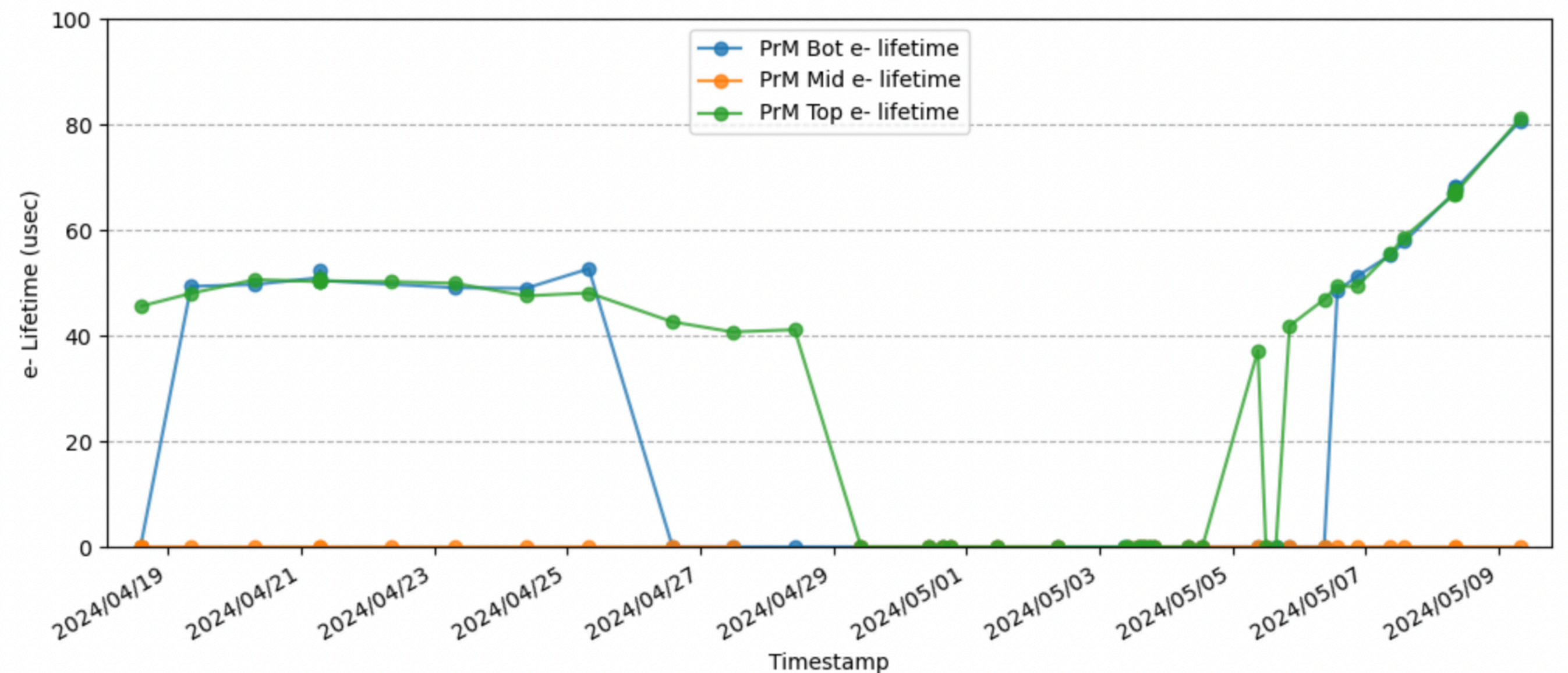


Status and plans

A. Cervera
IFIC-Valencia

Overall NP04 status

- Filling completed last week on Tuesday
- Wednesday and Thursday with no recirculation for temperature sensor calibration and fluid flow studies
- Recirculation started on Friday
- The different subsystems are being commissioned, with noise tests among others
- Purity increasing steadily
 - Saturation will take at least 3 weeks

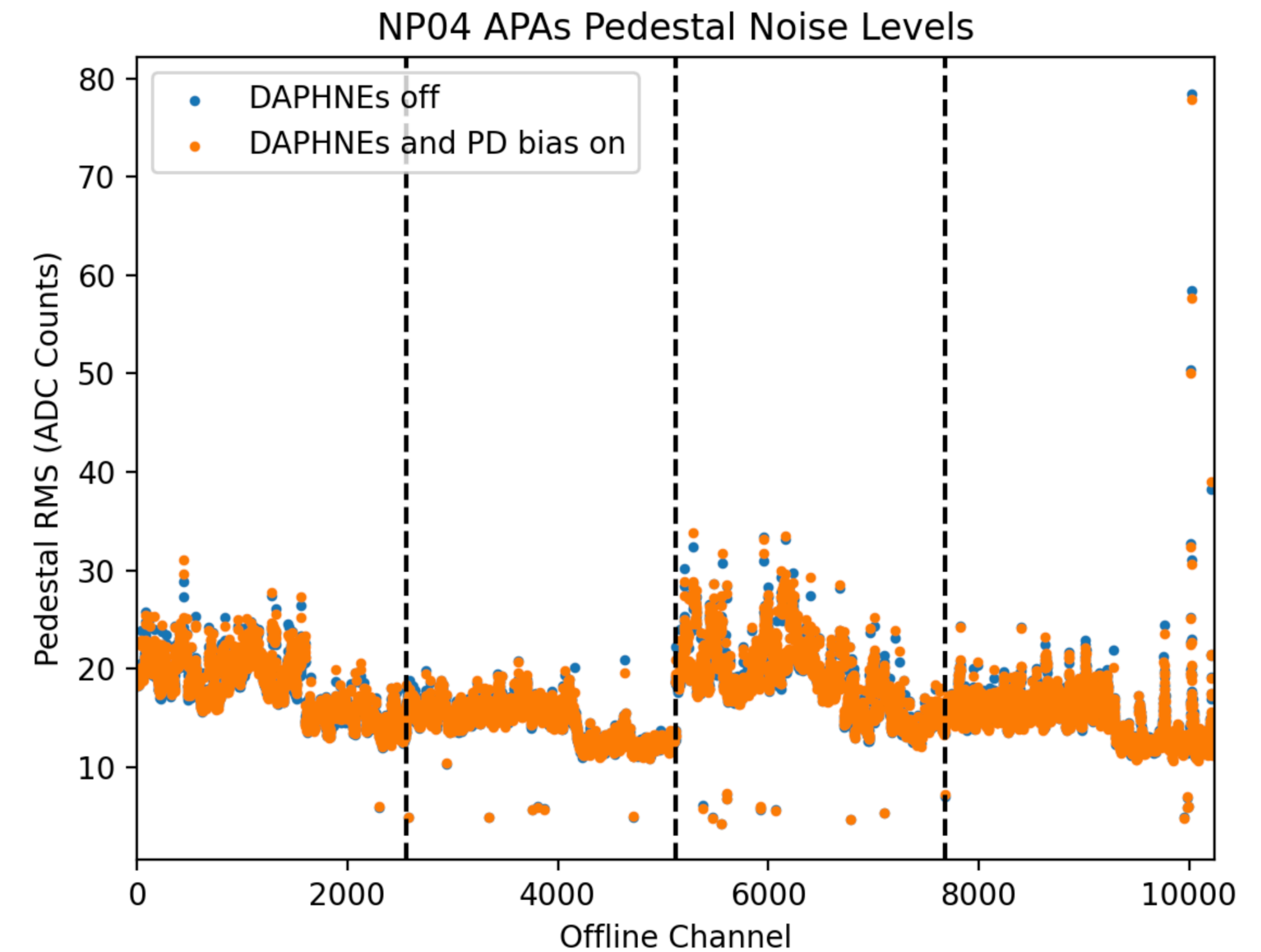
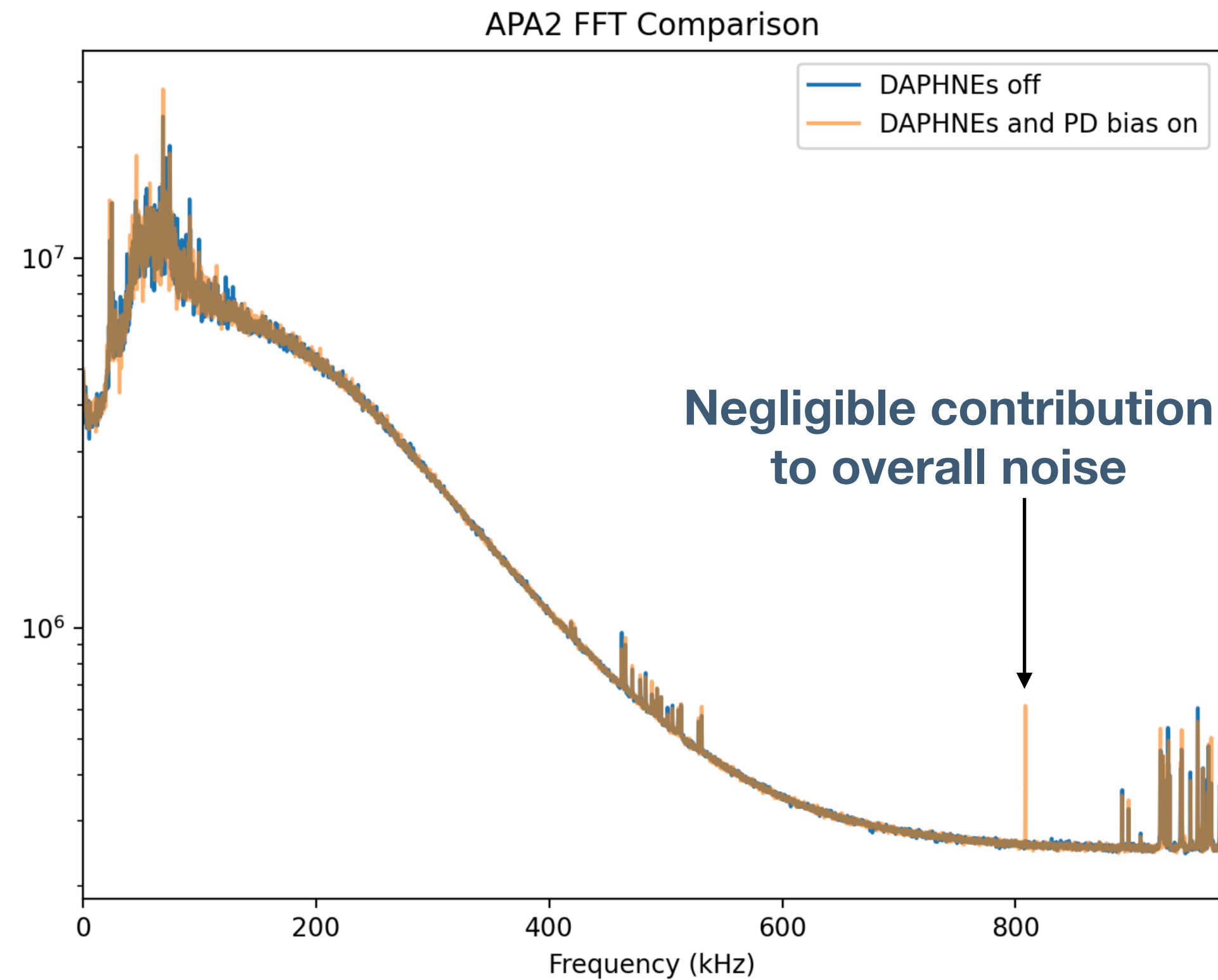


Overview

- People at CERN this week: Manuel, Alessandro, Renan, Laura, Michaela, Jairo, Daniel, Anselmo
- Progress in the last two weeks:
 - Rationalisation of DAPHNE configuration and DAQ scripts (Laura and Manuel)
 - IV curves (Laura, Alessandro, Anna)
 - LED calibration commissioning (Jairo, Laura, Renan, Manuel)
 - Quick Data quality assessment (Renan)
 - Matching filter self-trigger tests and DAPHNE firmware (Daniel and Manuel)
 - Noise studies (Laura and Anselmo)
 - First studies s.p.e. studies with deconvolution and scintillation lifetime (Henrique and Federico)
 - Data Quality Monitoring (just starting, Alessandro, Renan and Anselmo)
 - LArSoft decoder adapted to new DAPHNE frame format, to integrate the PDS data reconstruction in the general data processing chain (Jake, José)
 - Analysis framework (all)

Noise studies: PDS impact in APA CE

- Studies of CE noise w/wo PDS activity done last Tuesday (Roger Huang)



- We will do similar studies of PDS noise w/wo TPC CE in the next few days

Noise studies: APA CE impact in PDS

- We took 8 runs this morning with combinations of upper and lower APA CE off and PDS bias on/off
- Ongoing analysis

Noise studies: lol impact in PDS

- We took two additional runs to check the impact of the Ionisation Laser
- 5mW alignment laser ON in P2, 24VDC for motor drivers ON and enabled, laser stand for P2 grounded, motors in fixed position pointing at PIN diode module 4 located outside of the field cage
- Ongoing analysis

Timing Interface (TI) Command

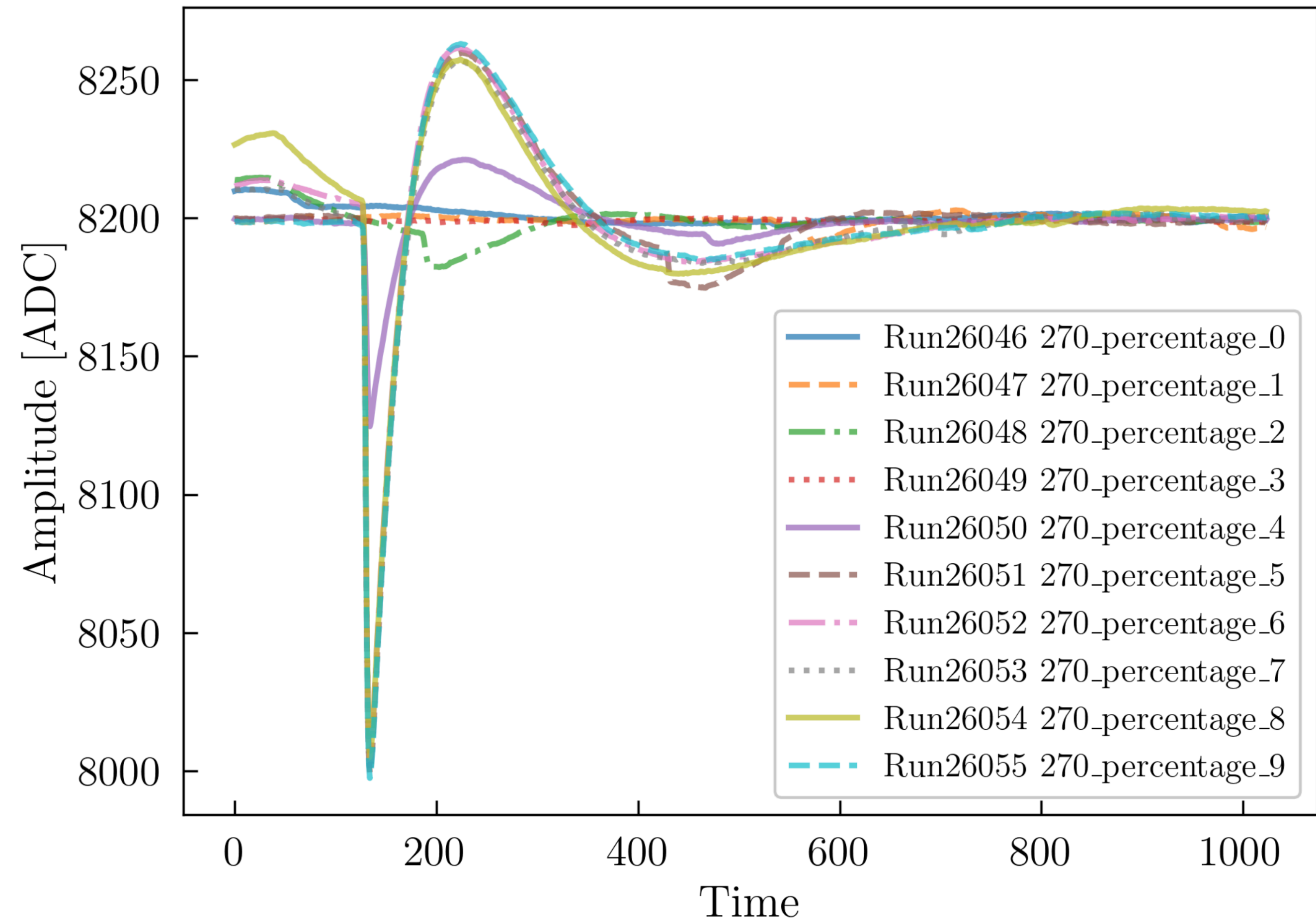
- It consists on a 0x7 word sent by TI to all systems with a frequency that we can control
- We use this command as an ad-hoc trigger for both DAPHNE and the PDS LED calibration system (LEDCAL).
- We can disable the TI command independently for DAPHNE and LEDCAL. This can be used for self-trigger efficiency studies

LED calibration system

Laura Molina (CIEMAT)
Manuel Arroyave (FNAL)

- There are 5 diffusers in each side of the cathode that we can control individually
- TI command can send a trigger to the LED calibration system
- We need to find the right illumination for each ARAPUCA module such that we can characterise the s.p.e. spectrum
- These studies are being done this week

Raw Average Waveform for different light intensities



First scanning (0-100%) for 15 volts

Self-trigger studies

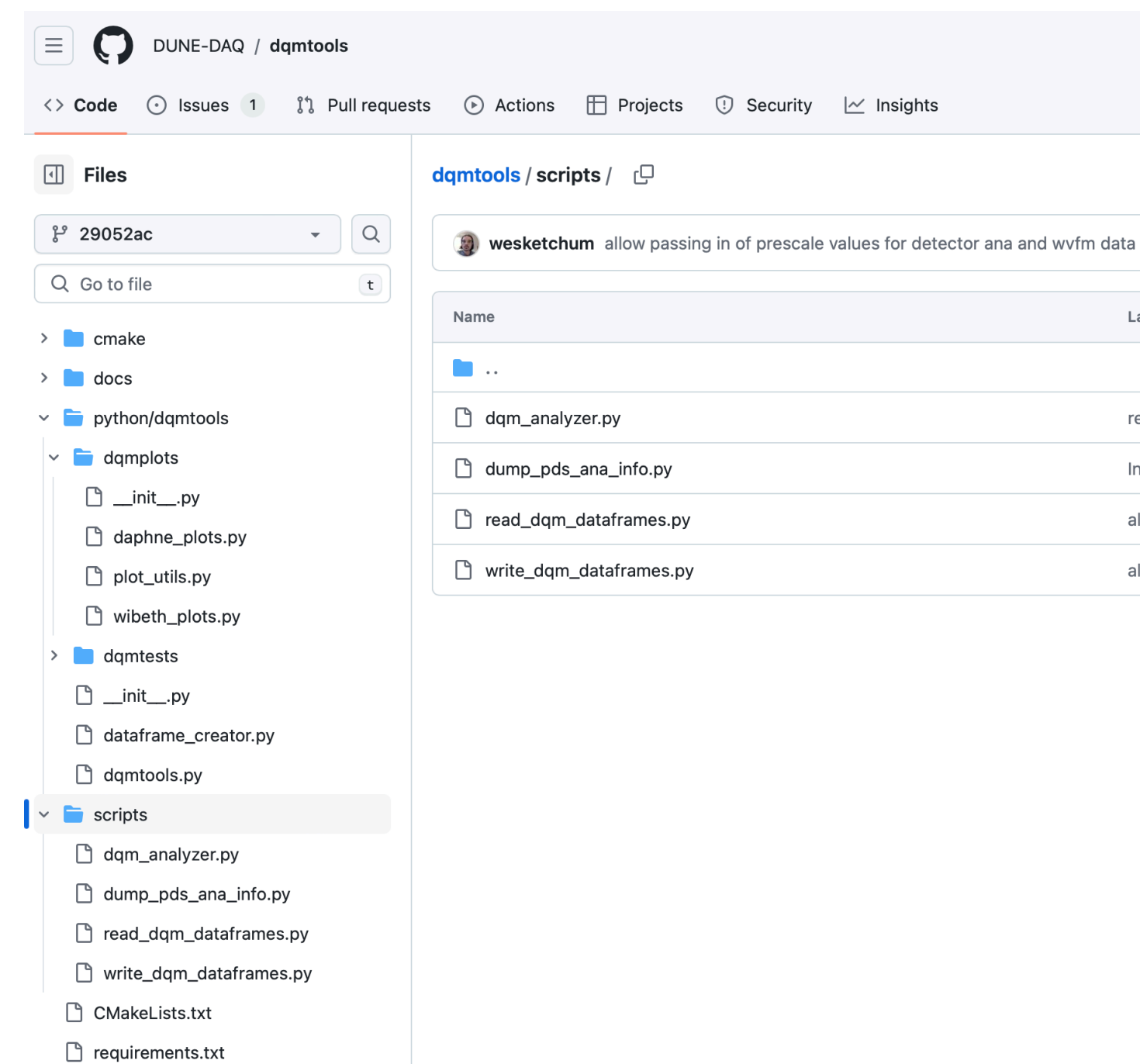
- Next week will be devoted to understand the performance of the different trigger algorithms. Most of the actors will be at CERN
- For each self-trigger algorithm a different firmware has to be uploaded into DAPHNE. Once this is done the efficiency of the trigger will be computed using the tuned LED as light source and the TI command trigger as normalisation
- This week Daniel Avila (EAI) was working in matching filter integration (dedicated talk)
- Plan is to have a default trigger for the first week of beam in June, but the final trigger algorithm for July/August will be most likely a combination of several after optimisation

Integration with DAQ

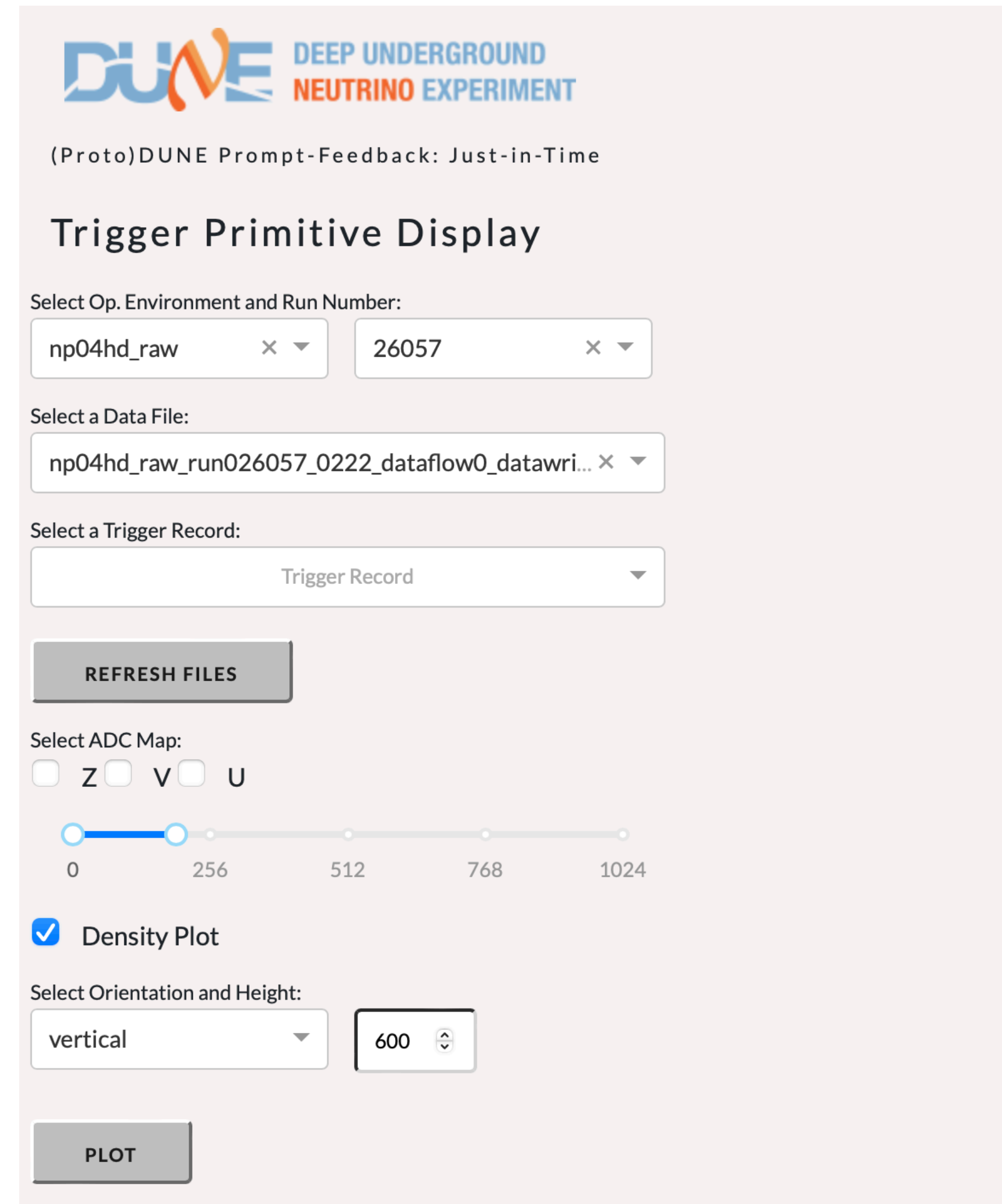
- Continues effort since early this year
- LED calibration configuration integrated
- OPMods for monitoring DAPHNE power supplies and SPY buffers (for checking and debugging DAPHNE configuration) fully operational
- DAPHNE configuration implemented and tested, to be commissioned this week once we receive the json file template
- New data frame format available with space for evolving trigger primitives

Data Quality Monitoring

- Ongoing discussions with DAQ experts (Wes & Vitaly) for integration of PDS DQM plots
- PDS team got the tools for developing the plots in standalone mode
- Then, they will be integrated into the web interface by DAQ team
- Plan to have something by next week

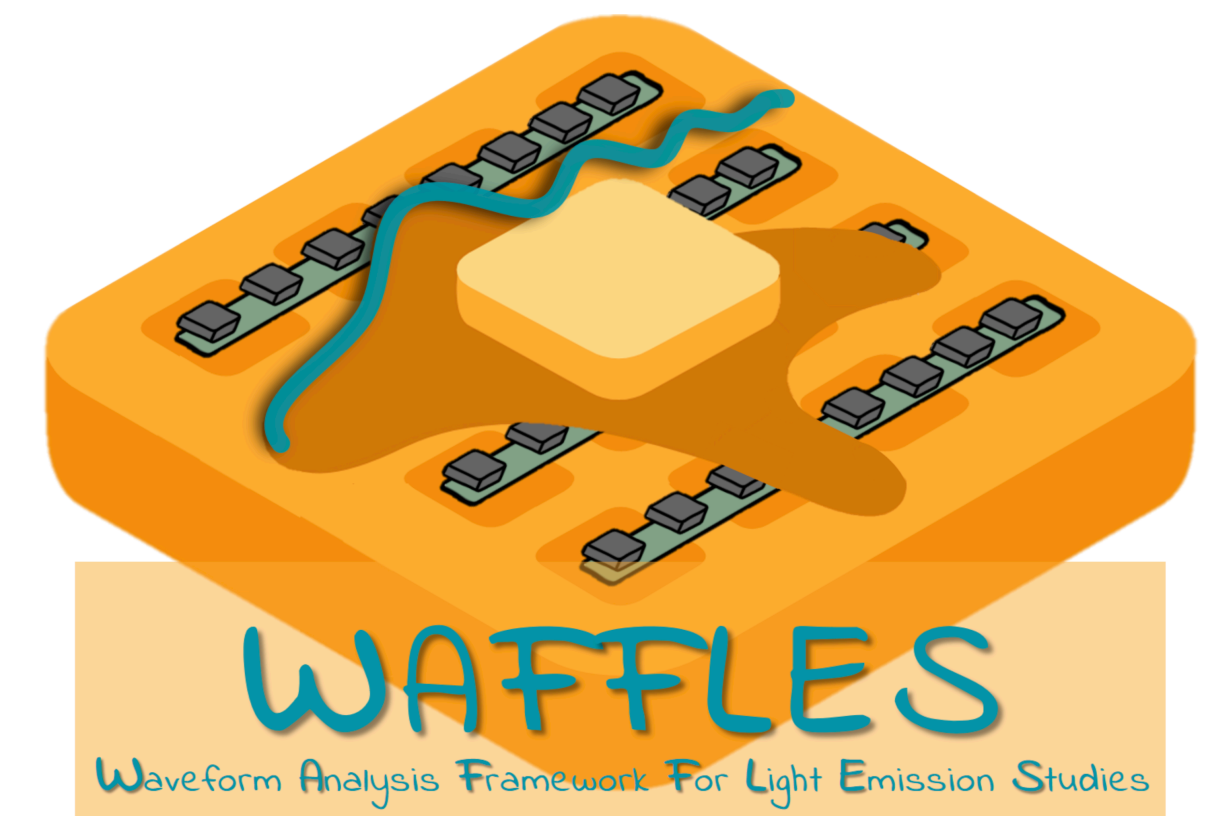


DQM web interface



PDS analysis framework

- Several existing “frameworks” for analysing waveforms and derived quantities (s.p.e. spectra, deconvolution, lifetime, ...) exist. Basically each analyser uses its own code
- We have started designing a new one from scratch, that it will incorporate functionality from existing ones
 - Quick feedback from analysers during NP04 beam periods
 - Easily integrate more people into the analysis effort
 - Better code/results sharing —> faster development
 - Continue developing the framework for NP02 and later for FDs



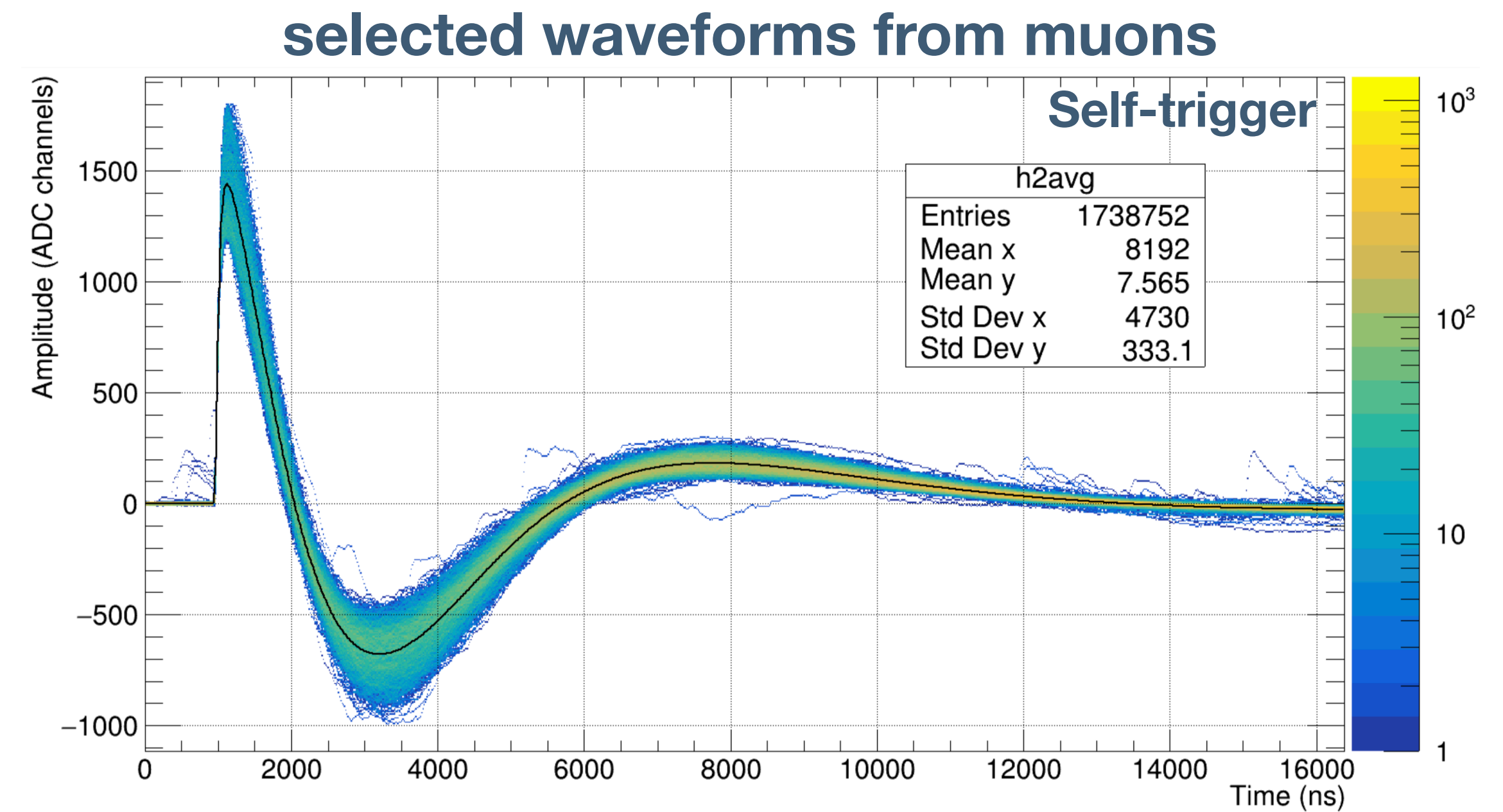
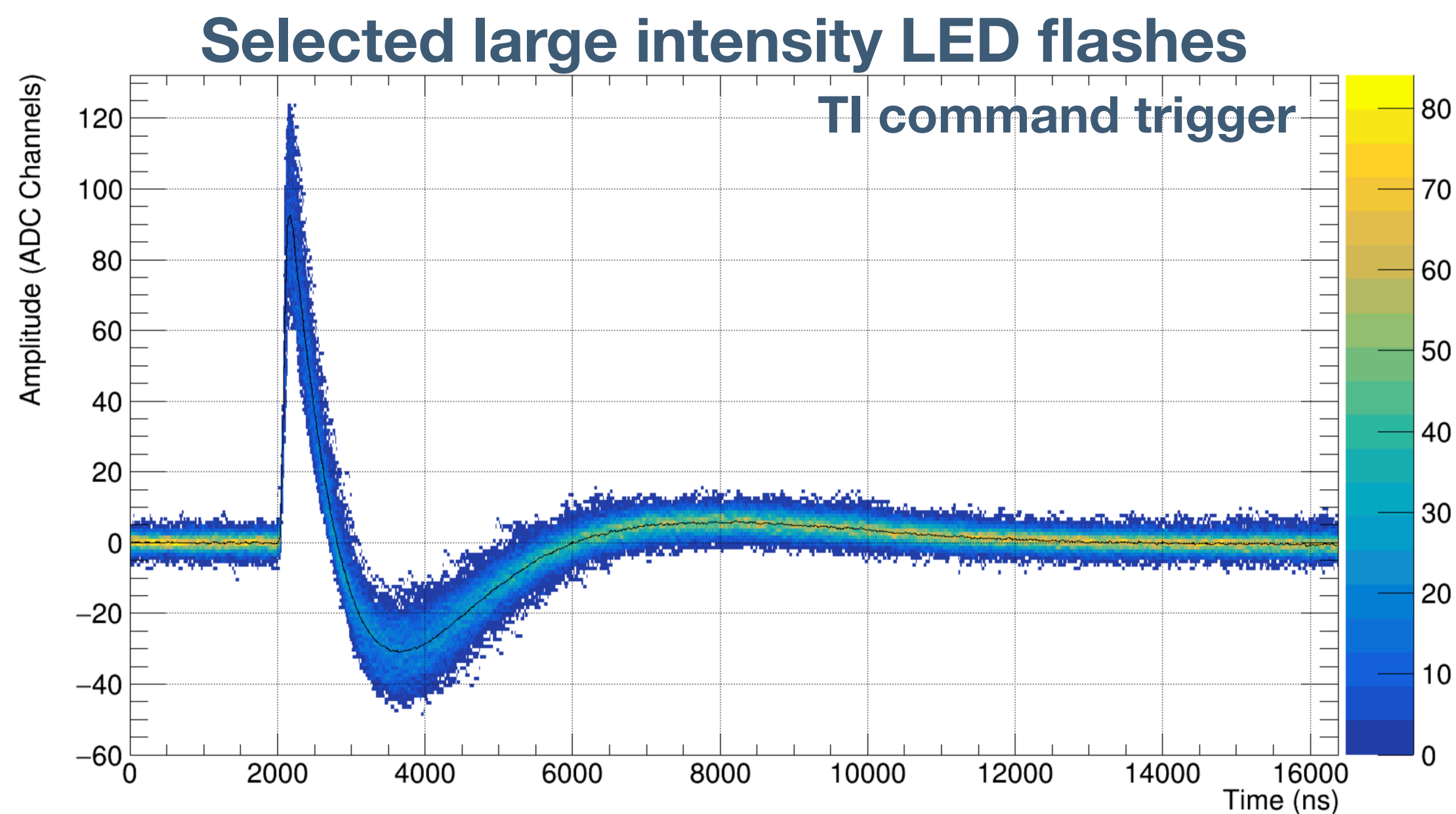
Preliminary logo from L. Molina

WAFFLES: Waveform Analysis Framework For Light Emission Studies

First *physics* result

Henrique Souza (APC)

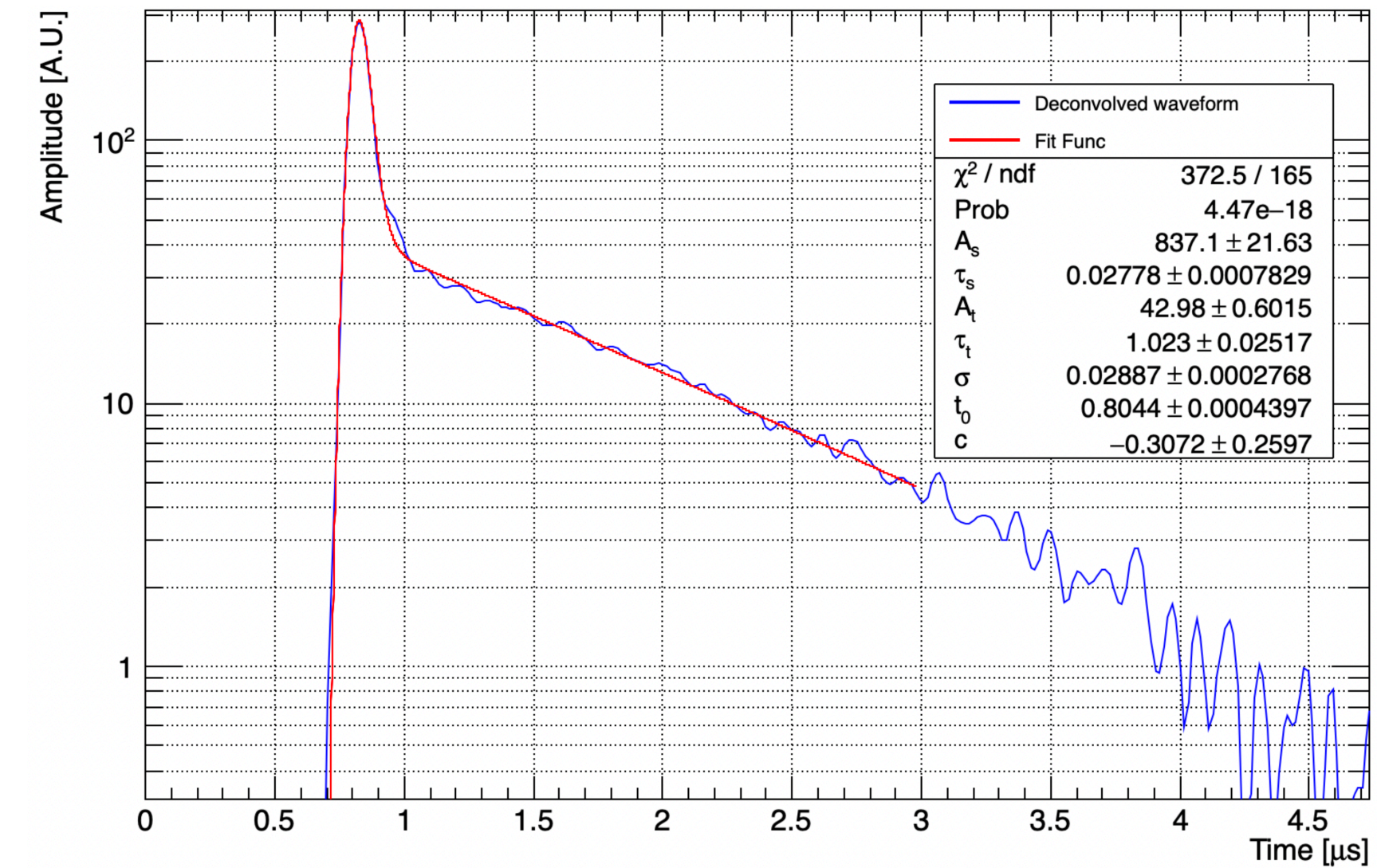
- Measurement of the slow component of the liquid argon scintillation light
- Use LED pulses for deconvolution of detector effects and cosmic muons for the actual analysis



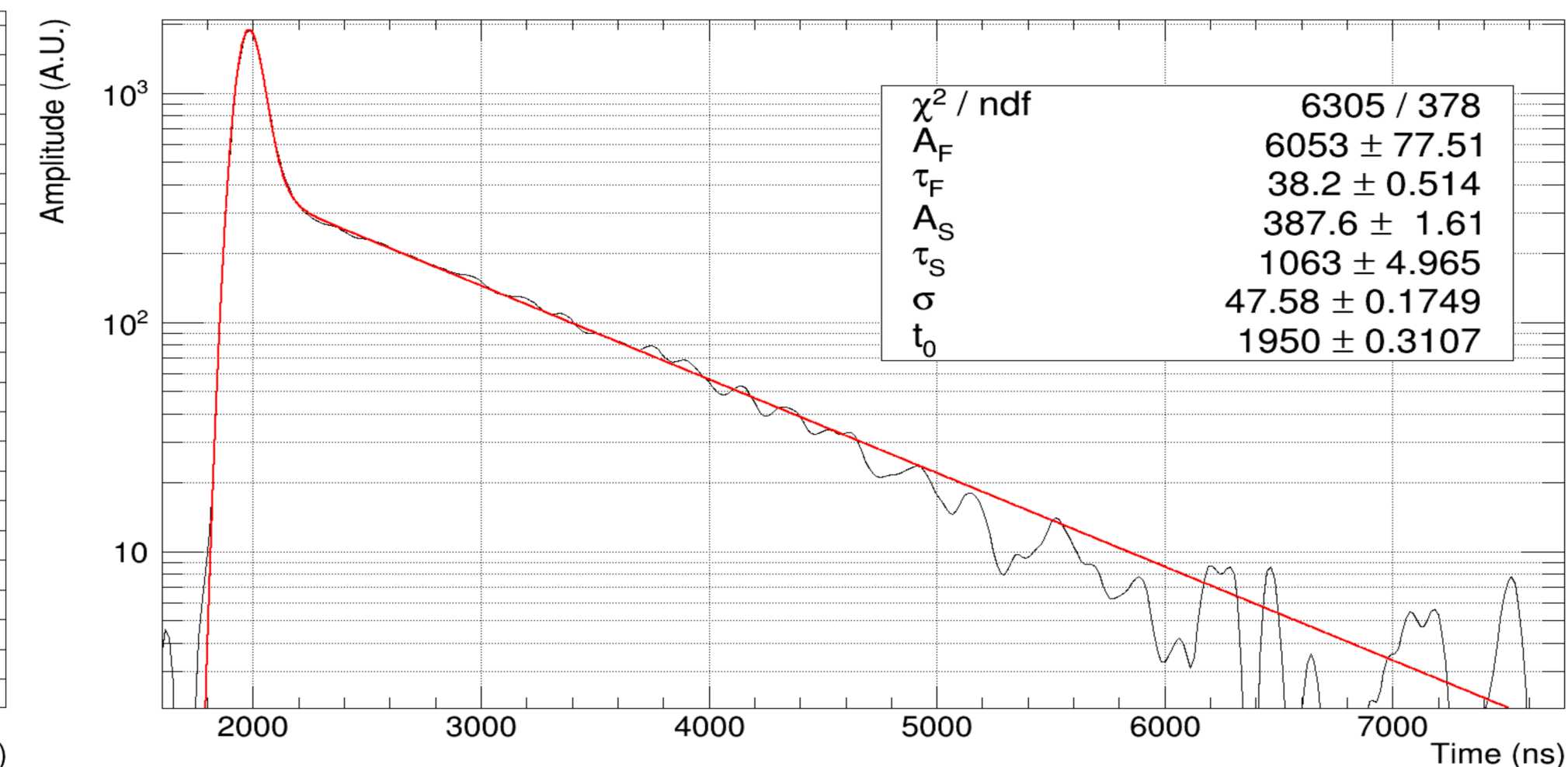
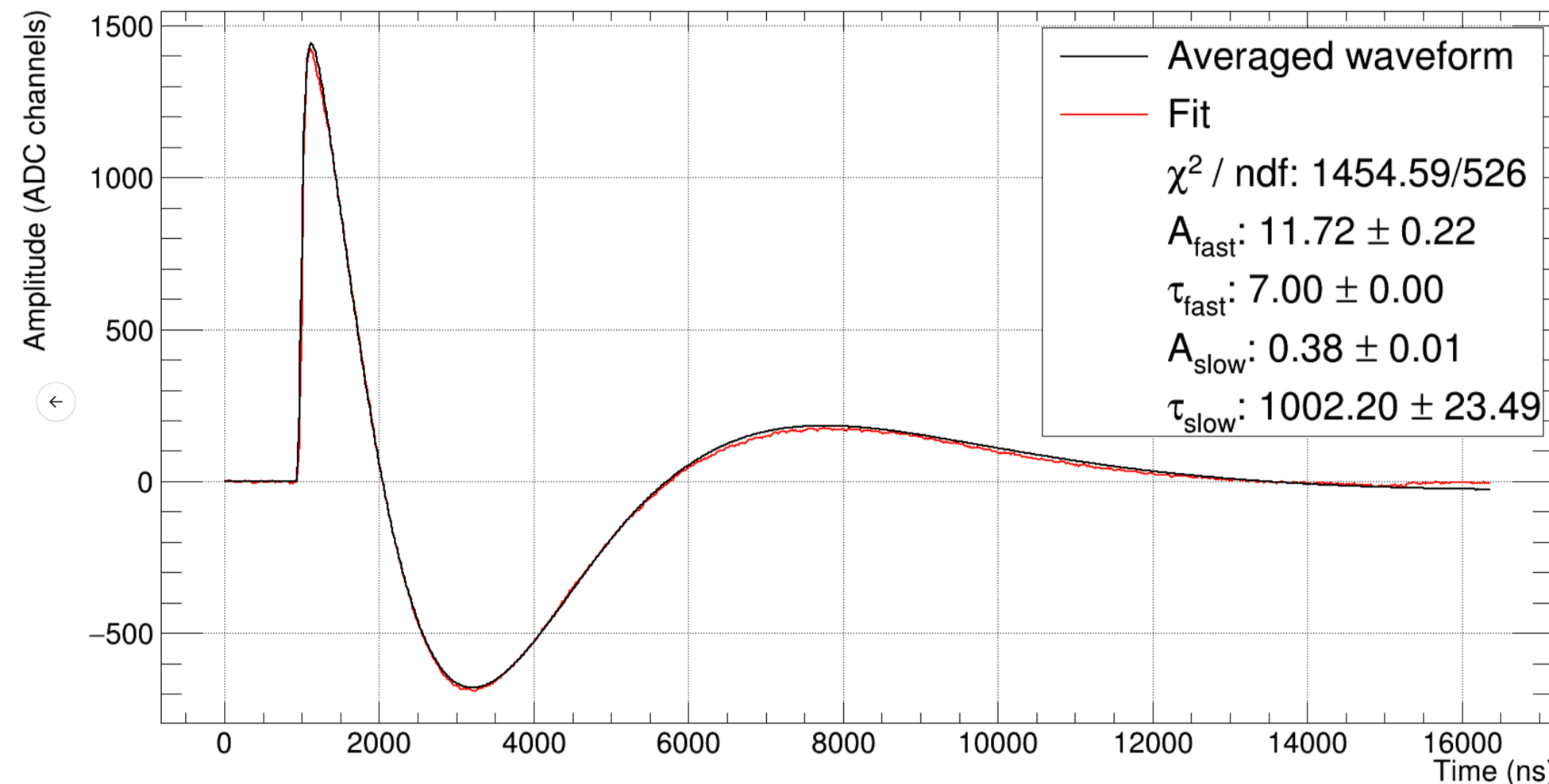
First *physics* result

- Average waveform in a cosmic run after deconvolution of the arapuca s.p.e. spectrum and electronics noise
- The lifetime of the slow scintillation light component is 1.0-1.1 μs
- We expect saturation $\sim 1.6 \mu\text{s}$ for good LAr purity

Federico Galizzi (MiB)



Henrique Souza (APC)



HV tests

- Tomorrow the HV will be ramp up
- We asked to do it in steps (10) to interleave PDS cosmics runs
- Motivation is to understand $\tau_s = f(\text{HV})$
- Sequence will be as follows:
 - 3 LED Calibration runs for deconvolution, before, in the middle and after the HV ramp up
 - 10' cosmic run with self trigger after each HV step

Run plan

		February			March			April				May			June			
		purging			cool	filling			purification				operation					
Study	trigger																	
IV curves and Vbd	none				d	d	d	d	d	d	d							
Test data in GAr	self																	
DCR	TI												d	d	d			
Light yield vs pur.	full str.												d	d	d			
Tau slow vs pur.	self												d	d	d			
Gain calibration	TI															w	w	w
Self-trigger efficiency	TI+self																	
Light yield map with laser	self															?		?
Physics	self																	

Important milestones

d=daily, w=weekly, TI=Timing interface command