MDT EE Pit Commissioning Results and Status on MDT Configuration DB Works

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28 May 2013

Outline

- EE Chamber A-side commissioning
  - Status/ Goals
  - HV/LV and Readout mapping
  - T/B sensor tests
  - MDT Alignment
  - MDT EE Gas system
  - Noise Run with HV
- MDT Configuration Database
  - Updated MDT Config DB Status
  - Ongoing and forseen tasks

EE A-side Installation

- Installation completed in April: 4 large (certified in BB5) and all 8 small (tested in B180) sectors

Inclusion of these chambers brings the Muon Spectrometer up to the original TDR!

Sector	Installation Date
EELA15	March 4
EELA01	March 20
EELA07	March 28
EELA09	April 2
EESA14	April 5
EESA16	April 8
EESA02	April 8
EESA04	April 9
EESA12	April 10
EESA10	April 11
EESA08	April 11
EESA06	April 12

Claudio Ferretti – UM
Jiaming Yu – UM

EE Chamber A-side Commissioning Status

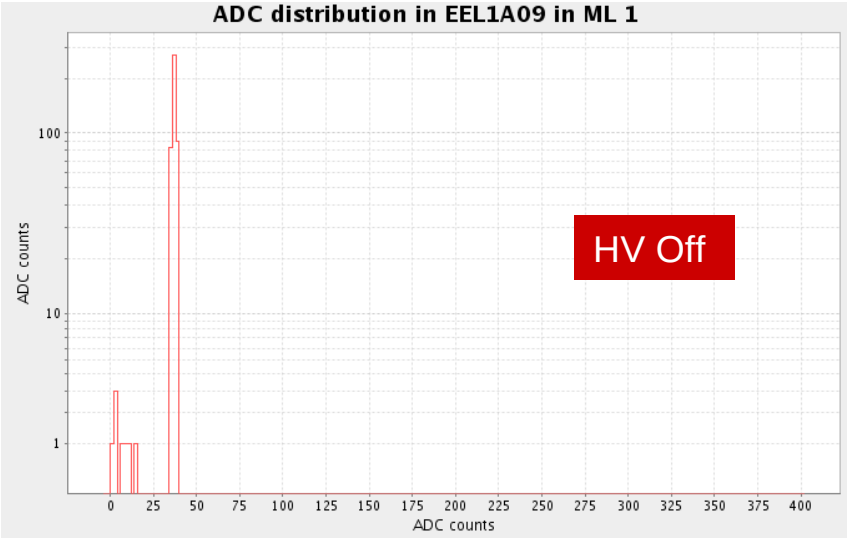
- Pre-commissioning started on Jan 15 and finished around Mar 1
- Cable services started on March 15 (Claudio, Haolu,Tiesheng, Zhen)
- P1 Control Room commissioning started on April 15
  - 4 experts in the pit : Tiesheng, Claudio, Haolu, Zhen
  - 12 shifters trained and 7 worked in control room: Alex, Koen, Liang, Lidia, Louis, Tom, Xin
  - Completed on May 15!
- MDT Alignment (Christoph, Andrei)
  - Completed on April 26
- MDT EE Gas system (Joerg, Haolu, Jiaming, Claudio, Zhen)
  - Training new MDT gas system experts: Claudio, Haolu, Jiaming
  - Completed on May 11-12

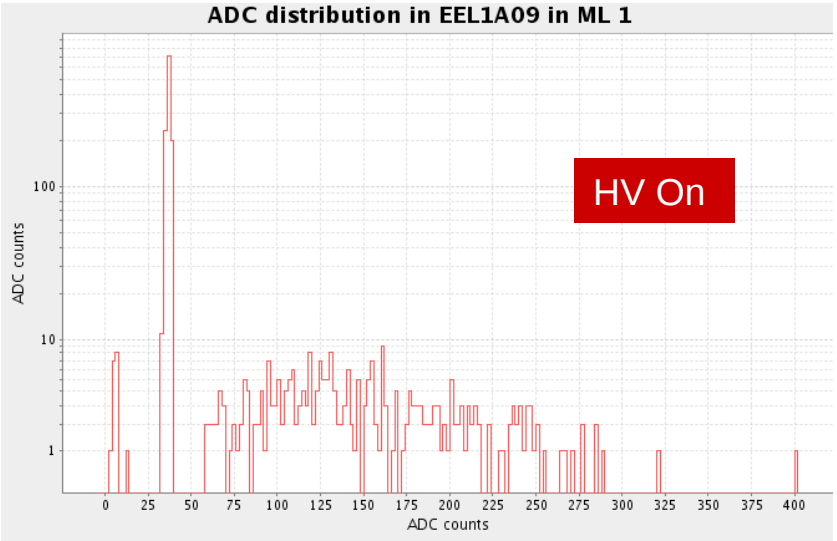
EE Commissioning Goals

- Functional alignment system and consistent results with the survey
- Chamber adjusted to the final position
- CANBUS and DCS fully operational
- Functional front-end electronics and working JTAG initialization
- Continuous monitor of B-field, Temperature and Voltage Sensors to ensure stable readout
- Chamber able to hold HV 3080V with low dark current
- Correct mapping for LV, HV
- Correct mapping for DAQ readout
- No unexpected noise
- TDAQ works properly for these chambers and gives correct readout
- No gas leaks
- No unexpected dead tubes/channels
- Reasonable ADC (peaked around 100 ns) and TDC distributions

HV/LV and Readout Mapping

- LV Mapping
  - Turn on LV sector by sector and measure GOL fiber light
- HV Mapping
  - Hardware: Measure HV with 30V directly at multilayer level
  - Software: turn on/off HV for each multilayer and check DAQ reading (ADC distribution, etc)
- Readout Mapping
  - Test that JTAG initialization mapped to right sector at both hardware and software level



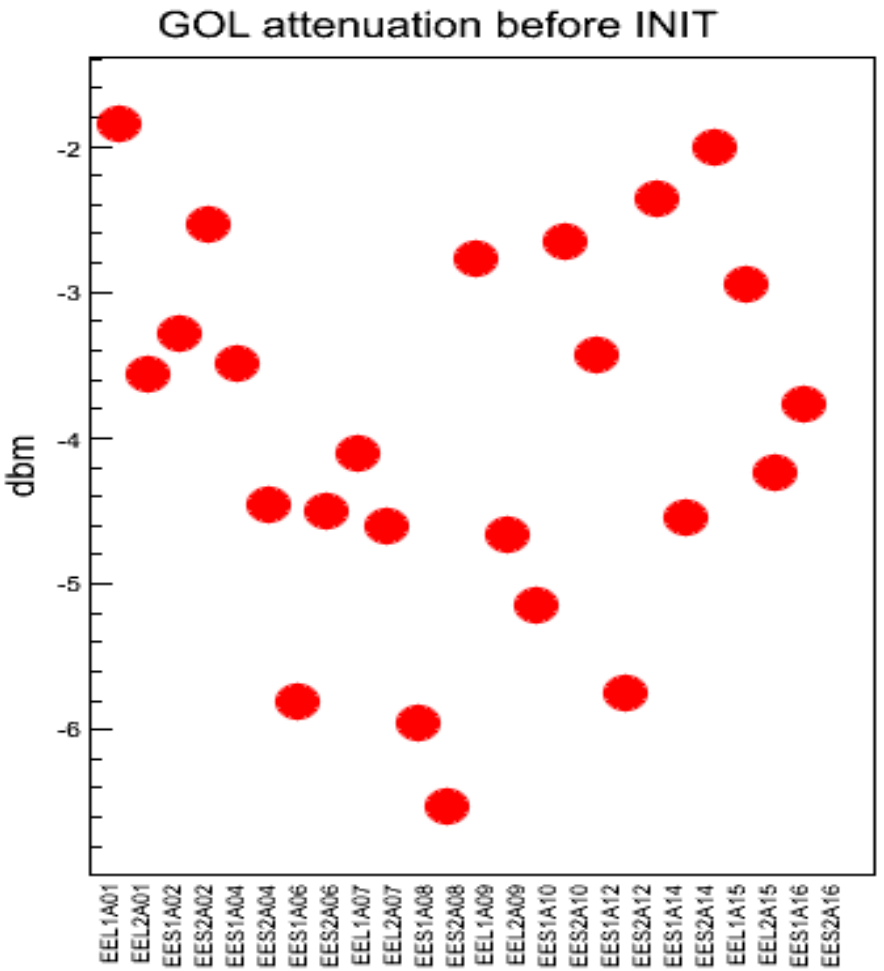


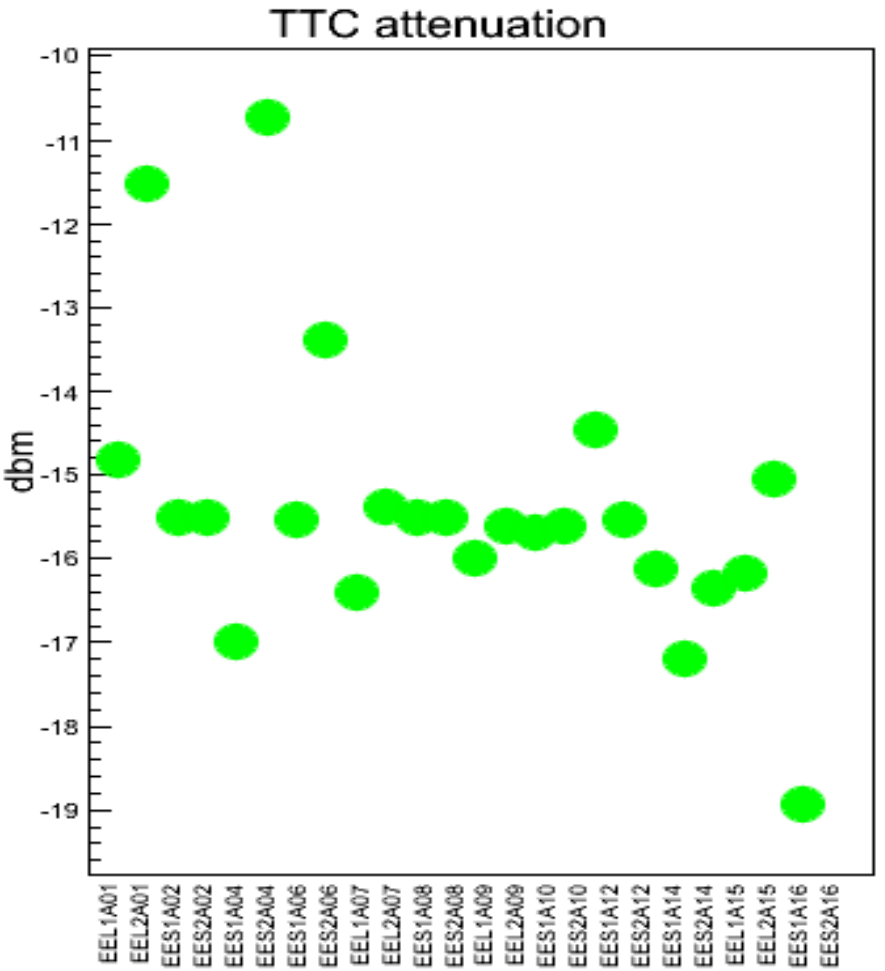
Fiber Light Measurements

EES1A06 fiber too weak, replaced week of 2 May

EEL1A15 fiber broken, switch to spare fibres last week

Claudio Ferretti - UM



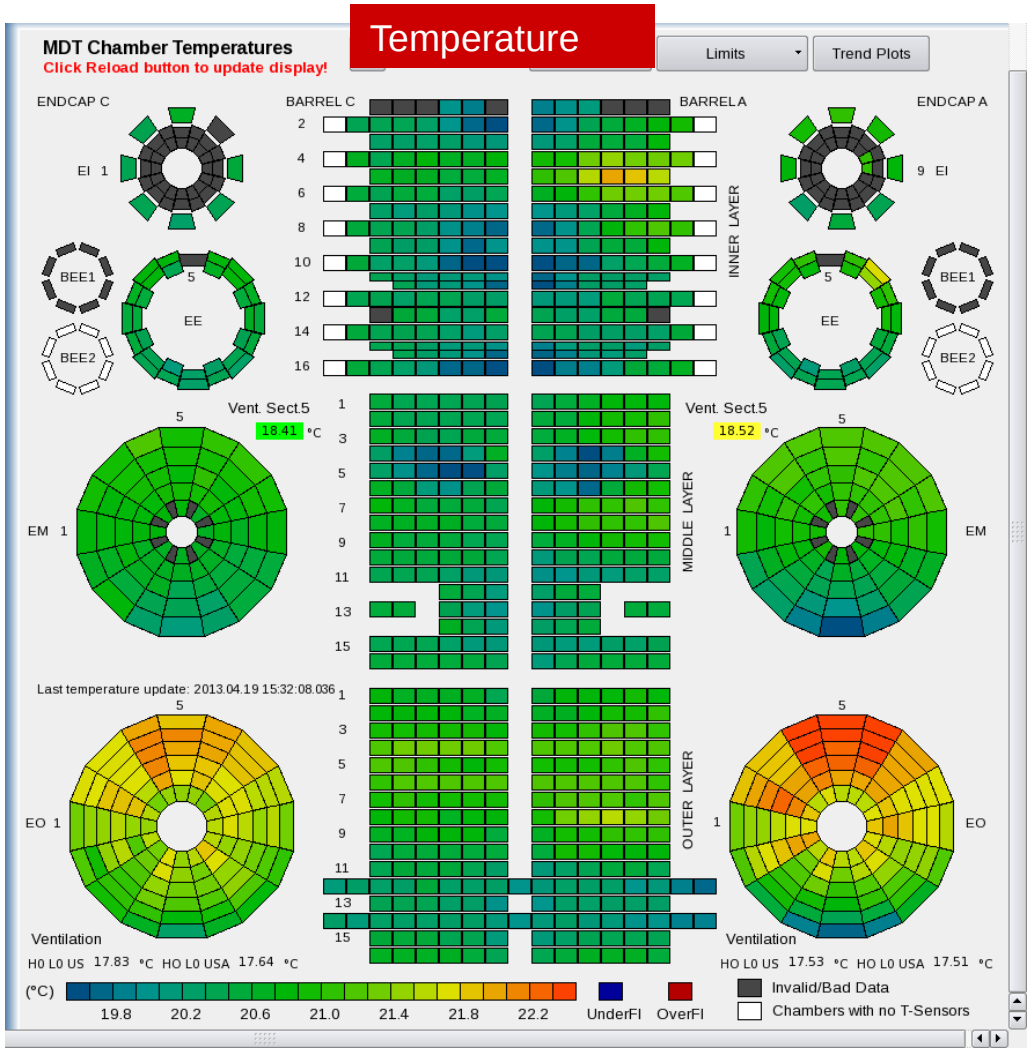


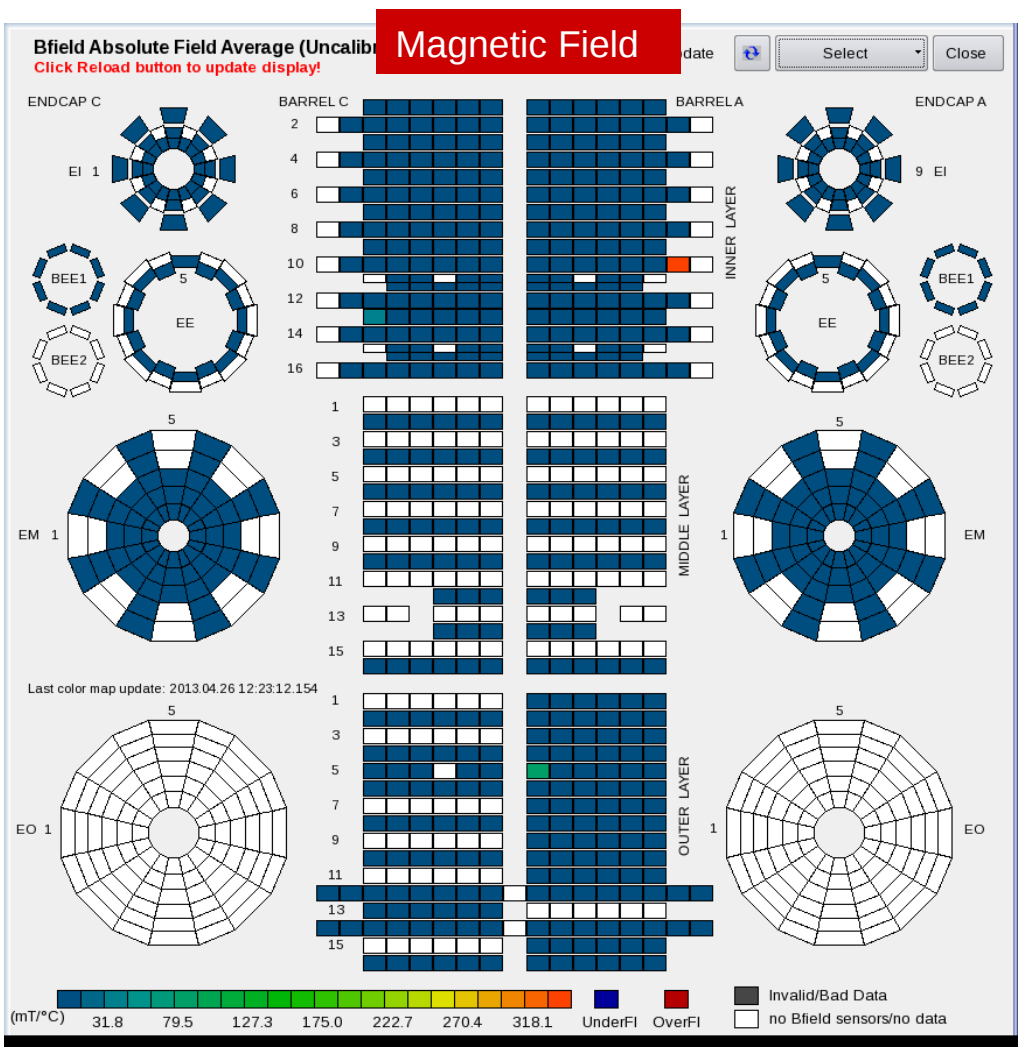
Voltage Mapping and Readout

Chamber	LV Mapping	HV Hardware	HV Software	Readout Software
EEL1A01	ok	ok	ok	ok
EEL2A01	ok	ok	ok	ok
EES1A02	ok	ok	ok	ok
EES2A02	ok	ok	ok	ok
EES1A04	ok	ok	ok	ok
EES2A04	ok	ML1,ML2 Crossed - Fixed	ok	ok
EES1A06	Replaced optic fiber on MROD	ok	ok	ok
EES2A06	ok	ok	ok	ok
EEL1A07	ok	ok	ok	ok
EEL2A07	ok	ok	ok	ok
EES1A08	ok	ML1,ML2 Crossed - Fixed	ok	ok
EES2A08	ok	ok	ok	ok
EEL1A09	ok	ok	ok	ok
EEL2A09	ok	ML1,ML2 Crossed - Fixed	ok	ok
EES1A10	ok	ML2 Crossed w/ 2A10 - Fixed	ok	ok
EES2A10	ok	ML2 Crossed w/ 1A10 - Fixed	ok	ok
EES1A12	ok	ok	ok	ok
EES2A12	ok	ok	ok	ok
EES1A14	ok	ok	ok	ok
EES2A14	ok	ok	ok	ok
EEL1A15	Fiber box replacement - Fixed	ok	ok	ok
EEL2A15	ok	ok	ok	ok
EES1A16	ok	ok	ok	ok
EES2A16	ok	ok	ok	ok

Temperature and Magnetic Sensors

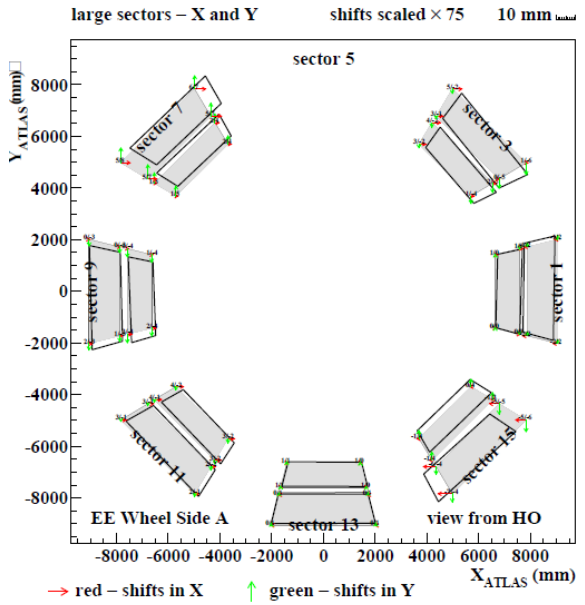
- Checked all sensors in all chambers
  - EE A-side OK in the DCS FSM except for 1 chamber T sensor

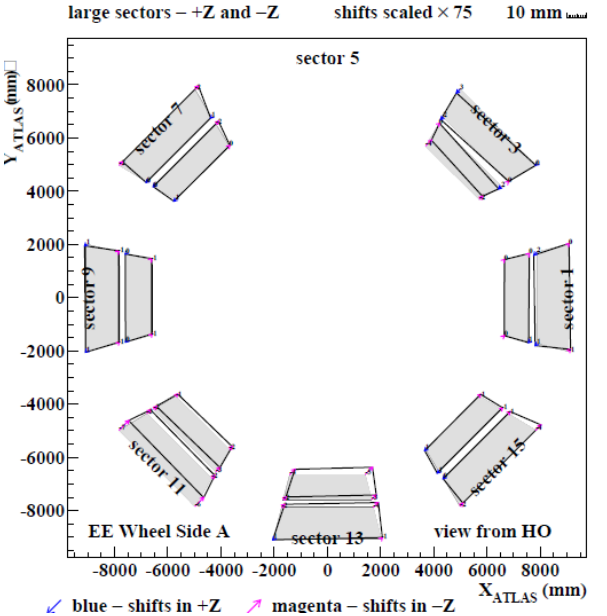




EE Chamber Alignment

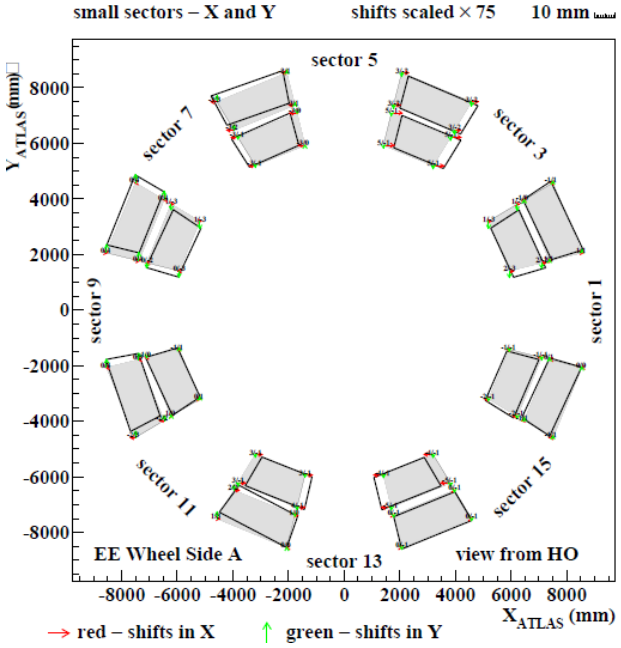
- All EEL and EES chambers and alignment bars positioned on April 26.



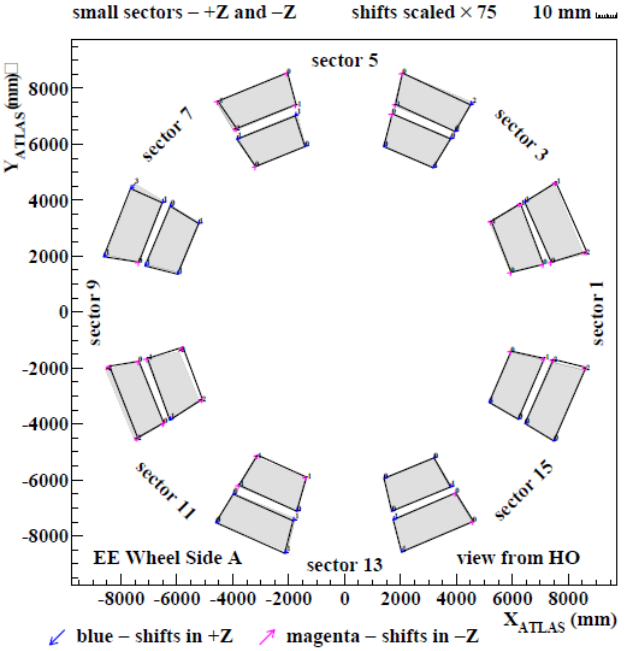


EEL Chambers

Cristoph Amelung – Brandeis



EES Chambers



MDT Gas Services

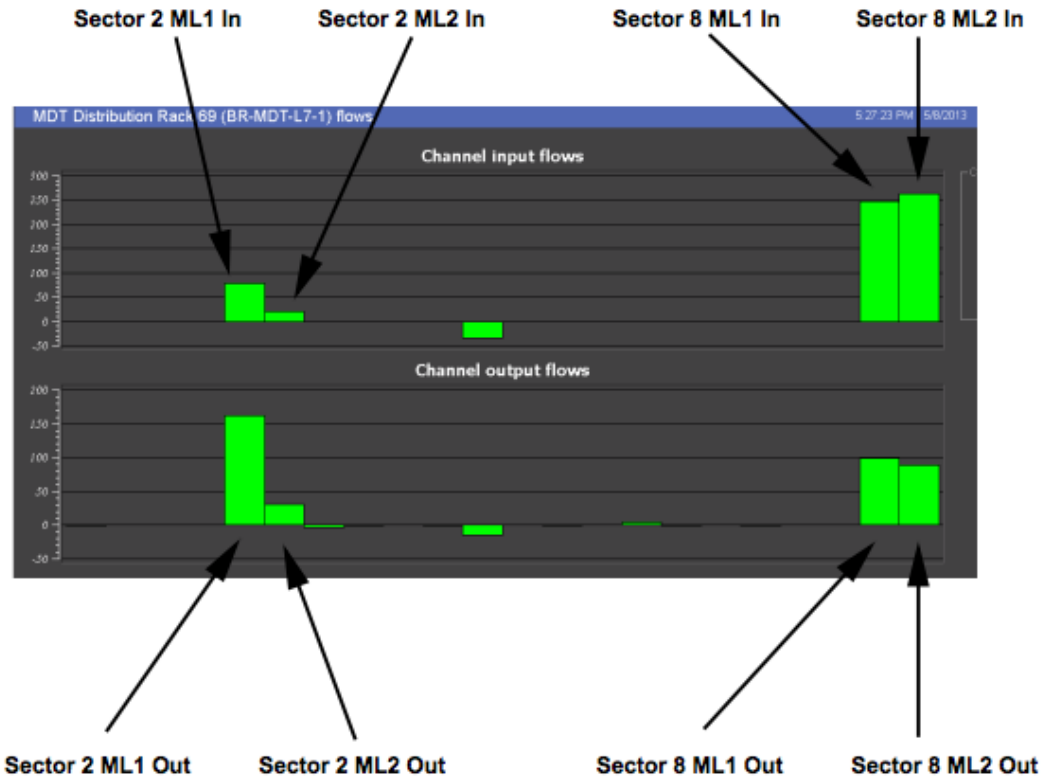
All EE chambers connected to gas system – Completed on May 7

All EE chambers purged with fresh gas and included in gas system – The last sectors, 2 & 8, were purged May 8-10

Gas leak tests show no leaks (< 3mbar) – Final measurements done on May 11-12

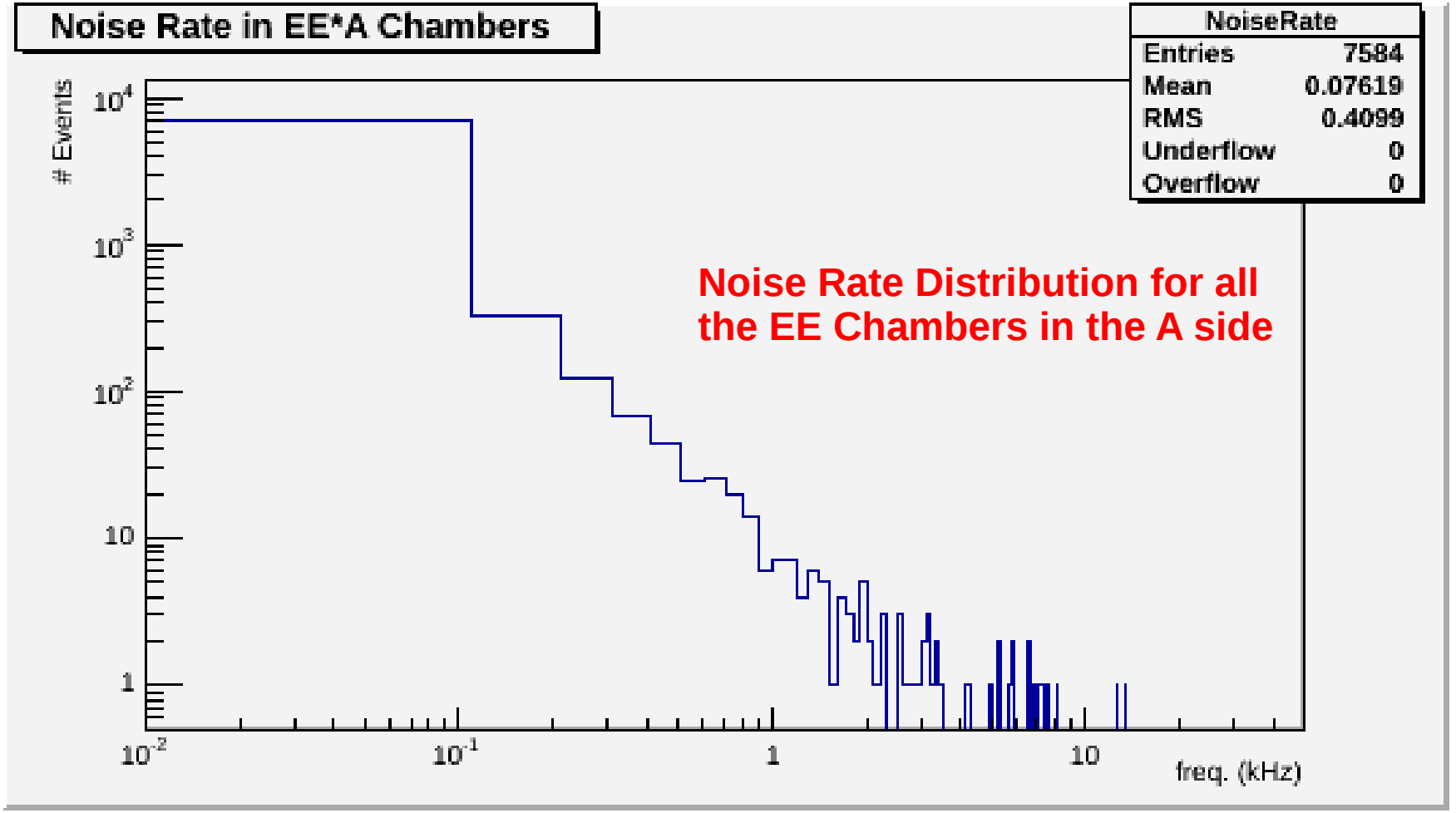
No major problems observed except in sector 2:

- Flow mismatch observed in sector 2 when started purging
- Traced to swapped connections between ML1 In and ML2 Out valves and manifolds for both EES chambers (pipes installed by TC in 2006), effectively connecting all ML either to only inputs or outputs.
- Fixed



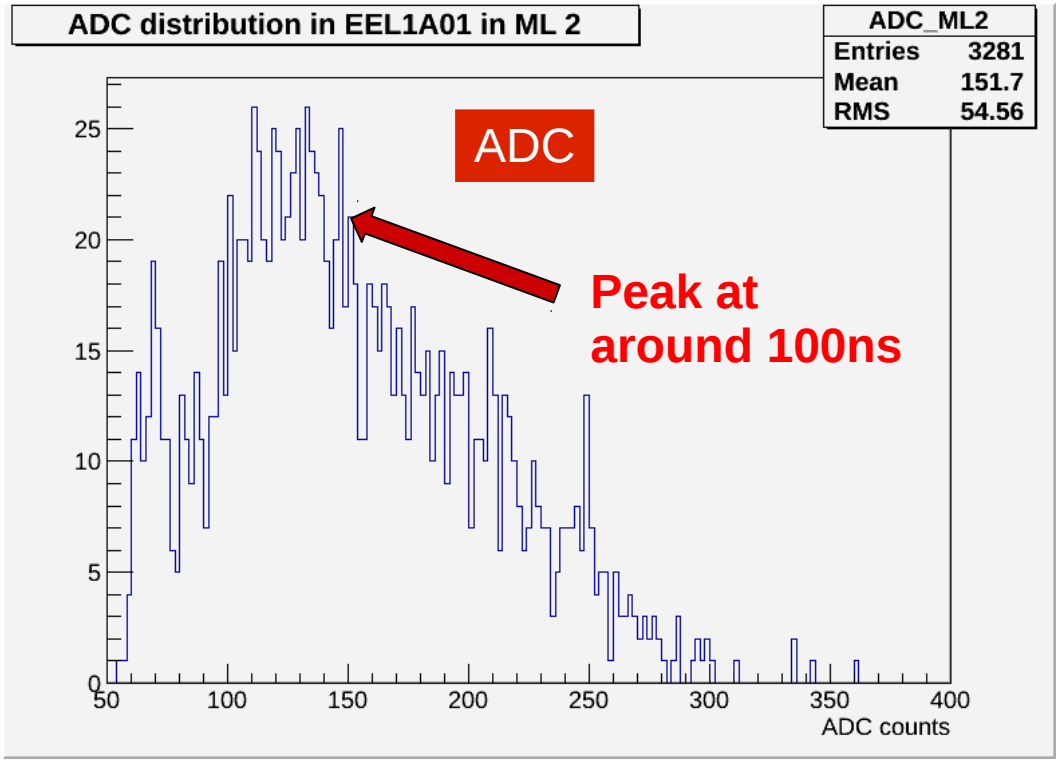
Noise Run with HV

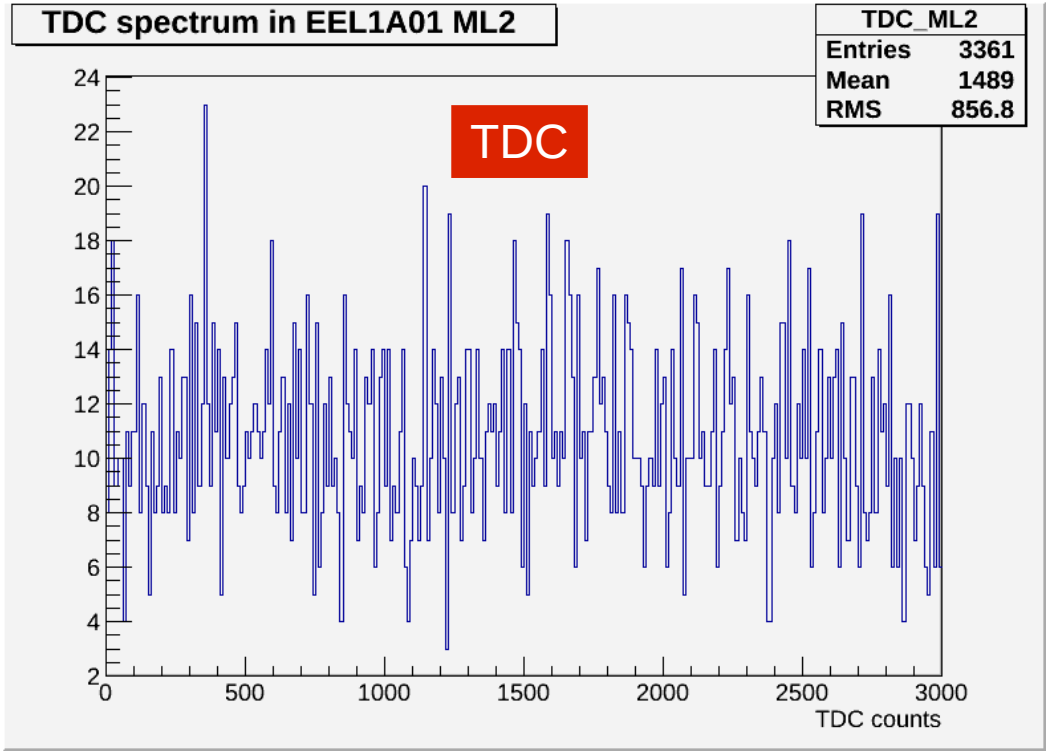
Each run lasted for 7-8 hrs. (May 13-15)
Most large sectors recorded hits in every tube.



Noise Run with HV

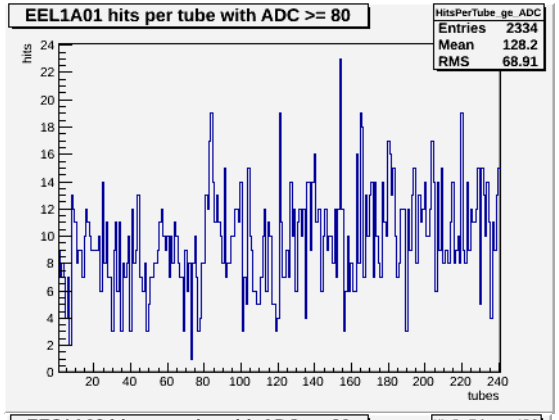
Reasonable ADC (peak at around 100ns) and TDC (flat) distributions.

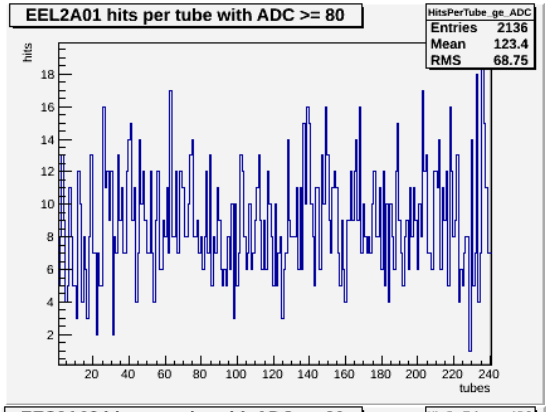




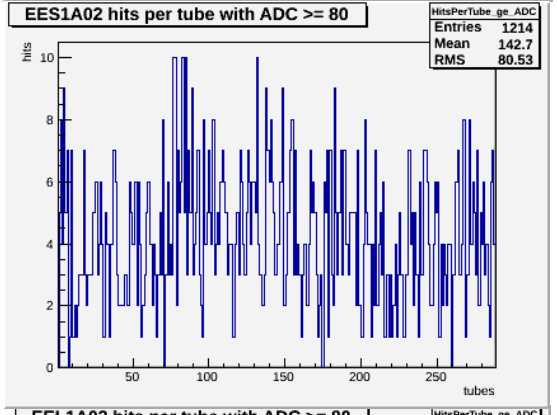
Noise Run with HV

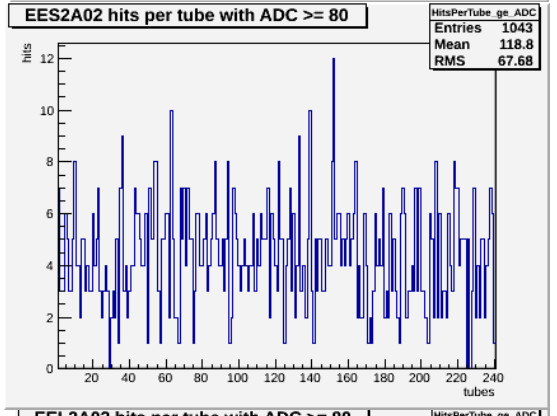
Dead tubes determined by hits per tube with ADC>=80



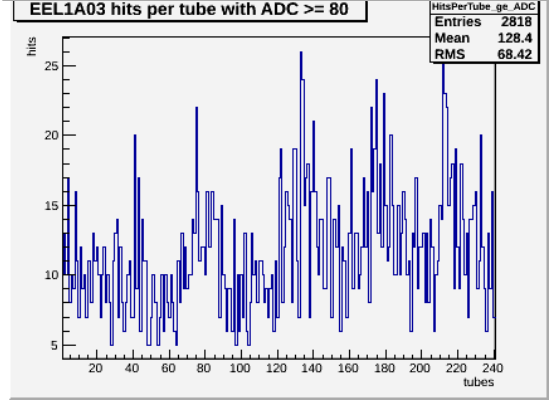


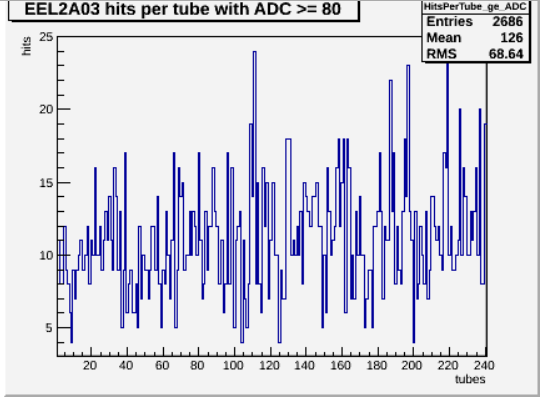
Sector 1





Sector 2





Sector 3

MDT Configuration Database

Tasks done:

Integrated new installed EE side A chambers

Added new python management tools

An example to list disabled Mezz cards

```
listDisabledMezz.py: Querying (ATONR) for a list of disabled Mezzanine cards.nine cards.
| INFO Sending summary e-mails to: h.cheng@cern.ch
| INFO with cc to: ['dai1568@gmail.com']
  atonr_r :    BIS2A08       1015       1023   Disabled Mezz    3
  atonr_r :    BIS2A14        959       1023   Disabled Mezz    6
  atonr_r :    BIS3C04       1021       1023   Disabled Mezz    1
  atonr_r :    BIS4C14       1015       1023   Disabled Mezz    3
  atonr_r :    BIS1C16       2047       4095   Disabled Mezz   11
  atonr_r :    BIS1C02       4091       4095   Disabled Mezz    2
  atonr_r :    BMS1A08      16255      16383   Disabled Mezz    7
  atonr_r :    EIL1C05       4091       4095   Disabled Mezz    2
  atonr_r :    EIS1A14      16127      16383   Disabled Mezz    8
  atonr_r :    EMS2A08      65527      65535   Disabled Mezz    3
  atonr_r :    EMS2C12      62463      65535   Disabled Mezz   10  11
  atonr_r :    EOS3A02      14335      16383   Disabled Mezz   11
  atonr_r :    EOS3A16      16127      16383   Disabled Mezz    8
  atonr_r :    EOS4A02       3583       4095   Disabled Mezz    9
  atonr_r :    EOS5C06       3071       4095   Disabled Mezz   10
  atonr_r :    EOS5C02       4087       4095   Disabled Mezz    3
  atonr_r :    EOS5C08       4031       4095   Disabled Mezz    6
  atonr_r :    ESL1A13      5775     245791   Disabled Mezz    4
  atonr_r :    EES1C16       4031       4095   Disabled Mezz    6
  atonr_r : Disabled Me      e cards listed, ALL OK
```

EO chambers disappeared after the commissioning

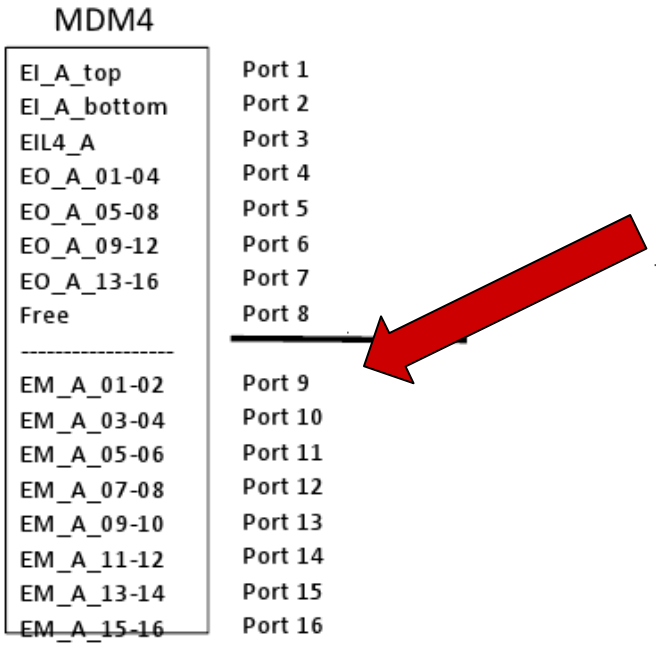
```
listDisabledM      erying (ATONR) for a list of disabled Mezzanine cards.
| INFO Sending summar      ls to: h.cheng@cern.ch
| INFO with cc to: ['da     68@gmail.com']
  atonr_r :    BIS2A08       1015       1023   Disabled Mezz    3
  atonr_r :    BIS2A14        959       1023   Disabled Mezz    6
  atonr_r :    BIS3C04       1021       1023   Disabled Mezz    1
  atonr_r :    BIS4C14       1015       1023   Disabled Mezz    3
  atonr_r :    BIS1C16       2047       4095   Disabled Mezz   11
  atonr_r :    BIS1C02       4091       4095   Disabled Mezz    2
  atonr_r :    BMS1A08      16255      16383   Disabled Mezz    7
  atonr_r :    EIL1C05       4091       4095   Disabled Mezz    2
  atonr_r :    EIS1A14      16127      16383   Disabled Mezz    8
  atonr_r :    EMS2A08      65527      65535   Disabled Mezz    3
  atonr_r :    EMS2C12      62463      65535   Disabled Mezz   10  11
  atonr_r :    ESL1A13     245775     245791   Disabled Mezz    4
  atonr_r :    EES1C16       4031       4095   Disabled Mezz    6
  atonr_r : Disabled Mezzanine cards listed, ALL OK
```

MDT Configuration Database

Tasks done:

Implemented new CANBUS control scheme:

from 12 CANBUS/PC to 16 CANBUS/PC (Reduced PC from 8 to 6)



16-port switch added for the hardware
Into DB? TBD

Added new python management tools

An example to list PC for CANBUS

```
[atint02] /home/hcheng/db/python/trunk/python > python readPCForCANBUS.py %
      readPCForCANBUS.py: Reading PC (ATONR and DEVDB11) for a given CANBUS
| INFO Sending summary e-mails to: h.cheng@cern.ch
| INFO with cc to: ['dai1568@gmail.com']
   devdb11:  PCATLCHARIOT.cern.ch          1            CHARIOT
   devdb11:  PCATLMDTMDM1.cern.ch          1          BI_A01-02
   devdb11:  PCATLMDTMDM1.cern.ch         10          BI_C03-04
   devdb11:  PCATLMDTMDM1.cern.ch         11          BI_C05-06
   devdb11:  PCATLMDTMDM1.cern.ch         12          BI_C07-08
```

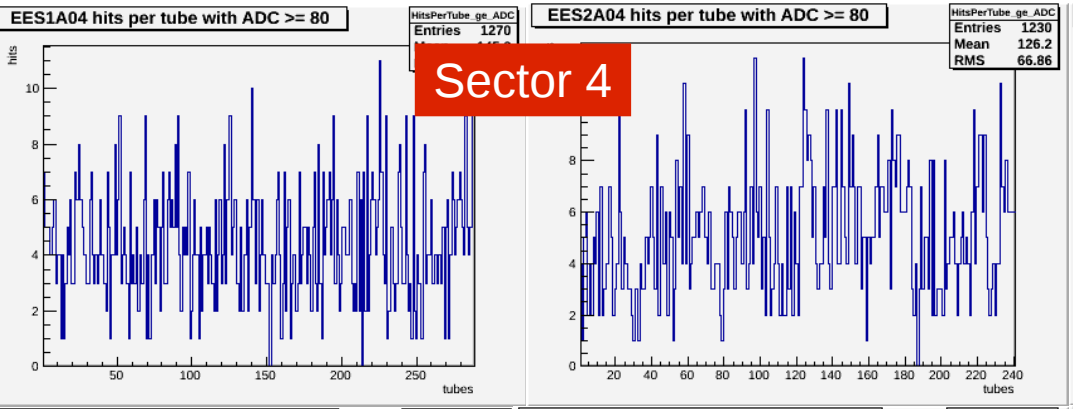
MDT Configuration Database
Ongoing and Foreseen Tasks

- Continue to develop new python management tools to provide new functions, like displaying hardware replacement history
- Update document accordingly
- Insert and integrate new MDT, sMDT and RPC chambers in sector 13 elevator region
- Configuration selection from DCS? Introduce more configurations, such as long latency configuration
- Management tool development especially to deal with multiple configuration
- Tune MDT configuration to minimize MDT integrate gate and threshold for high luminosity
- Support new GUI development

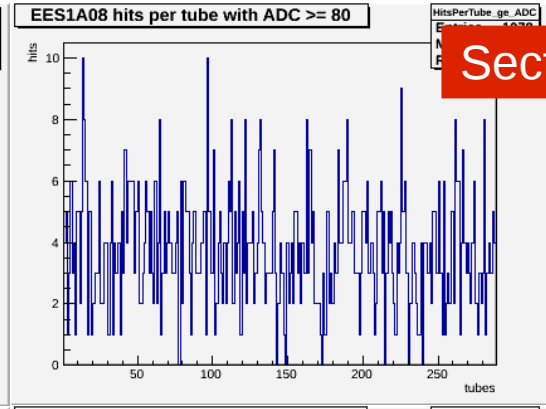
T. Dai - UM
H. Cheng - UM

Backup

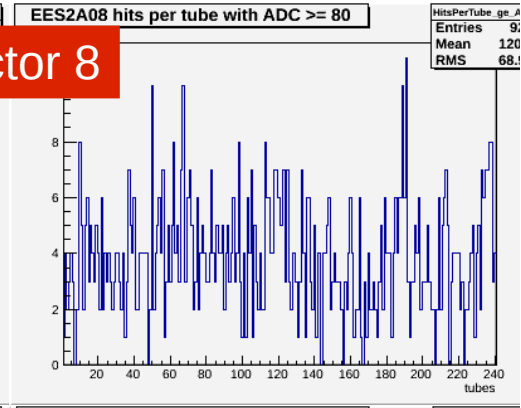
Noise Run with HV

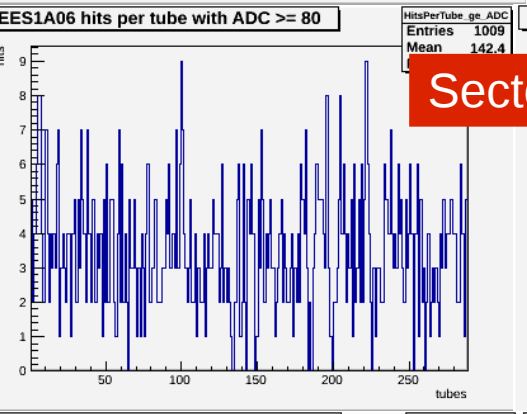


Sector 4

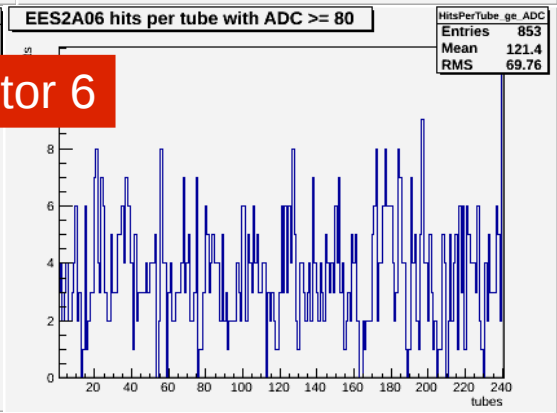


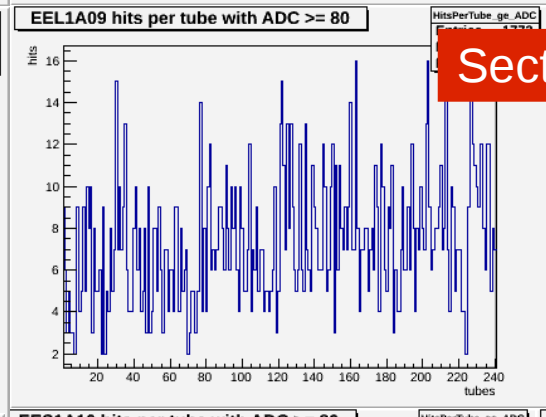
Sector 8



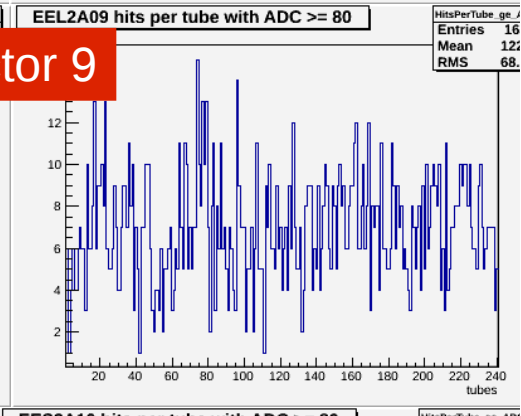


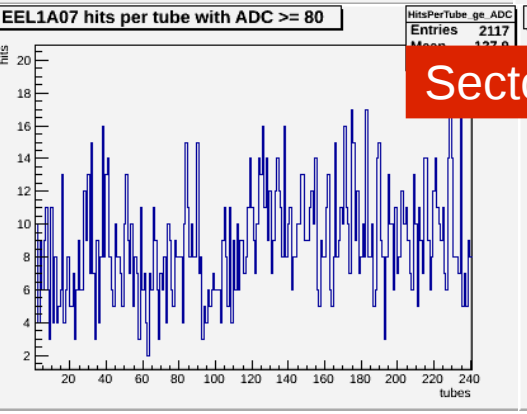
Sector 6



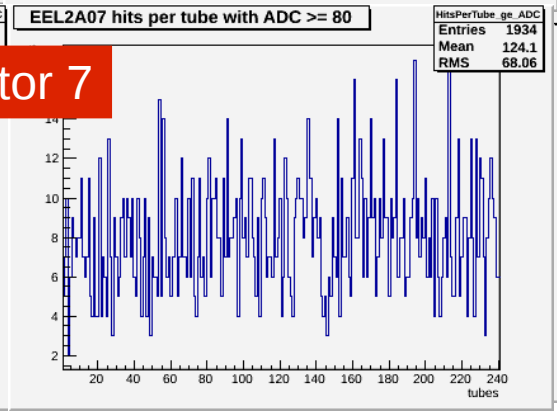


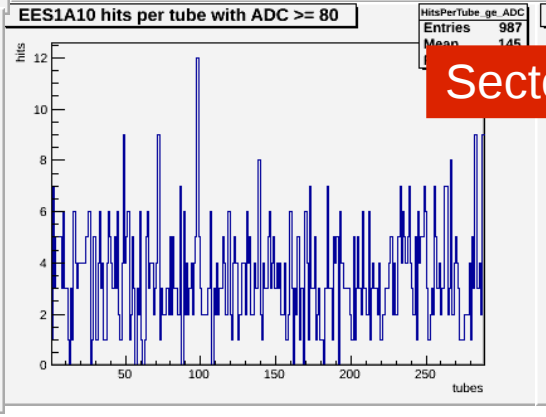
Sector 9



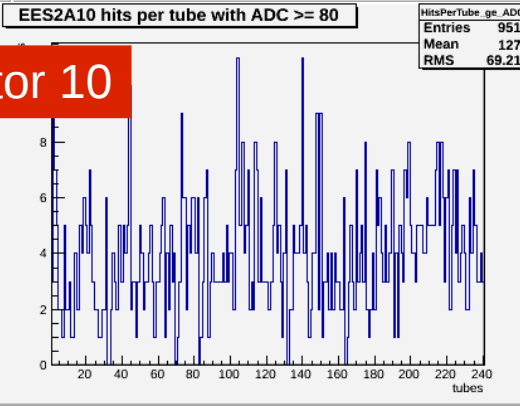


Sector 7

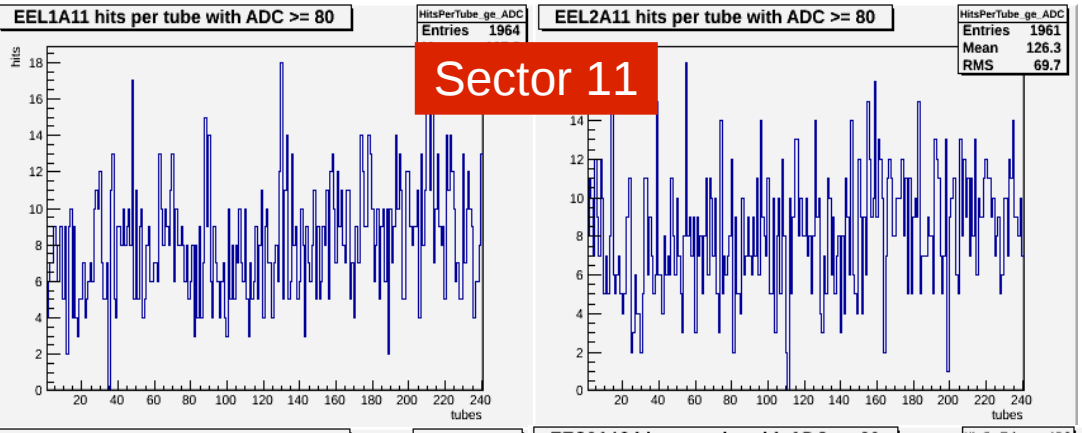




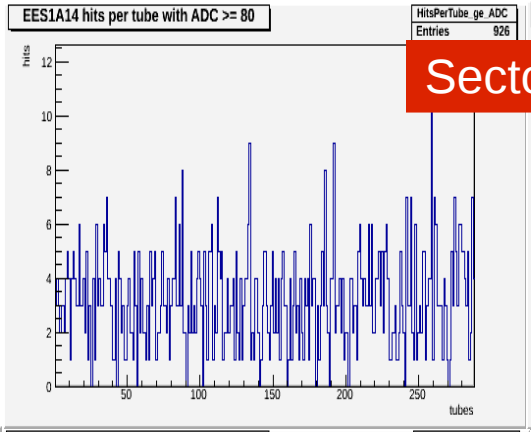
Sector 10

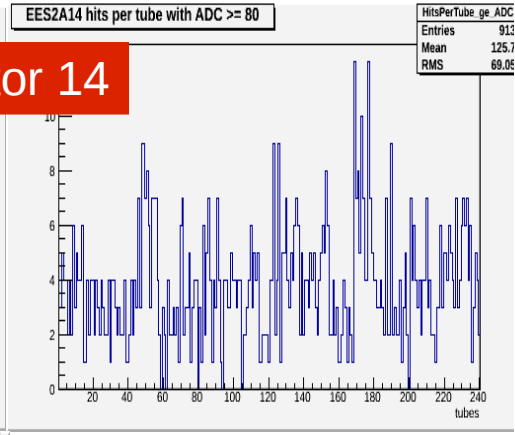


Noise Run with HV

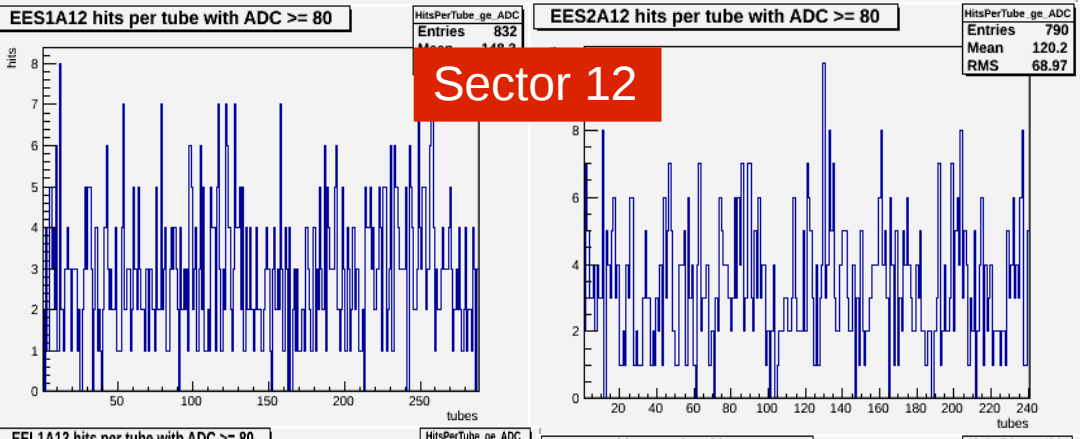


Sector 11

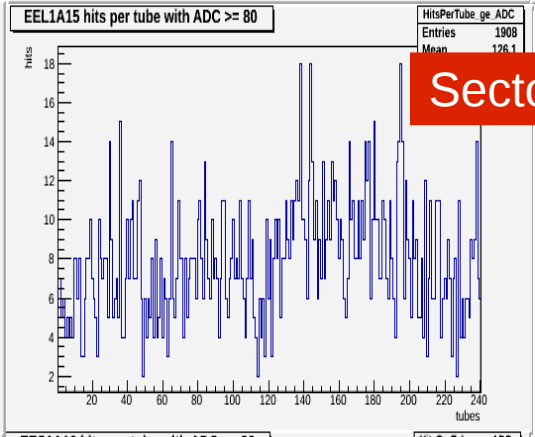


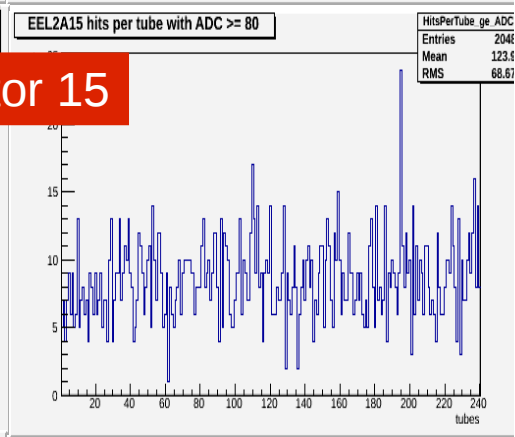


Sector 14

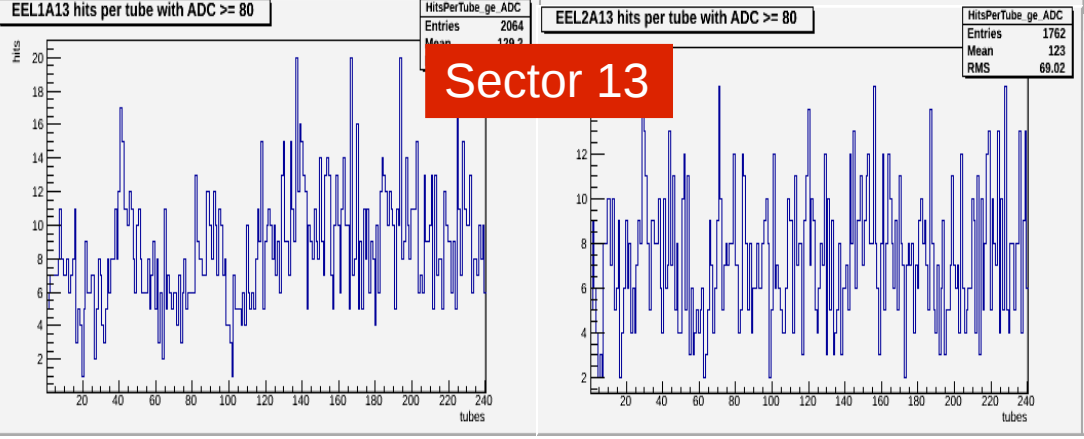


Sector 12

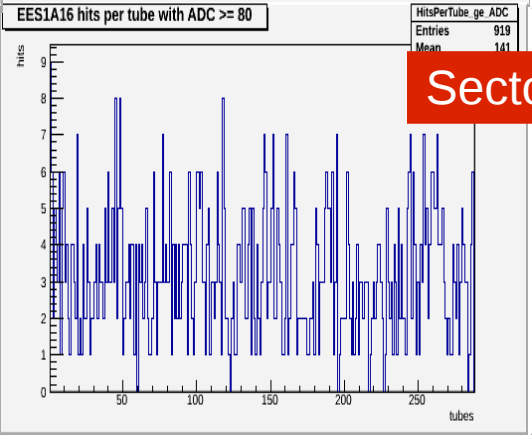


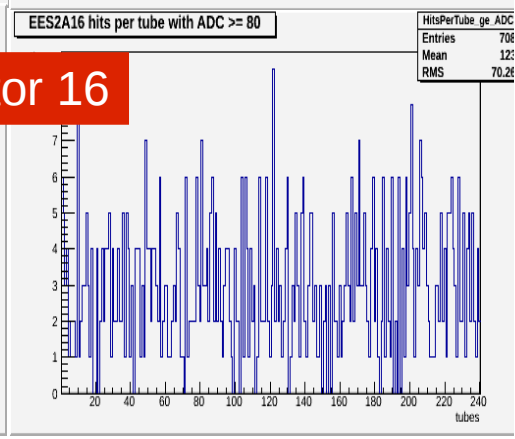


Sector 15



Sector 13





Sector 16