# 19/12/2025 data checks

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Consistency at low charge

- Made checks as to whether the peak positions change after doing simple stop starts

- Analysed data from http://lpnws5026.in2p3.fr:8080/nucubes/3

- Runs 503, 504, 505 had the same settings
  - Ramp HV down and back up after 503

- Match histogram integral within the viewing range

- Gain calculation:
  - Fitting gaussians to 7 peaks after the first one
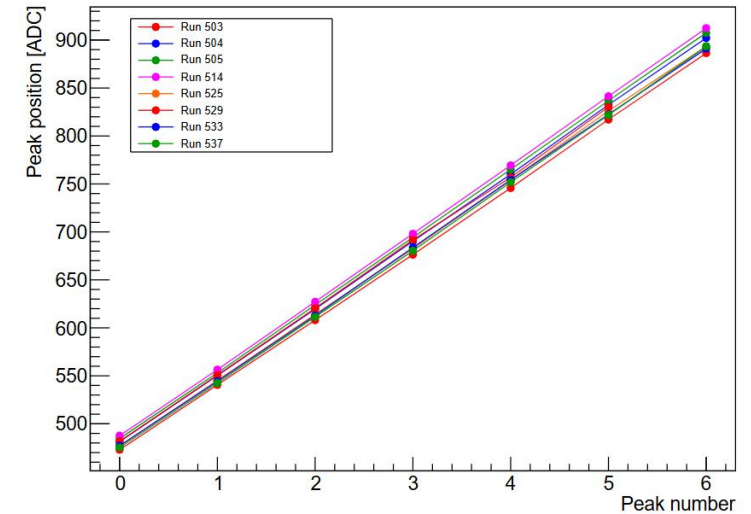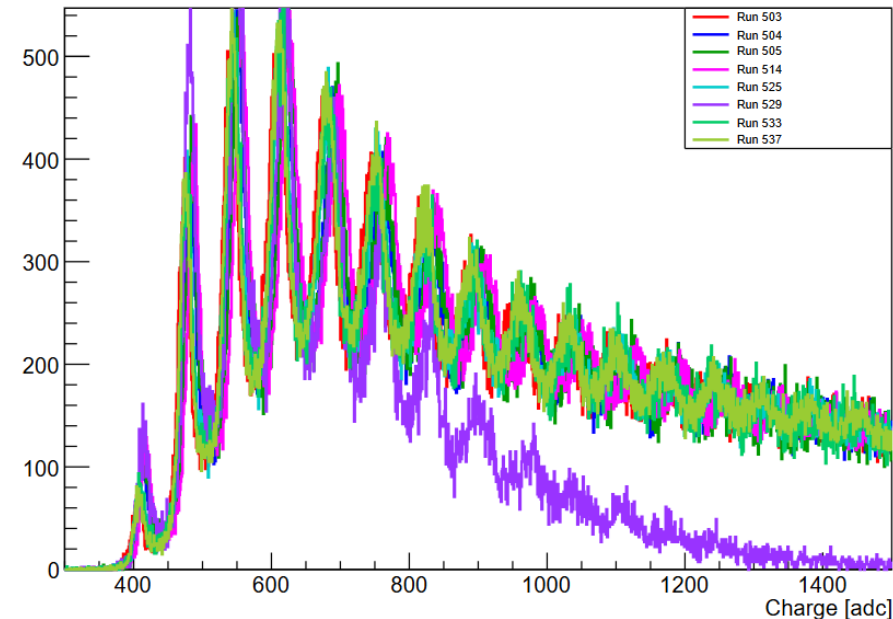 - Get mean and std of the gaps between peak centres

Run	First peak pos. [adc]	Gain [adc/p.e.]
503	472.9 ± 0.2	68.9 ± 1.3
504	481.4 ± 0.1	70.1 ± 1.2
505	484.6 ± 0.3	70.5 ± 1.0
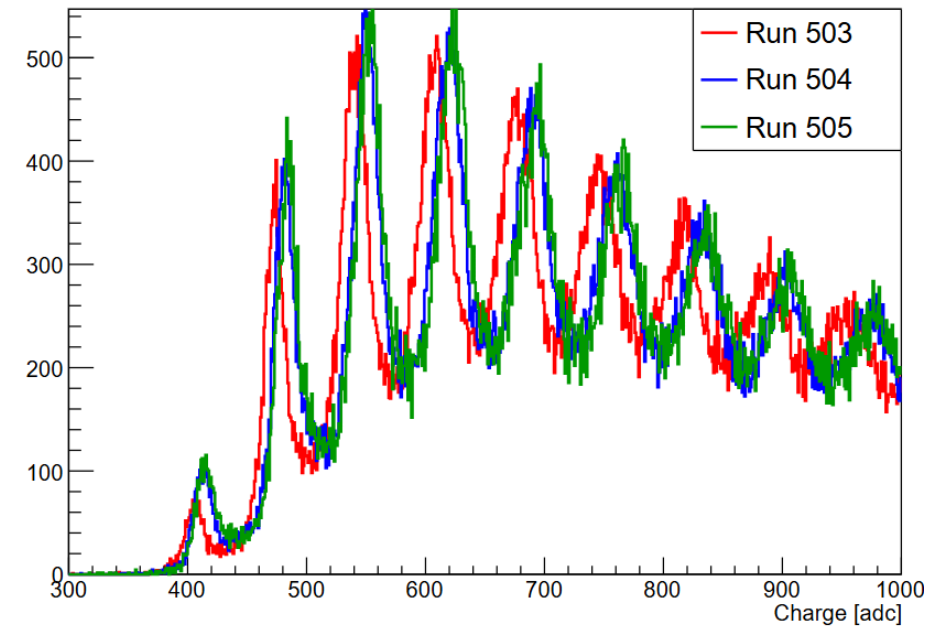
More runs

- Collecting all runs from the data with a HG setting of 50:

Run	1st peak	Gain
503	472.9 ± 0.2	68.9 ± 1.3
504	481.4 ± 0.1	70.1 ± 1.2
505	484.6 ± 0.3	70.5 ± 1.0
514	487.7 ± 0.2	70.8 ± 1.0
525	477.2 ± 0.2	69.4 ± 1.8
529	481.8 ± 0.3	69.7 ± 2.8
533	477.1 ± 0.3	69.0 ± 1.3
537	475.3 ± 0.2	69.7 ± 1.6

- Run 529 had tip of the fibre 1-2mm away from SiPM

- Shifts in the first peak are no larger than 15 adc or ¼ p.e.
  - If ignoring run 503, then the difference is no larger than 10 adc

LG distributions for HG 50 runs

- LG 50 was used for run 505, LG 60 for all other runs

- Very good consistency between the runs

| Run no	LG formula
505	$0.10 \times HG - 87.35$
514	$0.29 \times HG - 67.30$
525	$0.29 \times HG - 67.65$
529	$0.29 \times HG - 67.19$
533	$0.29 \times HG - 67.78$
537	$0.29 \times HG - 67.48$
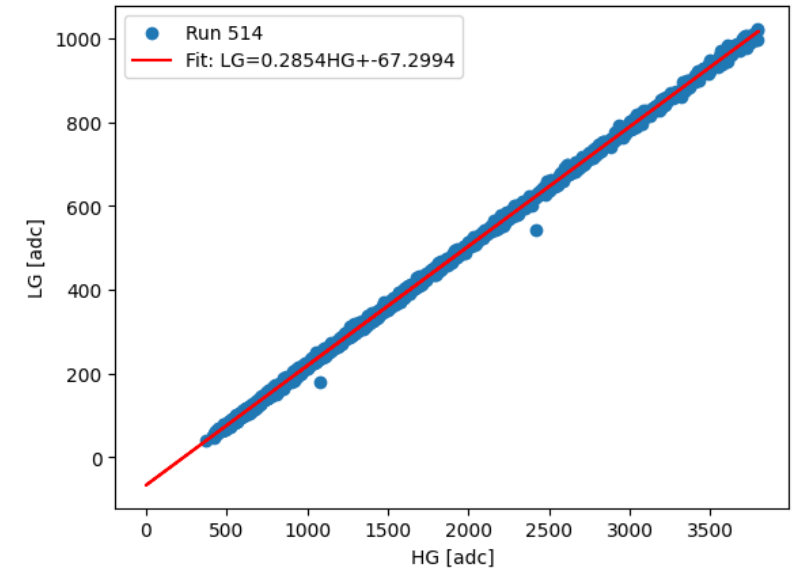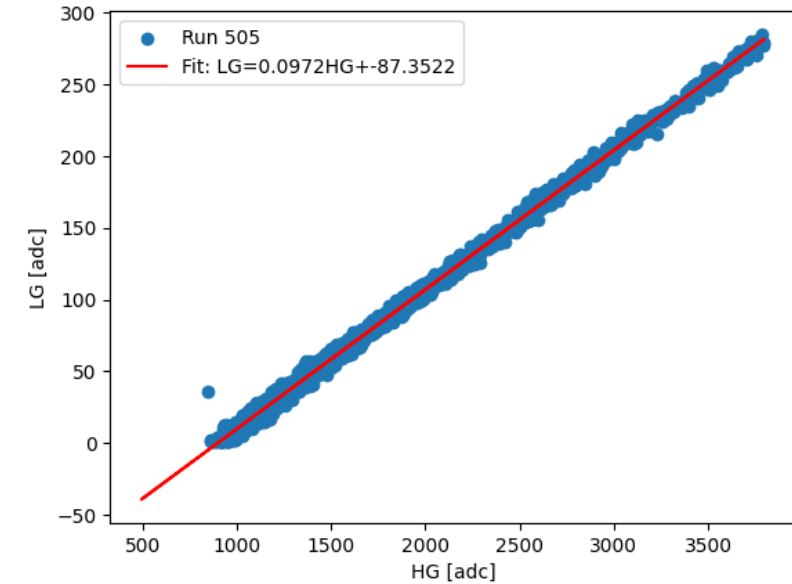
Problematic run

- Run 521, with HG 50 was 2 minutes long according to run info, had no other differences with the other runs

- I could not unpack it into histograms

- When converting into ROOT TTree format, it has $O(10^7)$ entries, others are $O(10^5)$

- LG seemed to follow two different configurations
  - Swapped configurations after 104s
  - Rest of run matches the other LG60 runs

- Unclear why there was corruption here
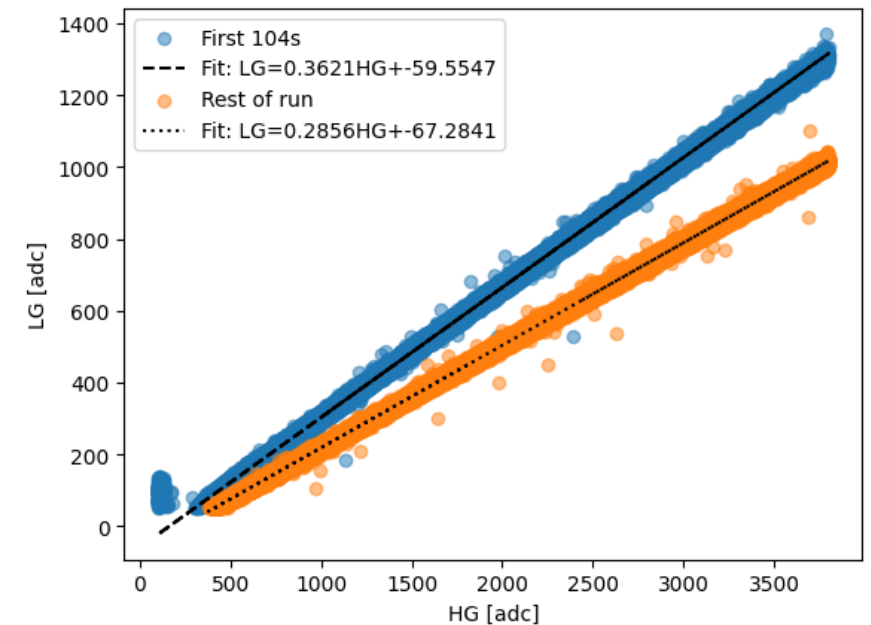
Pedestal convergence

- Updated the SFGD pedestal algorithm to work better with data at higher p.e. from radioactive source

- Consistent within a few adc

| No.	Runs	Comment:	Pedestal [adc]
1	505,506,507, 508,510		-73.3 ± 0.4
2	513,514,515, 516,517	Moving the fiber away, Unpluging the SiPM, and then putting back in place	-74.0 ± 0.2
3	520,522,523 (Skipped 521)	Dissassembling and cleaning the SiPM before assembling again, fiber cleaned too.	-75.2 ± 0.3
4	524,525,526	Dissassembling and cleaning the SiPM before assembling again, fiber cleaned too.	-75.1 ± 0.3
5	528,529,530, 531	Setting the tip of the fiber 1-2mm away from the SiPM	-73.1 ± 0.5
6	532,533,534, 535	Dissassembling and cleaning the SiPM before assembling again, fiber cleaned too, Putting a 0.3mm pmma interface in between the fiber tip and the SiPM.	-73.6 ± 0.3
7	536,537,538, 539	Dissassembling and cleaning the SiPM before assembling again, fiber cleaned too, letting a 0.3mm gap in between the fiber tip and the SiPM.	-73.7 ± 0.3
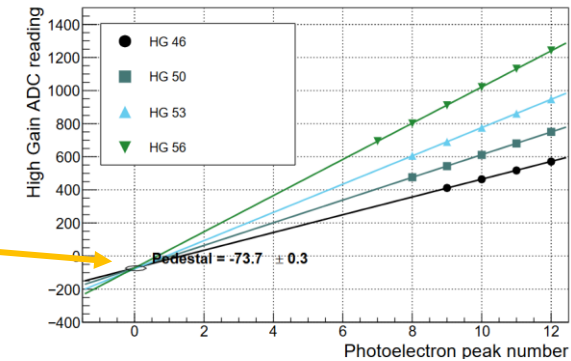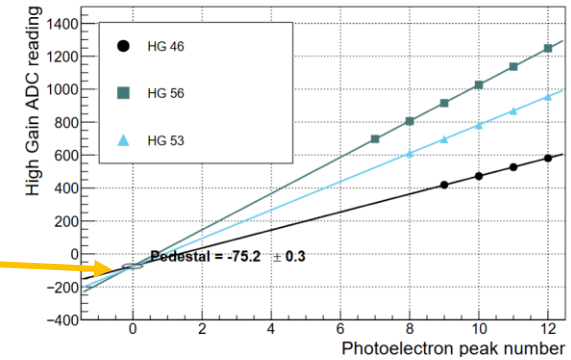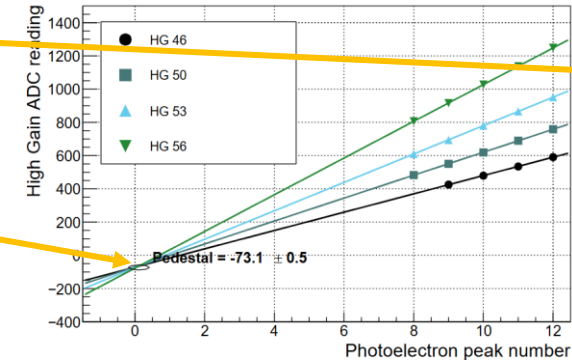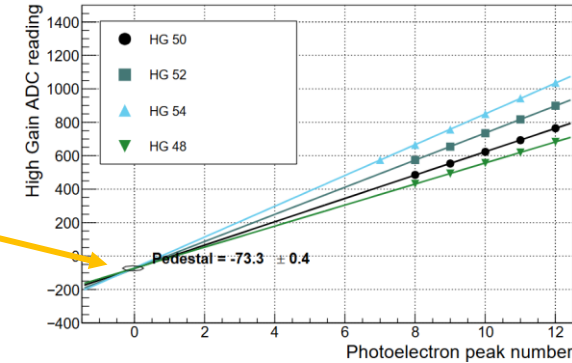
Charge distribution at HG50

- Using the HG gain, and the pedestal tables, as well as LG/HG conversion to plot charge as a function of p.e.
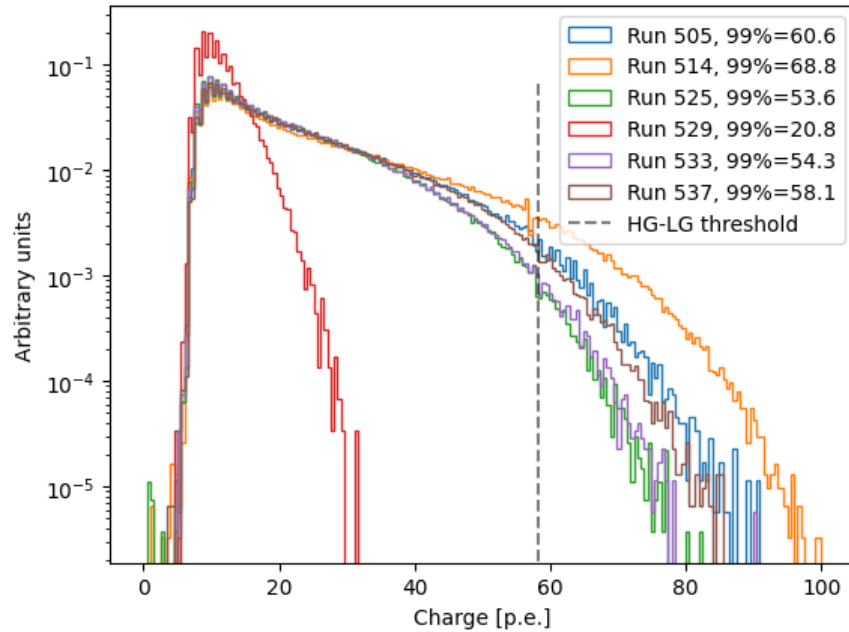
Divergence at higher p.e., even before swapping to LG charge

| Runs	99th percentile [p.e]	Comment:
505	60.6	
514	68.8	Moving the fiber away, Unpluging the SiPM, and then putting back in place
525	53.6	Dissassembling and cleaning the SiPM before assembling again, fiber cleaned too.
529	20.8	Setting the tip of the fiber 1-2mm away from the SiPM
533	54.3	Dissassembling and cleaning the SiPM before assembling again, fiber cleaned too, Putting a 0.3mm pmma interface in between the fiber tip and the SiPM.
537	58.1	Dissassembling and cleaning the SiPM before assembling again, fiber cleaned too, letting a 0.3mm gap in between the fiber tip and the SiPM.

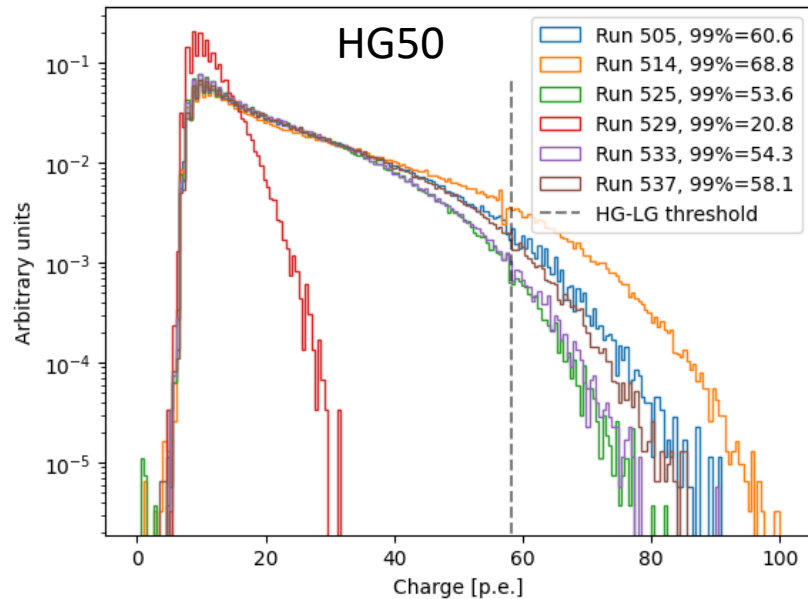

Expected less charge due to air gap
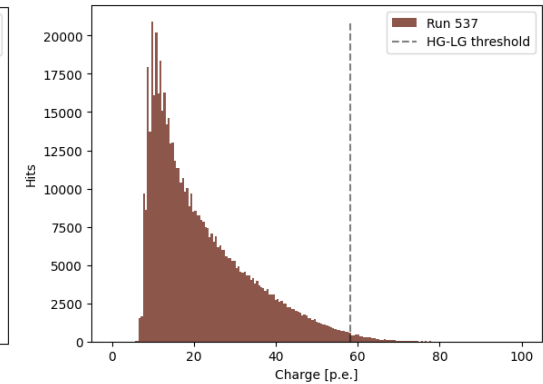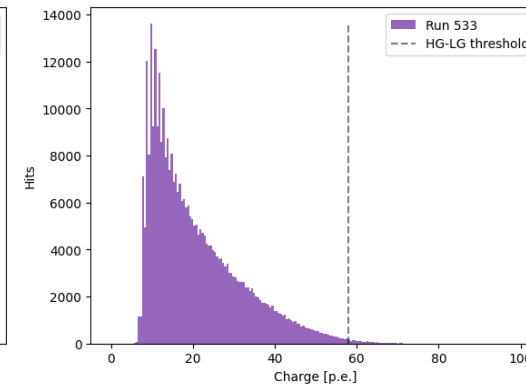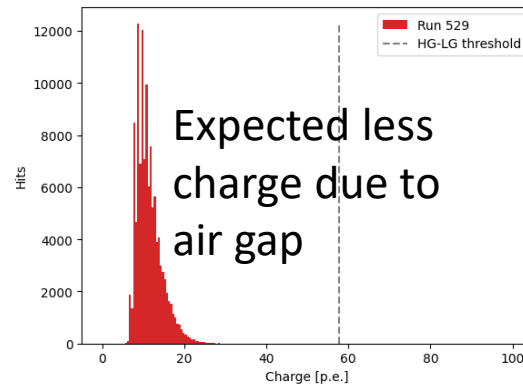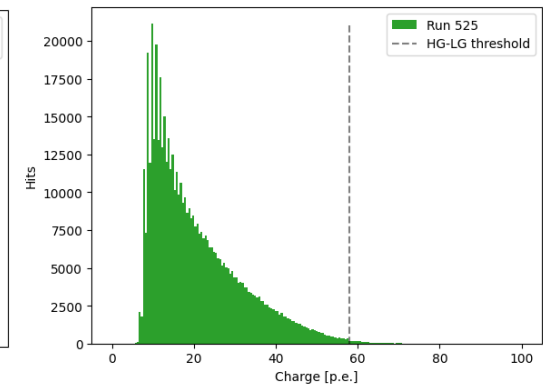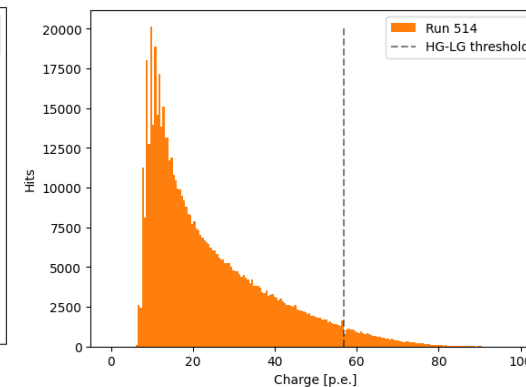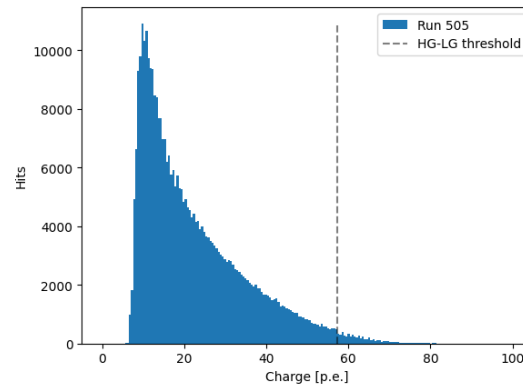
Higher charge check

- First three runs had no physical movement in between them
- Charge distributions are identical
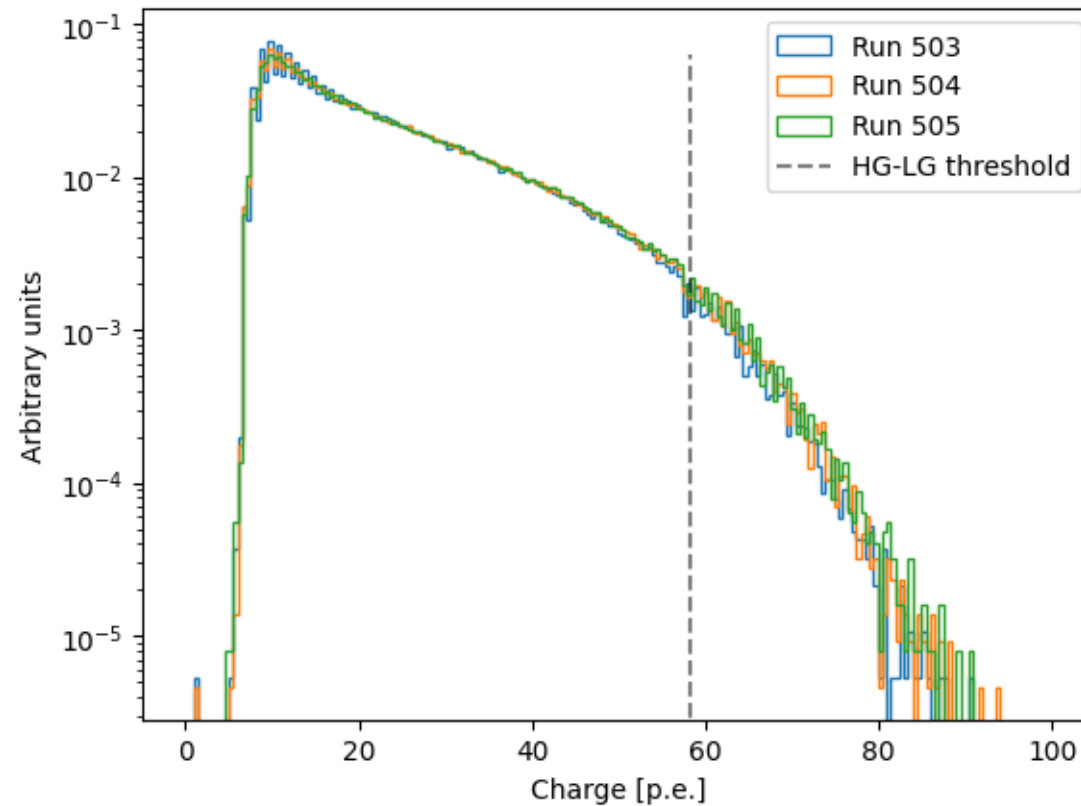
Other HG settings

- Upper thresholds are consistent between data taken at different HG settings without any physical interventions (matching colours)
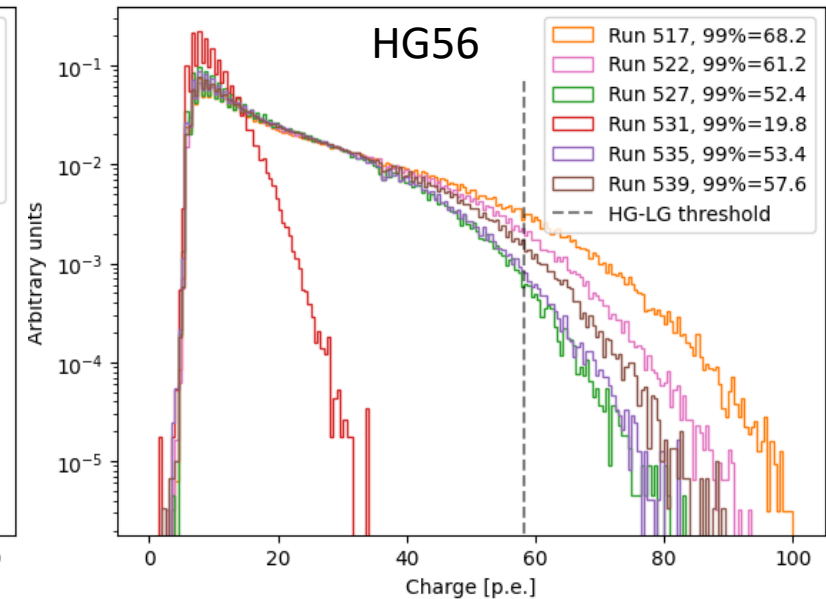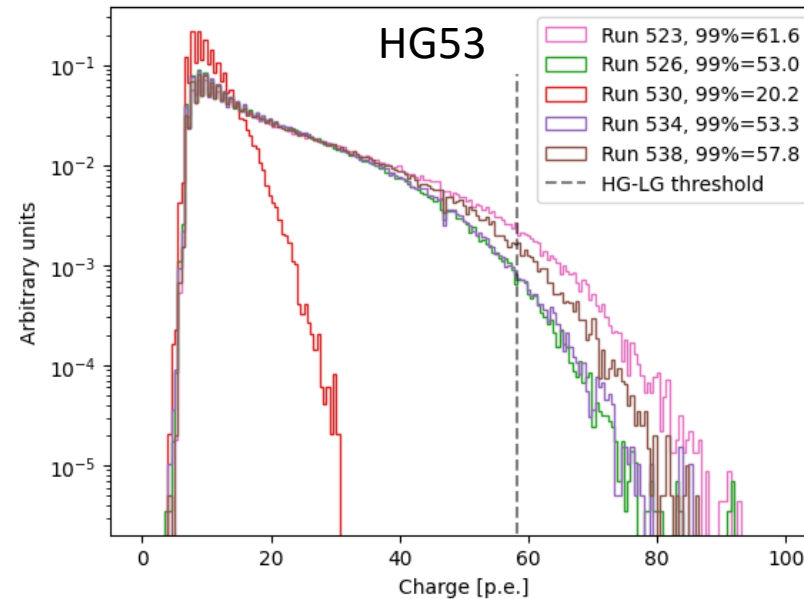
Low p.e. distribution for HG50

- Zooming in to the low charge region, all p.e. peaks line up very well (as seen in earlier slides)

- This includes run 529, though it detects much lower charge
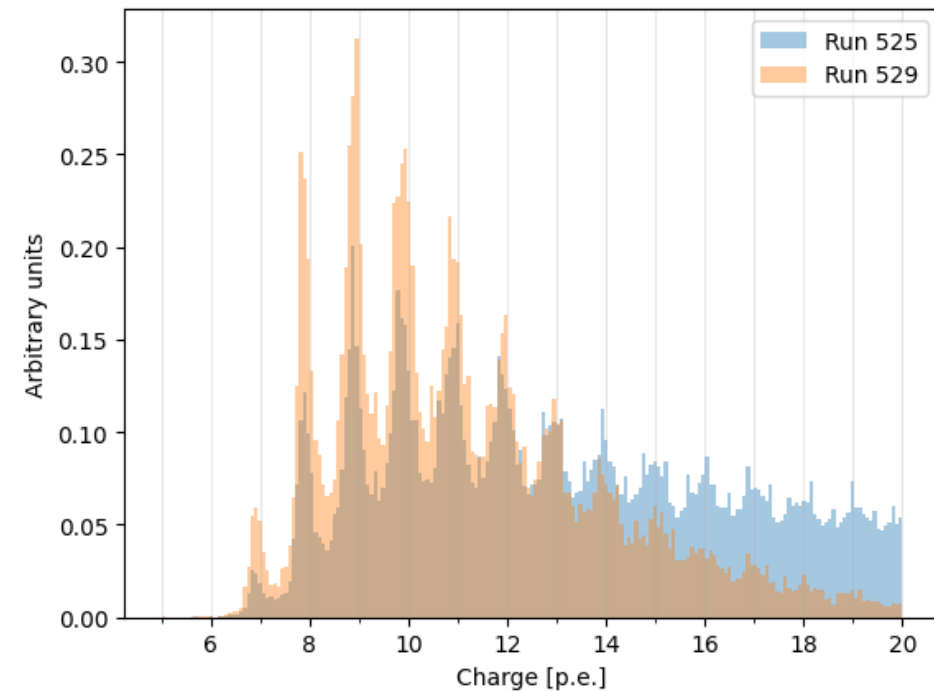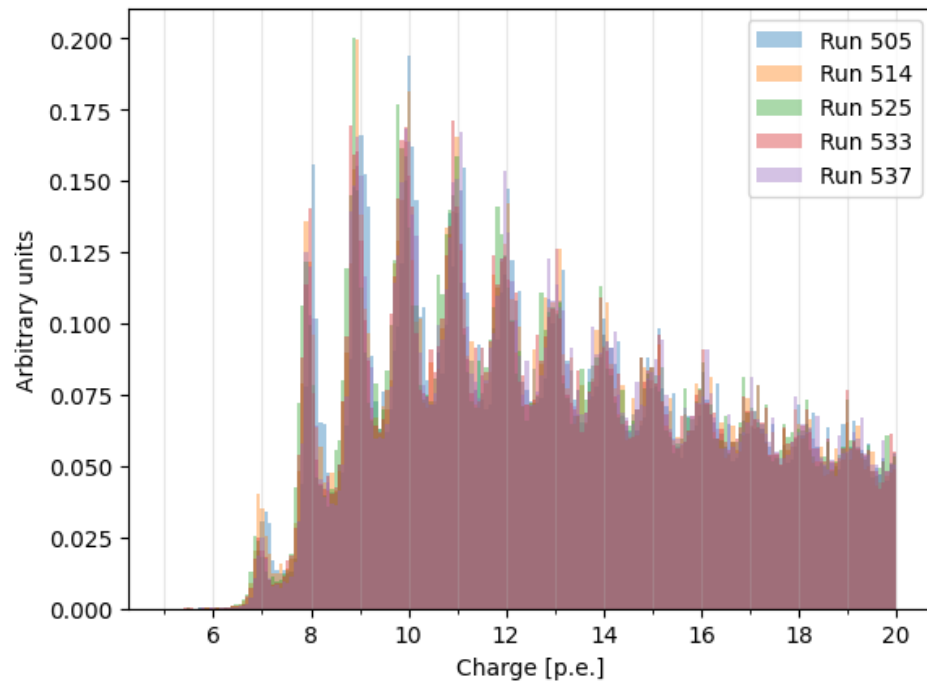
Conclusion

- The 19/12/2025 data is very consistent at low charge between runs even after disassembly
  - Calibration constants can be re-used

- One run seemed to have corrupted and changed its LG setting (first time I have seen this)

- Agreement at high p.e. seems to be less consistent between runs
  - Up to 15 p.e. difference
  - Seems to be affected by physical movement of the components
  - This might cause issues when trying to compare a maximum charge threshold