Log Book

on

The LAPPD activity at INFN, Trieste

Important Links:

Argonne Magnetic field Data Analysis Results/Slides:

https://indico.bnl.gov/event/18905/

Argonne Magnetic field Data:

https://app.box.com/folder/196982508426?s=sr6cadbviajd8hqgat9sp6adrkkkayty

BeamTest-LAPPD-Oct2022-CERN-PS

https://istnazfisnucl-my.sharepoint.com/:w:/r/personal/chchatte_infn_it/_layouts/15/Doc.aspx?sourcedoc=%7B208D0769-E2A7-45B8-A03C-0364B37CF2E7%7D&file=LogBook.docx&action=default&mobileredirect=true&cid=63f9f412-def4-41b9-a2c0-27a74ec25099

eRD110 // 20 Feb 2023

https://indico.bnl.gov/event/18438/

LAPPD workshop Oct 2022

https://indico.bnl.gov/event/17475/

Important Links:

LAPPD Workshop-1 [21 March 2022]

https://indico.bnl.gov/event/15059/

LAPPD Workshop-2 [20 April 2023]

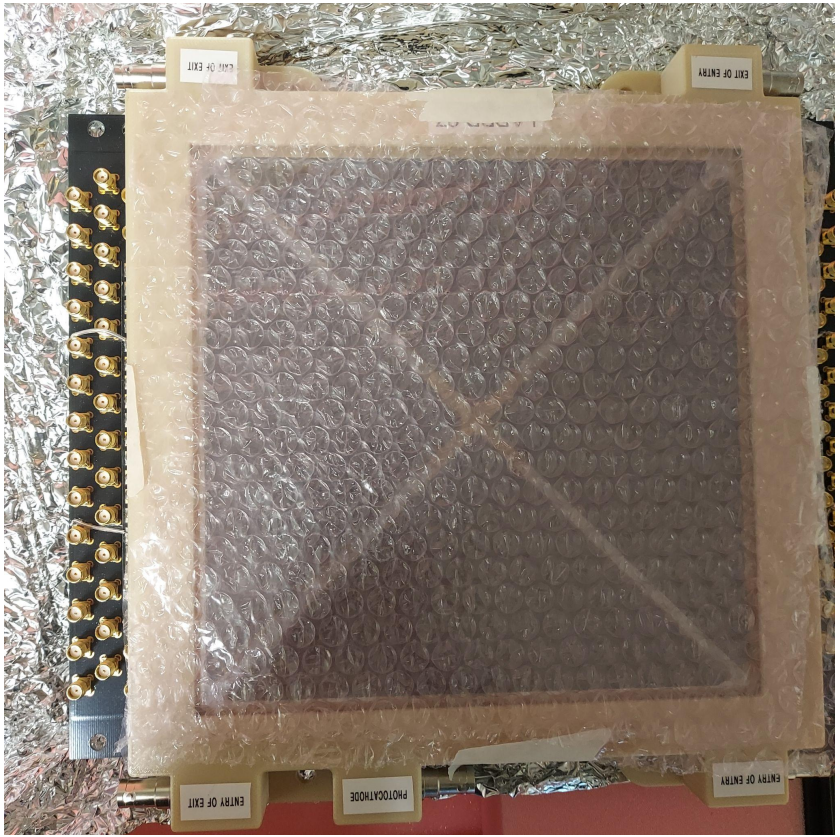
https://indico.bnl.gov/event/18642/

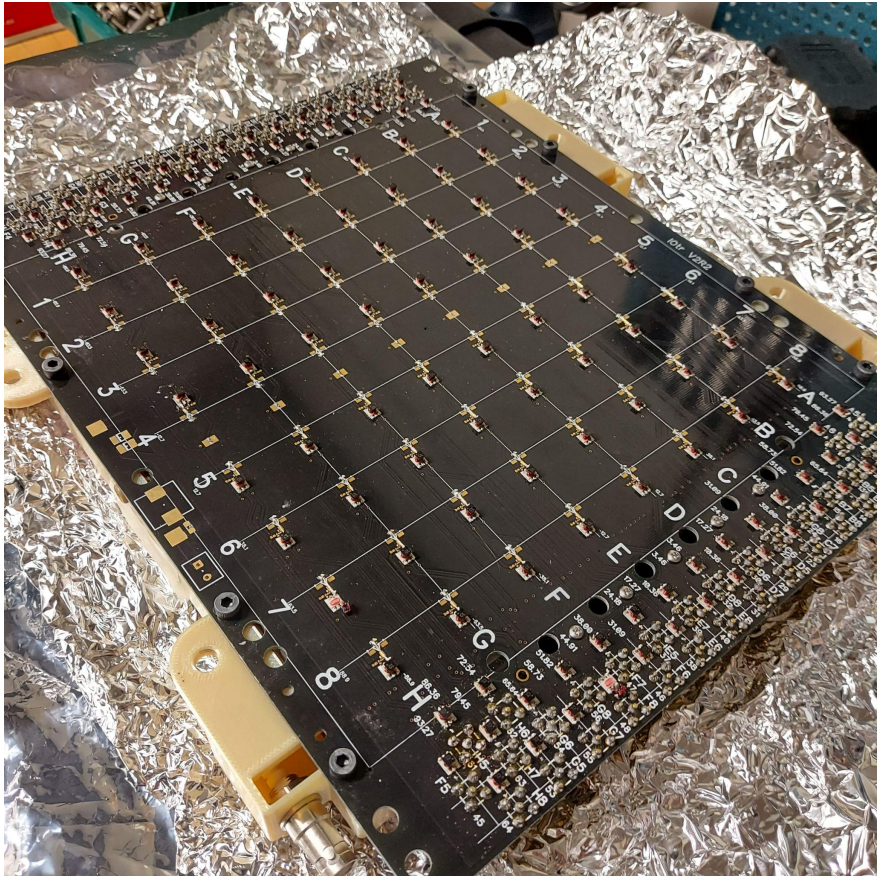
eRD110 [3 April]

https://indico.bnl.gov/event/18954/

3 Jan 2022:

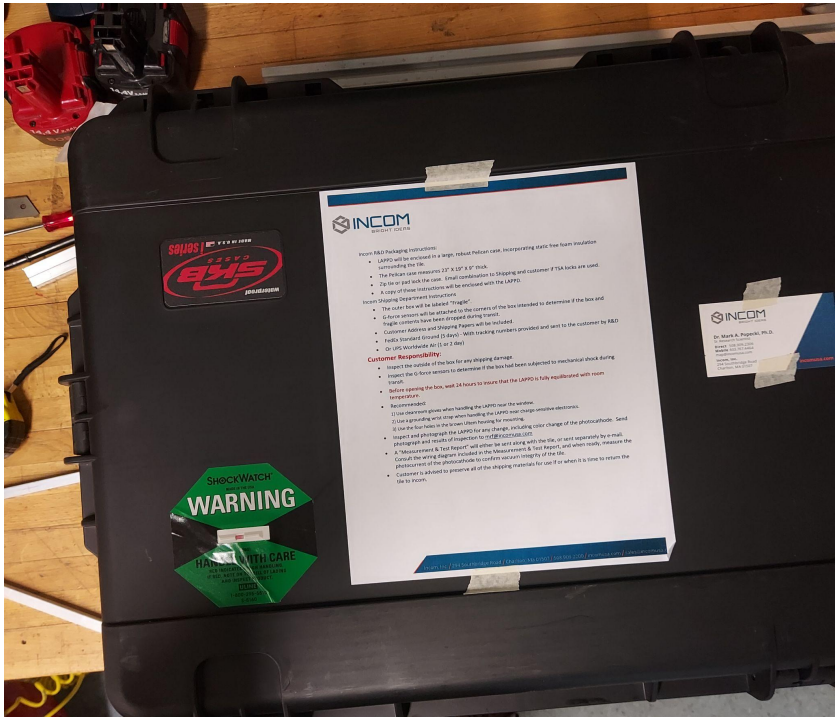
Arrival of the First LAPPD:

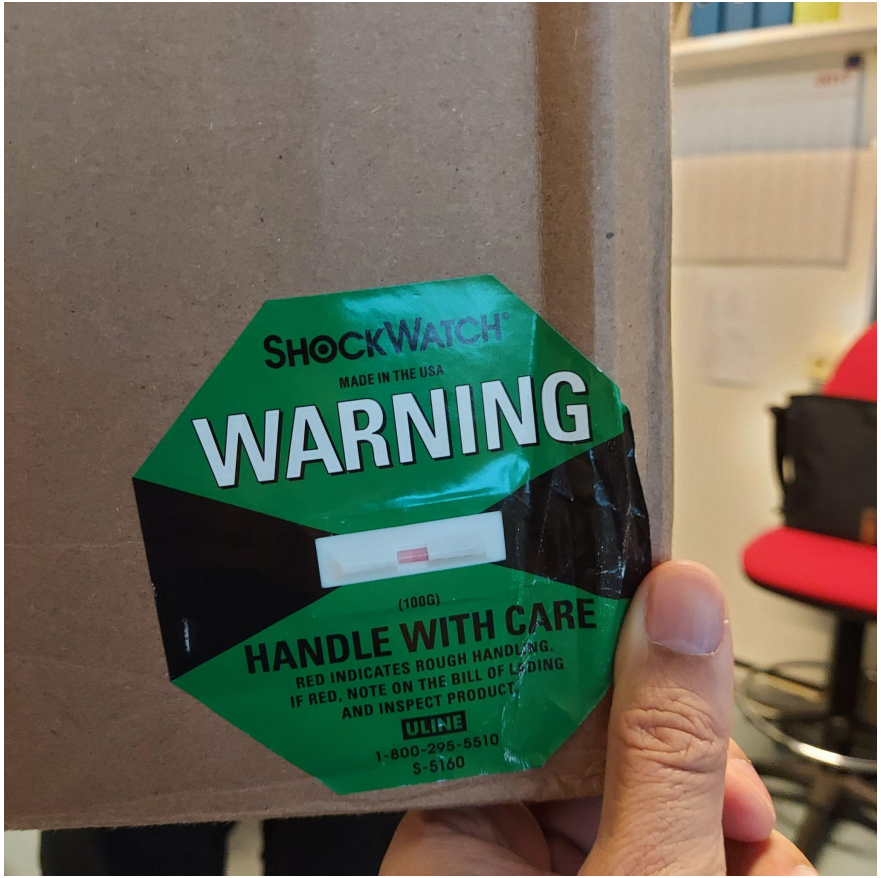




3 Jan 2022:

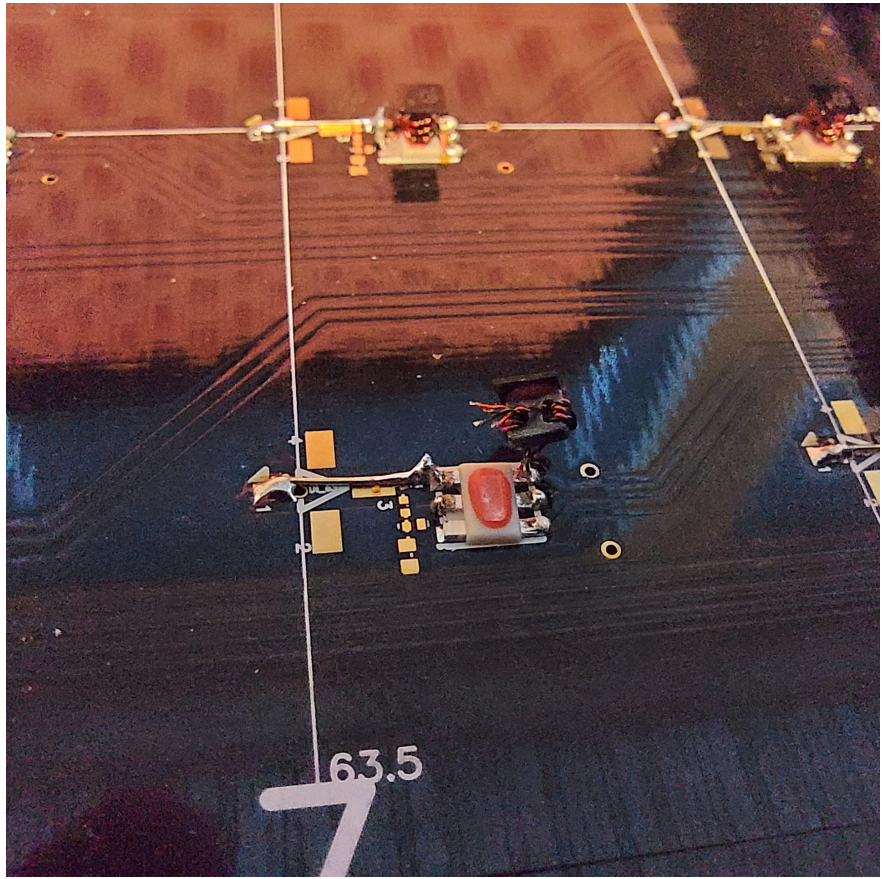
The shockWatch warning
(1 out of 2, was broken)



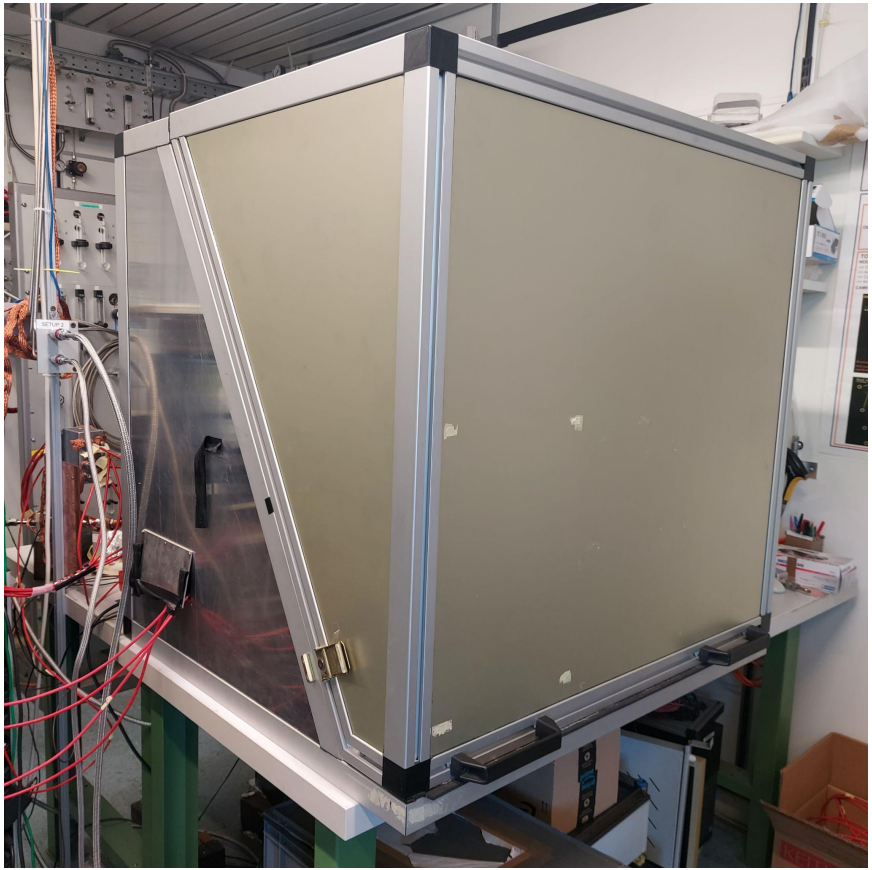


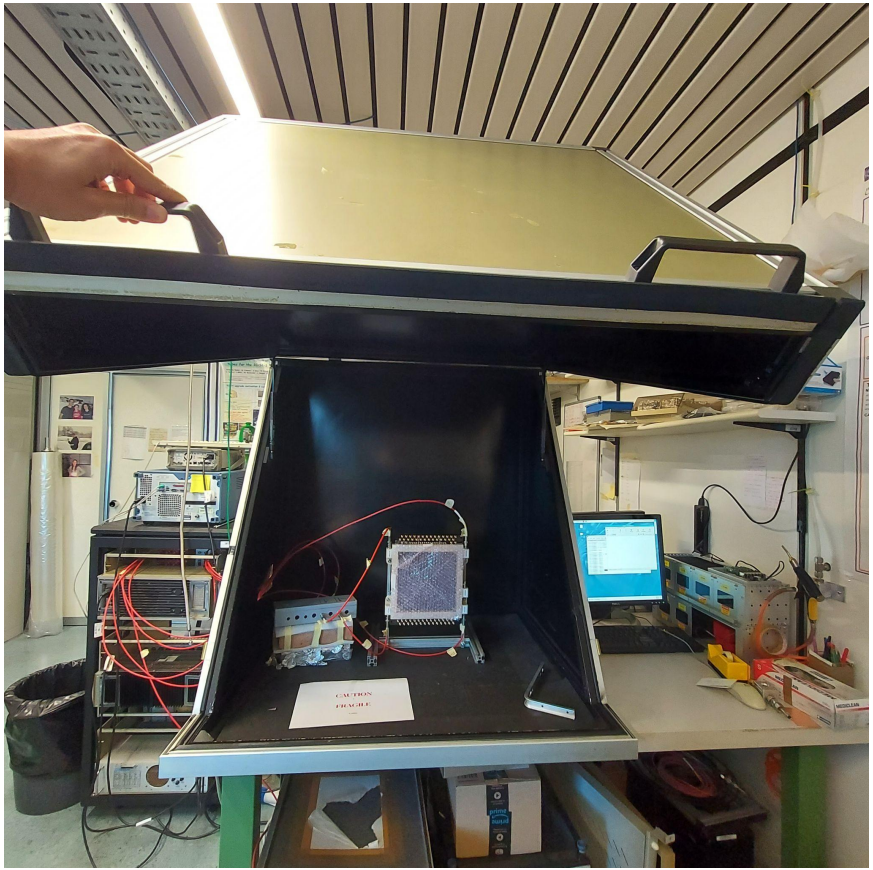
3 Jan 2022:

The broken transformer:

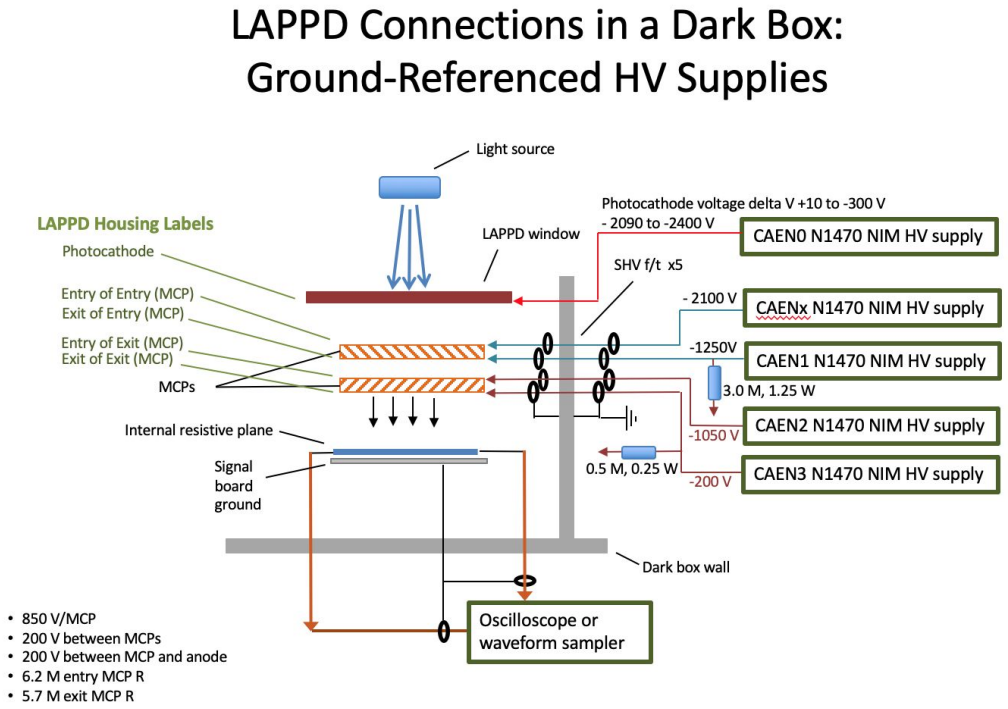


10 Jan 2022: The new 'Black Box' and the LAPPD in it





11 Jan 2022: After a discussion with the Incom experts (Mark and Stephen)



The independent HV scheme (not with resistor chain)

11 Jan 2022: After a discussion with the Incom experts (Mark and Stephen)

A typical I/V chart of the LAPPD (check the HV scheme on the previous page)

CAEN0 VMON	CAEN0 IMON	CAEN1 VMON	CAEN1 IMON	CAEN2 VMON	CAEN2 IMON	CAEN3 VMON	CAEN3 IMON	Voltage per MCP	SPELLMAN SET	S VMON	24V IMON	Spellman uA
1200	0,65	800	3,90	600	65,00	200	335,00	400	1,28	0,669	0,060	62,3
1600	0,65	1000	4,95	800	98,70	200	301,20	600	1,94	0,993	0,070	91,5
2000	0,70	1200	5,95	1000	133,00	200	266,80	800	2,50	1,318	0,080	121,5
2110	0,70	1250	6,20	1050	142,20	200	257,60	850	2,70	1,407	0,080	130,3

Please Note: This was taken before being sent to Vincenzo and uses a floating power supply for the Entry of the Entry MCP HV connection (labeled Spellma

CAEN0 VMON	CAEN0 IMON	CAEN1 VMON	CAEN1 IMON	CAEN2 VMON	CAEN2 IMON	CAEN3 VMON	CAEN3 IMON	CAENX VMON	CAENX IMON			
2180,000	0,70	1275	1124,75	1075	160,55	200	241,10	2150,000	146,6			
2230,000	0,70	1300	1144,00	1100	167,40	200	235,50	2200,000	152,0			
2280,000	0,65	1325	1162,15	1125	179,25	200	228,50	2250,000	158,5		Start of Dark Rate Deca	
2280,000	0,65	1325	1161,25	1125	178,35	200	227,20	2250,000	159,5		End of Dark Rate Decay	

Please Note: This was taken upon return of testing with Vincenzo and replaces floating voltage supply (Spellman) with additional ground reference CAEN H

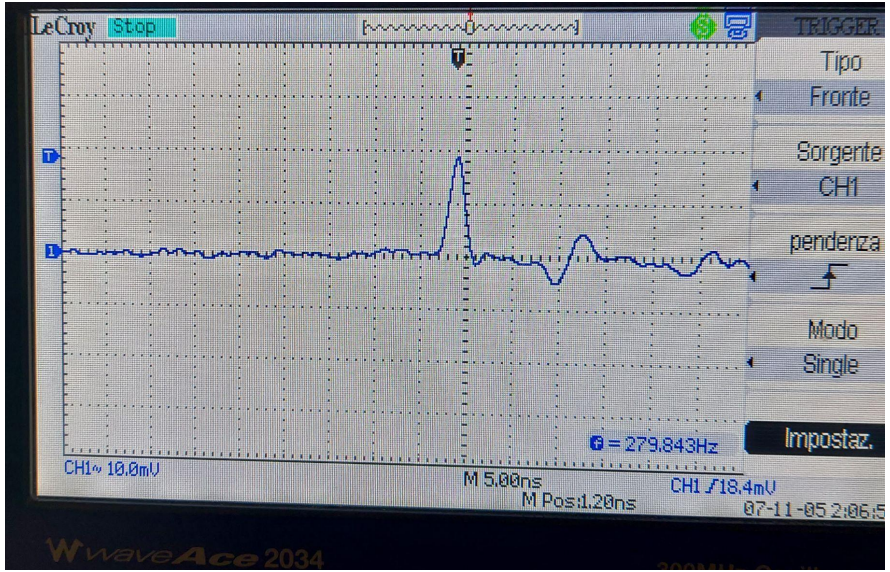
13 Jan 2022:

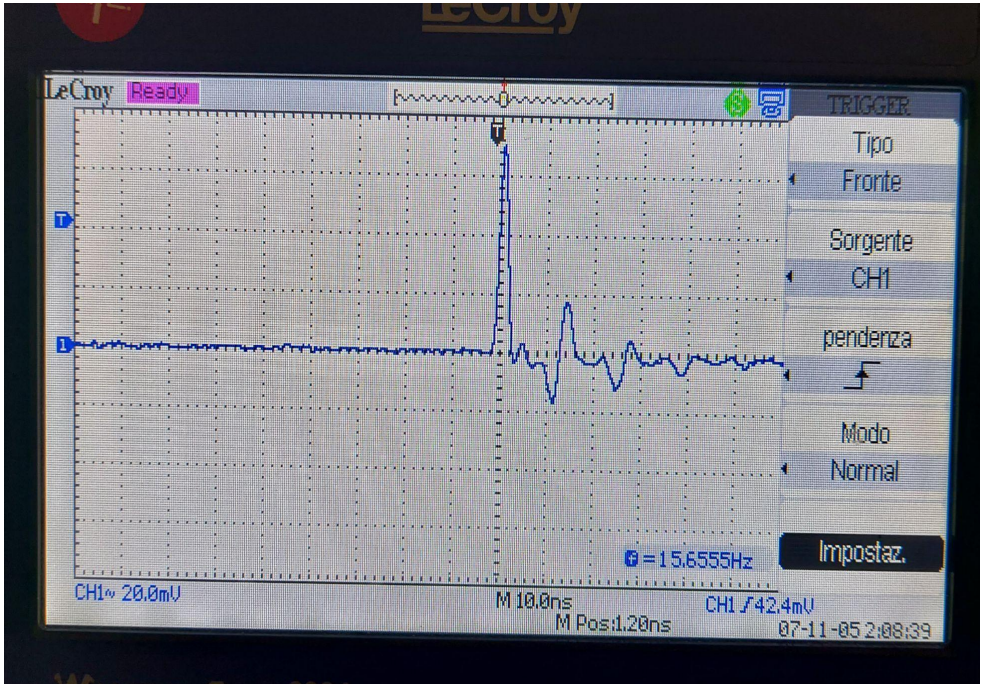
Today we are sure that the existing CAEN 1471 H module is not adequate to ramp up the LAPPD. It has a maximum current out limit of 20 μA. The other CAEN 14XX has a max of 300 μA, which is still not enough.
I need a module which can go up to 3 mA!

14 Jan 2022:

Fortunately we got a CAEN N8033N module, with 8 channels, and max current out of 3 mA from the Physics Department of the University of Trieste.

14 Jan 2022: The possible **FIRST** signal from the LAPPD: (thermal photon/electron / dark pulse)



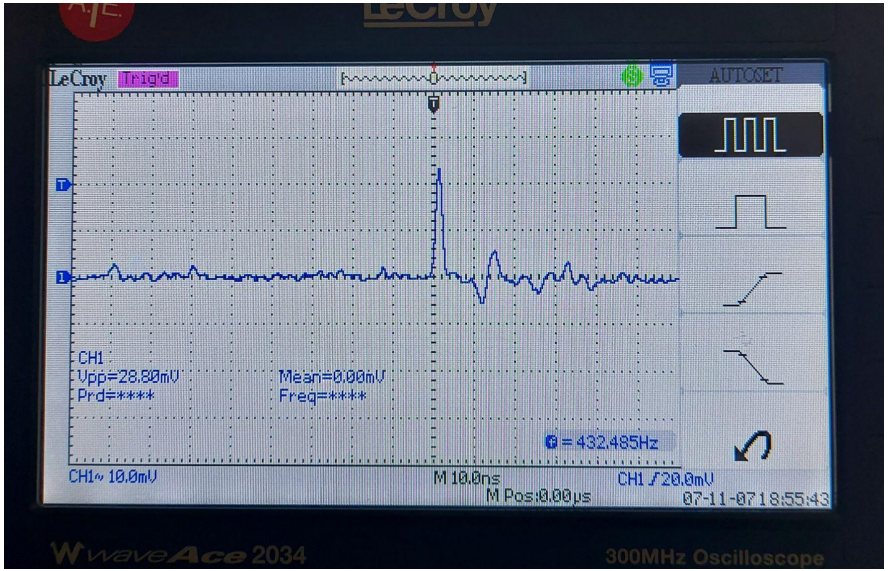


17 Jan 2022:

Yes, these are dark pulses! The 'dark rate' changes with the MCP voltage.

PC = 2230
EnOEn = 2200
ExOEn = 1300
EnOEx = 1100
ExOEx = 200

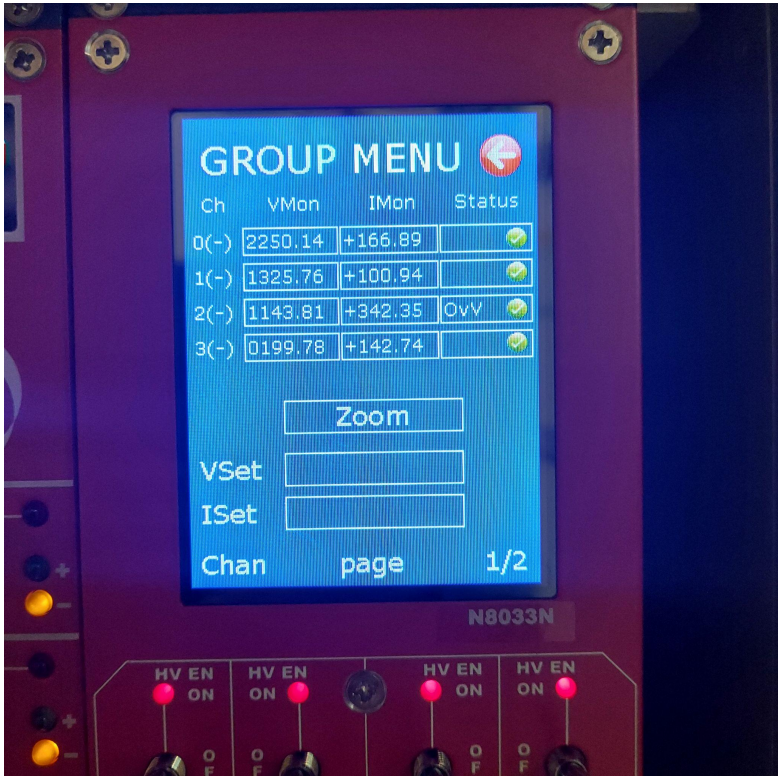
Trigger level: 20 mv,
rate: ~150 Hz

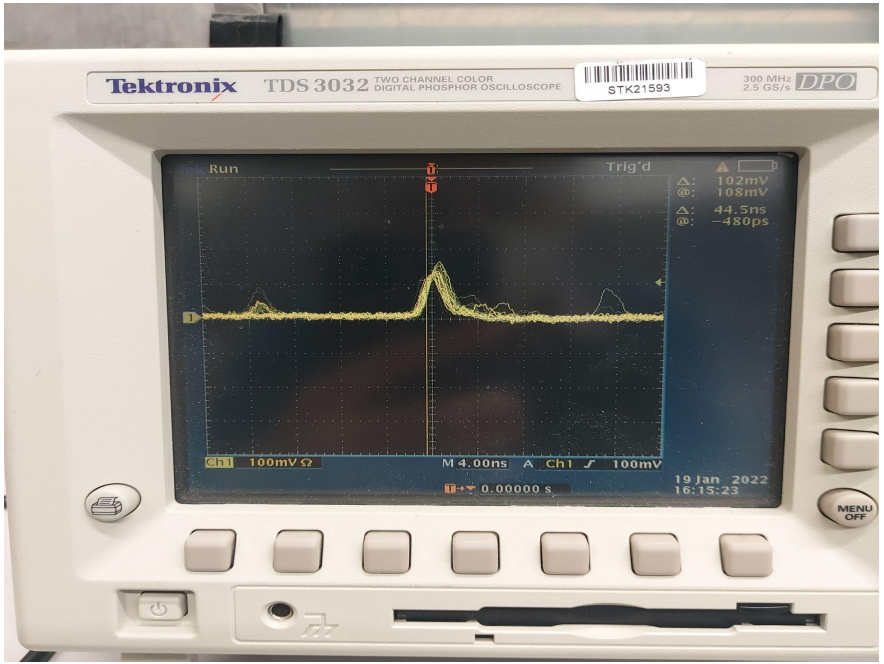


PC = 2280
EnOEn = 2250
ExOEn = 1325
EnOEx = 1125
ExOEx = 200

Trigger level: 20 mv,
rate: ~440 Hz

19 Jan 2022:


GROUP MENU
Ch VMon IMon Status
0(-) 2250.14 +166.89
1(-) 1325.76 +100.94
2(-) 1143.81 +342.35 OvV
3(-) 0199.78 +142.74
Zoom
VSet
ISet
Chan page 1/2
N8033N
HV EN ON OFF
HV EN ON OFF
HV EN ON OFF
HV EN ON OFF


Tektronix TDS 3032 TWO CHANNEL COLOR DIGITAL PHOSPHOR OSCILLOSCOPE
STK21593
300 MHz 2.5 GS/s DPO
Run
Trig'd
Δ: 102mV
@: 108mV
Δ: 44.5ns
@: -480ps
Ch1 100mV Ω
M 4.00ns A Ch1 100mV
0.00000 s
19 Jan 2022
16:15:23
MENU OFF

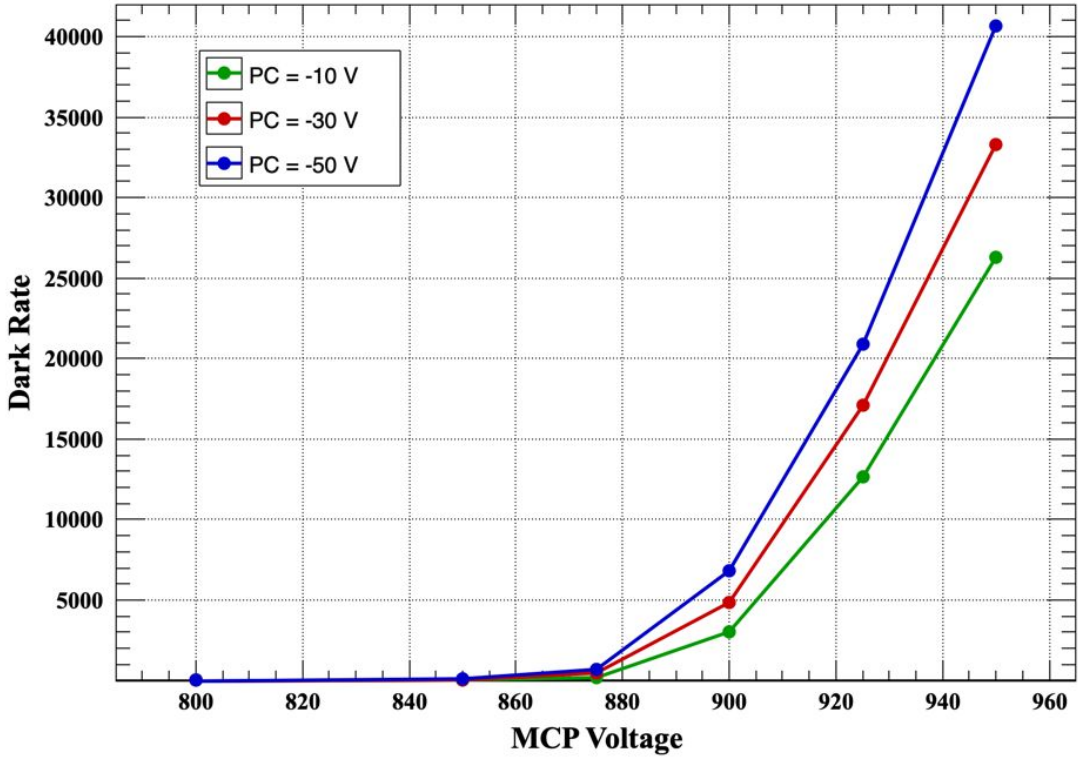
21 Jan 2022:

LAPPD-fixedGain_PC-vary

PC	Del PC	Entry of Entry	Exit of Entry	Del Voltage MCP-1	Entry of Exit	Exit of Exit	DEL Voltage MCP-2
2010	-10	2000	1200	800	1000	200	800
2110	-10	2100	1250	850	1050	200	850
2160	-10	2150	1275	875	1075	200	875
2210	-10	2200	1300	900	1100	200	900
2260	-10	2250	1325	925	1125	200	925
2310	-10	2300	1350	950	1150	200	950

Discriminator limit is 30 mV

24 Jan 2022:


PC = -10 V
PC = -30 V
PC = -50 V
Dark Rate
40000
35000
30000
25000
20000
15000
10000
5000
800
820
840
860
880
900
920
940
960
MCP Voltage

25 Jan 2022:

The channel mapping of the LAPPD

Looking Towards the Photo Cathode

Exit of Entry										Entry of Entry
		H	G	F	E	D	C	B	A	
	8	**H8**	**G8**	**F8**	**E8**	**D8**	**C7**	**B8**	**A8**	8
	7	**H7**	**G7**	**F7**	**E7**	**D7**	**C6**	**B7**	**A7**	7
	6	**H6**	**G6**	**F6**	**E6**	**D6**	**C6**	**B6**	**A6**	6
	5	**H5**	**G5**	**F5**	**E5**	**D5**	**C5**	**B5**	**A5**	5
	4	**H4**	**G4**	**F4**	**E4**	**D4**	**C4**	**B4**	**A4**	4
	3	**H3**	**G3**	**F3**	**E3**	**D3**	**C3**	**B3**	**A3**	3
	2	**H2**	**G2**	**F2**	**E2**	**D2**	**C2**	**B2**	**A2**	2
	1	**H1**	**G1**	**F1**	**E1**	**D1**	**C1**	**B1**	**A1**	1
Exit of Exit		H	G	F	E	D	C	B	A	Entry of Exit

Photo Cathode

25 Jan 2022:

The channel mapping of the LAPPD

Looking Towards the Photo Cathode

Exit of Entry	H8	G5	G7	F8	F6	E6	E8	D7	D5	C7	B8	B6	A7	C5
	F5	H7	G6	G8	F7	E5	E7	D8	D6	C6	C8	B7	B5	A8
	H5	H6											A6	A5
	H4	H3											A3	A4
	F4	H2	G3	G1	F2	E4	E2	D1	D3	C3	C1	B2	B4	A1
Exit of Exit	H1	G4	G2	F1	F3	E3	E1	D2	D4	C2	B1	B3	A2	C4

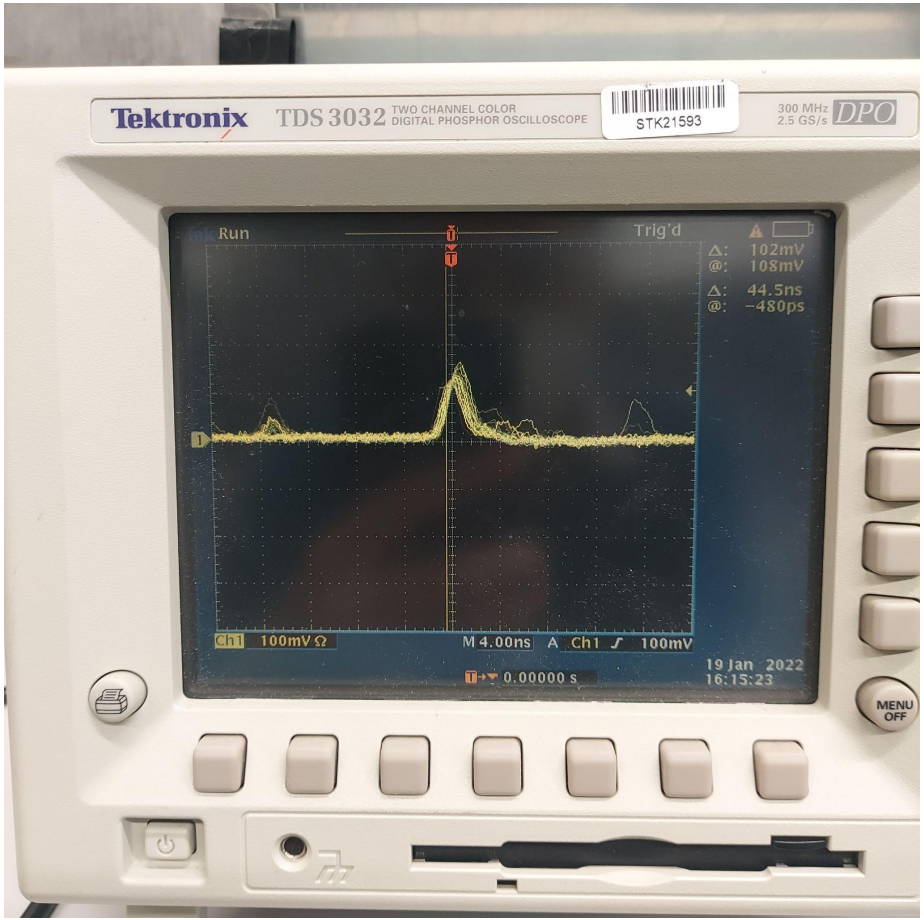
Entry of Entry

Photo Cathode

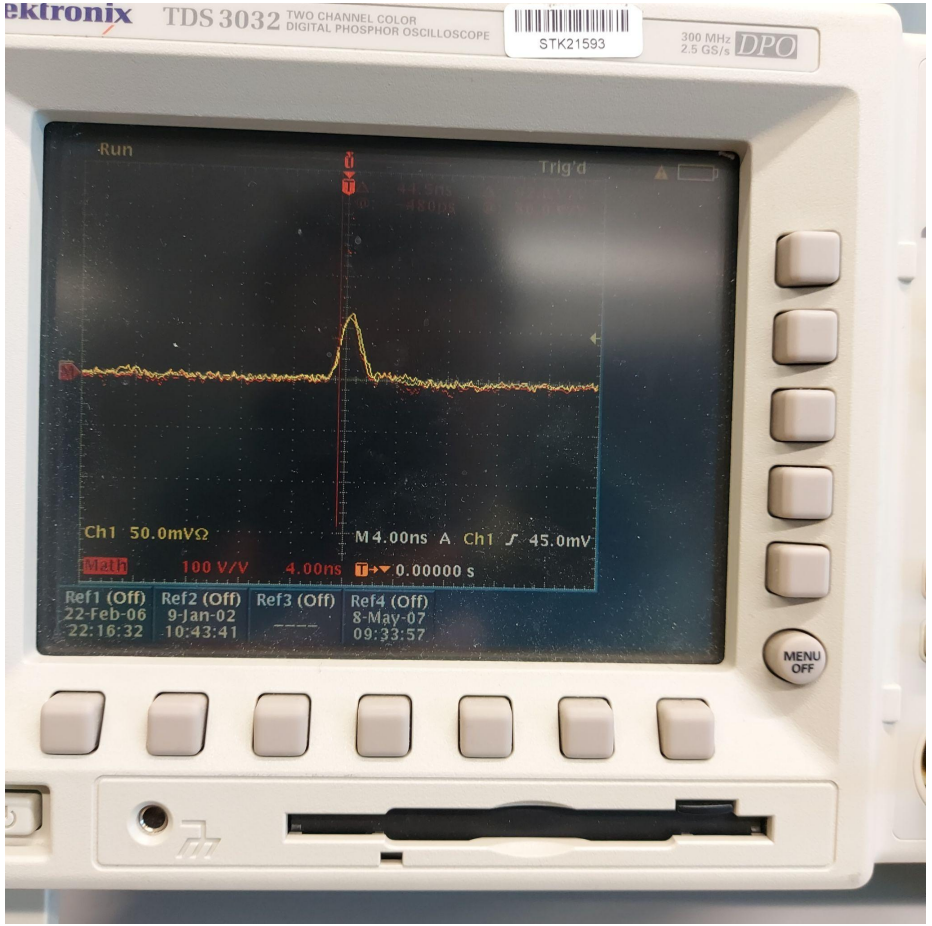
Entry of Exit

25 Jan 2022:

Before Light-Tight window

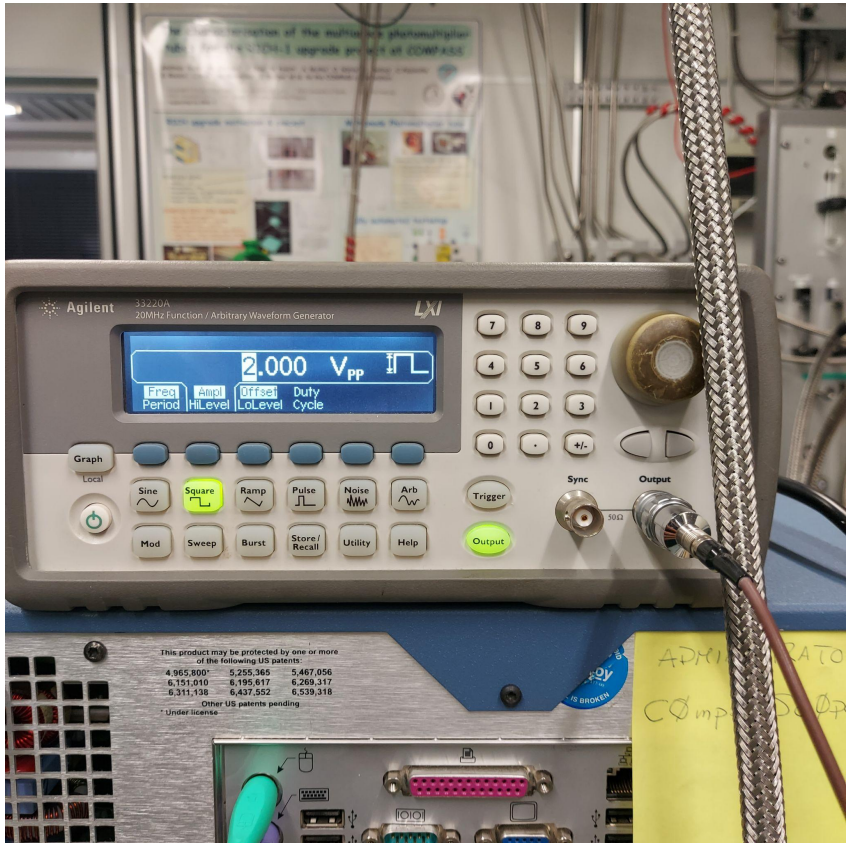


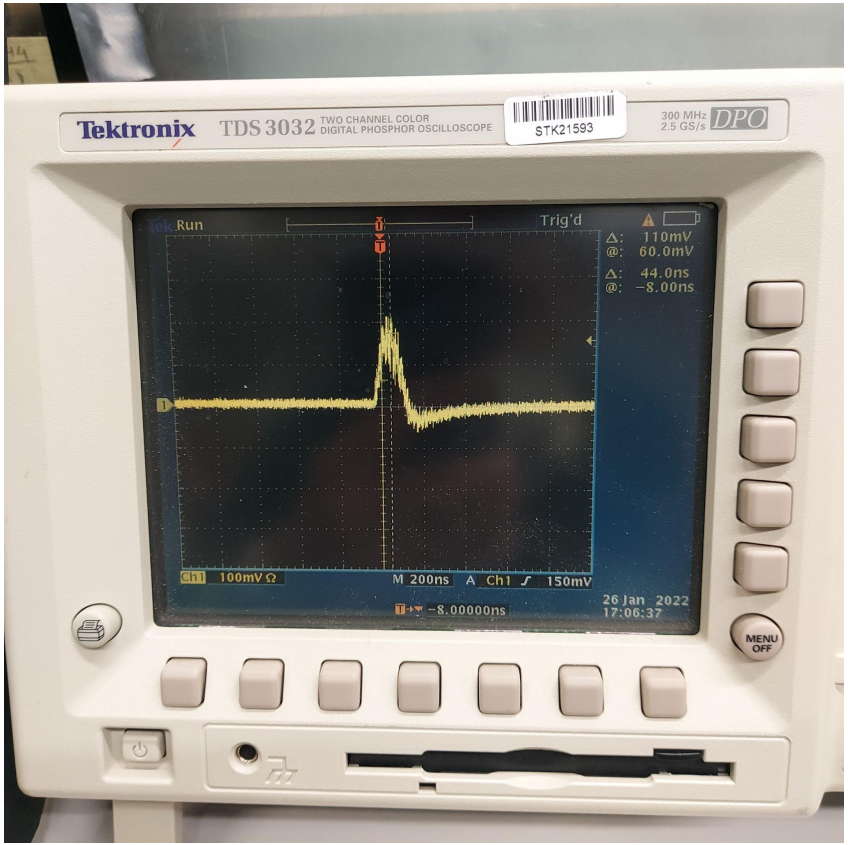
After Light-Tight window



26 Jan 2022:

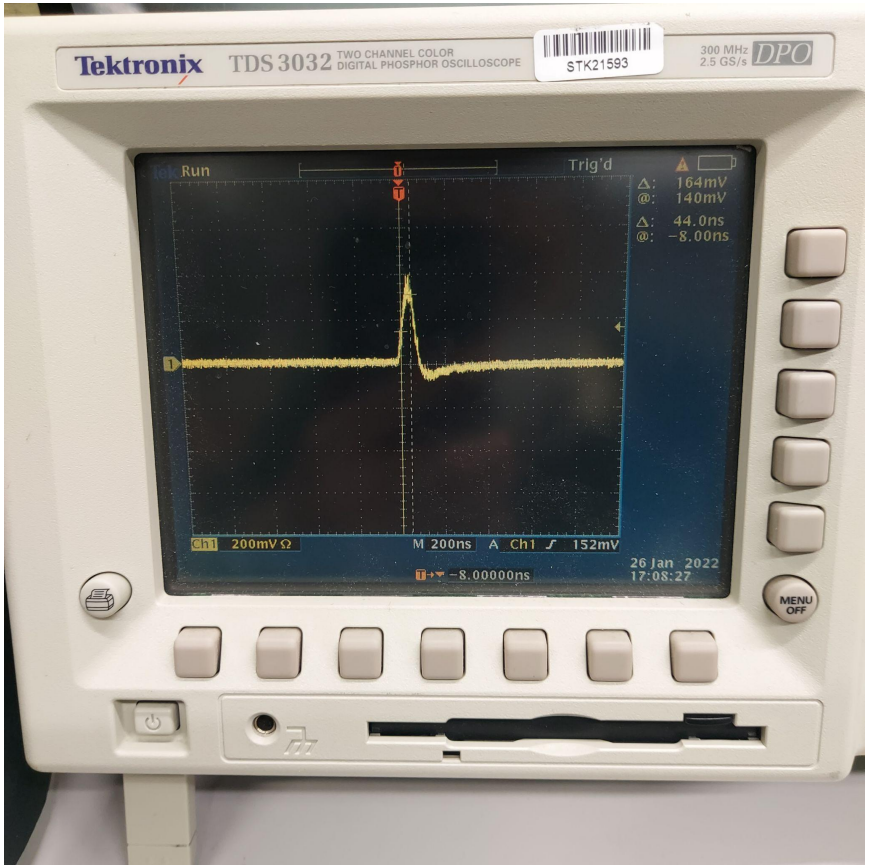
Pulse height changing with light intensity (compare with the picture on the next page). This is qualitative only.





26 Jan 2022:

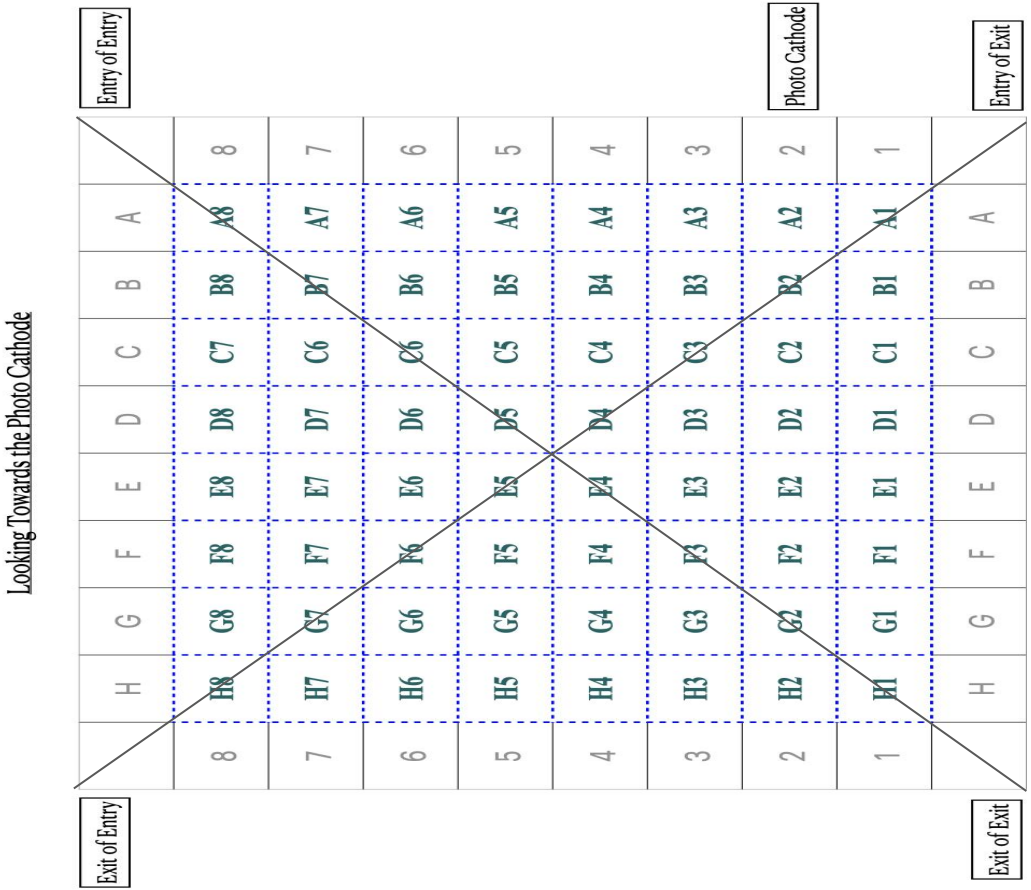
Pulse height changing with light intensity (compare with the picture on the prev. page). This is qualitative only.



15 Feb 2022:

The channel mapping of the LAPPD

[the orientation is rotated by -90 deg]



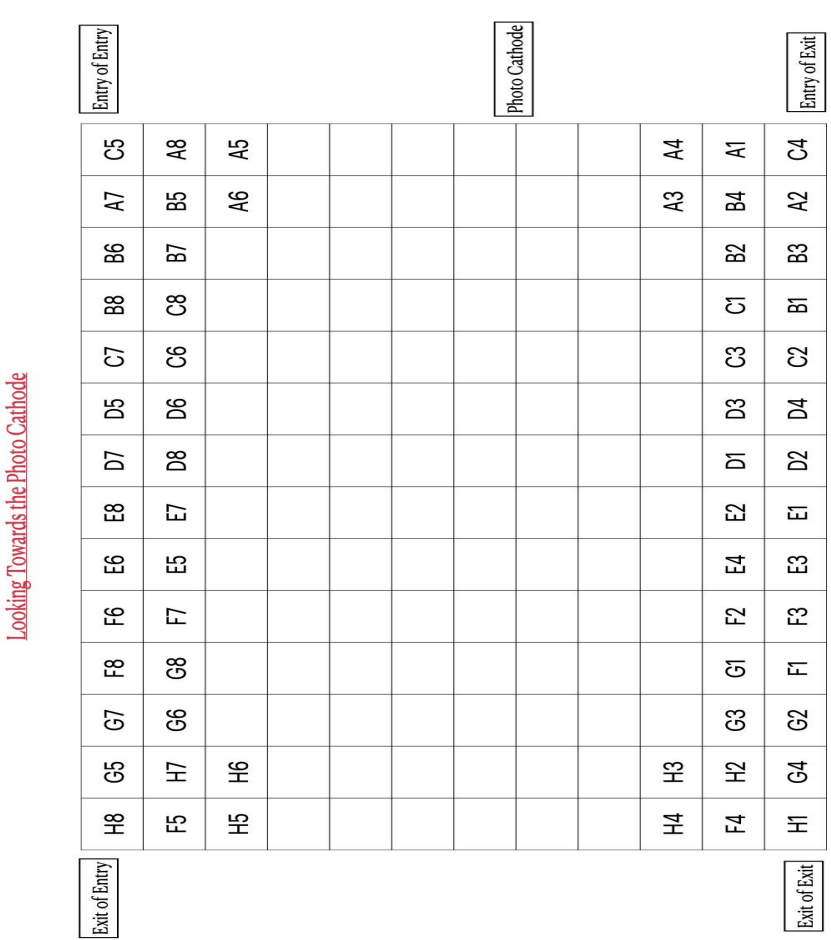
Up

Down

15 Feb 022:

The channel mapping of the LAPPD

[the orientation is rotated by -90 deg]



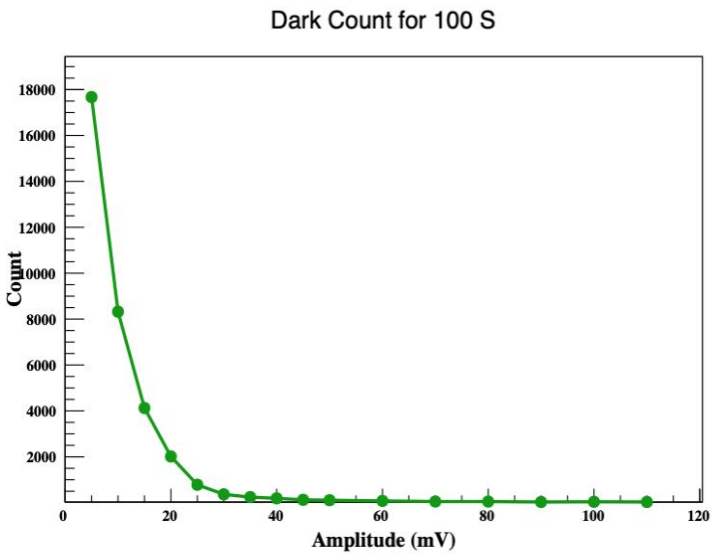
Up

Down

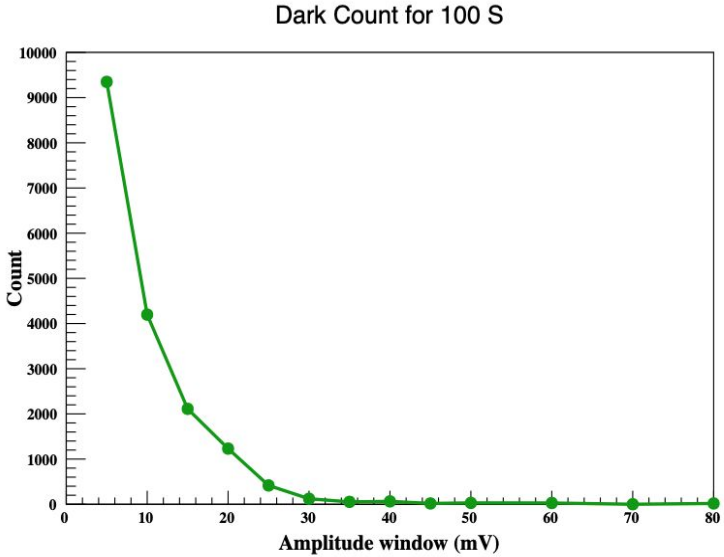
8 March 2022:

Voltage set: 2160, 2150, 1275, 1075, 200 (875/MCP)

Count (i) VS Threshold (i)

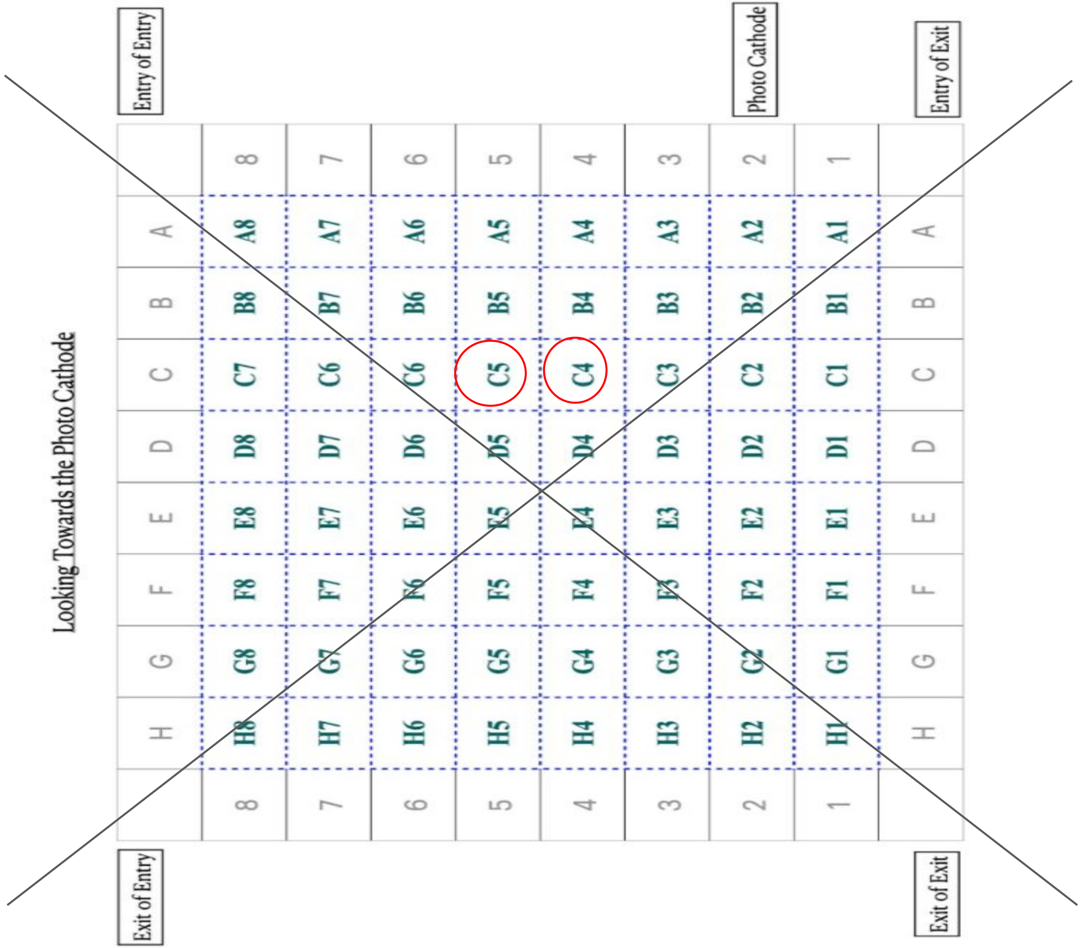


Count-difference (i to i+1) VS Threshold (i)



Channel is C5. See the geometrical location in the next slide

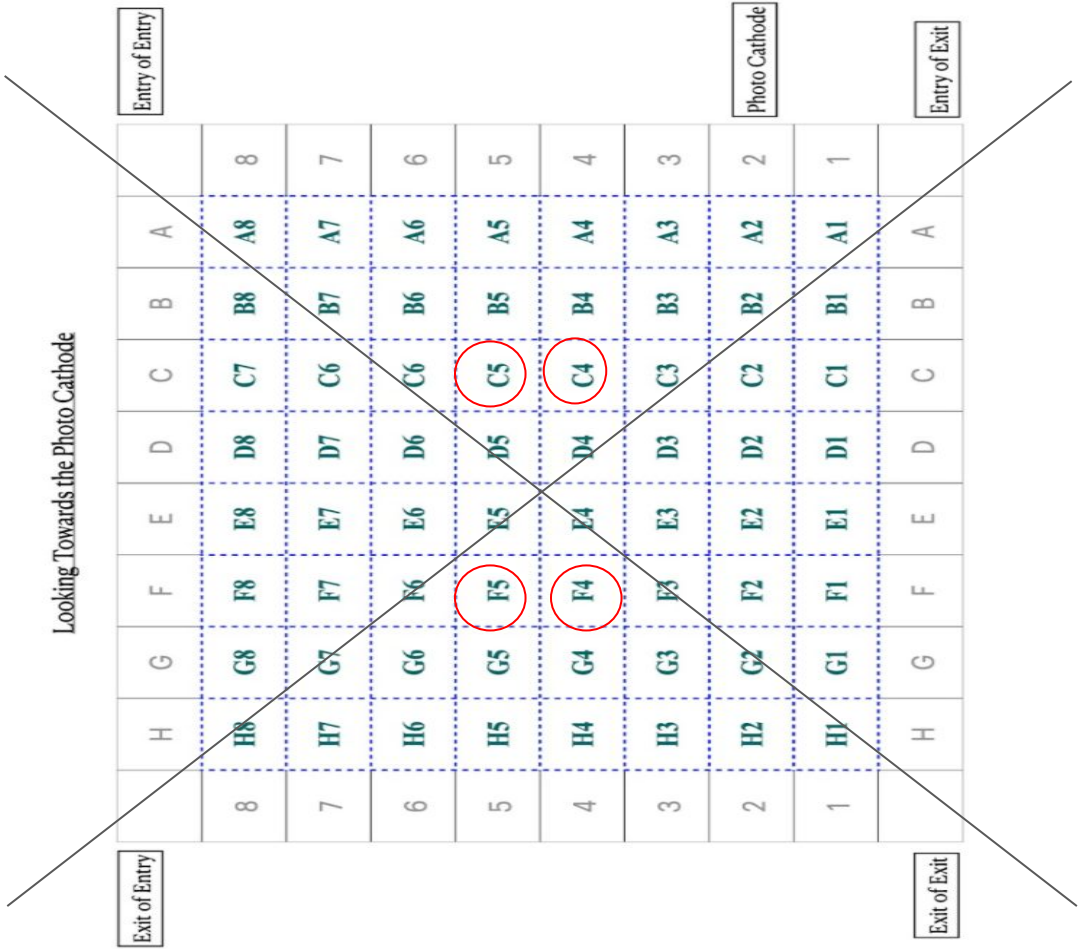
8 March 2022:



Entry of Entry
Photo Cathode
Entry of Exit
Looking Towards the Photo Cathode
Exit of Entry
Exit of Exit
A8 A7 A6 A5 A4 A3 A2 A1
B8 B7 B6 B5 B4 B3 B2 B1
C7 C6 C6 C5 C4 C3 C2 C1
D8 D7 D6 D5 D4 D3 D2 D1
E8 E7 E6 E5 E4 E3 E2 E1
F8 F7 F6 F5 F4 F3 F2 F1
G8 G7 G6 G5 G4 G3 G2 G1
H8 H7 H6 H5 H4 H3 H2 H1

9 March 2022:

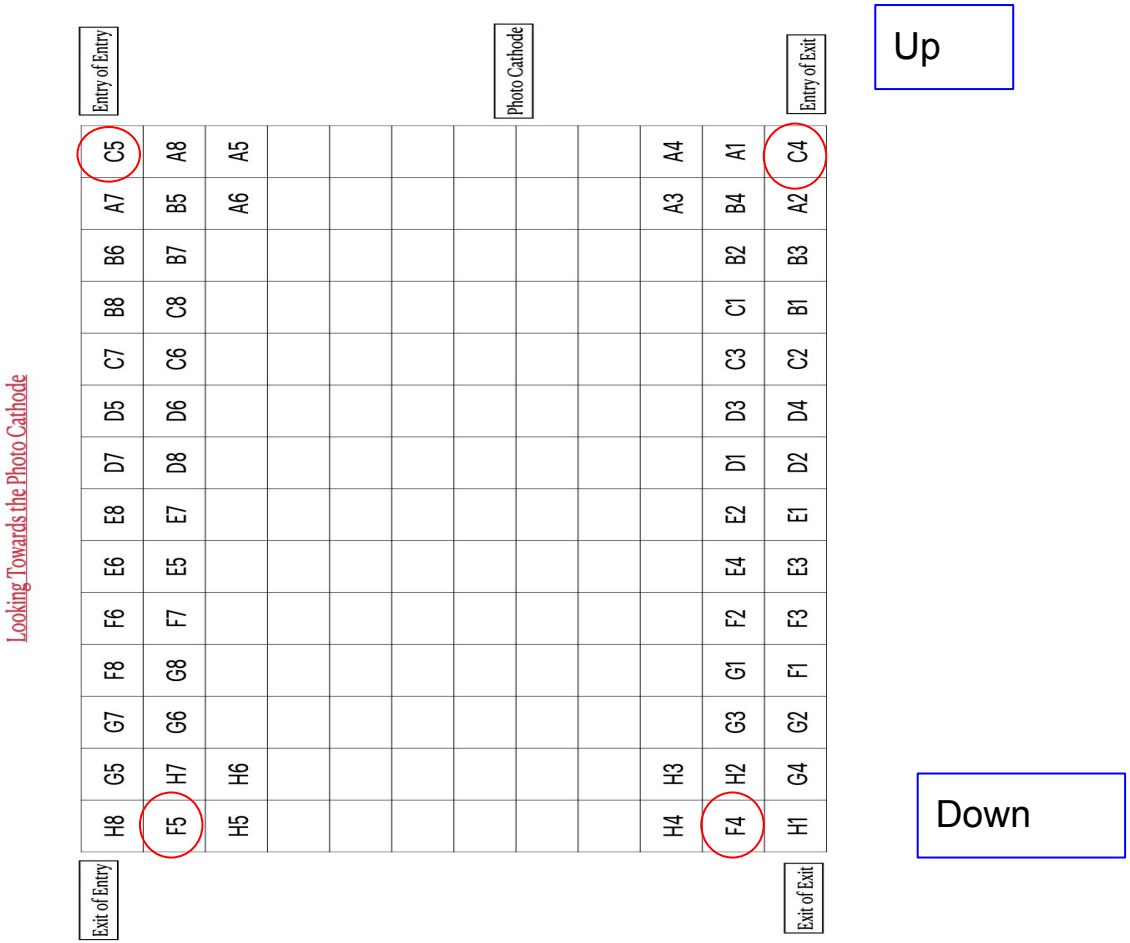
>Noise tests.
>And possible light tests



10 March 22:

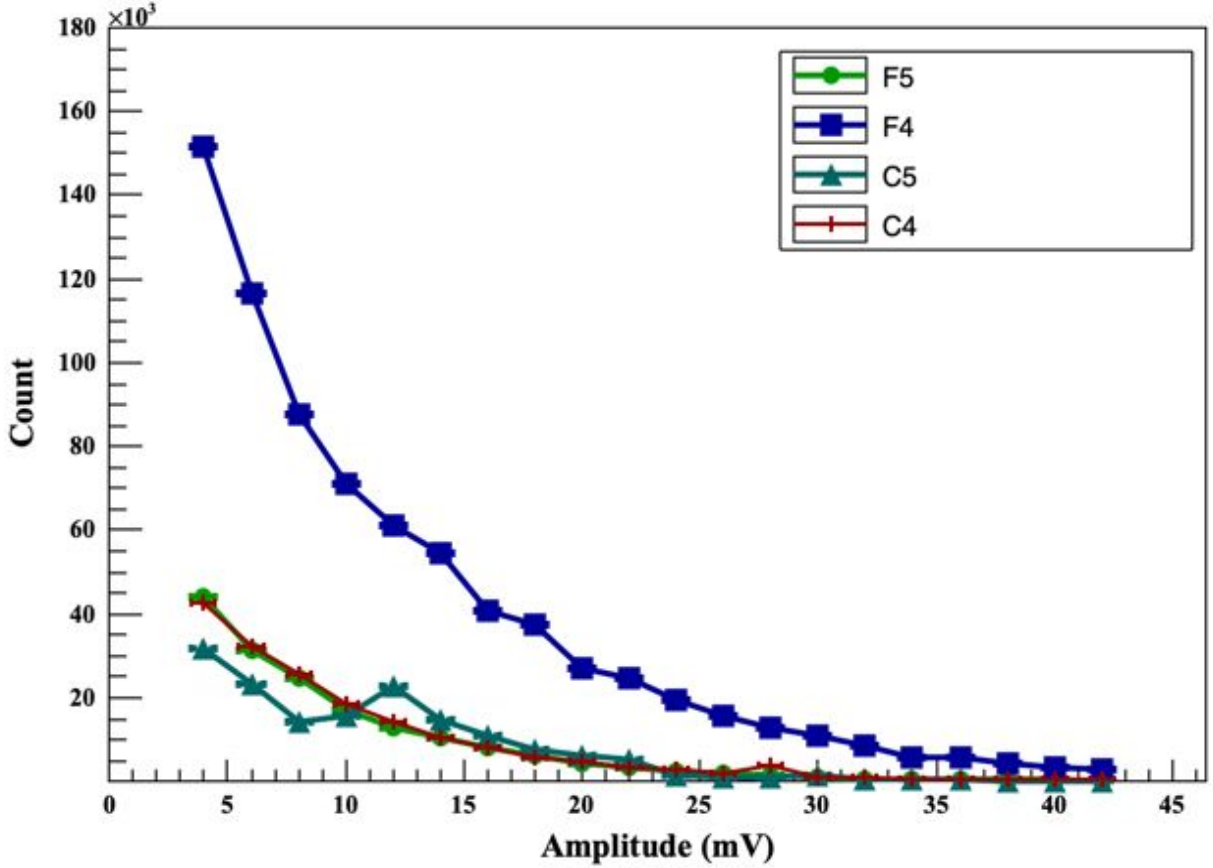
The channel mapping of the LAPPD

[the orientation is rotated by -90 deg]



11 March 2022

[voltage: 2160,2150,1275,1075,200]



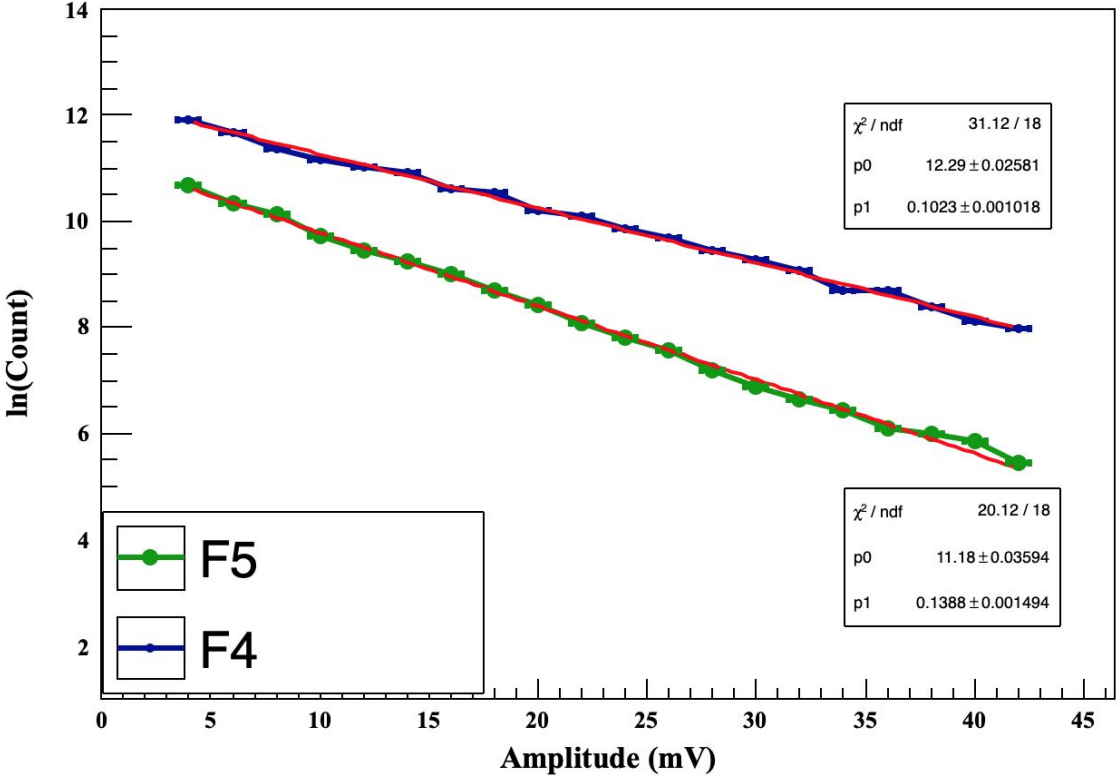
Pulse height scan for ∑(counts) from 4 different channels (pads).
Time gate = 100 S

Please be referred back to last 2 slides to see the geometrical locations of the 4 channels.

Error both in Count and V have been considered.

11 March 2022

[voltage: 2160,2150,1275,1075,200]



Pulse height scan for (∑counts).
Fitting the ln(∑counts) with

$\sum C(v) = \int A\exp(-\mu v) = [(A/\mu)*\exp(-\mu v)]$
$\ln(C) = \ln(A/\mu)-\mu v = [0]-[1]*v$

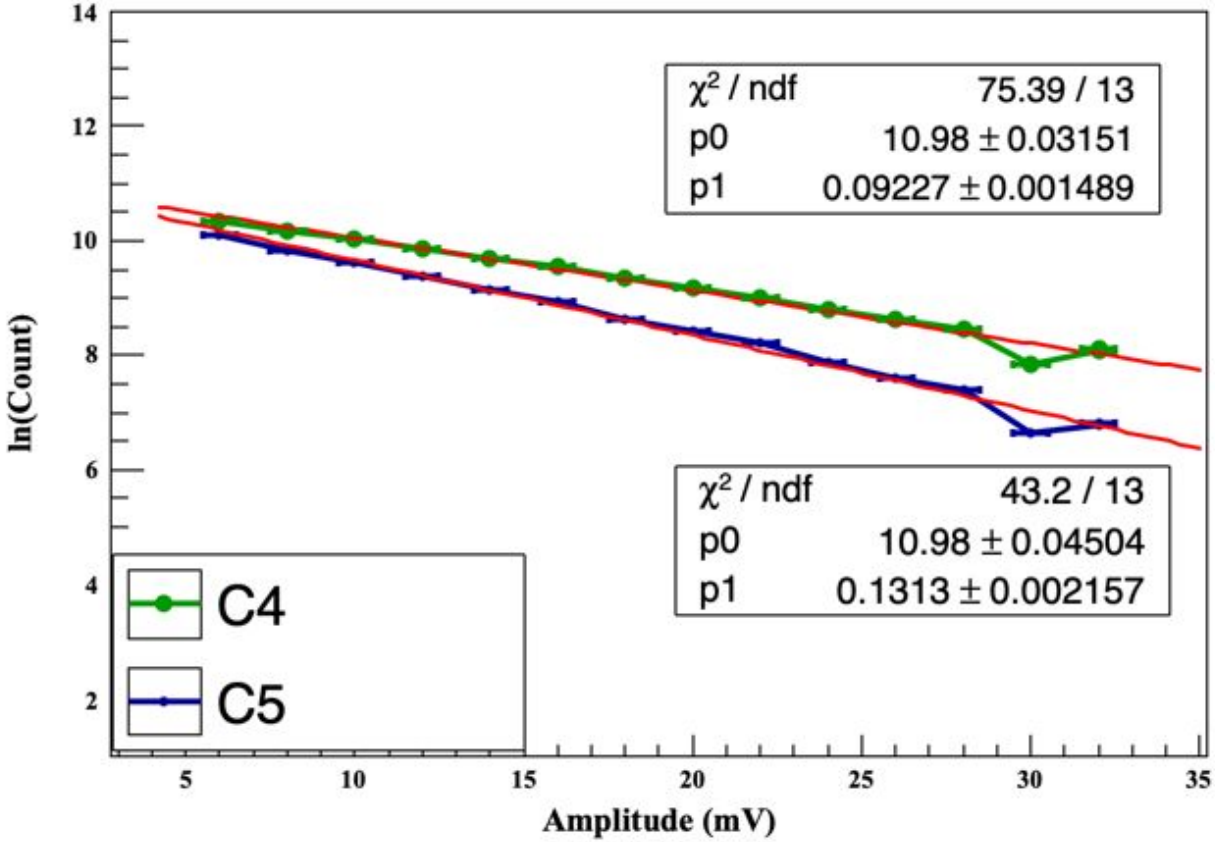
Time gate = 100 S

Errors on count has been propagated.

15 March 2022

[voltage: 2160,2150,1275,1075,200]

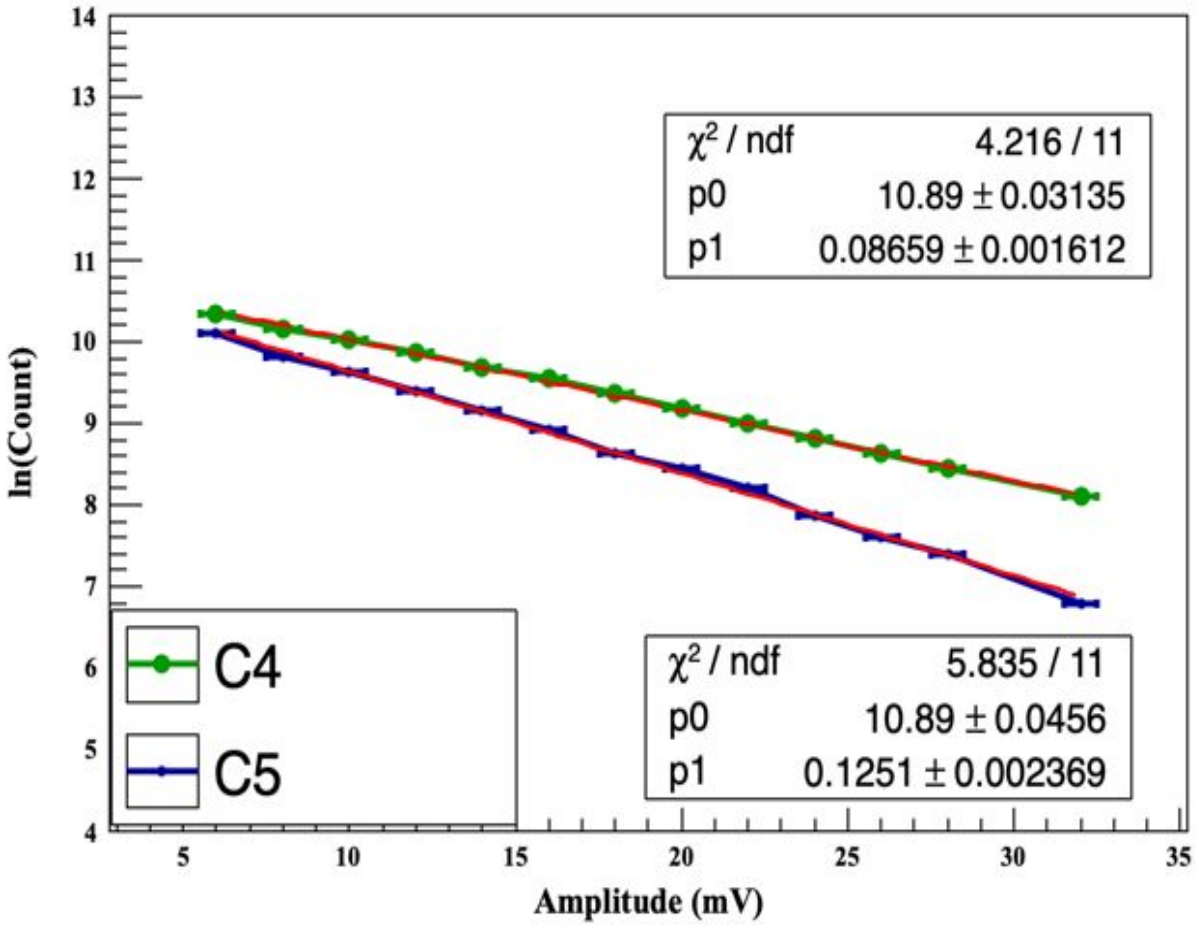
Time gate = 60 S



The discriminator and counter channels are swapped/reversed.

15 March 2022

tage: 2160,2150,1275,1075,200]



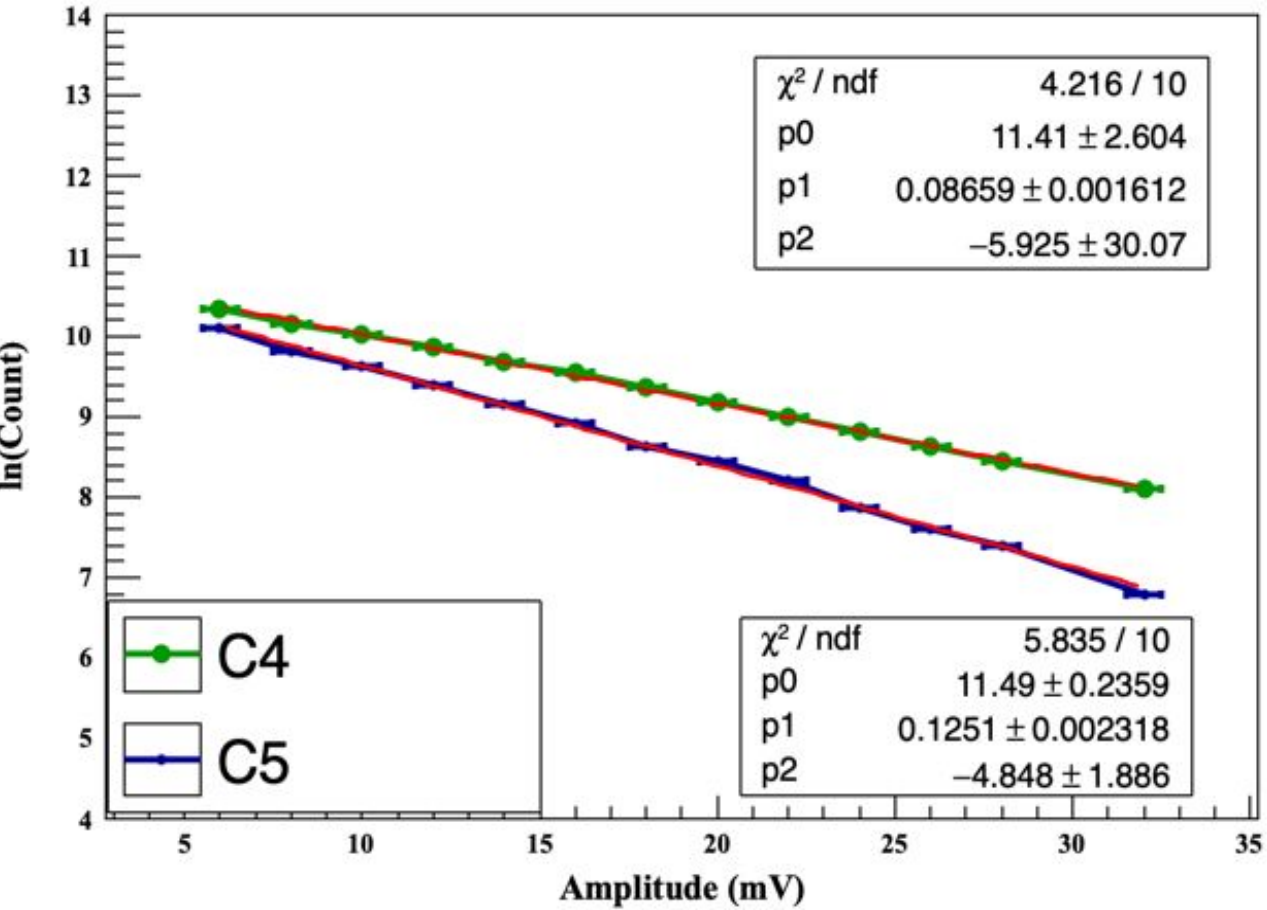
Time gate = 60 S

The discriminator and counter channels are swapped/reversed.

> point at 30 is removed.

15 March 2022

[voltage: 2160,2150,1275,1075,200]



Time gate = 60 S

The discriminator and counter channels are swapped/reversed.

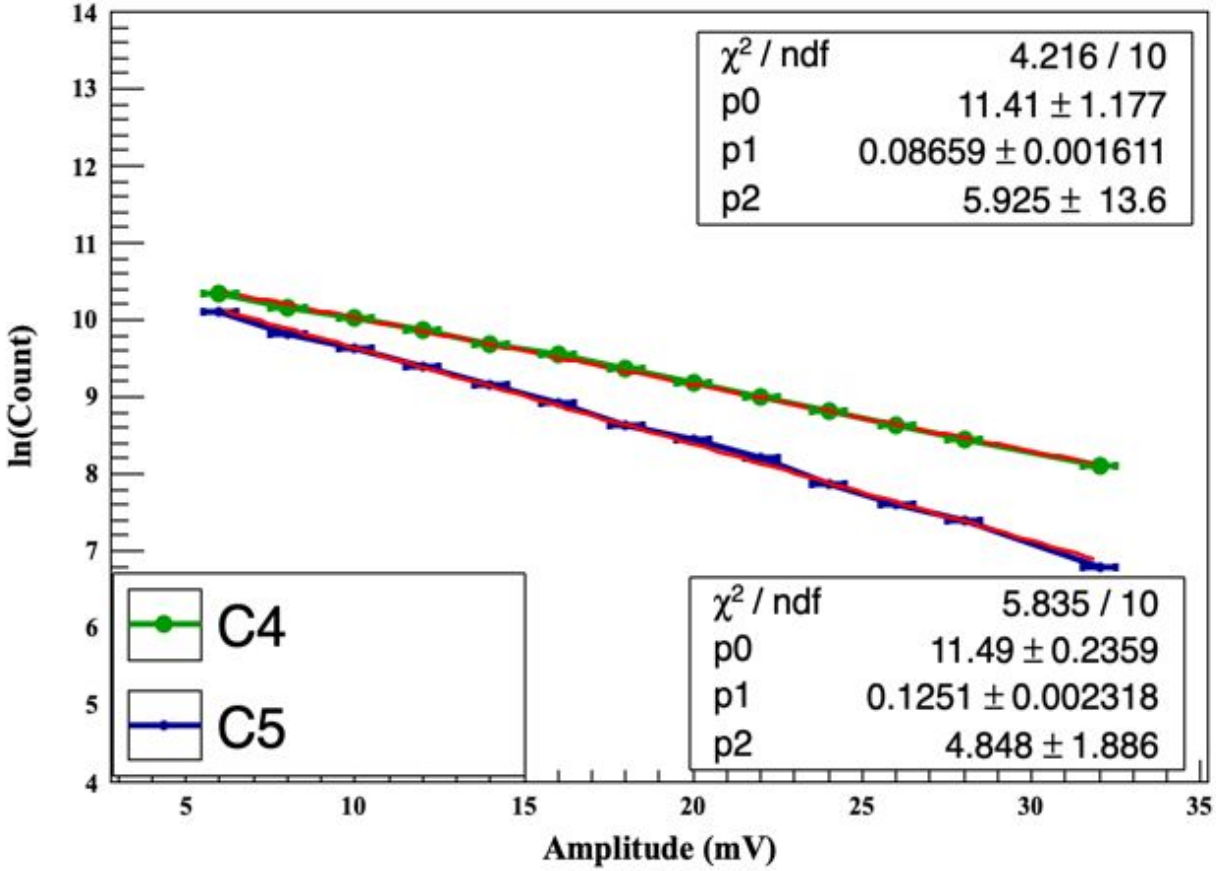
> point at 30 is removed.

3 parameter Fit:
Y = m (x-x')+C

15 March 2022

[voltage: 2160,2150,1275,1075,200]

Time gate = 60 S



The discriminator and counter channels are swapped/reversed.

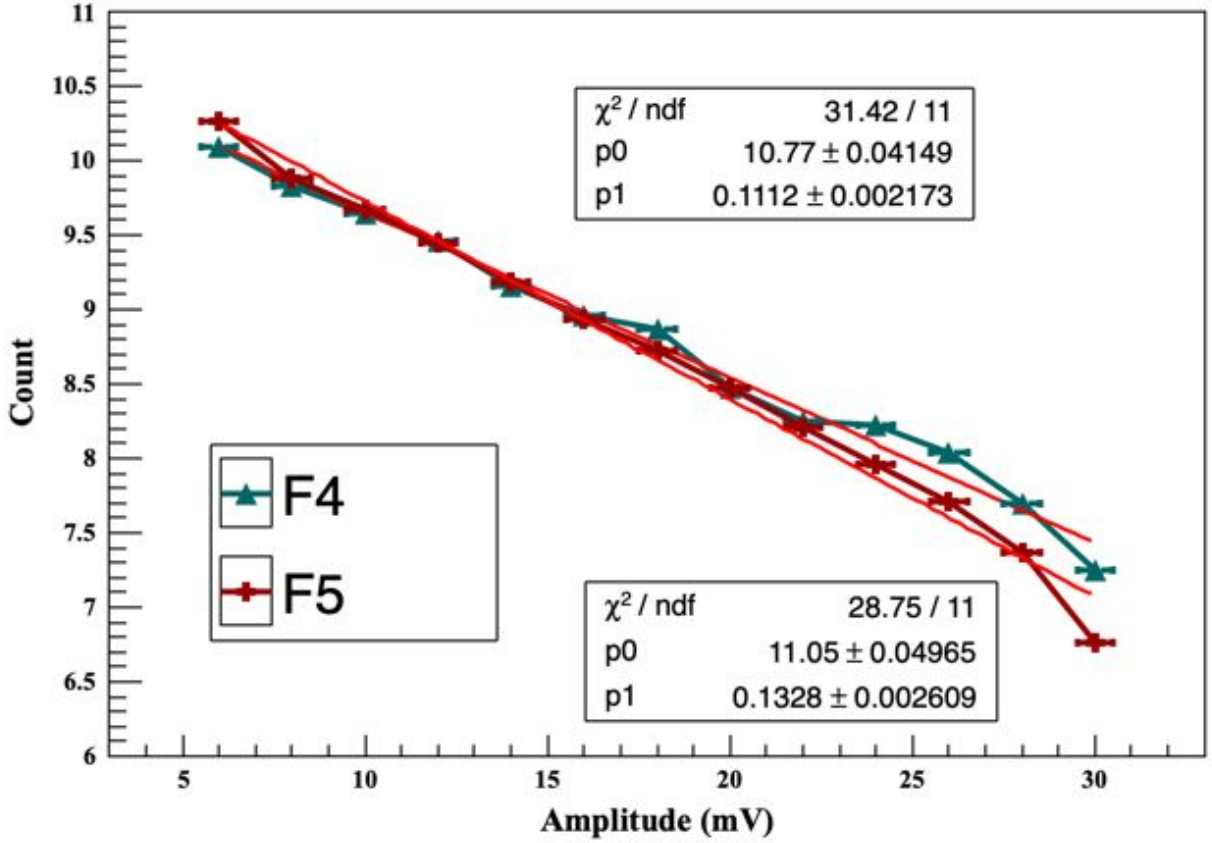
> point at 30 is removed.

3 parameter Fit:
Y = m (x+x')+C

15 March 2022

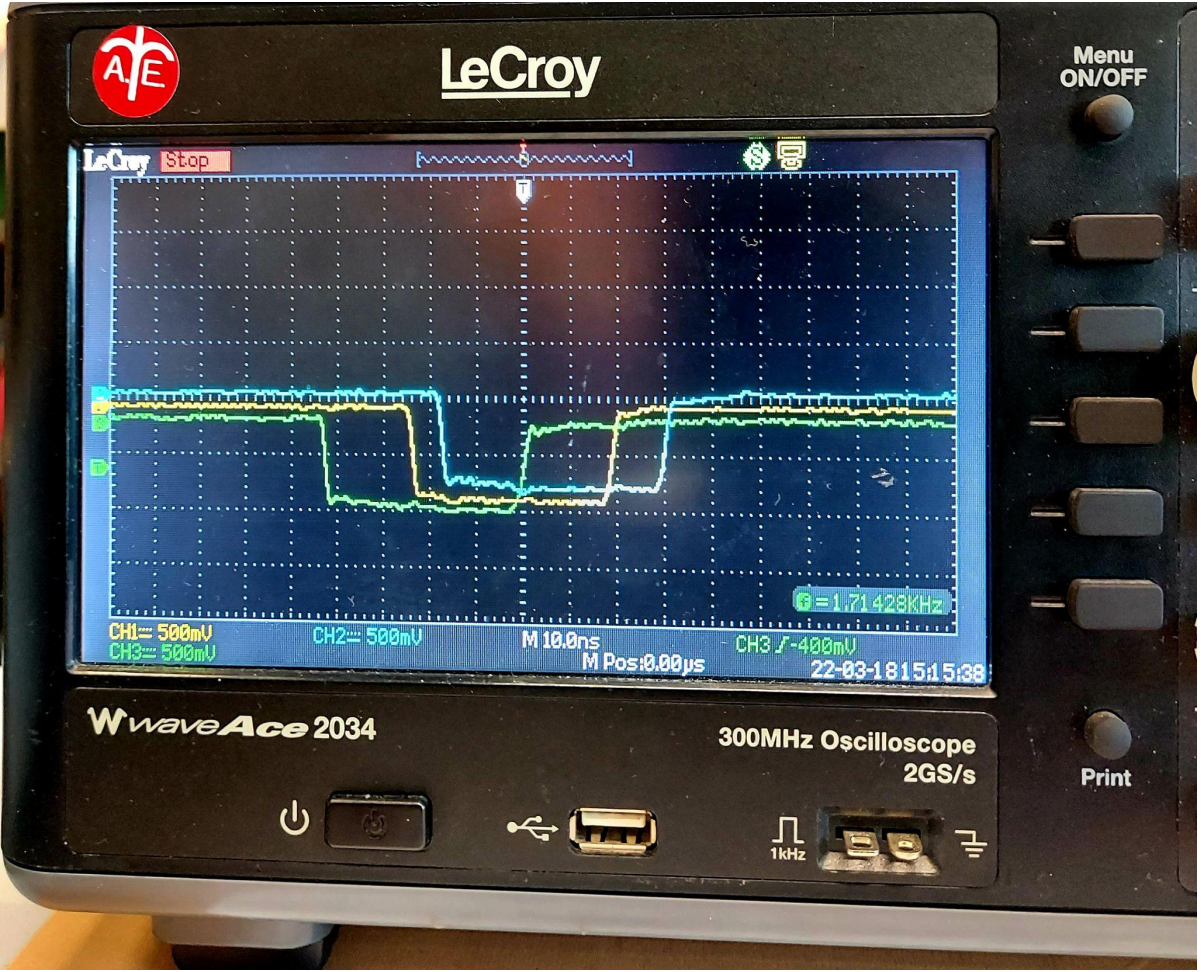
[voltage: 2160,2150,1275,1075,200]

Time gate = 60 S



The discriminator and counter channels are swapped/reversed.

18 March 2022



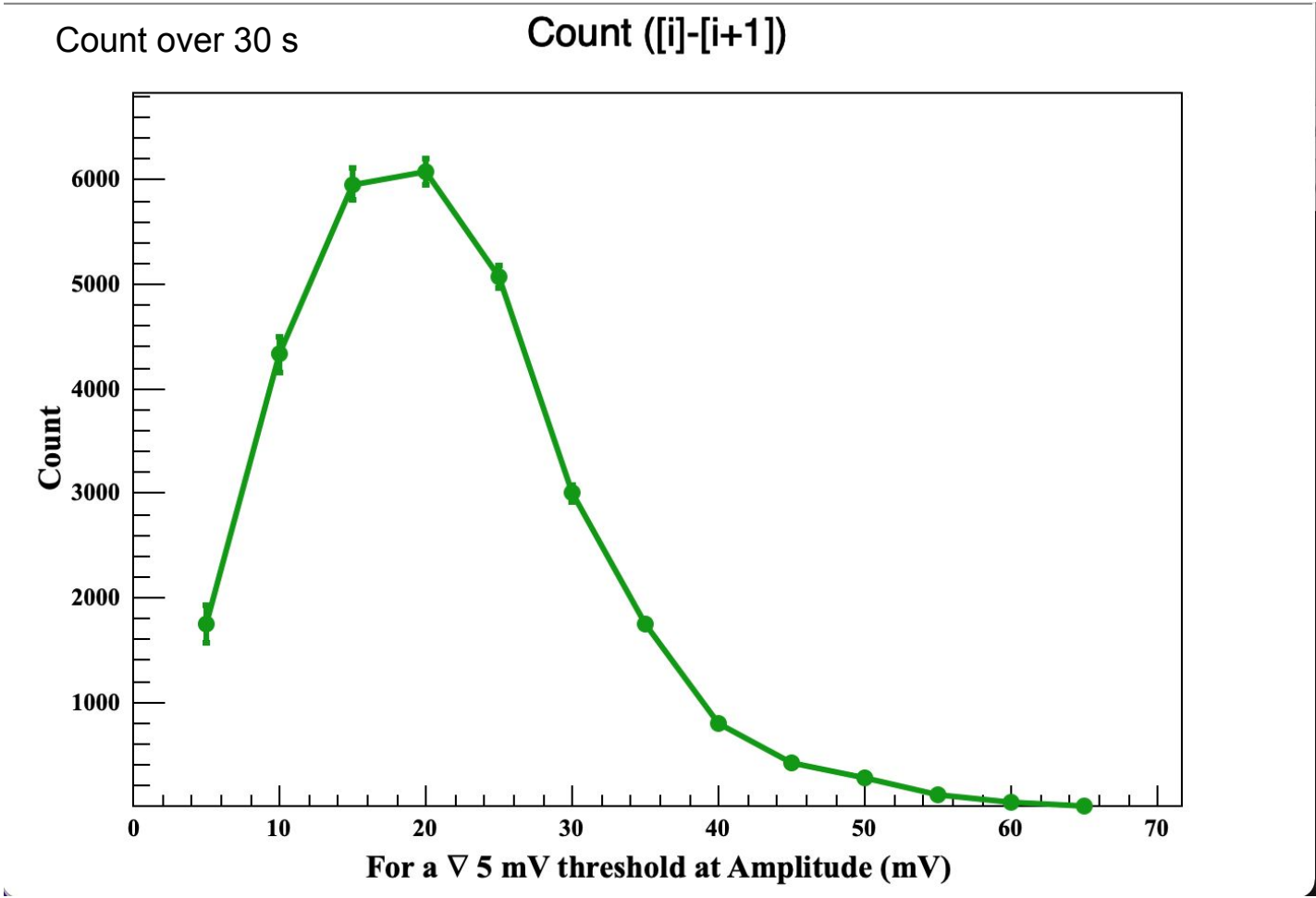
Blue = (LED-Signal) Pulse after discriminator. The LED gets the pulse from a pulser.

Green = The Sync Pulse from the same pulser, after: TTL to NIM conversion, with a suitable width and delay to include the falling edge of the blue. The width and delay is given by a dual timer.

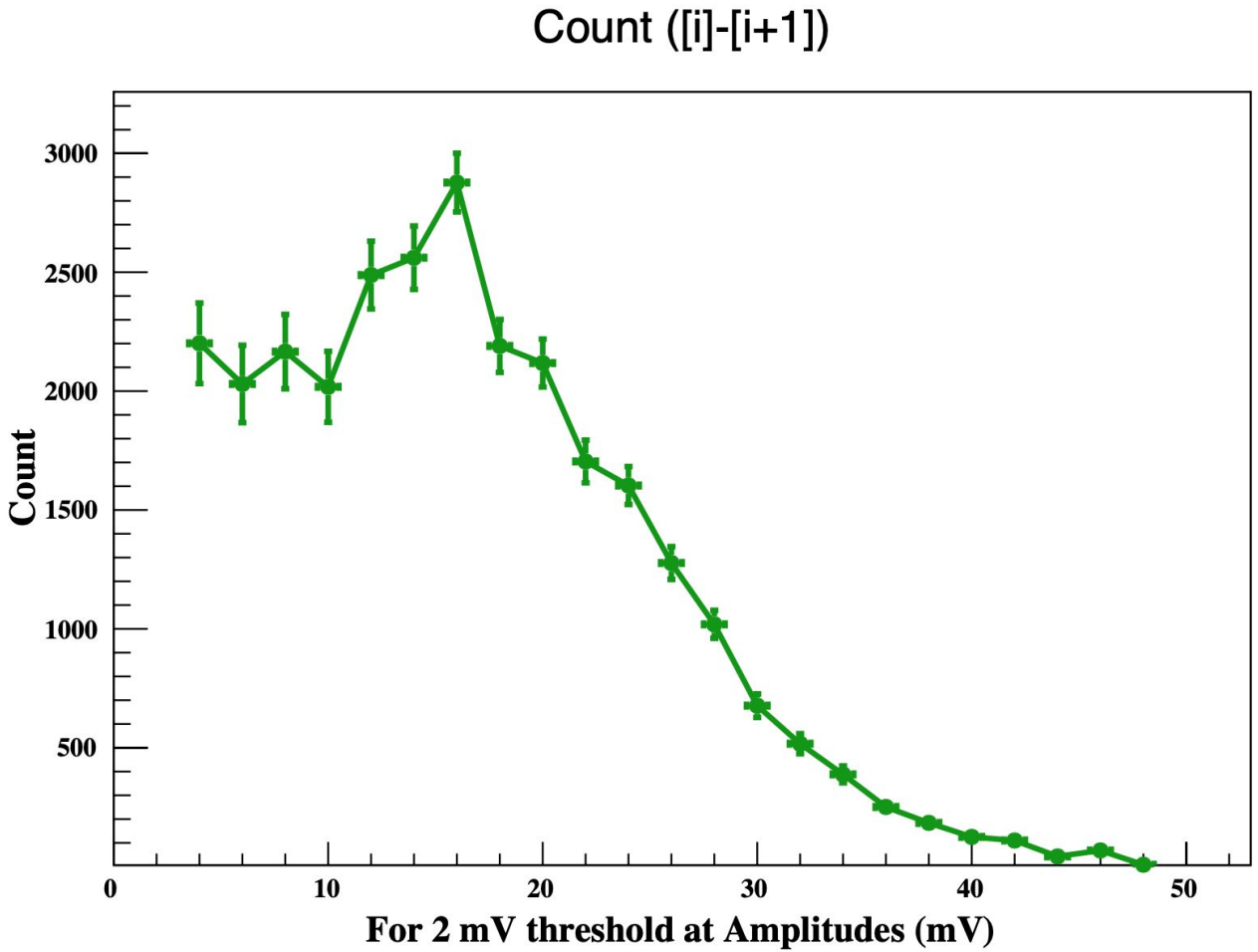
Yellow = The AND of the Green Pulse and the Clock-Pulse of the Scalar-Counter. It must well include the falling edge of the Blue pulse. The cable lengths matters, as the width is set to 50 ns.

*The LED Pulses = above 1.3V, 20 ns width, 1 ms period (1 KHz), 5 ns edge.

18 March 2022



21 March 2022

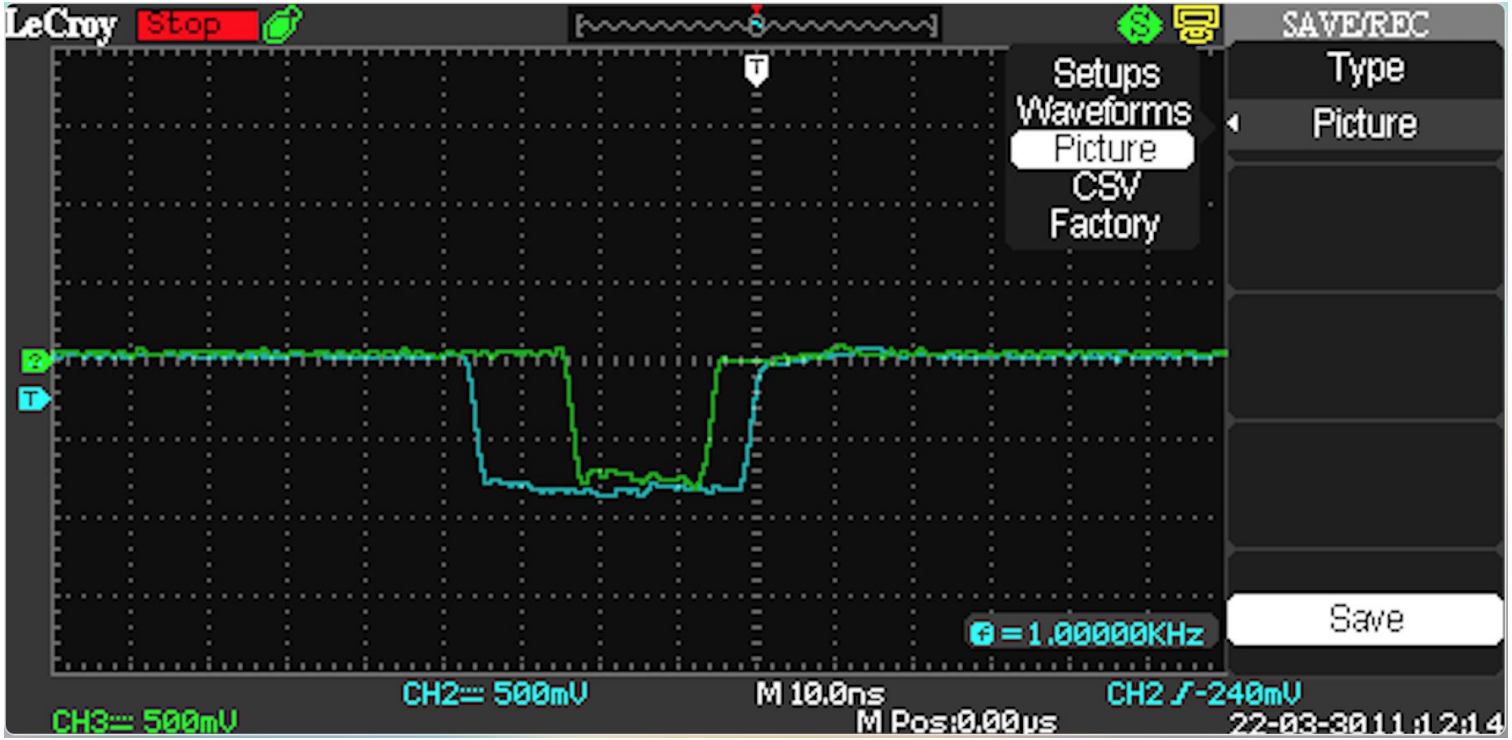


1.35 V to the LED; no paper stopper applied

1 KHz Pulse
30 S count.

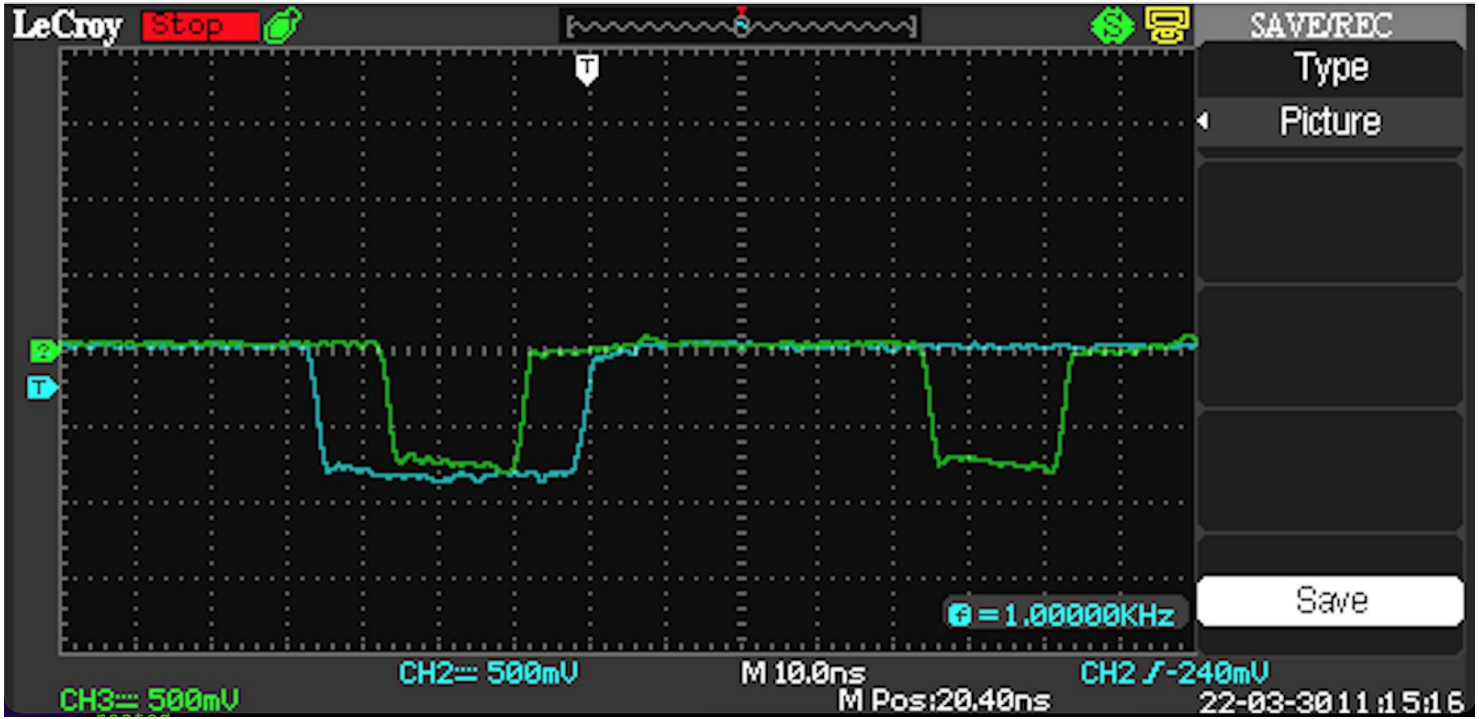
30 March 2022

Blue Pulse = Gate for the scalar
Green Pulse = PE Pulse after Discriminator out

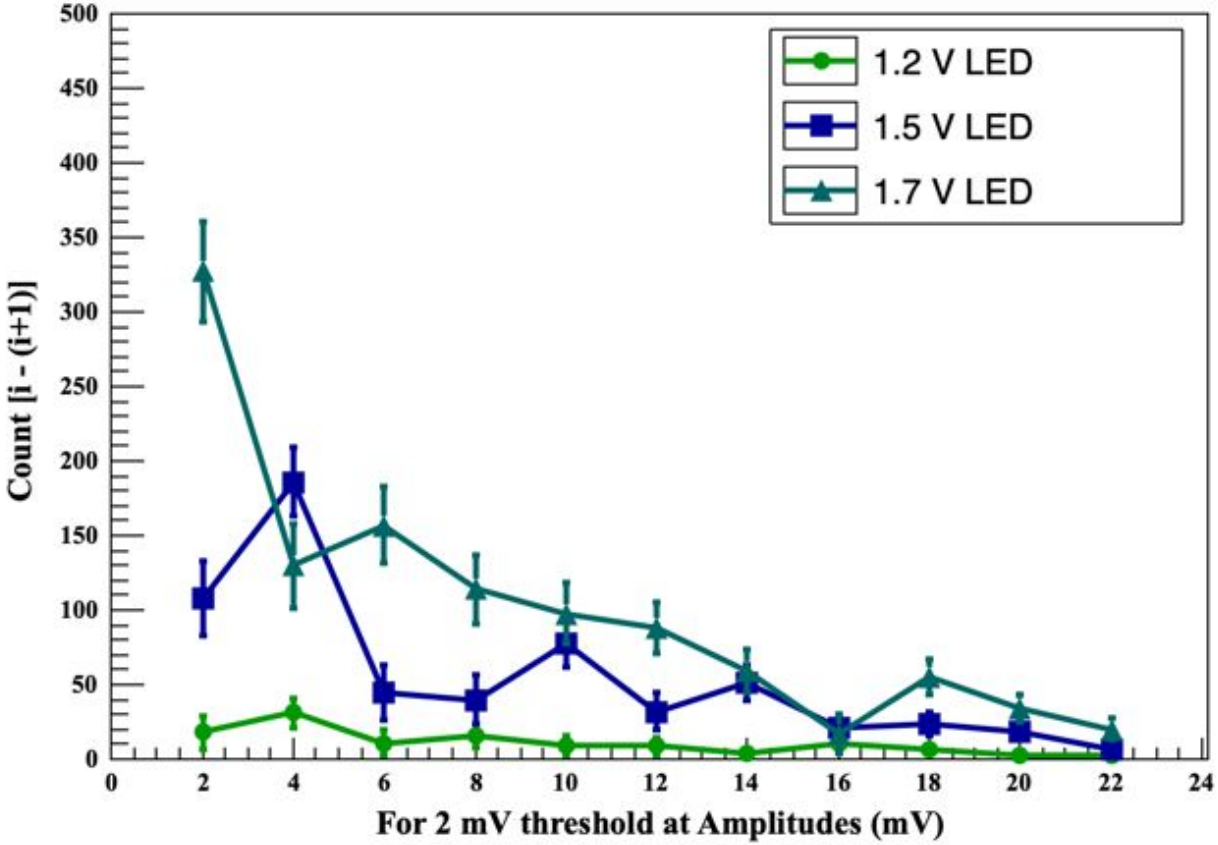


30 March 2022

Blue Pulse = Gate for the scalar
Green Pulse = PE Pulse after Discriminator out
The second **green** pulse = may be from ion feedback



30 March 2022



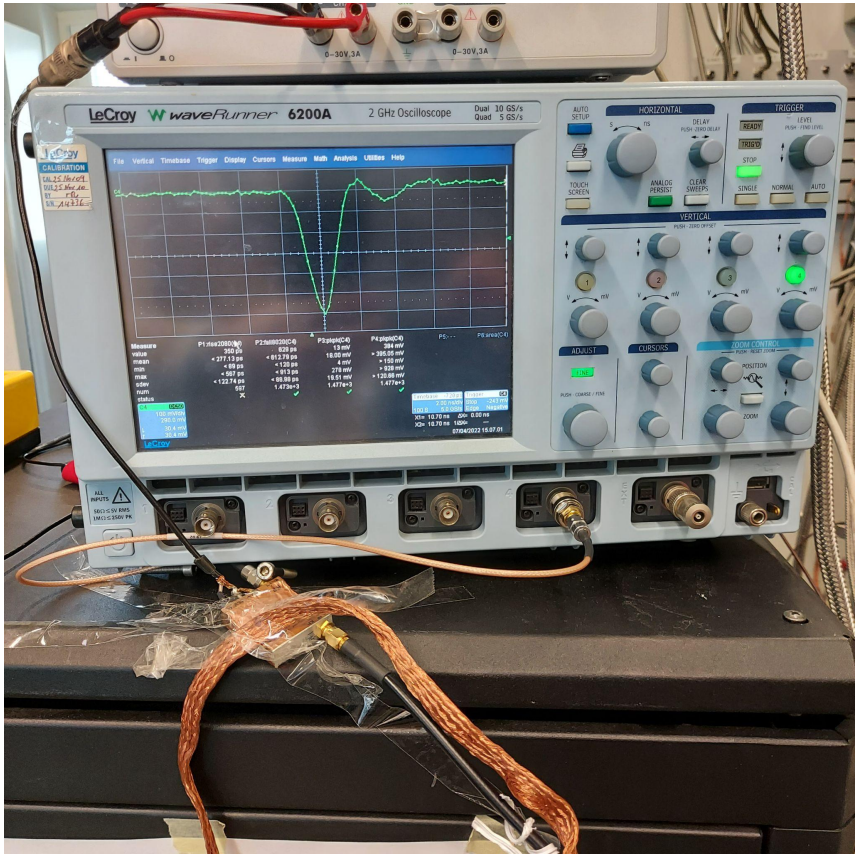
1.35 V to the LED; 3 paper stopper applied.

1 KHz pulse to LED, 10 s count

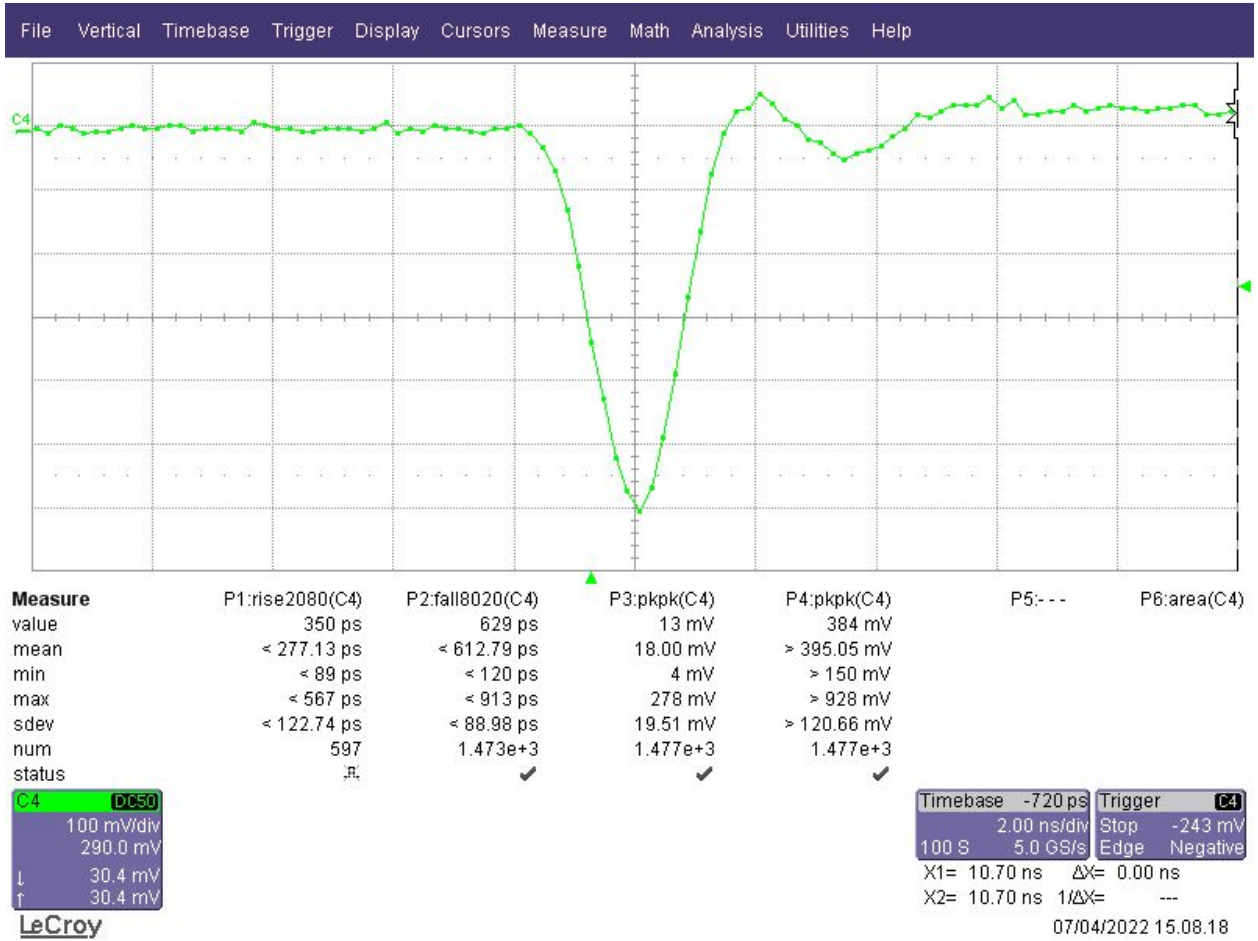
5 April 2022 (Mikhail visit Week)

Working with:
> VME CAEN crate
> VME controller/Bridge: V1718 (USB connection only)
> VME digitizer: V1742
>> Console: Wavedump
>> DAQ PC: DELL/ Ubuntu 20.4 LTS
>> Wavedump uses Gnuplot
>> Digitizer & Controller needs a USB driver in Ubuntu; Found at V1718 page
>> USB controller needs the "Secure Boot off" at the Bios level
>> Additional gain can be achieved from a home made electronics amplifier from Genova. That also improves S/N ratio
>> Still using LED.
>> Plotting and Data Aquisition in GNUplot follows stand shortcut
>> Analysis Macro/software is written by Mikhail and being improved
>> The /etc/wavedump/Wavedumpconfig_X742.txt file has to be tuned for different data taking condition. e.g=> trigger time window length etc.
>> The executable is at /usr/local/bin/wavedump
>> The analysis macro has to be configured, e.g, for threshold, event numbers.

6 April 2022 (Mikhail visit Week)



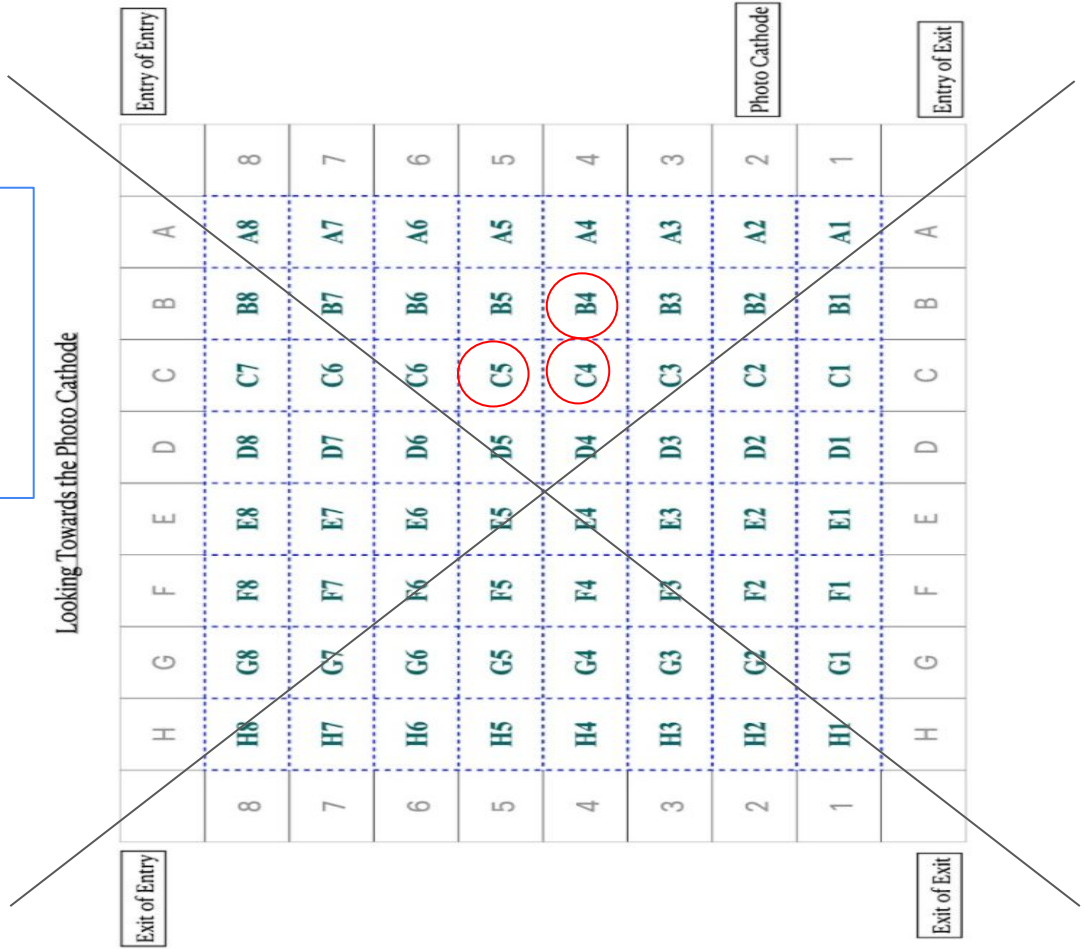
7 April 2022 (Mikhail visit Week)



LED = 1V (No Paper block)
Light through small hole on cartoon.
>
Each MCP = 900 V
two gaps = 200 V
PC at +10 V (magnitude).
>
Signal goes through an inverting amplifier (mode made at Genova) with gain ~10
>
Analysis on Oscilloscope
Fall(Rise) time (20-80%) = 612.8 ps
Noise rms = 18 mV; pkTOpk = 9 mV
Signal pkTOpk = 395 mV
Signal to Noise Ratio = 395/9=43.89
Time Resol = 612.8/43.89 = 13.96 = 14ps.
Without Amplifier the S/N is slow;
Time resol = ~30-40

7 April 2022 (Mikhail visit Week)

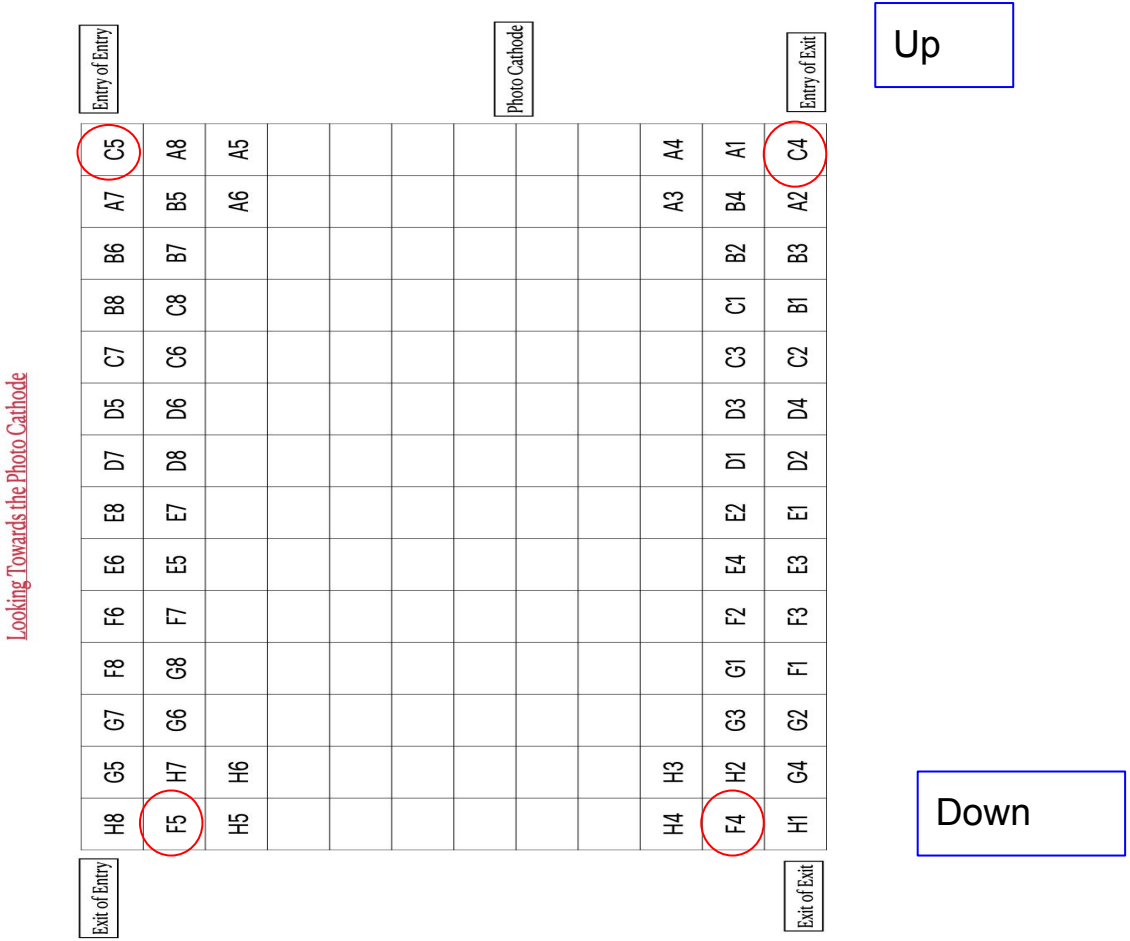
> LED: 1 V
> incident through a small hole
> No paper.
> Possible position: C4 (partially C5, B4)



xxx

The channel mapping of the LAPPD

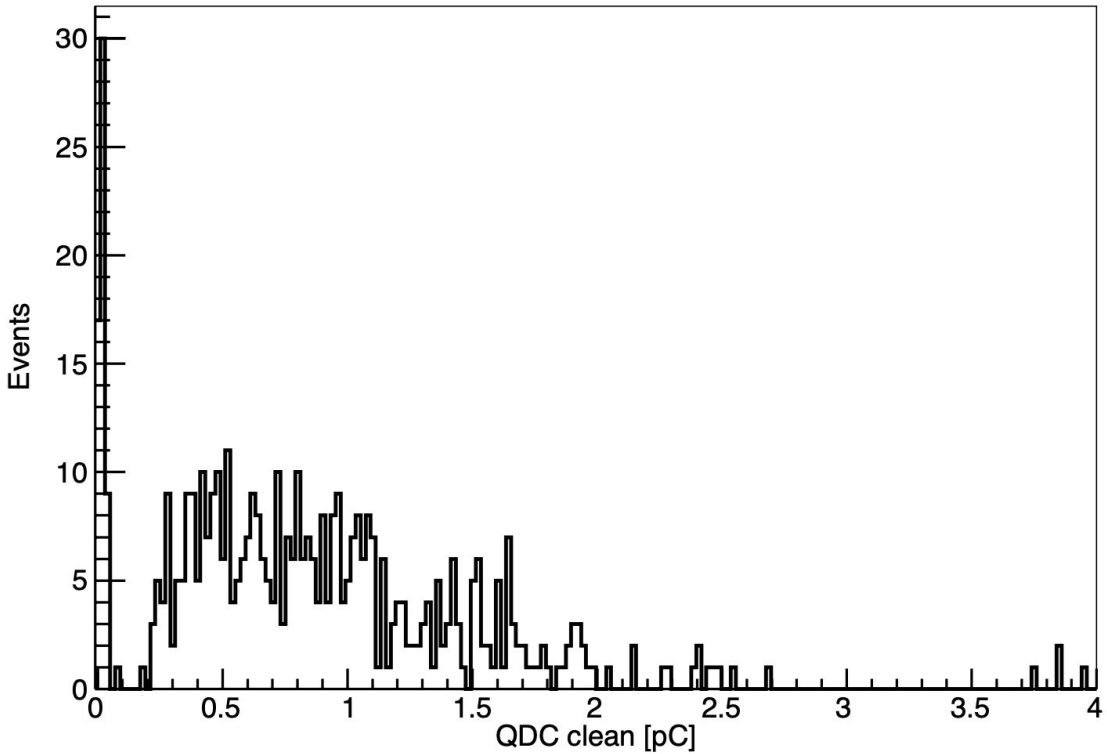
[the orientation is rotated by -90 deg]



Up

Down

7 April 2022 (Mikhail Visit Week)



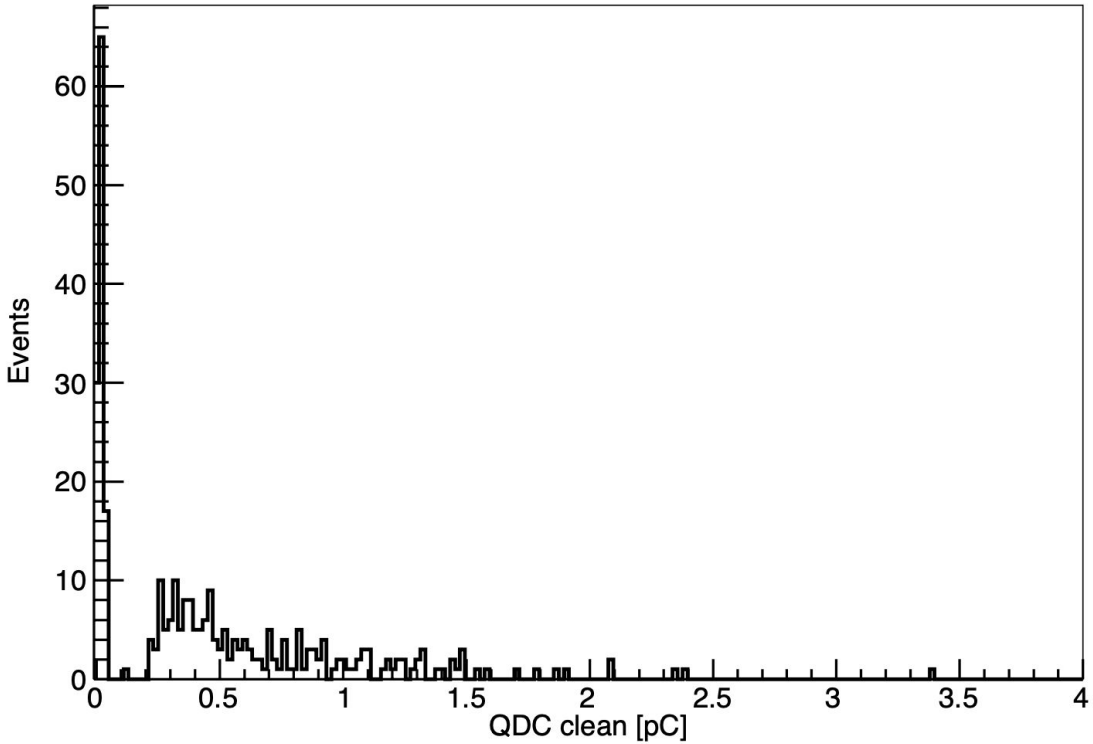
LED = 1V (No Paper block)
Light through small hole on cartoon.
>
Each MCP = 900 V
two gaps = 200 V
PC at +10 V (magnitude).
>
Signal goes through an inverting amplifier (mode made at Genova) with gain ~10
>
Channel 0 = C4

Possible SPE charge distribution.
Light/Avenalch Charge is possibly shared with C5

(> The noise has to improve)
(> Correlated events between C4&C5 has to be eliminated from the histogram.)

Form same setup Incom gets a gain

7 April 2022 (Mikhail Visit Week)



LED = 1V (No Paper block)
Light through small hole on cartoon.
>
Each MCP = 900 V
two gaps = 200 V
PC at +10 V (magnitude).
>
Signal goes through an inverting amplifier (mode made at Genova) with gain ~10
>
Channel 1 = C5

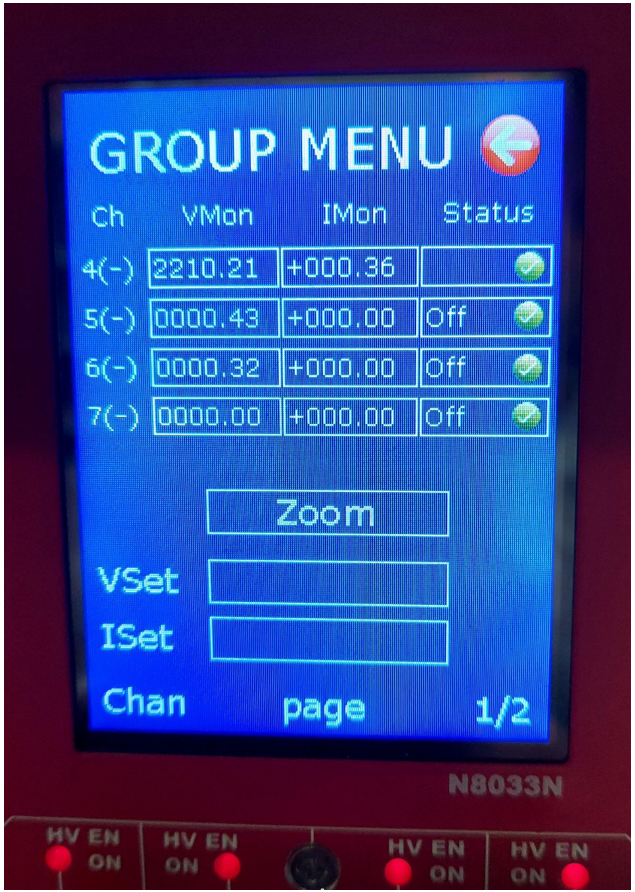
Possible SPE charge distribution.
Shares charge with C4.

(> The noise has to improve)
(> Correlated events between C4&C5 has to be eliminated from the histogram.)

19 May 2022

The currents for a given voltage should look like this:

The resistance measured across an MCP should be 6 MOhm



24 May 2022

The 'slow gate' terminator finally arrived today.

This is the first LASER spot.

LDH-P-C-405 laser head

https://www.picoquant.com/images/uploads/downloads/ldh_series.pdf

https://www.meetoptics.com/light-sources/pulsed-lasers-and-sources/diode-laser/s/picoquant/p/LDH-P-C-405

The LASER Driver

PDL-800-D

https://www.picoquant.com/products/category/picosecond-pulsed-driver/pdl-800-d-picosecond-pulsed-diode-laser-driver-with-cw-capability#custom1

24 May 2022

The 'slow gate' terminator finally arrived today.

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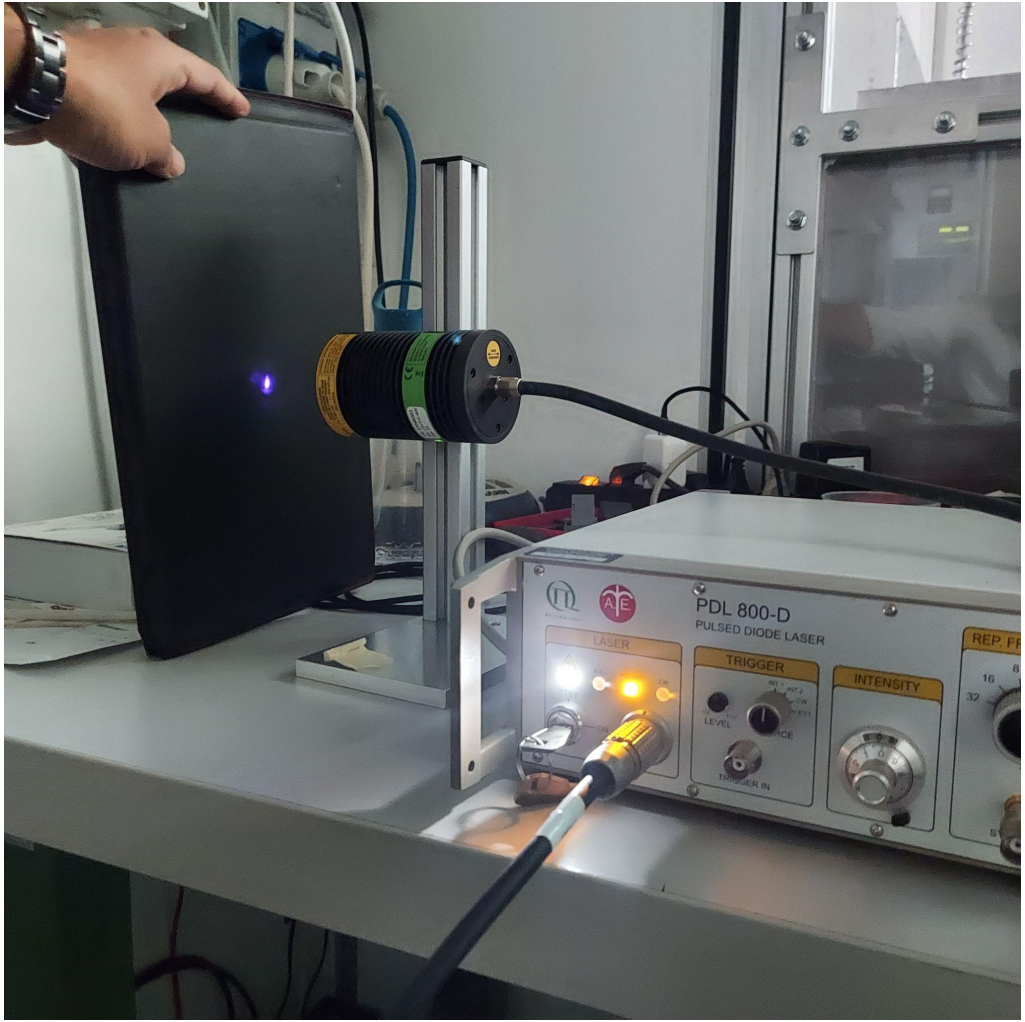
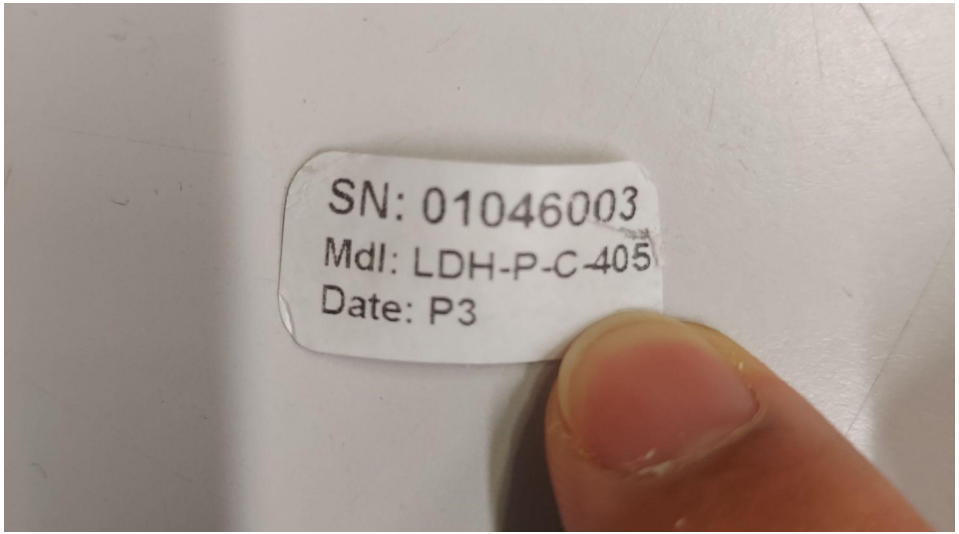
https://www.meetoptics.com/light-sources/pulsed-lasers-and-sources/diode-laser/s/picoquant/p/LDH-P-C-405



The serial number of the LASER head got lose:



25 May 2022

A few more details on the DAQ:

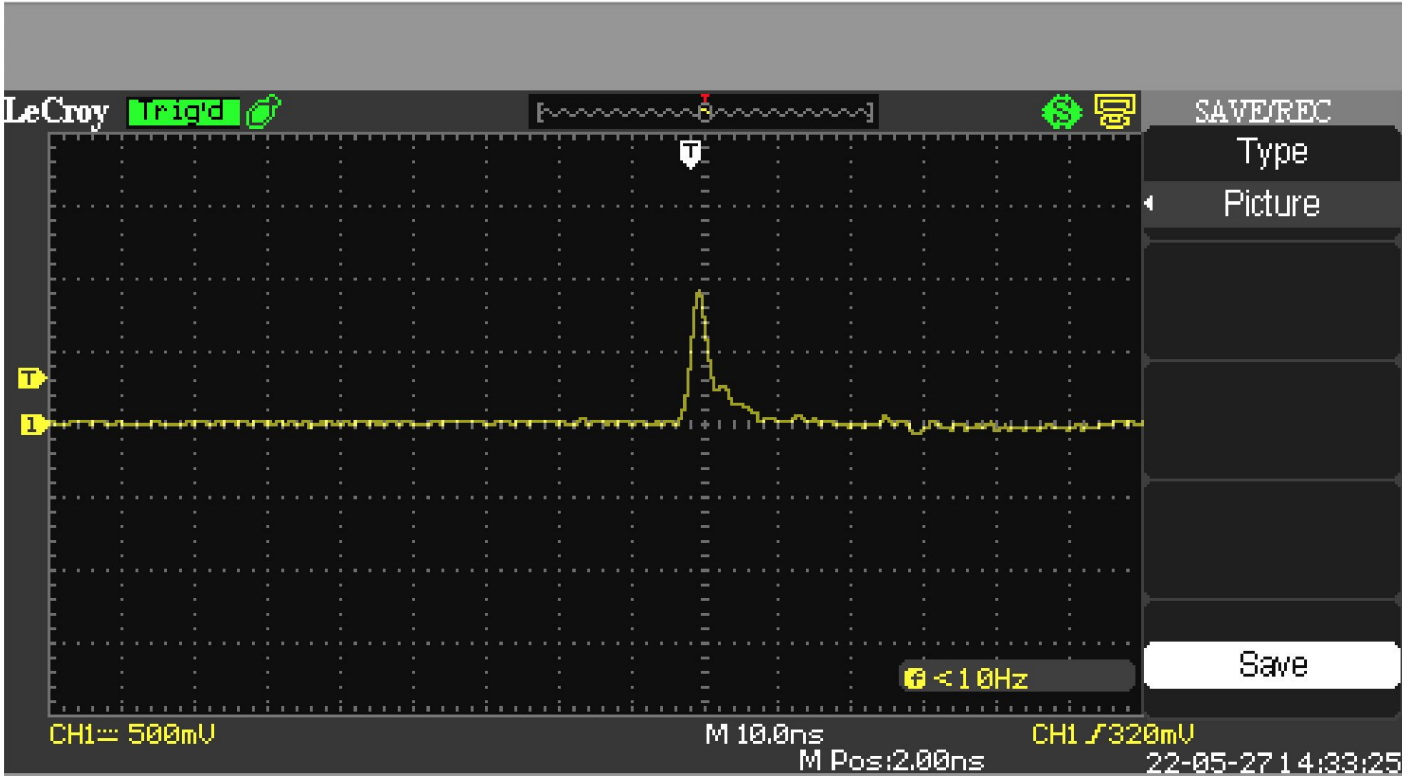
We opt for:
The DRS4 chip frequency = 5 GHz (out of 2.5 GHz, 1.0 GHz, 750 MHz)
Meaning=> one time window = ⅕ GHz = 0.2 ns

We opt for:
RECORD_LENGHT=50 unit => 50*0.2 ns = 104 ns

We opt for:
POST_TRIGGER (delay) = 50 ns (depends on cable length)

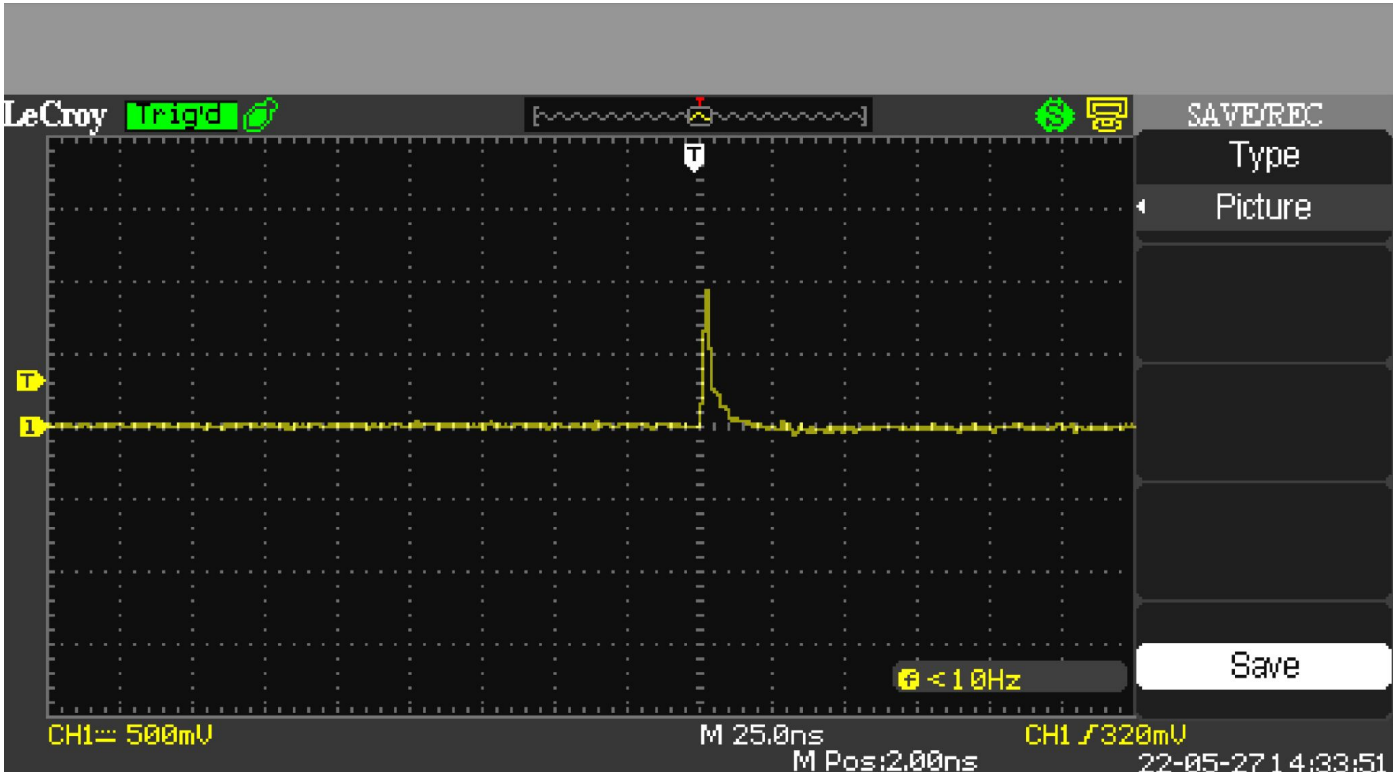
27 May 2022

The first LAPPD pulse with the LASER source on the oscilloscope, through SMA cable,connectors



27 May 2022

The first LAPPD pulse with the LASER source on the oscilloscope, through SMA cable,connectors



27 May 2022

An idea on the currents, when the LASER is on. For LASER settings, see the next slide.
For currents without LASER, see slide # ~46

27 May 2022

LASER head:
LASER driver:

External trigger: (+ve) from the pulse generator::
> rate: 1 KHz.
> on driver (full range): that is 1 KHz
> Intensity: ~5 (mid)

DAQ is still giving some problem:

6 July 2022

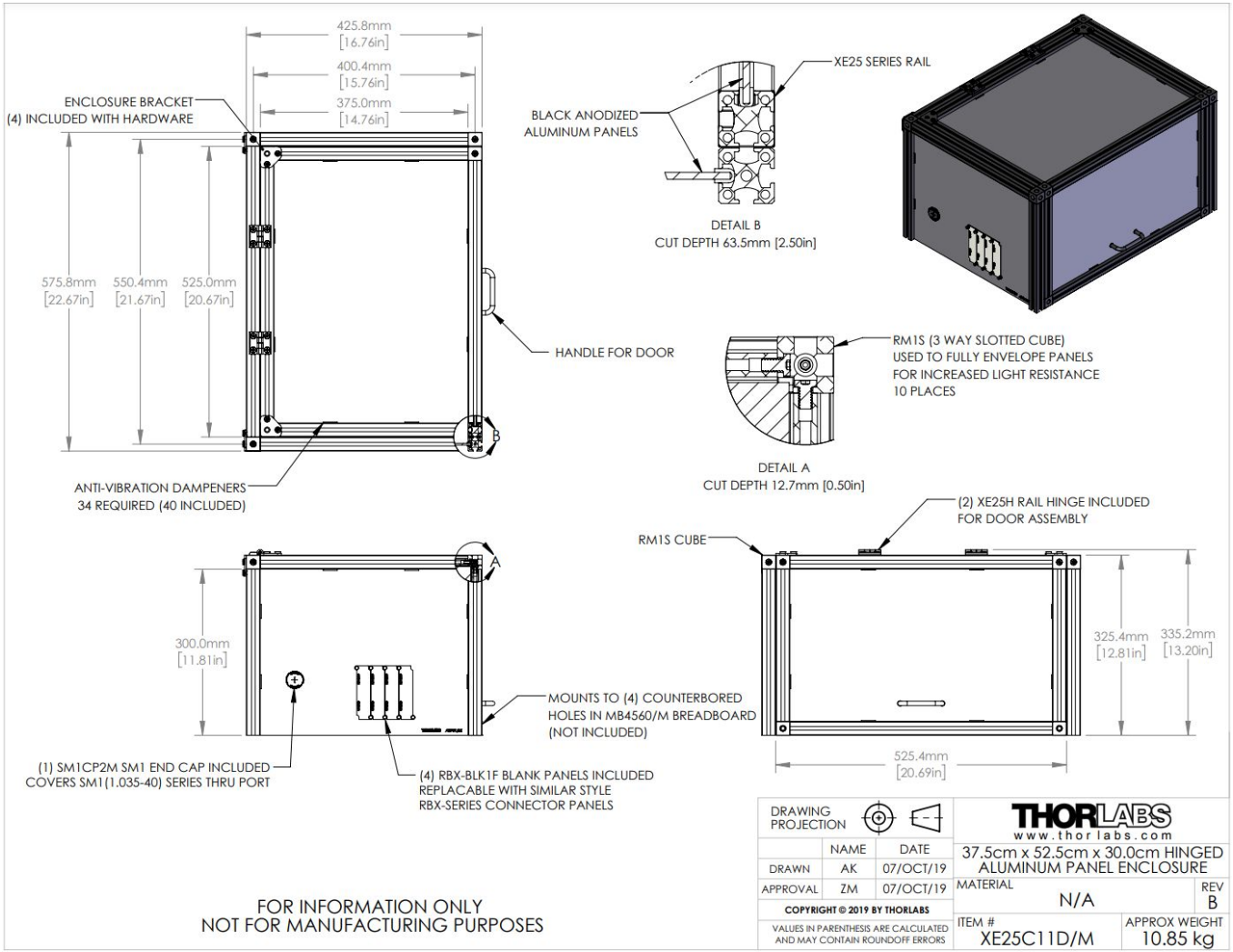
LASER head: **LDH-P-C-405**

- Wavelengths between 375 and 1990 nm
- Pulse widths as short as 20 ps (FWHM)
- Adjustable (average) power up to 50 mW
- Repetition rate from single shot to 80 MHz
- Optional dual mode: pulsed and CW operation
- Collimating optics, optional fiber coupling and peltier cooling

LASER driver: PDL800-D

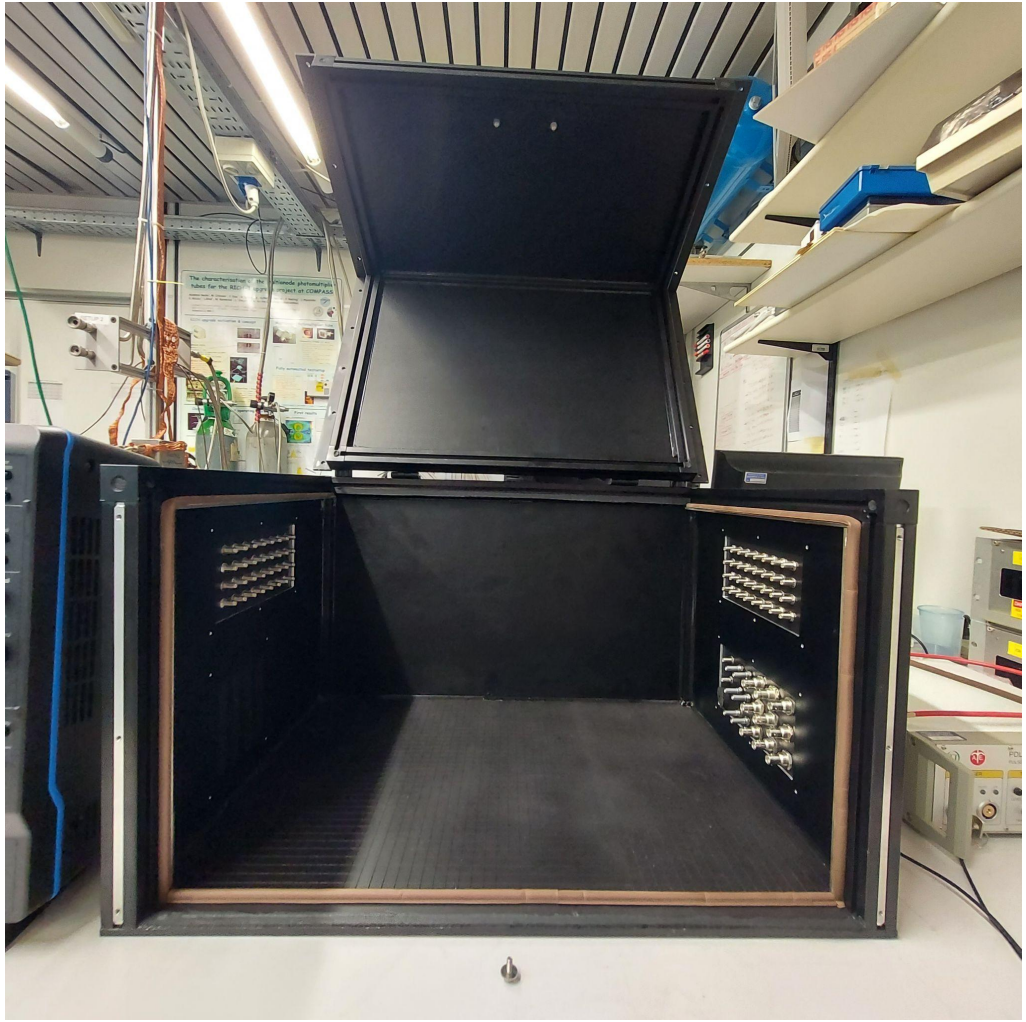
3 Aug 2022

The Thorlabs
DarkBox Dimension



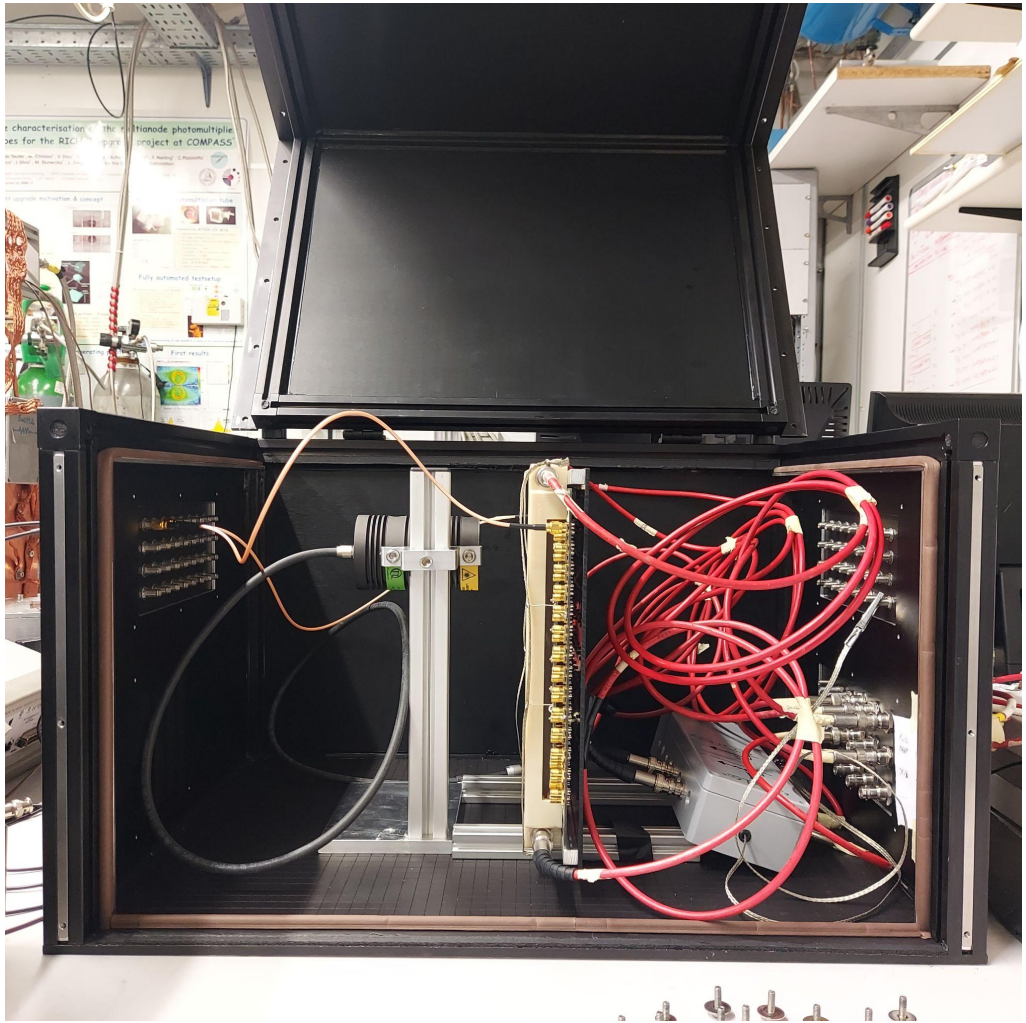
3 Sept 2022

3 Sept 2022



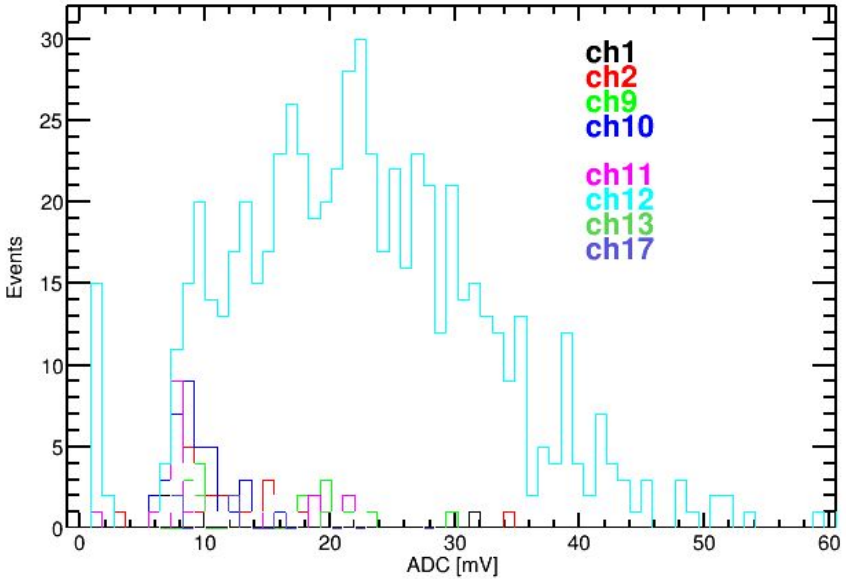
3 Sept 2022

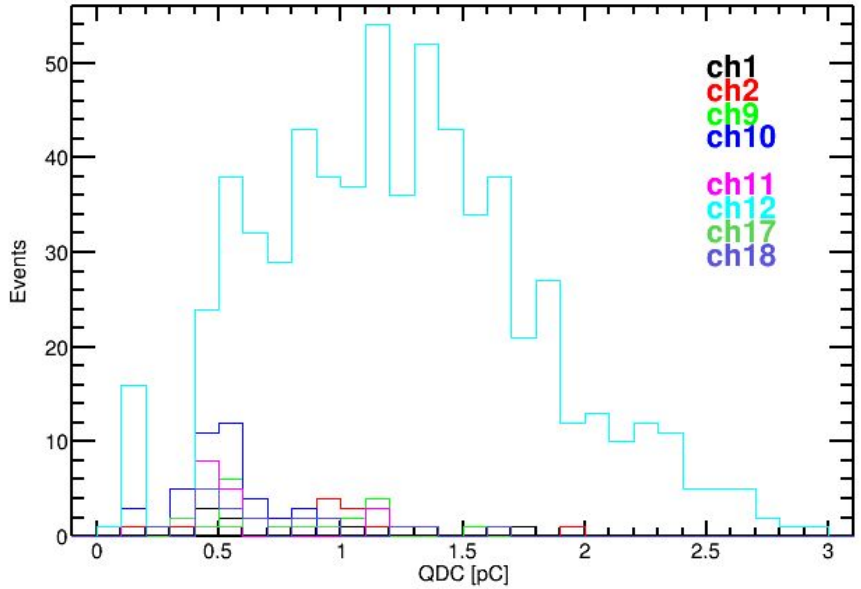
3 Sept 2022



14 Sept 2022

The two main plots from the exercise done when Mikhail was here last week.





For the we used the LASER with a paper stopper. The Channel is C4.

PC -> Anode

2160, 2150, 1275, 1075, 200, ground.

21 Sept 2022

ADC / Amplitude Calibration of the V1742 Board:
(Channel #0) for all 1024 cells.

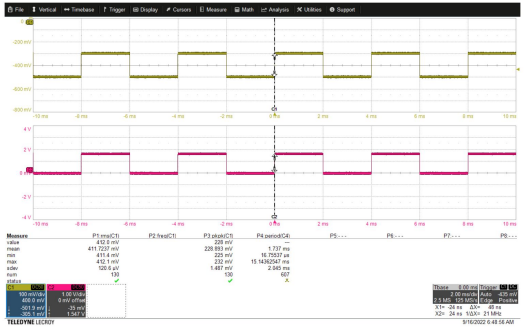
Applied voltages: -300 mV, 0, +300 mV.

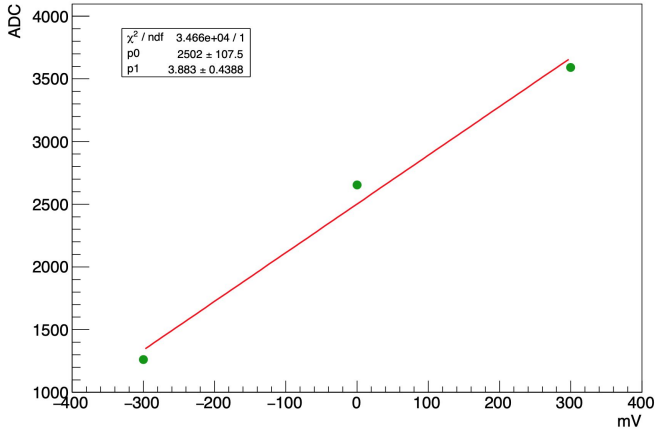
Results: Next 5 slides

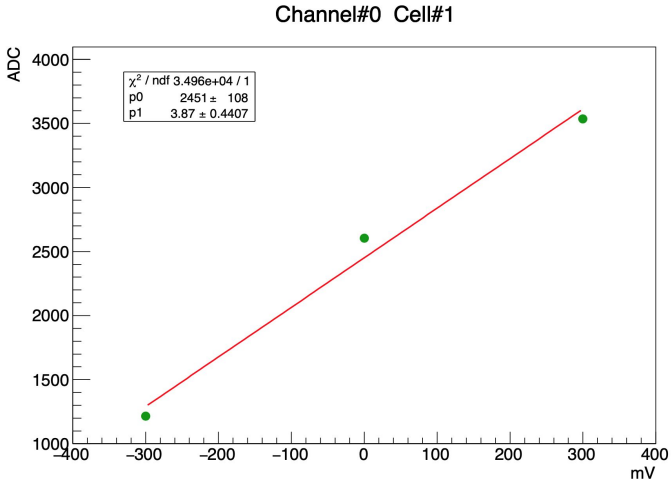
21 Sept 2022

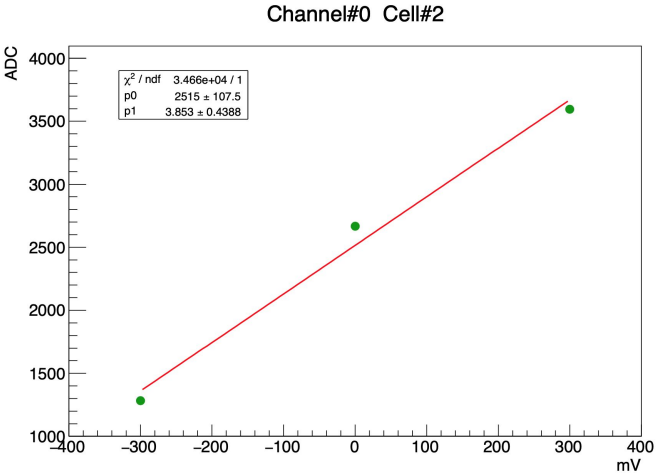
zoomed

applying (-300 mV) signal

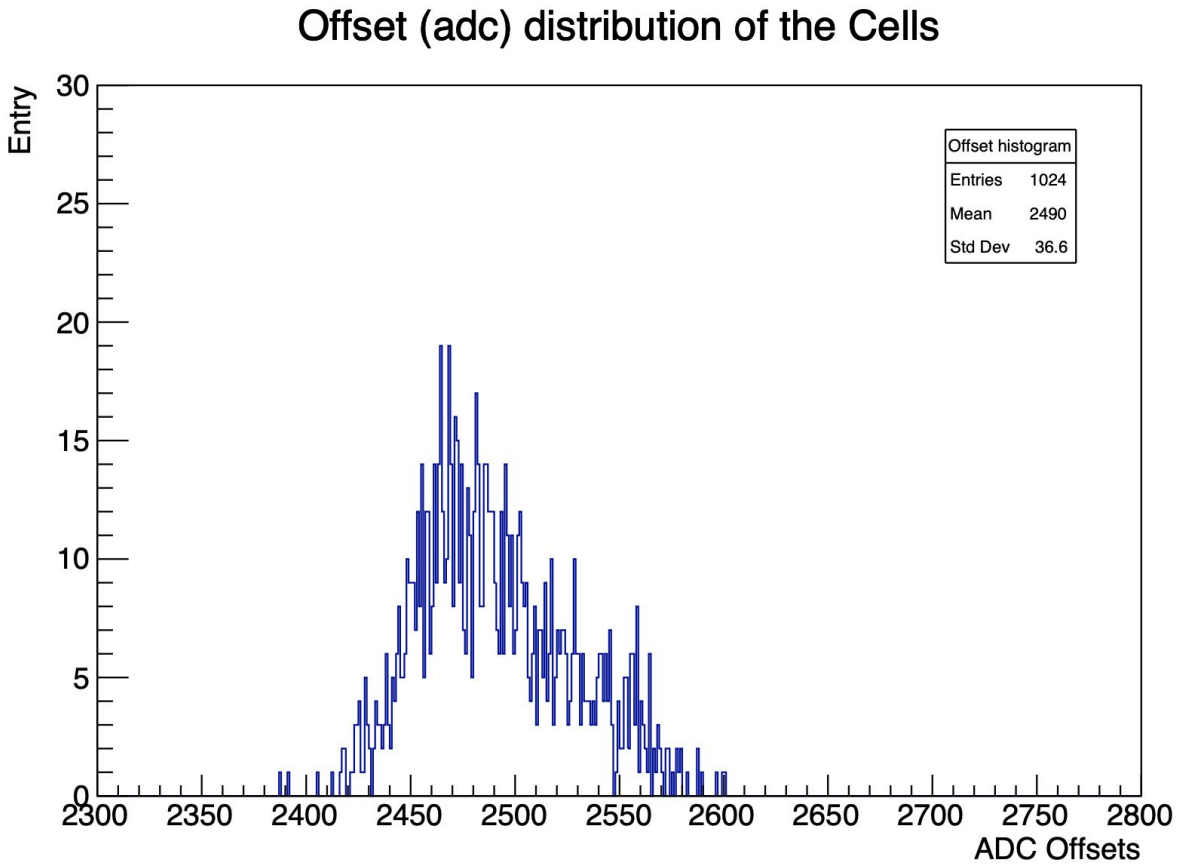




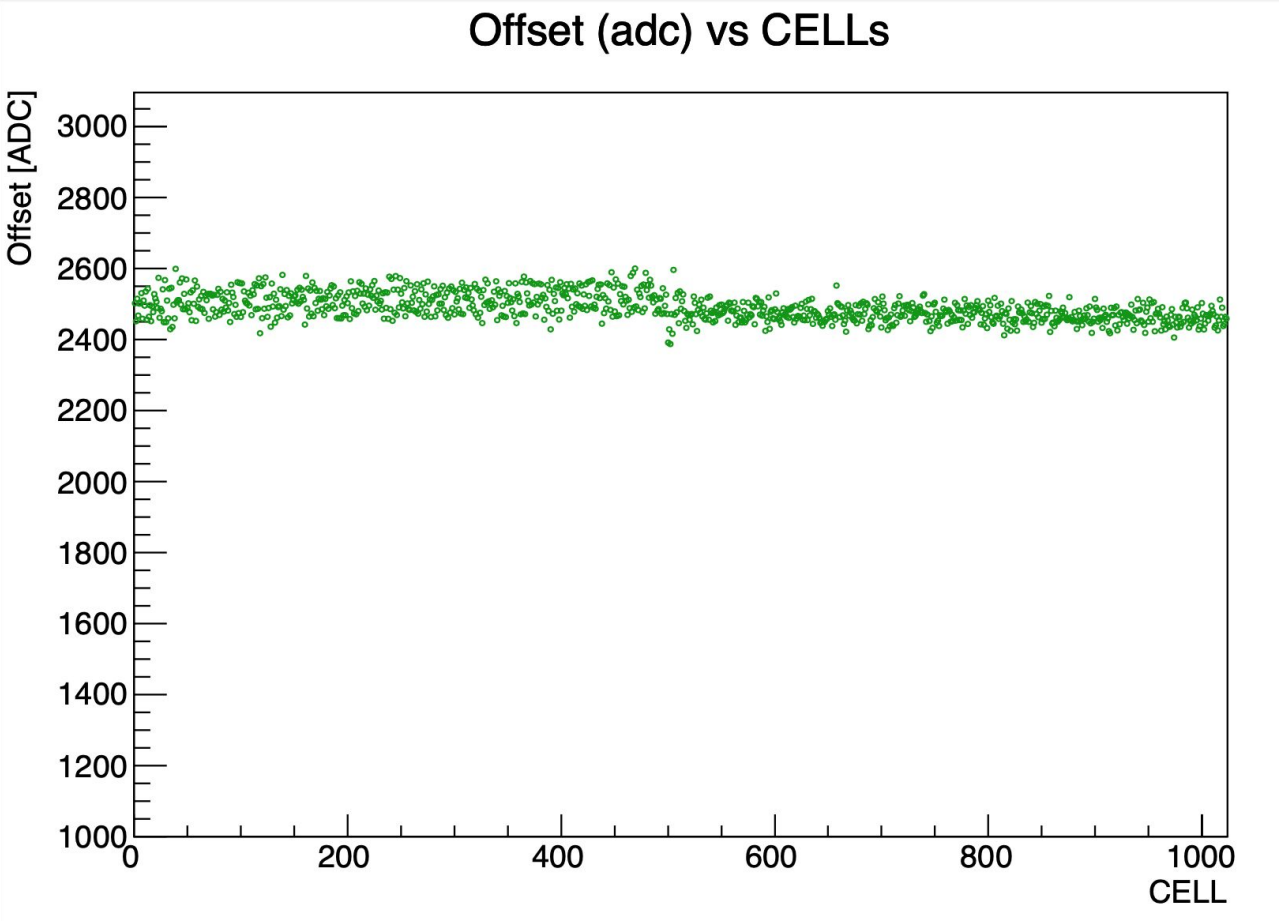




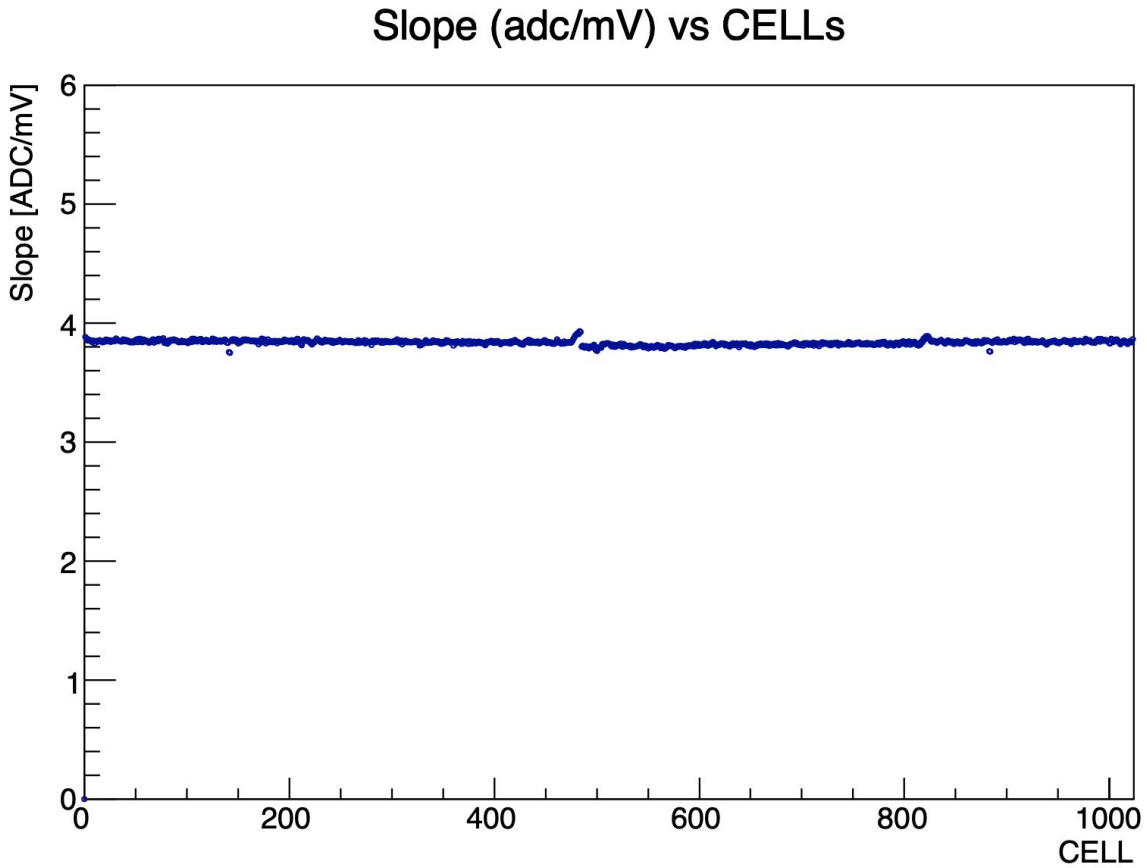
21 Sept 2022


Offset (adc) distribution of the Cells
Entry
ADC Offsets
Offset histogram
Entries 1024
Mean 2490
Std Dev 36.6
0
5
10
15
20
25
30
2300
2350
2400
2450
2500
2550
2600
2650
2700
2750
2800

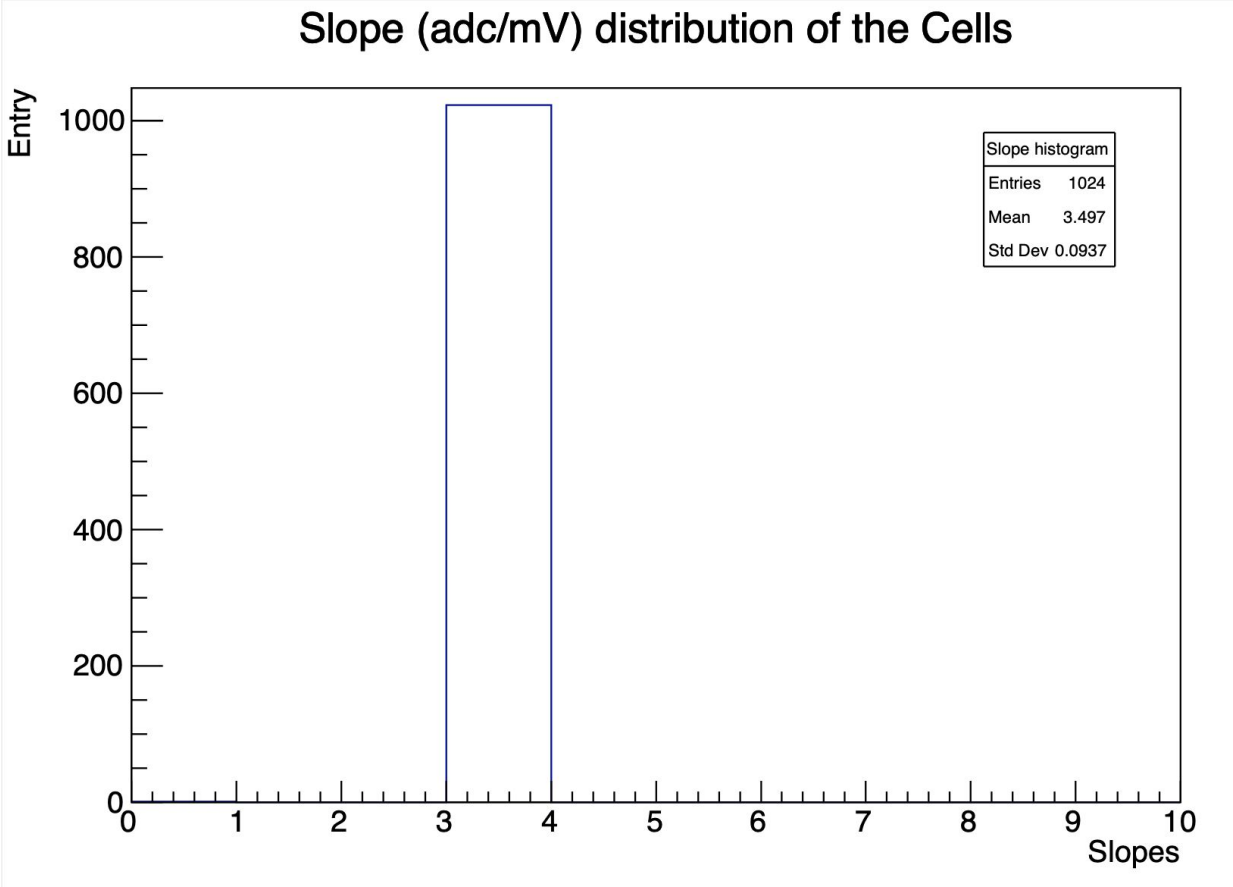
21 Sept 2022


Offset (adc) vs CELLs
Offset [ADC]
3000
2800
2600
2400
2200
2000
1800
1600
1400
1200
1000
0
200
400
600
800
1000
CELL

21 Sept 2022


Slope (adc/mV) vs CELLs
Slope [ADC/mV]
0
1
2
3
4
5
6
0
200
400
600
800
1000
CELL

21 Sept 2022


Slope (adc/mV) distribution of the Cells
Entry
1000
800
600
400
200
0
0
1
2
3
4
5
6
7
8
9
10
Slopes
Slope histogram
Entries 1024
Mean 3.497
Std Dev 0.0937

10 Oct 2022, Monday, 19.57, CERN, Prev

Changing #87 to #124

Entry-of-Entry To Exit-of-Entry = 6.7 M Ω

Entry-of-Exit To Exit-of-Exit = 4.7 M Ω

9 Nov 2022, Trieste, Lab

This morning I found that while trying to start the Digitizer through wavedump, it sends a message: '...Can't open Digitizer.'

Then in (Ubuntu) I went to the CAENUSBdrvB-1.5.4 and compiled the executable to reinstall the CAEN driver. As written in the 'readme' file, I did 'make' followed by 'make install' and it worked.

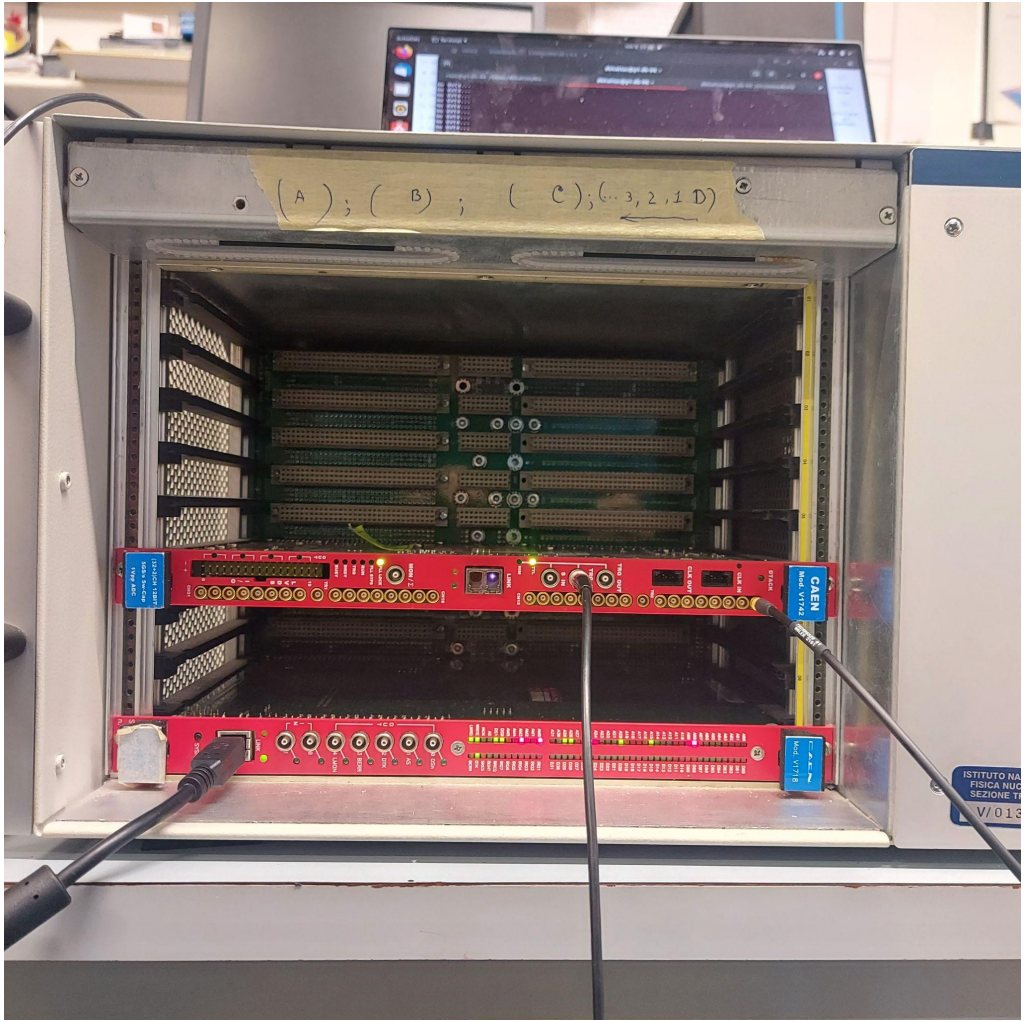
** > don't forget: sudo su

So, what happened?

A few days ago, Ubuntu made a update and it seems that with the update the drivers were uninstalled. Now it is fixed.

Also now, on the controller board:
> The Link LEDs are on. Green is always, Orange is on when data being sent.
> A few other LEDs on the controller board are on. See the Pic on next page.

9 Nov 2022, Trieste, Lab



15 Nov 2022, Tuesday, INFN, Trieste,

Trying to Ramp up HV of the new LAPPD #124

The attempts are explained in the next slides, day by day.

15-16 Nov 2022, Tuesday

Example -1

at voltages lower than nominal to start with

	V_set	V_mon	I_mon
PC (CH_4)	1600	1600	0.23
NoN (CH_3)	1600	1600	102
XoN (CH_2)	900	983 !	0
NoX (CH_1)	800	800	126
XoX (CH_0)	100	250 !	0
Anode	grnd	grnd	grnd

16 Nov 2022, Wednesday

Example -2

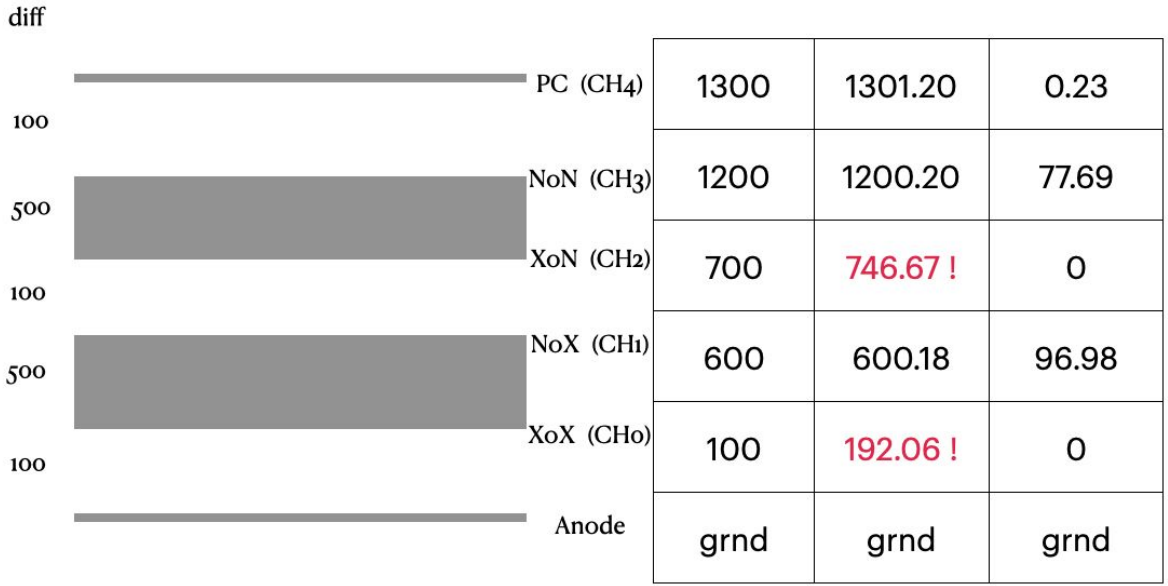
checking if dark counts can be seen?

	V_set	V_mon	I_mon
PC (CH_4)	2010	2010	0.30
NoN (CH_3)	2000	2000	129.23
XoN (CH_2)	1200	1239 !	0
NoX (CH_1)	1000	1000	159
XoX (CH_0)	200	250 !	0
Anode	grnd	grnd	grnd

No Signal for Dark Count is observed from the test channels (C_4, C_5)

17 Nov 2022

Attempt-3



	V_set	V_mon	I_mon
PC (CH4)	1300	1301.20	0.23
NoN (CH3)	1200	1200.20	77.69
XoN (CH2)	700	746.67 !	0
NoX (CH1)	600	600.18	96.98
XoX (CHo)	100	192.06 !	0
Anode	grnd	grnd	grnd

The over-current problem persists for the 'Exit planes' of the both MCPs.

21 Nov 2022, Monday:

This morning I measured the resistances across the MCPs:

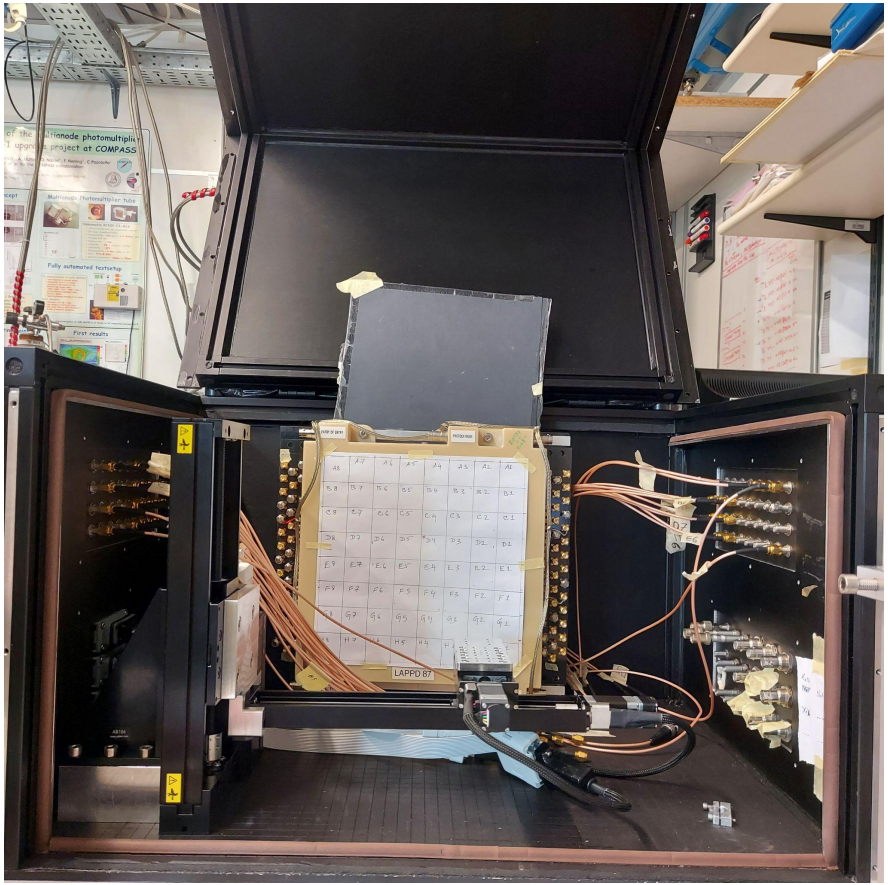
Entry MCP = 3.95 MΩ

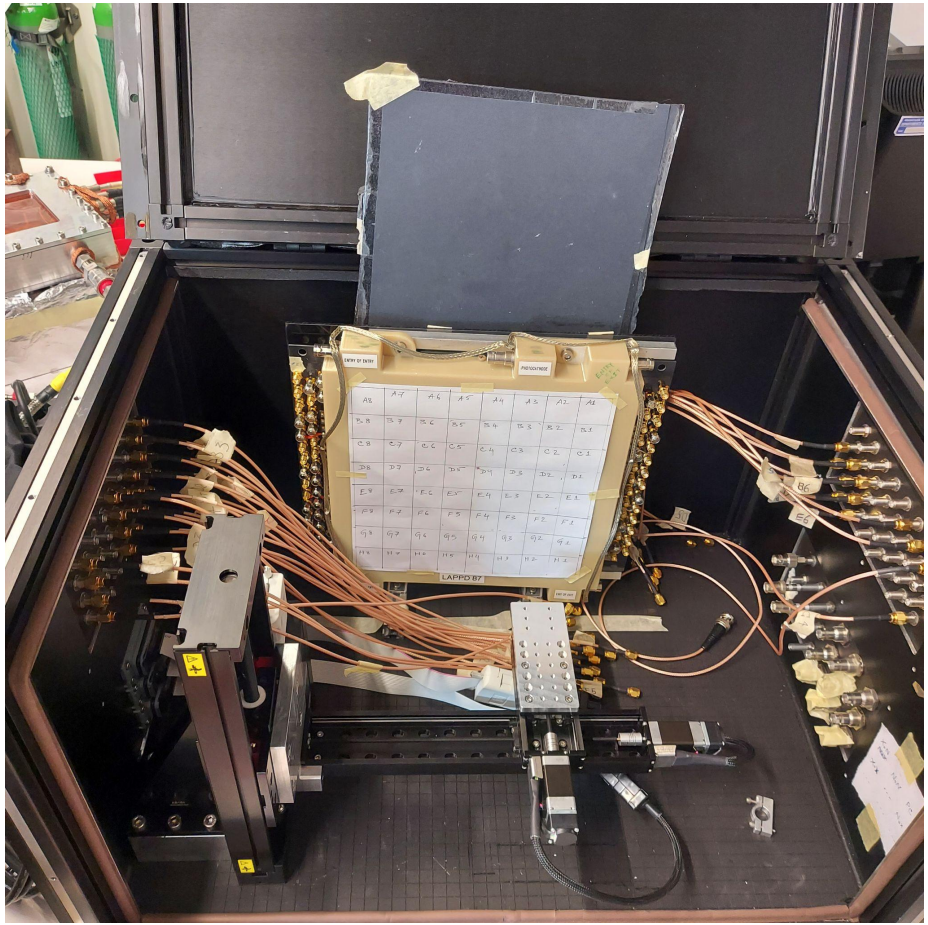
Exit MCP = 4.2 MΩ

2 Feb 2023: Using a PMT signal (cosmic Muon) as random trigger for Time calibration

This PMT takes - 2000 V
Also, the current limit had to be set at 1.5 mA
The current was already 1227 μA
(note, it seemed that there was a 2 MΩ resistance), but it was not any serious issue.

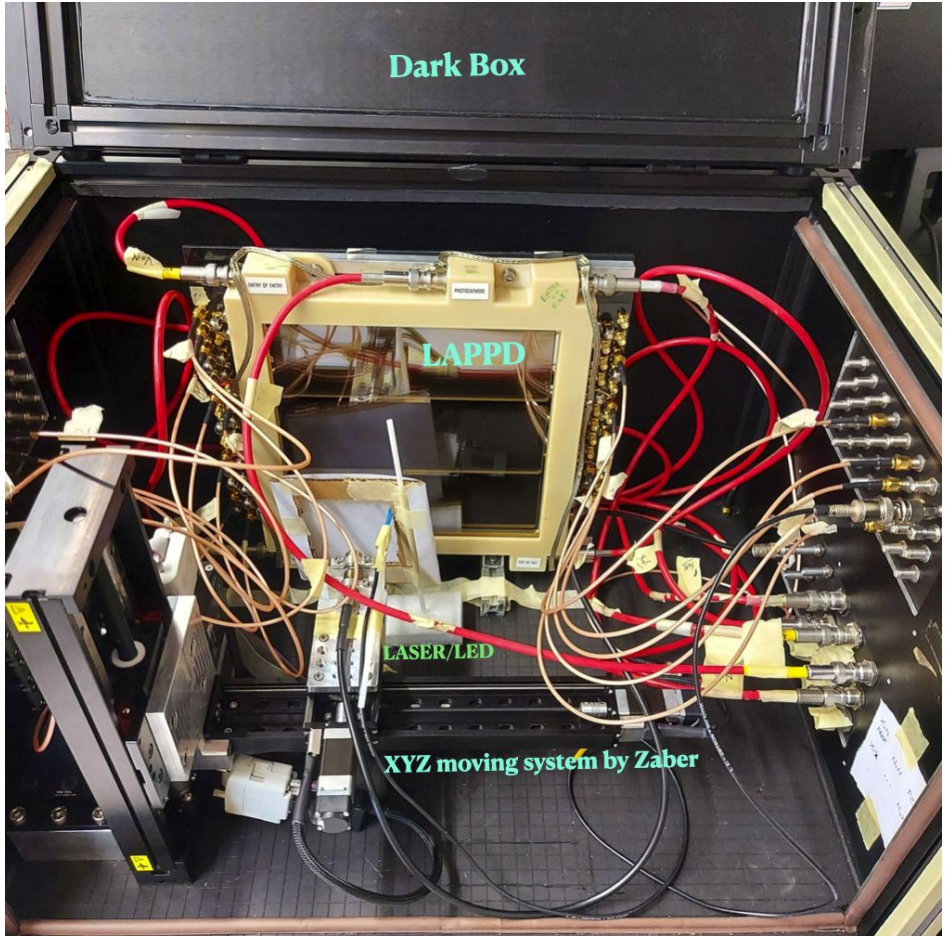
27 March 2023 // XYZ table pictures inside the Darkbox





27 March 2023 // XYZ table pictures inside the Darkbox


dark box
LAPPD
XYZ moving system by Zaber


Dark Box
LAPPD
LASER/LED
XYZ moving system by Zaber

27 March 2023 // Powering the LAPPD with DT1415

Entry MCP = 6.47 MΩ, Exit MCP = 4.75 mΩ

The resistance across the (protection resistance) the XoX is changed to 3 MΩ. Now the current the ~66 μA, which is what we saw at CERN.

15-17 May 2023 // (Changing the LAPPD to #153, with a the PCB from Genova.)

(1) Protection Resistance for XoX = 3 MΩ
(2) Protection Resistance for XoN = 5 MΩ
(3) Resistance across both the MCPs are ~5 MΩ
(4) The anode is ceramic. Thickness = 2.5 mm
(5) PCB => from Genova. (see next pages)
(6) First (second day) voltage response => see next page.
(7) Tried taking data => details next pages.

Important documents & pictures (only a few) related to

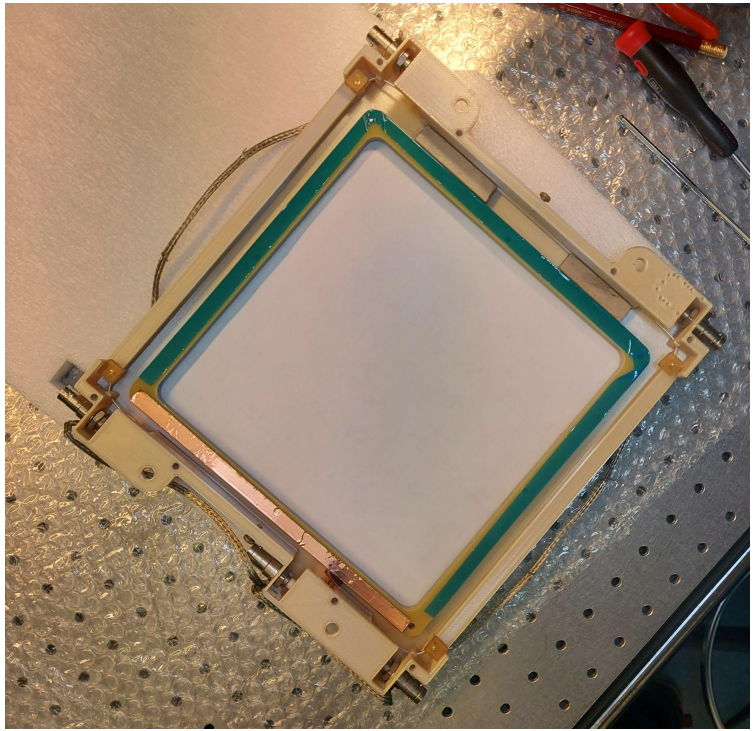
(1) LAPPD-153 incom report; (2) PCB details (3) channel mapping (for Pad type 6 mm) (4) pictures ***can be found here:***

https://agenda.infn.it/event/32302/

(look for contribution from Deb Sankar/ LAPPD_153 folder)

17 May 2023

Picture of the LAPPD-153 *during* setup:



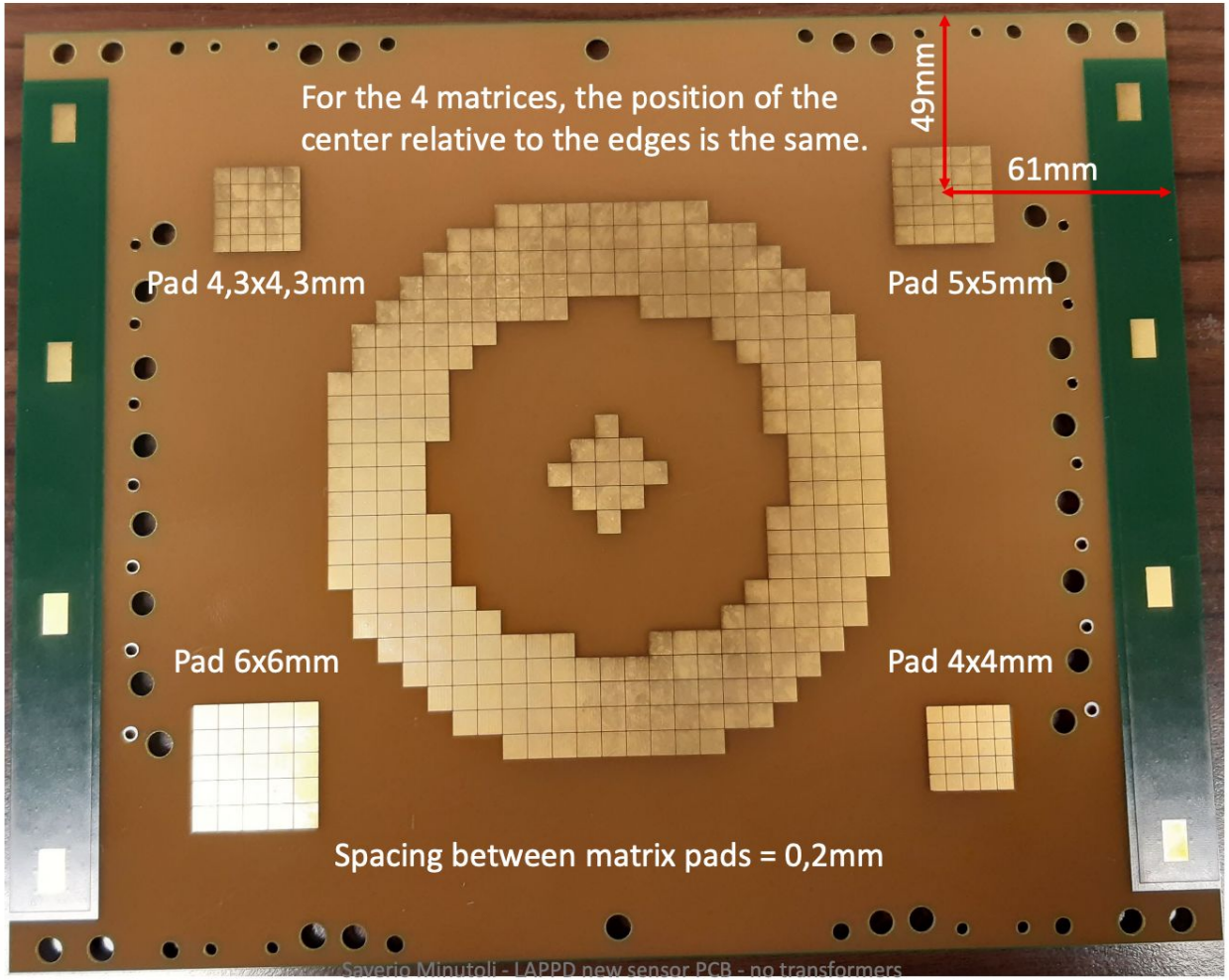
The existing plastic frame (for #87 and #124) is not fit for #153. Temporary arrangements are done.

17 May 2023

Picture of the LAPPD-153 *after* setup:

To be filled

17 May 2023


For the 4 matrices, the position of the center relative to the edges is the same.
49mm
61mm
Pad 4,3x4,3mm
Pad 5x5mm
Pad 6x6mm
Pad 4x4mm
Spacing between matrix pads = 0,2mm
Saverio Minutoli - LAPPD new sensor PCB - no transformers

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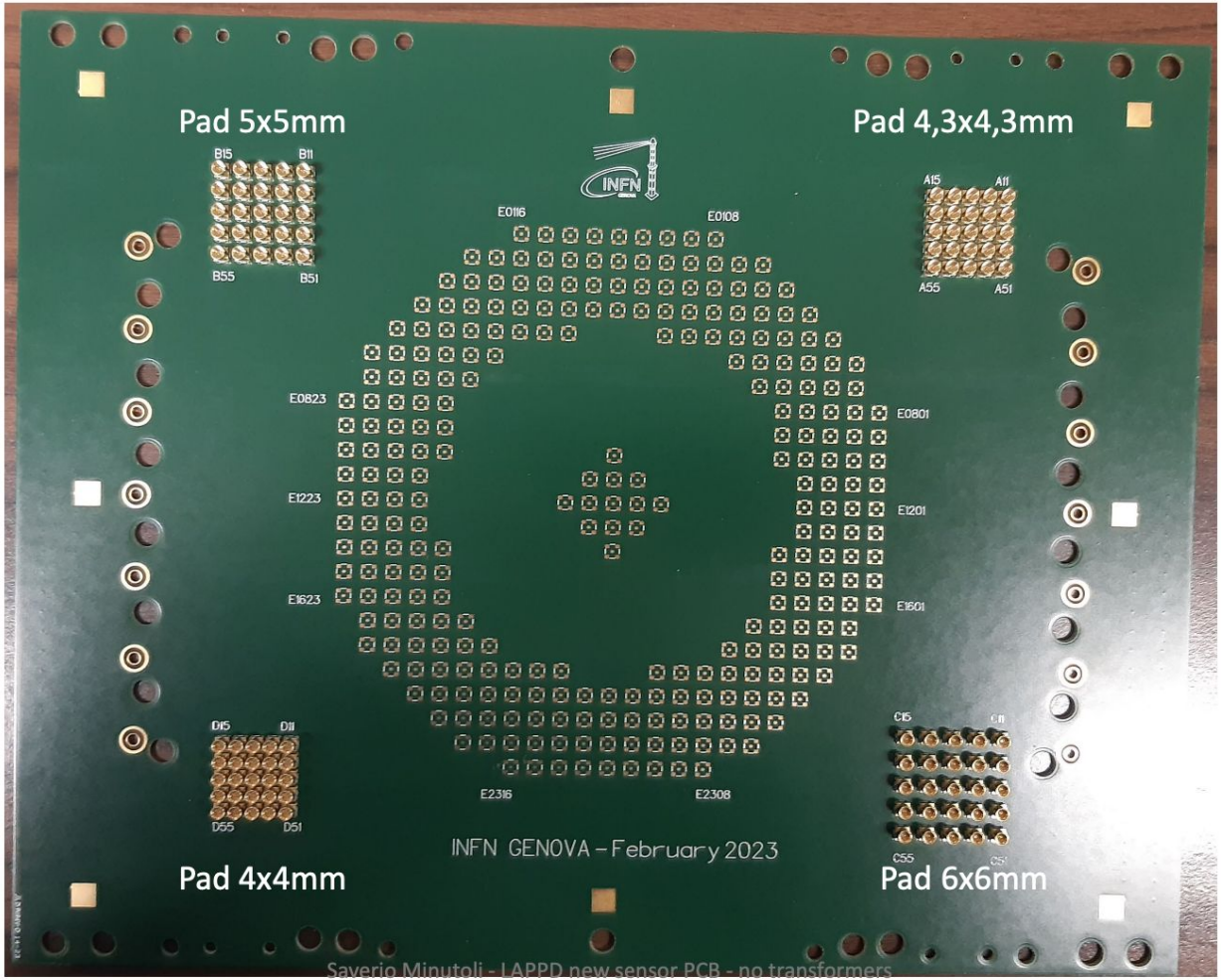
Pad 5x5mm
Pad 4,3x4,3mm
Pad 4x4mm
Pad 6x6mm
INFN
B15
B11
B55
B51
A15
A11
A55
A51
E0116
E0108
E0823
E0801
E1223
E1201
E1623
E1601
E2316
E2308
D15
D11
D55
D51
C15
C11
C55
C51
INFN GENOVA – February 2023

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NoN

PC

NoX

4 mm

D

55				51
15				11

C

6 mm

55	54	53	52	51
45	44	43	42	41
35	34	33	32	31
25	24	23	22	21
15	14	13	12	11

Looking at the Window

B

5 mm

55				51
15				11

A

4.3 mm

55				51
15				11

XoN

XoX

Looking toward the Window

NoN

PC

NoX

C / 6 mm

NOT	CH 23	CH 21	CH 13	CH 5
CH 22	CH 15	CH 14	CH 7	CH 6
CH 20	CH 19	CH 18	CH 17	CH 16
CH 12	CH 11	CH 10	CH 9	CH8
CH 4	CH3	CH2	CH1	CH 0

XoN

(*) "CH x" is a CAEN channel.

XoX

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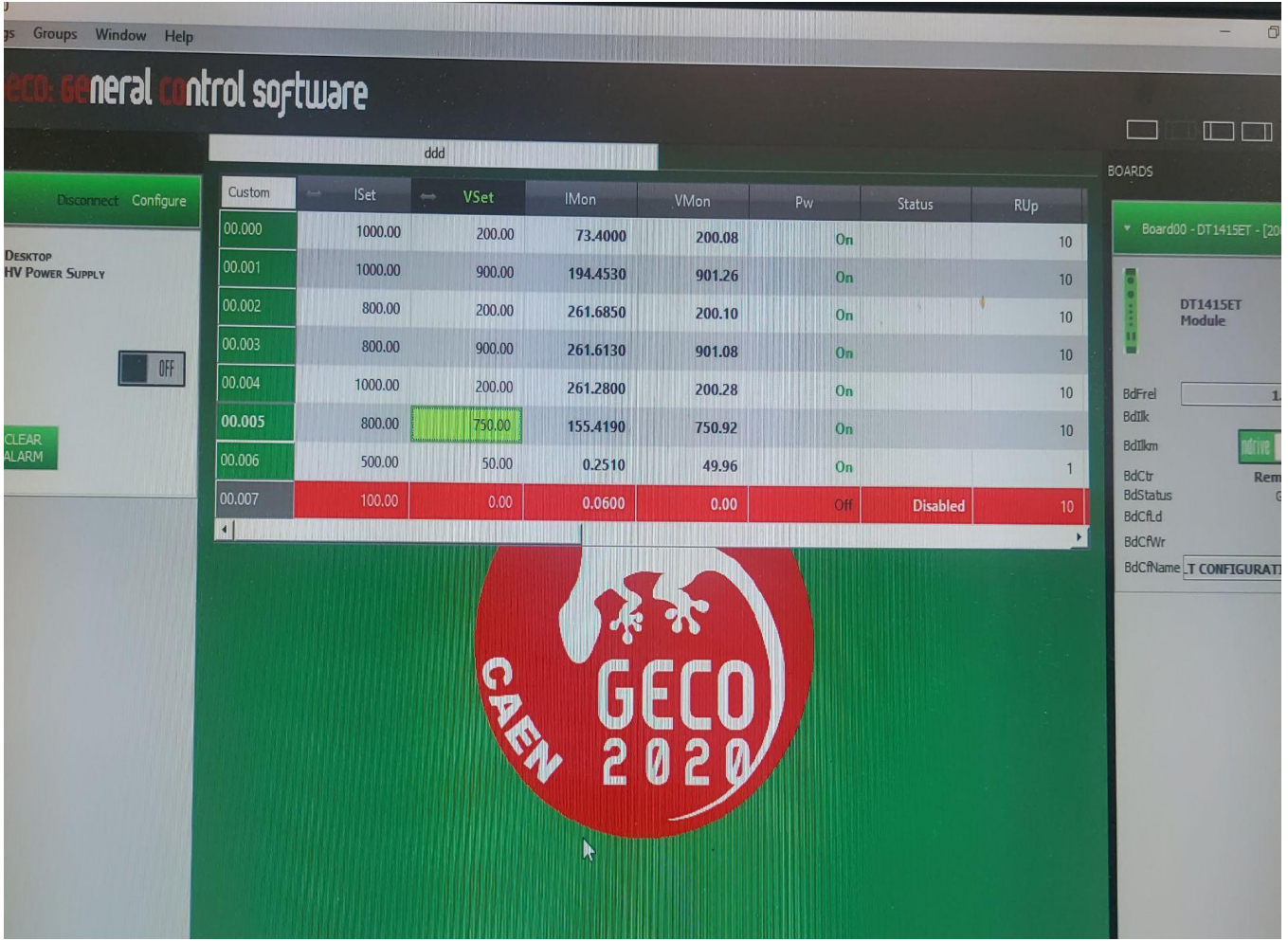
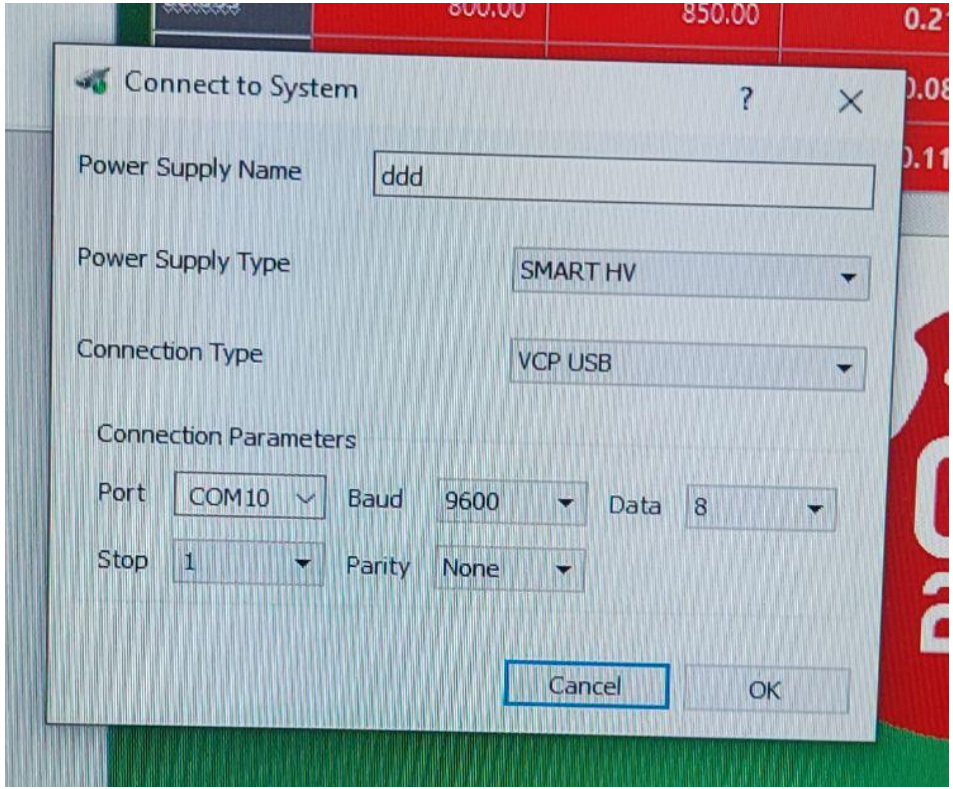
Using CAEN DT1415

First Set of data is taken with this vol_config



Custom	ISet	VSet	IMon	VMon	Pw	Status	RUp
00.000	1000.00	200.00	73.4000	200.08	On		10
00.001	1000.00	900.00	194.4530	901.26	On		10
00.002	800.00	200.00	261.6850	200.10	On		10
00.003	800.00	900.00	261.6130	901.08	On		10
00.004	1000.00	200.00	261.2800	200.28	On		10
00.005	800.00	750.00	155.4190	750.92	On		10
00.006	500.00	50.00	0.2510	49.96	On		1
00.007	100.00	0.00	0.0600	0.00	Off	Disabled	10

GECO 2020 settings:



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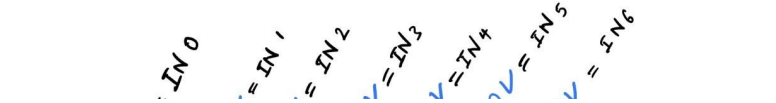
Using Daisy chain on DT1415:

IMPORTANT:

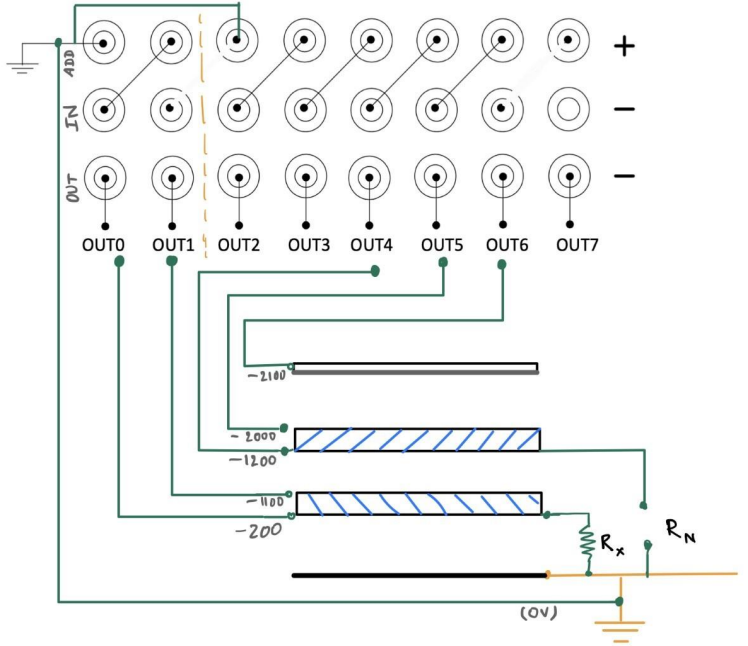
(1) The voltages are different (see page before)

(2) The Rn = 5MΩ

(3) The Rx = 3 MΩ



check the voltages on pages before



17 May 2023 Regarding DAQ:

(1) The CAEN 'WaveDump.c' software is modified by Mikhail.
(2) The binary header structure is modified in such way he can analyse the data
(3) There are two versions: for 10k and 100 events. (it stops after that many events)
(4) Both versions are compiled and the executables are stored locally.
(5) The executables are at: /home/dbhattac/LAPPD_153/6mm_pad/3by3 They can be moved anywhere.
(6) The config file is at: /etc/wavedump [WaveDumpConfig_X742.txt]
(7) After the inverting amplifier, the signal is now positive. So the baseline settings are changed
(8) We are using LASER, triggered externally, so as to trigger at 100-1000 Hz.
(9) Remember, the Digitizer is not faster than 1KHz

This is how a signal looks like on Ch18.
The gain is low (voltages are given in pages before).
The LASER is at 300 Hz (external)
The intensity knob is at 1 + (7.5 fine)
(Fine means * 0.1).

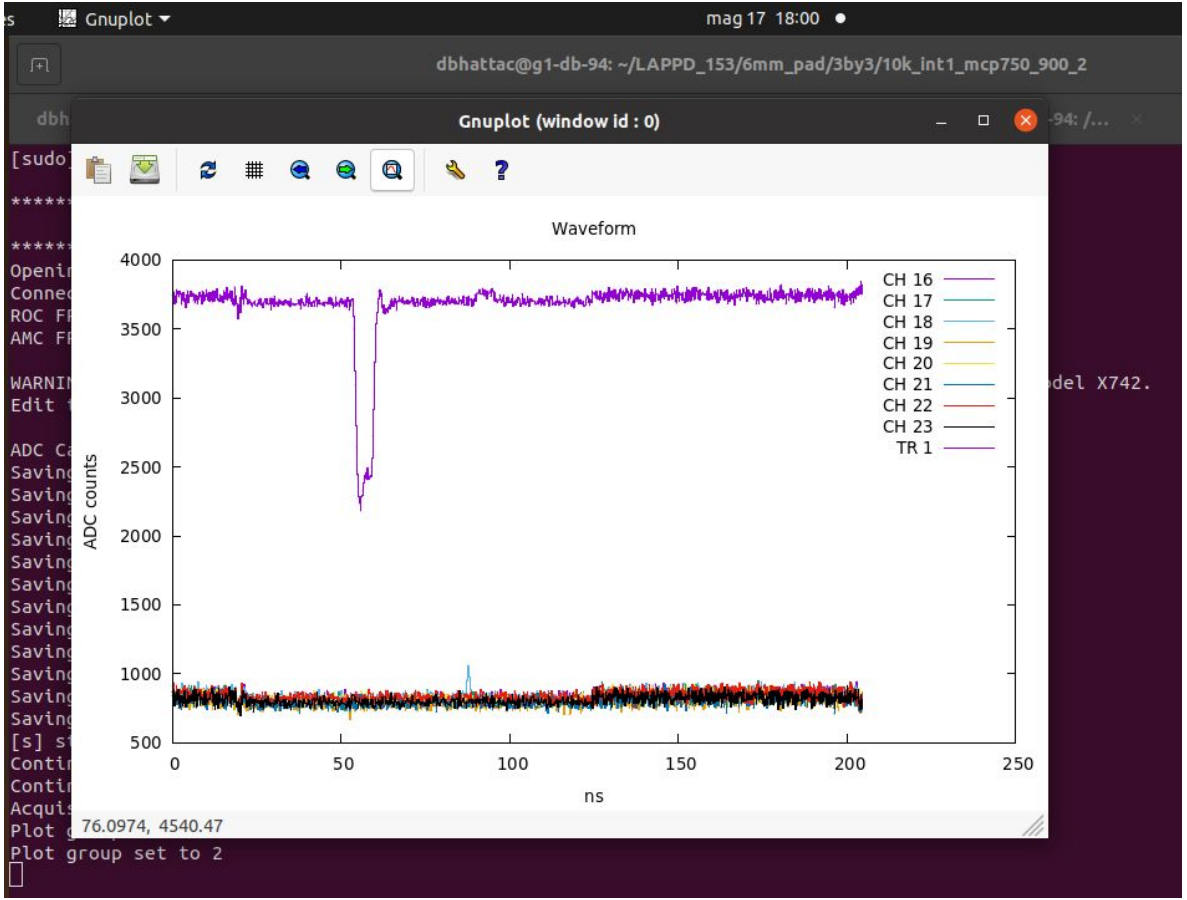
The executable was run, for example, as: sudo ../wavedump_10kevents

It was 1 folder above.

After analysing, we make sure that 90 to 95% triggers are empty.

So, we need a script before hand to make sure of the SPE condition.

Otherwise, classical, electronics!



17 May 2023: Analysis [Mikhail's code]

tar zxvf xxxx.tar.zip

Inside work-> 'make' [if this does not work, ask Mikhail]
Example: (/home/dbhattac/LAPPD_153/work)

Now make a soft link to the place where your data-files are:

ln -s /home/dbhattac/LAPPD_153/6mm_pad/3by3/10k_int1_mcp750_900_2 data
For example: the data is here: /home/dbhattac/LAPPD_153/6mm_pad/3by3/10k_int1_mcp750_900_2

Run the analysis code: ./wavedump_read > read.log
Read the log file: tail -100 read.log
The first two numbers gives empty trigger:
———-
Total number of TRn trigger events: 12975
Total number of ch trigger events: 504
Total number of coincidence events: 230

17 May 2023: Moving the XYZ arm :

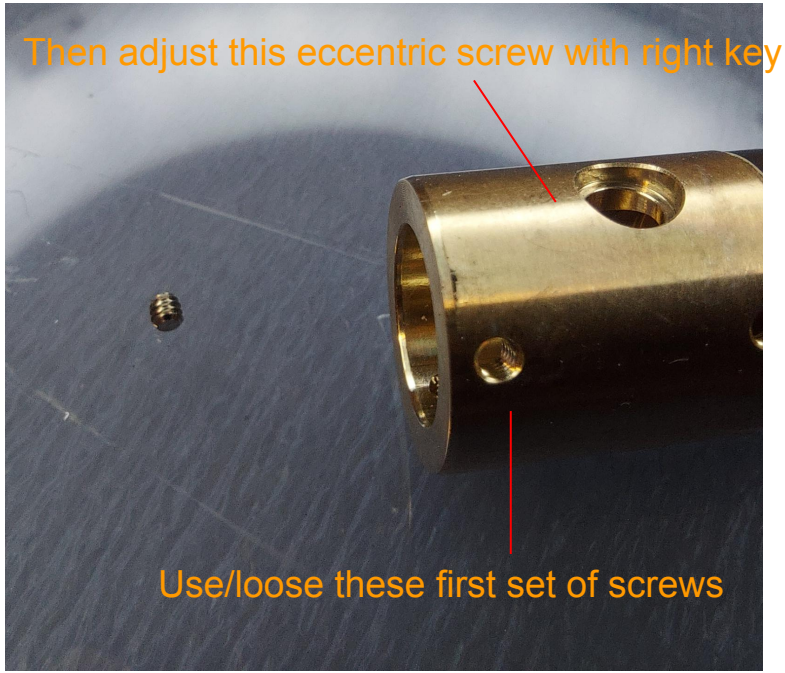
/home/dbhattac/zaber

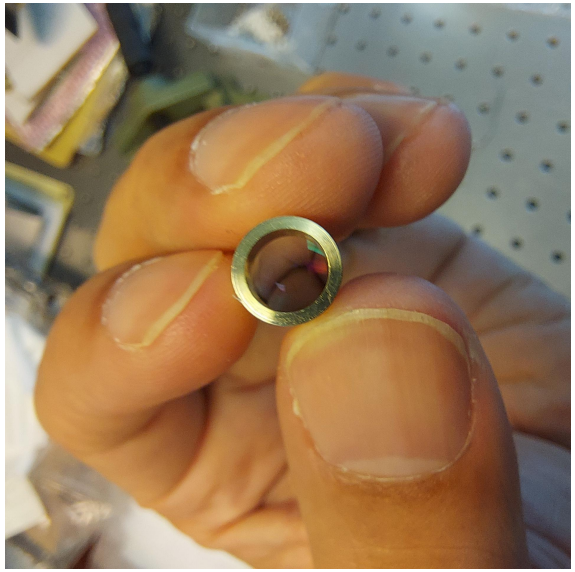
./zaber -r - - a b c

[r is for relative. a can be -a and so on]

First argument [a]	Second argument [b]	Third argument [c]
up (+) down (-)	forth (+) back (-)	left (+) right (-)

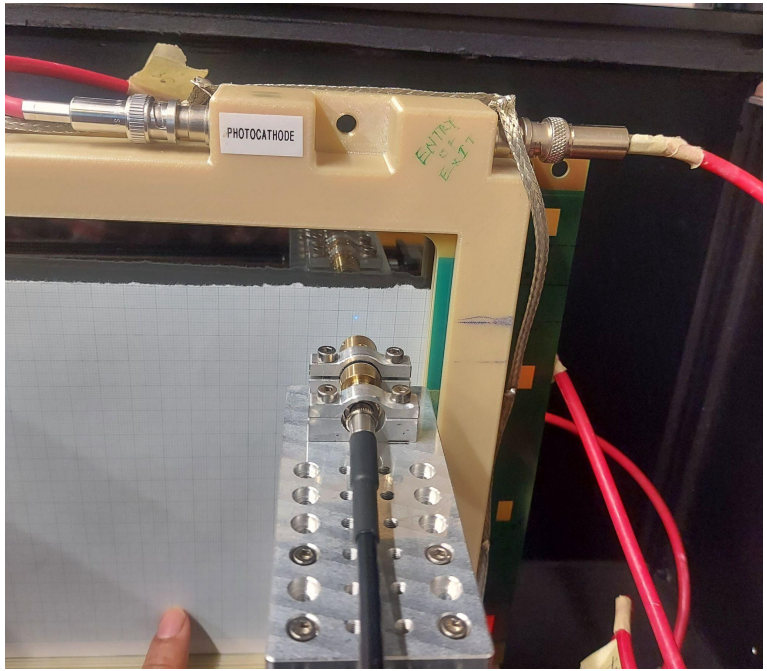
25 May 2023: Mounting and Focusing the LASER

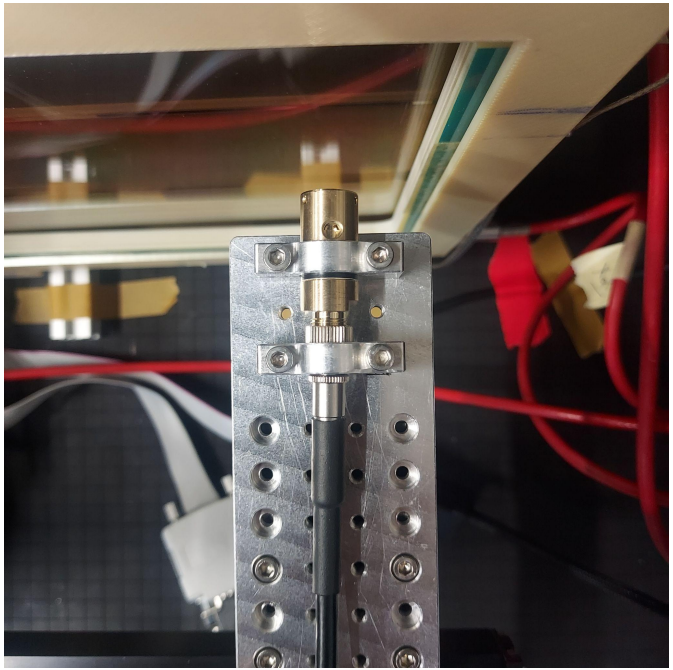




This cylindrical objective lens rests inside the collimator (on left).
Depending on which way it is inserted, the focal distance can be ~10 cm or 1 cm (practically 2 cm)

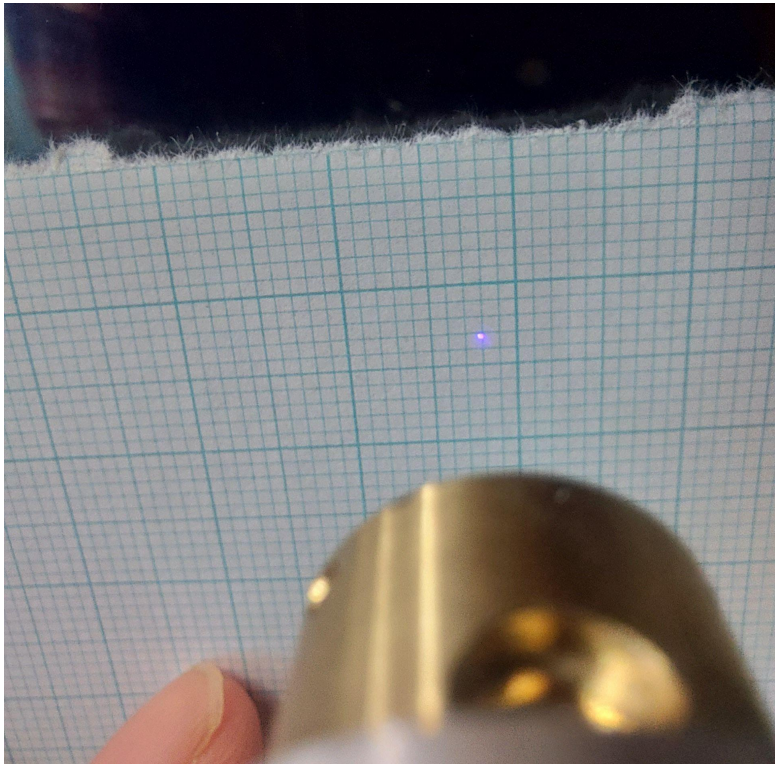
25 May 2023: Mounting and Focusing the LASER with LAPPD

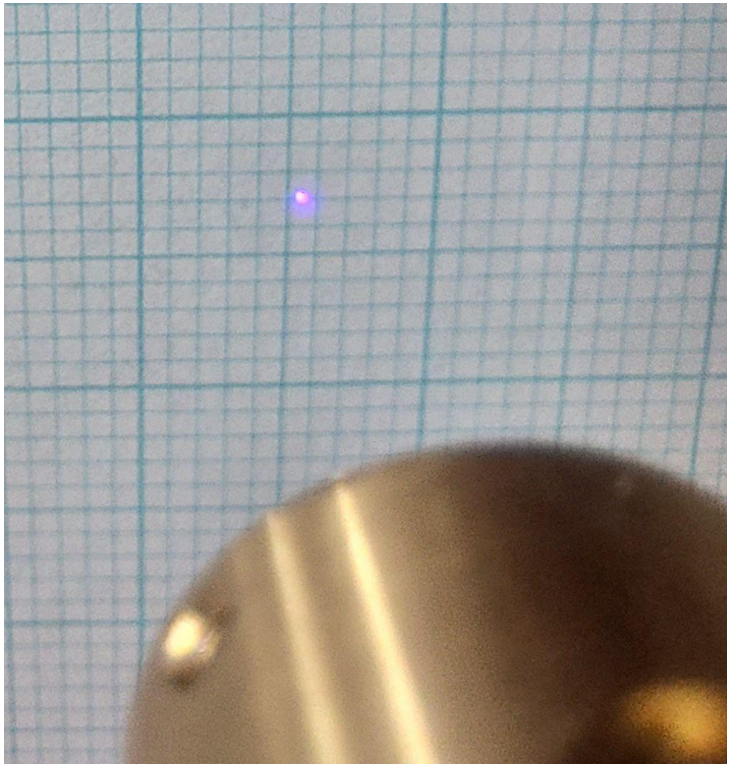




The reason for fixing the collimator like this is to have access to the eccentric screw.

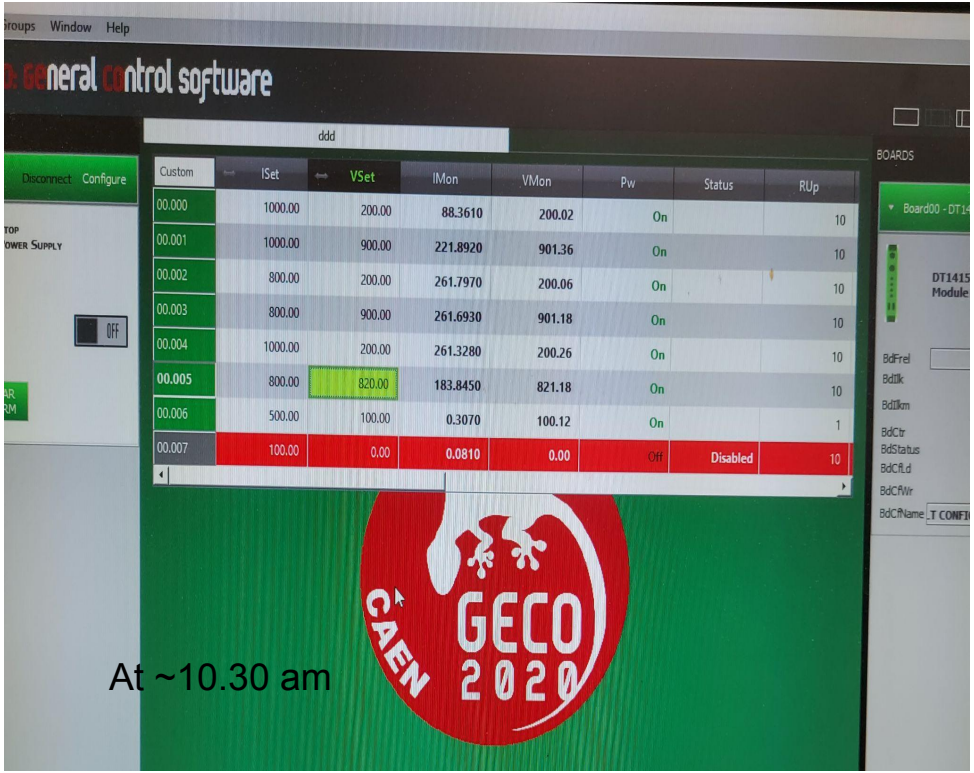
25 May 2023: Mounting and Focusing the LASER with LAPPD



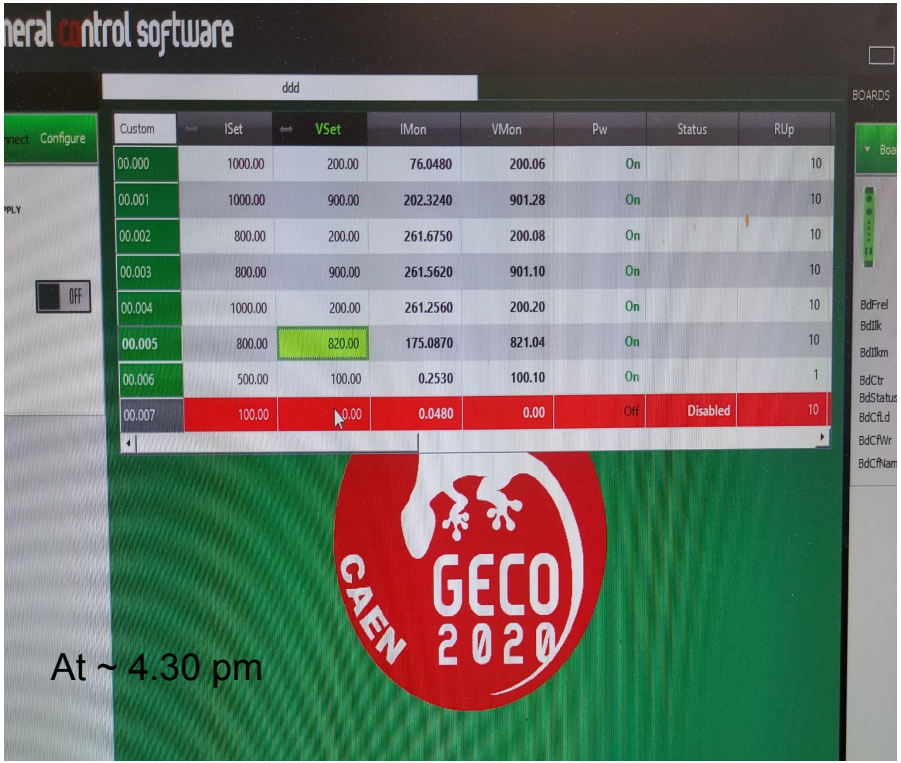


Min division on paper = 1 mm. Collimator to Window = 28.89 mm (calipers)
LASER spot seems to just below 500 μm. Going down further seems to be difficult.

25 May 2023: Comparison of Voltage Stability [we started working with this on 16 May]



At ~10.30 am



At ~ 4.30 pm

I was working with the LASER to focalise it. The box was open for ~2 hrs

28 June 2023, Wednesday:

1. Last week I went to EIC school. I dismounted the LAPPD before going to Rossano.
2. At the works shop they needed the LASER collimator to better design the new darkbox for Mag Test.
3. I took back the LASER on 27 June to the LAb
4. I could not see the LASER to turn on with external trigger.
5. Today, 28 June, I managed to run the LASER with external trigger at 300 Hx, as before
6. I made sure of the focusing
7. The XYZ arm did not move
8. The laser spot is surely ~250 μm, if not 200 μm.
9. The distance is 2.8 to 3.0 cm.
10. I closed the dark box with the LASER fixed. (off)
11. I started with the LAPPD. HAd some trouble with Geco. Eventually solved it.
12. I reach the following HV at one go: 0/800/200/800/200
13. Then I raised to 50/800/200/800/200.
14. Then, I could not go to : 50/825/200/825/200. That is increasing the MCP by 25 V with PC at 50
15. I need to wait to get back to old voltage configuration. May be a day. PC is unstable now.
16. **This LAPPD is NOT good to travel with (for beam test/ mag field test).**
17. ***Just for comparison**: Before when I switched off the LAPPD for say 1 or 2 hrs, I could immediately reach back to nominal HV settings (50/850/200/850/200). But after 10 days, I can not do it instantaneously. *
18. Let's see in a few hours.

11 Sept 2023 // Monday //

The main tasks done since the last entry in this notebook are:

1. Studying TTS with the oscilloscope
2. Calibration of the V1742 board
3. Testing the HV scheme with V1415

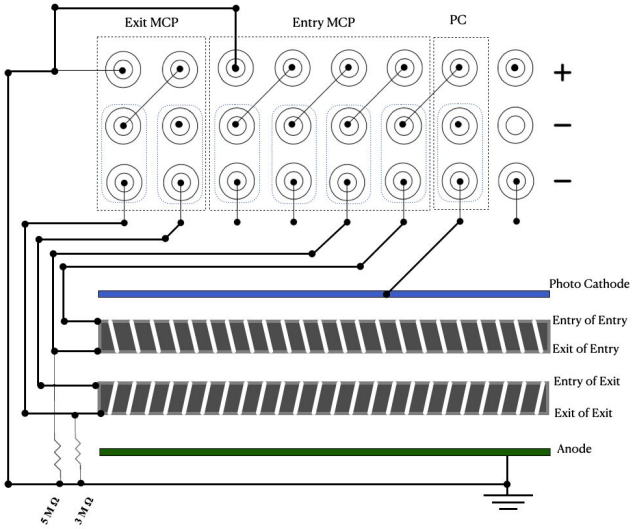
Both the works are well discussed in the weekly group meetings (with Genova)
And the results are well documented in the Indico repository.

Now, I am again staring with the LAPPD 153.
Aim => counting (probability of occurrence) of the secondary pulses

11 Sept 2023 // Monday //

1. Trigger "Pulse" to LASER.
2. 300Hz, Hi = 500 mV, Low = -500mV, width = 20 ns, edge = 5 ns
3. Output (or sync)

1. LASER: 1 (5.5) intensity



1. HV values: