Updates on HRPPD #25 activities

Measurements from lab

Ageing studies – measurement protocol and optics setup

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Outline

- Dark Count Rate scan (32 pads)
- Digitizer – status update
- QE measurement strategy
- Mappings (Pin to pixel) – two groups
- Ageing studies – measurement protocol

Dark Count Rates

- Light tightness of the darkbox was NOT good enough
  (1.7 kHz/pad becomes 1.3 kHz/pad when lights of the room OFF)

- Sources of light leak
  - Hole in the patch panel for the passage of fibre
  - Outside light sneaks in via the fibre/fibre-laser head junction
  - The fibre body/jacket emits light

- Light tightness taken care.
  - → Laser head and the fibre (outside the darkbox) covered with black blankets
  - → Window fully covered by black protection card that has been put on the detector frame
  - → Fibre inside the darkbox covered with black clothes

(1.3 kHz/pad becomes 50 Hz)

Dark Count Rates

Good light-tight

- HV: -200_-700_-200_-700_-200 V
- Without amplifier
- CAEN Discriminator
- CAEN Scalar
- 4 x 8 Pads from A0Top

A0 TOP

37	27	33	?	19	14	11	9
34	39	29	24	20	13	3	10
30	40	31	21	17	7	4	1
38	28	32	22	?	8	12	2
2	12	8	18	22	32	28	38
1	4	7	17	21	31	40	37
10	3	13	20	24	29	39	34
9	11	14	19	23	30	27	33

Two measurements x 3 Th. values
(**6 mV,** 10 mV, 20 mV)

I. 3079/50 sec

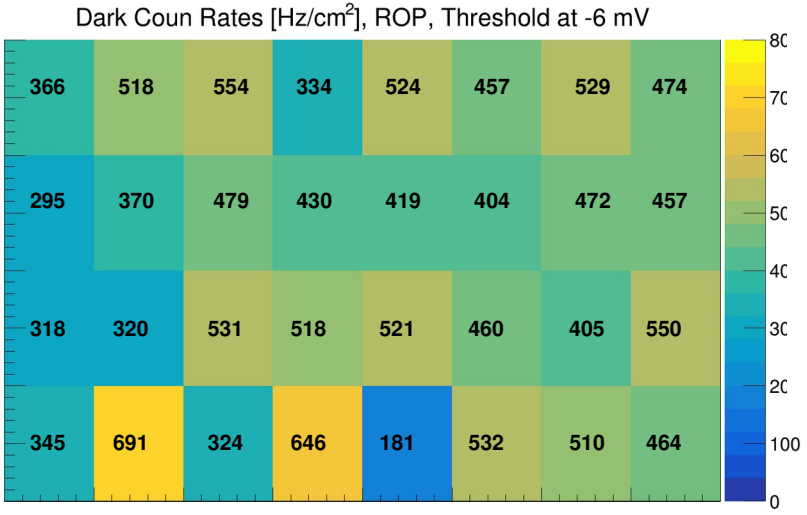
II. 3137/50 sec

6216/100 sec*0.09 cm^2

error = √6216

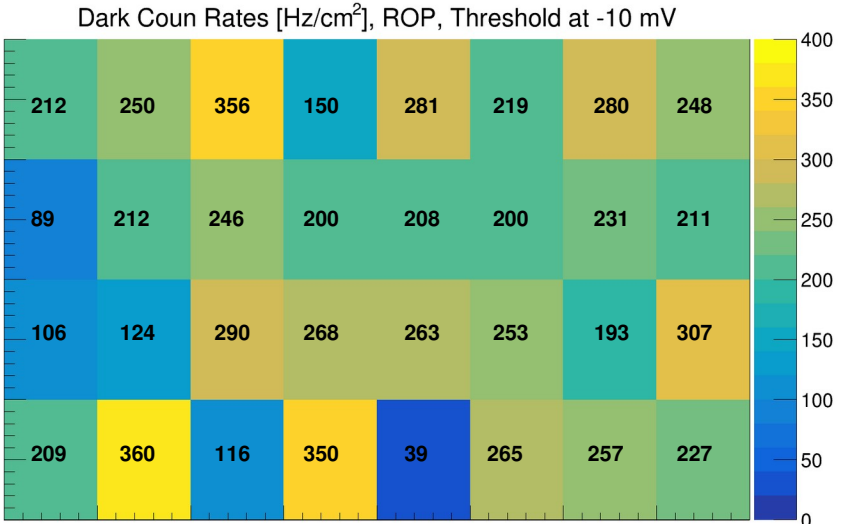
691 ± 8 Hz/cm^2

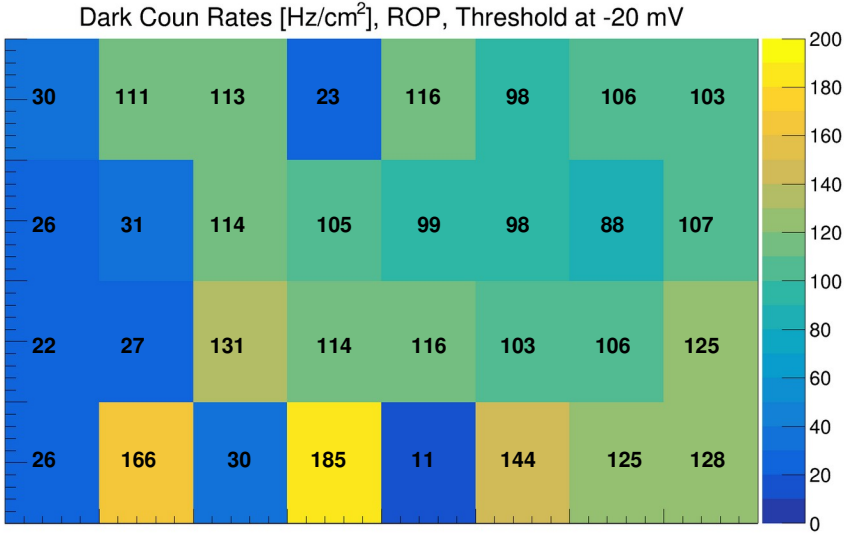
Dark Count Rates



37	27	33	?	19	14	11	9
34	39	29	24	20	13	3	10
30	40	31	21	17	7	4	1
38	28	32	22	?	8	12	2

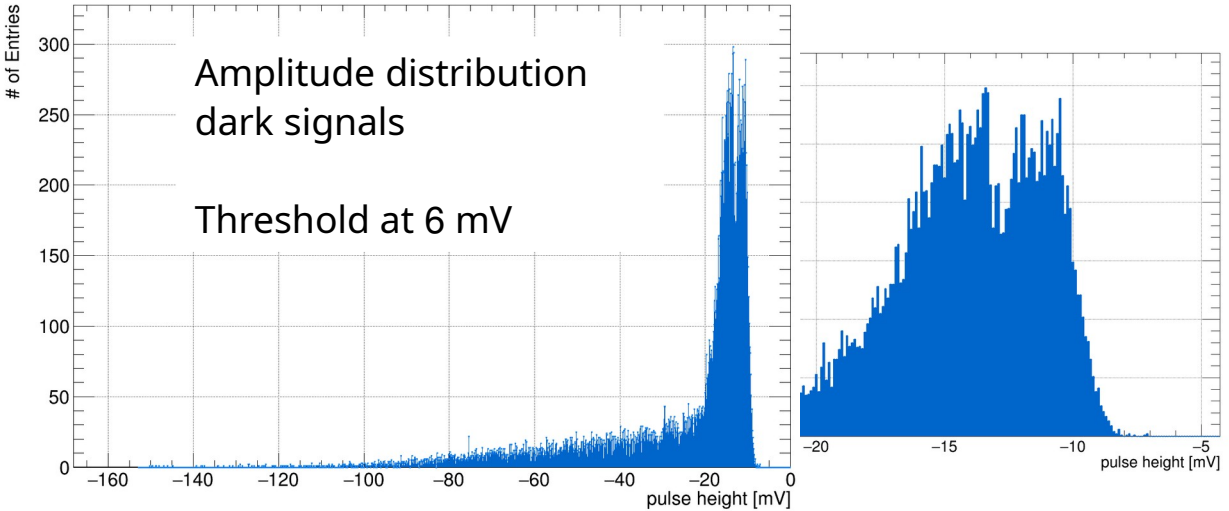
? → 23, 18

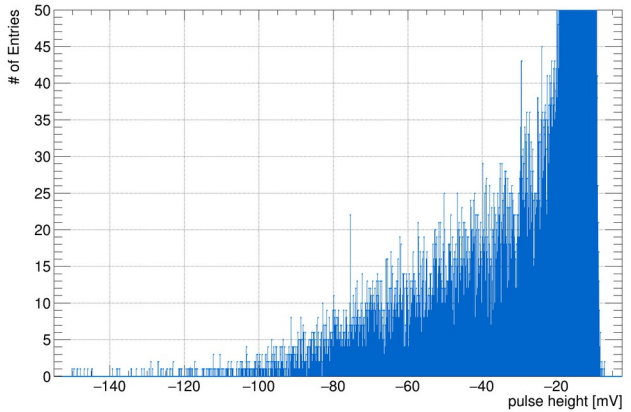




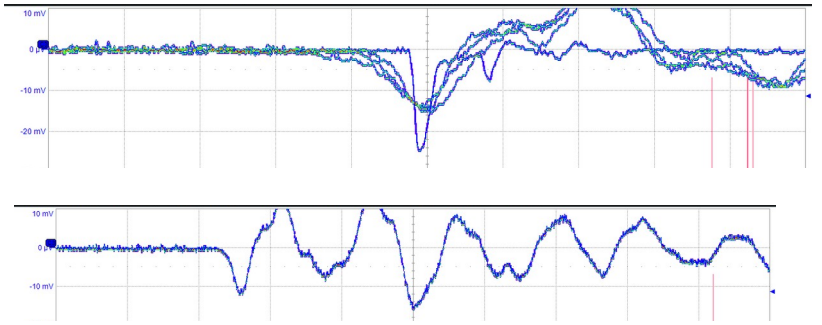
Incom:
2.58 kHz/cm²
At ROP,
Th 4mv

Dark Count Rates





Fraction of dark signals have some patterns that are common to several pads

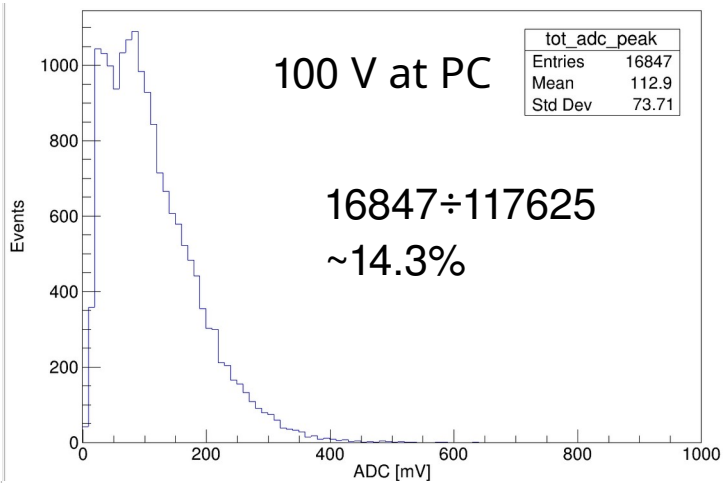


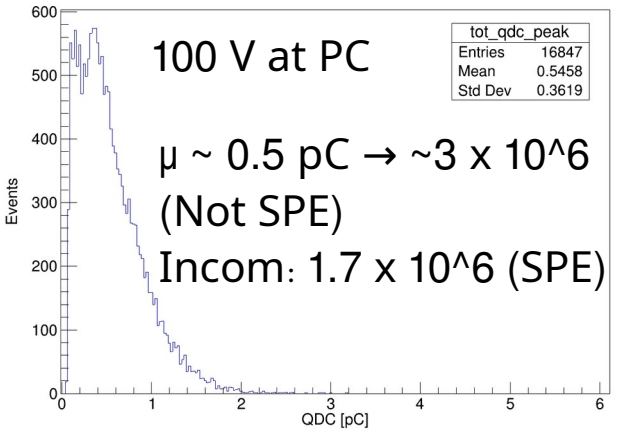
Data acquisition with digitizer

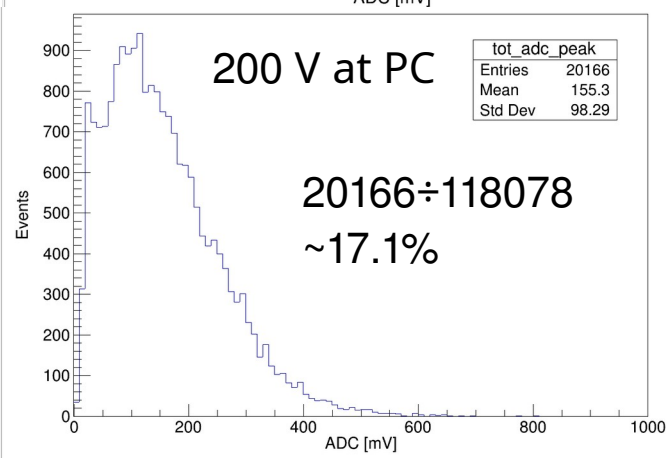
HV: -200_**-650**_-200_**-650**_-ΔV

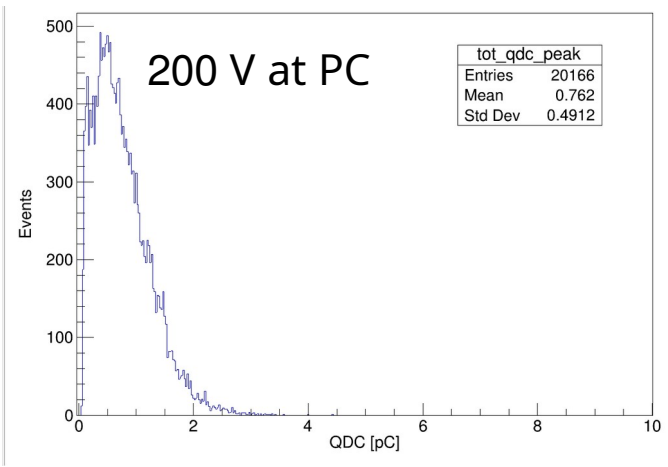
Trigger on Sync pulse

Int. 2.0; With amplifier + 1 kΩ resistor; Pin #12 A0Top









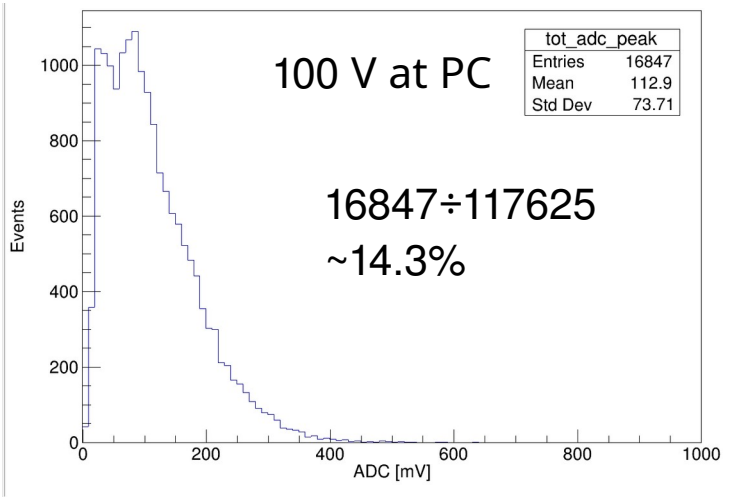
- ADC saturated for ROP – has to be working with low gain/ without amplifier
- WaveDump Codes working fine

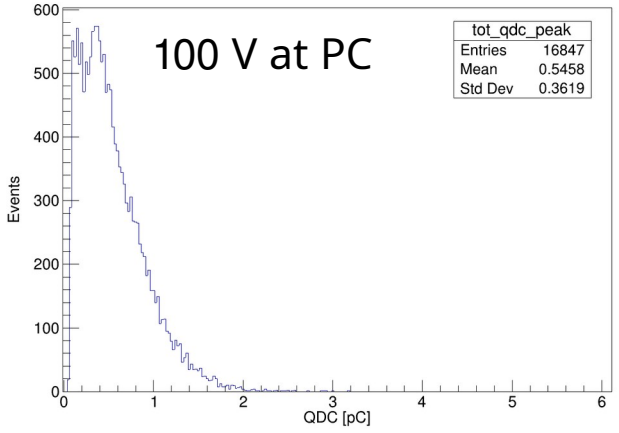
Data acquisition with digitizer

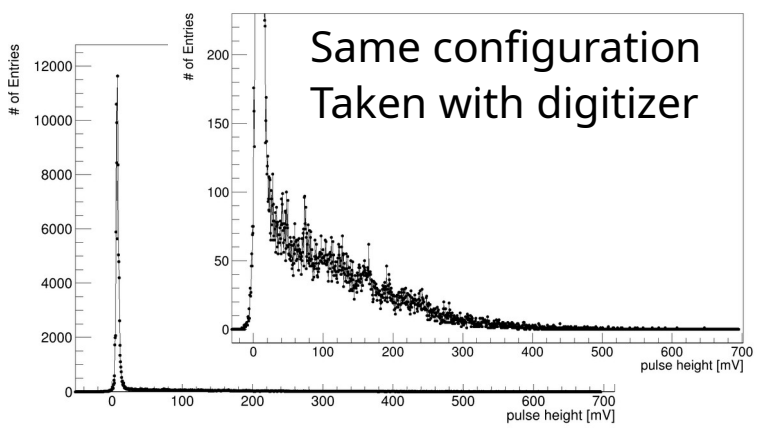
HV: -200_**-650**_-200_**-650**_-ΔV

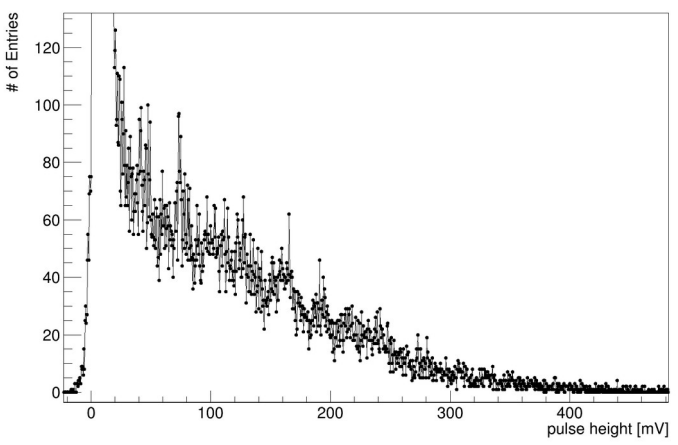
Trigger on Sync pulse

Int. 2.0; With amplifier + 1 kΩ resistor; Pin #12 A0Top

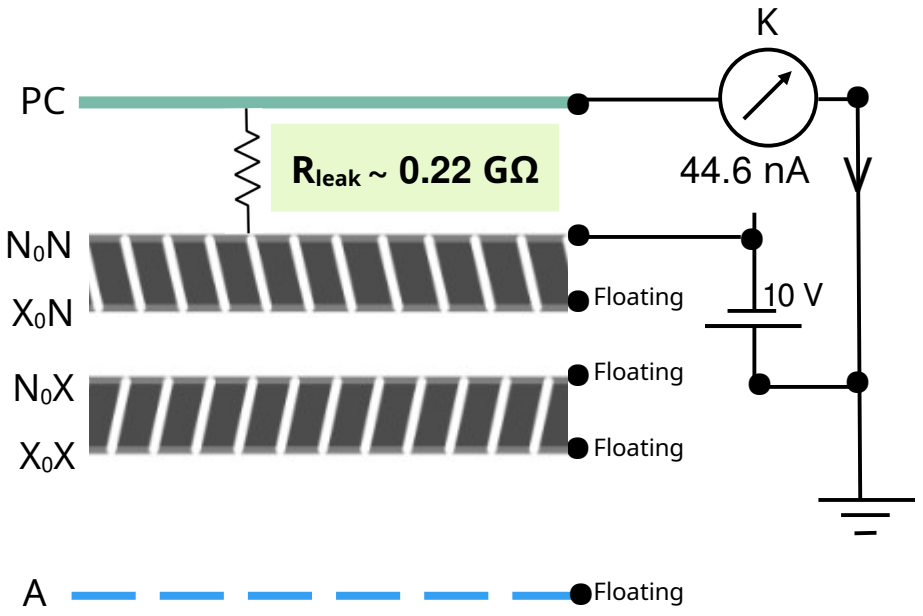






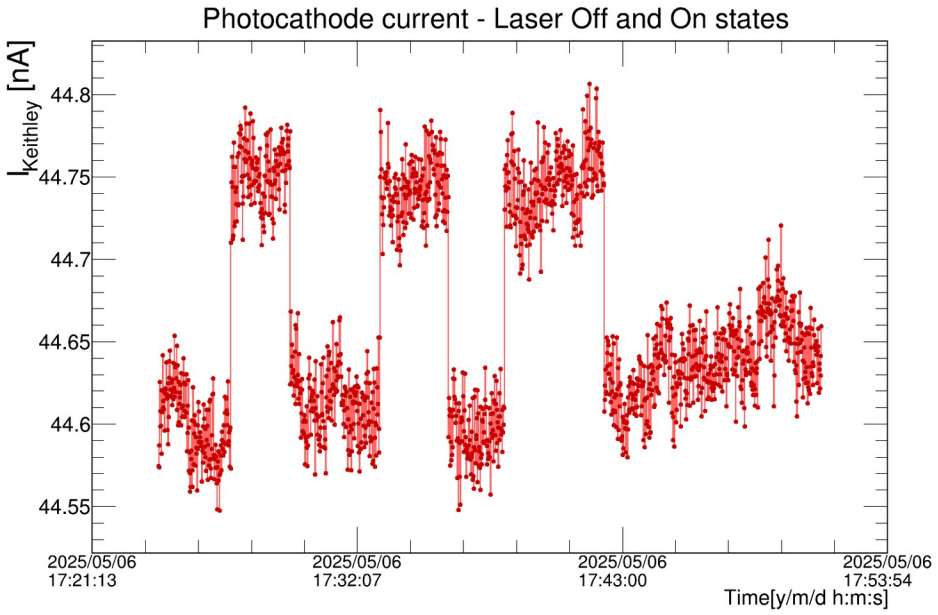


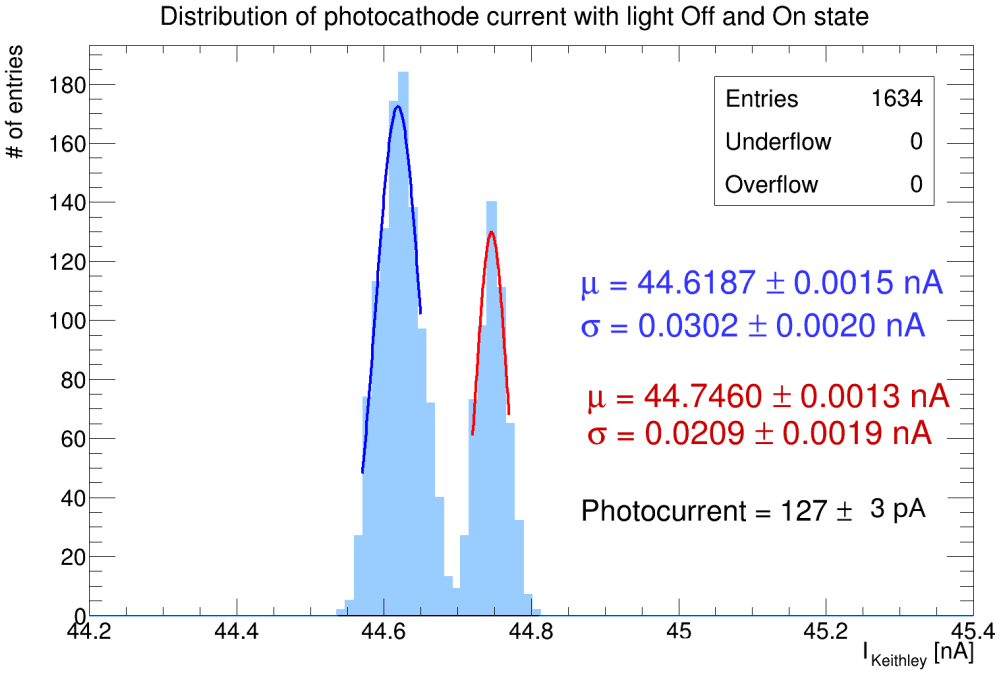
QE measurement strategy



QE measurement strategy

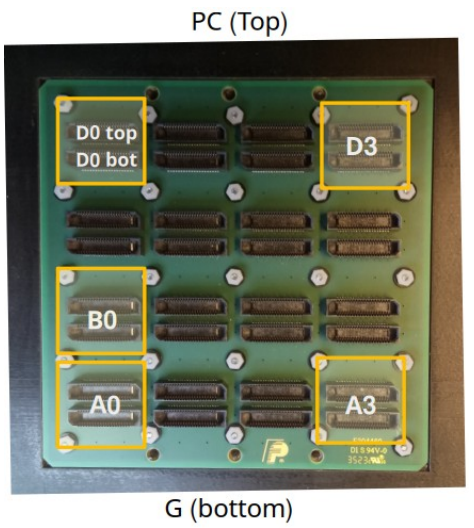
Light On state: Intensity 3.5, Internal Trigger 40 MHz
NoN at +10 V





Mapping – A1, A2

All mapping are Rear End View



A0 (Measured)

Top								
	37	27	33	?	19	14	11	9
	34	39	29	24	20	13	3	10
	30	40	31	21	17	7	4	1
	38	28	32	22	?	8	12	2
Bottom	2	12	8	18	22	32	28	38
	1	4	7	17	21	31	40	37
	10	3	13	20	24	29	39	34
	9	11	14	19	23	30	27	33

D0 (Measured)

	?	27	33	23	19	14	11	9
	34	?	29	24	20	13	3	10
	30	?	31	21	17	7	4	?
	38	28	32	22	18	8	12	?
	2	12	8	18	22	32	28	38
	1	4	7	17	21	?	40	37
	10	3	13	20	24	29	?	34
	9	11	14	19	23	30	27	33

33	27	30	23	19	9	11	1
34	39	29	24	20	13	3	10
37	40	31	21	17	7	4	14
38	28	32	22	18	8	12	2
2	12	8	18	22	32	28	38
1	4	7	17	21	31	40	37
10	3	13	20	24	29	39	34
9	11	14	19	23	30	27	33

From the two Gerber files

Top (PC)

37	27	33	23	19	14	11	9
34	39	29	24	20	13	3	10
30	40	31	21	17	7	4	1
38	28	32	22	18	8	12	2
2	12	8	18	22	32	28	38
1	4	7	17	21	31	40	37
10	?	13	20	24	29	?	34
?	11	14	19	23	30	27	?

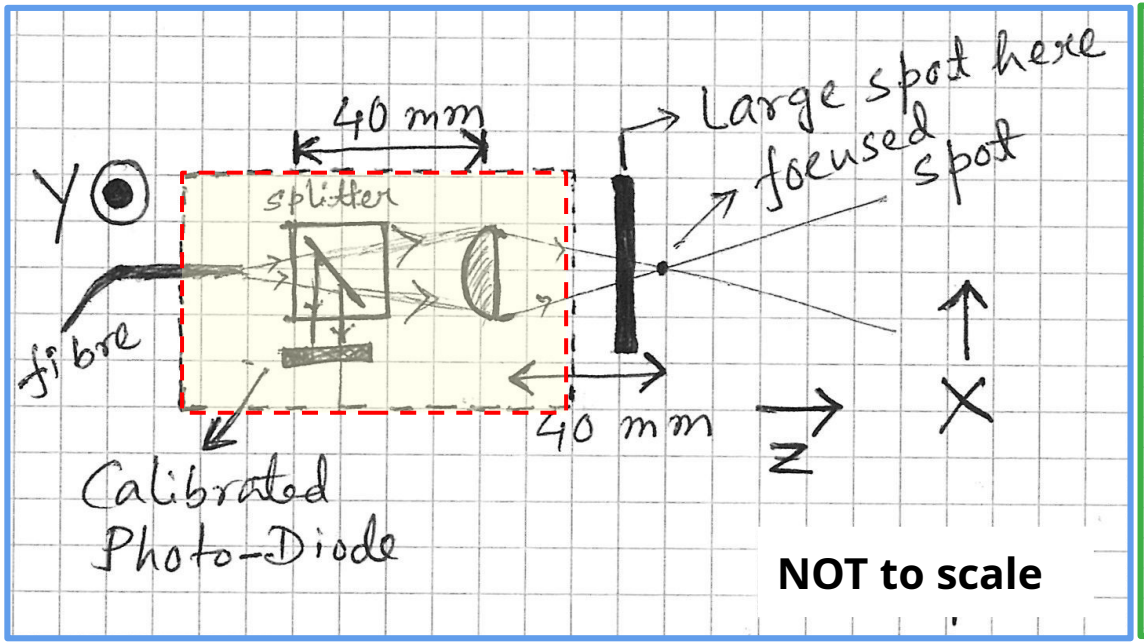
A1

37	27	33	23	19	14	11	?
34	39	29	24	20	13	3	10
30	40	31	21	17	7	4	1
38	28	32	22	18	8	12	2
2	12	8	18	22	32	28	38
1	4	7	17	21	31	?	?
10	3	13	20	24	29	?	34
9	11	14	19	23	30	27	33

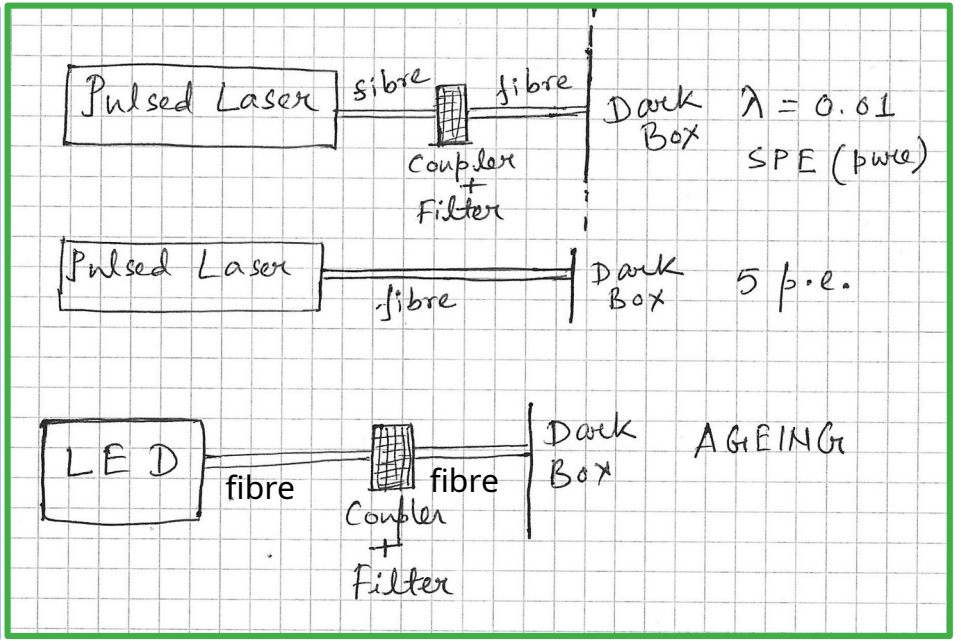
A2

Ageing studies – measurement protocol

Optics inside dark box (Top view)



Optics outside dark box



Dotted area mounted on the moving system
Spot size in Z
Window XY plane

Ageing studies – measurement protocol

10^{14} photons/cm^2 in 10 days

10^{13} /day [~10 hours a day]

Characterisation

- At ageing spot and reference spot
- Before, intermediate, after ageing
  - 1*10^{13}, 3*10^{13}, 6*10^{13}, 10*10^{13} [days*10^{13}]
- For three values of ΔV MCPs

Ageing Spot

- Area ~1.1 cm^2
- 4 x 4 Pads under measurement

Quantities of Interest

1) QE (Photocurrent with Keithley)
2) Gain (λ = 0.01)
3) Horizontal/vertical PDE scans with focused spot (λ = 0.01)?
4) Dark Count Rates
5) After Pulse Rates

Reference Spot

- 4 x 4 Pads under measurement??