PDE set - up and measurements

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Reminder

$$PDE = QE \cdot P_G \cdot FF = \frac{\text{N° photon detected}}{\text{N° photon generated}}$$

$$PDE = \frac{n_{pe} R}{T} \cdot \frac{h\nu}{P}$$

Scaling

Light frequency

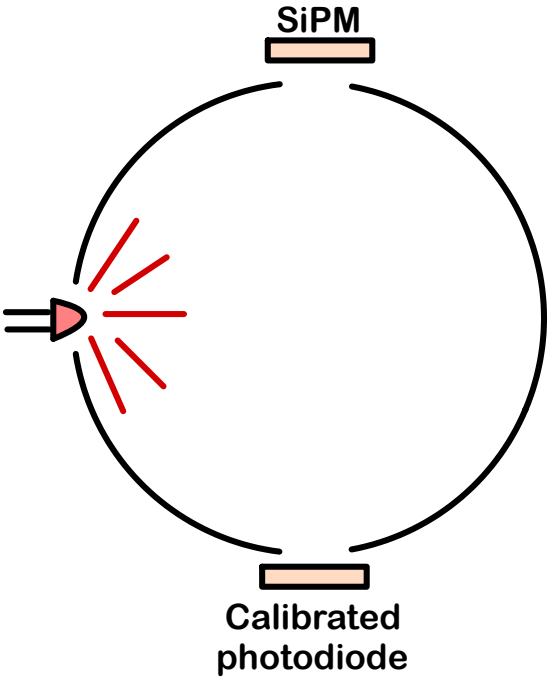
Period pulses

Optical power

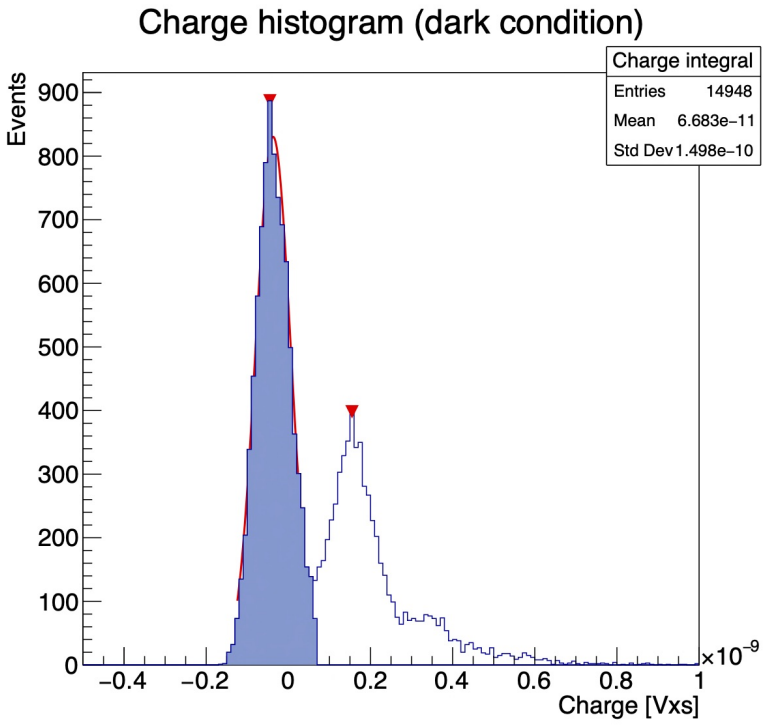
$$n_{pe} = - Ln(N_P/N_T) + Ln(N_P^D/N_T^D)$$ SiPM

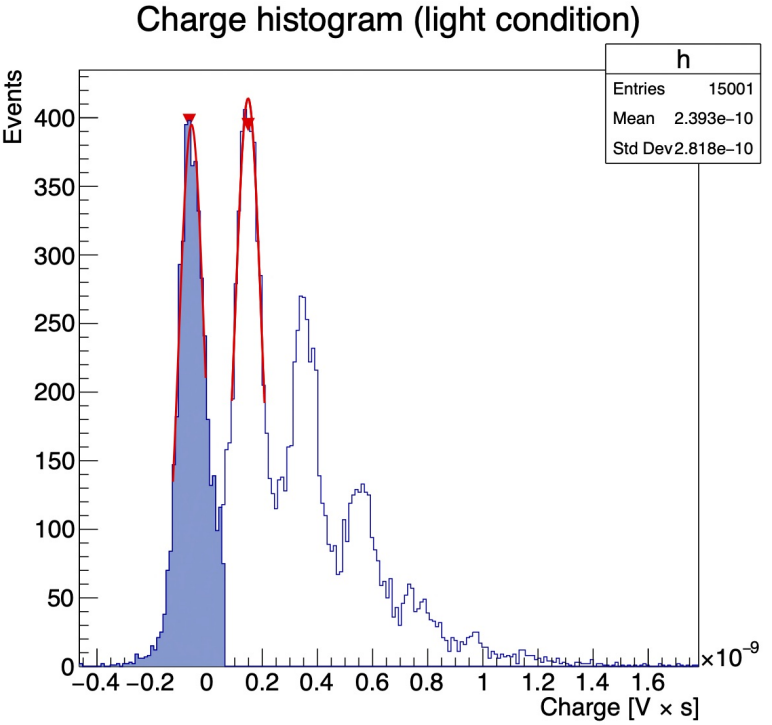
$$P = \frac{I}{S}$$ Photodiode

The last value of PDE ~ 1%



SiPM Measurements

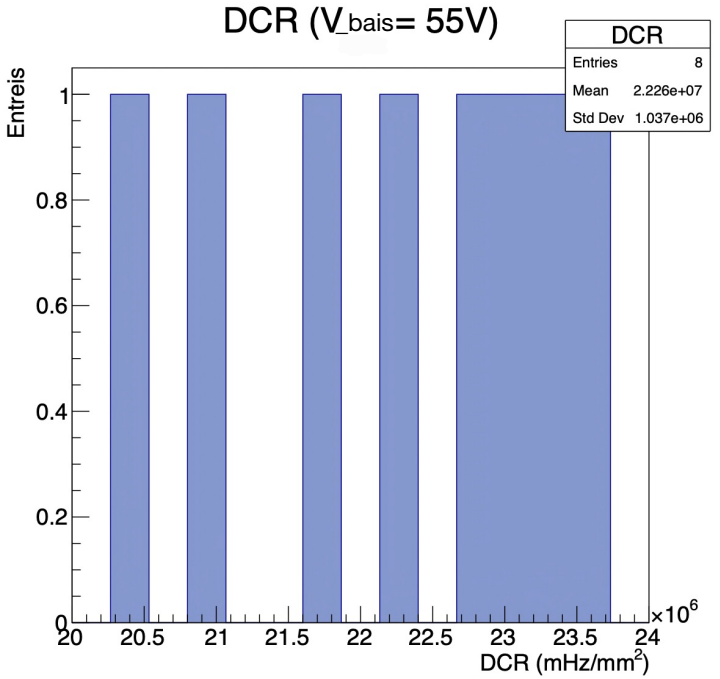


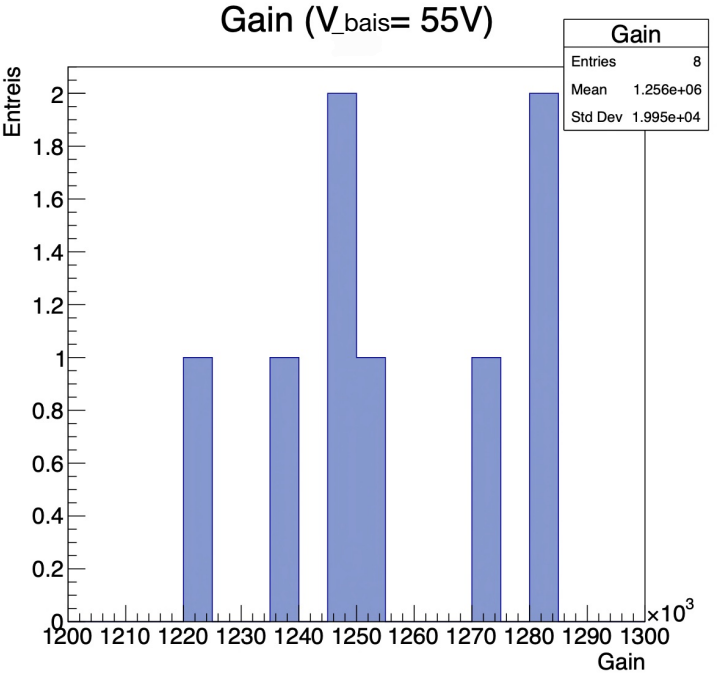


SiPM

$$n_{pe} = - \mathrm{Ln}(N_P/N_T) + \mathrm{Ln}(N_P^D/N_T^D)$$

SiPM performance





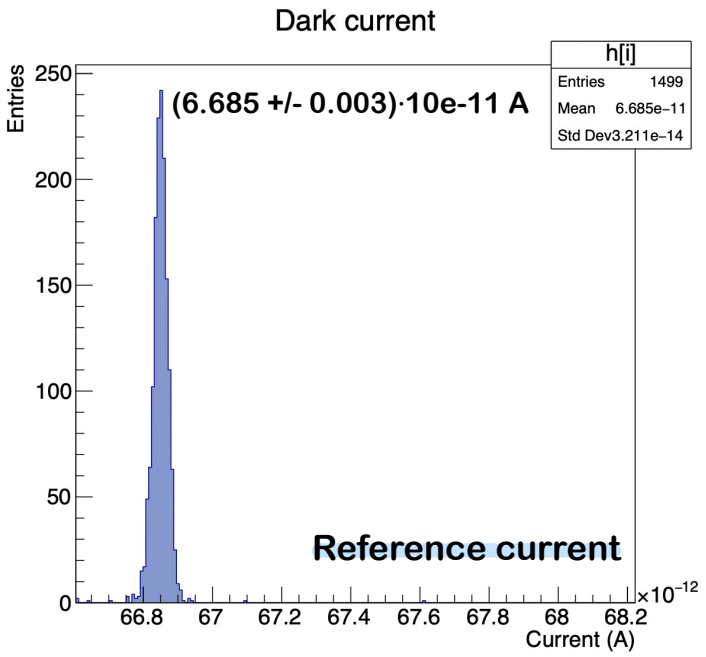
Experimental value (V_bais = 55 V)

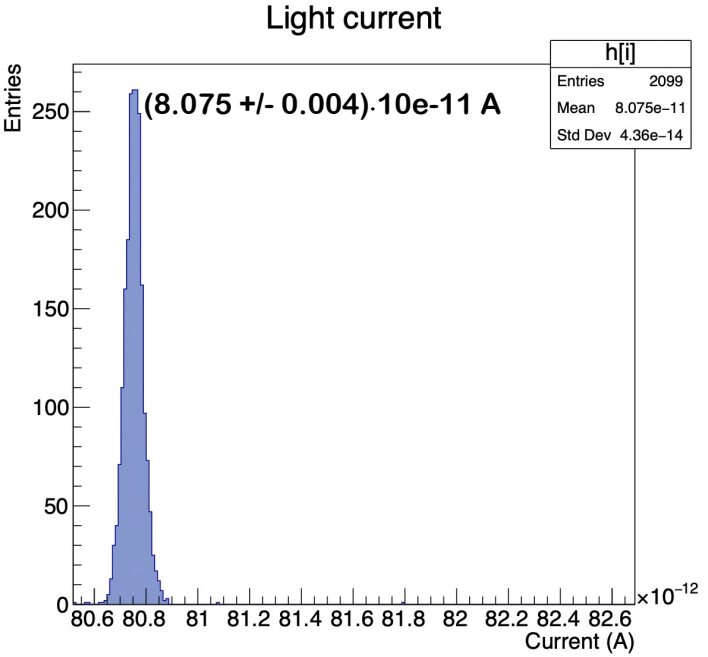
Gain = (1.26 +/- 0.02)·10e6
DCR = (2.23 +/- 0.10)·10e7 mHz/mm^2

Datasheet characteristics (V_bais = 56V)

- **Gain = 1'7 · 10e6**
- **DCR = 5'5 · 10e7 mHz/mm^2**

Photodiode measurements





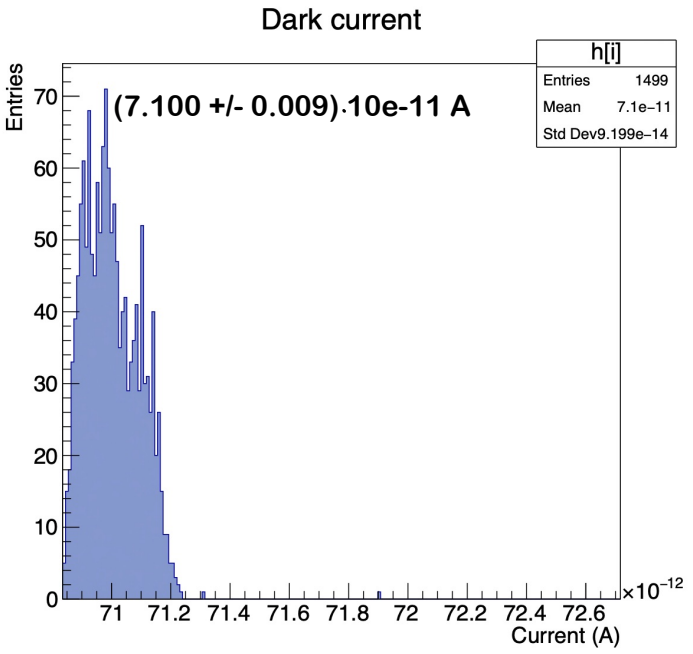
Correction

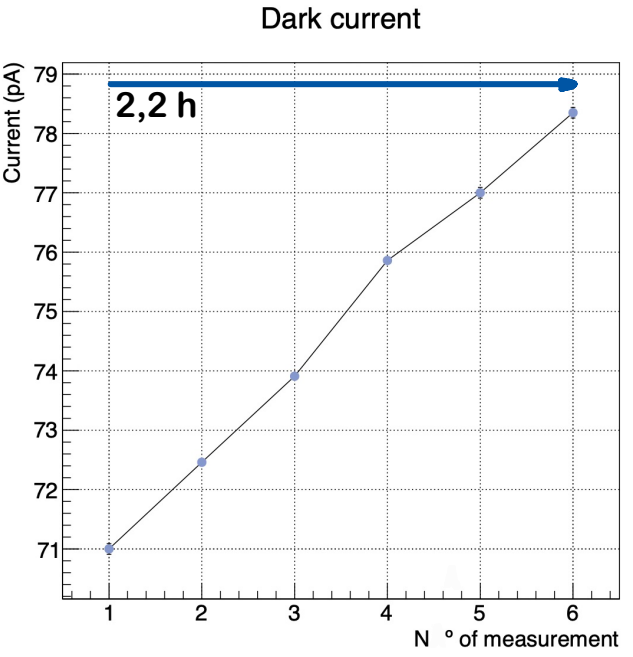
$I = I_L - I_D$

Photodiode

$P = \frac{I}{S}$

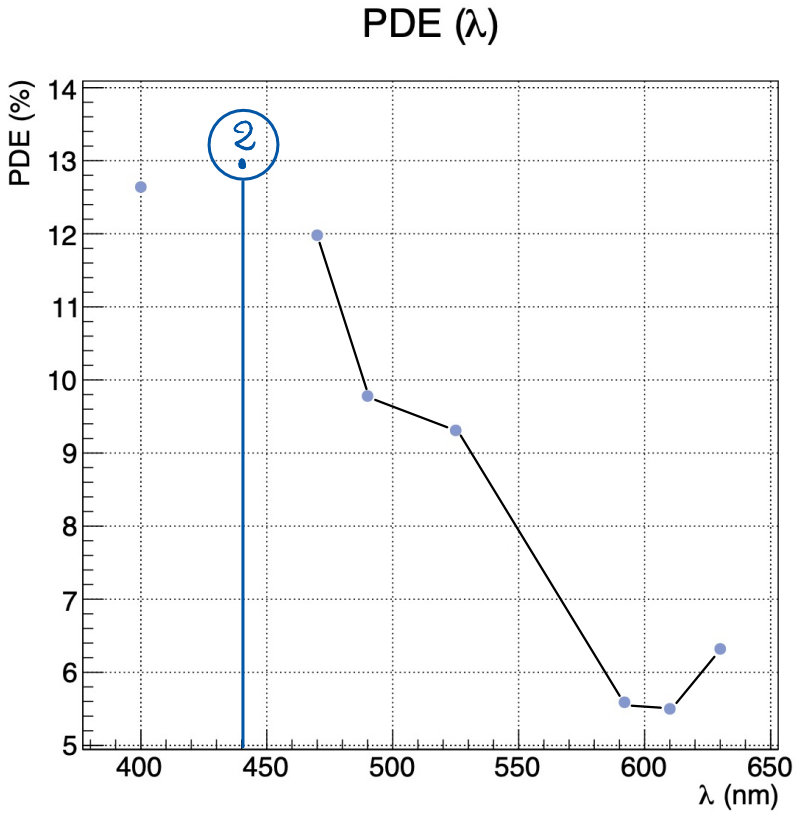
Photodiode measurements





We observe instabilities in some dark current measurements with an increase over large time period

PDE Preliminary results



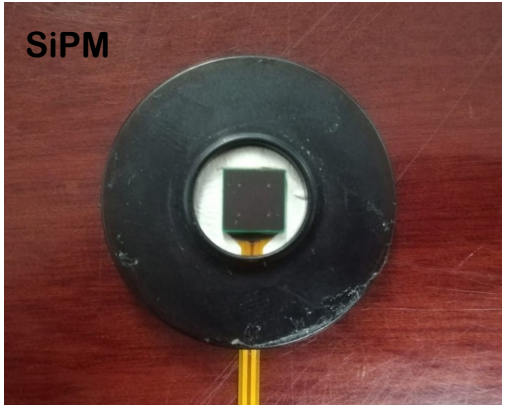
Working on:

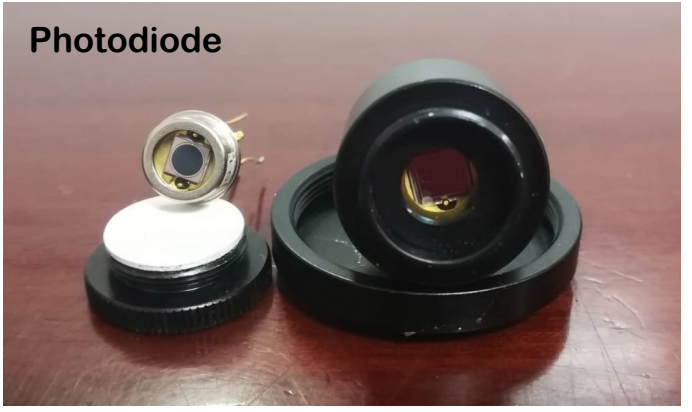
- The 440nm measurement
- Reproducibility

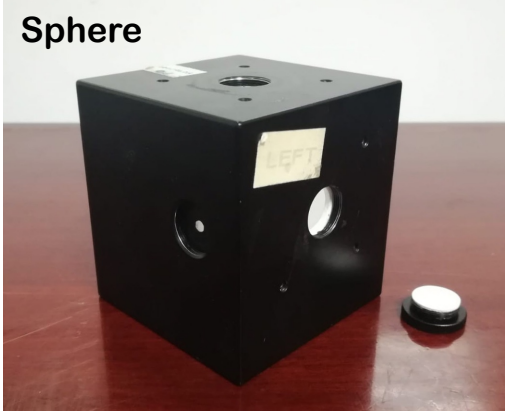
Good news:

- Change with wavelength
- PDE increase

Back - up







- SiPM: Hamamatsu S13360 - 6050VE
- Si PD: Hamamatsu S3399
  Thorlabs SM05PD1B
- Neutral density filter: Thorlabs NE510A
- Integrating sphere with four port + LED