

# Collaboration Meeting: TDAQ Update

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Presenting on behalf of Tracker DAQ group:

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ci sono istogrammi per errori global run details: prima instabile abbiamo ancora il firmware vecchio su daq09 non ancora testato il software nuovo e accennare il rate ma non è un problema perché possiamo continuare a caratterizzare abbastanza bene l'apparato (artdaq non è stato testato a quei rate) e pure slow control daq is composed of controlling, monitoring and data flowing gains, voltages devono essere controllati slide con immagine del tracker board : hardware building that dtc-dtc connection event building avverrà nel dtc , not for cosmics to be done: implementare lo slow control dei lowhigh voltage

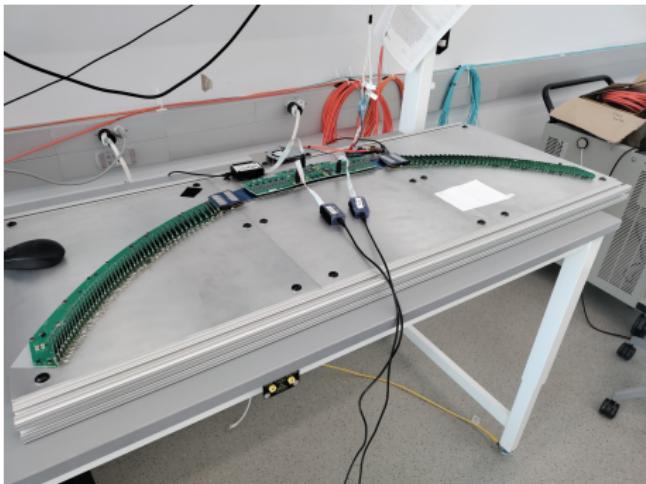
# A snapshot of the current job

- Currently in the phase of commissioning and integration;
- Reading from a tracker station is imminent;
- We need to know how to read the detector;
- Learning about errors and data transmission;
- A functional DAQ is needed.

⇒ The rest of the talk will be about **Data Quality Monitoring**

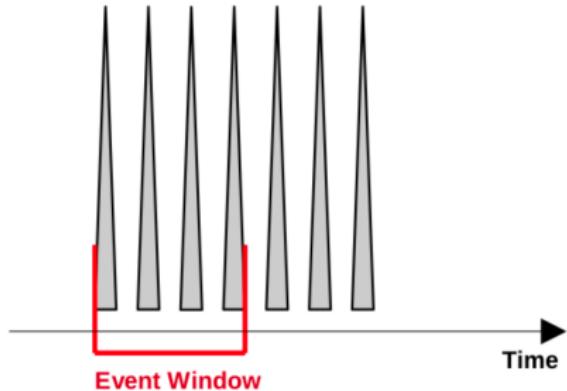
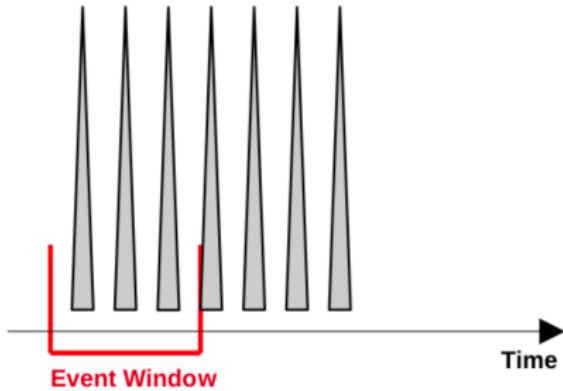
⇒ Some updates from **GR1** will be given too

# Working area



- DRAC card connected to the DTC installed in the DAQ computer mu2edaq09 via optical fibers;
- Each teststand has 96 channels;
- A pulser implemented in the DRACs is sending pulses to the preamps (CAL side) at 50 kHz;
- Pulses are digitized at 40 MHz;
- 12 channels pulsed per RUN;
- We are using 1 or 2 ROCs at the same time.
- 3 test stands @IERC (only 2 have been used).

# Description of the teststand setup



- Pulses are separated by  $1/f_{gen}$ ;
- EW can be varied between 700 ns and 50  $\mu$ s;
- The timing of the readout is uncorrelated with the generator timing sequences → number of readout pulses is variable;
- ROC is reading digiFPGAs;
- ROC hit buffer stores up to 255 hits (DOCDB47837);
- The channel readout sequence is fixed.

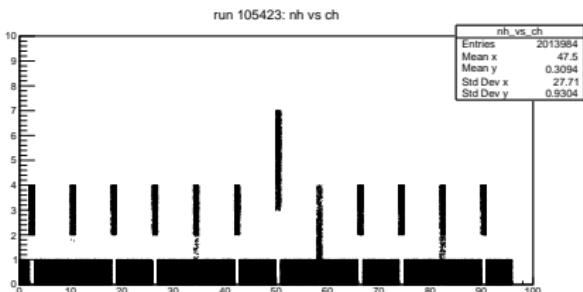
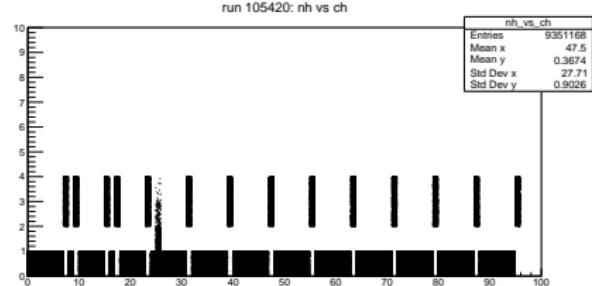
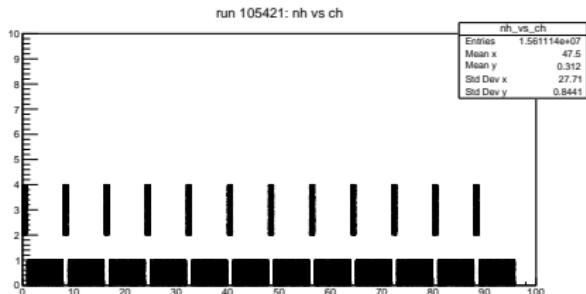
# Available Histograms and Error Identification

## Real Time Monitoring:

- **Channel histograms:**
    - Time distribution of hits;
    - Waveforms;
    - First sample, baseline, charge, pulse height, charge tail and mean time distribution;
    - $\Delta t$  distribution between hits.
  - **ROC histograms:**
    - Number of hits versus channel;
    - Waveform mean values versus channel.
  - **Event histograms:**
    - Number of hits distribution;
    - Error distribution;
    - Number of bytes distribution.
- Real Time Diagnostic:
- Number of bytes error bit;
  - Number of ADC packets  $> 2$ ;
  - Undefined link ID;
  - Invalid channel ID;
  - More hits than the maximum in a given channel.

# Number of hits versus channel number

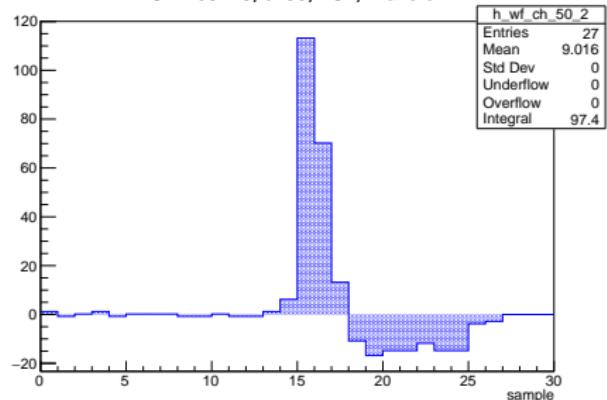
- Need to see cross talks between channels:  
⇒ one pulsed channel for every eight not pulsed channels.
- Cross talks in odd pulsed channels only;
- Asymmetric cross talks (e.g. 3→5, not seen 3→1).



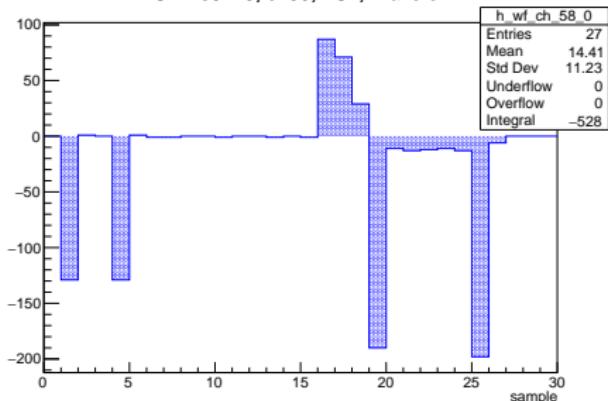
- DEAD channels found;
- Less hits than expected;
- More hits than expected:  
⇒  $\Delta t$  distribution;  
⇒ Negative waveforms.

# Waveforms

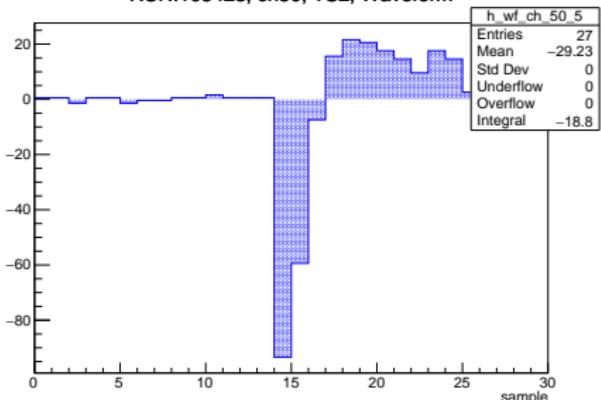
RUN:105423, ch50, TS2, Waveform



RUN:105423, ch58, TS2, Waveform



RUN:105423, ch50, TS2, Waveform



- Negative peaks (baseline and tail);
- Peaks depth is 64, 128 or 192 (6th or/and 7th bit error);
- Reconstruction of the waveforms: isolation of negative peaks;
- The time interval between hits is always  $20 \mu\text{s}$  for positive waveforms;
- Time difference distribution between hits for negative waveforms is peaked in  $4$  or  $16 \mu\text{s}$ .

# Waveform Features versus Channel Number

$q$ ,  $ph$ ,  $qt$ ,  $fs$  mean value to identify critical channels (noise, negative waveforms)

