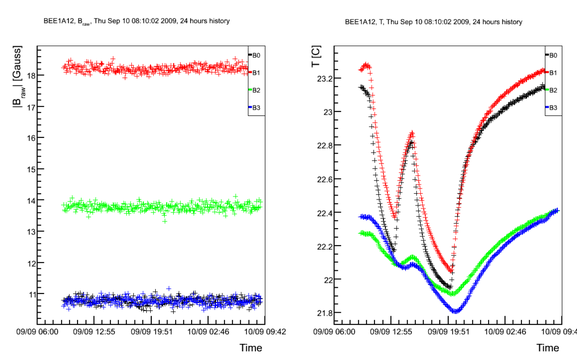
CSM (Chamber Service Module)

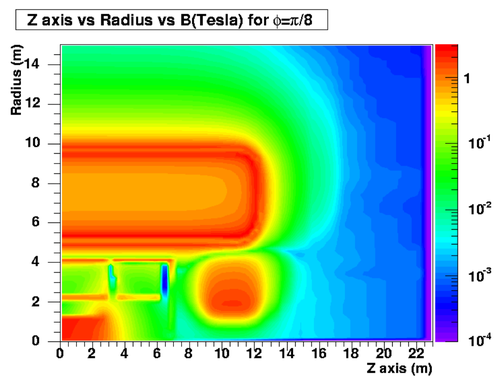
Magnetic-Field



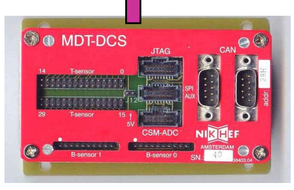
B-sensors: 1773
- Precision 10^{-4}
- Max. field 1.4 [Tesla]
- Calibrated
- Unique ID
- stability < 0.5 Gauss
- Hall-sensor(x,y,z) + T







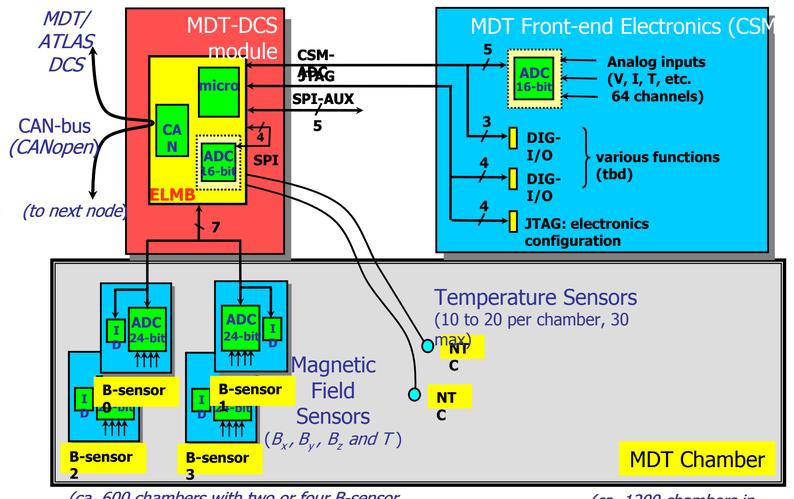
DCS – CAN-bus based



MDM (MDT-DCS-Module)
- Based on ELMB
- CAN field-bus
- 64 channel 16bit ADC
- 24 digital I/O

Sub-systems covered:
- T: Temperature
- B: Magnetic-field
- FE: Front-end electronics:
  - CSM-ADC (V,T)
  - JTAG

Not covered: LV, HV, gas, alignment

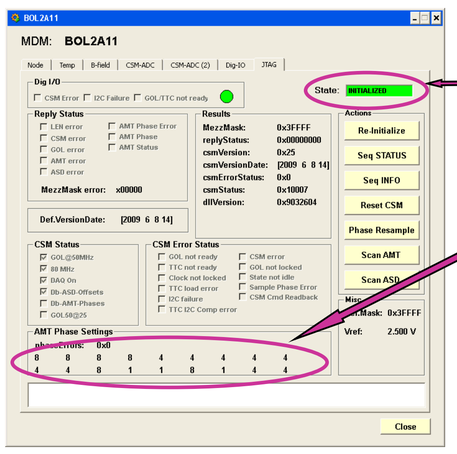


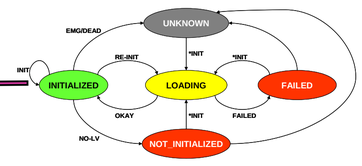
(ca. 600 chambers with two or four B-sensor modules each)

(ca. 1200 chambers in total)

Front-end electronics

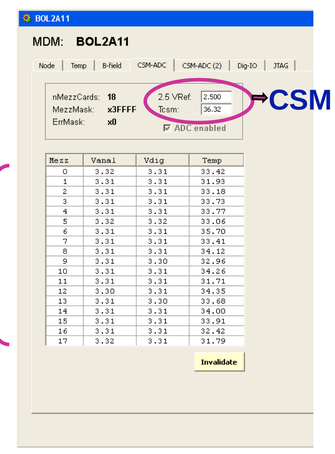
JTAG expert panel



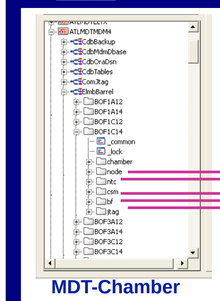


- Max. 18 Mezzanines/chamber
- Monitoring: V & T
- MDT: 14,236 Mezzanines

CSM-ADC



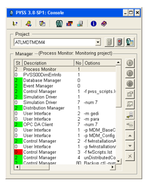
PVSS Datapoint structure

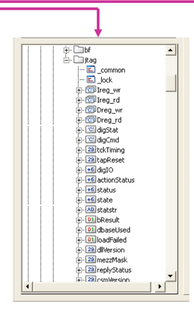


PVSS-Project / PC
- 12 CAN-buses
- ± 150 MDT chambers
- ± 100,000 datapoint elements
- ± 4,000 _address configs

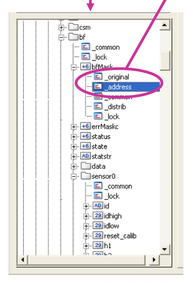
OPC

MDT-Chamber

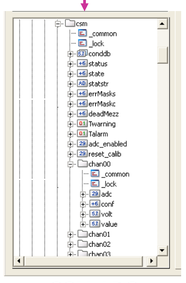




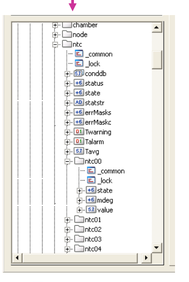
JTAG



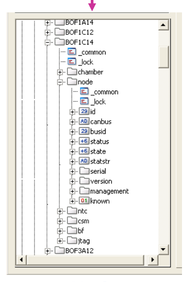
Magnetic-field



CSM-ADC



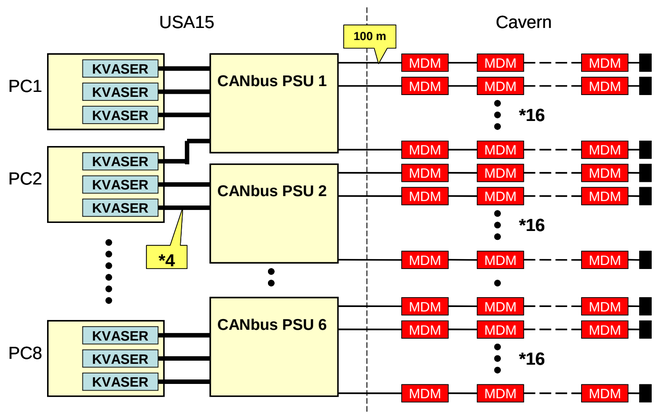
Temperature



Node

Hardware Configuration

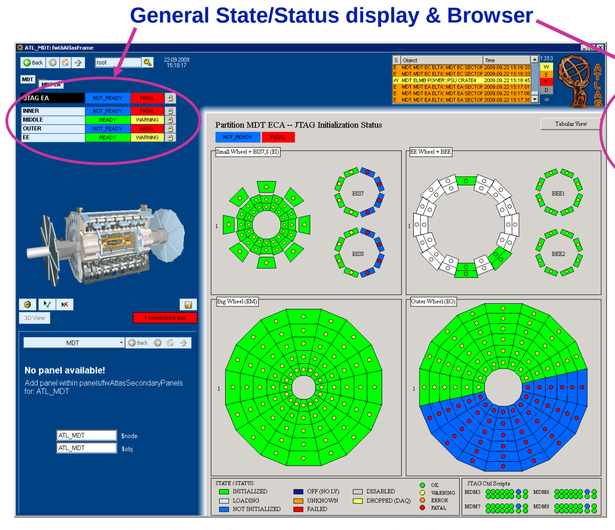
USA15

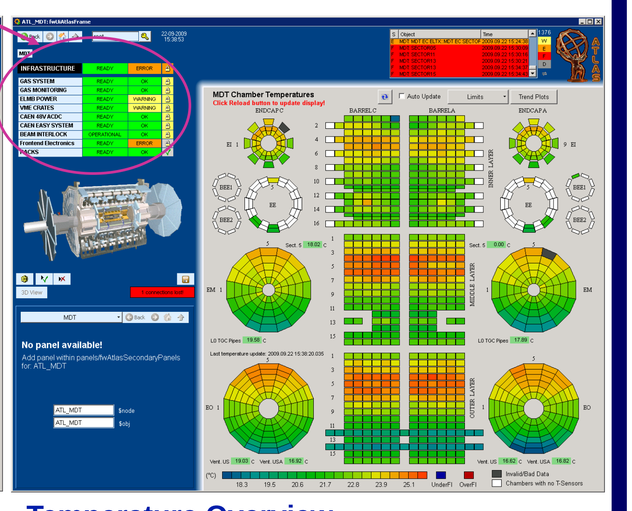


- 8 PCs + 1 super-visor + 1 spare
- 96 CANbuses (90 in use)
- 6 power crates * 16 PSUs

FSM

General State/Status display & Browser



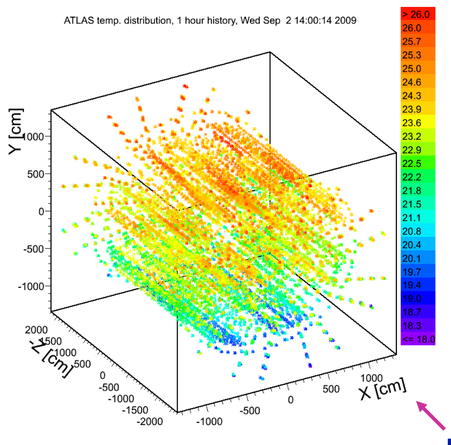


Example: JTAG endcap side-A

Temperature Overview

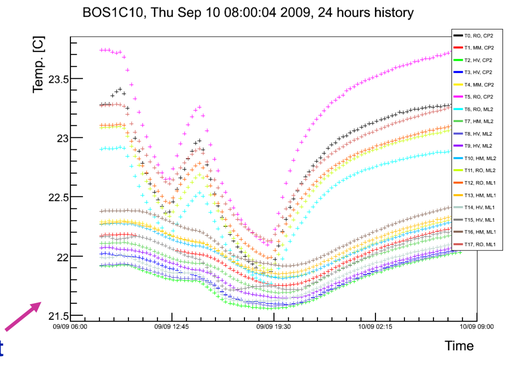
FSM-concepts:
- Setup/Maintain MDT ready for physics
- Tree structure: commands ↓ , states ↑
- Abstract model: summary information

Temperature



Daily report

T-sensors: 12,236



References

[1] ELMB Documentation; https://twiki.cern.ch/twiki/bin/view/Atlas/DcsElmb
[2] H.Boterenbrood, “MDT-DCS CANopen Module”; http:/www.nikhef.nl/pub/departments/ct/po/html/MDT/MDT-DCS-CANnode.pdf