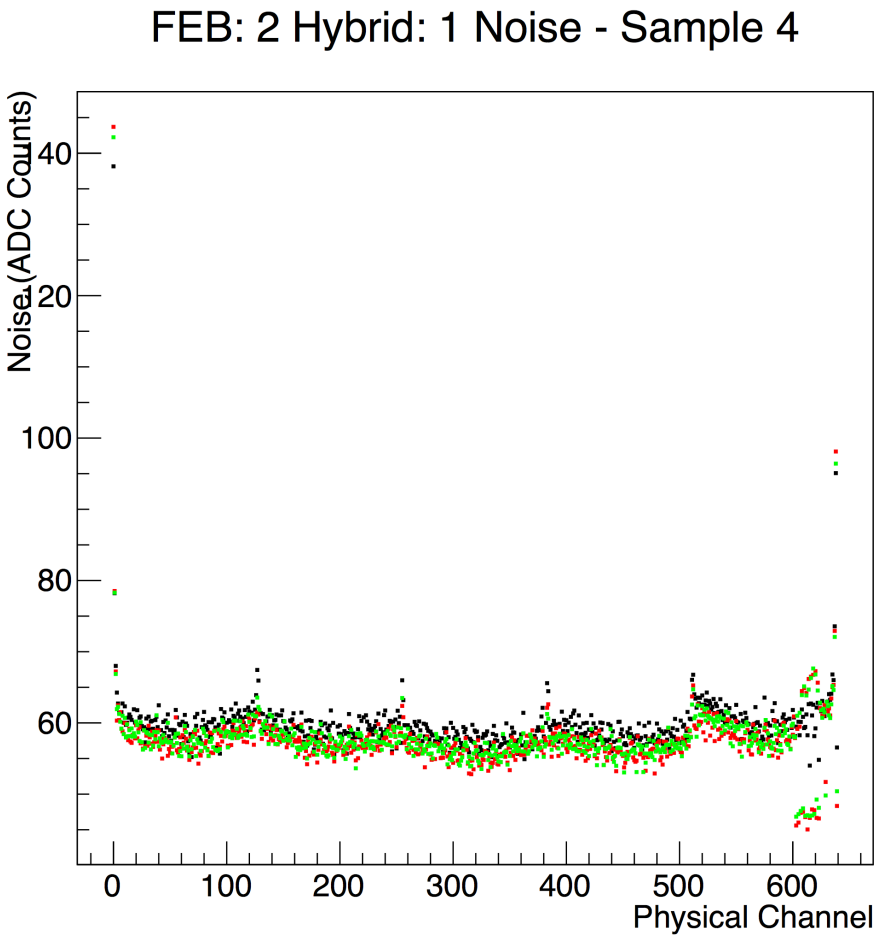
Baseline and noise studies

Pelle

Low noise level on L1bA



Goal was to check “weird” channels and if fitted width of “baseline” can be used to estimate noise

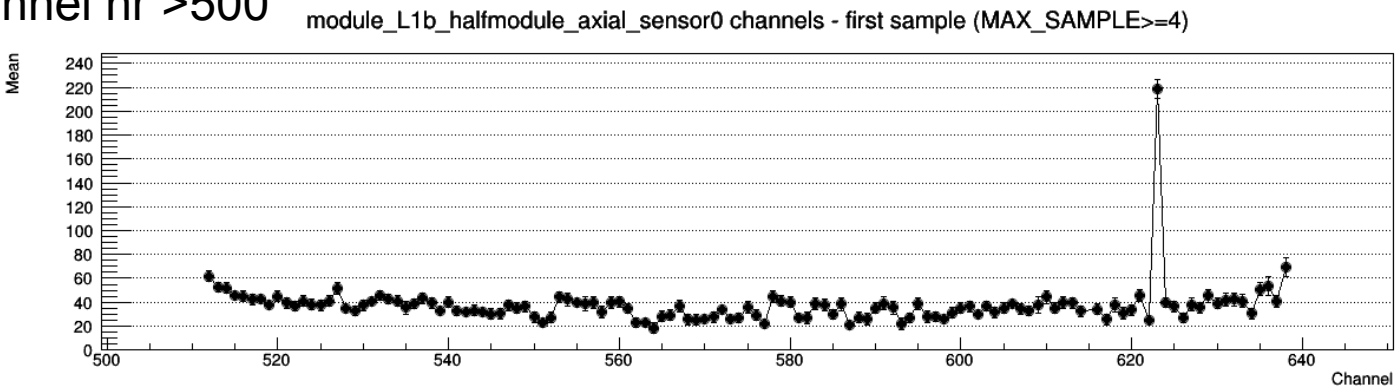
⇒ Width biased by pile-up i.e. real energy depositions

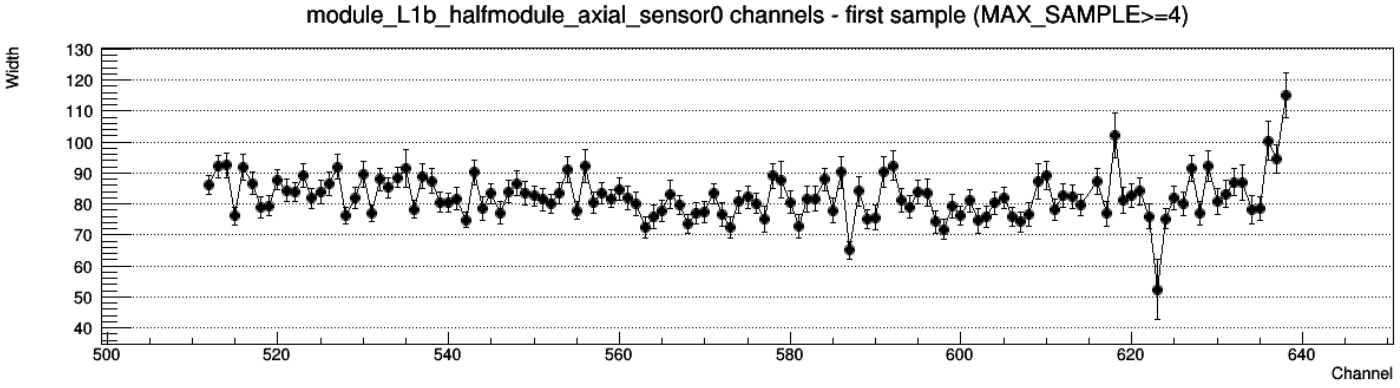
Region [600-639] with ~dozen channels with 20% lower noise and some 10% high

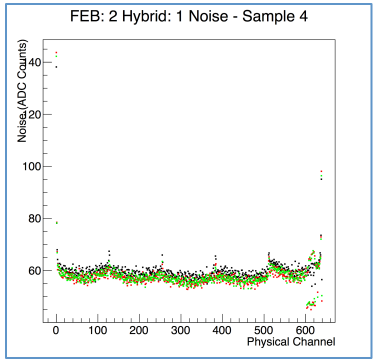
[whole apv has issues?]

Sample-0 fitted mean/width

Run 5772, channel nr >500







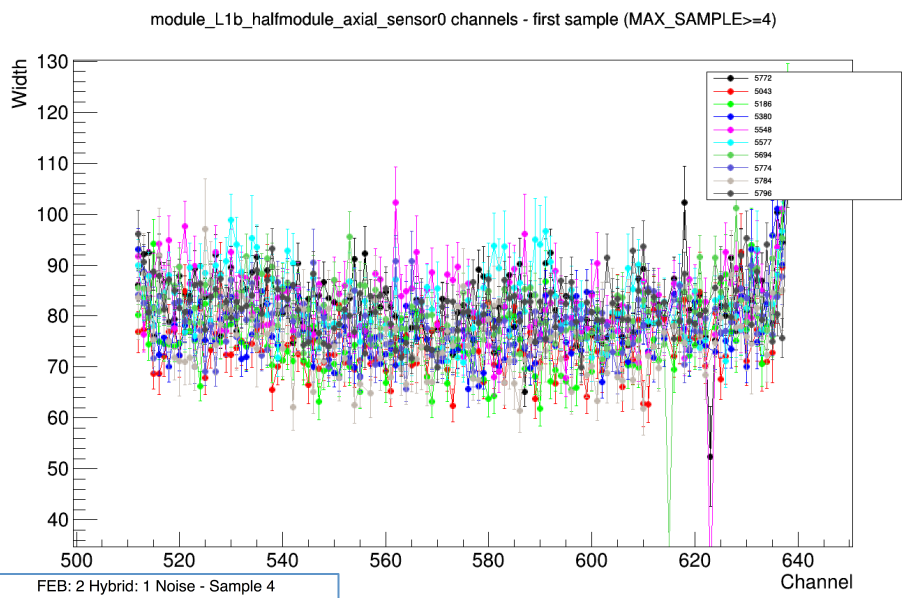
I think I should see a 20% effect here?

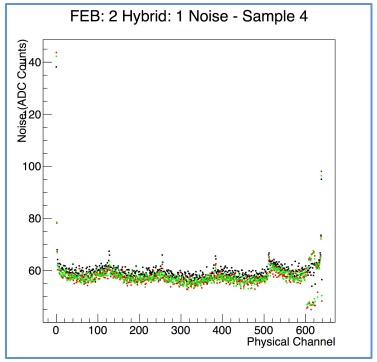
Runs

5784	Straight through
5043	3mm (10kHz)
5186	2mm (10kHz)
5380	1.5mm (10kHz)
5772	0.5mm (20kHz)
5774	0.5mm pulser only (10kHz)
5796	0.5mm
5694	0.5mm (17kHz)
5405	1.5mm
5548	1.5mm
5577	1.5mm

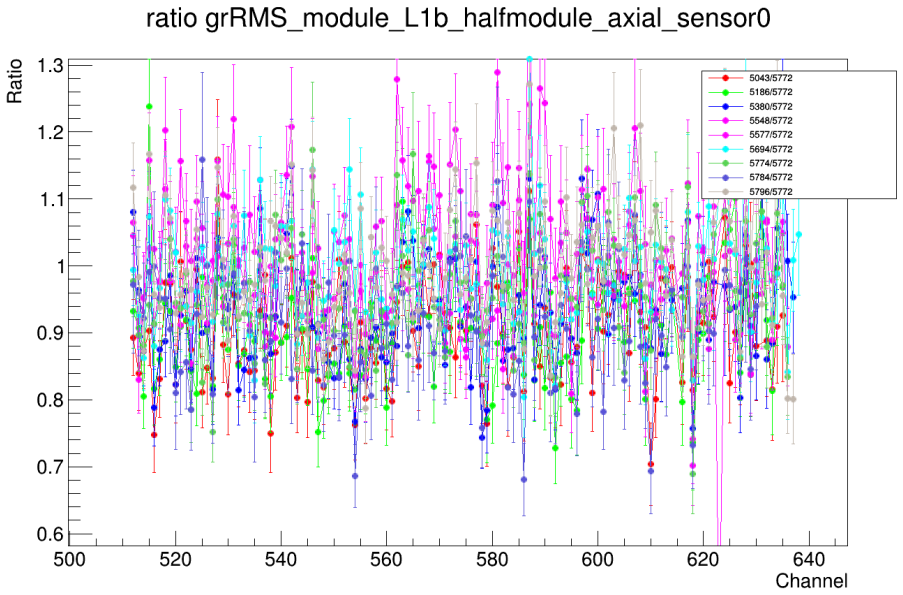
Sample-0 fitted width

Width for multiple runs





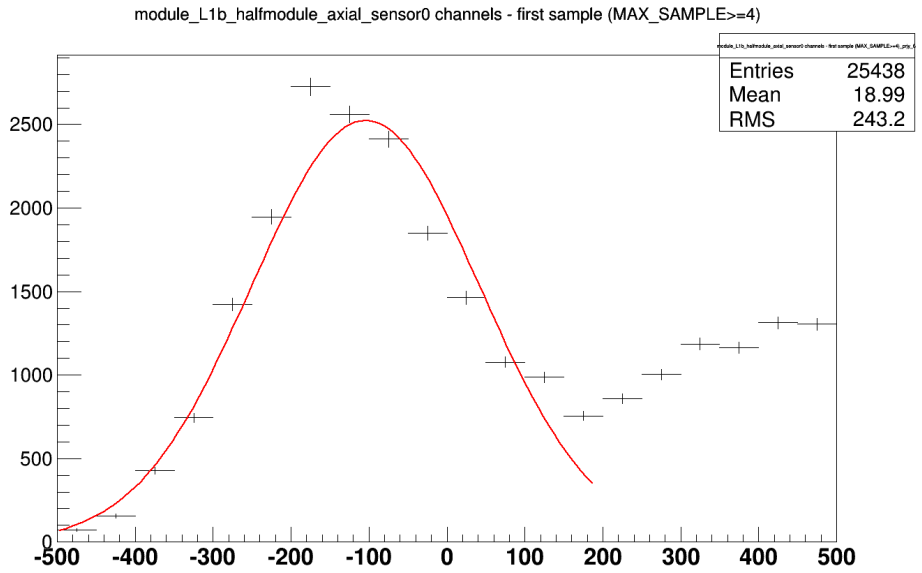
Ratio vs 5772



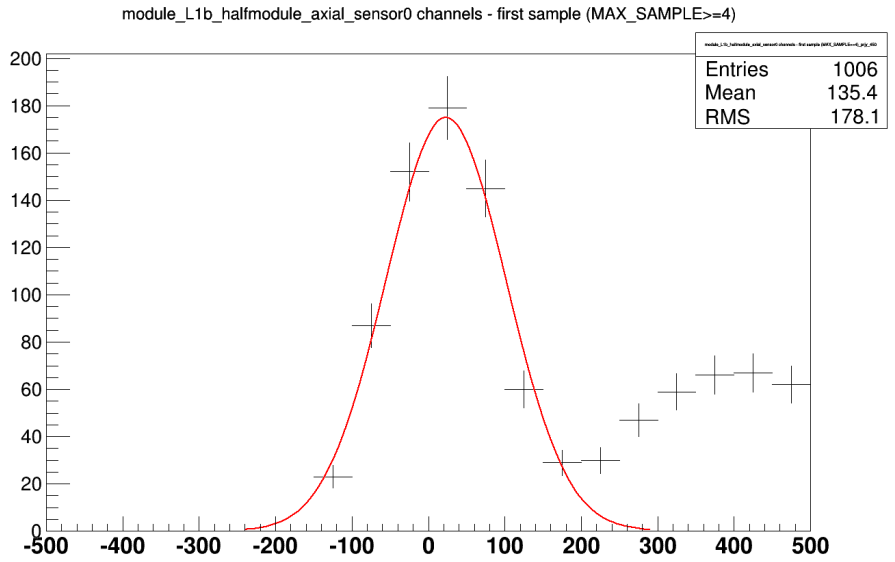
No obvious sign in any of these runs.

Sample-0 distributions

Channel 6



Channel 451



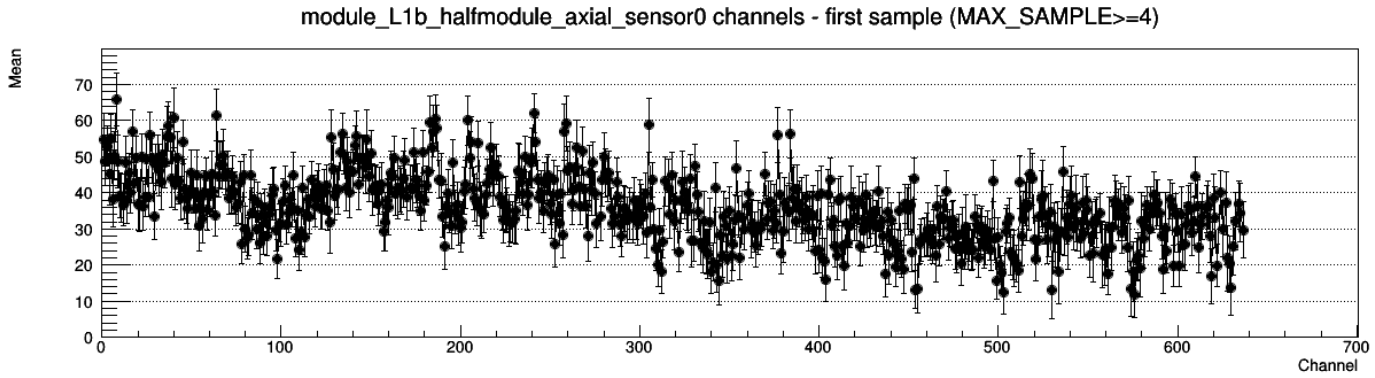
Goal was to check “weird” channels on L1bA.

- Width biased by pile-up i.e. real energy depositions
- Noticed that fitted mean (“baseline”) seemed biased too

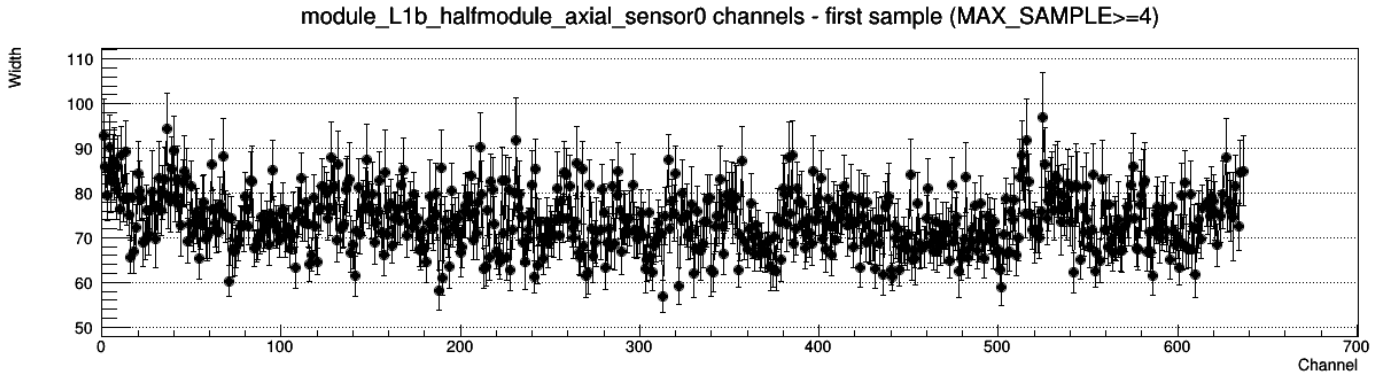
Started looking at this systematically: compared mean and width for multiple runs

Notes for the following: avoid point if fit has “large” error or less than 30 hits per channel

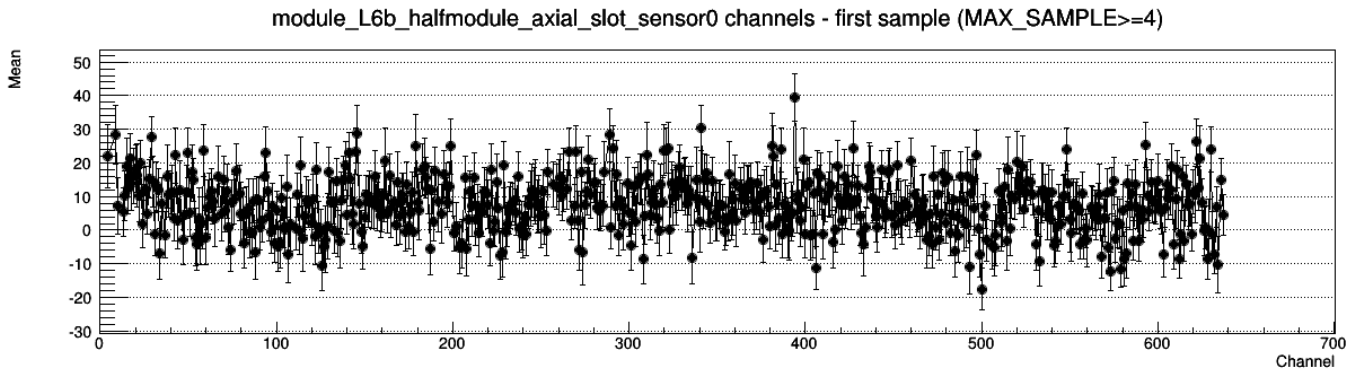
Straight Throughs – L1b axial



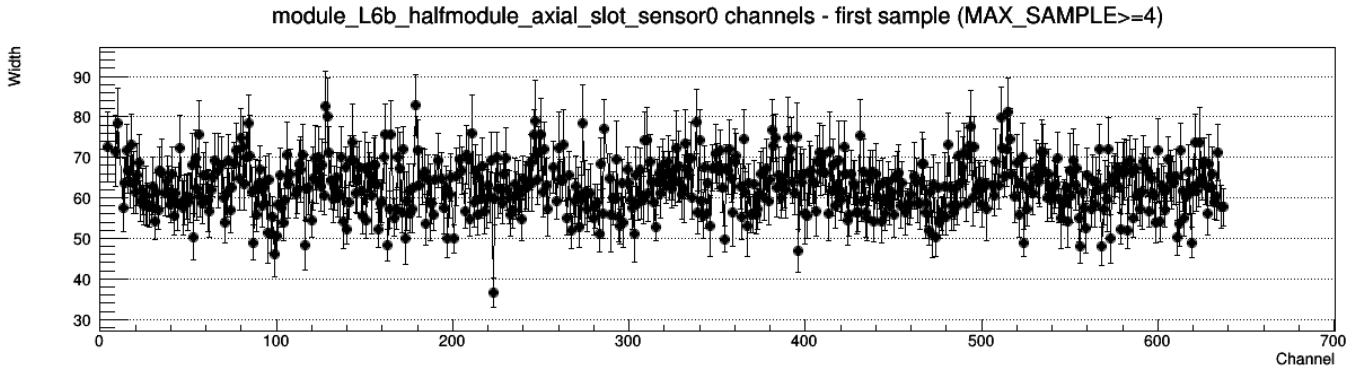
Away from beam plane



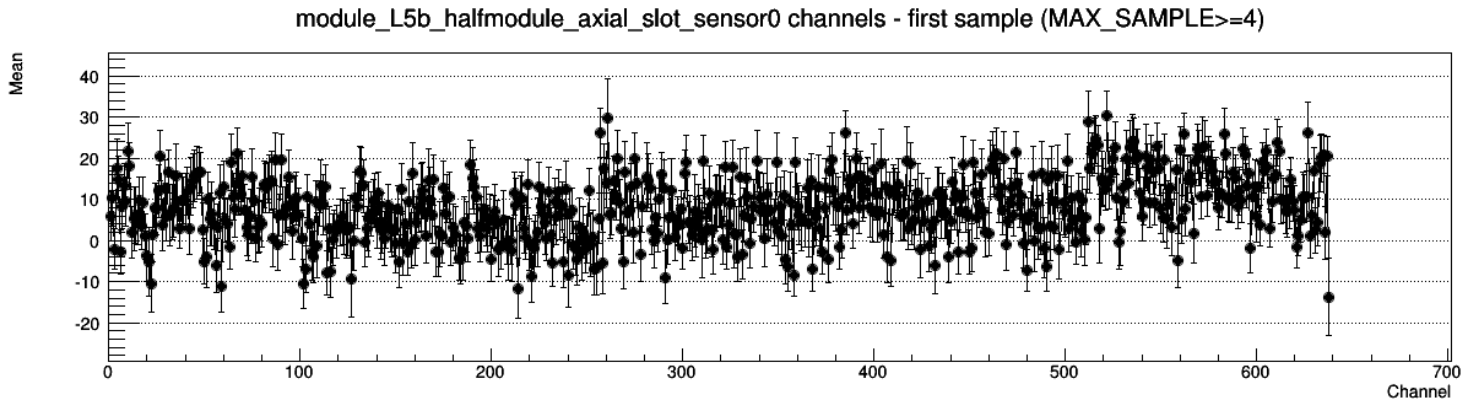
Straight Throughs – L6b axial slot (positron)



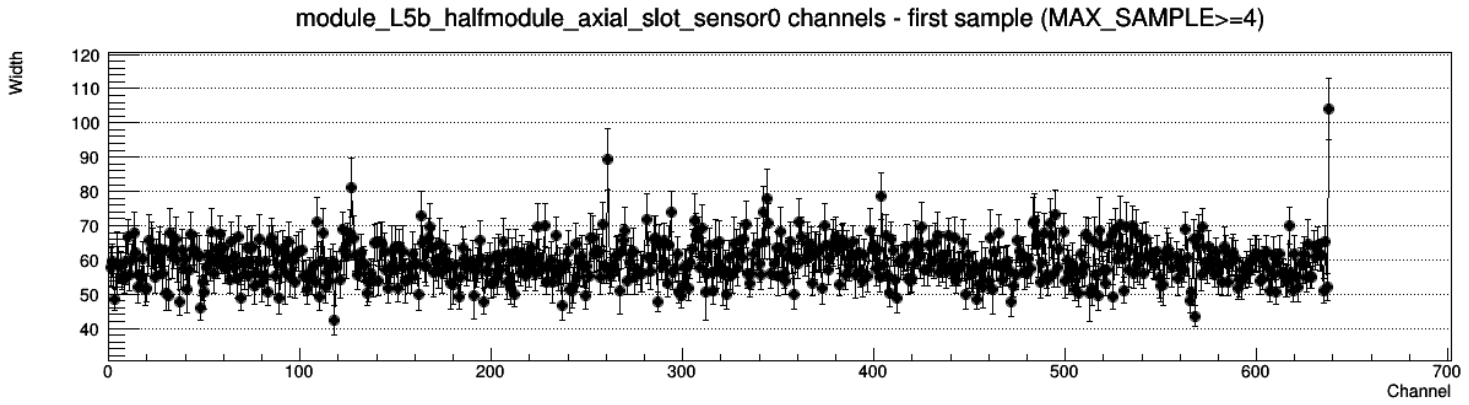
Away from beam plane



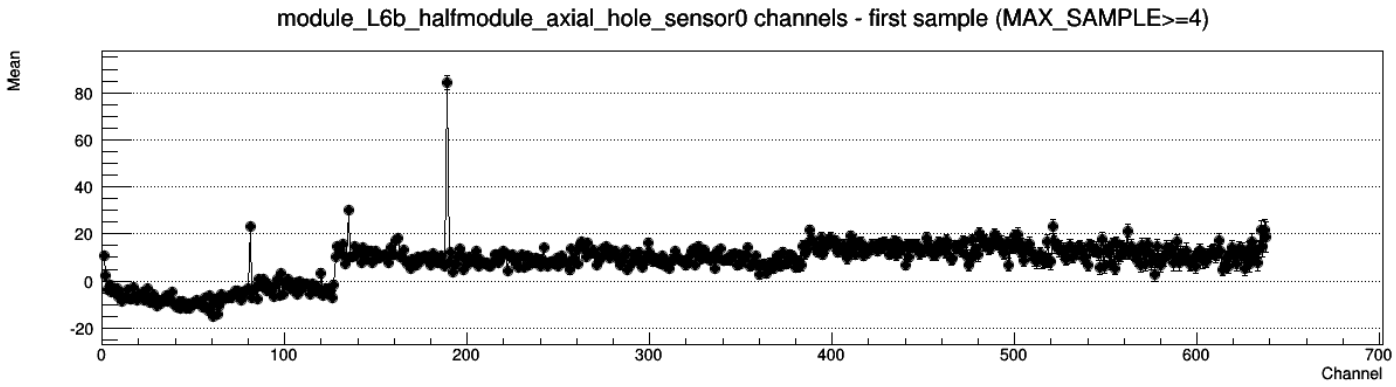
Straight Throughs – L5b axial slot (positron)



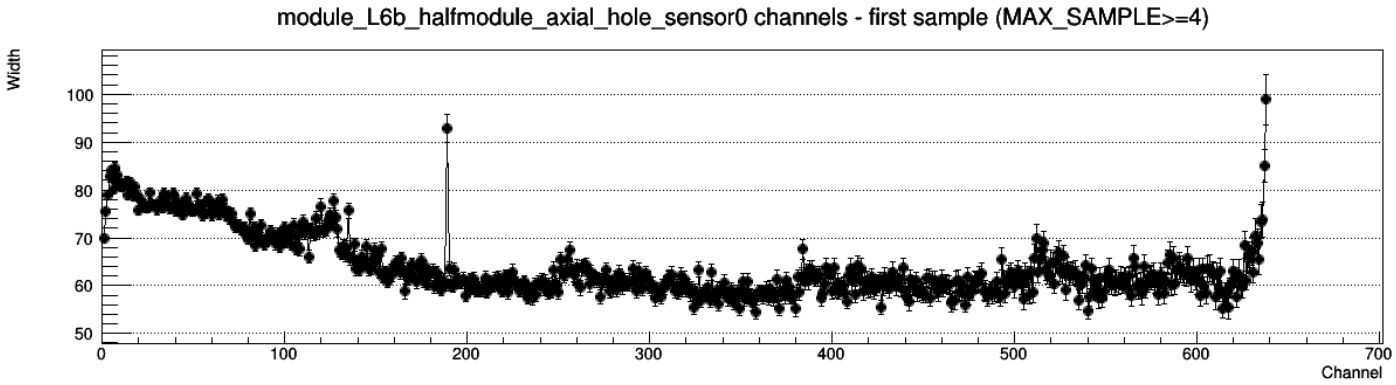
Away from beam plane



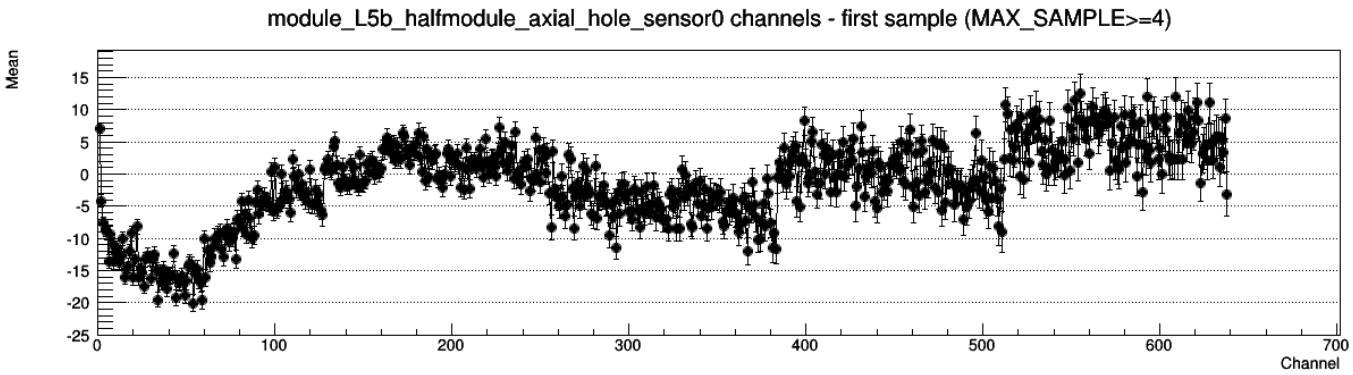
Straight Throughs – L6b axial hole (electron)



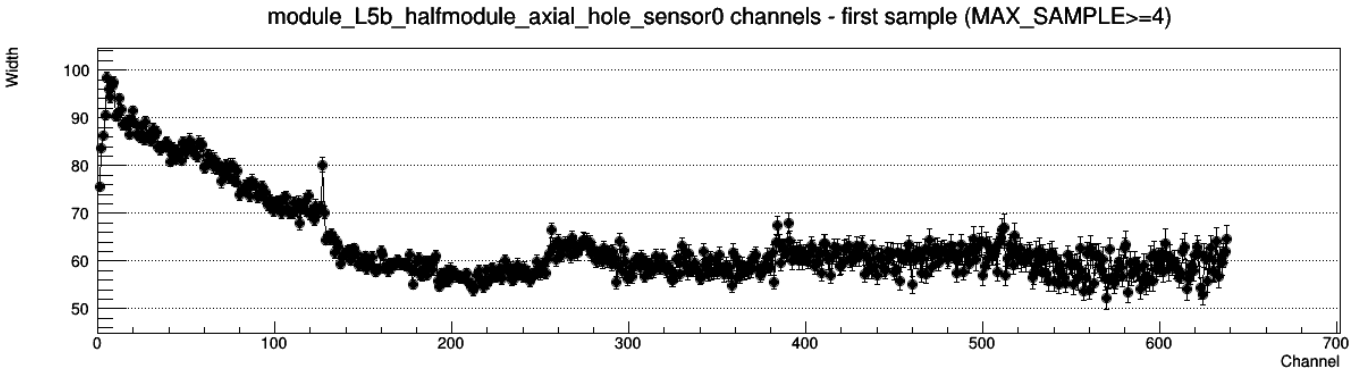
Away from beam plane



Straight Throughs – L5b axial hole (electron)

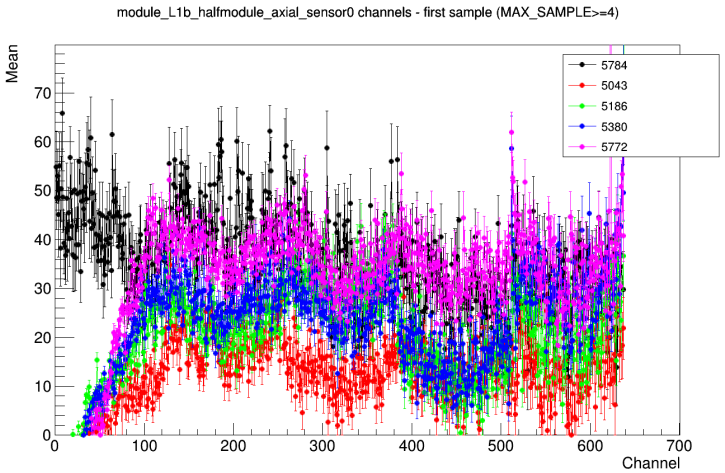


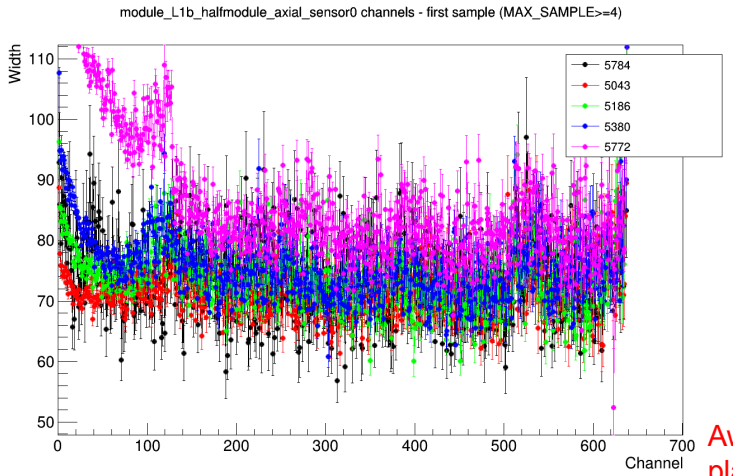
Away from beam plane



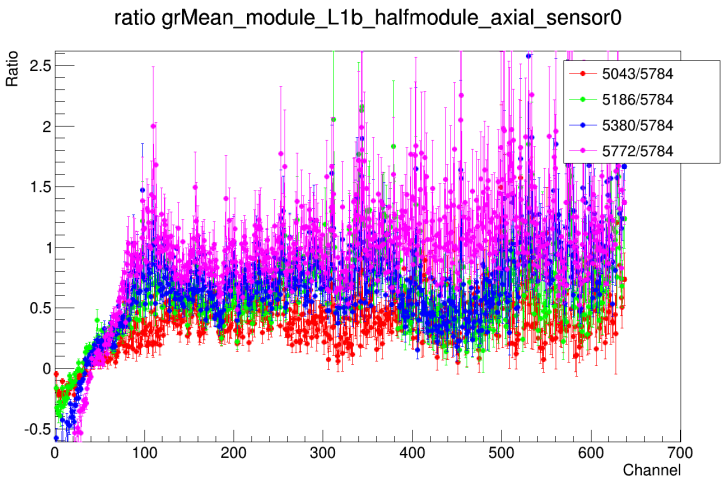
Multiple runs – L1b axial

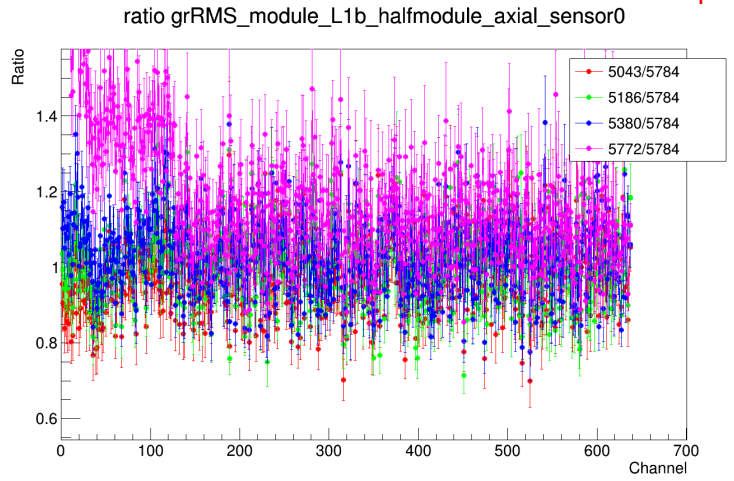
5784	Straight through
5043	3mm (10kHz)
5186	2mm (10kHz)
5380	1.5mm (10kHz)
5772	0.5mm (20kHz)





Away from beam plane

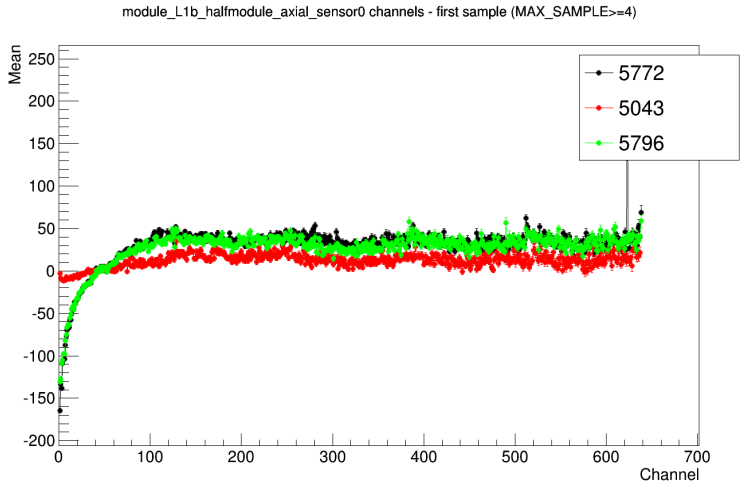


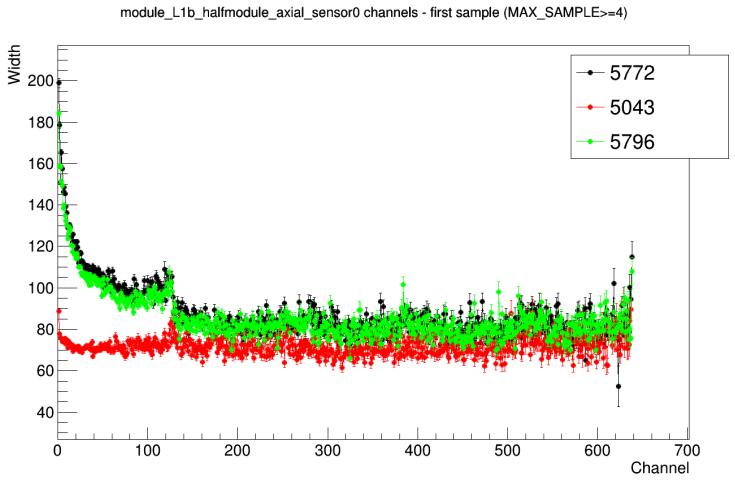


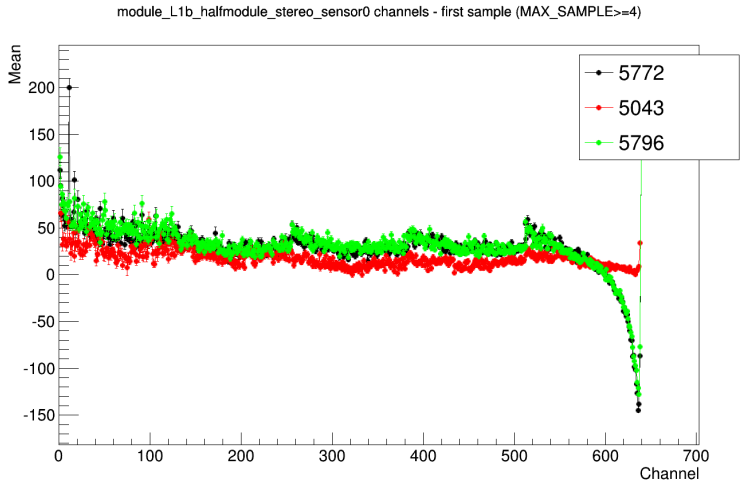
Effect depends on occupancy (?); perhaps an overall baseline shift too (or calib. effect)?
For all (?) the 0.5mm the whole innermost APV chip has a step in width (expected smoother transitions)?

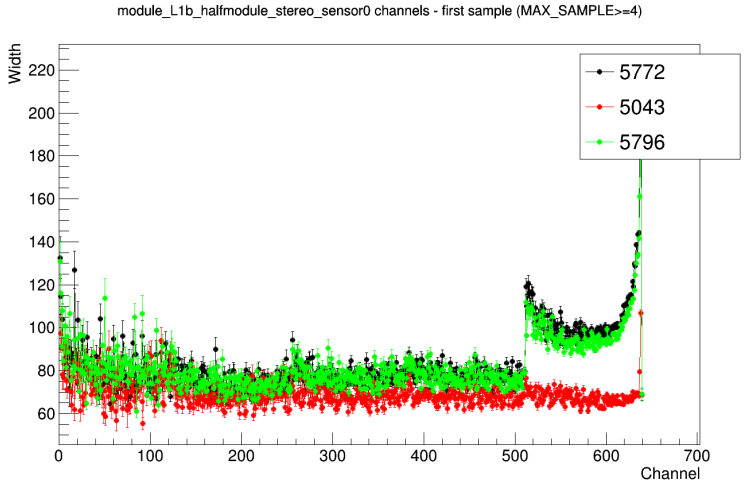
0.5mm vs 3mm runs – L1b axial vs L1b stereo

5043 is 3mm runs, the others late 0.5mm runs



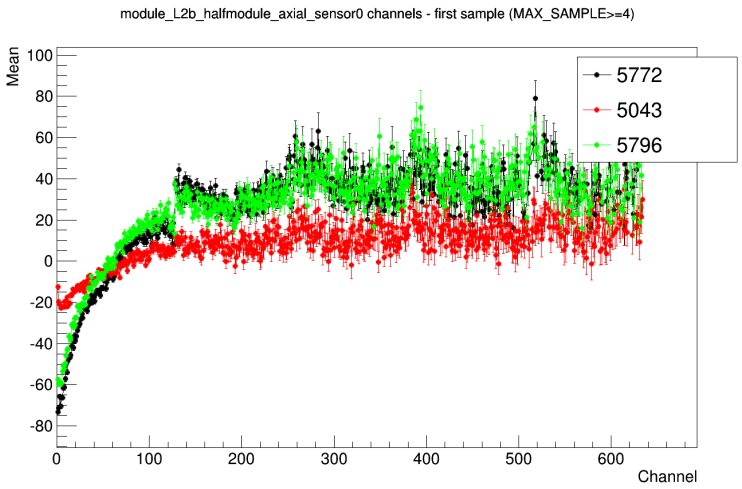


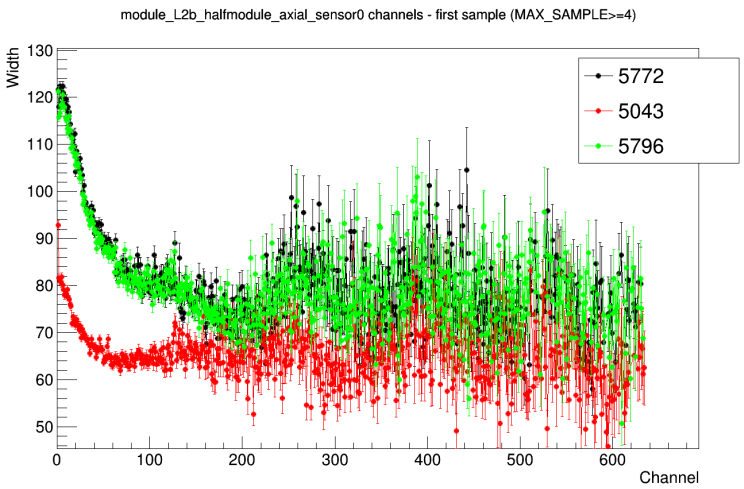


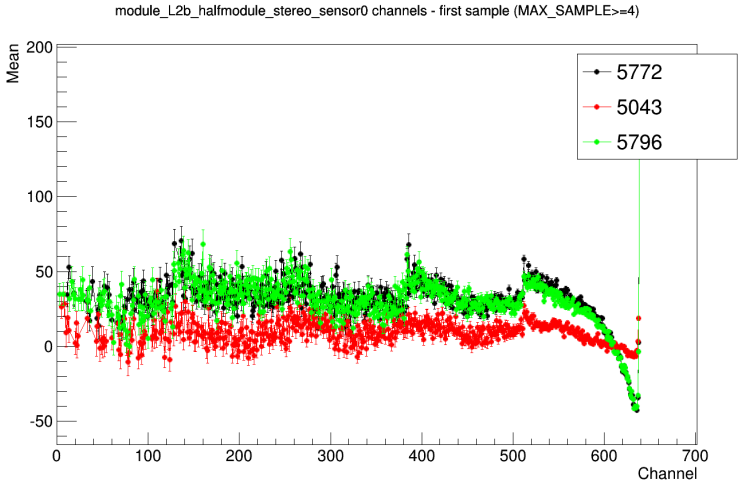


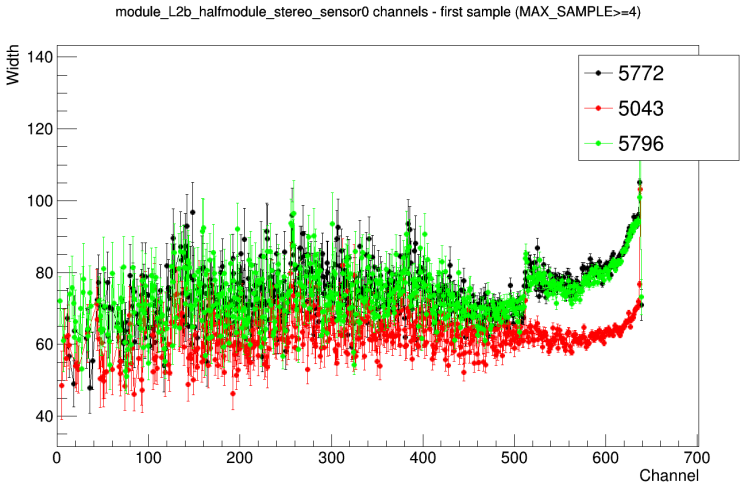
Axial and stereo behave the same

0.5mm vs 3mm runs – L2b axial vs L2b stereo



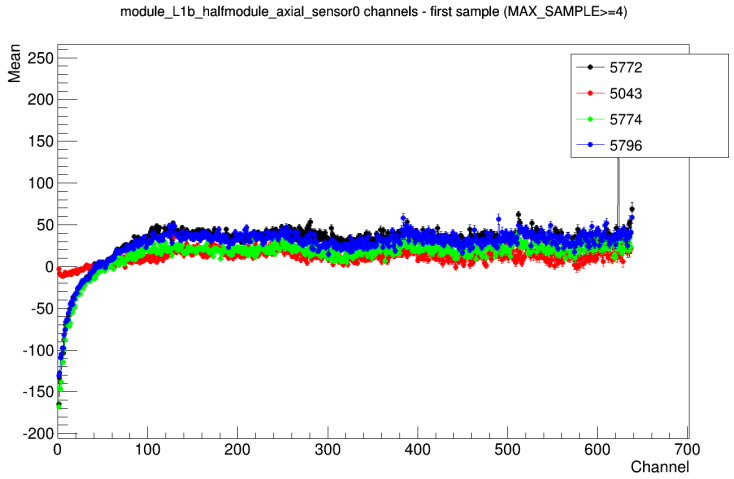


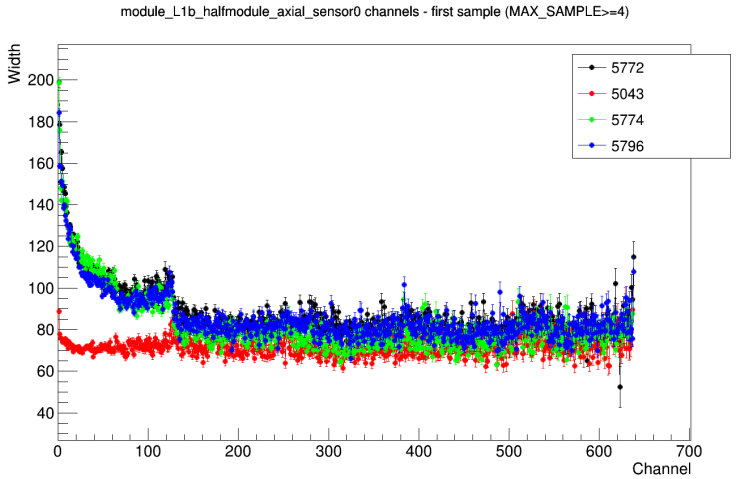


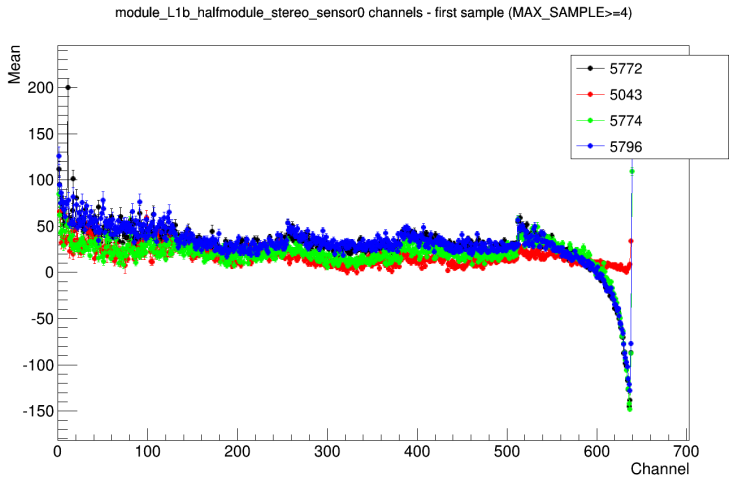


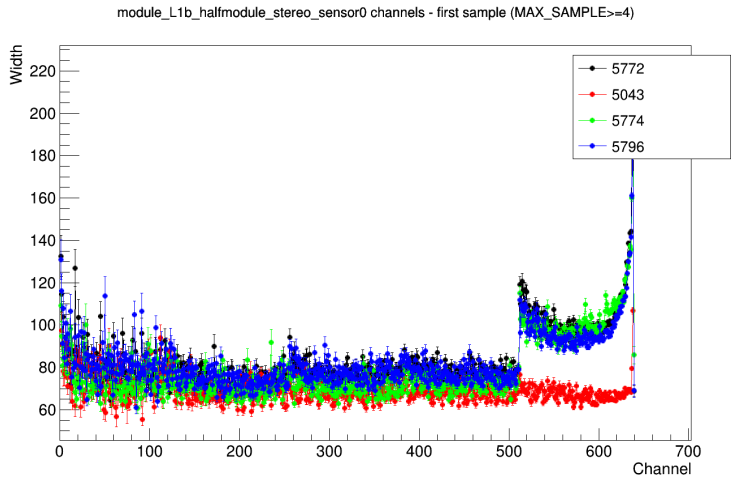
L2 shows similar but smaller effect (see scale)
Innermost APV has less pronounced “step” in width

Pulser vs normal runs – L1b axial vs L1b stereo









Pulser identical to triggered runs

Summary

SLAC

No obvious sign of low noise on “weird” channels on L1b in any run

- Not sure I would see them this way; look harder?

Sample-0 biased by pile-up (no surprise)

- Width (“noise”) increase by up to x2 (x1.5) for 10 channels close to beam for L1 (L2) @ 0.5mm
- Fitted mean shifts down by up to 200 (100) ADC for 10ch’s close to beam for L1 (L2) @ 0.5mm. Not sure why; artifact in selection?
- Pulser, straight throughs, old vs new all show similar behavior
- Observe baseline shifts (sample-0 mean – pedestal) regularly above 50 ADC.