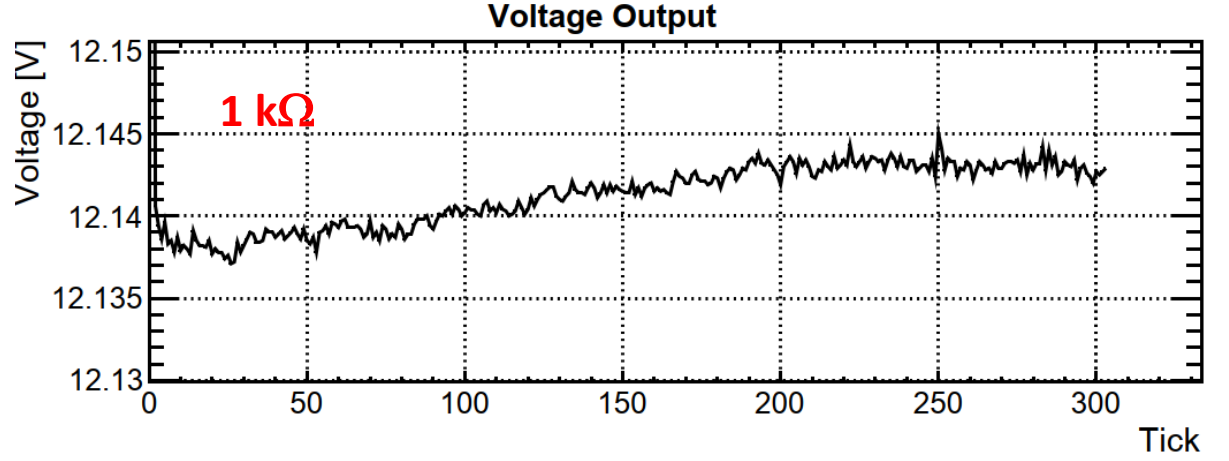
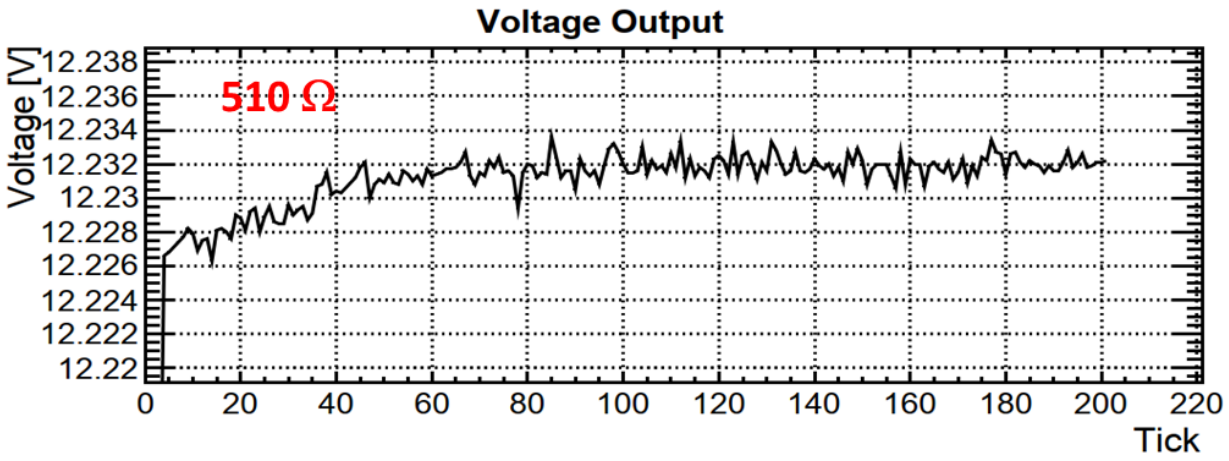
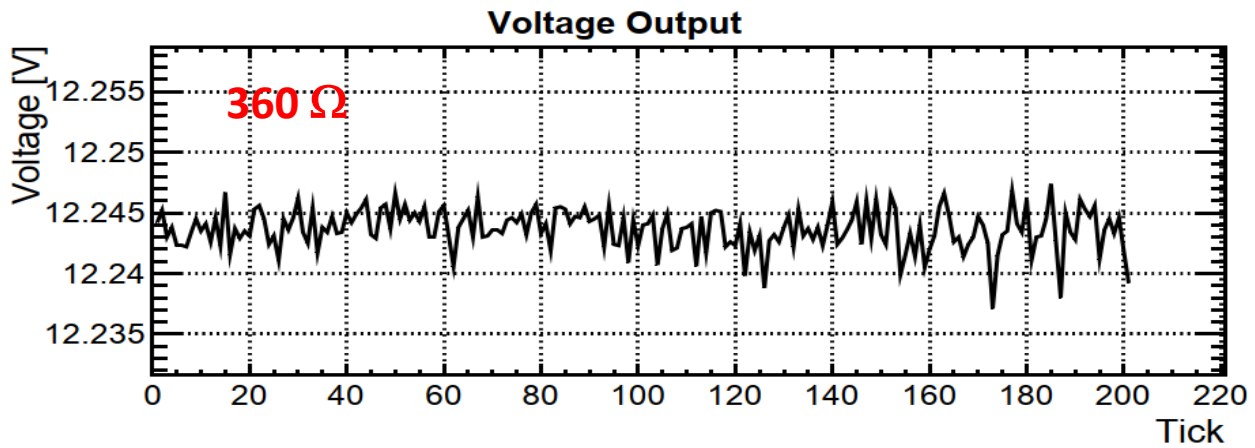
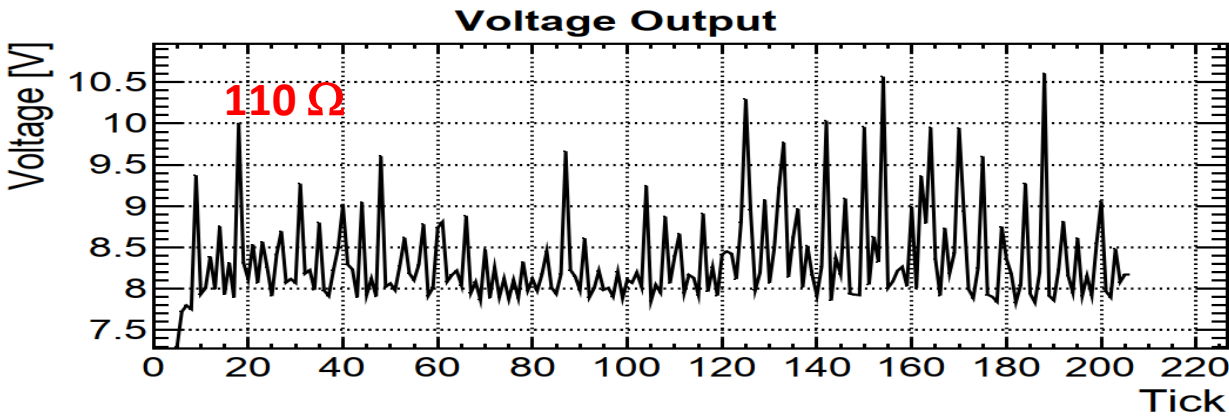


Testing Fermilab PoF system in LAr IV (Nov 19,2020)

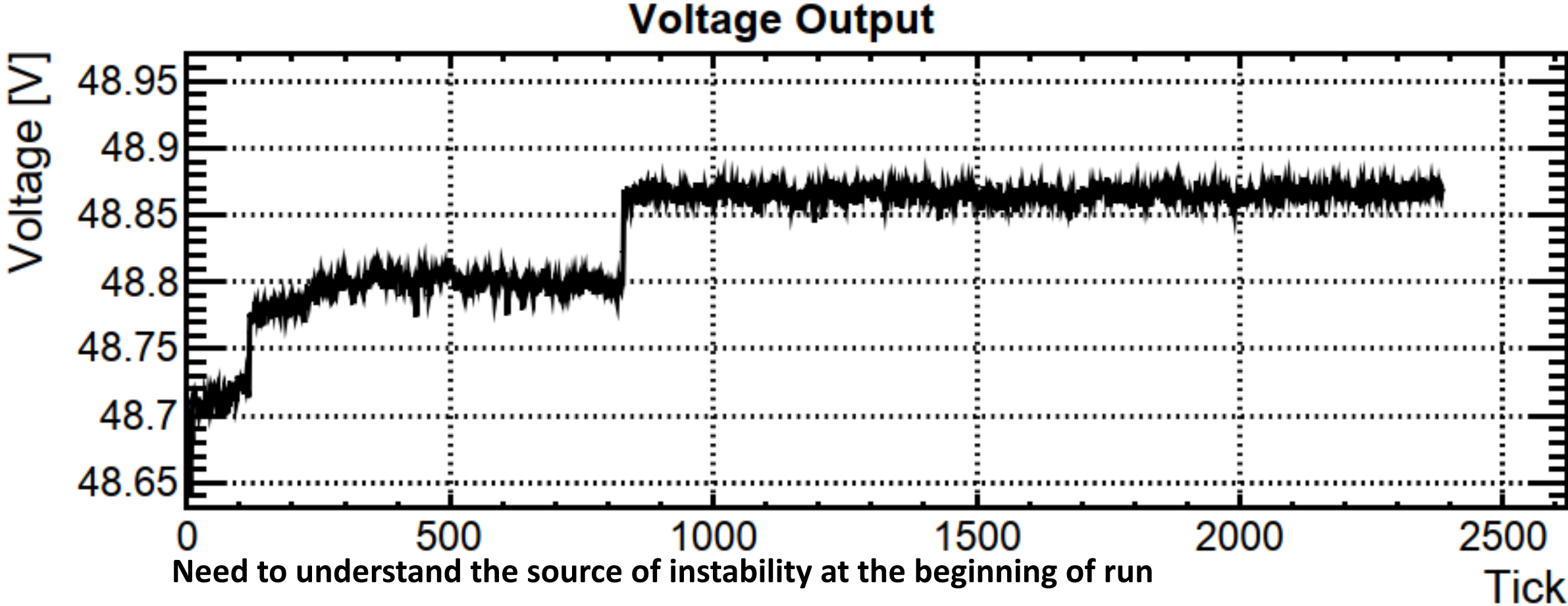
Dante TOTANI

Umut KOSE

Changing the resistor on Laser Power Module #1 (powering PPC #1)



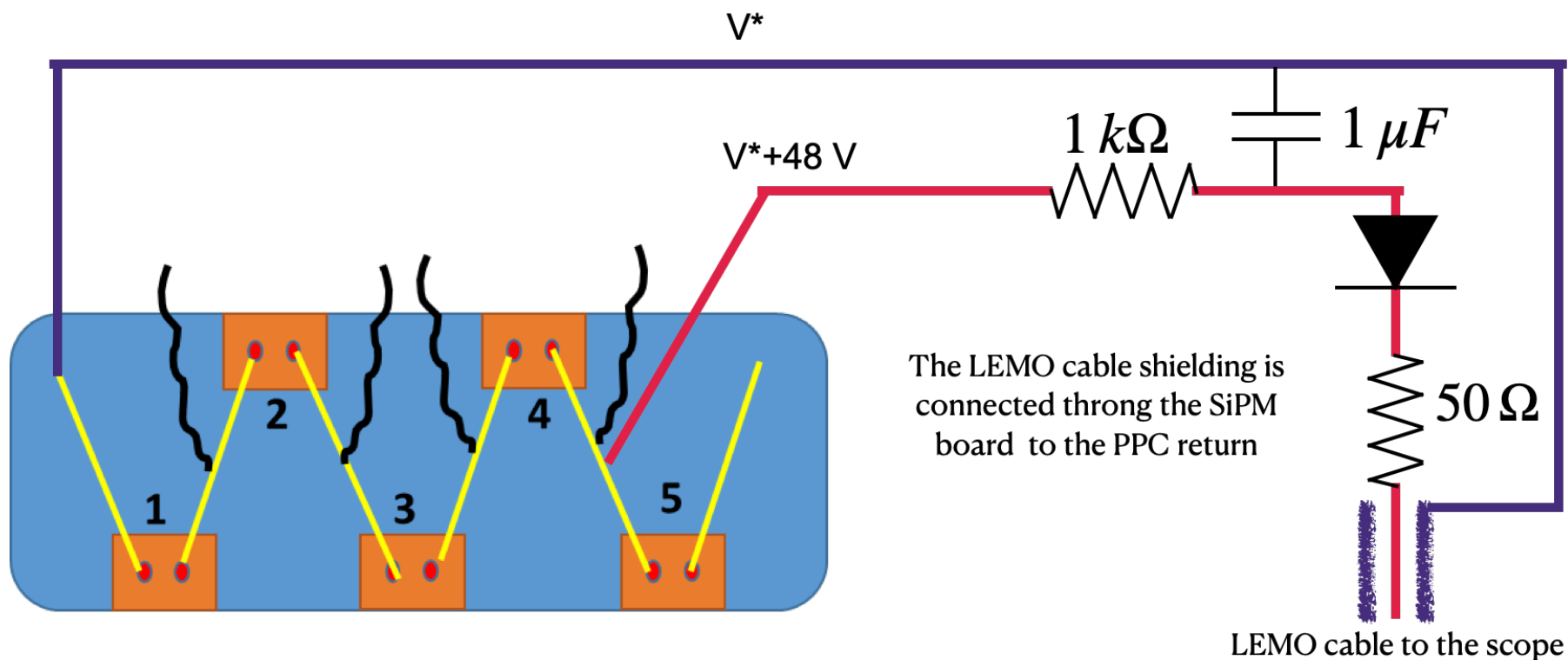
PPC 1 to 4 in series with 360 Ohms resistors



First test of 1 array of 4 MPPC (6x6 mm²)

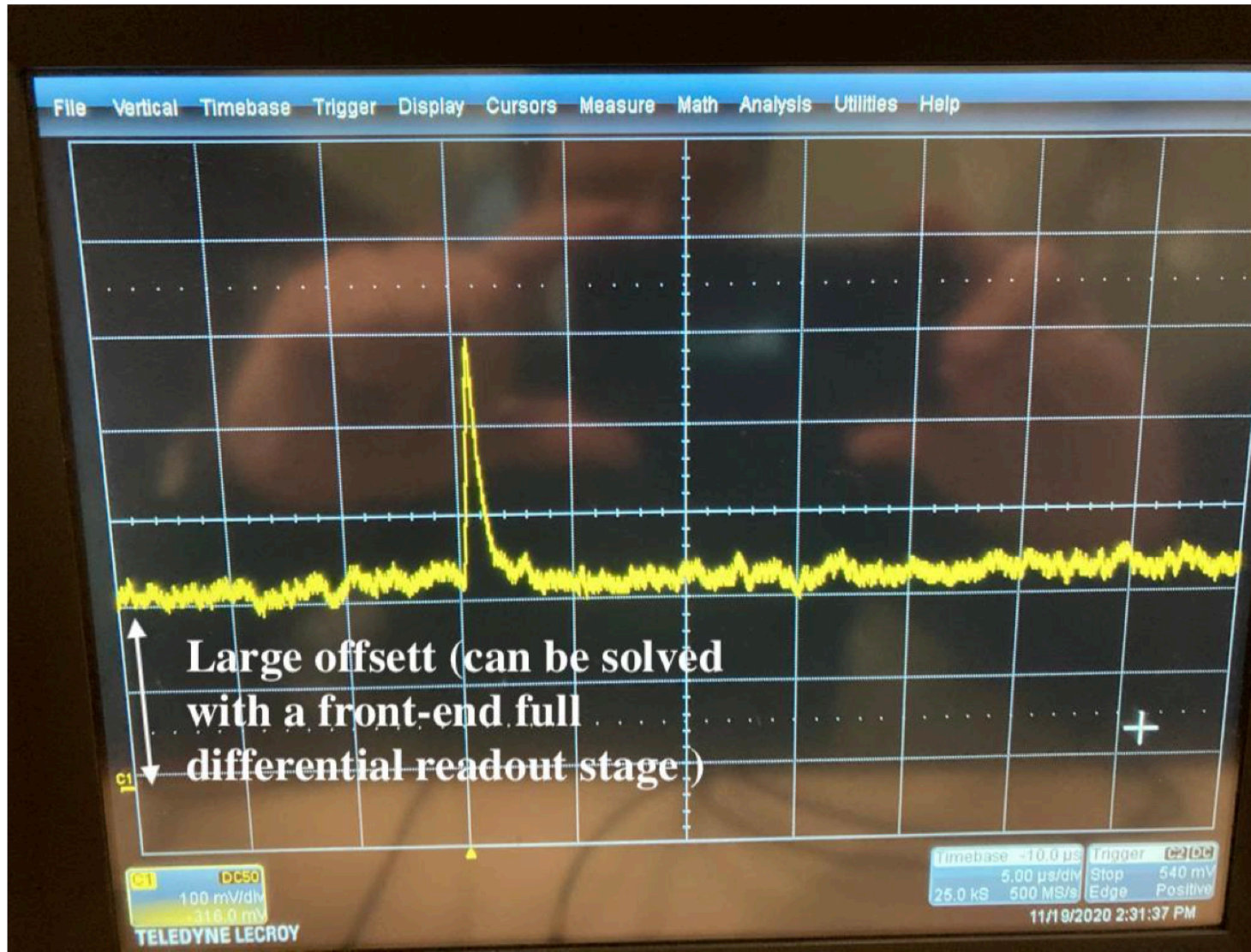
- The array is powered connecting the series of 4 PhotoVoltaic Power Converter (PPC) to get ~48 V.
- The SiPM board is placed near the PPC, and all is immersed in Liquid Argon.
- A LEMO cable is used to bring out the SiPM signal, read by a scope (50 Ω termination).
- The SiPM board has 1 k Ω resistor in series to the power input and a capacitor 1 μ F in parallel (connected between the SiPM cathode and the return to PPC array).
- A 50 Ω resistor is placed just after the SiPM output.

At the same time a cable between each PPC is connected to allow the reading of each PPC independently to check the stability

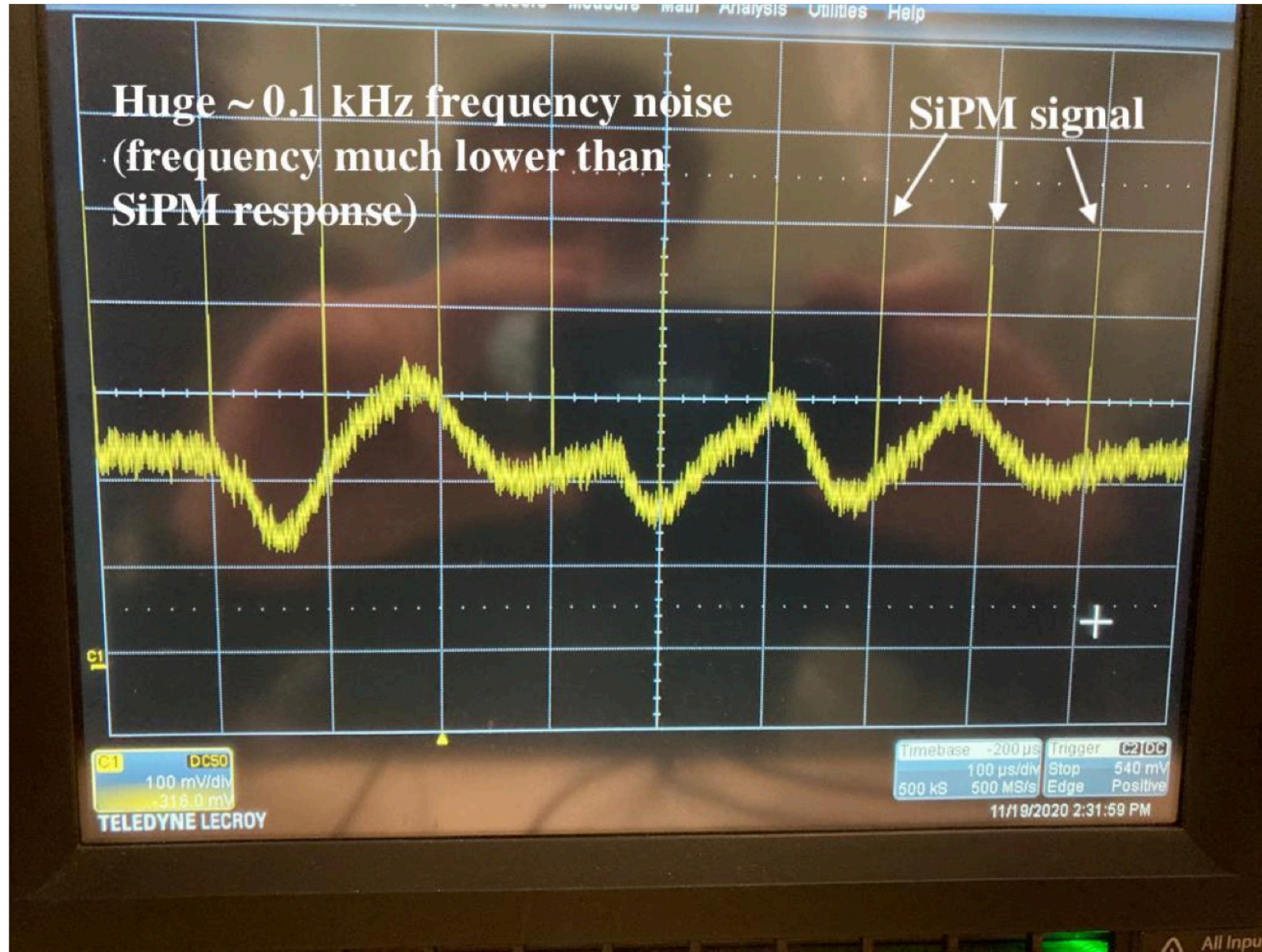


The SiPM signal is the expected one, in that acquisition the signal is relative to a huge amount of photons produced by an LED. The rise time is slower than the SiPM response since the LED pulse used was large (500 ns width).

A large offset is observed, it can cause some problems in the PE analysis. Probably a full differential readout will help (for example SSP).



Besides the SiPM shape, a huge noise has been observed. The frequency is much lower than PE response, so it is visible only with a window of 5 ms ($500\ \mu\text{s}/\text{div}$), in the previous waveform it was $5\ \mu\text{s}/\text{div}$. Probably it is due to some grounding problem. We are investigating on that.

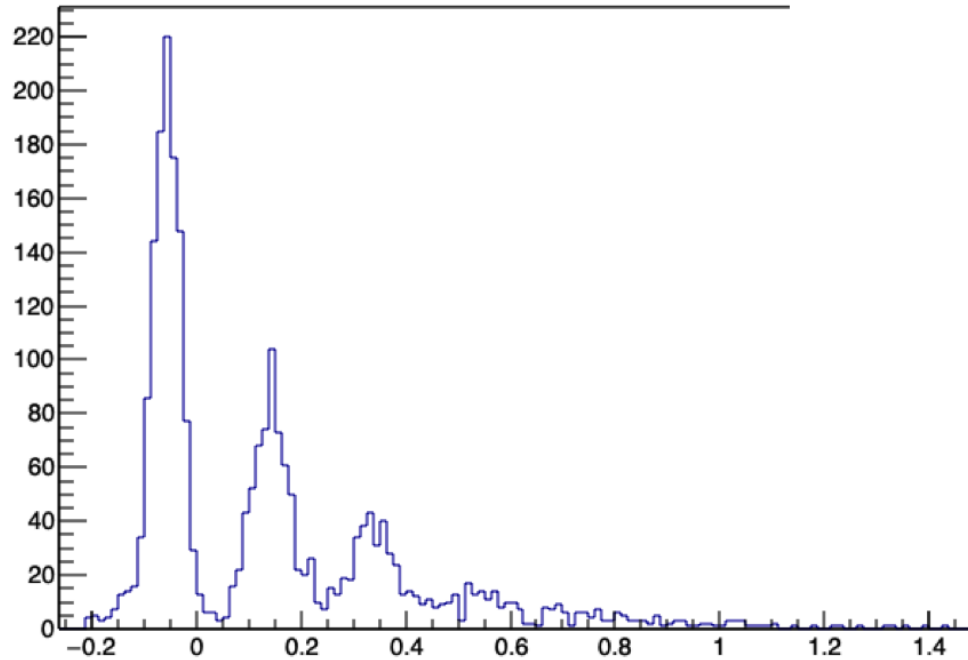


- **1 array of 4 MPPC (6x6 mm²)**
- **Powered by standard power supply**
- **Read by a scope.**
- **Signal amplified x10 by NIM module**

1 PE amplitude is ~ 1 mV after a an amplification of x10

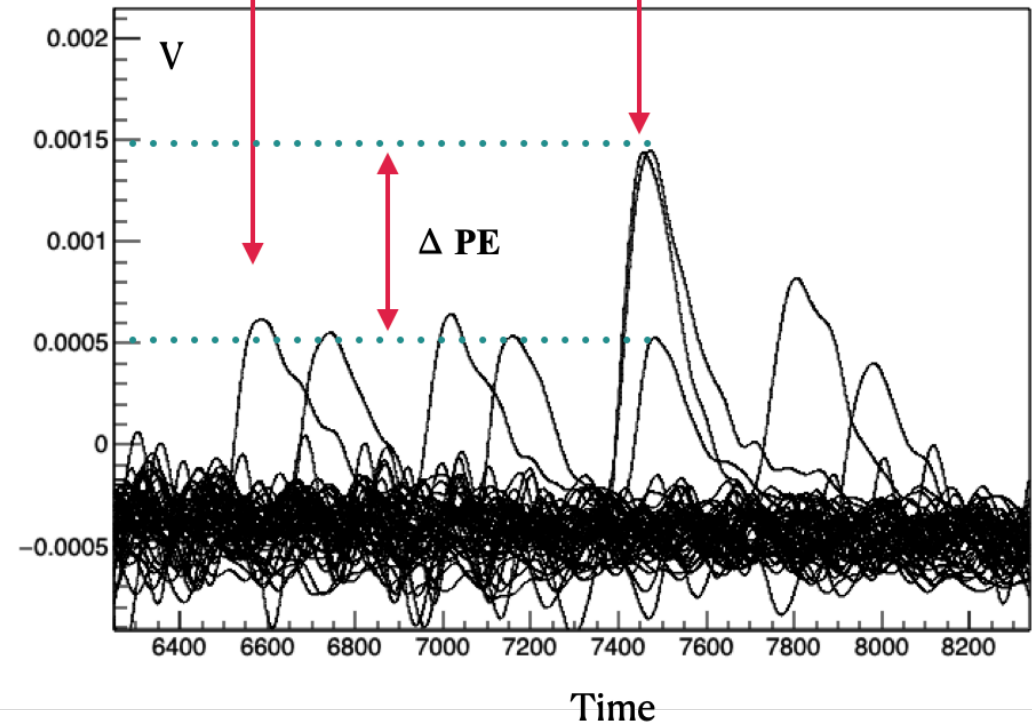
Is almost impossible doing a SPE recognition without and amplification stage, when we use an array of 4 SiPM or larger

Charge



1 PE

2 PE



This was a preliminary test so I forgot to record the sample rate (each time tick should be around 2 ns).
 However an online 20 MHz bandwidth threshold and a offline mobile average of +/- 3 tick is applied to filter the waveforms.

PE peak shapes shown in right plot are filtered.