



## APD screening status

## Screening status in June:

- 370 series à 20 APDs (7400 pieces) @ all 5 temperatures

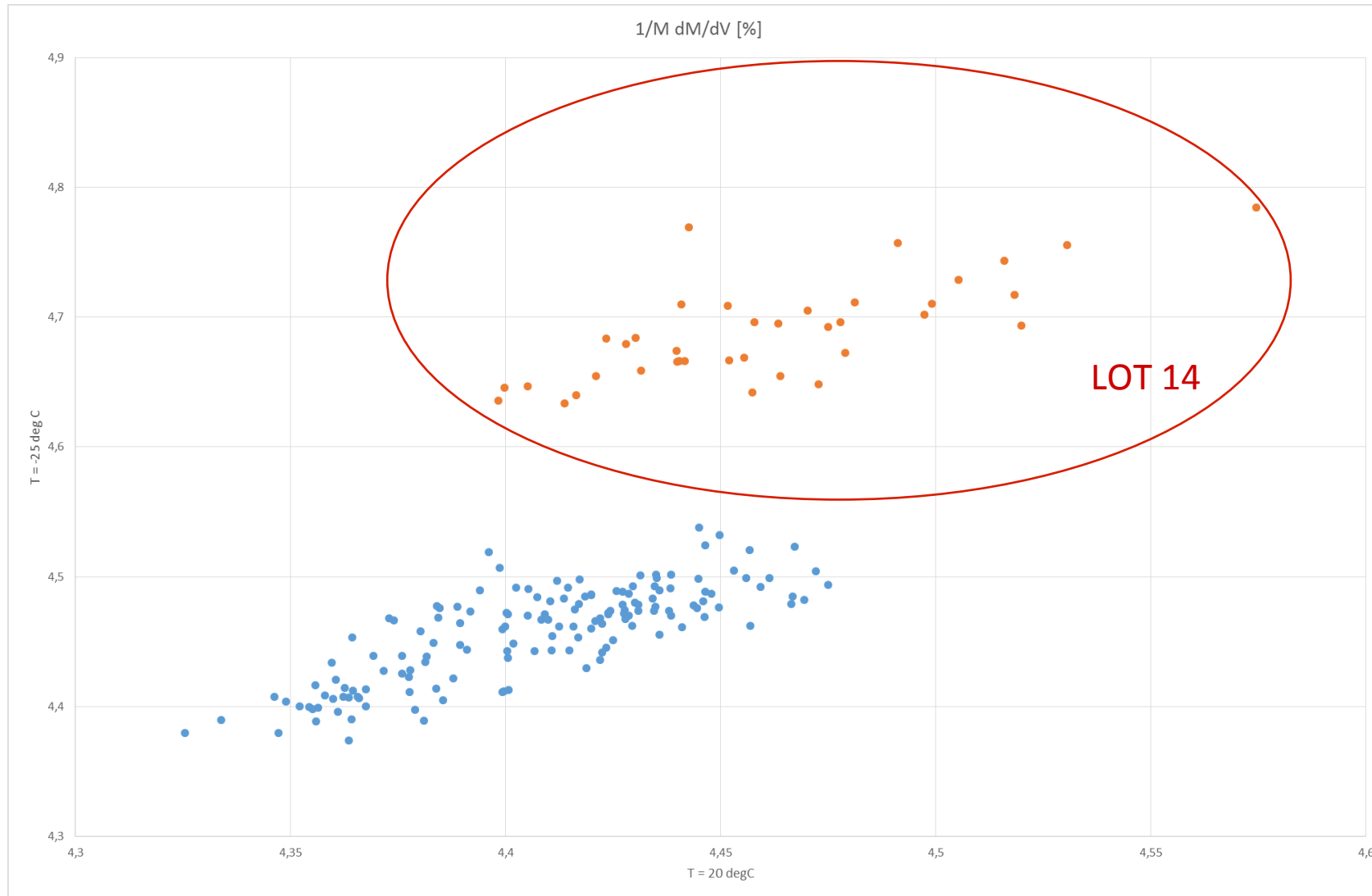
## Screening status so far:

- 679 series à 20 APDs (13580) @ all temperatures
  - data analysis and validation permanently ongoing
  - data for 20°C, 10°C and -25°C pre-validated by students
  - re-measurements done in parallel

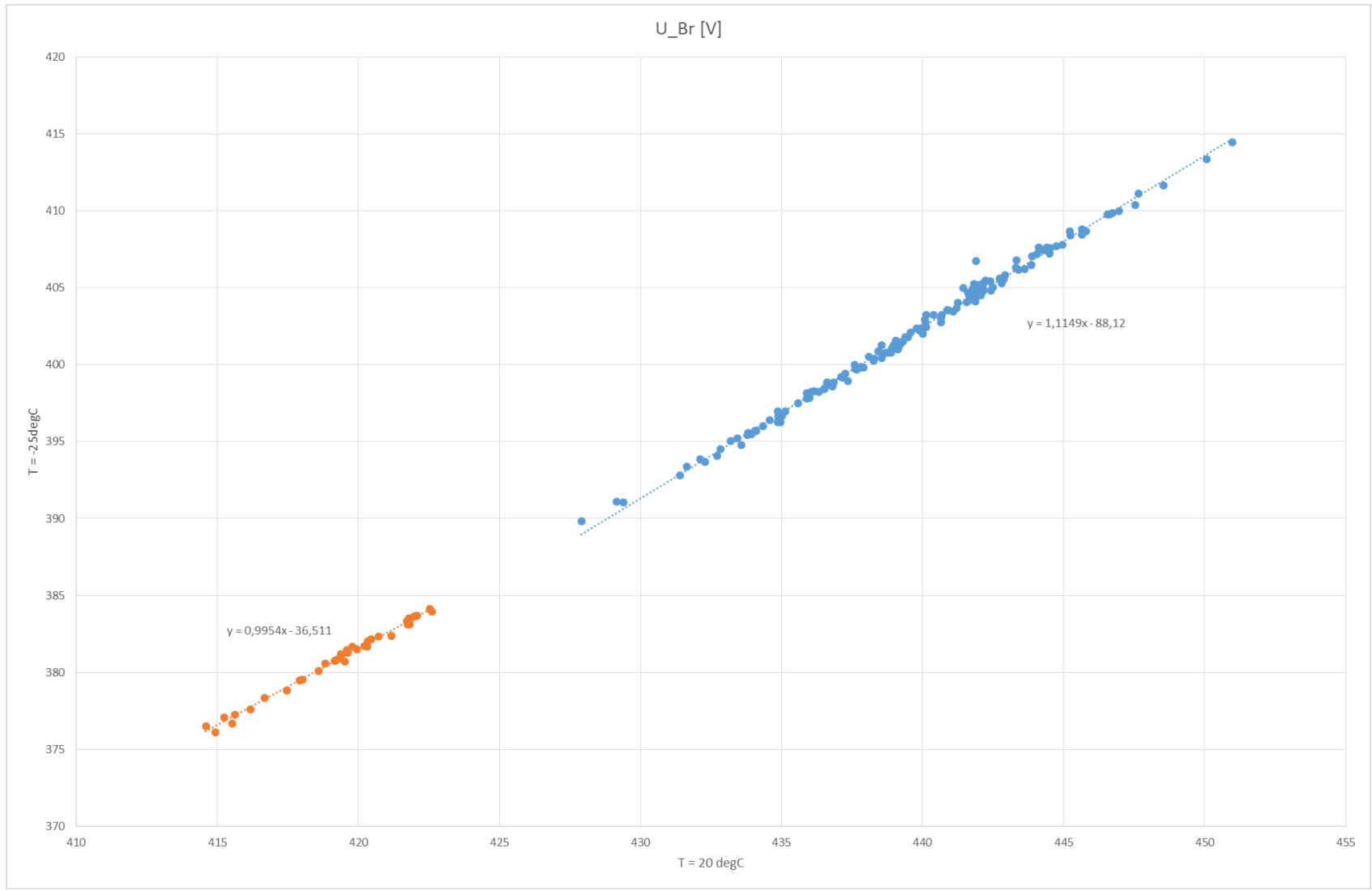
## Parameter distributions:

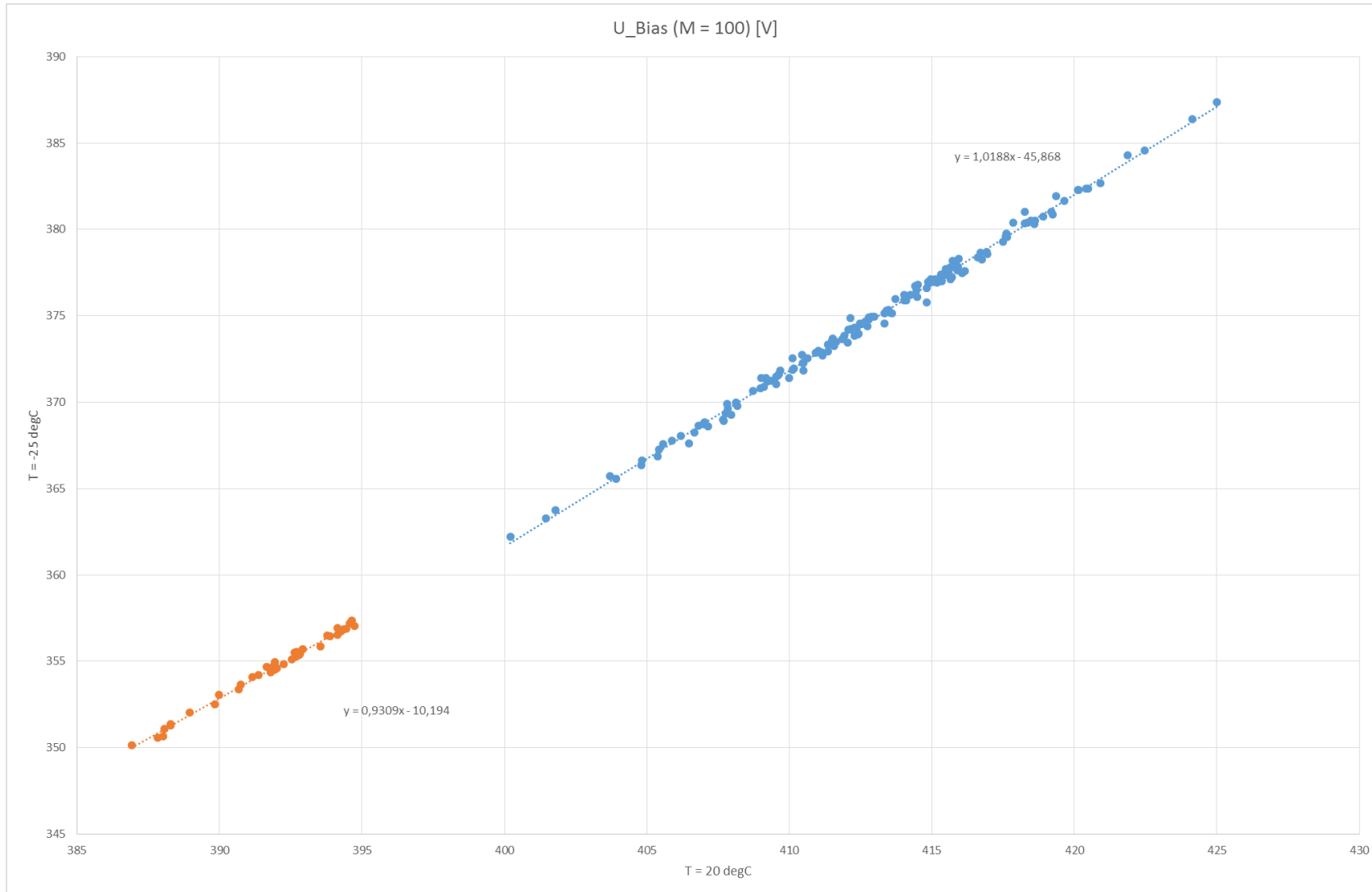
- sample of 190 APDs shown, taken from LOT 12, 13, 06 and 14
- as example bias-voltages for  $M = 100$ , breakdown voltages and  $1/M$   $dM/dV$  distributions are shown

# $1/M \text{ dM/dV [\%]} @ T = 20^\circ\text{C}$ and $T = -25^\circ\text{C}$



# $U_{Br}$ [V] @ $T = 20^\circ\text{C}$ and $T = -25^\circ\text{C}$



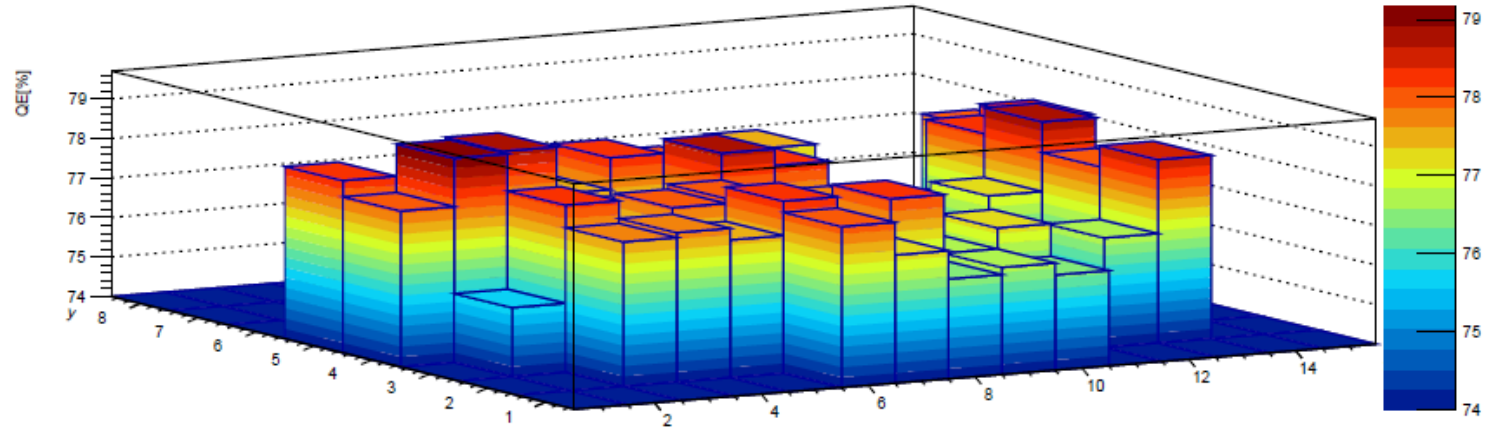


## QE distributions:

- APD-Lab has participated in Summer students program this summer
  - topic: QE value distribution depending on APD wafer positions
  - has been done for 6 wafers of different LOTs
    - wafers selected in terms of manufacturer yield > 60 %
    - are used as guideline for maximum existing QE-values @ 420 nm

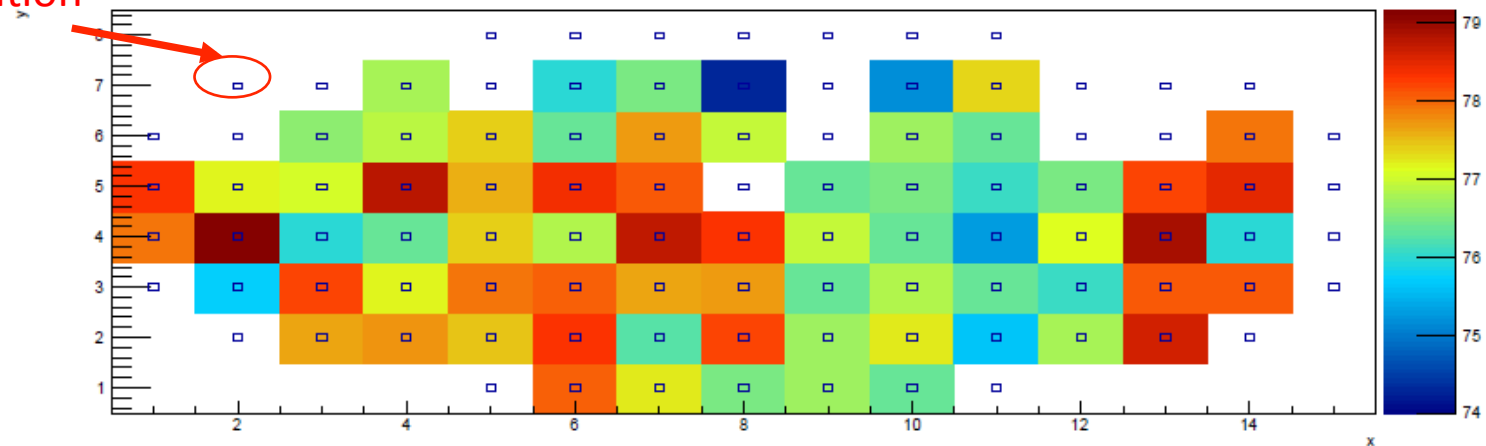
# QE @ 420 nm for different wafers

Legoplot LOT 14 Wafer 16



Empty APD waferposition

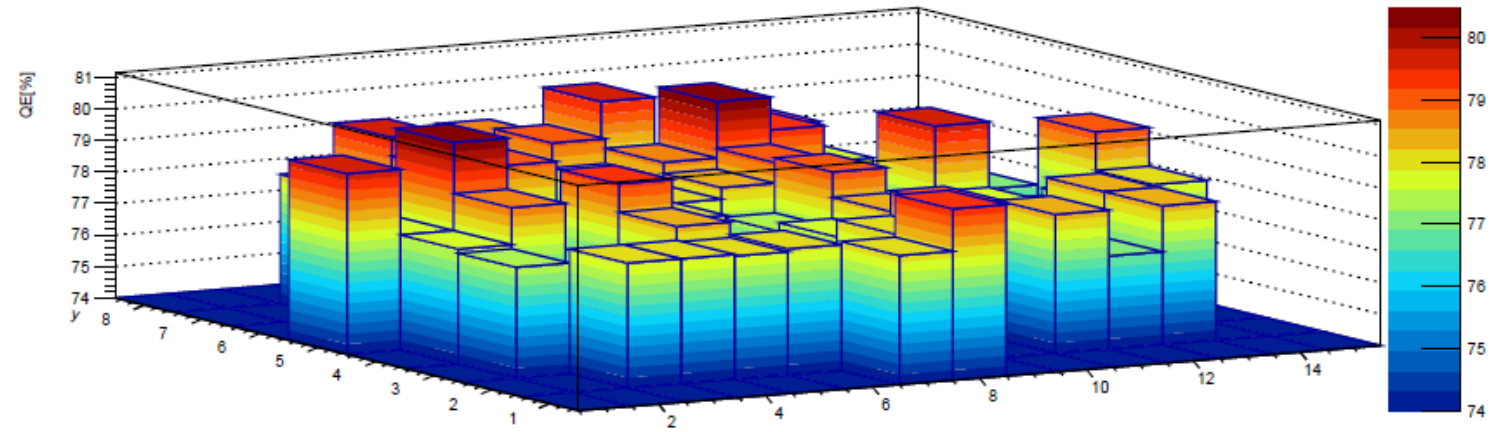
Contour LOT 14 Wafer 16



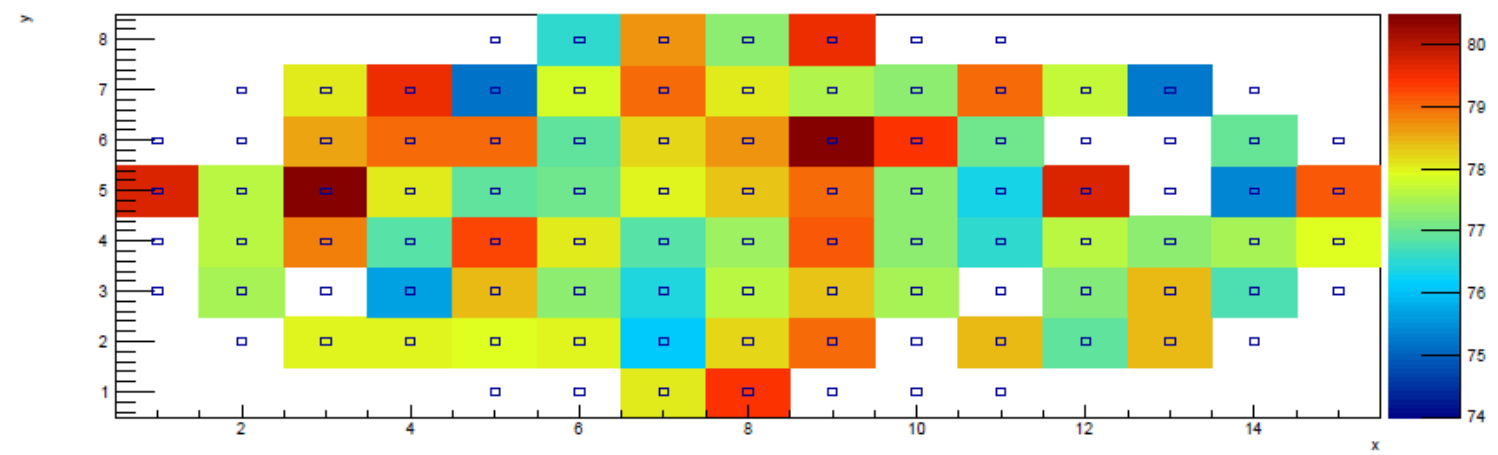


# QE @ 420 nm for different wafers

Legoplot LOT 15 Wafer 01

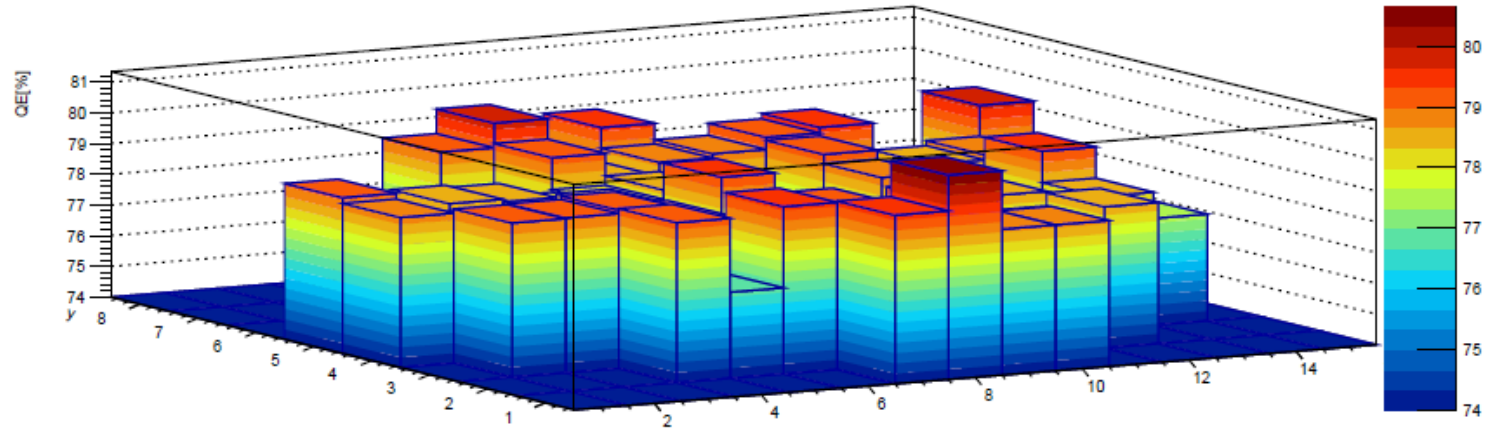


Contour LOT 15 Wafer 01

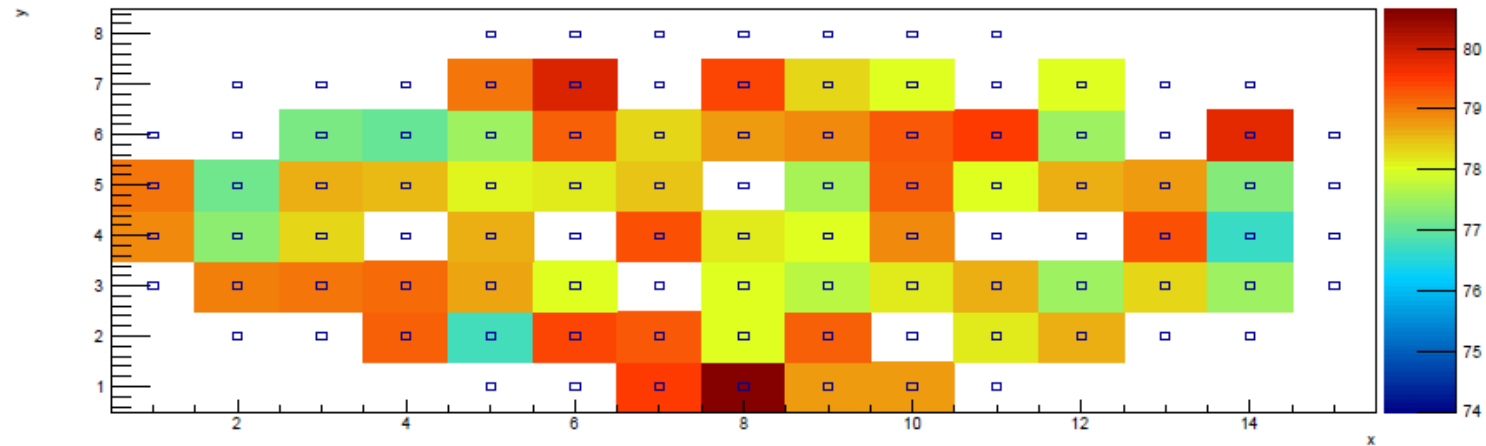


# QE @ 420 nm for different wafers

Legoplot LOT 16 Wafer 02

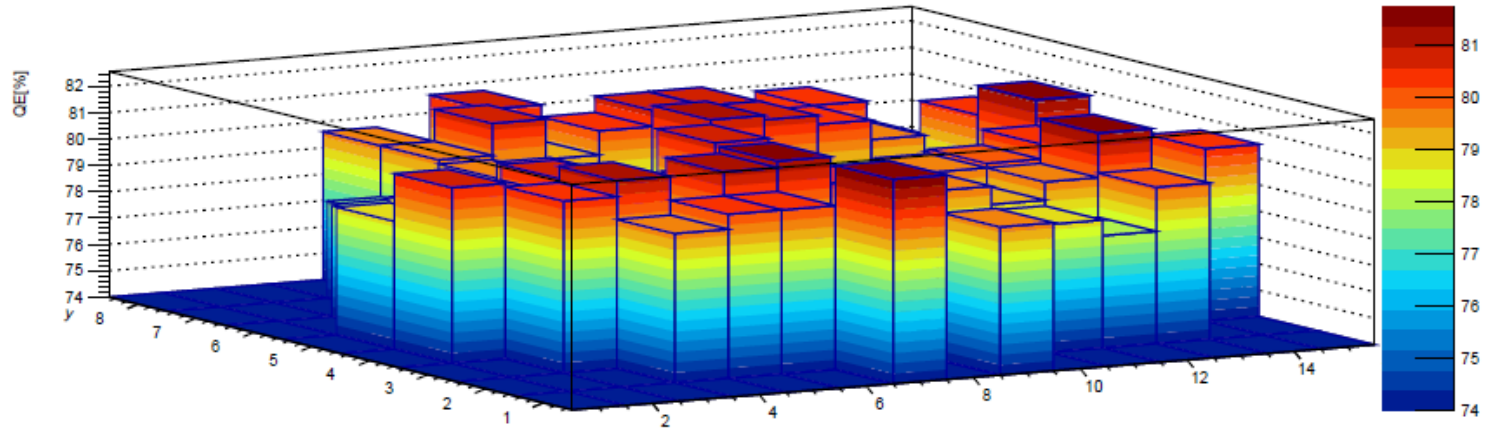


Contour LOT 16 Wafer 02

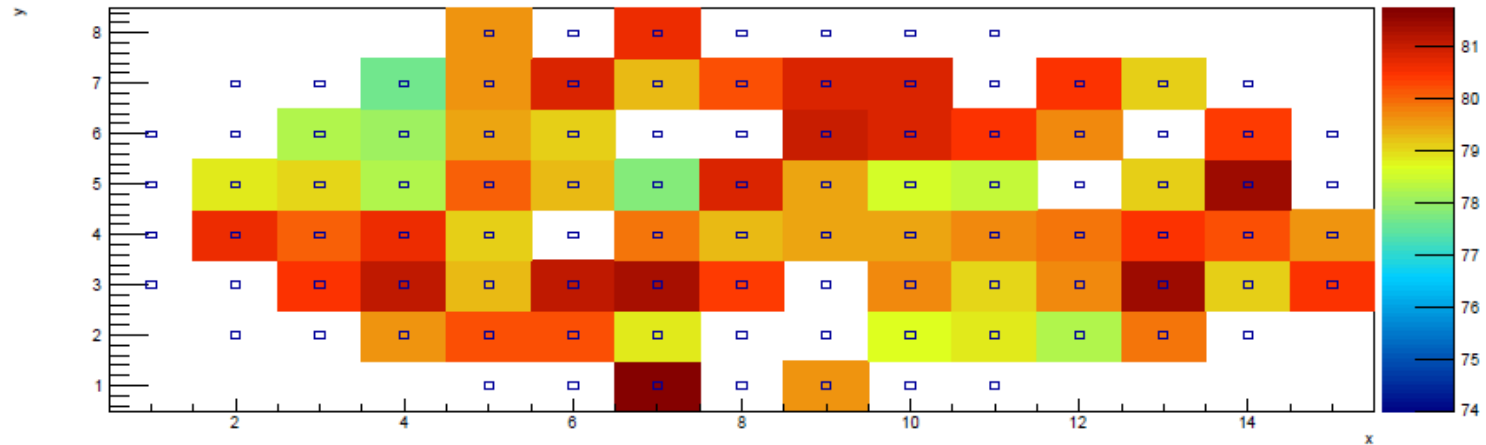


# QE @ 420 nm for different wafers

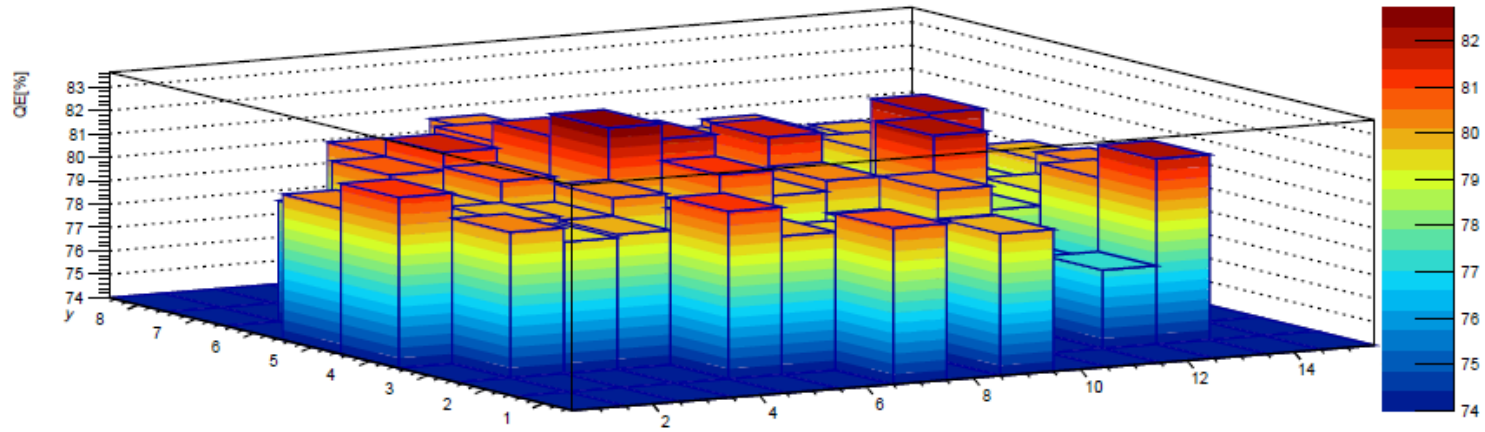
Legoplot LOT 16 Wafer 06



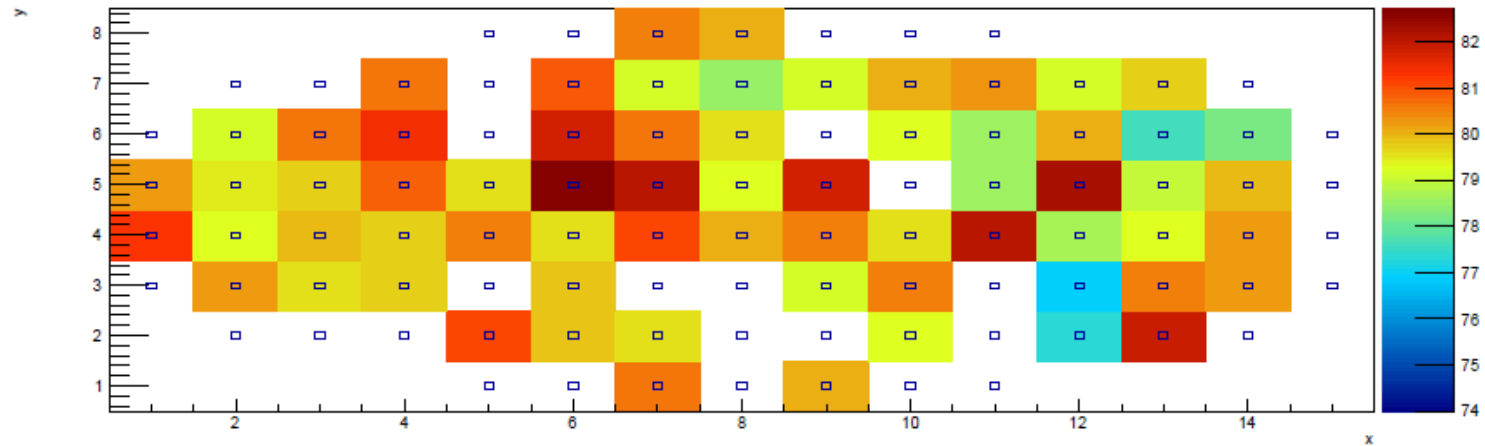
Contour LOT 16 Wafer 06



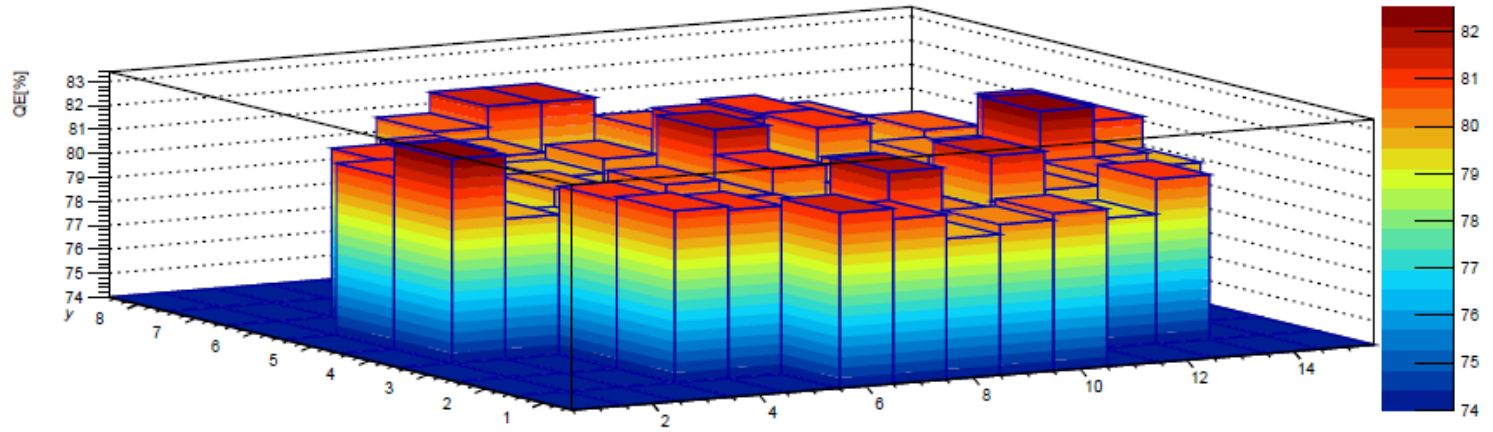
Legoplot LOT 16 Wafer 07



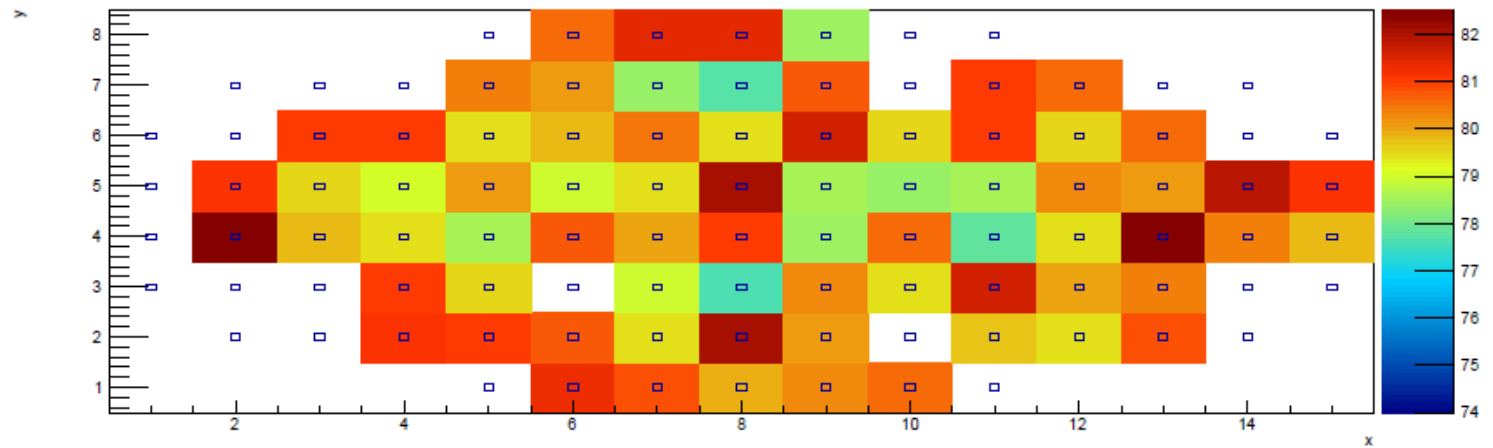
Contour LOT 16 Wafer 07



Legoplot LOT 16 Wafer 10



Contour LOT 16 Wafer 10



# $M(\lambda) = \text{const.}$ or $M(\lambda) \neq \text{const.}$ ?

## Method:

➤ Measurement of wavelength dependence of APD photo current  $I_{\text{ph}}$  at different bias voltages

$U_1 \rightarrow 60 > M > 1$

$U_2 \rightarrow 150 > M > 60$

$U_3 \rightarrow 250 > M > 150$

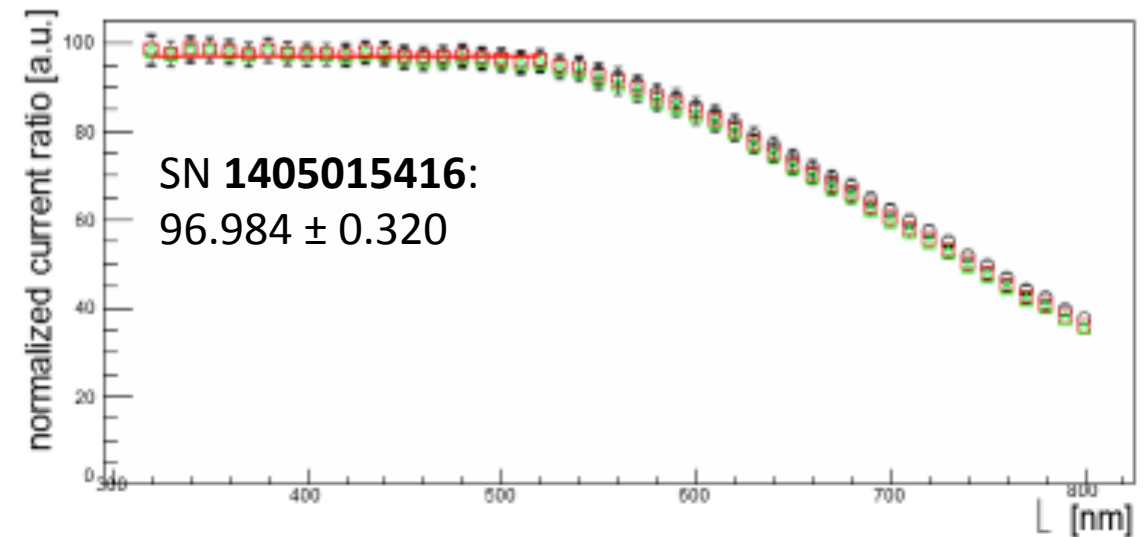
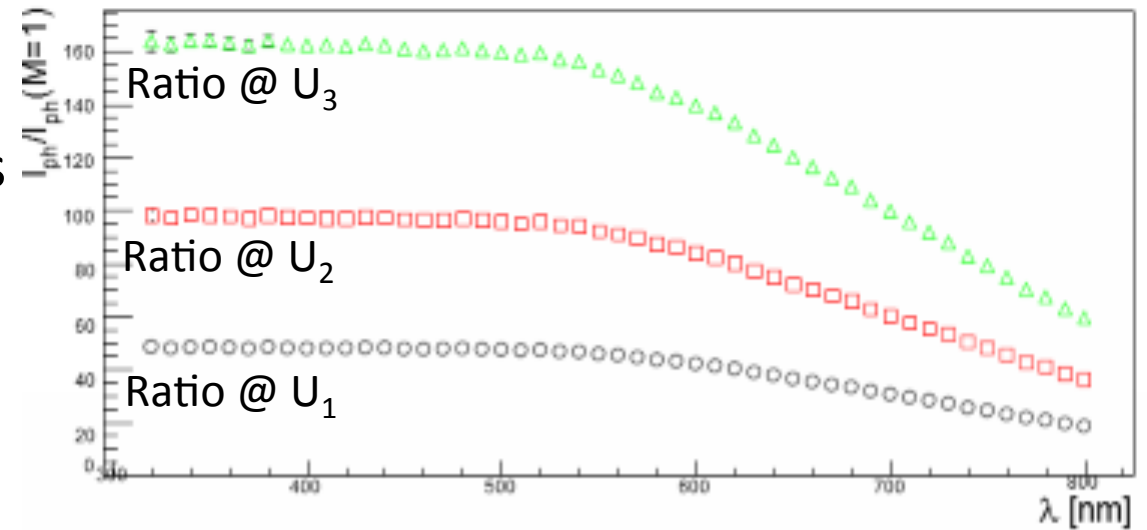
➤ Normalization with photo current @  $M = 1$

➤ Overlaying of the curves ends up in: 

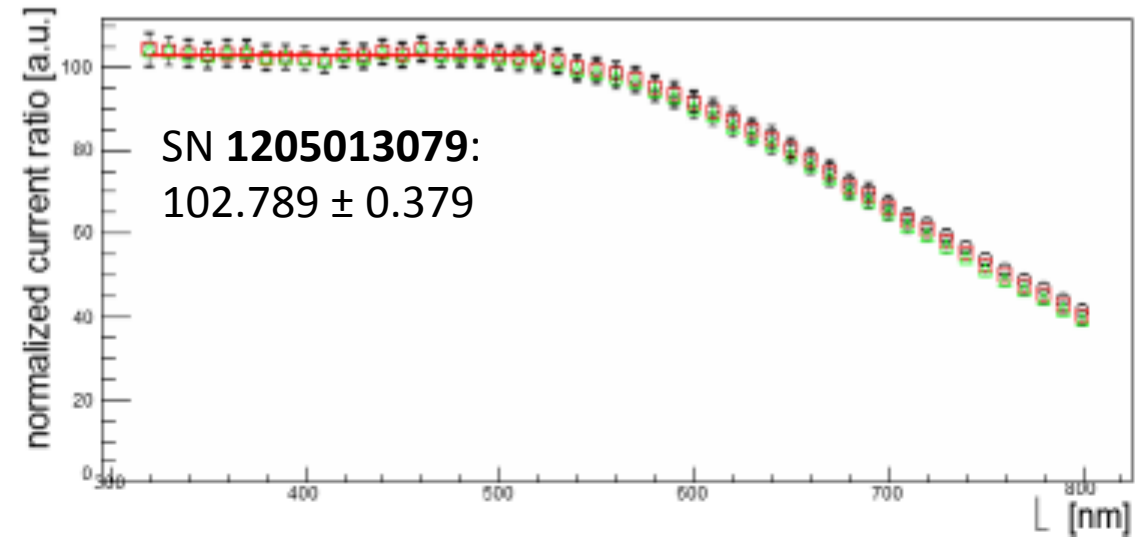
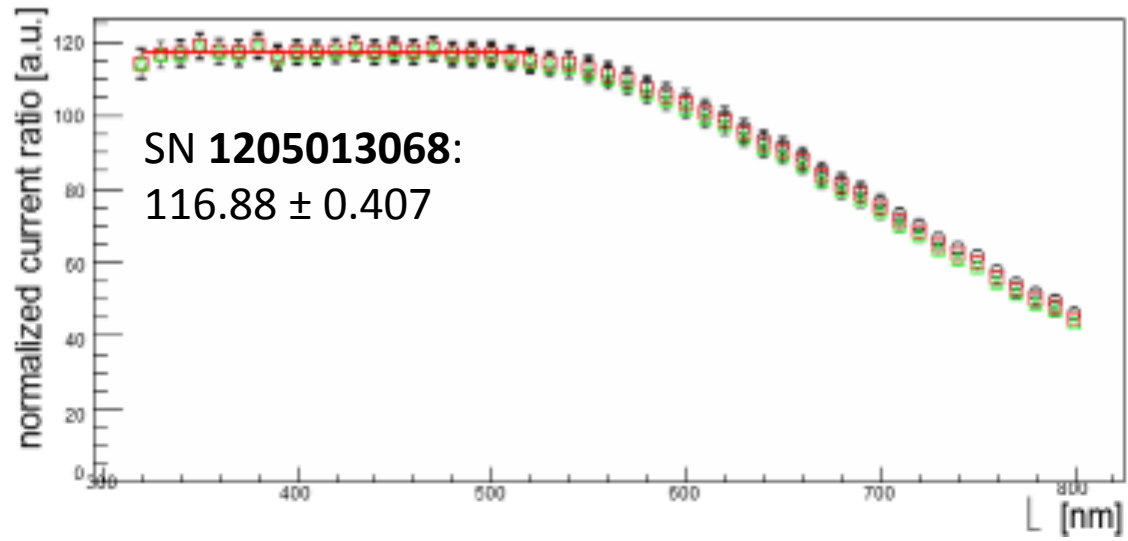
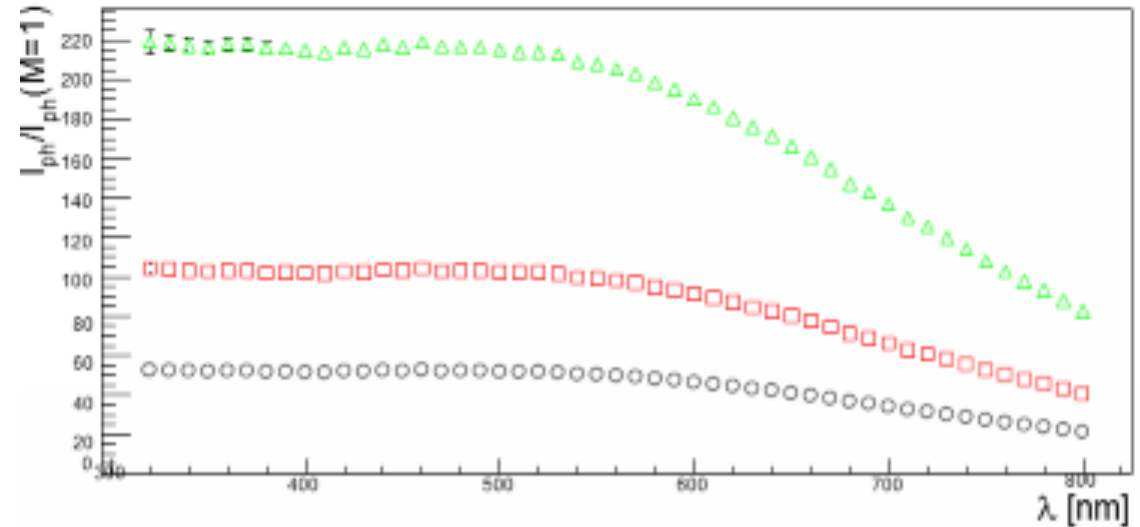
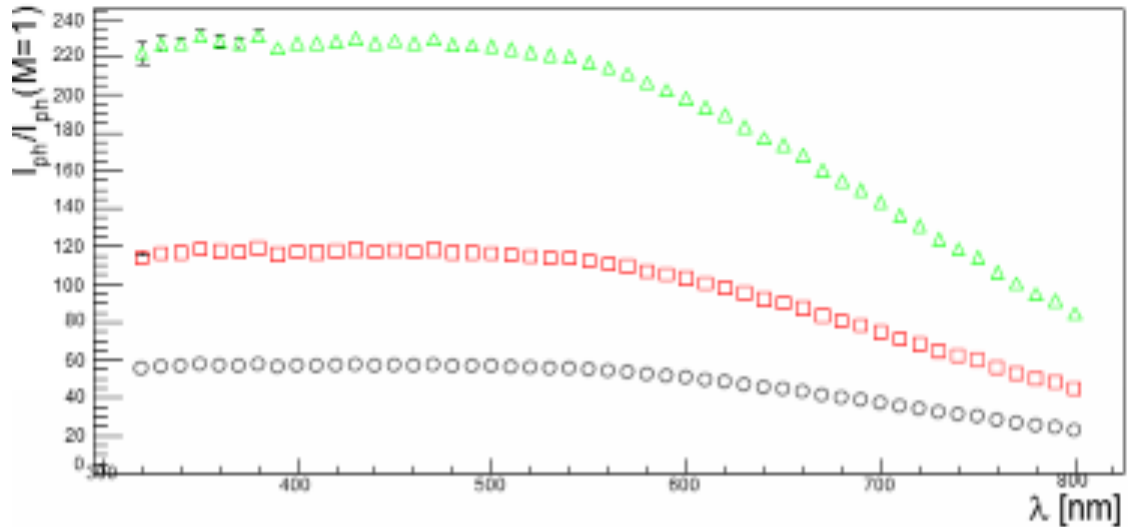
➤ Procedure done for 5 APDs:

➤ Parameter of „Pol0-fit“ up to 520 nm shown

➤ APDs show constant gain behavior up to ~ 520 nm with precision of  $\Delta M/M \cong \pm 0.3 \%$



# $M(\lambda) = \text{const.}$ or $M(\lambda) \neq \text{const.}$ ?





# M ( $\lambda$ ) = const. or M ( $\lambda$ ) $\neq$ const ?

