\( \alpha \) parameter MPPC Temperature response
Method

1. Collecting data on Module 2
2. Source fix
3. Varying the temperature by means of Air Condition “manipulation”
4. Waiting for T stabilized
5. Setting the MPPC bias value according to the temperature

Assuming $\alpha = -5\%$

$$\frac{\Delta V}{\Delta T} = 60 \text{ mV/°C}$$

Assuming $\alpha = -9.3\%$

$$\frac{\Delta V}{\Delta T} = 102 \text{ mV/°C}$$

6. Collecting 4 runs of 25k events each at that T value with that gain variation

or – or
ADC(T)/ADC(T₀) => α Results

1. Selecting one and only on LYSO at the photo-peak
2. Gaussian fit of
   - the ADC distribution of the selected LYSO
   - for each run at different T

Assuming $\frac{\Delta V}{\Delta T} = 60 \text{ mV/°C}$

- $\Delta$ADC count vs. temperature variation

- $\Delta$ADC count vs. temperature variation

Assuming $\frac{\Delta V}{\Delta T} = 102 \text{ mV/°C}$

- $\mu$, $d\mu$
  (see plots below)
  and $\sigma$

LYSO 4 Layer 6

ADC counts nicely corrected

ADC counts corrected by “too much”
Conclusion

After different approaches, discussions, data taking (with a lot of care), time and very very very very very useful suggestions and helps

=> correcting the bias value using $\Delta V/\Delta T = 60 \text{ mV/°C}$ (which correspond to $\alpha = -5\%$) seems to provide the correct result

$$ADC^{\text{true}}(T) = \frac{ADC^{\text{meas}}(T)}{1 + \alpha \cdot \Delta T}$$

$\alpha = -5\%$