SVT Offline Baseline Calibration with the 2019 Data

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Software Meeting

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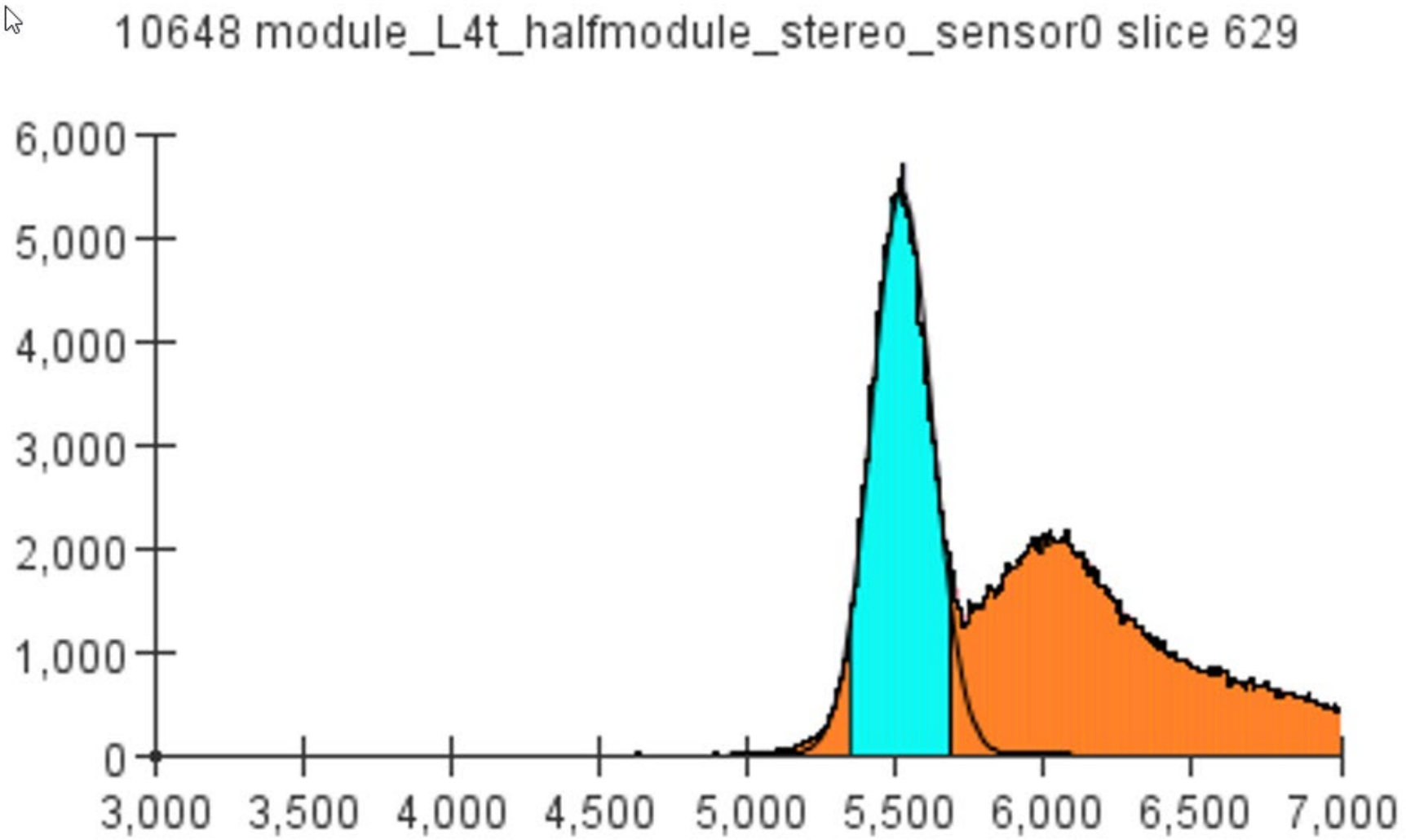
Detector Calibration with Data

- Goal is to improve on the SVT baselines which were determined during online calibration runs, if possible.
  - Some runs were taken when the online calibrations might have become stale
  - Some high-occupancy channels experience shifts in their baseline due to power-busing on the APV25 chip
- Previous analysis using hpstr by Cameron and Alic here.
- May want to incorporate into the DQM stream during the 2021 run.
  - Develop code within hps-java

Procedure

- Fill 2D histograms for each sensor
  - X axis corresponds to the strip / readout channel number
  - Y axis contains the value of the first of the six APV25 readout samples.
- Y-Projection of each channel gives occupancy vs ADC value for channel
- In principle, distributions composed of a Gaussian signal (baseline) and a Landau at some threshold (pileup from hits prior to current trigger)

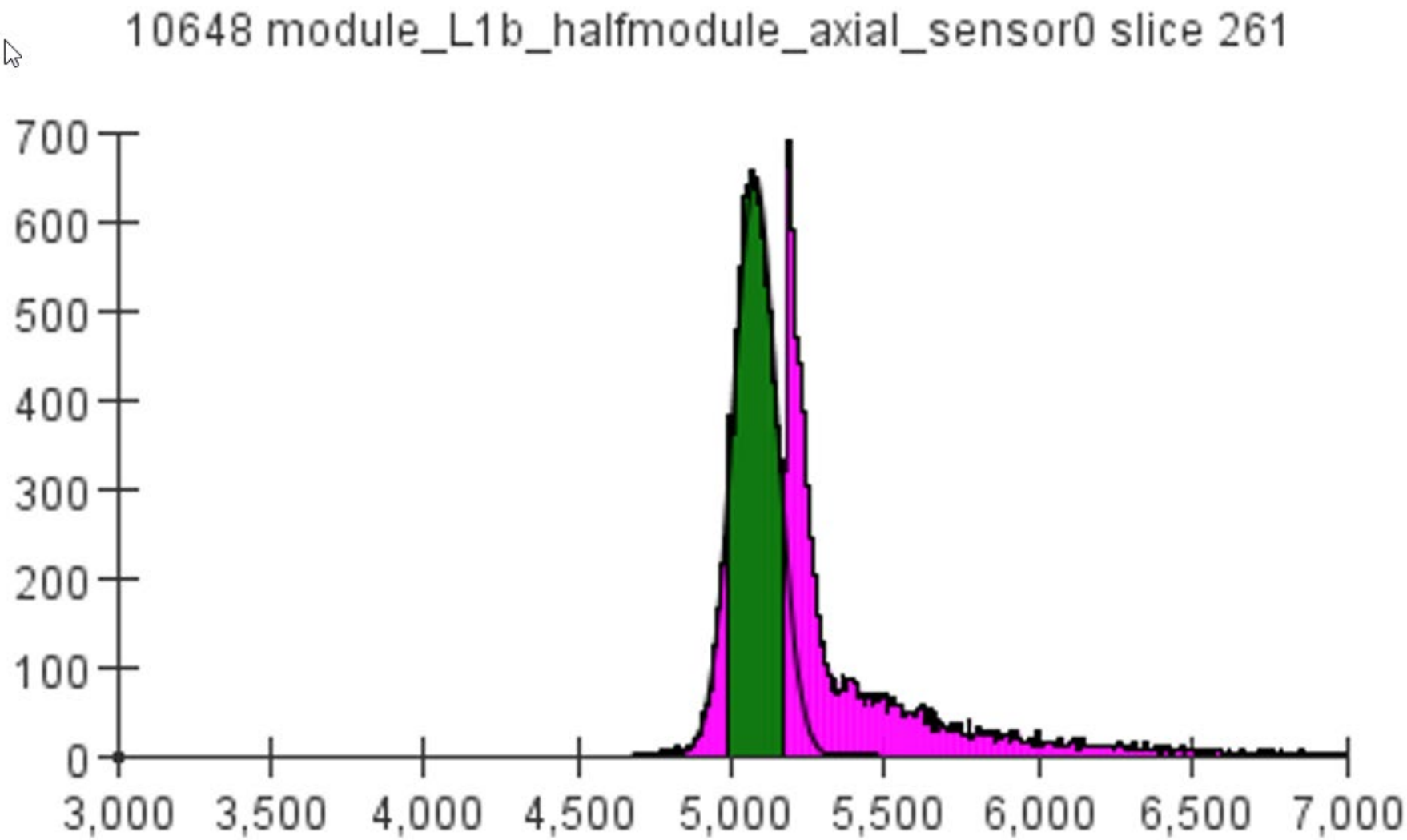
Example Distribution



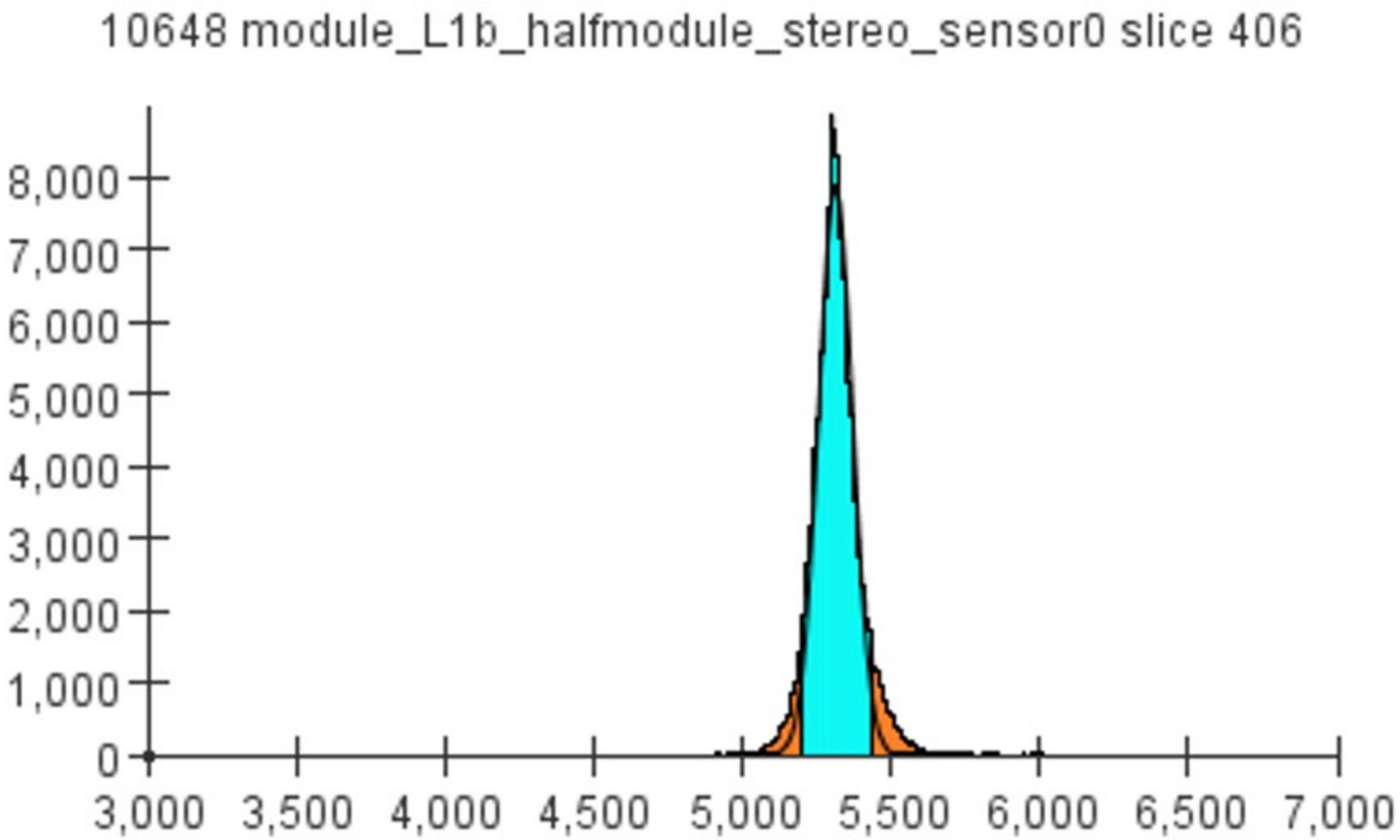
Distributions

- In practice, distributions are much more complicated.
- See the following slides for some examples.
  - not exhaustive…

Others

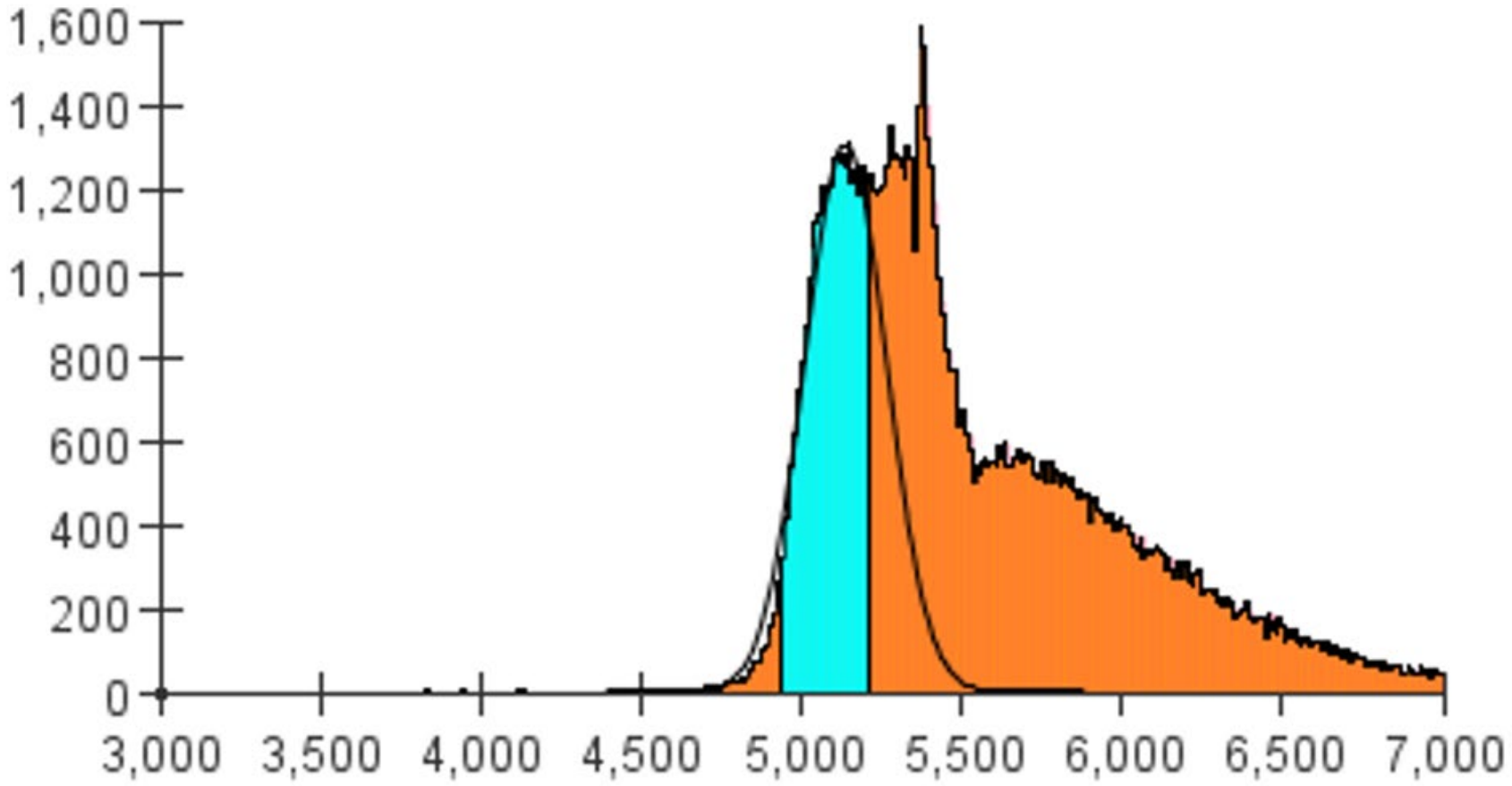

10648 module_L1b_halfmodule_axial_sensor0 slice 261
700
600
500
400
300
200
100
0
3,000
3,500
4,000
4,500
5,000
5,500
6,000
6,500
7,000

Others

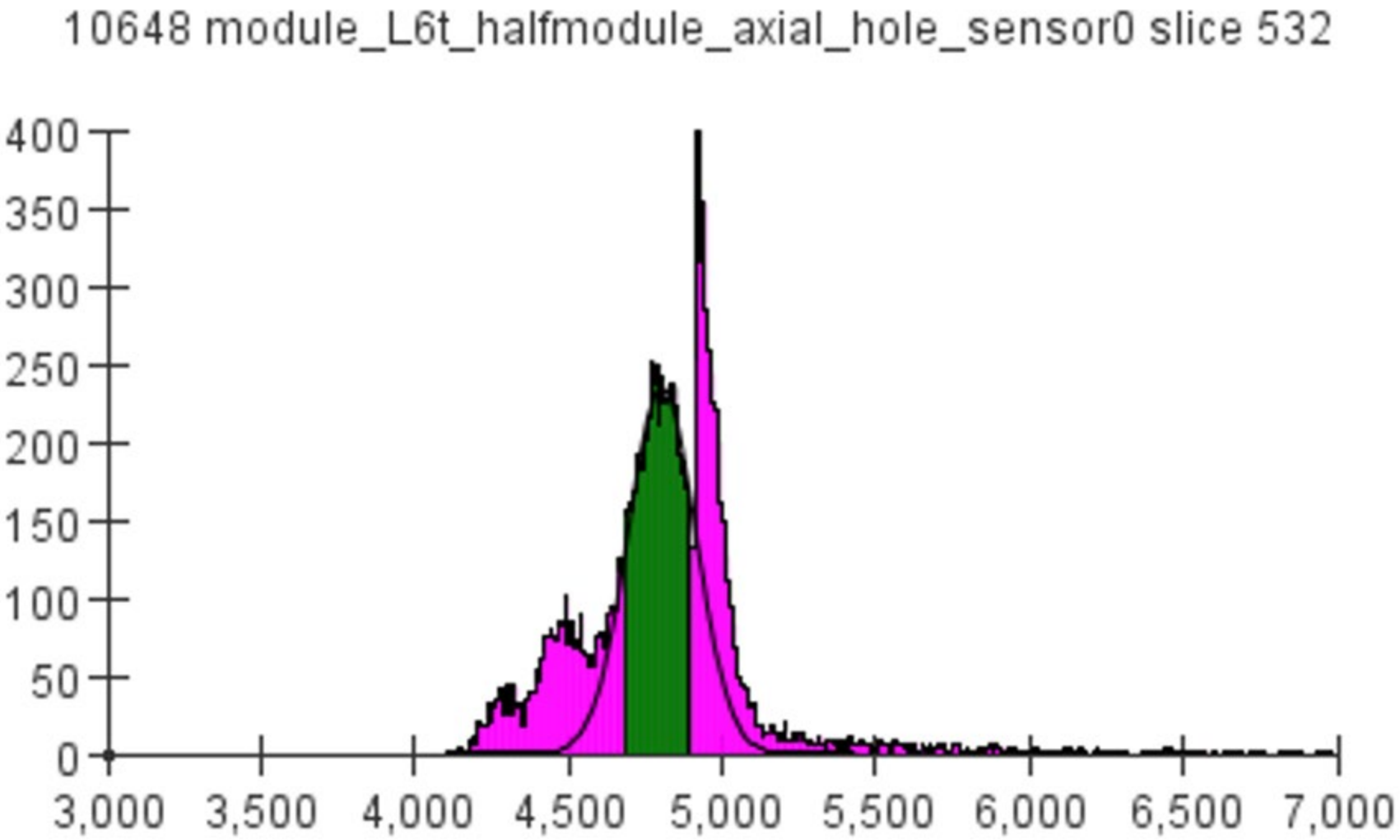

10648 module_L1b_halfmodule_stereo_sensor0 slice 406
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
3,000
3,500
4,000
4,500
5,000
5,500
6,000
6,500
7,000

Others

10648 module_L1b_halfmodule_stereo_sensor0 slice 392



Others


10648 module_L6t_halfmodule_axial_hole_sensor0 slice 532
400
350
300
250
200
150
100
50
0
3,000
3,500
4,000
4,500
5,000
5,500
6,000
6,500
7,000

Results

- Algorithms have been developed which handle most of the cases, but further development requires a better understanding of what these odd distributions represent and how best to identify and fit them.
- What precision is required on the mean?
- What precision is required on the width?
- Comparisons to online distributions from dedicated baseline runs would be useful.
- Progress documented at:

https://confluence.slac.stanford.edu/display/hpsg/2019+SVT+Offline+Baseline+Calibrations