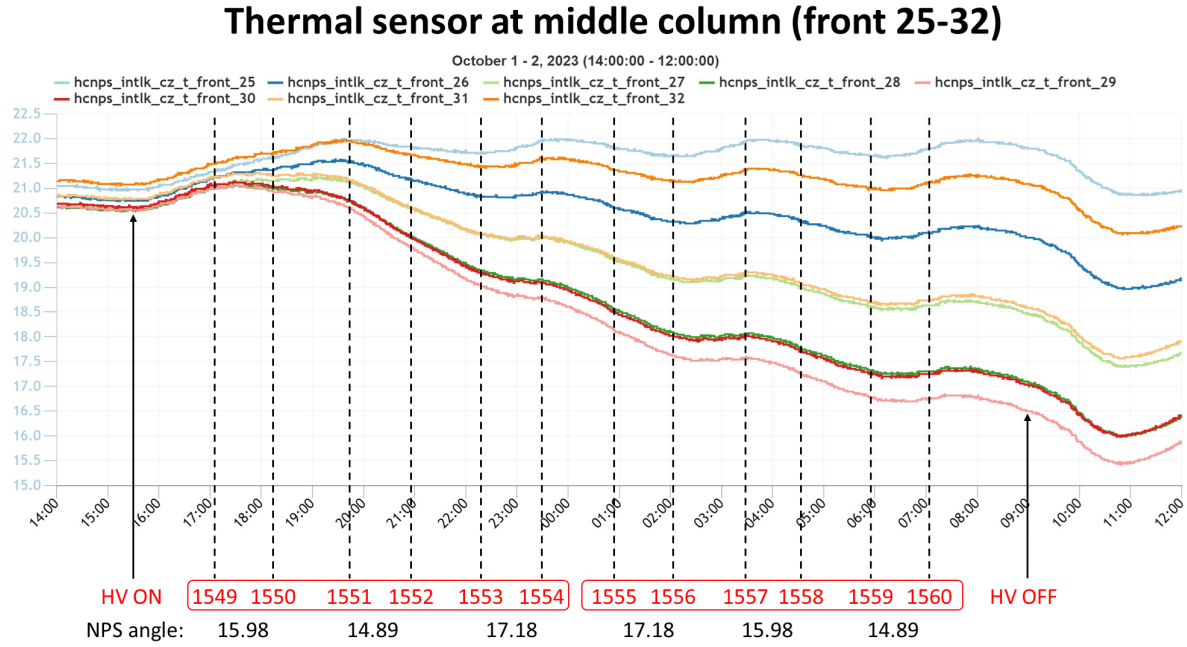
Effects of temperature on elastic calibration coefficients

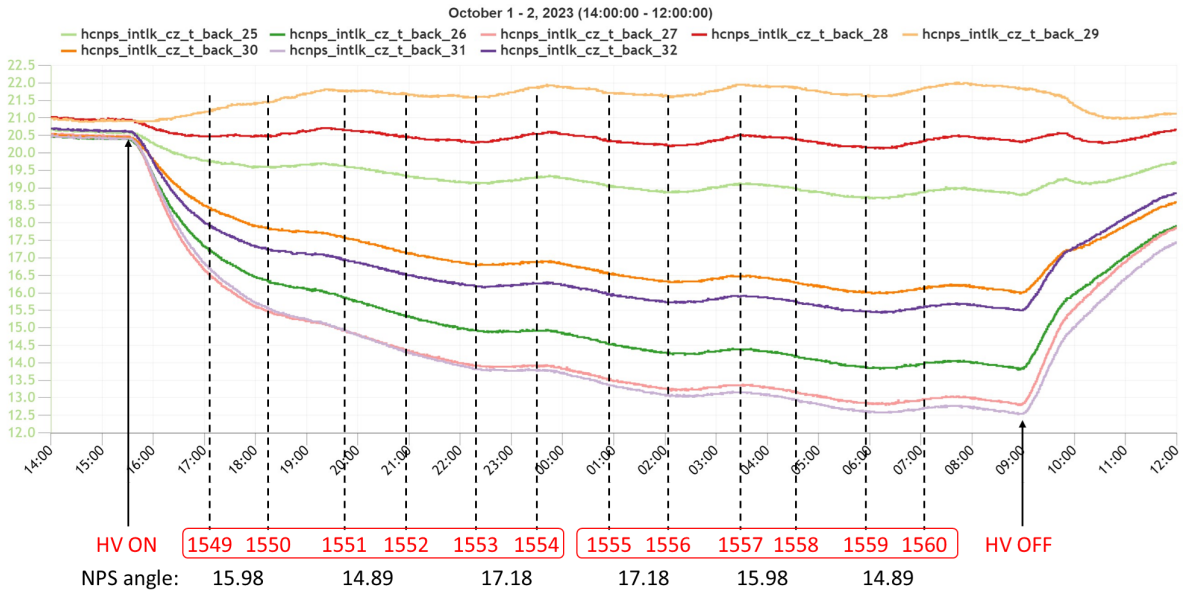
Date	@10/04/2023
Event	Research
Tags	Jab_NPS

Crystal temperatures on Oct.1-Oct.2

- Dash line denotes the start time of each run

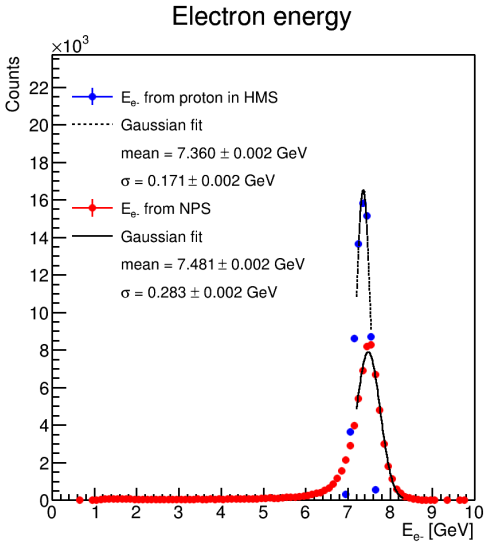


Thermal sensor at middle column (back 25-32)

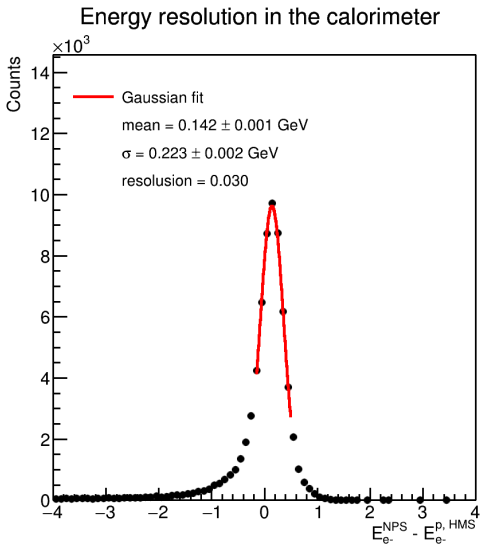


First 6 runs taken on Oct.1-Oct.2 (run 1549-1554)

Electron energy

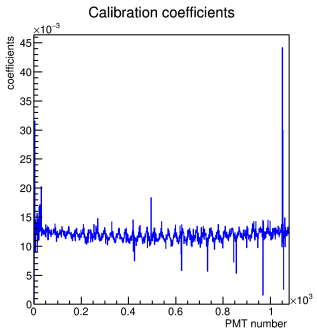


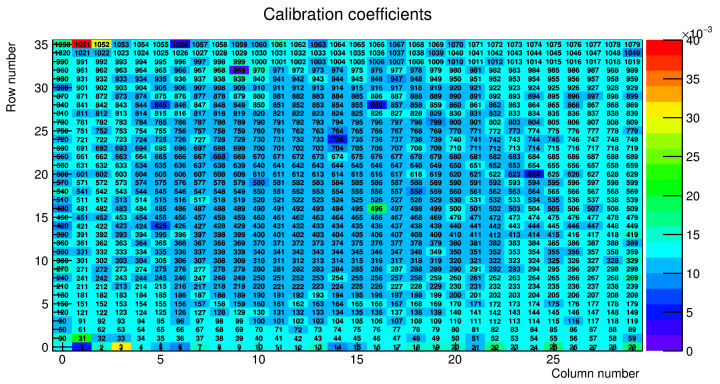
Energy resolution in NPS



Coefficients (zoom in)

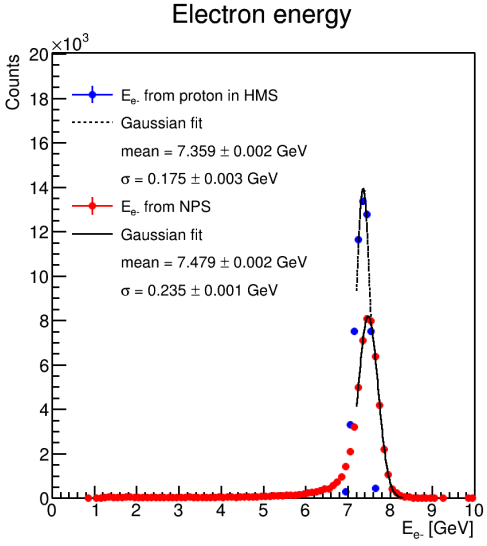
Coefficients in 2D view (zoom in)



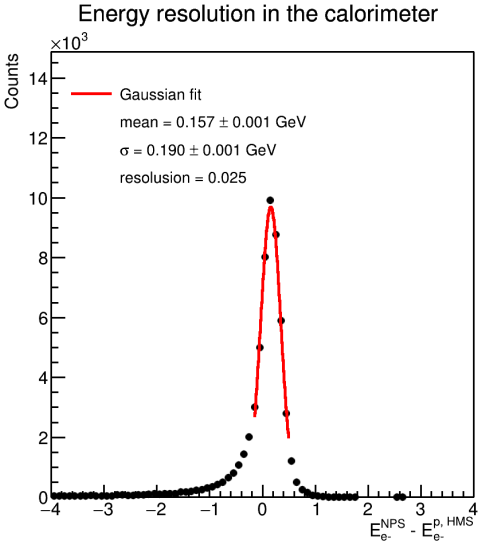


Last 6 runs taken on Oct.1-Oct.2 (run 1555-1560)

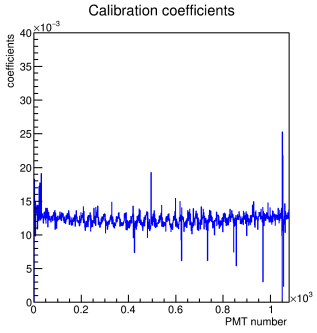
Electron energy



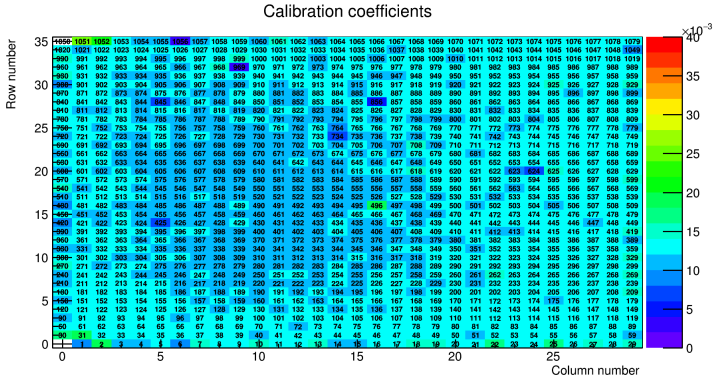
Energy resolution in NPS



Coefficients (zoom in)

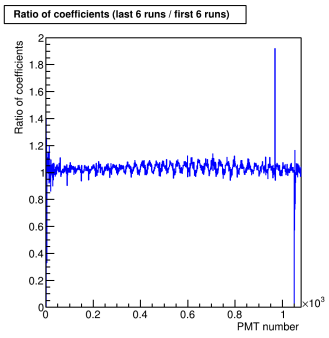


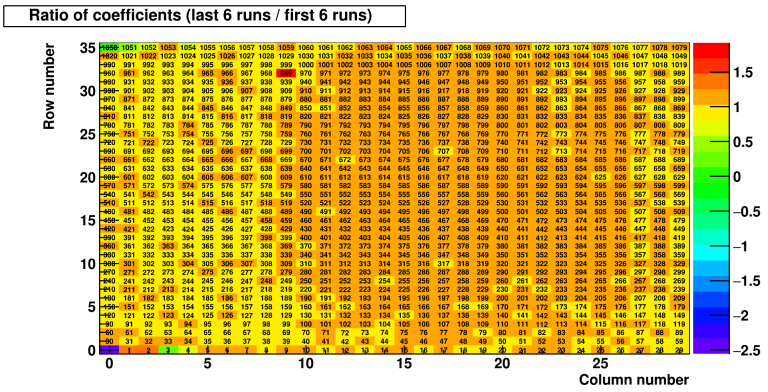
Coefficients in 2D view (zoom in)



Ratio of these coefficients (last 6 runs / first 6 runs)

- The light yield of crystals decrease when the temperature increase
- Higher temperature result in higher coefficients

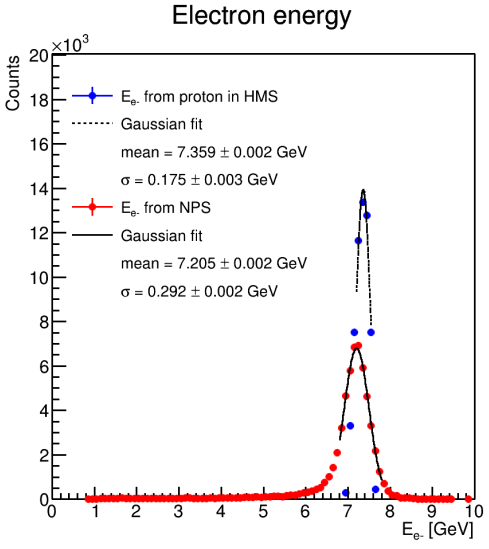




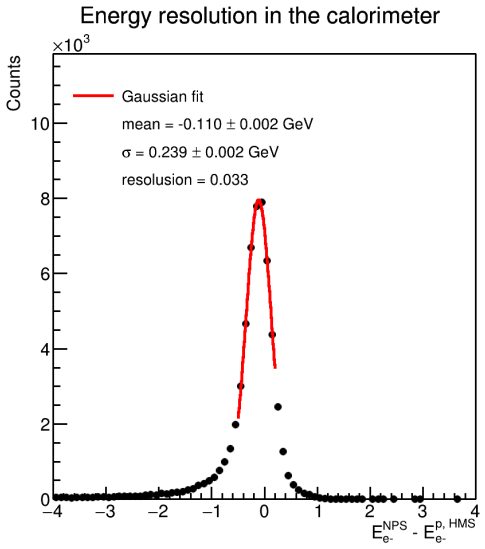
Energy with mis-calibration due to the unsteady temperature

- Apply the coefficients from run 1549-1554 to the data of run 1555-1560
- 32% difference of the resolution (0.025→0.033)
- Under estimation of deposited energy: 7.479→7.205 GeV ($E_{dep} = C \times Amp.$)

Electron energy

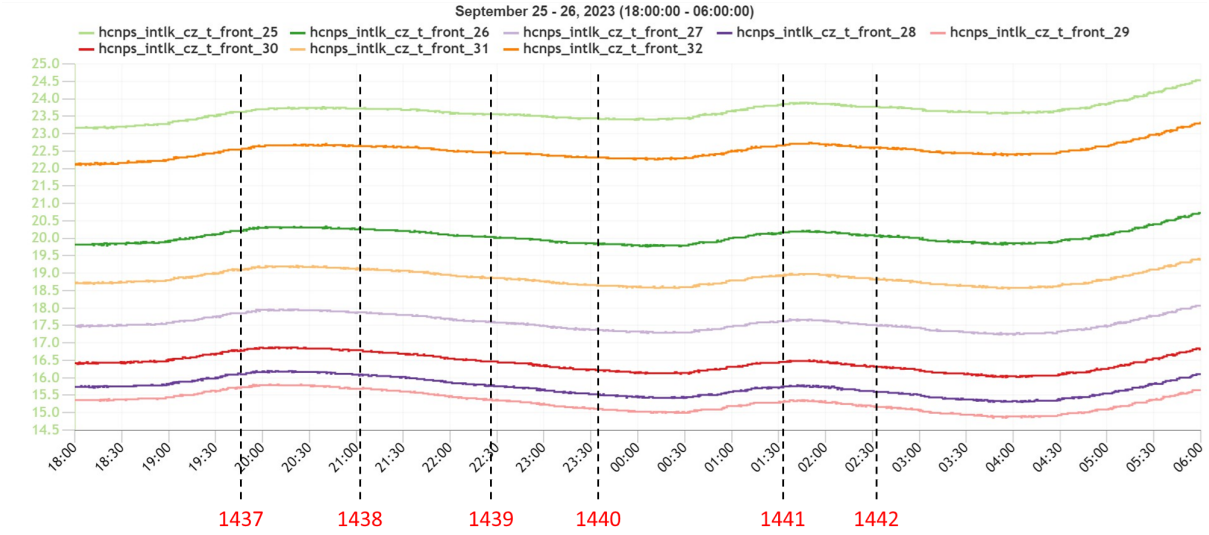


Energy resolution in NPS

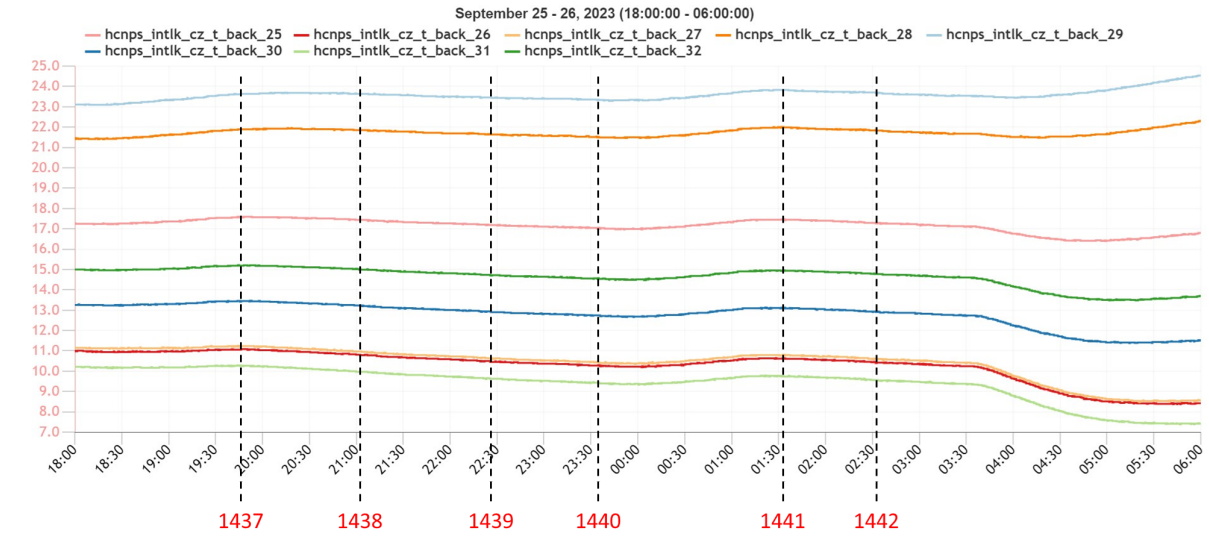


Previous coefficients (with run 1437-1442) are quite uniform, why?

Thermal sensor at middle column (front 25-32)

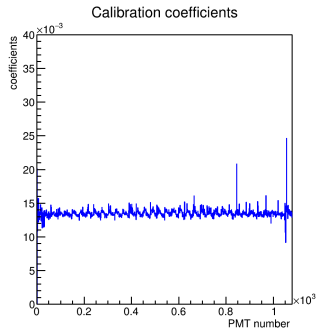


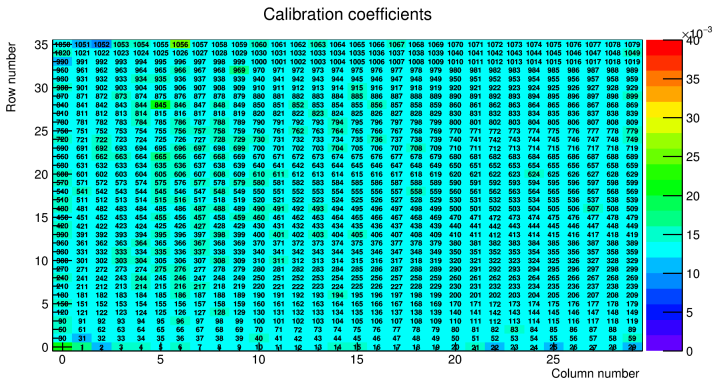
Thermal sensor at middle column (back 25-32)



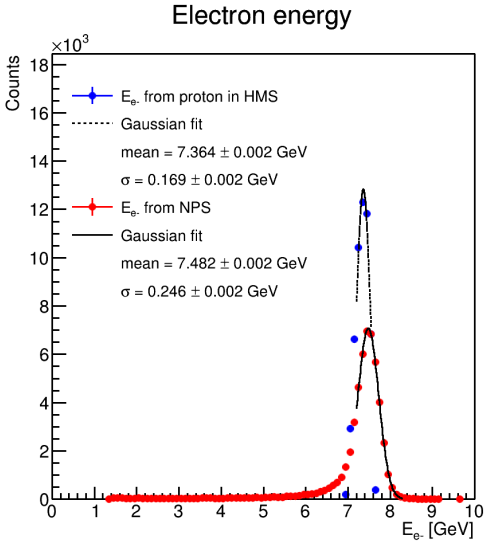
Coefficients (zoom in)

Coefficients in 2D view (zoom in)





Electron energy



Energy resolution in NPS