

# Preparation of HRPPD ageing study set up

**Maya Santoro**

Internship experience,  
Bachelor's degree in Physics

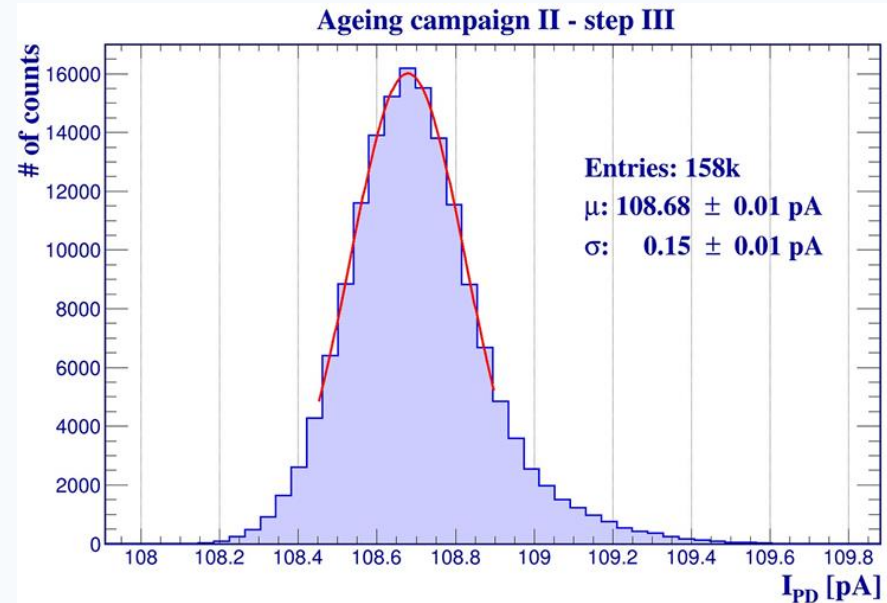
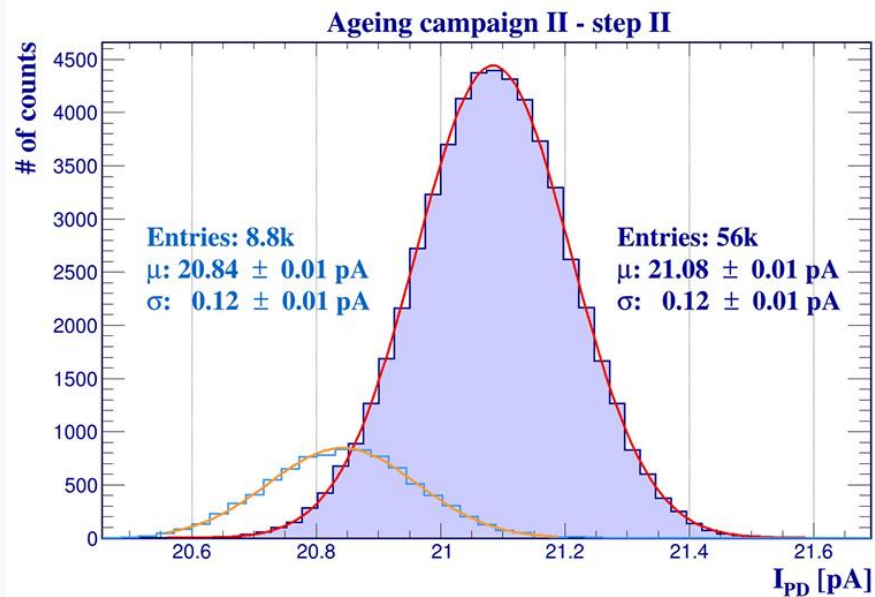
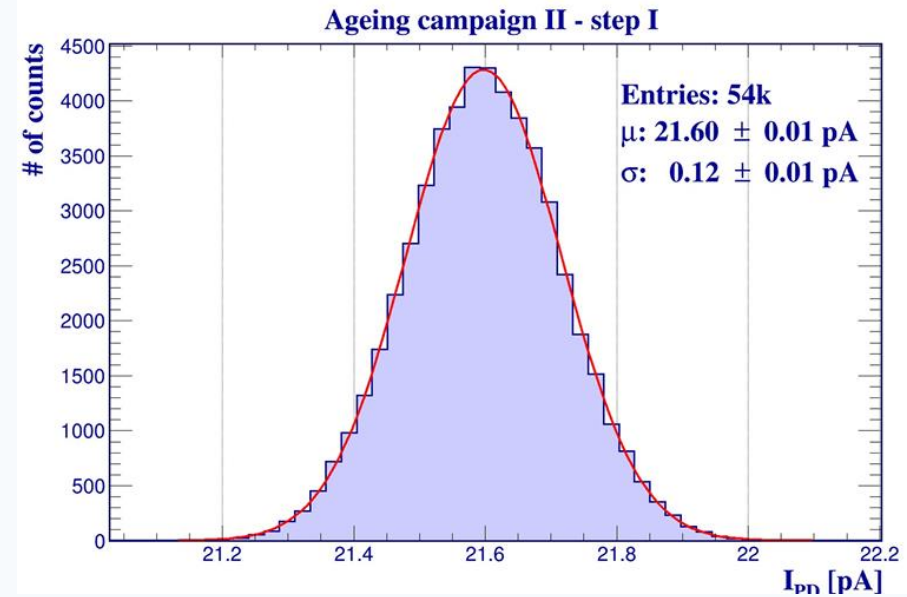
17/03/2026



**UNIVERSITÀ  
DEGLI STUDI  
DI TRIESTE**

# Motivation of the study:

- Ageing campaign II in **three steps** 2025
- Continuous illumination:
  - Step I – 16 hours (LED current = 85 mA)
  - Step II – 18 hours (LED current = 85 mA/100 mA)
  - Step III – 44 hours (LED current = 300 mA)

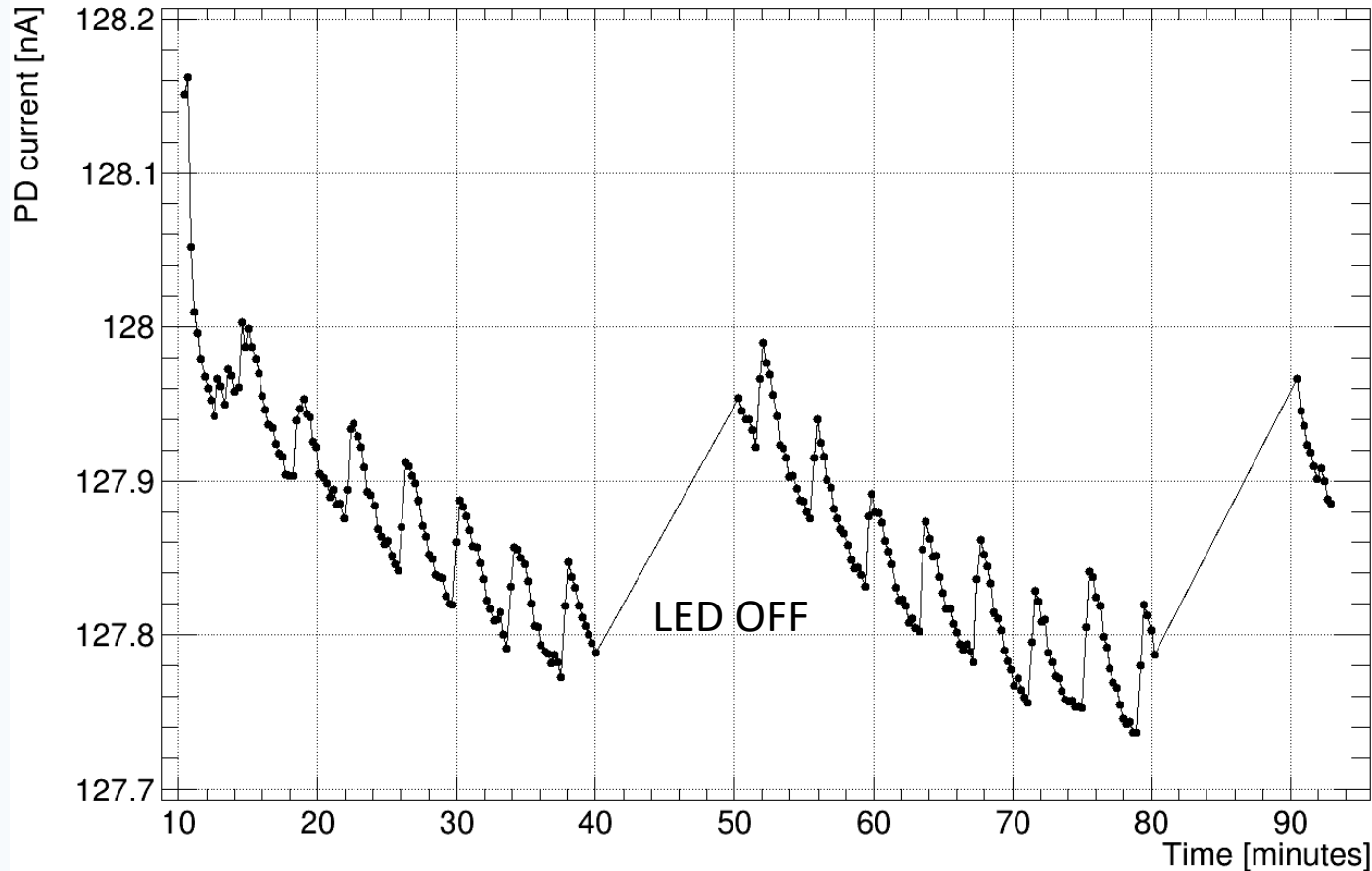


**Questions:** stability and linearity of the LED?

# Motivation of the study:

N.B. PD current in the reflected position

## 2D QE scan in time (2025 ageing campaign)



### Observations:

1. Illumination pattern showed position dependence
2. No correlation between the QE and the observed pattern

**Question:** understand the systematics

# 1) Characterisation of the LED

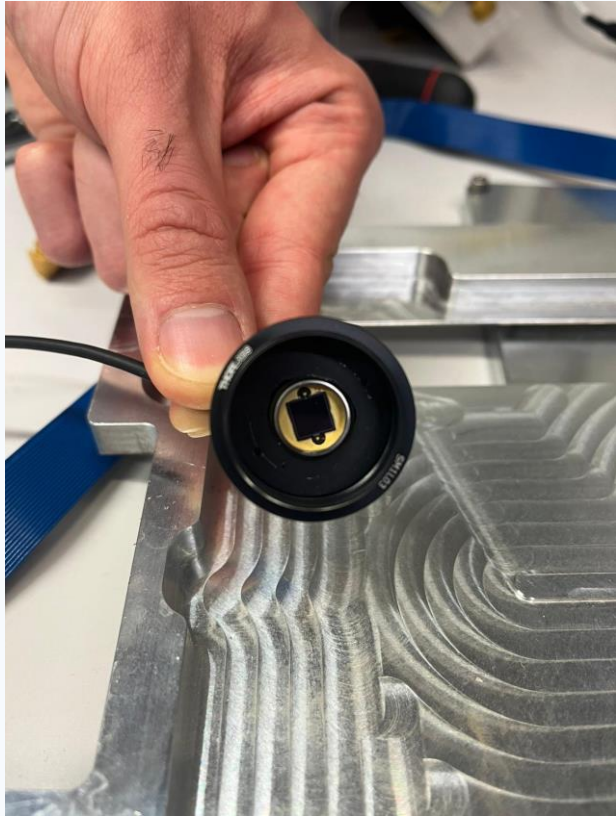
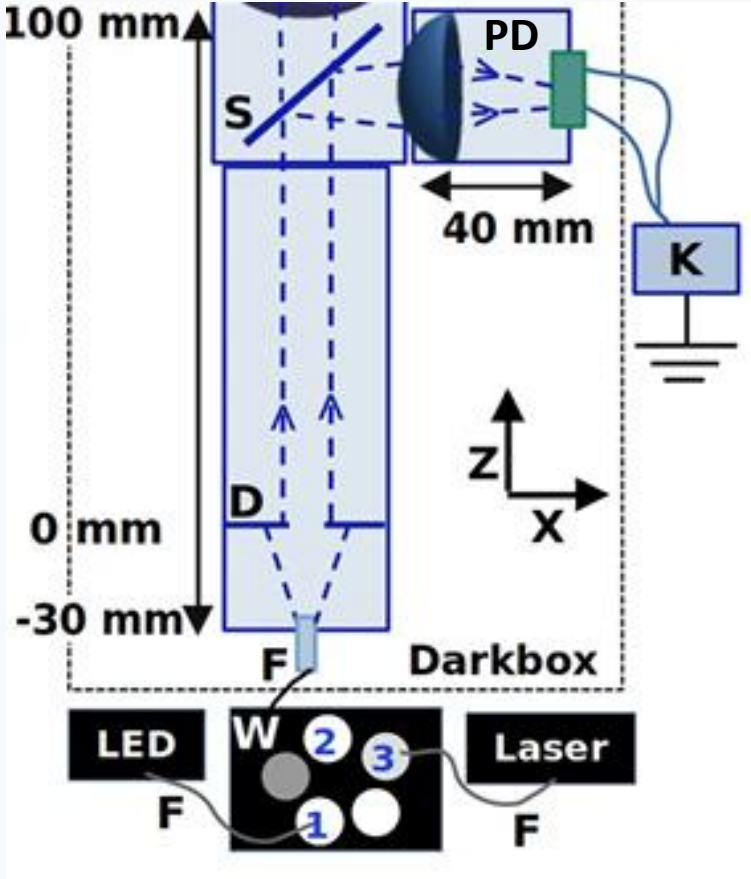
- Experimental set up
- PD current in time
- Stability study (long runs)
- PD current VS LED current
- Resolution test
- Understanding systematics of QE scans (ageing campaign II)

# Experimental set up

- Optics arrangement

- a. Optical fiber (d=50 μm, l=1m)
- b. Splitter: **S**
- c. Hamamatsu Photo-diode: **PD**

N.B. LED is directly connected via the fiber



PD

- Light source: LED

- Continuous light (405 nm)
- Minimum current: 16 mA
- Maximum current: 500 mA
- Computer controlled switch for ON-OFF



# Characterization of the LED

## PD current time evolution at different input LED currents:

- From 20 mA to 90 mA  
10 mA steps
- From 100 mA to 500mA  
20mA steps

100 points

Photo-diode current

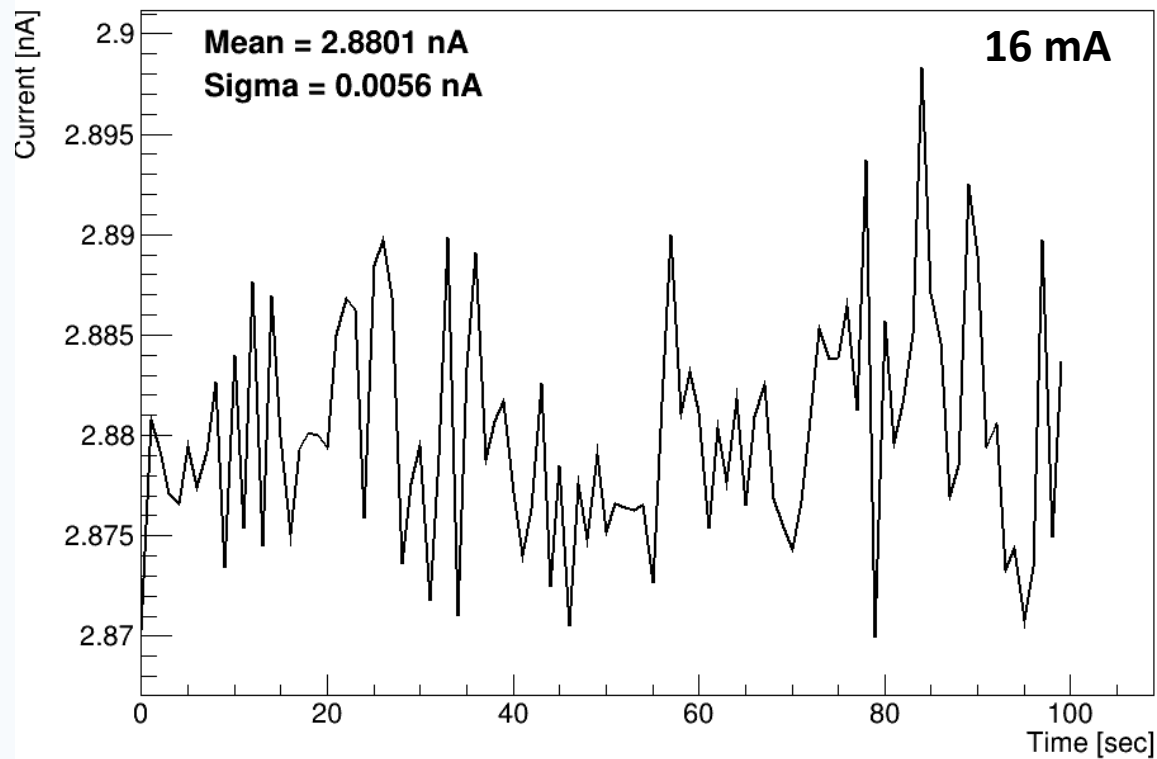
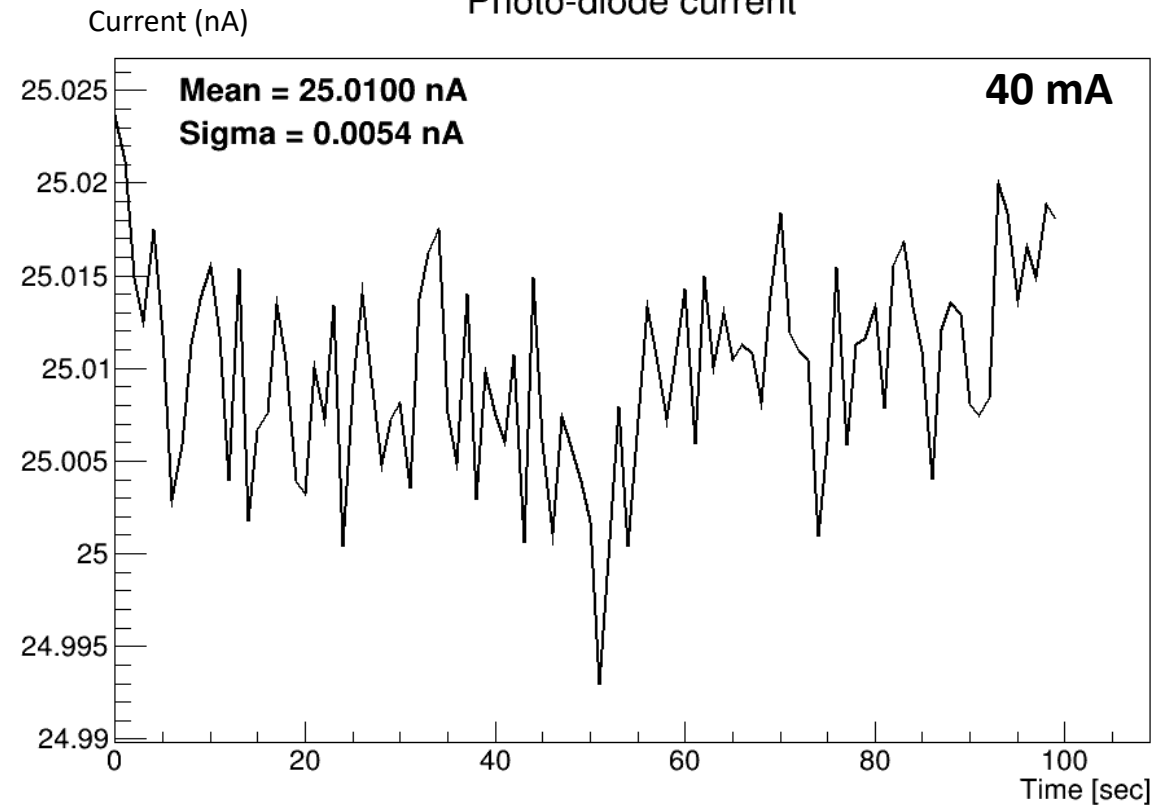
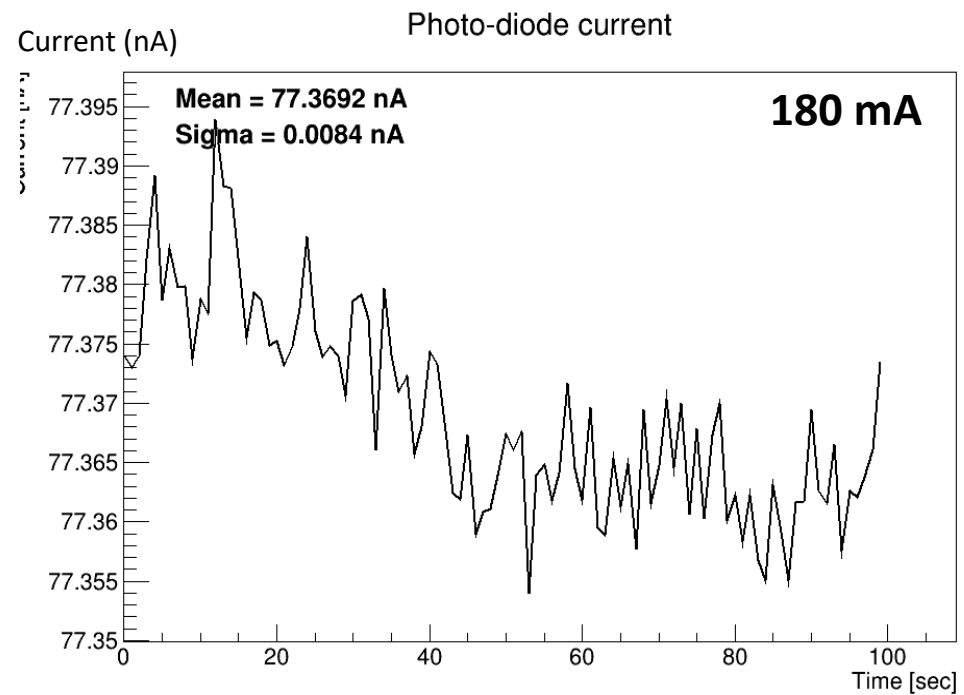
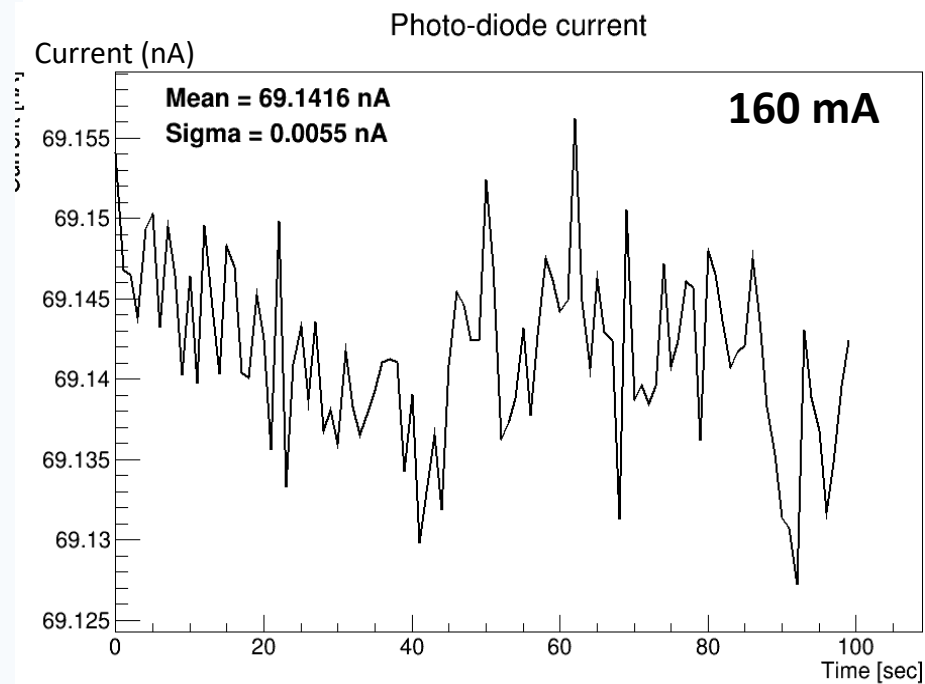
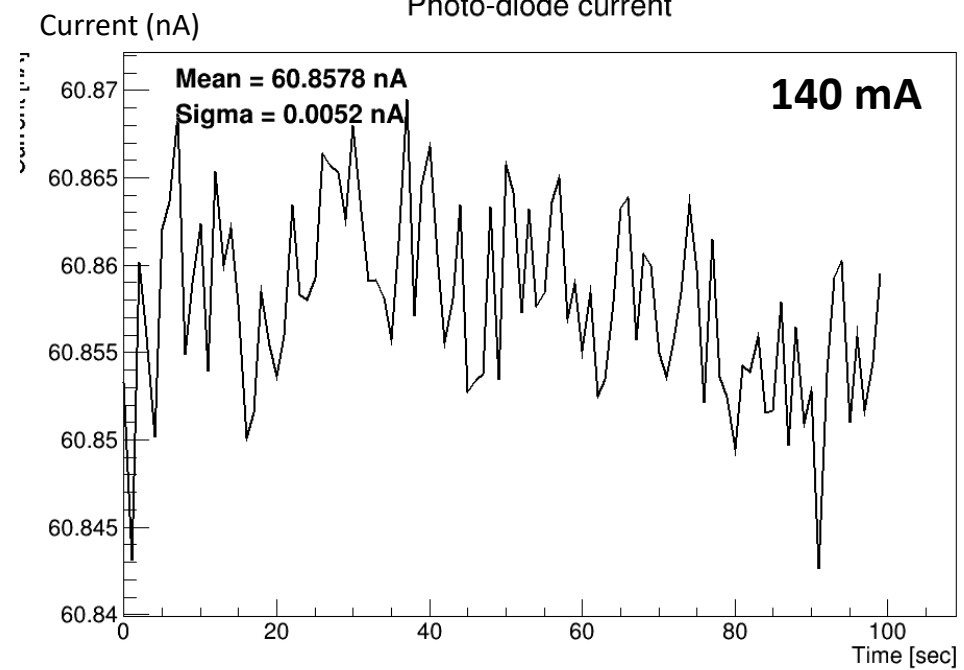
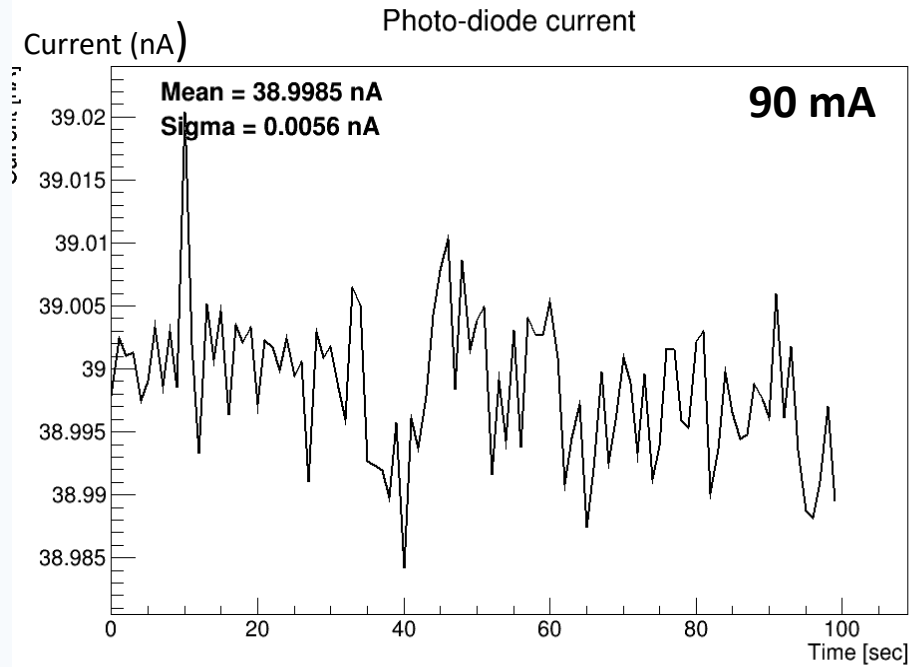
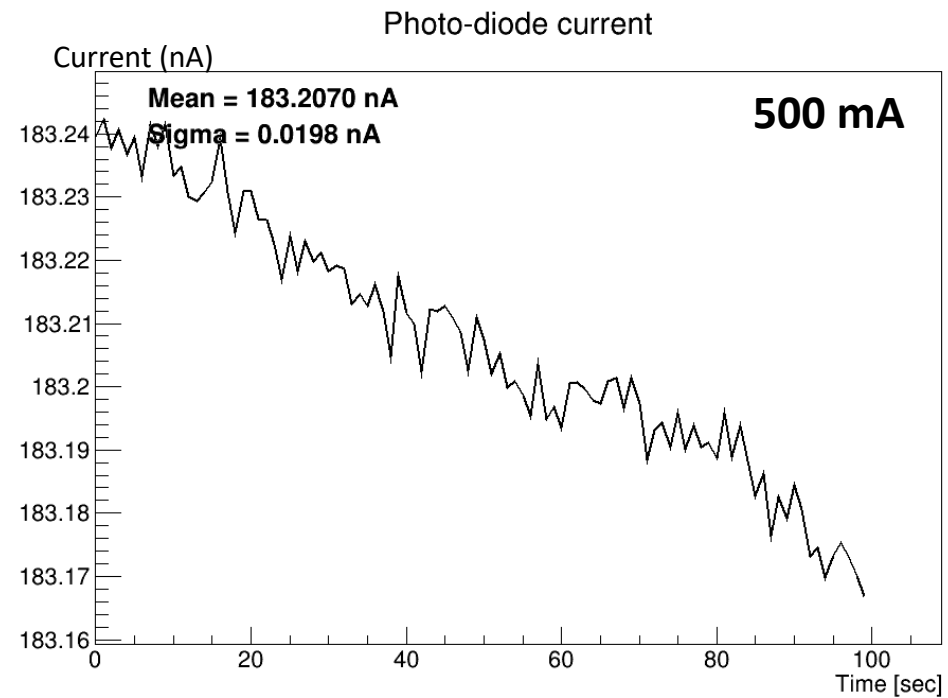
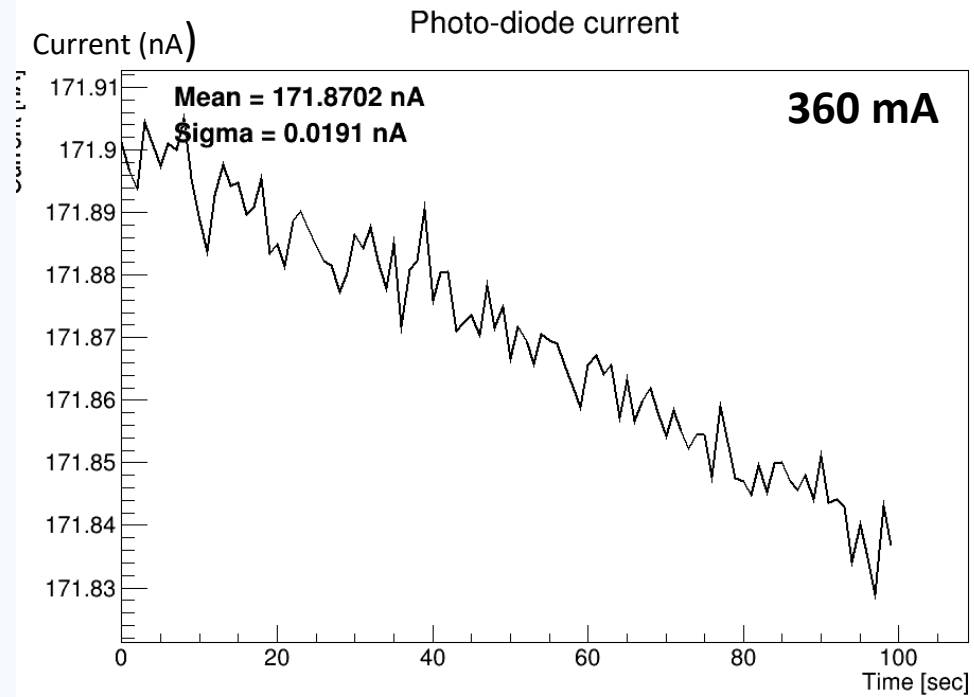
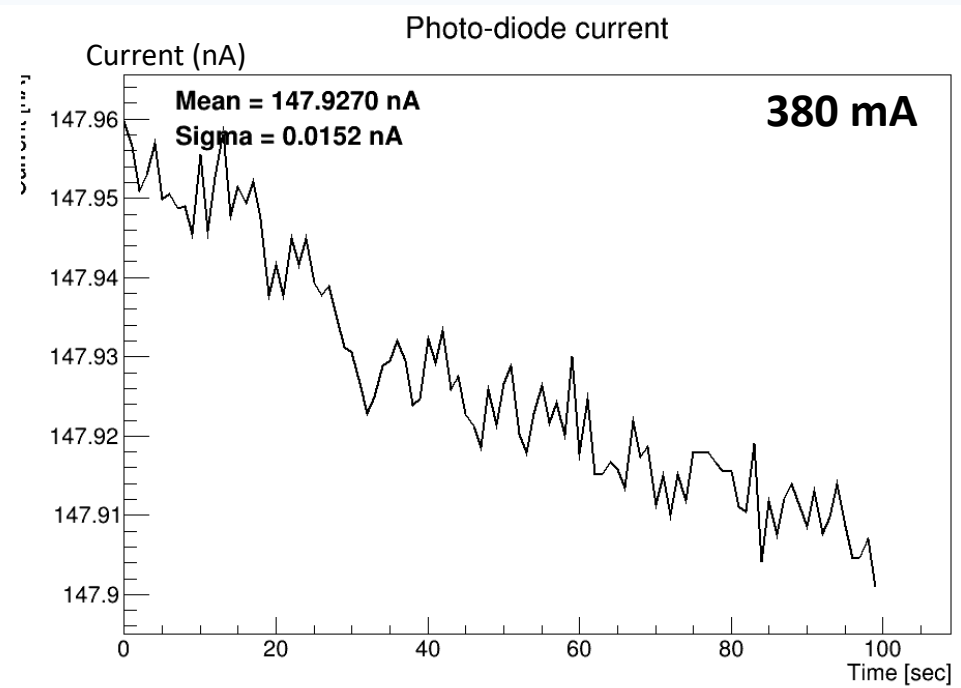
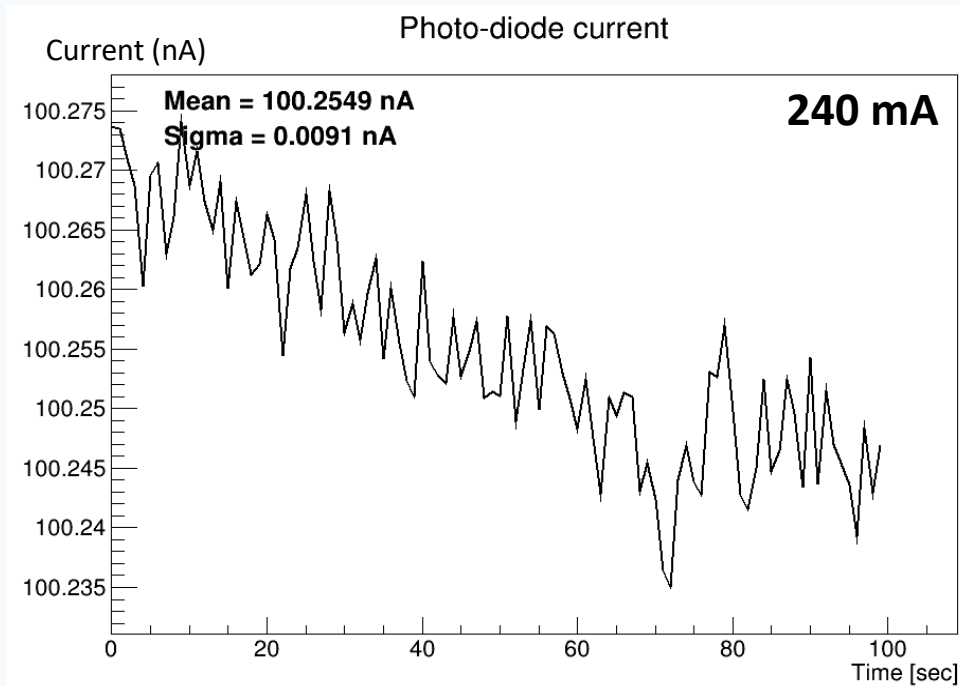


Photo-diode current



(Minimum current)





## Stability study -long runs:

- LED current= 100 mA
- T: 1h

- LED current= 300 mA
- T: 1 h

Photo-diode current

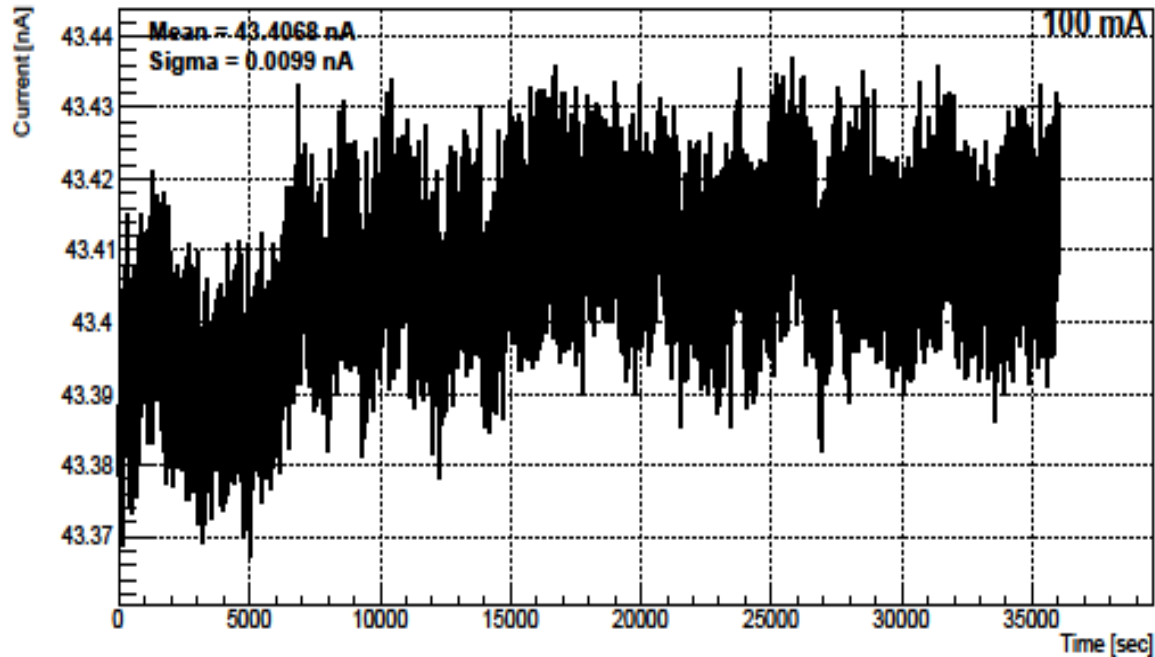
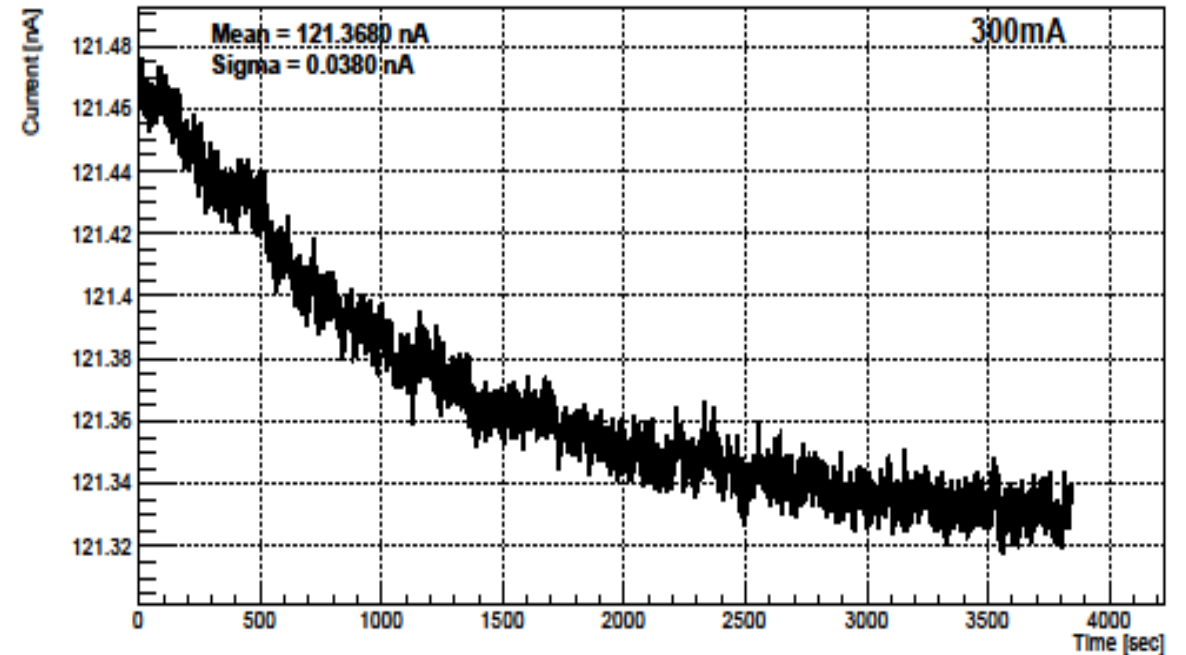
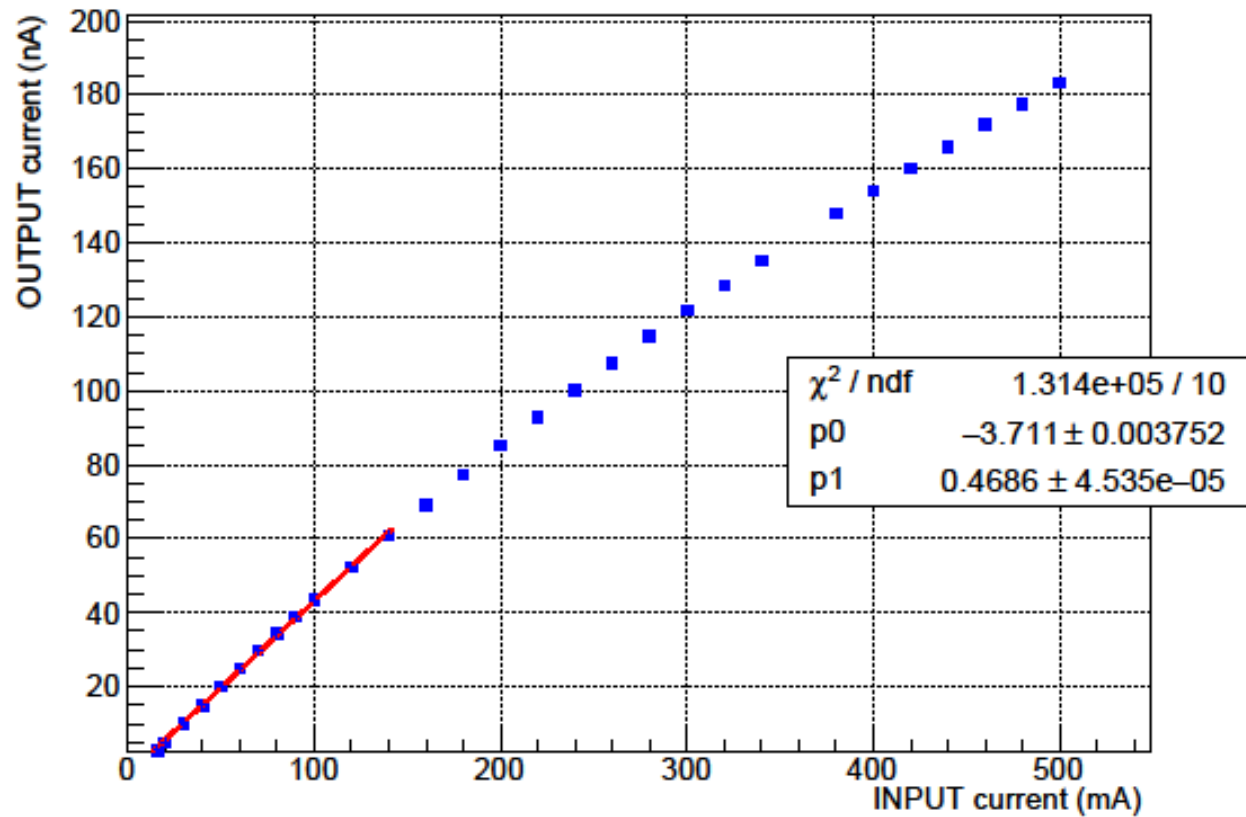


Photo-diode current

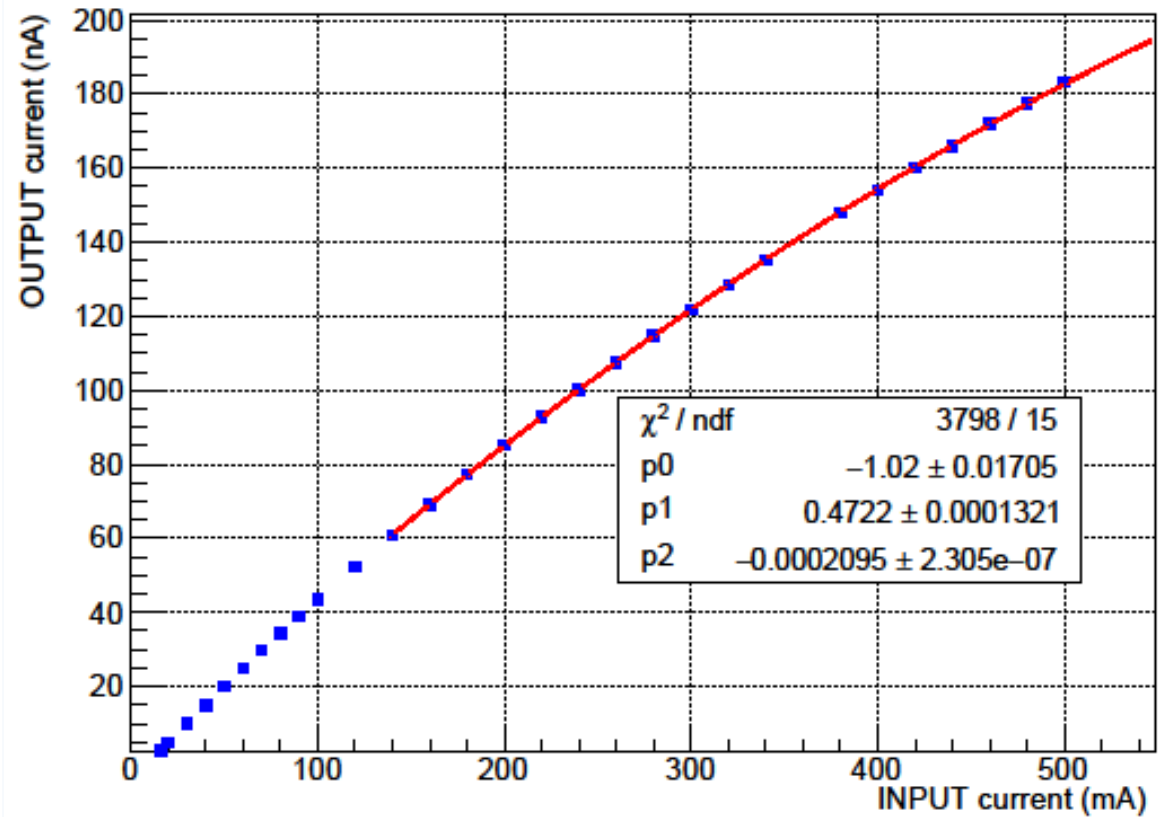


## PD current – LED driver current

INPUT VS OUTPUT



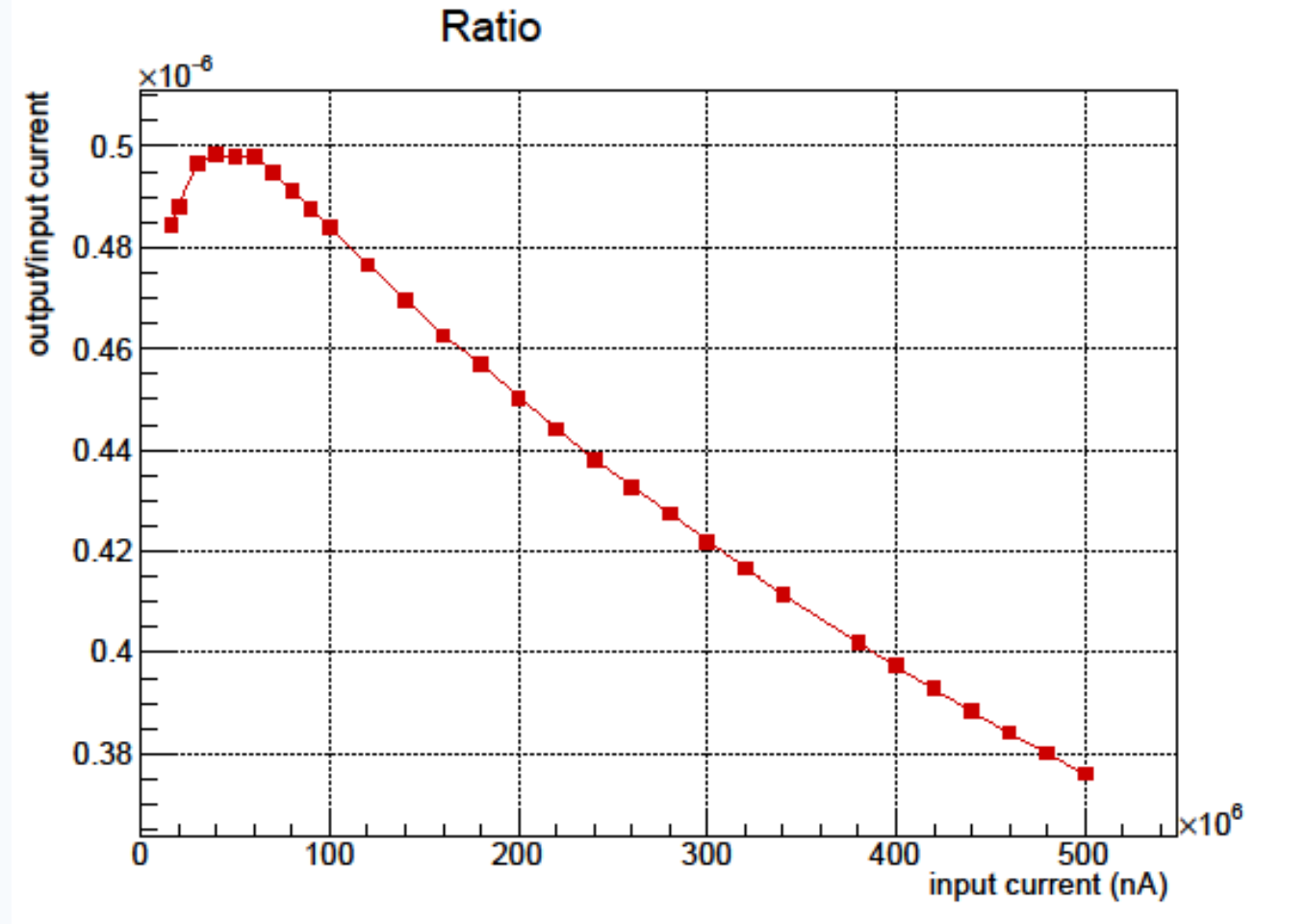
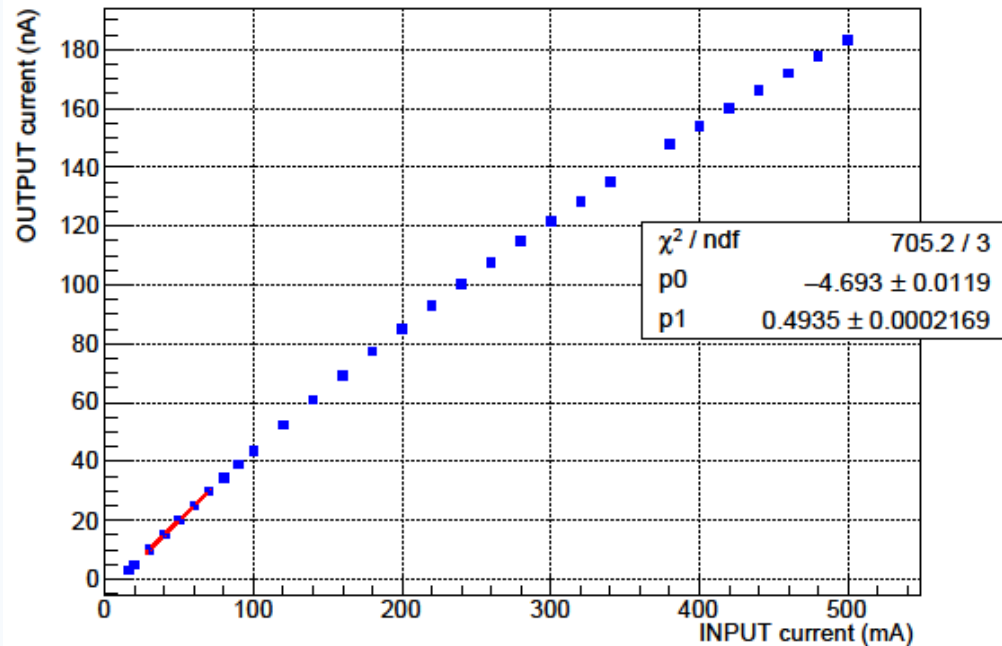
INPUT VS OUTPUT



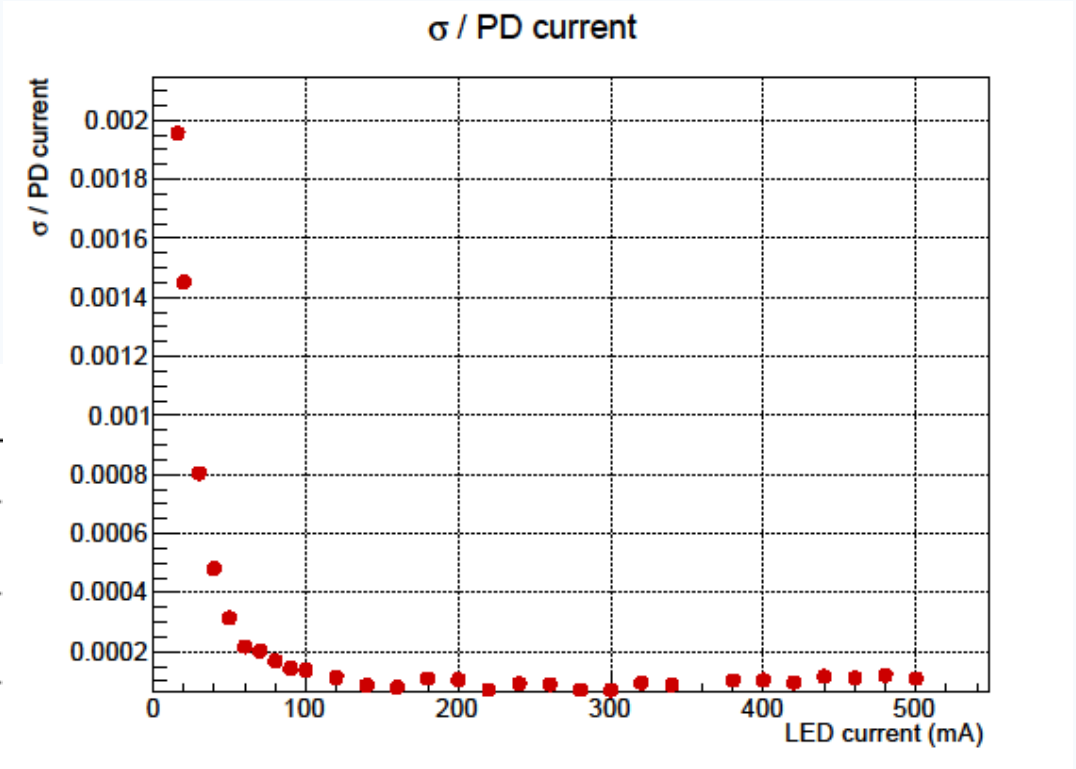
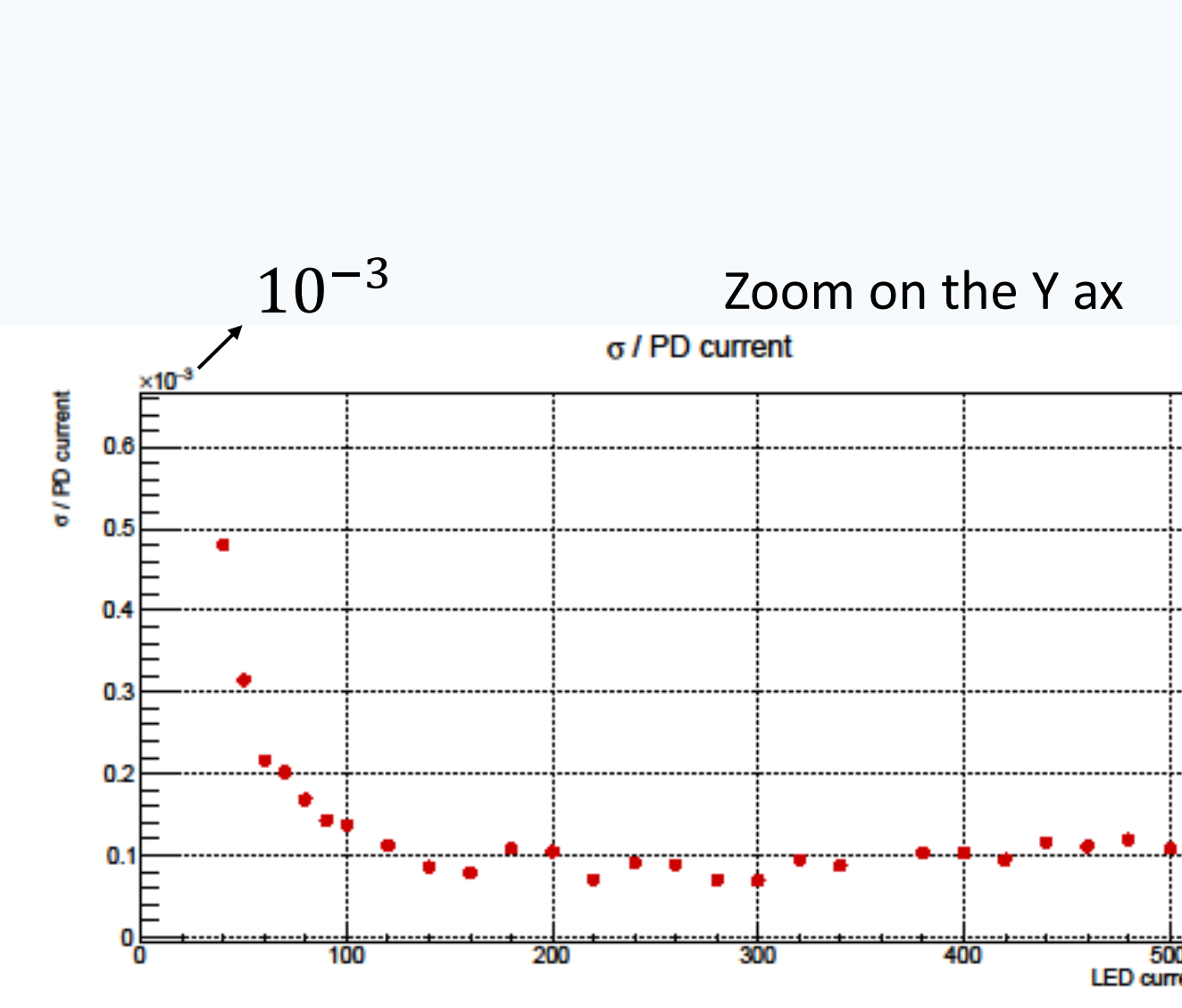
## Ratio between PD current and LED current

Linear fit from 30mA to 60mA

INPUT VS OUTPUT

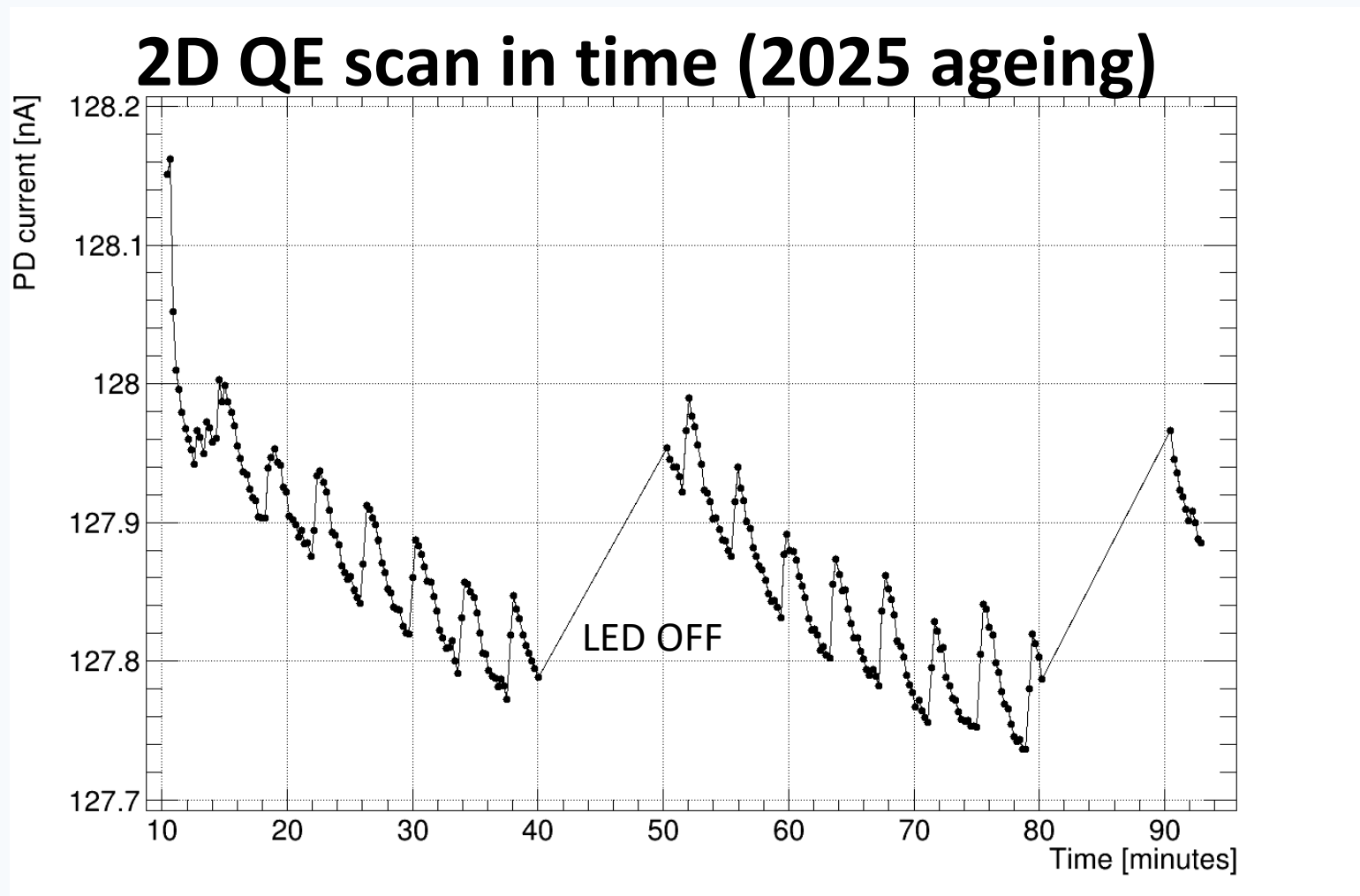


## Resolution test



Conclusion:  
We will not use 300mA  
for the studies but a  
optimal point

# Motivation of the study:



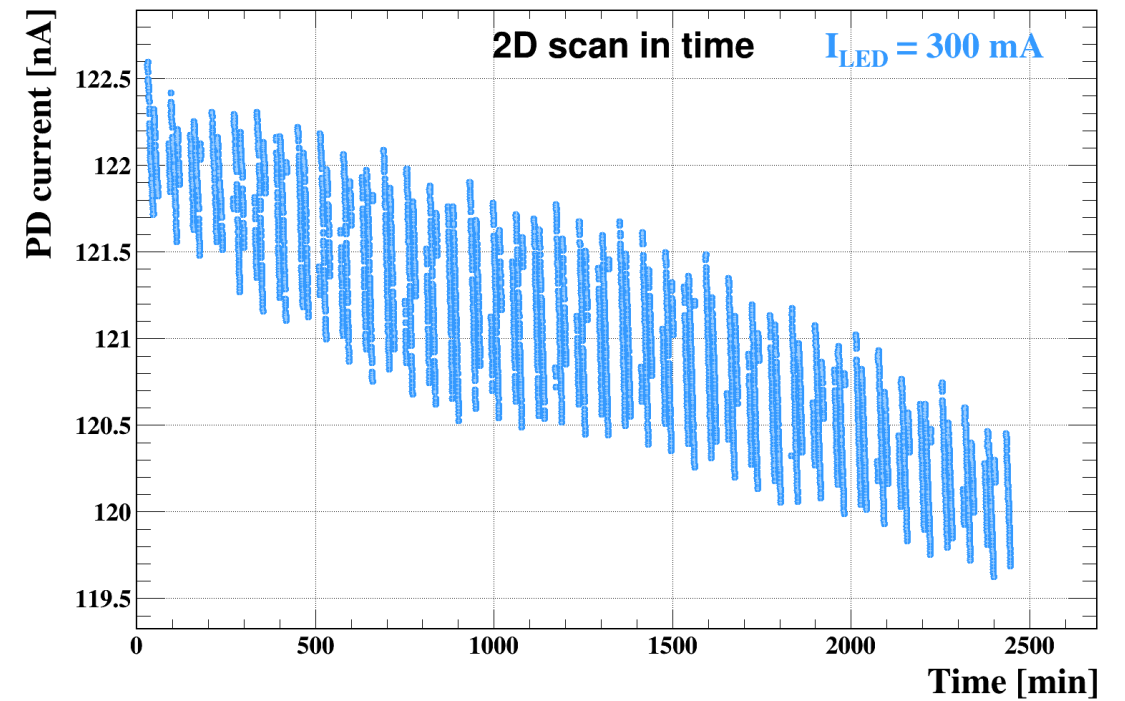
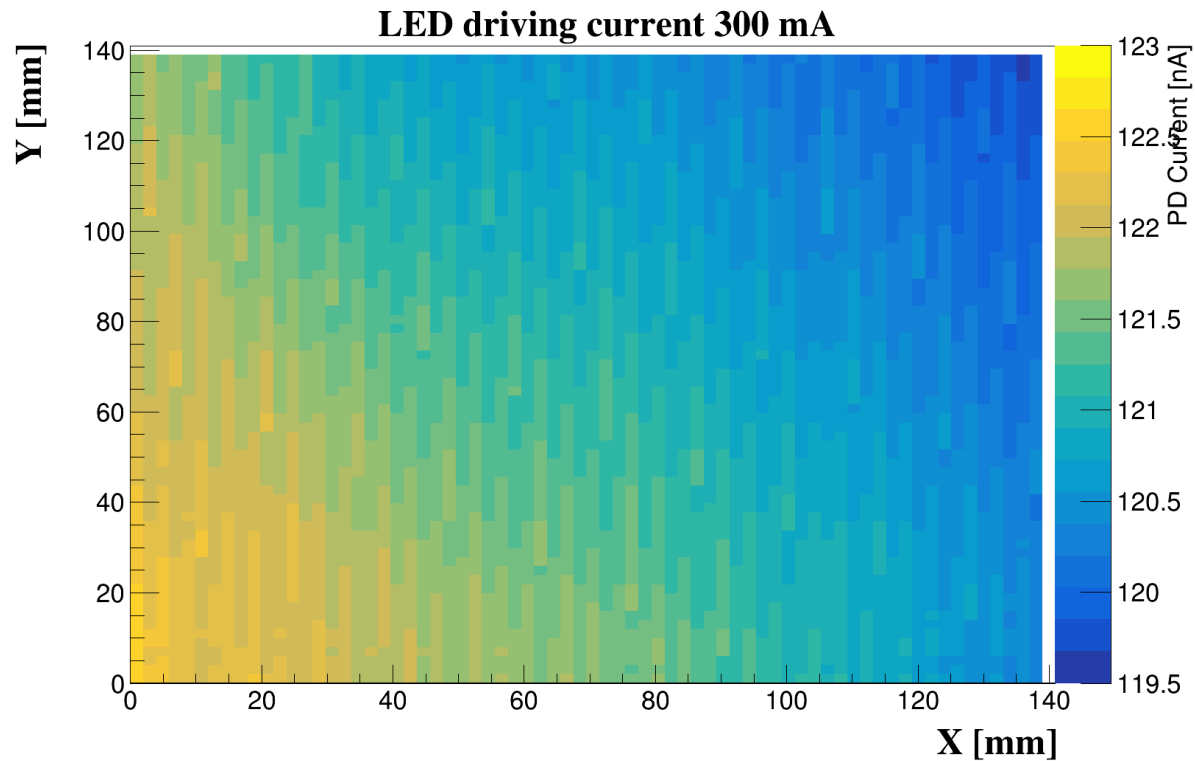
Observations:

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**Questions:** understand the systematics

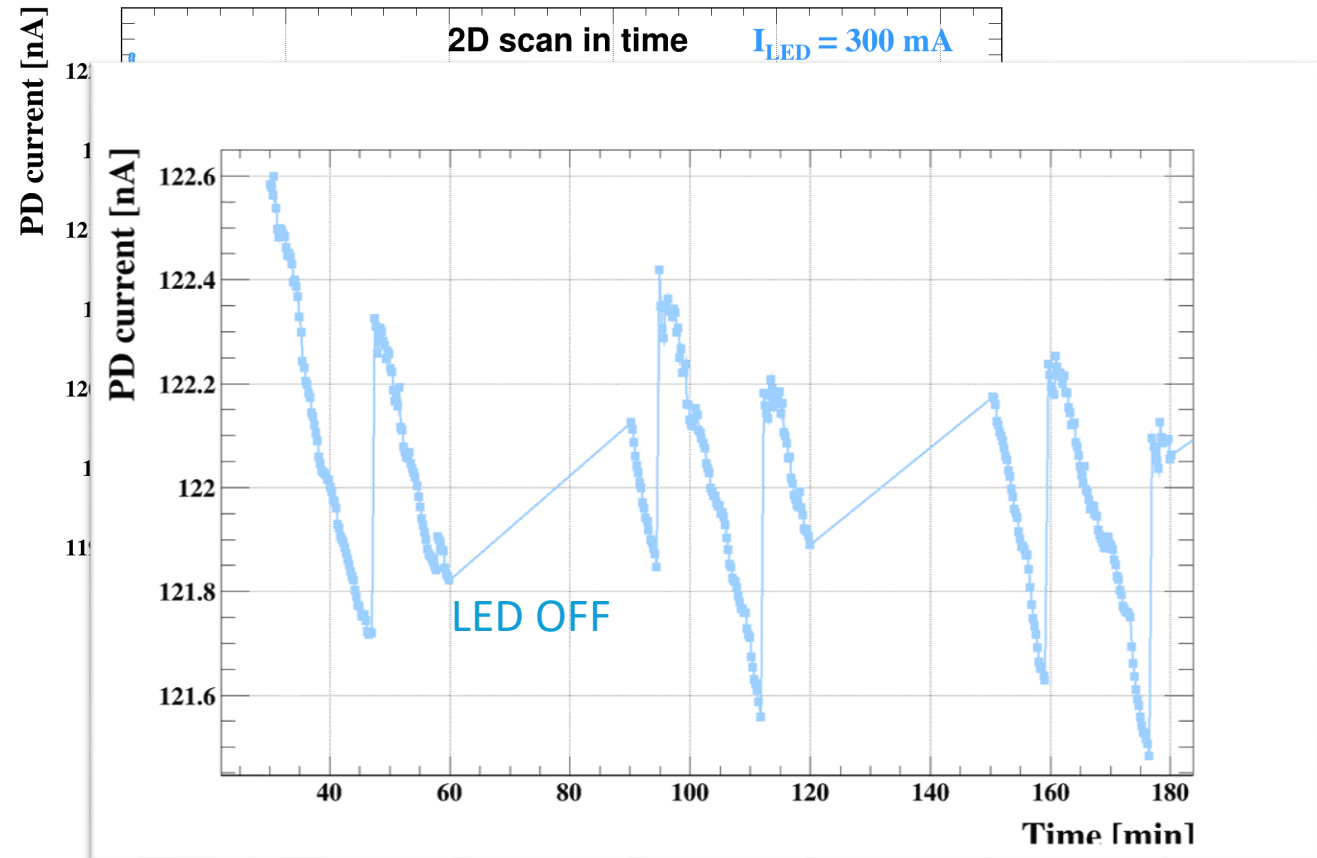
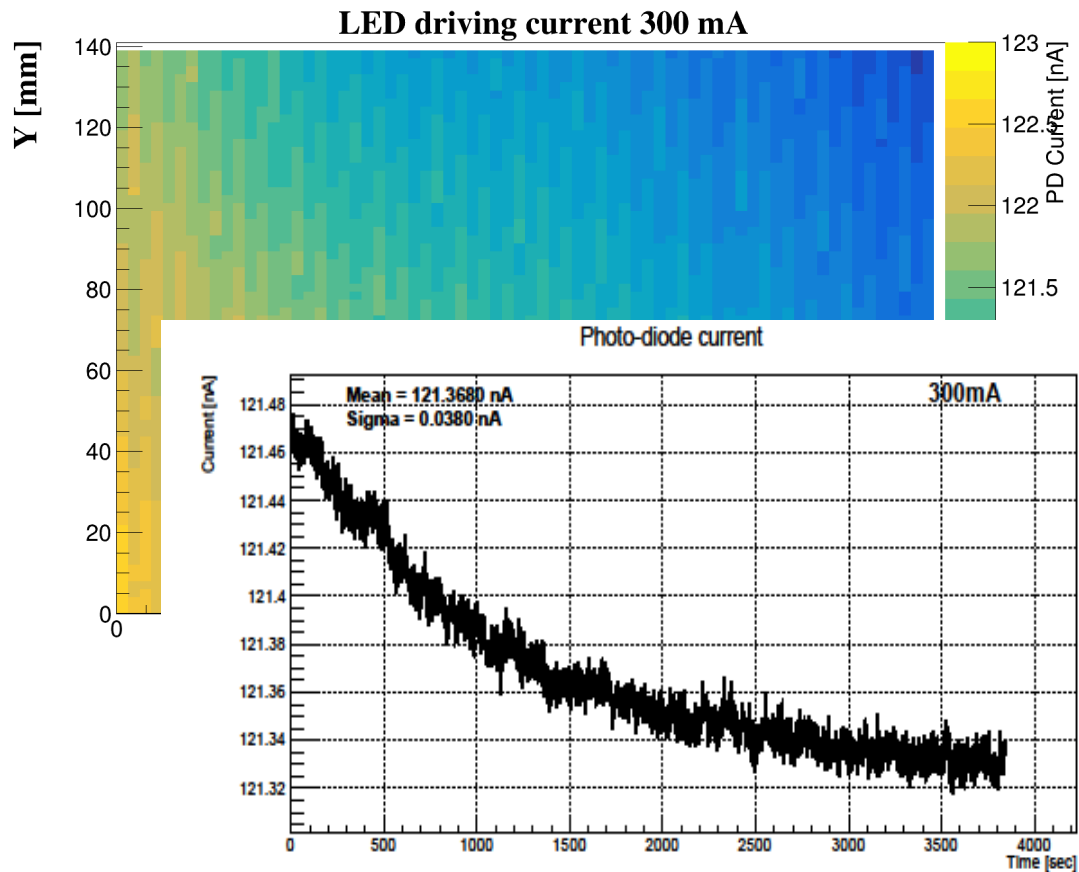
# 2D scan of light illumination

Dummy 2D QE scan – without HRPPD  
Column by column, bottom to top



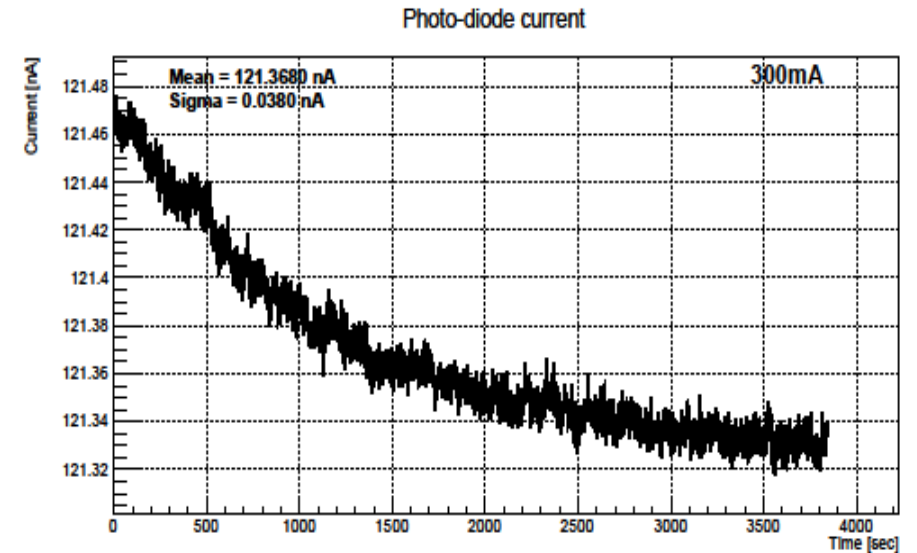
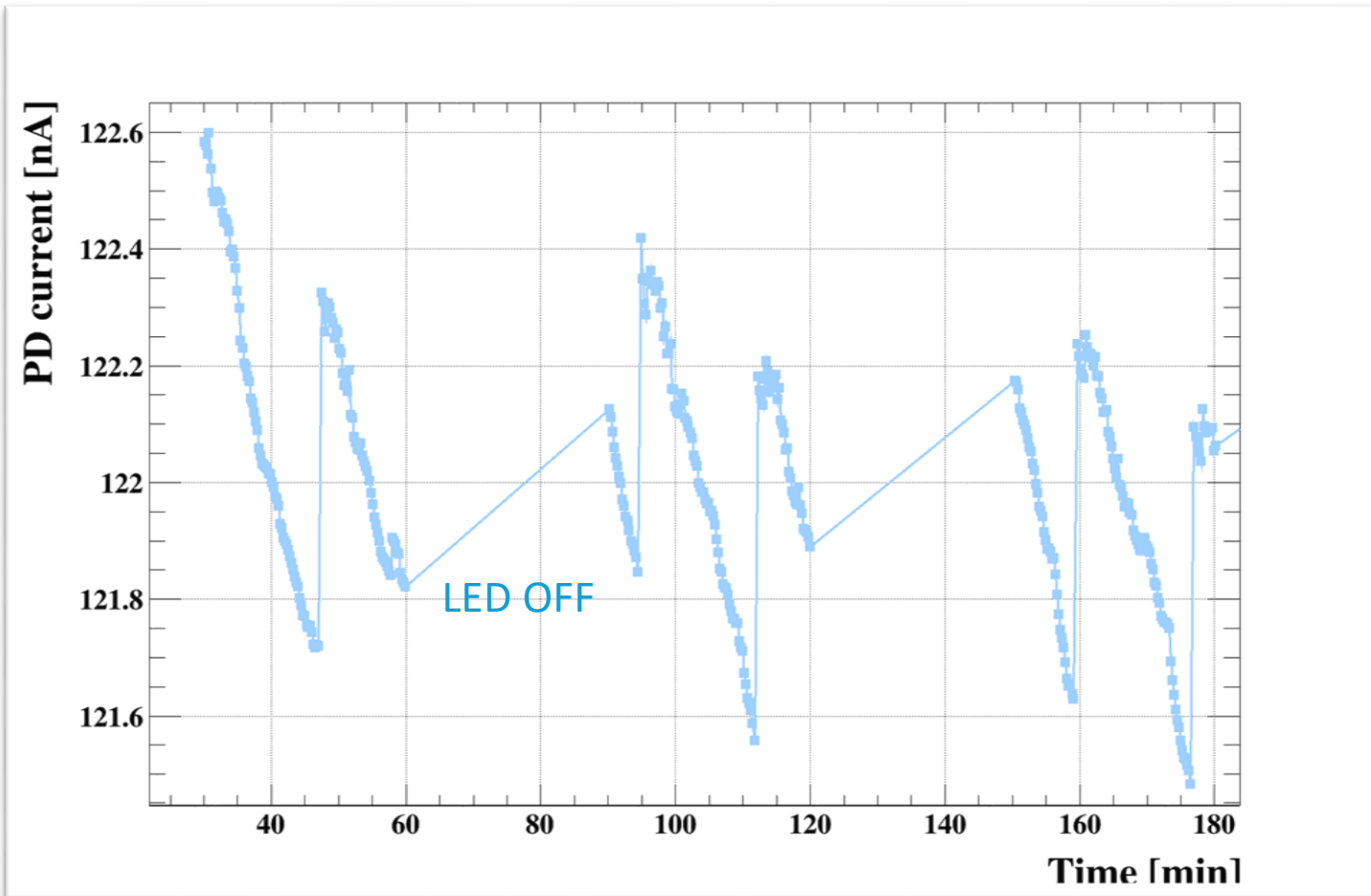
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Dummy 2D QE scan – without HRPPD  
Column by column, bottom to top



# 2D scan of light illumination

Dummy 2D QE scan – without HRPPD  
Column by column, bottom to top



Conclusion:

- We know the position dependency
- Time to stabilise

## 2) Splitting ratio (of the splitter)

- Experimental set up
- PD's current ratio

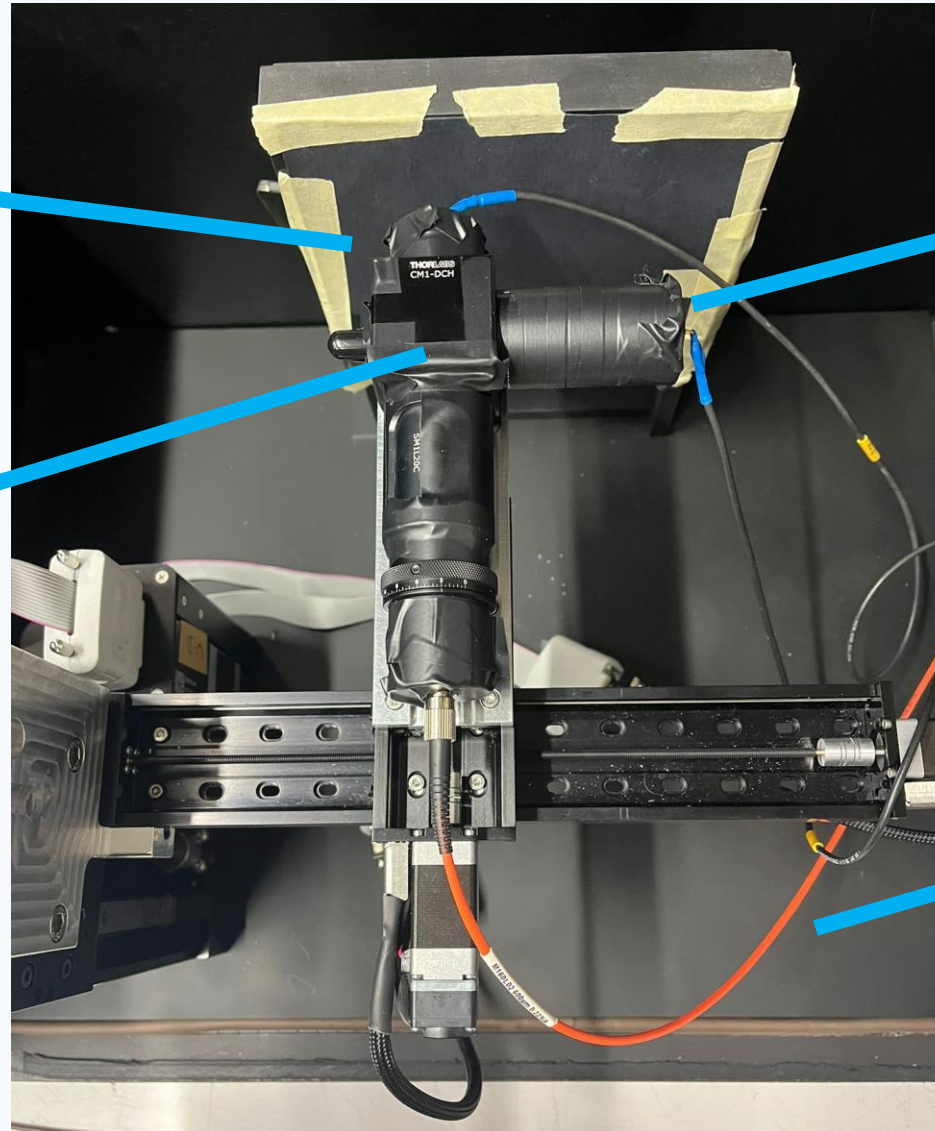
# Experimental set up

Splitting ratio

CALIBRATED  
PHOTO-DIODE

UNCALIBRATED  
PHOTO-DIODE

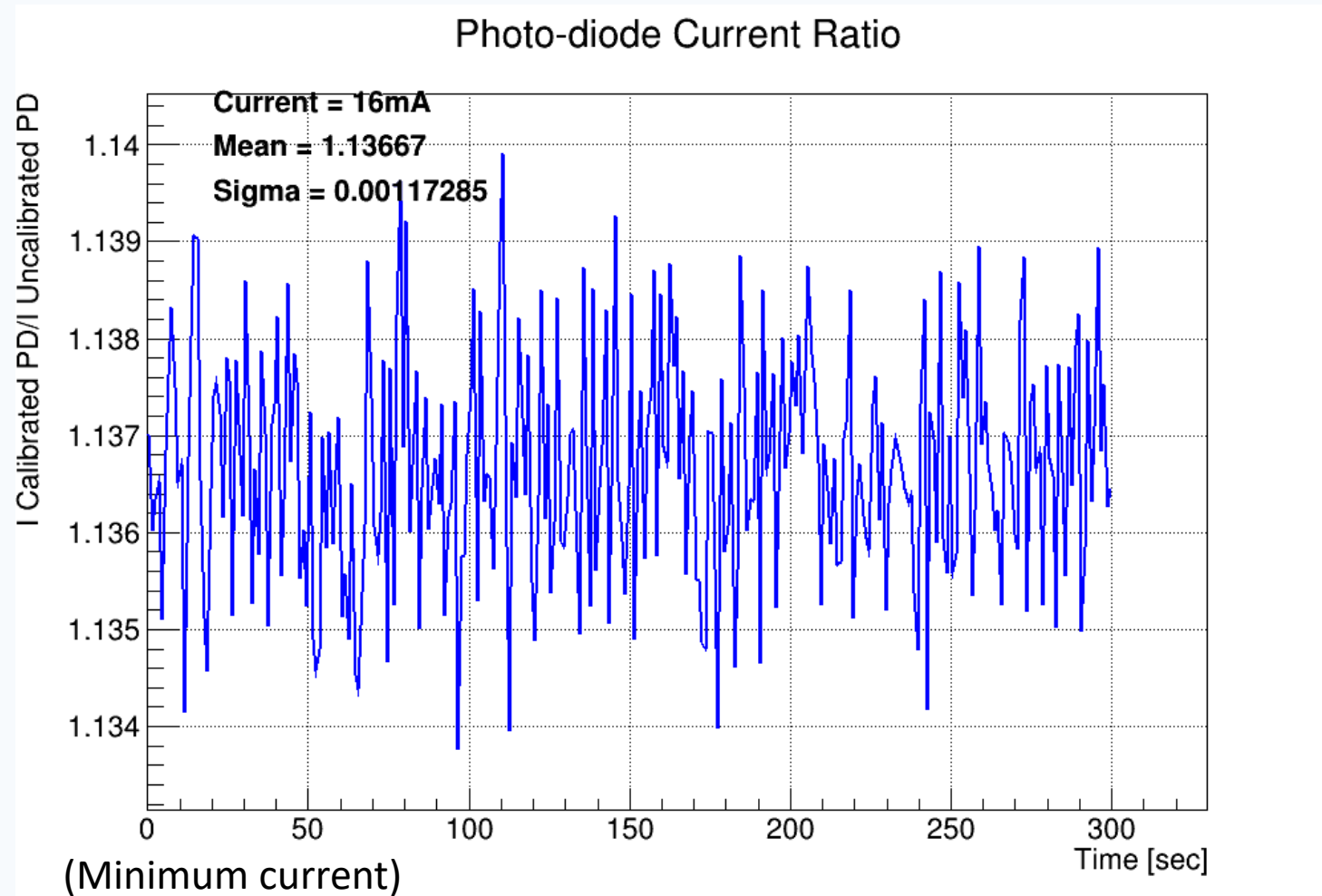
BEAM SPLITTER



FIBER  
d=600 $\mu$ m

# Splitting ratio stability:

Ratio between trasmitted PD current and reflected PD current



- From 20mA to 90mA  
10mA steps
- From 100mA to 180mA  
20mA steps
- From 200mA to 500mA  
50mA steps

Photo-diode Current Ratio

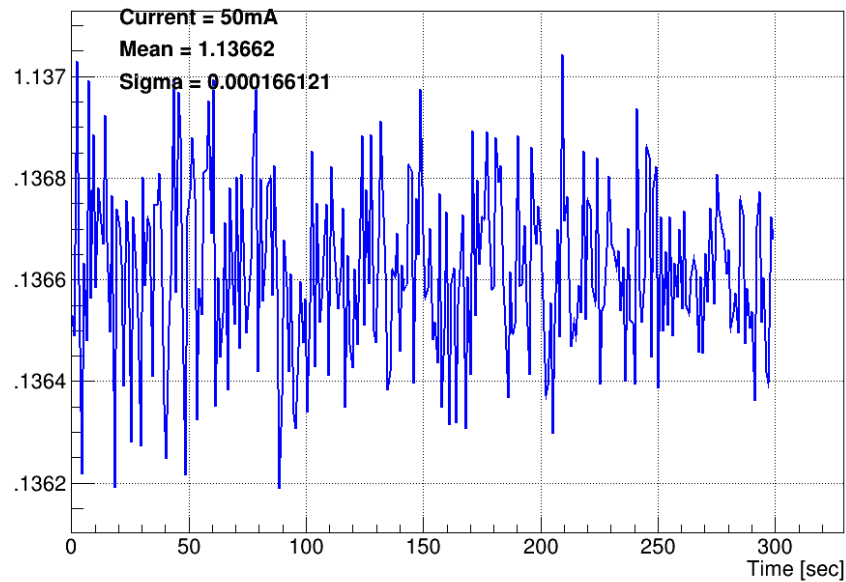


Photo-diode Current Ratio

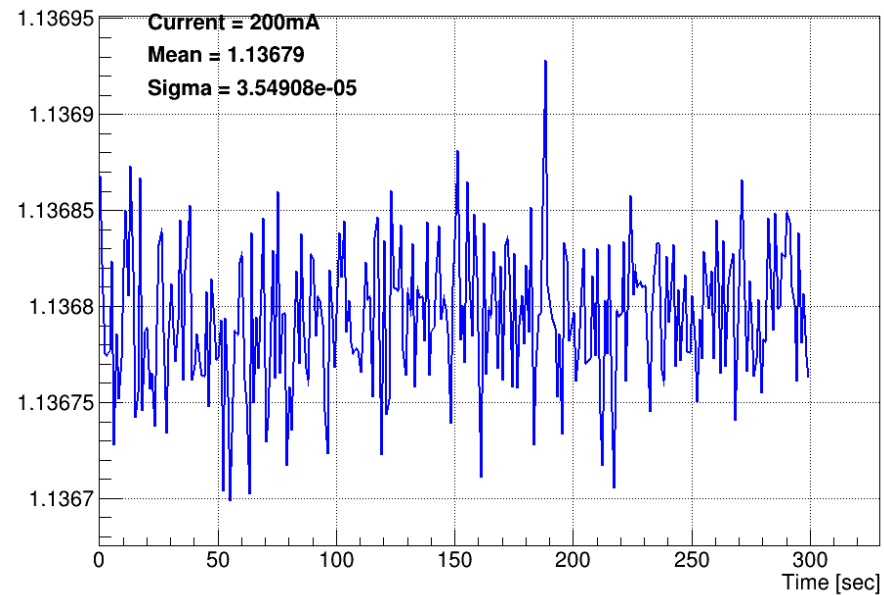


Photo-diode Current Ratio

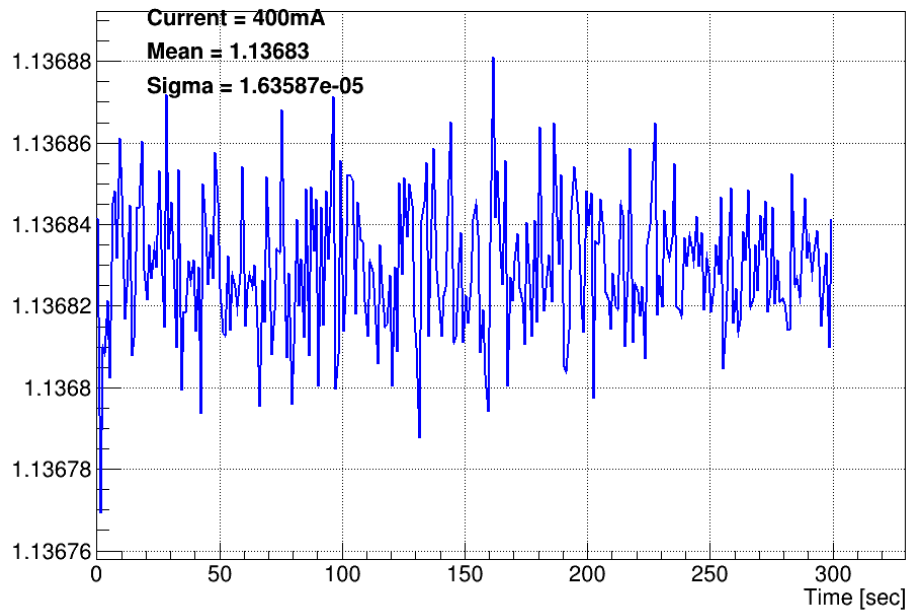


Photo-diode Current Ratio

