The barrel ladder tests

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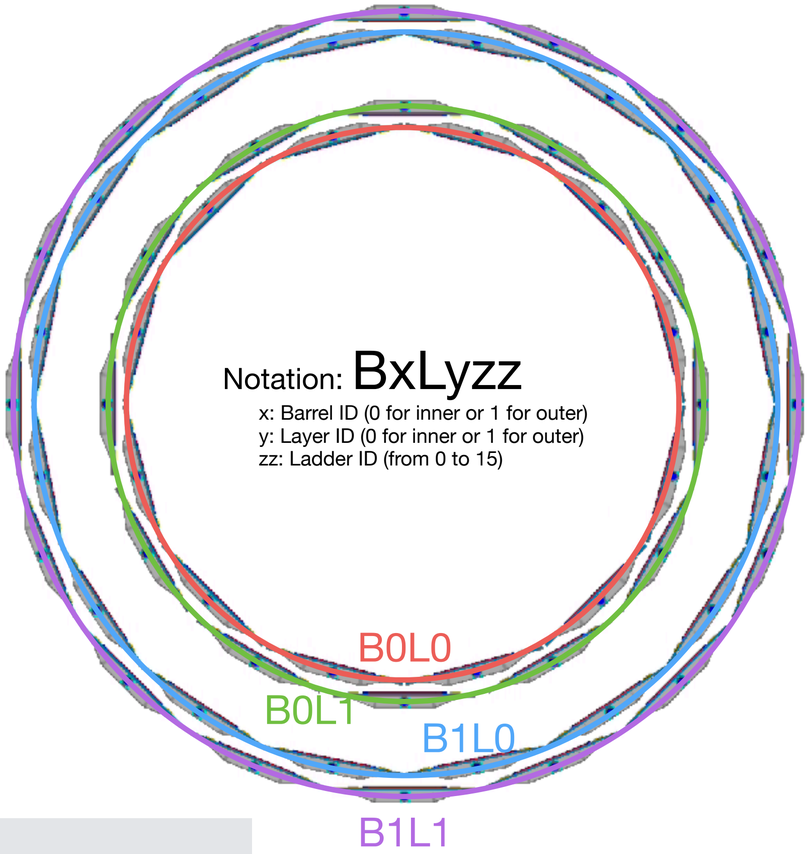
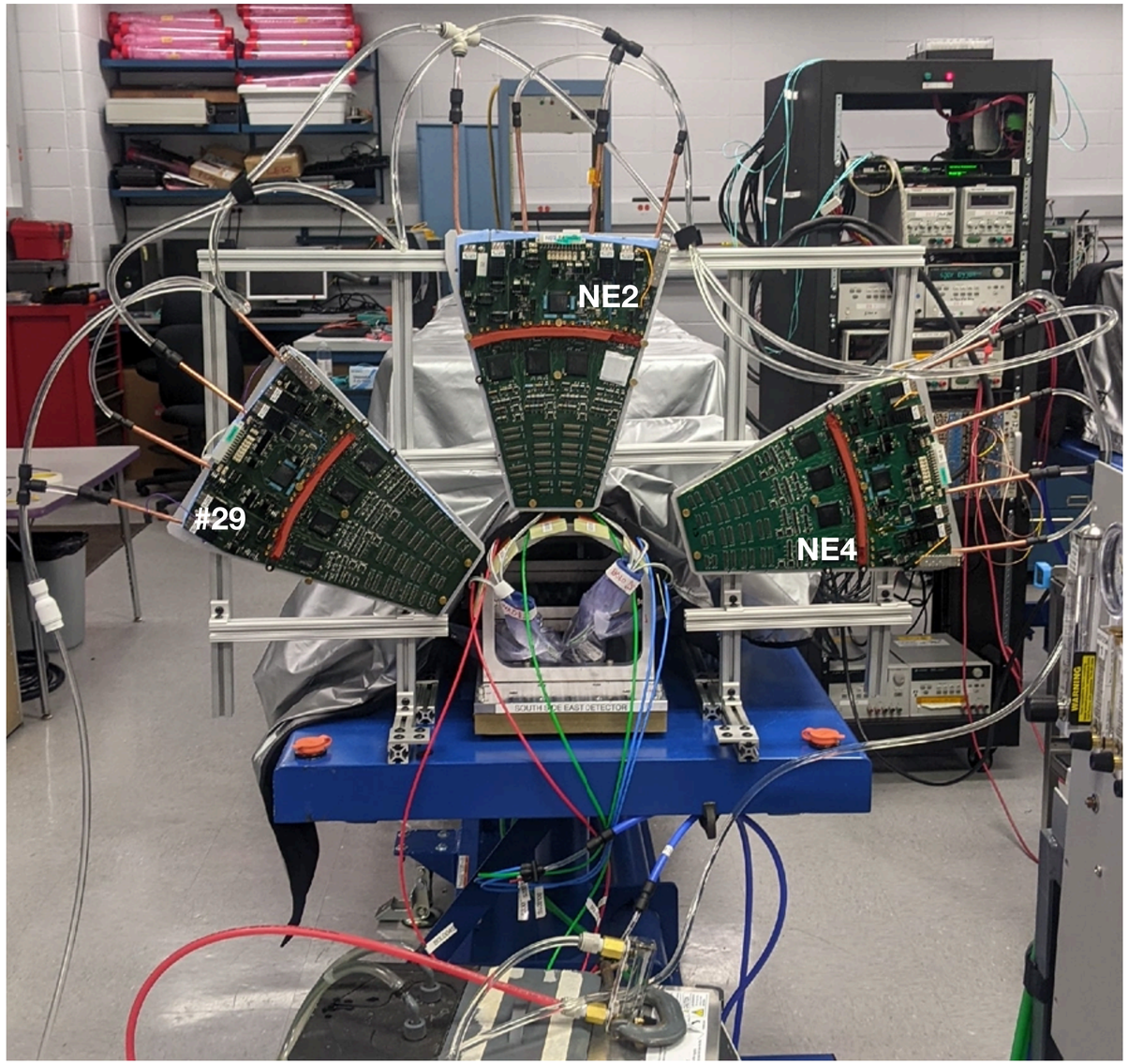
M. Hata(NWU), M. Watanabe(NWU),
W. Tang(NCU)

Tests of the barrel ladders

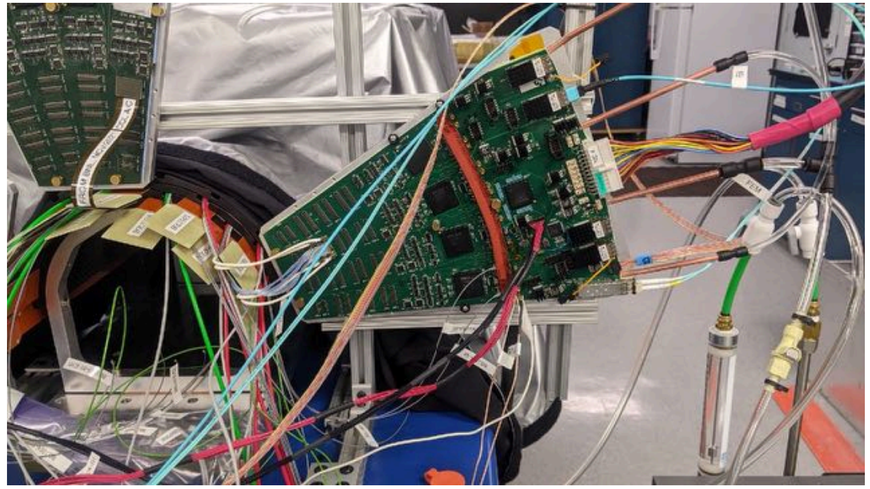


	Date	Tested layers	Results
1st test	June/10-June/14	B0L0	Good.
2nd test	June/17-July/07	B0L1, some of B0L0	Some ladders in B0L1 were noisy. GND condition was investigated.
3rd test	Aug/10-now	B1L0 (some of) B0L1&B0L0	Ongoing Tested ladders showed good results.
4th test	later…		

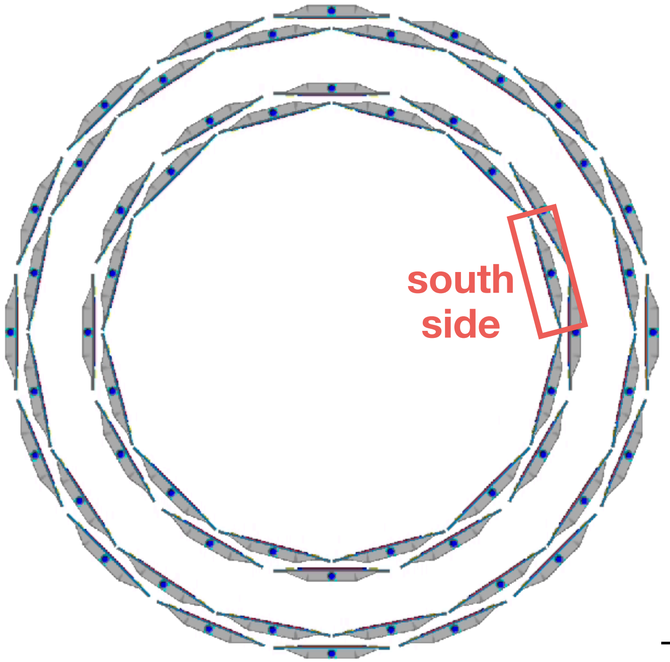
The barrel calibration tests: The setup



- 3 good ROCs (NE2, NE4, and #29)
  - 3 ROCs were put on each side in the 3rd test
- The FEM/FEM-IB system
- The same LV system as the test bench
  - upgraded in the 3rd test
- The new temperature monitor system
- The ladder cooling and the ROC cooling
- The FPC conversion cable or the μ-coaxial conversion cable was used. No difference found b/w the 2 types.
- A single ladder was operated to test it.

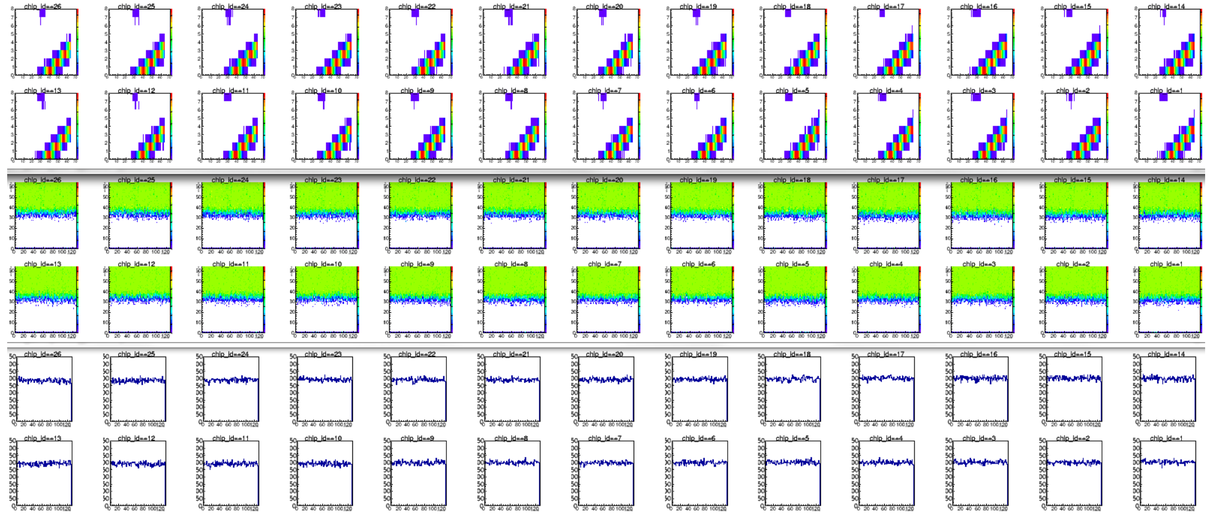


Results: A typical good case (the 1st&2nd tests)



B0L002S (PB1-L031)

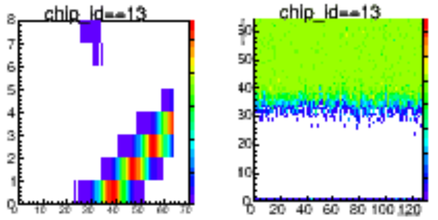
Test bench



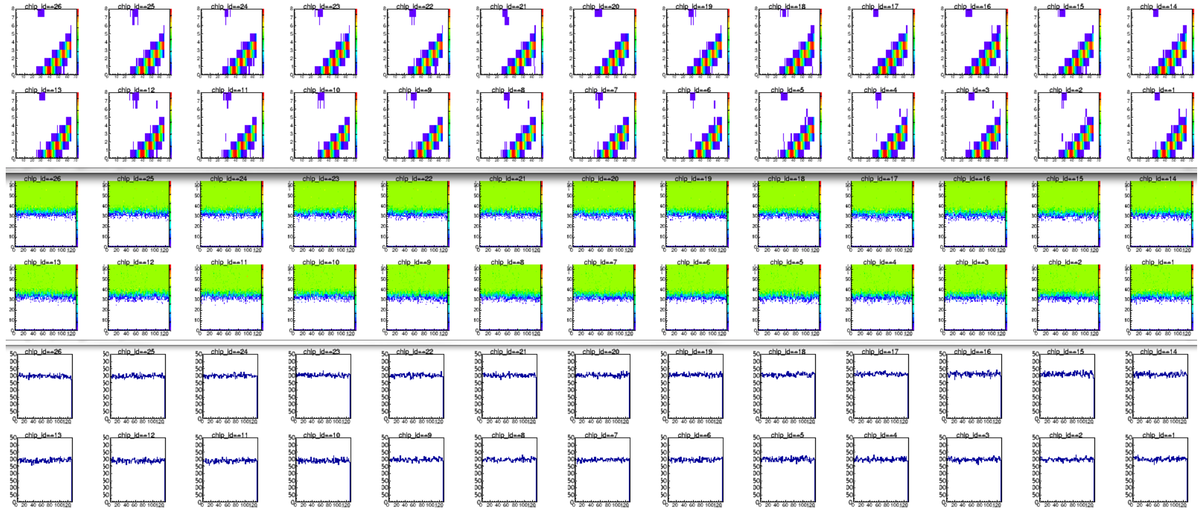
Data: 20220513_1217, 111 cm Bus extender + 20 cm FPC conversion cable

Bias current
type-A: 184 nA
type-B: 141 nA

Chip13

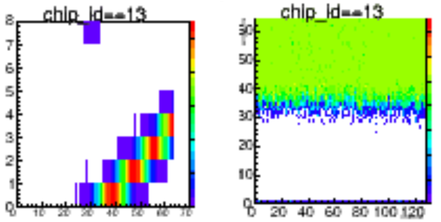


Barrel (1st test)



Data: 20220613_1546

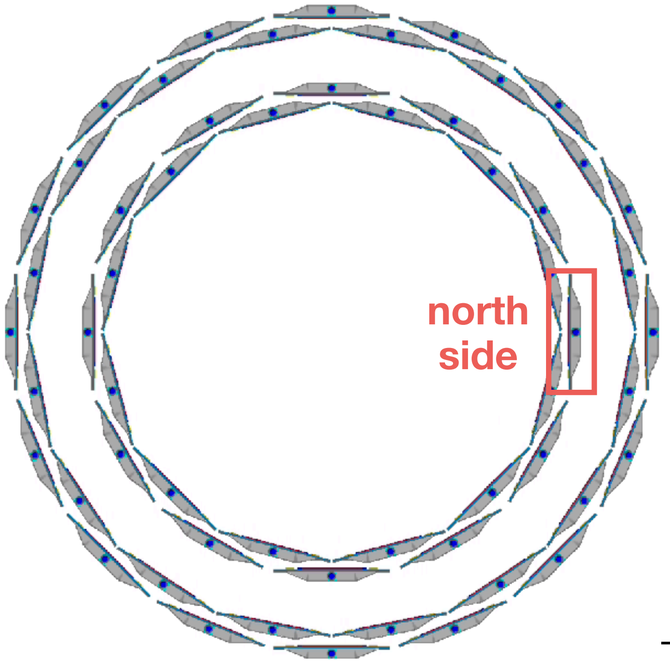
Chip13



Bias current
type-A: 135 nA
type-B: 102 nA

Generally speaking, many ladders showed results as good as ones in the test bench

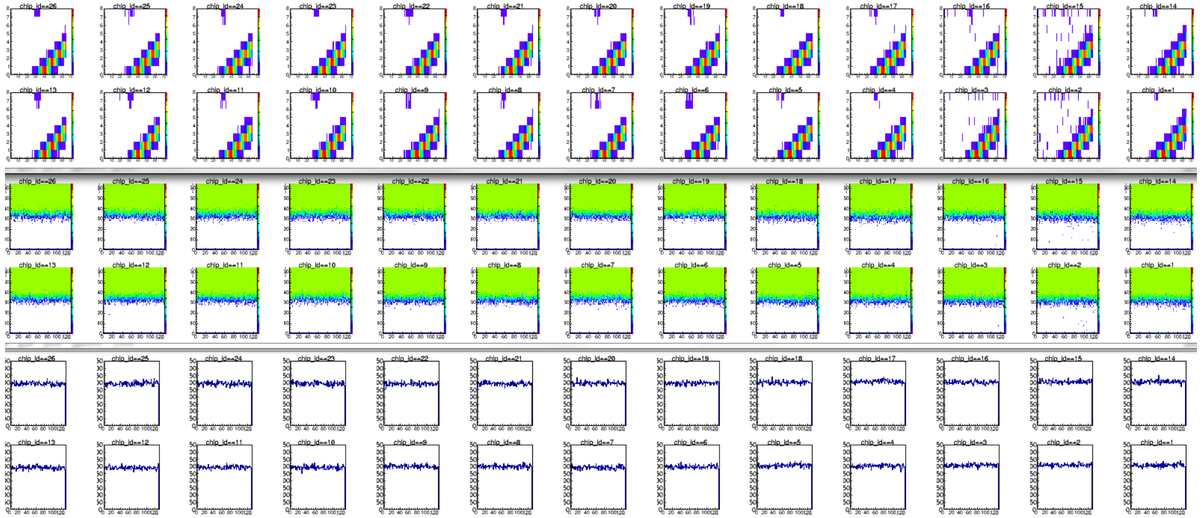
Results: A typical difficult case (the 2nd test)



B0L103N (PB1-L0??)

Test bench

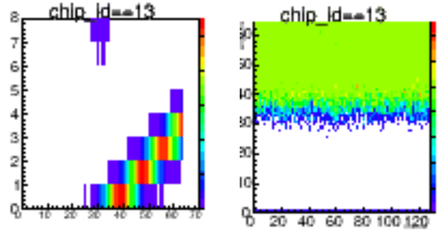
Due to the radiation source↓



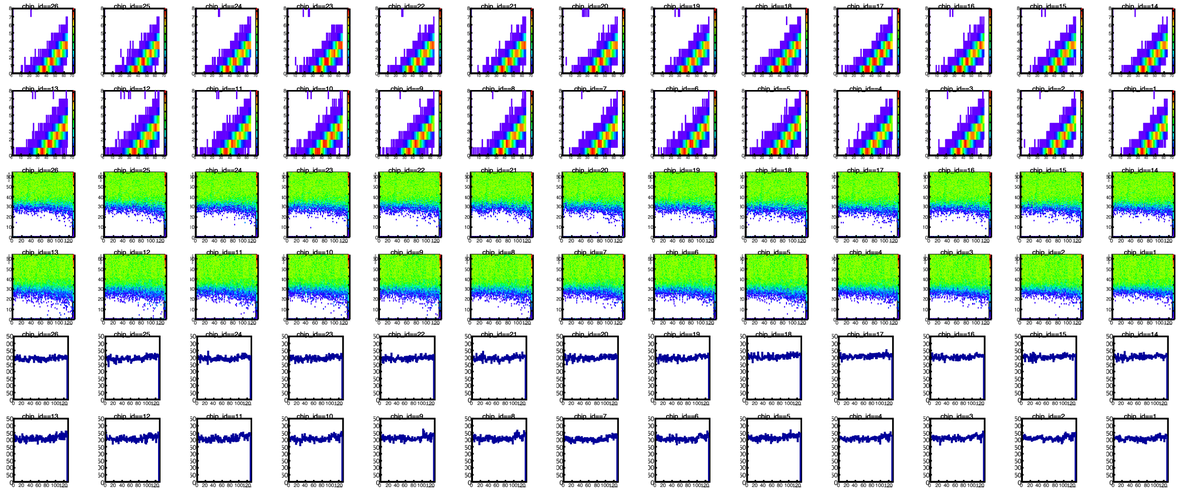
Data: 20220420_1927

Bias current
type-A: 139 nA
type-B: 98 nA

Chip13

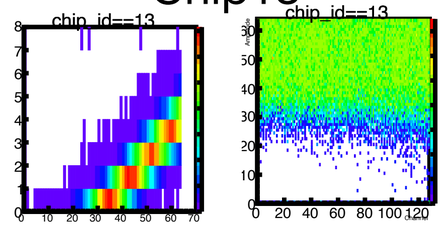


Barrel



Data: 20220622_1248 (after modification of GND, good results were obtained)

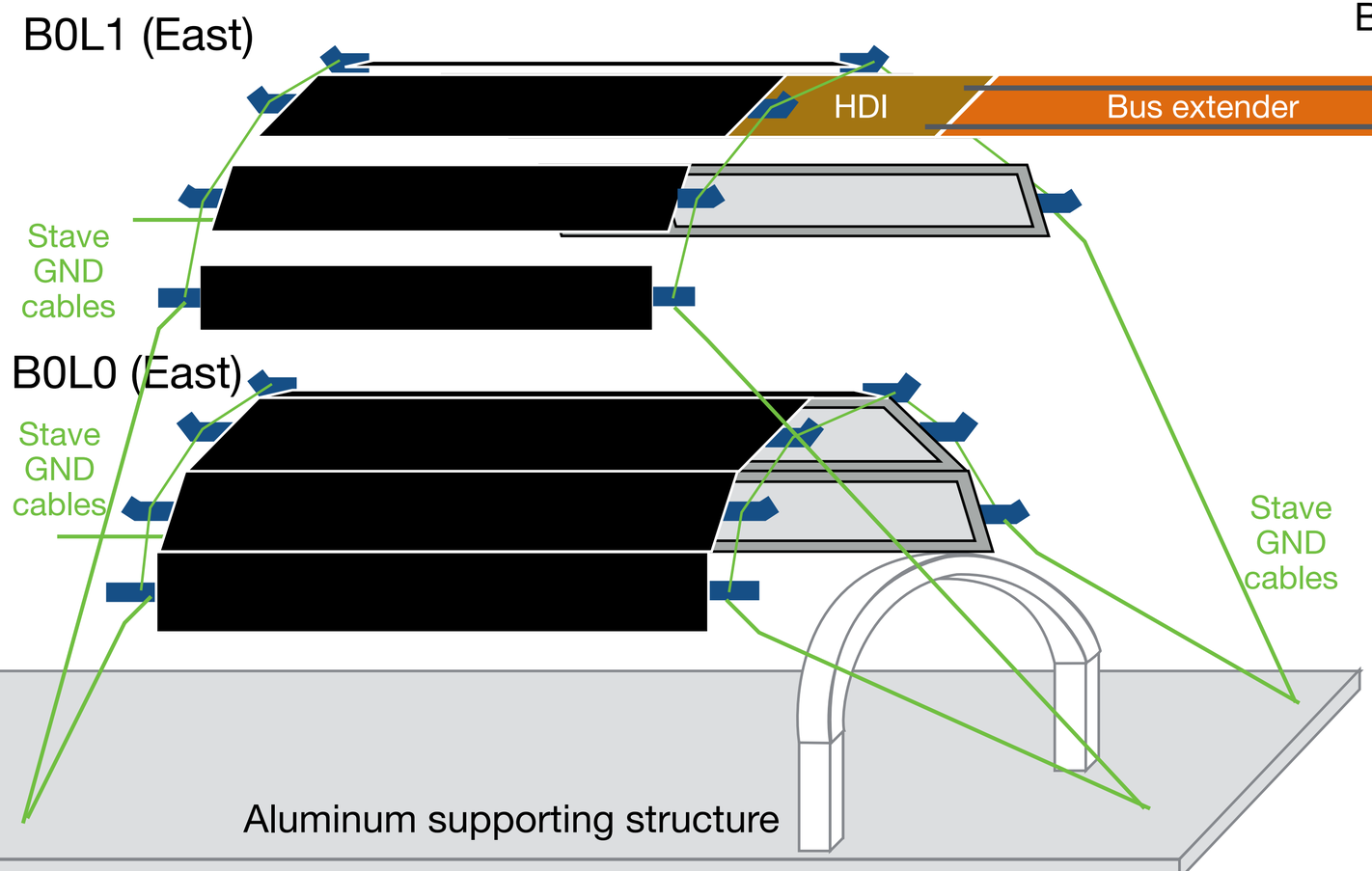
Chip13

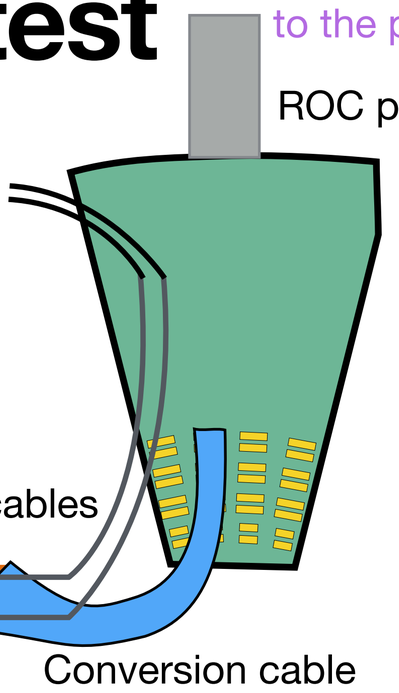


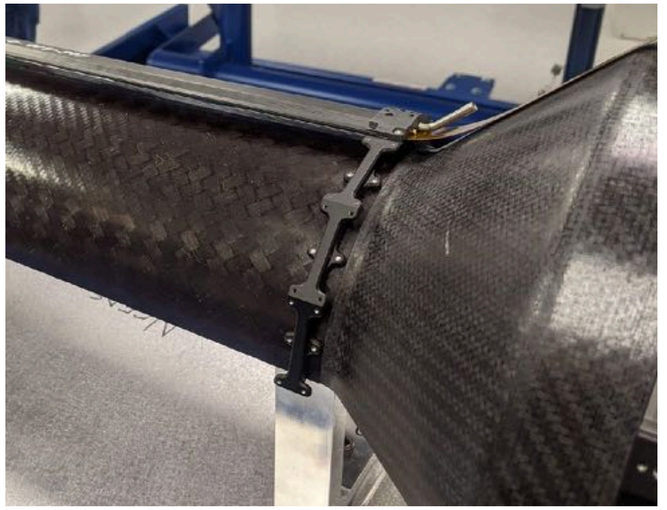
Bias current
type-A: 117 nA
type-B: 83 nA

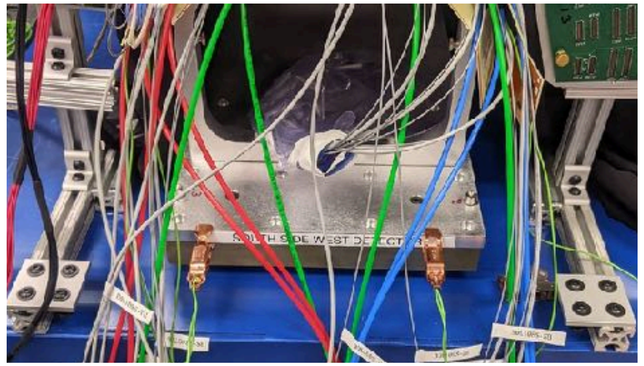
Results in the barrel had more noise than those in the test bench on some B0L1 ladders.

GND investigations in the 2nd test









Without the stave GNDs connection to the aluminum supporting structure,

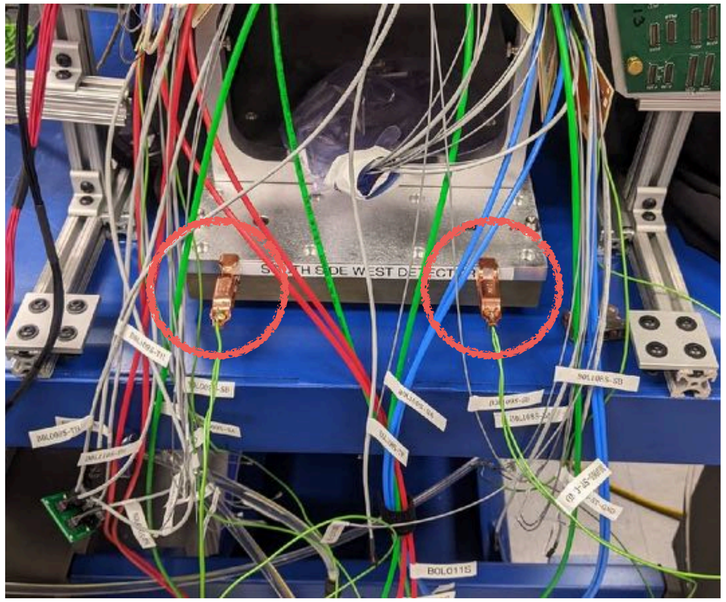
B0L0 <—> the supporting structure: ~0 Ω

B0L1 <—> the supporting structure: 180 Ω

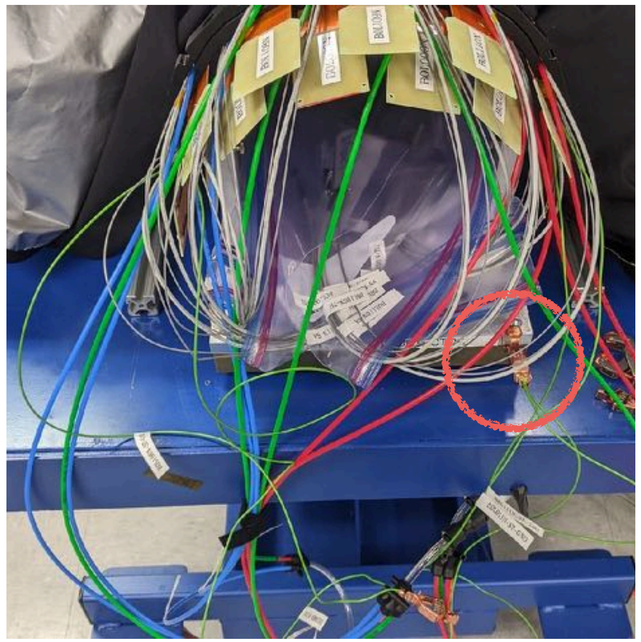
Note: CFC cone omitted

GND investigations: The harvest

Connecting the stave GNDs to the aluminum supporting structure drastically improves the condition.

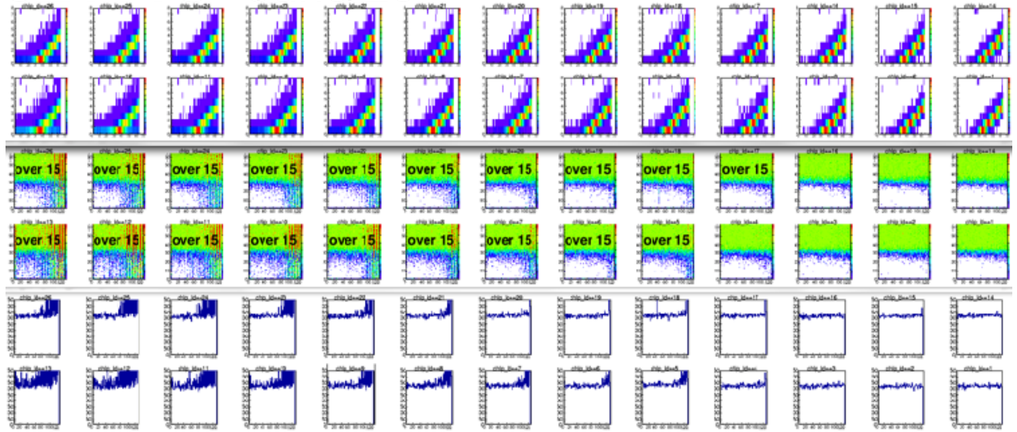


South side



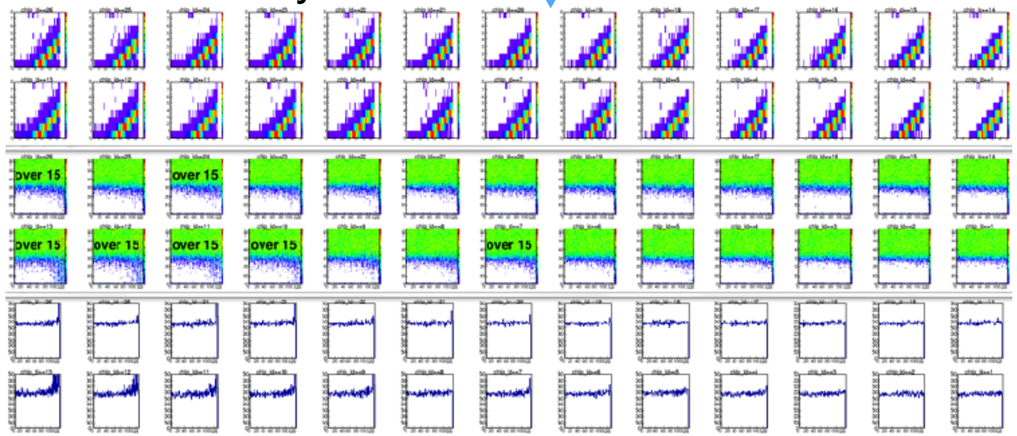
North side

B0L111S June/29



B0L0 ↔ the supporting structure: ~0 Ω
B0L1 ↔ the supporting structure: 180 Ω

July/07



B0L0 ↔ the supporting structure: ~0 Ω
B0L1 ↔ the supporting structure: ~0 Ω

All staves must be well connected to GND. In the IR, there is a GND port for this purpose. In the silicon lab, the aluminum supporting plate on the table can be large enough GND port. Power supplies with less noise are also necessary.

Upgrades on HV&LV

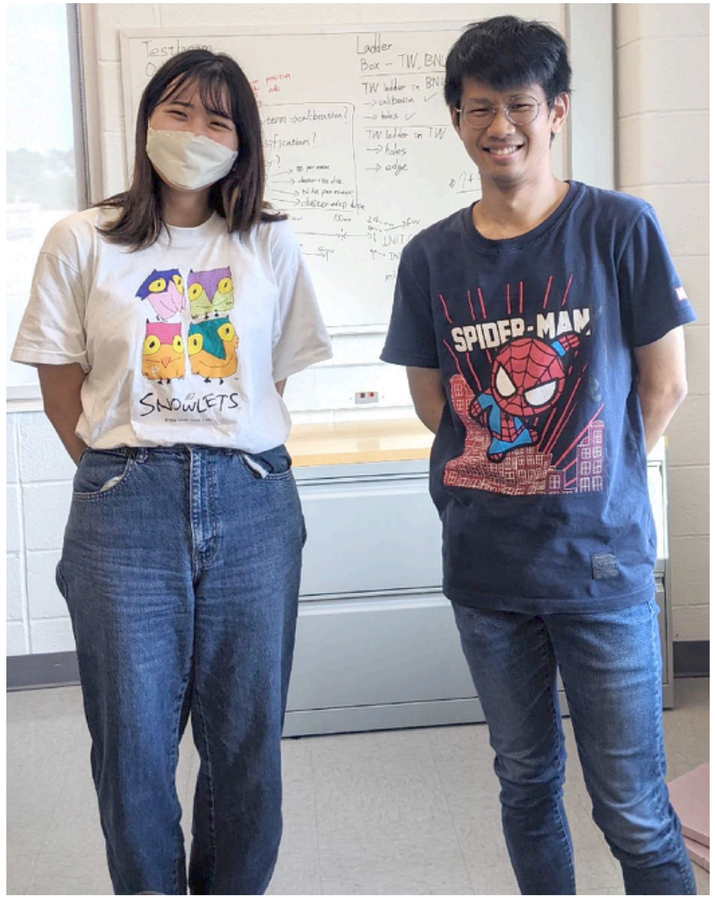
HV & LV power supplies were upgraded to the same one used in IR, so the environment is much cleaner now.

Thanks to Maki&Wei-Che, the new power supply system is operational.

See their reports for more details:

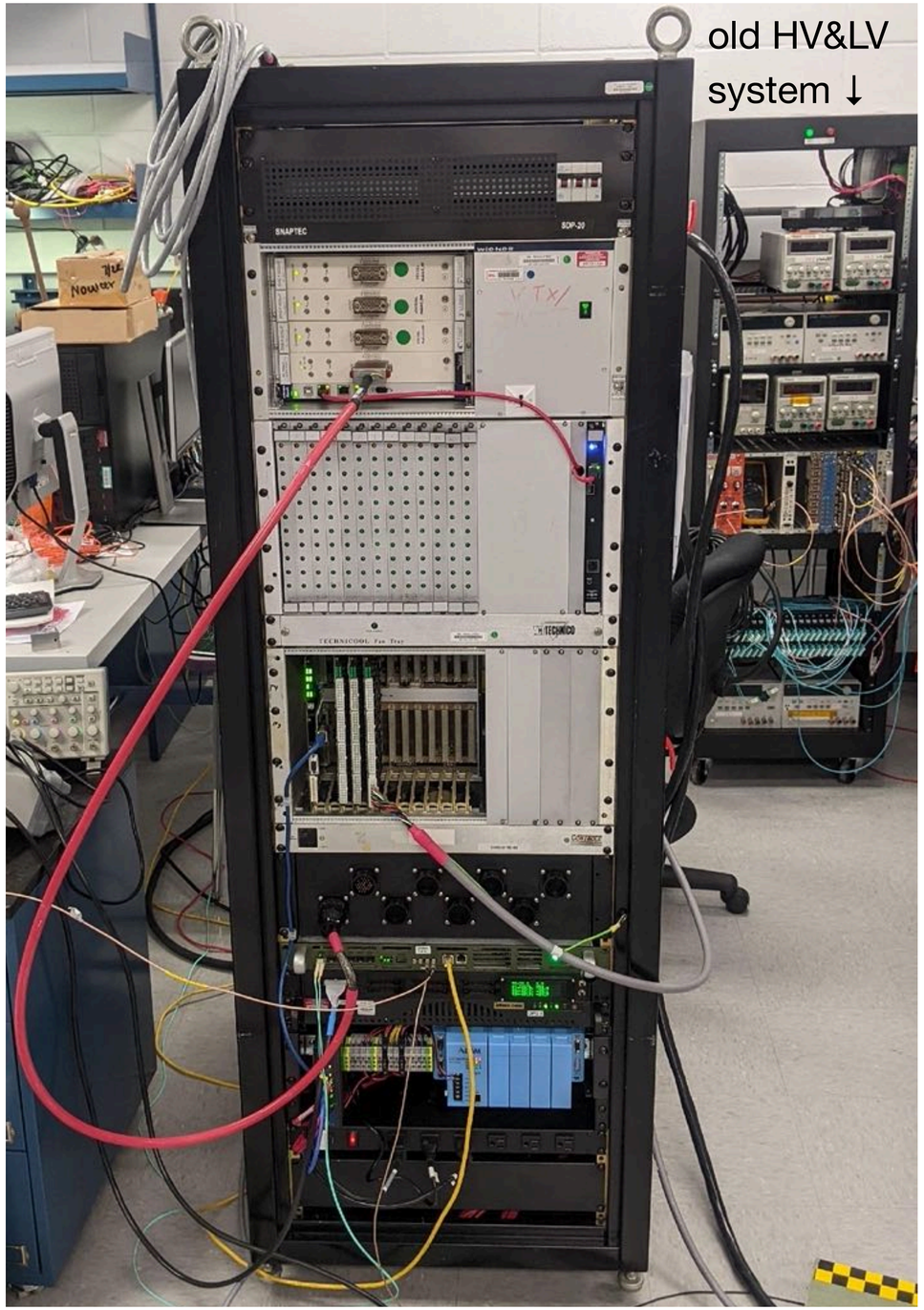
- HV by Maki
- LV by Wei-Che

The 3rd test was started on Aug/10.



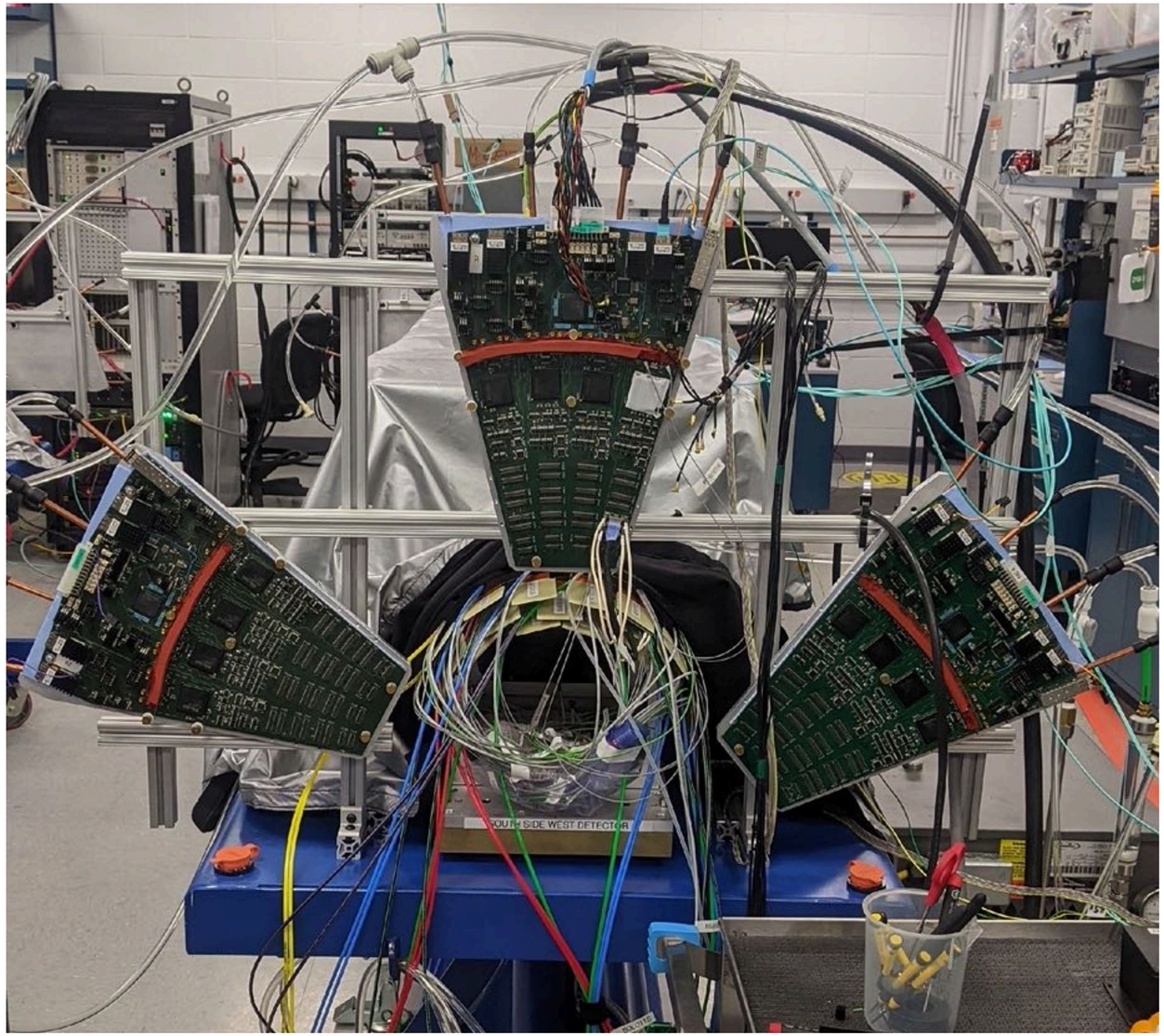
Maki Wakata
(Rikkyo Univ.)

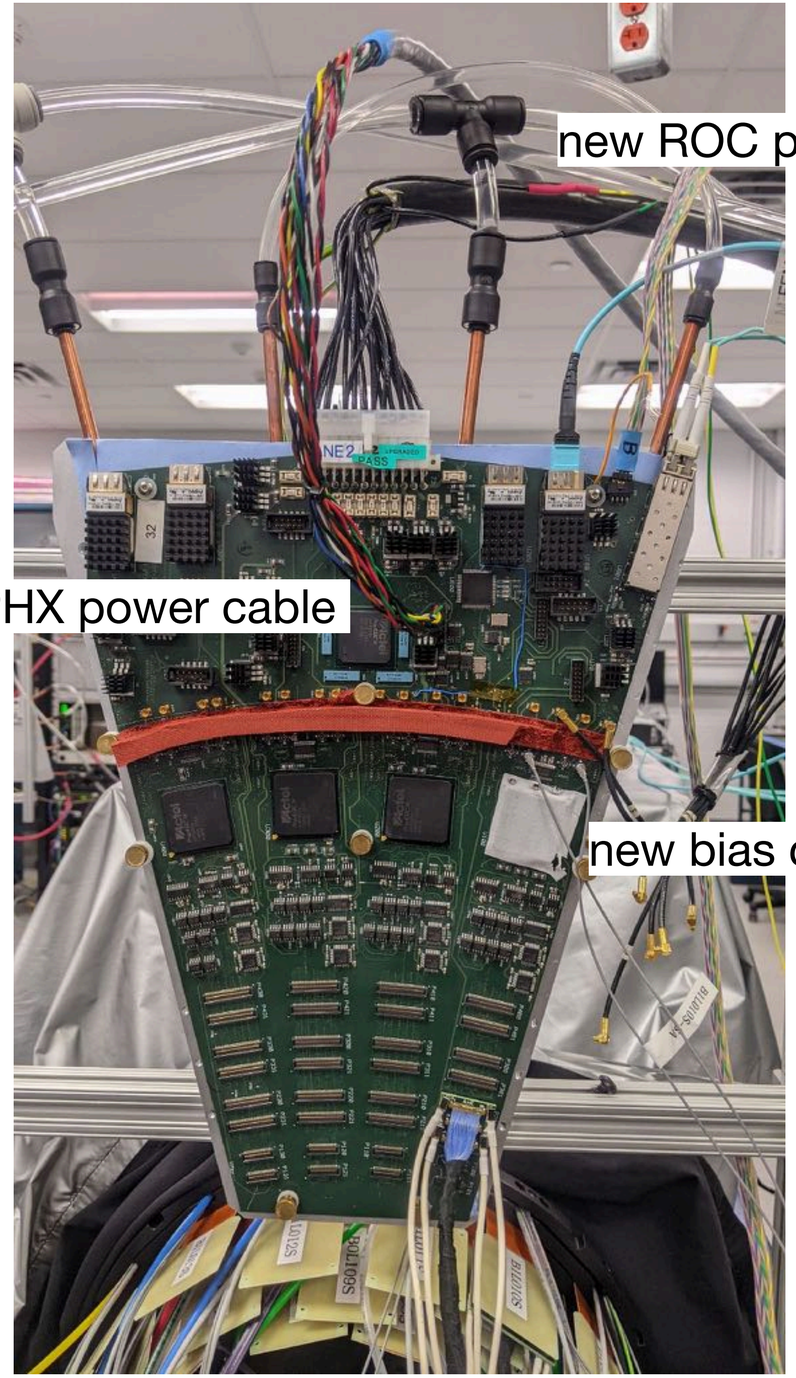
Wei-Che Tang
(NCU)



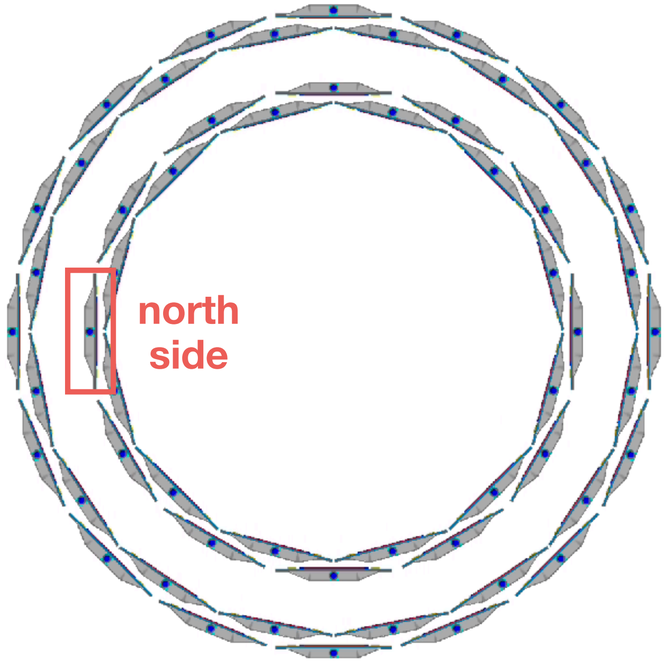
The new HV&LV system

The 3rd test


SOUTH SIDE WEST DETECTOR


new ROC power cable
new FPHX power cable
new bias cables

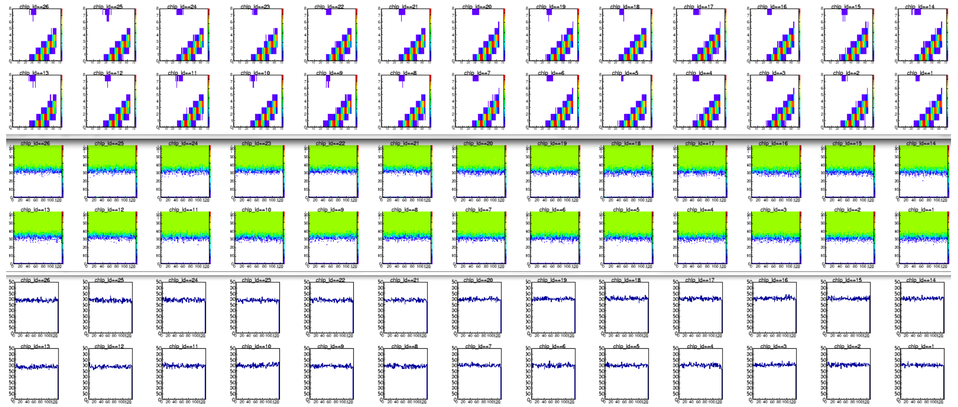
Results: Good news from 3rd test



The noise in the 2nd test is not in the 3rd test. It's as good as the one on the test bench.

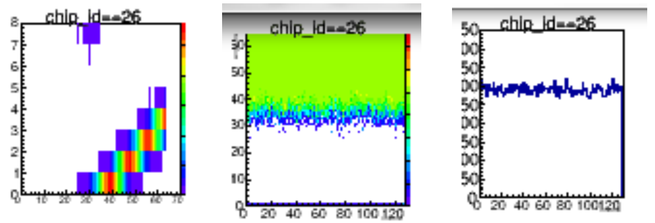
B0L109N (PB1-L023)

Test bench



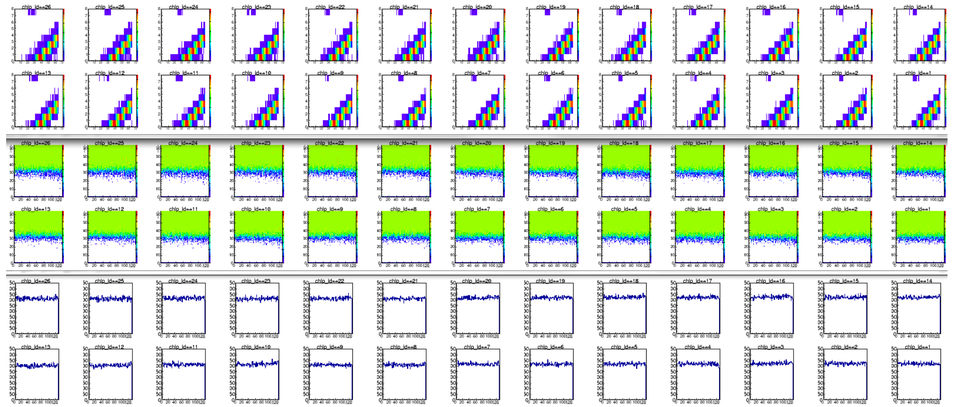
Data: 20220506_1747

Chip26



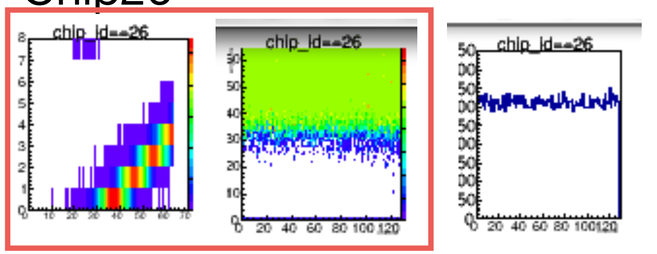
Bias current
type-A: 204 nA
type-B: 105 nA

Barrel the 2nd test



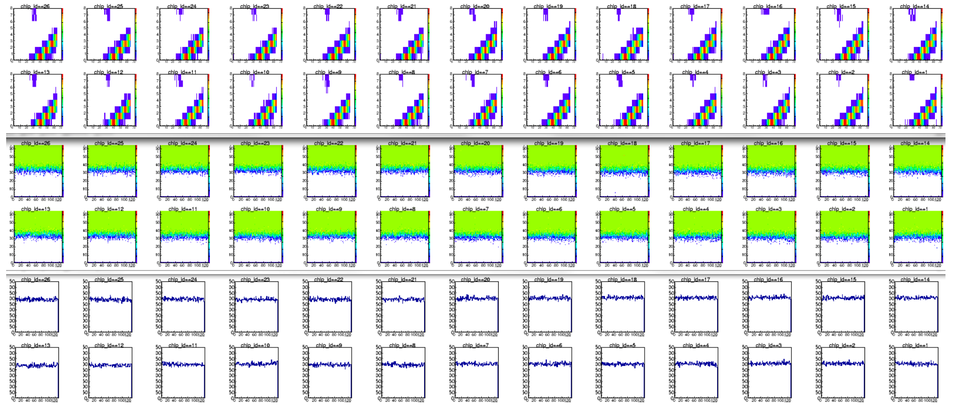
Data: 20220621_1316

Chip26



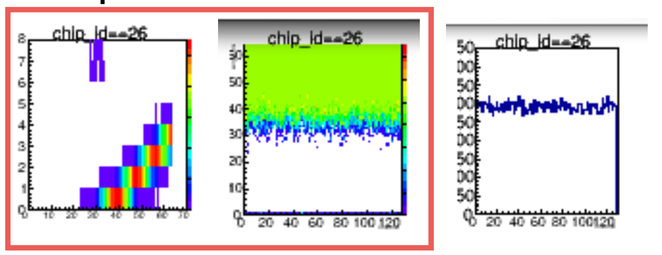
Bias current
type-A: 143 nA
type-B: 87 nA

Barrel the 3rd test



Data: 20220811_1137

Chip26



Bias current
type-A: 262 nA
type-B: 291 nA

The 3rd test: Current situation and prospect

3rd test is ongoing now, mainly by M. Hata and M. Watanabe.

For the moment, all tested ladders showed very good results like in the test bench.

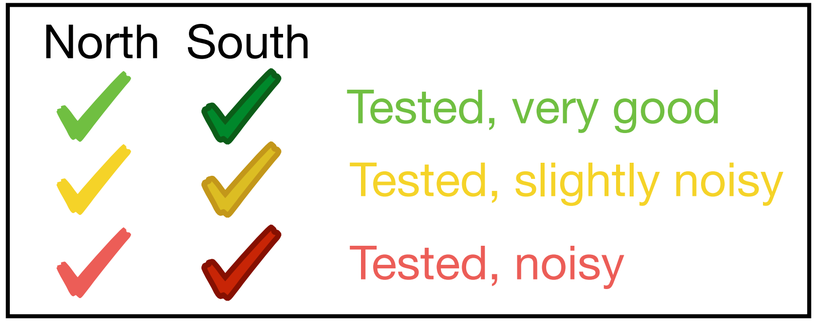
<u>In the best cases</u>, testing 1 half-ladder takes ~10 min. If we test all ladders, there are 2×(12 + 12 + 18) = 84 ladders, it takes about 14 hours.

20 min/half-ladder is in average. → 28 hours

Maybe 6 working days are enough.

Once the 2nd Felix operation system is available for these tests, we will migrate from the FEM/ FEM-IB system to the new one.

M. Watanabe (NWU) M. Hata (NWU)



: OK, but the results are with readout issues

Summary

	Date	Tested layers	Results
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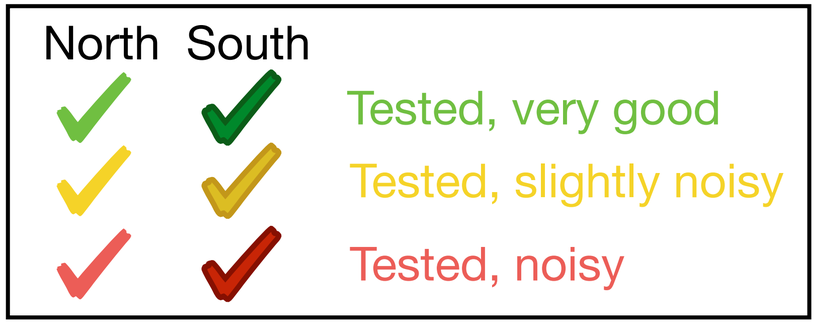
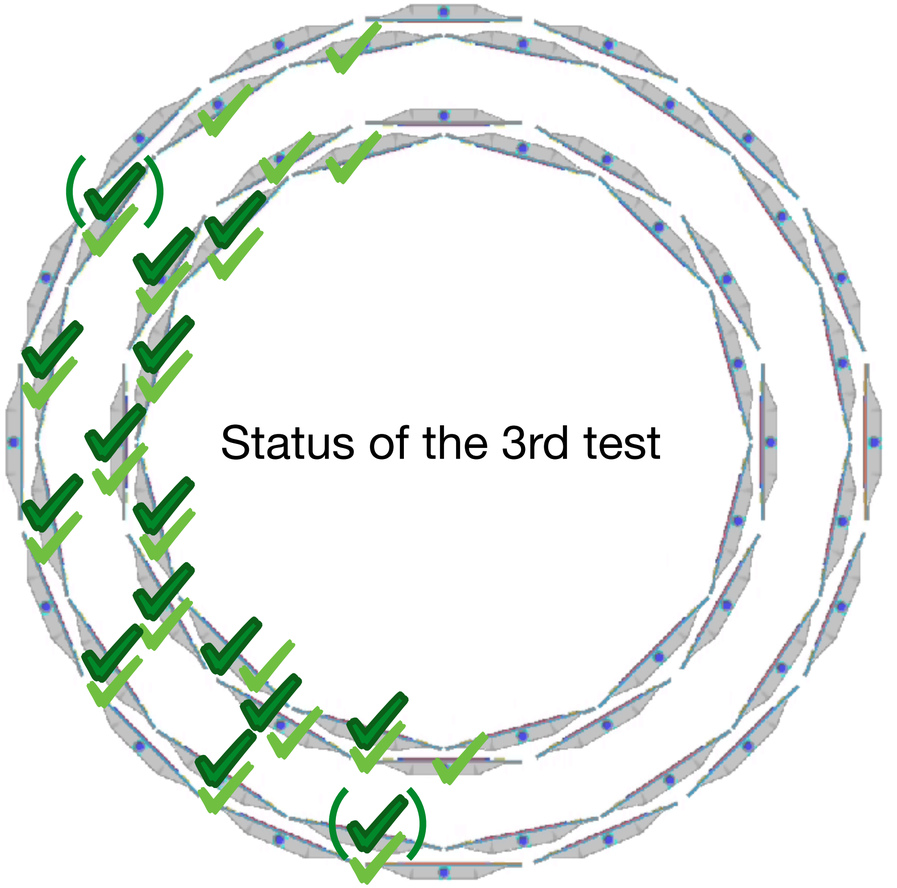
4th test	later…		





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