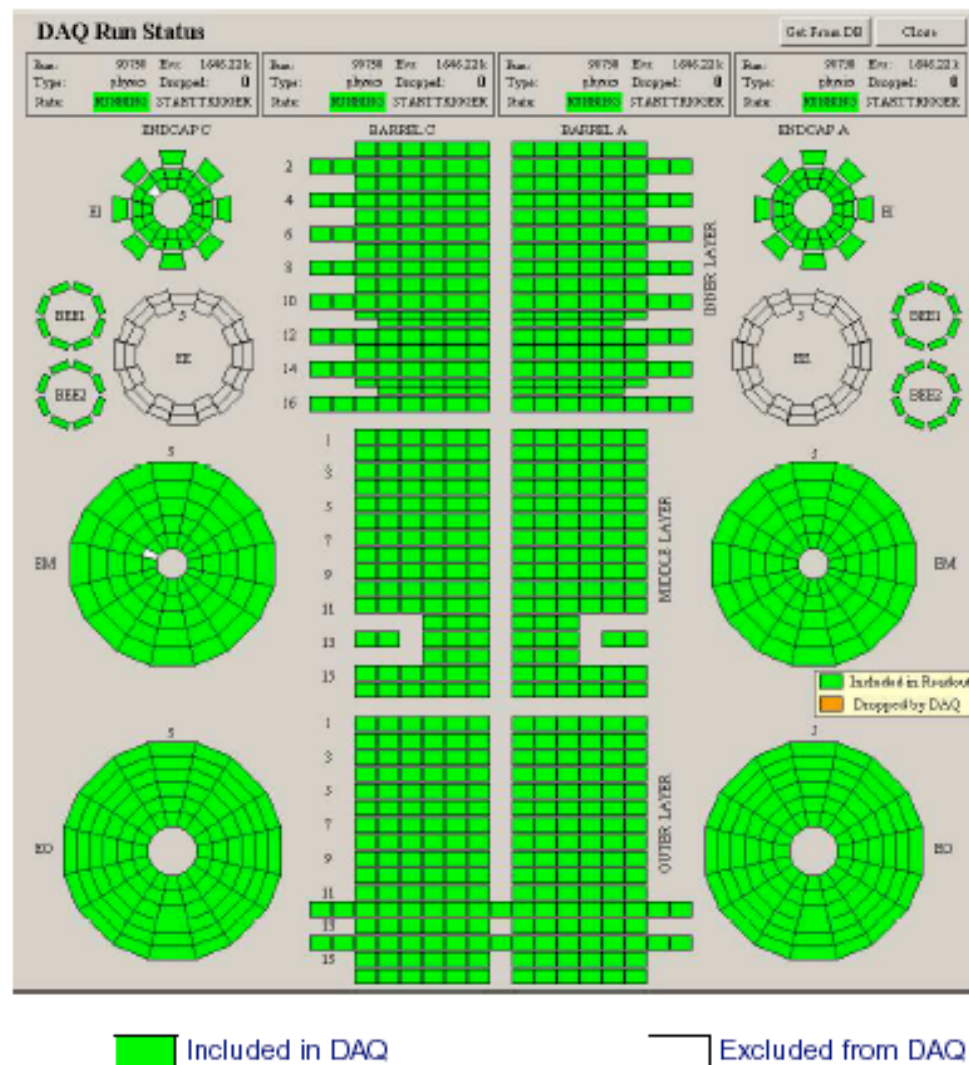


Status MDT

Giovanni Maccarrone
LNF

MDT R.O. Status

- **99.8% of 1088 MDT chambers included** in read-out
 - Complete barrel
 - 2 endcap chambers missing: no access
- Stable initialization
- **Stable running**
- Chambers with problems dropped without stopping run
 - Automatic re-inclusion: Work in progress



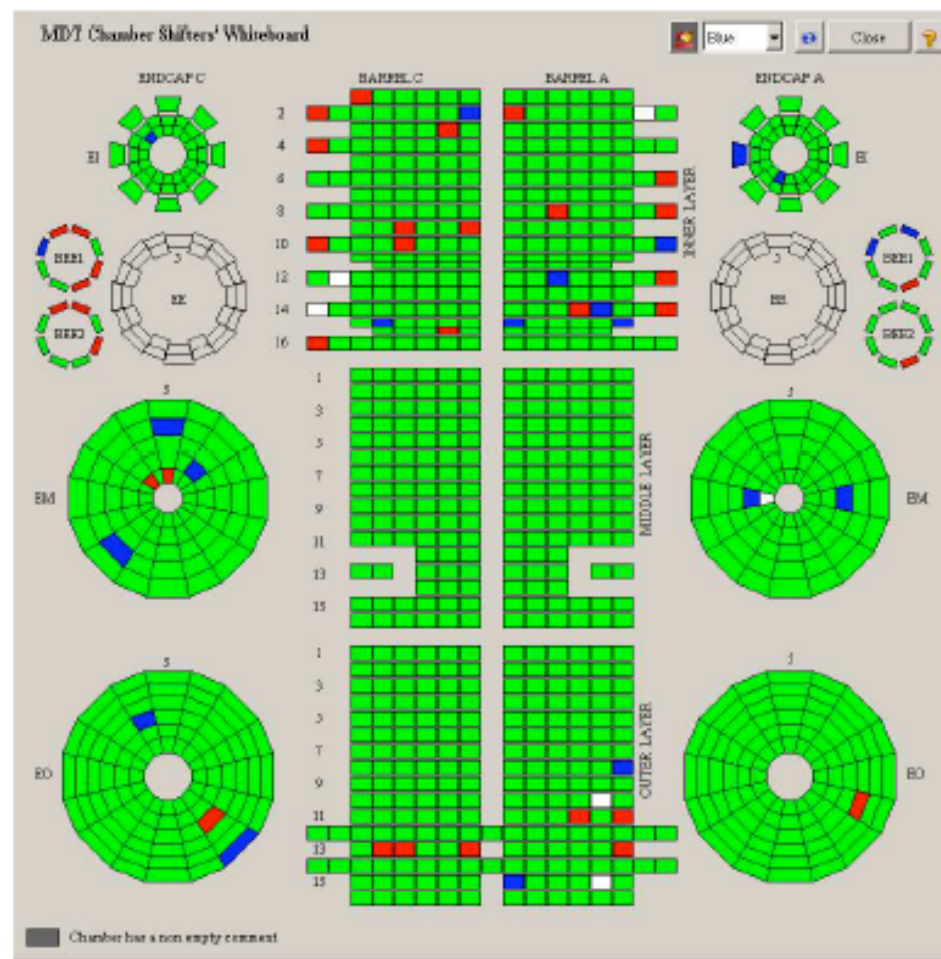
MDT Running Problems

98.5% of 1088 MDT chambers operational with HV

- 6 gas problems
 - 2 MDT disconnected (1 BOL, 1 BIS8)
 - 4 multilayer disconnected
 - **Will be reduced to 0 in shutdown**
- 36 HV problems
 - Multilayer or single tube layer disconnected
 - **Will be reduced to single tube layers or single tubes**
- 23 Read-out problems
 - 2 MDT excluded
 - Single FE cards (24 tubes) or smaller
 - **Will be reduced in shutdown**
BIS/BIL might be impossible to fix (no access)

Only problems left at chambers with difficult or no access

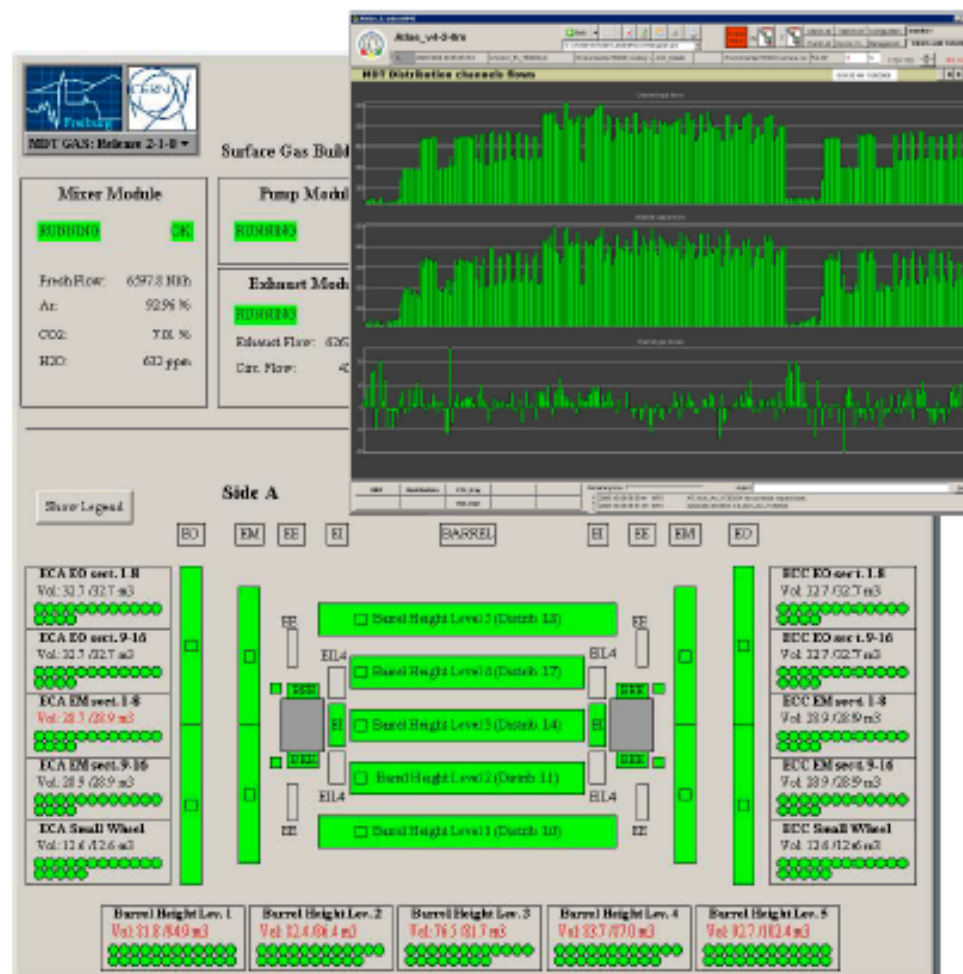
Currently 1.5% of 338640 channels dead
Aim: 0.2% after shutdown



MDT Gas

MDT Gas System

- Largest LHC gas system
 - Volume: $\sim 700 \text{ m}^3$ at 3 bar
 - 1 volume exchange per day ($\sim 100 \text{ m}^3/\text{h}$)
 - 5% fresh gas input flow
 - 274 channel (1/2 – 2 MDT sectors)
- Fully operational
- Water injection ready to be tested
- Problems:
 - Spurious read-out problems in 1 of 15 gas racks in UX15 (under investigation)
 - Few broken pressure sensors (already exchanged)



Many thanks to the CERN gas group for their work and excellent support

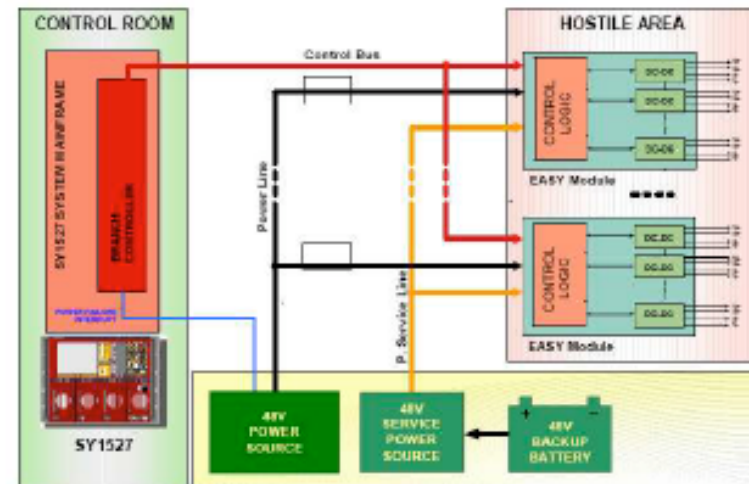
MDT DCS

- **Almost all sub-tasks implemented into FSM**
 - ✓ Power system (LV and HV)
 - ✓ Initialization
 - ✓ Front-end electronics monitoring
 - ✓ B-field and temperature sensors
 - ✓ Gas system
 - ✓ Endcap alignment
 - ✗ Barrel alignment
- DCS status to COOL
 - On-going work
 - Data: LV and HV status change with multilayer granularity
 - Need to define algorithm to calculate detector status DQA flags

DCS very advanced — only very few features missing

MDT Power Supply

- MDT LV and HV (and CSC HV) based on **CAEN EasyCrate** system
 - 14 branch controller in USA15
 - 130 LV modules in UX15
 - 194 HV modules in UX15
 - 18 48V-generators in US15
- Finally **all modules delivered**



Problems

- **High failure rate** of HV modules
 - Still ~5% (but down from 20%)
- Issues with **stray currents** on all HV boards
- **Kill signal not** working **reliably** (probably firmware issue)
- Observed at least 2 **channel ramping** voltage to hardware limit (3400 V) **without** being issued any **command**
- Several **channels oscillating** up to 2000 V in **OFF** condition when neighboring channel is on
- Glitches of 48V-generators

CAEN power supplies are potentially our biggest problem

MDT Alignment

Aim: Measure chamber alignment with $30\ \mu\text{m}$ accuracy

Endcap

- Routine acquisition/reconstruction since August 2008
- **98–99% of sensors working** within each wheel
- Polar sensors: **99%** (C-side), **96%** (A-side) working
- Performance near specifications:
Sagitta error: $50\ \mu\text{m}$ (absolute meas.)
- Chamber positions stable within $100\text{--}200\ \mu\text{m}$ (timescale days to months)
- EI, EM chamber movements of several mm when toroids switched on

Barrel

- Routine acquisition/reconstruction since several month
- **99.4% of sensors working**
 - **All projective lines working**
- No absolute measurement from optical alignment system alone
 - **Current sagitta error: $100\text{--}200\ \mu\text{m}$**
 - Initial barrel geometry to be determined with straight tracks
- Chamber positions stable within $100\text{--}200\ \mu\text{m}$ (timescale days to months)
- Toroid distortions of several mm when switched on (monitored by ref. system)

Optical alignment system in very good shape

See: Ch. Amelung, *Status of Alignment Constants in Barrel and Endcaps*, ATLAS Performance and Physics Workshop, Oct. 2nd, 2008

I. Potrap, *Status of Barrel Alignment*, ATLAS Performance and Physics Workshop, Oct. 2nd, 2008

I. Potrap, *Muon Alignment with Tracks*, ATLAS Week, Oct. 7th, 2008

MDT Winter Shutdown Activities

Premessa: Le camere MDT sono di fatto un rivelatore commissionato per cui sarebbe piu corretto parlare di una maintenance “ordinaria”.

Nov08-Gen09: Aggiornamento dei CSM delle camere del barrel per raddoppiare la velocita' di trasmissione verso i ROD. Questo aggiornamento e' gia' funzionante per le camere endcap.

Gen09-Feb09: Soluzioni dei problemi con camere problematiche per gas, HV, RO.

Feb09-Mar09: Installazione delle rotaie delle camere BEE nonche' di alcune camere in base al base al tempo disponibile, certamente le quattro del settore 5.

Mar09: Sostituzione delle fibre delle camere delle BW con altre resistenti alle radiazioni. Per fare cio' sara' necessario aprire la BW e quindi avere il Calorimetro chiuso. E' necessario circa un mese in tutto.

Se ci fosse ulteriore tempo a disposizione si monteranno altre camere EE a partire dai settori large 1,3,7,9.

Sara' necessario spostare alcune camere BIL e BML per permettere l'accesso ad altre parti del rivelatore.

MDT After Closure Activities

Premessa: Al momento I problemi legati all'incidente di Settembre sembrano non modificare la schedula LHC. Marzio nella sua presentazione all'ultima Atlas week ha confermato Aprile come data di chiusura!

Con la schedula attuale i tempi per la realizzazione di quanto previsto dal T.M. sono stretti, non tanto per le camere MDT quanto per altre componenti di Atlas, muoni e non.

Nell'ipotesi di uno slittamento della data di partenza di LHC a dopo l'estate lo scenario ragionevole delle attivita' per le camere MDT nel periodo Aprile-Settembre 2009 potrebbe essere questo:

Apr09-Mag09: Completamento se necessario della sostituzione delle fibre delle camere delle BW e installazione di quante piu camere possibili delle EE

Mag09-Giu09: Commissioning delle camere in modo standalone e costante integrazione in Atlas

Lug09-Ago09: Cosmic run in diverse condizioni.

Per la fase di commissioning e cosmic run sono previsti 3 persone in shift per gli items DCS e DQ, inoltre sono previsti 2*3 persone ai calibration centers, 2 per alignment e 3 experts on-call per DCS, Gas, DQ