Weekly Update

On behalf of the Team @ CERN

Last two weeks: Renan, Julio, Anna, Gabriel, Denise, Elisabetta, Anselmo, Alessandro, Manuel

Plus remote contribution from: Laura, Carlos, Michaela, Esteban, Federico, Daniel

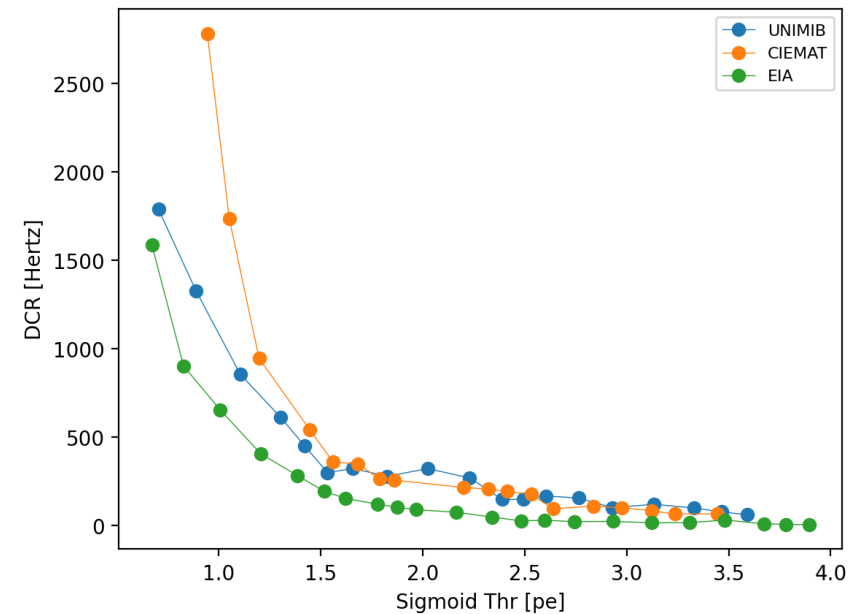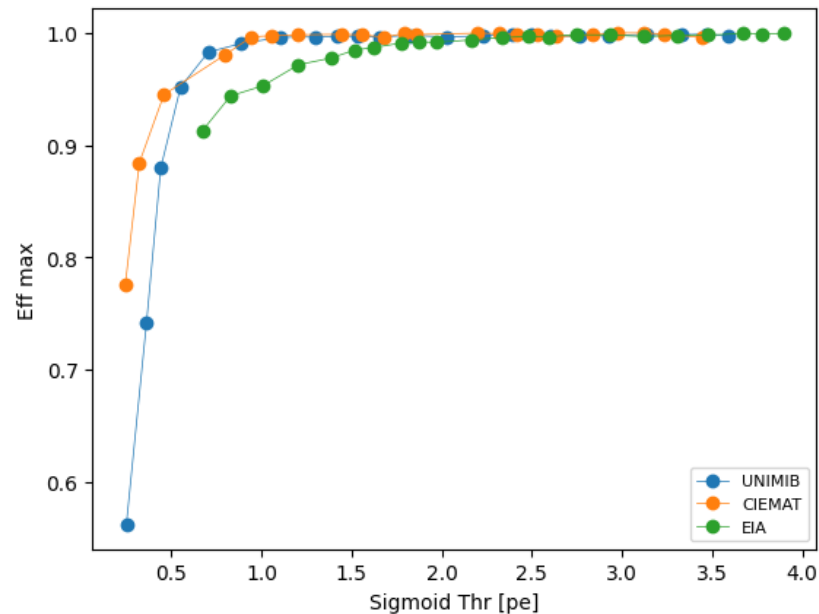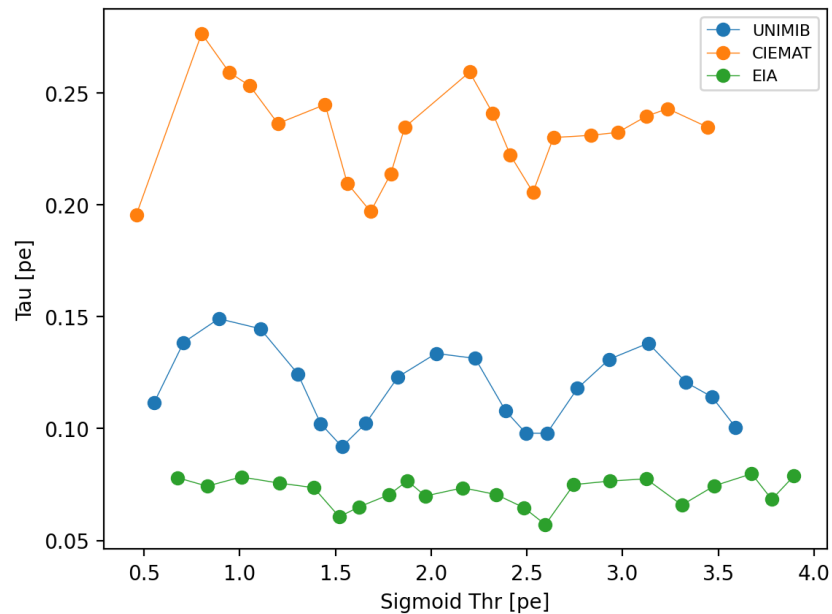NP04 PDS Data Taking Planning Meeting – 18/07/2024

News of the Last 2 Weeks

- NP04 status: beam back on for 2 weeks (ends on the 24th, then 5 days before next beam)

  - Use the time to deploy a stable new Daphne firmware

- Noise run analysis

  - Ongoing analysis with new Purity Combo runs, will continue for quite some time

- New self-trigger modules test results from Milan

  - Different algorithms show similar performances, working towards a compromise before next beam

  - New version of the firmware tested in the last few days with more functionalities

- Waffles alpha release and first analysis task assignment

  - New (plus old) wafflers onsite this week, started looking at beam data

  - Tutorial with Julio + ~1 week of training and first studies

- First comparison of onsite and lab measurements for the PDS

New Self-Trigger Modules Test Results

- Comparison of Milano-Bicocca, CIEMAT, and EIA in terms of accuracy, trigger jitter and average shape, by Federico and Esteban

  - New results with matched filter histogram building, and measurements under breakdown as noise profile

  - Similar performances between the three algorithms with some differences (best performances at N+0.5 pe)

  - Working towards a compromise <u>for the whole group to work on</u>, to fit design and achieve best performances

New Firmware Installed and Tested

- People have been pushing hard to have trigger primitive inside the chain, but it is difficult

- We need a stable firmware <u>before this run ends</u> (new firmware to test next week)

- A new firmware was tested with candidates, self-trigger algo, counter,

  - Includes candidates, a self-trigger algorithm, a counter for the DAQ

  - We want to deliver a PDS trigger candidates list for the DAQ trigger decision
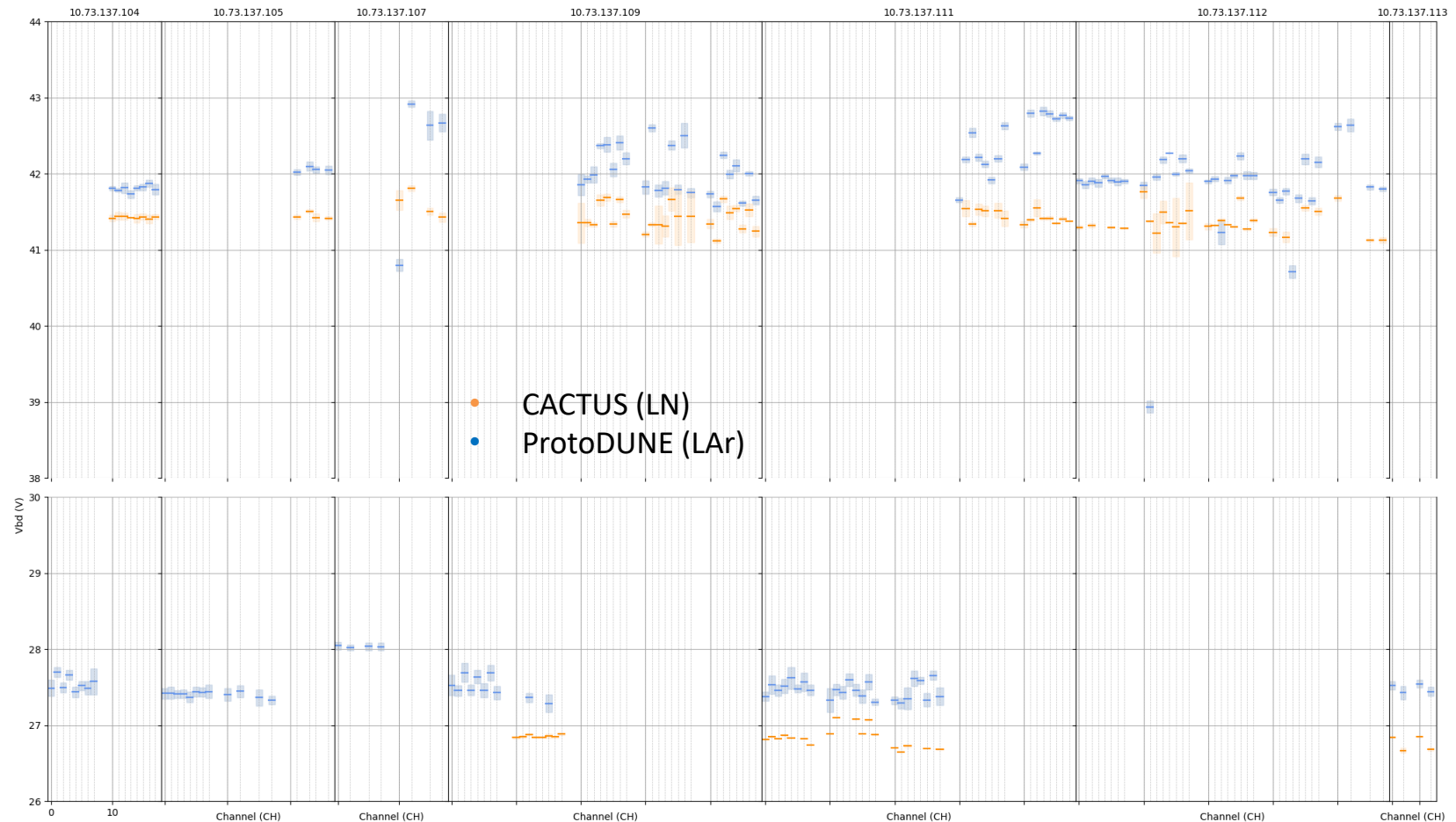
Waffles Alpha and Analysis Tasks

- New batch of analyzers arrived this week (Denise, Elisabetta, Gabriel, plus Anna)

  - Introduction to Waffles Alpha with Julio

  - Preliminary subdivision of [tasks](#), with focus on beam data (Anna, Elisabetta, Gabriel)

  - Ongoing effort for PDS calibration with IVs, LEDs, gain scans and comparison with lab measurements (Anna, Julio and myself)

- In the coming weeks we will have a clear assignment of people to different [analyses](#) that will continue offsite

Onsite vs Lab Measurements

- Preliminary study of Vbd comparison between in-ProtoDUNE and off-ProtoDUNE (CACTUS)

  - Only Ferrara data, Bologna to be included soon

  - Trend follows expectations

  - Problematic channels may have larger variance in Vbd (not the only explanation)

- Will be extended to gain and S/M (CIEMAT)

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Looking Forward

- Converging fast towards a new working firmware that includes the self-trigger algorithm and the trigger candidates to benchmark the PDS-trigger capability; we need:

  1. Firmware (tested)

  2. DAQ to recognize the new format (modify libraries)

  3. Modified decoder (Denise)

  4. Modified Waffles

  - In parallel, start thinking in trigger from the DAQ point of view (how use info to produce trigger candidates for the DAQ to take decisions

- Refreshed analysis team to develop in Waffles and start producing analysis results in the coming weeks (focus on beam data)

- 4 weeks of beam ahead of us to collect statistics and deliver items