

SiPM NUV HD HFF

3x3 mm

Corrado Altomare, Francesca Pantaleo, Roberta Pillera and Fabio Gargano on
behalf of the Bari HERD group

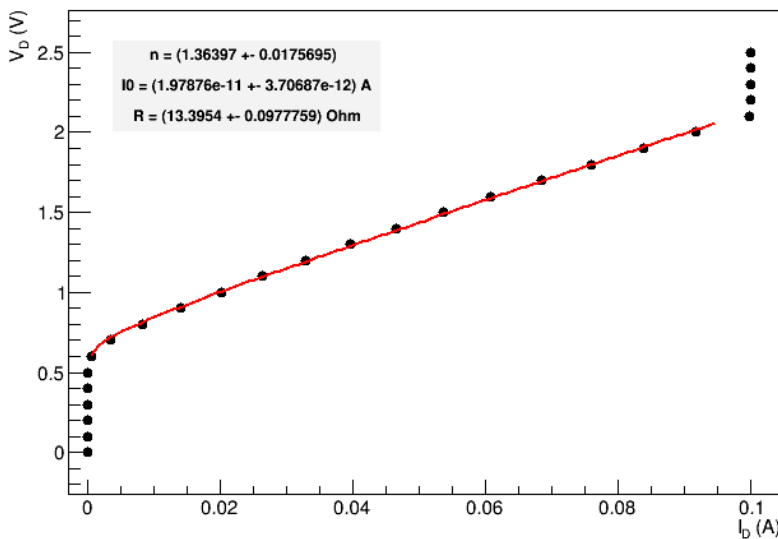
18/2/2022

FBK AdvanSiD

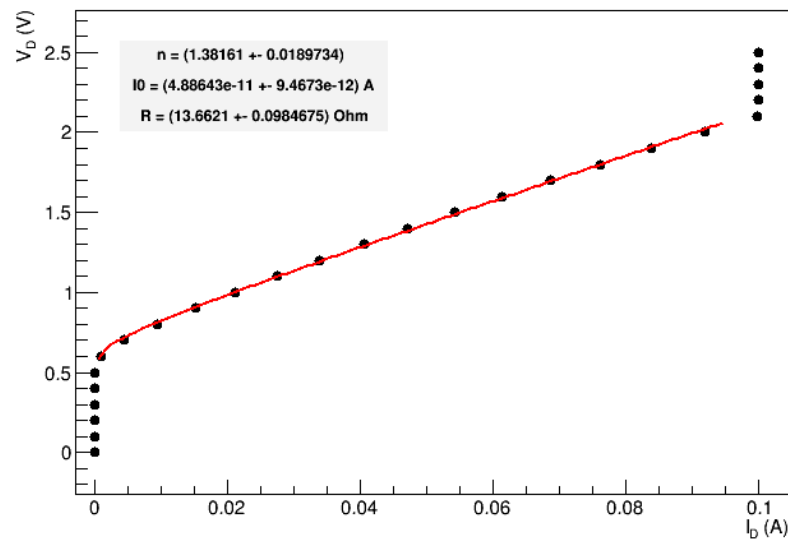
- NUV-HD High Fill Factor
- Size 3x3 mm²
- IV characterization. Breakdown voltage VS Temperature
- Temperature test: from -10 to 10 °C (with laser) from -20 to 30 °C (Dark)

IV Analysis: Forward polarity

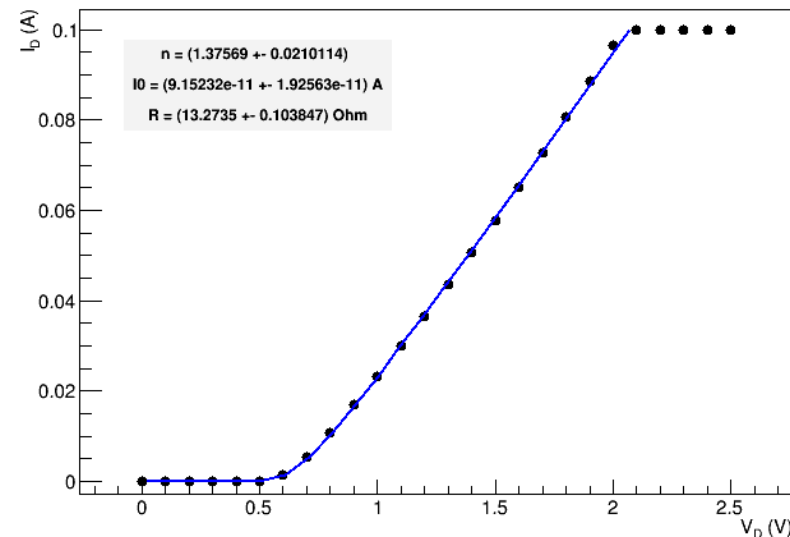
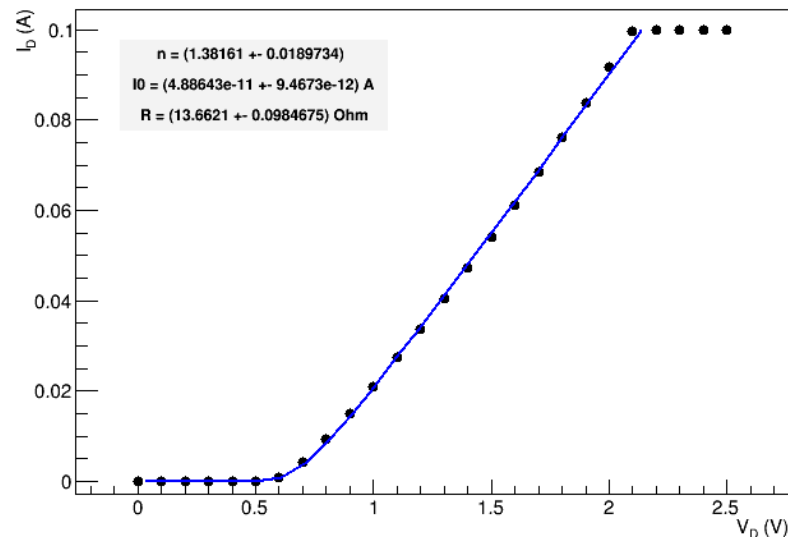
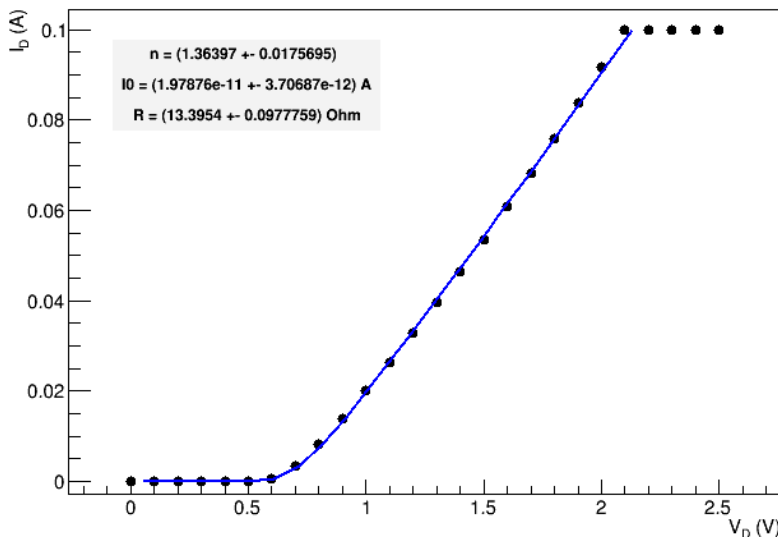
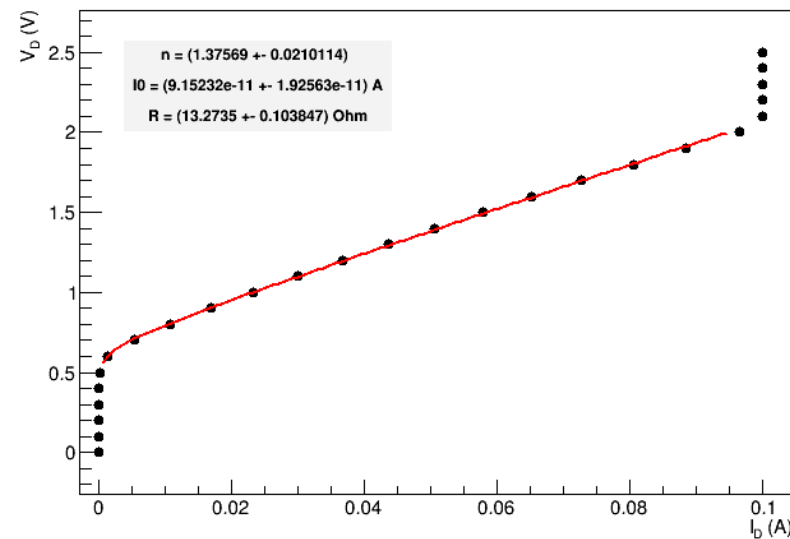
Temperature 10 °C



Temperature 20 °C

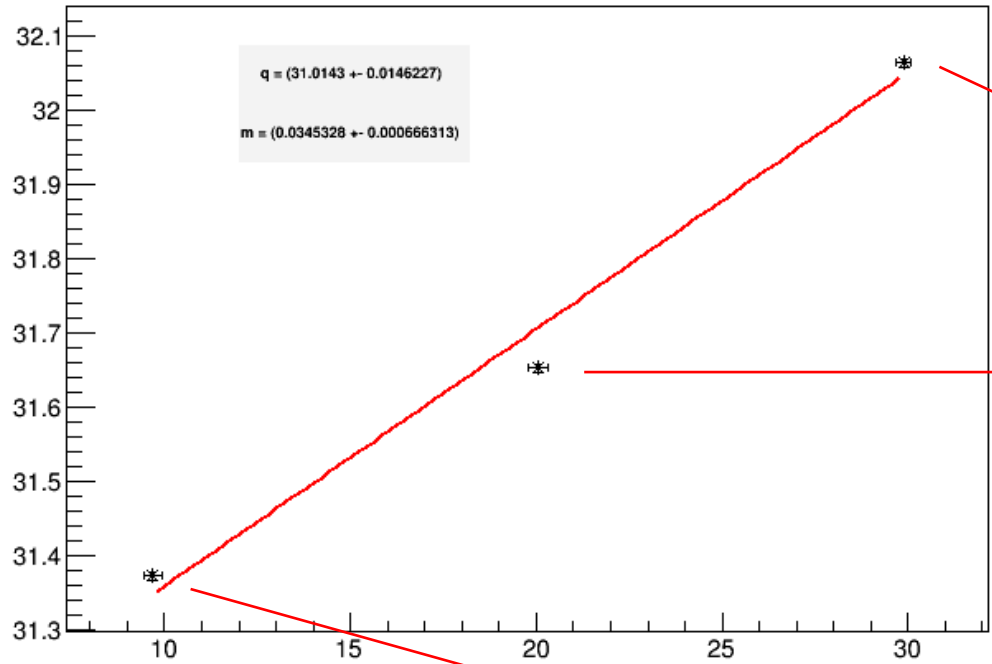


Temperature 30 °C

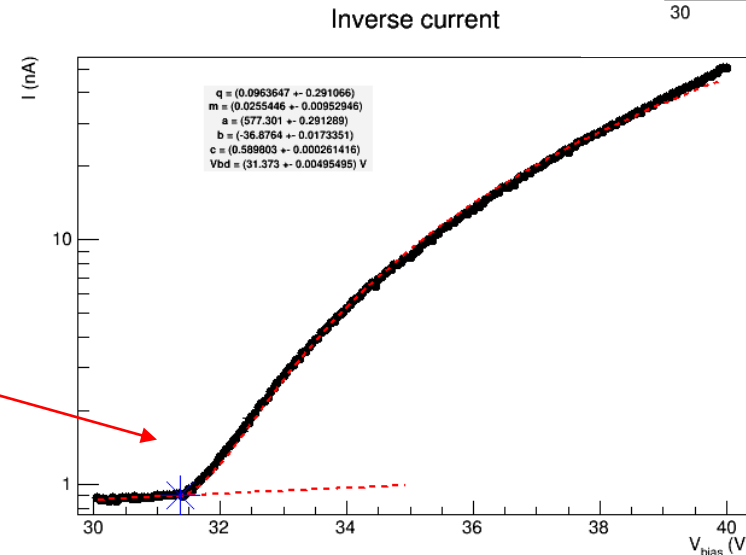
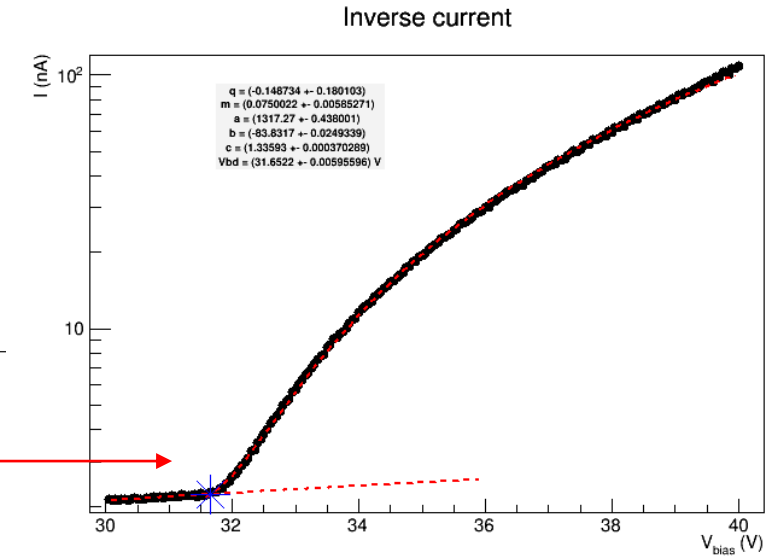
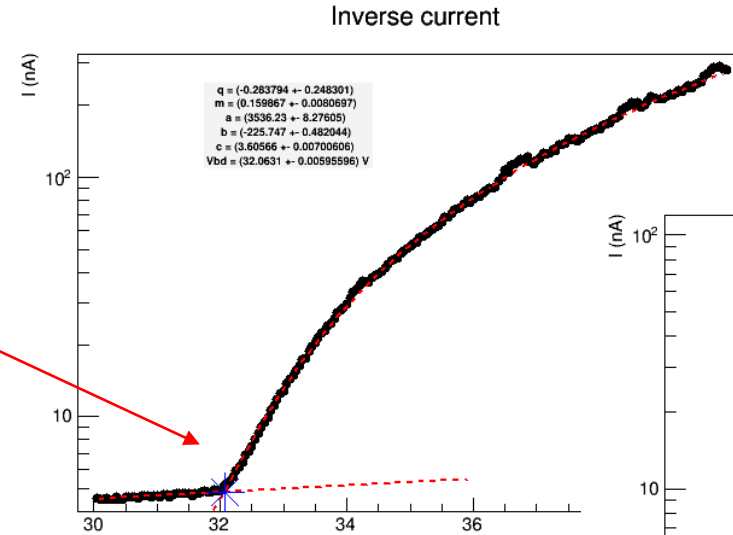


IV Analysis: Reverse polarity

BDV [V]

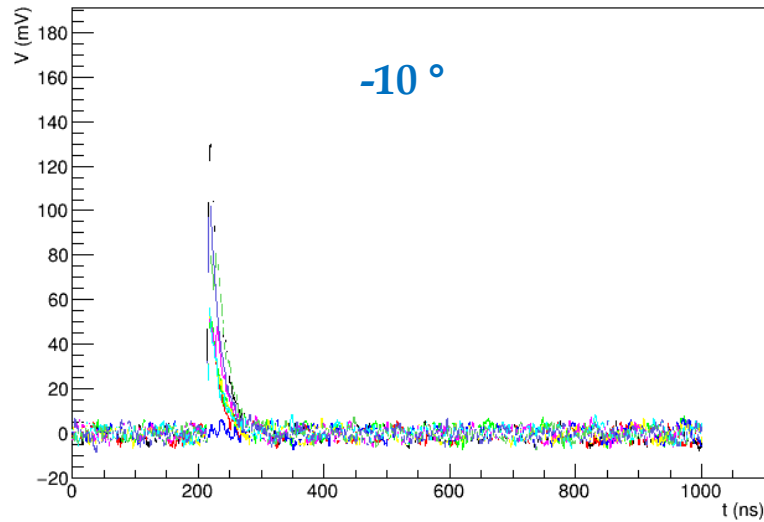


Temperature [°C]

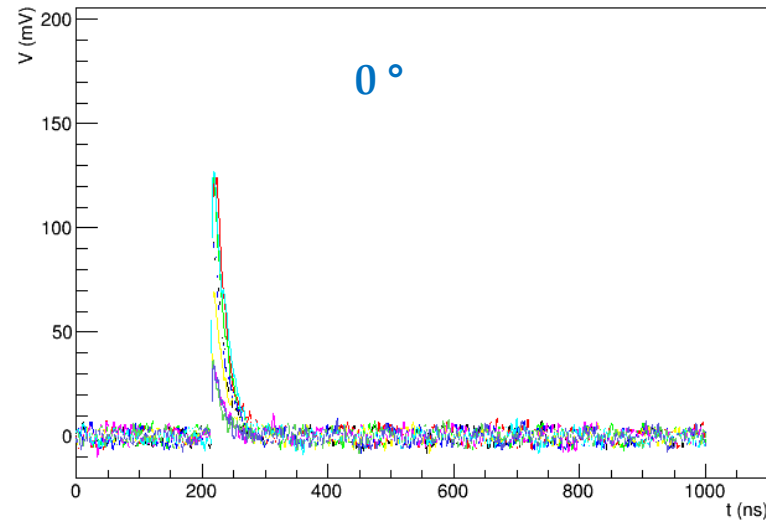


Light Analysis: 38 V

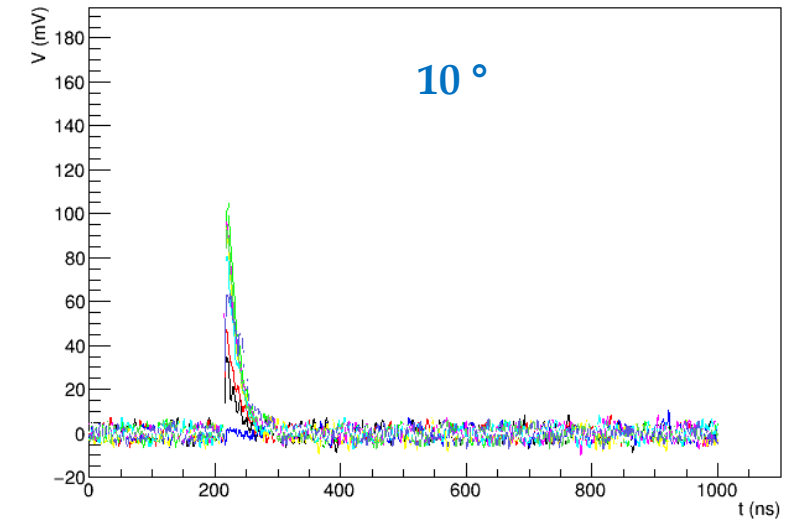
Waveform



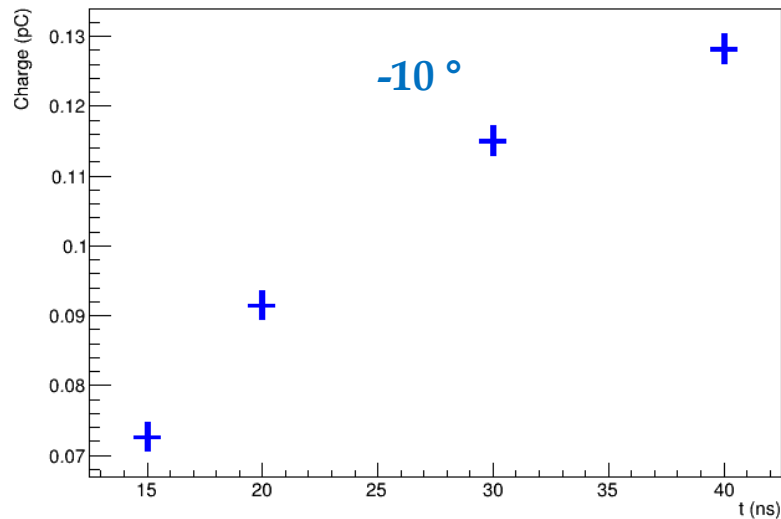
Waveform



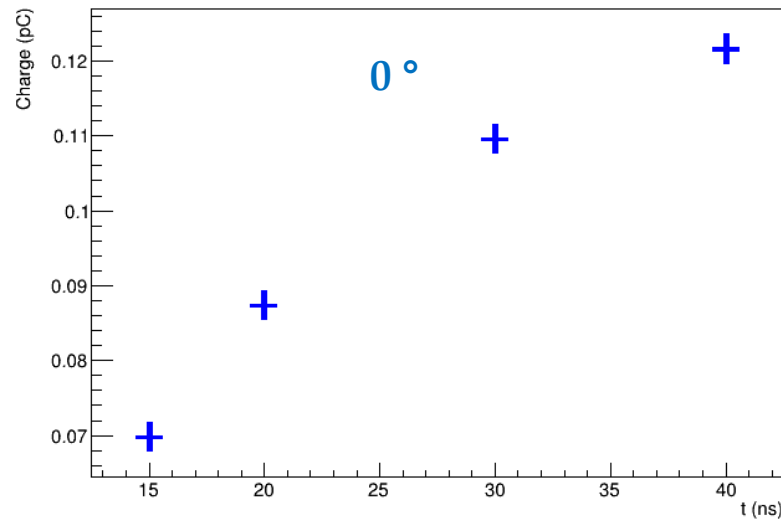
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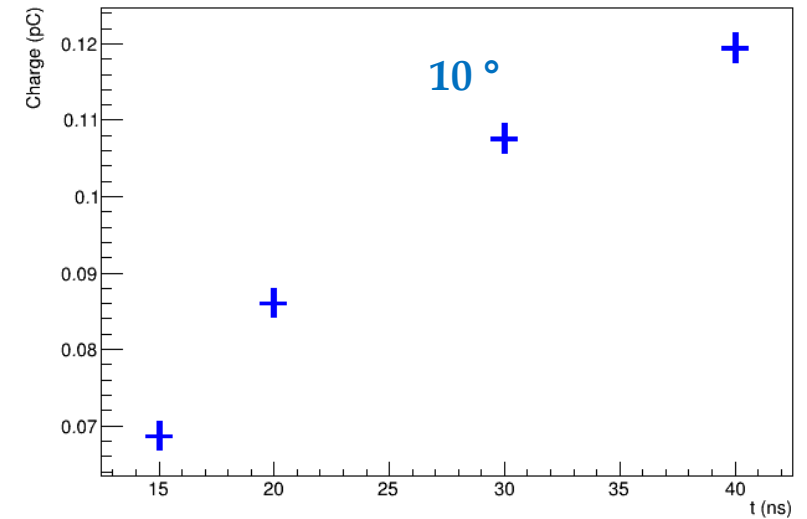
Charge vs Integration Time



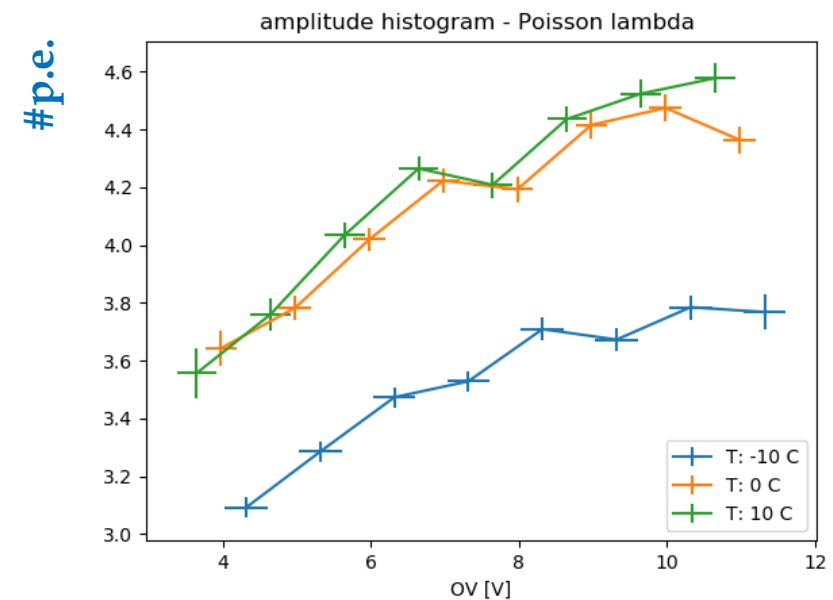
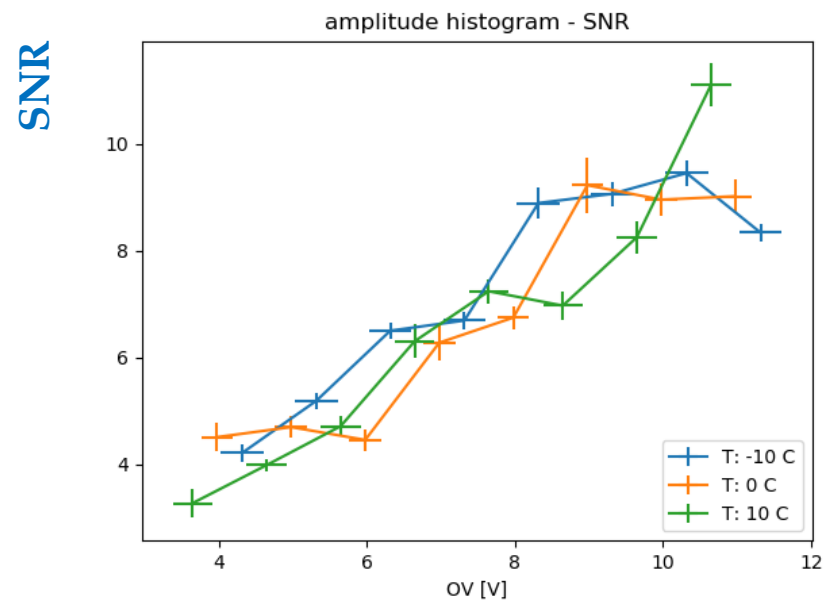
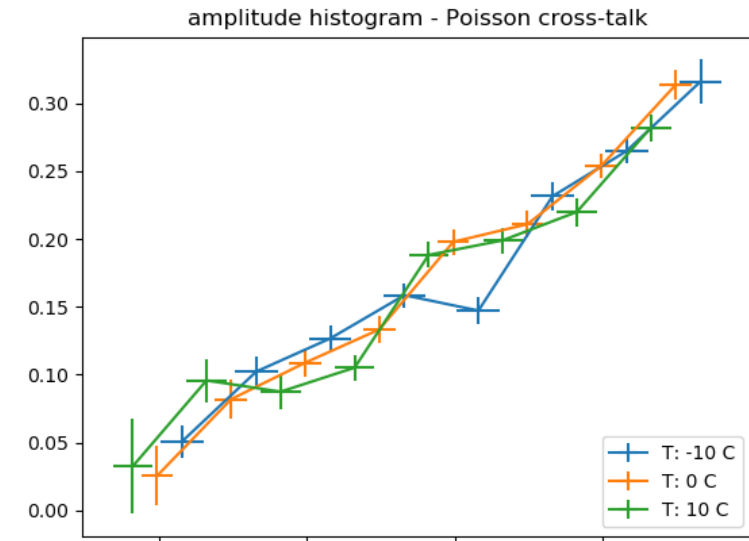
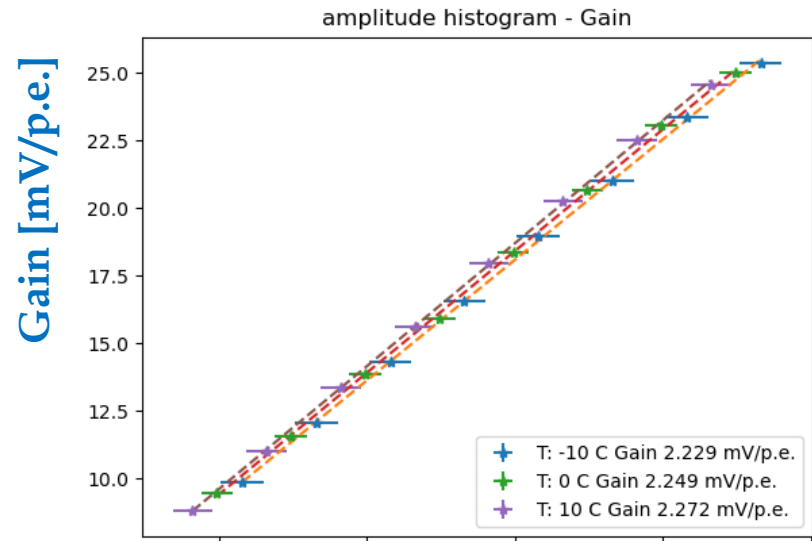
Charge vs Integration Time



Charge vs Integration Time

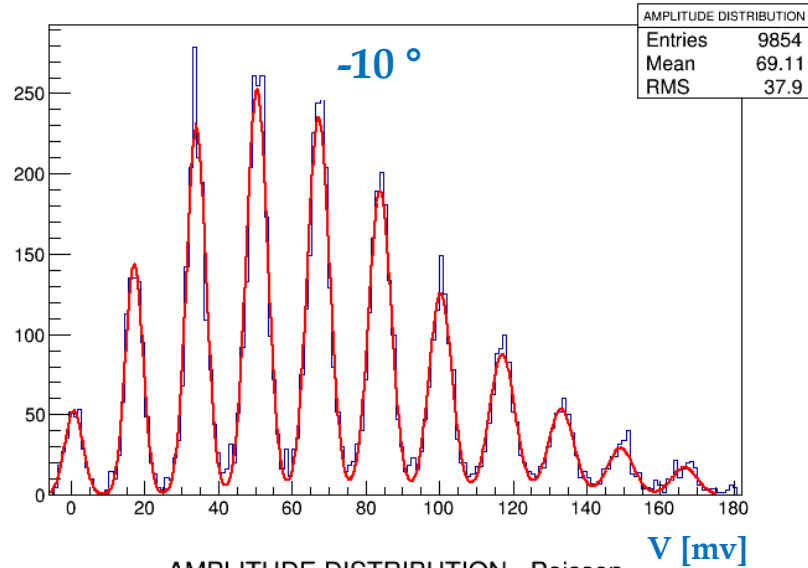


Light Analysis (Amplitude)

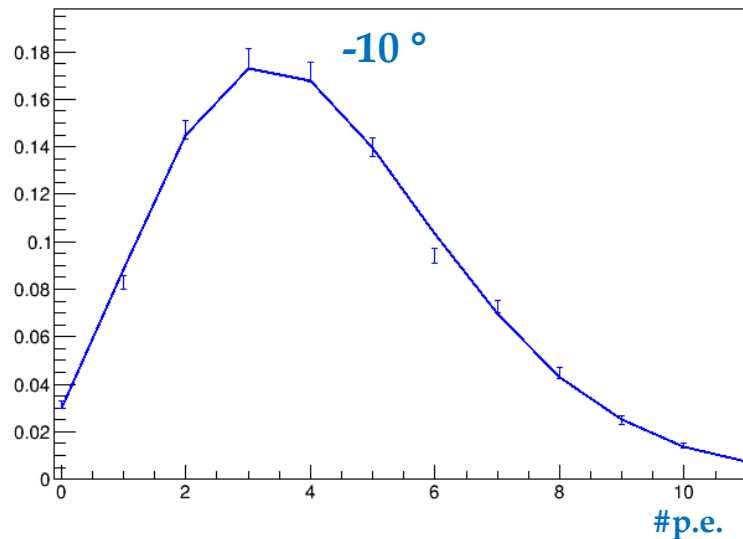


Light Analysis (Amplitude) : 38 V

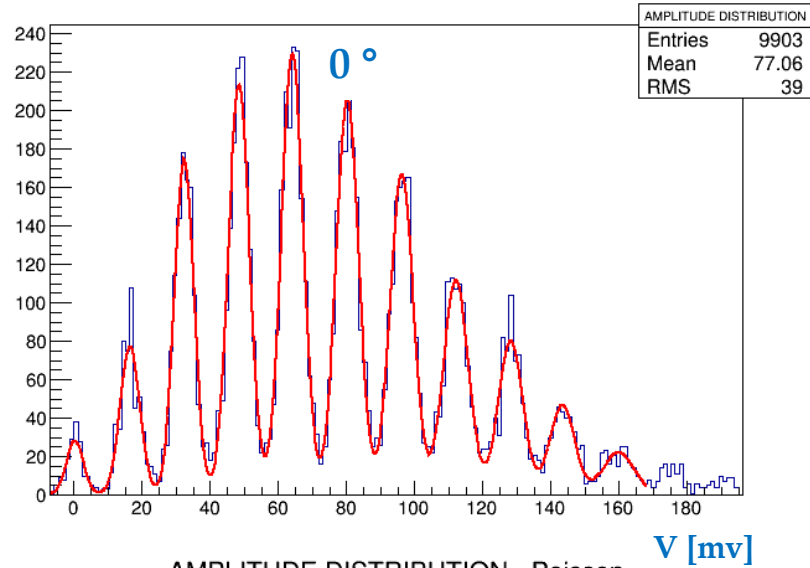
AMPLITUDE DISTRIBUTION



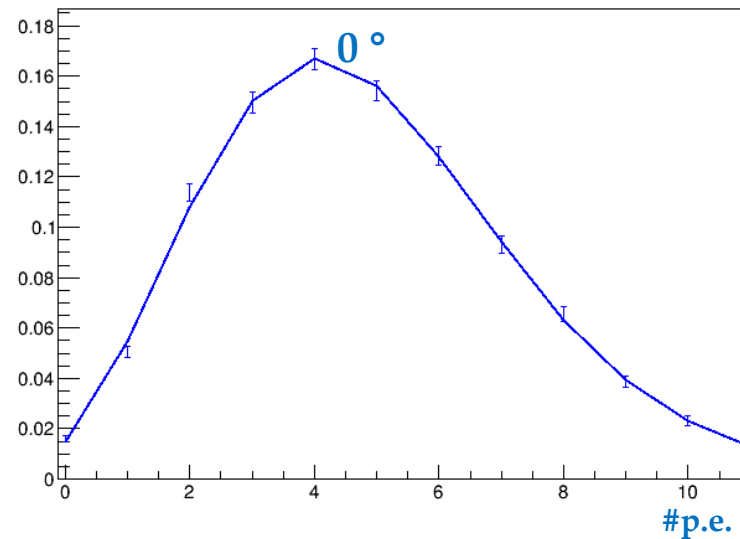
AMPLITUDE DISTRIBUTION - Poisson



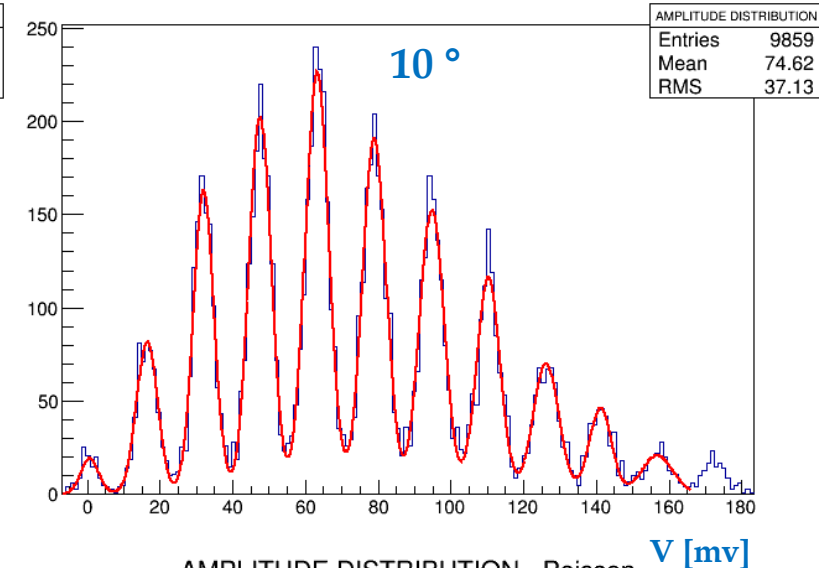
AMPLITUDE DISTRIBUTION



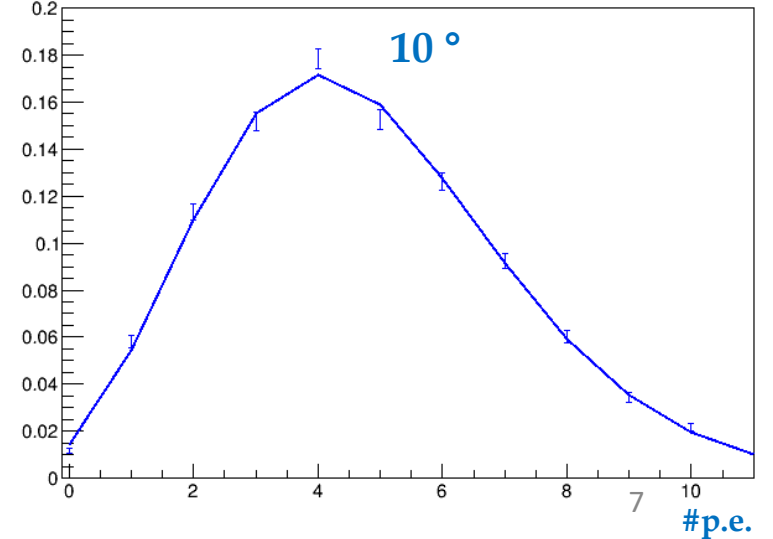
AMPLITUDE DISTRIBUTION - Poisson



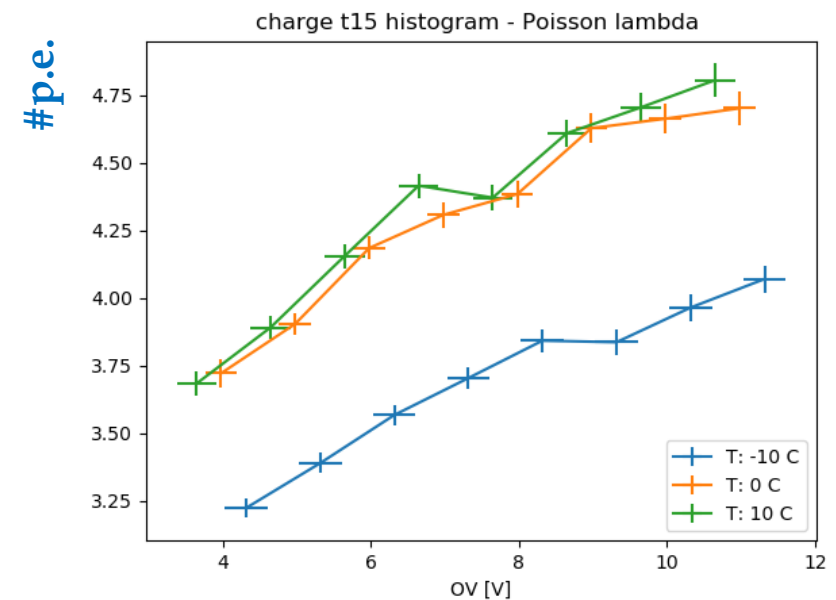
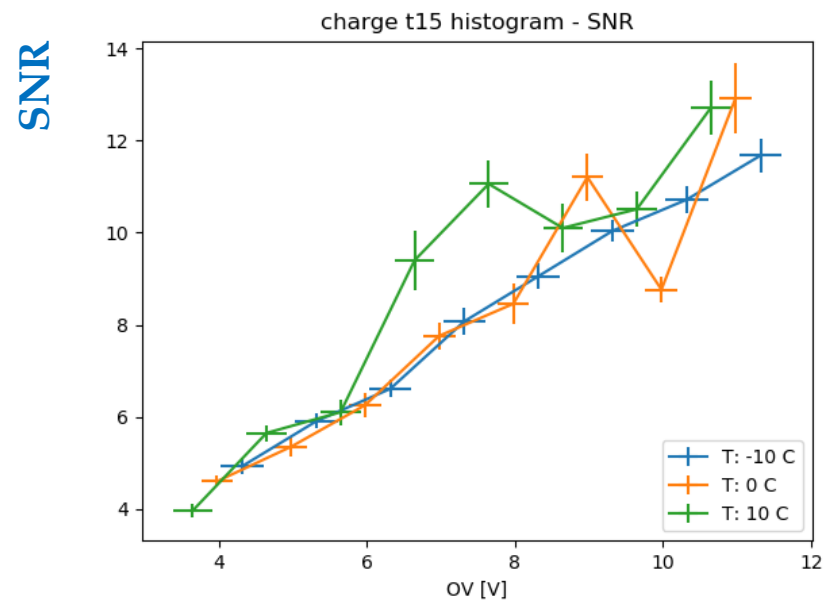
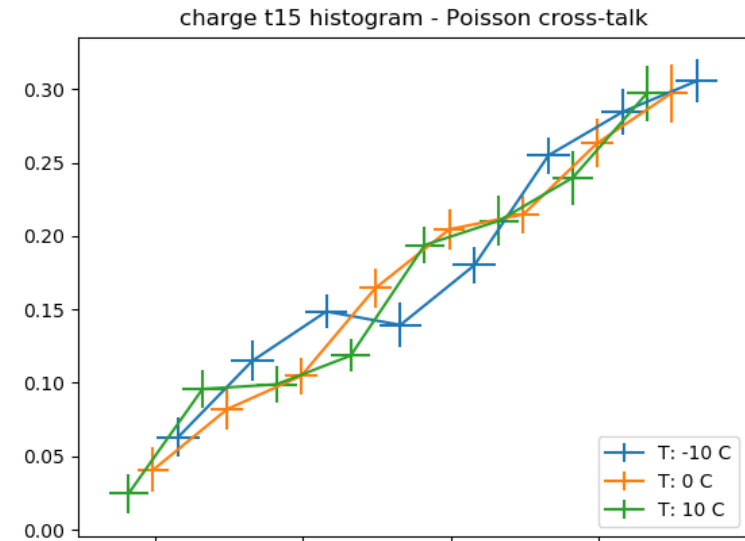
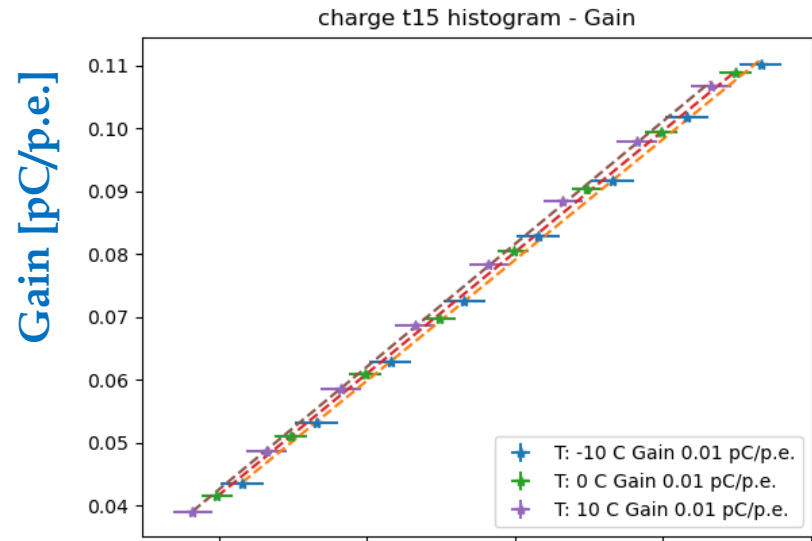
AMPLITUDE DISTRIBUTION



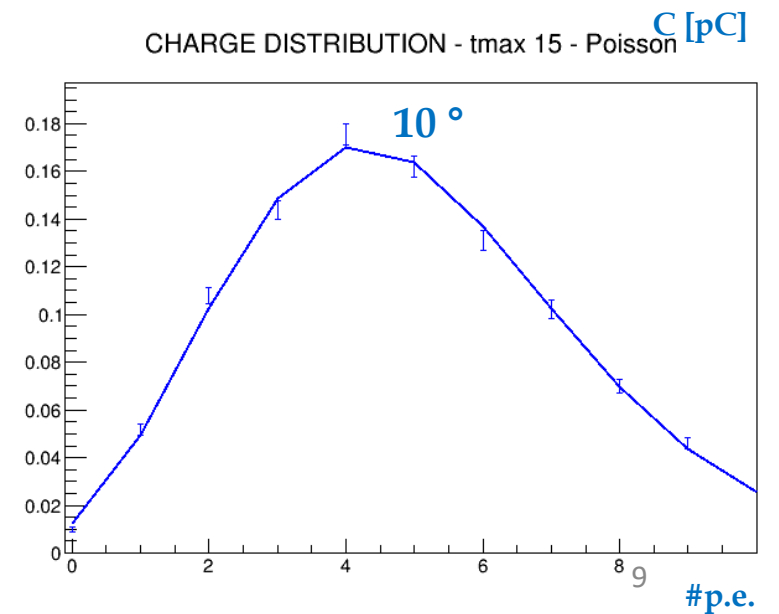
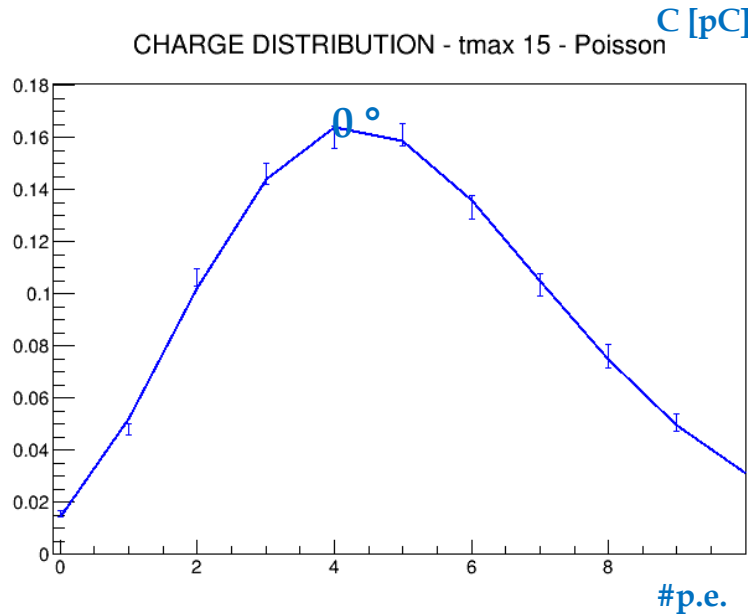
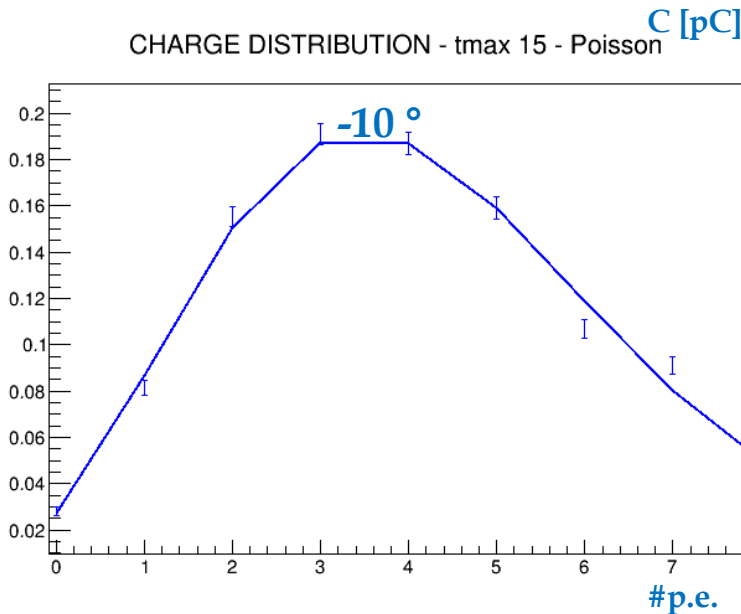
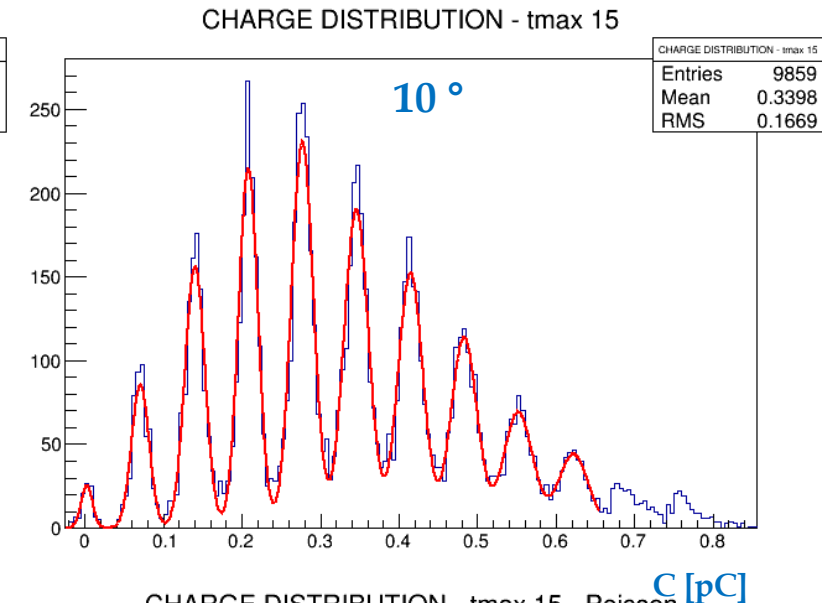
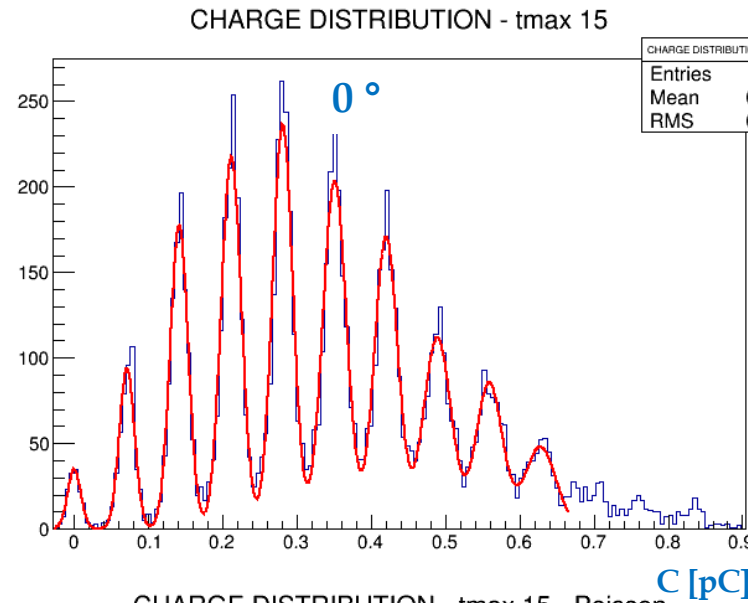
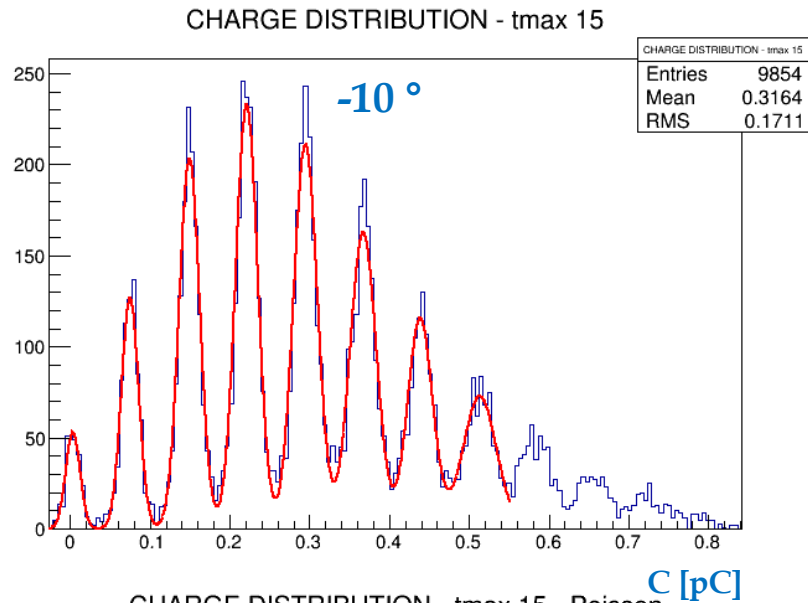
AMPLITUDE DISTRIBUTION - Poisson



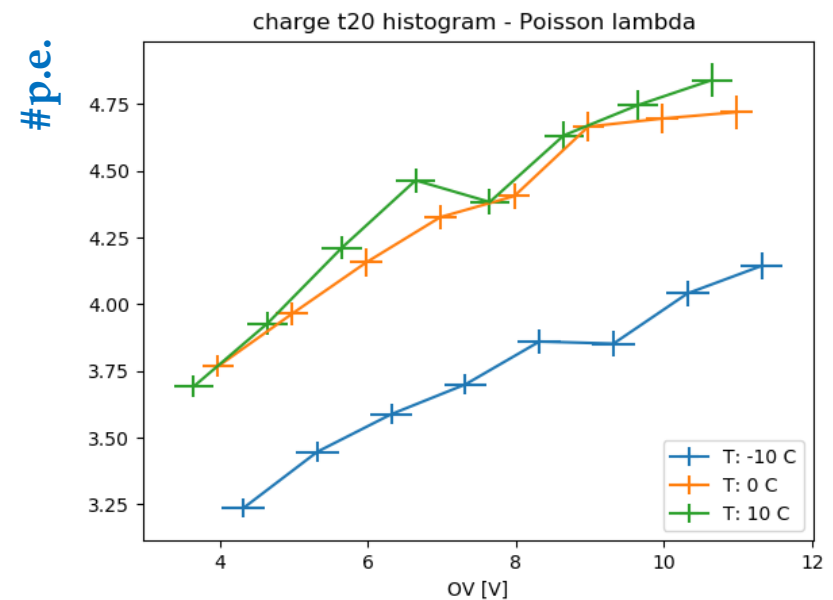
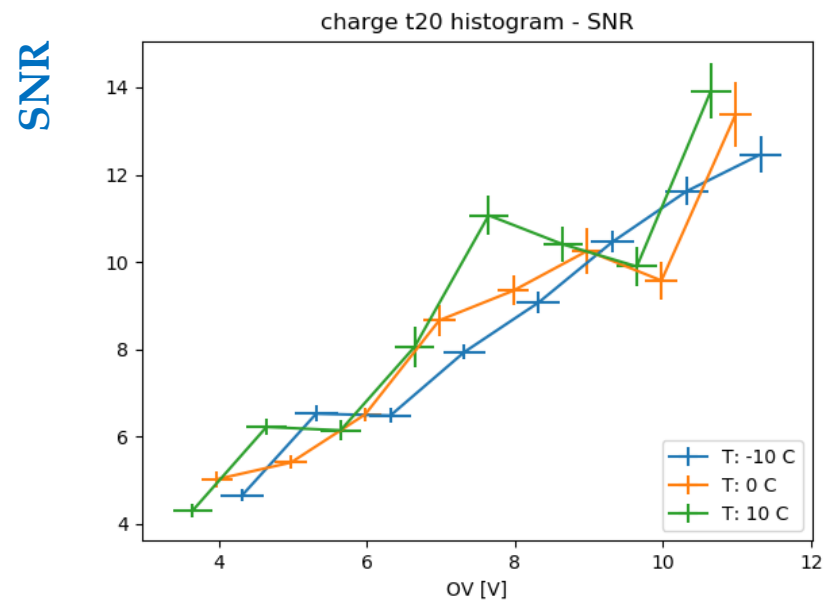
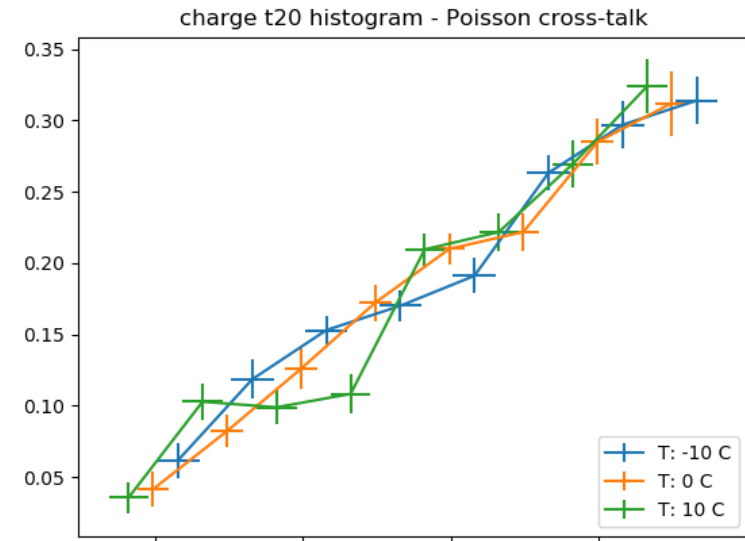
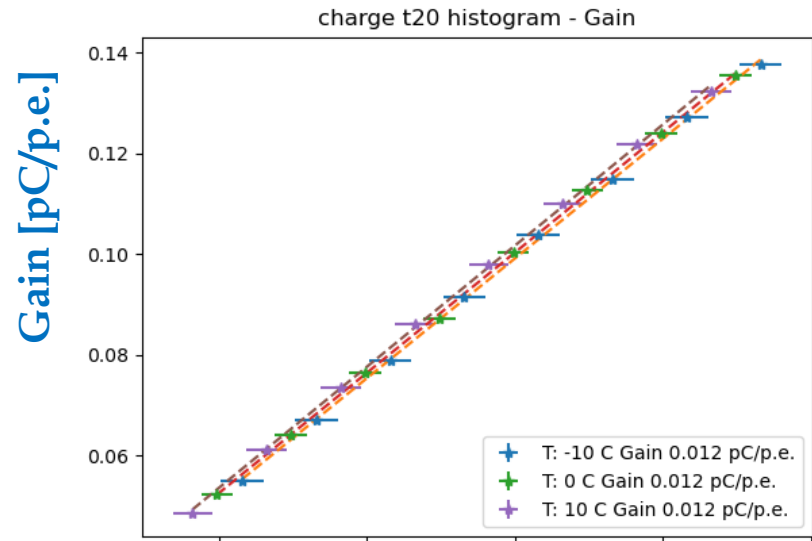
Light Analysis (Integration time 15 ns)



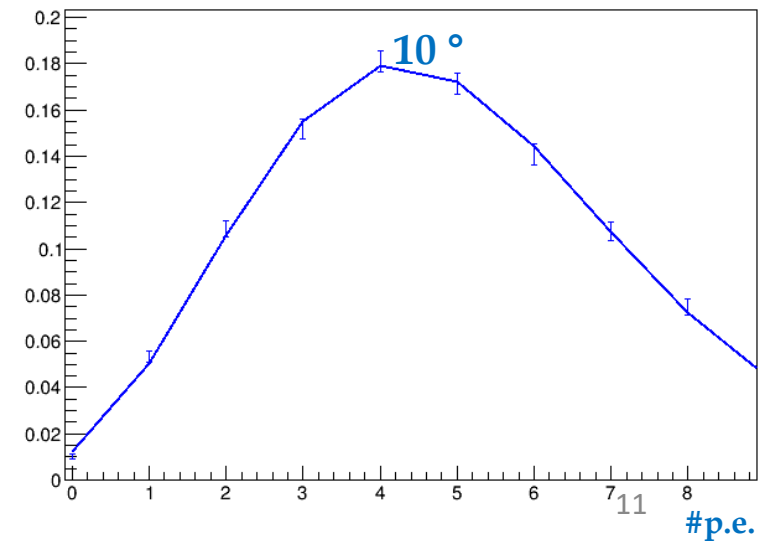
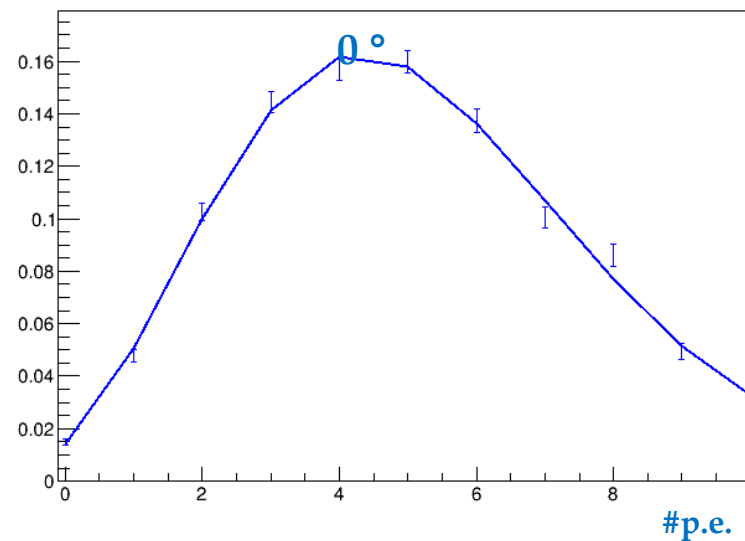
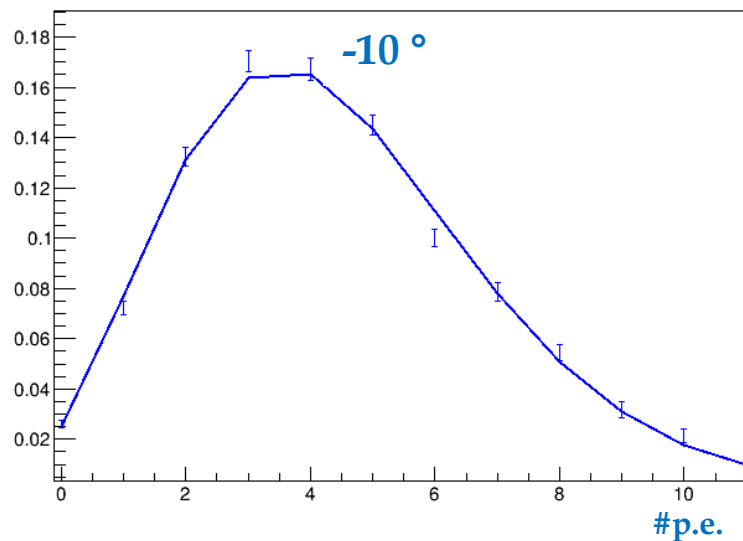
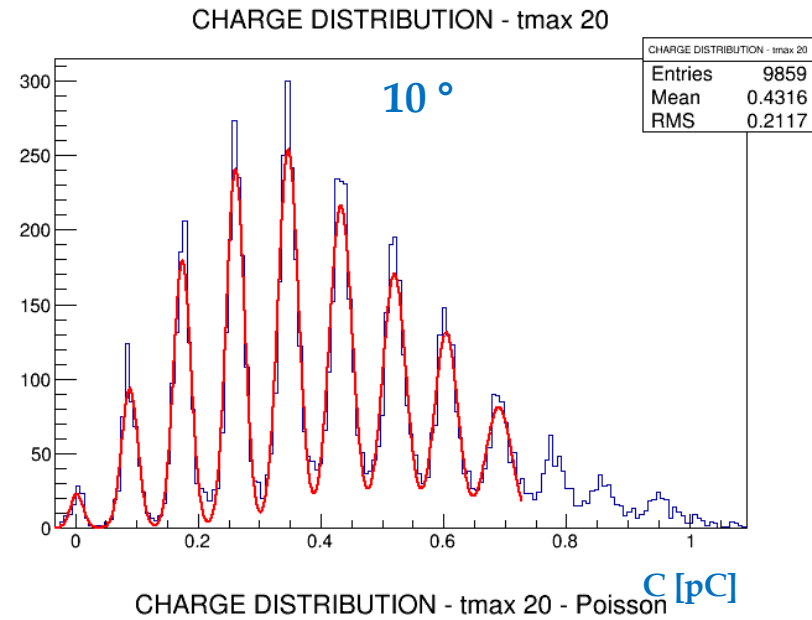
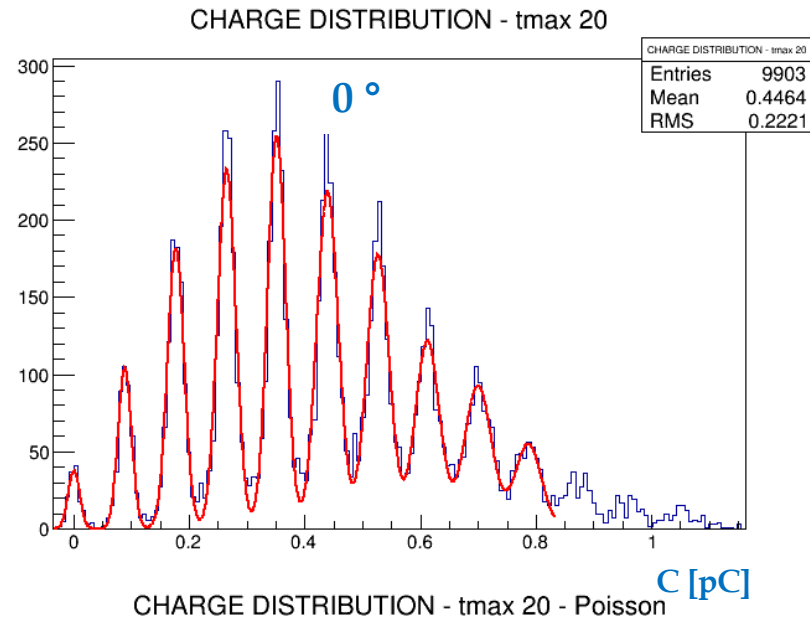
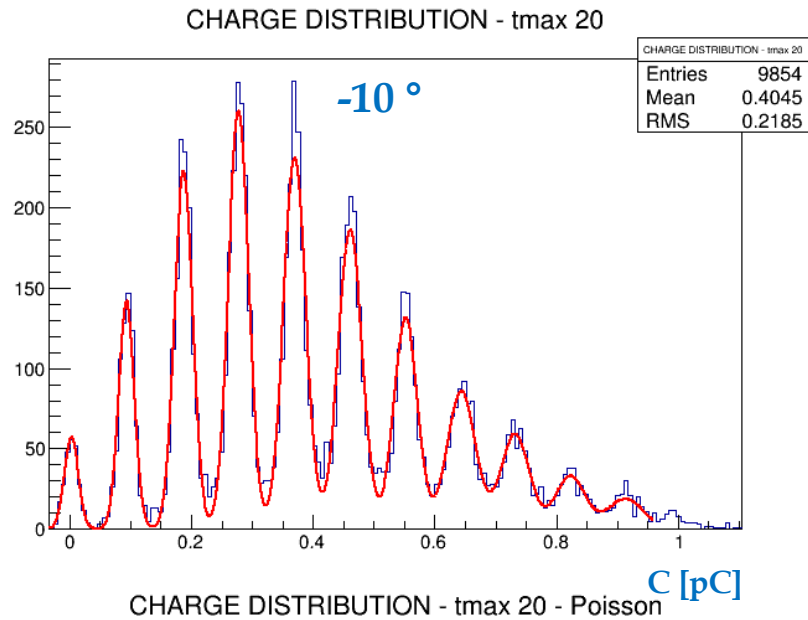
Light Analysis (Integration time 15 ns) : 38 V



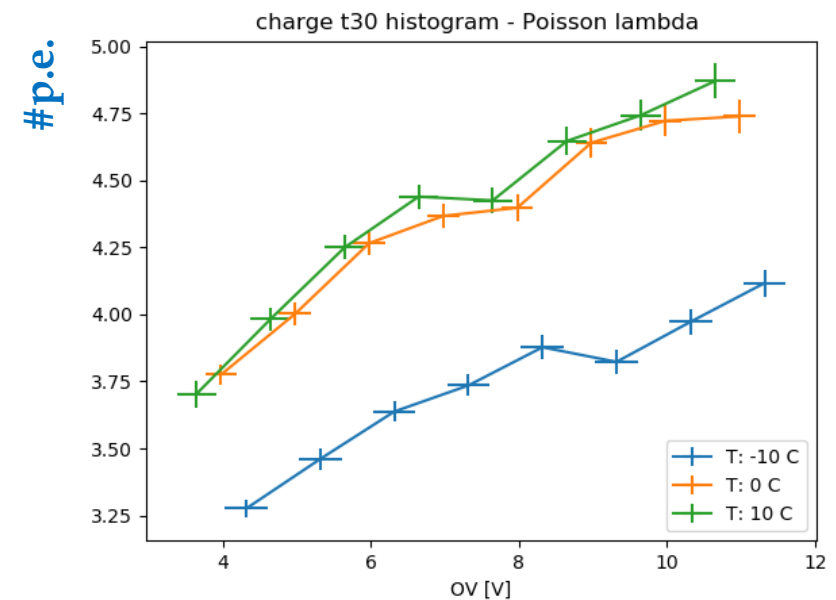
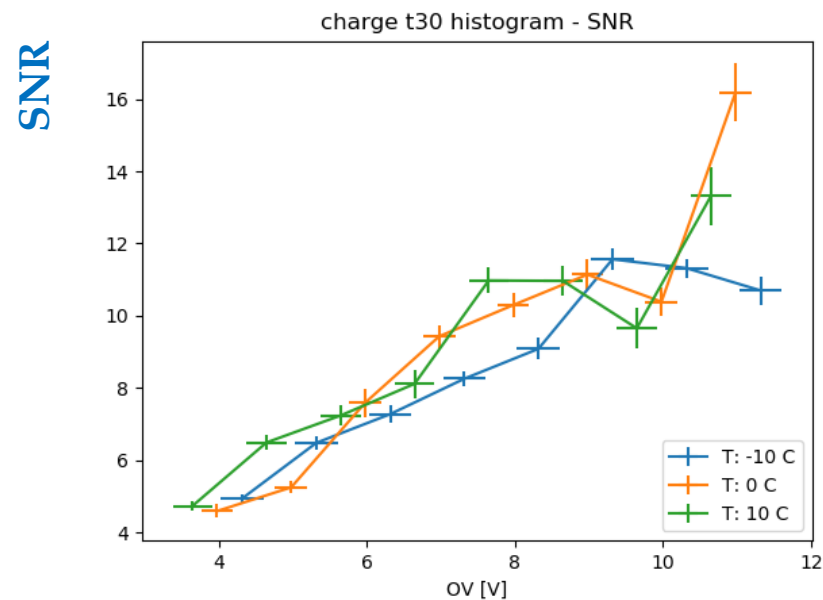
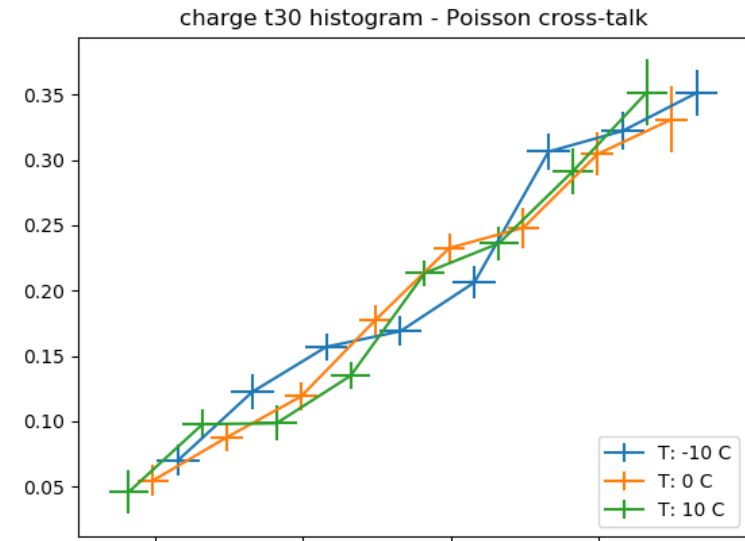
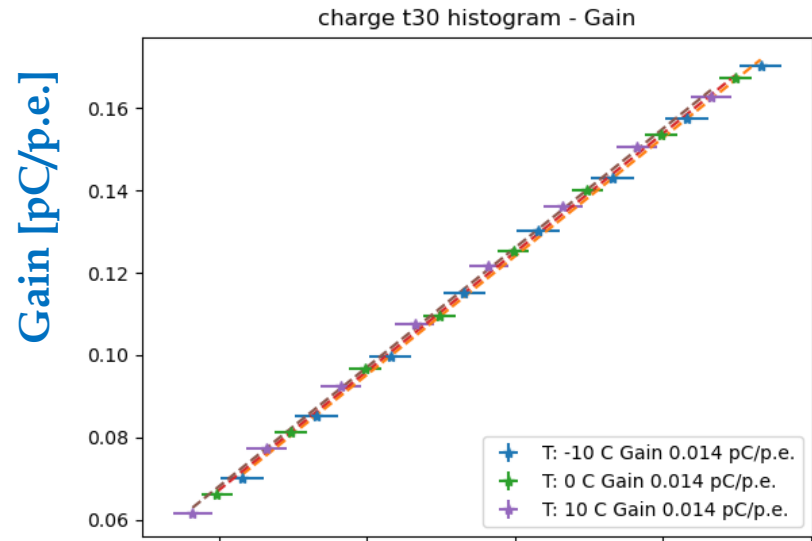
Light Analysis (Integration time 20 ns)



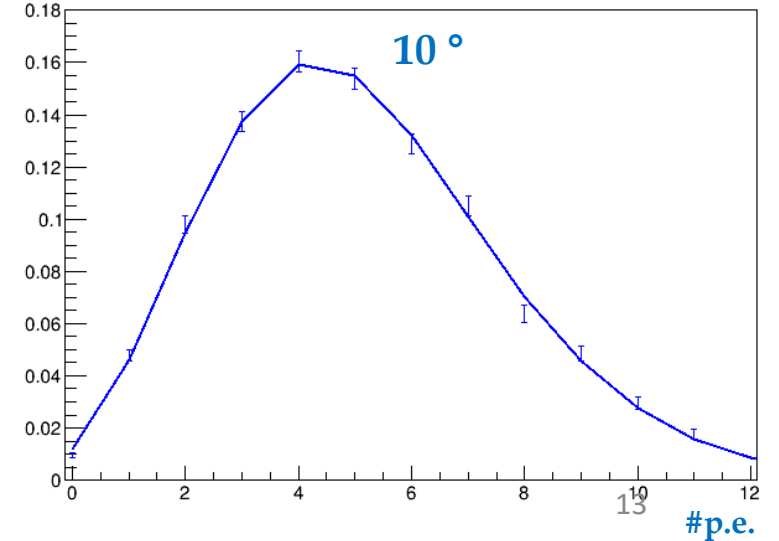
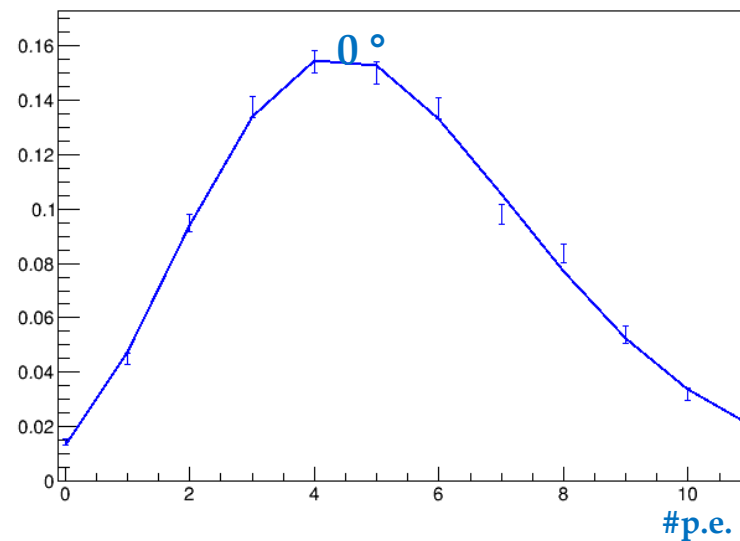
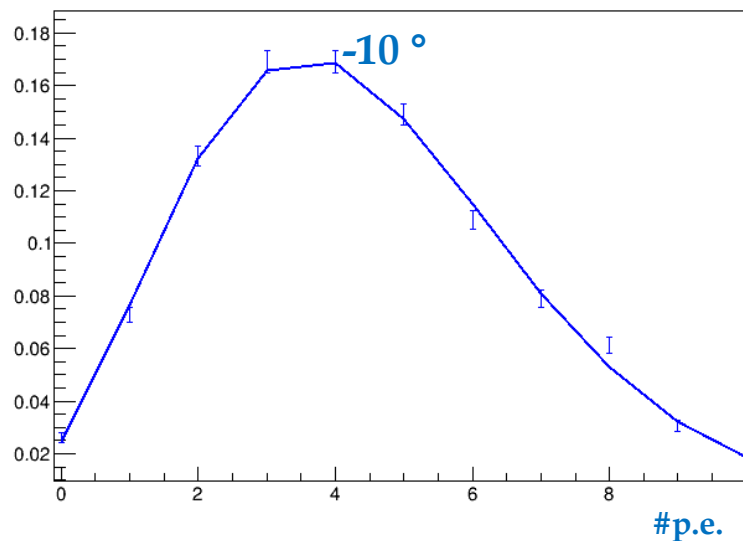
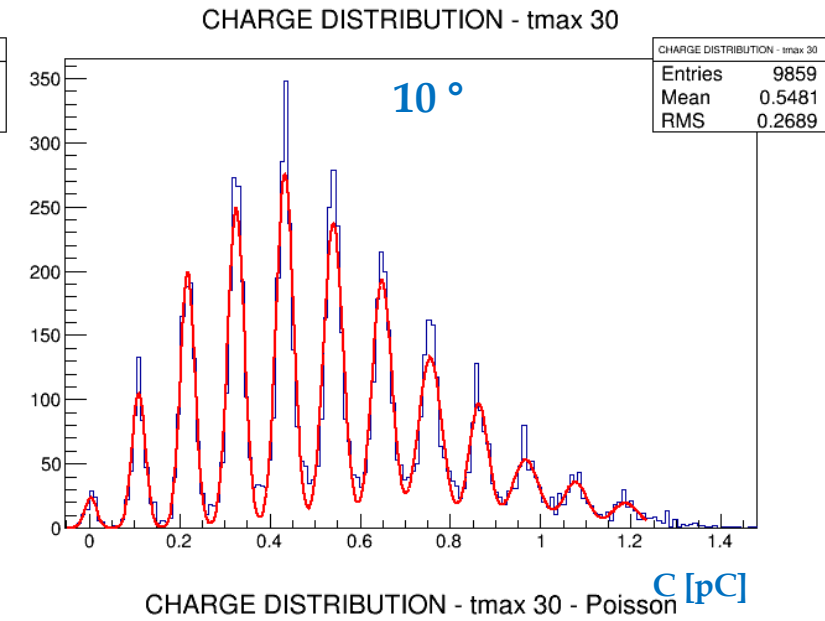
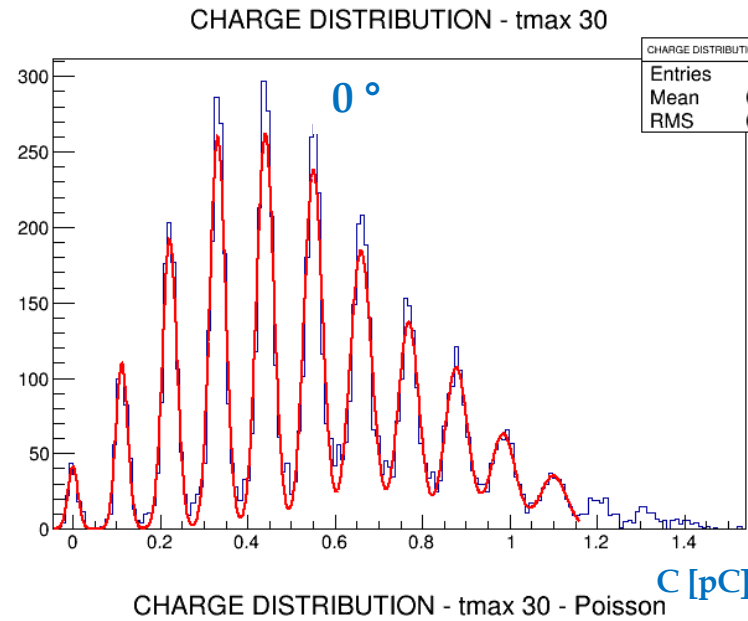
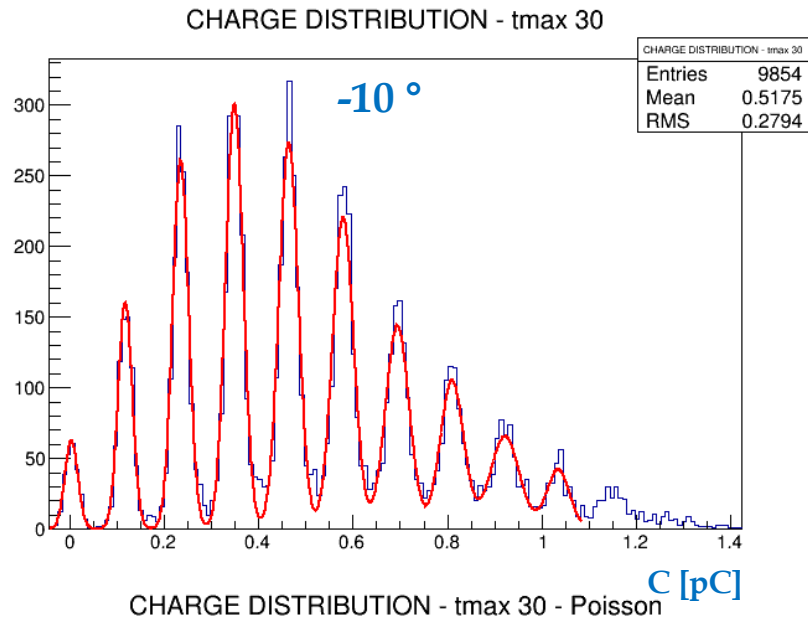
Light Analysis (Integration time 20 ns) : 38 V



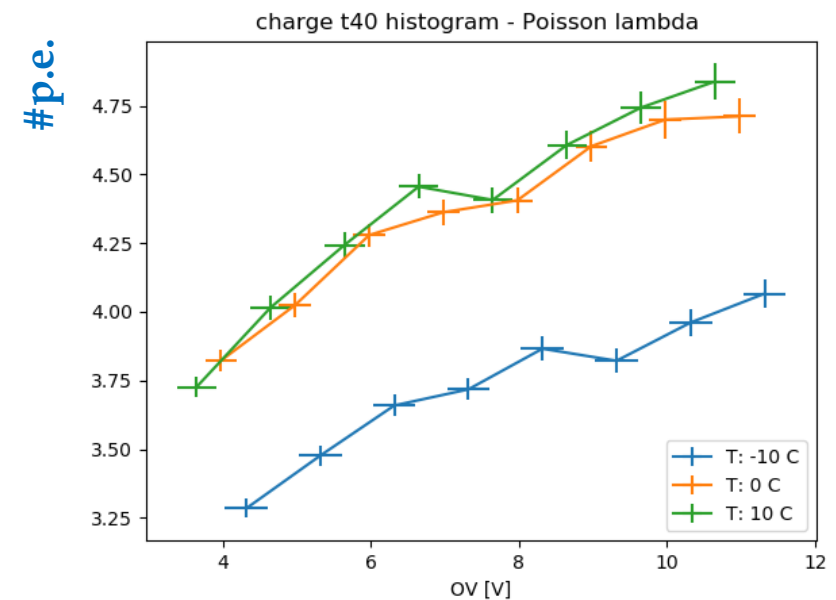
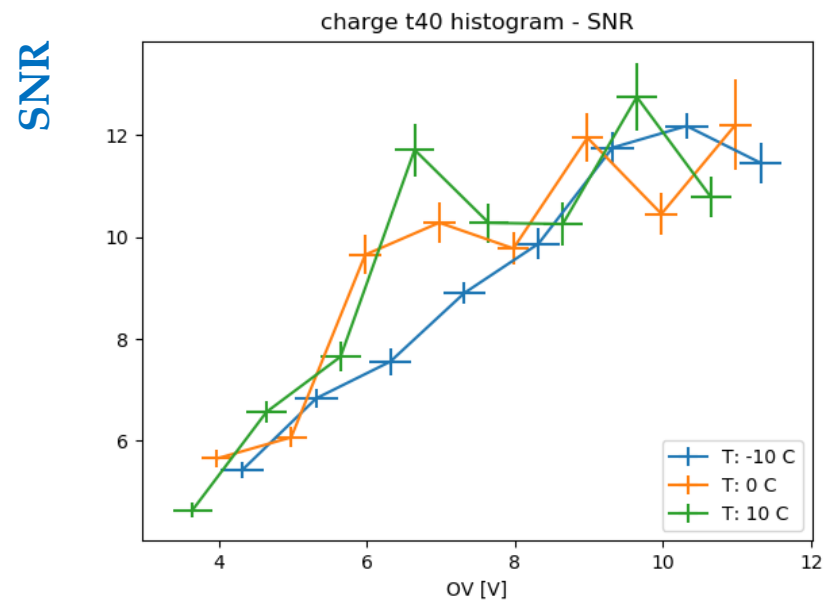
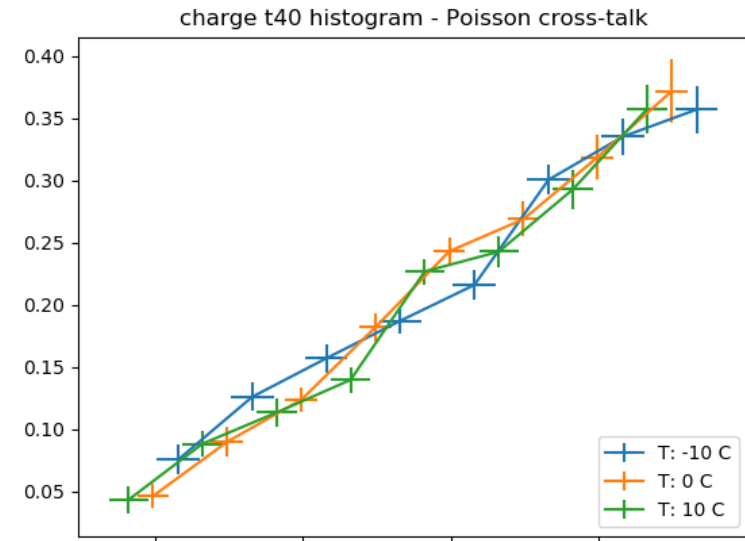
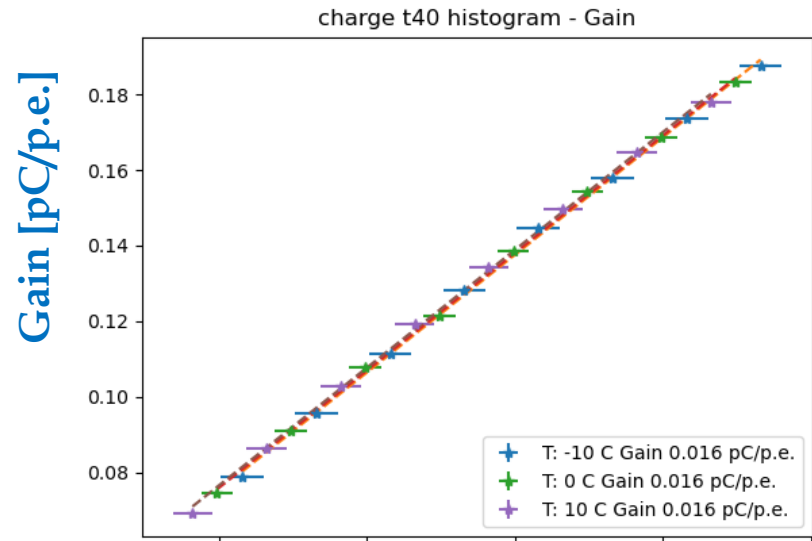
Light Analysis (Integration time 30 ns)



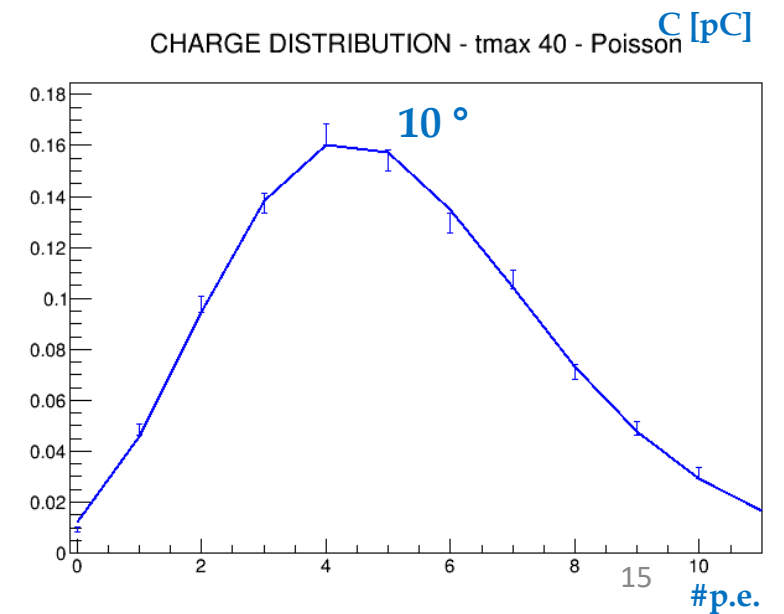
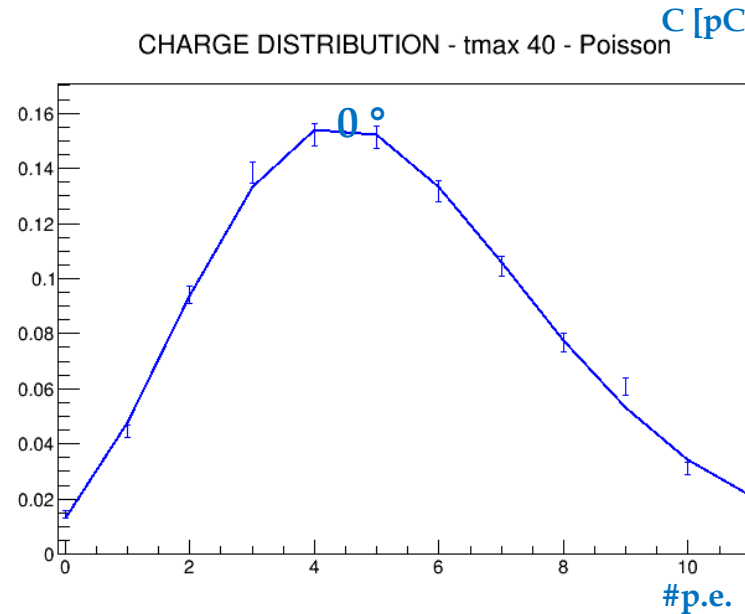
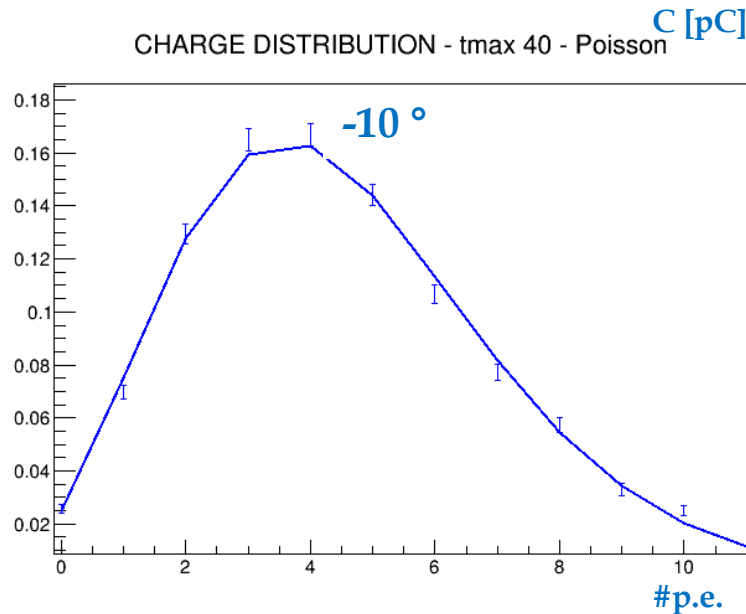
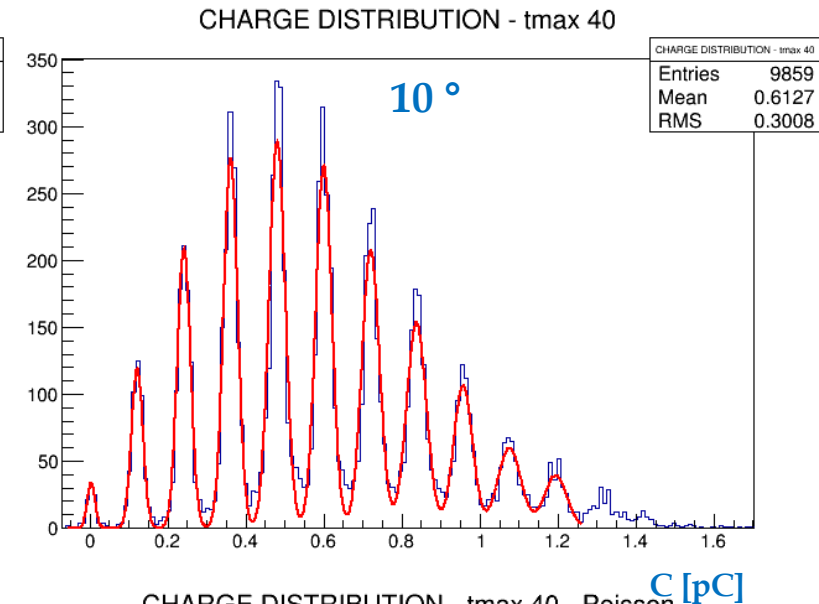
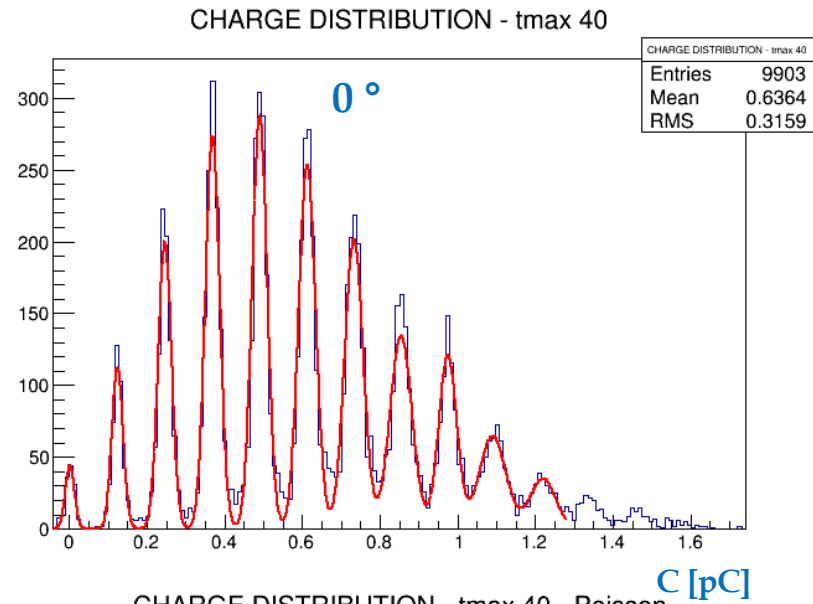
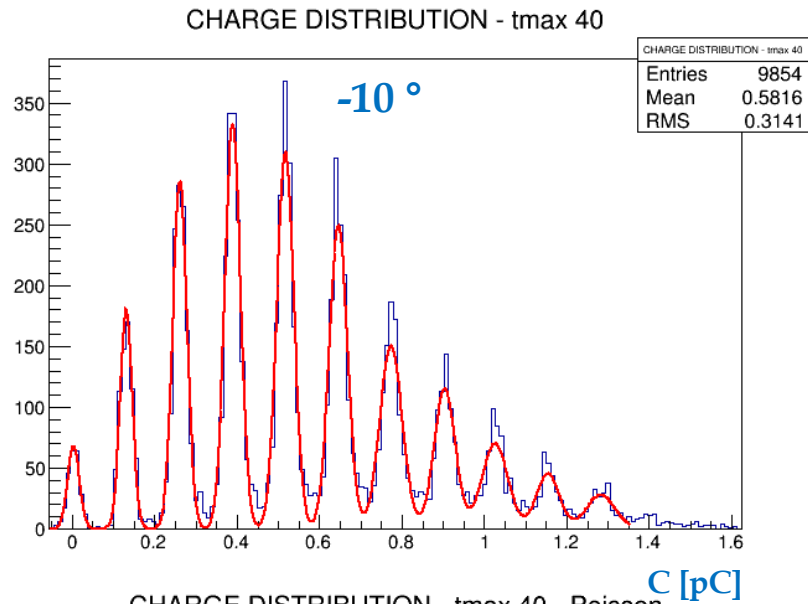
Light Analysis (Integration time 30 ns) : 38 V



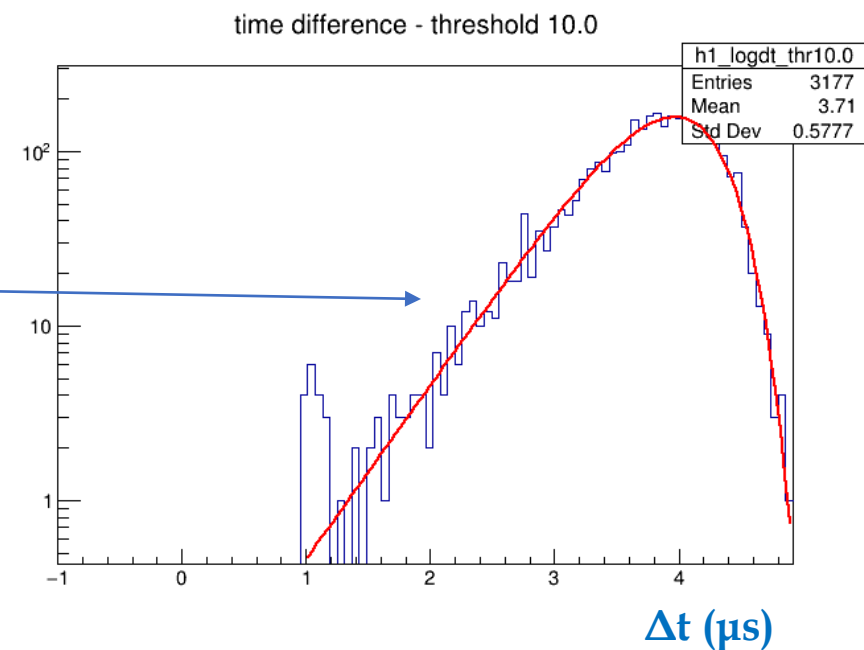
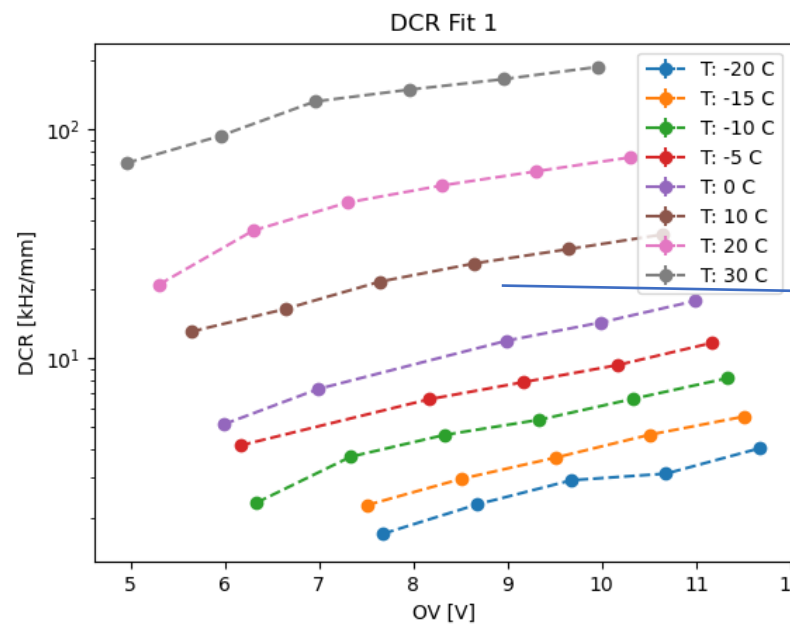
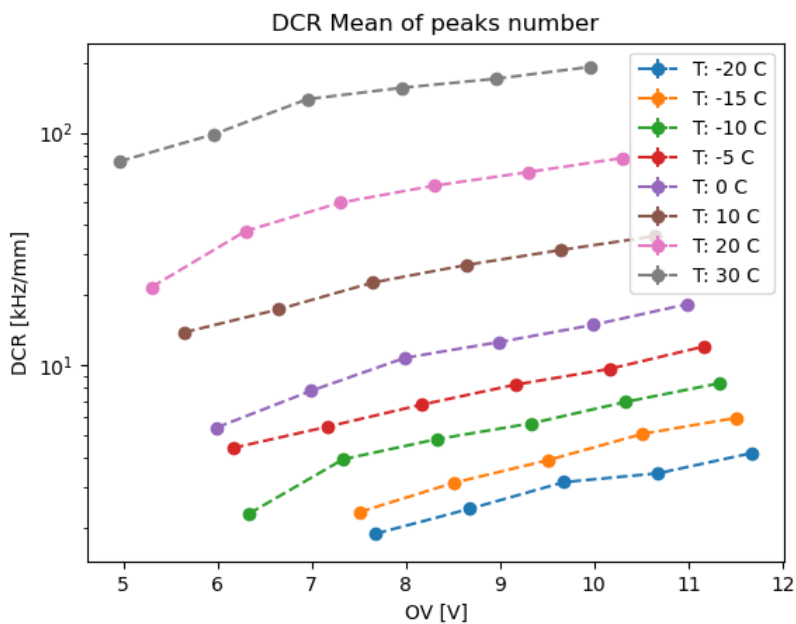
Light Analysis (Integration time 40 ns)



Light Analysis (Integration time 40 ns) : 38 V



Dark Analysis

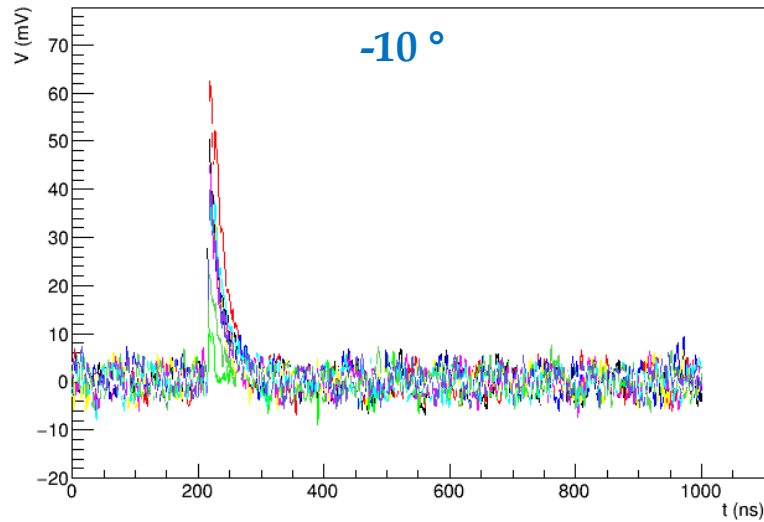


$$P(\Delta t) = k_0 e^{-\Delta t/\tau} \quad \tau = \frac{1}{DCR}$$

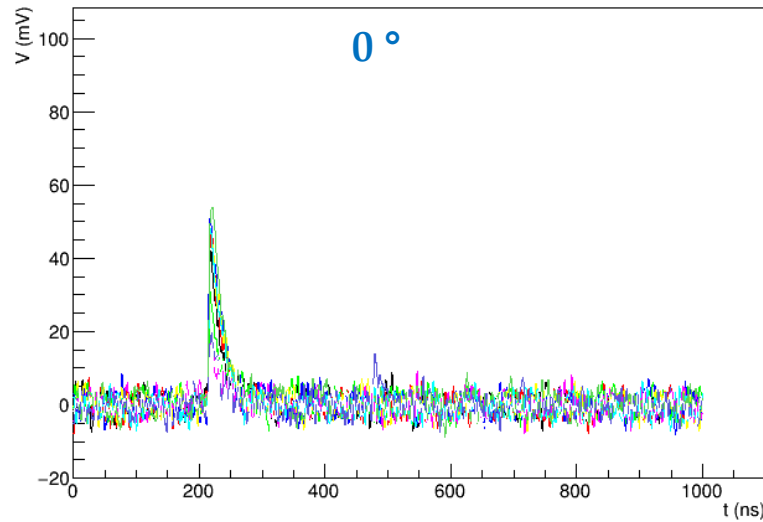
BackUp Slides

Light Analysis: 35 V

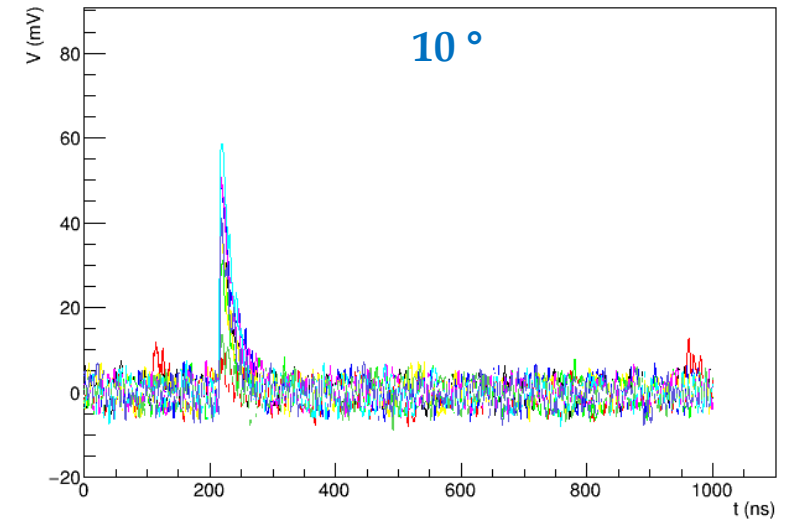
Waveform



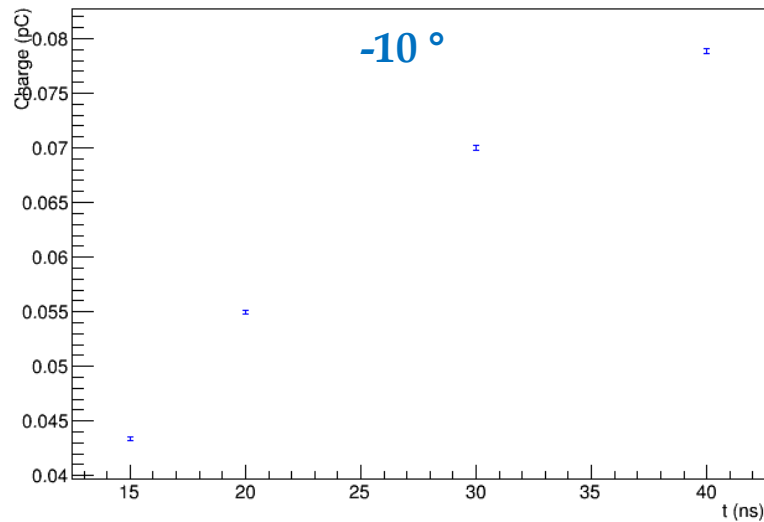
Waveform



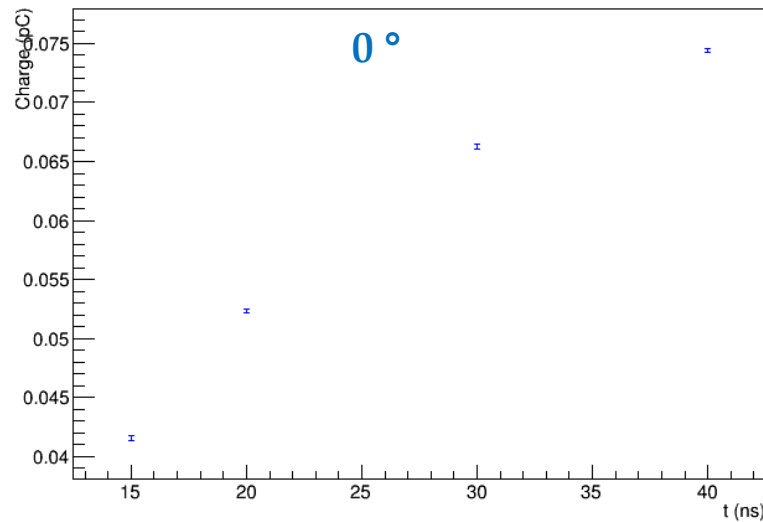
Waveform



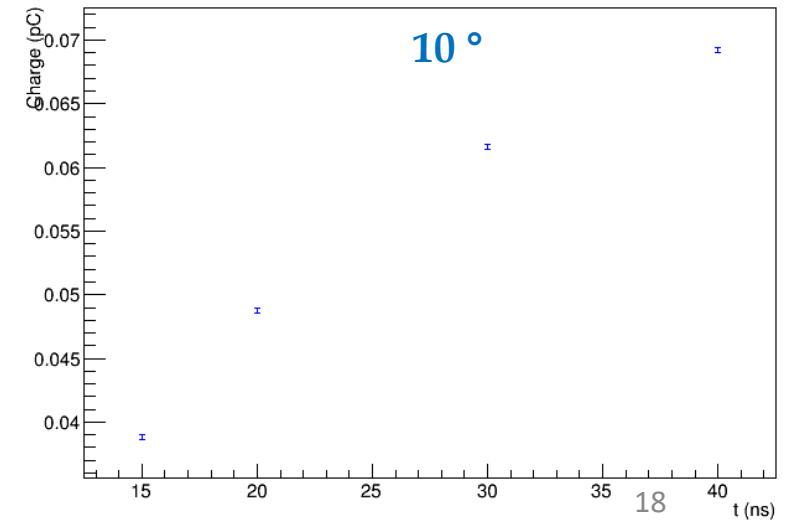
Charge vs Integration Time



Charge vs Integration Time

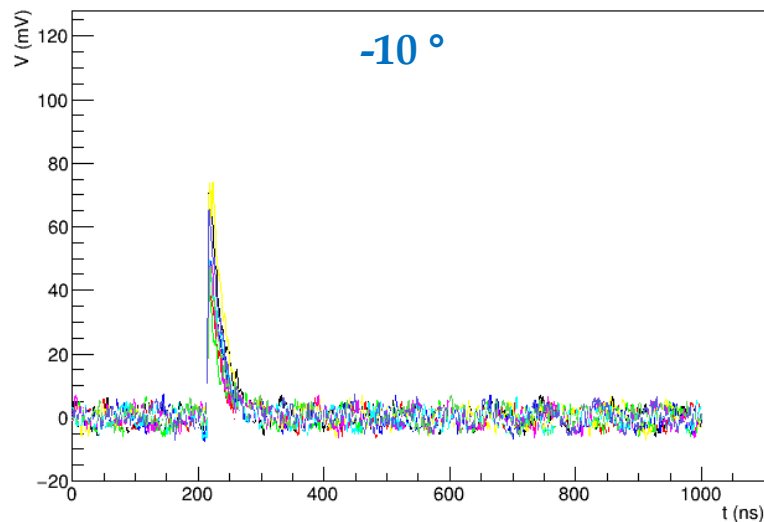


Charge vs Integration Time

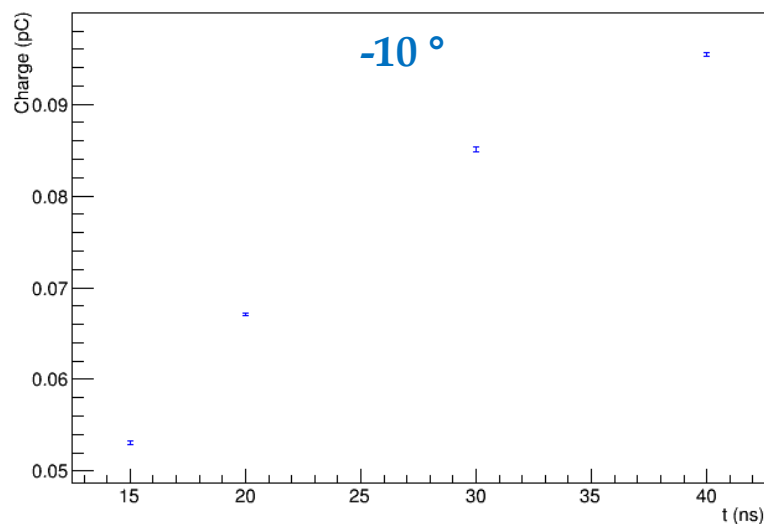


Light Analysis: 36 V

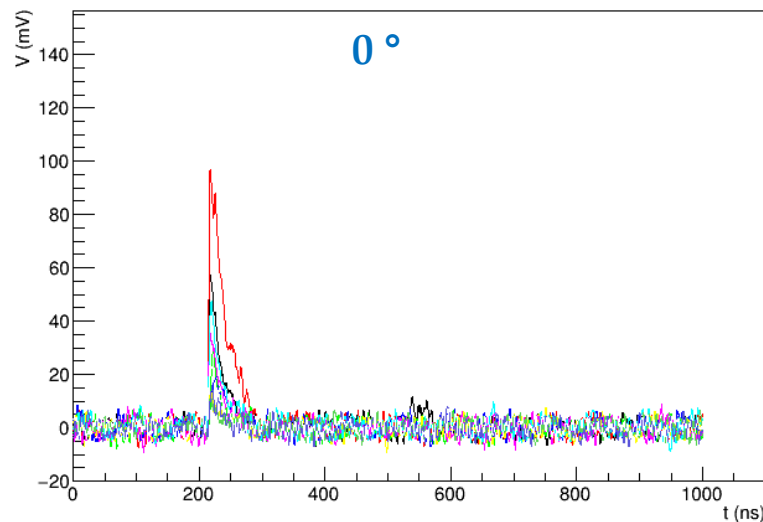
Waveform



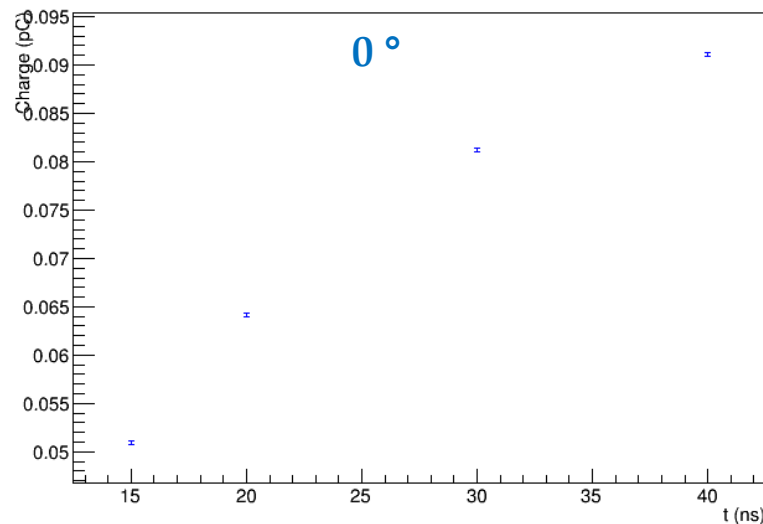
Charge vs Integration Time



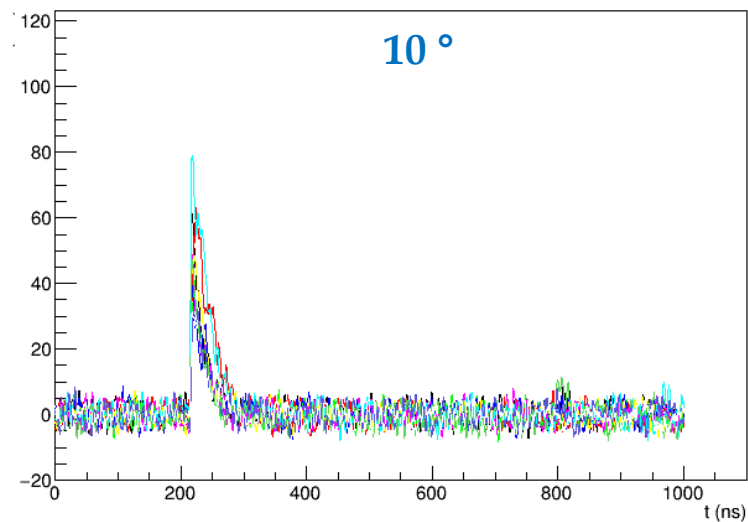
Waveform



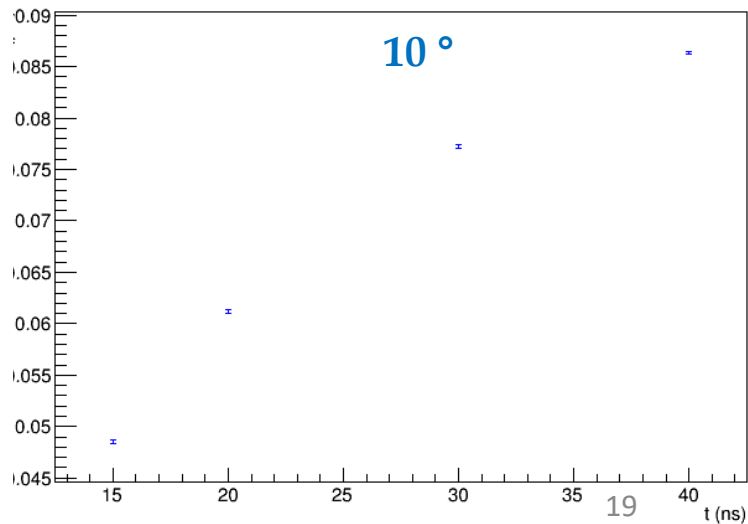
Charge vs Integration Time



Waveform

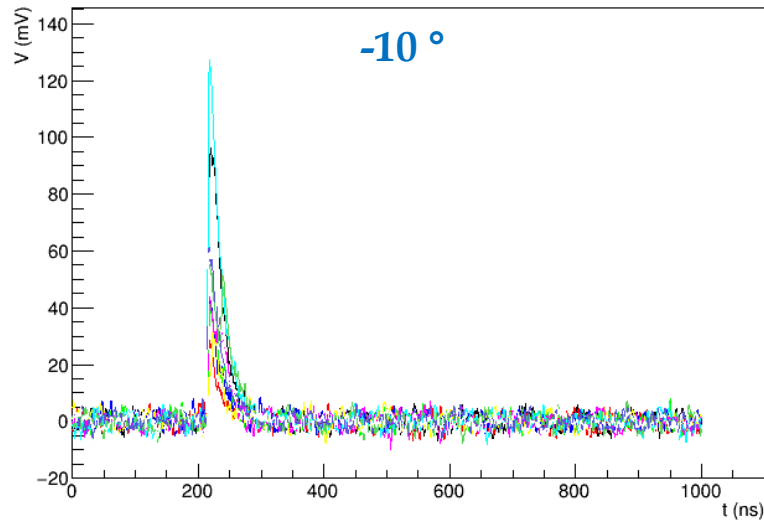


Charge vs Integration Time

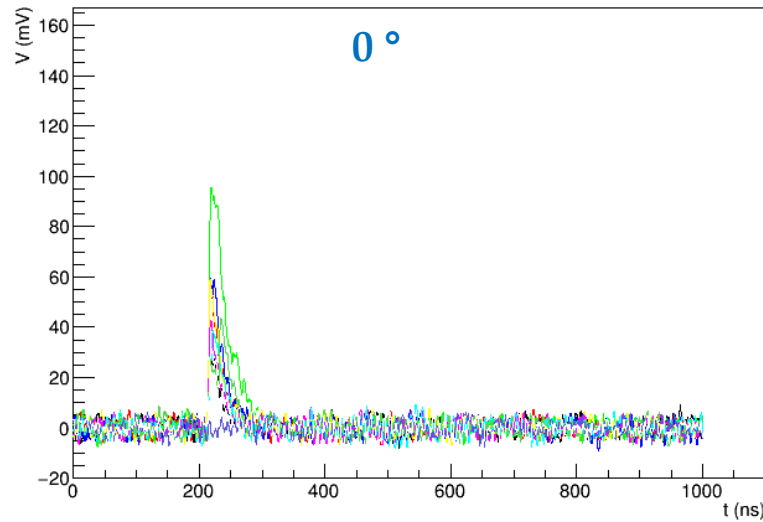


Light Analysis: 37 V

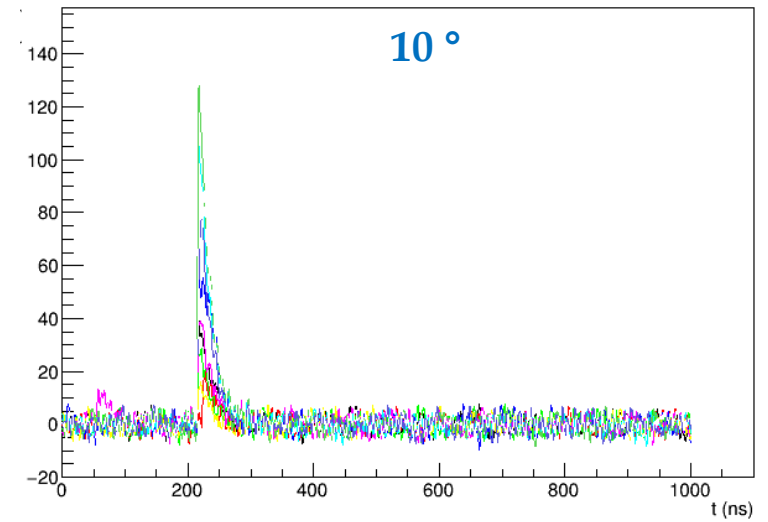
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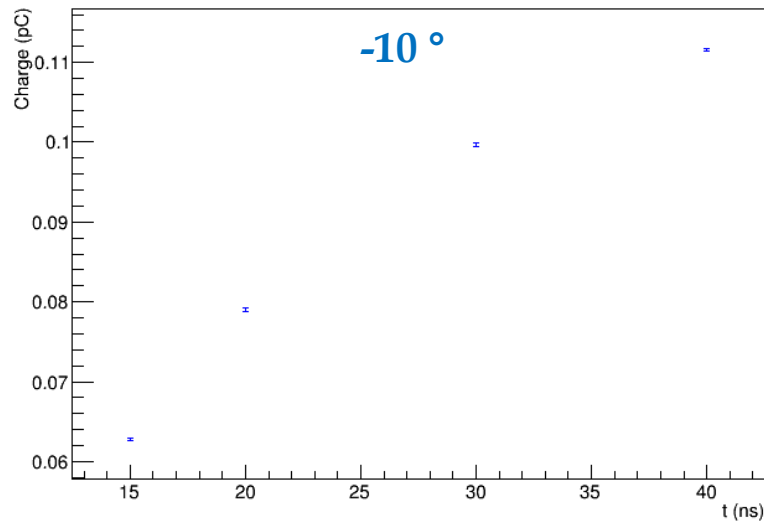
Waveform



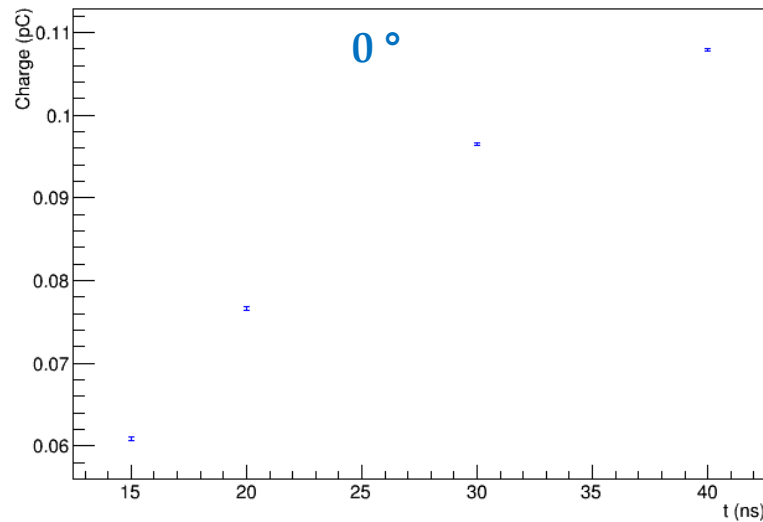
Waveform



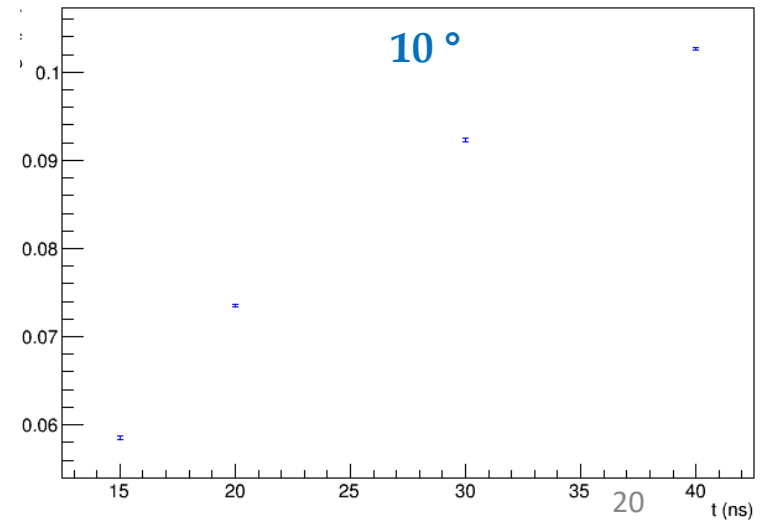
Charge vs Integration Time



Charge vs Integration Time

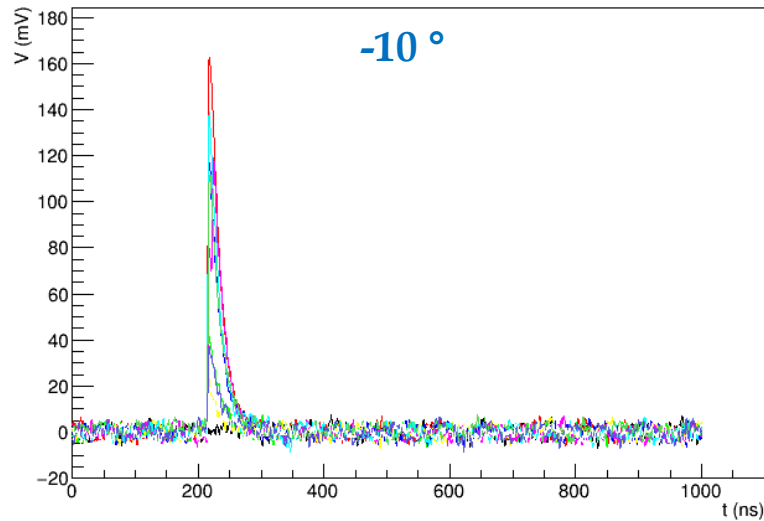


Charge vs Integration Time

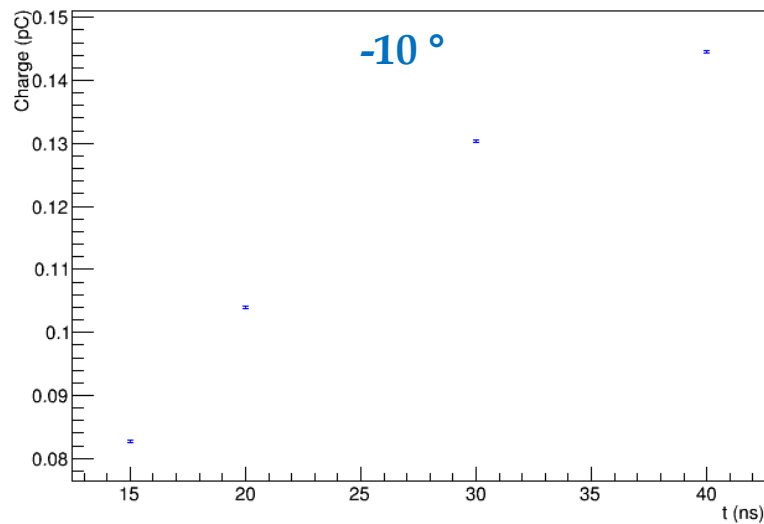


Light Analysis: 39 V

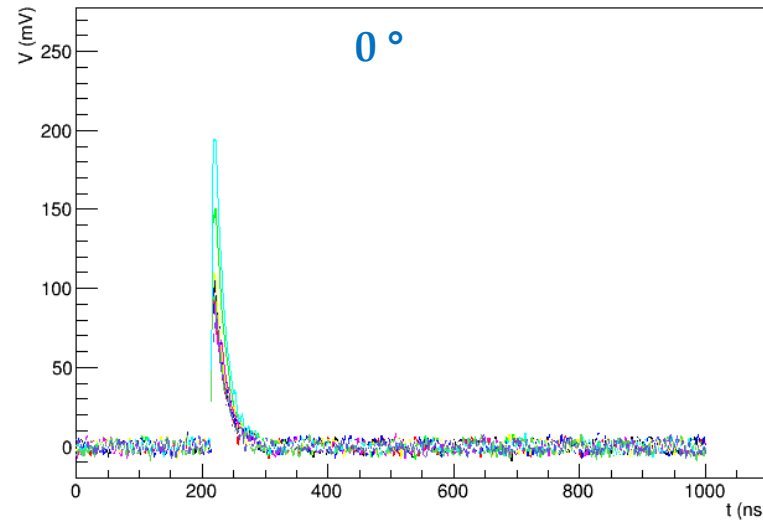
Waveform



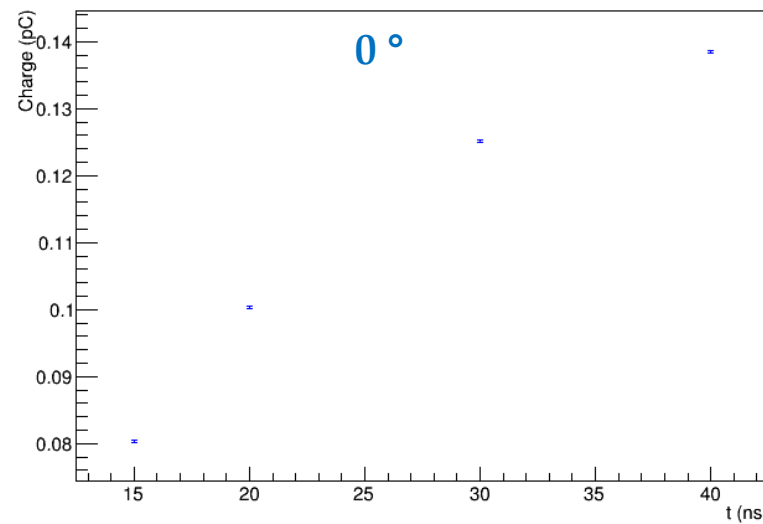
Charge vs Integration Time



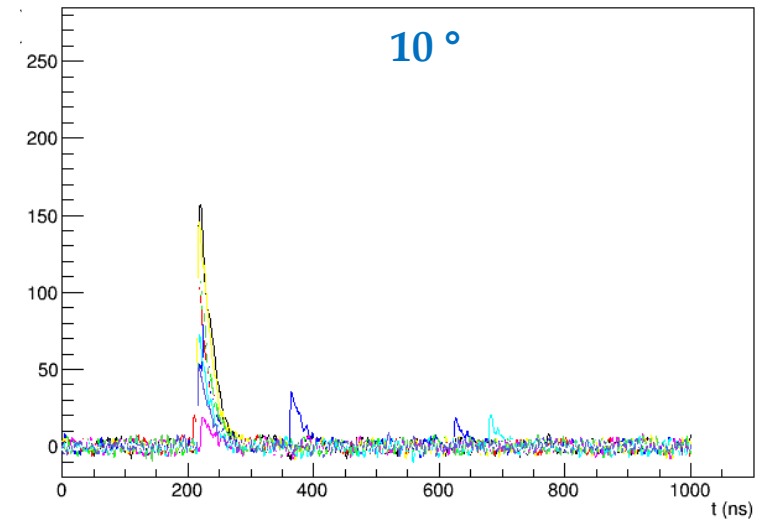
Waveform



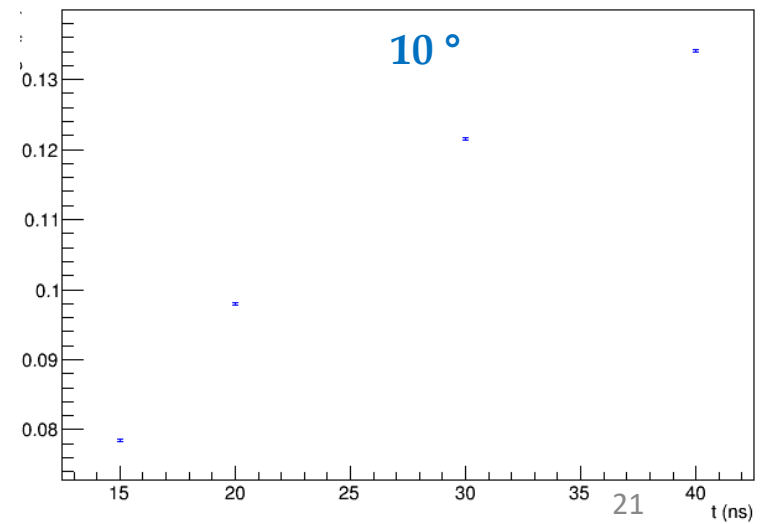
Charge vs Integration Time



Waveform

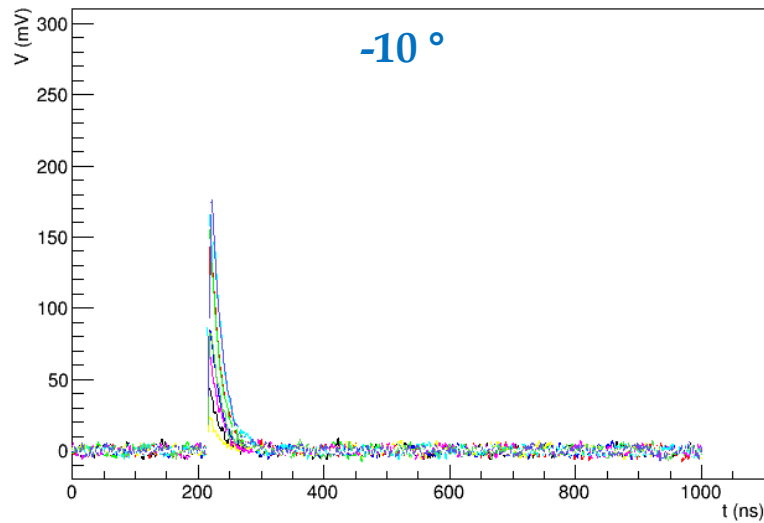


Charge vs Integration Time

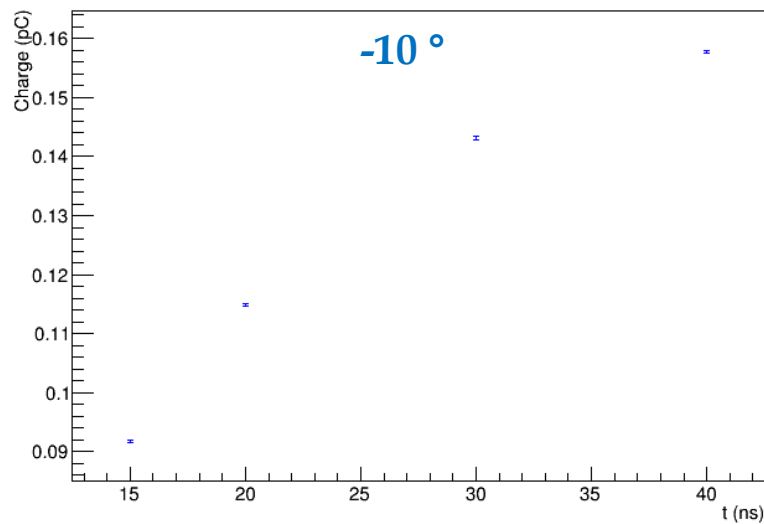


Light Analysis: 40 V

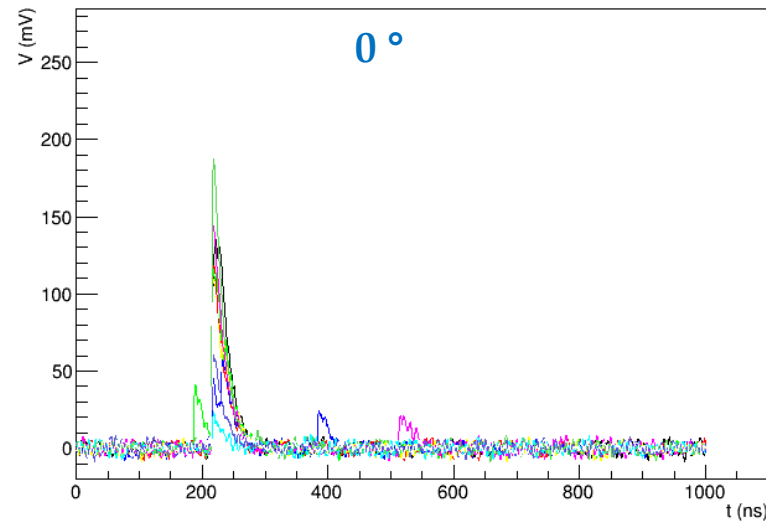
Waveform



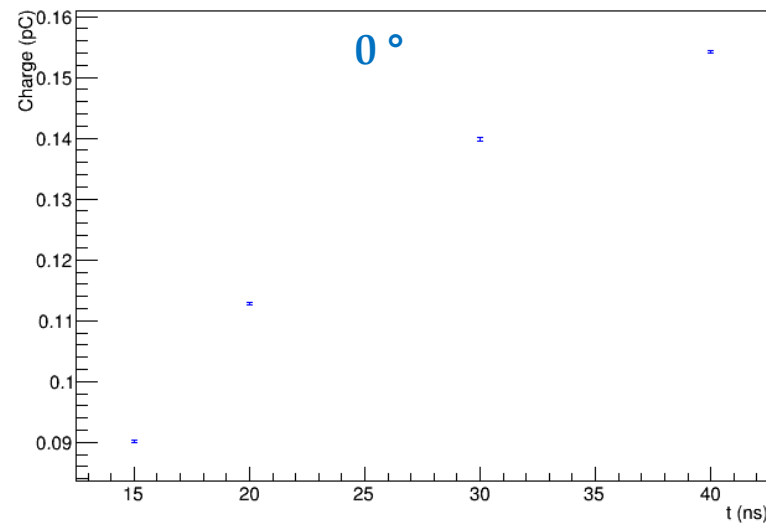
Charge vs Integration Time



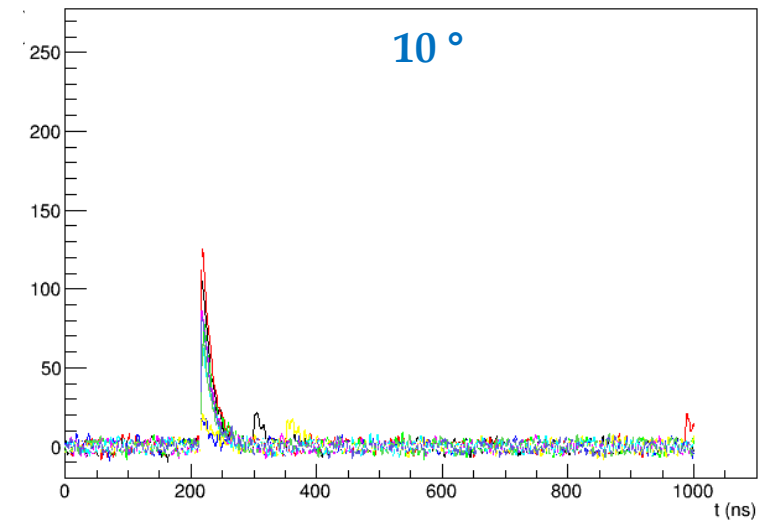
Waveform



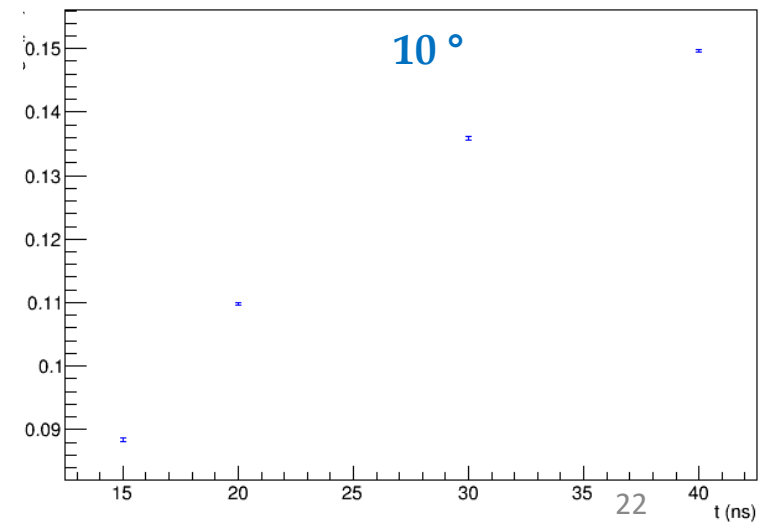
Charge vs Integration Time



Waveform

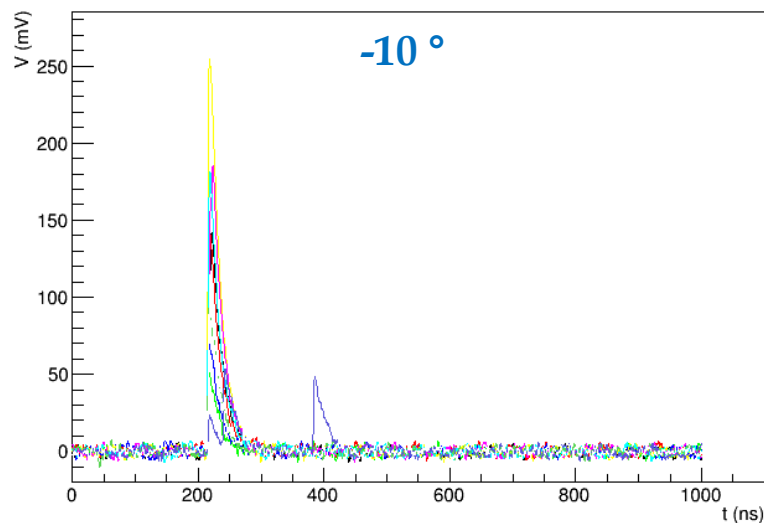


Charge vs Integration Time

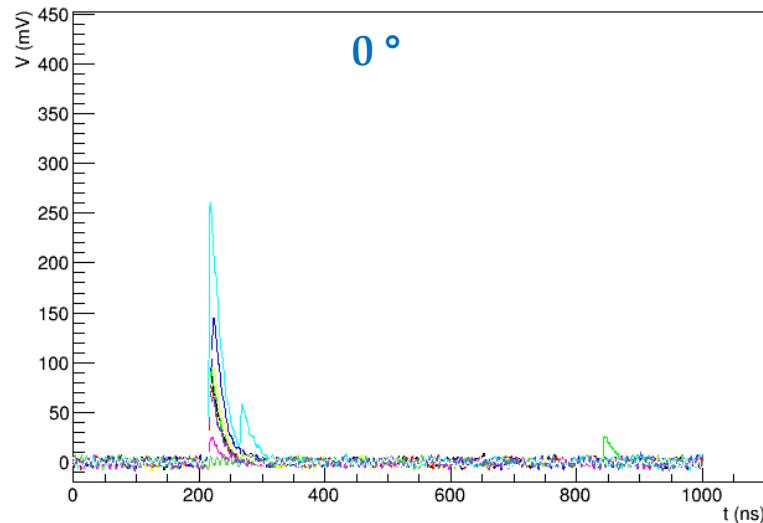


Light Analysis: 41 V

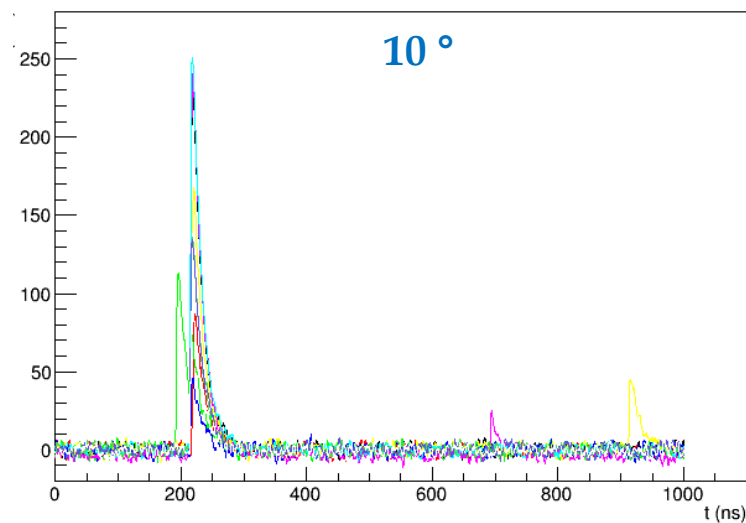
Waveform



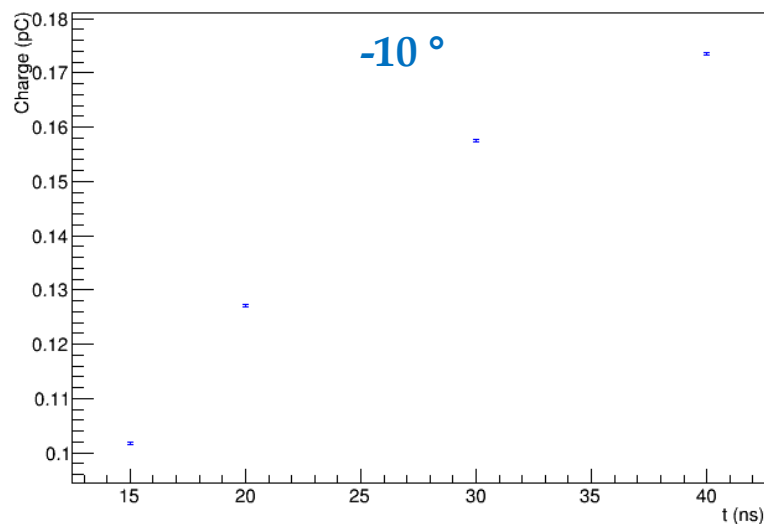
Waveform



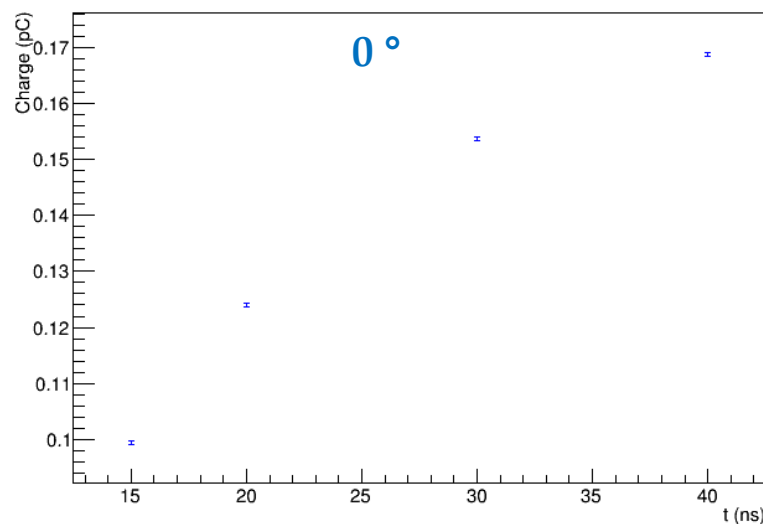
Waveform



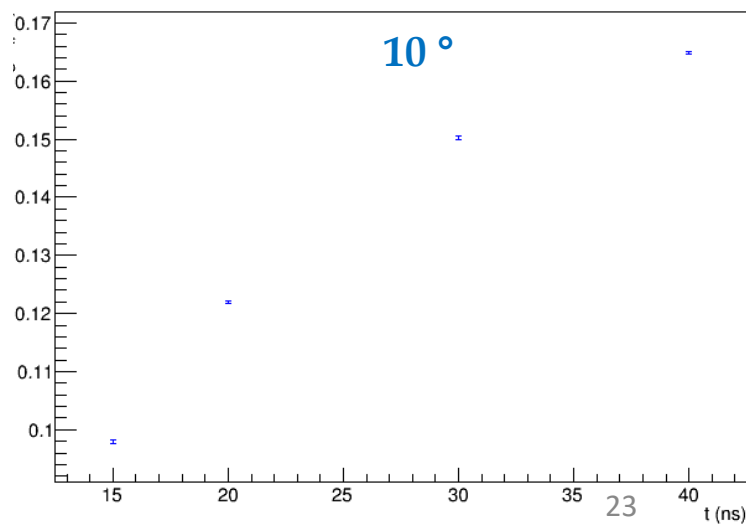
Charge vs Integration Time



Charge vs Integration Time

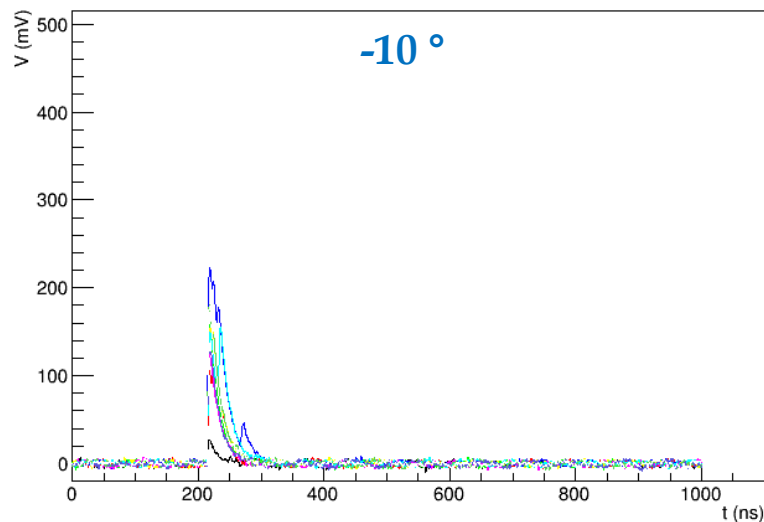


Charge vs Integration Time

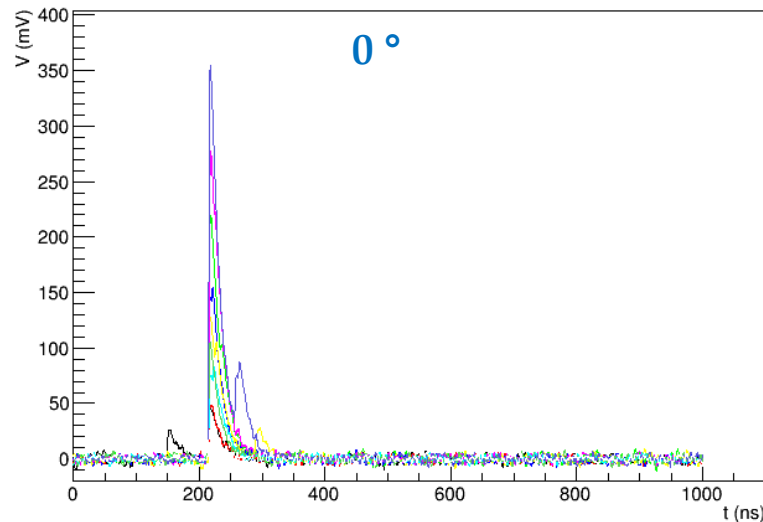


Light Analysis: 42 V

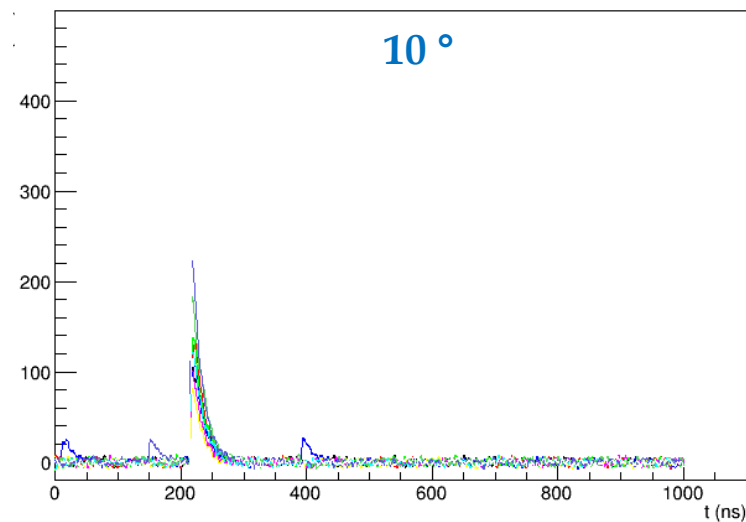
Waveform



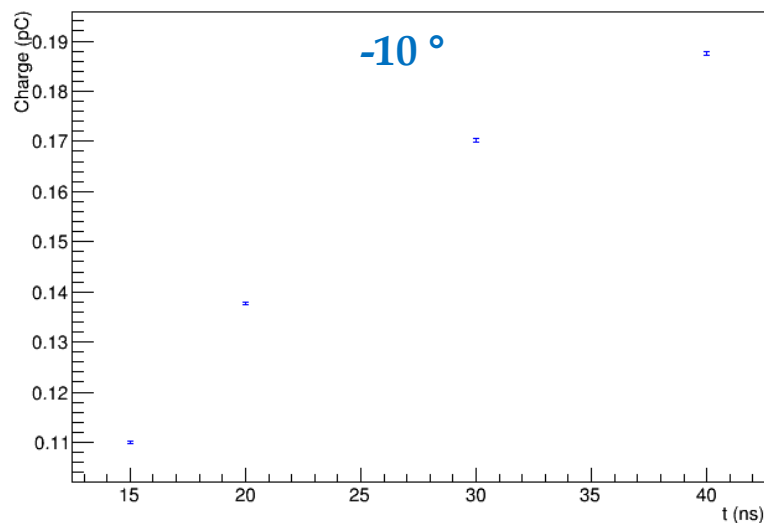
Waveform



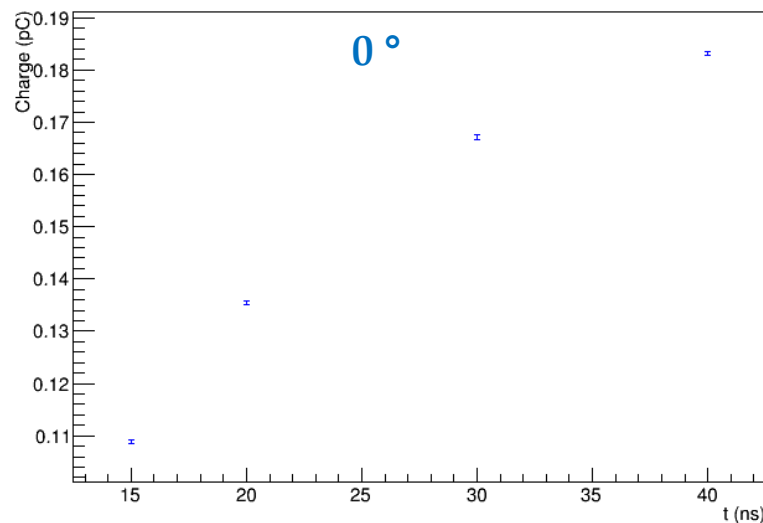
Waveform



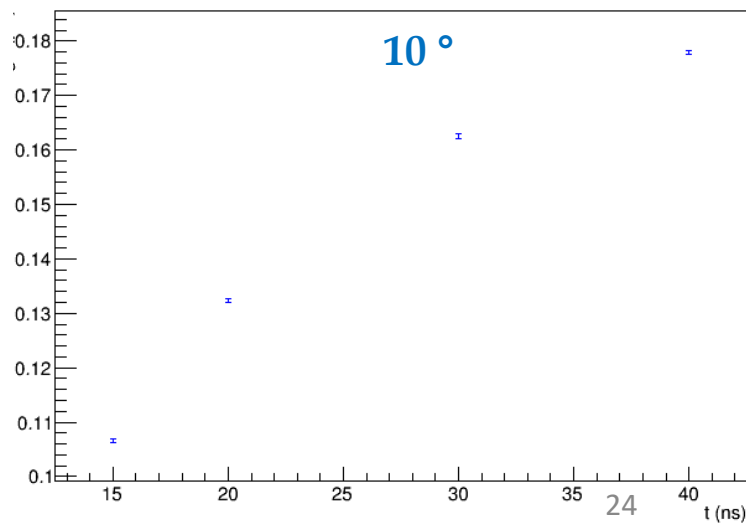
Charge vs Integration Time



Charge vs Integration Time

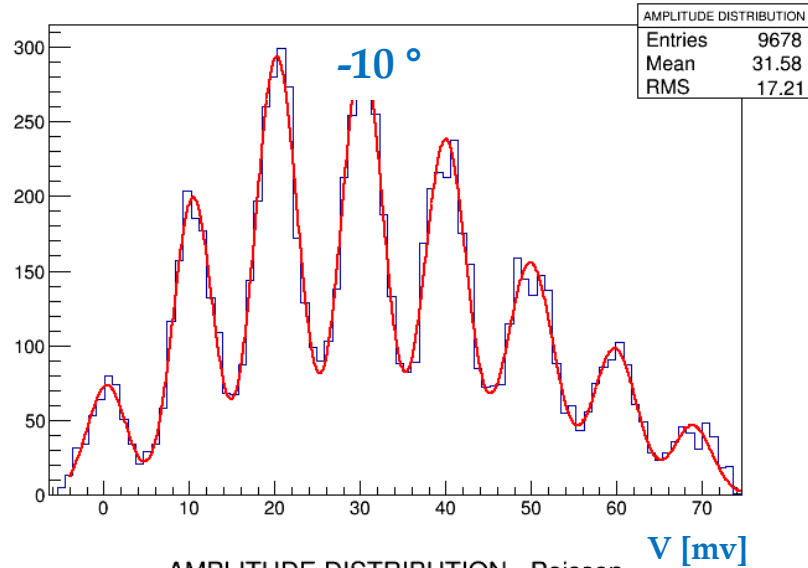


Charge vs Integration Time

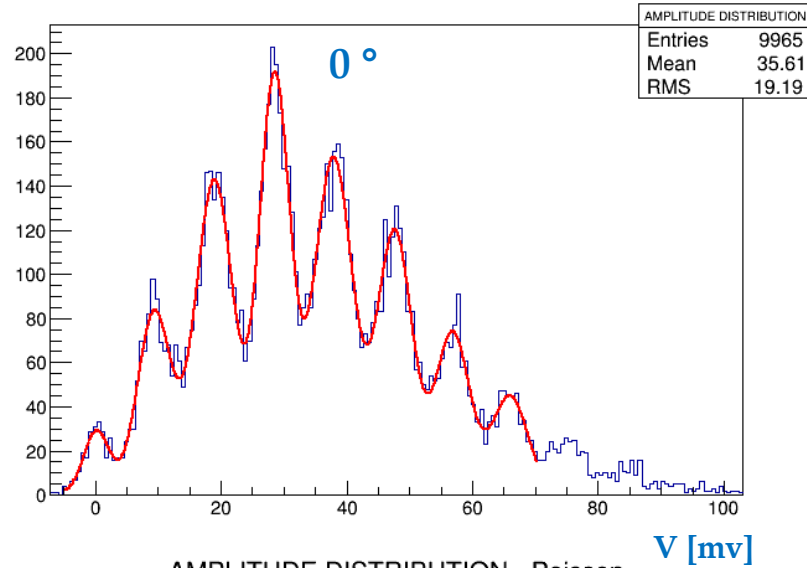


Light Analysis (Amplitude) : 35 V

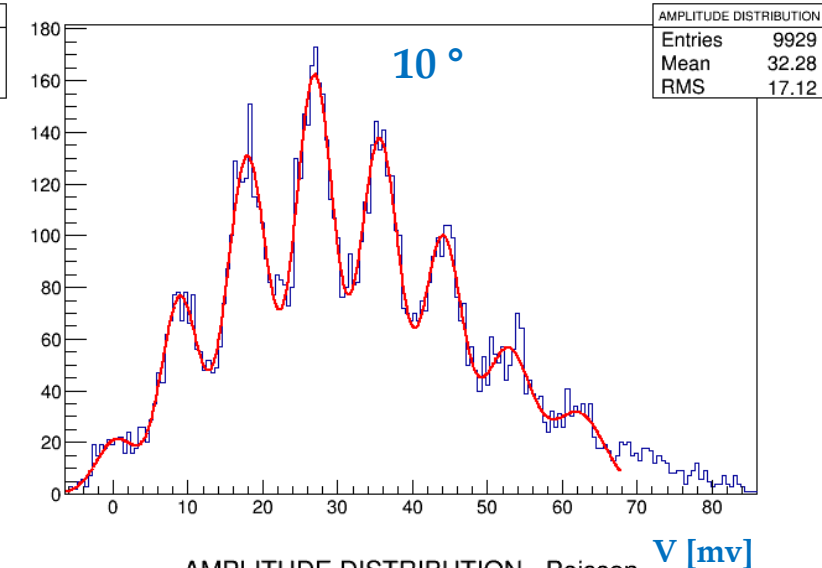
AMPLITUDE DISTRIBUTION



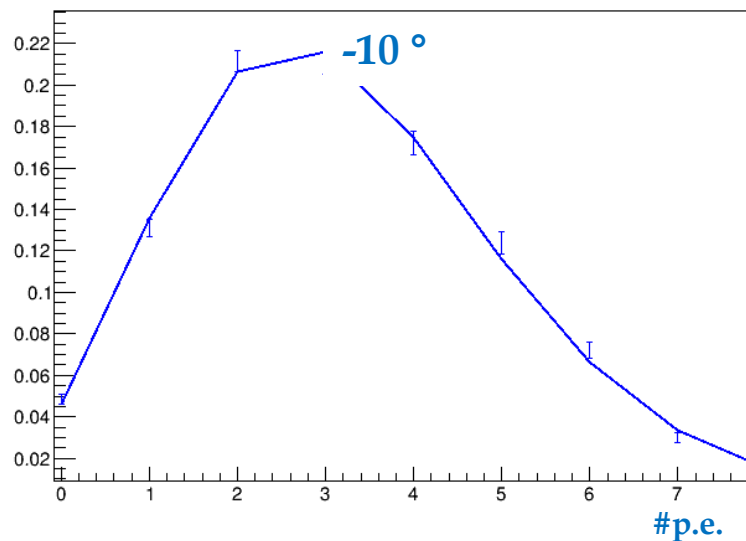
AMPLITUDE DISTRIBUTION



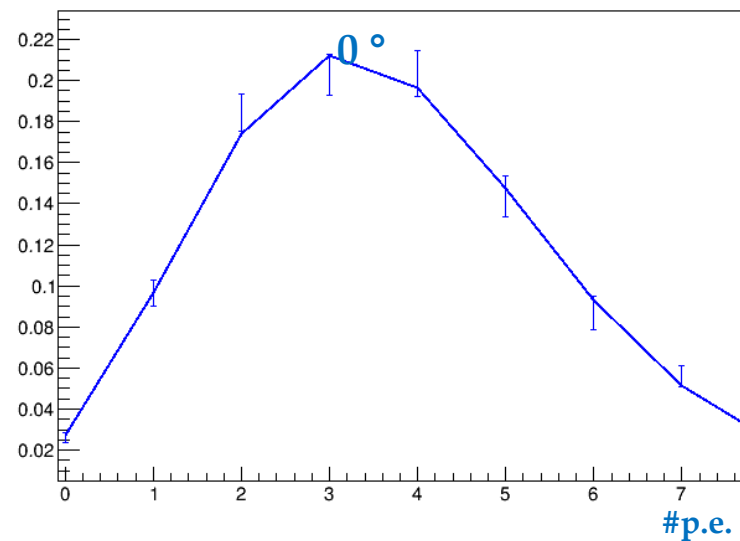
AMPLITUDE DISTRIBUTION



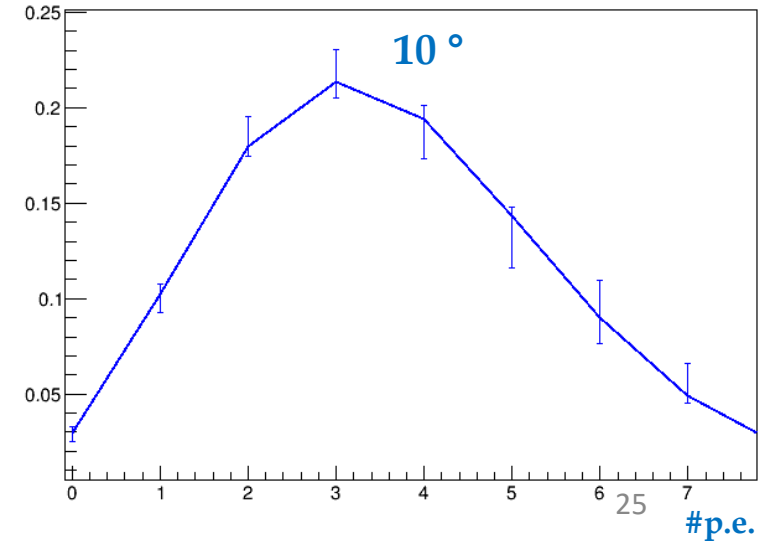
AMPLITUDE DISTRIBUTION - Poisson



AMPLITUDE DISTRIBUTION - Poisson

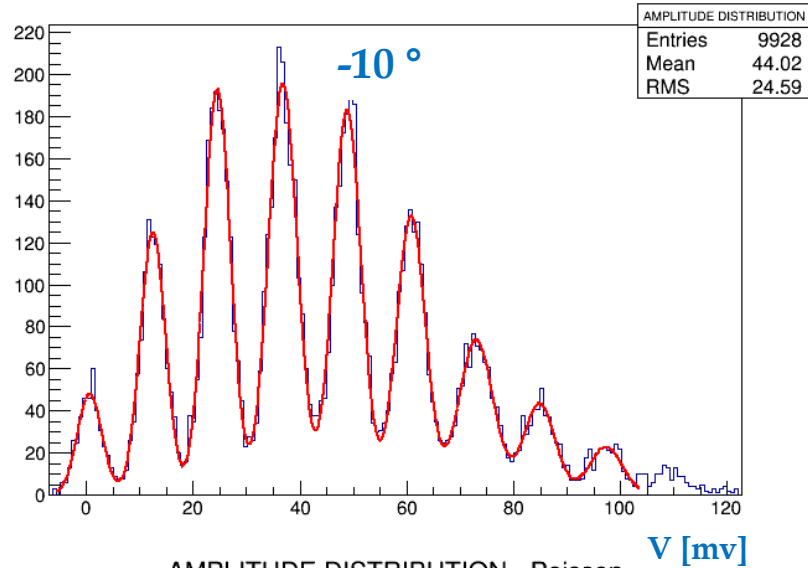


AMPLITUDE DISTRIBUTION - Poisson

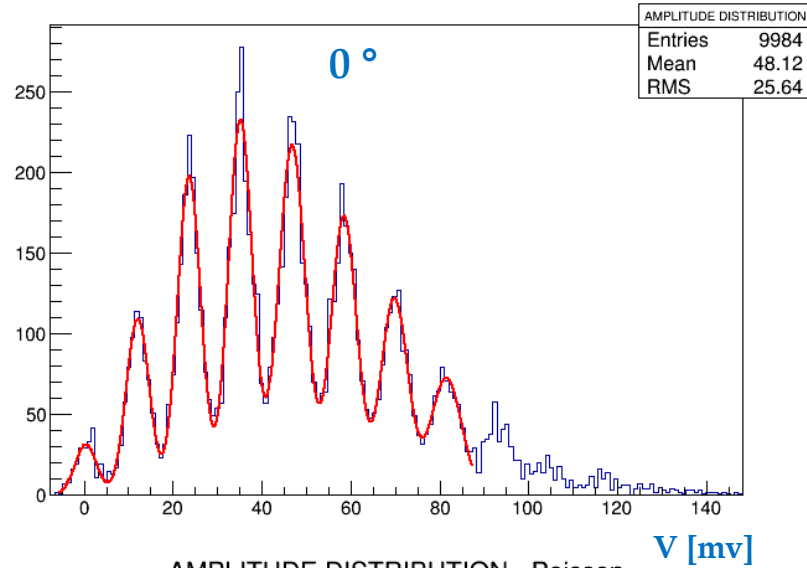


Light Analysis (Amplitude) : 36 V

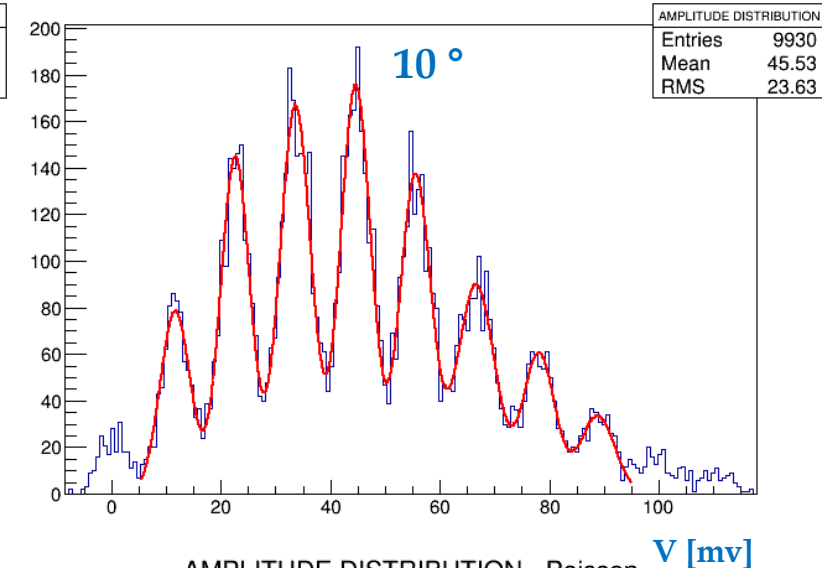
AMPLITUDE DISTRIBUTION



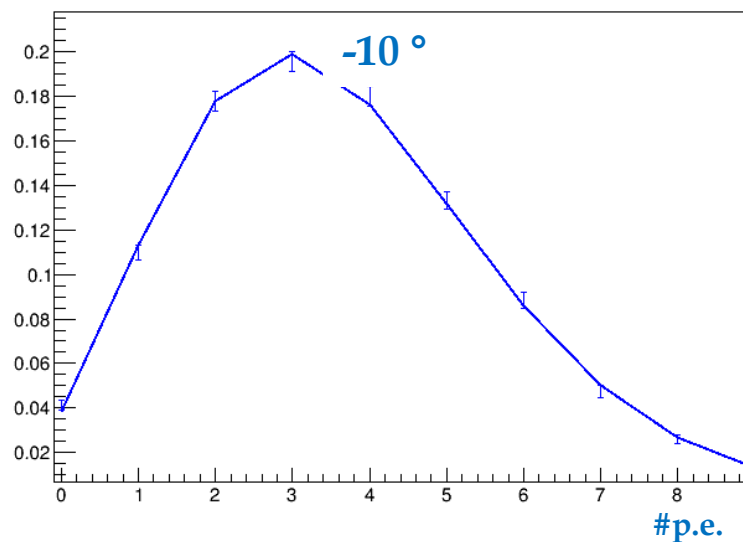
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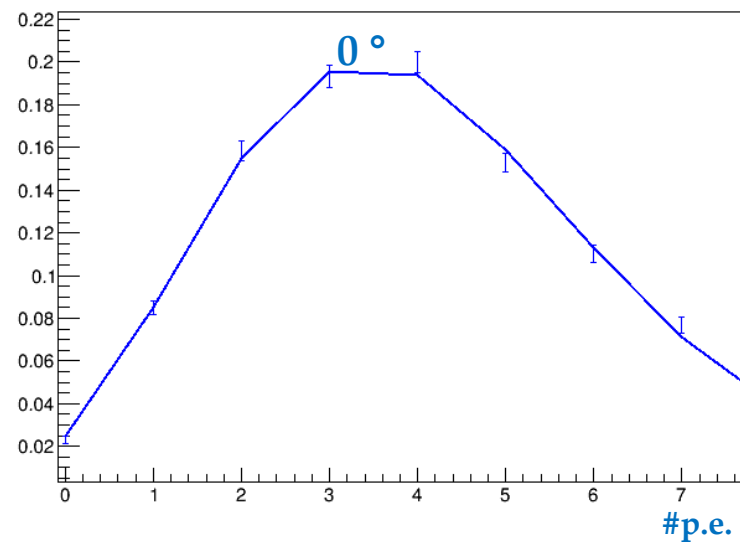
AMPLITUDE DISTRIBUTION



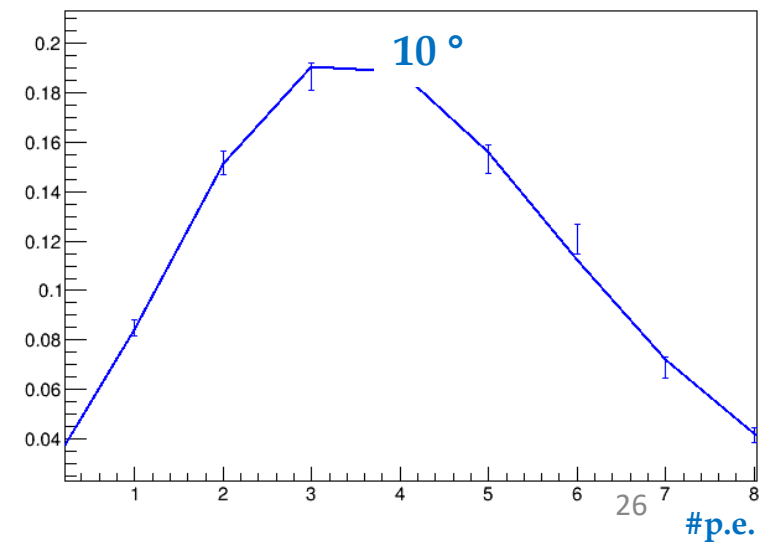
AMPLITUDE DISTRIBUTION - Poisson



AMPLITUDE DISTRIBUTION - Poisson

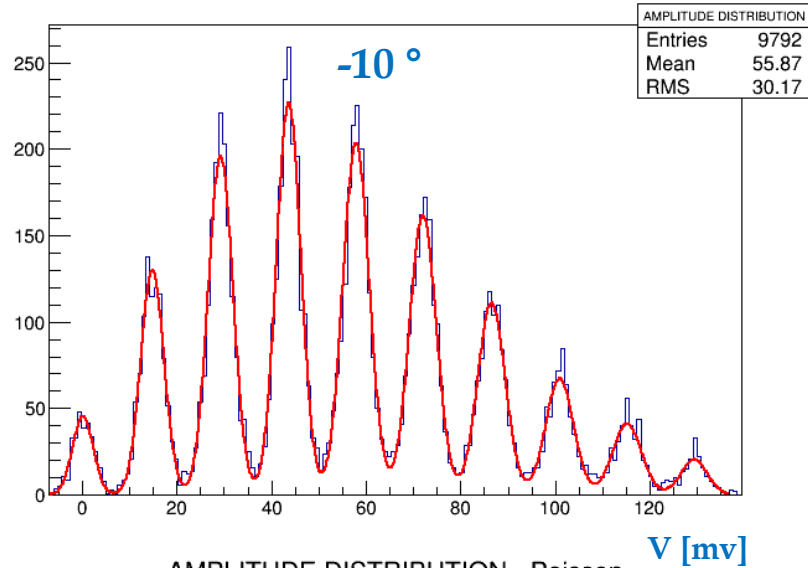


AMPLITUDE DISTRIBUTION - Poisson

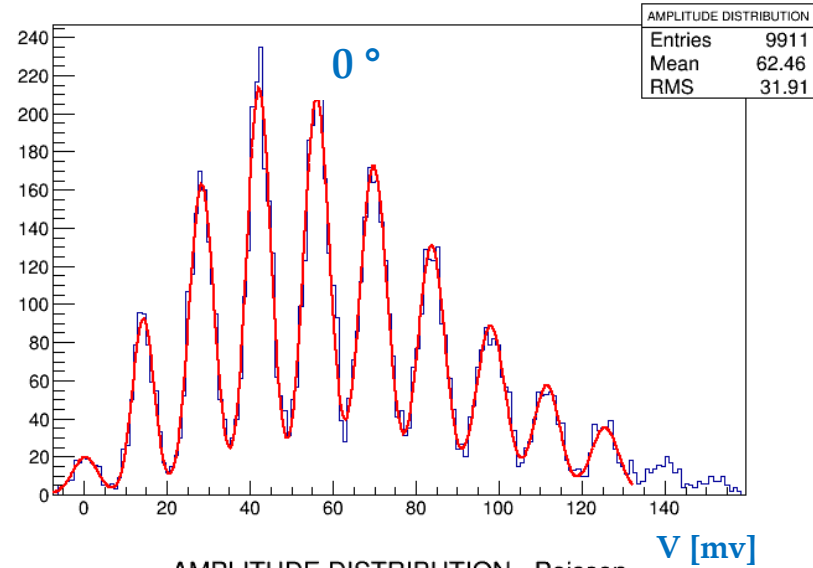


Light Analysis (Amplitude) : 37 V

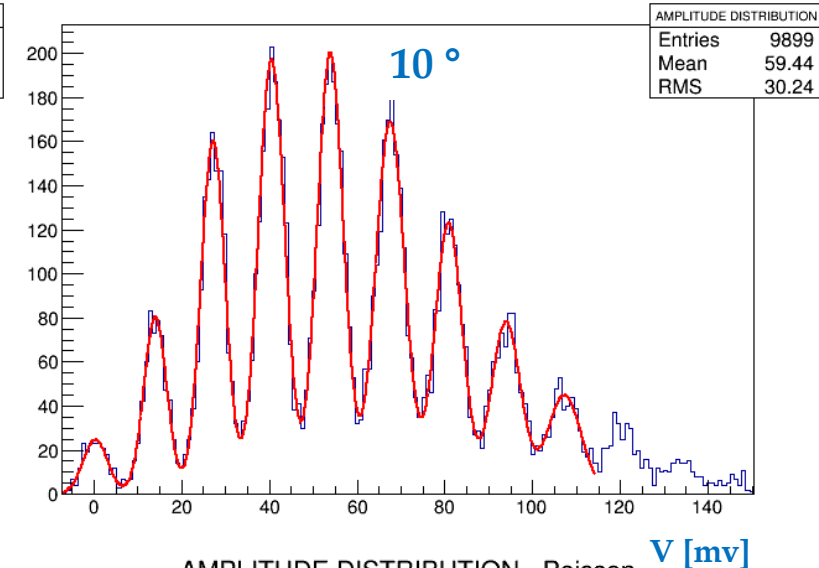
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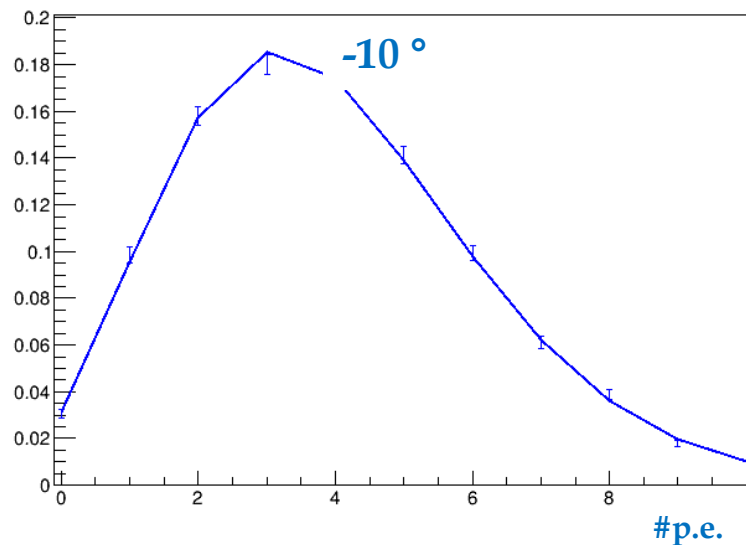
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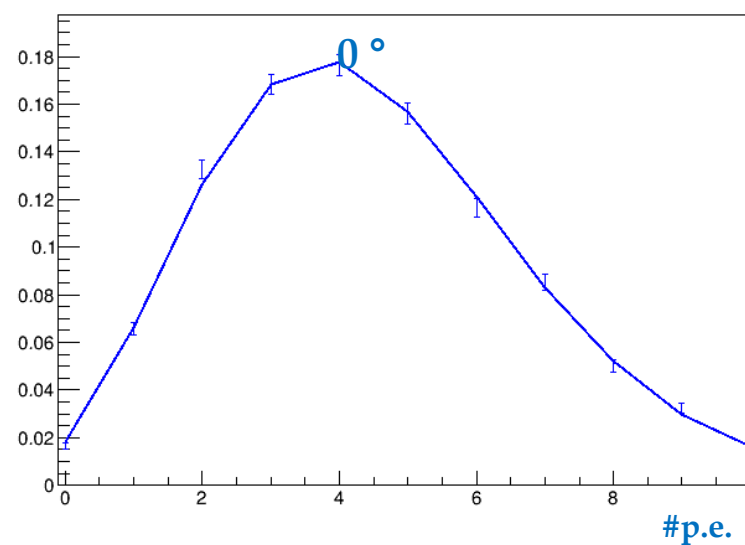
AMPLITUDE DISTRIBUTION



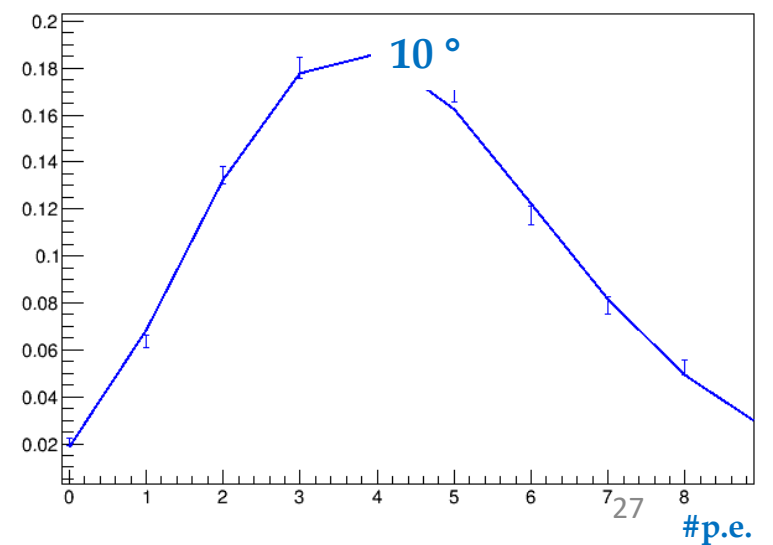
AMPLITUDE DISTRIBUTION - Poisson



AMPLITUDE DISTRIBUTION - Poisson

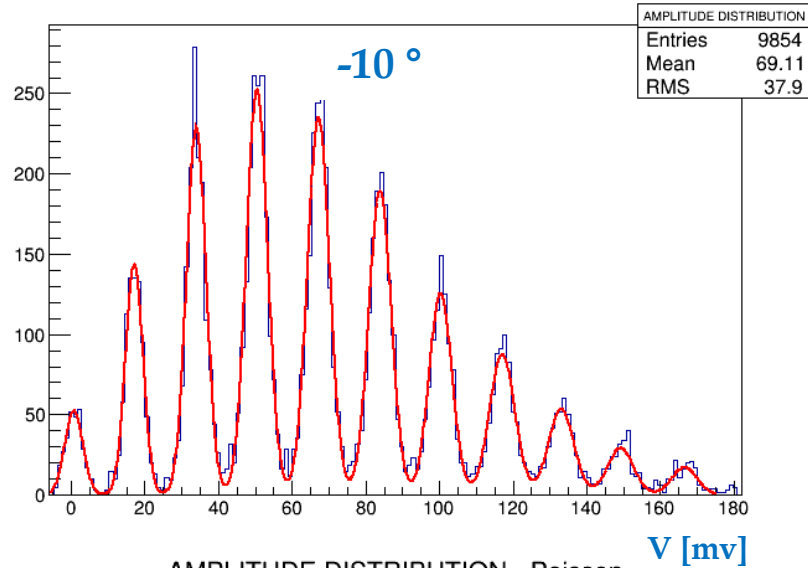


AMPLITUDE DISTRIBUTION - Poisson

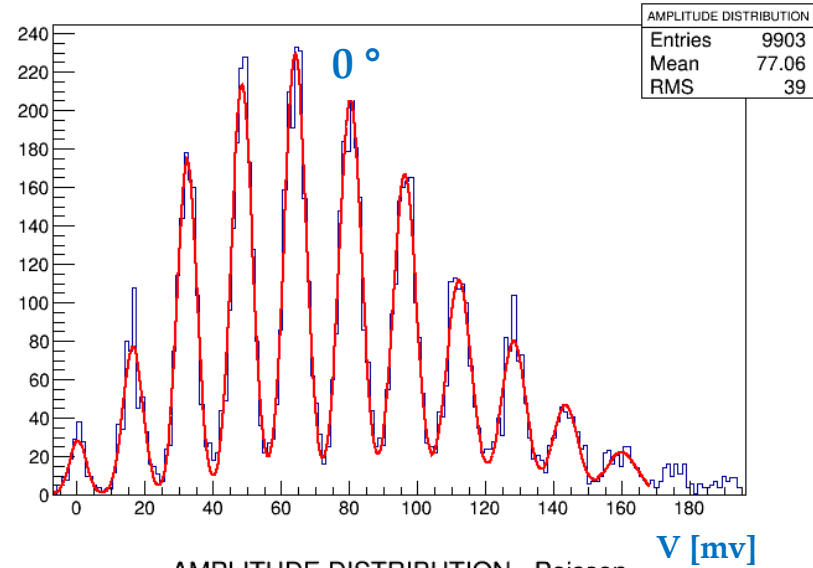


Light Analysis (Amplitude) : 38 V

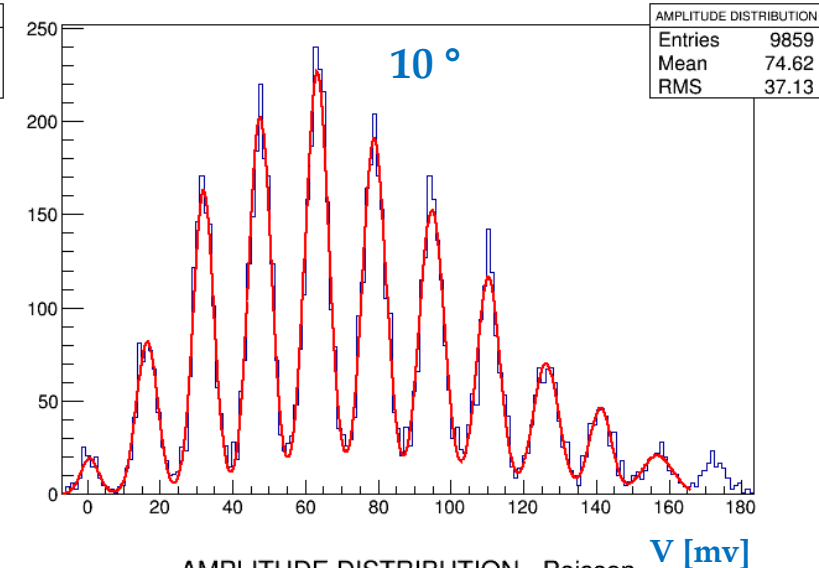
AMPLITUDE DISTRIBUTION



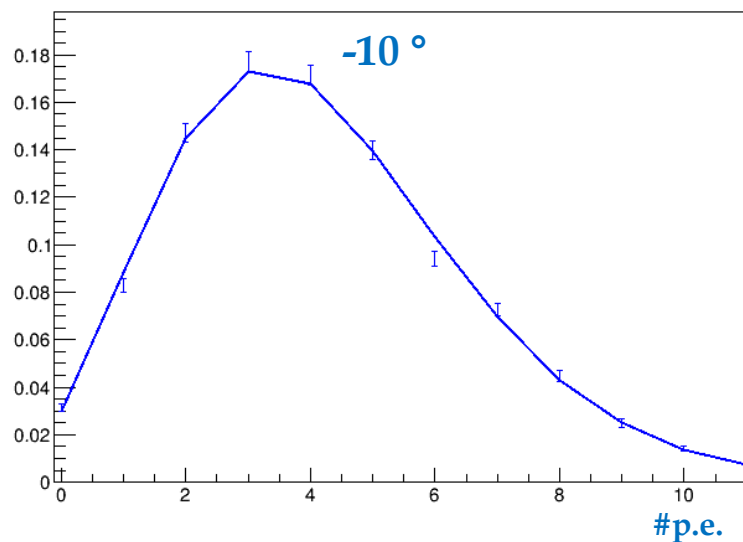
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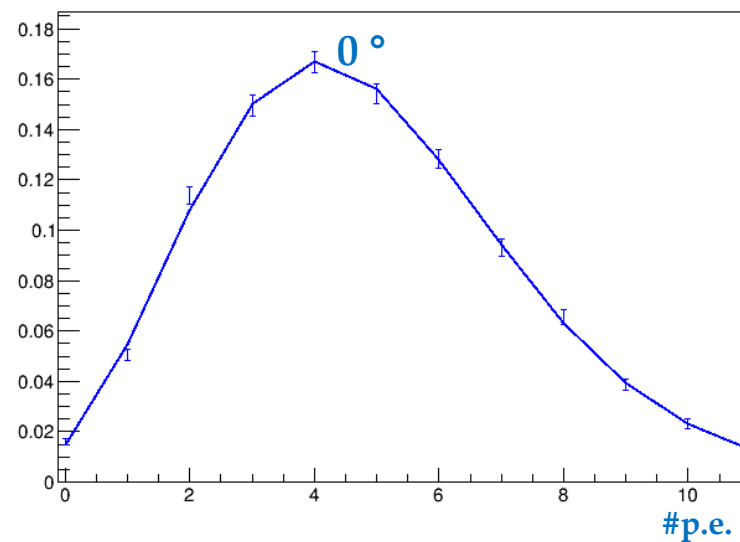
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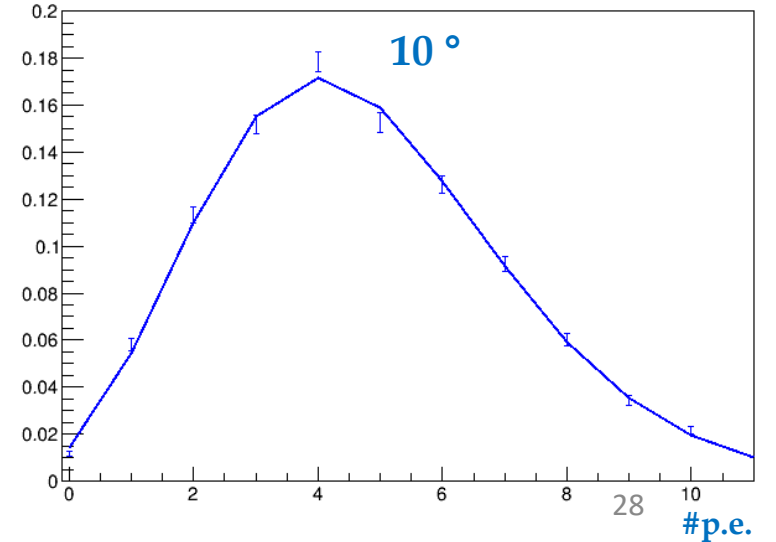
AMPLITUDE DISTRIBUTION - Poisson



AMPLITUDE DISTRIBUTION - Poisson

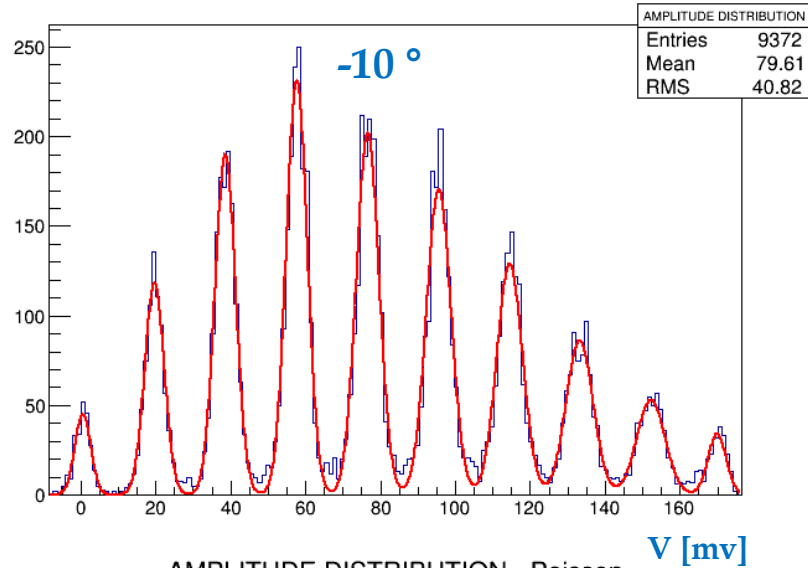


AMPLITUDE DISTRIBUTION - Poisson

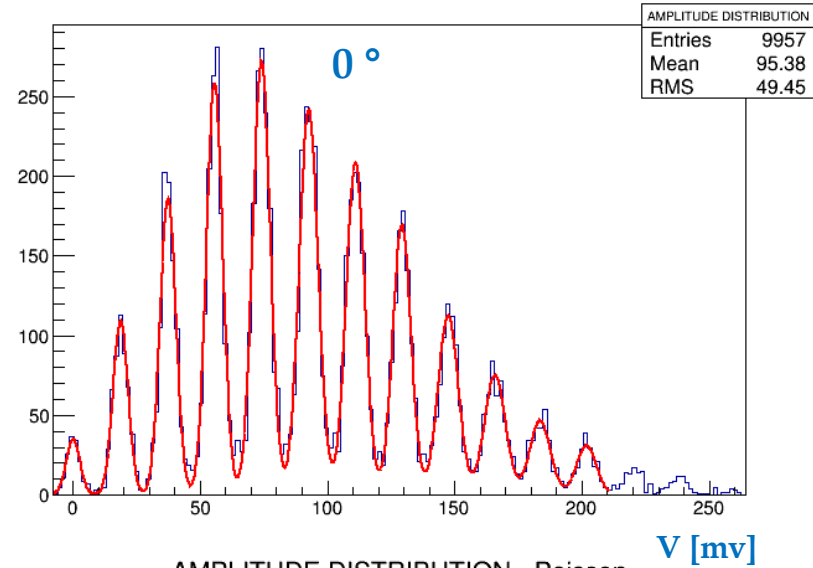


Light Analysis (Amplitude) : 39 V

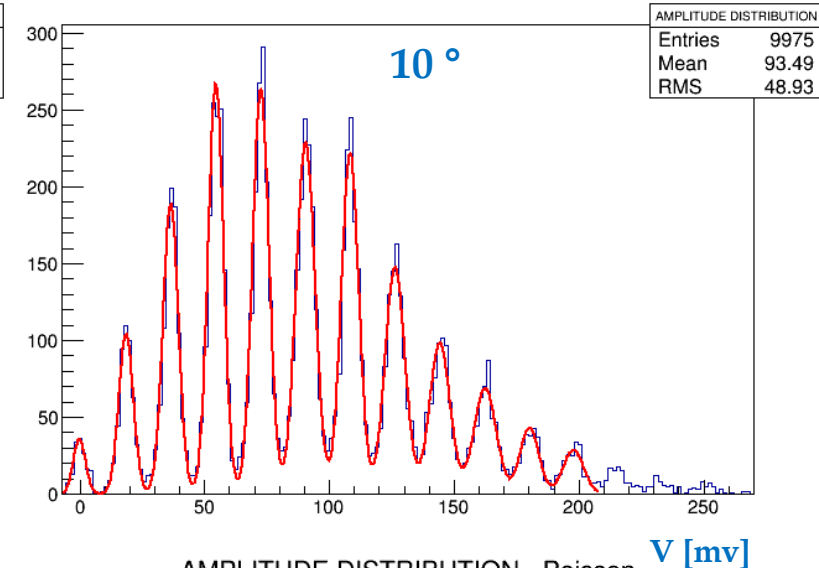
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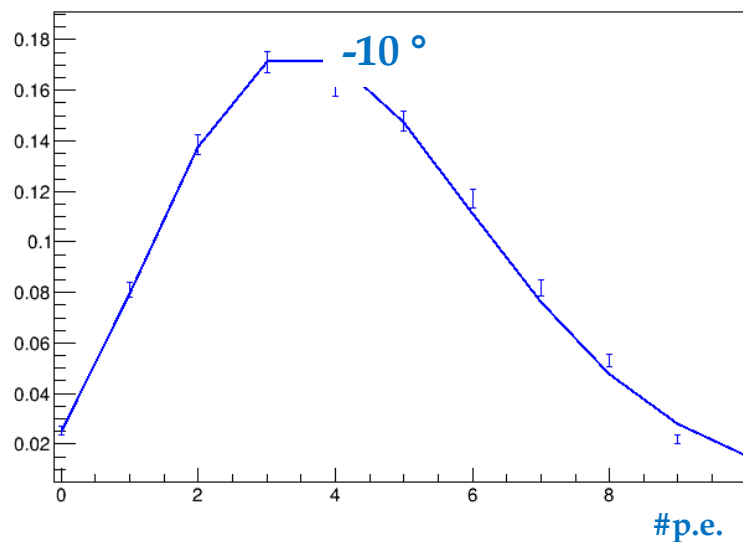
AMPLITUDE DISTRIBUTION



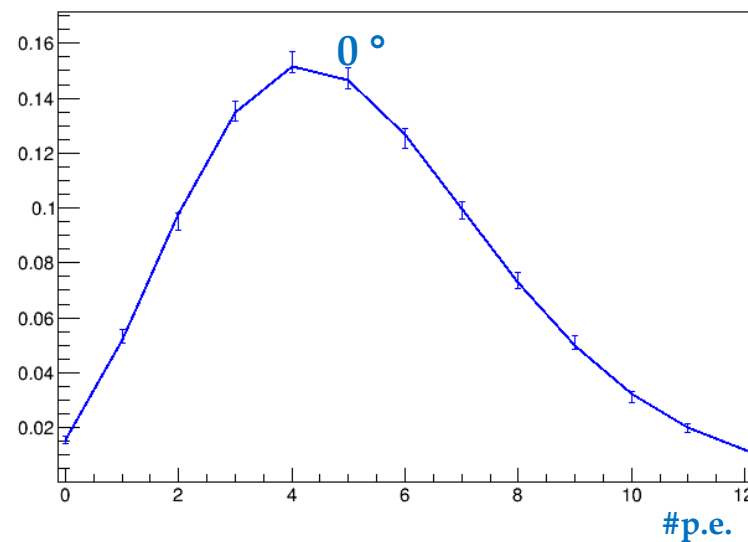
AMPLITUDE DISTRIBUTION



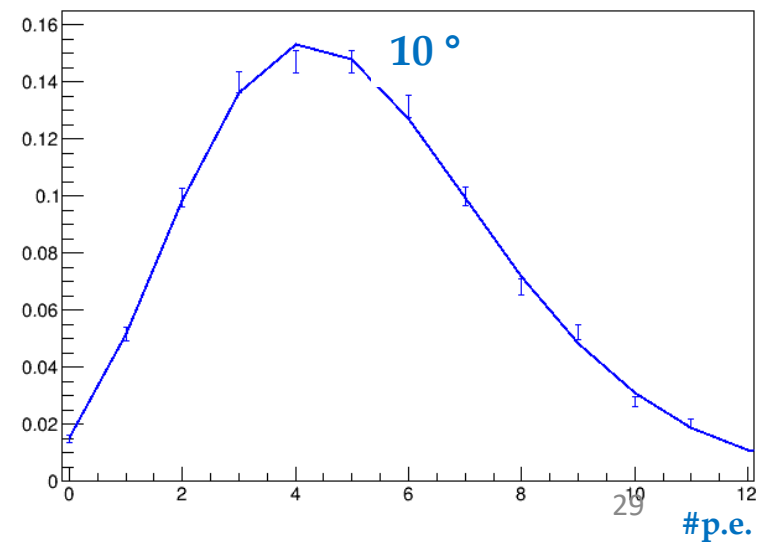
AMPLITUDE DISTRIBUTION - Poisson



AMPLITUDE DISTRIBUTION - Poisson

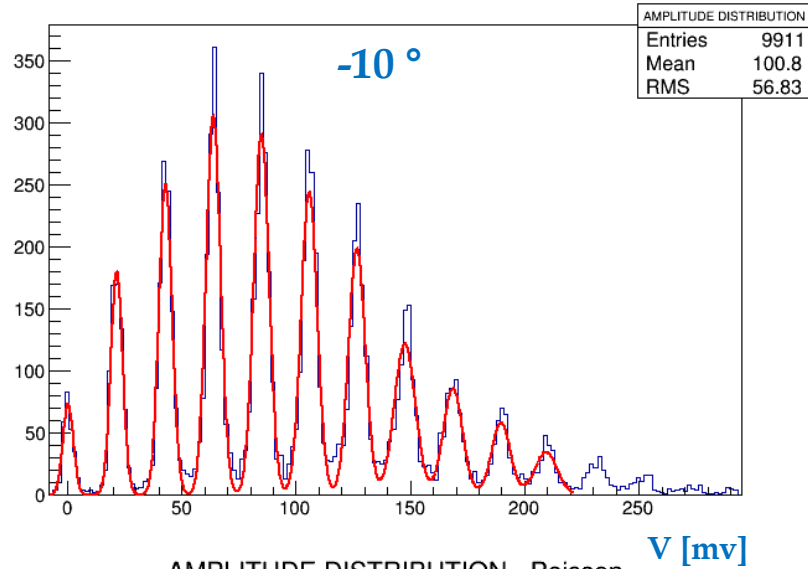


AMPLITUDE DISTRIBUTION - Poisson

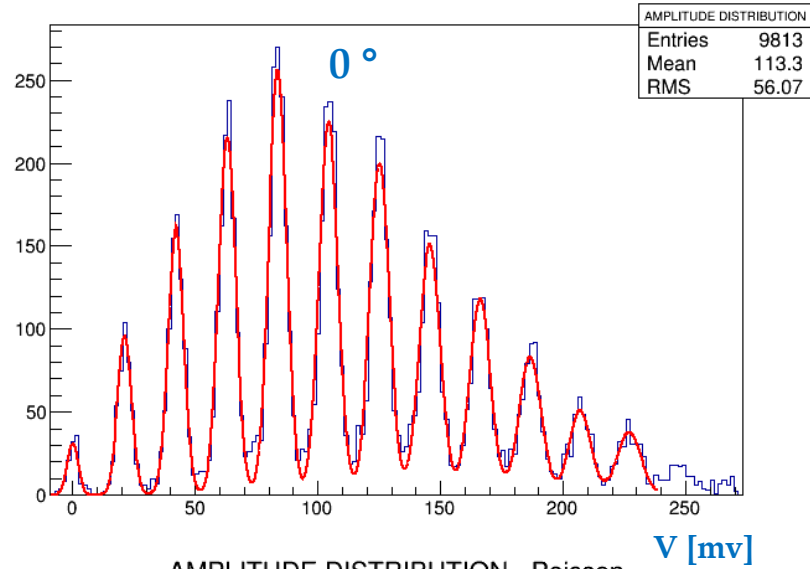


Light Analysis (Amplitude) : 40 V

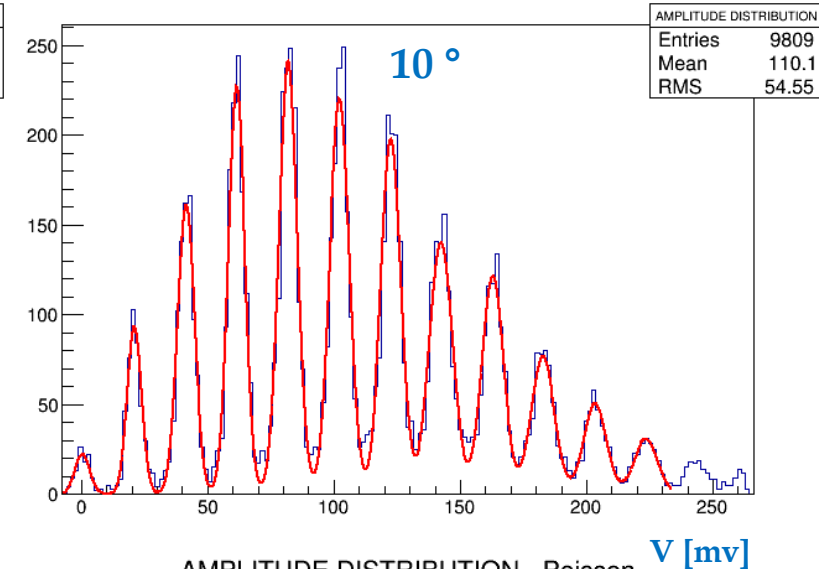
AMPLITUDE DISTRIBUTION



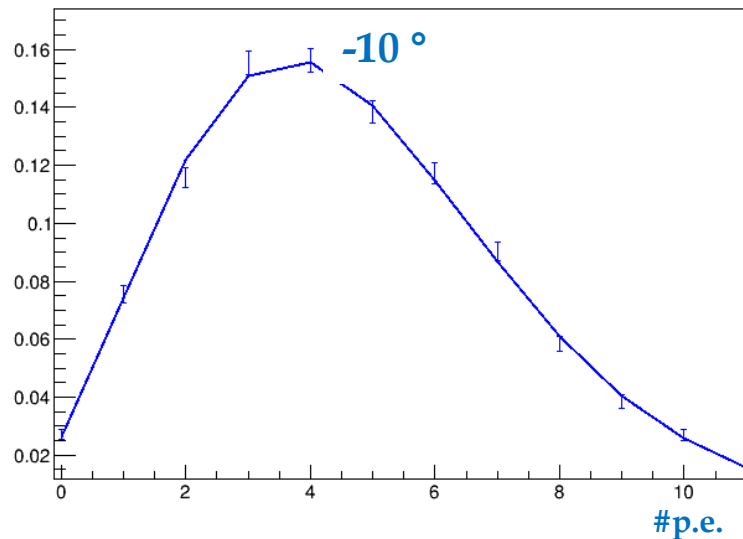
AMPLITUDE DISTRIBUTION



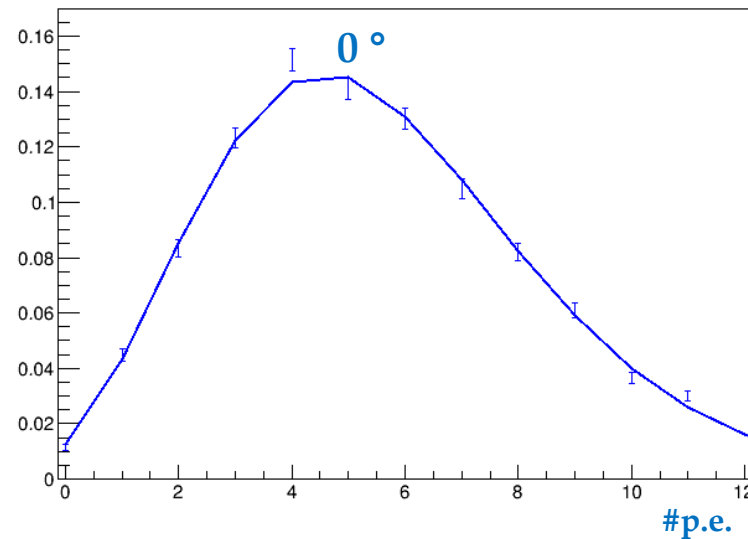
AMPLITUDE DISTRIBUTION



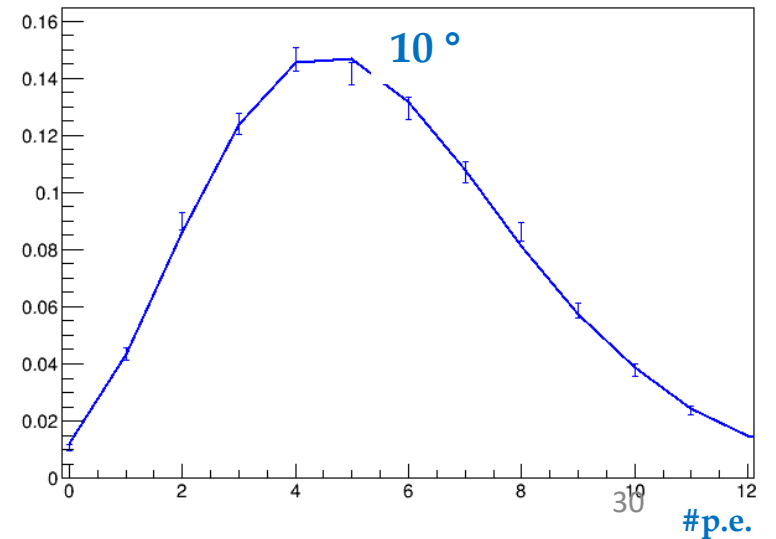
AMPLITUDE DISTRIBUTION - Poisson



AMPLITUDE DISTRIBUTION - Poisson

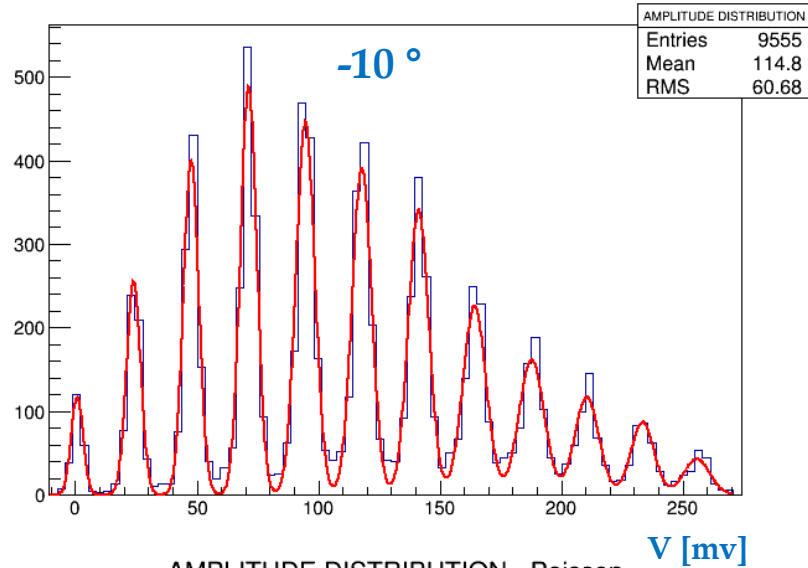


AMPLITUDE DISTRIBUTION - Poisson

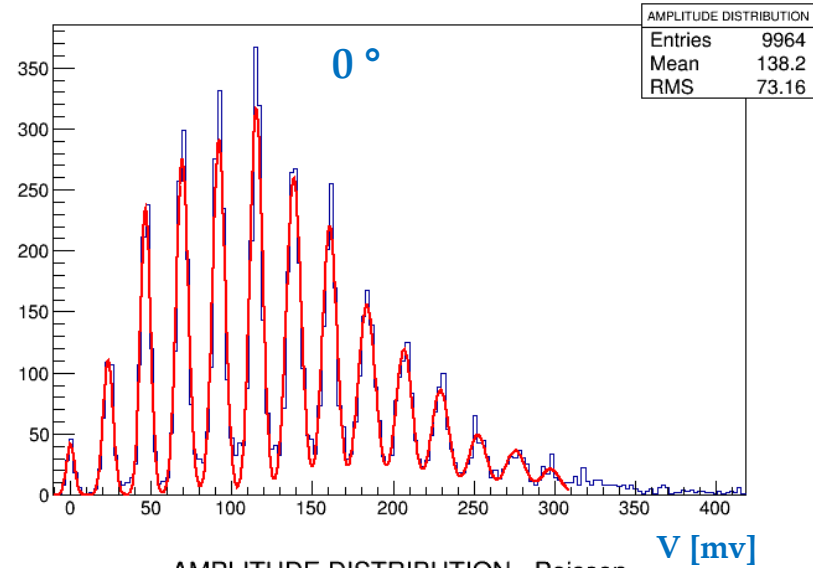


Light Analysis (Amplitude) : 41 V

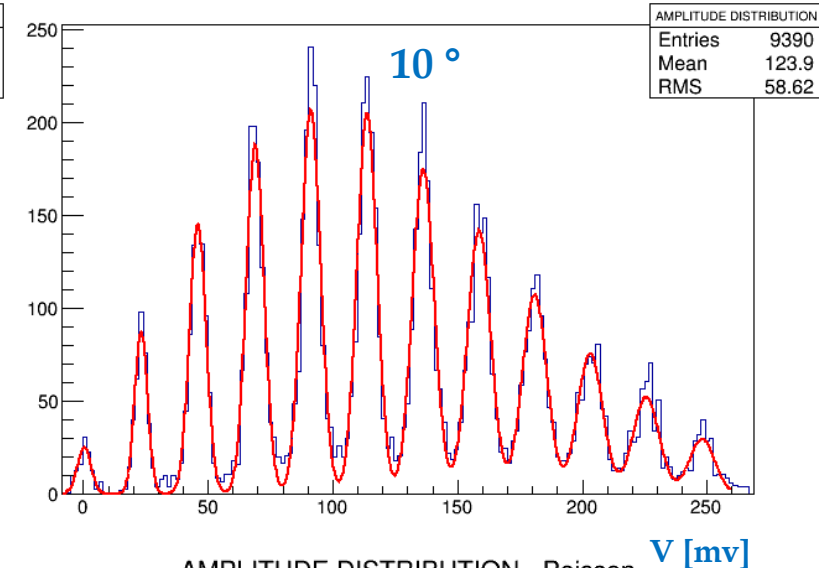
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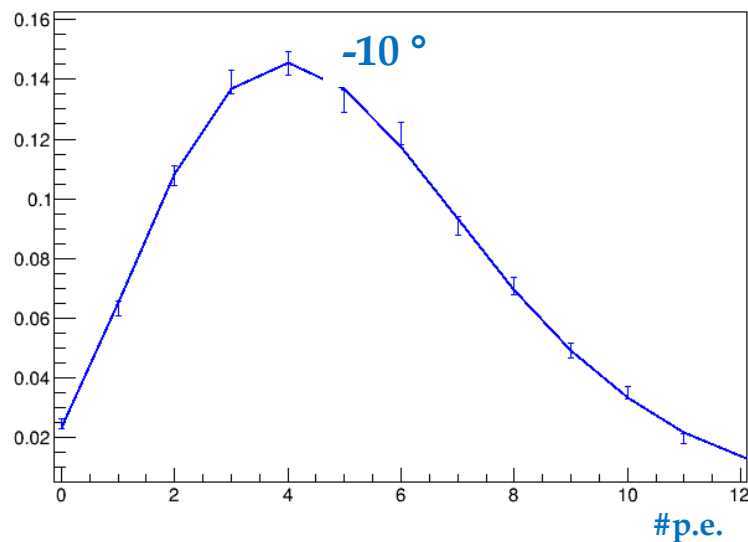
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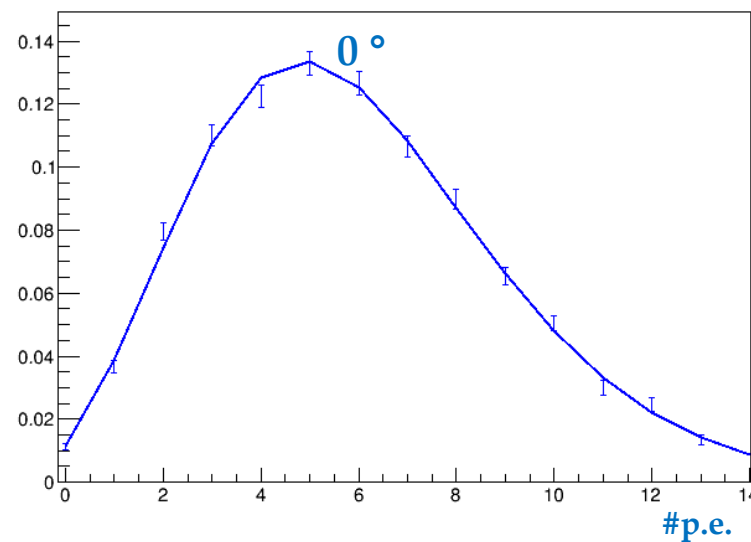
AMPLITUDE DISTRIBUTION



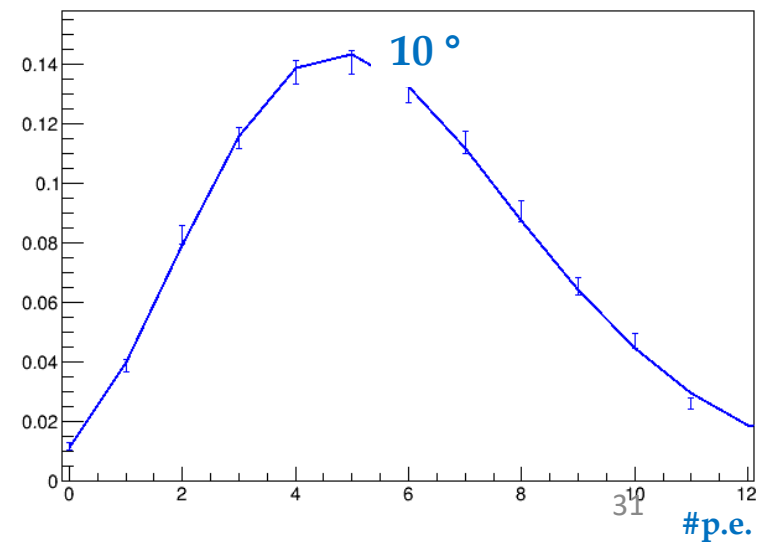
AMPLITUDE DISTRIBUTION - Poisson



AMPLITUDE DISTRIBUTION - Poisson

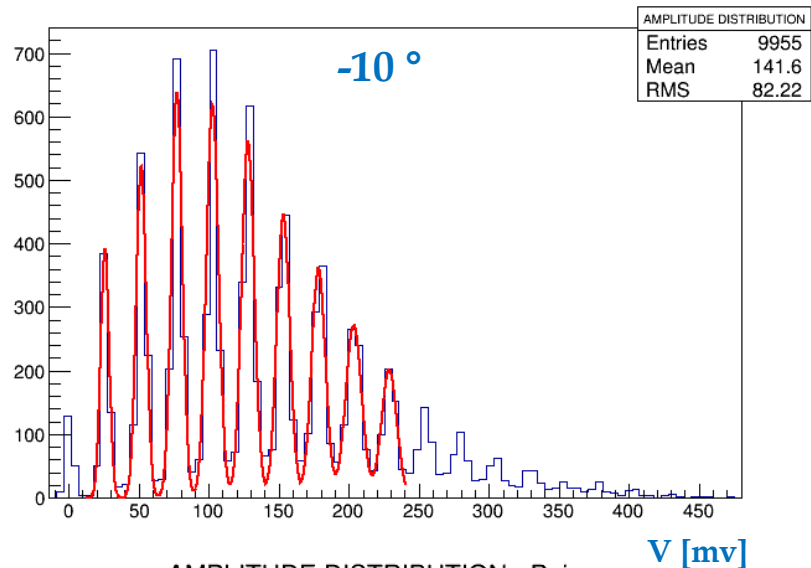


AMPLITUDE DISTRIBUTION - Poisson

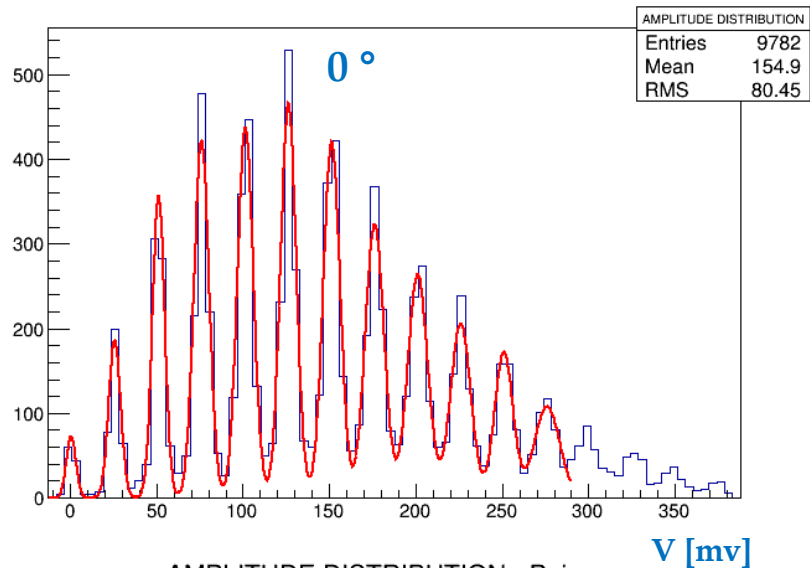


Light Analysis (Amplitude) : 42 V

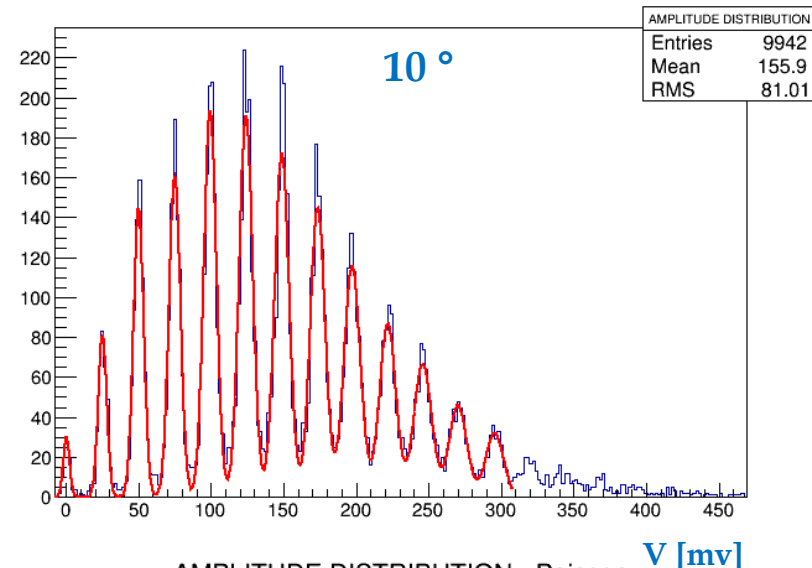
AMPLITUDE DISTRIBUTION



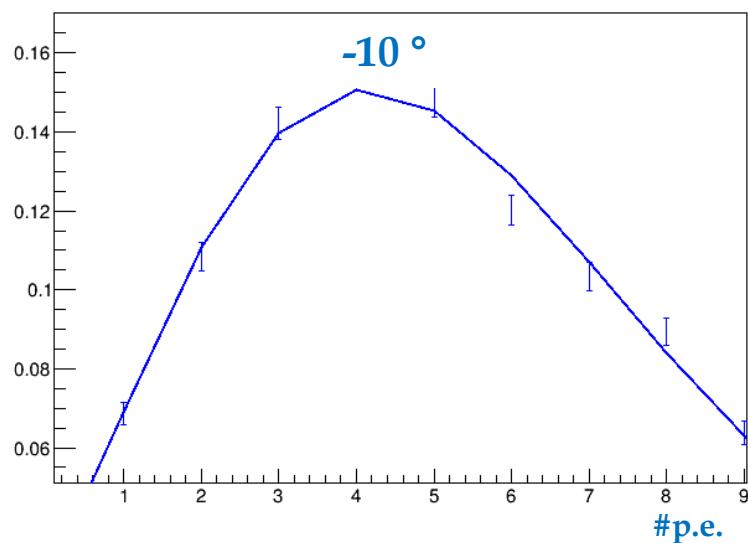
AMPLITUDE DISTRIBUTION



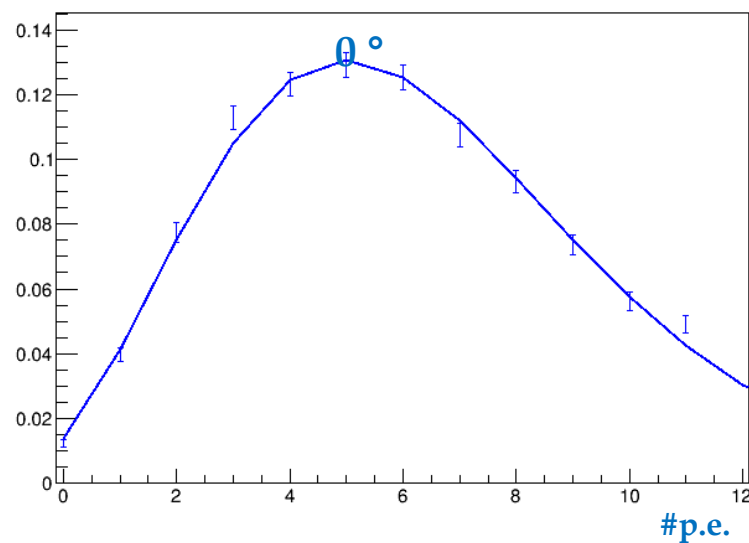
AMPLITUDE DISTRIBUTION



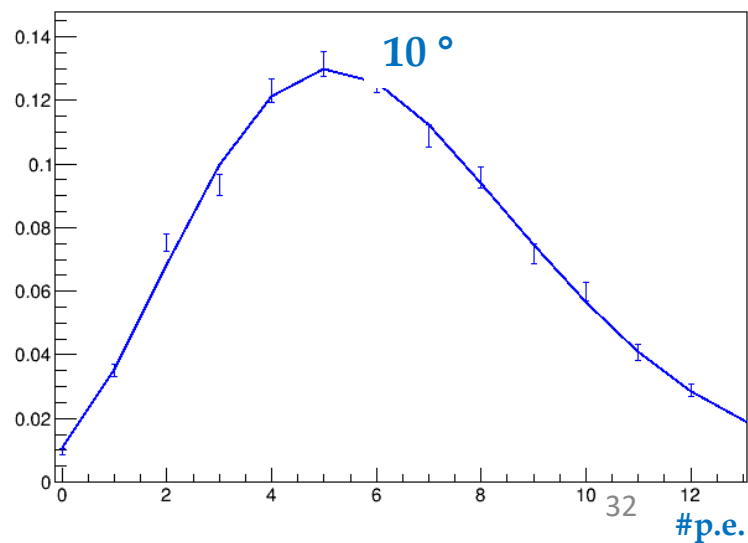
AMPLITUDE DISTRIBUTION - Poisson



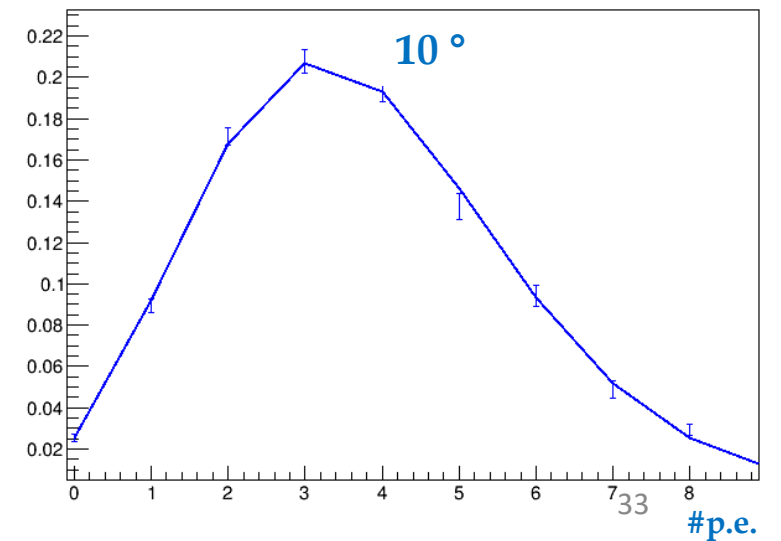
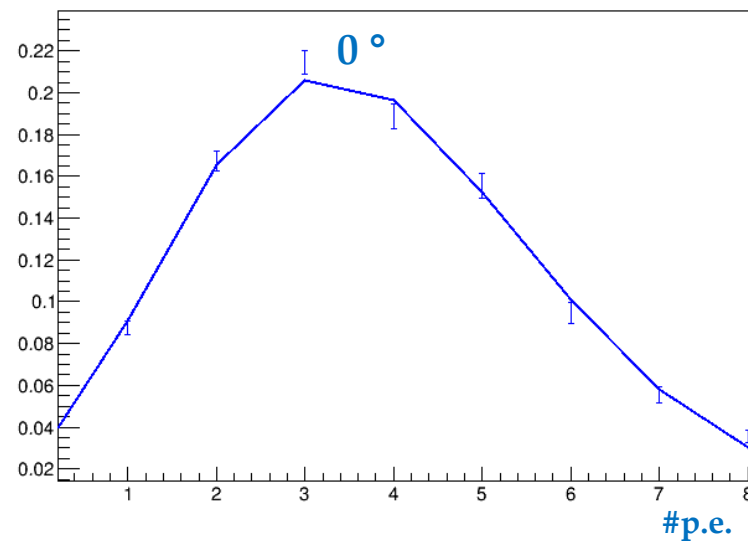
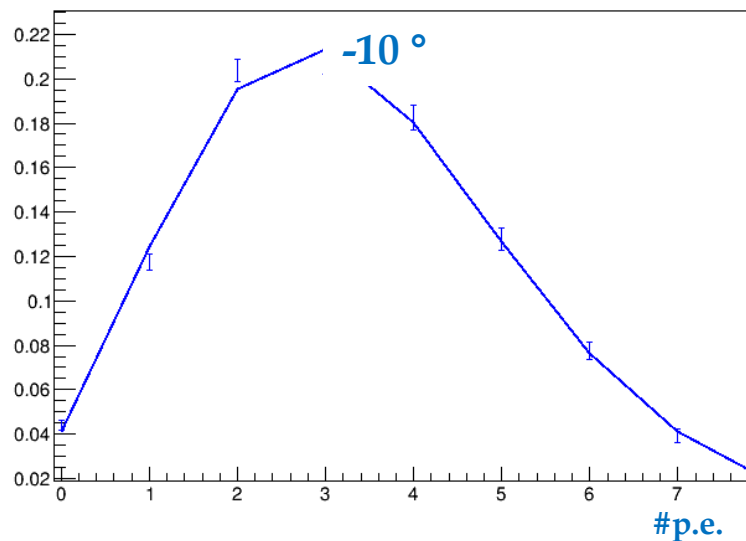
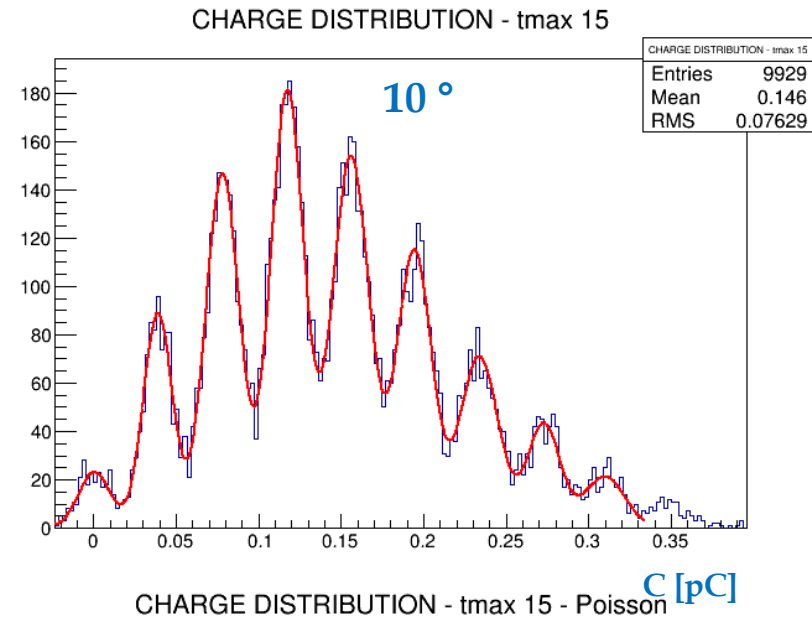
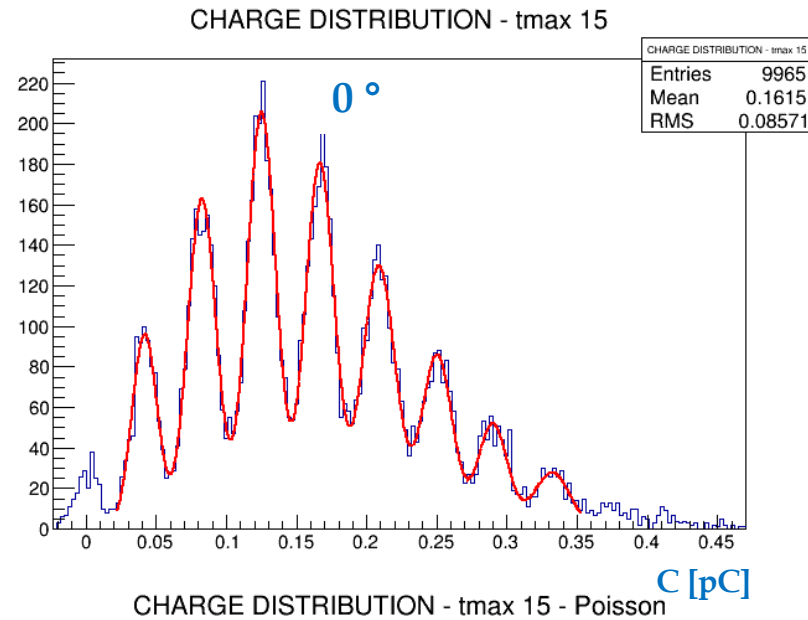
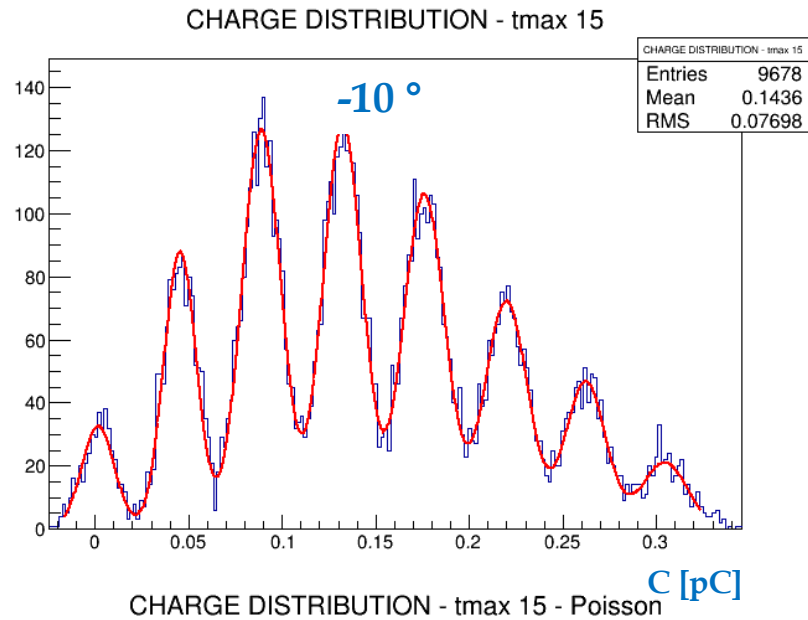
AMPLITUDE DISTRIBUTION - Poisson



AMPLITUDE DISTRIBUTION - Poisson

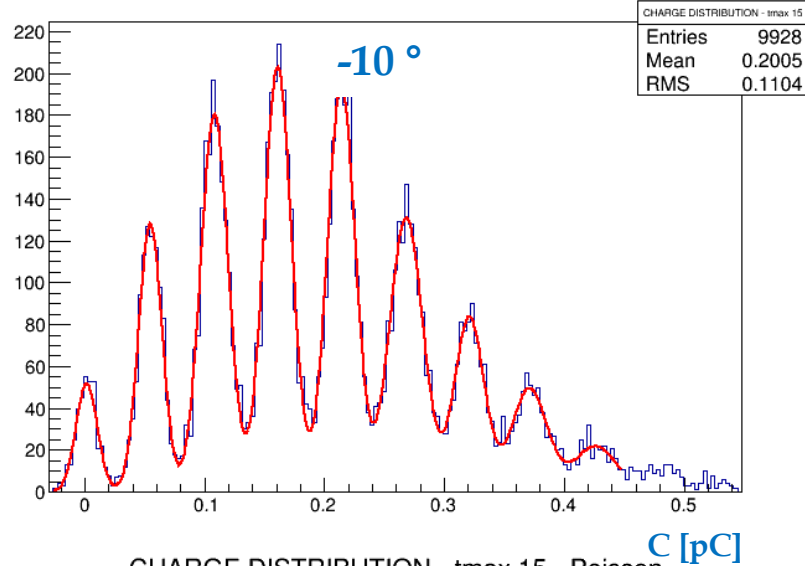


Light Analysis (Integration time 15 ns) : 35 V

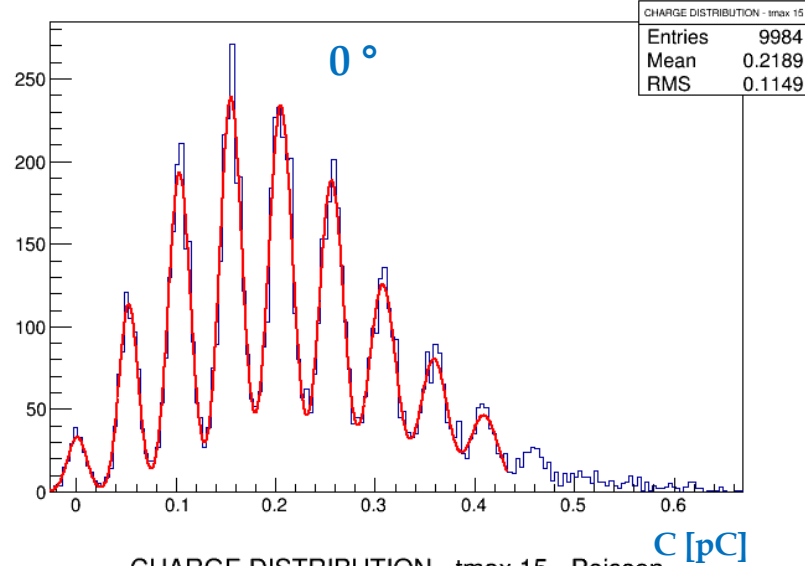


Light Analysis (Integration time 15 ns) : 36 V

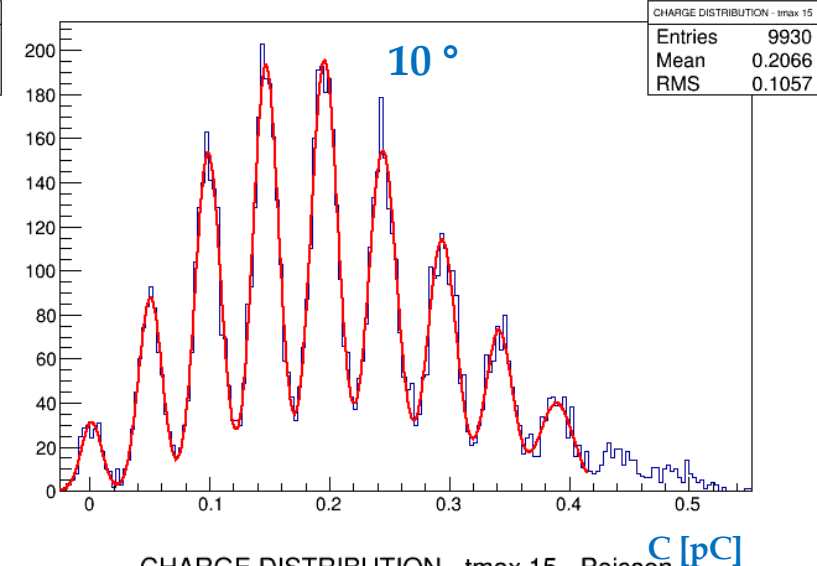
CHARGE DISTRIBUTION - tmax 15



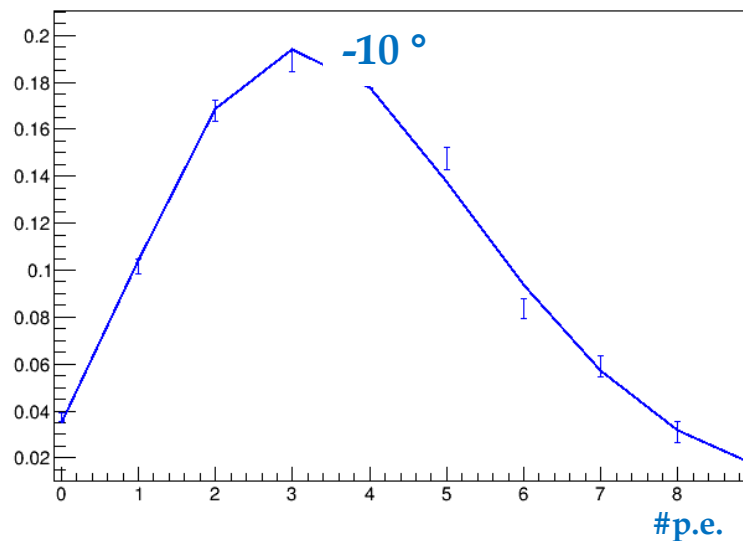
CHARGE DISTRIBUTION - tmax 15



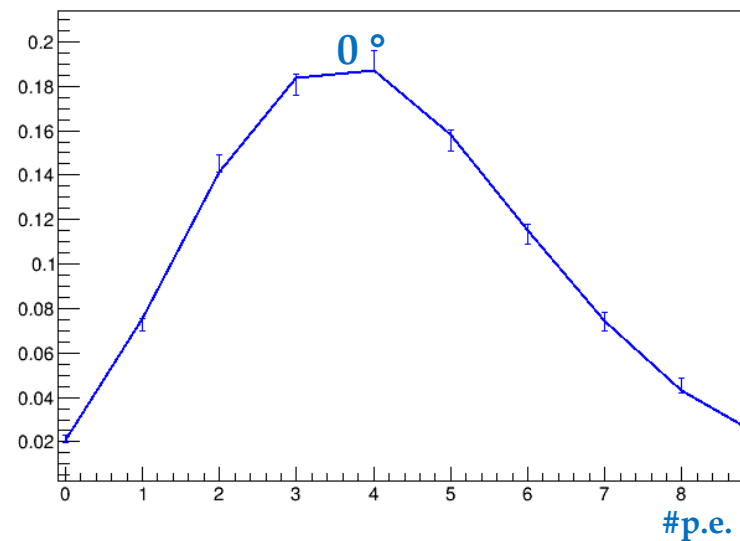
CHARGE DISTRIBUTION - tmax 15



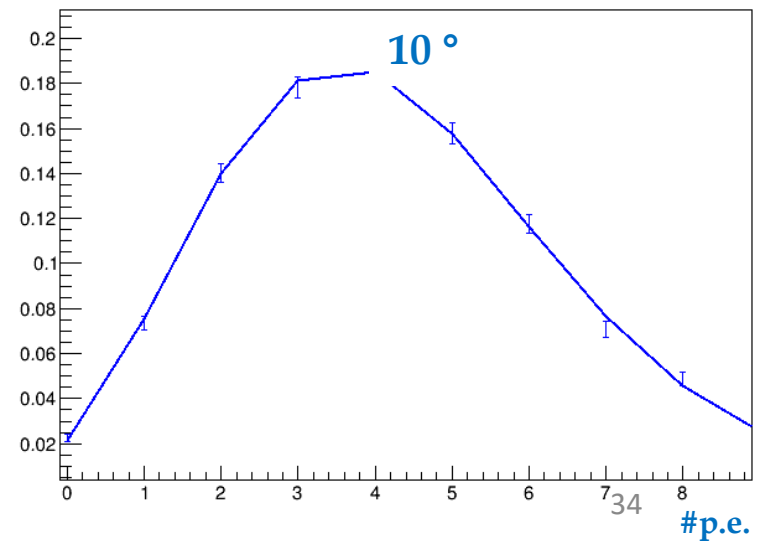
CHARGE DISTRIBUTION - tmax 15 - Poisson



CHARGE DISTRIBUTION - tmax 15 - Poisson

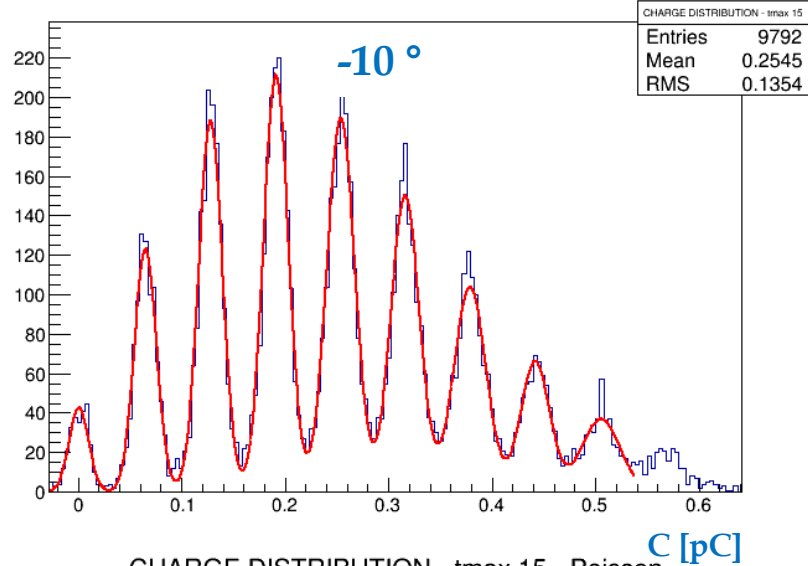


CHARGE DISTRIBUTION - tmax 15 - Poisson

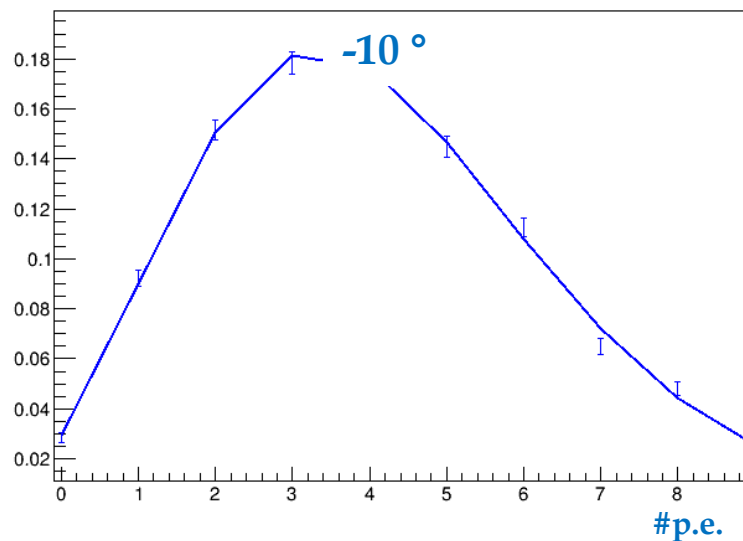


Light Analysis (Integration time 15 ns) : 37 V

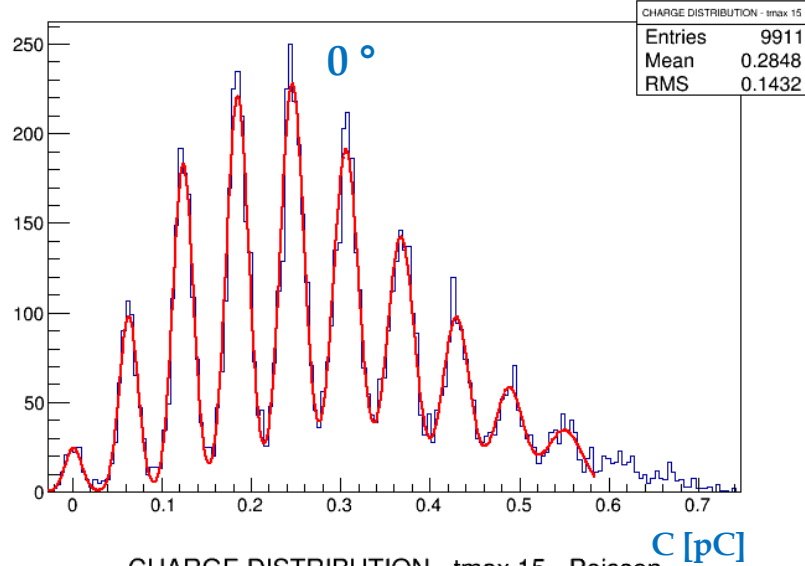
CHARGE DISTRIBUTION - tmax 15



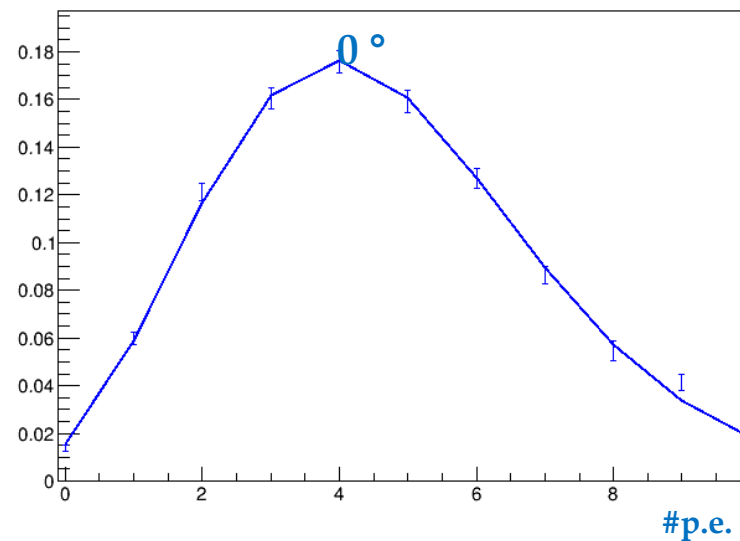
CHARGE DISTRIBUTION - tmax 15 - Poisson



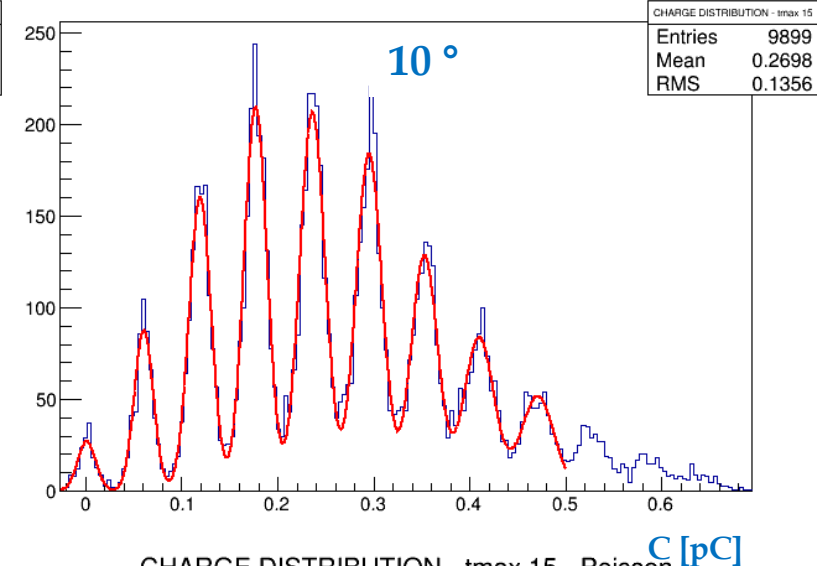
CHARGE DISTRIBUTION - tmax 15



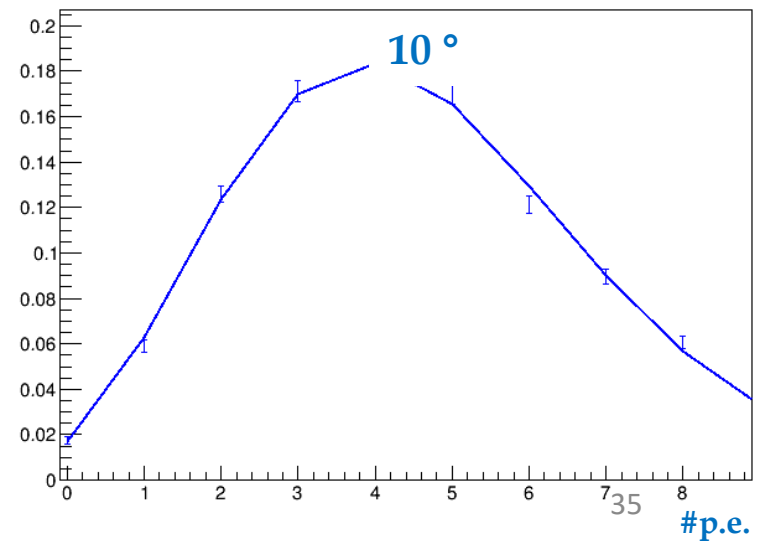
CHARGE DISTRIBUTION - tmax 15 - Poisson



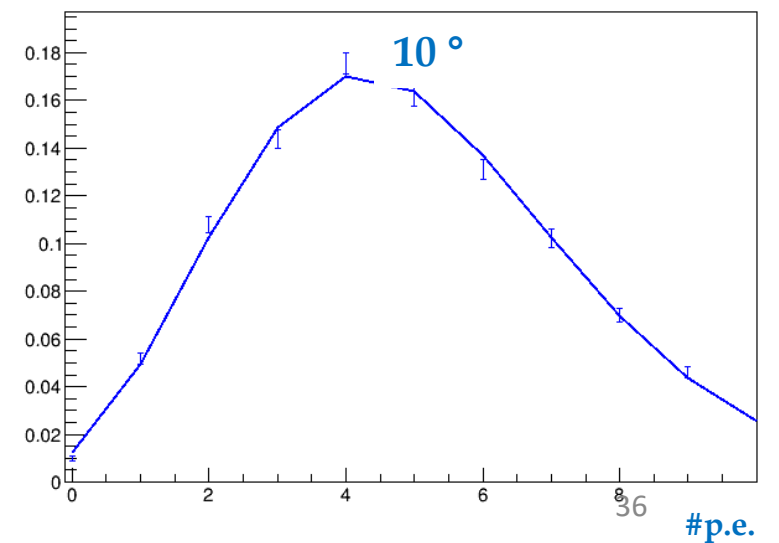
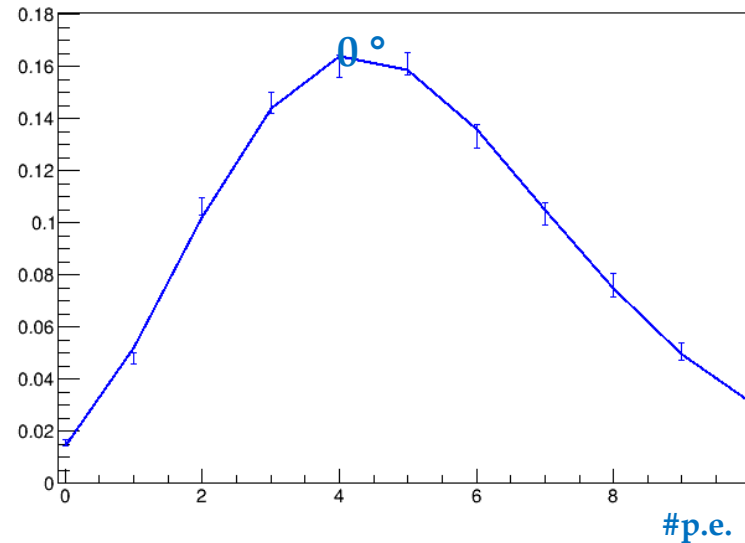
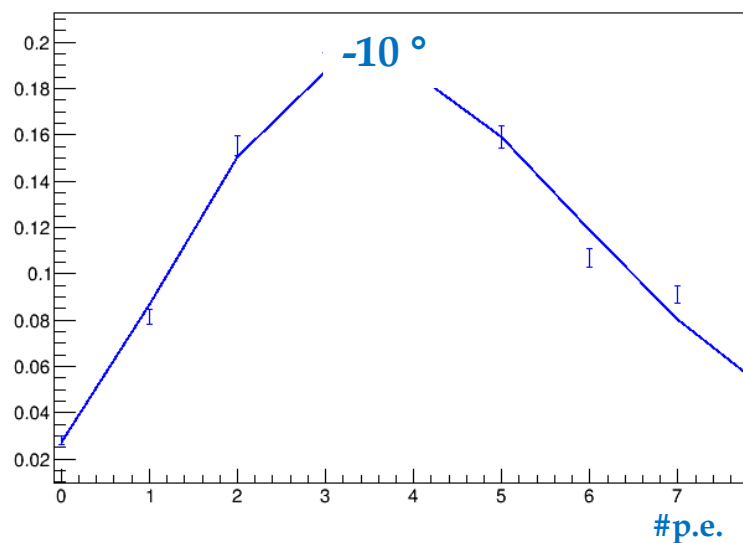
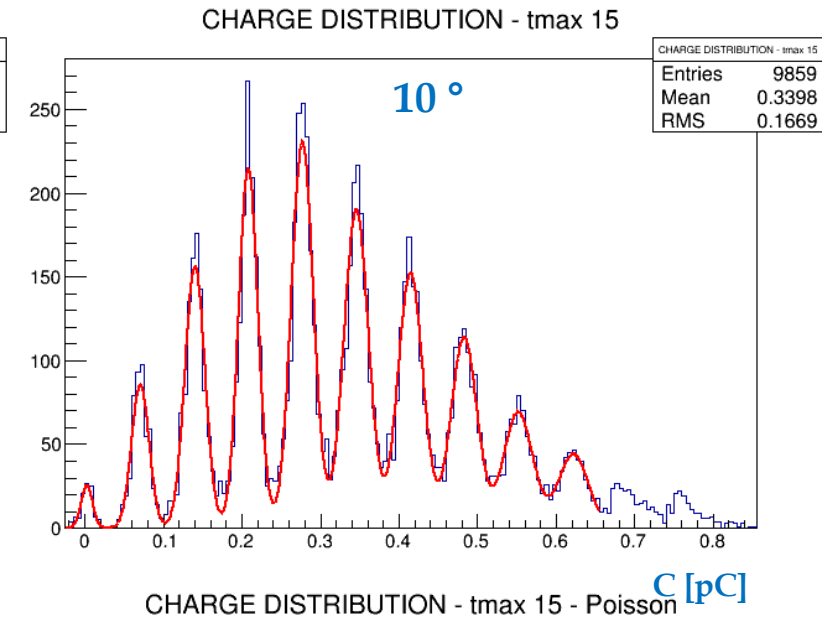
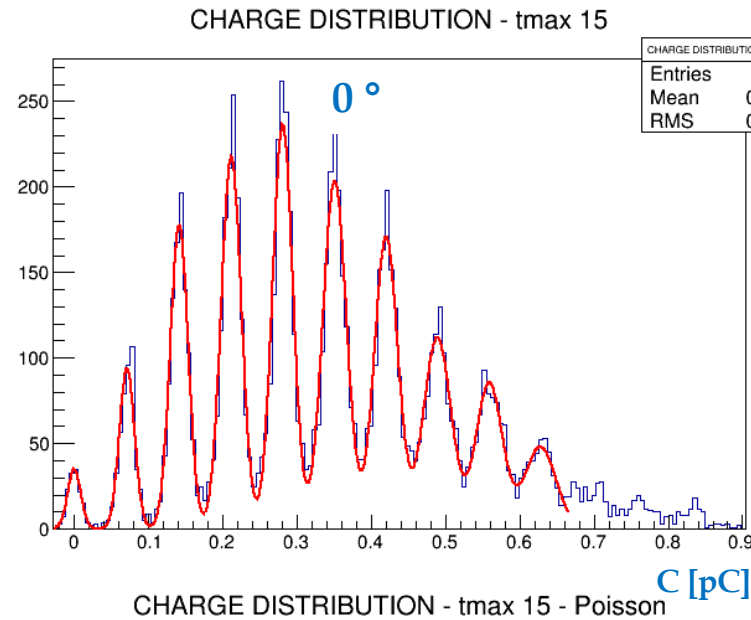
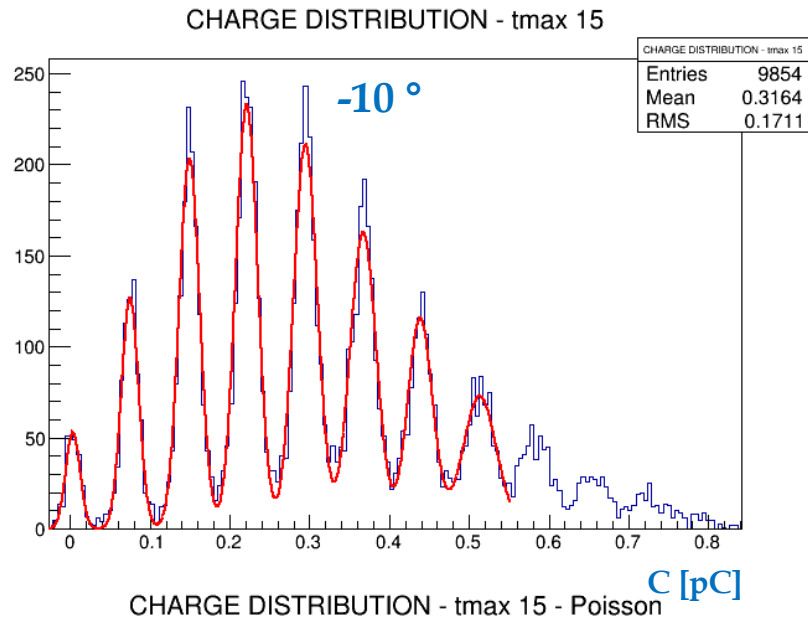
CHARGE DISTRIBUTION - tmax 15



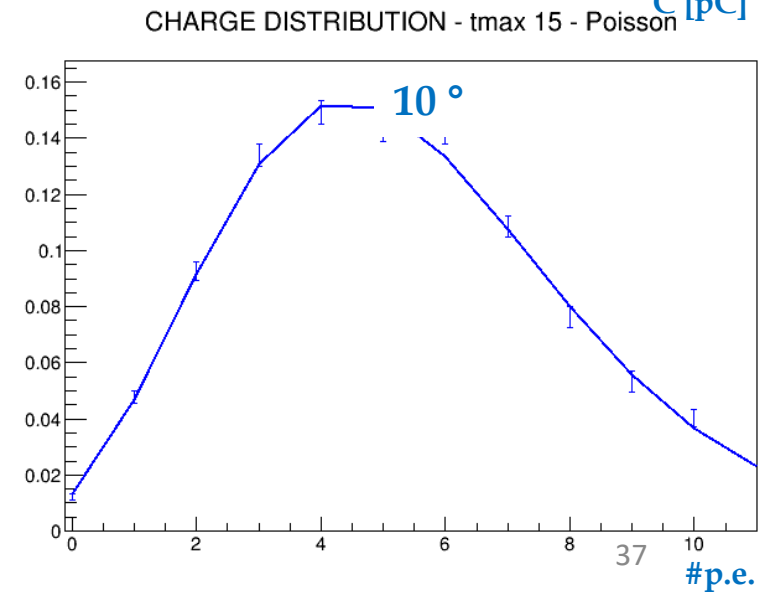
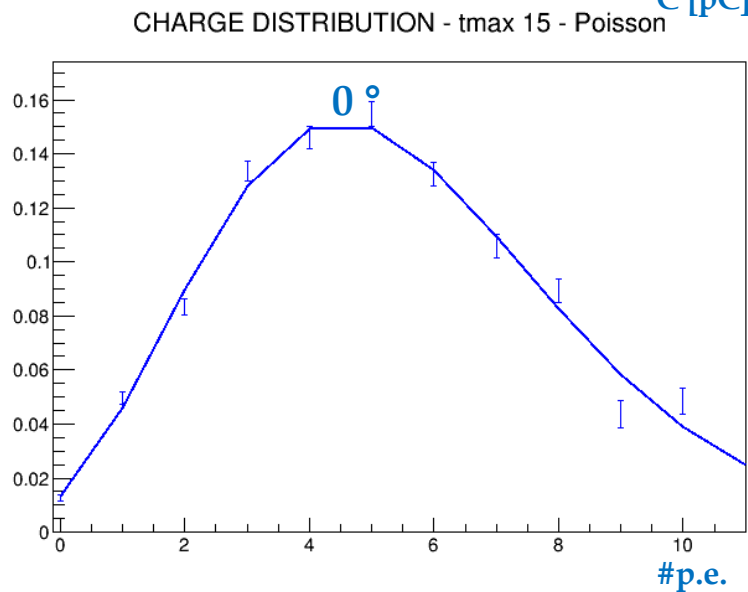
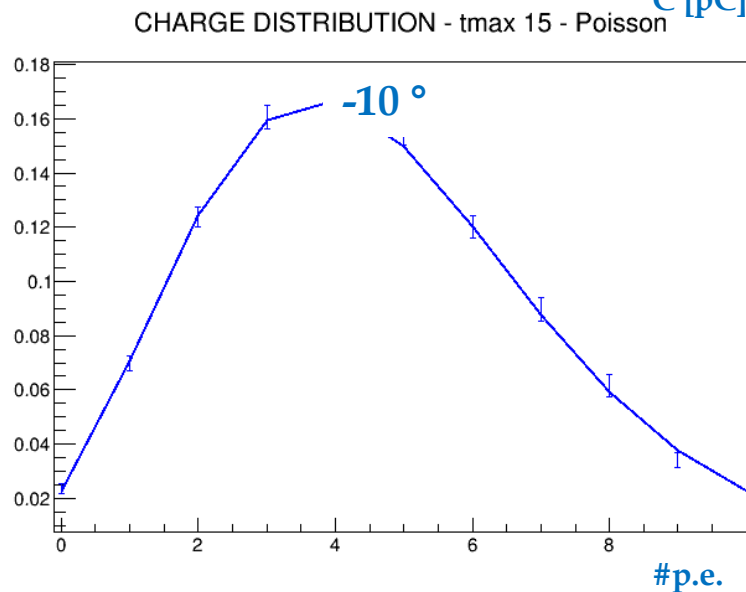
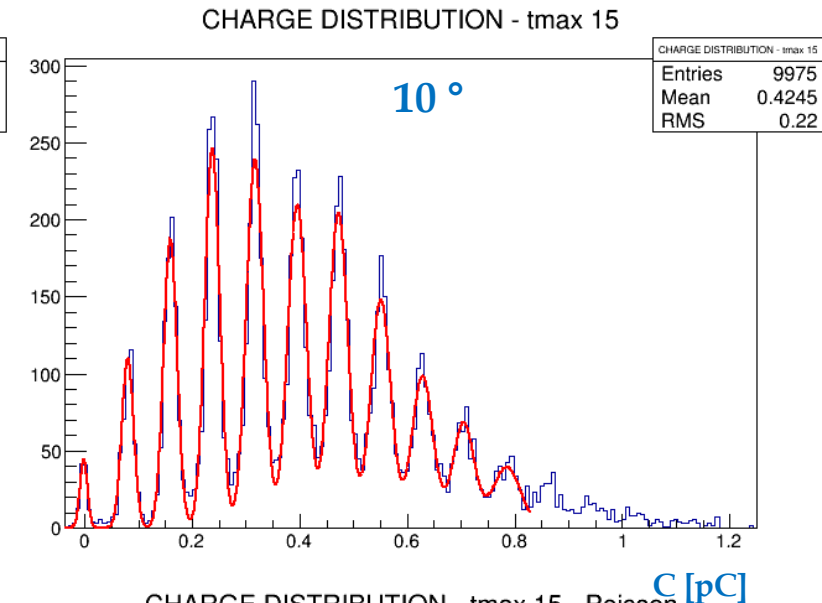
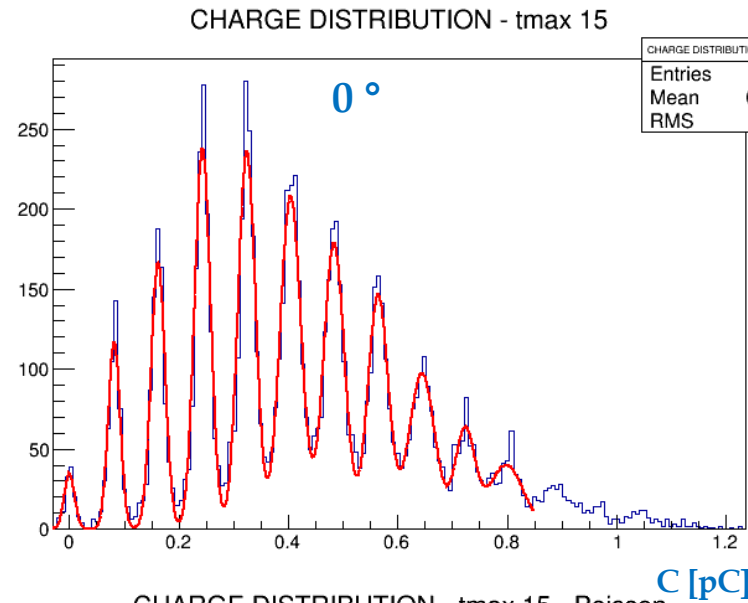
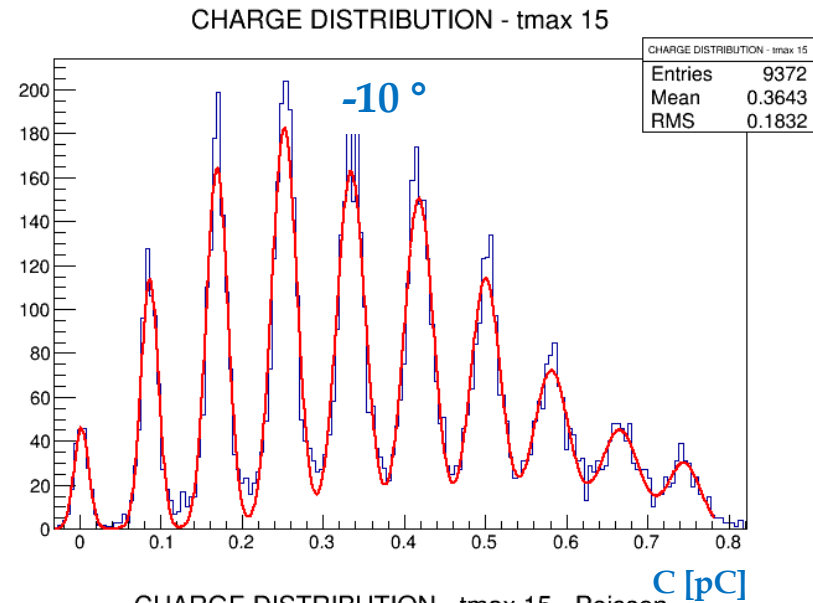
CHARGE DISTRIBUTION - tmax 15 - Poisson



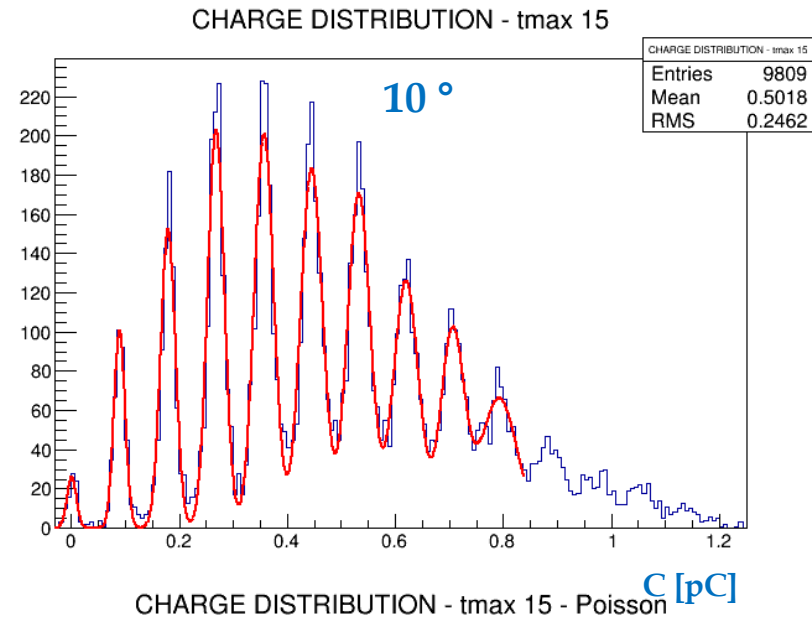
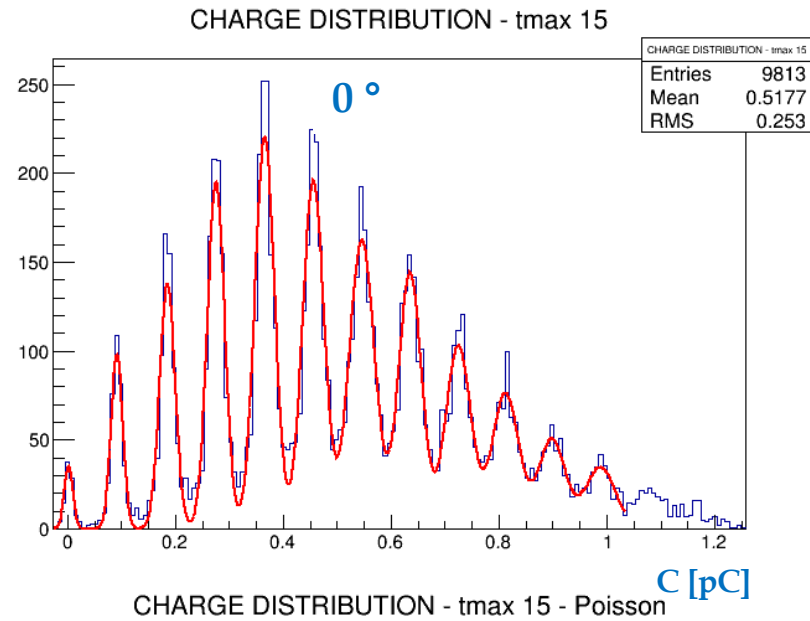
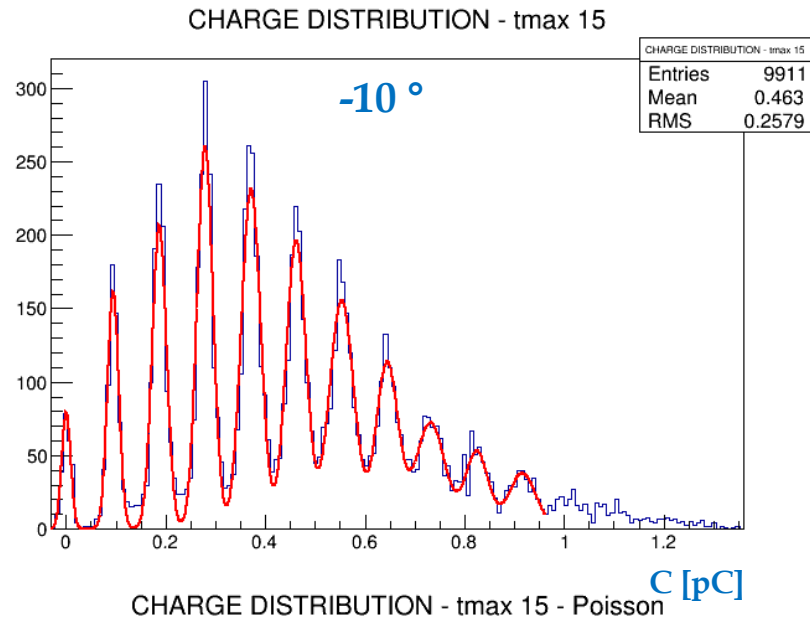
Light Analysis (Integration time 15 ns) : 38 V



Light Analysis (Integration time 15 ns) : 39 V

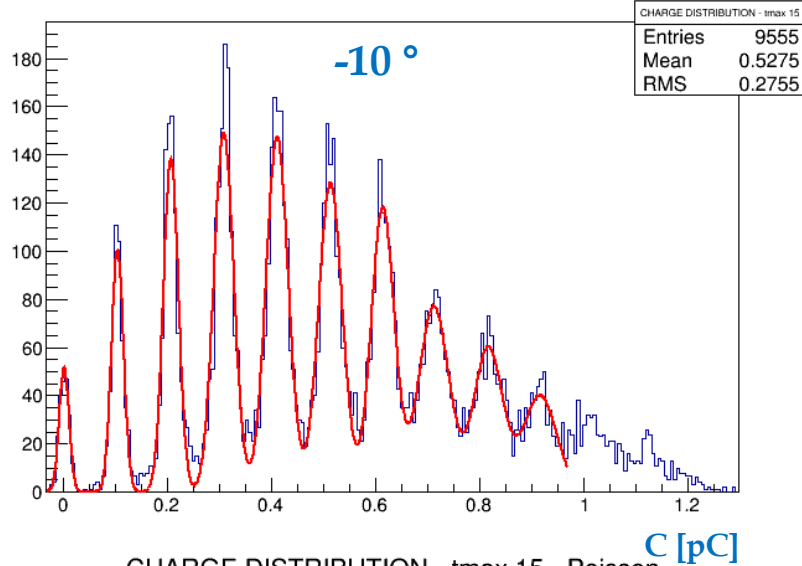


Light Analysis (Integration time 15 ns) : 40 V

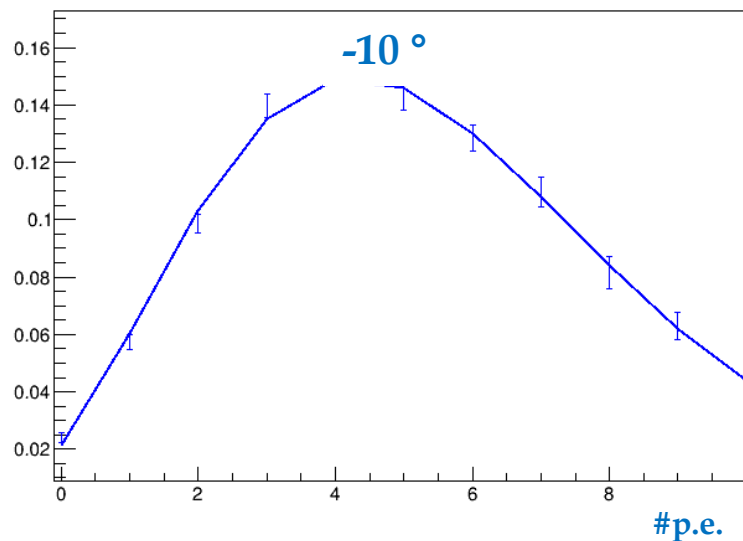


Light Analysis (Integration time 15 ns) : 41 V

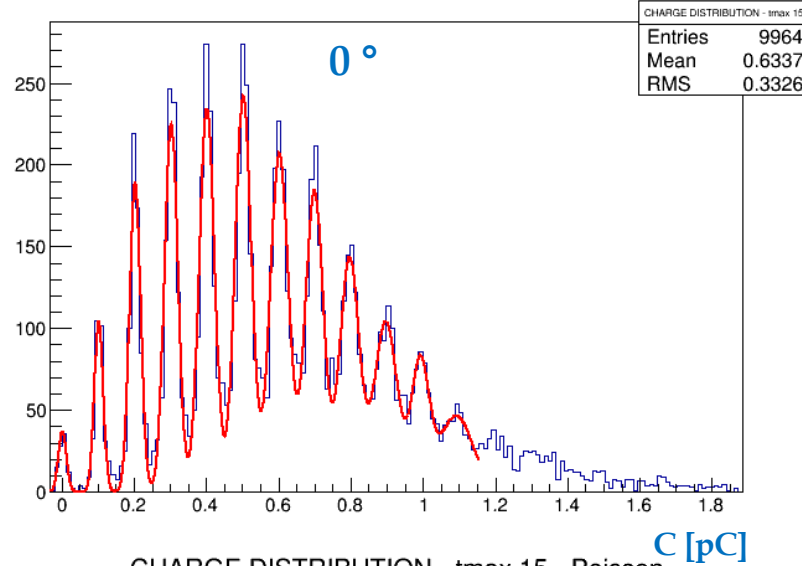
CHARGE DISTRIBUTION - tmax 15



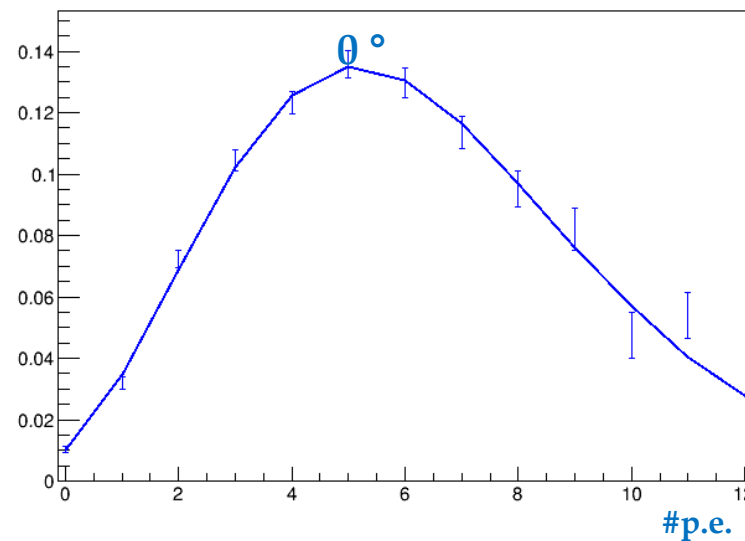
CHARGE DISTRIBUTION - tmax 15 - Poisson



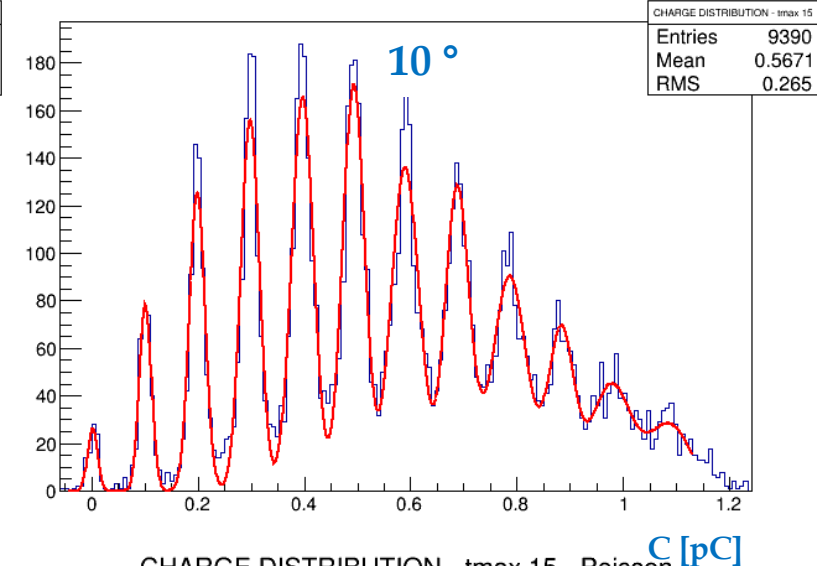
CHARGE DISTRIBUTION - tmax 15



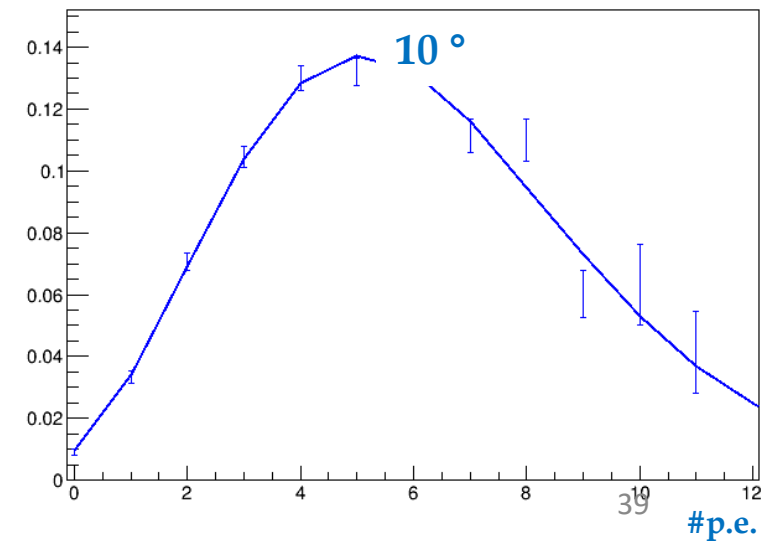
CHARGE DISTRIBUTION - tmax 15 - Poisson



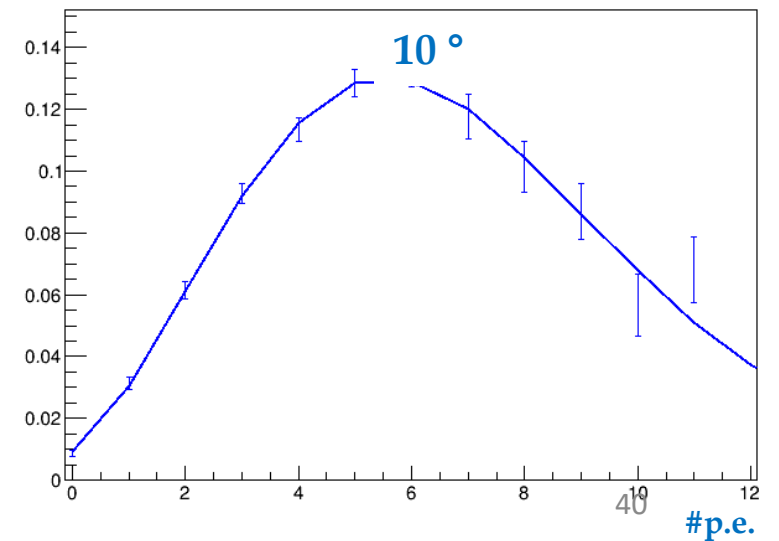
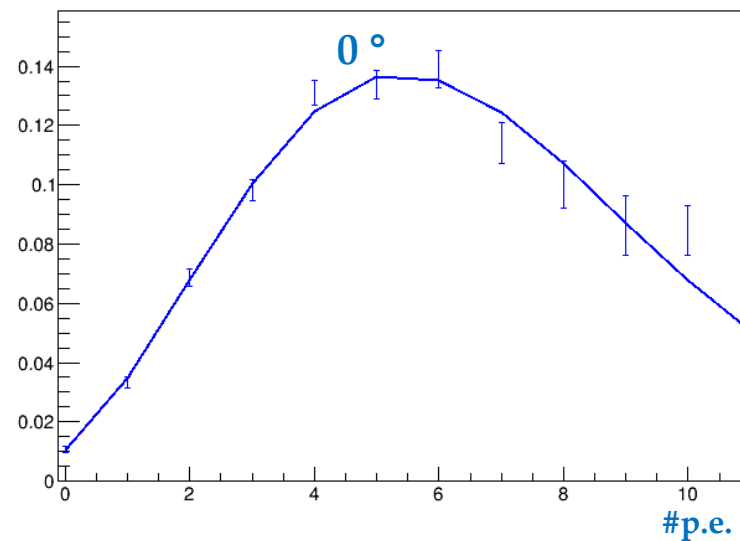
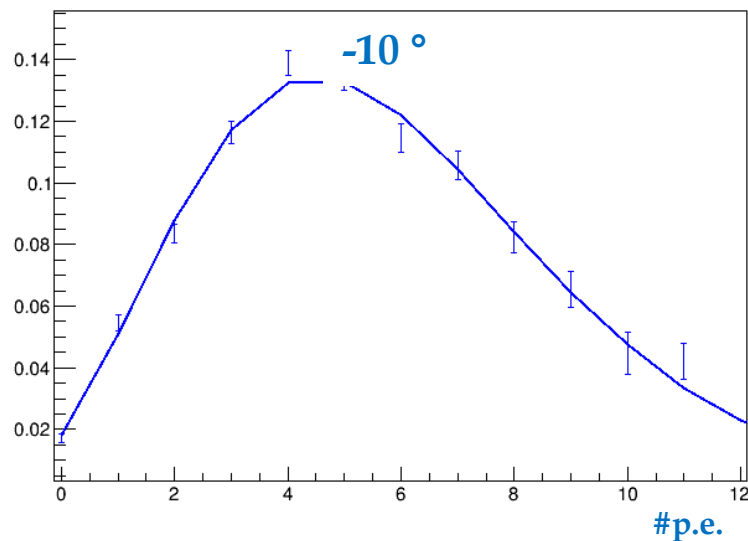
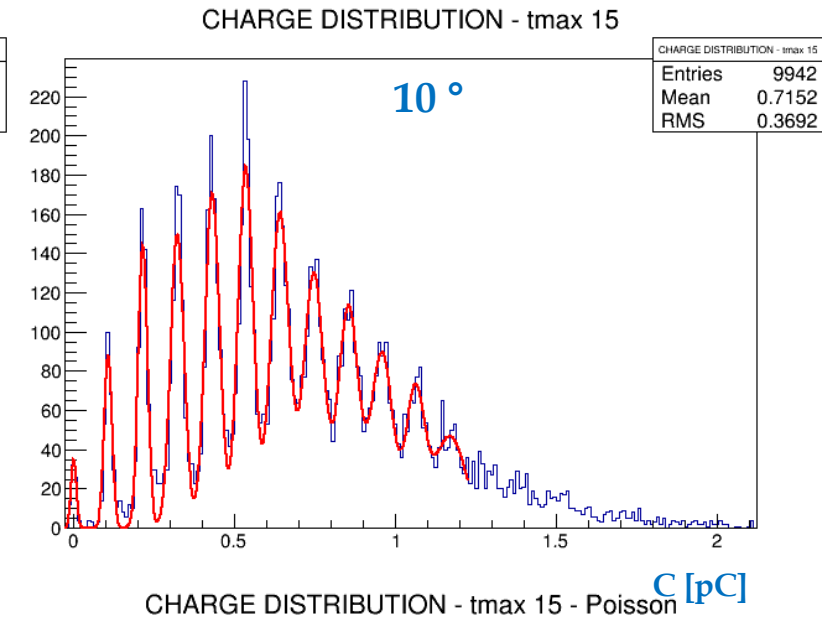
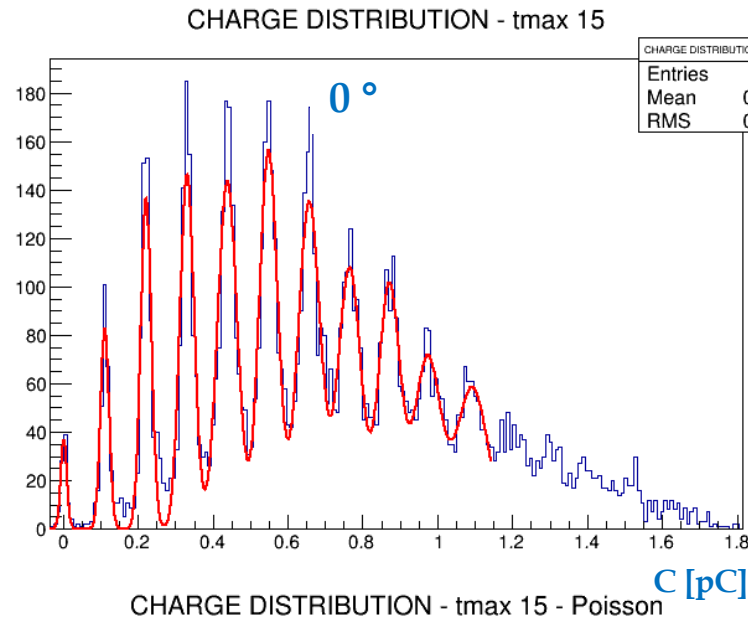
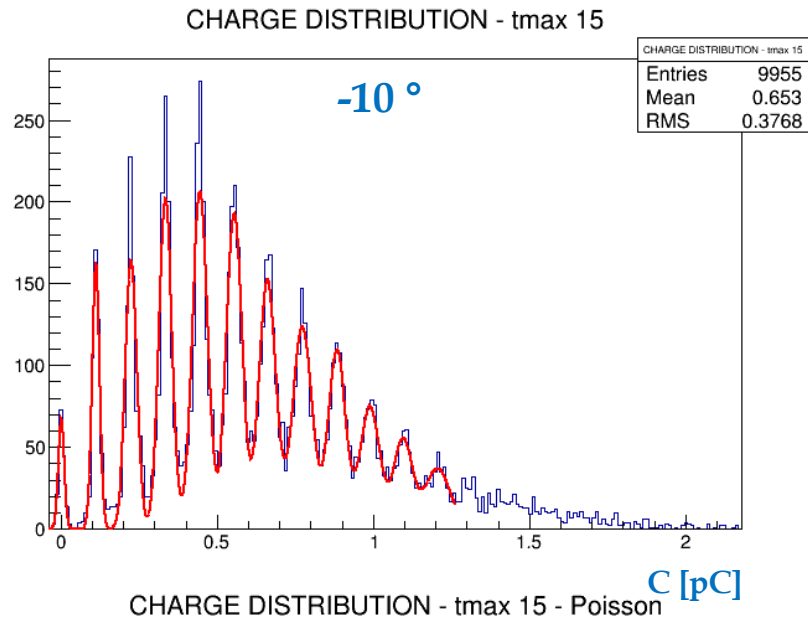
CHARGE DISTRIBUTION - tmax 15



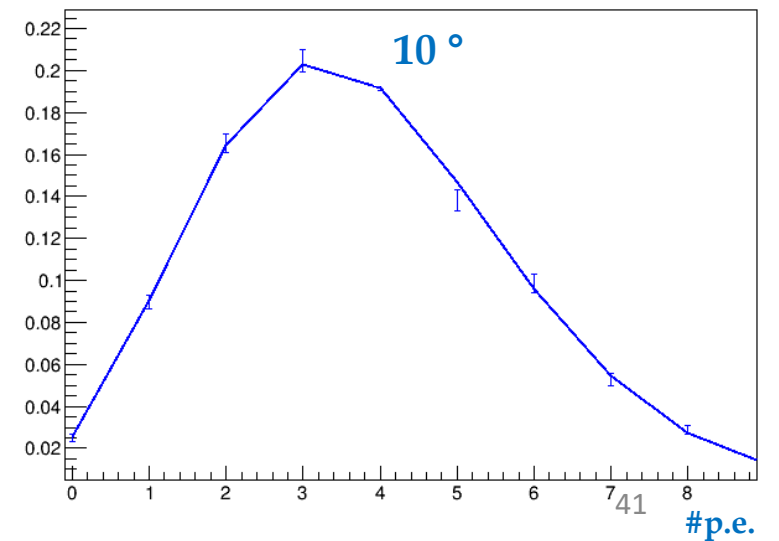
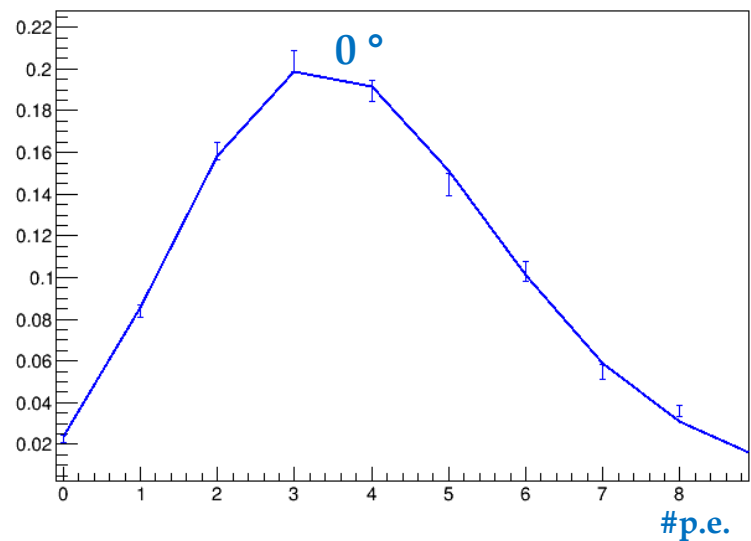
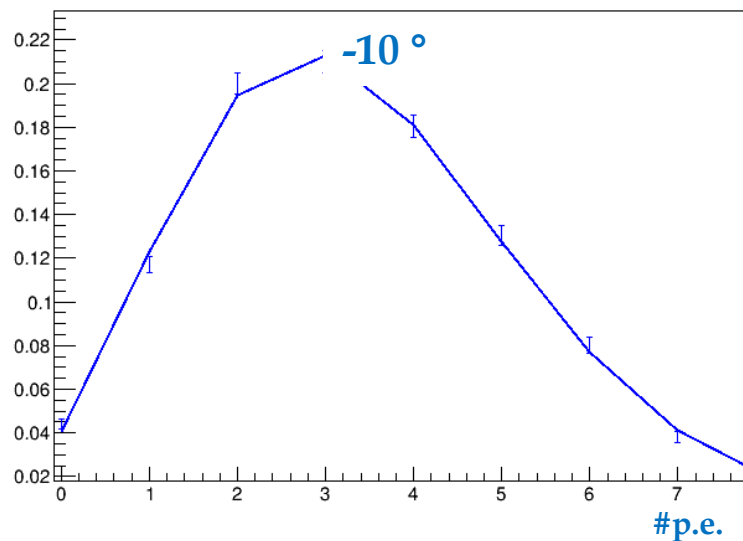
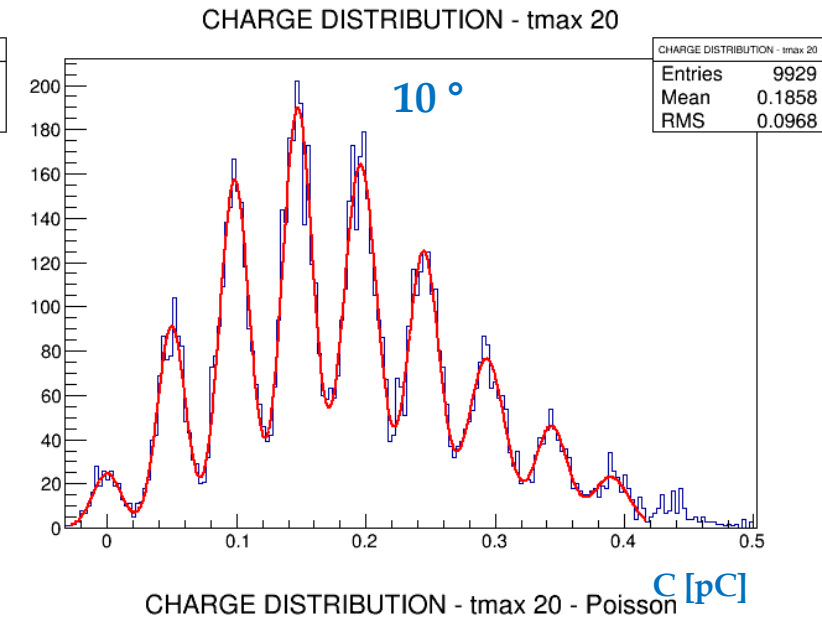
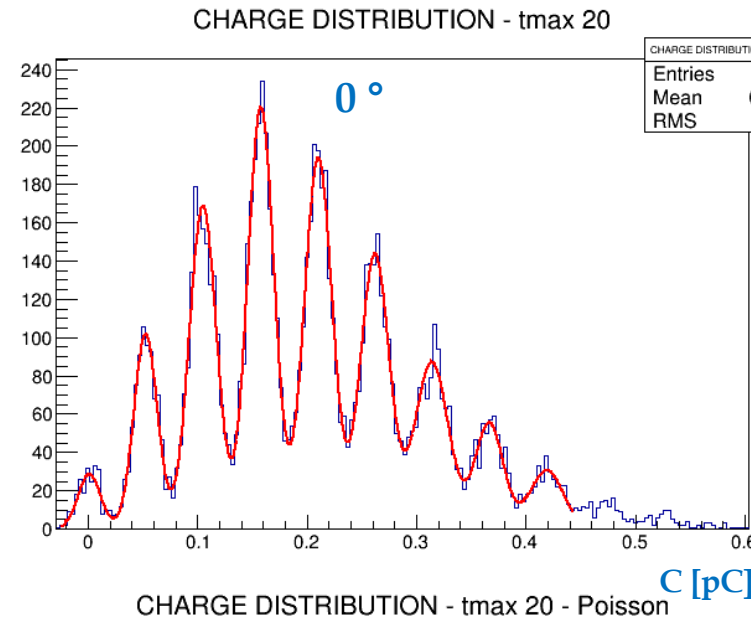
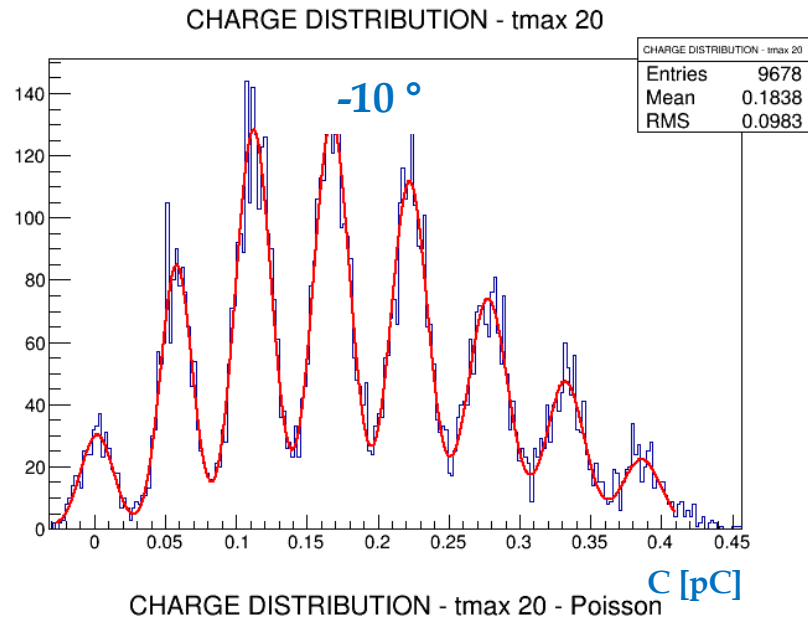
CHARGE DISTRIBUTION - tmax 15 - Poisson



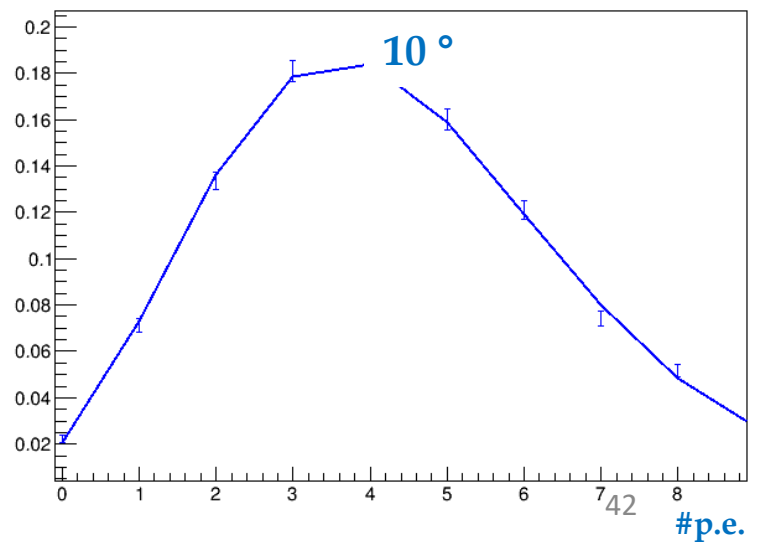
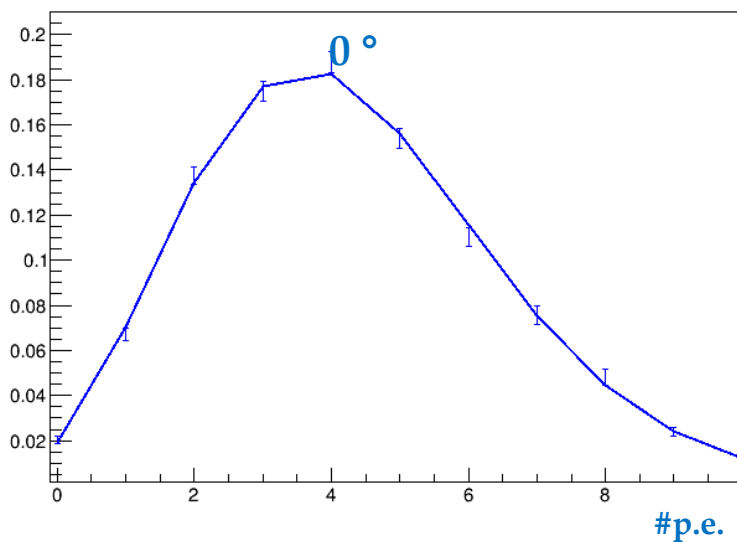
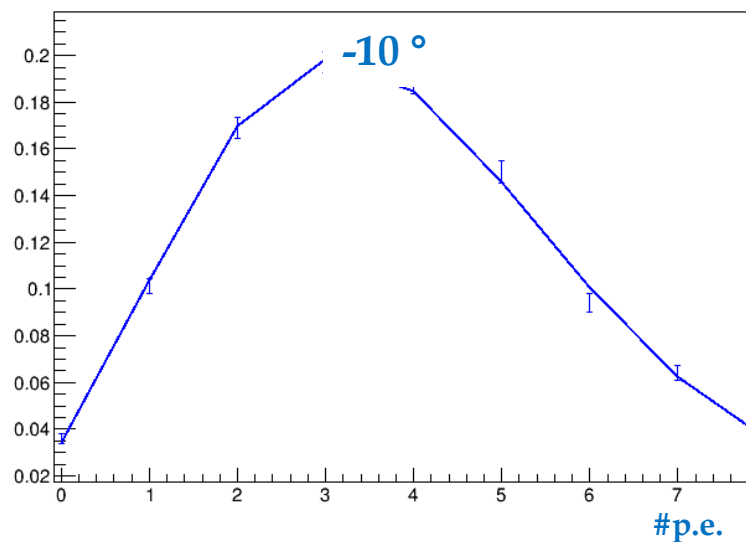
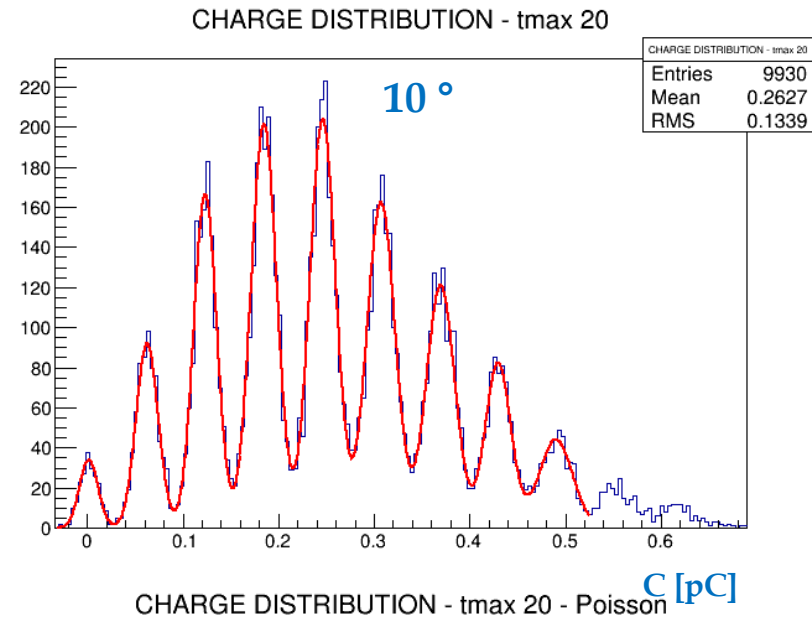
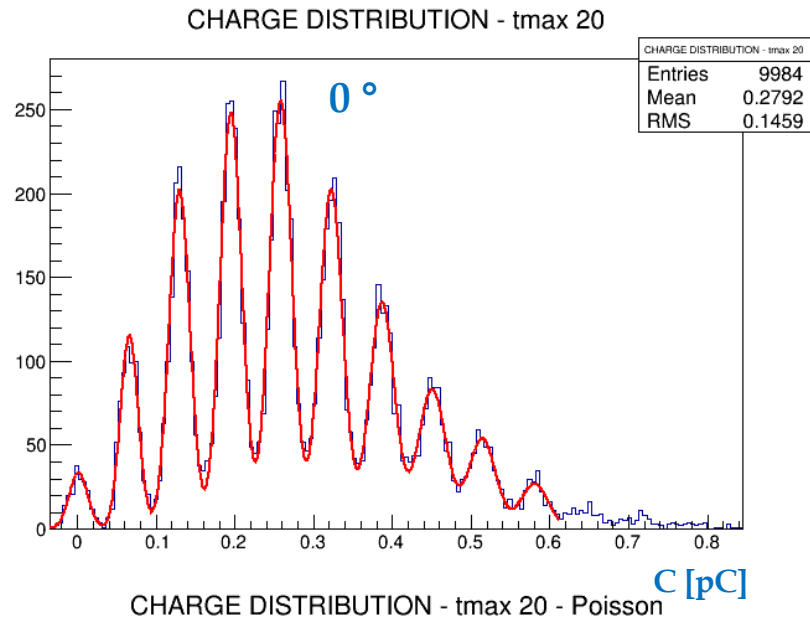
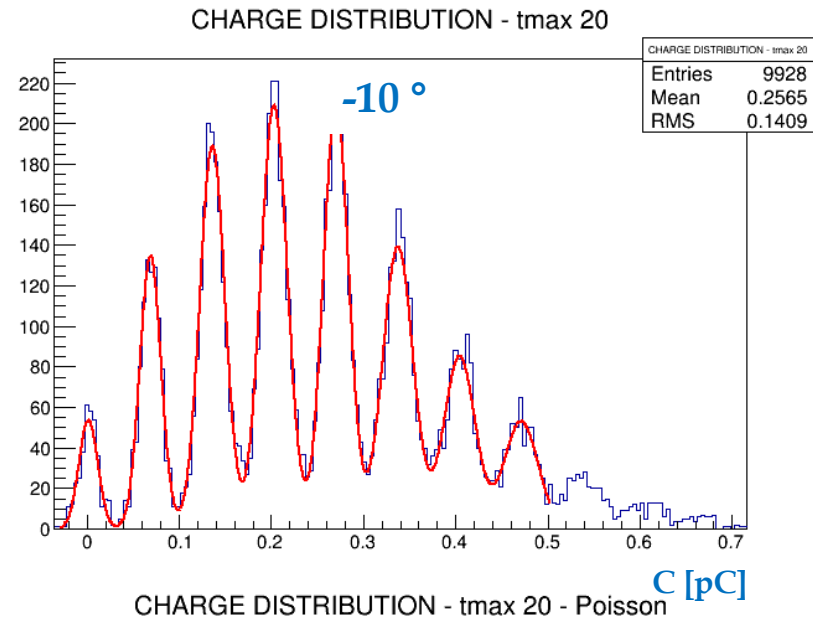
Light Analysis (Integration time 15 ns) : 42 V



Light Analysis (Integration time 20 ns) : 35 V

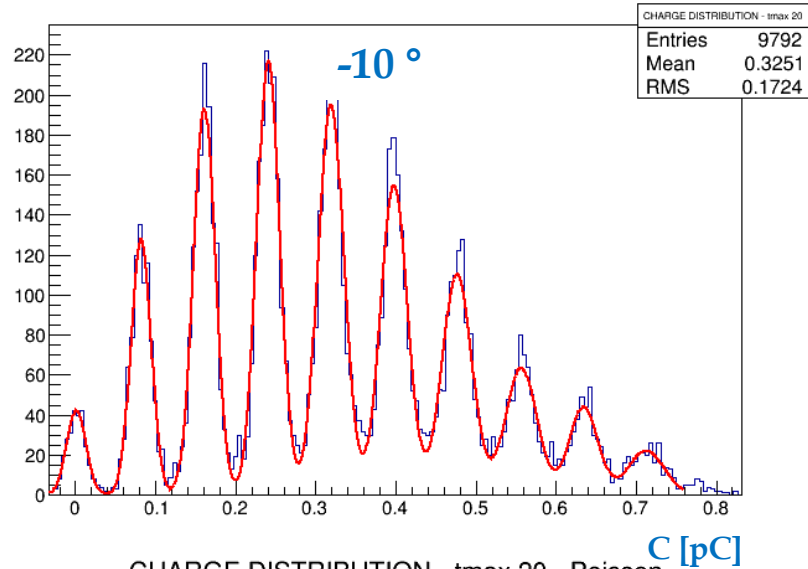


Light Analysis (Integration time 20 ns) : 36 V

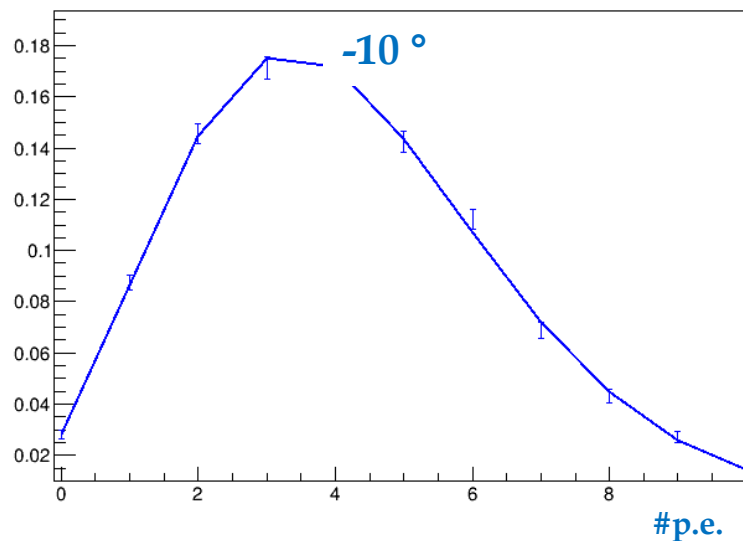


Light Analysis (Integration time 20 ns) : 37 V

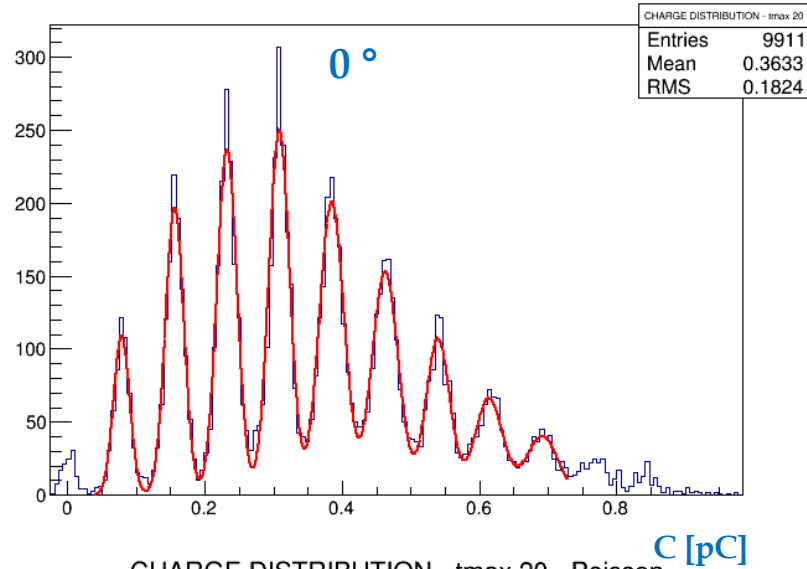
CHARGE DISTRIBUTION - tmax 20



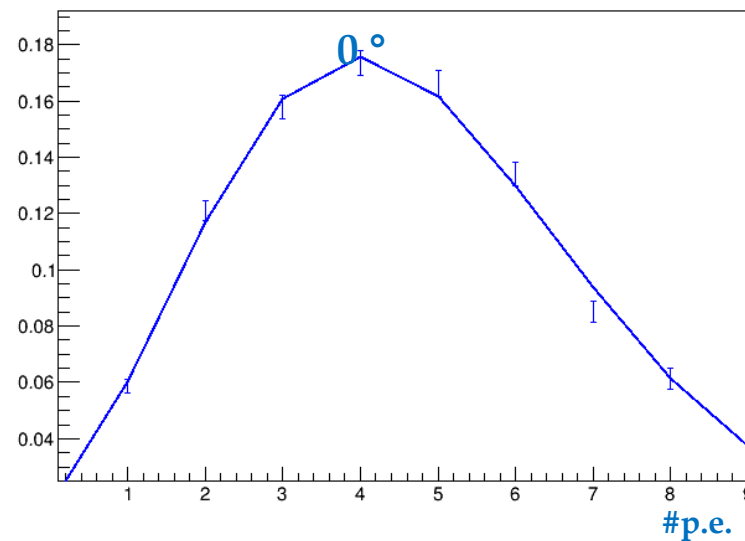
CHARGE DISTRIBUTION - tmax 20 - Poisson



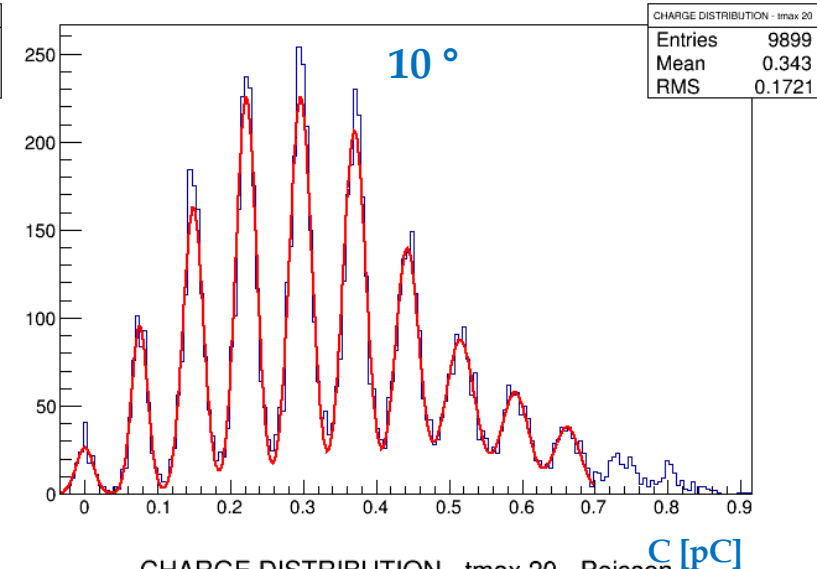
CHARGE DISTRIBUTION - tmax 20



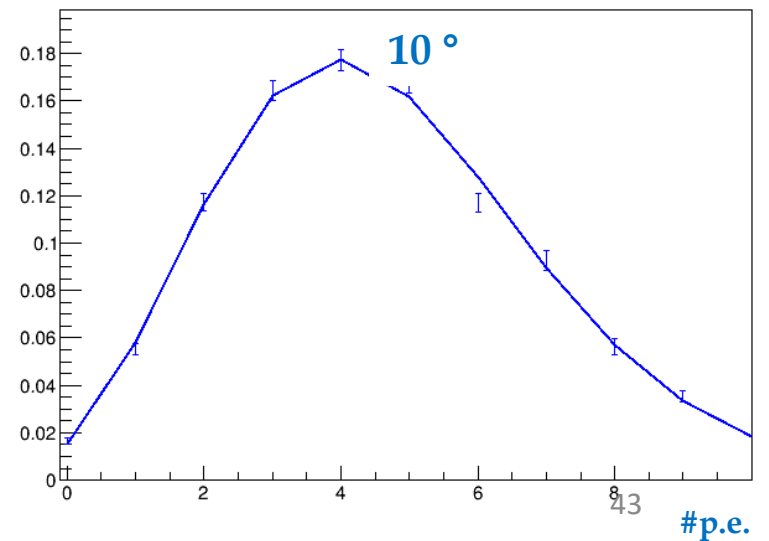
CHARGE DISTRIBUTION - tmax 20 - Poisson



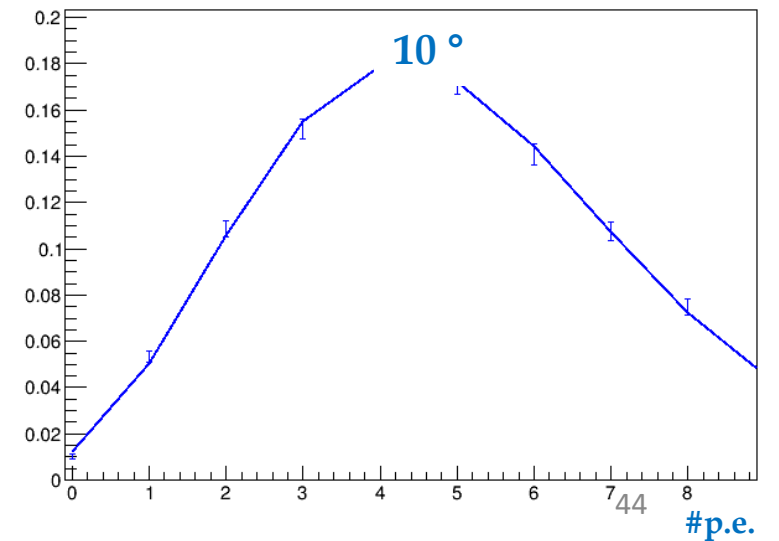
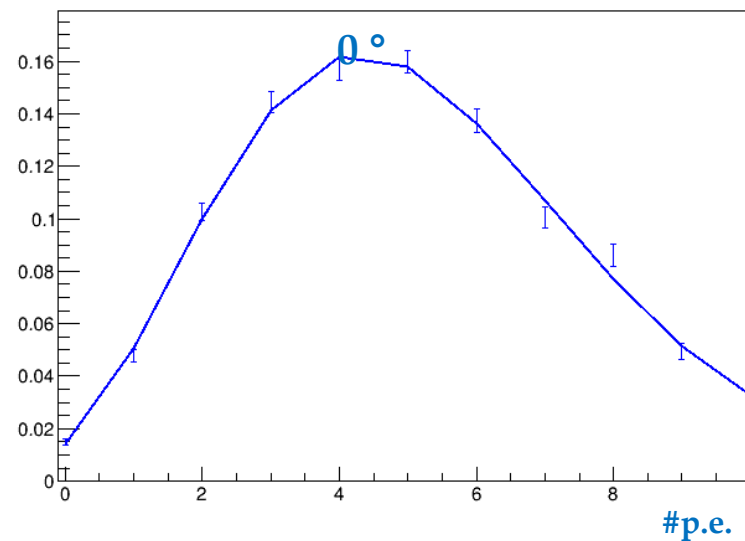
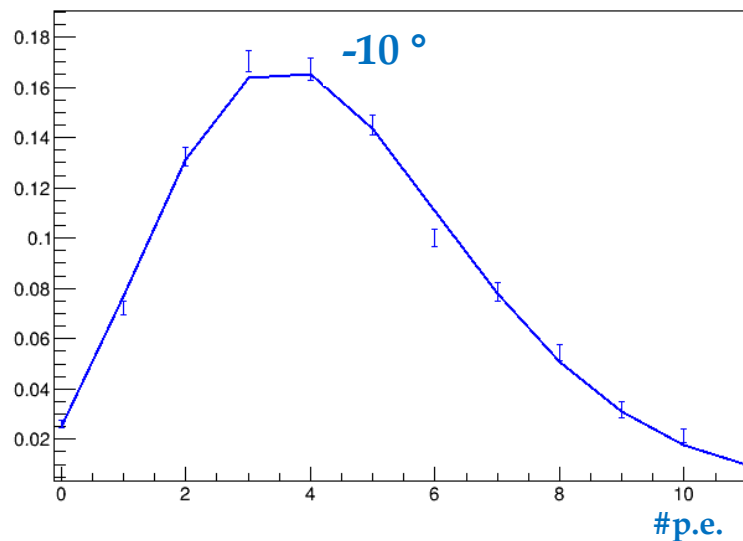
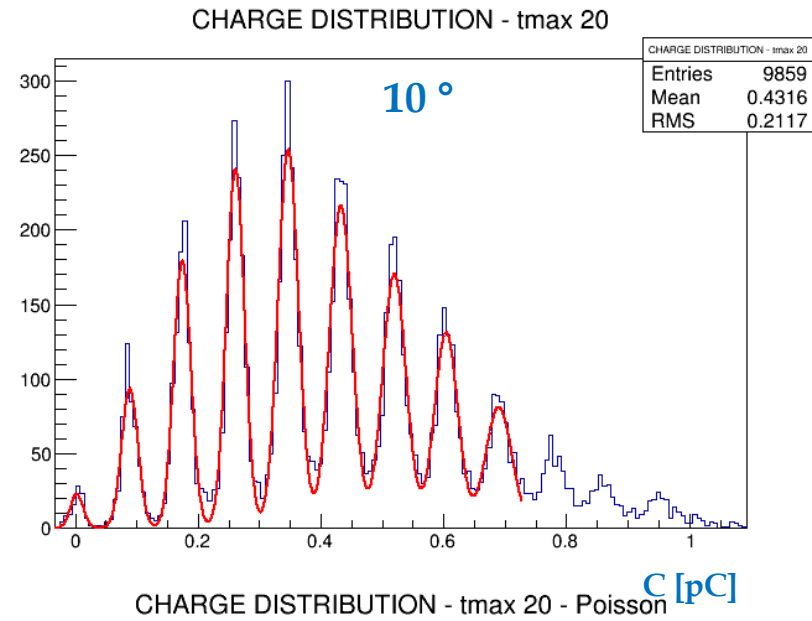
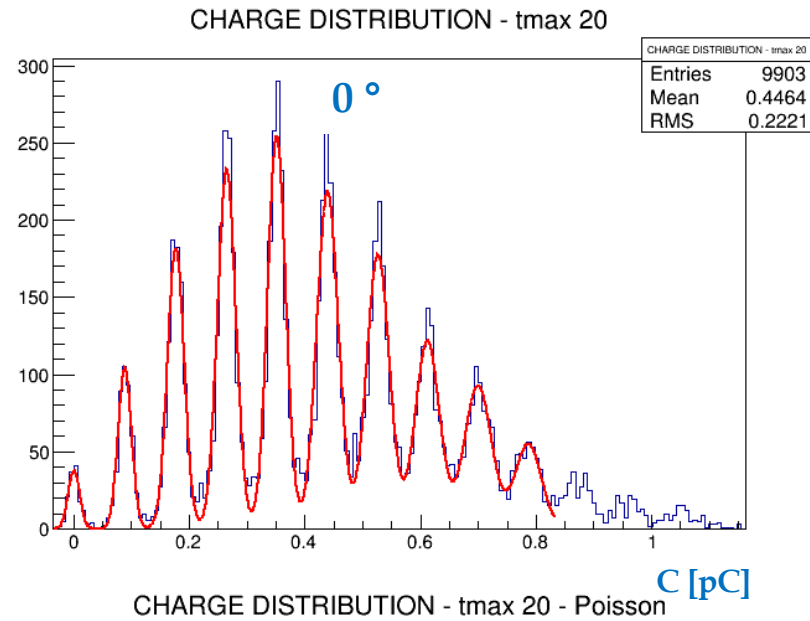
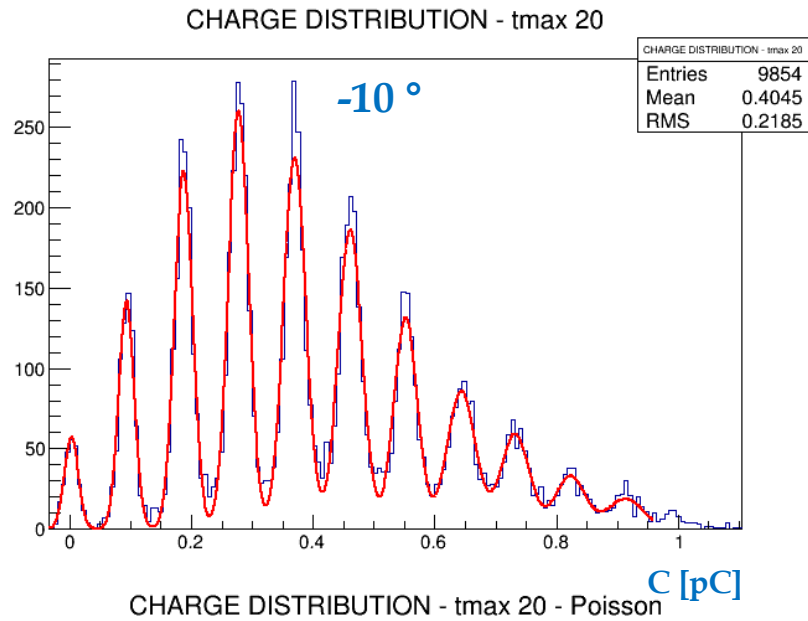
CHARGE DISTRIBUTION - tmax 20



CHARGE DISTRIBUTION - tmax 20 - Poisson

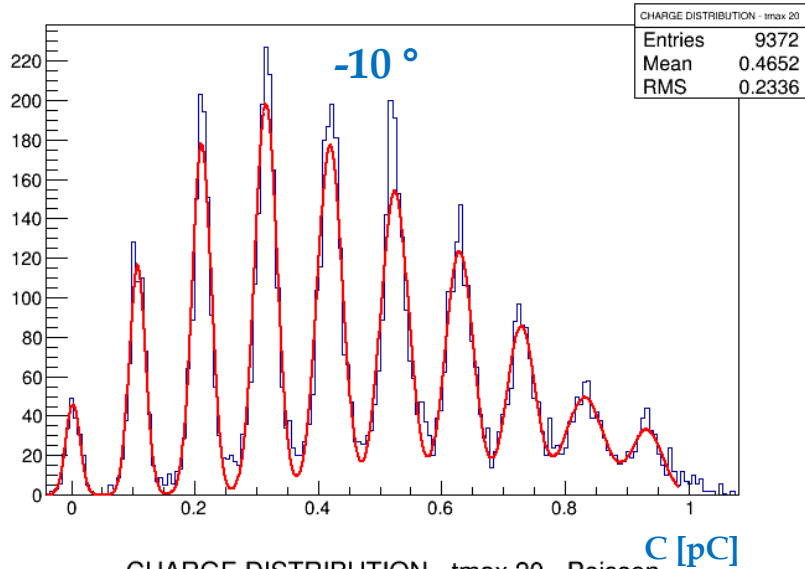


Light Analysis (Integration time 20 ns) : 38 V

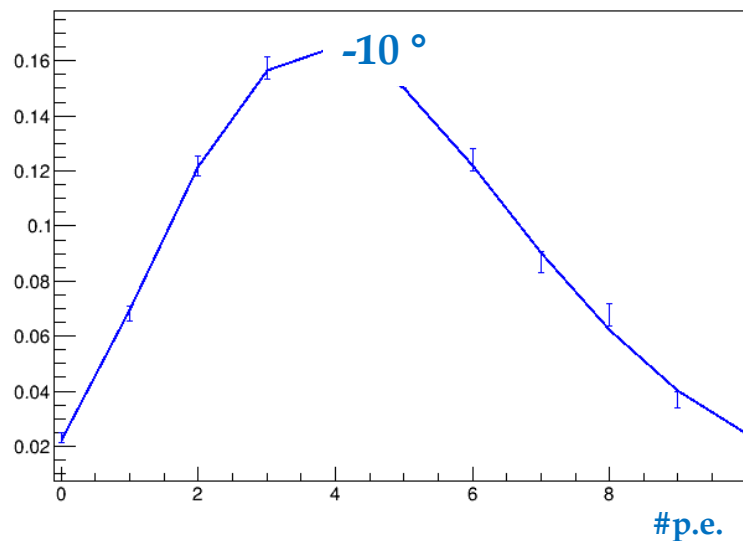


Light Analysis (Integration time 20 ns) : 39 V

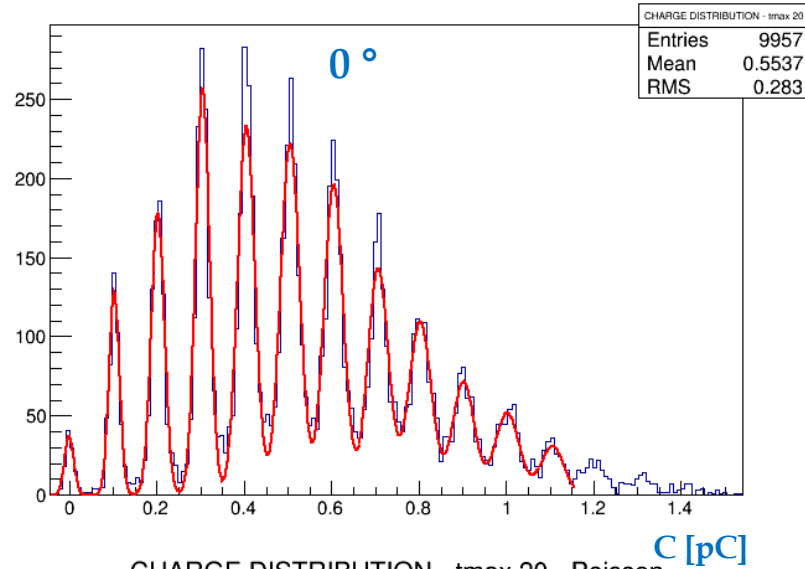
CHARGE DISTRIBUTION - tmax 20



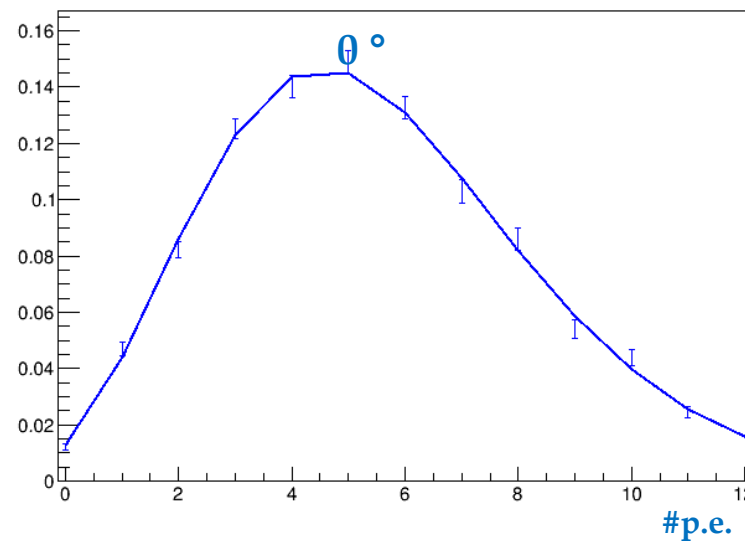
CHARGE DISTRIBUTION - tmax 20 - Poisson



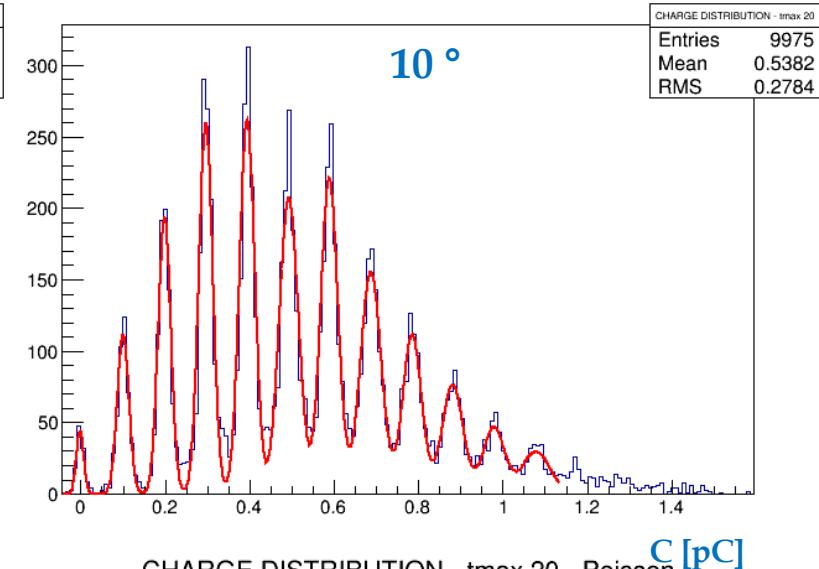
CHARGE DISTRIBUTION - tmax 20



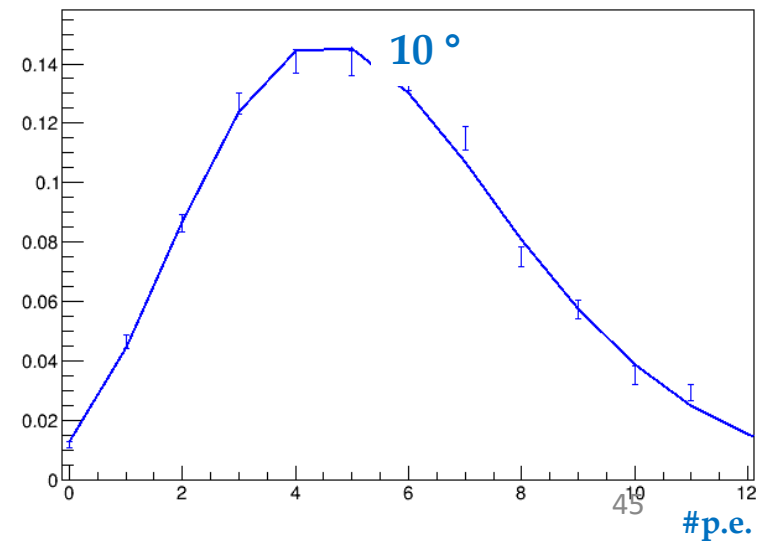
CHARGE DISTRIBUTION - tmax 20 - Poisson



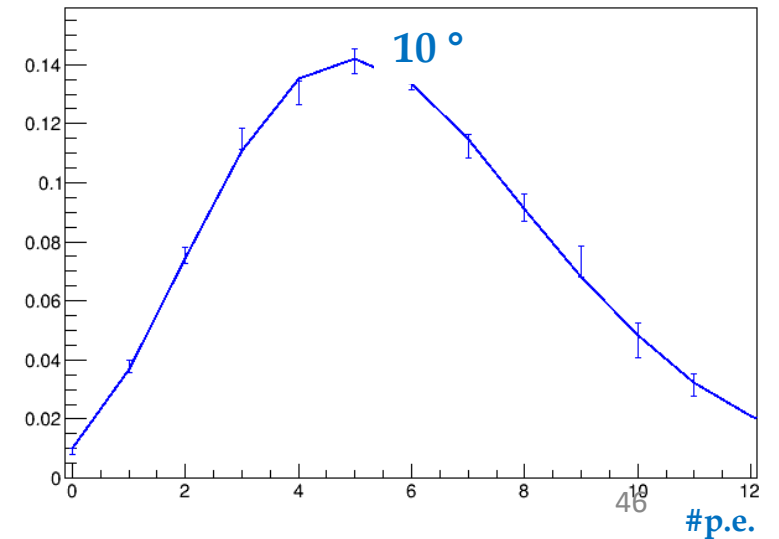
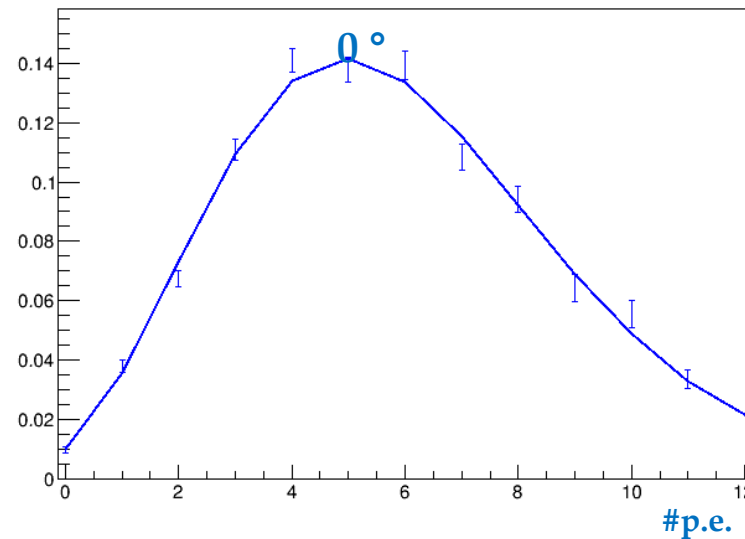
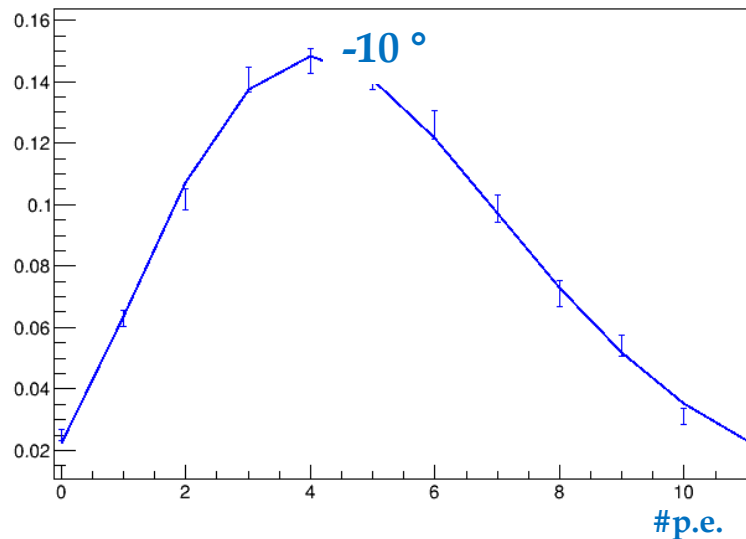
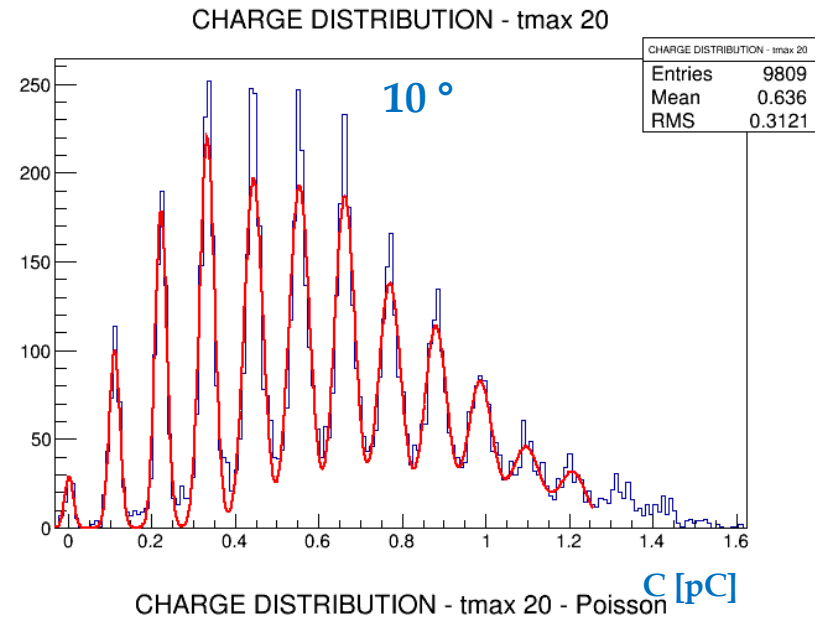
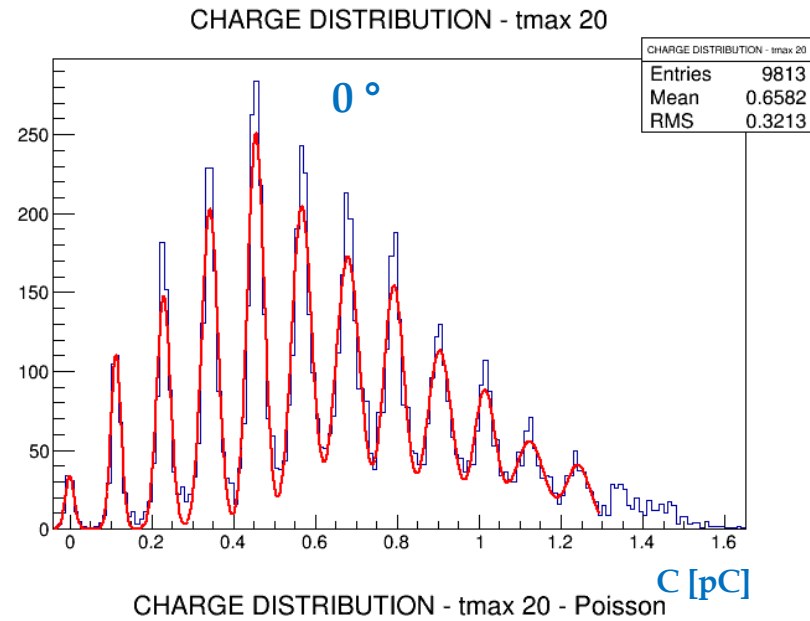
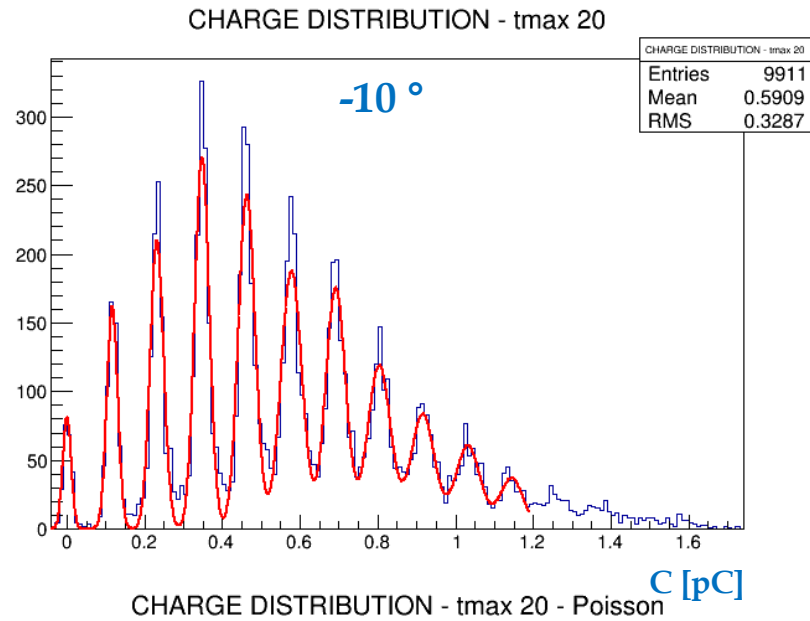
CHARGE DISTRIBUTION - tmax 20



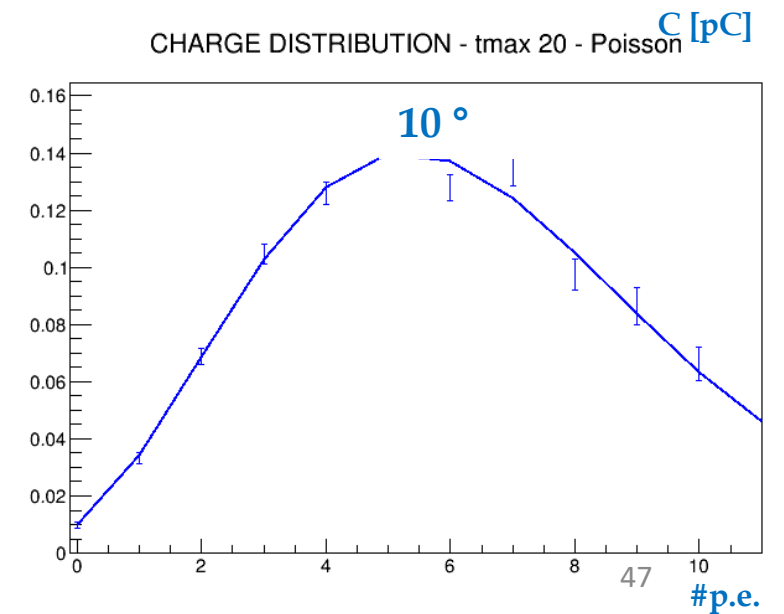
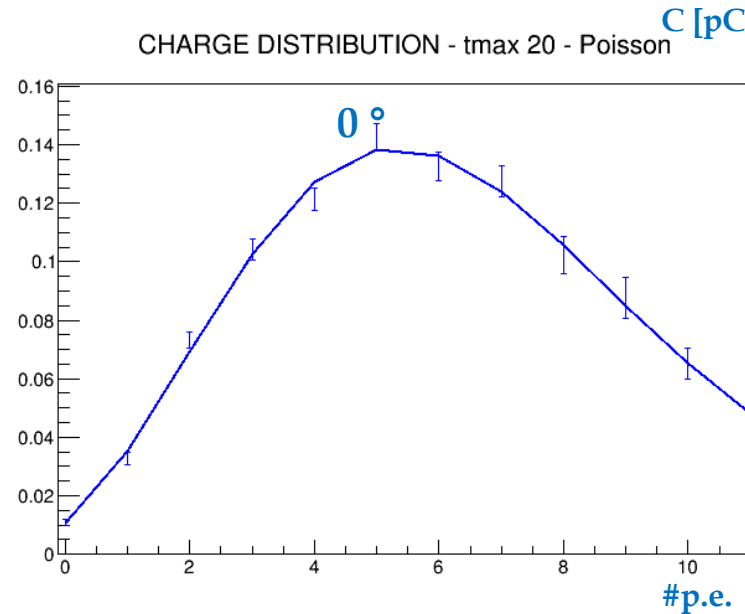
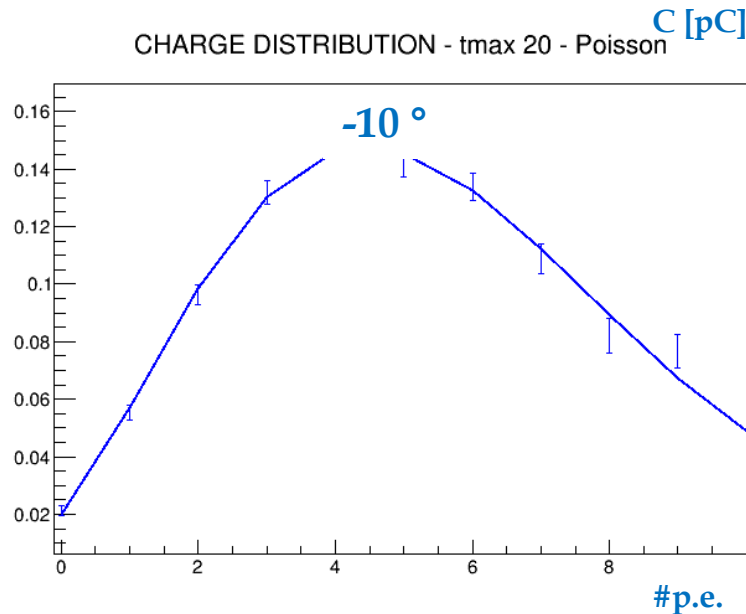
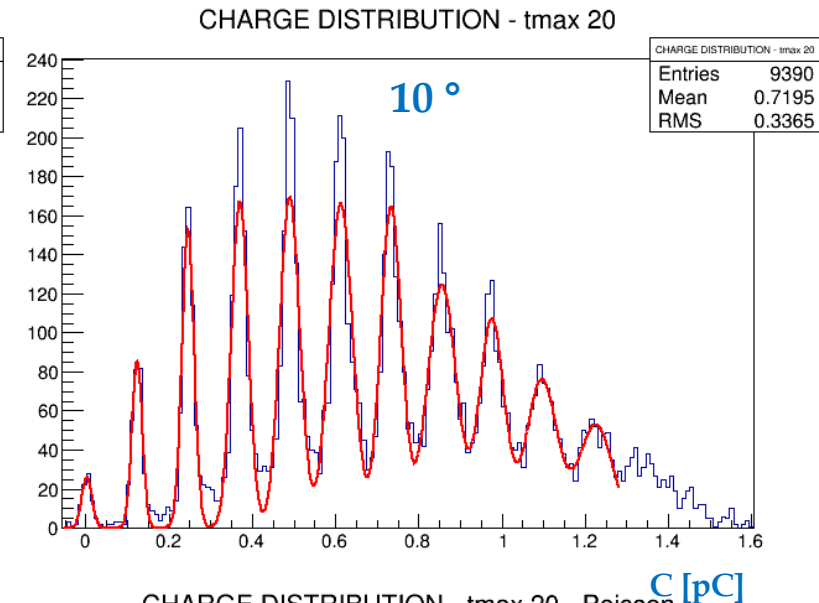
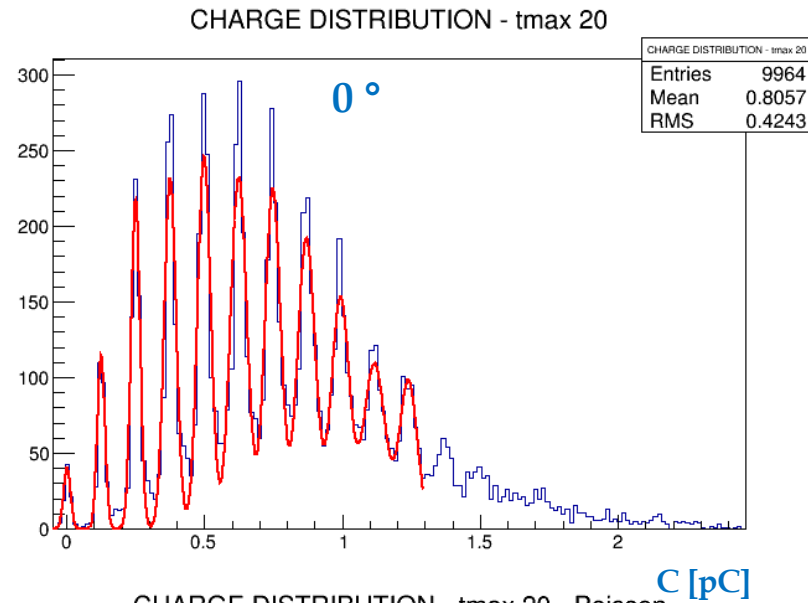
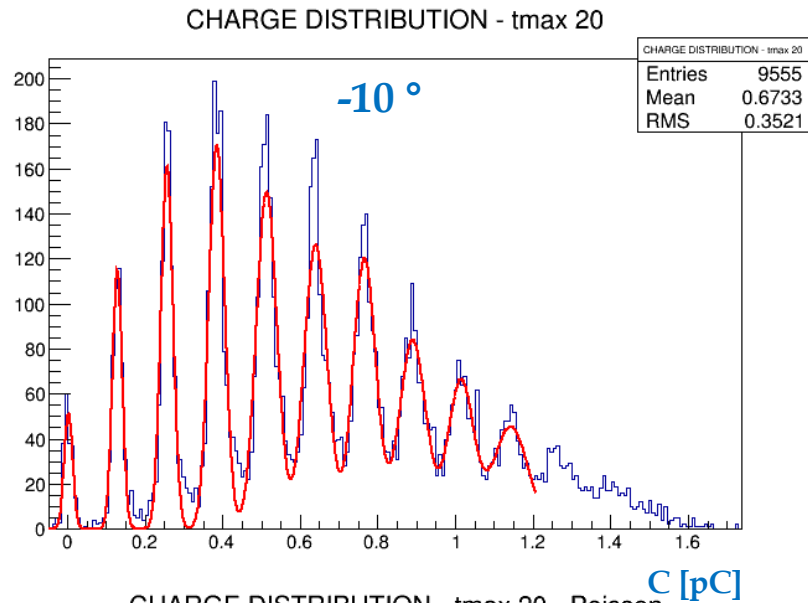
CHARGE DISTRIBUTION - tmax 20 - Poisson



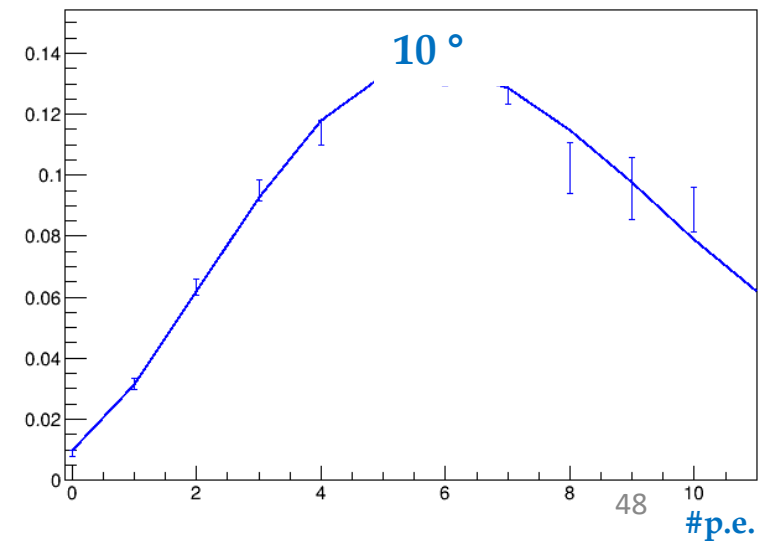
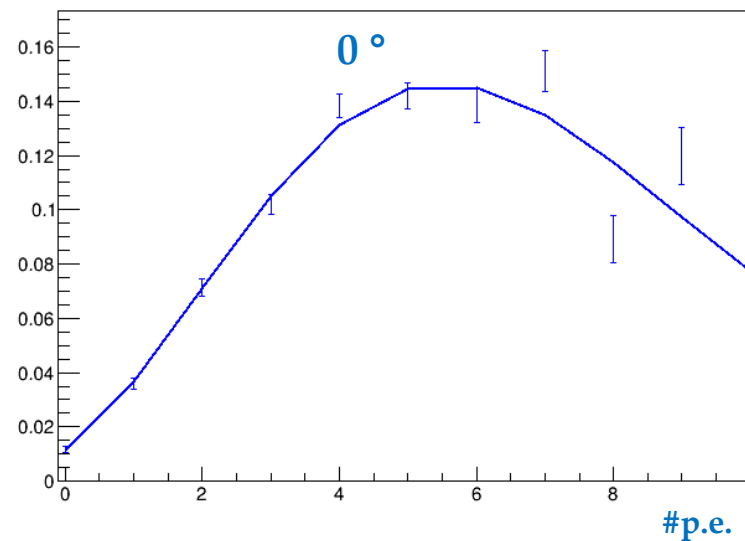
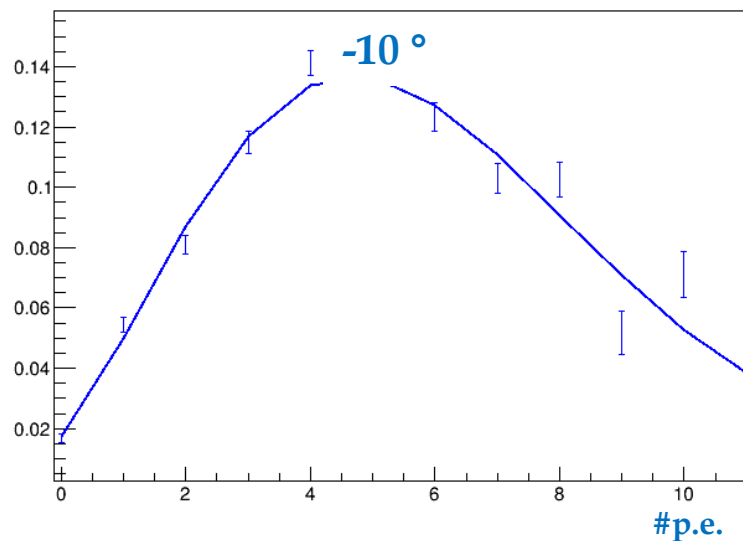
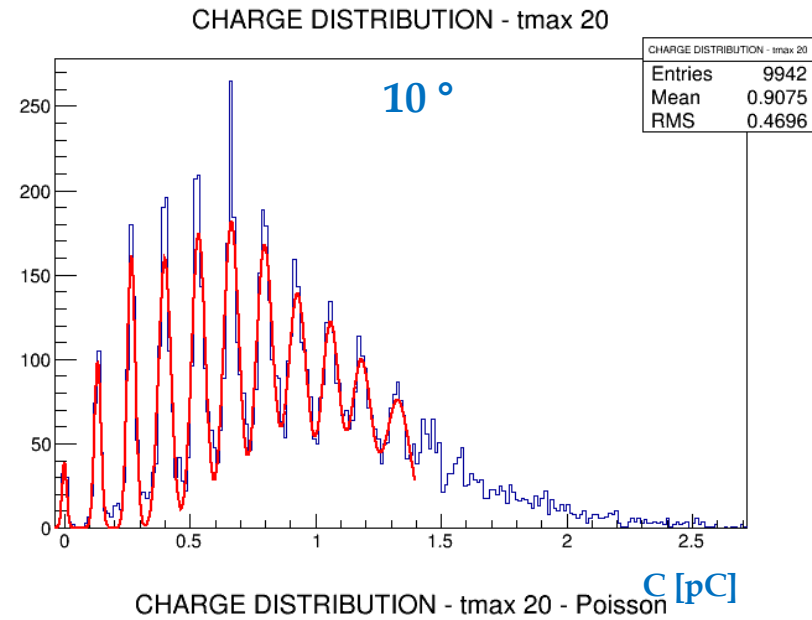
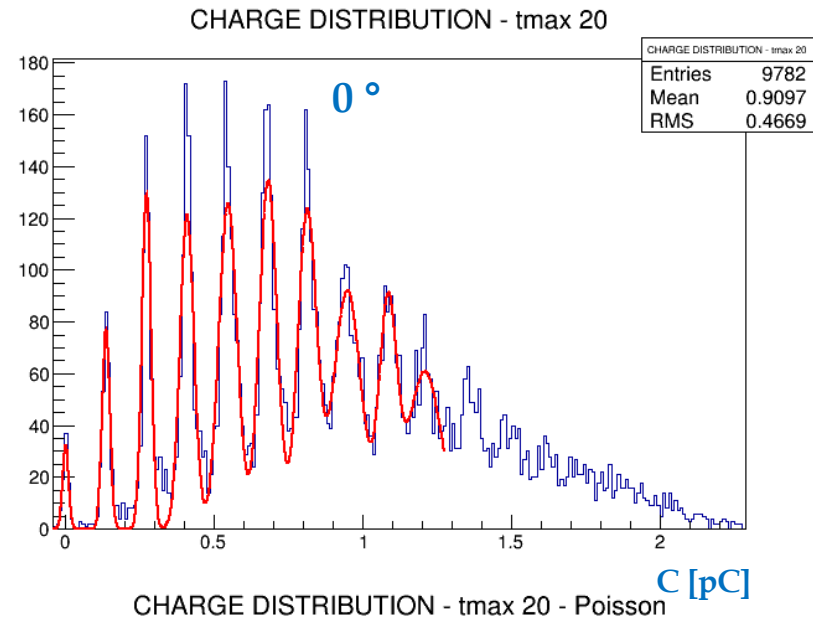
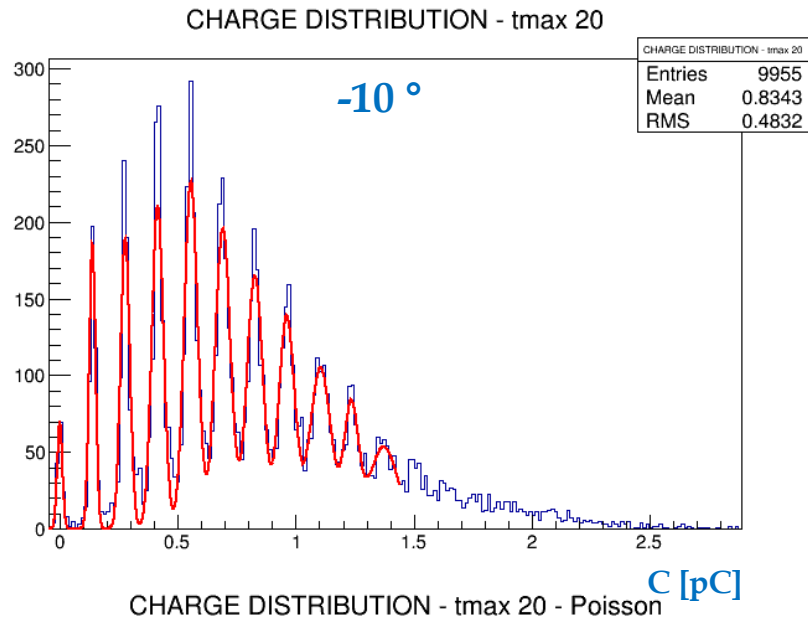
Light Analysis (Integration time 20 ns) : 40 V



Light Analysis (Integration time 20 ns) : 41 V

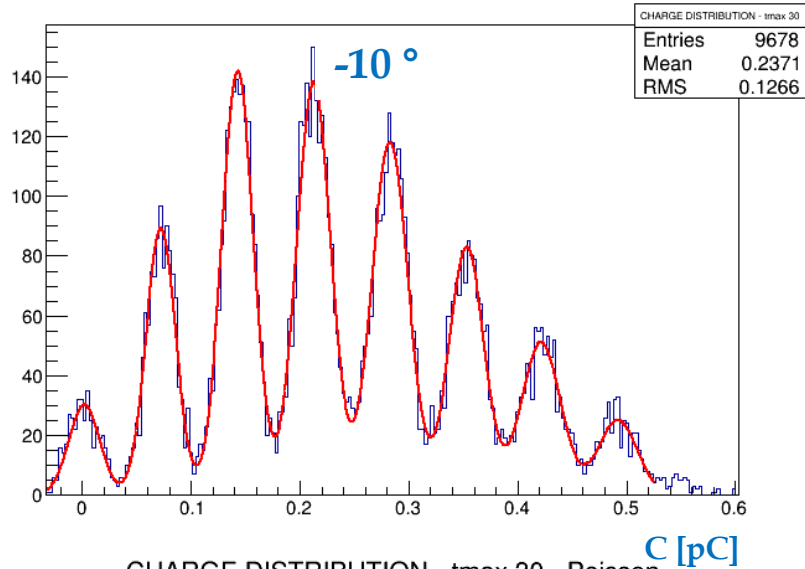


Light Analysis (Integration time 20 ns) : 42 V

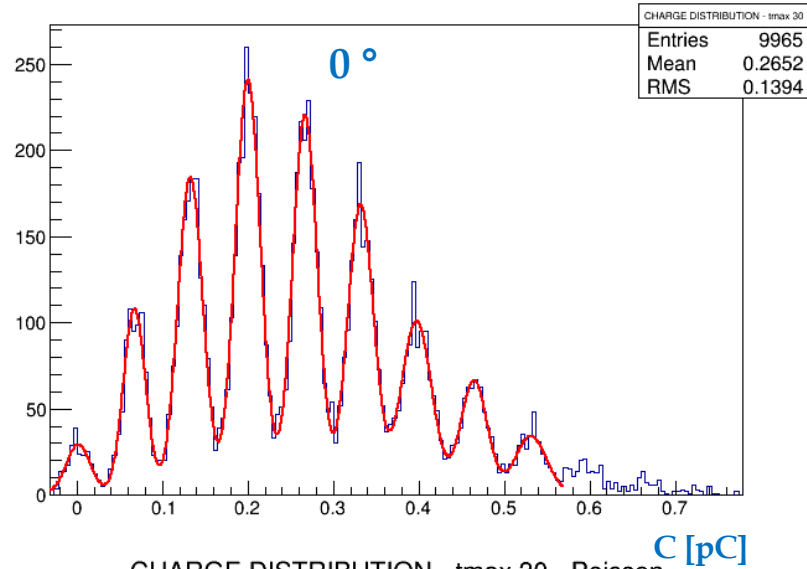


Light Analysis (Integration time 30 ns) : 35 V

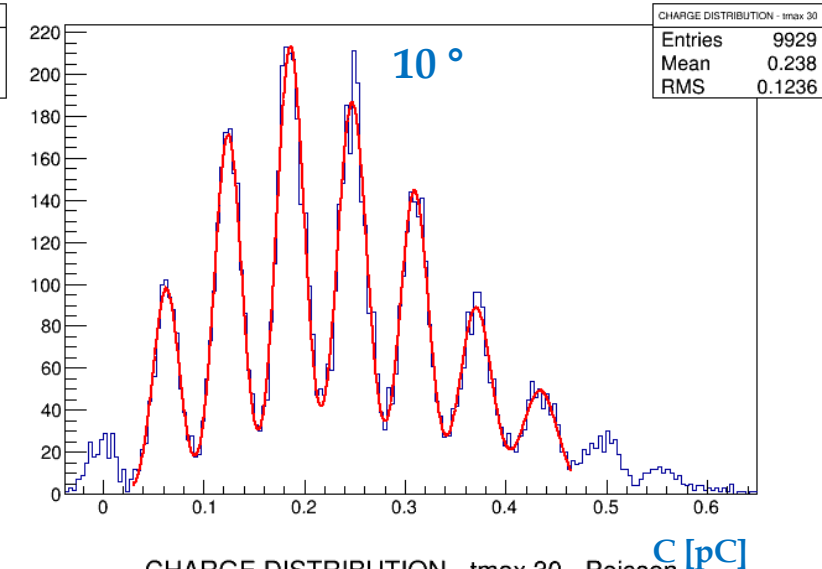
CHARGE DISTRIBUTION - tmax 30



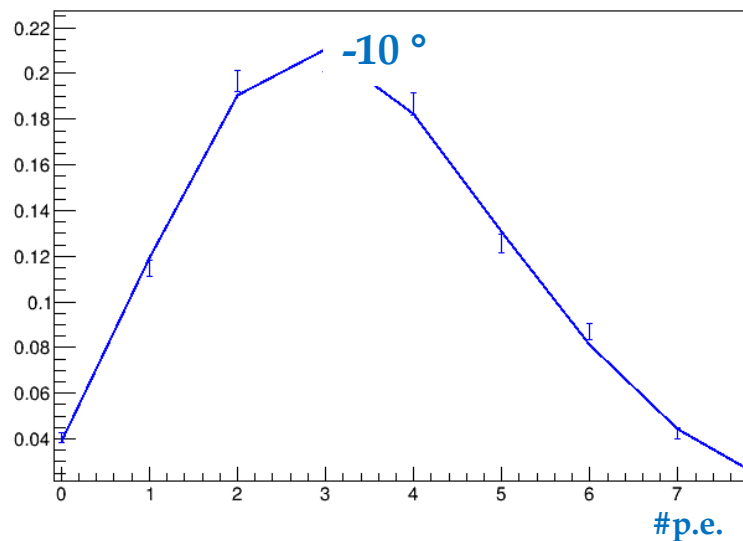
CHARGE DISTRIBUTION - tmax 30



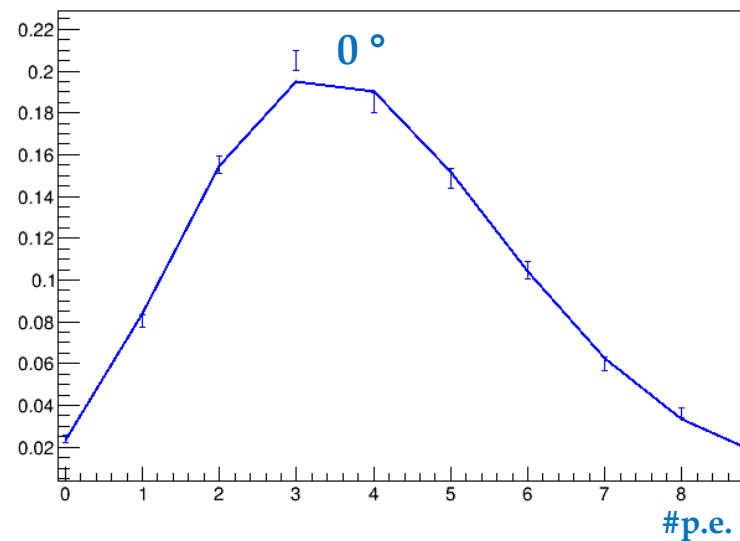
CHARGE DISTRIBUTION - tmax 30



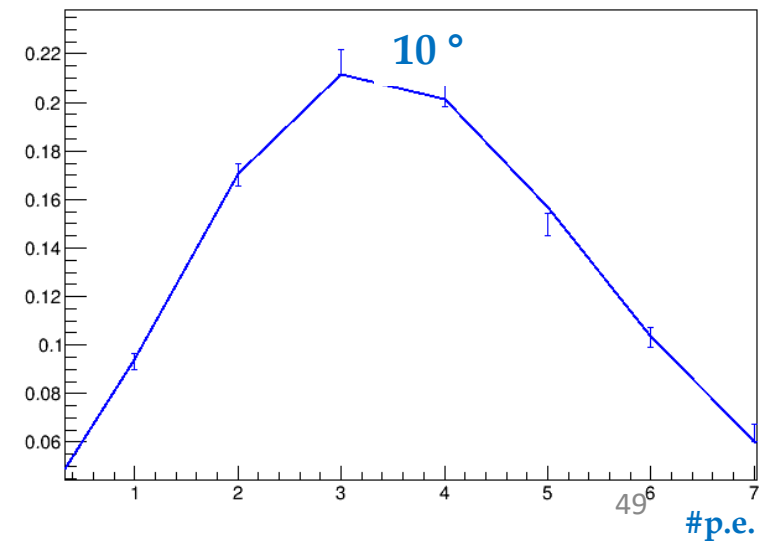
CHARGE DISTRIBUTION - tmax 30 - Poisson



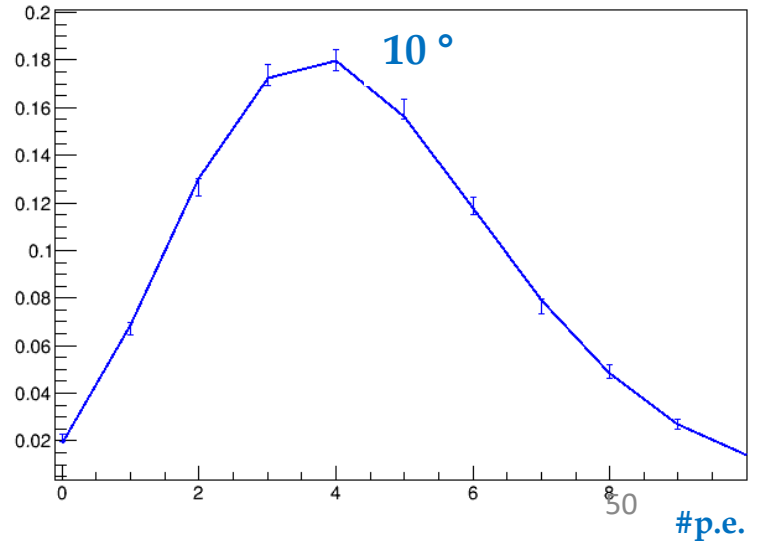
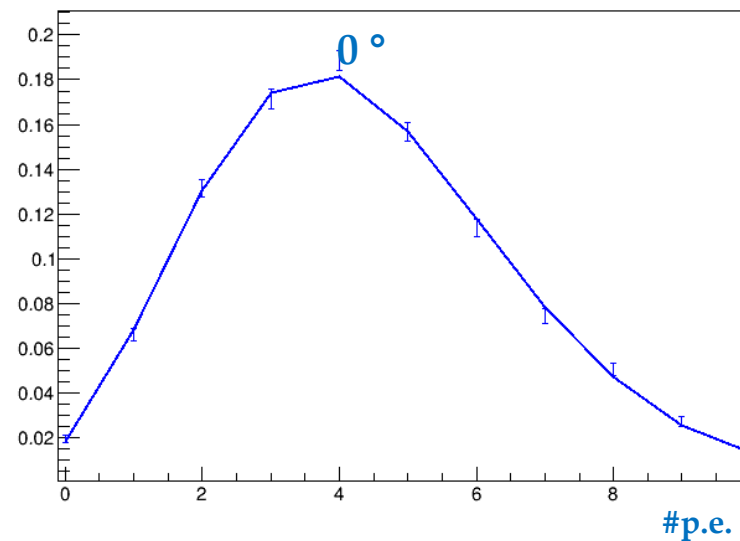
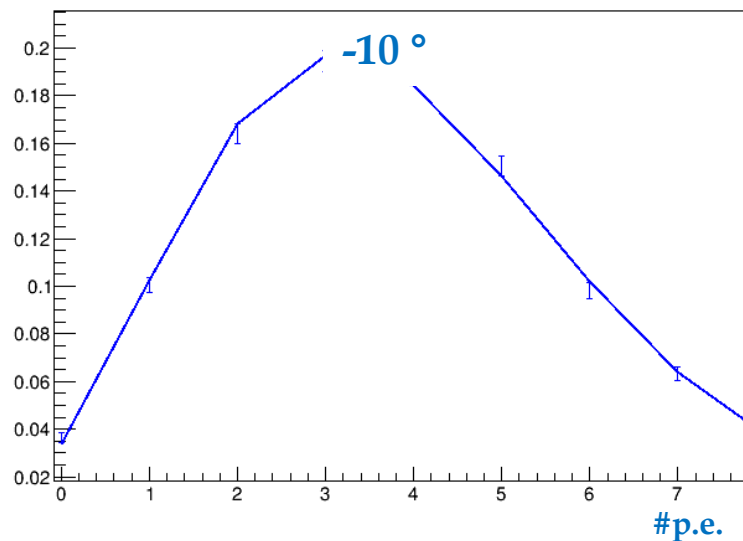
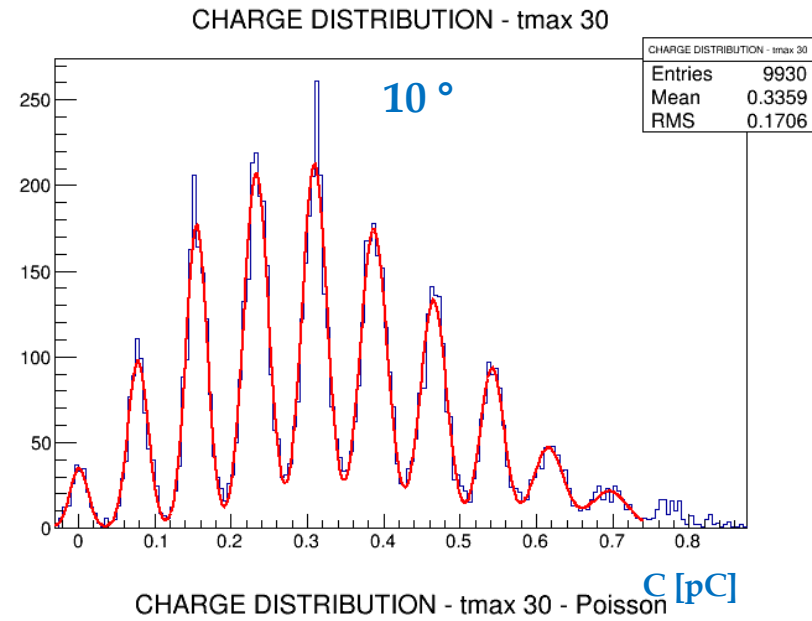
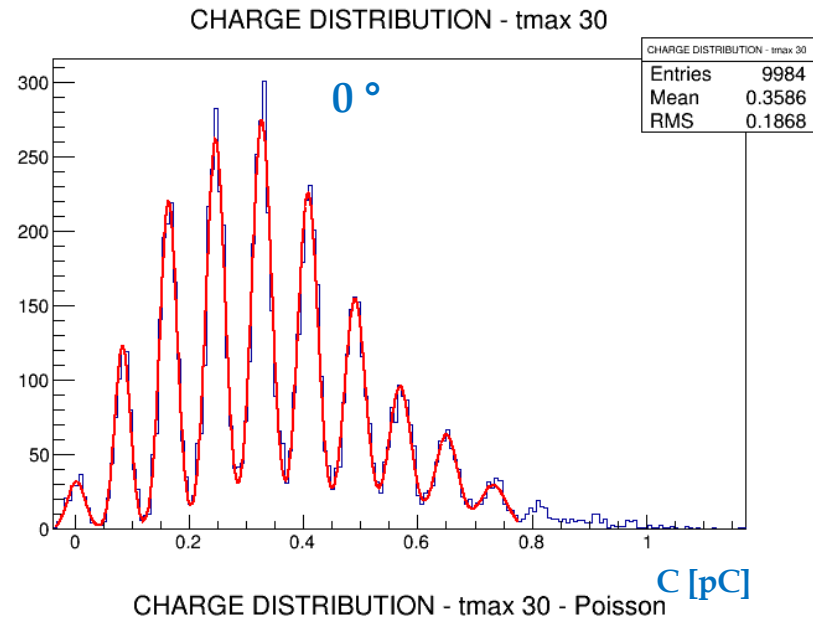
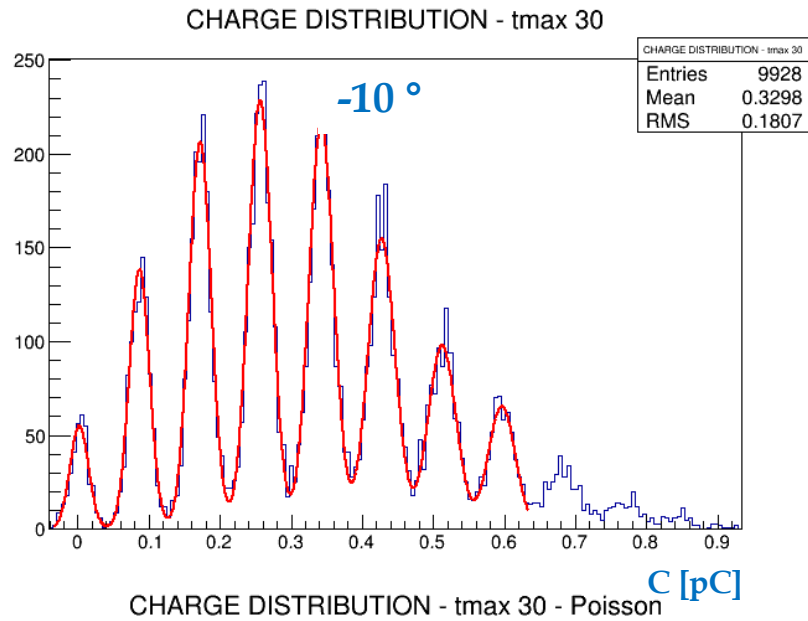
CHARGE DISTRIBUTION - tmax 30 - Poisson



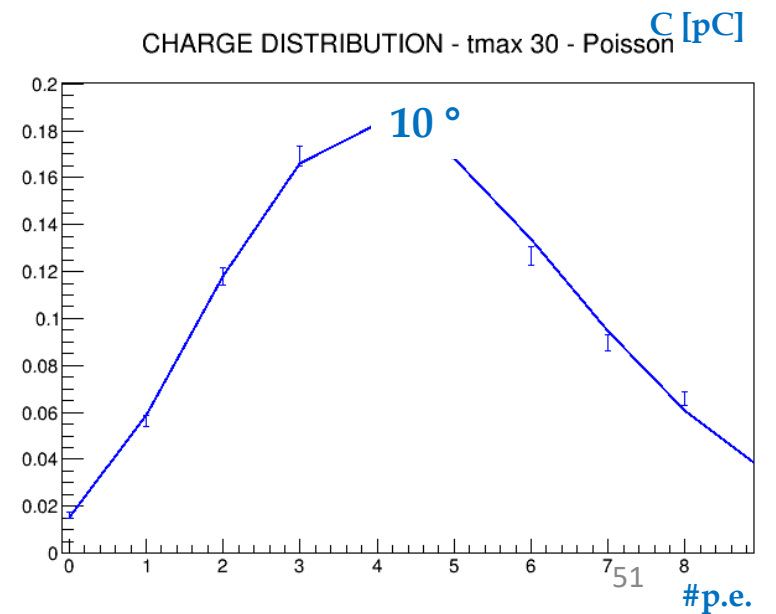
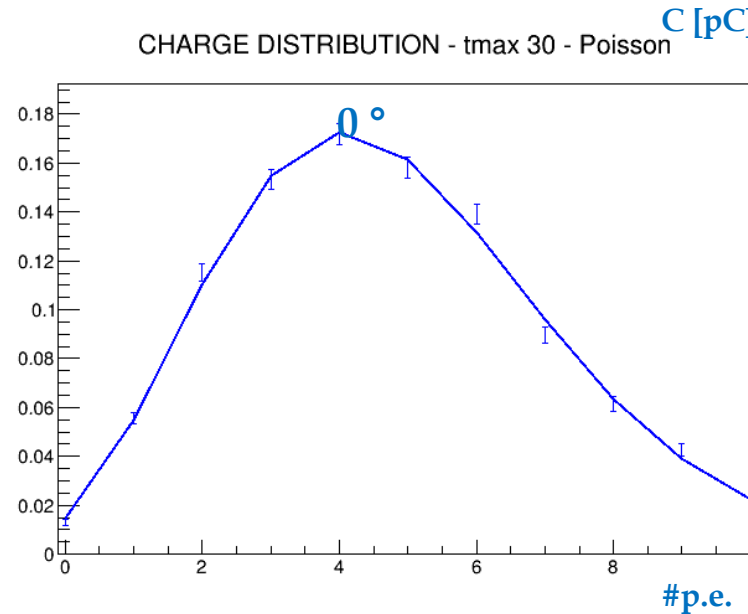
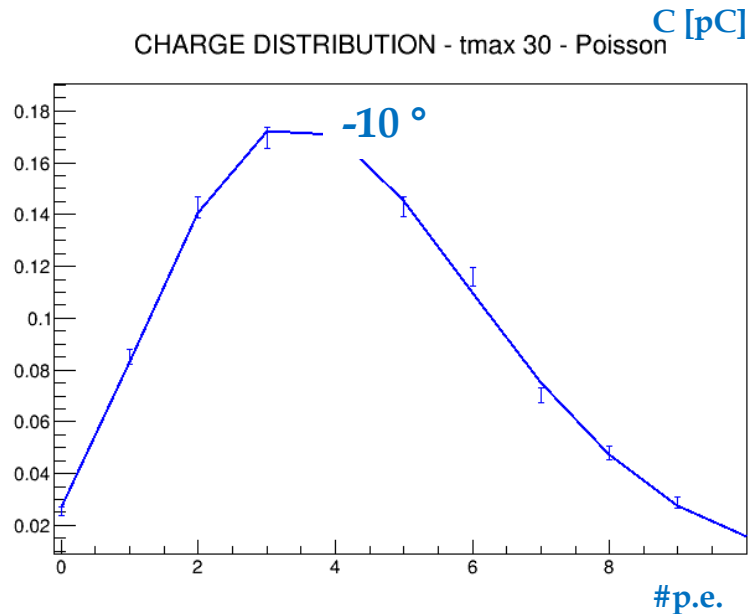
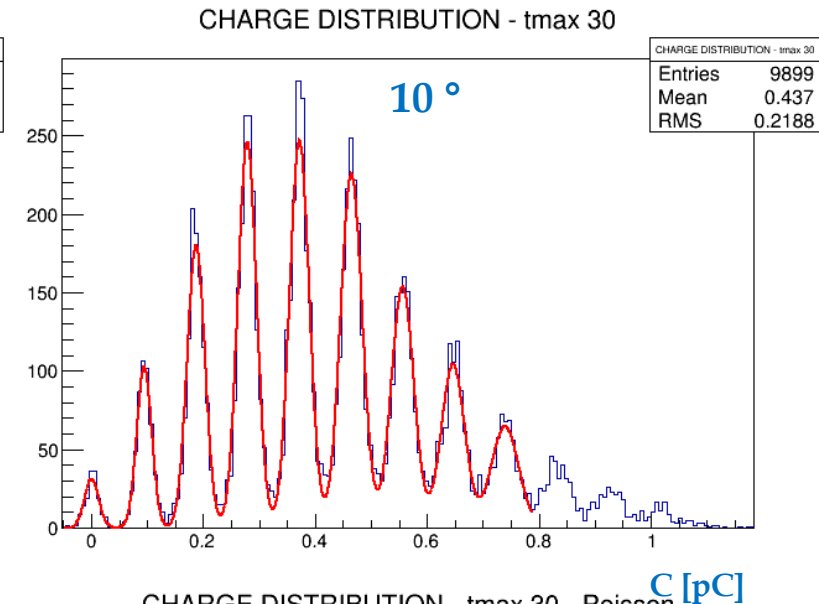
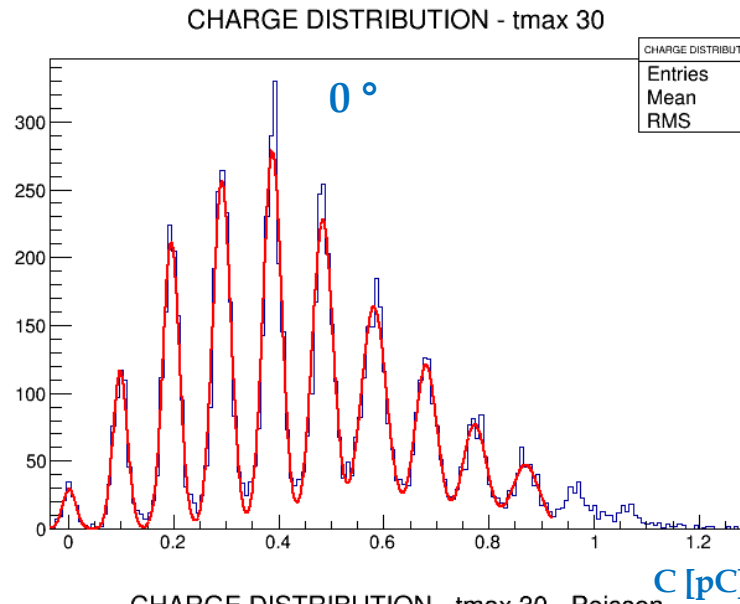
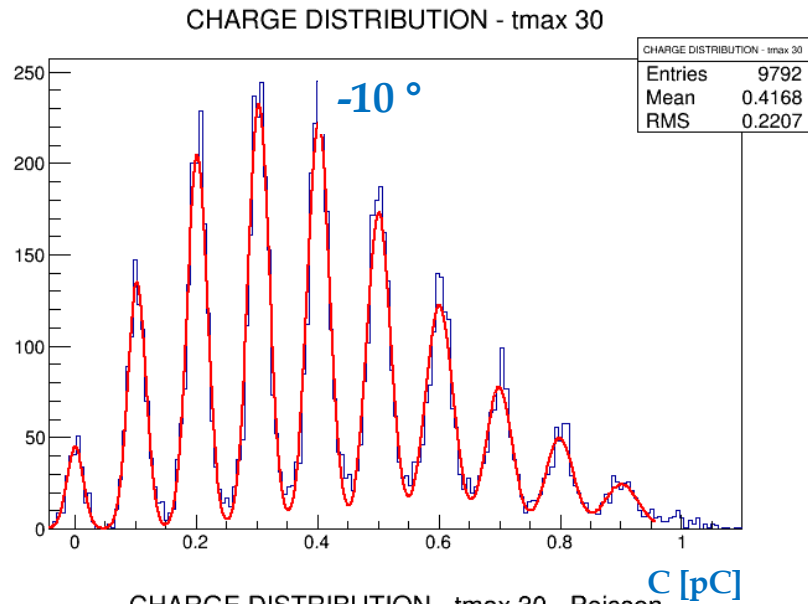
CHARGE DISTRIBUTION - tmax 30 - Poisson



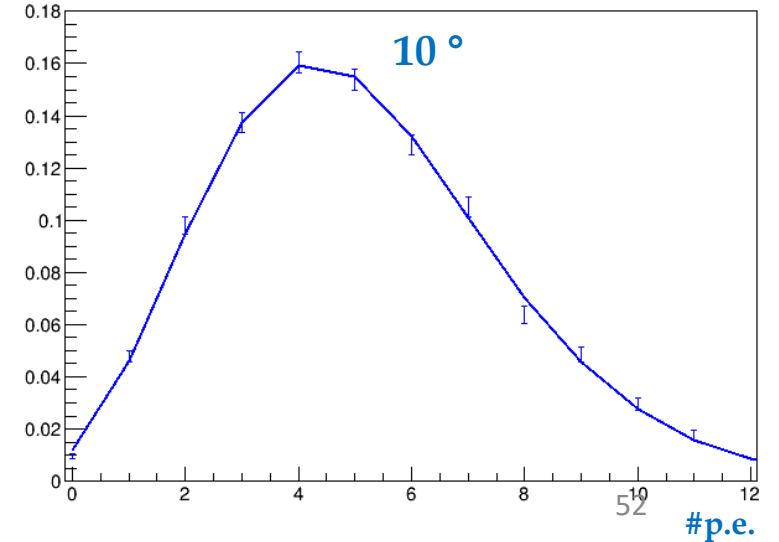
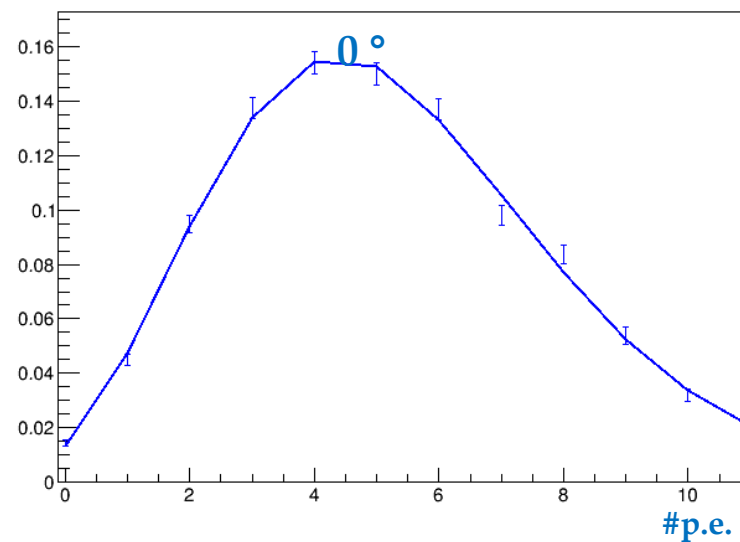
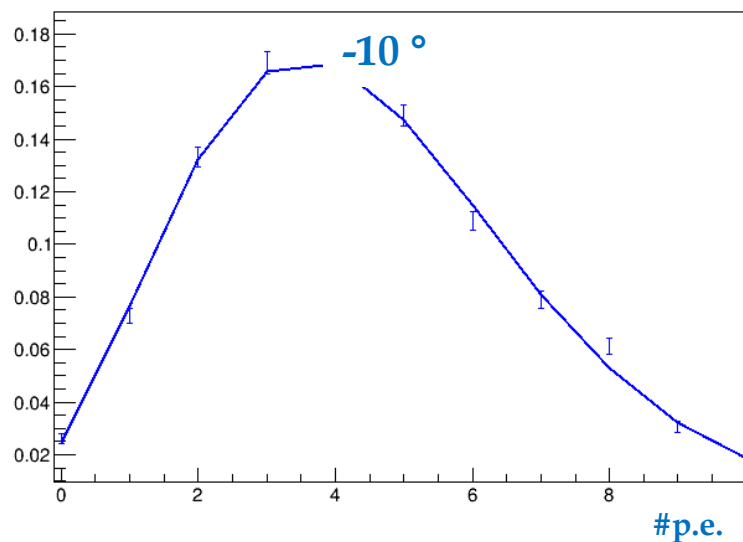
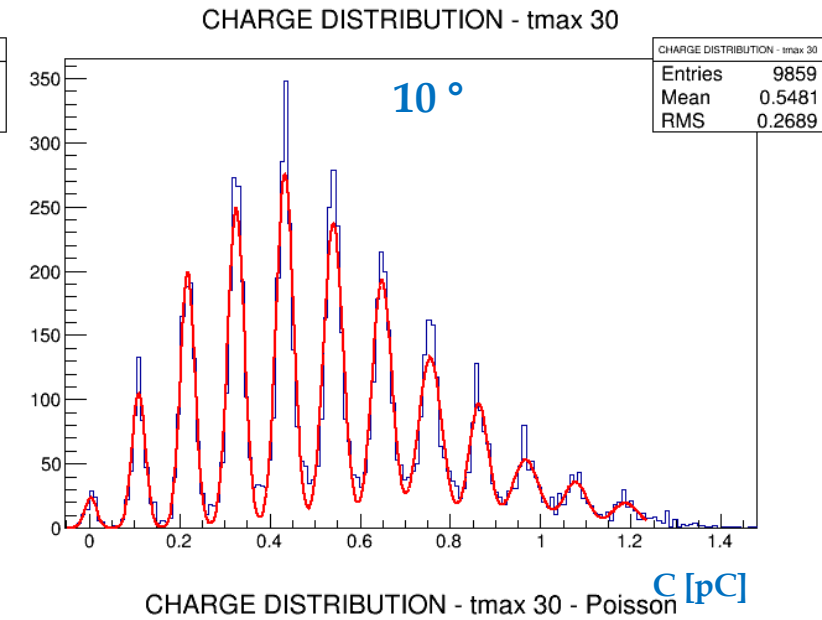
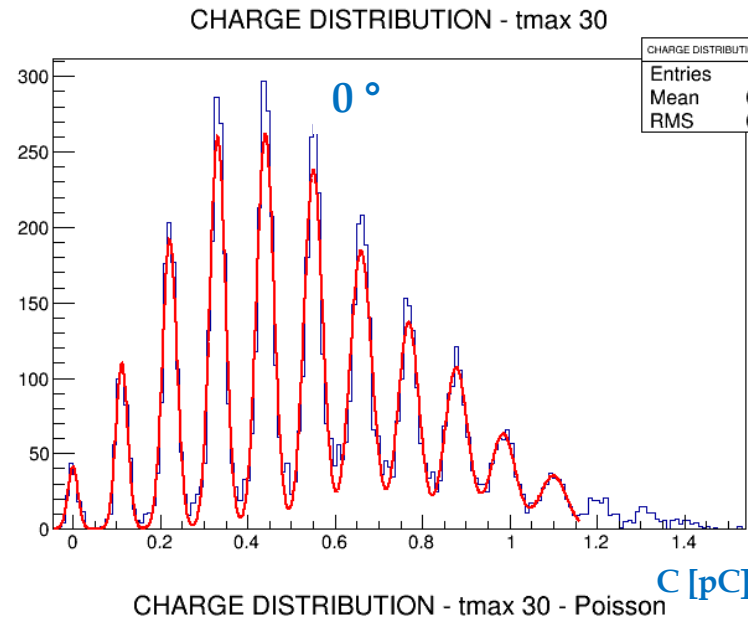
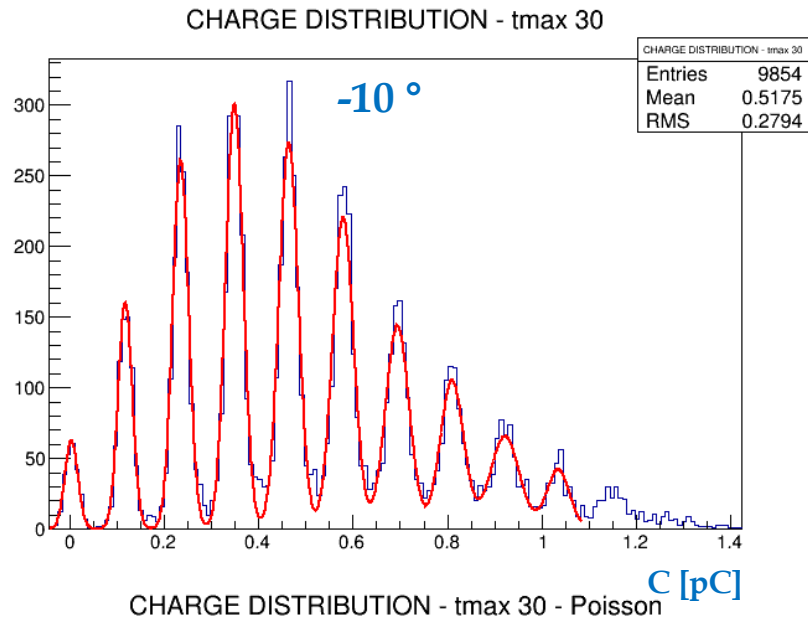
Light Analysis (Integration time 30 ns) : 36 V



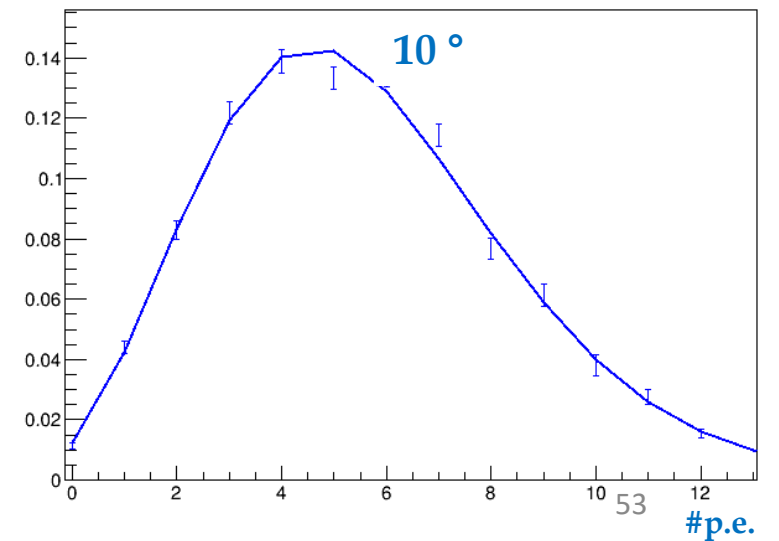
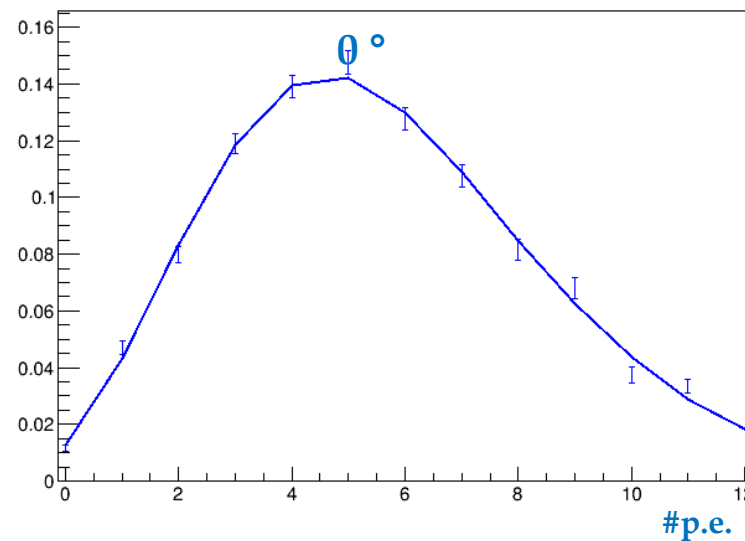
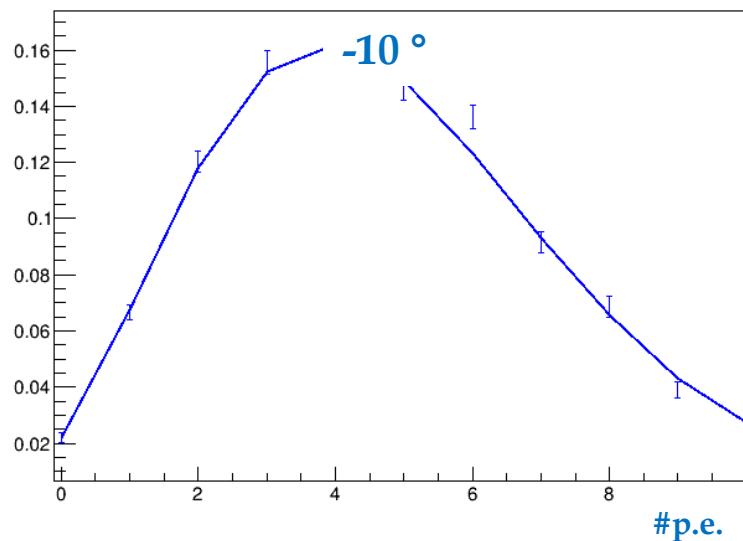
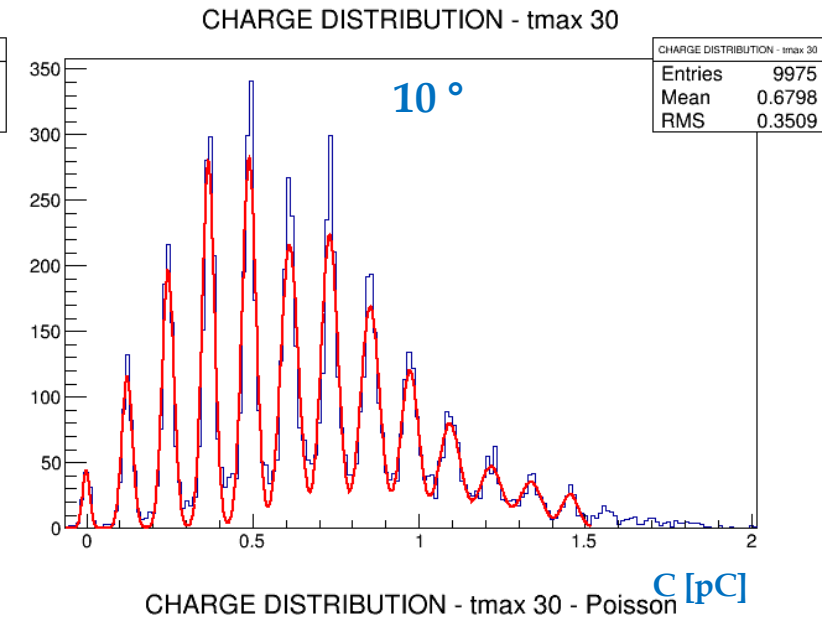
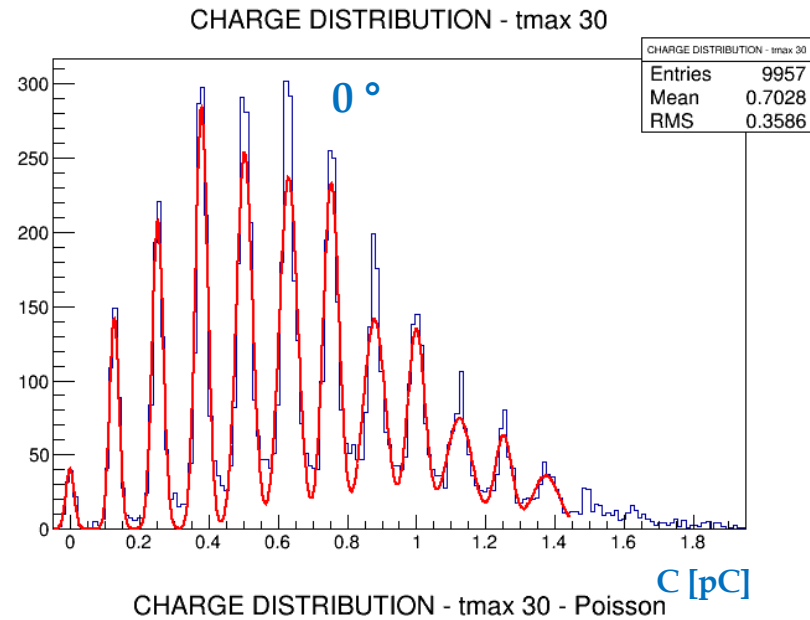
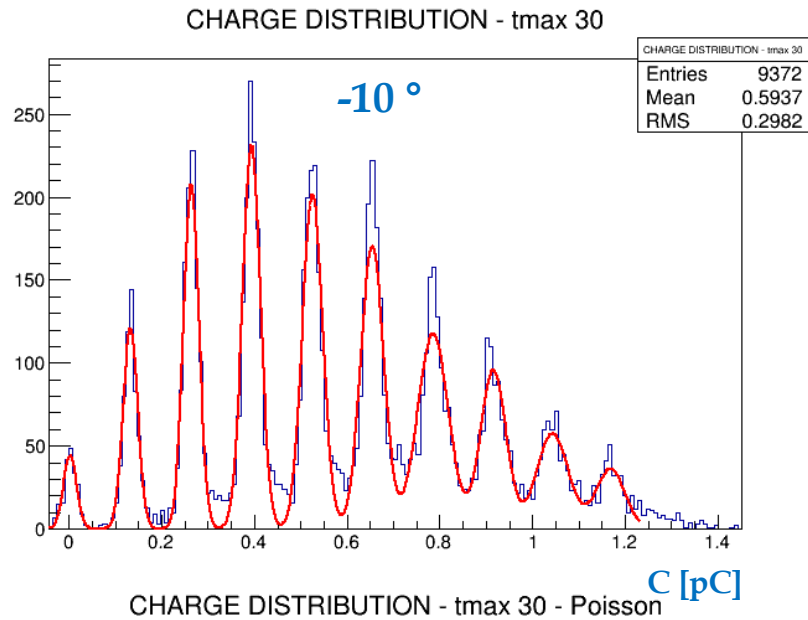
Light Analysis (Integration time 30 ns) : 37 V



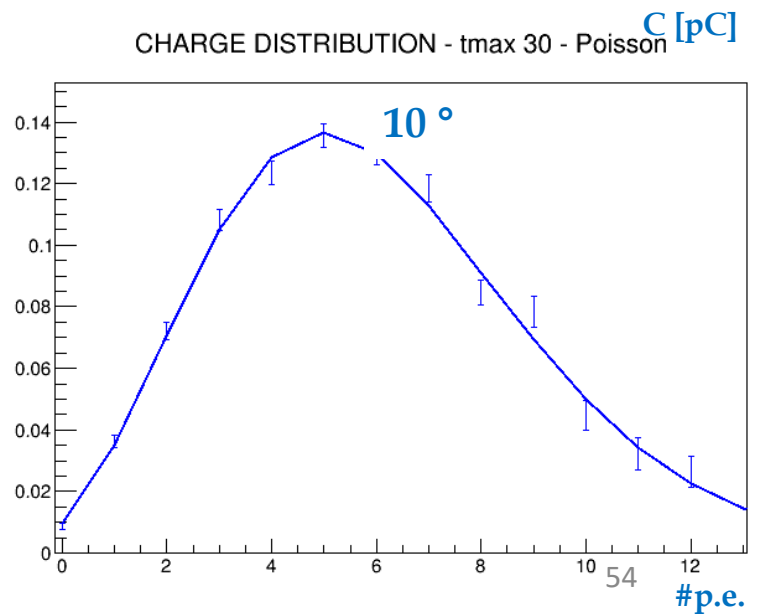
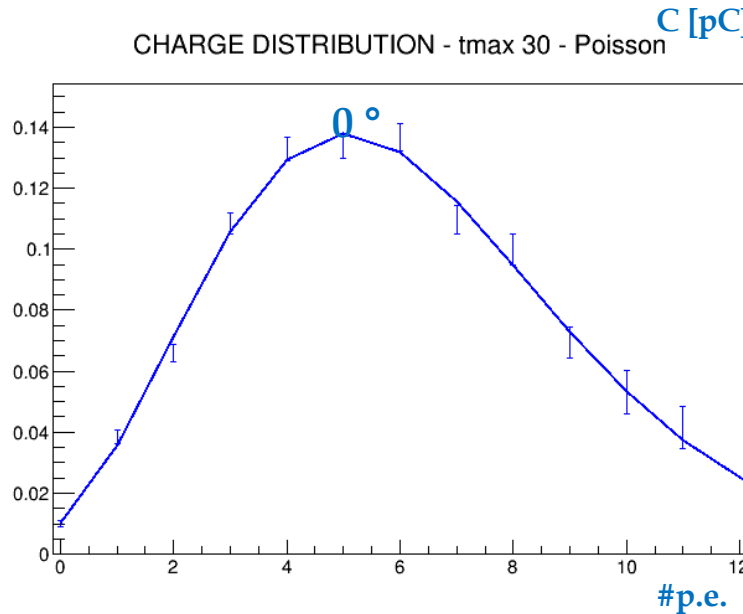
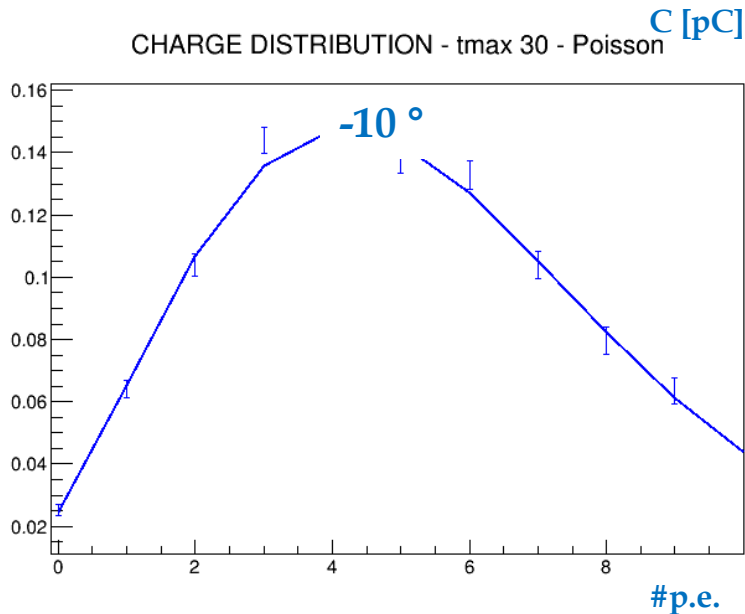
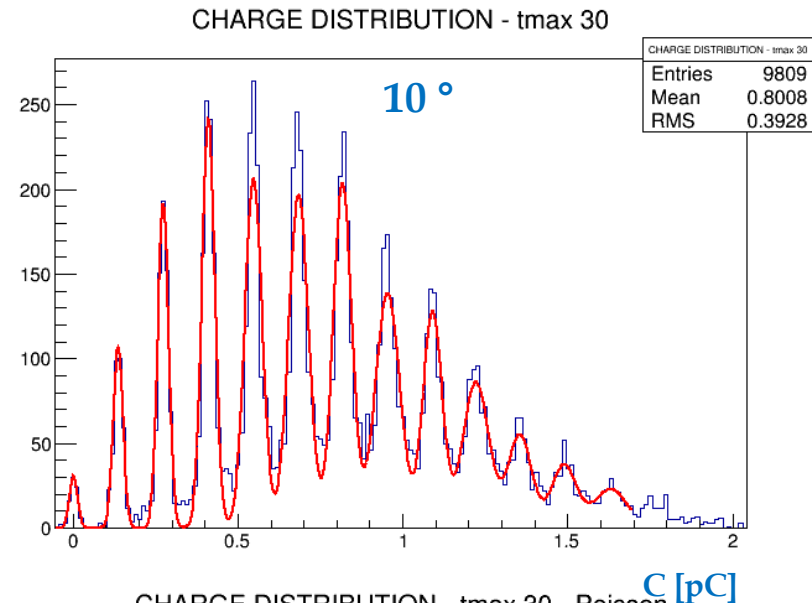
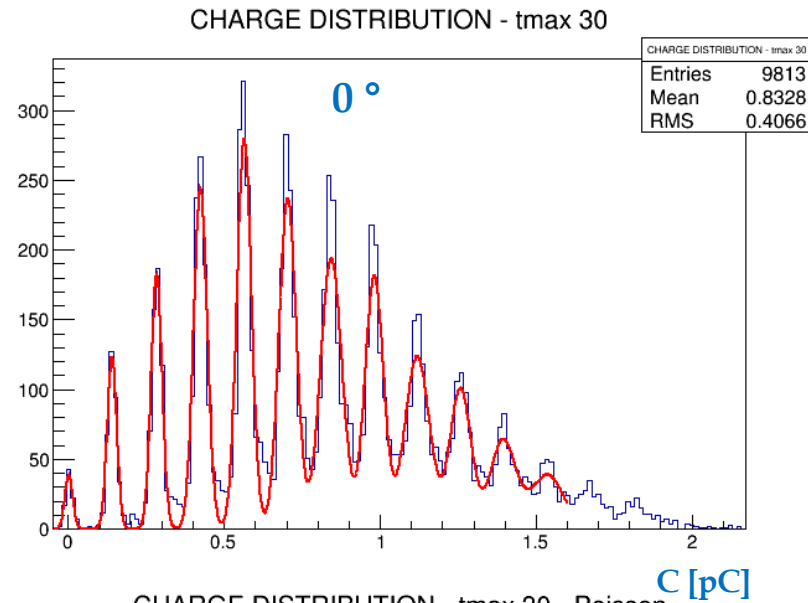
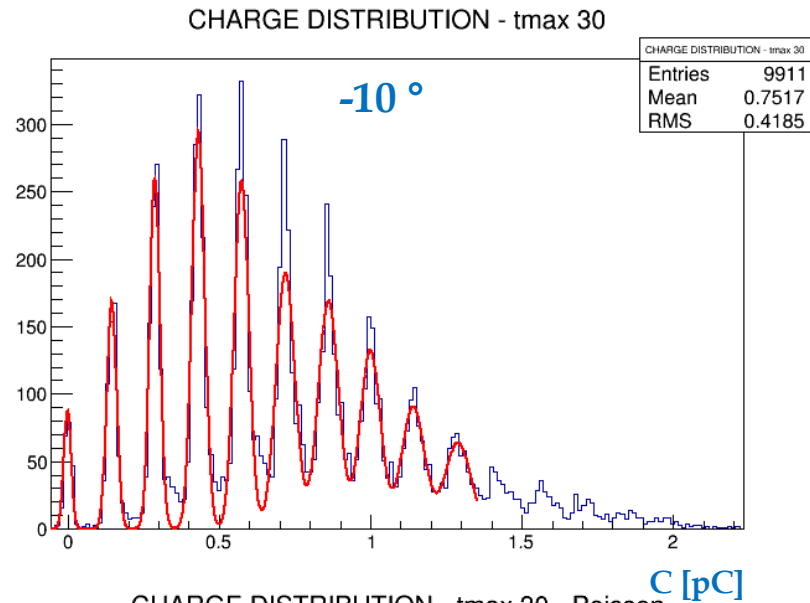
Light Analysis (Integration time 30 ns) : 38 V



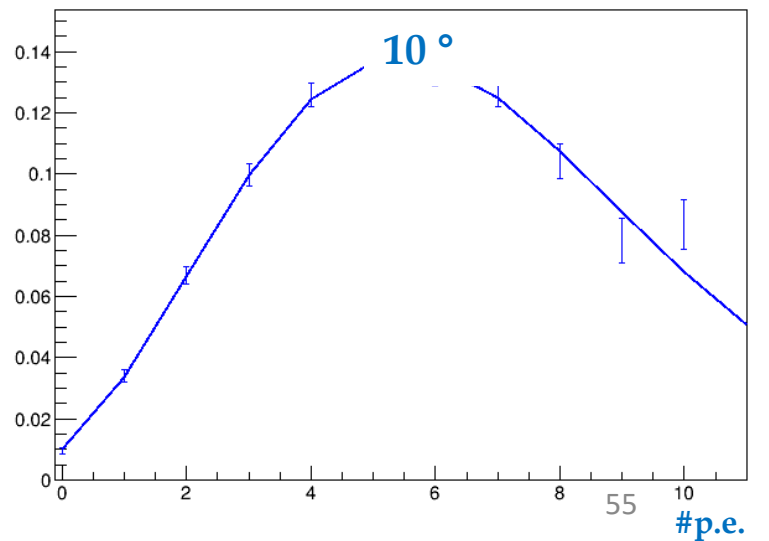
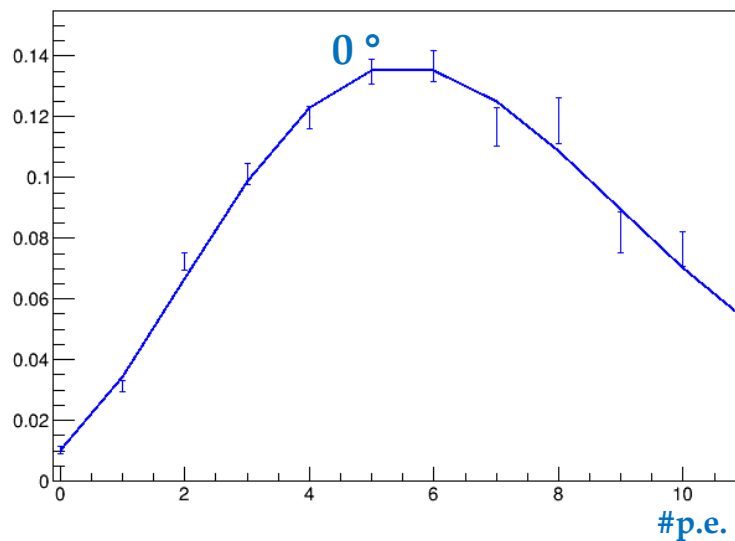
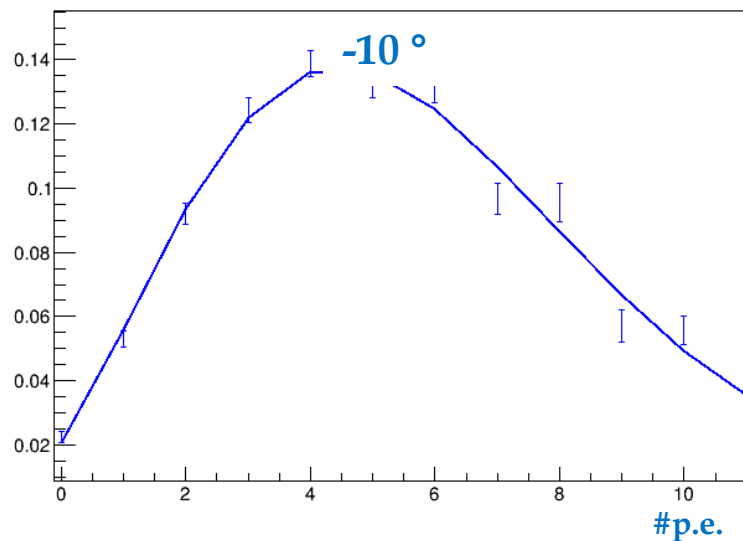
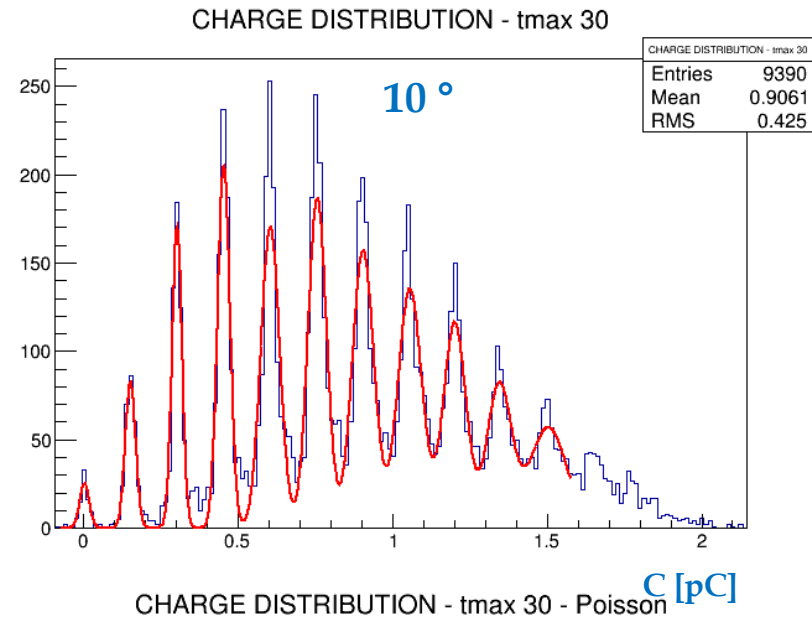
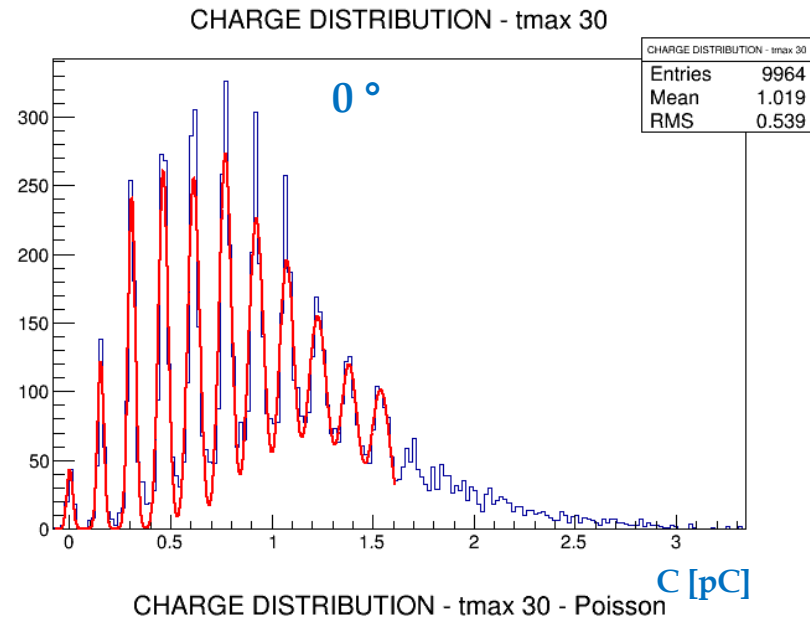
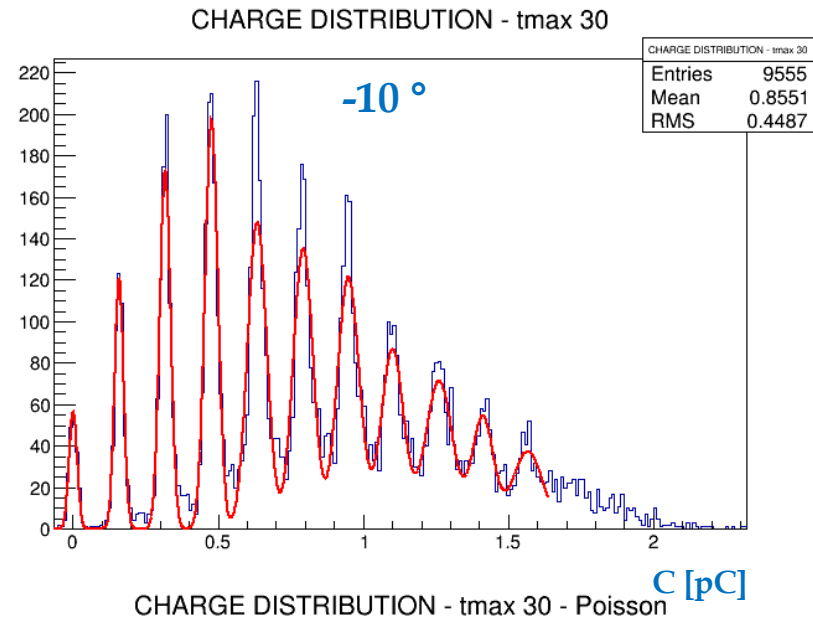
Light Analysis (Integration time 30 ns) : 39 V



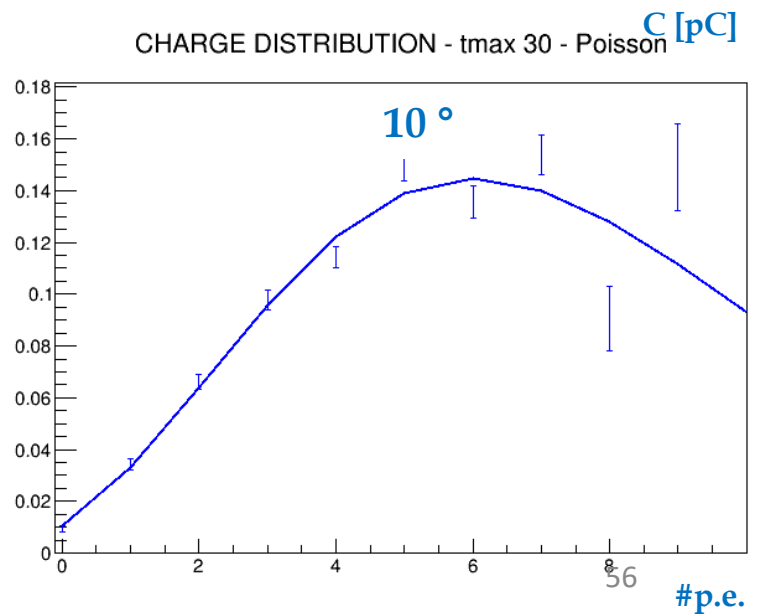
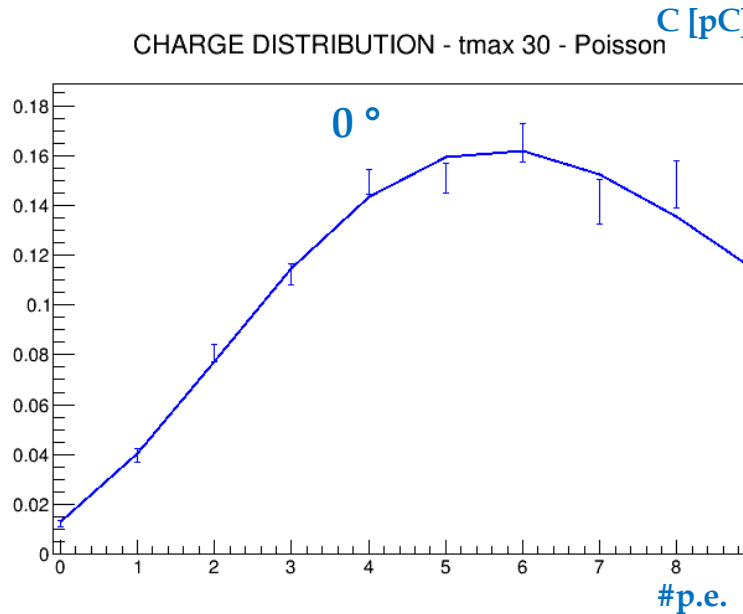
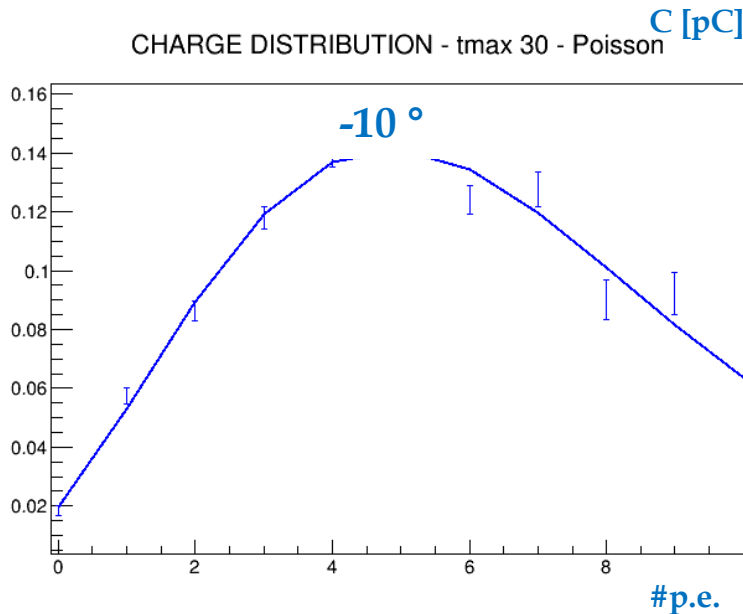
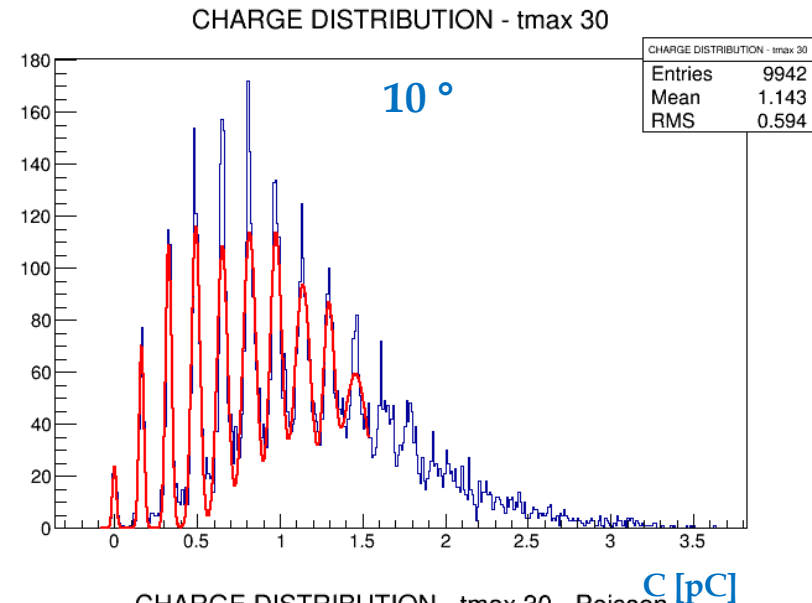
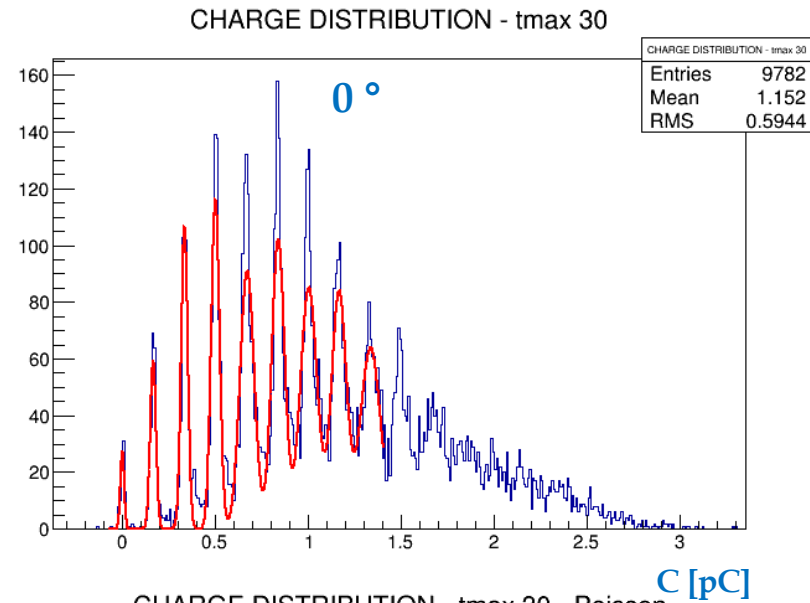
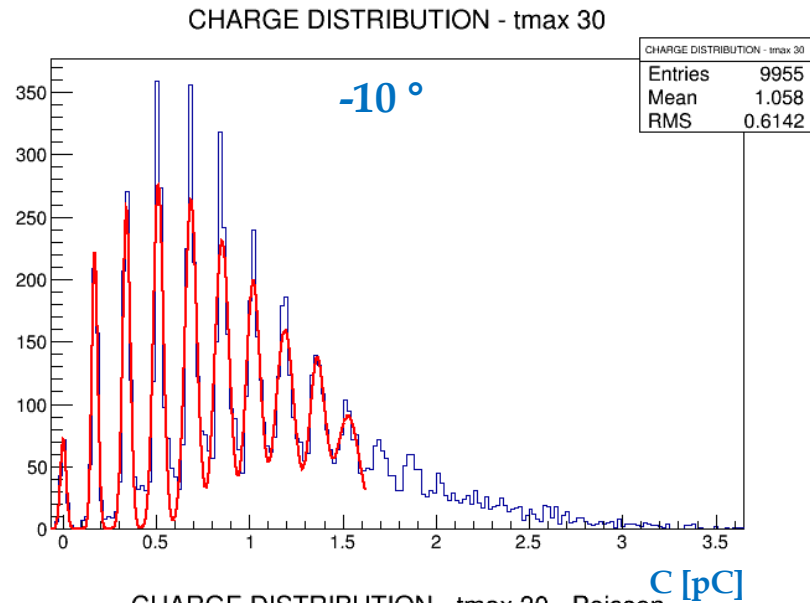
Light Analysis (Integration time 30 ns) : 40 V



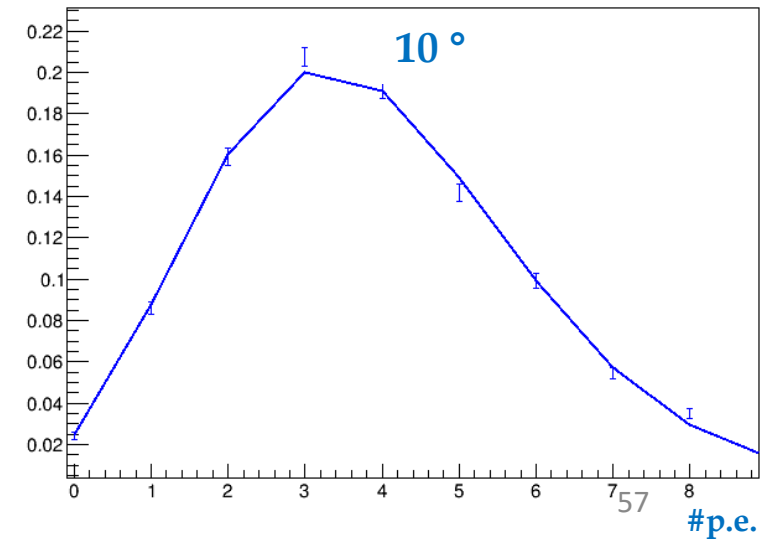
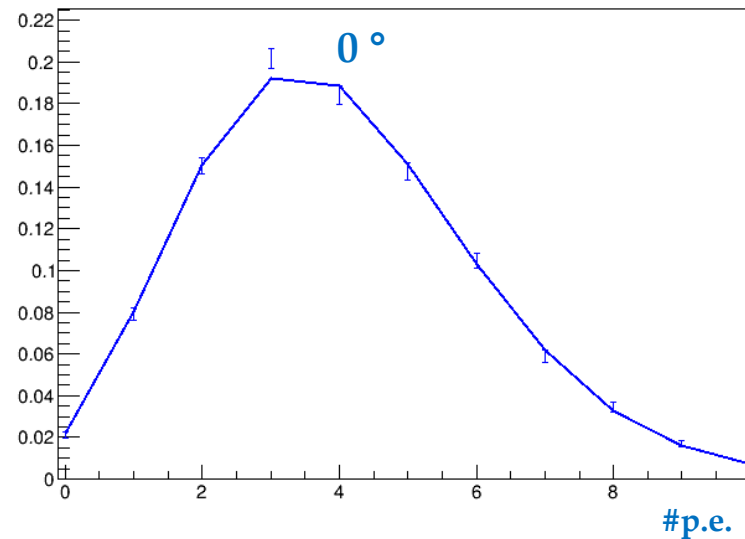
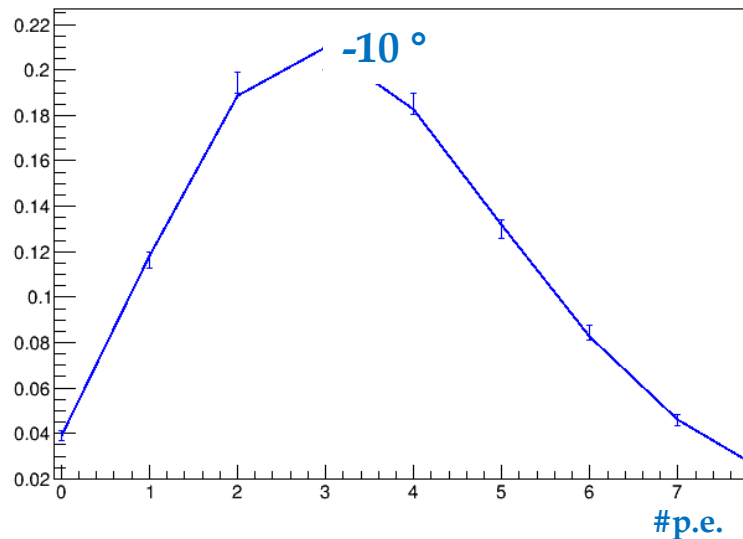
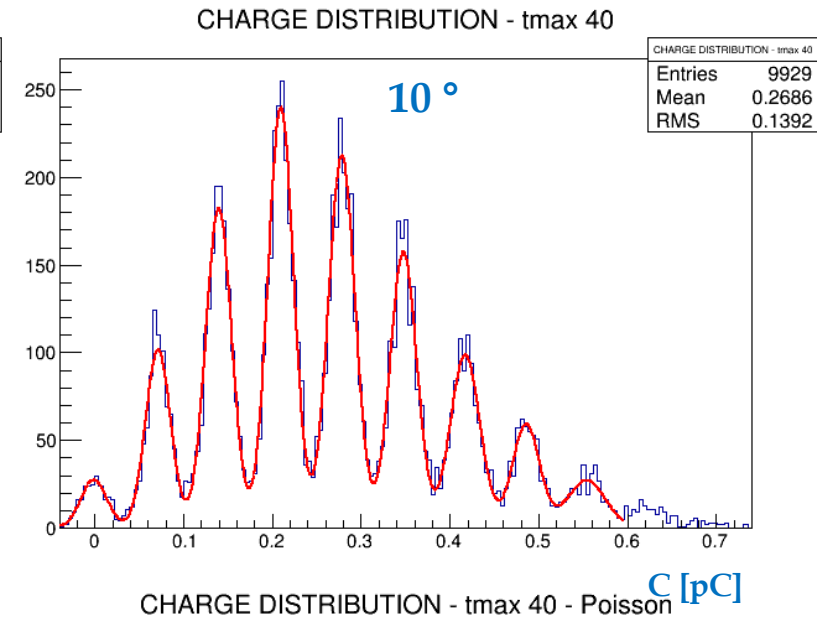
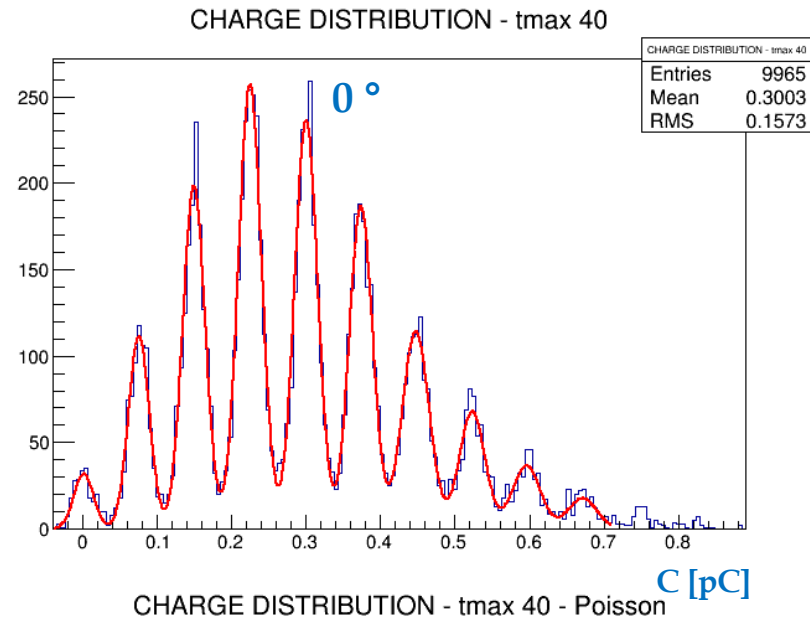
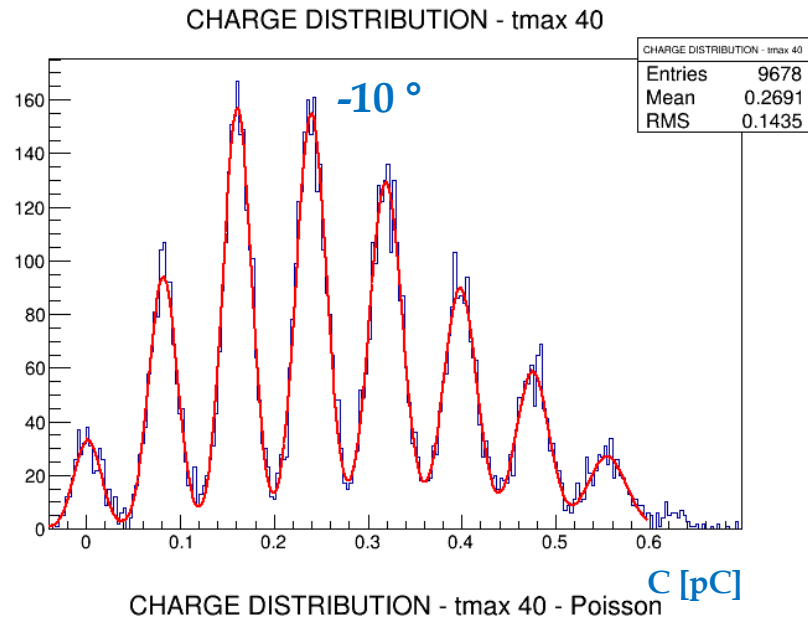
Light Analysis (Integration time 30 ns) : 41 V



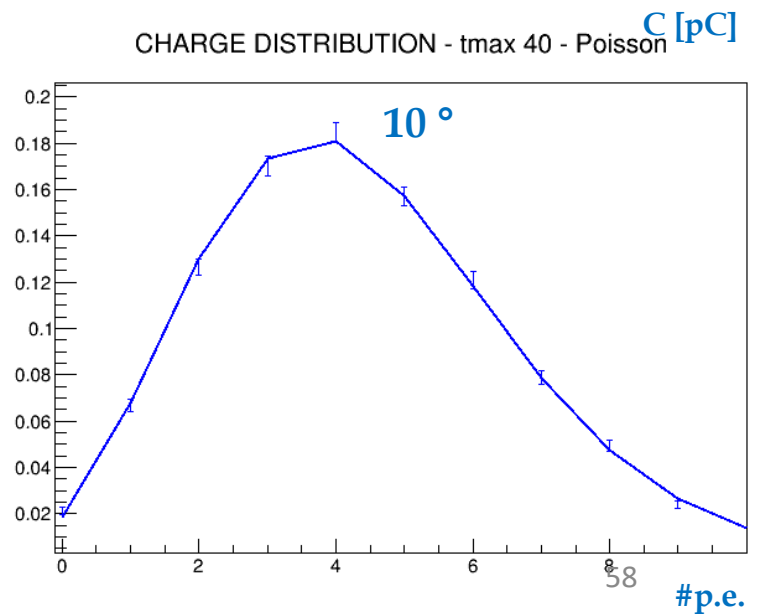
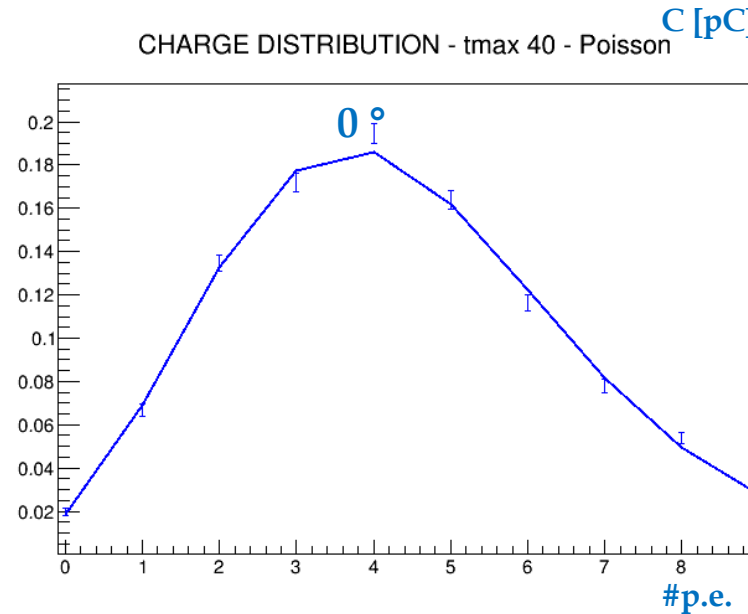
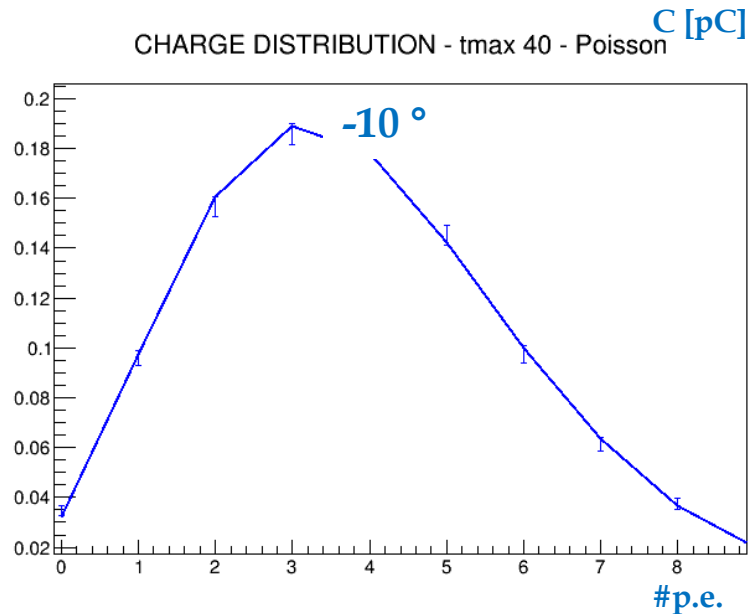
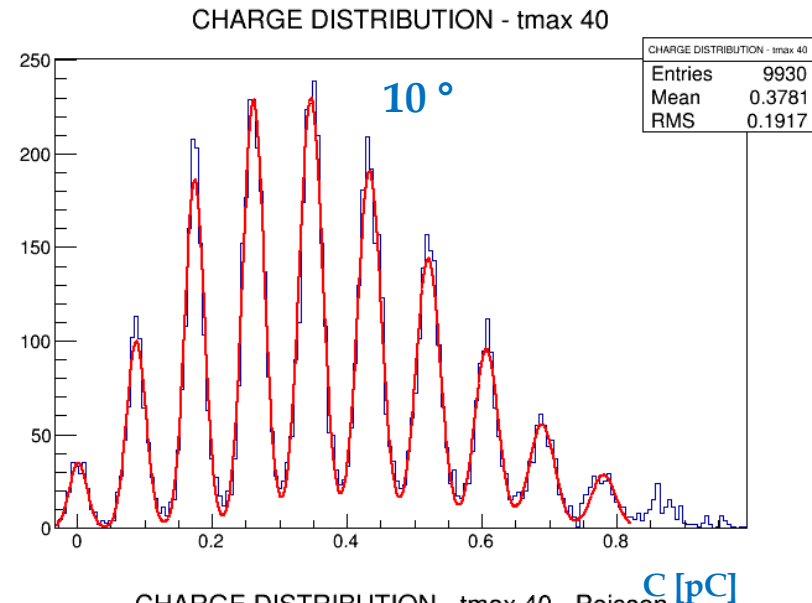
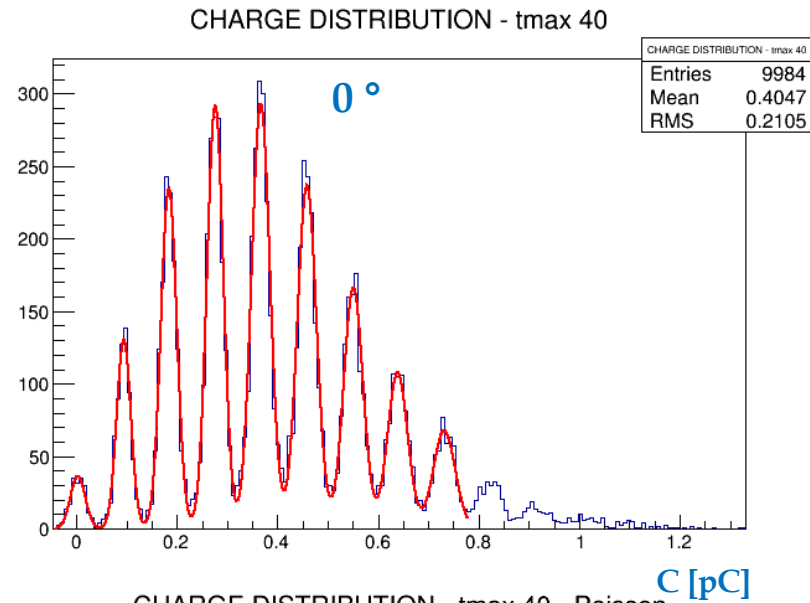
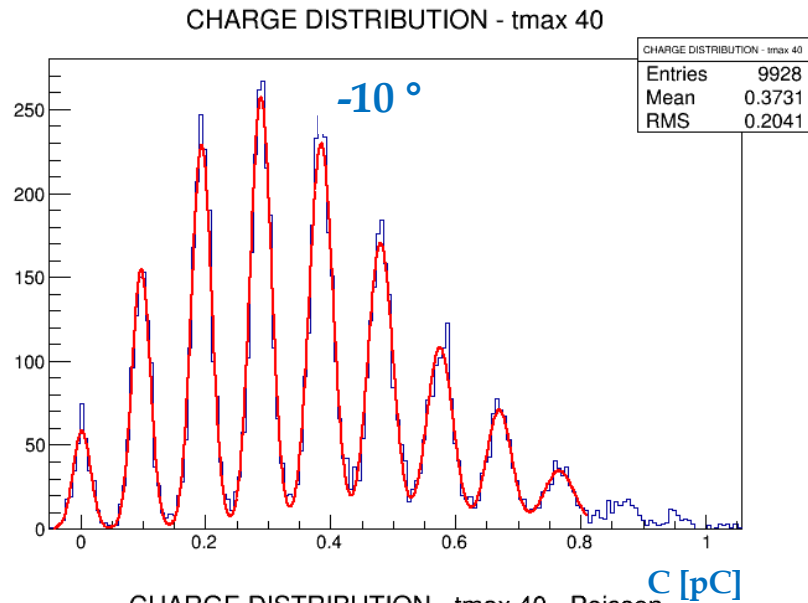
Light Analysis (Integration time 30 ns) : 42 V



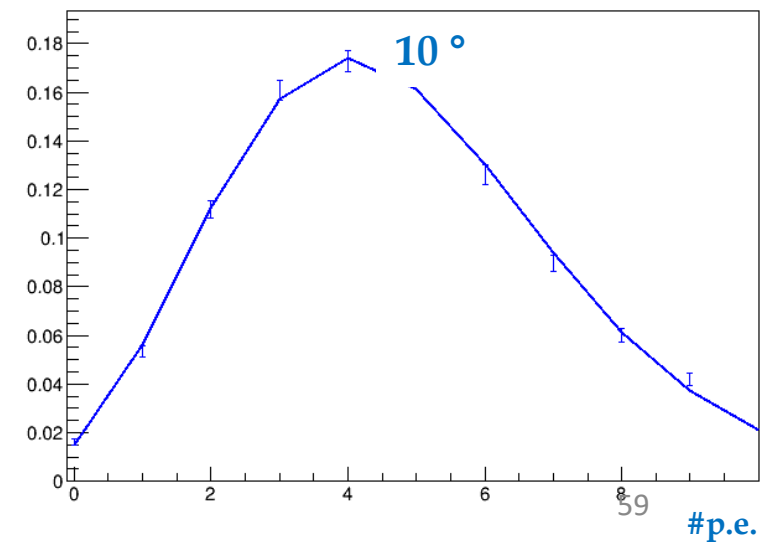
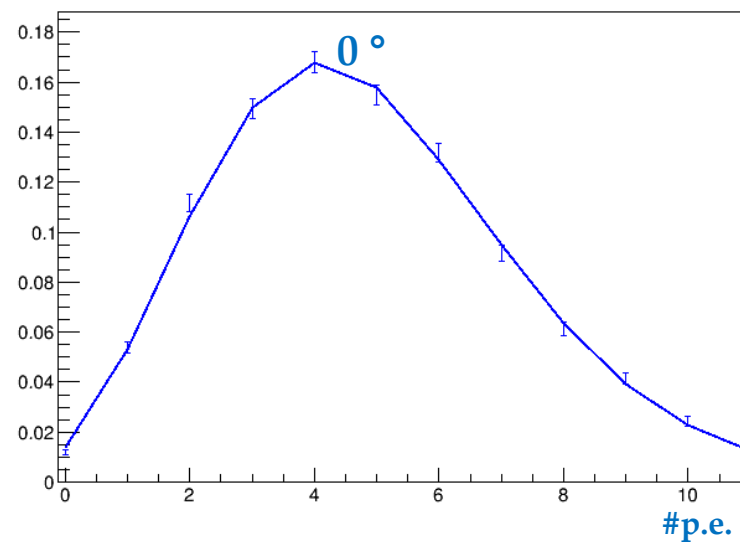
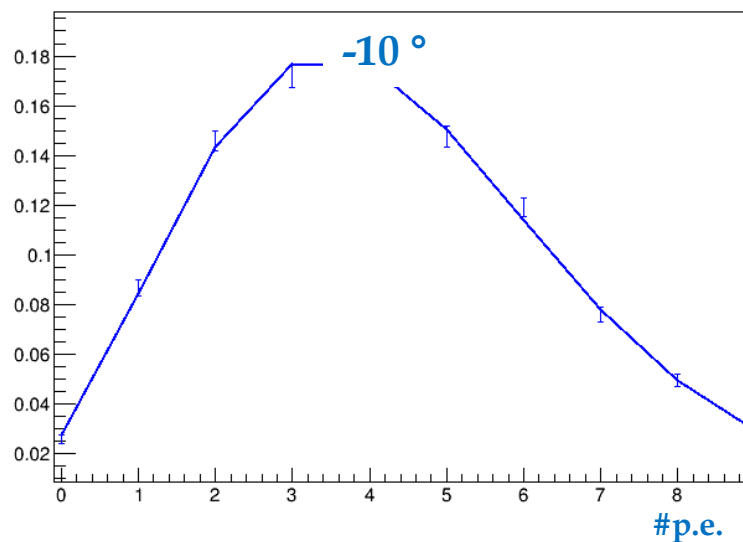
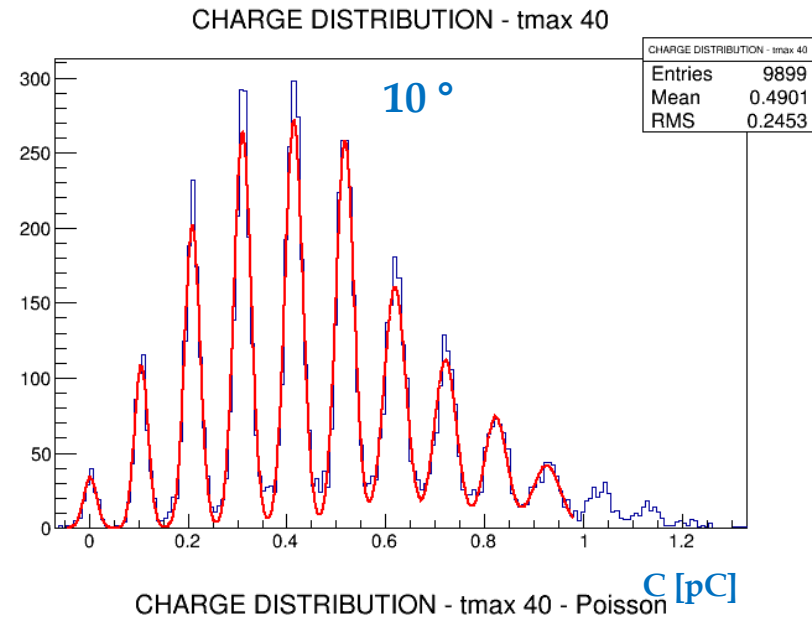
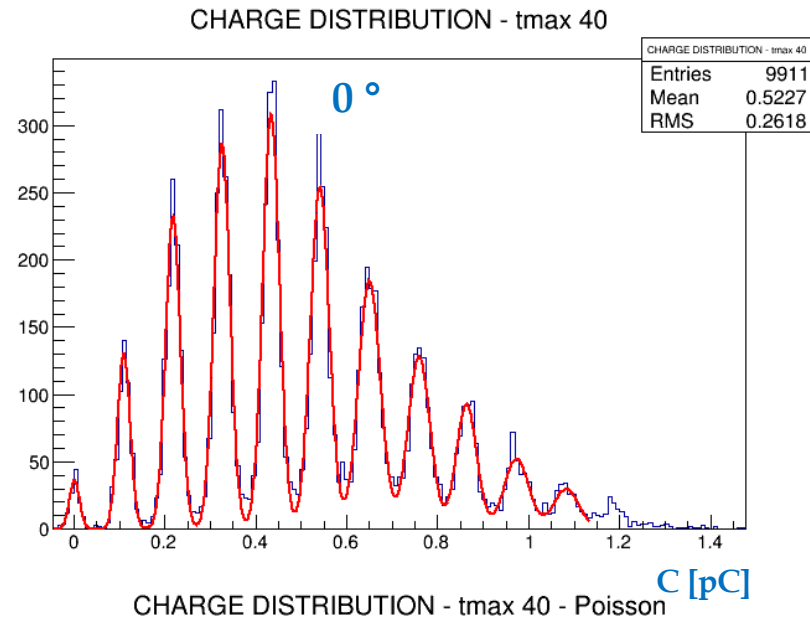
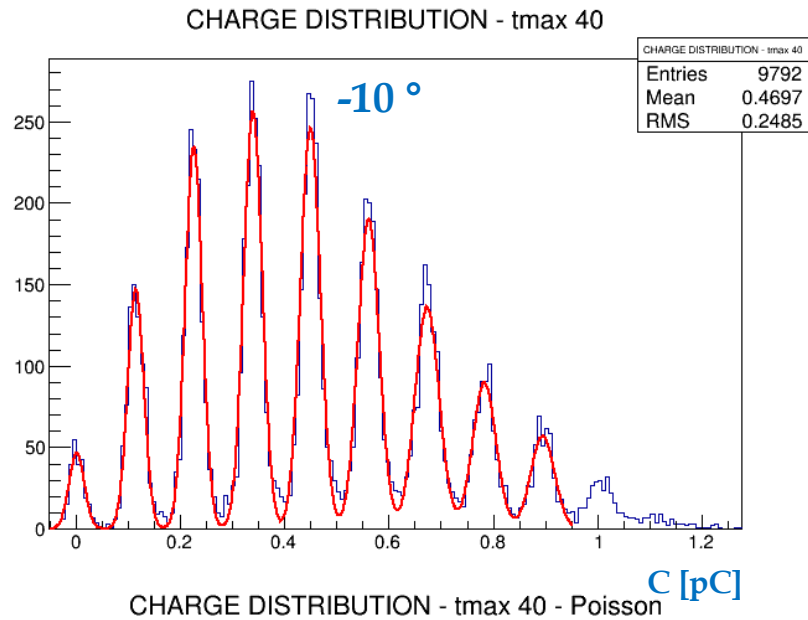
Light Analysis (Integration time 40 ns) : 35 V



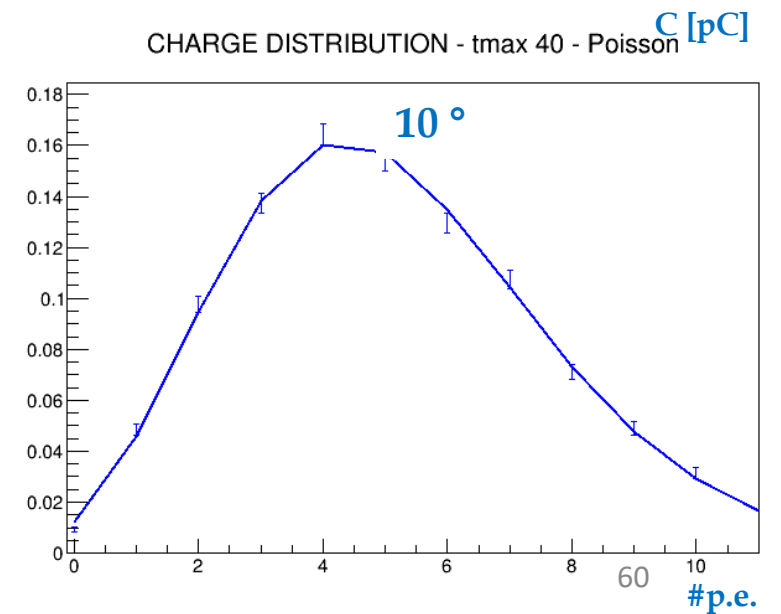
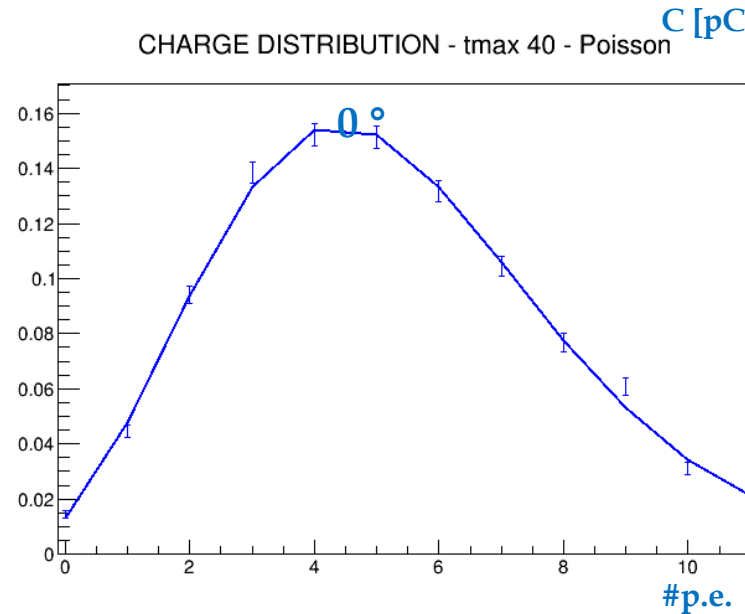
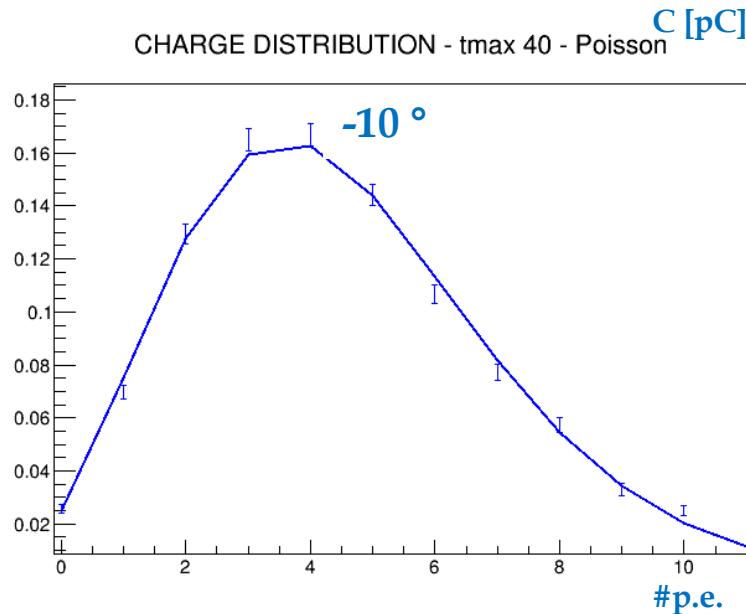
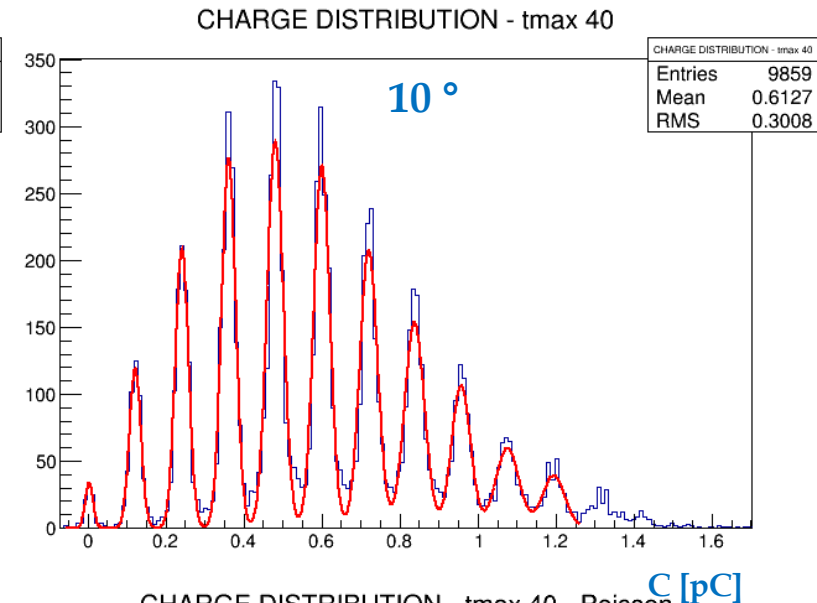
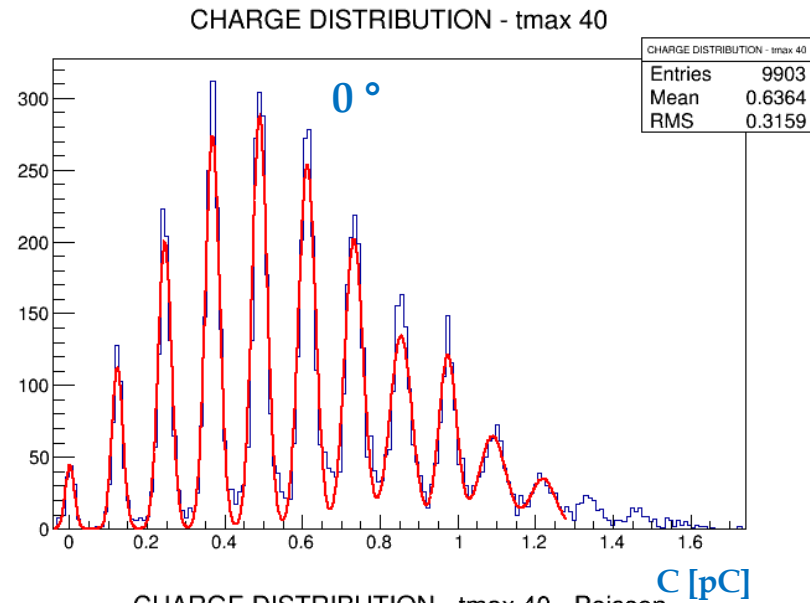
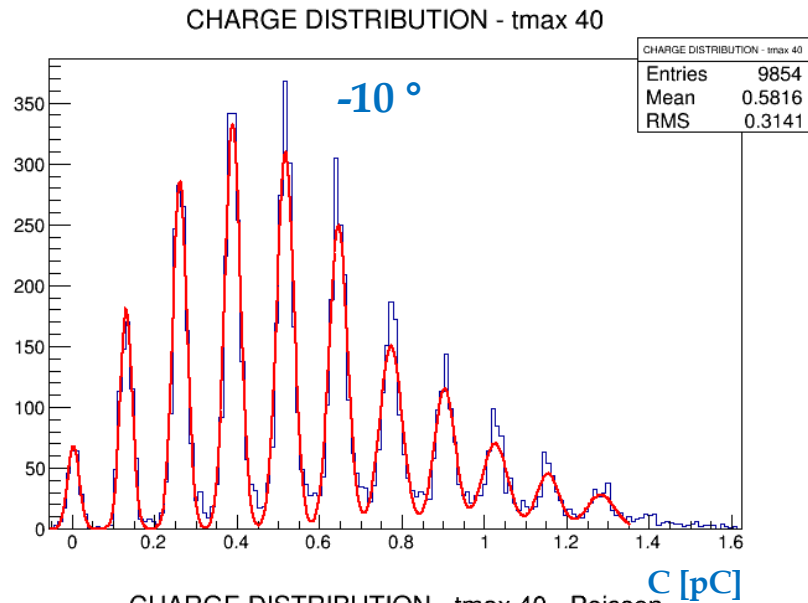
Light Analysis (Integration time 40 ns) : 36 V



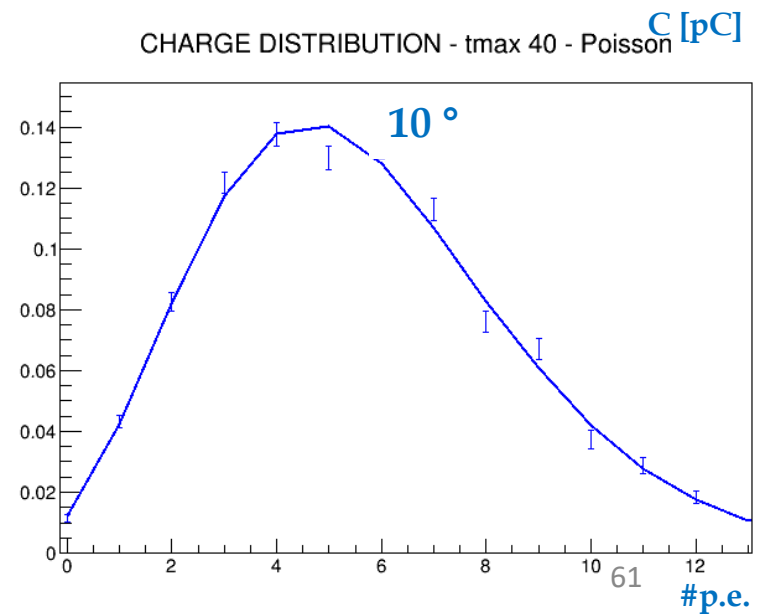
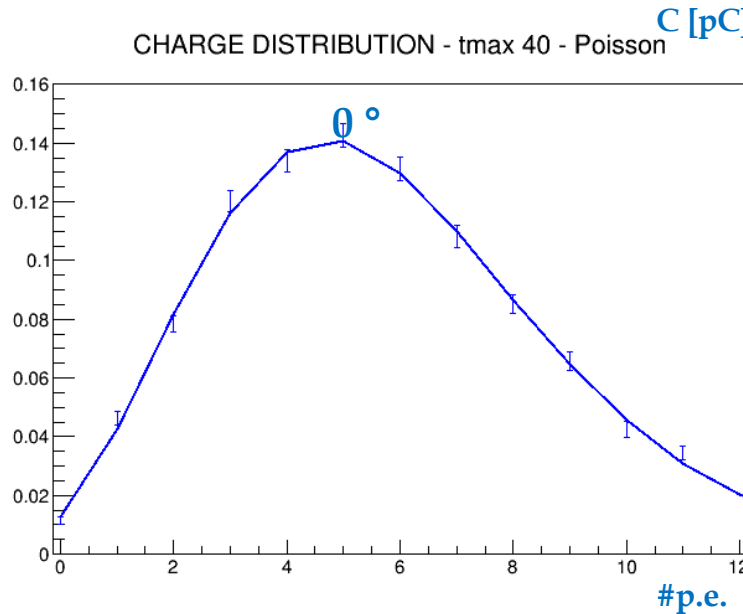
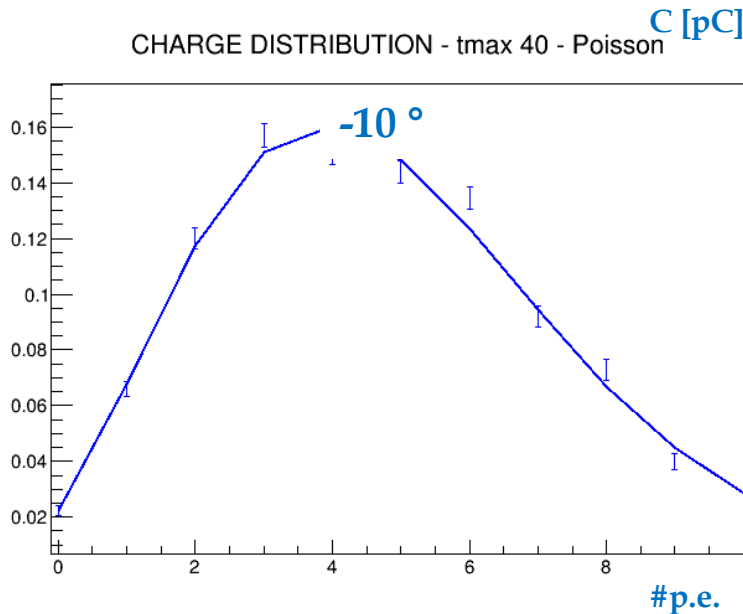
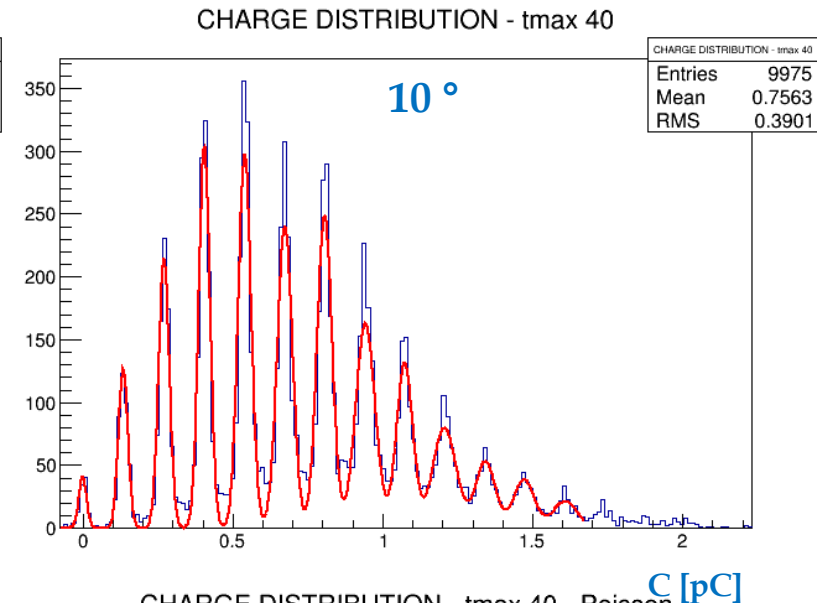
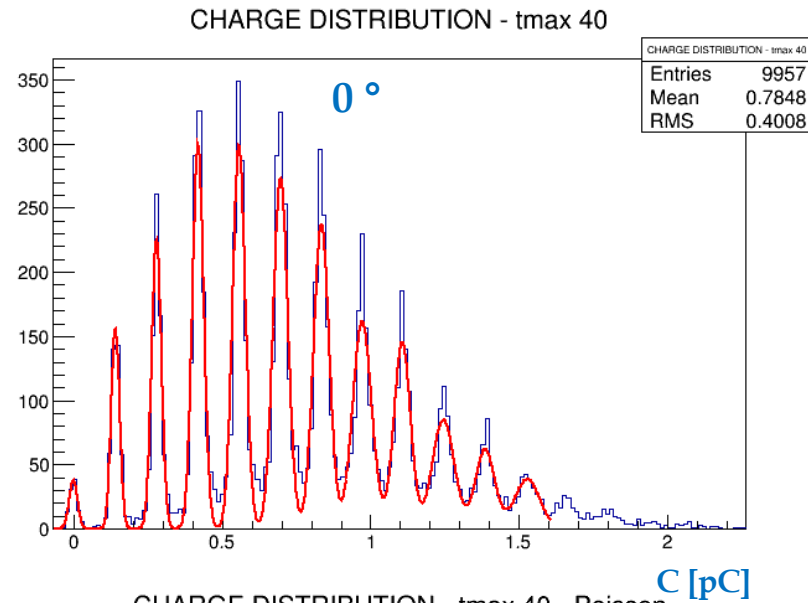
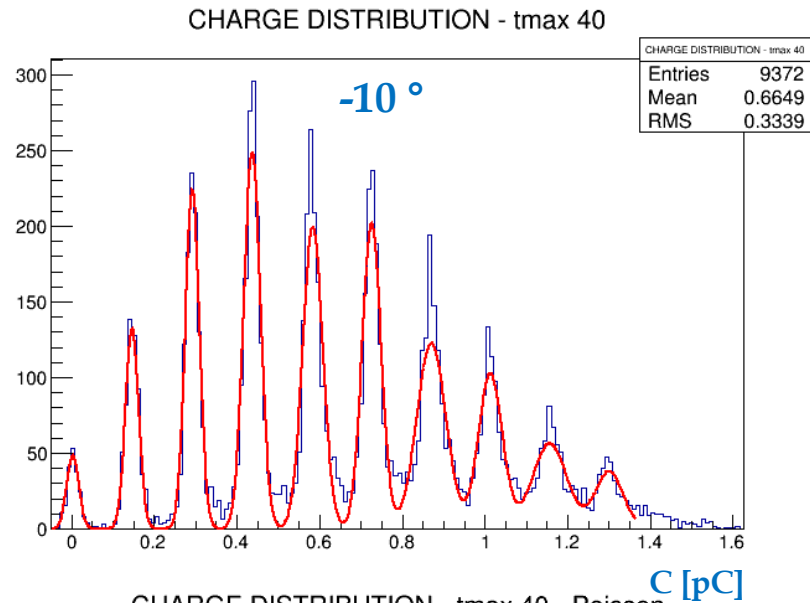
Light Analysis (Integration time 40 ns) : 37 V



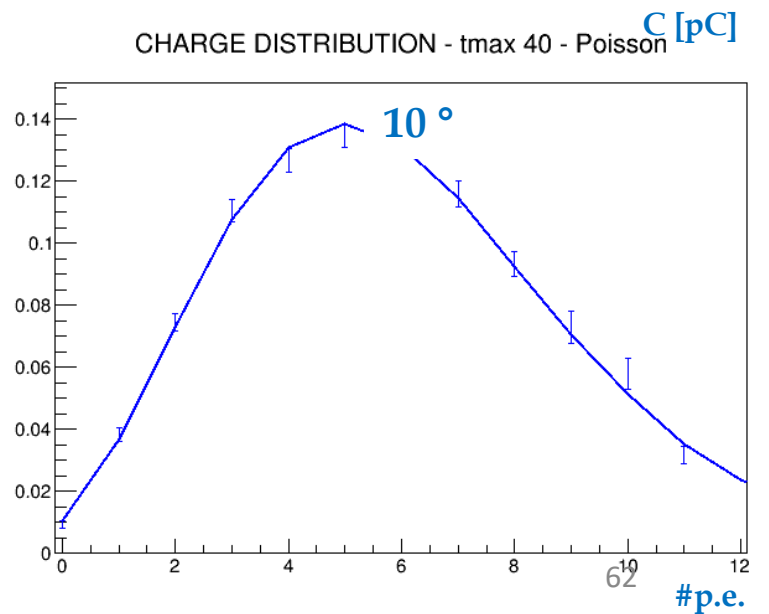
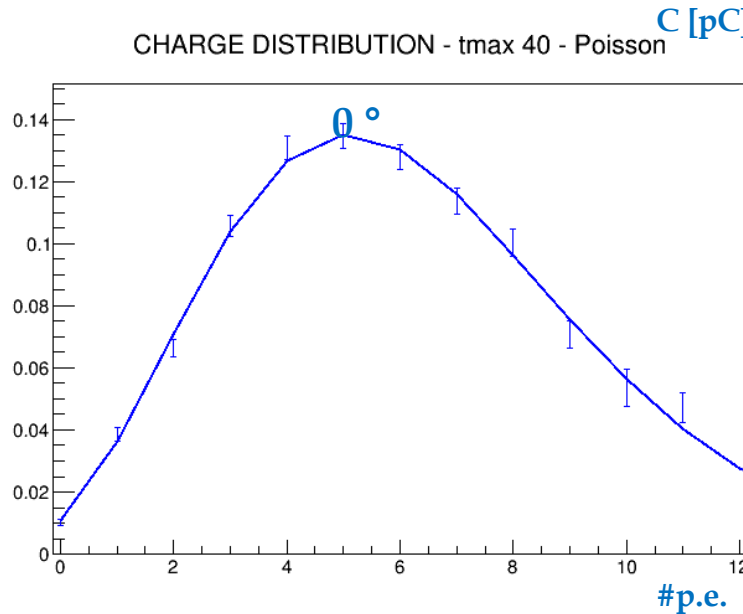
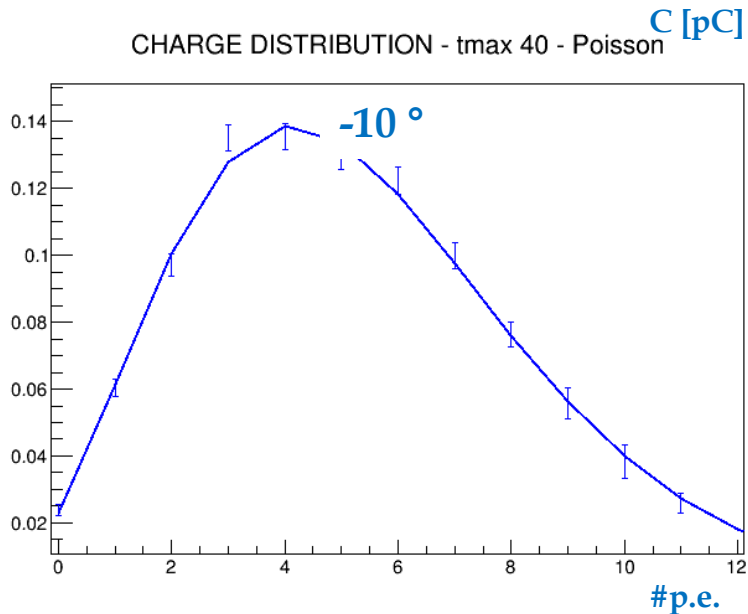
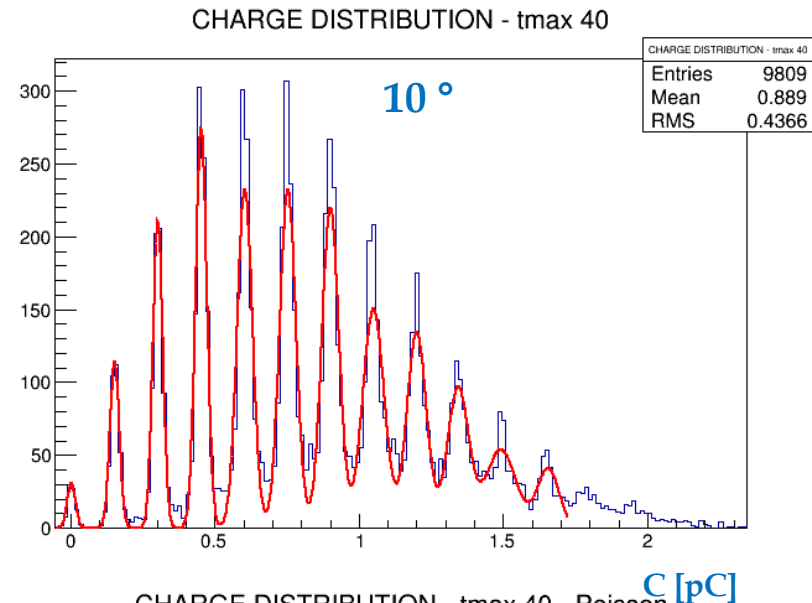
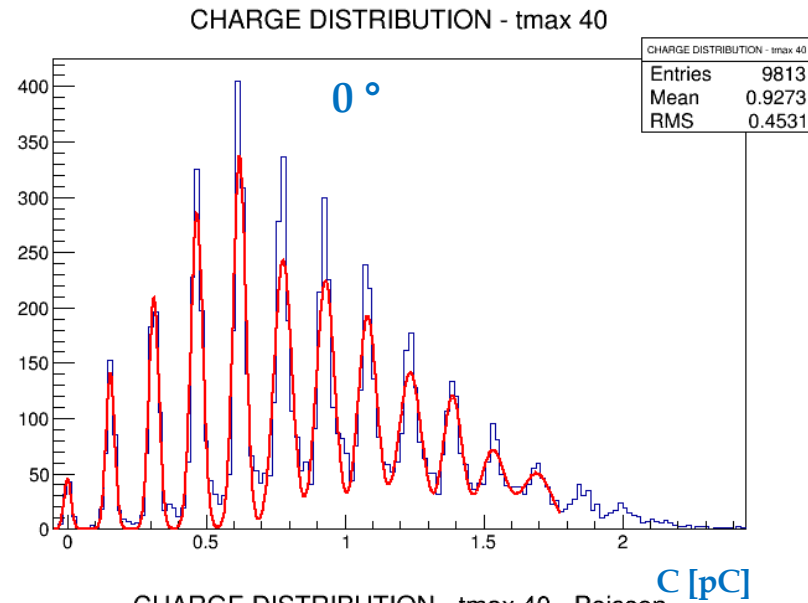
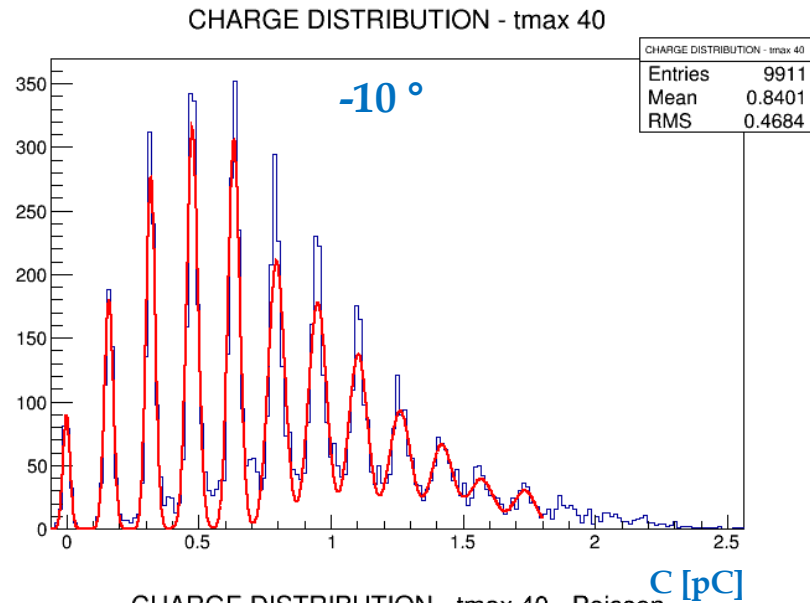
Light Analysis (Integration time 40 ns) : 38 V



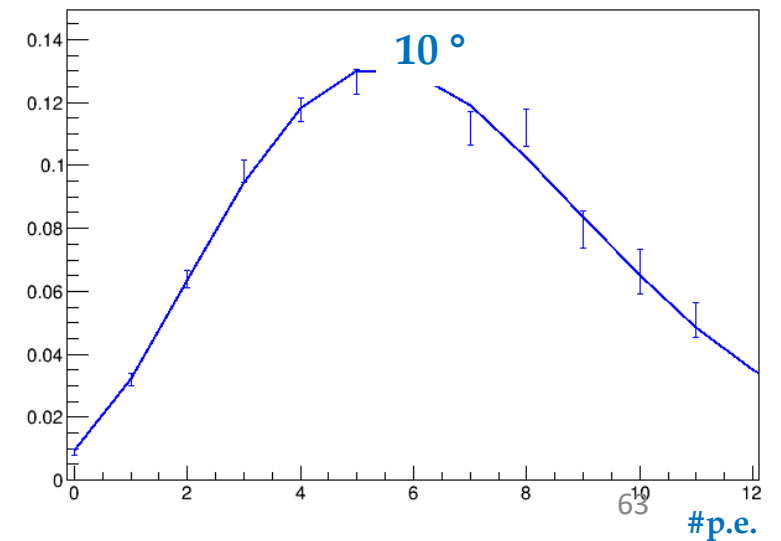
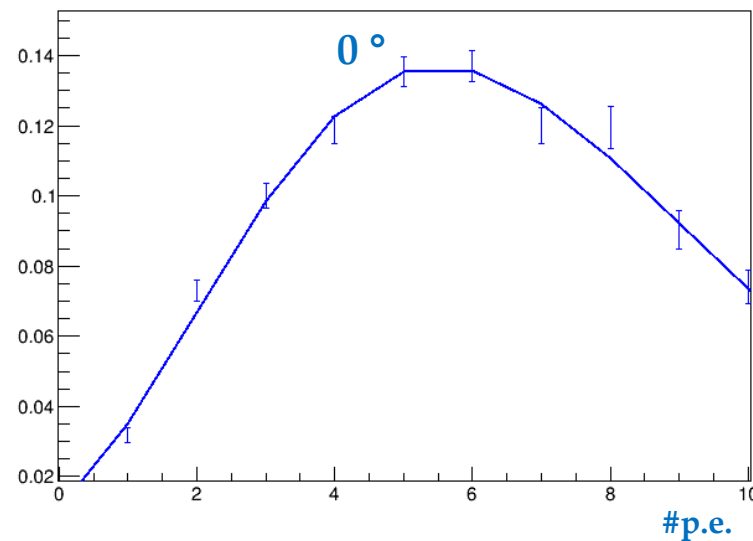
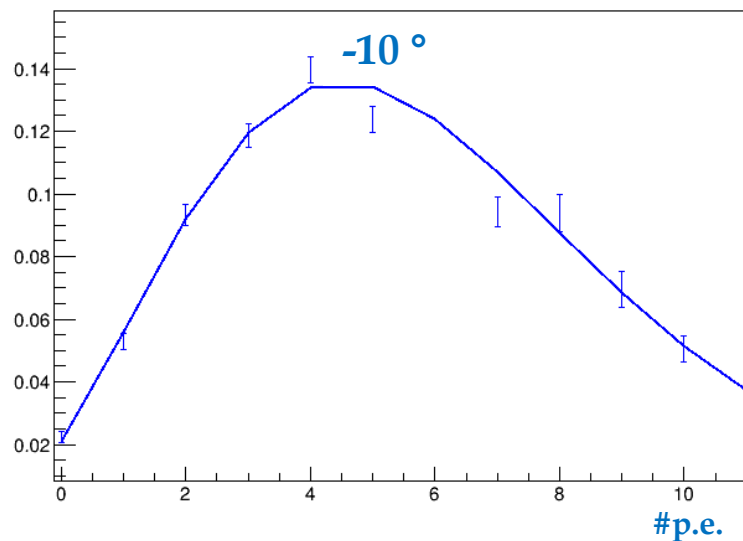
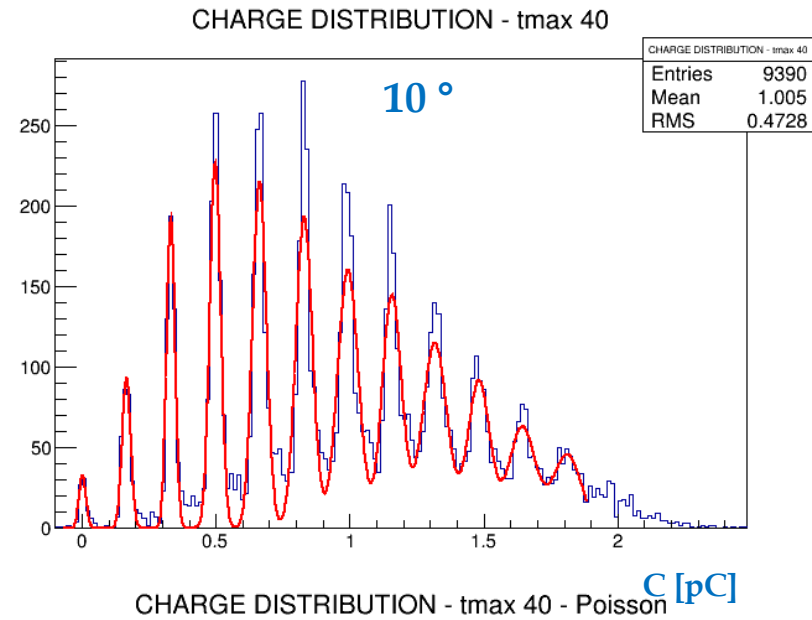
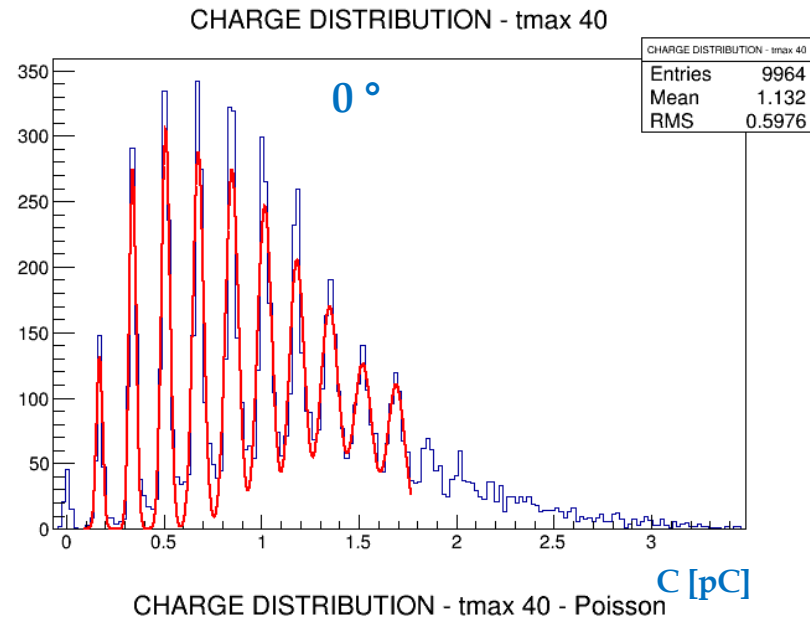
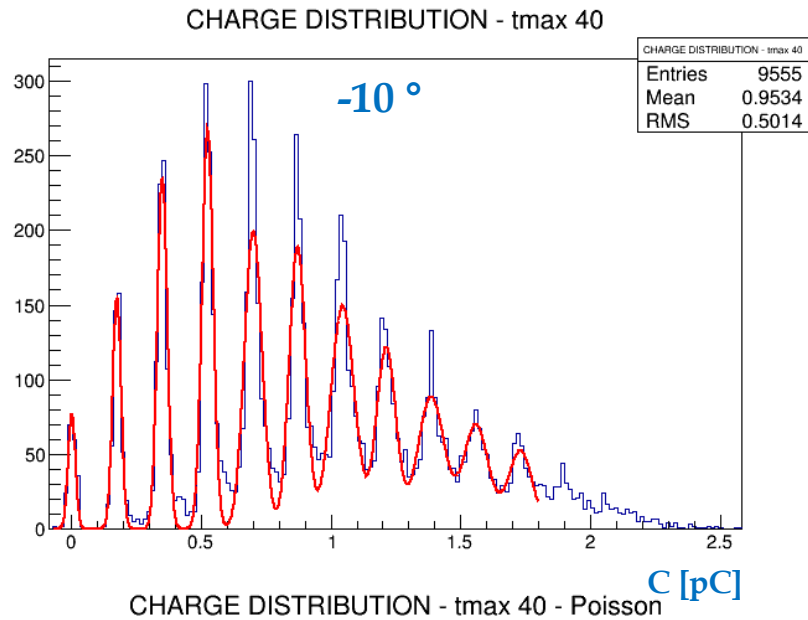
Light Analysis (Integration time 40 ns) : 39 V



Light Analysis (Integration time 40 ns) : 40 V

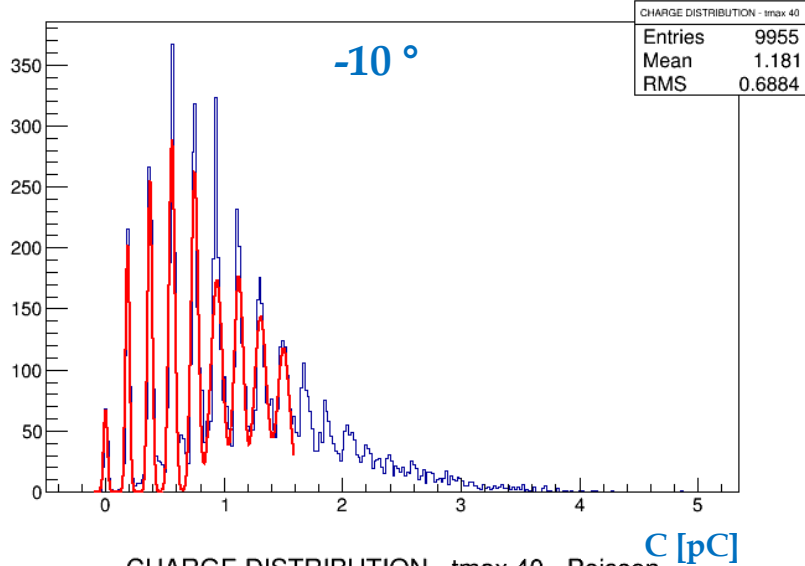


Light Analysis (Integration time 40 ns) : 41 V

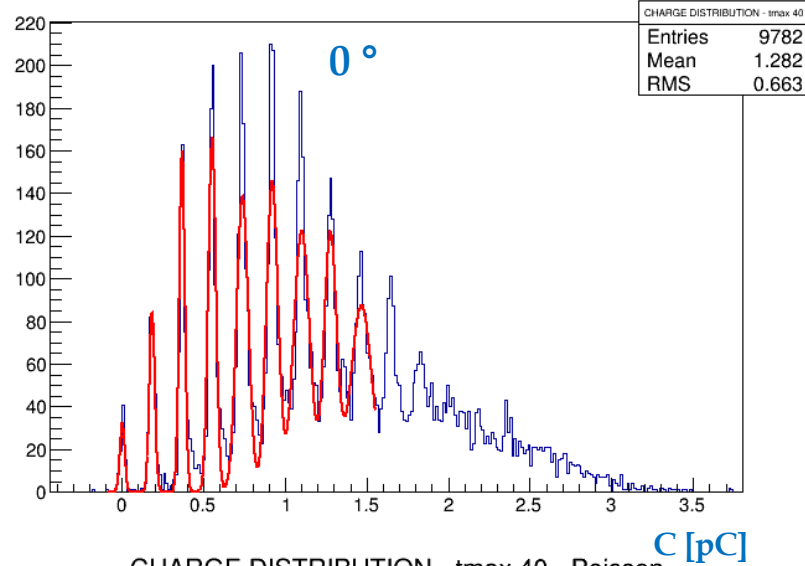


Light Analysis (Integration time 40 ns) : 42 V

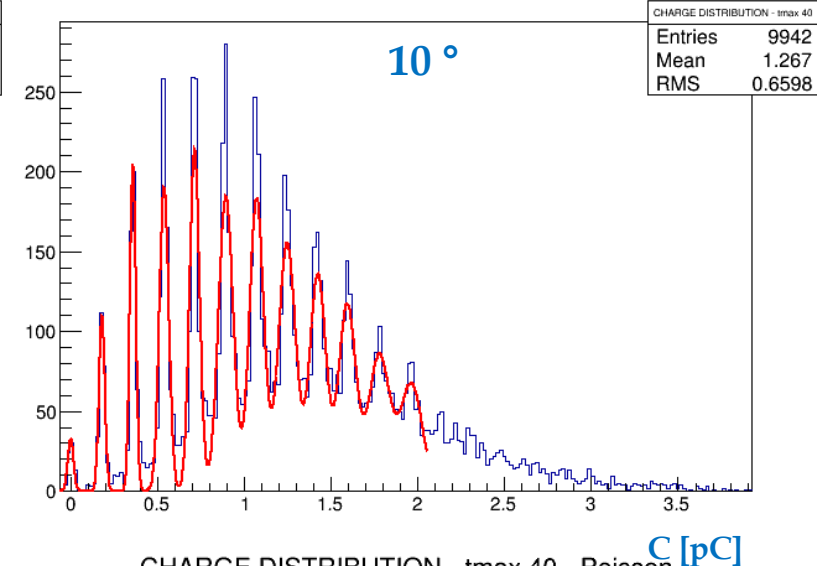
CHARGE DISTRIBUTION - tmax 40



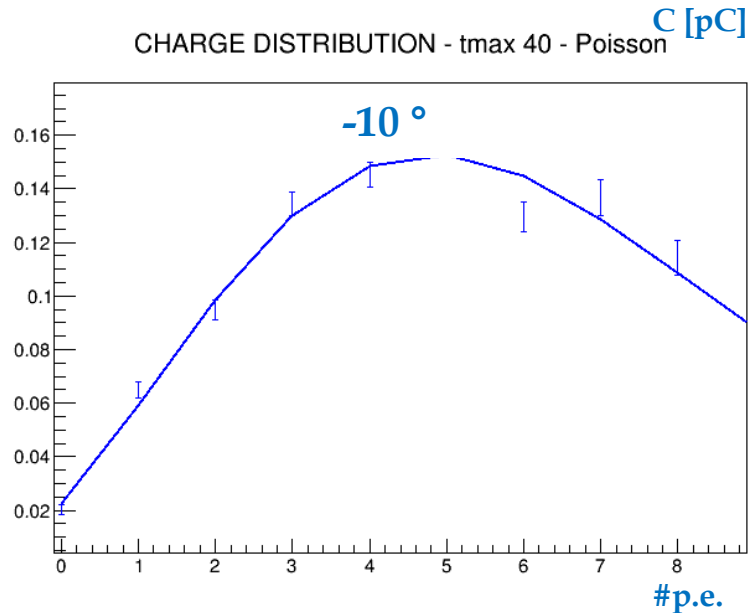
CHARGE DISTRIBUTION - tmax 40



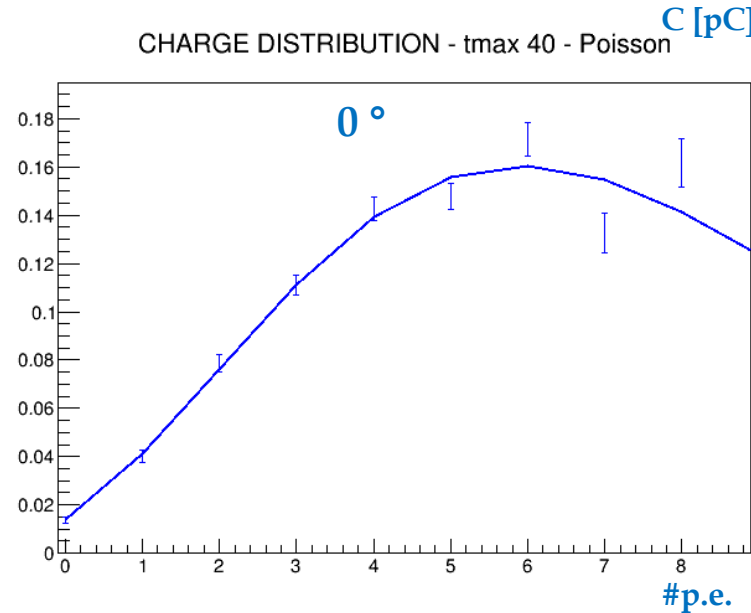
CHARGE DISTRIBUTION - tmax 40



CHARGE DISTRIBUTION - tmax 40 - Poisson



CHARGE DISTRIBUTION - tmax 40 - Poisson



CHARGE DISTRIBUTION - tmax 40 - Poisson

