Update on TDAQ status and future perspectives

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12 December 2023 – XV FOOT Collaboration Meeting

Inner Tracker test@BTF (Frascati)
Developments for CNAO2023
TDAQ summary of CNAO2023 data taking
CNAO2023 resynchronization
Future developments and upgrades

DAQ development for IT

- **13-15 September** in the lab@Frascati

- **preliminary test** with all the boards, **first hint of loss of synchronization** due to too few threads

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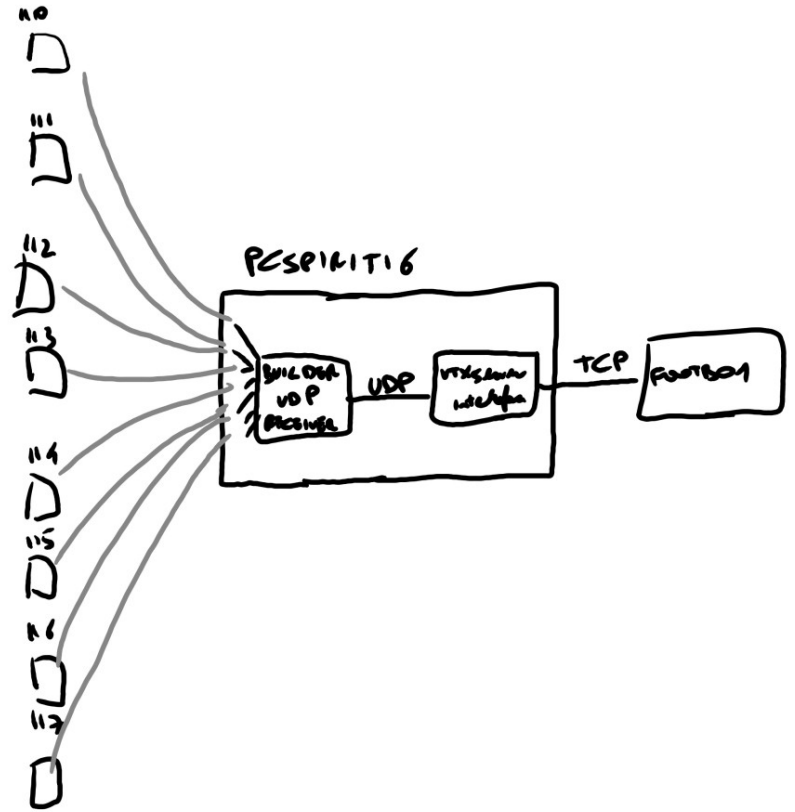
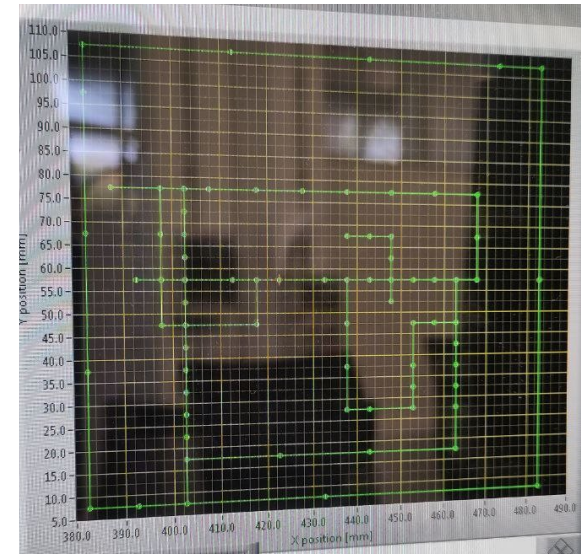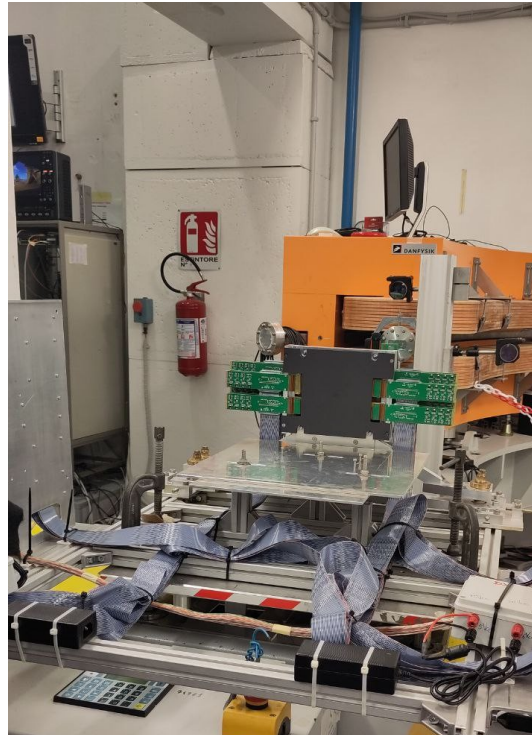# IT test beam@BTF

- **25 – 29 September**@BTF

- dedicated run with
450 MeV **electrons** (i.e. *mip*)

- requested low rate to have
clean tracks

- **confirmed problems with
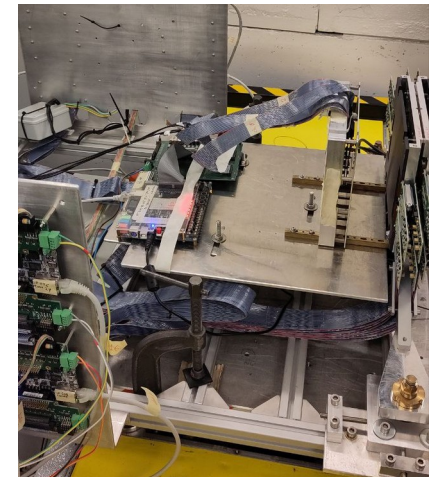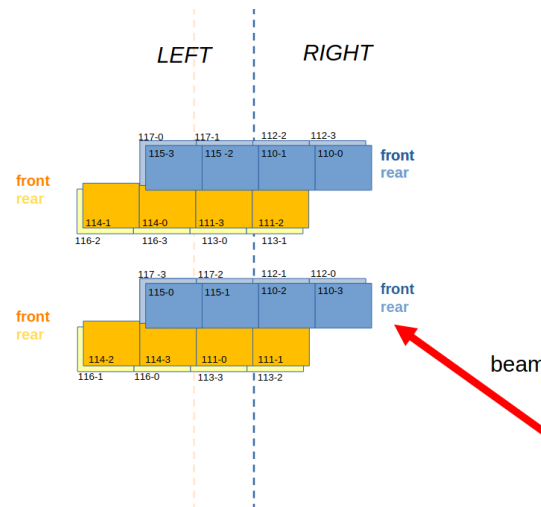threads** → run with 6/8 boards
(safe threshold)

- main trigger → accelerator
spill AND crystal in the room

- **scan of the whole IT** with a
moving table

- first beam in IT

- **mapping** on the fly (regardless of actual sensor orientation)

- on Thursday we set up also the VTX (downstream of IT)

- **"painted" all the VTX** to spot inefficiencies

- check **correlation** between IT and VTX
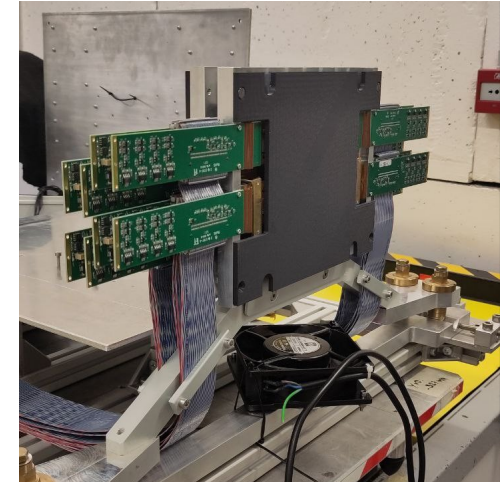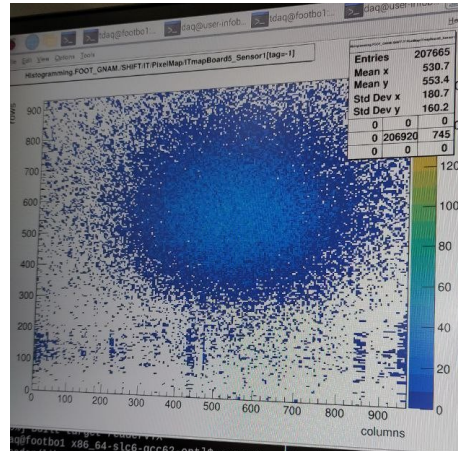
From Frascati to CNAO

- **slow control** for IT trigger board

- flash purchase + borrowing of **PCIe network boards** to put in another PC (4xCPU wrt to tracker desktop) + network setup

- **thread problem solved** (anyway safer solutions are on track)

- **new Arduino sketch** to handle all calorimeter crystals compressing temperature information

- removed hardcoded parts which gave (could give) some trouble in the past (future)

before

reading ⋙ float conversion → writing in datastream

after

reading ⋙ compression → decompression

float conversion ⋘ writing in datastream
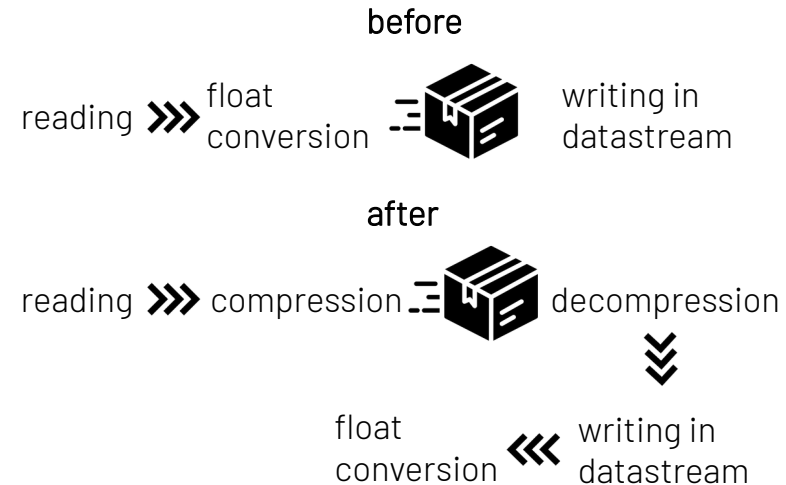
TDAQ@CNAO2023

- **TDAQ ran smoothly** for both beam shifts

- **200 MeV/u C beam:**
  MB, fragmentation trigger

- C and C2H4 targets

- background runs

- calorimeter calibration, TW scan and tracker tests

- **real-time data transfer** to T1 (see Roberto Z' talk)

index	Type	Beam energy (MeV/u)	Target	Magnet	Total events
		default particle: C			
1	Carbon target	200	Carbon 5 mm	yes	1.106.027
2	Poly target	200	Poly 10 mm	yes	590.368
3	Pedestal	no beam	N/A	N/A	799.439
4	Carbon target & frag	200	Carbon 5 mm	yes	2.072.468
5	Poly target & frag	200	Poly 10 mm	yes	1.479.451
11	Alignment with magnet	200	no	yes	220.410
6	Alignment w/o magnet	200	no	no	201.255
7	Calorimeter calibration	many	no	no	4.511.639
12	TW calibration	200	Poly 10 mm	no	296.001
13	Cosmics	no beam	N/A	N/A	674.059
15	Background & frag	200	no	yes	479.822
23	Background	200	no	yes	144.793
20	Tracker test	200	no	no	115.045
21	Tracker test	200	2 cm Al	no	437.618
22	Tracker test	protons 125	2 cm Al	no	367.227
24	Tracker test	200	no	no	163.328
25	Tracker test & MSD alignment	400	no	no	162.347
26	Tracker test	115	no	no	65.533
27	Tracker test	300	no	no	68.906
28	Tracker test	protons 100	no	no	146.158
29	Tracker test	protons 200	no	no	135.351
40	Emulsion				355.805
				Sum w/o emulsion runs	**14.237.245**

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- **online monitoring**
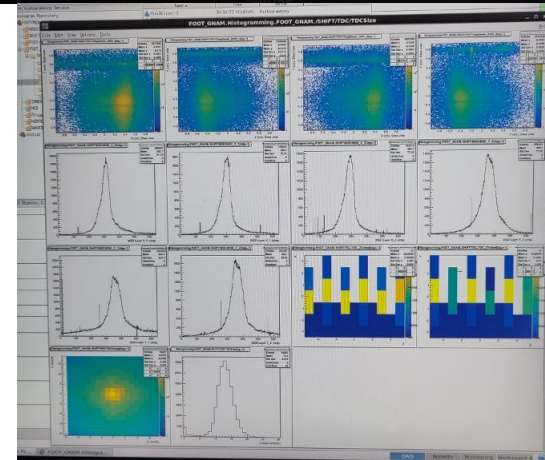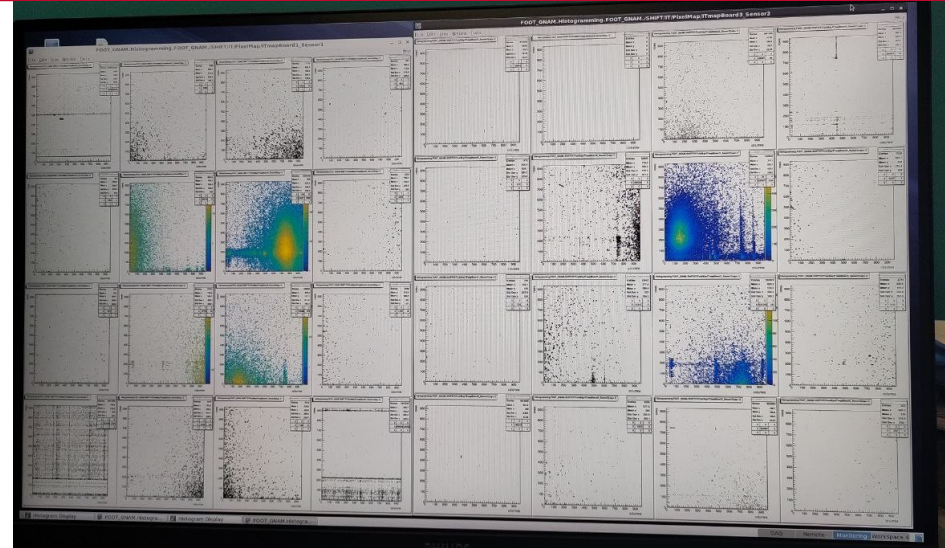
CNAO2023 resynchronization

- CNAO2023 resynchronized files available in DataCNAO2023sync

- particularly important for VTX (almost all runs were not synchronized) but all detectors are checked

- **IT considered as a whole**, time reference is the first valid board

trigger

1 2 3 4 5 6

detector

1 2 3 4 5

original datastream

1
2
3
4
5
6

corrected datastream

1
2
3
4
5
6

TDAQ upgrade

- **update slowed down** by the CentOS EOL in June 2024 (CentOS used at CERN in LHC experiments and FOOT TDAQ is a spin-off of ATLAS TDAQ)

- **some uncertaintes** in the high-energy physics scientific community about OS to adopt

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AlmaLinux to be Used by CERN and Fermilab in Groundbreaking Physics Experiments

CERN and Fermilab will use AlmaLinux for scientific computing, and many experiments will use AlmaLinux in their universities and other member institutions

CERN to become a member of AlmaLinux OS Foundation

April 13, 2023 08:05 AM Eastern Daylight Time

PALO ALTO, Calif.--(BUSINESS WIRE)--The AlmaLinux OS Foundation, the nonprofit that stewards the community-owned and governed open-source CentOS alternative AlmaLinux, has announced that CERN, the European Laboratory for Particle Physics, located near Geneva, Switzerland, and Fermilab, Fermi National Accelerator Laboratory, based in Illinois in the United States, will offer AlmaLinux as one of the standard Linux distributions for experiments at their facilities.

- AlmaLinux is now on new DAQ desktop, TDAQ infrastructure **upgrade to begin** soon

Conclusions and perspectives

Intense TDAQ development in last months in view of CNAO2023 data taking

Update of TDAQ software in progress

Resynchronization can be performed for every single IT board if needed

Start and stop with all detectors takes too long➡ we will perform detector configuration in parallel to speed up the process

Thanks for listening!