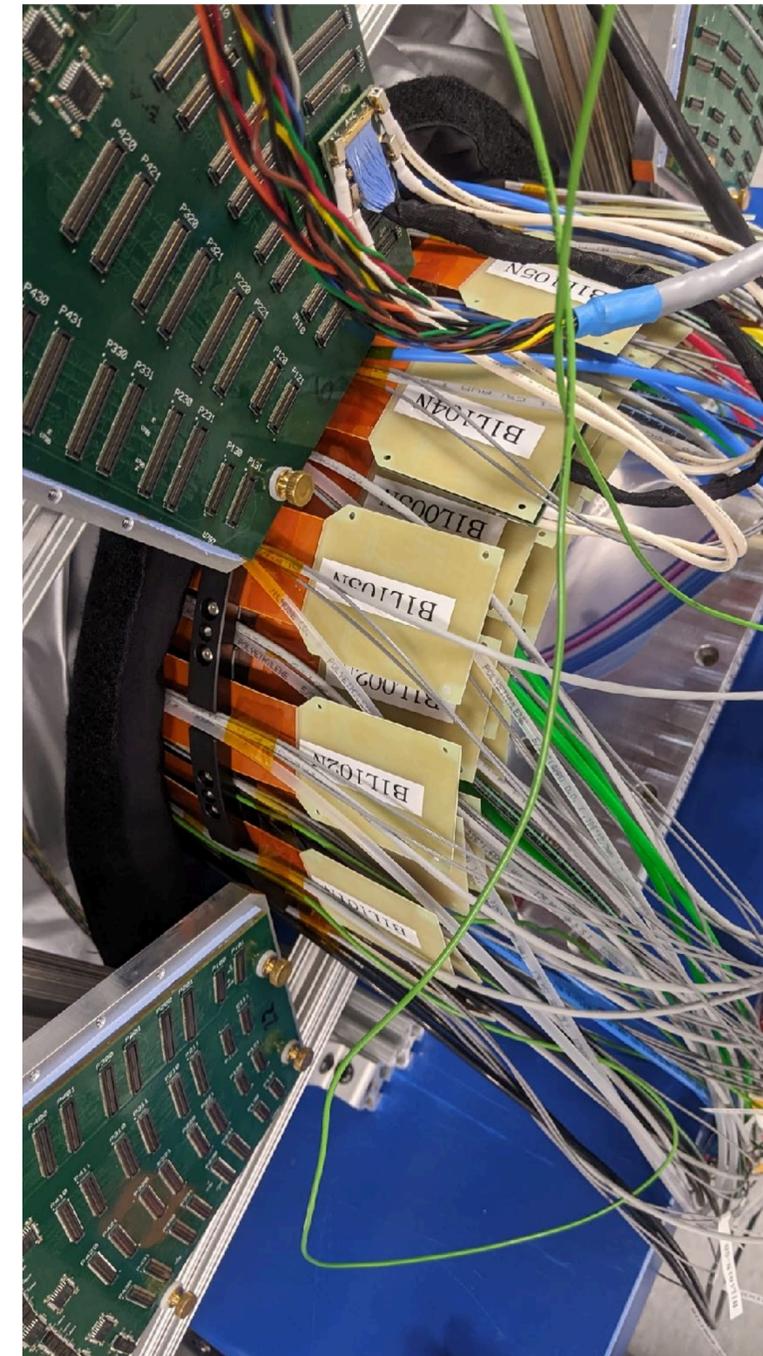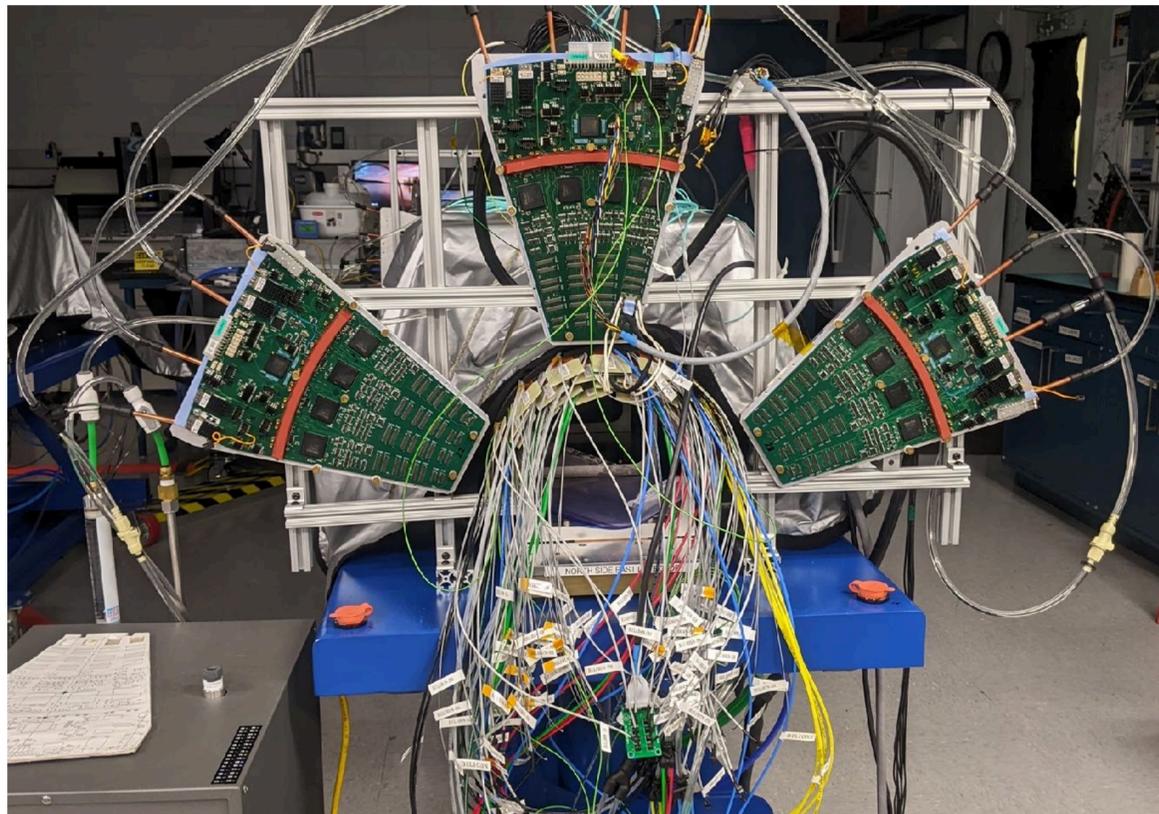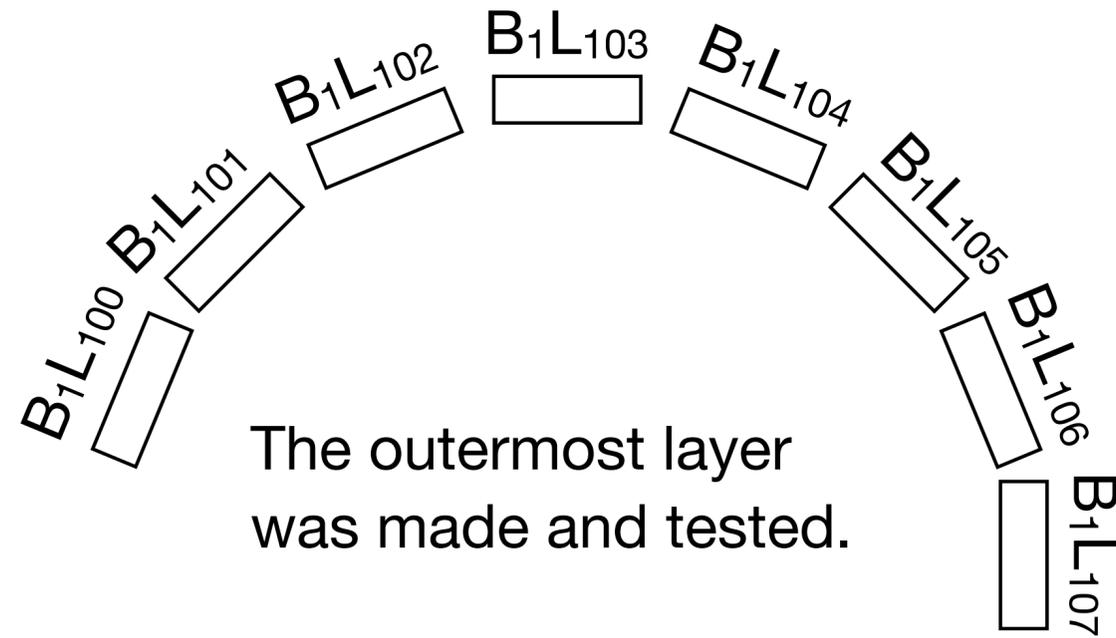# Status of the 4th barrel ladder test

M. Hata (NWU) , R. Nouicer (BNL), G. Nukazuka (RBRC),
R. Pisani (BNL), C. Shih (NCU), W. Tang (NCU),
M. Watanabe (NWU)

The barrel ladder tests

Notation: BxLyzz

x: Barrel ID (0 for inner or 1 for outer)
y: Layer ID (0 for inner or 1 for outer)
zz: Ladder ID (from 0 to 15)
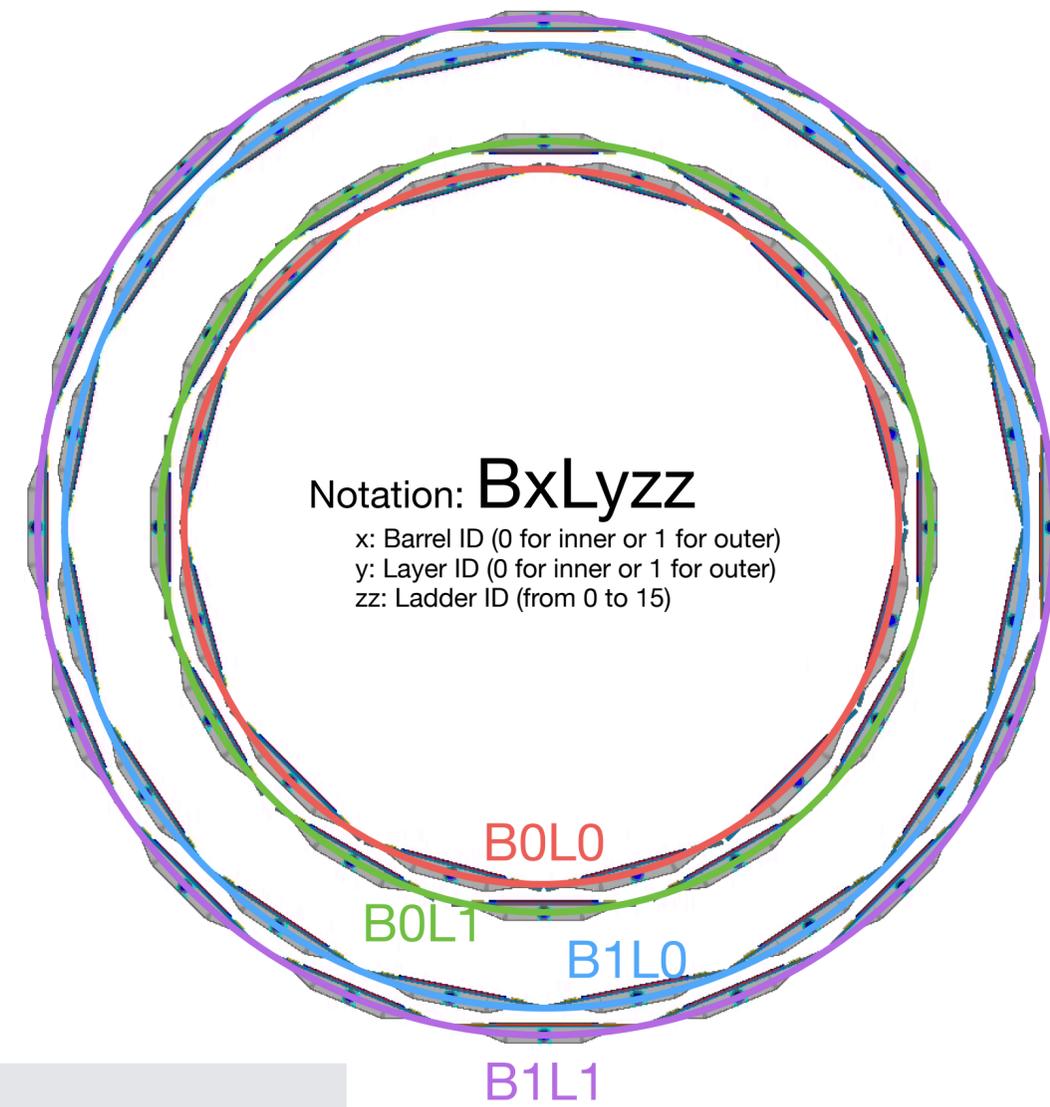
B0L0
B0L1
B1L0
B1L1

	Date	Tested layers	Results
1st test	June/10-June/14	B0L0	Good.
2nd test	June/17-July/07	B0L1, some of B0L0	Some ladders in B0L1 were noisy. GND condition was investigated.
3rd test	Aug/10-Aug/24	B1L0 (some of) B0L1&B0L0	Good.
4th test	Aug/26 - now	B1L1	The West barrel was done. Test of the East barrel is ongoing.

The 4th barrel calibration tests: The setup

B_1L_{100} B_1L_{101} B_1L_{102} B_1L_{103} B_1L_{104} B_1L_{105} B_1L_{106} B_1L_{107}

The outermost layer was made and tested.

B1L1 west side was already tested.
Test results of B1L1 north-west side are reported.
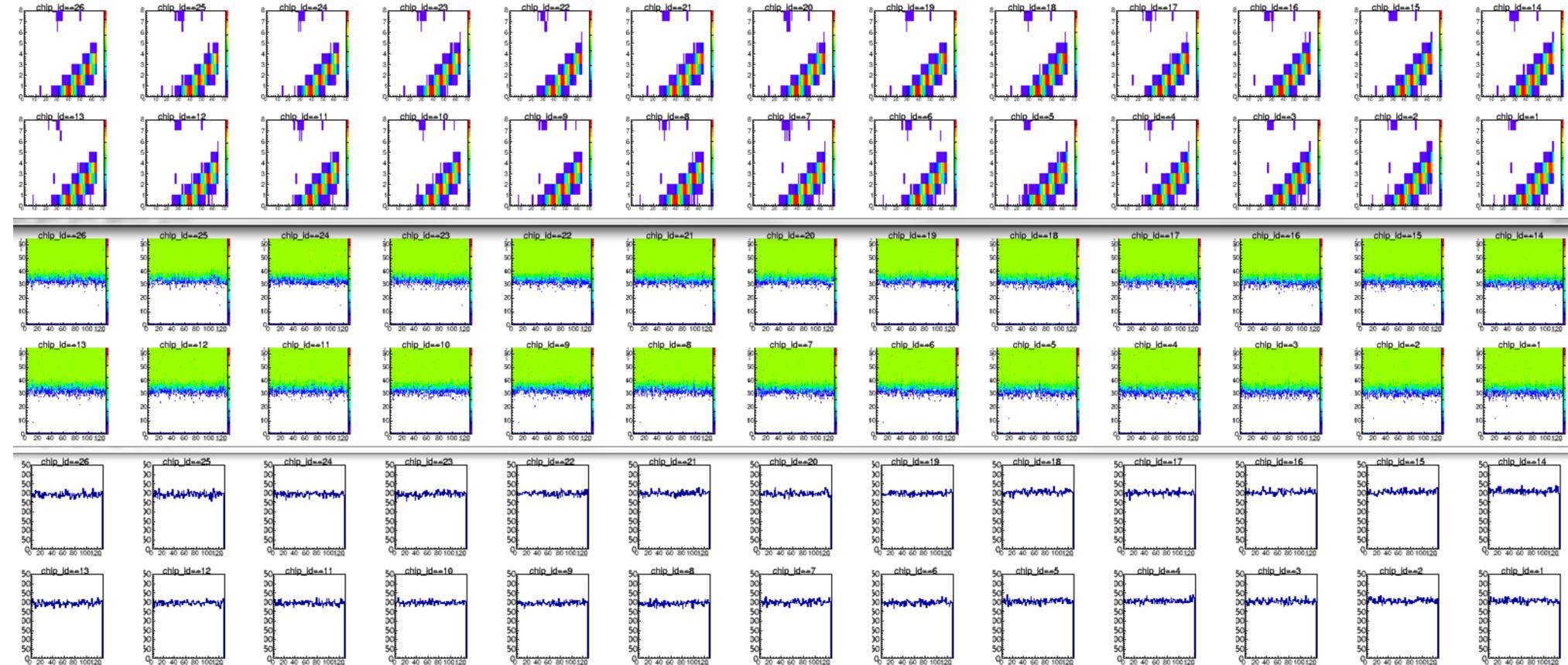
The 4th barrel calibration tests: Results

B1L100

North

Bias: 100 V, A = 381 nA, B = 349 nA
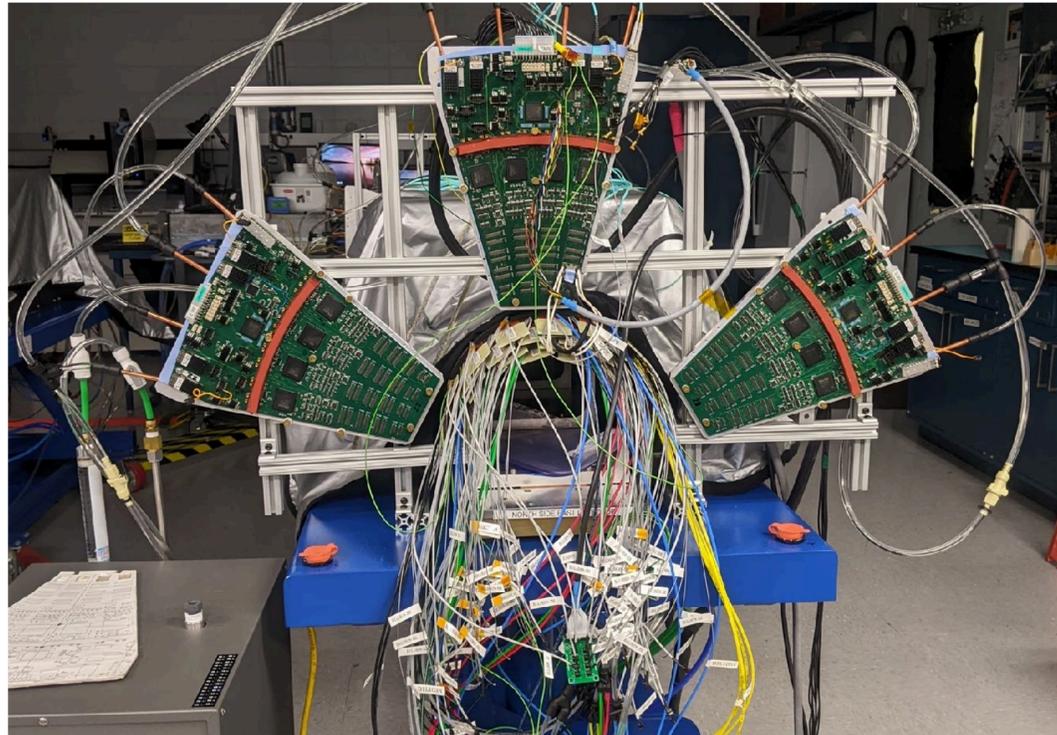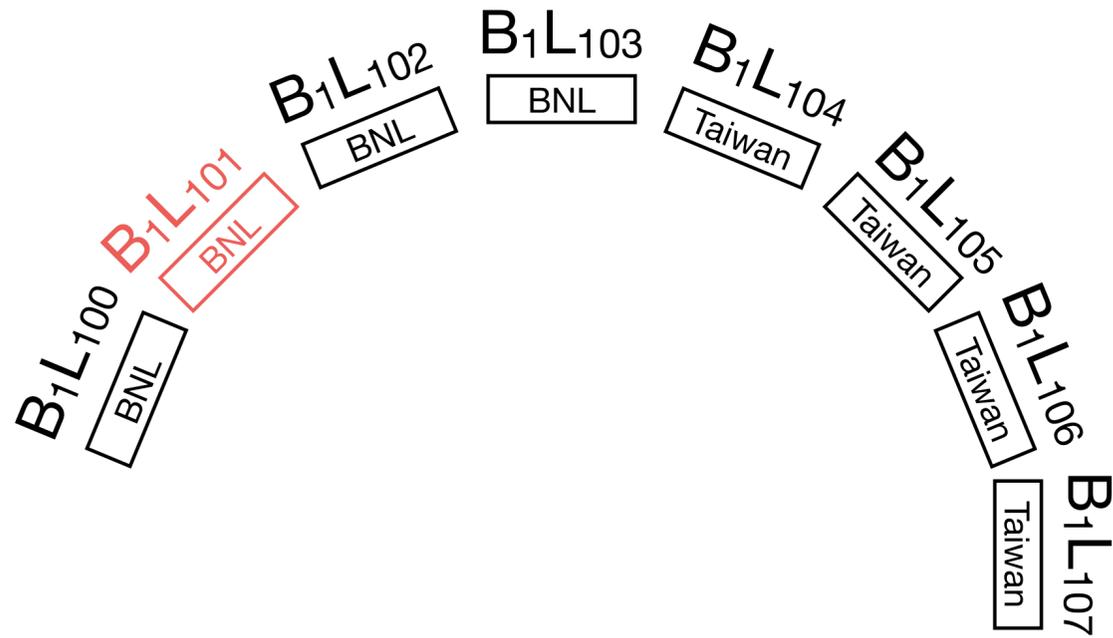Temperature: A = 23.7 °C, B = 23.5 °C
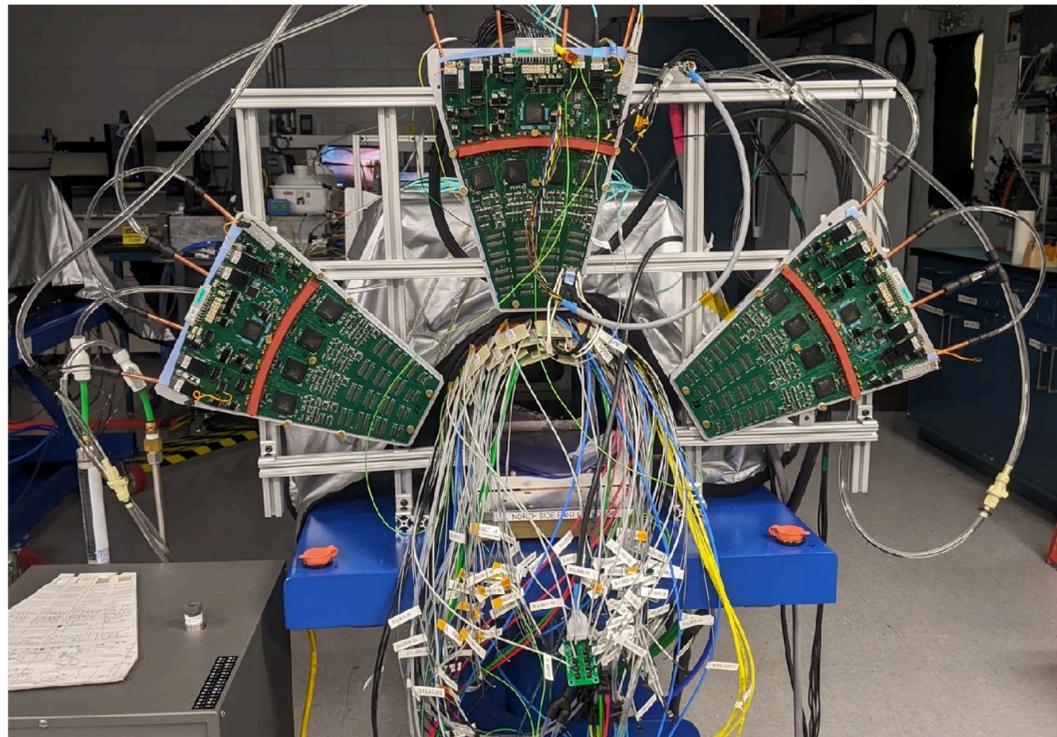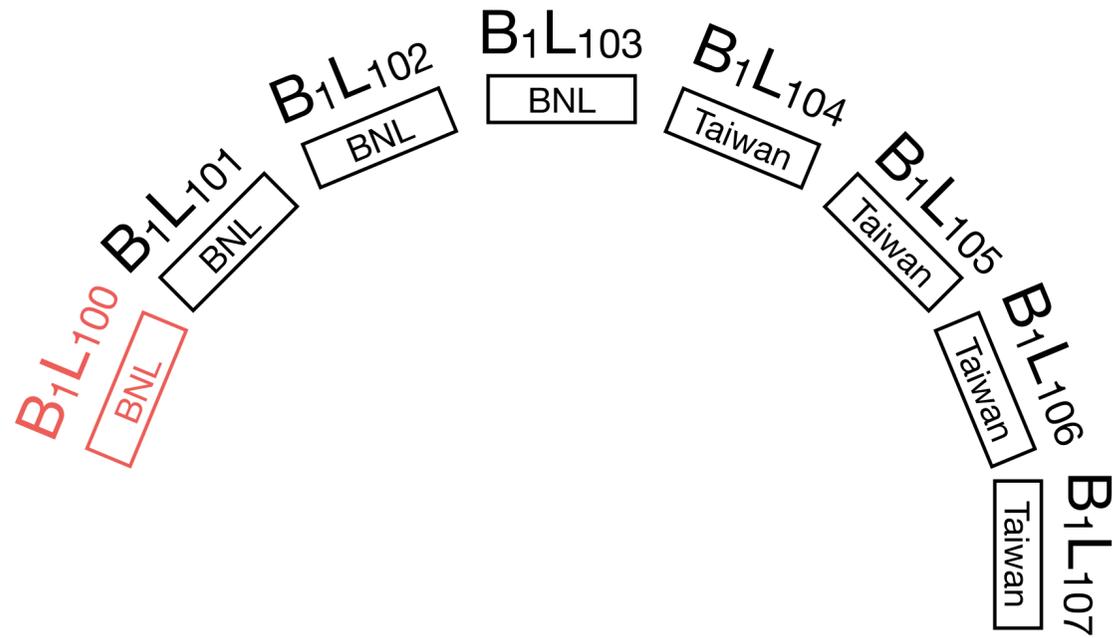
Calibration: 20220901-1909_0.dat, 6

Good results

The 4th barrel calibration tests: Results

B1L101
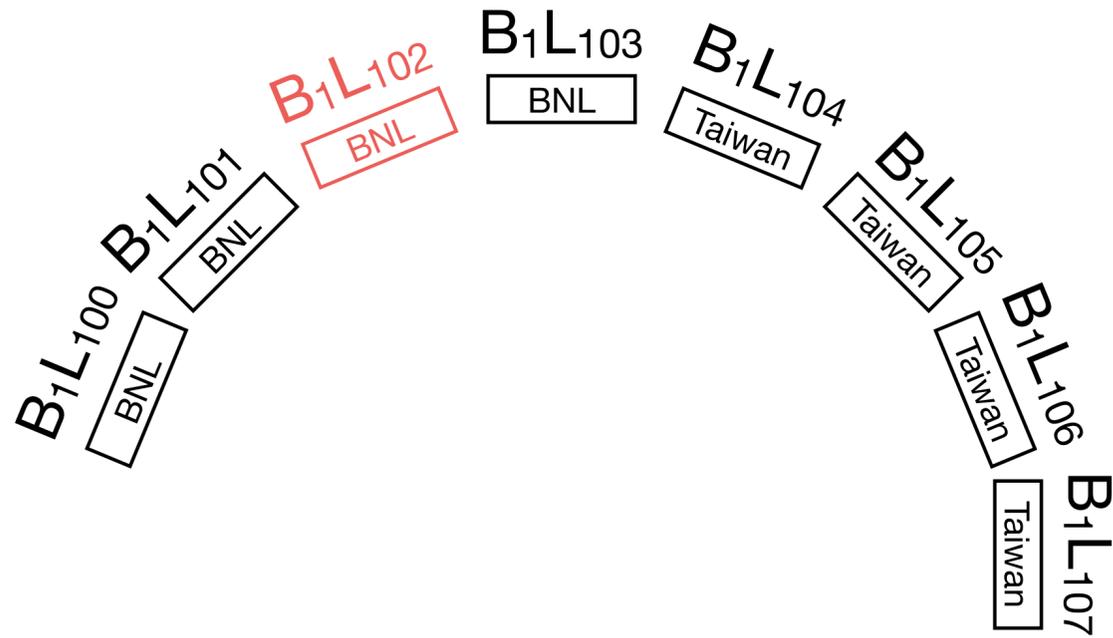
North

Calibration: 20220901-1900_0.dat, 6

Bias: 100, A = 422 nA, B = 351 nA
Temperature: A = 23.7 °C, B = 23.3 °C
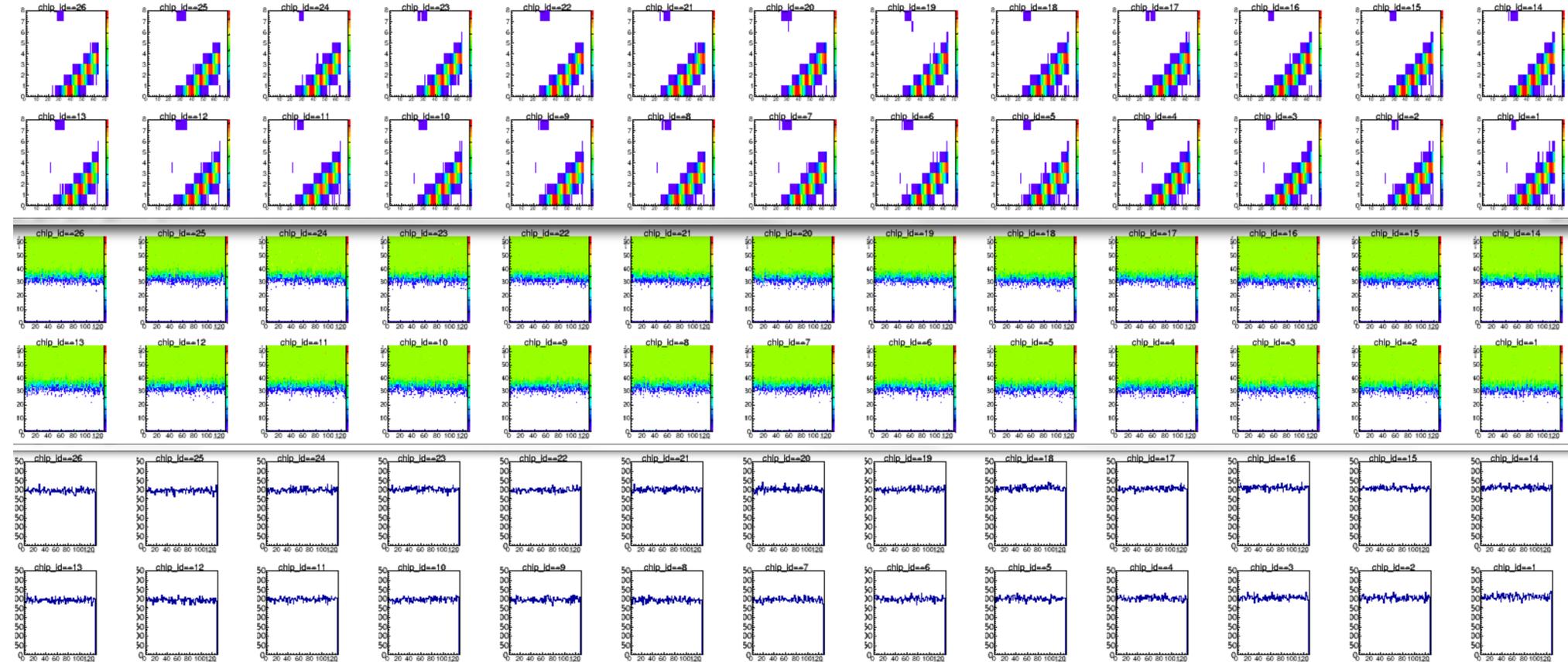
Good results

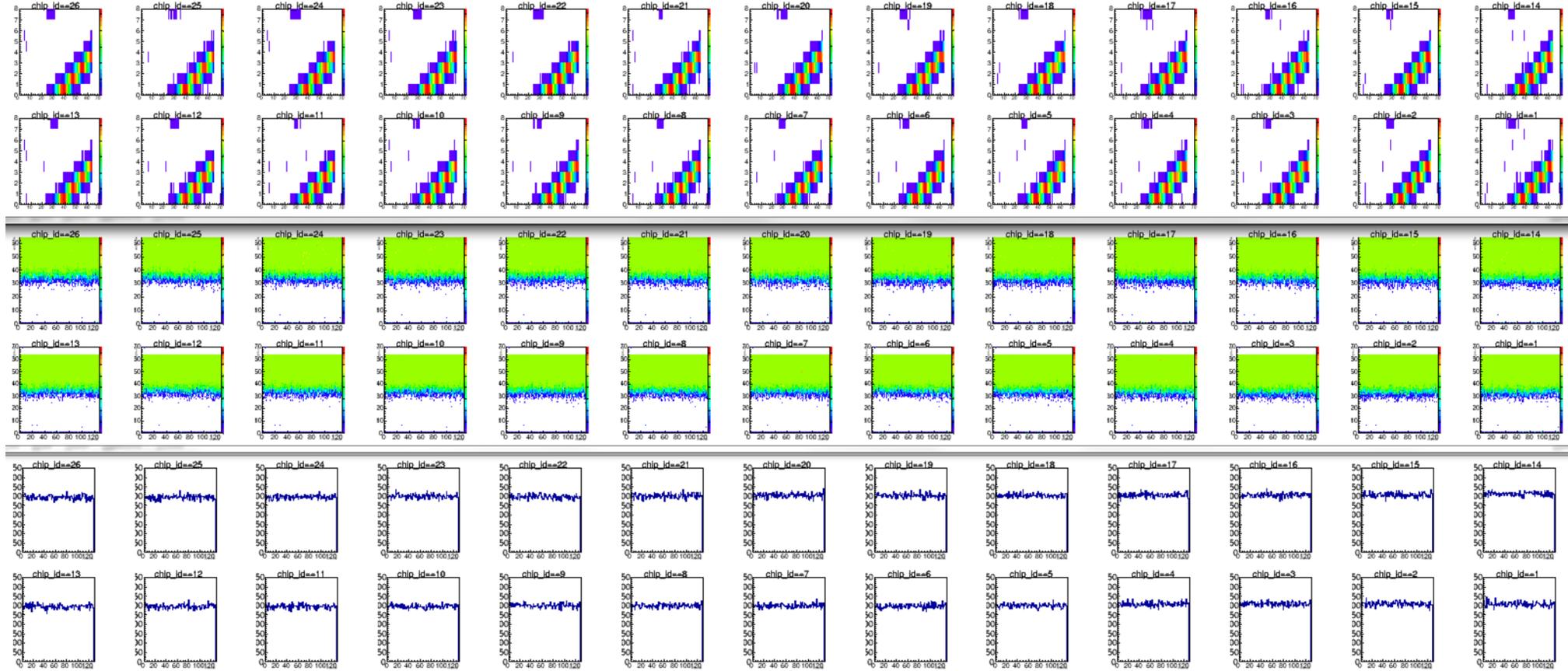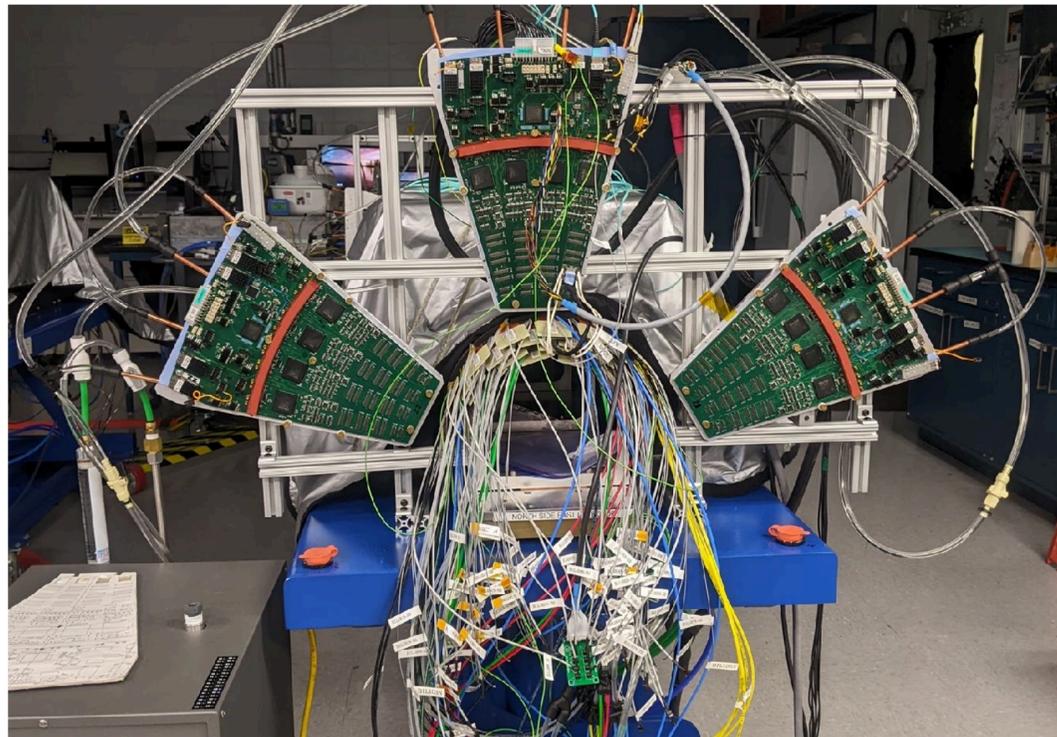# The 4th barrel calibration tests: Results

B1L102

North

Bias: 100, A = 400 nA, B = 340 nA
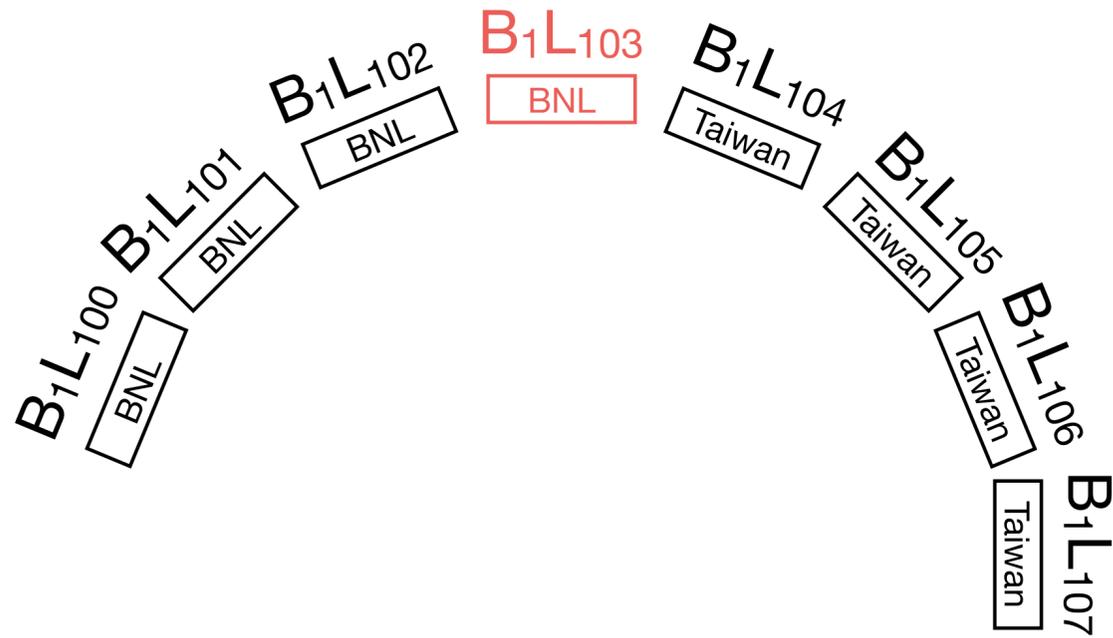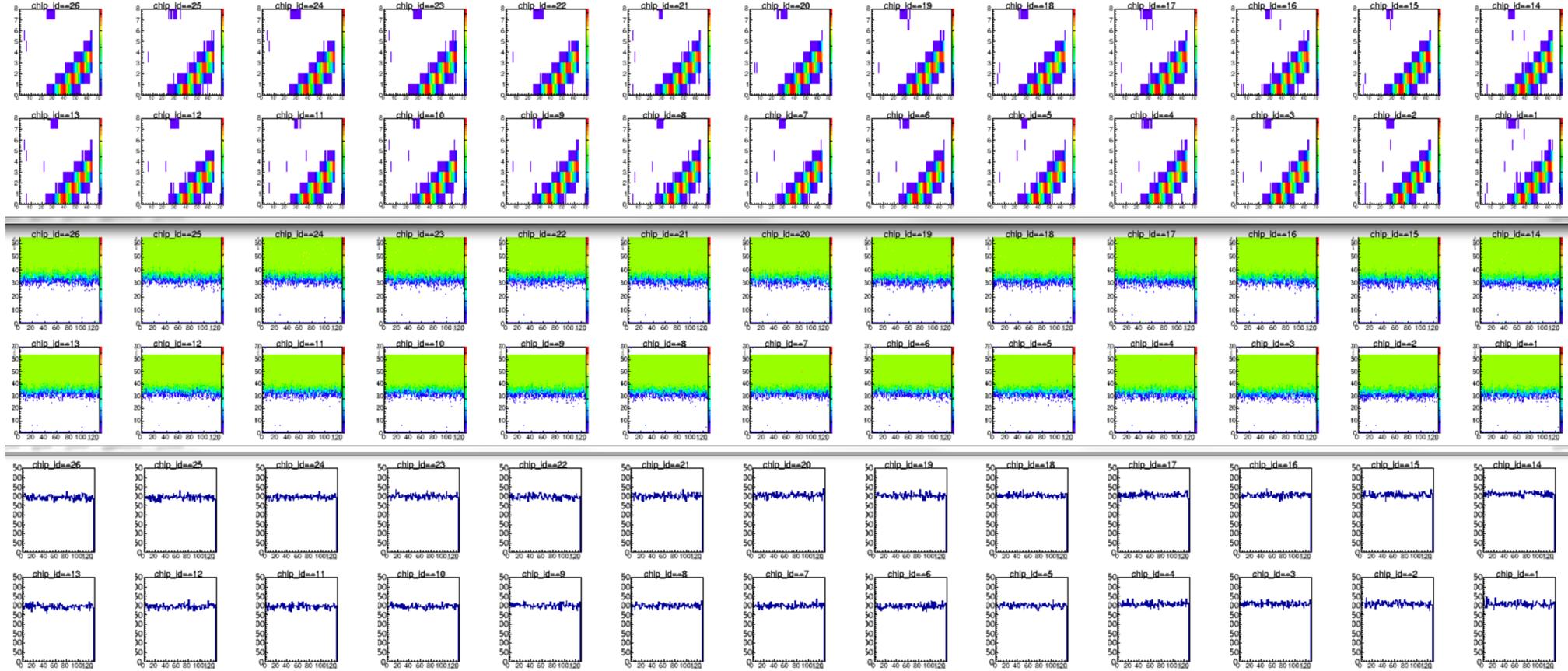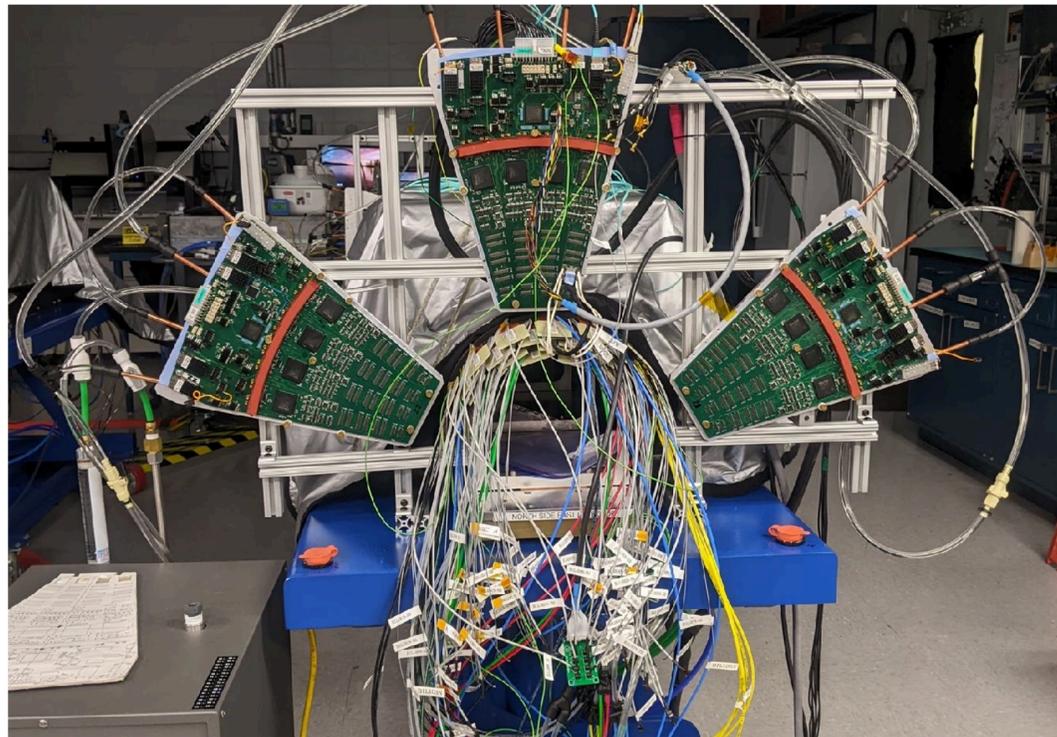Calibration: 20220901-1847_0.dat, 6
Temperature: A = 23.2 °C, B = 22.9 °C

Good results

The 4th barrel calibration tests: Results

B1L103

North

Bias: 100, A = 385 nA, B = 213 nA
Temperature: A = 23.3 °C, B = 22.8 °C

Calibration: 20220901-1801_0.dat, 6

Good results

Sep/01/2022 18:01
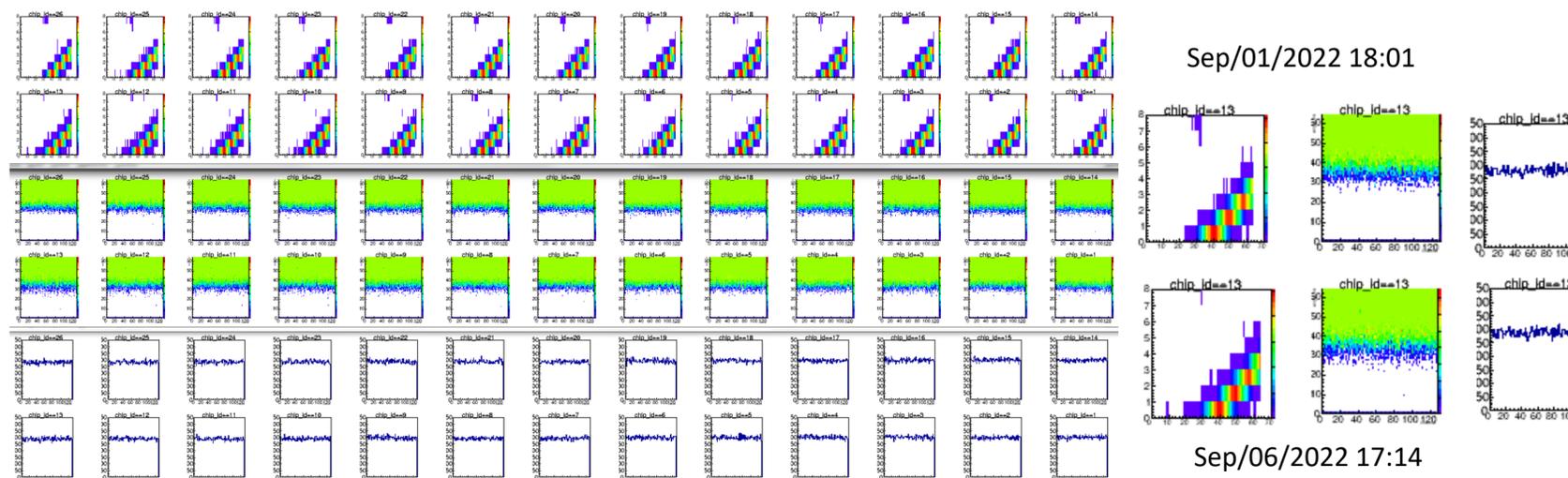
But on Sep/06, we got
slightly noisier results:
We don't understand what it means…

Sep/06/2022 17:14

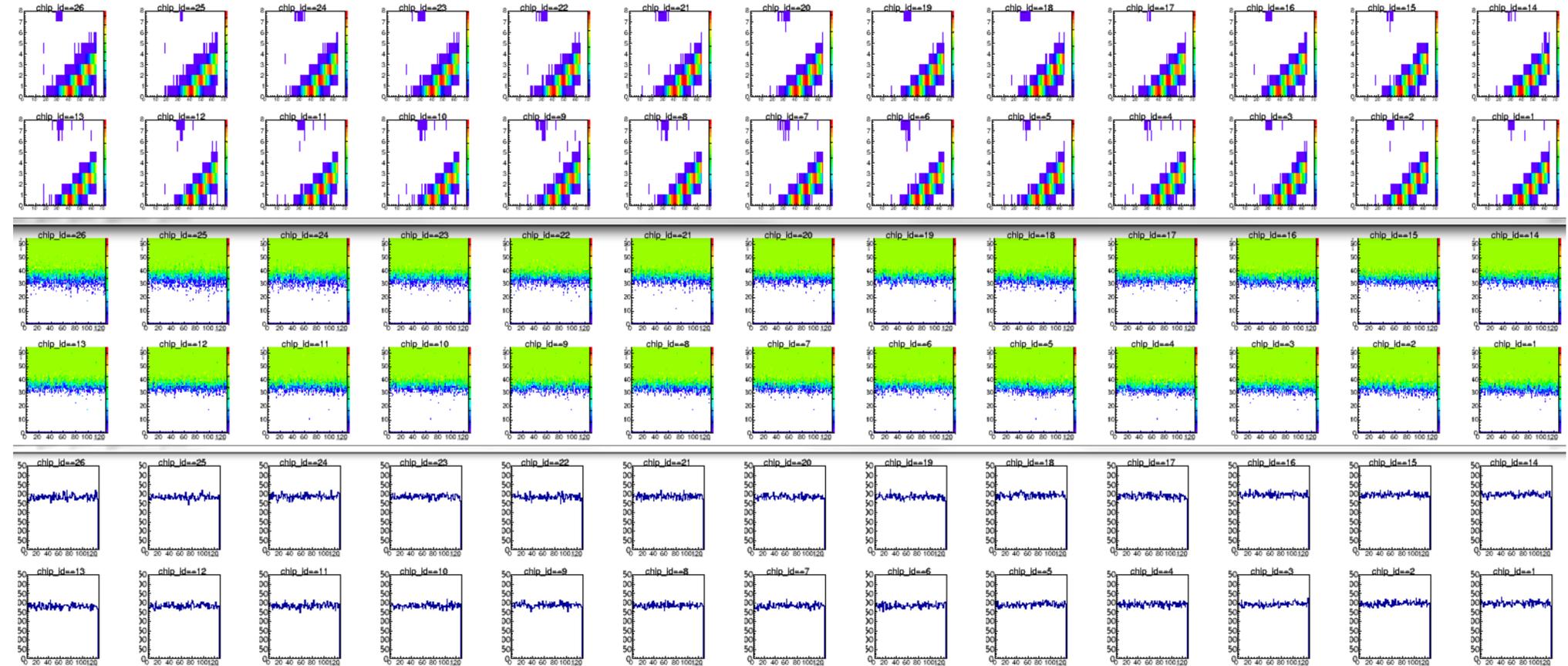# The 4th barrel calibration tests: Results
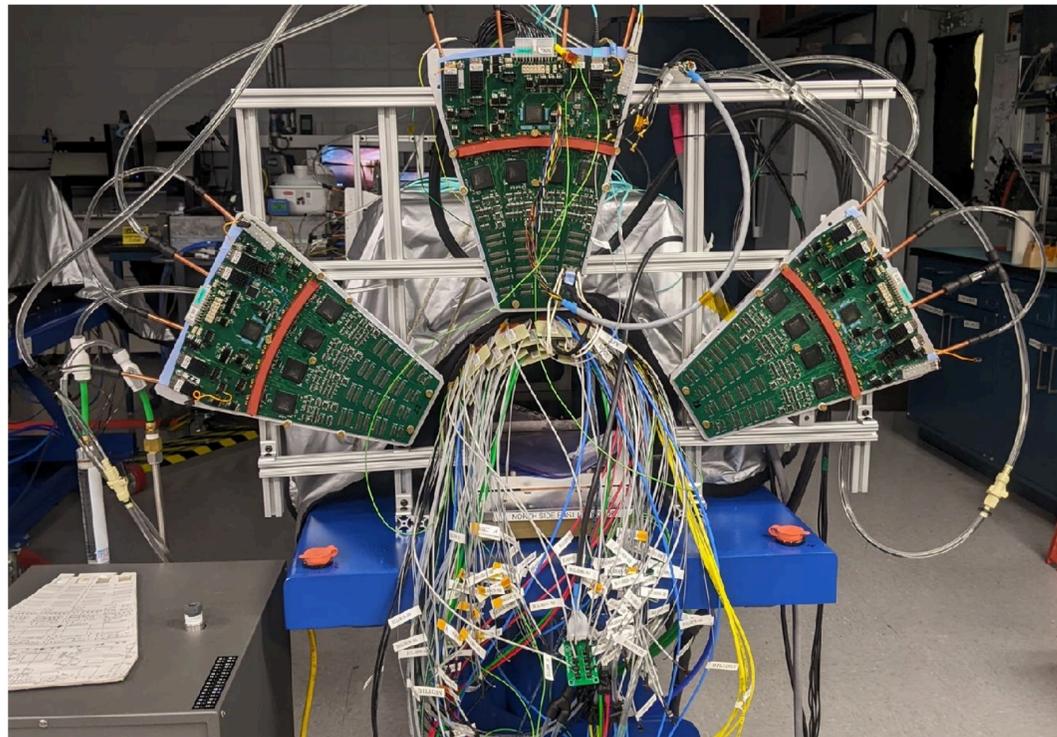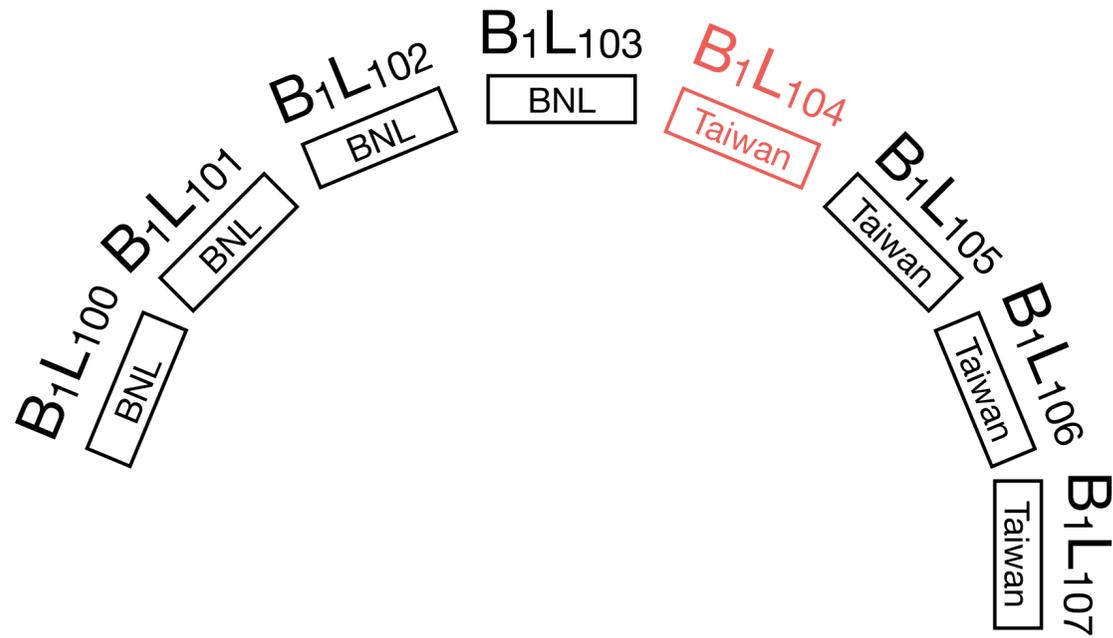
B1L104

North
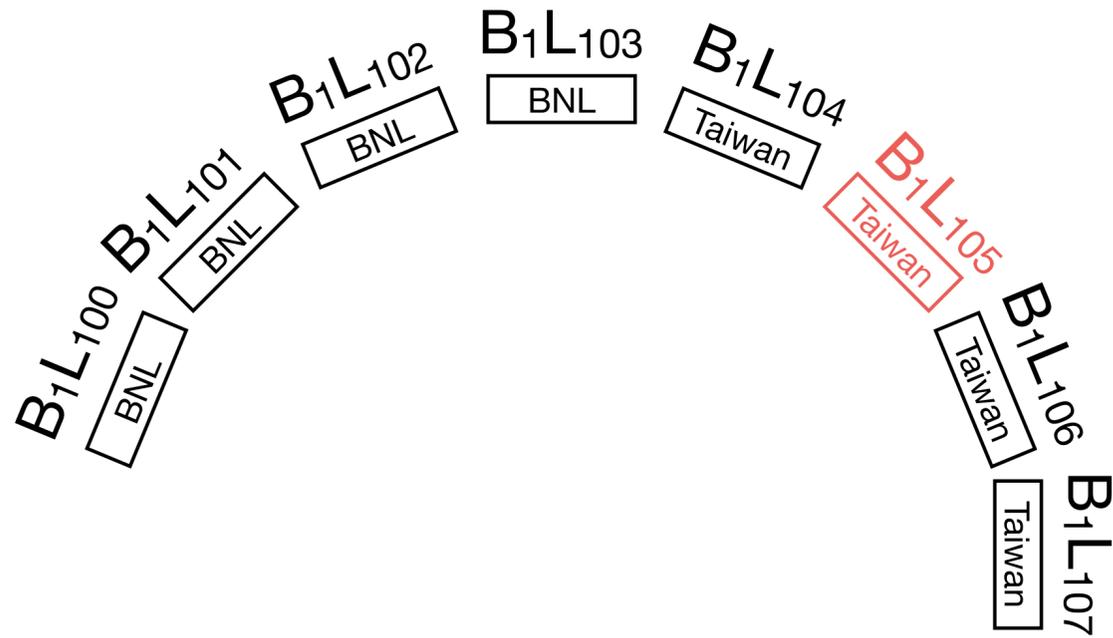
Calibration: 20220901-1756_0.dat, 6

Bias: 100, A = 405 nA, B = 350 nA
Temperature: A = 23.0 °C, B = 22.8 °C

The results look little bit noisy.
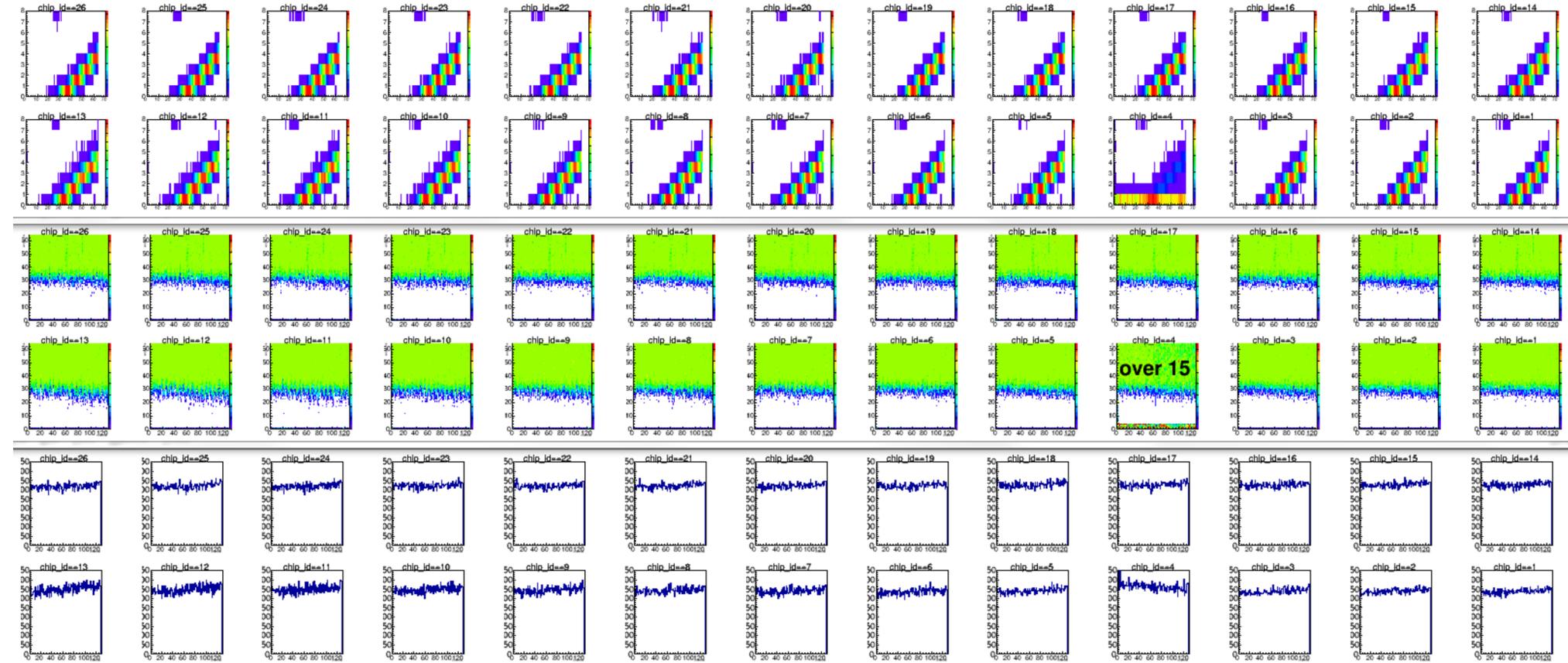
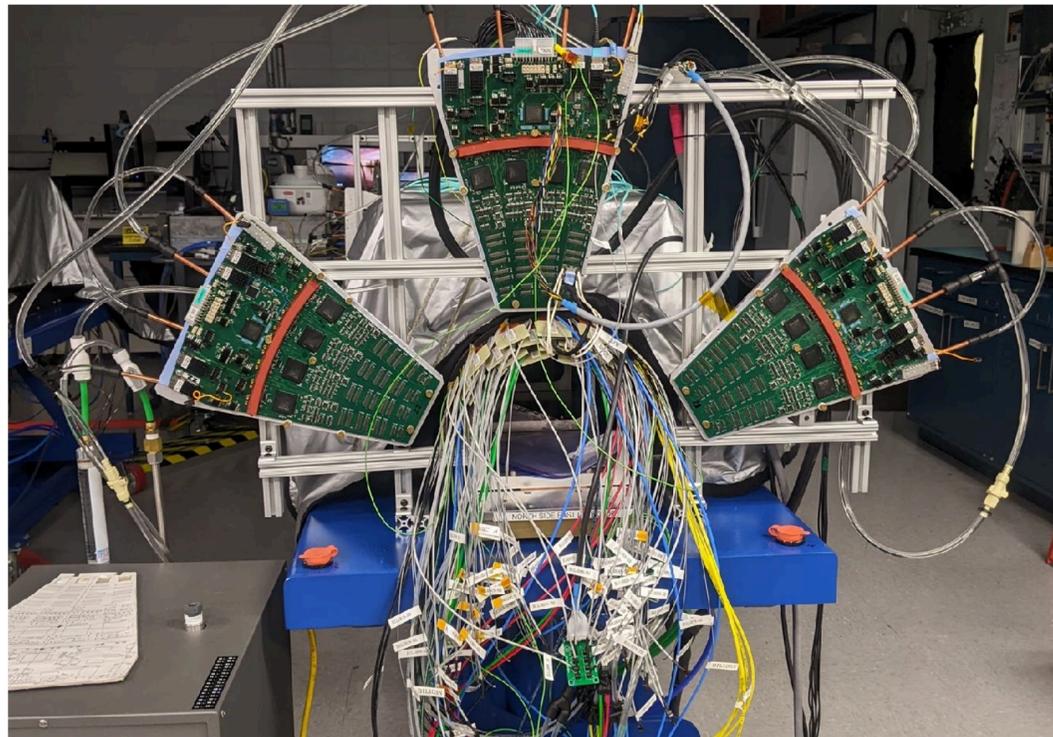# The 4th barrel calibration tests: Results

B1L105

North

Calibration: 20220906_1820_0.dat, 6

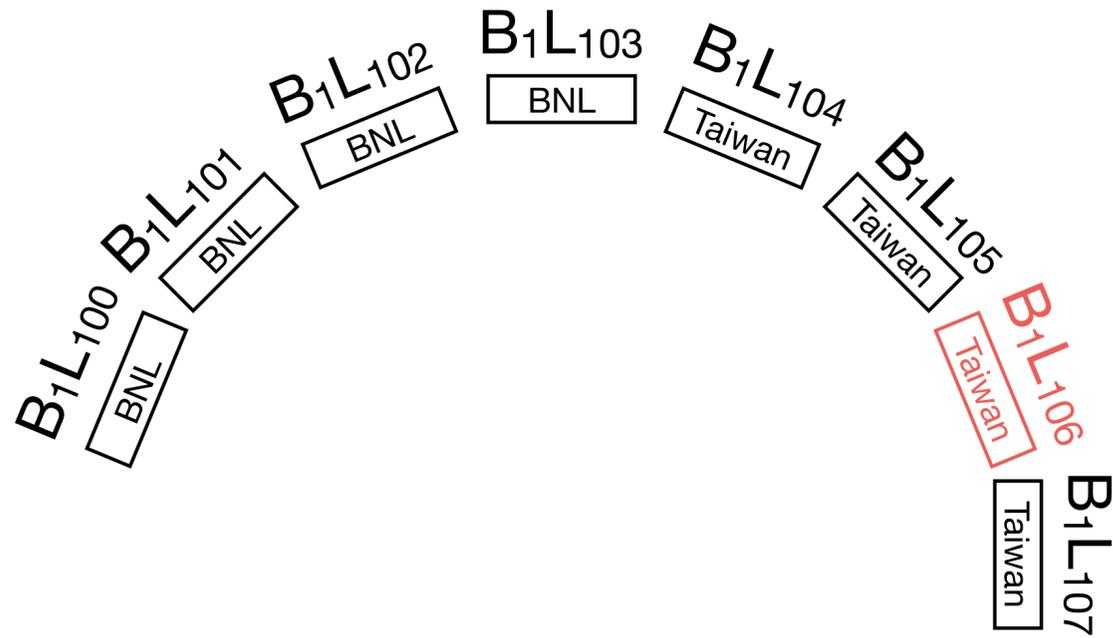Bias: 100, A = 421 nA, B = 356 nA
Temperature: A = 23.0 °C, B = 22.7 °C

The results look noisy.

The 4th barrel calibration tests: Results

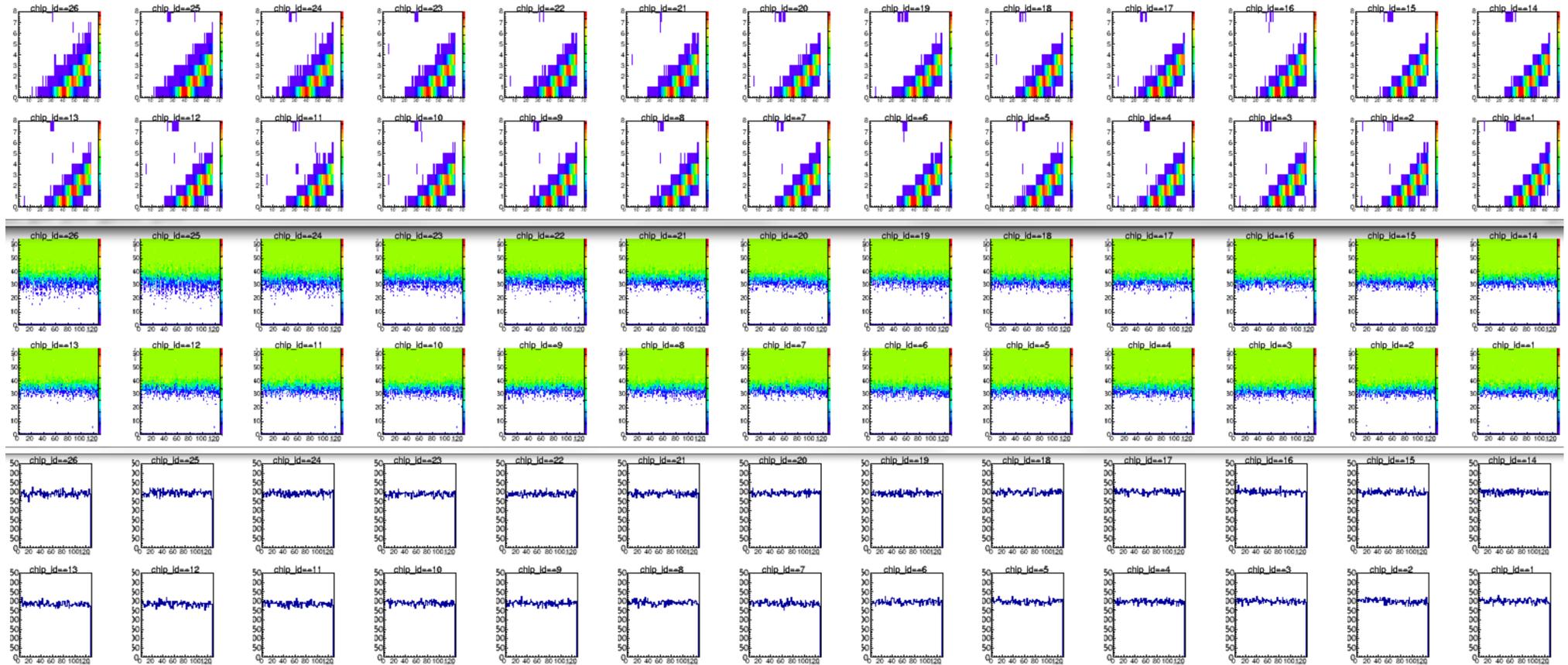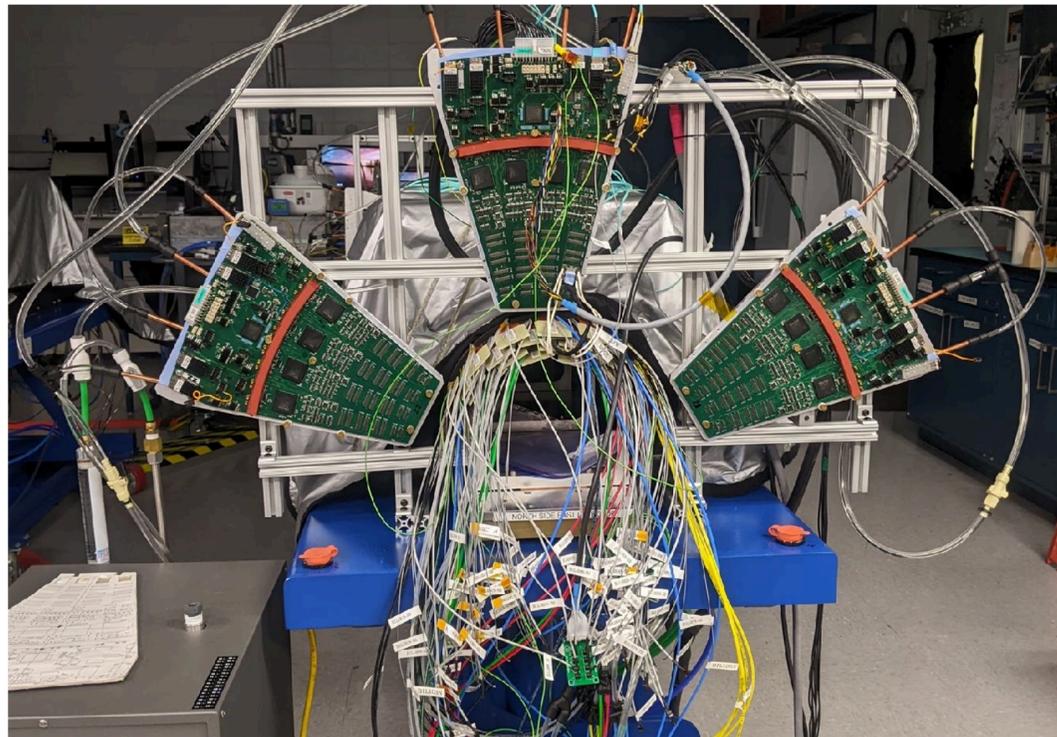## B1L106

North
Calibration: 20220901-1730_0.dat, 8

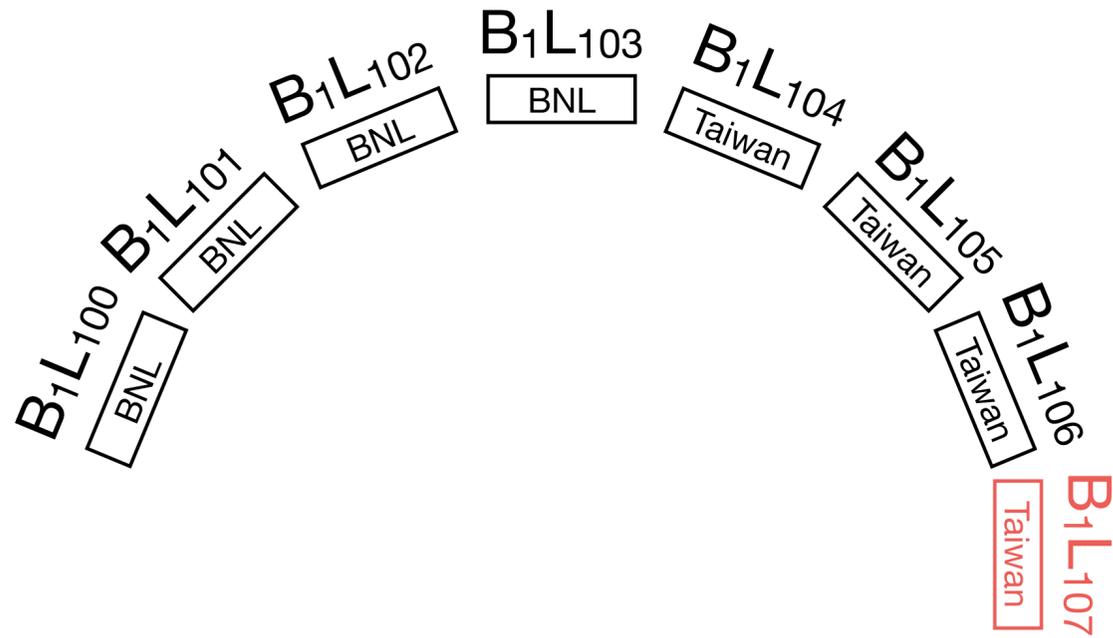Bias: 100, A = 377 nA, B = 361 nA
Temperature: A = 23.2 °C, B = 22.7 °C

The results look noisy.
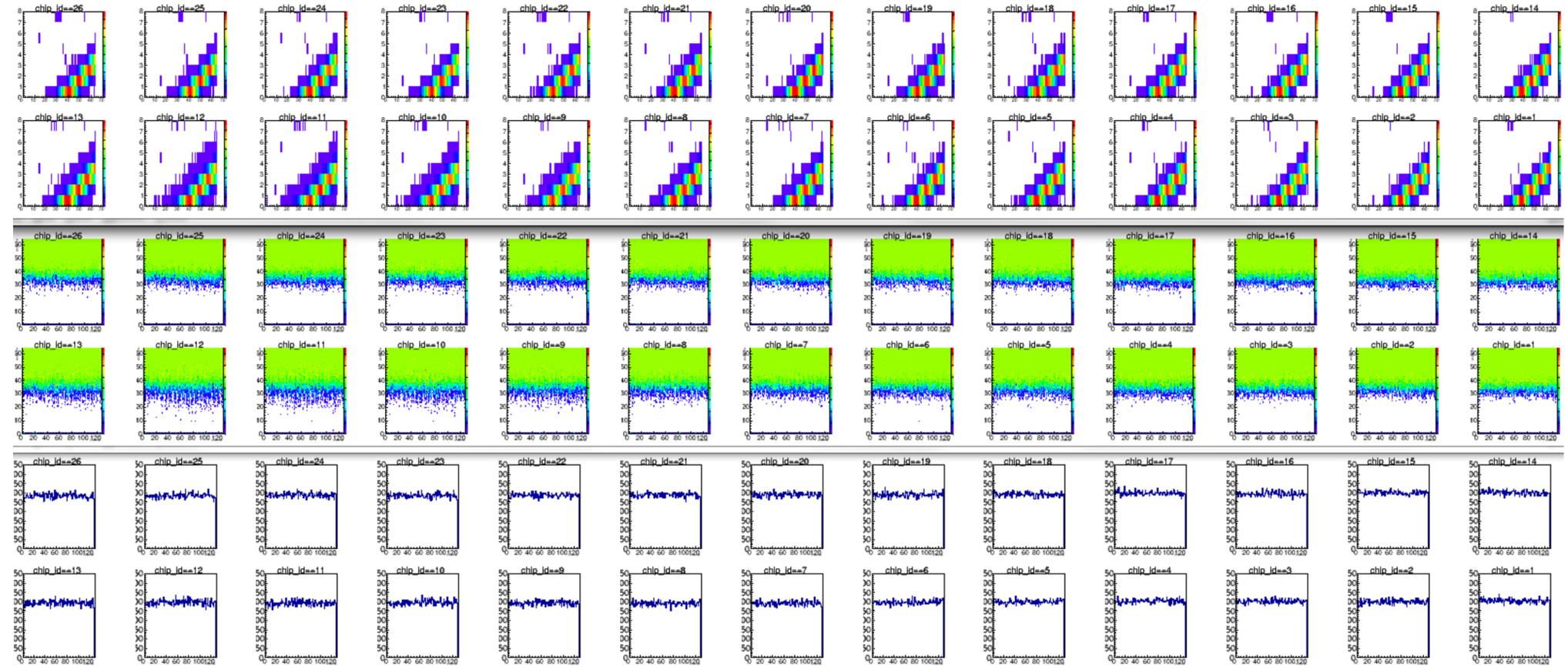
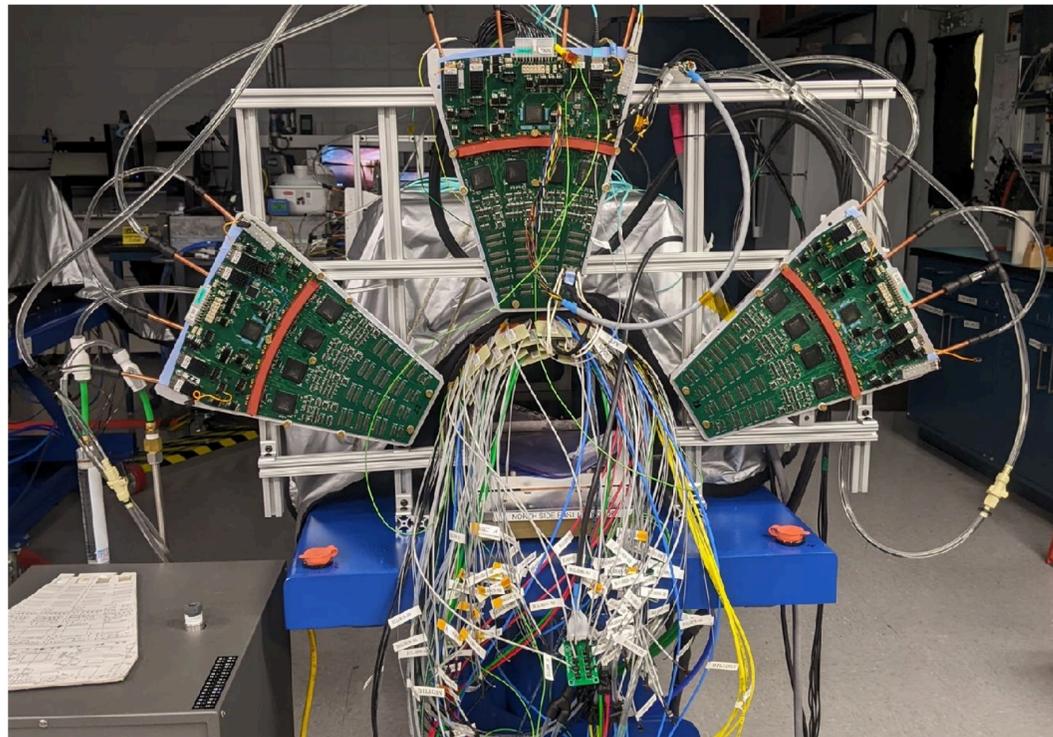# The 4th barrel calibration tests: Results

B1L107

North

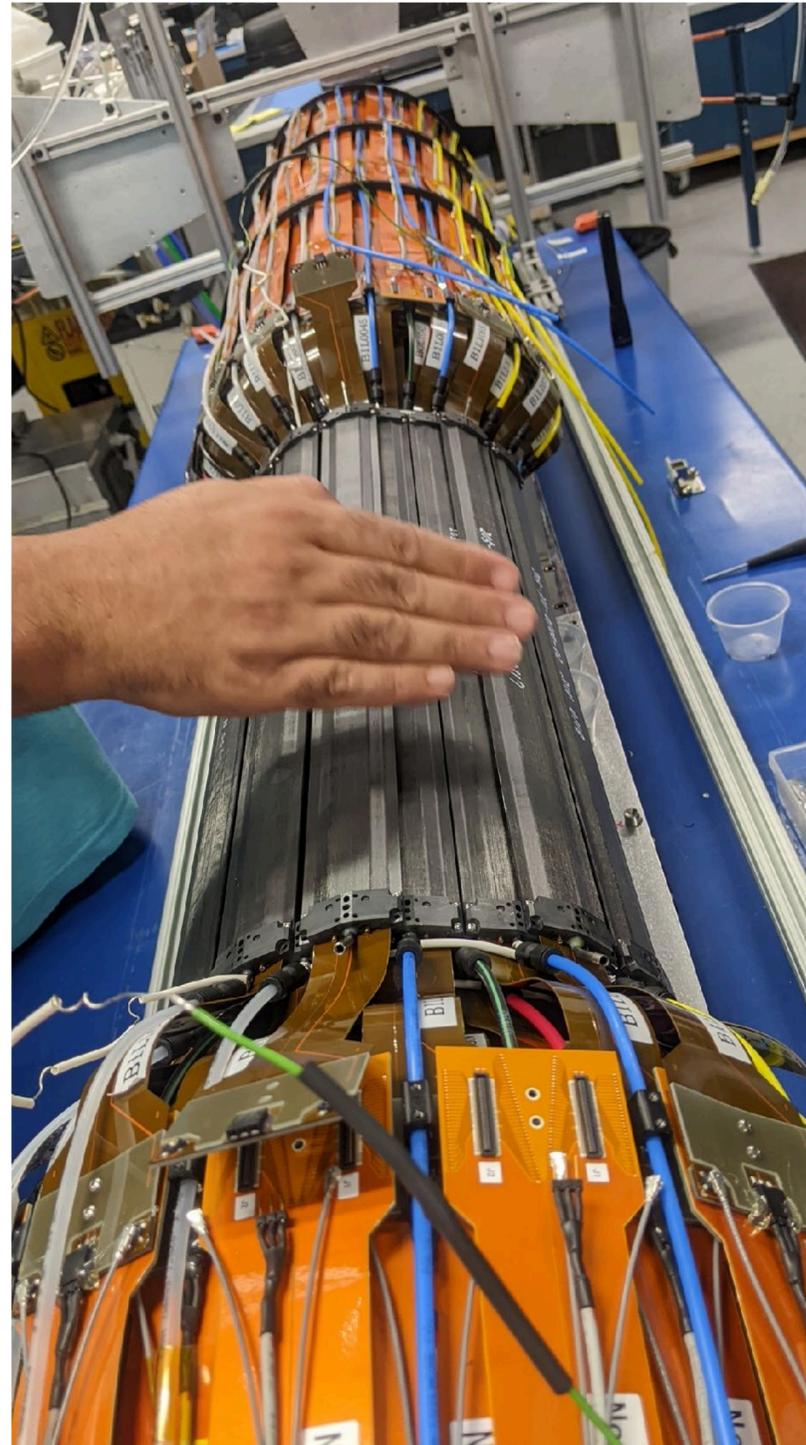Calibration: 20220901-1702_0.dat, 8

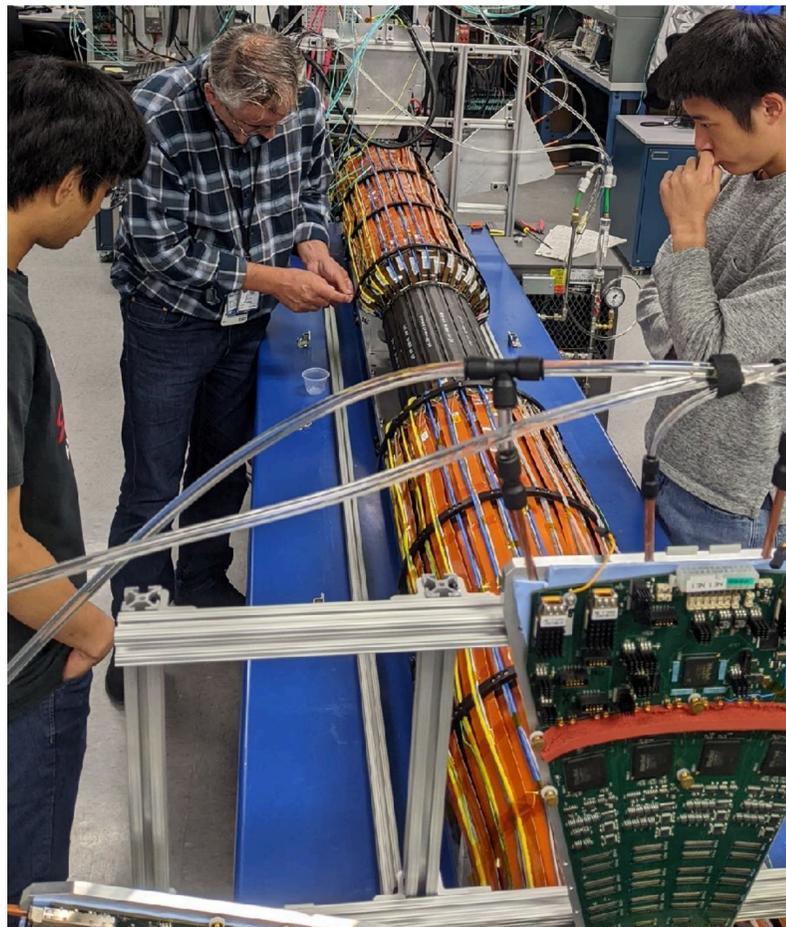Bias: 100, A = 417 nA, B = 350 nA
Temperature: A = 23.2 °C, B = 22.9 °C

The results look noisy.

Replacement of ladders

B_1L_{100}
BNL

B_1L_{101}
BNL

B_1L_{102}
BNL

B_1L_{103}
BNL

B_1L_{104}
Taiwan

B_1L_{105}
Taiwan

B_1L_{106}
Taiwan

B_1L_{107}
Taiwan

showed noisy results
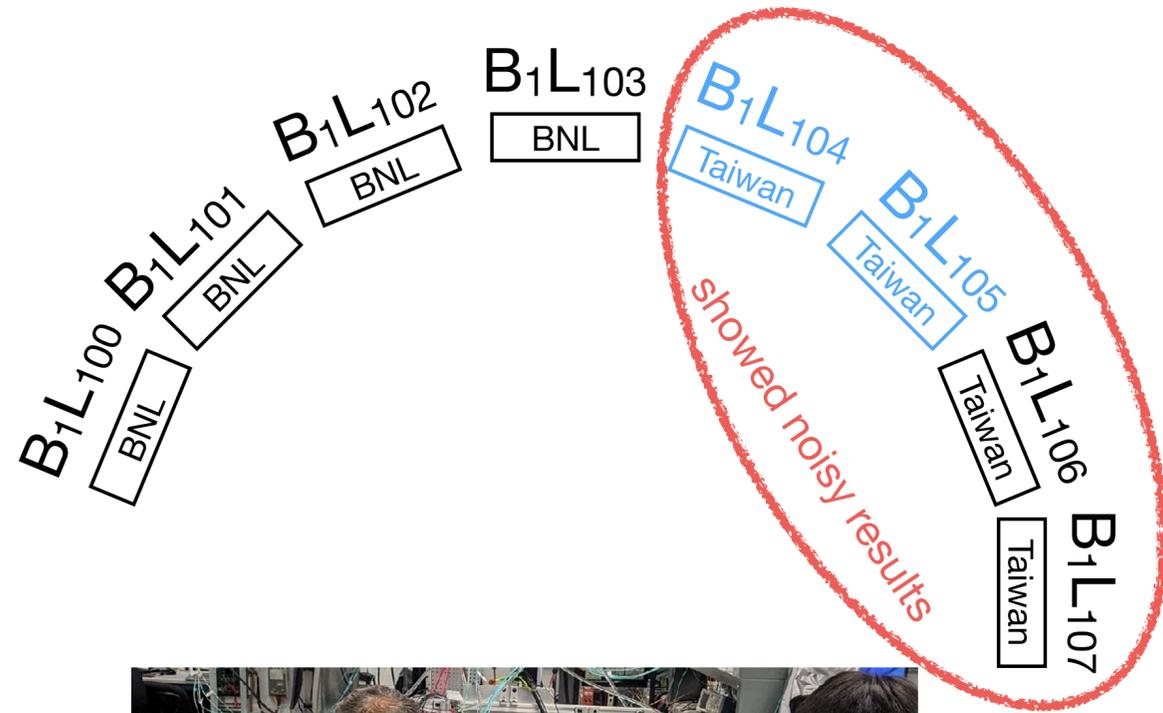
2 of the 4 noisy ladders were replaced with ladders made in BNL to see what is changed:
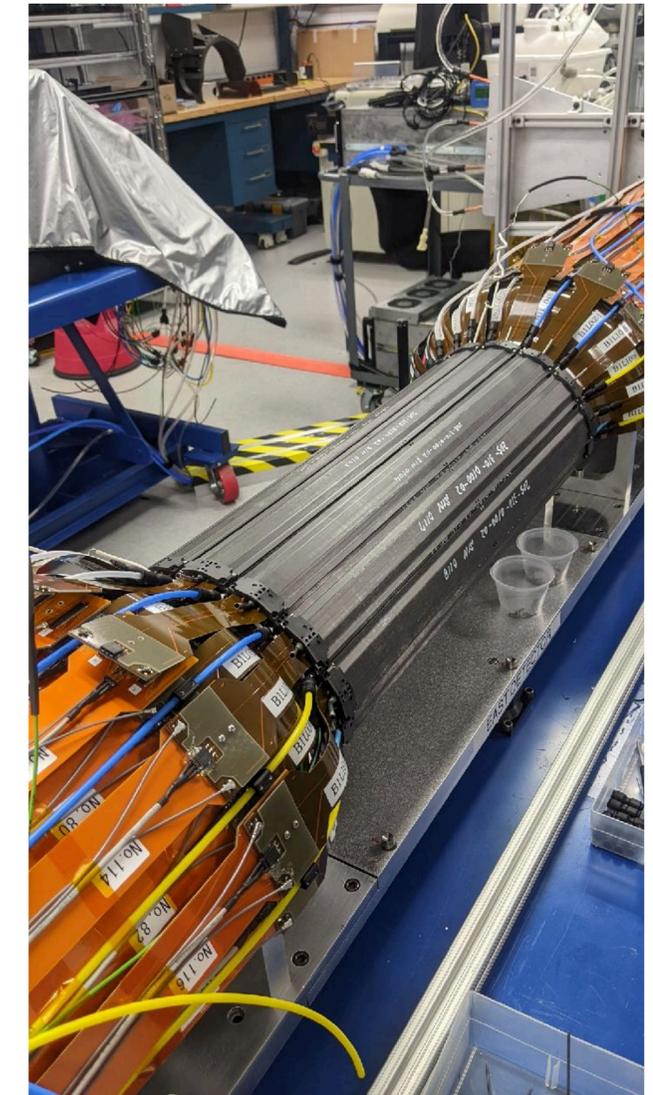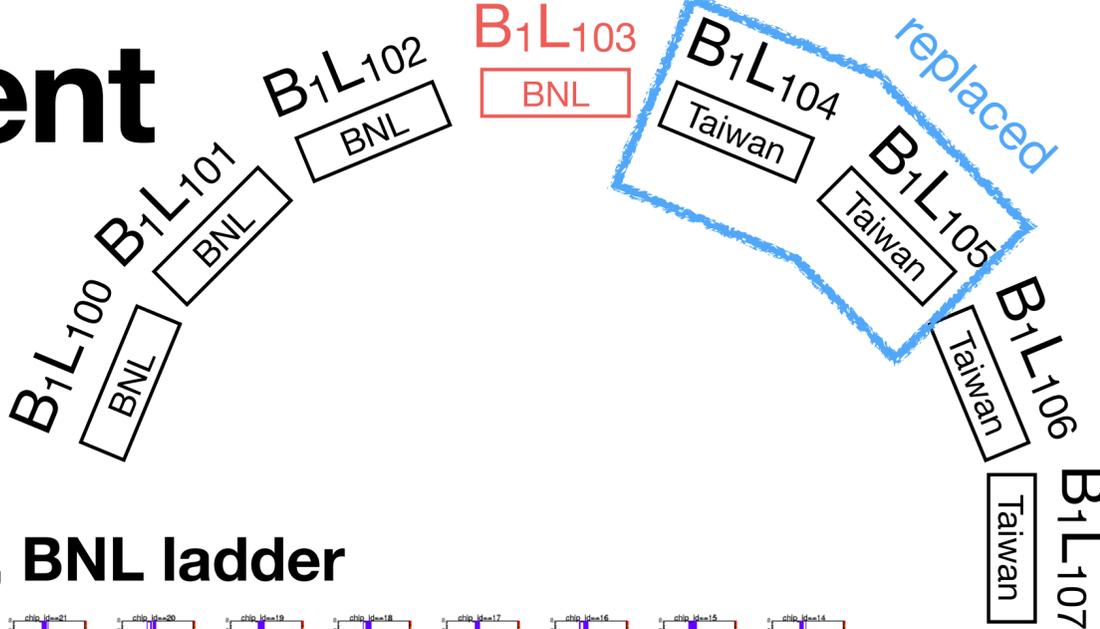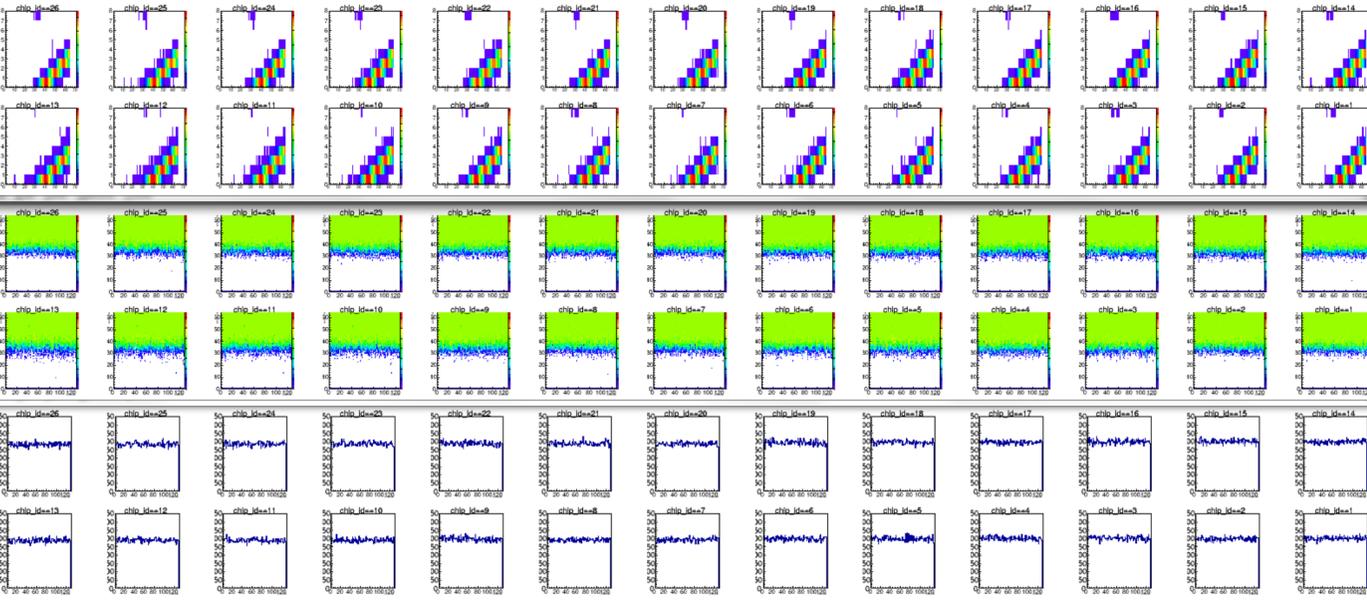
B1L104: TPB2-L060 → PB2-L039
B1L105: TPB2-L062 → PB2-L048

Results before/after the replacement

B1L103

PB2-L050, BNL

Before replacement, BNL ladder
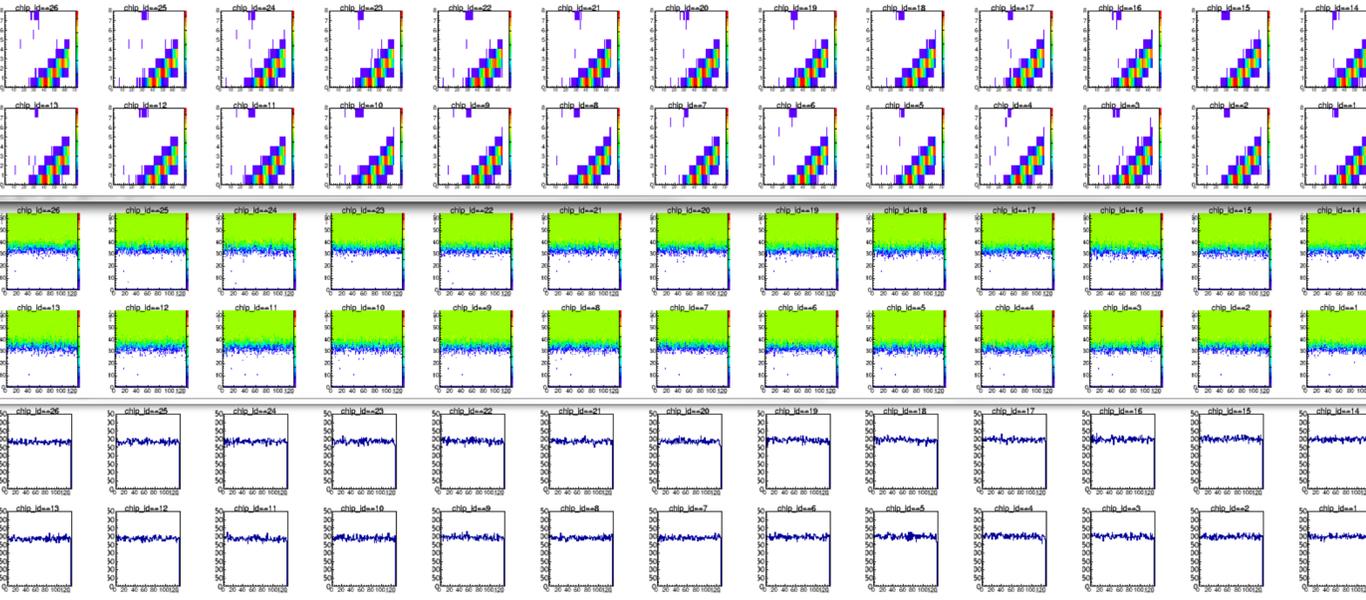

Bias: 100, A = 385 nA, B = 213 nA
Temperature: A = 23.3 °C, B = 22.8 °C

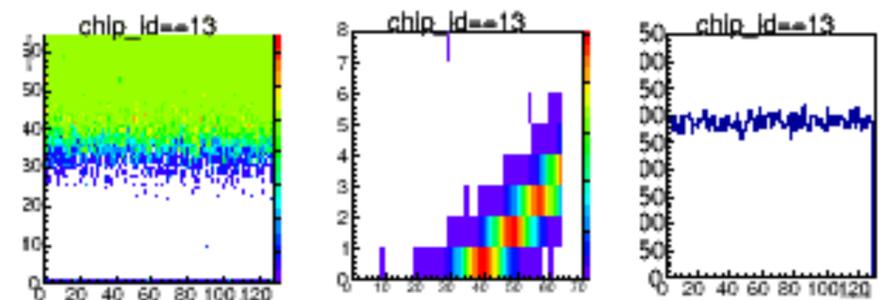The results look good, but are actually slightly noisy.

PB2-L050, BNL
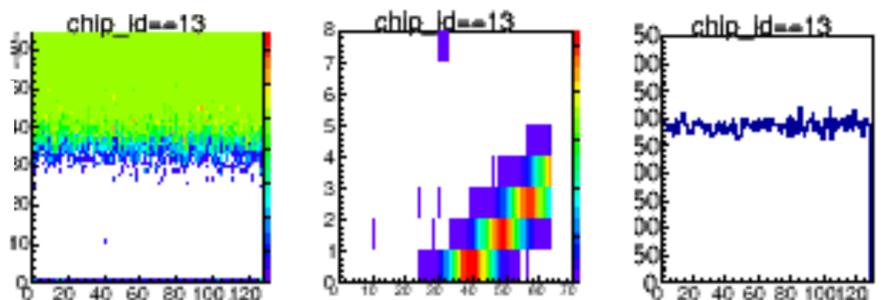
After replacement, BNL ladder

Bias: 100V, A = 388 nA, B = 245 nA
Temperature: A = 22.5 °C, B = 22.1 °C

The results are better than those before the replacement.
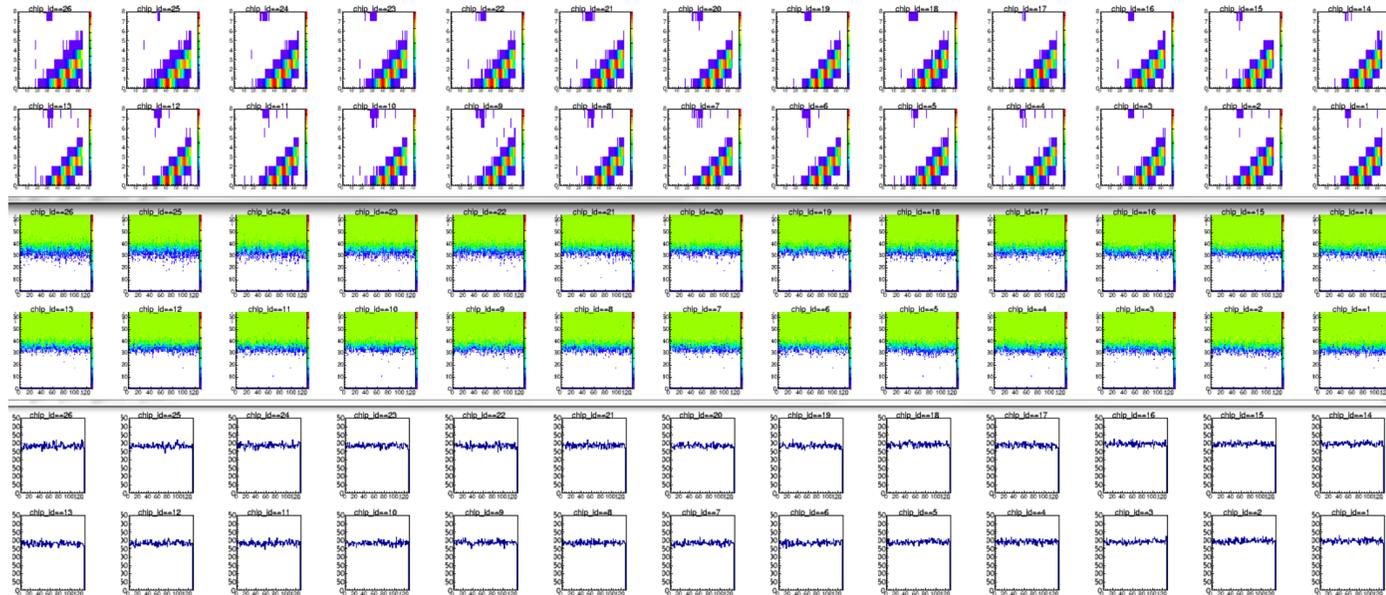
Example
Chip13

Results before/after the replacement

B1L104

TPB2-L060, Taiwan
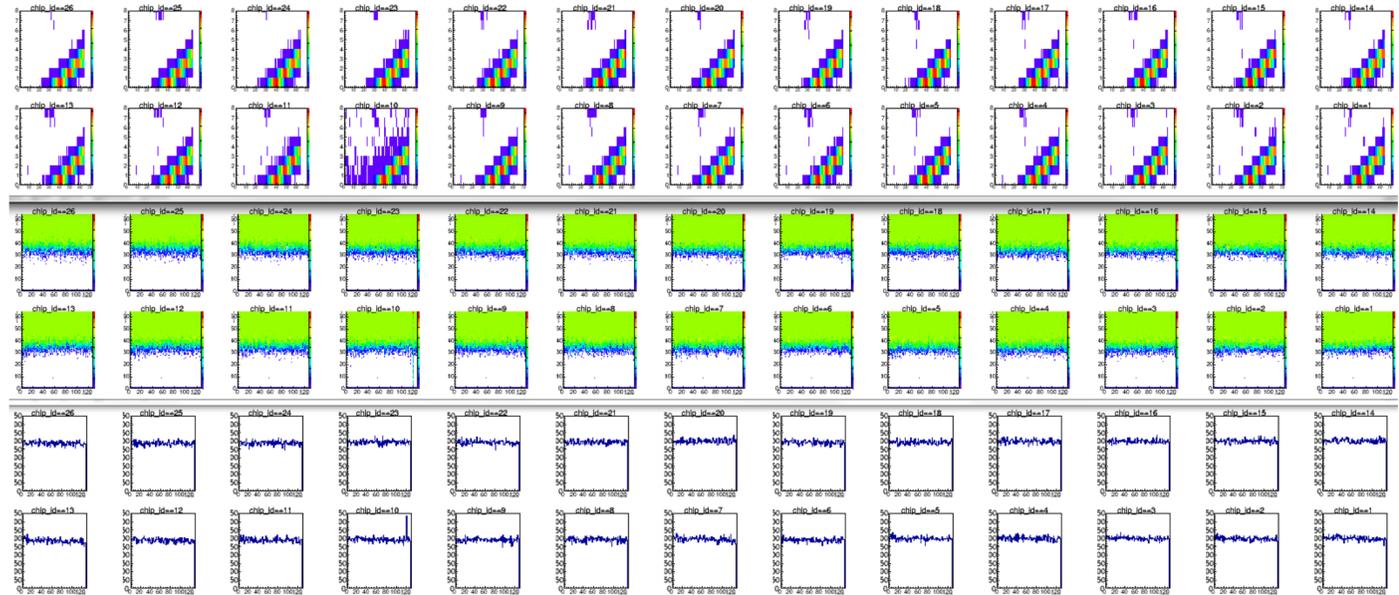
Before replacement, Taiwan ladder

Bias: 100, A = 405 nA, B = 350 nA
Temperature: A = 23.0 °C, B = 22.8 °C

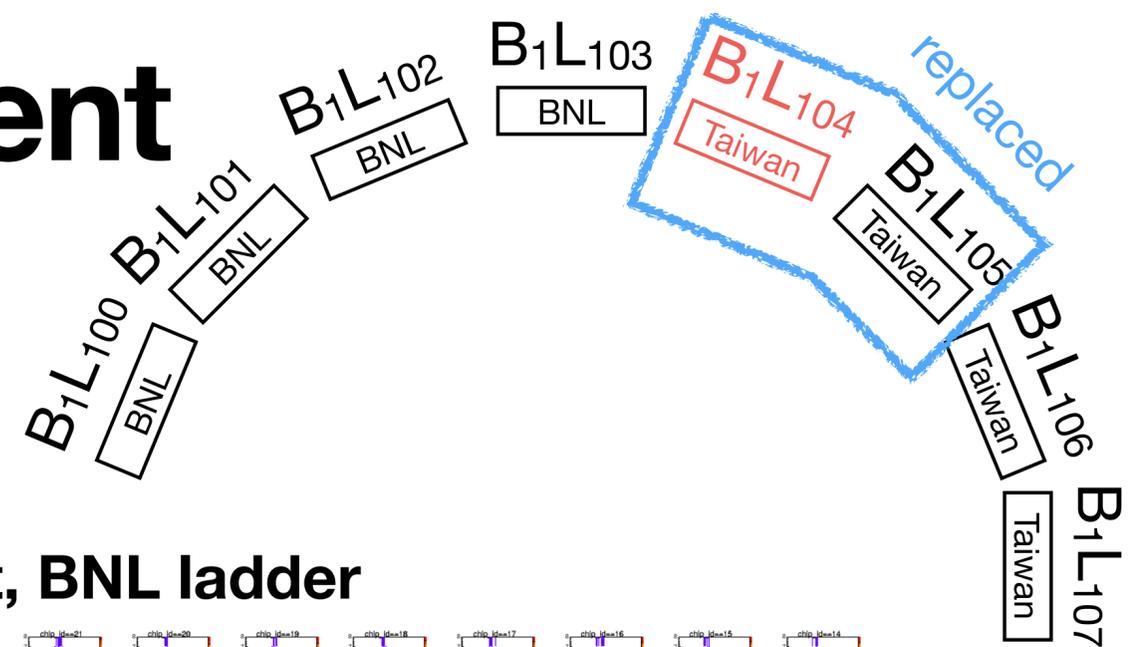The results look slightly noisy.

PB2-L039, BNL

After replacement, BNL ladder

Bias: 100 V, A = 292 nA, B = 345 nA
Temperature: A = 22.7 °C, B = 22.2 °C

The results are better than those before the replacement.

Results before/after the replacement

B1L105

TPB2-L062, Taiwan
Before replacement, Taiwan ladder

Bias: 100, A = 421 nA, B = 356 nA
Temperature: A = 23.0 °C, B = 22.7 °C

The results look slightly noisy.
Chip4 frequently got only half data somehow.

PB2-L048, BNL
After replacement, BNL ladder

Bias: 100V, A = 210 nA, B = 368 nA
Temperature: A = 22.8 °C, B = 22.5 °C

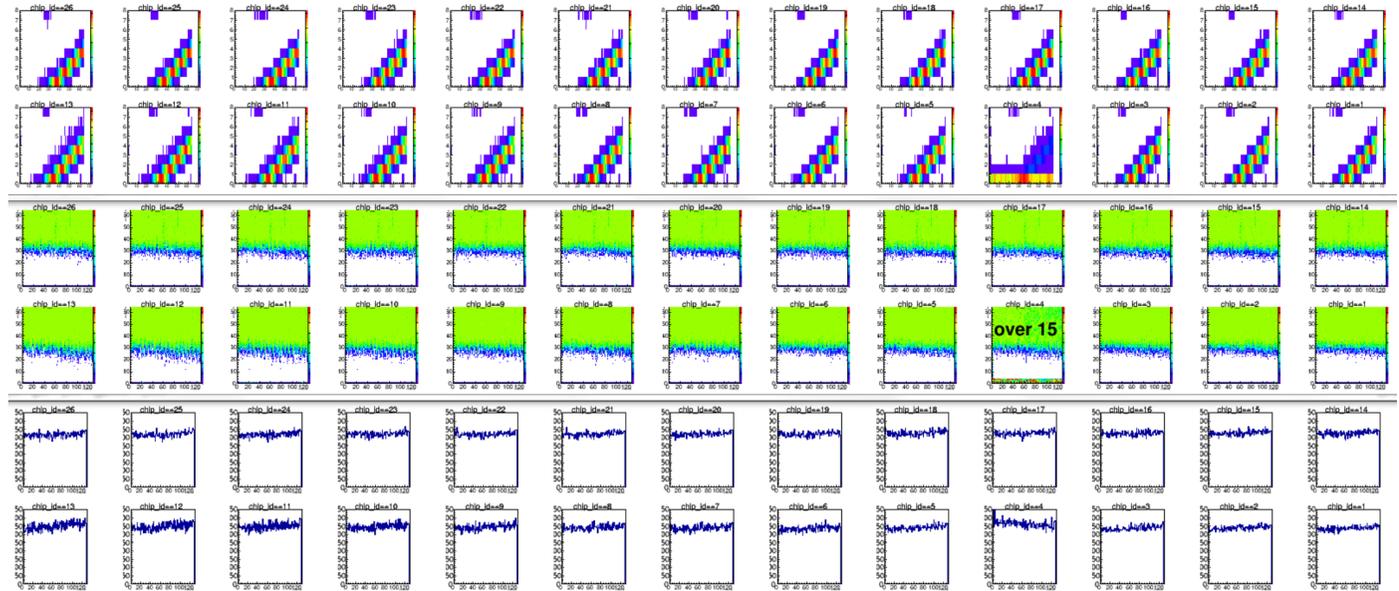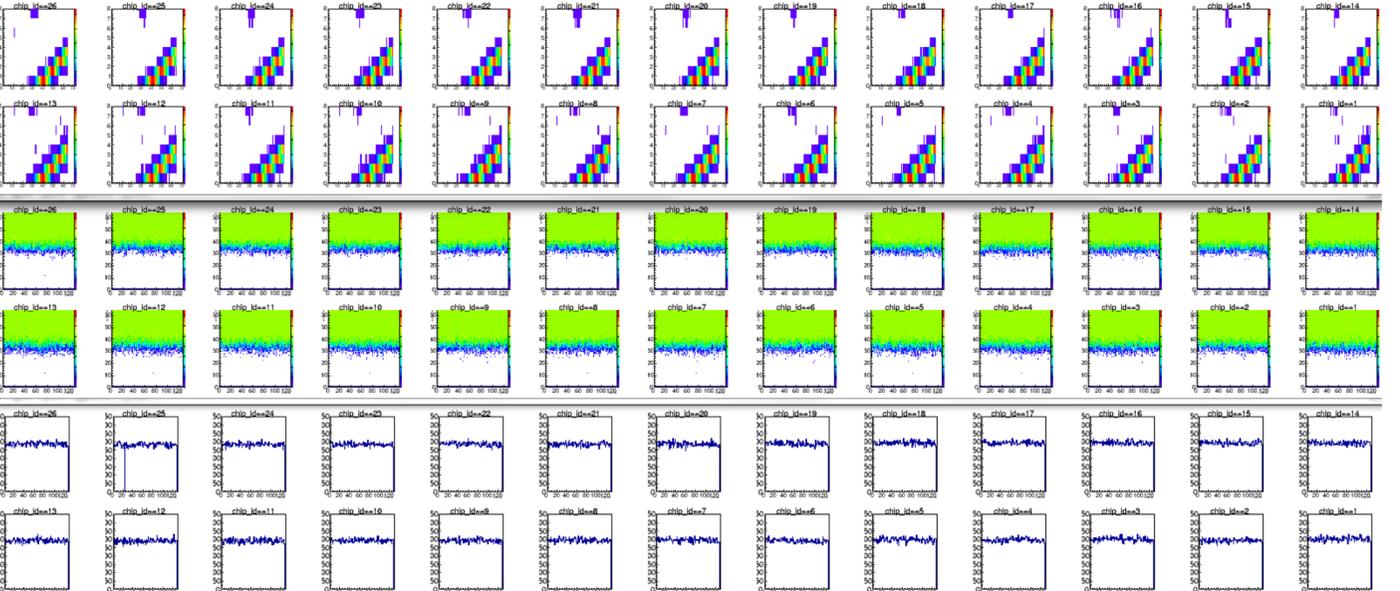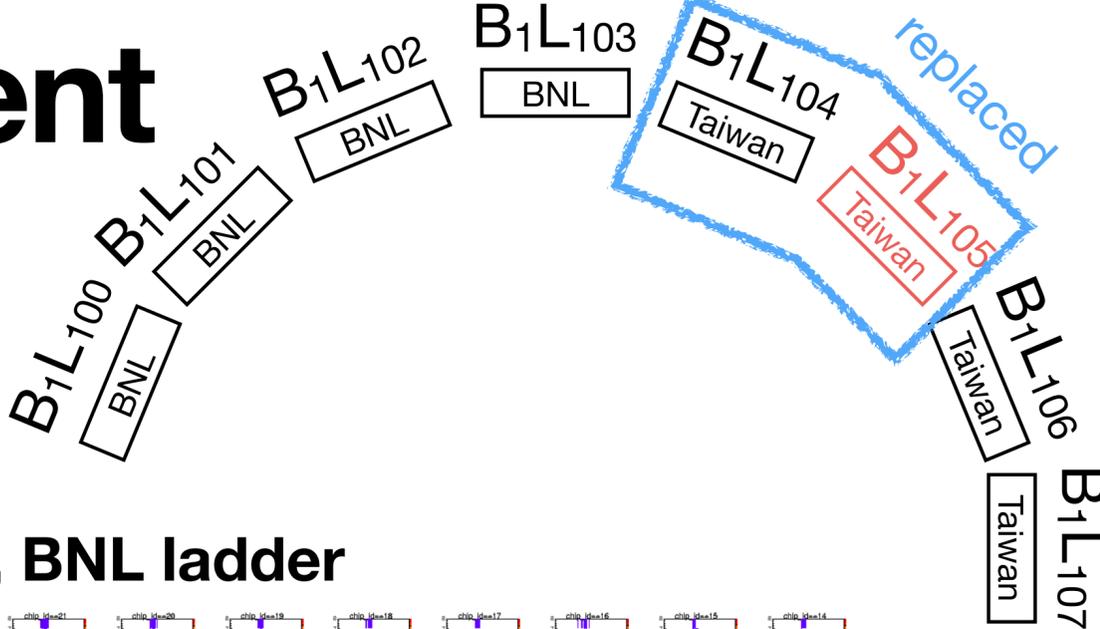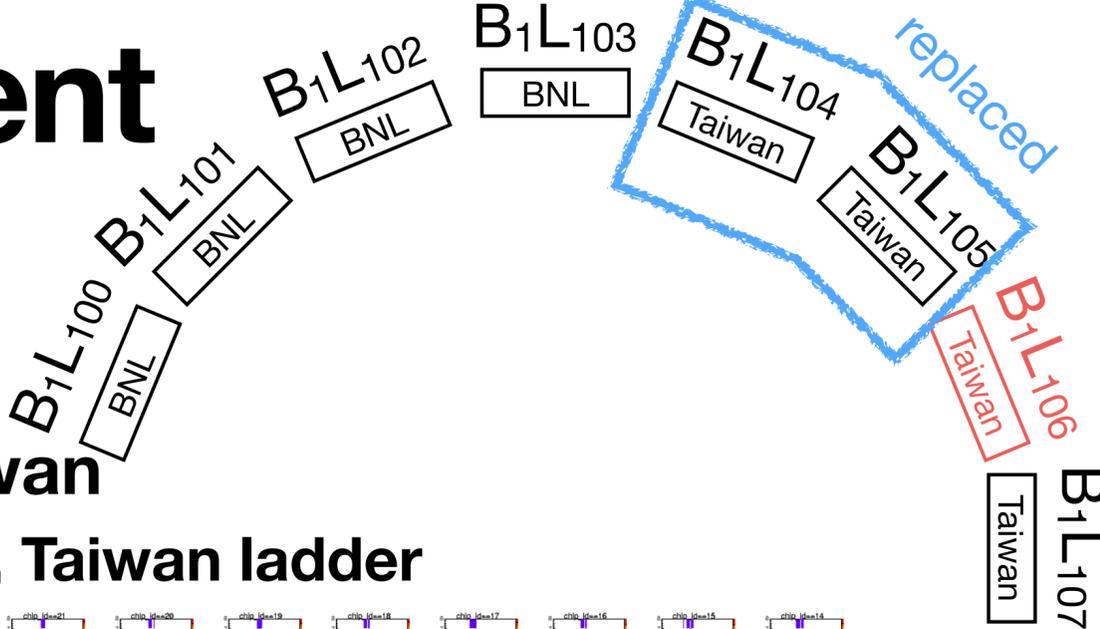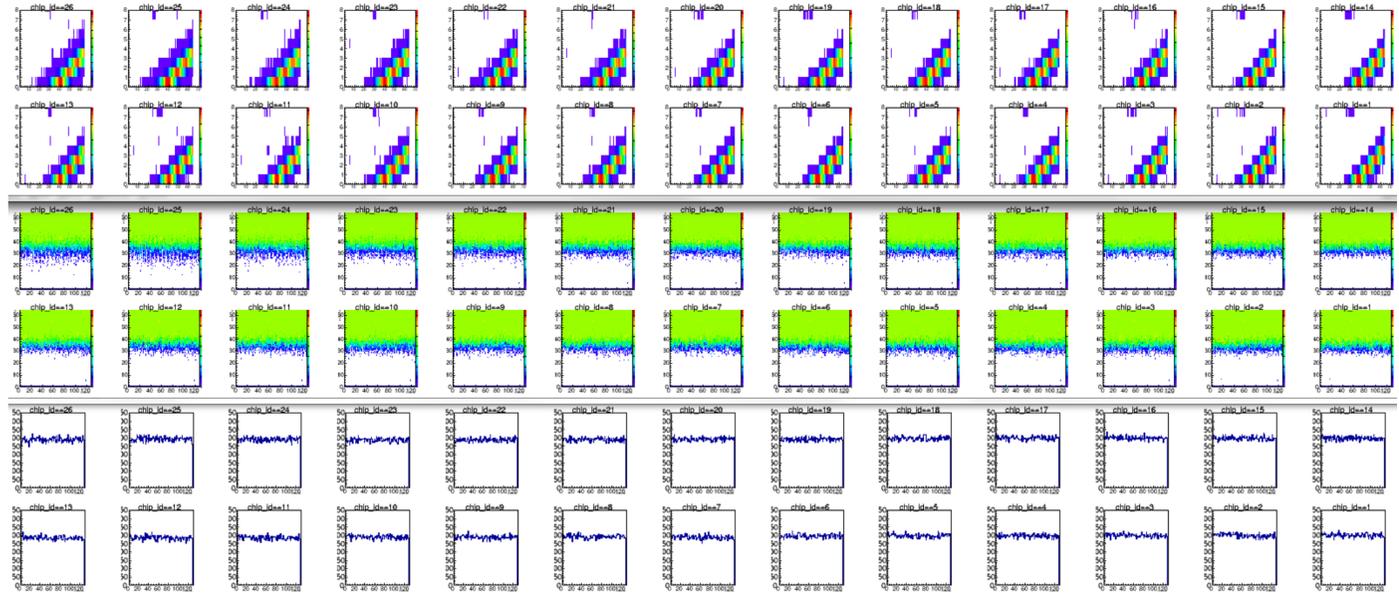The results are better than those before the replacement.

Results before/after the replacement

B1L106

Ladder diagram (top right): B$_1$L$_{100}$ BNL, B$_1$L$_{101}$ BNL, B$_1$L$_{102}$ BNL, B$_1$L$_{103}$ BNL, B$_1$L$_{104}$ Taiwan, B$_1$L$_{105}$ Taiwan (replaced), B$_1$L$_{106}$ Taiwan, B$_1$L$_{107}$ Taiwan

TPB2-L068, Taiwan

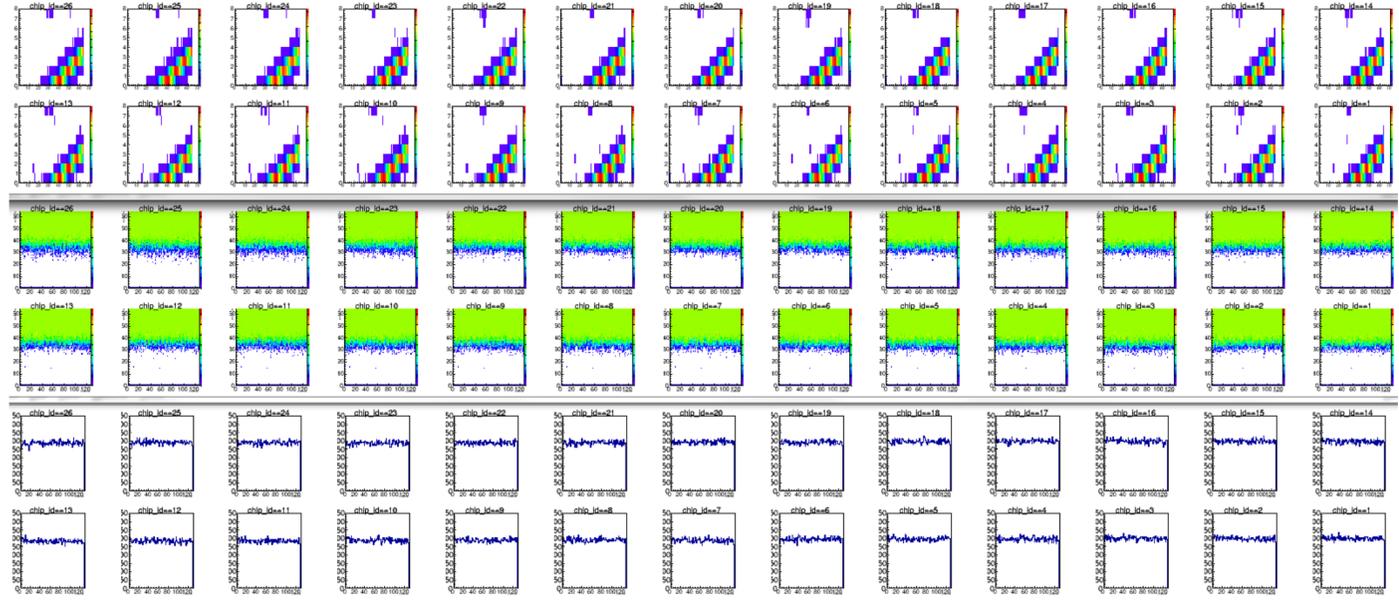**Before replacement, Taiwan ladder**

Bias: 100 V, A = 377 nA, B = 361 nA
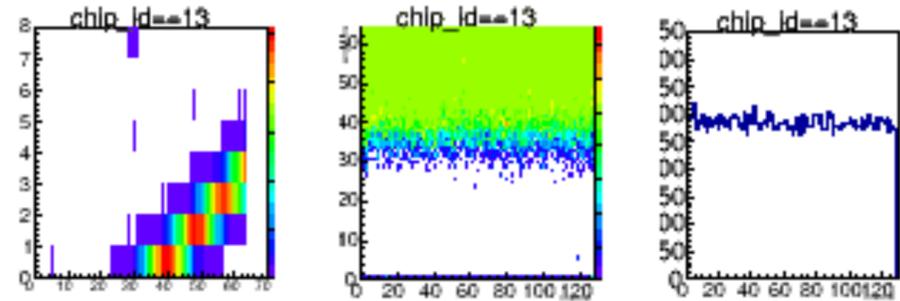Temperature: A = 23.2 °C, B = 22.7 °C

The results look noisy.

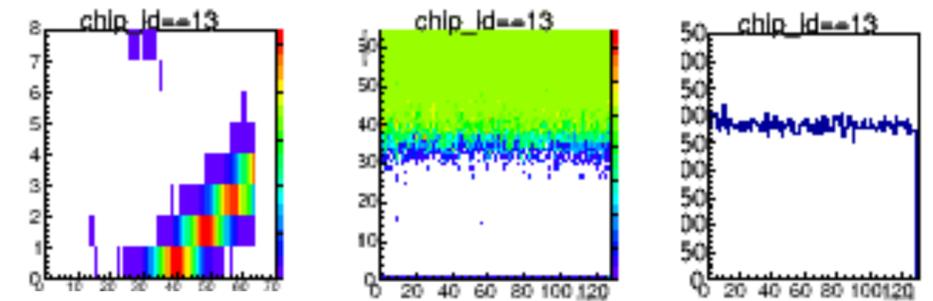**TPB2-L068, Taiwan**

After replacement, Taiwan ladder

Bias: 100V, A = 374 nA, B = 414 nA
Temperature: A = 22.8 °C, B = 22.4 °C

The results are better than those before the replacement but still noisy.
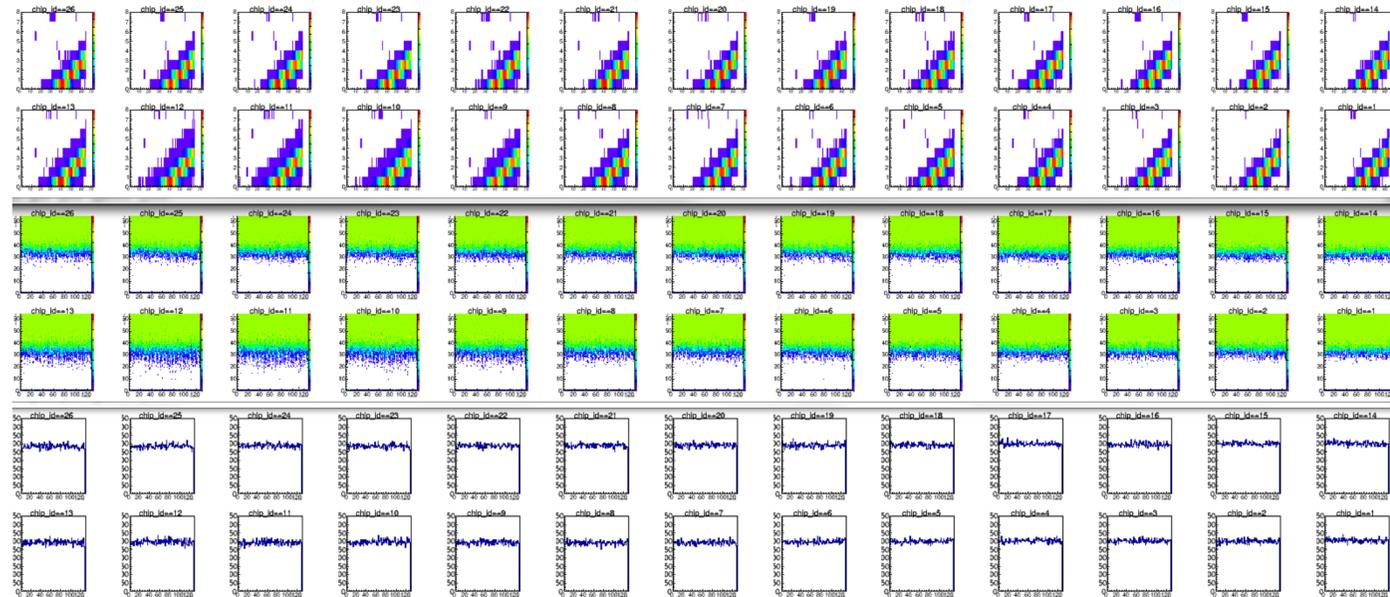
Example Chip13

Results before/after the replacement

B1L107

TPB2-L069, Taiwan

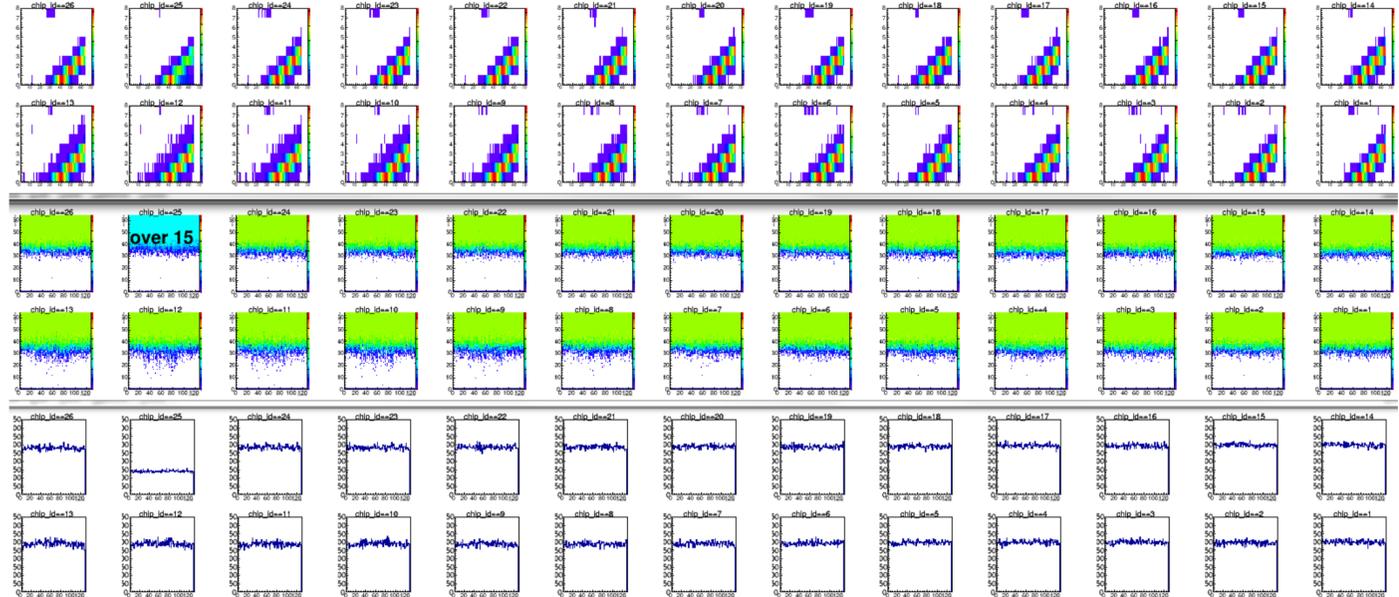**Before replacement, Taiwan ladder**

Bias: 100, A = 417 nA, B = 350 nA
Temperature: A = 23.2 °C, B = 22.9 °C

The results look noisy.
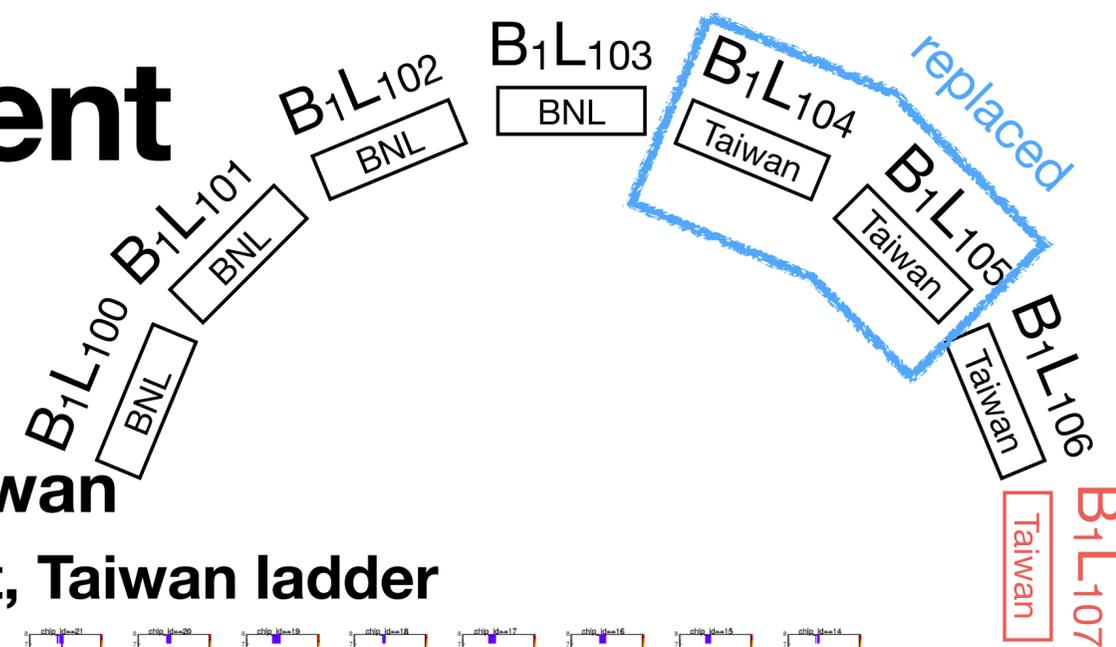
TPB2-L069, Taiwan

After replacement, Taiwan ladder
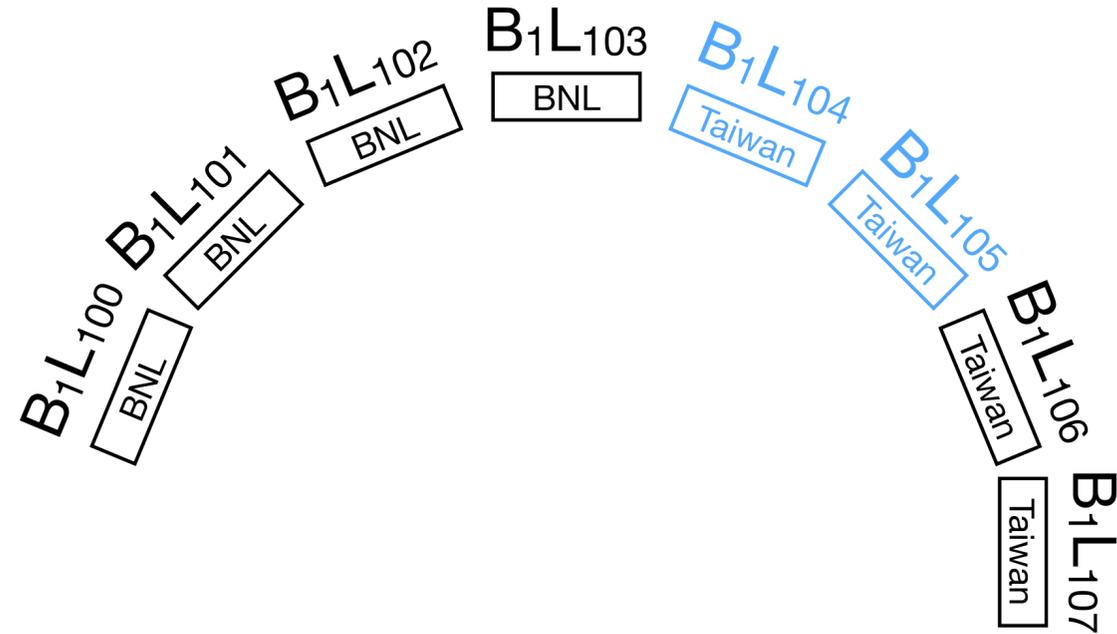

Bias: 100 V, A = x nA, B = x nA
Temperature: A = x °C, B = x °C

The results are not so different from those before the replacement.
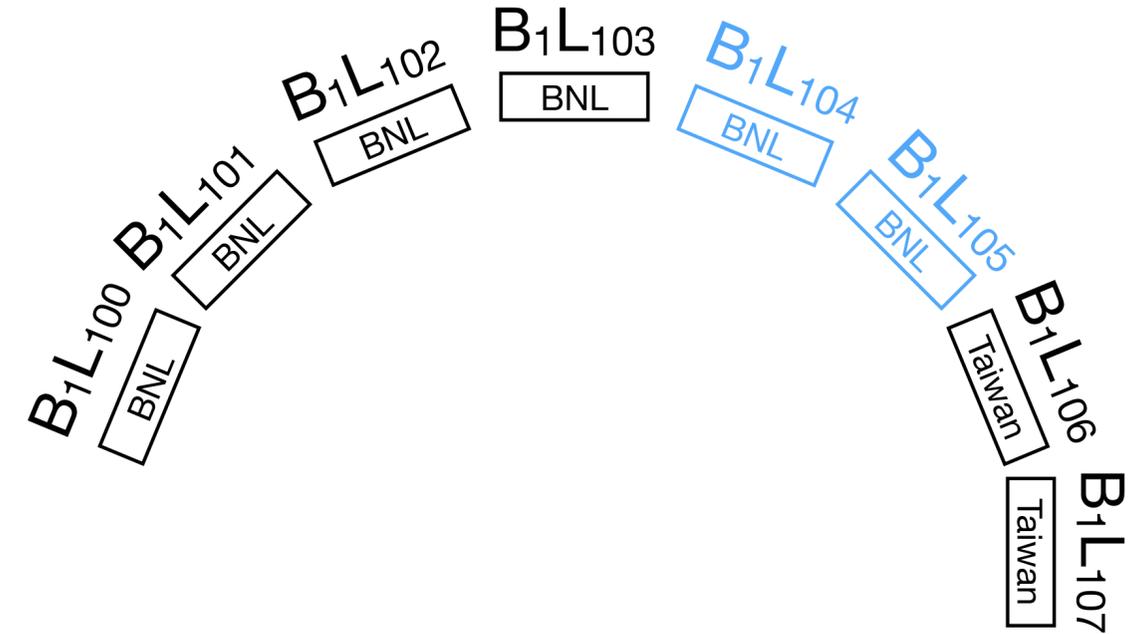Chip25 always got only half data somehow…

Summary

Before the replacement

Ladder	Made in	Condition
B1L103N	BNL	Slightly noisy
B1L104N	Taiwan	Slightly noisy
B1L105N	Taiwan	Noisy
B1L106N	Taiwan	Noisy
B1L107N	Taiwan	Noisy

After the replacement

Ladder	Made in	Condition
B1L103N	BNL	Good
B1L104N	BNL	Good
B1L105N	BNL	Good
B1L106N	Taiwan	Slightly noisy
B1L107N	Taiwan	Noisy