

# VD Coldbox Readout with DAPHNE Update

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(also Henrique Souza, Ajib Paudel, Eleonora Bertolini, Federico Galizzi, Manuel Arroyave at CERN)

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# Coldbox Details

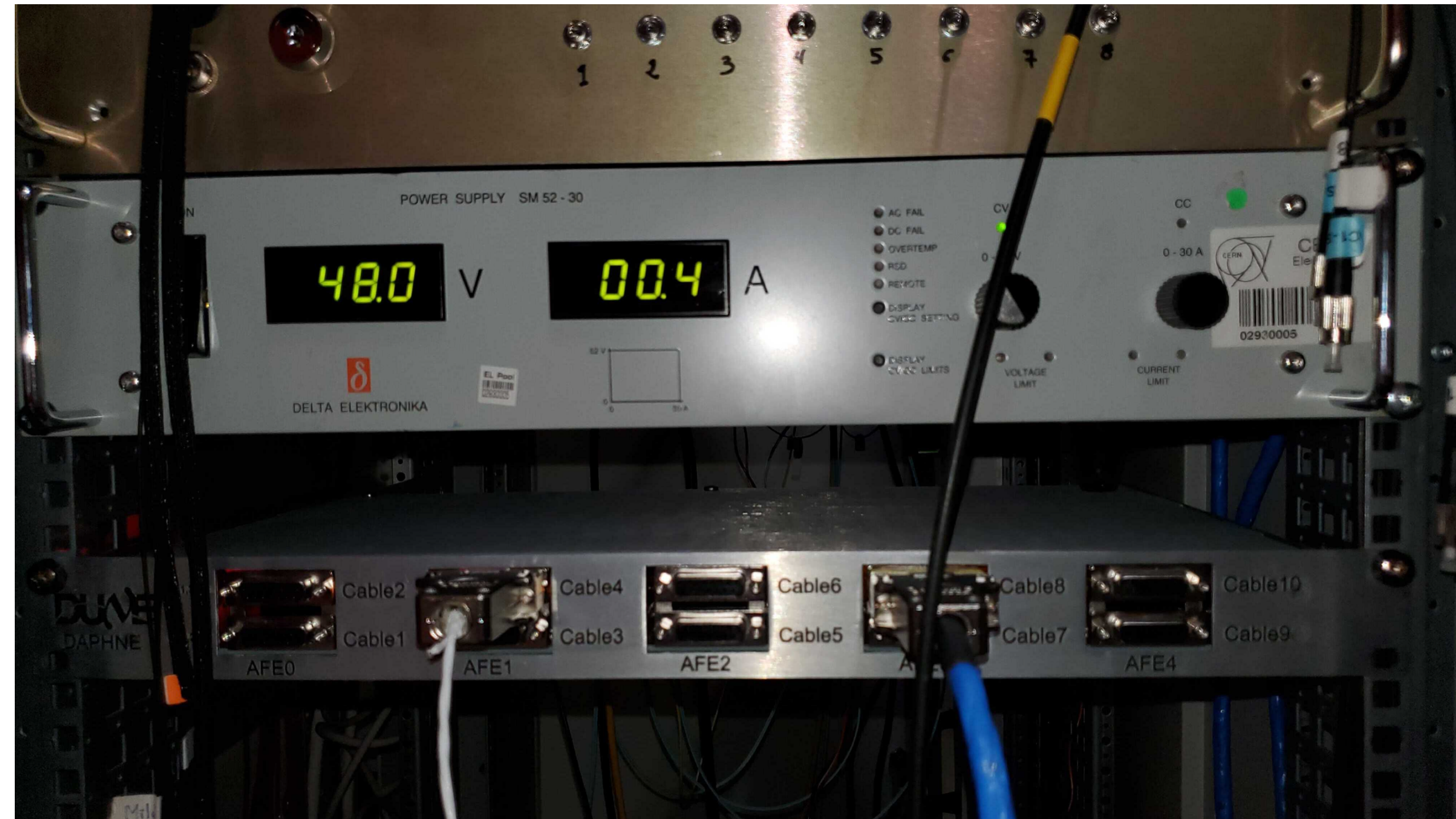
- The coldbox was filled ~mid last week
- Ajib and I have been at CERN starting to setup the DAPHNE I brought from CSU to readout the membrane modules
- We made some effort to cover the edges / ports of the coldbox to cut down on light leaking into the cryostat (because I was told it was an issue at the last coldbox)
- This week Eleonora, Henrique, and Federico arrived to help. Eleonora, Federico helped us to install the DAPHNE from Milano
- Henrique has took some CAEN digitizer data for the cathode modules. Also helped us test the cathode modules.





# DAPHNE Installation at Coldbox

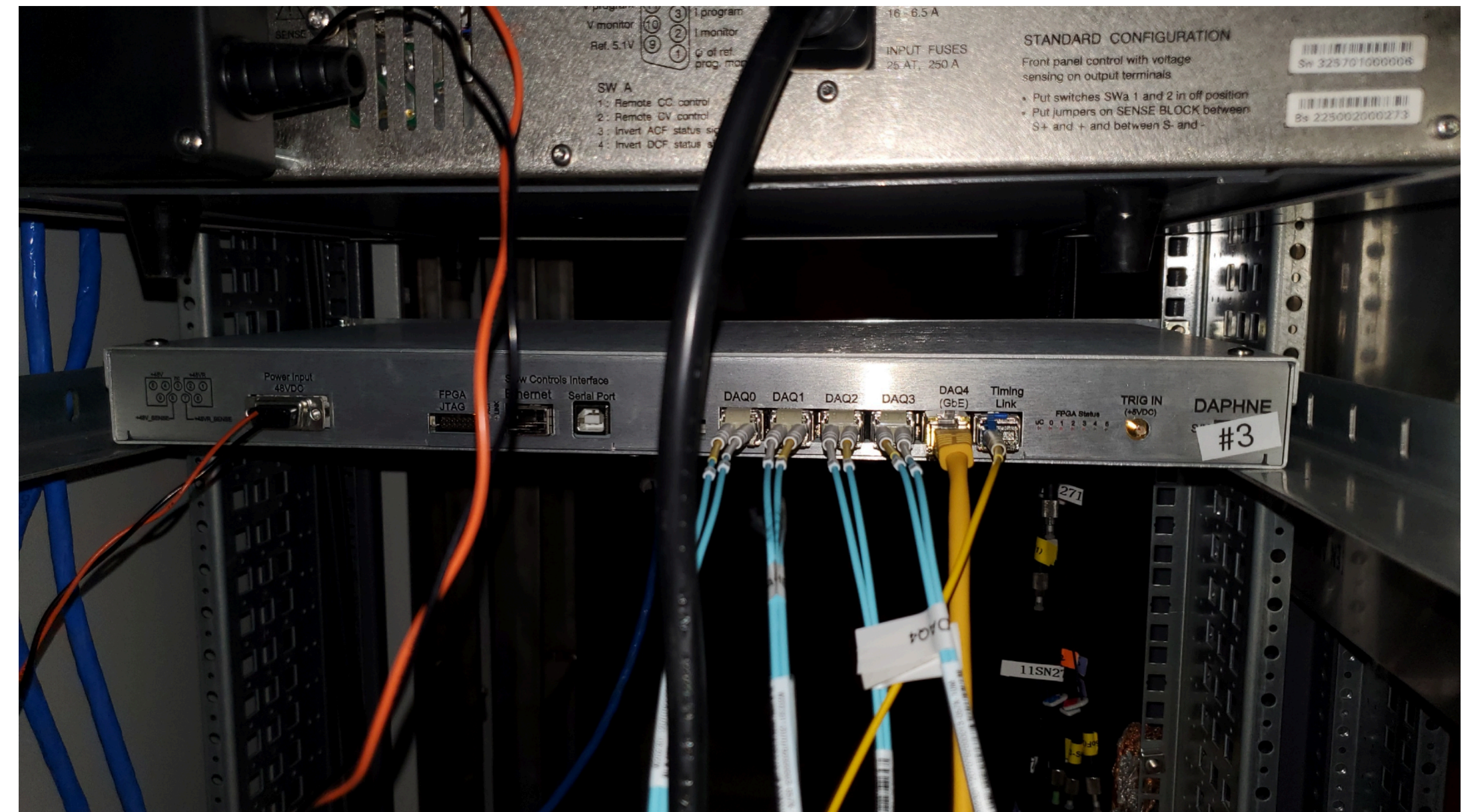
- DAPHNEv2 I brought from CSU was installed down by the coldbox at CERN np02 last week. We have been working on getting SNR, dynamic range measurements for the membrane in this setup (but this is in progress)
- Only can readout membrane modules with this DAPHNE since it is not setup to readout cathode modules (DAPHNE from Milano is)
- While waiting for the DAPHNE from Milano to arrive with Eleonora (which happened yesterday), we started looking at signals in the HD-style and VD-style membrane modules in the meantime





# DAPHNE Installation at Coldbox

- Before we installed the second DAPHNE, the first DAPHNE was connected to DAQ with data fibers, RG45 for slow controls, and a timing interface fiber as shown on the right
  - We confirmed we could configure DAPHNE and take spy buffer data thru the GbE interface on the np04 servers.
  - Tried setting up timing with DAQ, but ran into an issue (see bottom right image)
- At the moment all four data fibers connected in this picture, but in reality only need 1 for DAPHNE-1 (two channels for the membrane) and 2 for DAPHNE-2 (8 channels for cathode)



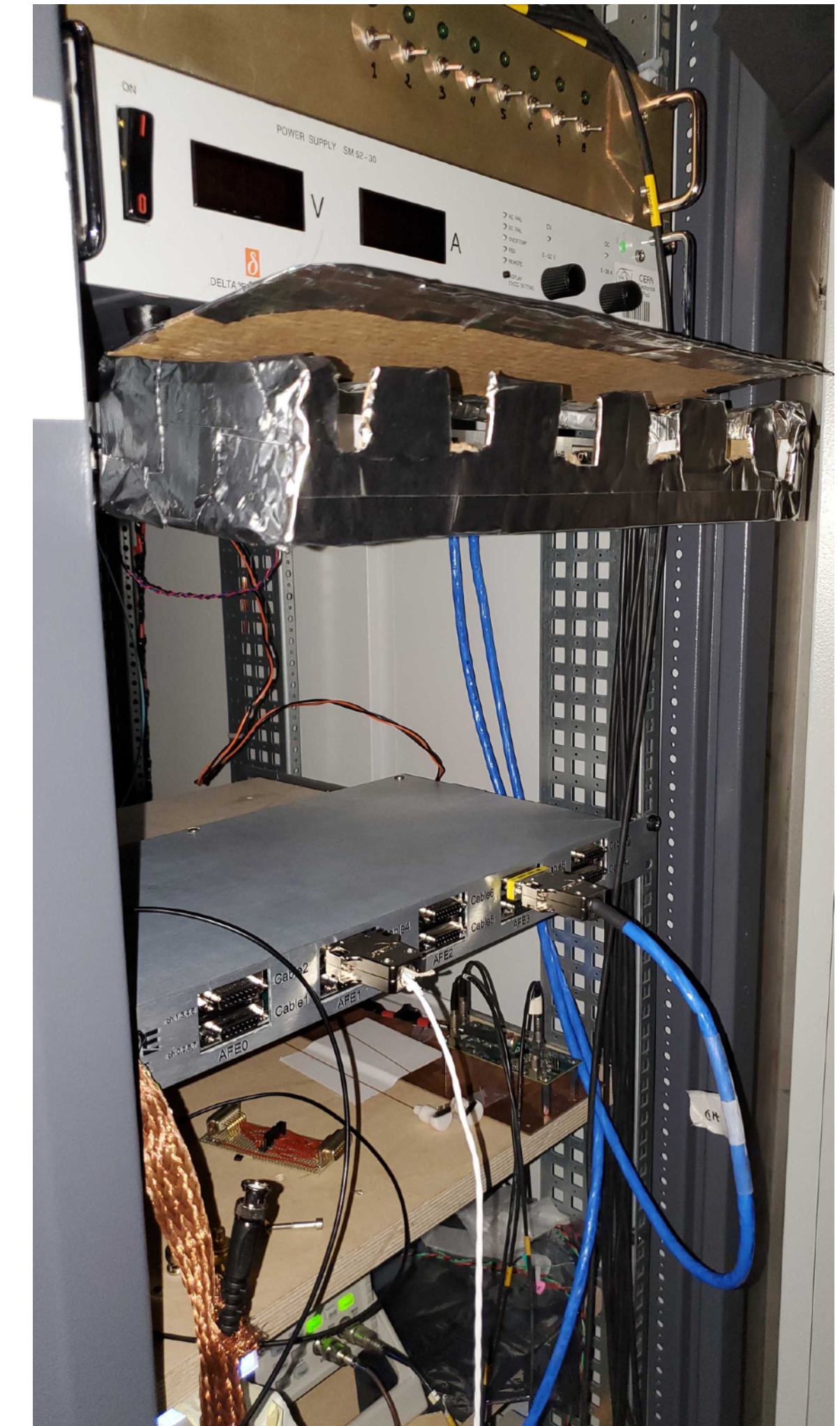
```
DAPHNE ip address 10.73.137.110
DAPHNE firmware version D080EA
test registers DEADBEEF
endpoint address 1
register 5001 1
register 3000 2081
MMCM0 is LOCKED OK
Master clock MMCM1 is LOCKED OK
CDR chip signal OK (LOS=0)
CDR chip LOCKED (LOL=0) OK
Timing SFP module optical signal OK (LOS=0)
Timing SFP module is present OK
Warning! Timing endpoint timestamp is NOT valid
Endpoint State = 6 : Waiting for phase adjustment command
```



# DAPHNE Installation at Coldbox

- Today (Tuesday) we installed the DAPHNE from Milano at the rack with the other DAPHNE (Milano DAPHNE is hidden behind a make shift faraday cage for the fiber receivers)
- We were able to power them in parallel on the same 48V power supply (PS was reading about 900 mA total current draw)

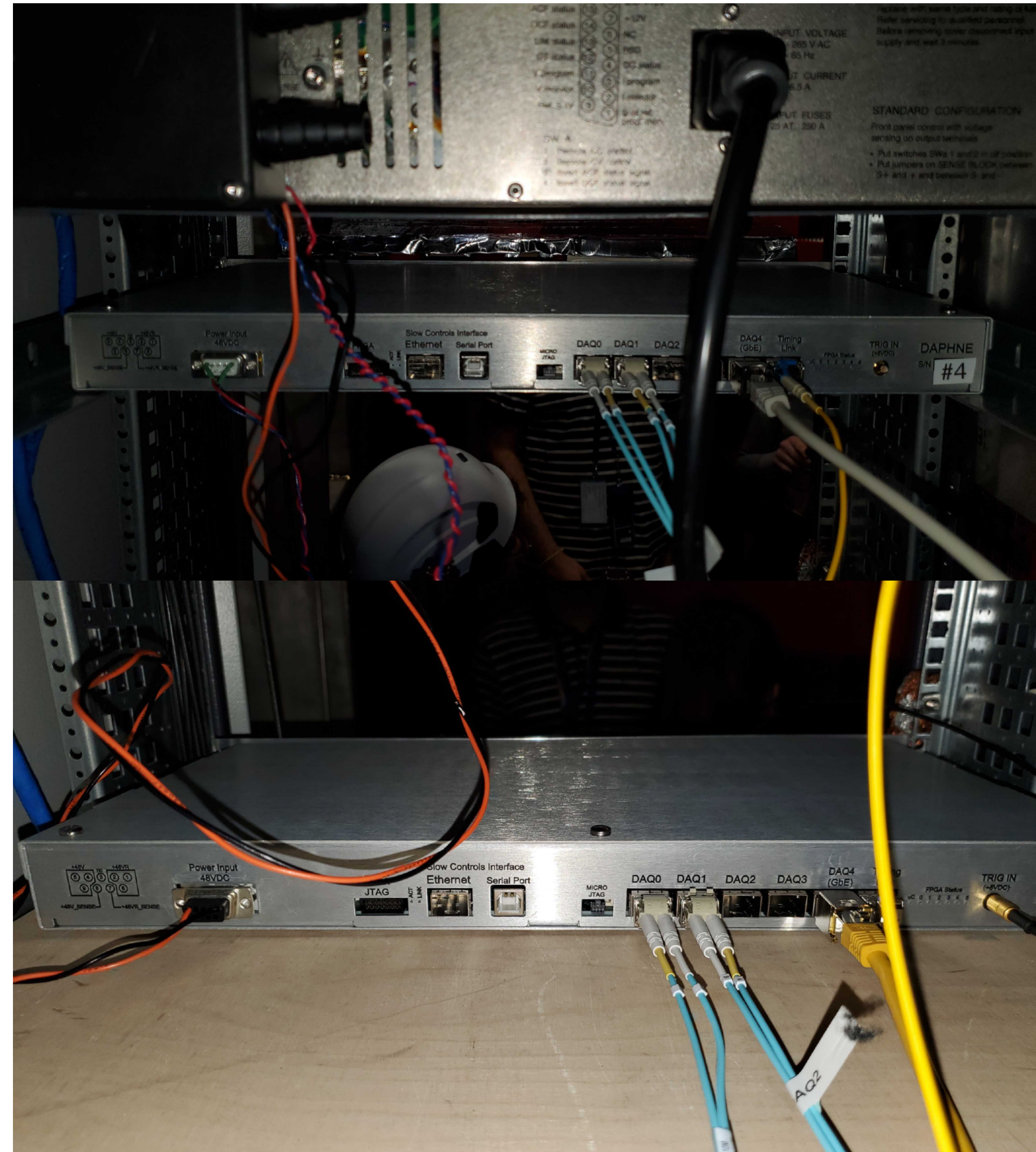
Optical fiber transceivers for reading out the cathode modules with DAPHNE





# DAPHNE Installation at Coldbox

- Moved two data fibers to the second DAPHNE (would have moved three but one was stuck)
- The links are:
  - DAQ 1 fiber -> DAQ0 DAPHNE 3
  - DAQ 2 fiber -> DAQ1 DAPHNE 3
  - DAQ 3 fiber -> DAQ0 DAPHNE 4
  - DAQ 4 fiber -> DAQ1 DAPHNE 4
- I had to update the microcontroller firmware on the Milano DAPHNE to be able to communicate with it over ethernet. Will be soon updating the fpga firmware to make sure it is the latest version



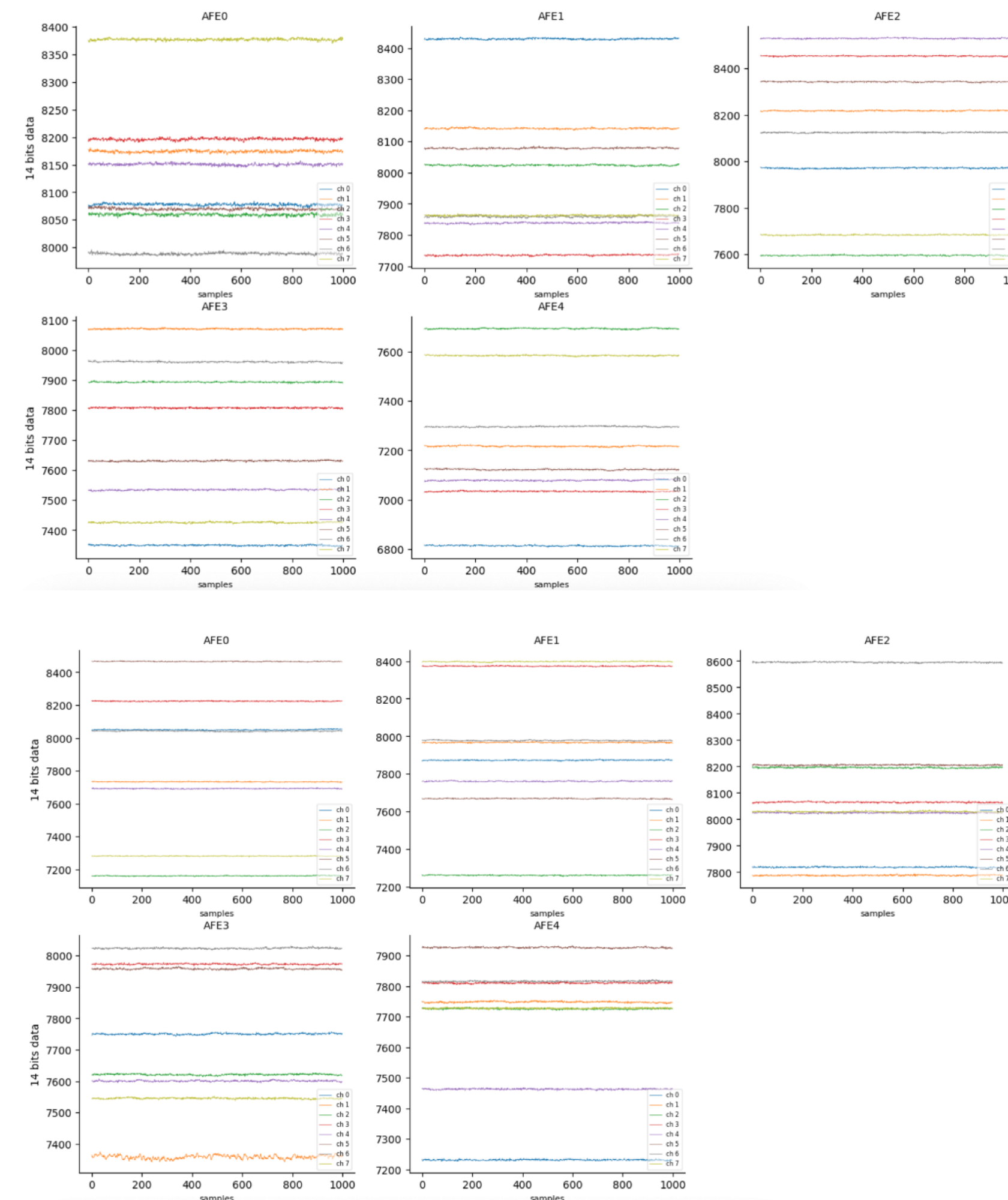
DAPHNE  
Label: #4  
EP 106

DAPHNE  
Label: #3  
EP 110



# Reading from DAPHNE

- Can access DAPHNE spy buffers over the network (on an np04 server) for both DAPHNEs (example random waveforms shown on the right, with VGAIN=1800, offset=1118)
- Currently in the process of finishing setting up timing interface and testing DAQ connection -> still need a second timing interface cable for the second DAPHNE



DAPHNE  
Label: #4  
EP 106

DAPHNE  
Label: #3  
EP 110



# Very preliminary results from membrane

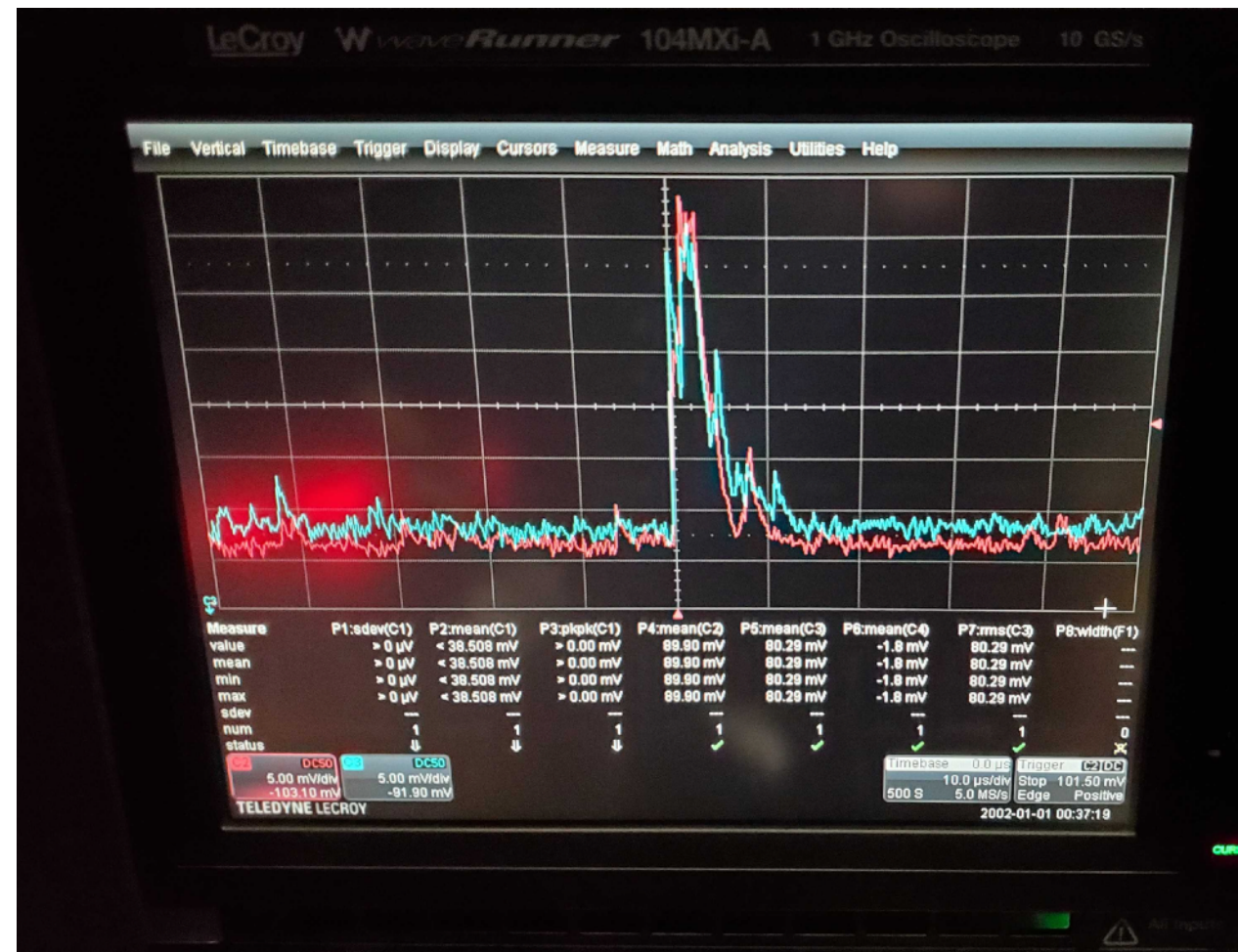
- Confirmed we could see LED-induced signals in DAPHNE for both VD and HD membrane. Datataking and analysis is in progress.
- Sorry I didn't have time to pull up signals to show — but there was an issue with the readout with spi buffers, but should be fixed with lower LED trigger rate. Will share results soon





# Very preliminary results from cathode

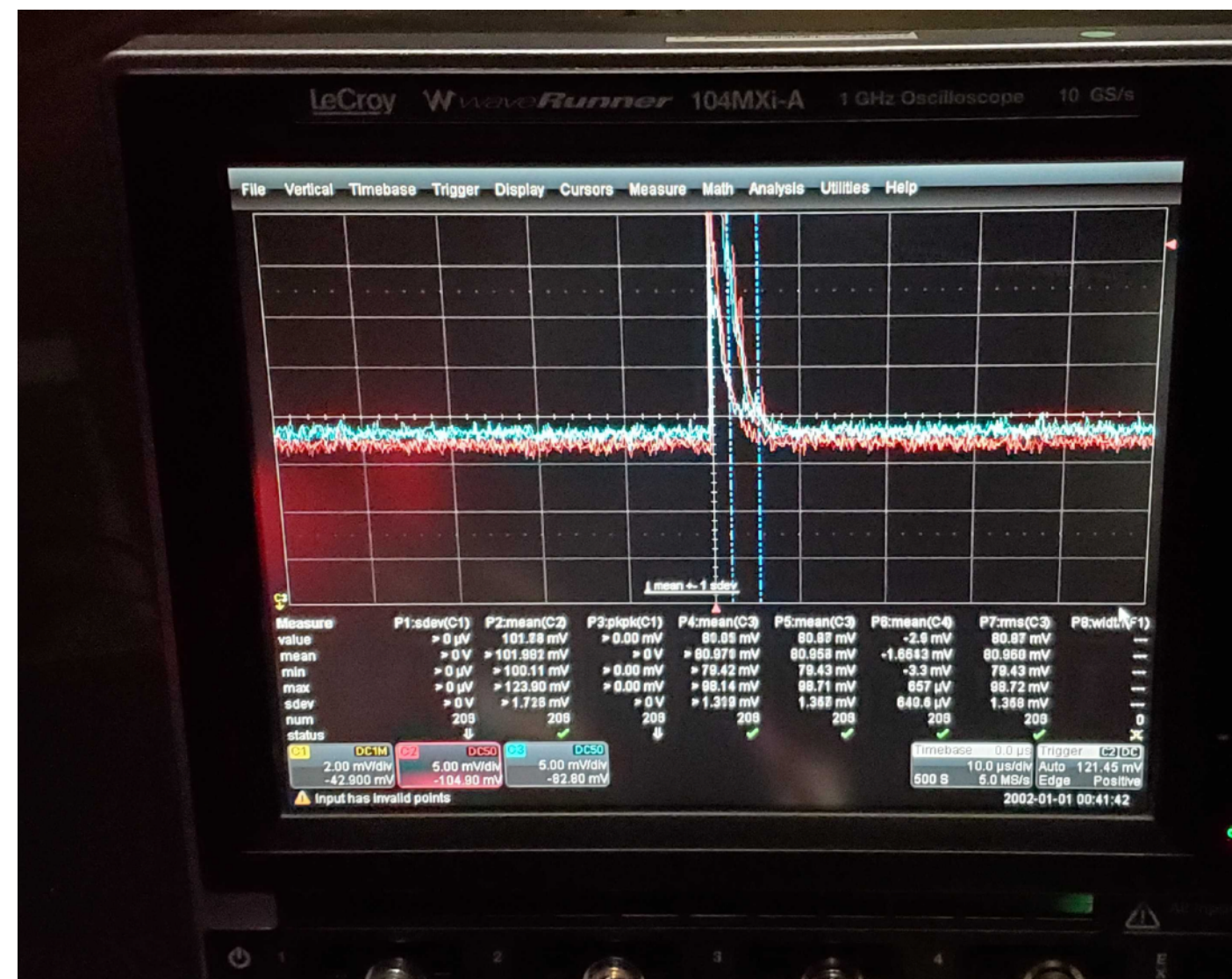
C1



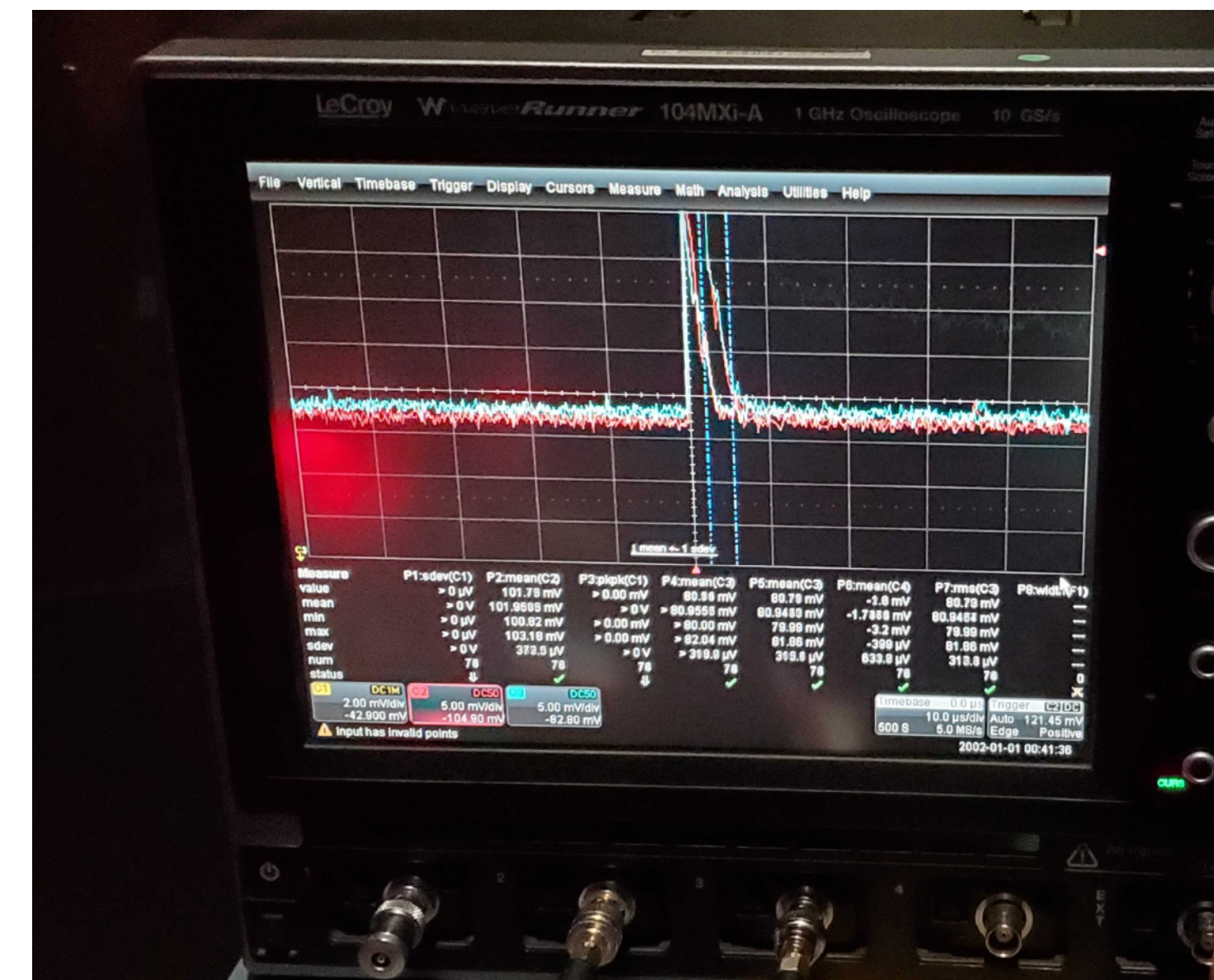
C3

I wasn't there to take the picture  
But I promise there were signals!

C2



C4





# Other Things

- With beam testing going on, access to the coldbox has been sporadic
- We have had all day access today (Tuesday) and I heard from Filippo that we should have access going forward (need to confirm this)
- Will need to work more on getting DAPHNE datataking working with the DAQ
  - Still need 1 extra timing interface fiber for the second DAPHNE. I'm told from DAQ experts that they think this will be possible to setup this week
  - We have enough data fibers for the two DAPHNEs and RG45 cables for slow controls
  - Still need to get the timing interface working for the first DAPHNE



# Other Things

- I am hopeful that by Wednesday we will be able to read LED signals from all modules with DAPHNE using the spi buffers, to determine SNR and dynamic range
  - The idea is to try different values of VGAIN in the DAPHNE configuration to see what gives the best SNR and dynamic range.
- More work needs to be done to setup datataking with DAQ, to prepare for cosmics data with CRP and, most importantly for this run, data taking with pulsed neutron source



# Next steps

- Need to connect cathode modules to DAPHNE with fiber transceiver (should happen today). confirm we can see LED signals through DAPHNE.
- Will try to get calibration data using SPI buffers in the DAPHNEs.
  - Need to try at lower LED rate, since we tried at 1kHz and we would see overlapping waveforms in the SPI buffer data (the reason being that the SPI buffers were updating too fast so that before we have finished reading a waveform, the buffer has started updating with the next trigger from LED).
- Henrique managed to take calibration data with CAEN for the cathode modules, but we will have to wait until he shares those results.