2x2 Data Assessment: LRS Calibration

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Status:

STILL IN PROGRESS

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Goals:

1. Compare **June 10th** and **July 12th** calibrations
2. Investigate discrepancies

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1. Compare **June 10th** and **July 12th** calibrations
2. Investigate discrepancies
3. Separate out dedicated calibration flow stage
4. Flow and validate

June 10th vs July 12th

Why Compare?

If the gain calibration results are consistent: we can confidently apply a single gain calibration to all the data.

If they aren't: we'll use the July calibration for the July data

In either case:

FUTURE 2x2 RUNS SHOULD INCLUDE (AT LEAST) WEEKLY CALIBRATIONS

June 10th vs July 12th

Issue:

selecting gain fits from finger plots for 384 channels requires hand-scanning across multiple parameter fittings

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selecting gain fits from finger plots for 384 channels requires hand-scanning across multiple parameter fittings
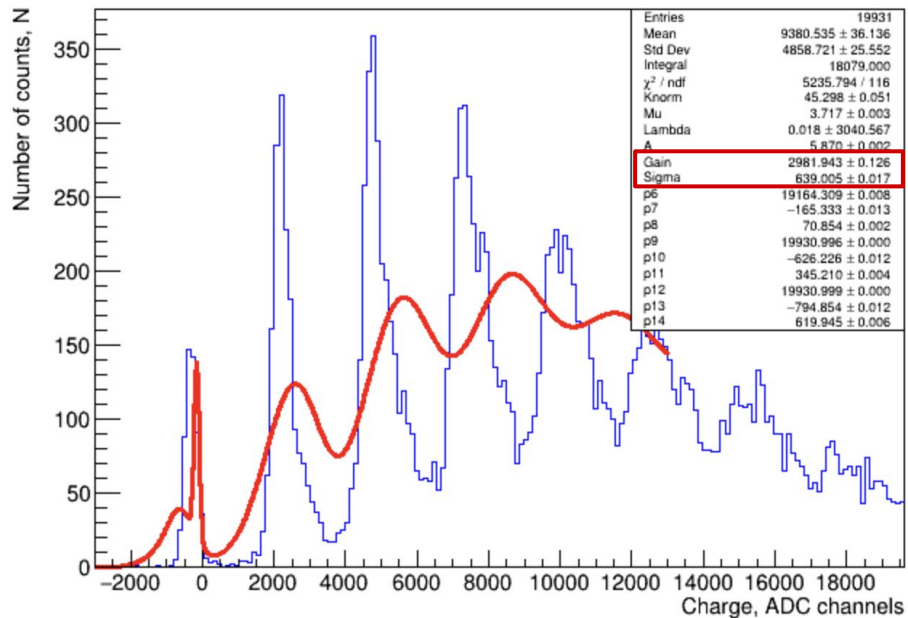
Priority:

- Write script to determine best fit across multiple parameter fittings
- Quantify effectiveness of script

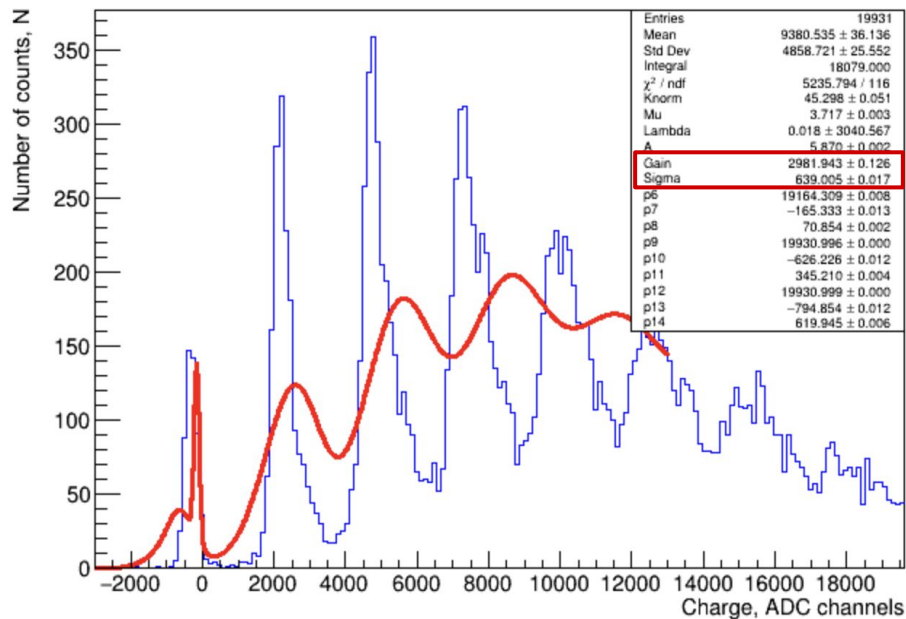# Finger Plot Fitting

Fit Failure
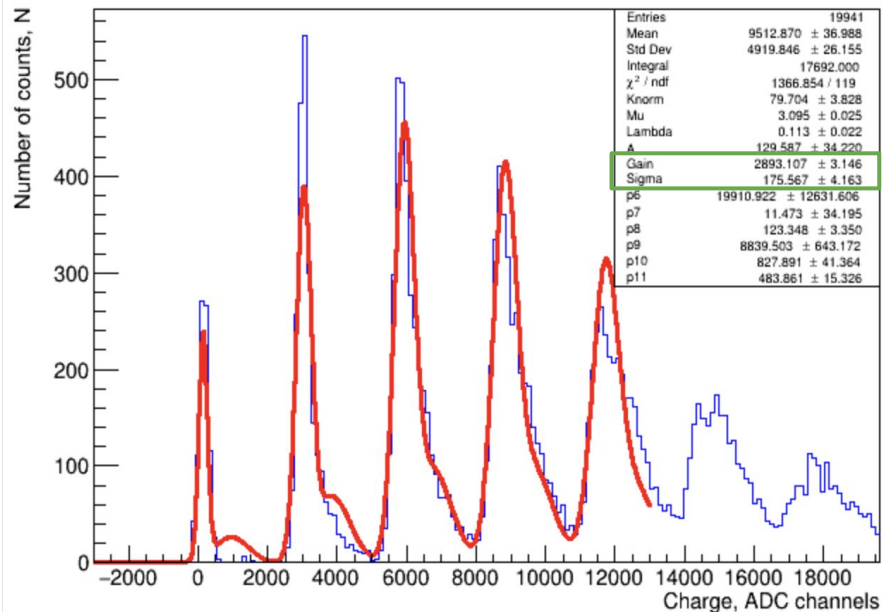
Charge spectrum [2650b3ff CH30]

Finger Plot Fitting
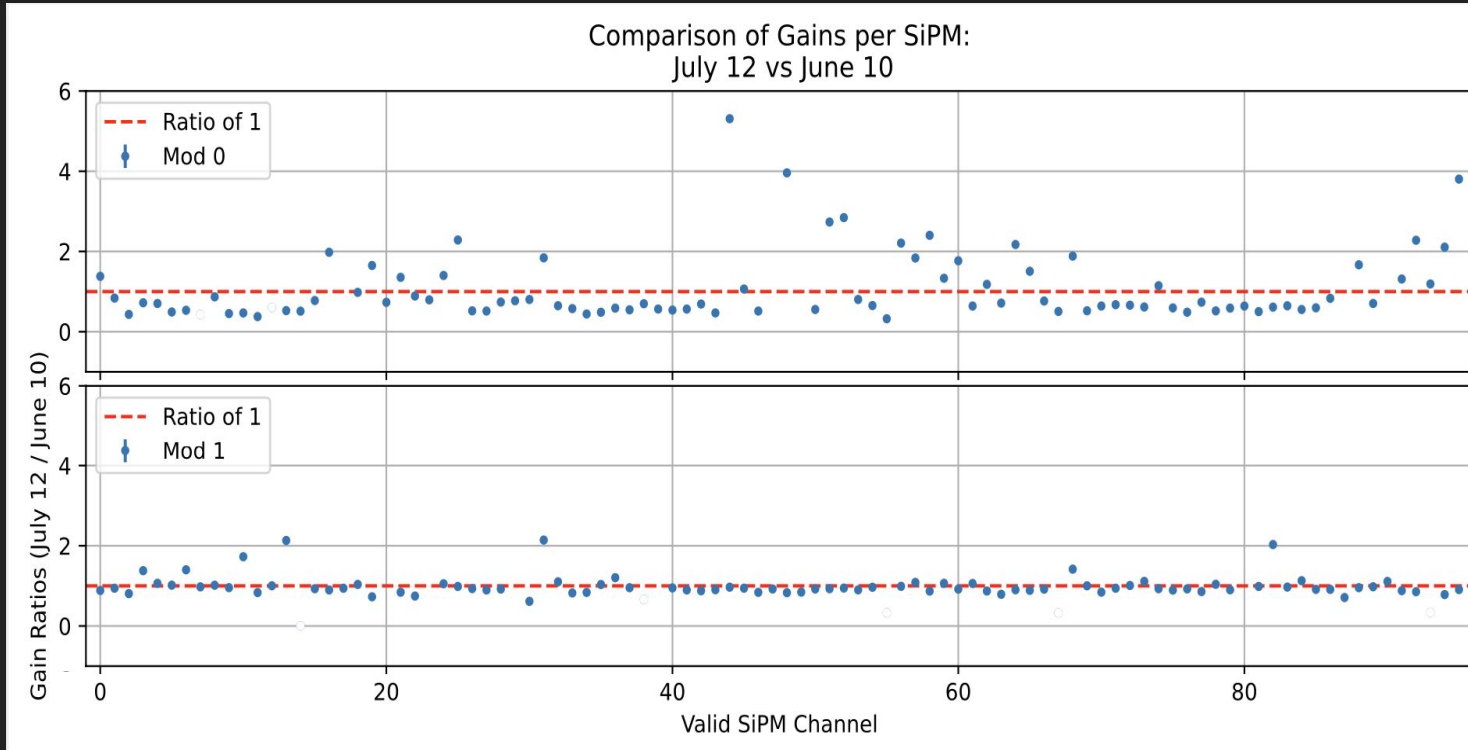

Fit Failure

Charge spectrum [2650b3ff CH30]

Entries	19931
Mean	9380.535 ± 36.136
Std Dev	4858.721 ± 25.552
Integral	18079.000
χ^2 / ndf	5235.794 / 116
Knorm	45.298 ± 0.051
Mu	3.717 ± 0.003
Lambda	0.018 ± 3040.567
A	5.870 ± 0.002
Gain	2981.943 ± 0.126
Sigma	639.005 ± 0.017
p6	19164.309 ± 0.008
p7	−165.333 ± 0.013
p8	70.854 ± 0.002
p9	19930.996 ± 0.000
p10	−626.226 ± 0.012
p11	345.210 ± 0.004
p12	19930.999 ± 0.000
p13	−794.854 ± 0.012
p14	619.945 ± 0.006

Successful Fit

Charge spectrum [26517dff CH11]

Entries	19941
Mean	9512.870 ± 36.988
Std Dev	4919.846 ± 26.155
Integral	17692.000
χ^2 / ndf	1366.854 / 119
Knorm	79.704 ± 3.828
Mu	3.095 ± 0.025
Lambda	0.113 ± 0.022
A	129.587 ± 34.220
Gain	2893.107 ± 3.146
Sigma	175.567 ± 4.163
p6	19910.922 ± 12631.606
p7	11.473 ± 34.195
p8	123.348 ± 3.350
p9	8839.503 ± 643.172
p10	827.891 ± 41.364
p11	483.861 ± 15.326

June 10th vs July 12th: Mod 0 and Mod 1

Comparison of Gains per SiPM:
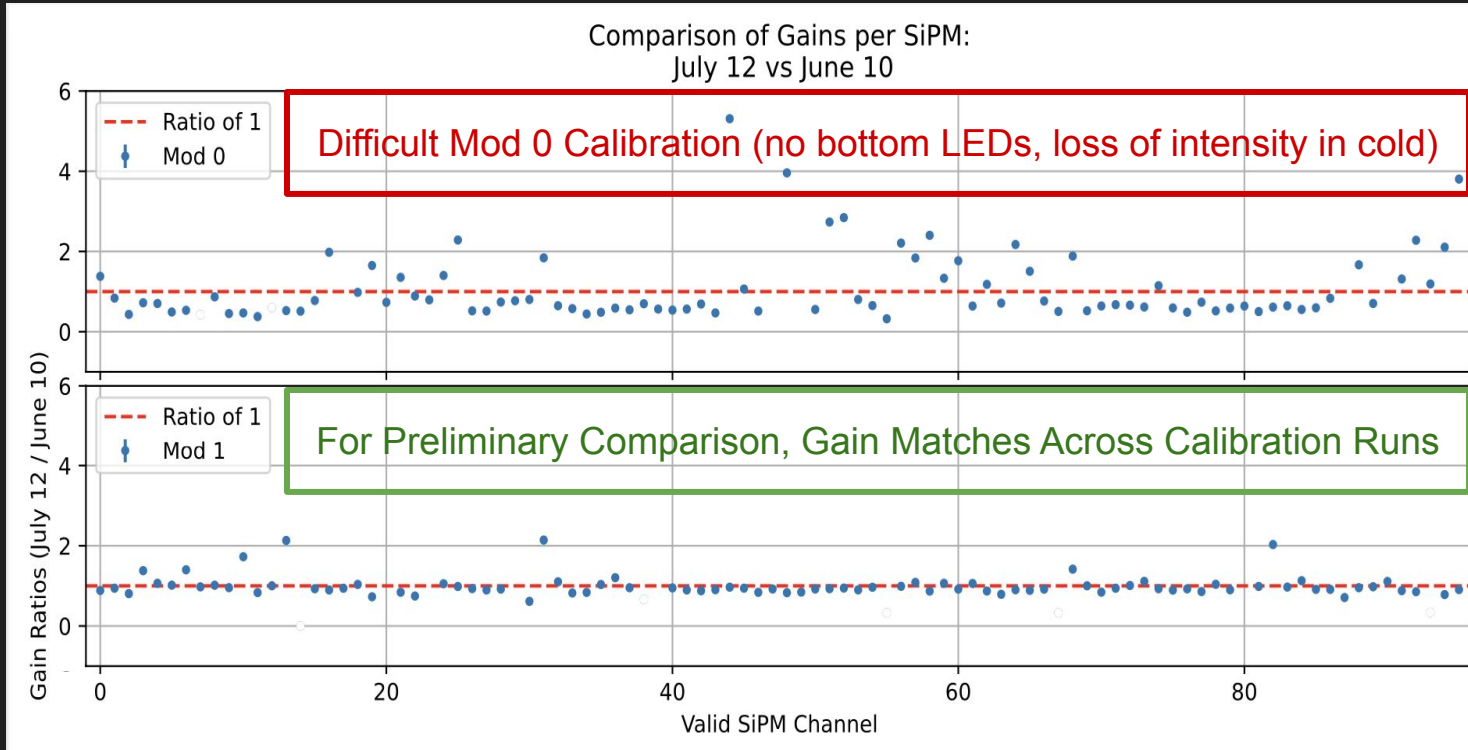July 12 vs June 10

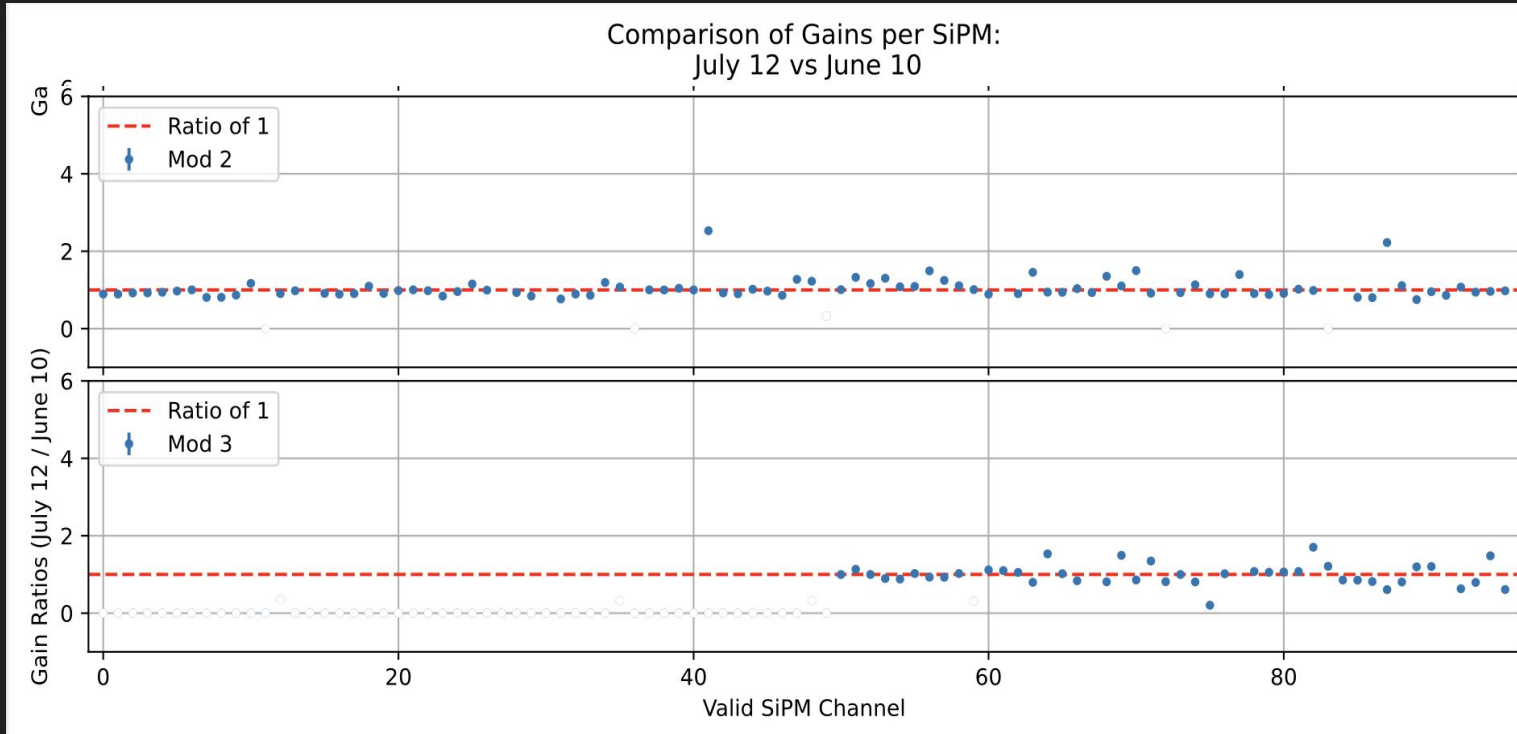June 10th fits need to be scanned the same way July 12 fits were before we can add error bars to this plot
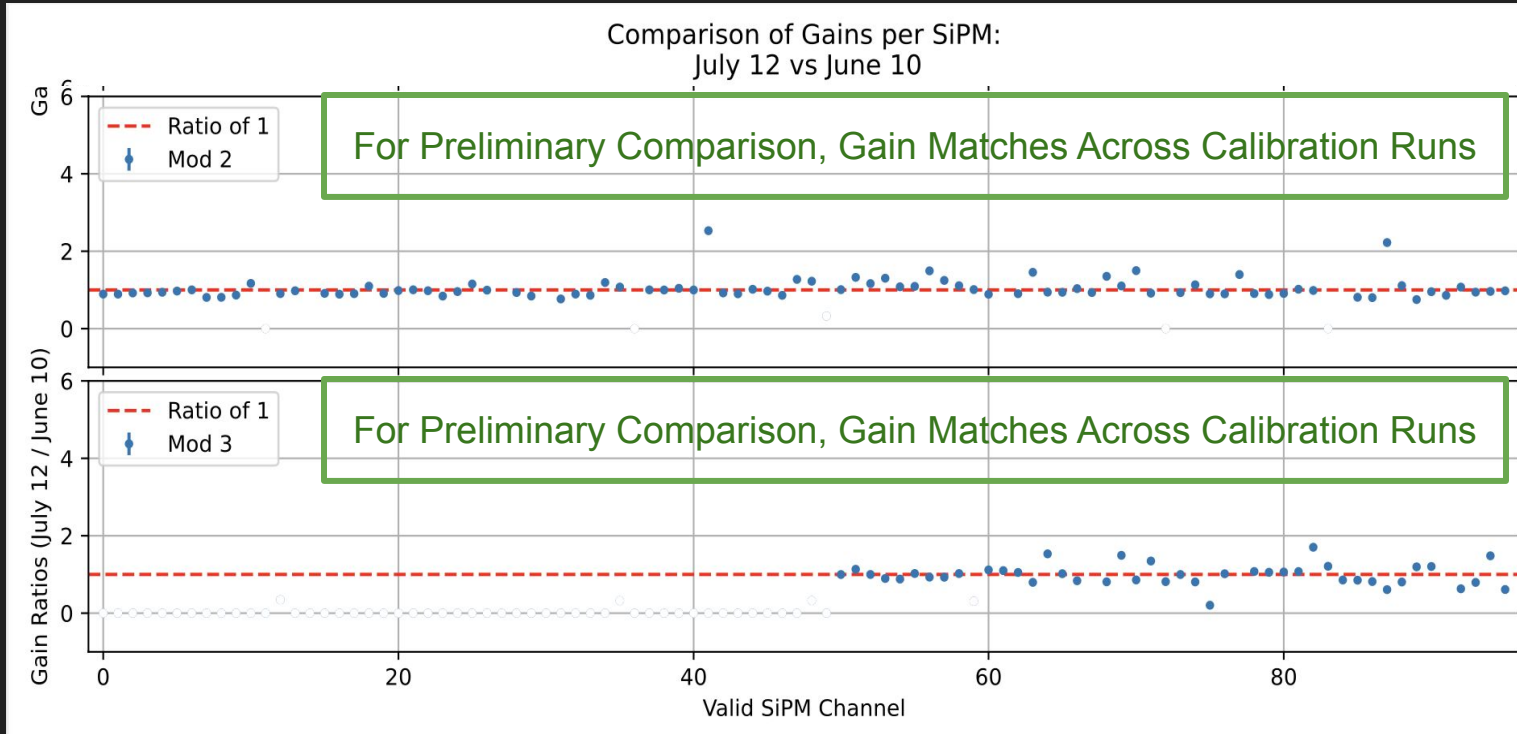
June 10th vs July 12th: Mod 0 and Mod 1

Comparison of Gains per SiPM:
July 12 vs June 10

Difficult Mod 0 Calibration (no bottom LEDs, loss of intensity in cold)

For Preliminary Comparison, Gain Matches Across Calibration Runs

June 10th fits need to be scanned the same way July 12 fits were before we can add error bars to this plot

June 10th vs July 12th: Mod 2 and Mod 3

We need to re-run half of July 12 calibration with correct ADC

June 10th vs July 12th: Mod 2 and Mod 3

Comparison of Gains per SiPM:
July 12 vs June 10

For Preliminary Comparison, Gain Matches Across Calibration Runs

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We need to re-run half of July 12 calibration with correct ADC

Integrating Gain Calibration into Flow

yaml link: feature_run_on_data branch

```
Yaml Name: ndlar_flow/yamls/proto_nd_flow/reco/light/WaveformCalib.yaml

15        gain:
16          # by default, don't include channel in waveform sum
17          default: 0.0000e+00
18
```

Default has been 0 for data
Calculating new values here: 2x2_Onsite/LRS/12 Analysis Needs/Calibration

Timeline: Integrating Gain Calibration into Flow

End of Day (10/23): have one file with calibrated waveforms

End of Week (10/25):

1. have **10 files** with charge, calibrated light, and geometry

2. Develop more detailed light event displays

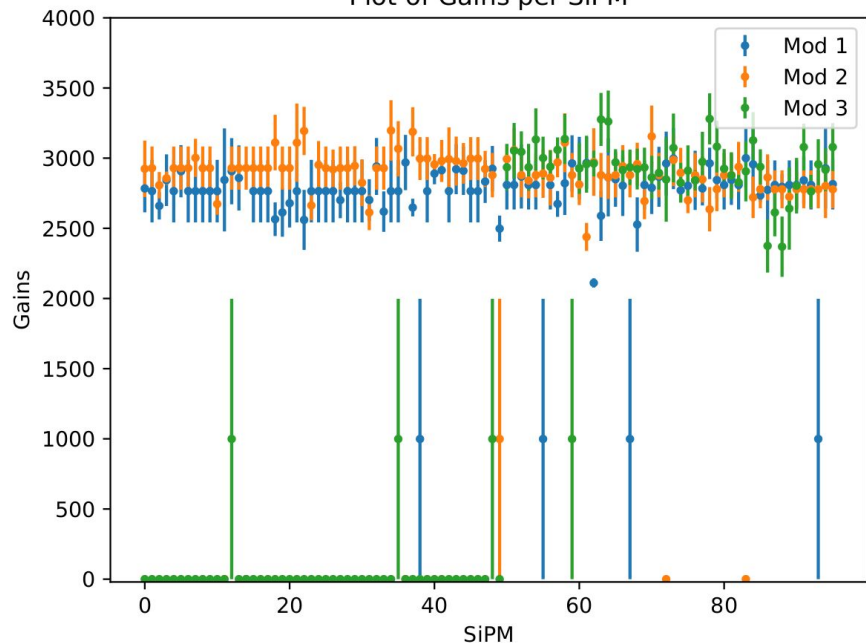3. Begin using calibrated files for data assessment studies

Backup

Gains for the 2x2 modules