DAPHNE configuration update

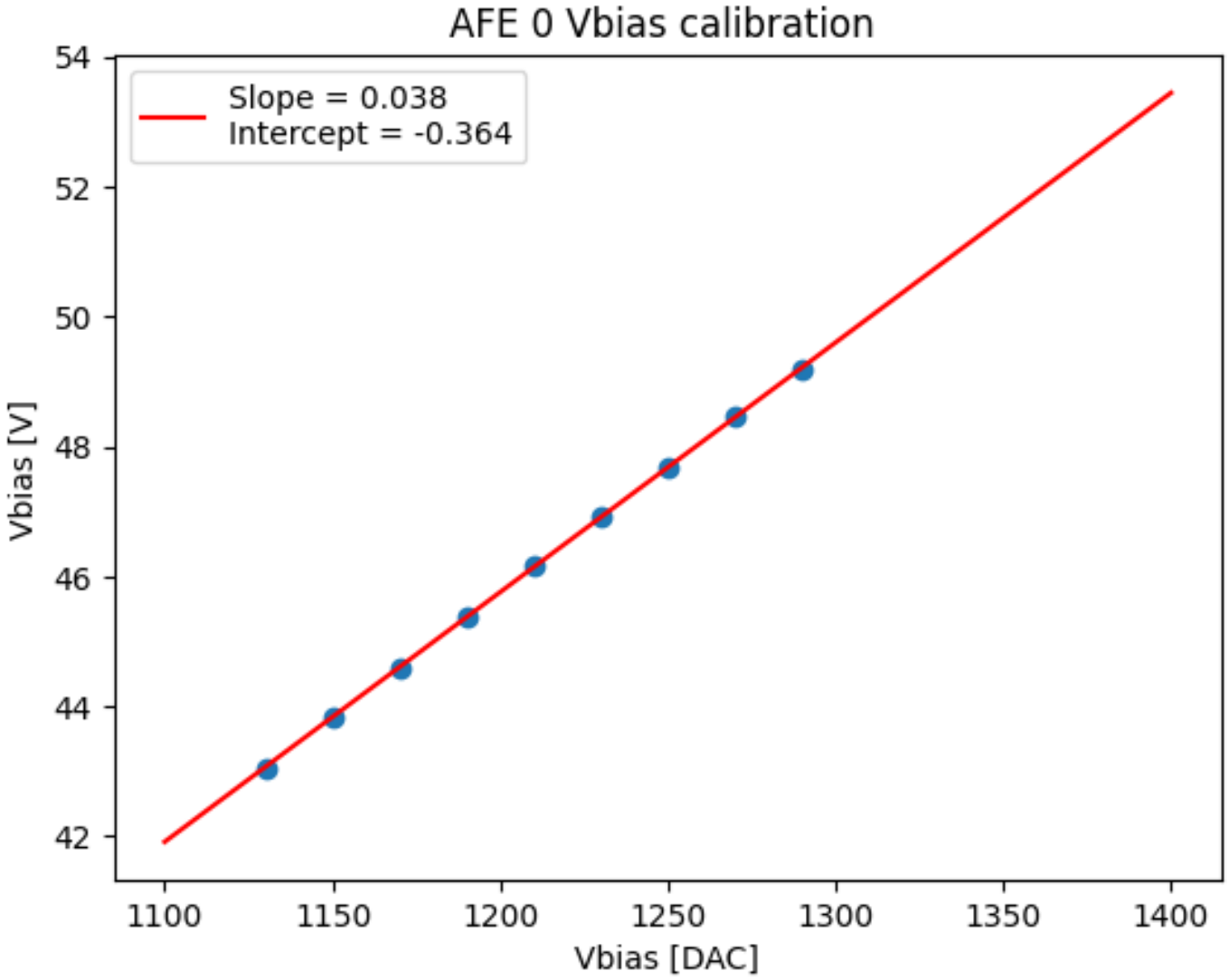
Benan Ünal

Calibration of AFE 0

- Conversion fit:

$$V_{bias}\,[V] = 0.038\,V_{bias}\,[DAC] - 0.364$$

- So far only AFE 0 voltages are measured, corresponding calibration for other chips will be done in the future.



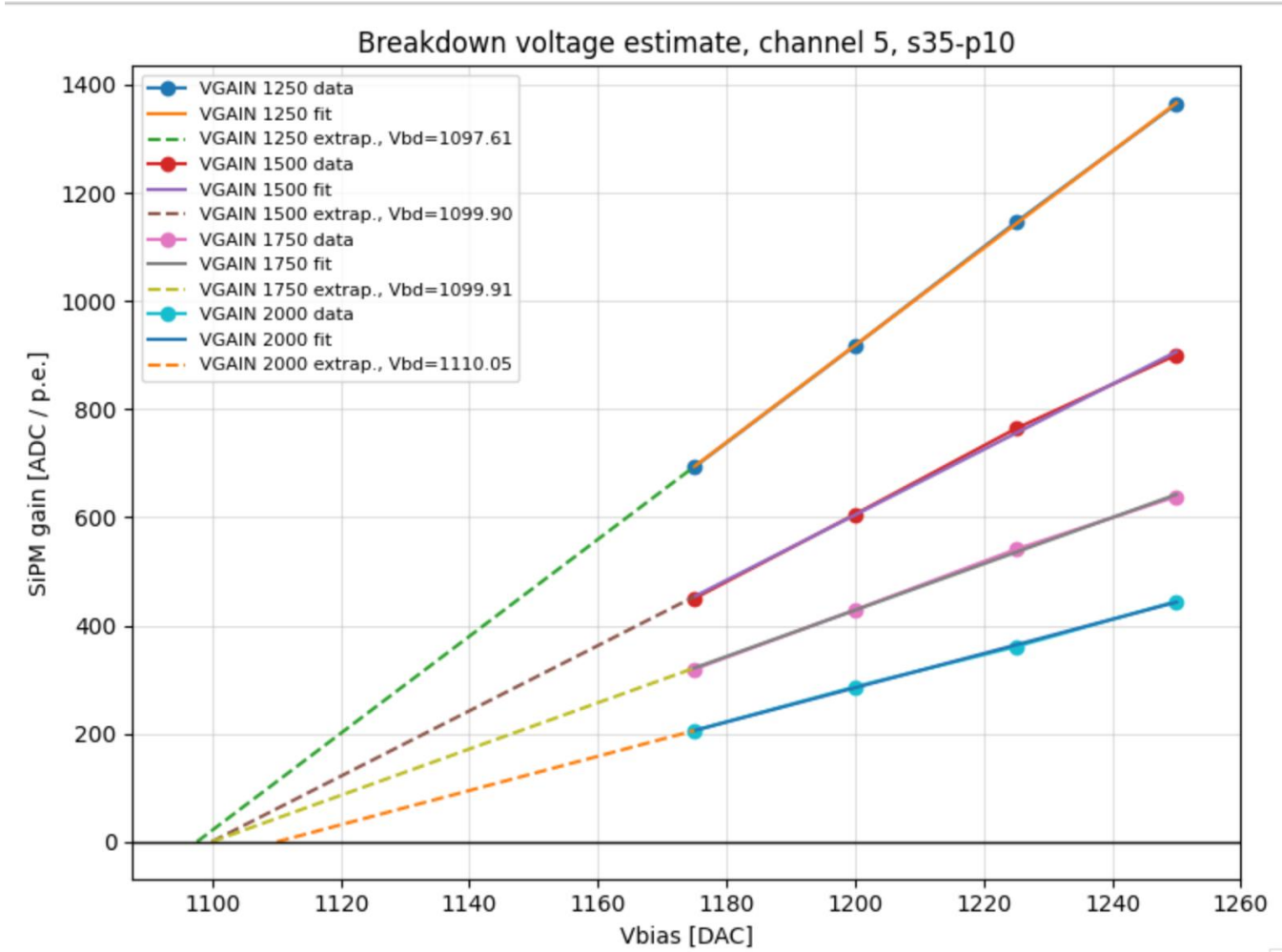
SQL Database

- Created an SQL-DB to store and access the analyzed data and their respective parameters.

```
[tune_run_sipm_calibration_db=> SELECT * FROM calibration_runs ORDER BY pulser_p ASC LIMIT 20;
 id  | vgain | vbias | pulser_s | pulser_p | channel | sipm_gain | snr  |         created_at         |         updated_at
-----+-------+-------+----------+----------+---------+-----------+------+----------------------------+----------------------------
  96 |  1500 |  1225 |       35 |       10 |       1 |    566.28 | 6.46 | 2026-05-02 12:38:15.964716 | 2026-05-02 13:21:00.80726
  23 |  1250 |  1175 |       35 |       10 |       1 |    410.08 | 3.68 | 2026-05-01 22:10:41.195517 | 2026-05-02 13:15:07.295846
  27 |  1250 |  1175 |       35 |       10 |       2 |    554.34 | 5.23 | 2026-05-02 12:22:32.859297 | 2026-05-02 13:15:12.313859
  38 |  1250 |  1200 |       35 |       10 |       1 |    651.49 | 5.85 | 2026-05-02 12:25:02.190678 | 2026-05-02 13:16:06.562787
  50 |  1250 |  1225 |       35 |       10 |       1 |    887.51 | 7.46 | 2026-05-02 12:27:45.026071 | 2026-05-02 13:17:07.785841
  62 |  1250 |  1250 |       35 |       10 |       1 |    971.75 | 8.97 | 2026-05-02 12:30:26.409586 | 2026-05-02 13:18:08.411425
  74 |  1500 |  1175 |       35 |       10 |       1 |    180.97 | 3.12 | 2026-05-02 12:33:07.373097 | 2026-05-02 13:19:08.165185
  84 |  1500 |  1200 |       35 |       10 |       1 |    417.33 | 5.05 | 2026-05-02 12:35:36.868471 | 2026-05-02 13:19:59.854484
   2 |  1750 |  1200 |       35 |       10 |       0 |    347.41 | 4.82 | 2026-04-29 17:42:46.534247 | 2026-05-02 13:23:56.617048
   5 |  1750 |  1225 |       35 |       10 |       0 |    458.53 | 5.63 | 2026-04-29 17:49:14.349919 | 2026-05-02 13:24:57.975122
  14 |  2000 |  1175 |       35 |       10 |       0 |    144.05 | 2.53 | 2026-04-29 20:46:34.988219 | 2026-05-02 13:27:02.720472
  15 |  2000 |  1200 |       35 |       10 |       0 |    279.61 |  3.9 | 2026-04-29 20:48:11.494533 | 2026-05-02 13:28:03.682569
  16 |  2000 |  1225 |       35 |       10 |       0 |     312.5 | 4.71 | 2026-04-29 20:49:27.677193 | 2026-05-02 13:29:05.244244
  17 |  2000 |  1250 |       35 |       10 |       0 |    344.41 | 5.07 | 2026-04-29 20:50:22.533855 | 2026-05-02 13:30:06.96596
  13 |  1250 |  1175 |       35 |       10 |       0 |    657.27 |  4.1 | 2026-04-29 20:40:54.551159 | 2026-05-02 13:15:02.220763
  28 |  1250 |  1175 |       35 |       10 |       3 |    355.69 | 3.99 | 2026-05-02 12:22:46.106387 | 2026-05-02 13:15:17.252564
  29 |  1250 |  1175 |       35 |       10 |       4 |    592.72 | 5.67 | 2026-05-02 12:22:59.825743 | 2026-05-02 13:15:22.213427
  30 |  1250 |  1175 |       35 |       10 |       5 |    676.28 | 6.23 | 2026-05-02 12:23:13.398145 | 2026-05-02 13:15:26.964735
  31 |  1250 |  1175 |       35 |       10 |       8 |    713.73 | 4.65 | 2026-05-02 12:23:26.621392 | 2026-05-02 13:15:31.909092
 108 |  1500 |  1250 |       35 |       10 |       1 |    738.35 | 7.61 | 2026-05-02 12:40:53.373354 | 2026-05-02 13:22:01.274893
(20 rows)
```

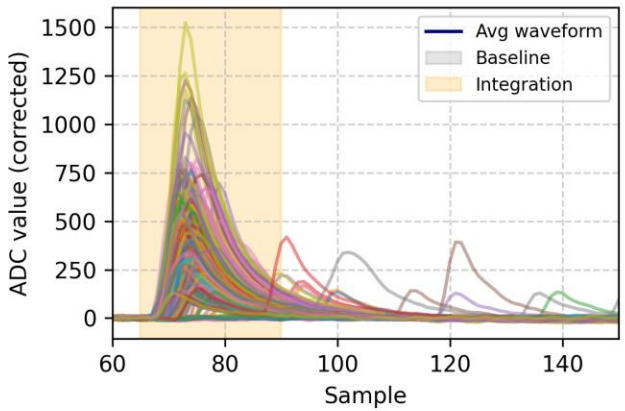
Extracting breakdown voltage

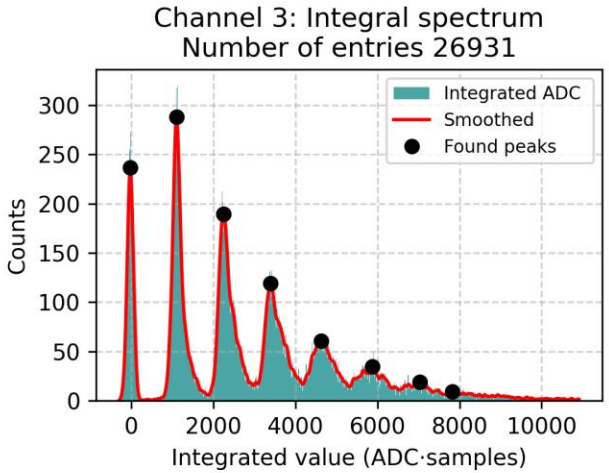
- Using the SiPM gain and Vbias entries from the SQL-DB breakdown voltage of CH5 was extracted
  - Mean breakdown voltage = 1101.9 DAC = 41.98 V
  - Median breakdown voltage = 1099.9 DAC = 41.9 V
- For other channels not all x–intercepts coincide → New peak finding or peak spacing computation algorithm needed

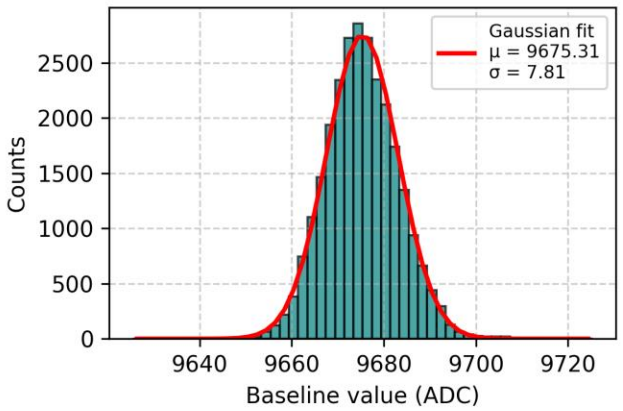


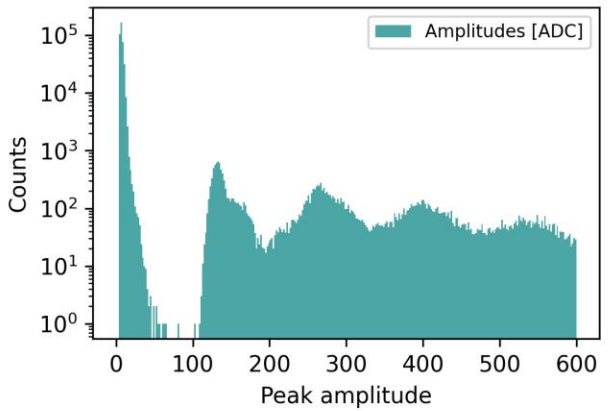
cold_test | Vgain 1250 | Vbias 1250 | s35-p10 | Channel 3
Baseline [0:30], Integration [65:90]

Mean peak spacing = 1121.8

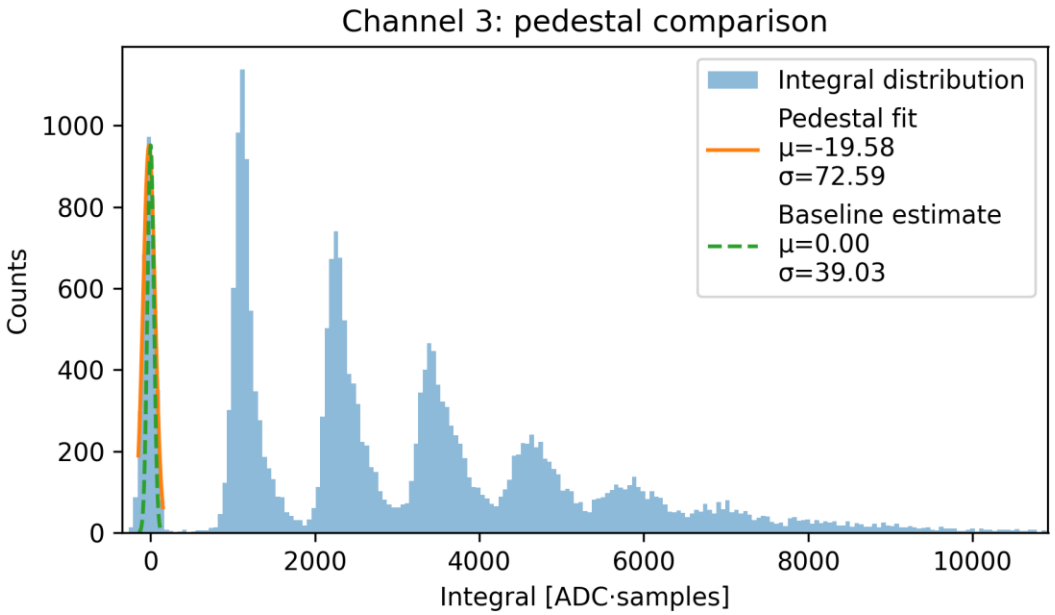


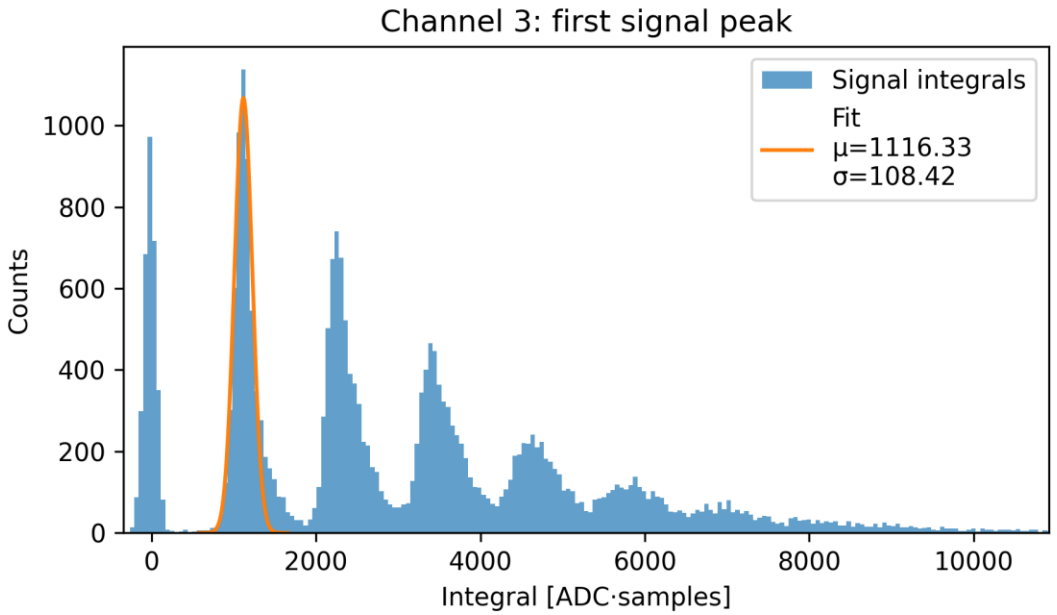






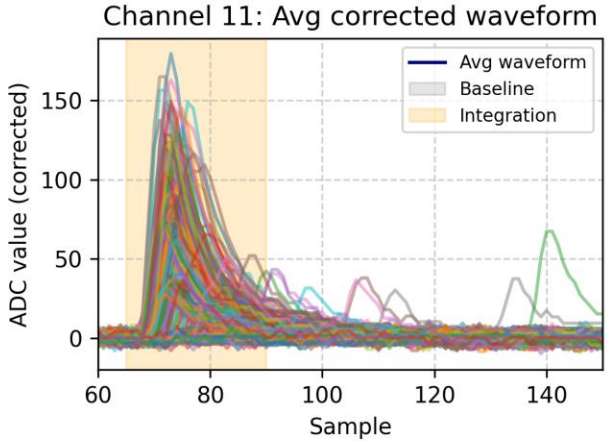
28Apr2026_cold_test_vgain1250_vbias1250_s35_p10_ch3: SNR value: 8.71, peak spacing: 1135.91, method: (integral)

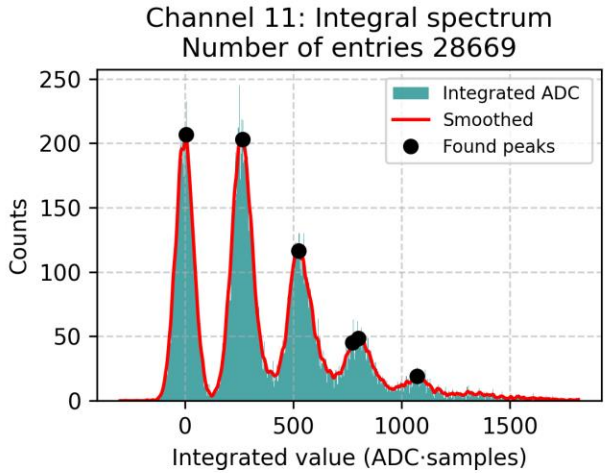


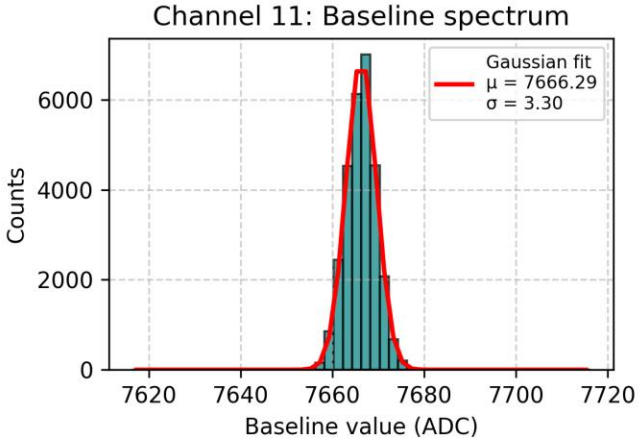


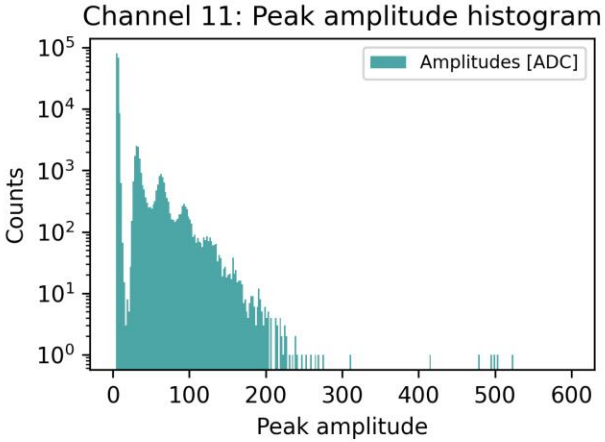
cold_test | Vgain 2000 | Vbias 1175 | s35-p10 | Channel 11
Baseline [0:30], Integration [65:90]

Mean peak spacing = 213.2

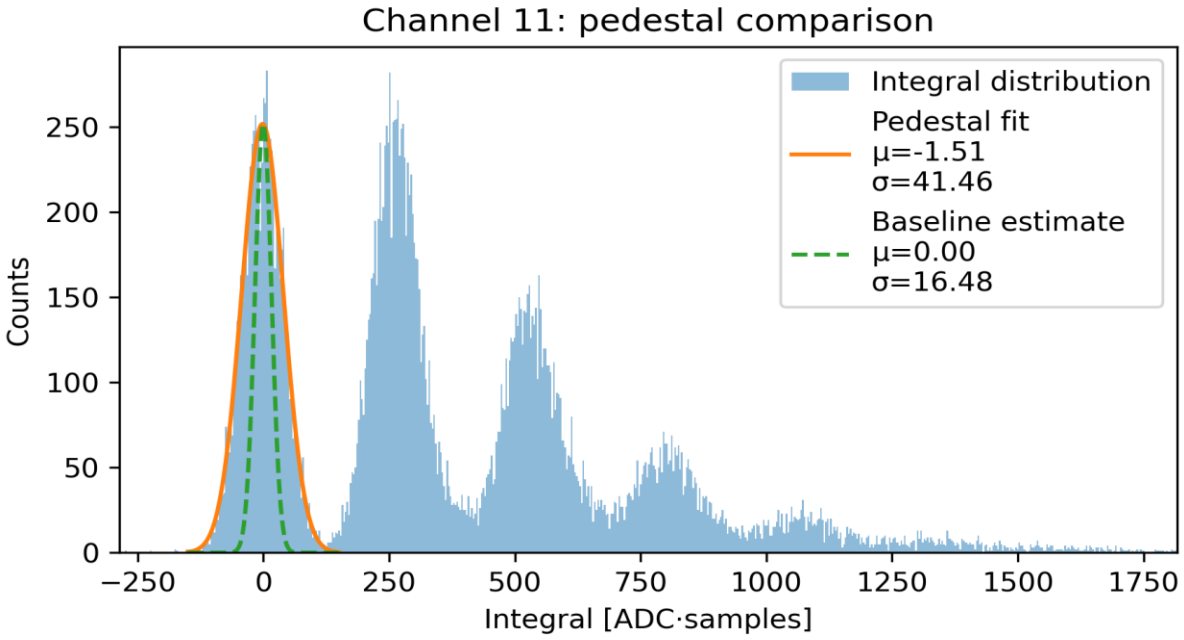


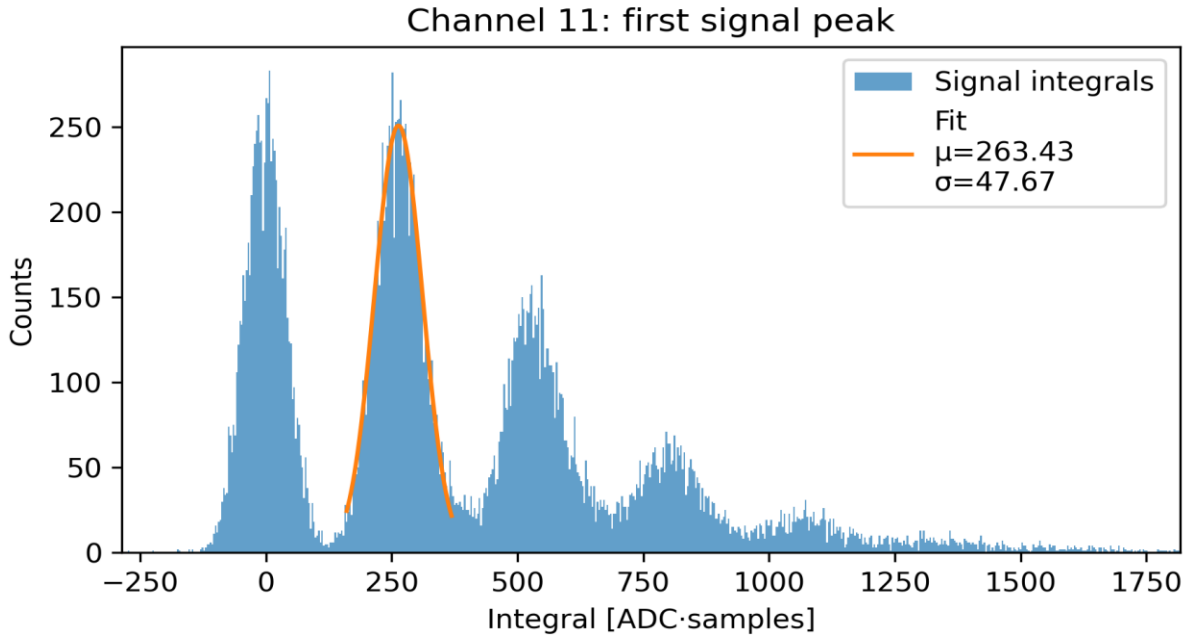






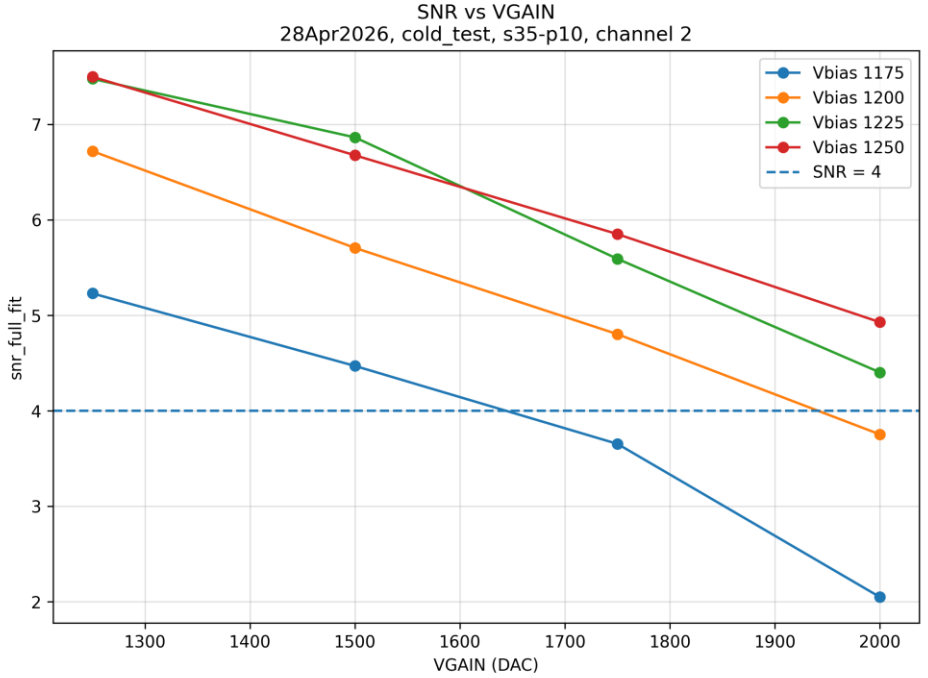
28Apr2026_cold_test_vgain2000_vbias1175_s35_p10_ch11: SNR value: 4.19, peak spacing: 264.94, method: (integral)



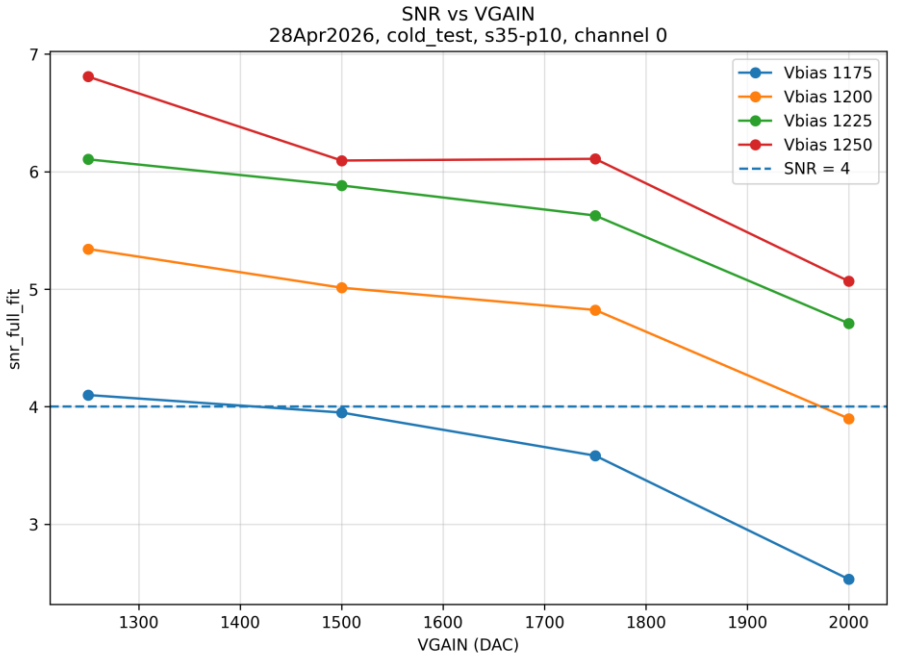


TUNE runs

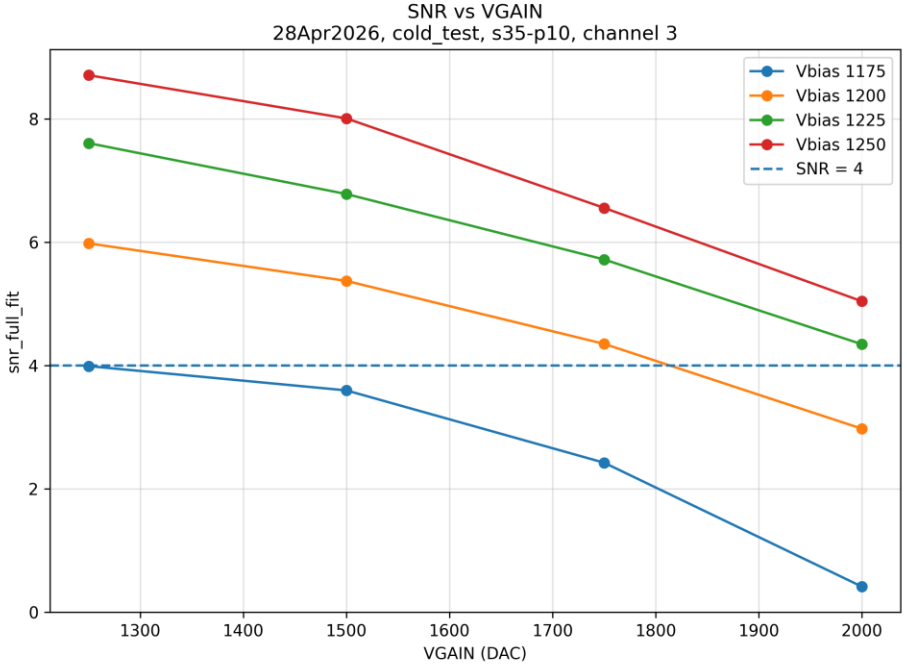
CH2



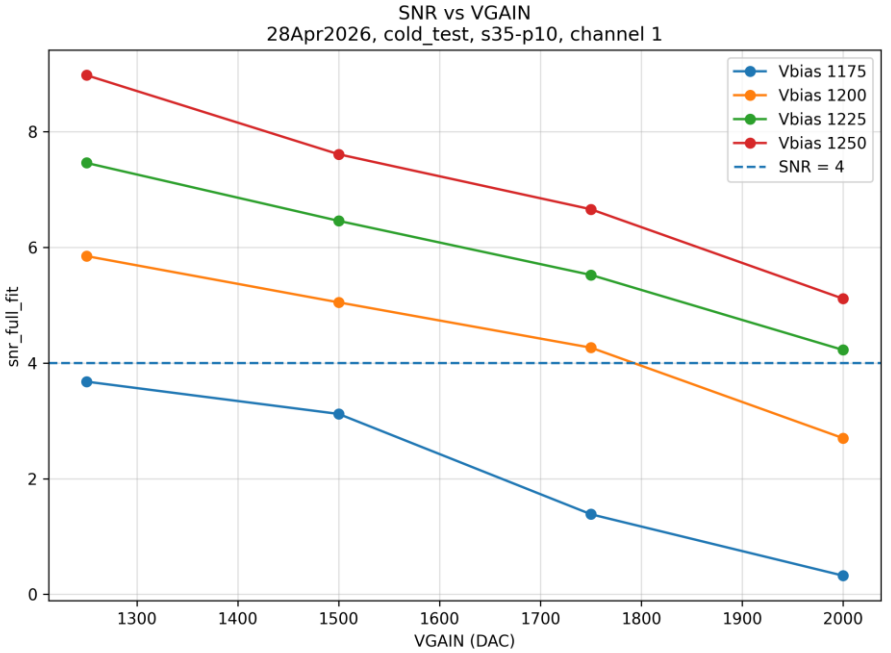
CH0



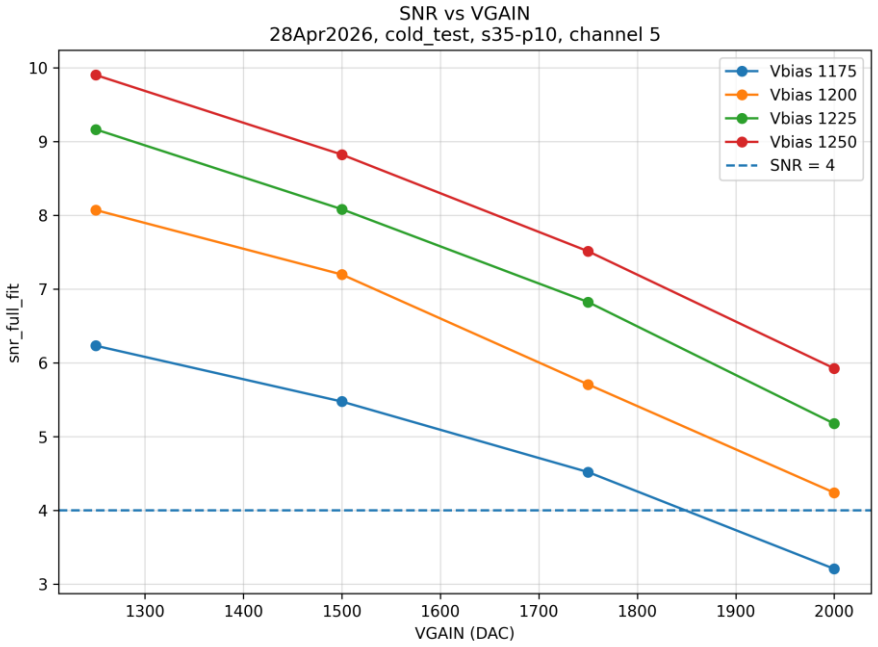
CH3



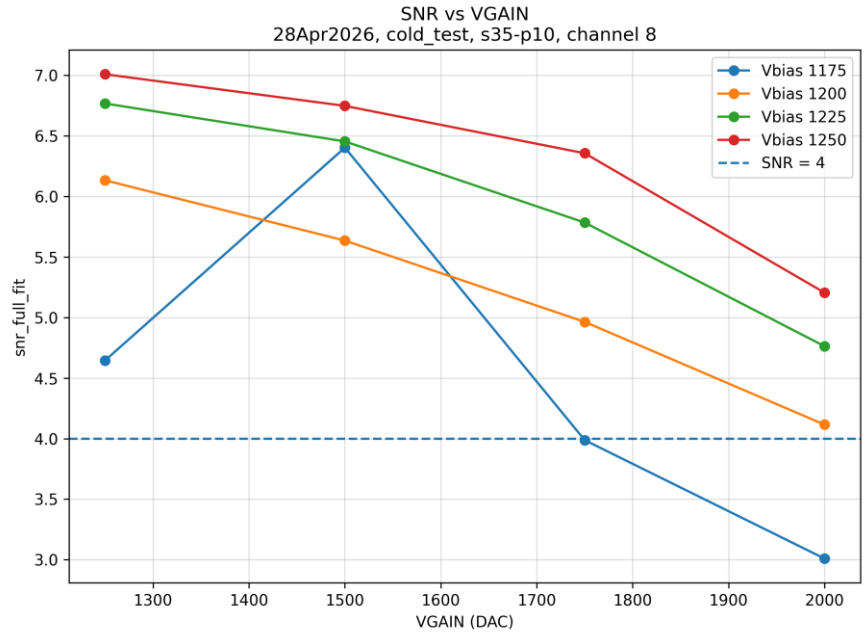
CH1



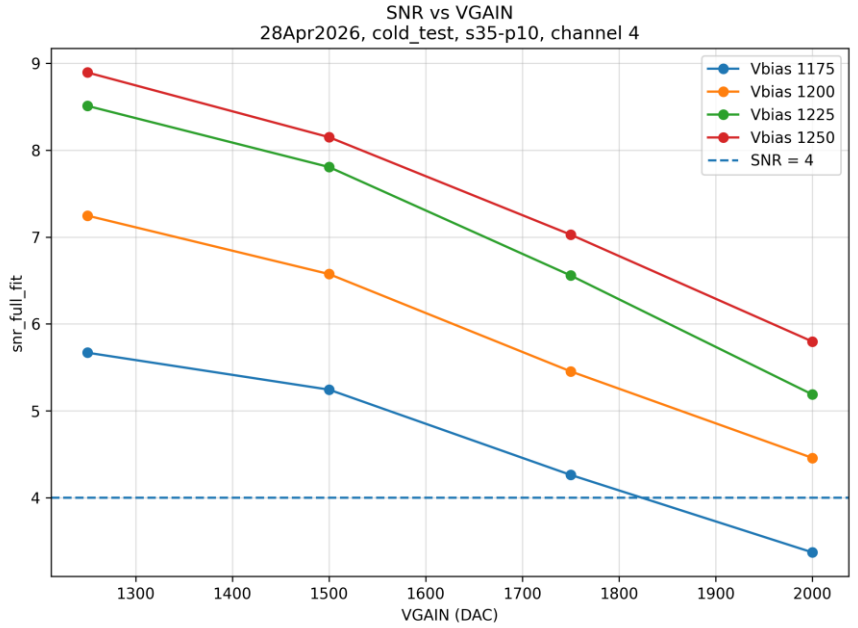
CH5



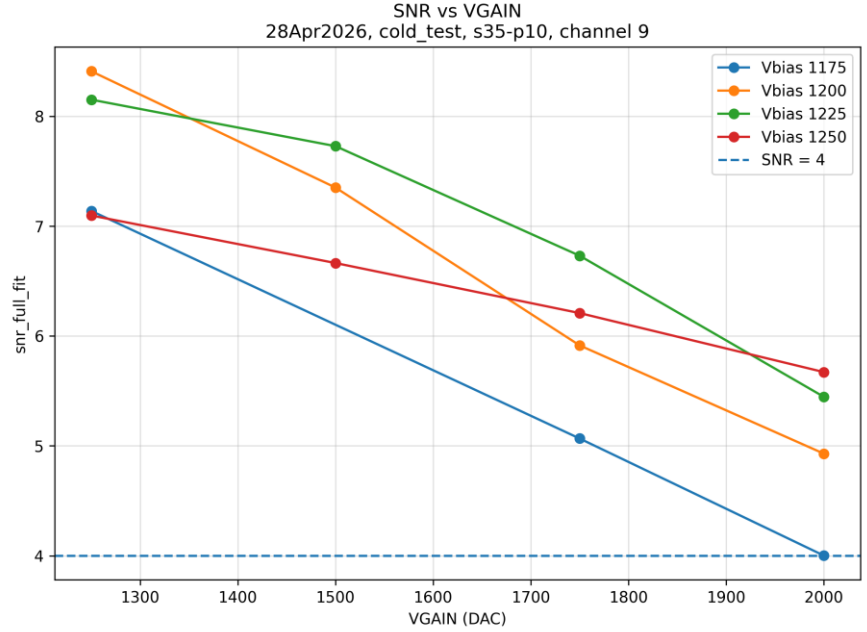
CH8



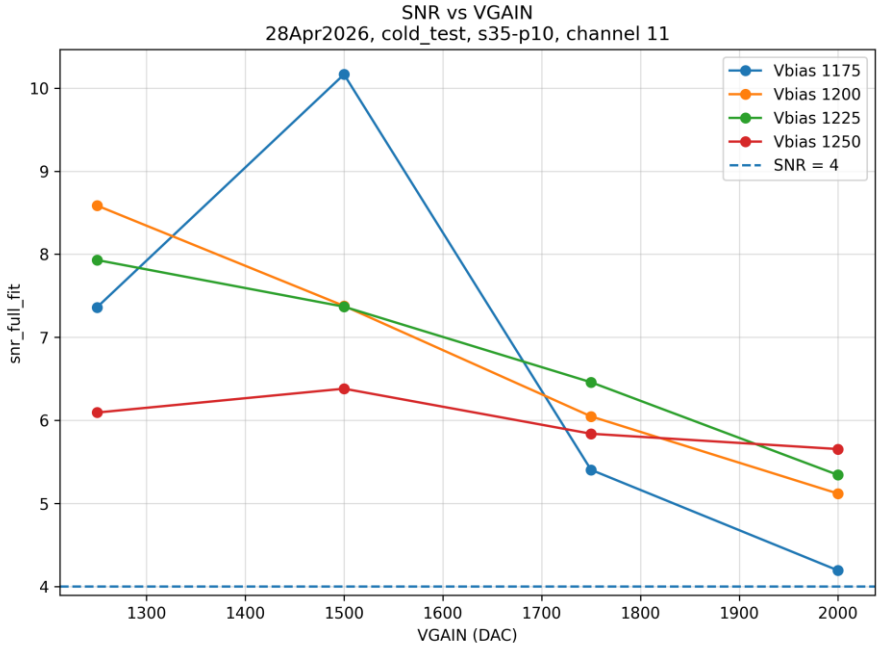
CH4



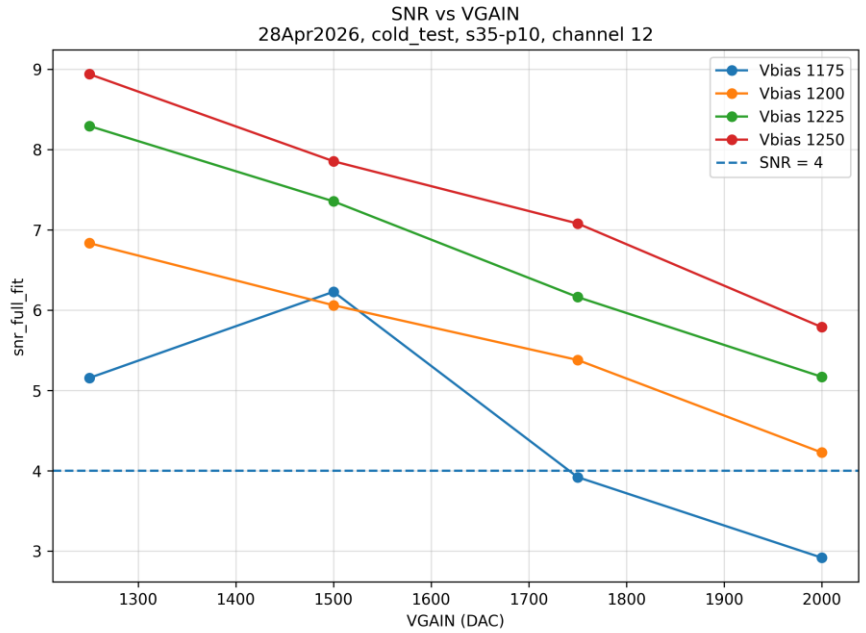
CH9



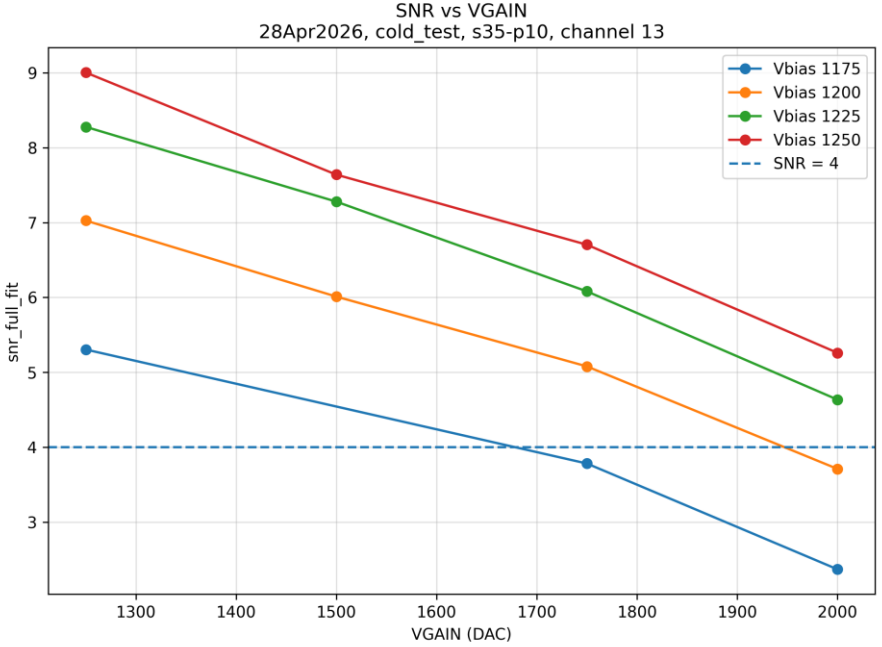
CH11



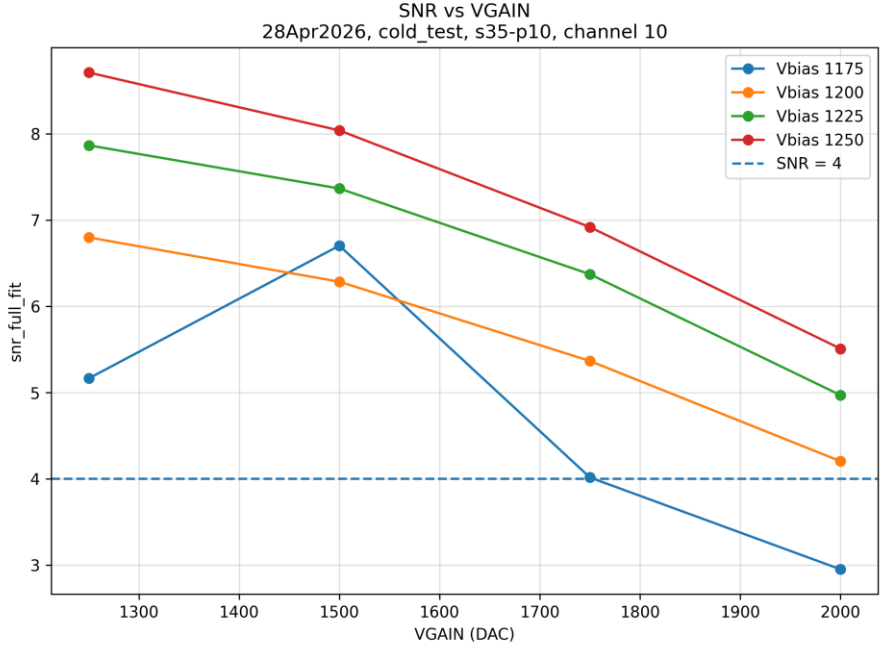
CH12



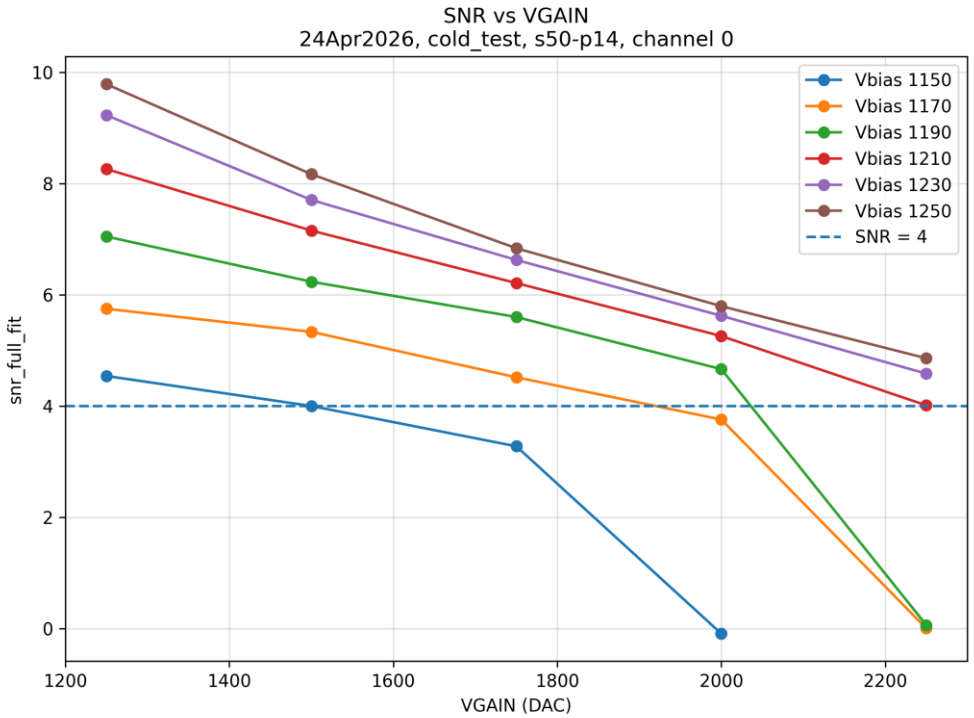
CH13



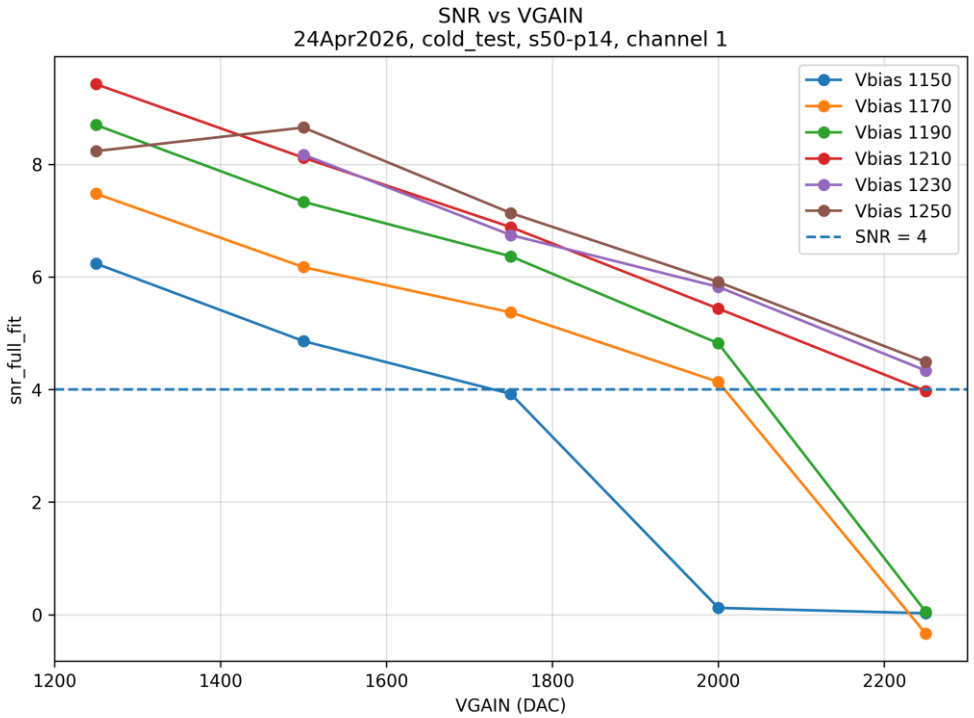
CH10



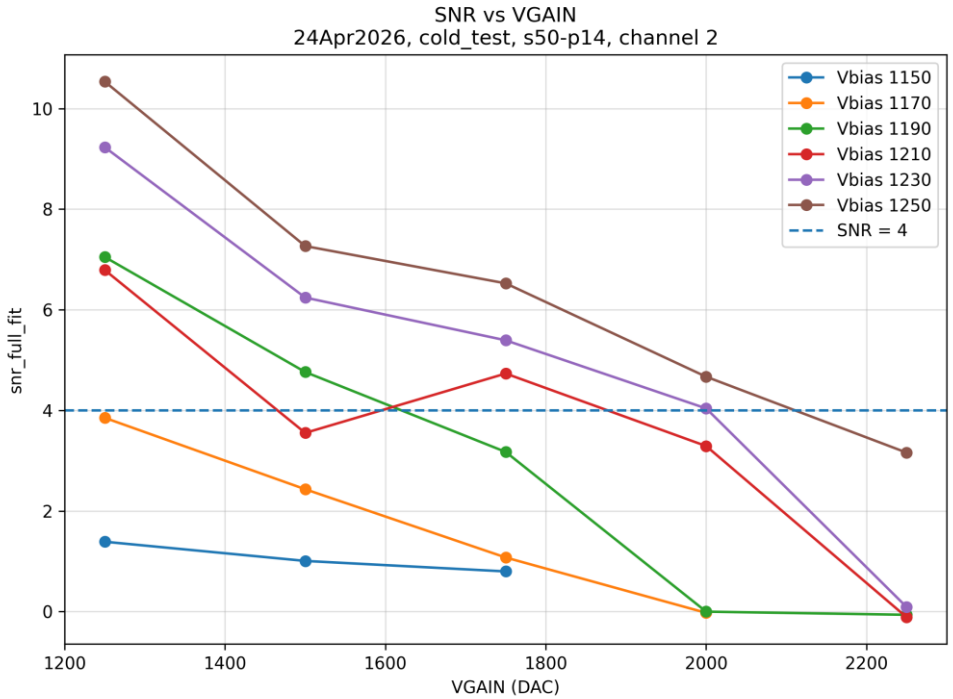
LED runs



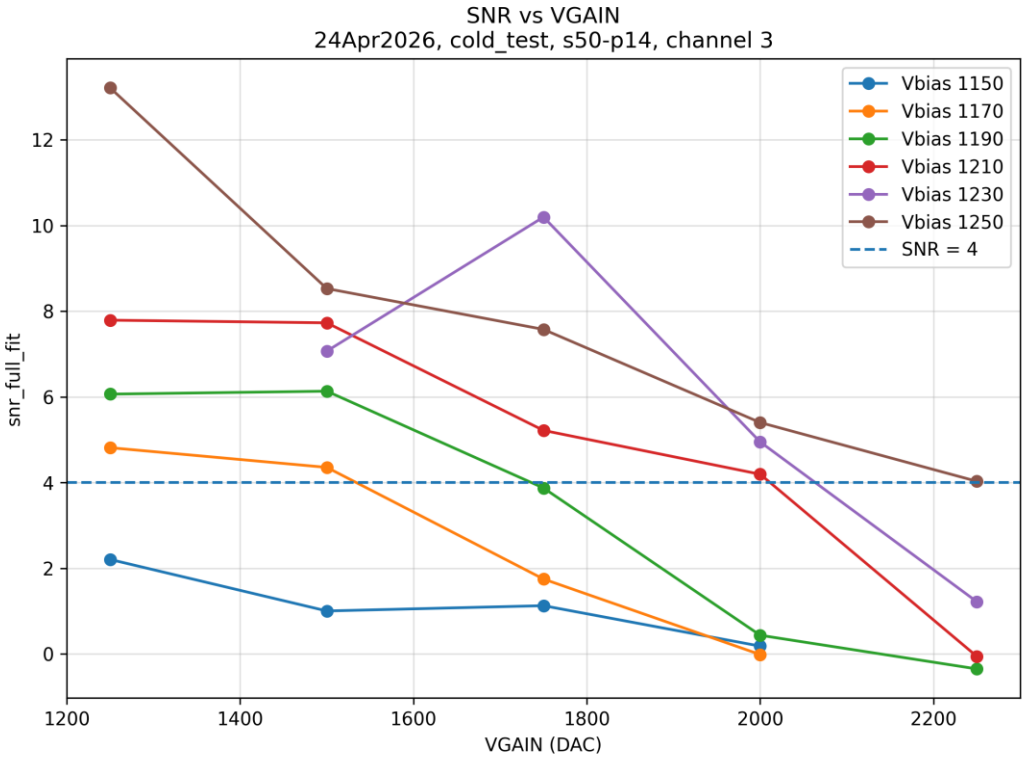
CH0



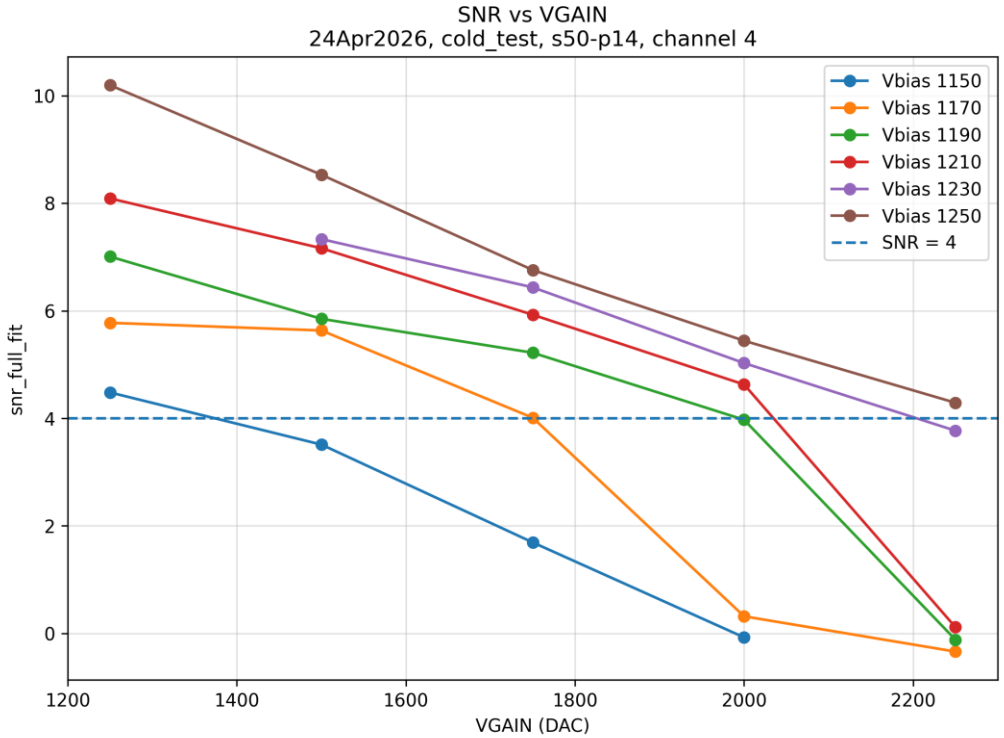
CH1



CH2

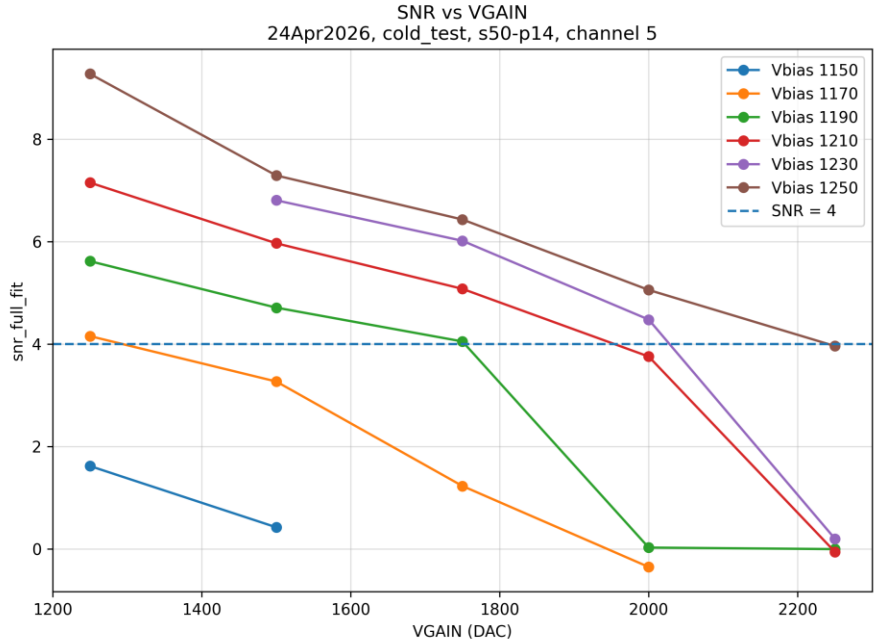

SNR vs VGAIN
24Apr2026, cold_test, s50-p14, channel 3
Vbias 1150
Vbias 1170
Vbias 1190
Vbias 1210
Vbias 1230
Vbias 1250
SNR = 4
snr_full_fit
VGAIN (DAC)

CH3


SNR vs VGAIN
24Apr2026, cold_test, s50-p14, channel 4
Vbias 1150
Vbias 1170
Vbias 1190
Vbias 1210
Vbias 1230
Vbias 1250
SNR = 4
snr_full_fit
VGAIN (DAC)

CH4

CH5


SNR vs VGAIN
24Apr2026, cold_test, s50-p14, channel 5
Vbias 1150
Vbias 1170
Vbias 1190
Vbias 1210
Vbias 1230
Vbias 1250
SNR = 4
snr_full_fit
VGAIN (DAC)