

Cosmic Ray Tagger for *ARTIC*

- status report

Antonio Surdo

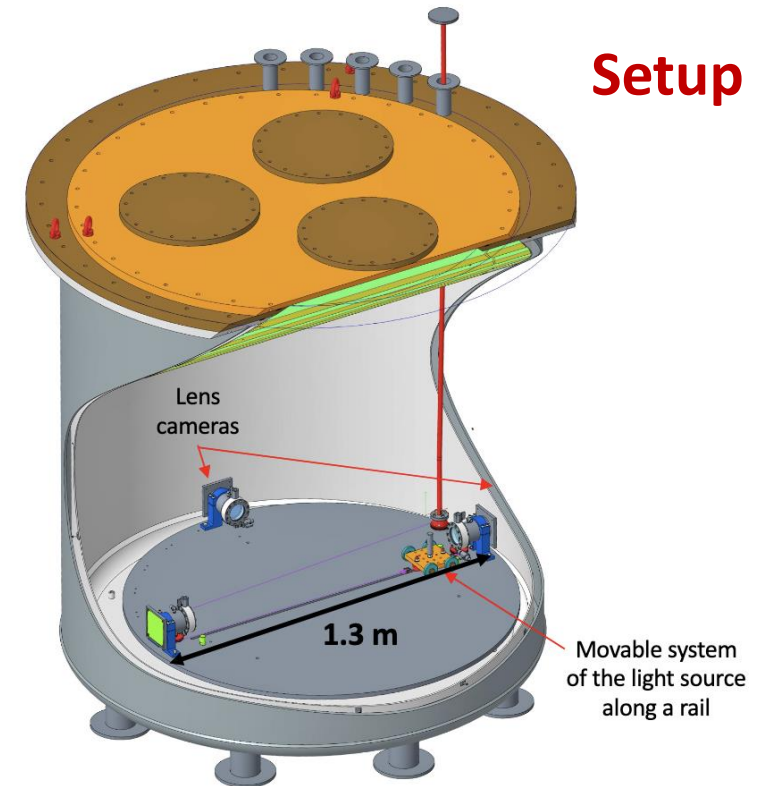
for the Lecce group

GRAIN WG Meeting

17-May-2024

ARTIC @University and INFN-Genova

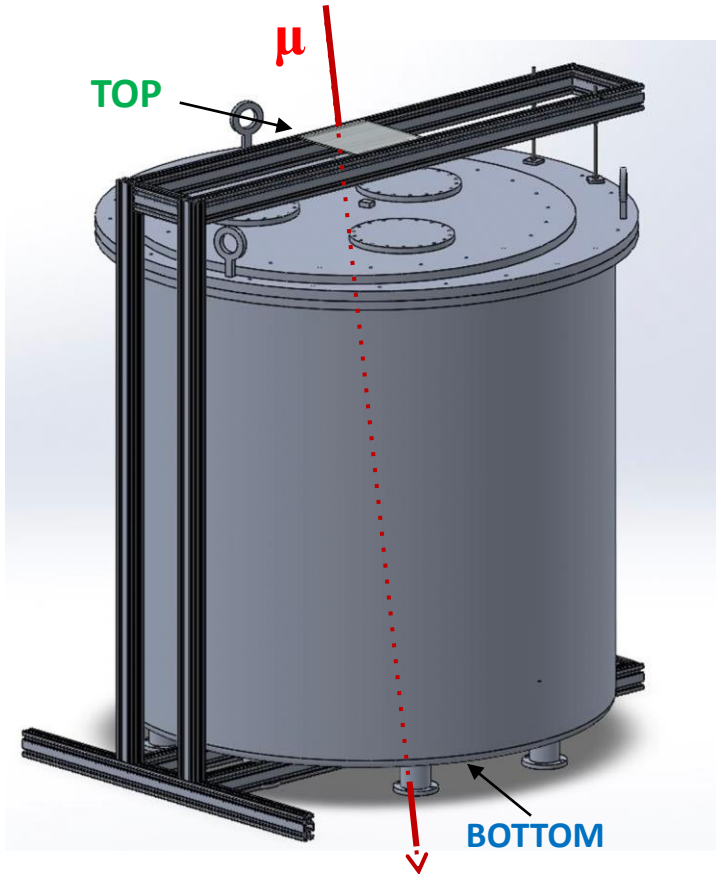
Facility to test the **imaging** of charged particle tracks in **Liquid Argon**, thanks to scintillation light, by means of lenses and coded masks coupled with SiPM matrices



Setup of Cosmic Ray Tagger (CRT)

CRT GOALS:

- Trigger for the LAr acquisition (fourfold coincidence)
- Two-view tracking to help the LAr event reconstruction



Trigger condition: Fourfold coincidence

CRT DESIGN:

TOP (50 cm x 50 cm active surface)

16 bars x 2 orthogonal planes:

- 8 bars (50 x 4 x 1) cm³
- 8 bars (50 x 2 x 1) cm³

BOTTOM (34 cm x 34 cm)

12 bars x 2 orthogonal planes:

- 4 bars (37 x 4 x 1) cm³
- 8 bars (37 x 2 x 1) cm³



SCINTILLATORS:

Saint Gobain BC-408

READ OUT:

6x6 mm² SiPMs

Hamamatsu S14160-6050HS
14331 pixels and 50 μm pitch



DAQ BOARD

CAEN FERS - DT5202



CRT present status

The setup is now in the phase of commissioning:

- The mechanical structure is complete
- The scintillator bars were assembled in the Top and Bottom trays
- Top and Bottom (double-layer) trays are installed and connected to FERS for DAQ
- Data Acquisition tests on single layer rates and coincidences are in progress for
 - Debugging
 - Trigger rate estimates from TOP-BOTTOM coincidences
 - ...

CRT status

Mechanical structure

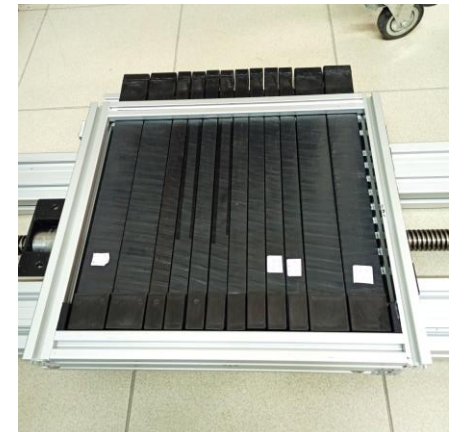


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TOP tray



BOTTOM tray



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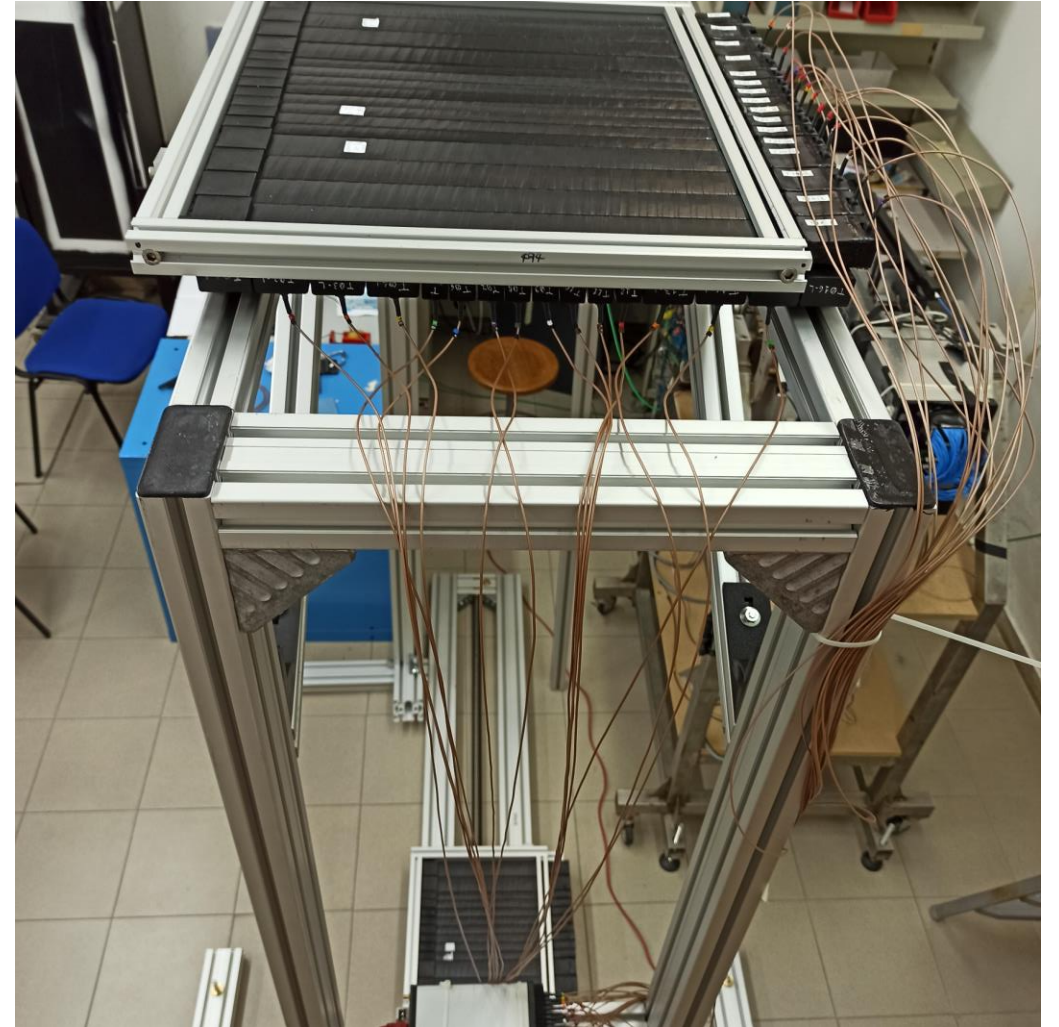
CRT status: installation phase



CRT status



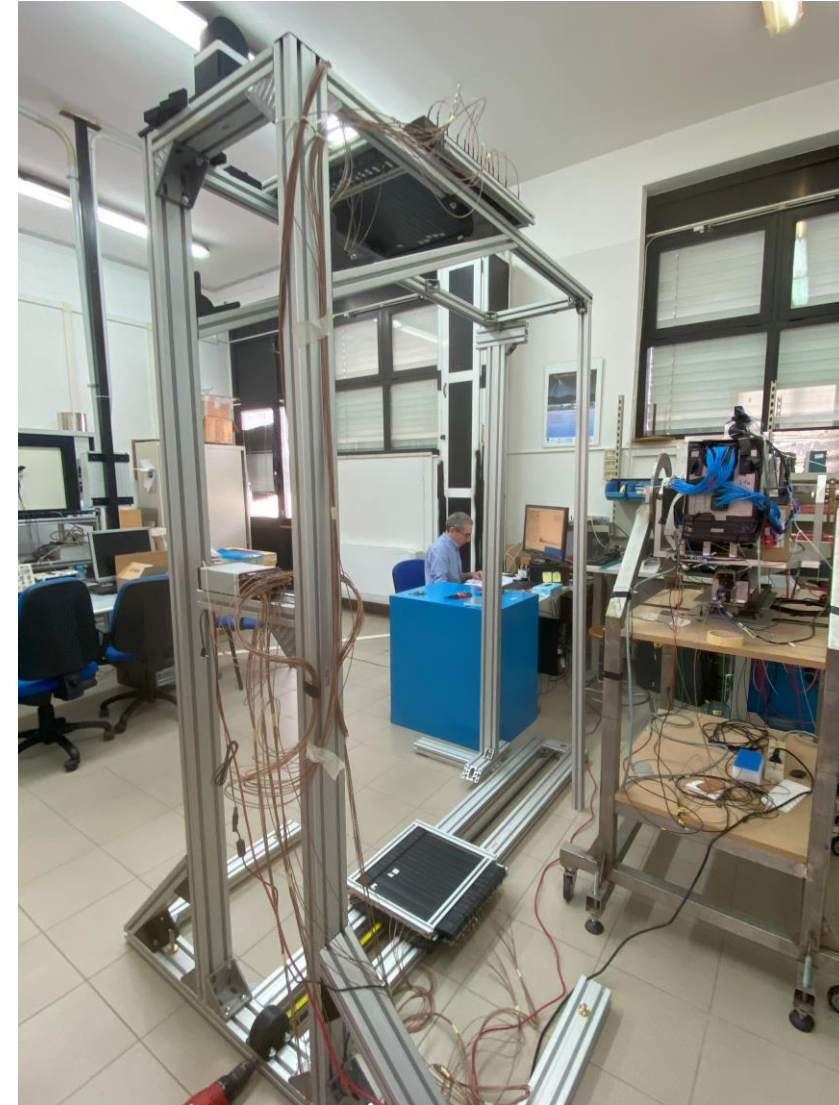
CRT status: cabling phase



CRT cabled and connected to FERS for DAQ

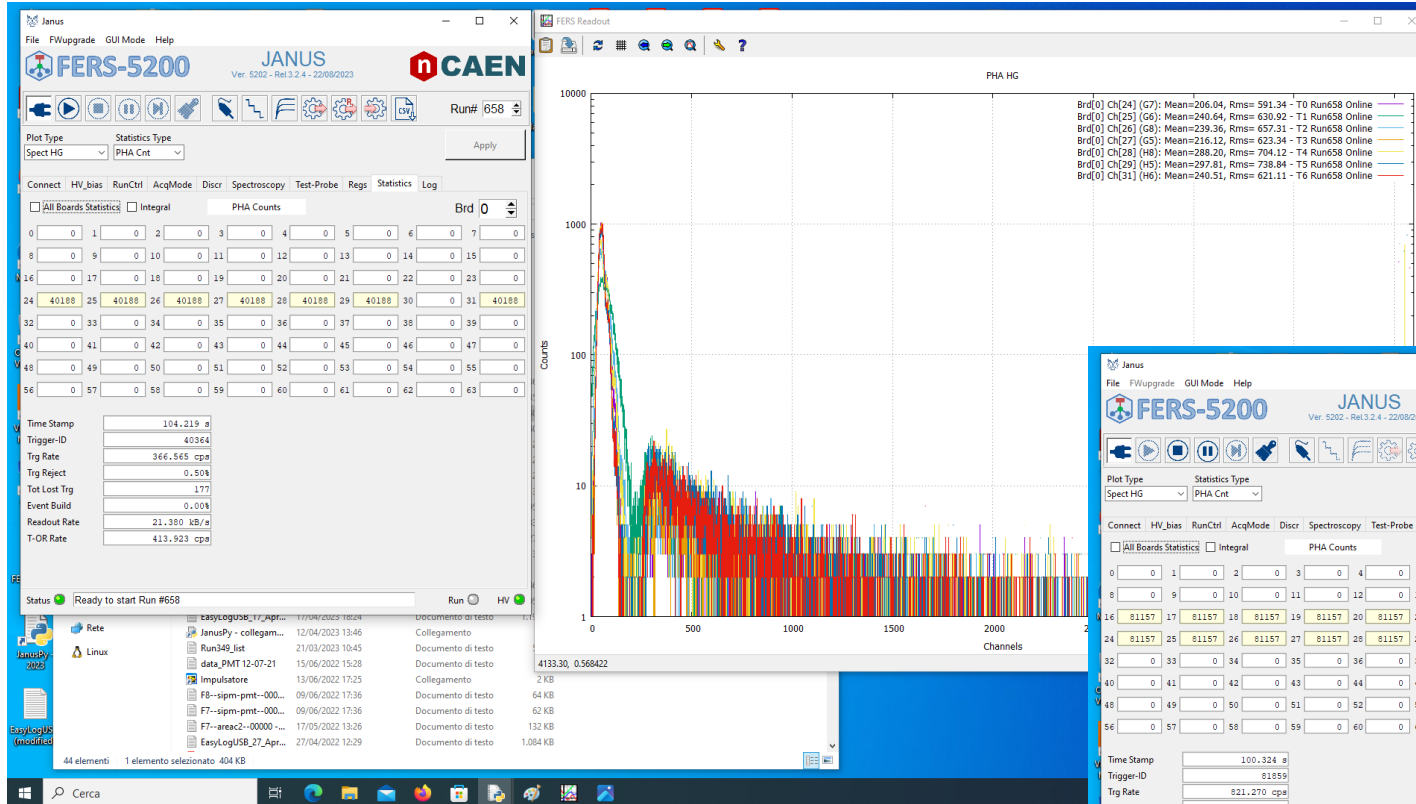


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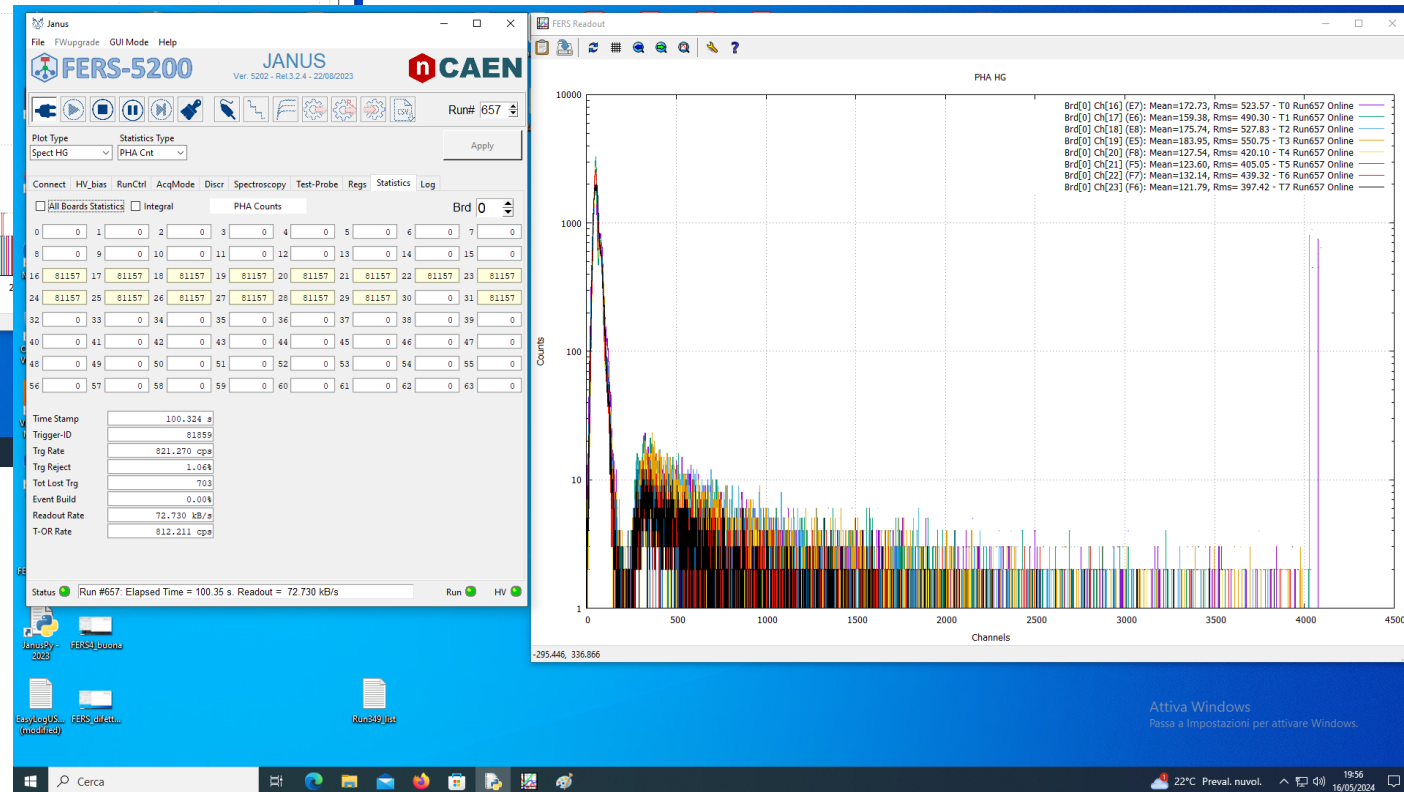


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CRT in DAQ: single layer rates



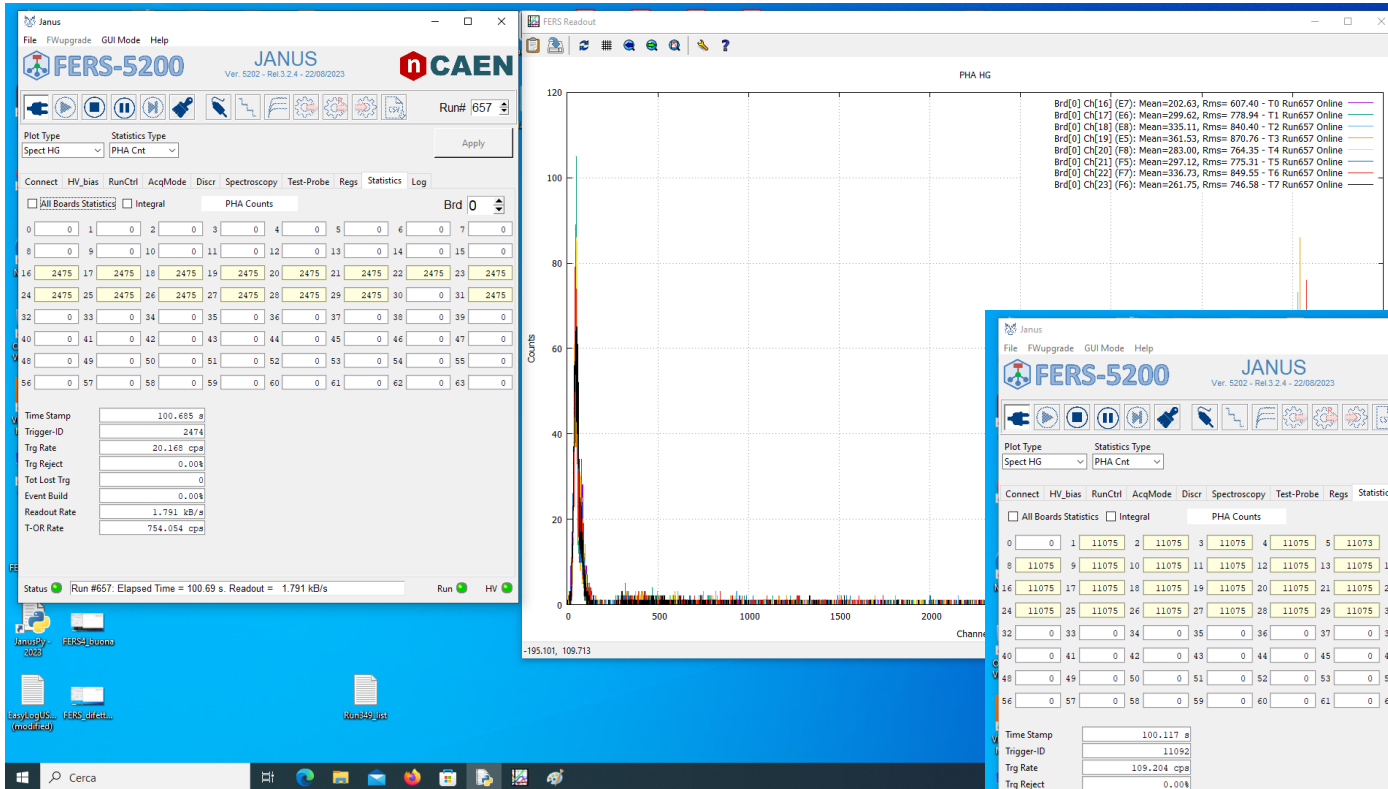
Trigger: .OR. of 8 Ch's
Rate: ~370 Hz



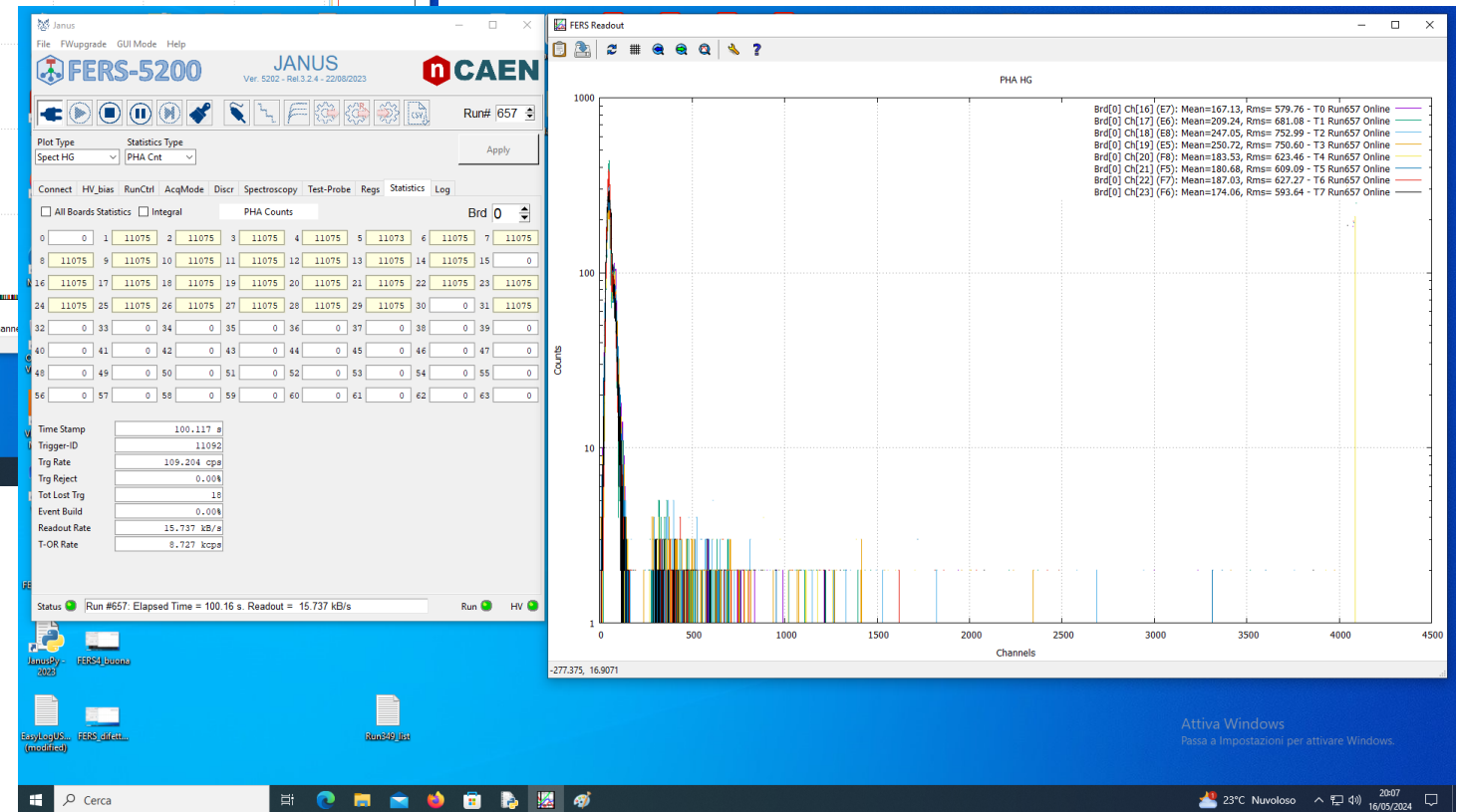
Trigger: .OR. of 16 Ch's
Rate: ~820 Hz

CRT in DAQ: single layer rates

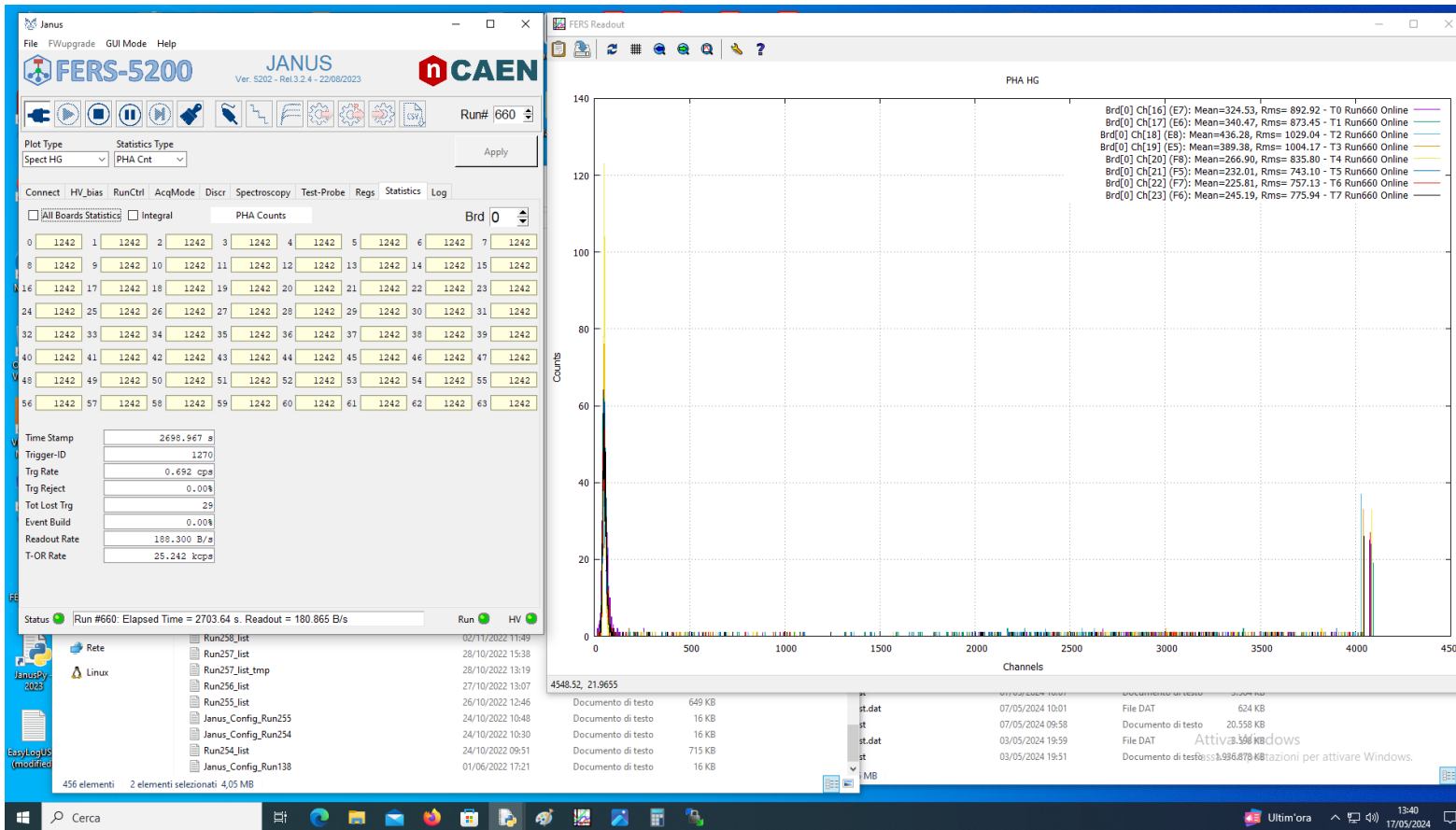
Trigger: $\text{Maj} \geq 2$ from 16 Ch's
Rate: ~ 20 Hz



Trigger: $\text{Maj} \geq 2$ from 32 Ch's
Rate: ~ 110 Hz



CRT in DAQ: trigger from fourfold coincidence



Trigger:
Maj ≥ 2 on
TOP .and. BOTTOM

Rate: ~ 0.5 Hz

≥ 1 hit on each layer: ?

=1 hit on each layer: ?

Conclusions

- **CRT in commissioning phase**
- **Some more days for test and debug**
- **Ready for ARTIC in Genova in 1 week/10 days**

BACKUP