



SRS mmdaq3

HOW TO

Info:

- mmdaq3 Q&A:

https://indico.cern.ch/event/218341/contributions/1519619/attachments/352429/491014/mmdaq_QA.pdf

- SRS Slow Control Manual:

<https://hallaweb.jlab.org/wiki/images/5/5b/SRSSlowControlManual.pdf>

- FEC FPGA Firmware Upgrade Tutorial:

[https://espace.cern.ch/rd51-wg5/srs/Documentation/FEC_3_6_Firmware_Upgrade_Tutorial%20\(3\).pdf](https://espace.cern.ch/rd51-wg5/srs/Documentation/FEC_3_6_Firmware_Upgrade_Tutorial%20(3).pdf)

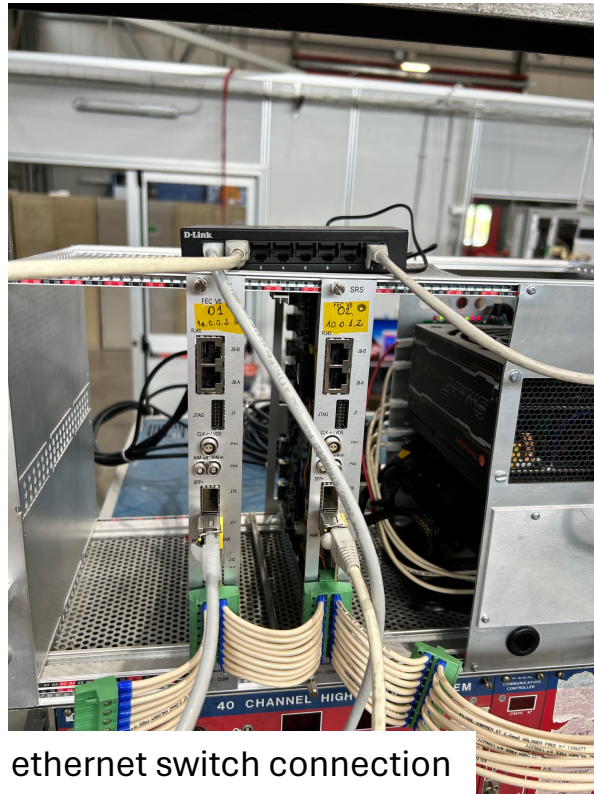
<https://vmm-srs.docs.cern.ch/firmware/>

Hardware Setup

Use of multiple FEC is supported



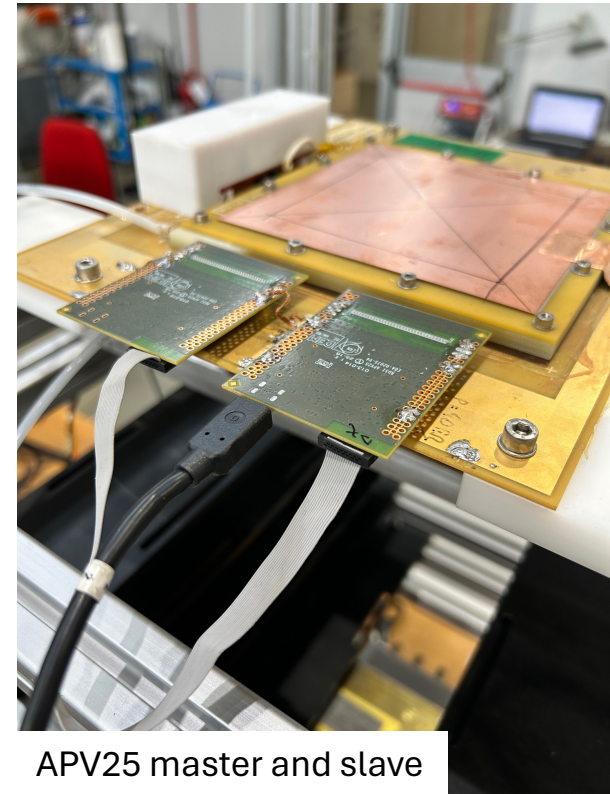
front



ethernet switch connection



back



APV25 master and slave

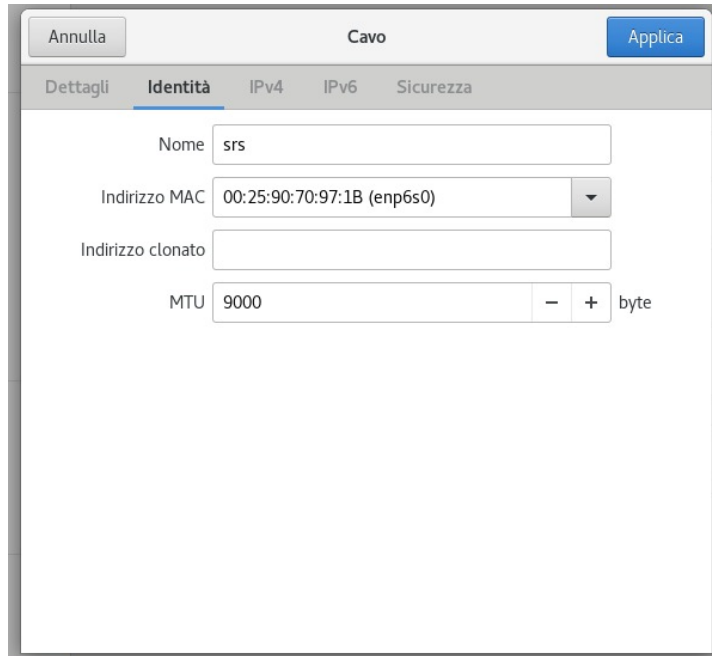
- FEC v6 – IP: 10.0.0.2 and 10.0.1.2
- Transivers 1000Base-T 1.25GBd

Computer Setup

Required:

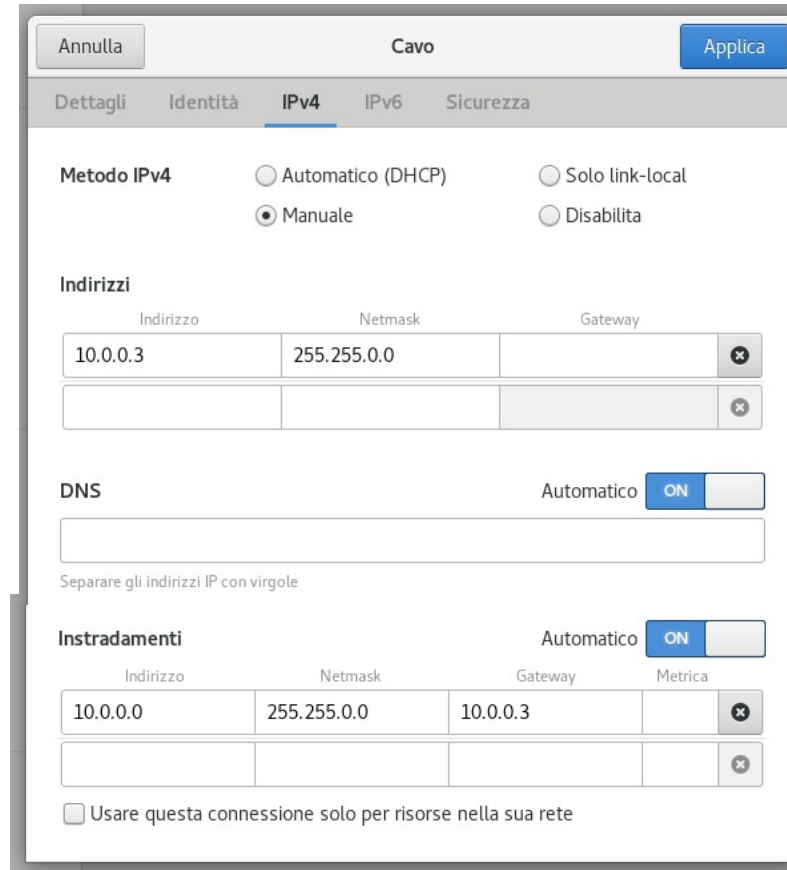
- CentOS7
- Boost 1.55
- ROOT 6.24
- Network card with Jumbo Frame support
- Disabled firewall

IP Setup



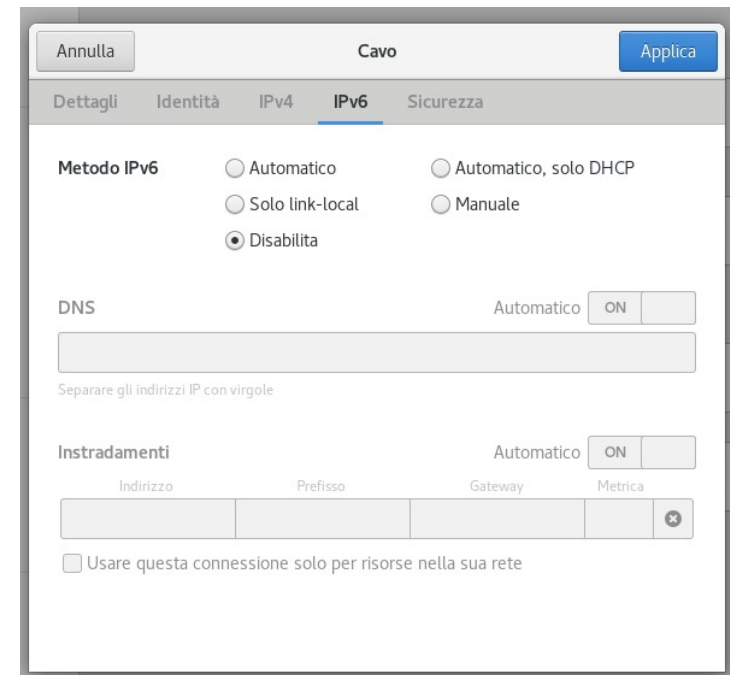
Network configuration window (Cavo) - Identity tab. Fields include: Nome (srs), Indirizzo MAC (00:25:90:70:97:1B (enp6s0)), Indirizzo clonato, and MTU (9000 byte). Buttons: Annulla, Applica.

Identity:
MTU 9000 byte



Network configuration window (Cavo) - IPv4 tab. Method: Manuale. Addresses: 10.0.0.3/255.255.0.0. DNS: Automatico (ON). Routing: 10.0.0.0/255.255.0.0, Gateway 10.0.0.3. Buttons: Annulla, Applica.

IPv4 Method: manual
Addresses: address 10.0.0.3; netmask 255.255.0.0
DNS automatic
Routing: address 10.0.0.0; netmask 255.255.0.0; gateway 10.0.0.3



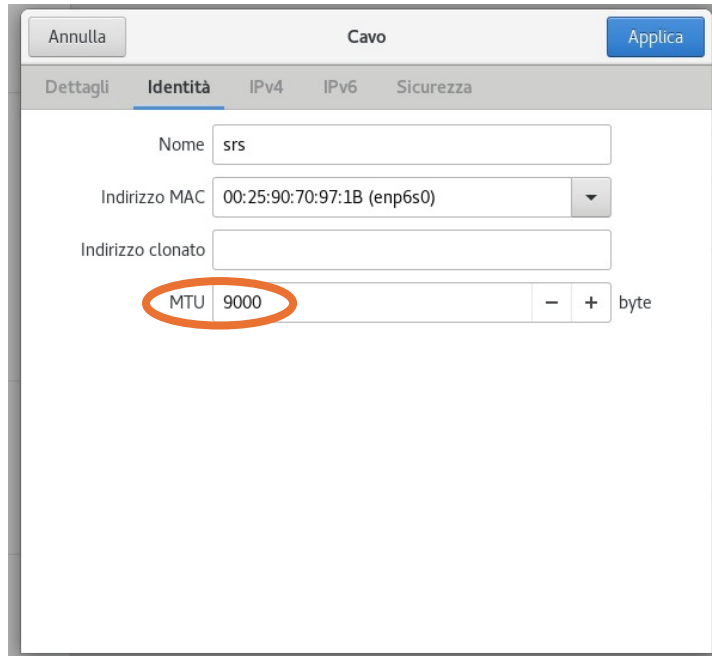
Network configuration window (Cavo) - IPv6 tab. Method: Disabilita. DNS: Automatico (ON). Intradamenti: Automatico (ON). Buttons: Annulla, Applica.



Network configuration window (Cavo) - Sicurezza tab. Sicurezza 802.1x: OFF. Autenticazione: MD5. Nome utente, Password fields. Buttons: Annulla, Applica.

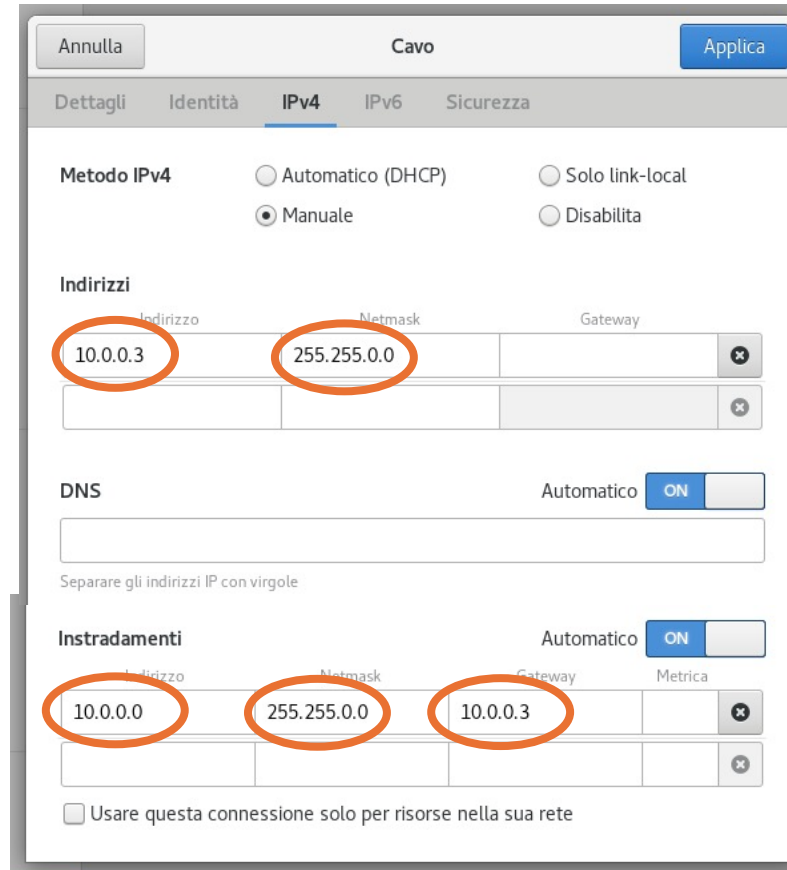
IPv6: disabled
Security: OFF

IP Setup



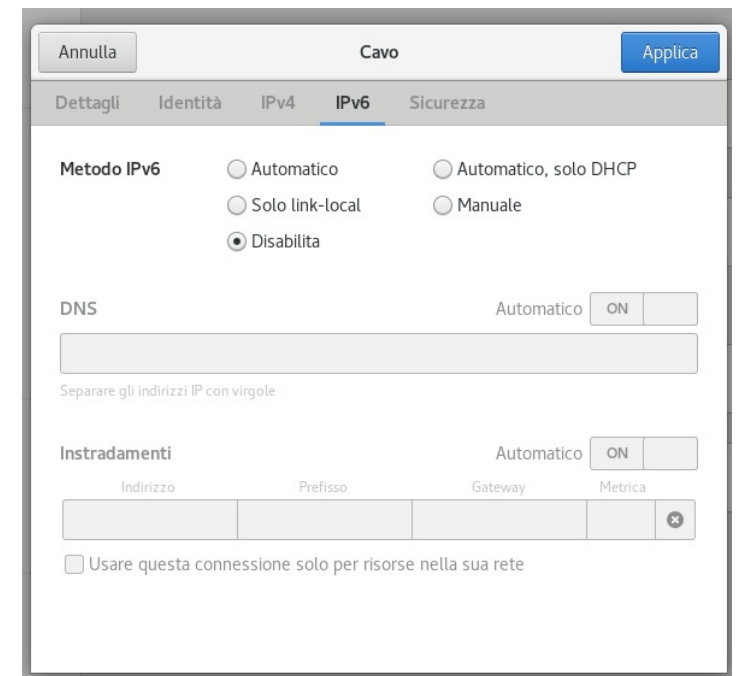
The 'Cavo' window shows the 'Identità' tab. The 'Nome' field is 'srs'. The 'Indirizzo MAC' is '00:25:90:70:97:1B (enp6s0)'. The 'Indirizzo clonato' field is empty. The 'MTU' is set to '9000' byte, which is circled in red.

Identity:
MTU 9000 byte



The 'Cavo' window shows the 'IPv4' tab. The 'Metodo IPv4' is set to 'Manuale'. The 'Indirizzi' table has one entry with 'Indirizzo' '10.0.0.3' and 'Netmask' '255.255.0.0', both circled in red. The 'DNS' is set to 'Automatico' and 'ON'. The 'Instradamenti' table has one entry with 'Indirizzo' '10.0.0.0', 'Netmask' '255.255.0.0', and 'Gateway' '10.0.0.3', all circled in red.

IPv4 Method: manual
Addresses: address 10.0.0.3; netmask 255.255.0.0
DNS automatic
Routing: address 10.0.0.0; netmask 255.255.0.0; gateway 10.0.0.3



The 'Cavo' window shows the 'IPv6' tab. The 'Metodo IPv6' is set to 'Disabilita'. The 'DNS' is set to 'Automatico' and 'ON'. The 'Instradamenti' table is empty.



The 'Cavo' window shows the 'Sicurezza' tab. The 'Sicurezza 802.1x' is set to 'OFF'. The 'Autenticazione' is set to 'MD5'. The 'Nome utente' and 'Password' fields are empty.

IPv6: disabled
Security: OFF

Software Structure

- SRSDCS
 - Sets the FECs connection
- mmdaq server
 - DAQ
- mmdaq browser
 - Online monitoring

./SRSDCS

Address10.0.0.2

Connect

Disconnect

Select Peripheral

APV Hybrid

APV Application

ADC Card

PLL

Configure

Hybrid

Reset

Configuration Files

Load

Download To H/W

er/config_cosmics_trk/srs_file_trks.txt

Acquisition

Off

Trigger

External

Zero Suppression

Threshold

0

Force Pedestal to Zero

Force Signal Detector

Set

Control APV Processor

Bypass on

Bypass off

Reset APV

0

Select APV

Start Pedestal

Resets

Warm Init

Force Reboot

Enable Expert Mode

Help

v1.5.4

Configuration

Select Mode

PLL

Master APV

Slave APV

Both APVs

Select Channel(s)

Channel 1

Channel 2

Channel 3

Channel 4

Channel 5

Channel 6

Channel 7

Channel 8

Select All

Select Command Type

Write Pairs

Write Burst

Read Pairs

Read Burst

Reset

Reply Form

Reply Port6007

Request Id: 0 Header: 0000ff00, aaaa0000, 00000000

Error

Data

Error

Data

00000000

0000c216 00000000

0000c600

Nominal Reply <<Nominal Reply >>

Received at 10:24:26 of 2024.05.06

Request Id: 2 Header: 0000ff03, aaaa0000, 00000000

Error

Data

Error

Data

00000000

00000001

Nominal Reply <<Nominal Reply >>

Received at 10:24:27 of 2024.05.06

Request Id: 3 Header: 0000ff03, aaaa0000, 00000000

Error

Data

Error

Data

00000000

00000000

SRSDCS

APV Application Registers Port

6039

Data Settings From Recipe File

APV Registers

BCLK_MODE

00000000

100

BCLK_TRGBURST

00000001

8

BCLK_FREQ

00000010

4000

BCLK_TRGDELAY

00000011

128

BCLK_TPDELAY

00000100

128

BCLK_ROSYNC

0000101

200

EVBLED_CHMASK

00001000

00000011111111

EVBLED_DATALENGTH

00001001

4000

EVBLED_MODE

00001010

0

EVBLED_EVENTINFOTYPE

00001011

0

EVBLED_EVENTINFODATA

00001100

512

Channel Mask Masters

0

2

4

6

8

10

12

14

Channel Mask Slaves

1

3

5

7

9

11

13

15

Save To File

Close

Send

Read From H/W

Load From File

Factory Settings

./SRSDCS

MainWindow

FEC
Address: 10.0.0.2
Connect
Disconnect
v1.5.4

Select Peripheral
☐ APV Hybrid
☒ APV Application
☐ ADC Card
☐ PLL
Configure
Hybrid
Reset

Configuration Files
Load
Download To H/W
er/config_cosmics_trk/srs_file_trks.txt

Acquisition
Trigger

Zero Suppression
Threshold: 0
☐ Force Pedestal to Zero
☐ Force Signal Detector
Set

Control APV Processor
Bypass on
Bypass off
Reset APV
0
Select APV
Start Pedestal
☐ Resets
Warm Init
Force Reboot
☒ Enable Expert Mode

Configuration
Select Mode
☐ PLL
☐ Master APV
☐ Slave APV
☒ Both APVs
Select Channel(s)
☒ Channel 1
☒ Channel 2
☒ Channel 3
☒ Channel 4
☒ Channel 5
☒ Channel 6
☒ Channel 7
☒ Channel 8
☒ Select All
Select Command Type
☒ Write Pairs
☐ Write Burst
☐ Read Pairs
☐ Read Burst
☐ Reset

Reply Form
Reply Port: 6007
Request Id: 0 Header: 0000ff00, aaaaafff, 00000000
Error: 00000000 | Data: 0000c216 00000000 | Error: 0000c600 | Data:
Nominal Reply <<Nominal Reply >>
Received at 10:24:26 of 2024.05.06
Request Id: 2 Header: 0000ff03, aaaaafff, 00000000
Error: 00000000 | Data: 00000001 | Error: | Data:
Nominal Reply <<Nominal Reply >>
Received at 10:24:27 of 2024.05.06
Request Id: 3 Header: 0000ff03, aaaaafff, 00000000
Error: 00000000 | Data: 00000000 | Error: | Data:

SRSDCS

☒ APV Application Registers Port: 6039 Data Settings From Recipe File

APV Registers

☐ BCLK_MODE	00000000	100	☒
☐ BCLK_TRGBURST	00000001	8	☒
☐ BCLK_FREQ	00000010	4000	☒
☐ BCLK_TRGDELAY	00000011	128	☒
☐ BCLK_TPDELAY	00000100	128	☒
☐ BCLK_ROSYNC	0000101	200	☒
☒ EVBLD_CHMASK	00001000	00000011111111	☒
☐ EVBLD_DATALENGTH	00001001	4000	☒
☐ EVBLD_MODE	00001010	0	☒
☐ EVBLD_EVENTINFOTYPE	00001011	0	☒
☐ EVBLD_EVENTINFODATA	00001100	512	☒

Channel Mask Masters
☒ 0 ☒ 2 ☒ 4 ☒ 6 ☐ 8 ☐ 10 ☐ 12 ☐ 14

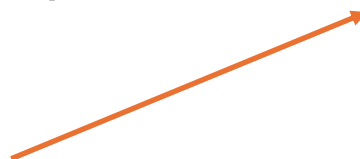
Channel Mask Slaves
☒ 1 ☒ 3 ☒ 5 ☒ 7 ☐ 9 ☐ 11 ☐ 13 ☐ 15

Save To File
Load From File
Factory Settings
Close
Send
Read From H/W

It is possible to save a personalized configuration (the instructions are outside the scope of this presentation)

DAQ config files

- DAQ_config.xml
 - sets machine ip
 - Calls for the srs file, setup file and the output folder
- srs.xml
 - sets the FECs and chips info
 - calls the chip files
- setup.xml
 - sets the chambers info
 - calls for the chambers' config files

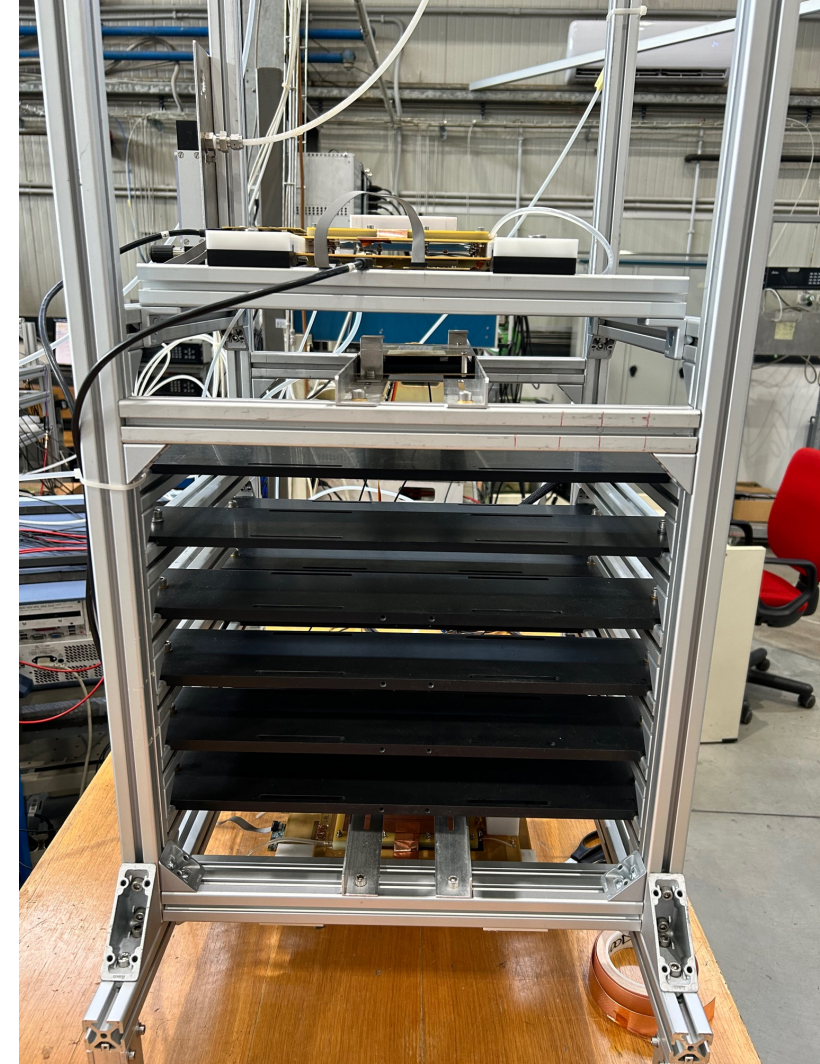
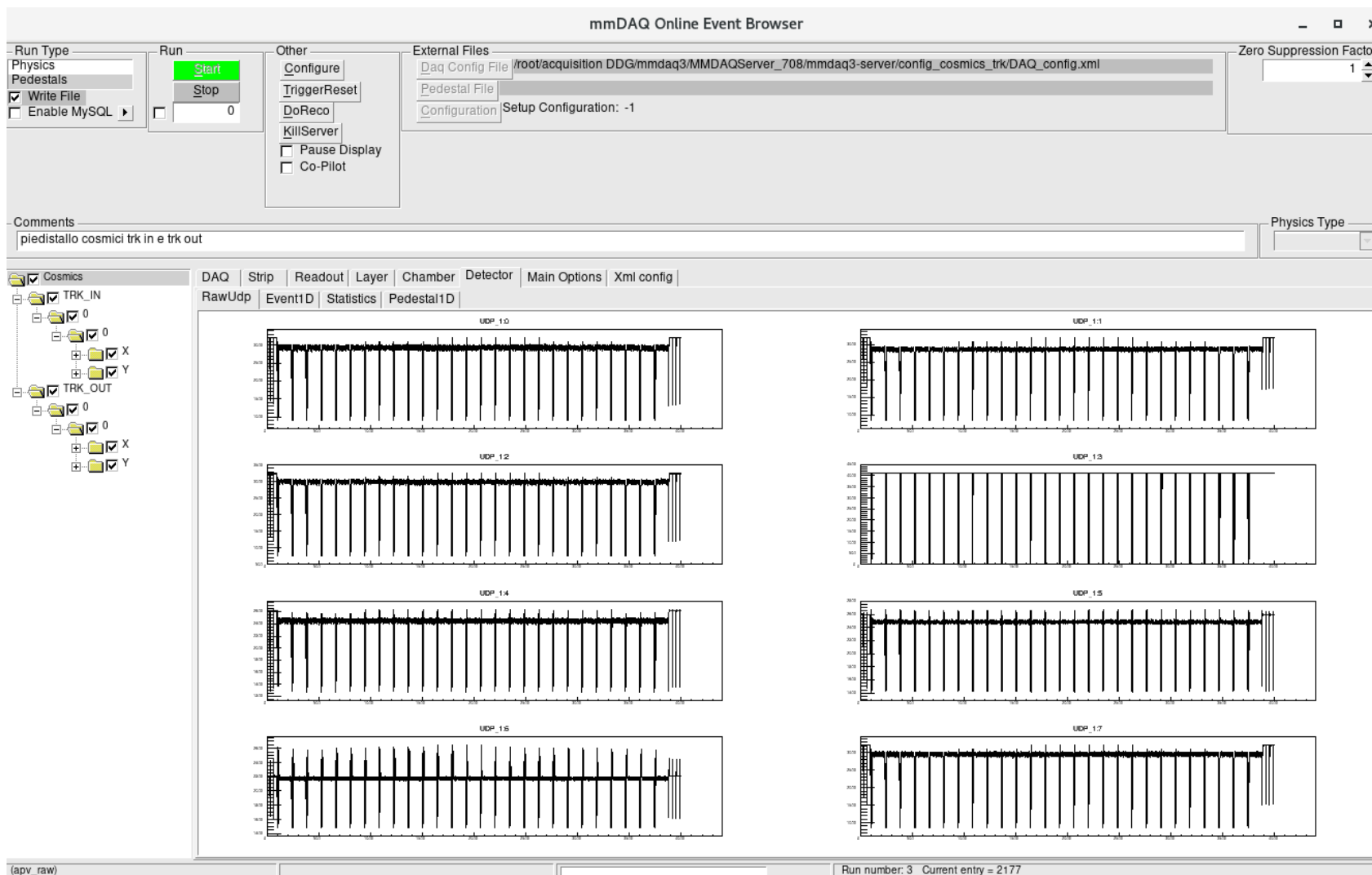


```
<fec id = "1">  
<name>FEC1</name>  
<ip>10.0.0.2</ip>  
<chip id = "0" type = "APV25"> <name>  
APV.1.00 </name> </chip>
```

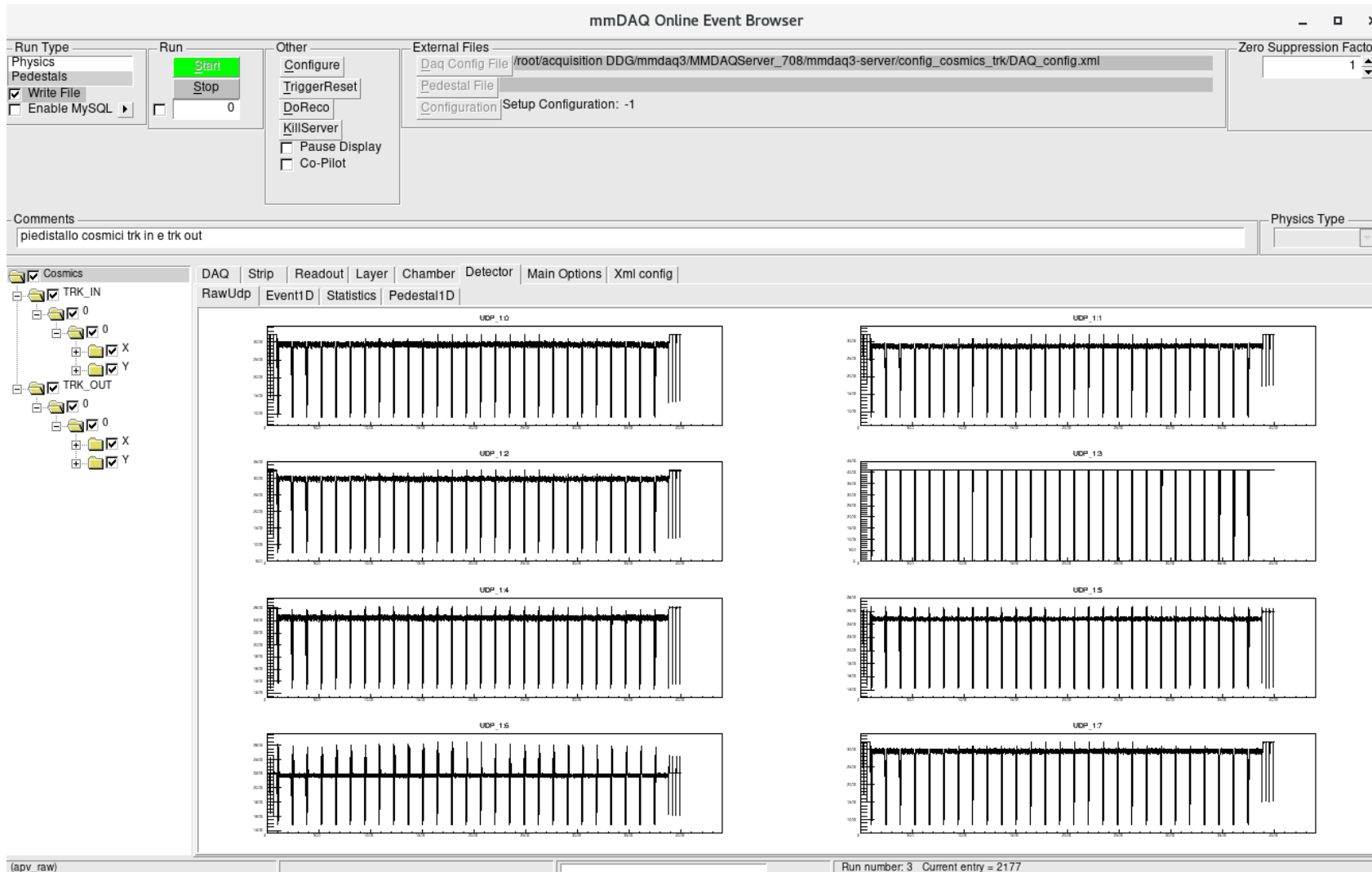


```
<chamber name = "Tmm2">  
<config_file>T-chamber.xml</config_file>  
<position> ...</position>  
<connector name = "C0">  
<chip> <name>APV.1.00</name>  
</chip>  
<map_file>APV-map.txt</map_file>  
</connector>  
</chamber>
```

./mmdaq3



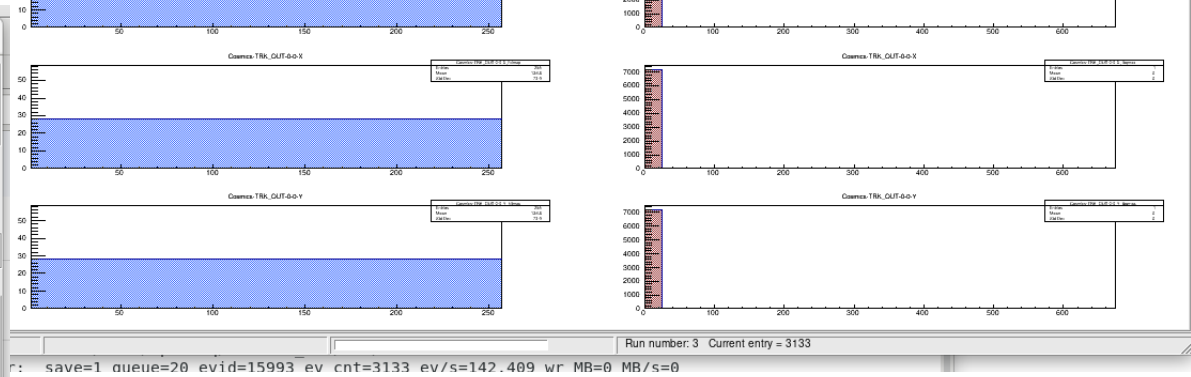
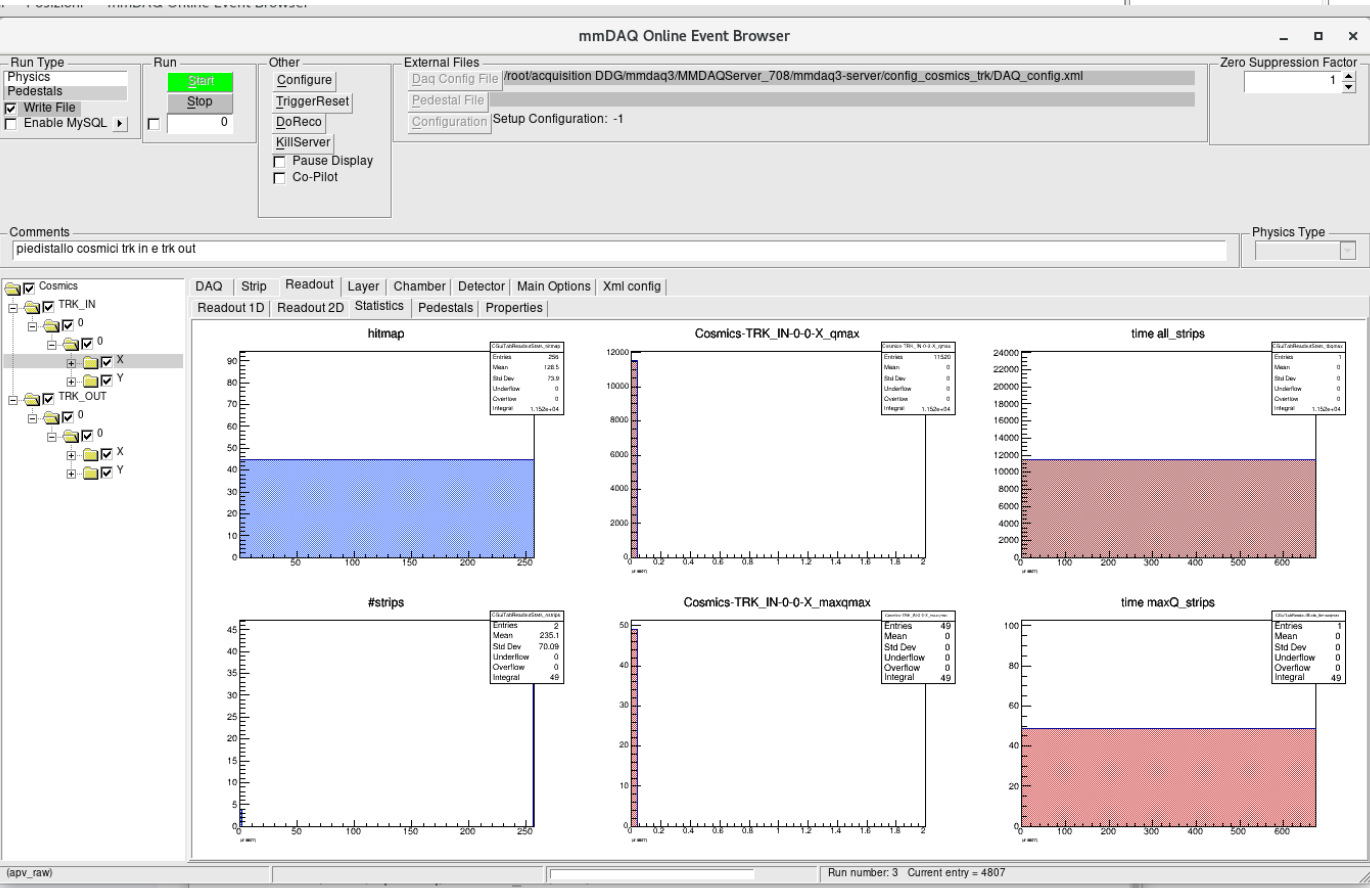
./mmdaq3



1. Run type
2. Run
3. Other
4. External files
5. Zero suppression factor
6. Comments
7. Physics type
8. Set up
9. Views 1D and 2D of statistics

Each plot represents the superposition of the 128 APV's channels raw signals (time vs charge)

./mmdaq3



Charge and time histograms

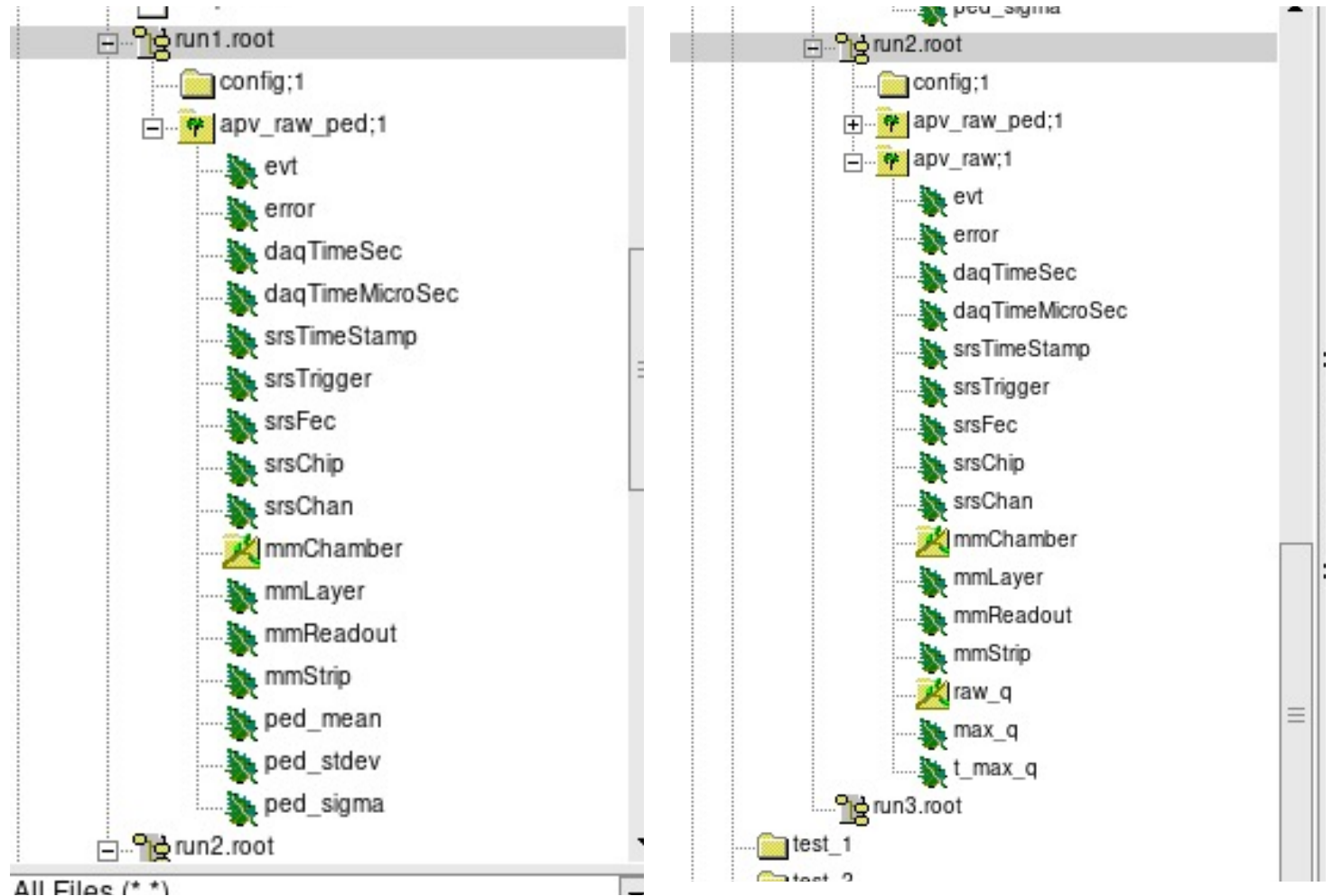
Output

ROOT files for pedestals runs:

- 1 event
- The dataset is composed by a collection of mean values representing the background noise

ROOT files for physics runs:

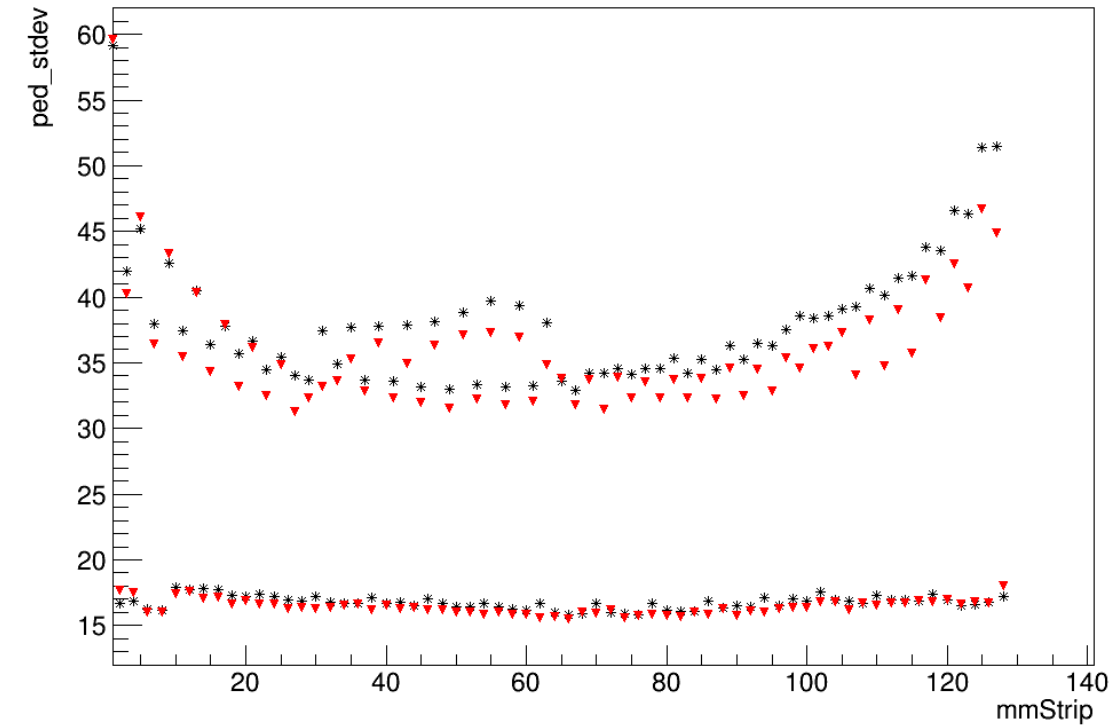
- Setup flags (#FEC, #APV, #channel, ...)
- Charge data (analog signals)
- Time data (under investigation)



WIP: data analysis with Corryvreckan (<https://project-corryvreckan.web.cern.ch/project-corryvreckan/>) test beam data analysis customizable framework used and developed by ALLPIX2.

CS 40x40 cm² - Preliminary study of background noise

ped_stdev:mmStrip {srsChip==0}



Due to a different pick up of signal by the routing of the strips

2 FEC (one master each)

ped_stdev:mmStrip {srsChip==0}

