

FOOT meeting

TOF-wall: test with cosmic rays



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November 2021

1. Experimental setup

1.1. TOF-wall detector

1.2. Data acquisition

2. Data analysis

2.1. Flowchart

2.2. Amplitude

2.3. Charge

2.4. Hitmap

TOF-wall detector

- TW used to measure the energy loss ΔE of the passing particles and to provide their arrival time.
- Made of 40 bars of EJ-200 plastic scintillator arranged in two orthogonal layers of 20 each.
- At each end of each bar, the two series of two SiPMs were connected in parallel.

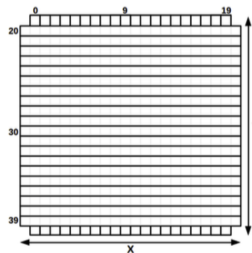


Figure: Scheme of TOF-Wall bar numbering

Experimental setup

- The light produced in the bars is collected at each end.
- Each group of four SiPMs provides a single summed analogical signal.
- The output signal of each side of each bar was input to a waveform digitizer board hosted in the WaveDAQ integrated trigger and data acquisition system.

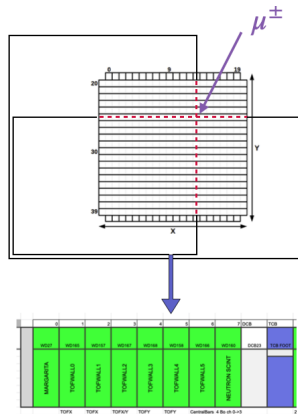


Figure: Thanks M. Morrocchi for the cabling!

Experimental setup

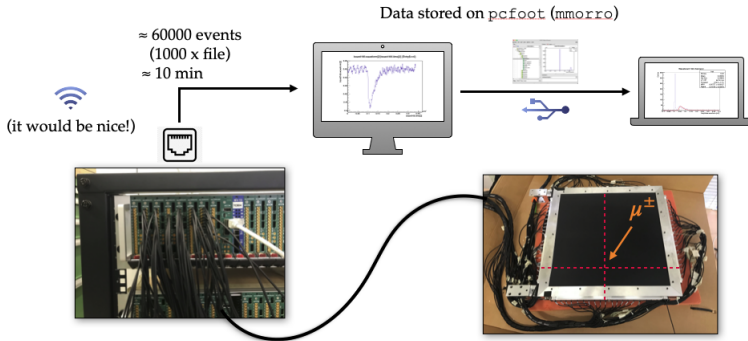
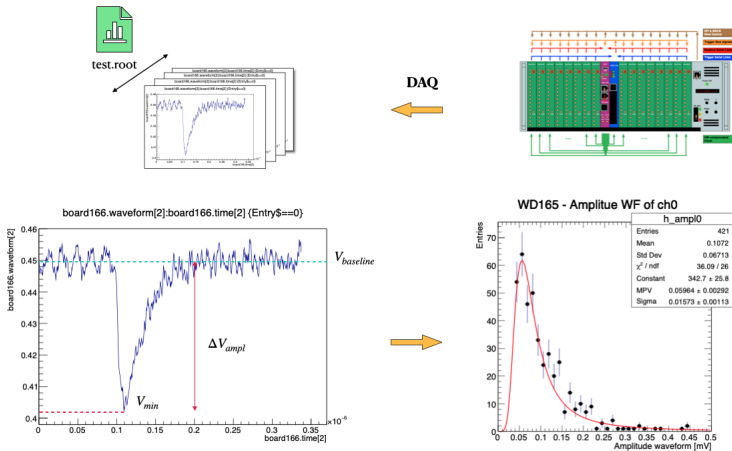
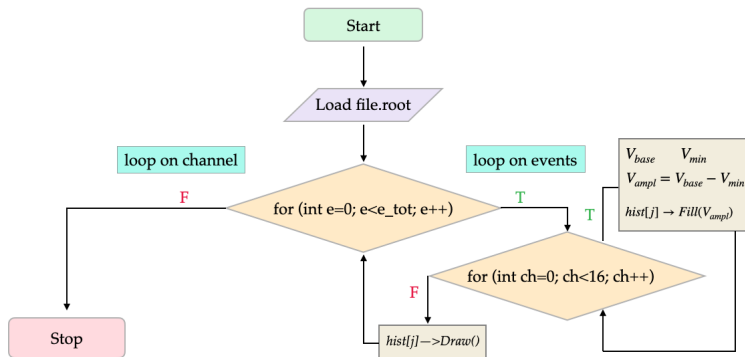


Figure: Schematic representation of the setup

Data acquisition



Flowchart



Algorithm applied on all the waveDREAMs of the TOF wall.

WaveDREAM board 165 - Amplitude histograms

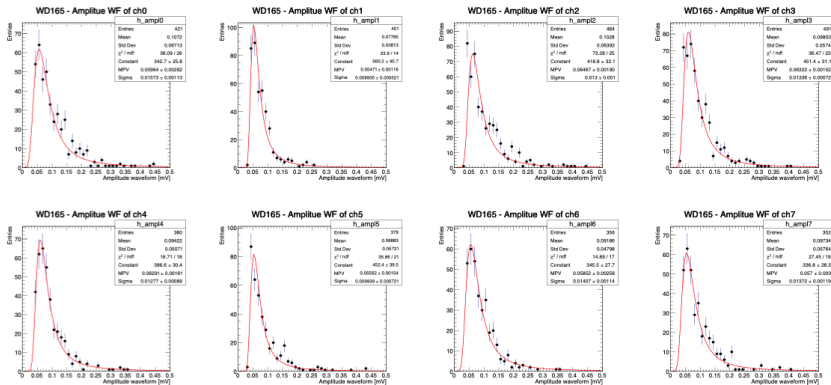


Figure: Channels from 0 to 7.

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¹Data in GoogleDrive/FOOT/Cosmici/3GSample-oct23

WaveDREAM board 165 - Amplitude histograms

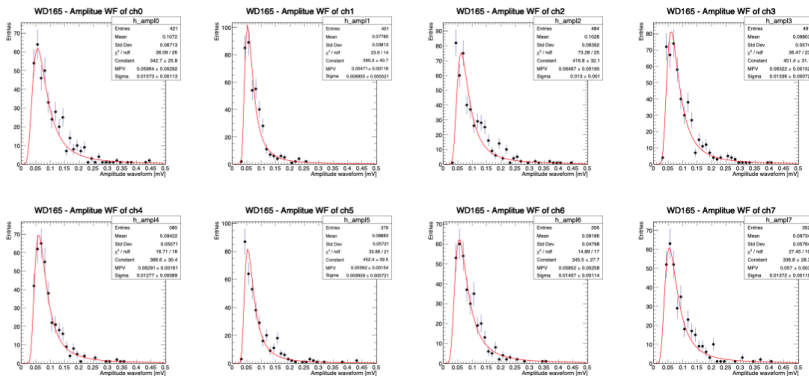
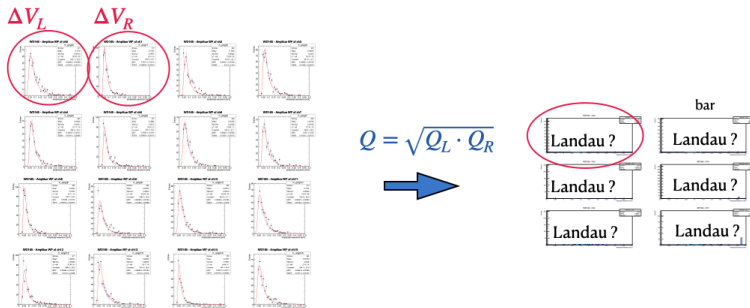


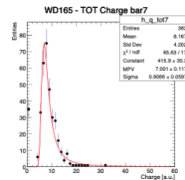
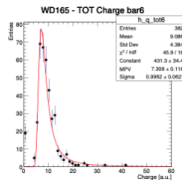
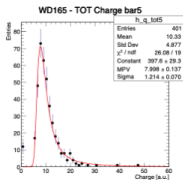
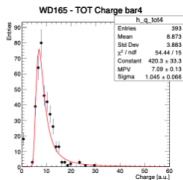
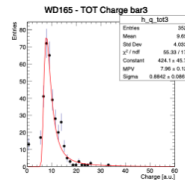
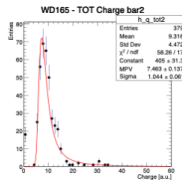
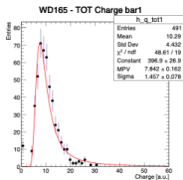
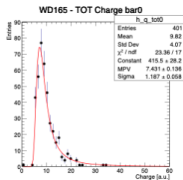
Figure: Channels from 8 to 15.

Charge



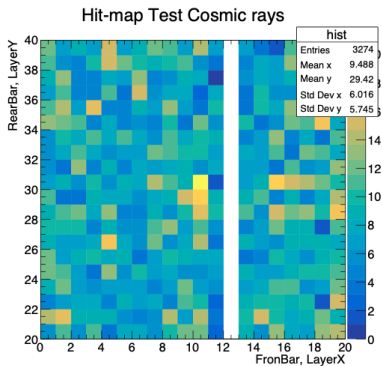
- Compute charge Q through the integral of the waveform (for each individual event).
- For each event, Q_{tot} evaluated from the collected charge on each side of the bar .

Charge

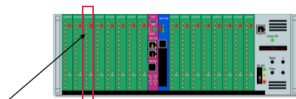


Good agreement with the expected Landau distribution.

Hit-Map TOFWall



Board 157, channel 2 and 3 disabled



Maybe a problem with the connector?

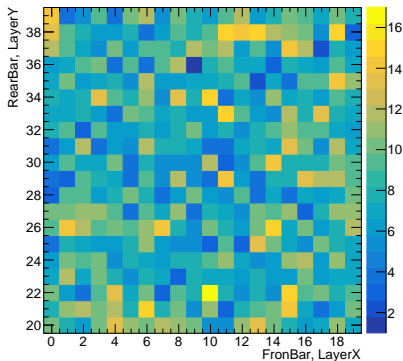
BAR 12 X-View



Distribution of hits on the TOF-wall bars is uniform for both layers .

Hit-Map TOFwall

Hit-map Test Cosmic rays



- Waiting for the CNAO, we replaced the WD 157 with the 170 .
- Thanks to Luca, Matteo and Marco.
- **Next task** \implies time resolution of TOFwall.



Tesi di Laurea, Roberto Zarrella 2018-19



Tesi di Laurea, Marco Montefiori 2019-20