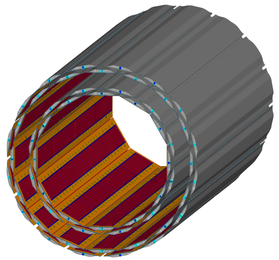
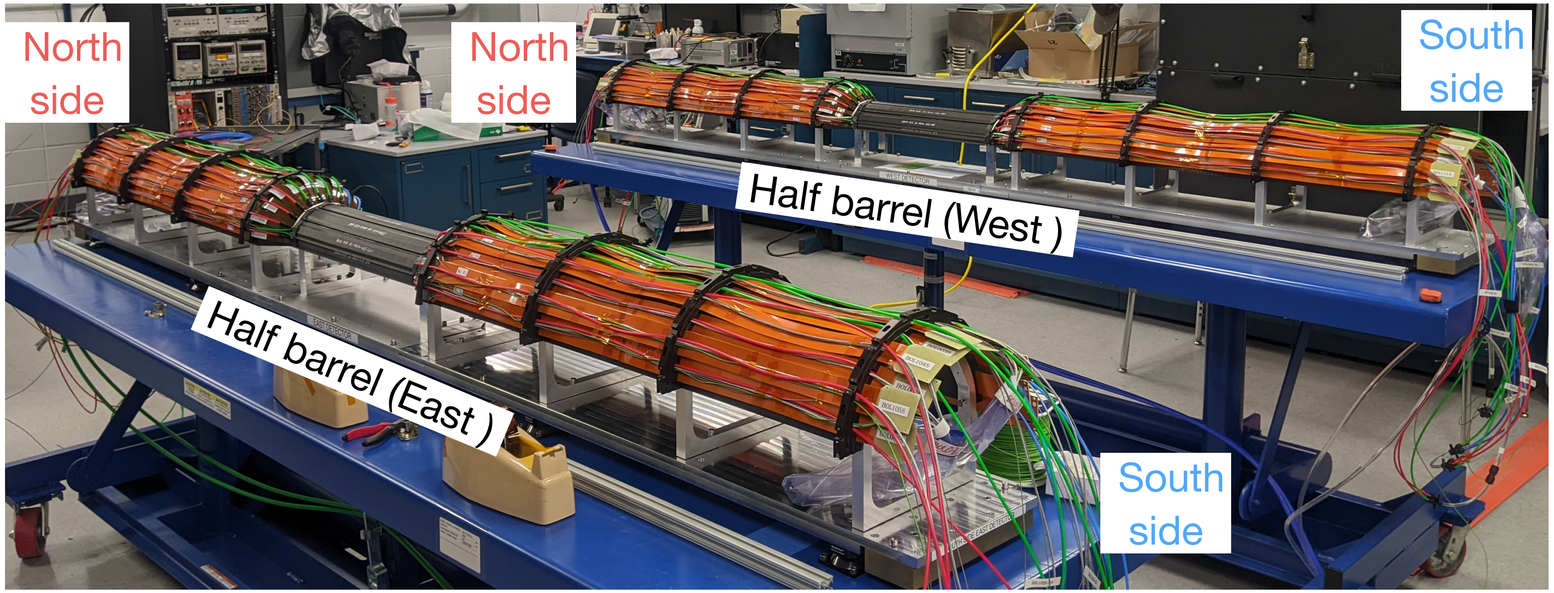
The barrel construction and the ladder tests

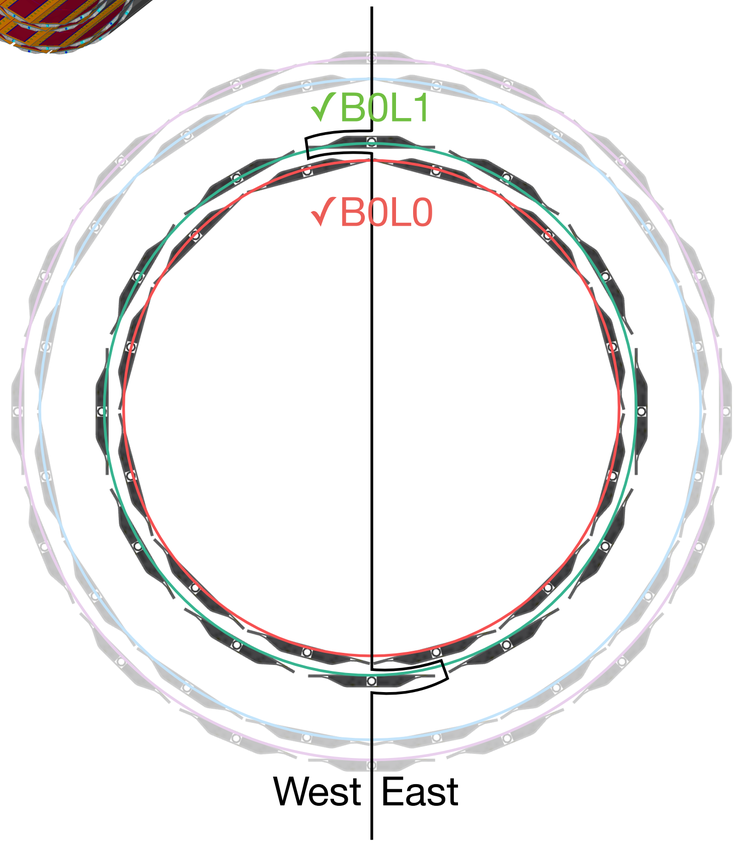
R. Nouicer (BNL), R. Pisani (BNL),
and **G. Nukazuka (RBRC)**

The barrel construction



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)





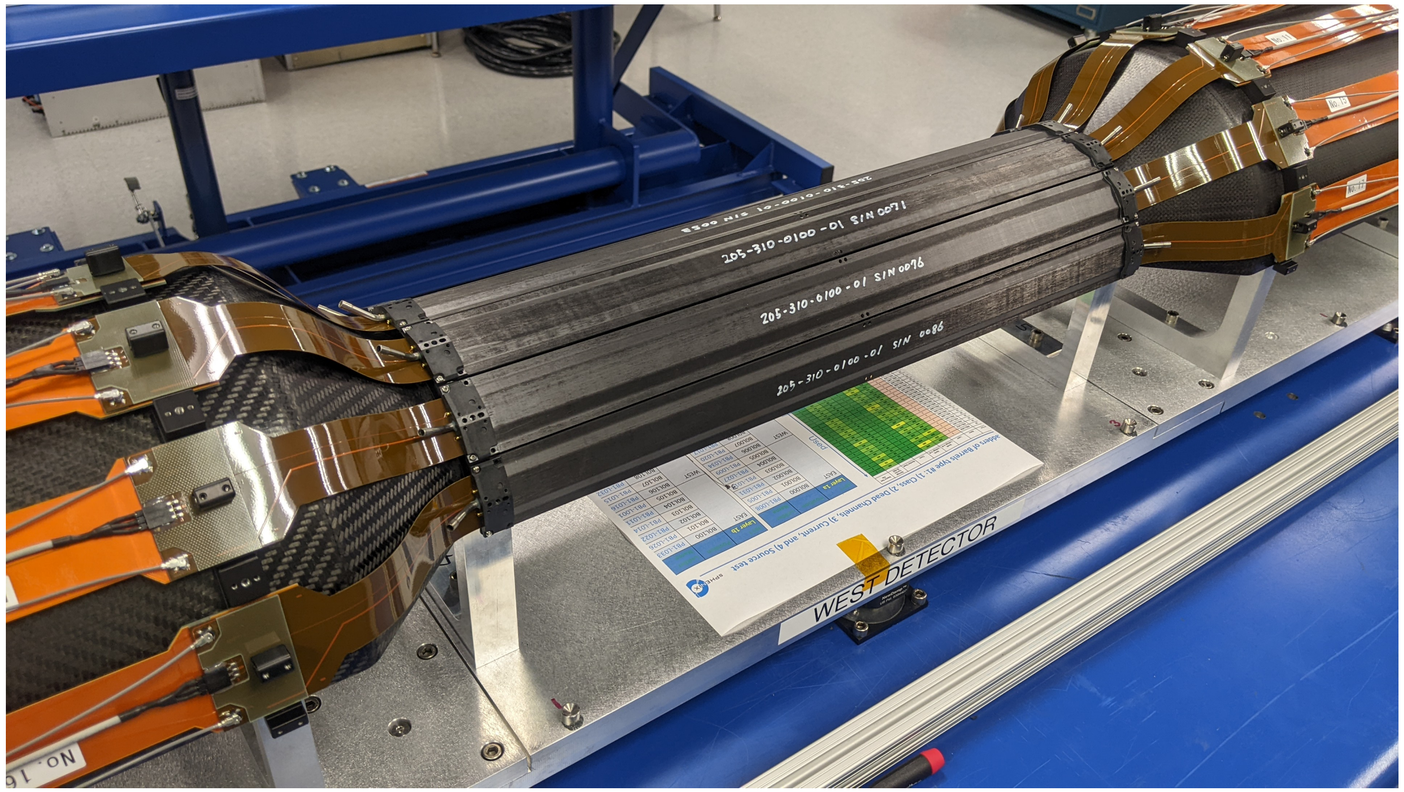
B0L0

- June/06 : Ladder installation and cabling done
- June/10 : Ladder survey done
- June/14 : Ladder calibration tests done

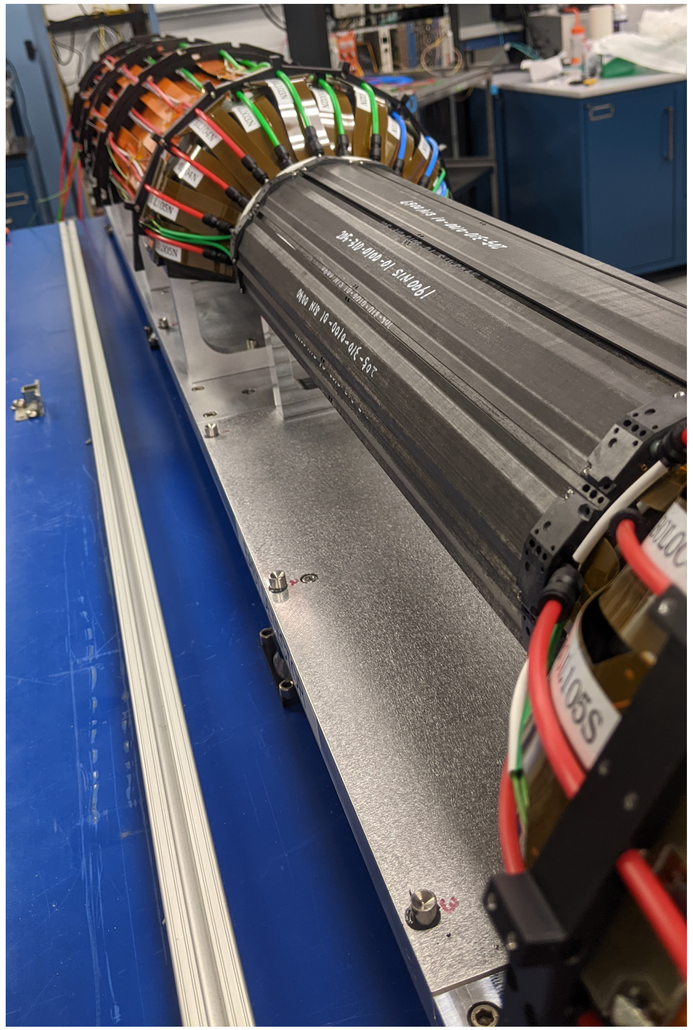
B0L1

- June/15: Ladder installation and cabling done
- June/17: Ladder survey done
- now: Ladder calibration tests ongoing

The barrel construction

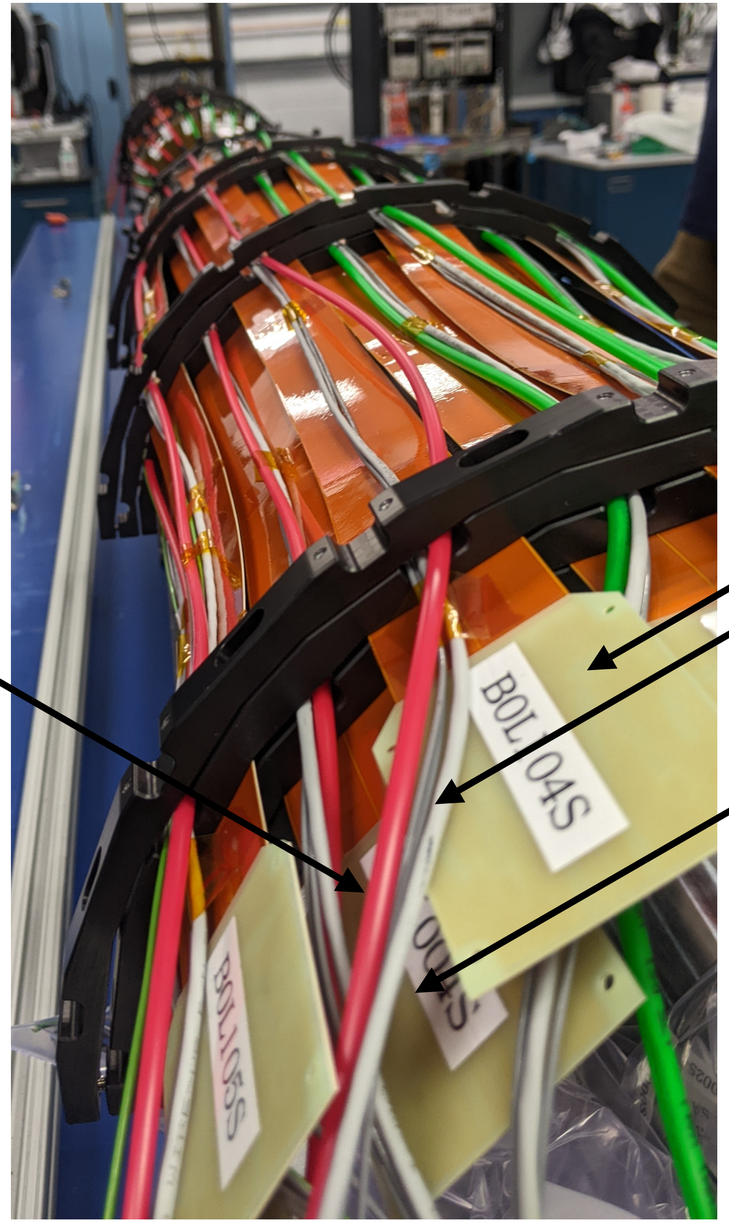


After the ladder installation for B0L0

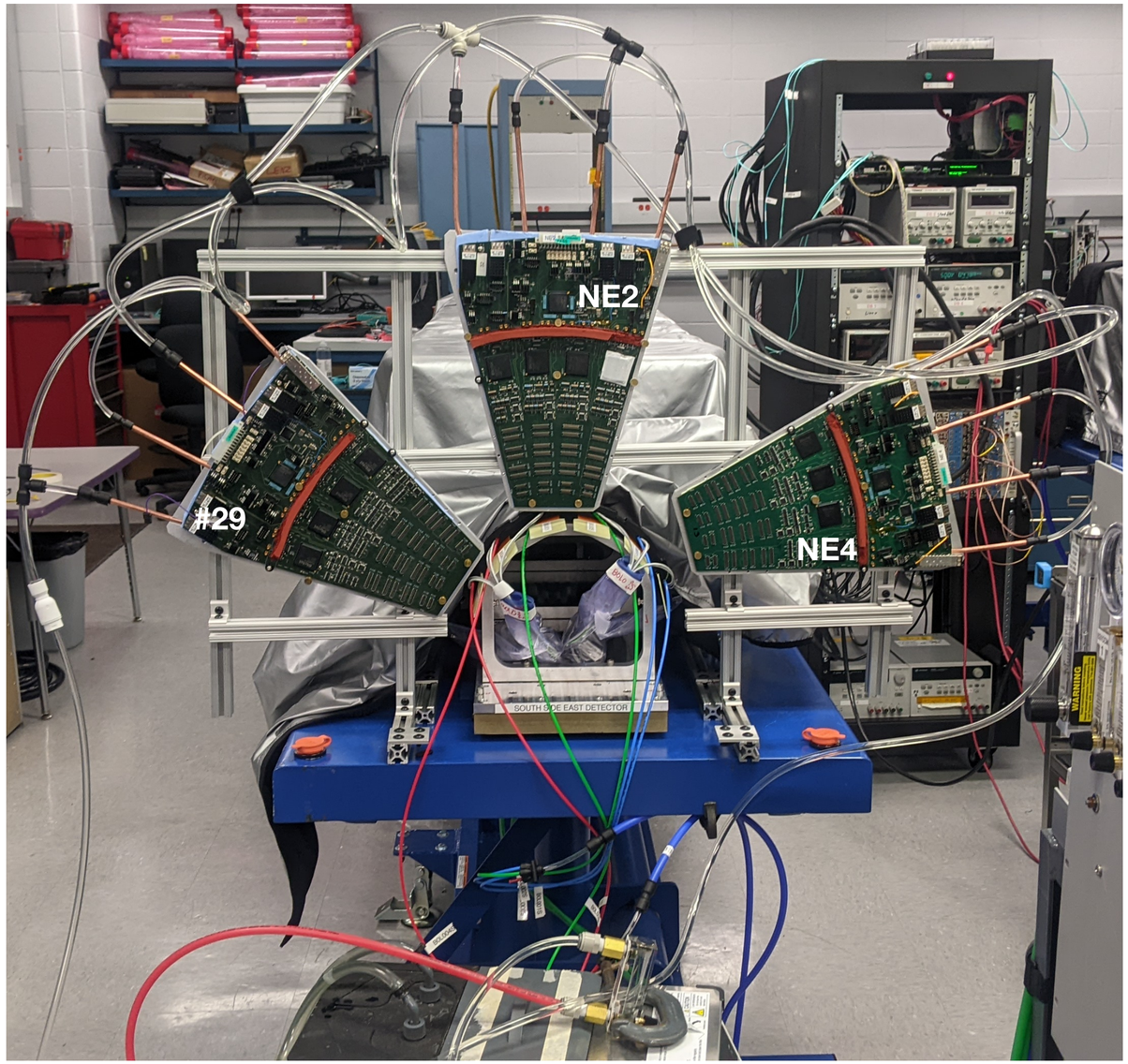


After the ladder installation for B0L1

The barrel construction

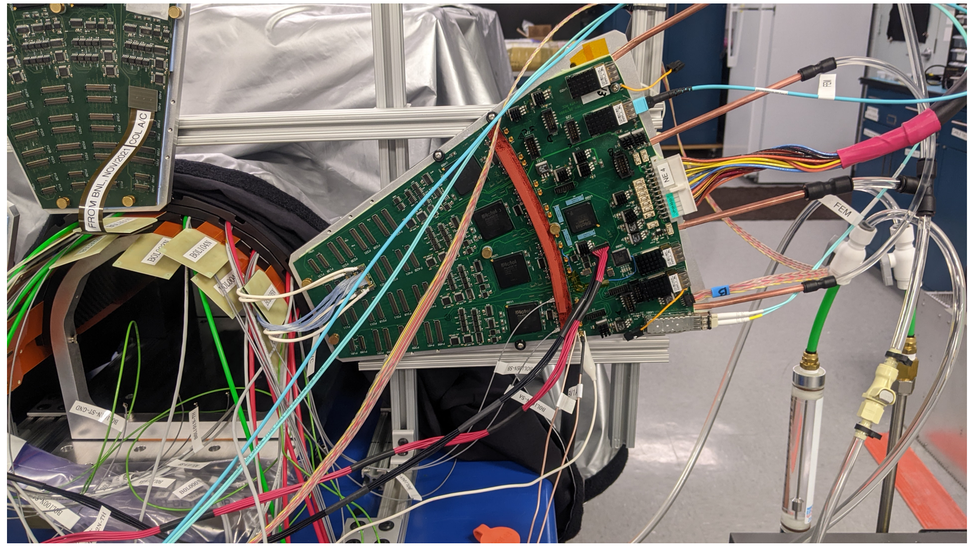


The barrel calibration tests: The setup

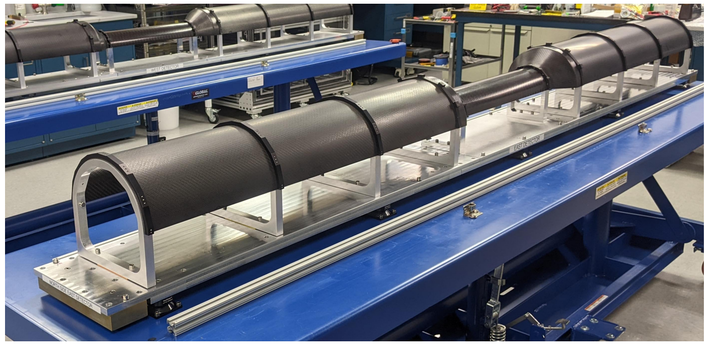


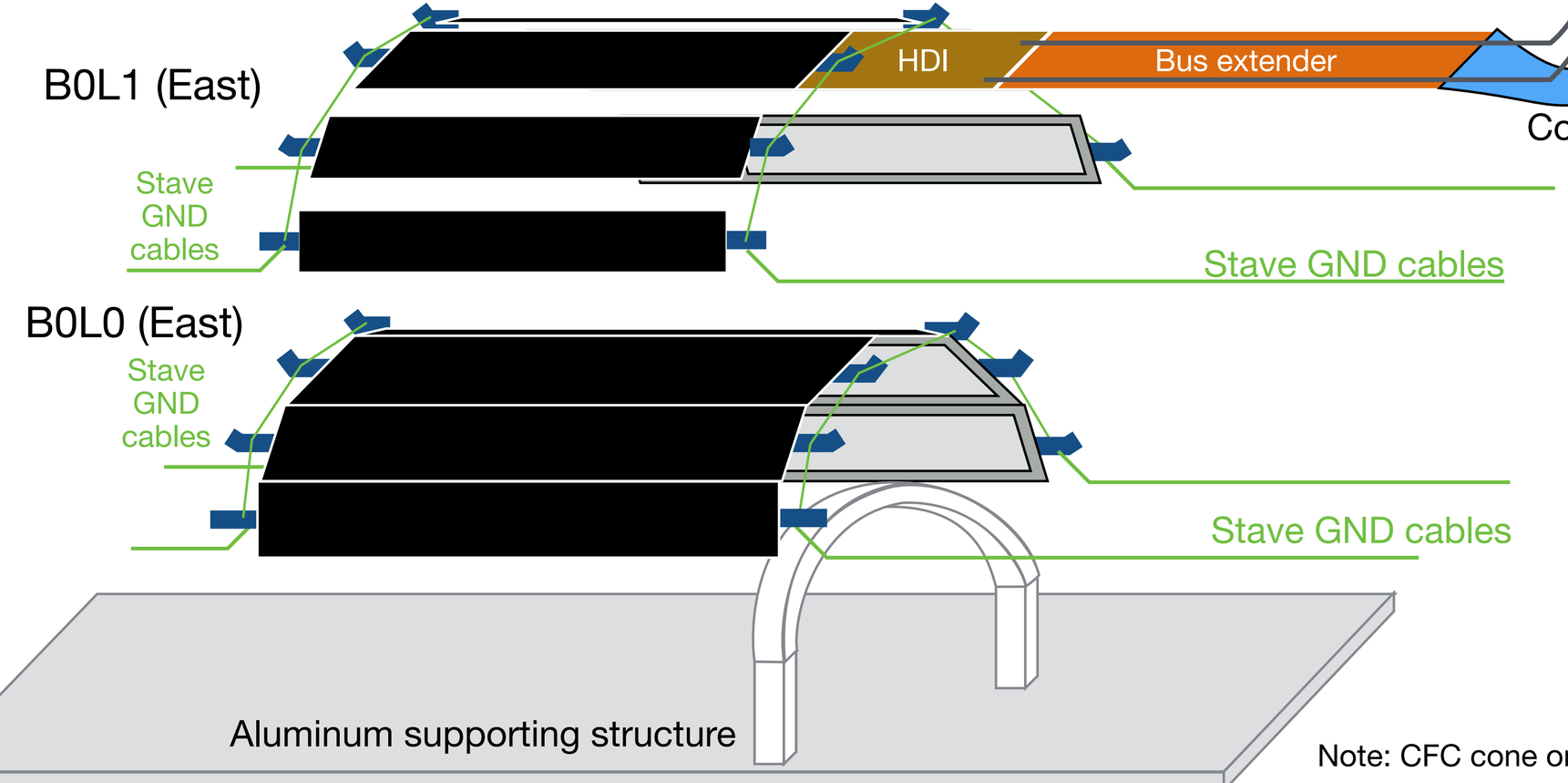
- 3 good ROC (NE2, NE4, and #29)
- The FEM/FEM-IB system
- The same LV system as the test bench
- The new temperature monitor system
- The ladder cooling and the ROC cooling
- The FPC conversion cable or the μ-coaxial conversion cable was used. No difference found b/w the 2 types.

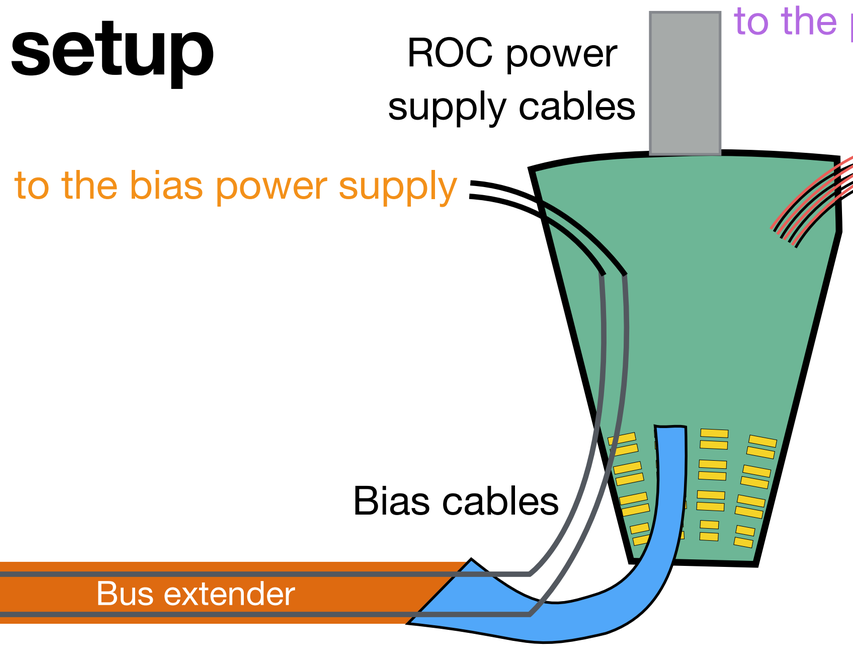
- ROCs were set for one side of a half barrel.
- A single ladder was operated to test it.



The barrel calibration tests: The setup







Note: CFC cone omitted

power for the lack

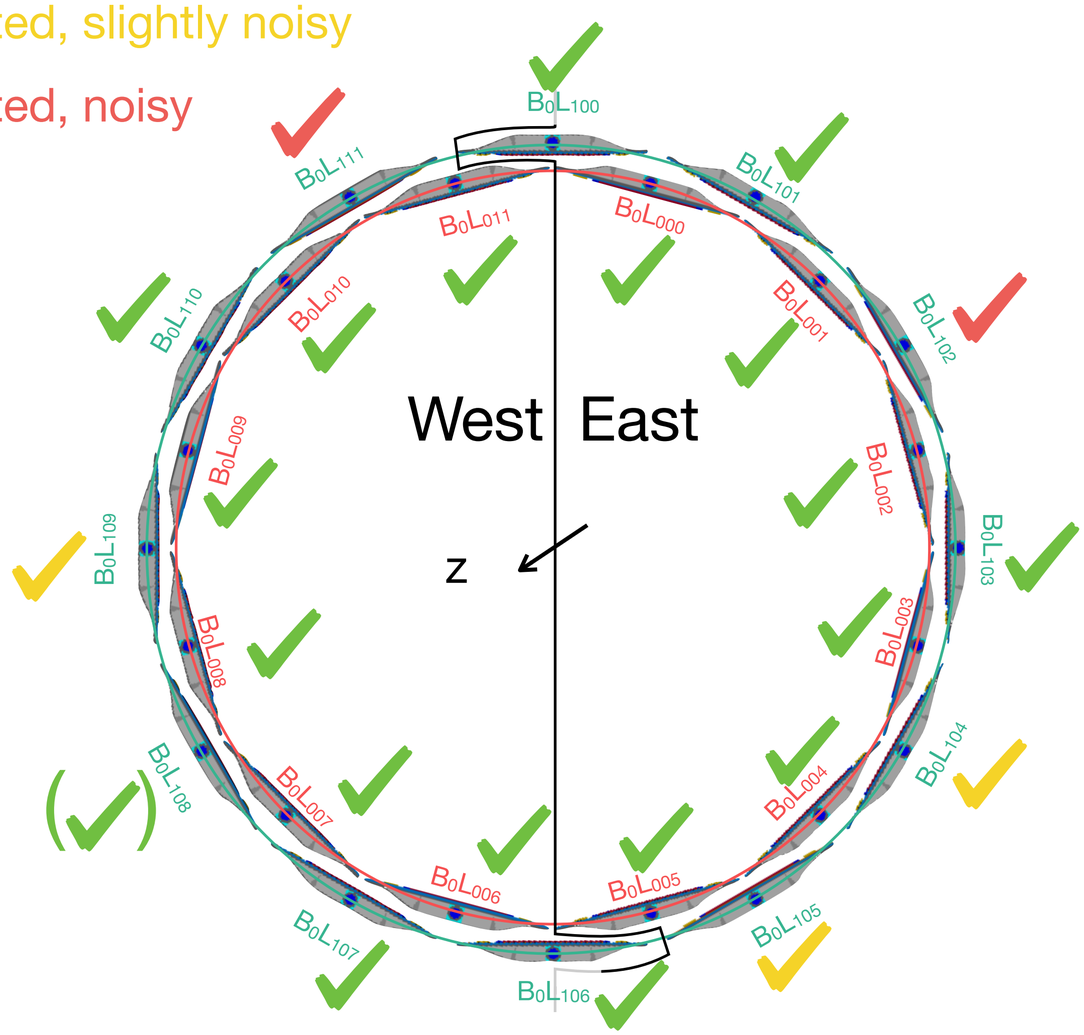
The barrel calibration tests: Results

Many ladders showed results as good as ones in the test bench

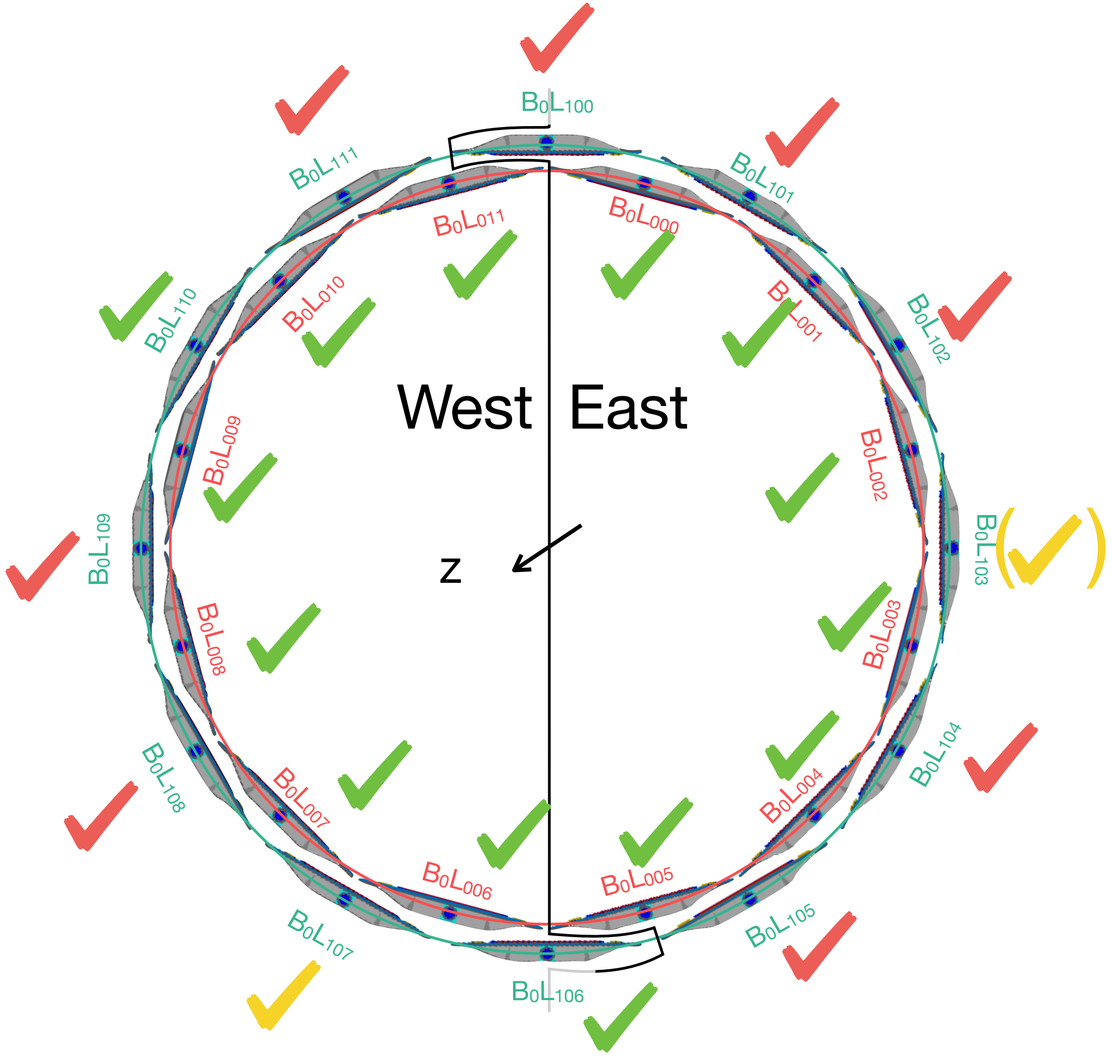
✓ Tested, very good

✓ Tested, slightly noisy

✓ Tested, noisy



North side

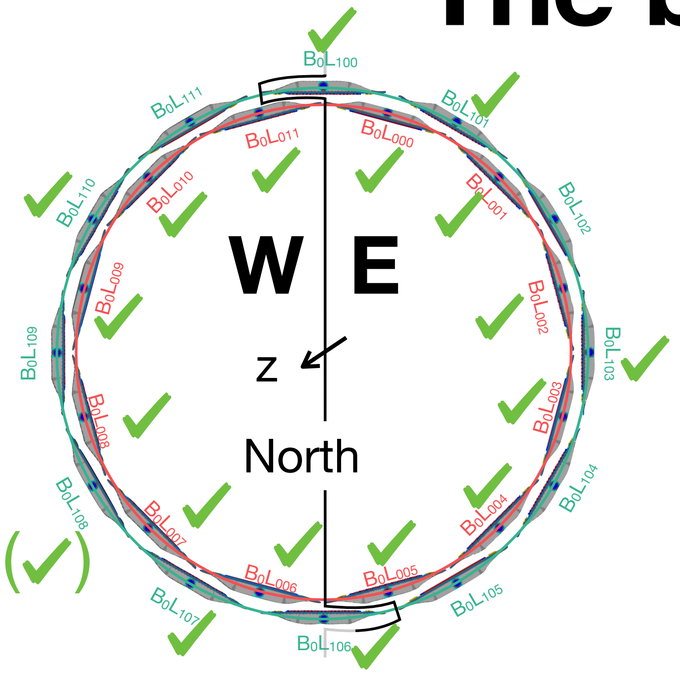


South side

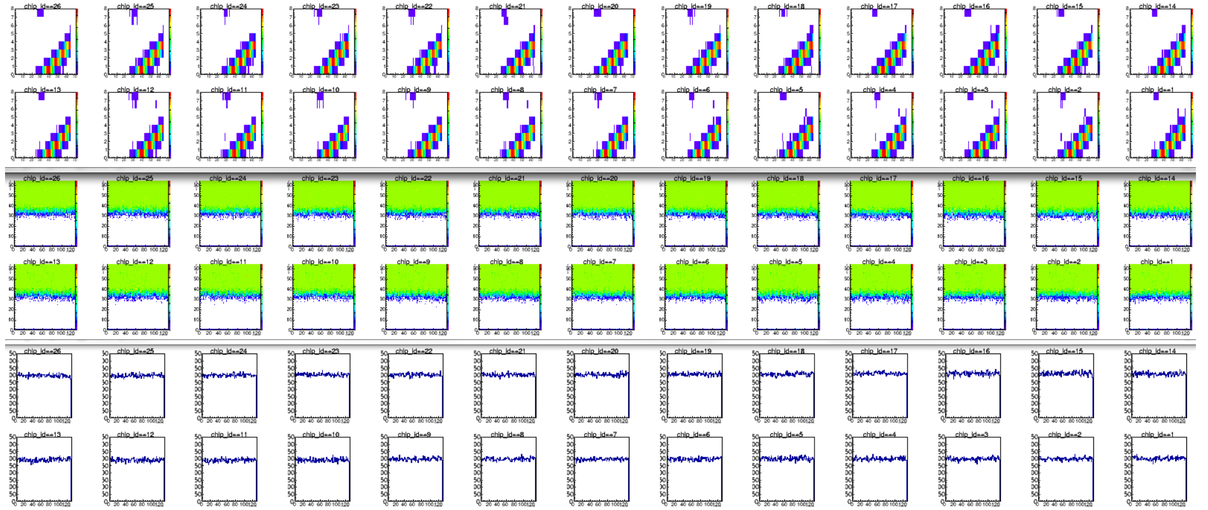
The barrel calibration tests: Results

Many ladders showed results as good as ones in the test bench

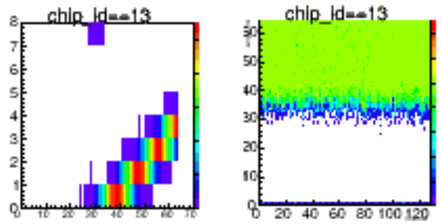
B0L002S (PB1-L031)



Barrel



Data: 20220613_1546

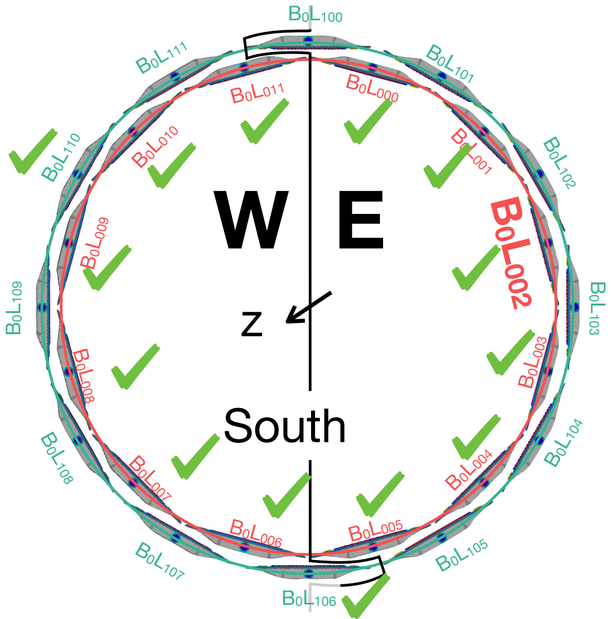


Bias current

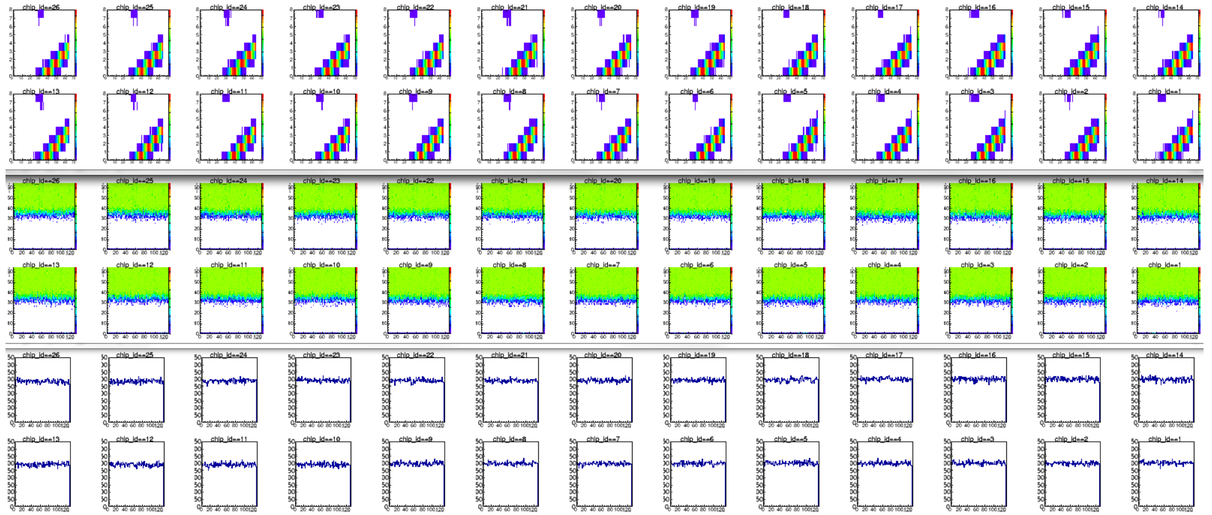
type-A: 135 nA

type-B: 102 nA

Chip13

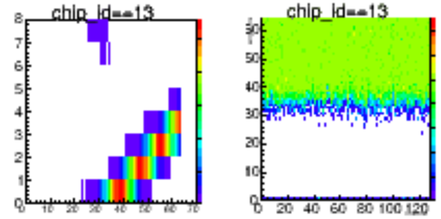


Test bench



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

Chip13



Bias current

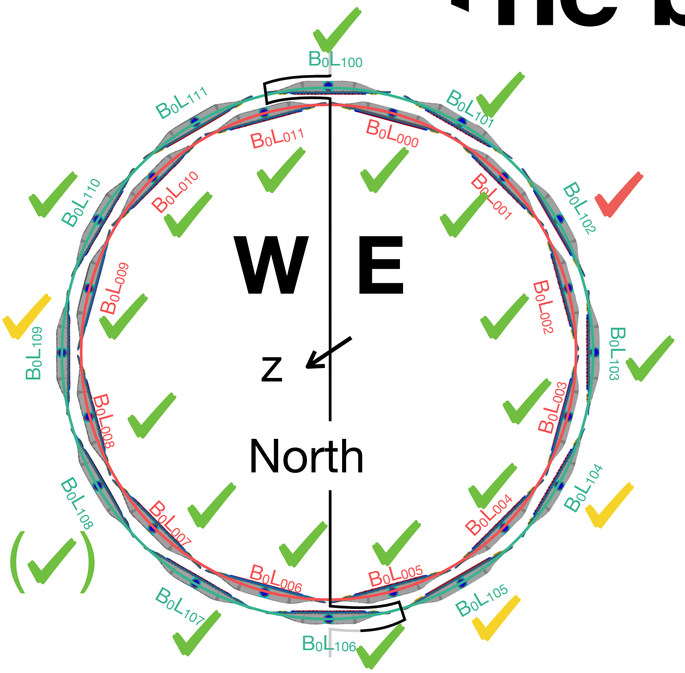
type-A: 184 nA

type-B: 141 nA

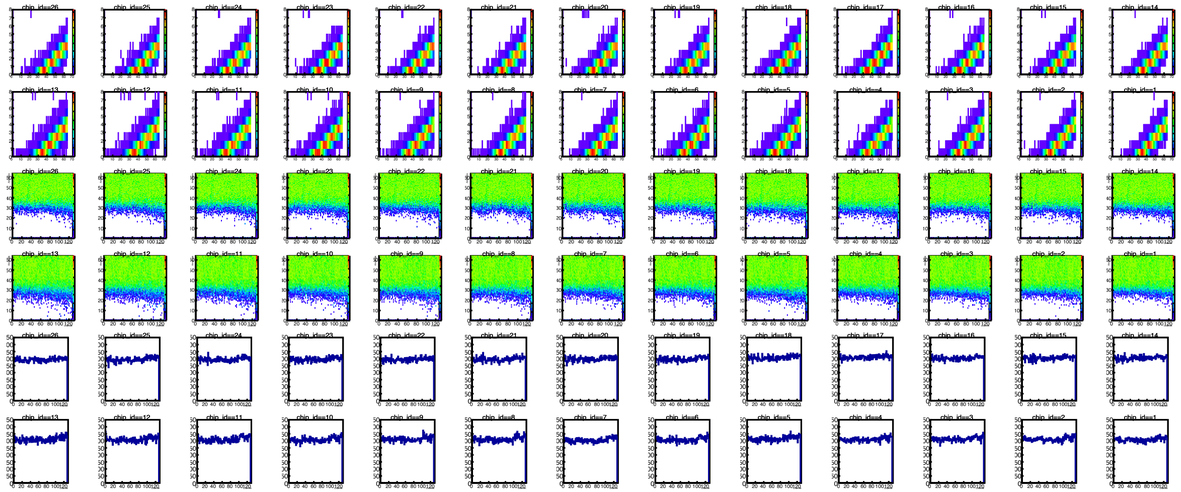
The barrel calibration tests: Results

Many ladders showed results as good as ones in the test bench

Some ladders had more noise… …, for example: B0L103N



Barrel

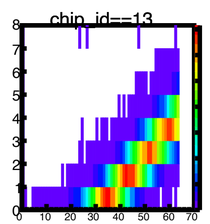


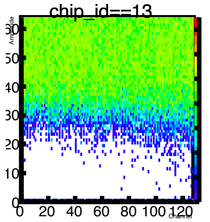
Data: 20220622_1248 (after modification of GND, good results were obtained)

Bias current

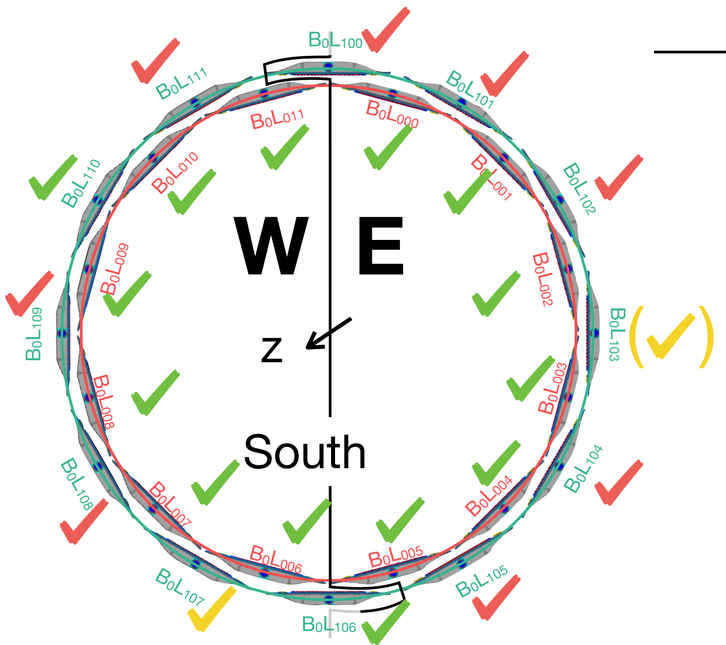
type-A: 117 nA

type-B: 83 nA



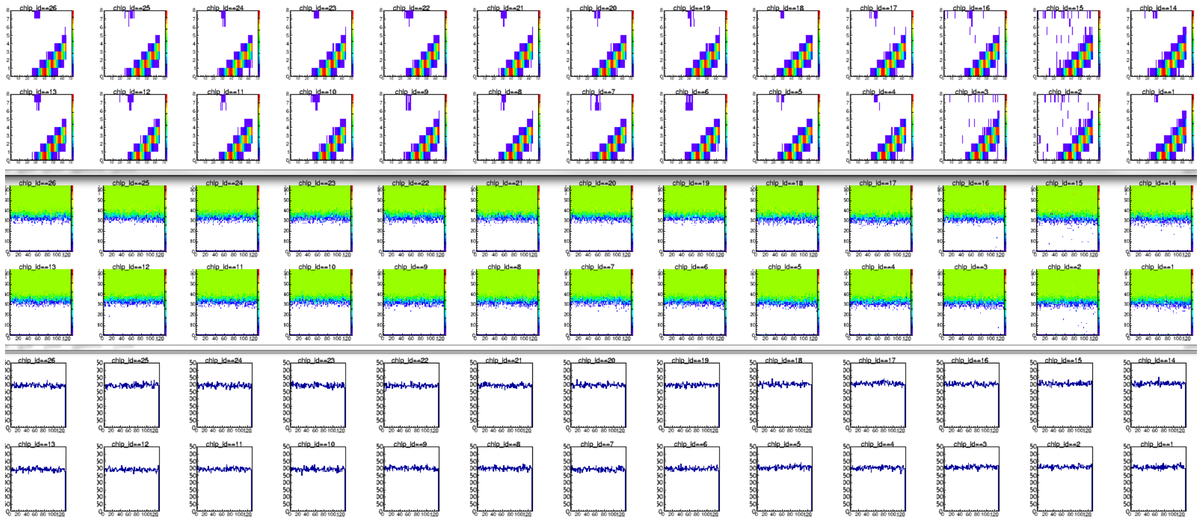


Chip13



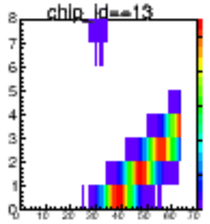
Test bench

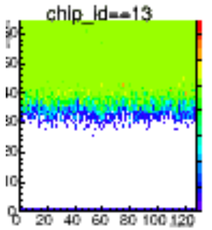
Due to the radiation source↓



Data: 20220420_1927

Chip13



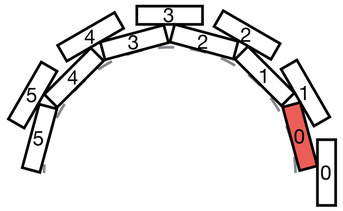


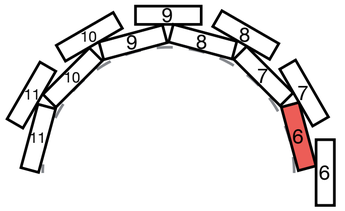
Bias current

type-A: 139 nA

type-B: 98 nA

The barrel calibration tests: Results





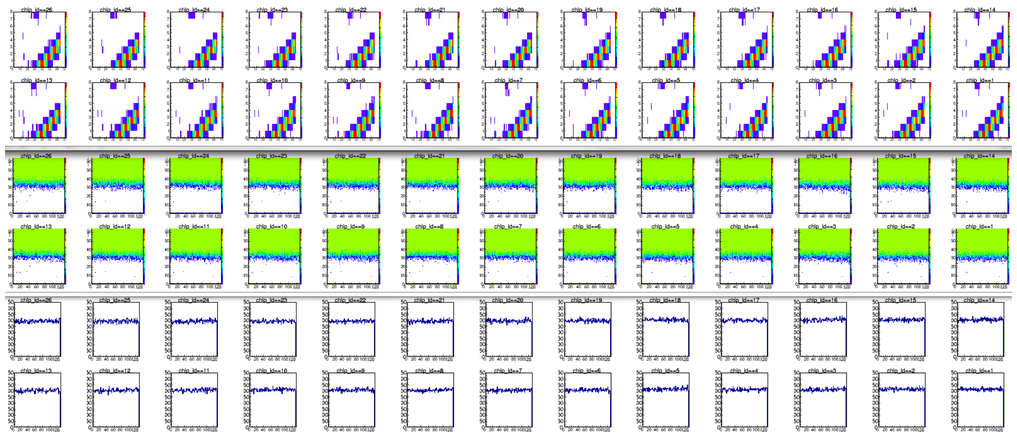
East barrel

West barrel

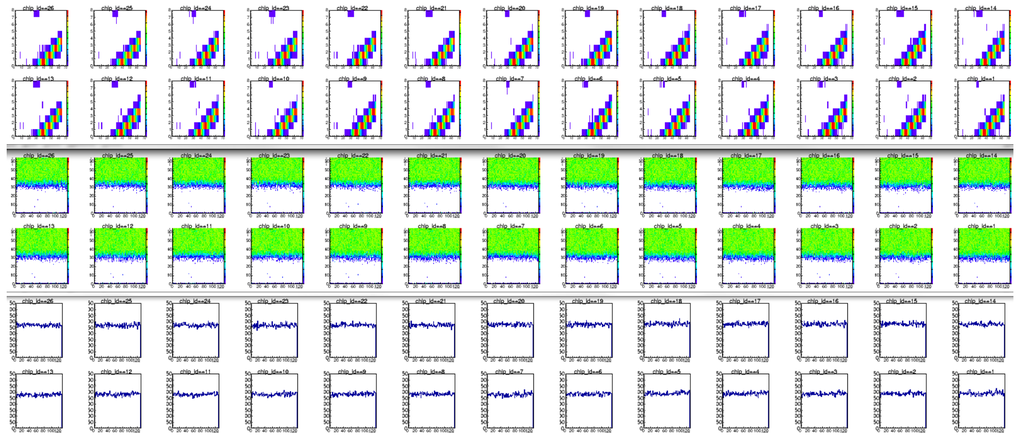
B0L000

B0L006

North



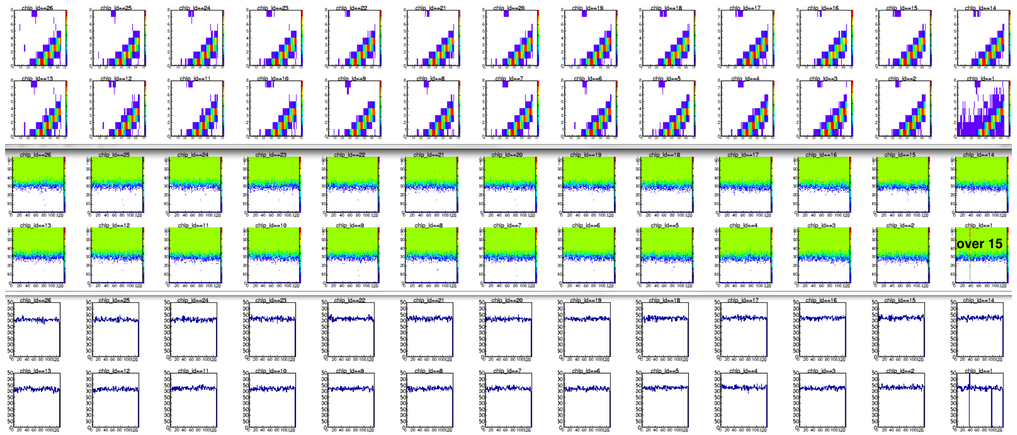
ROC: #29, C3



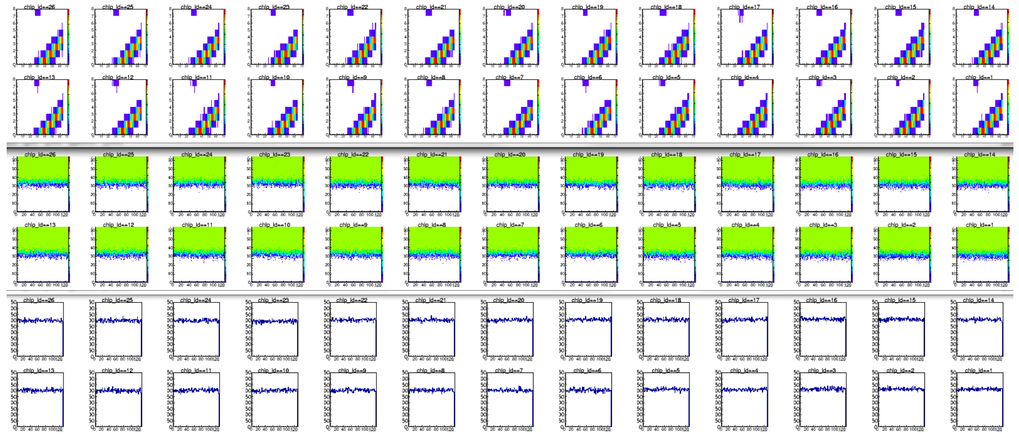
ROC: #29, C3

South

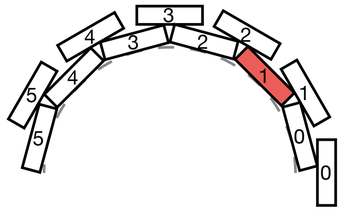
ROC: NE4, C1

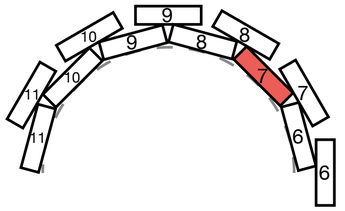


ROC: NE4, A3



The barrel calibration tests: Results





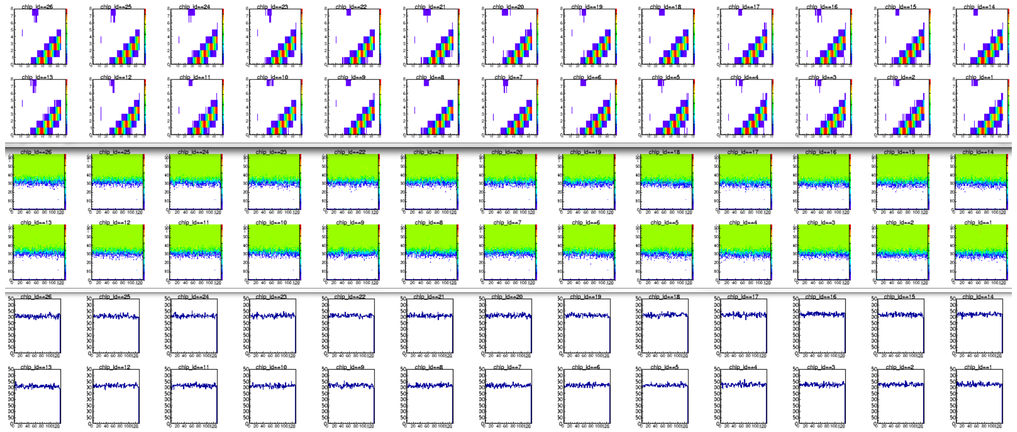
East barrel

West barrel

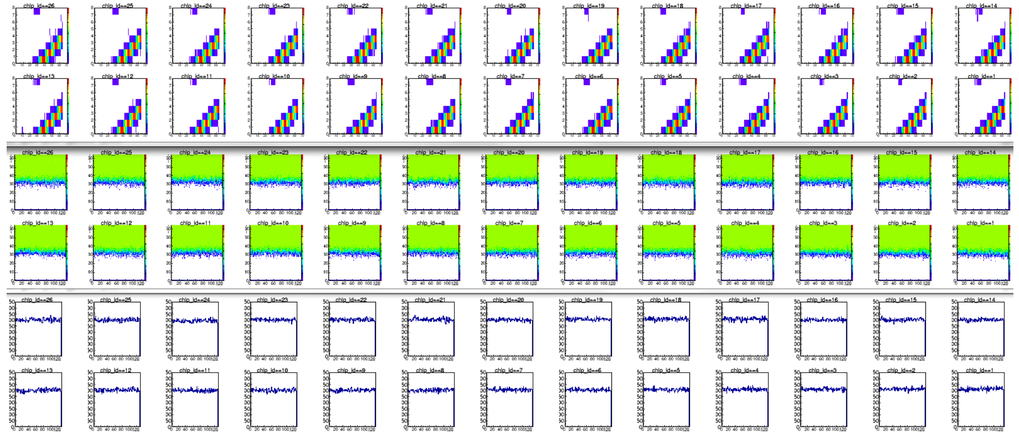
B0L001

B0L007

North



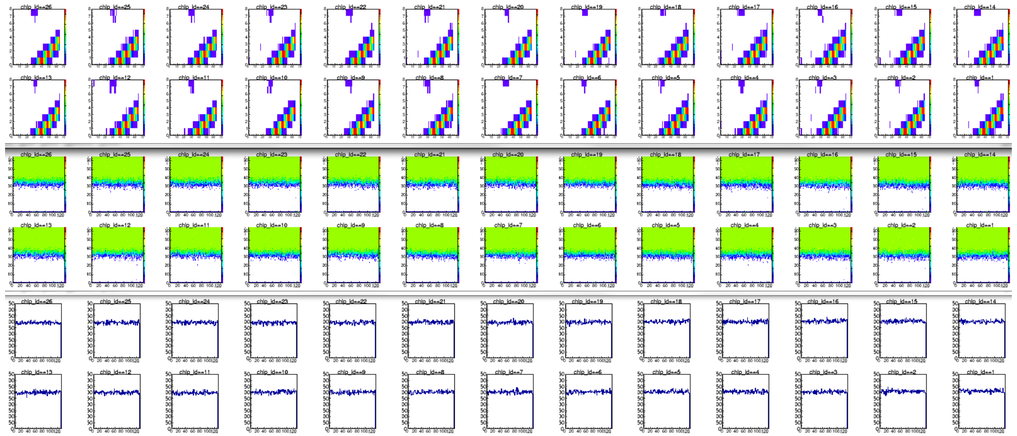
ROC: #29, C1



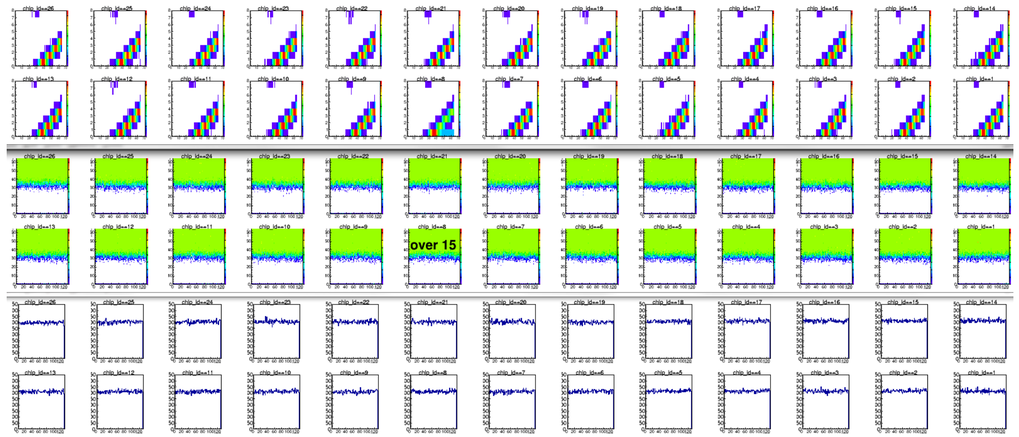
ROC: #29, C3

South

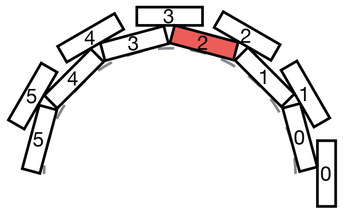
ROC: NE4, C2

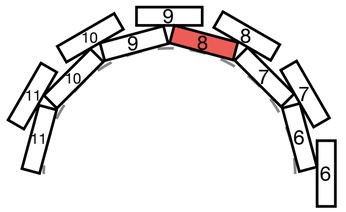


ROC: NE2, C2



The barrel calibration tests: Results





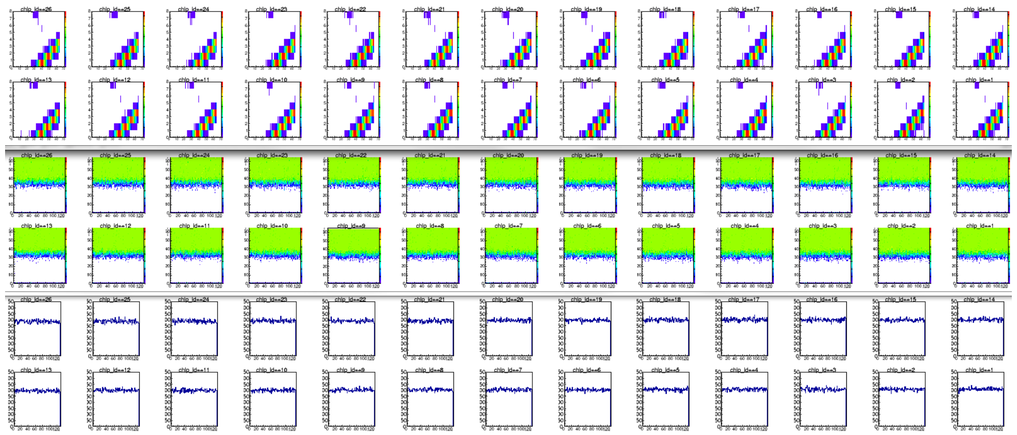
East barrel

West barrel

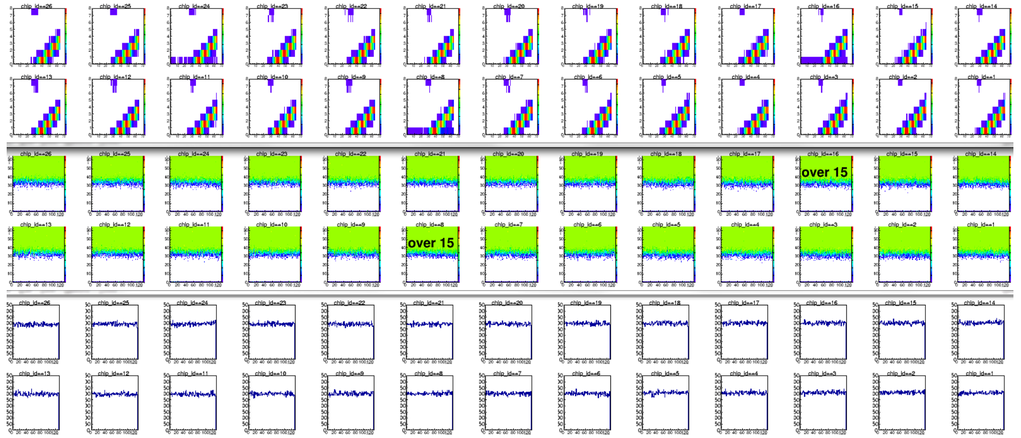
B0L002

B0L008

North



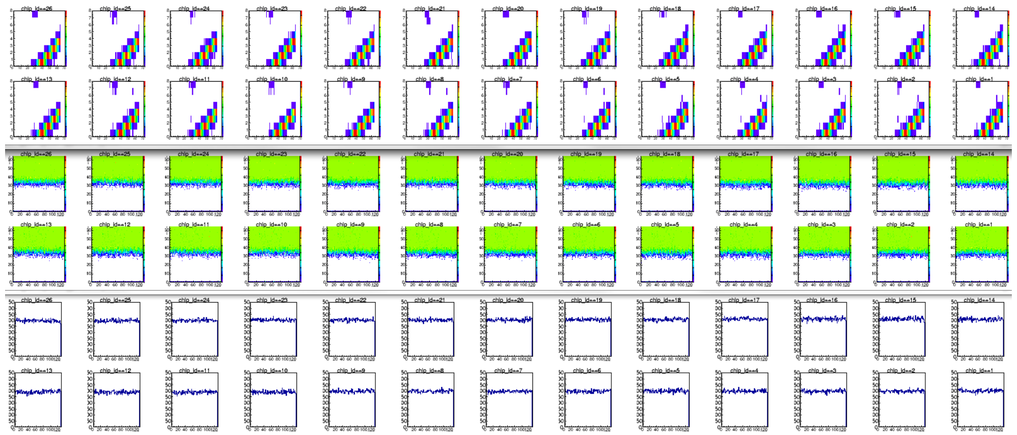
ROC: NE2, C3



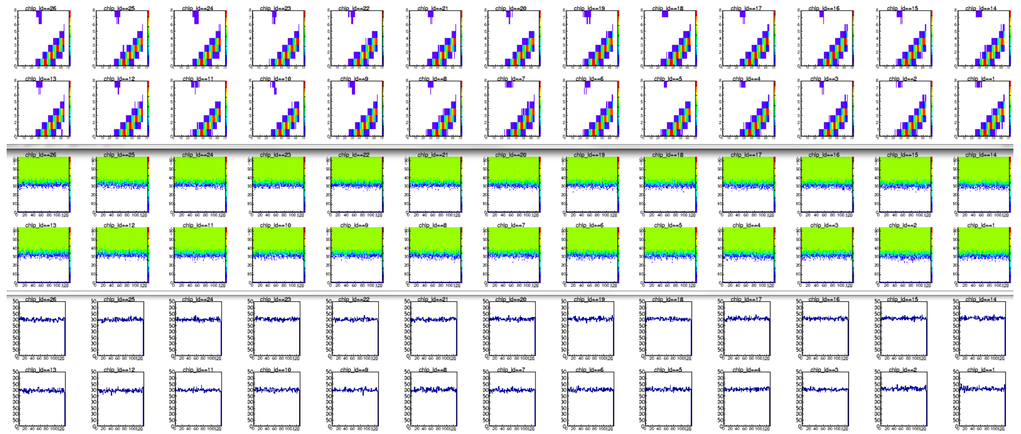
ROC: NE2, C2

South

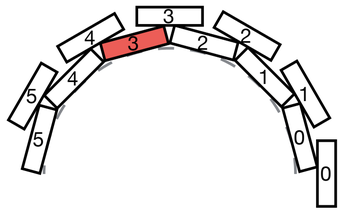
ROC: NE2, A3

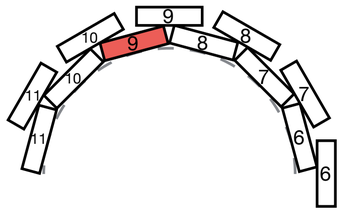


ROC: NE2, A3



The barrel calibration tests: Results





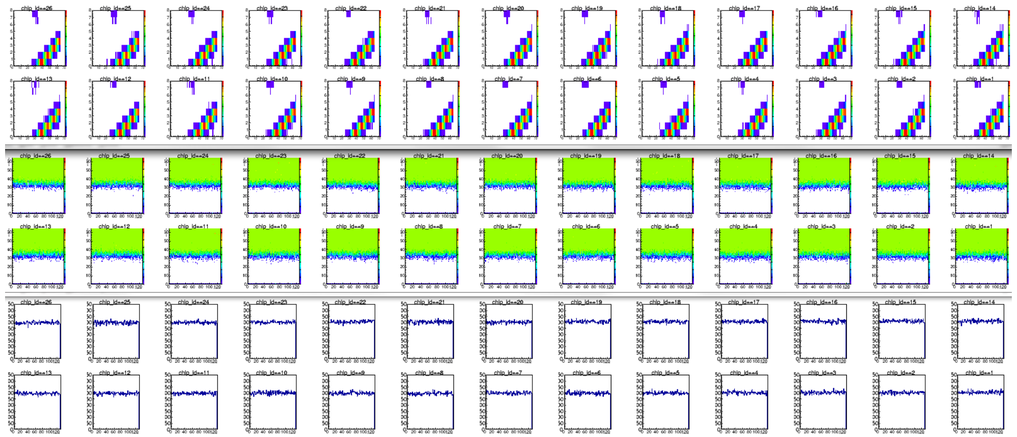
East barrel

West barrel

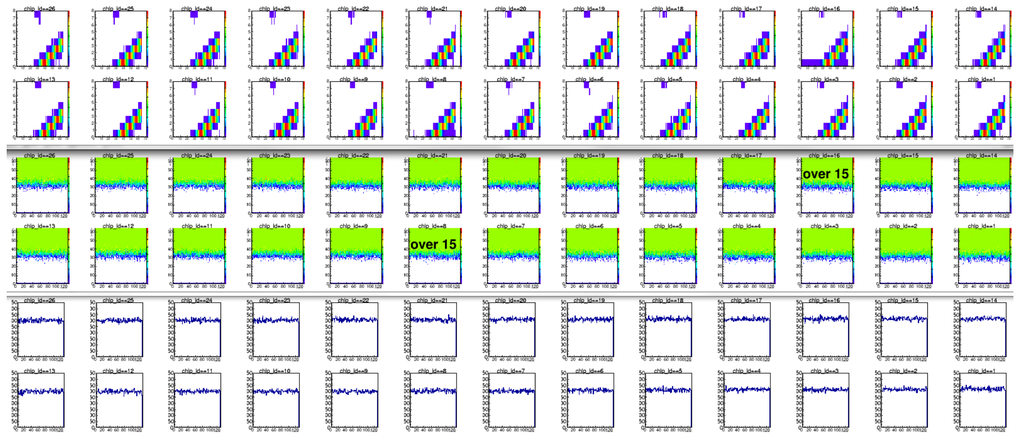
B0L003

B0L009

North



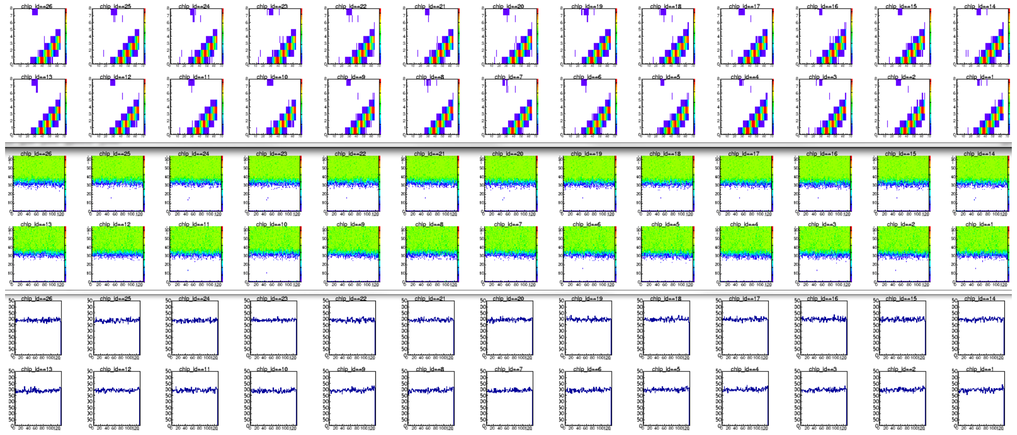
ROC: NE2, A3



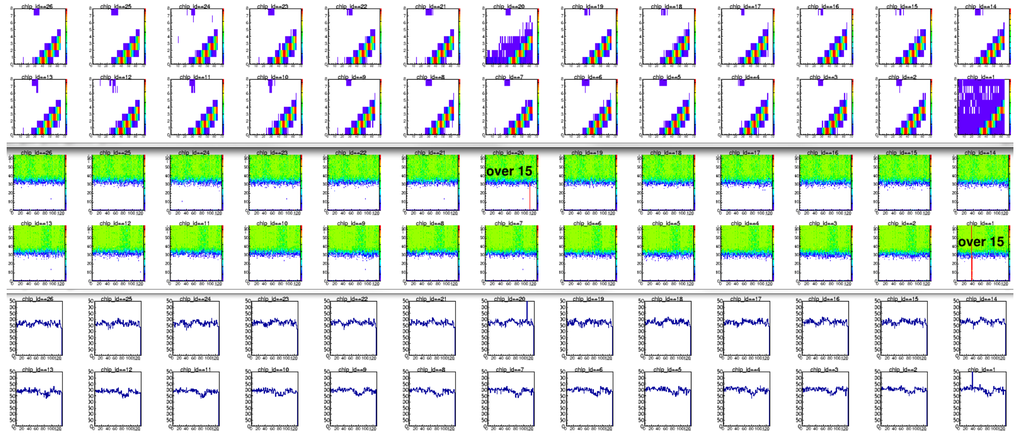
ROC: NE2, A2

South

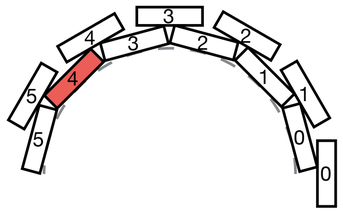
ROC: NE2, C3

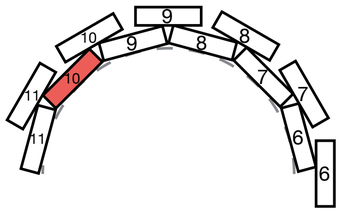


ROC: NE2, C3



The barrel calibration tests: Results





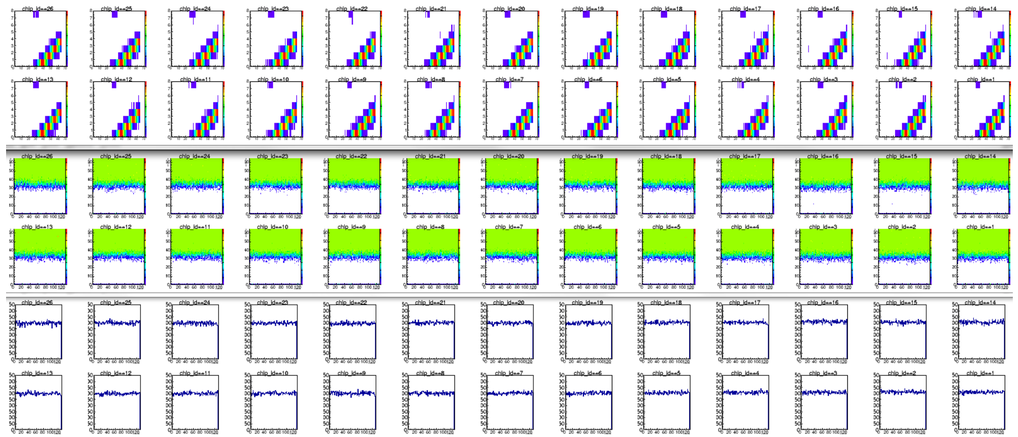
East barrel

West barrel

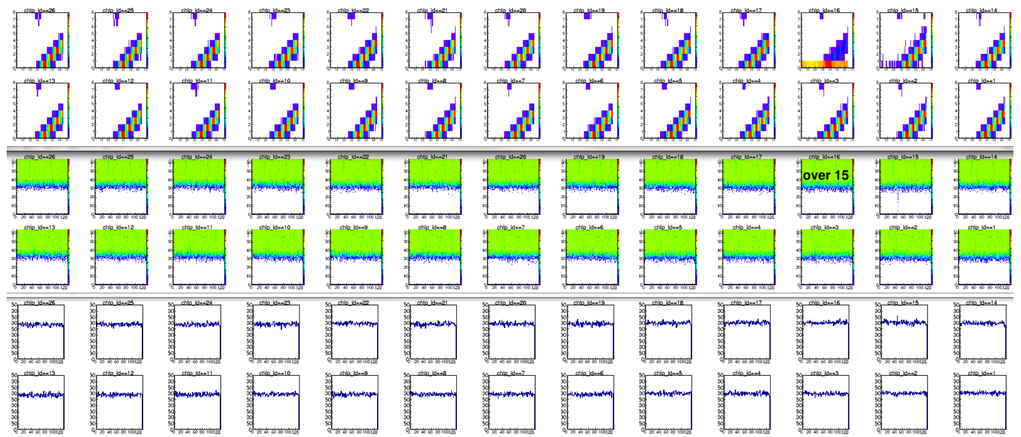
B0L004

B0L010

North



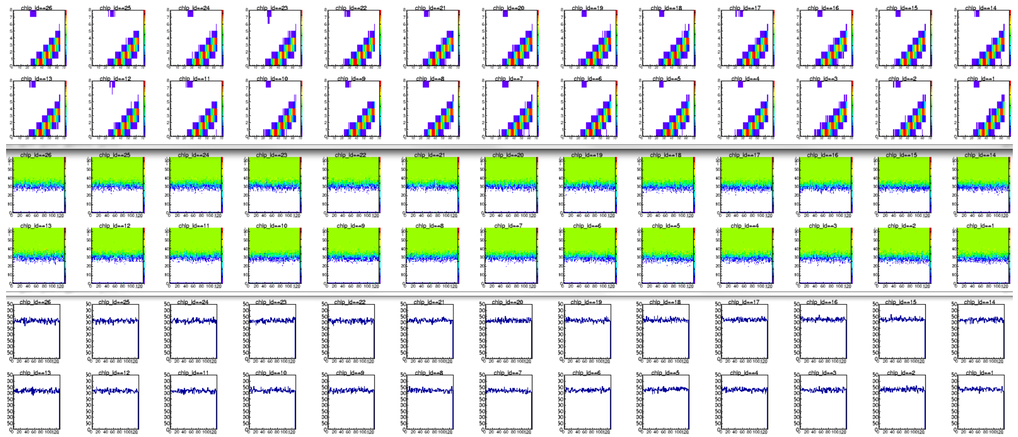
ROC: NE4, C2



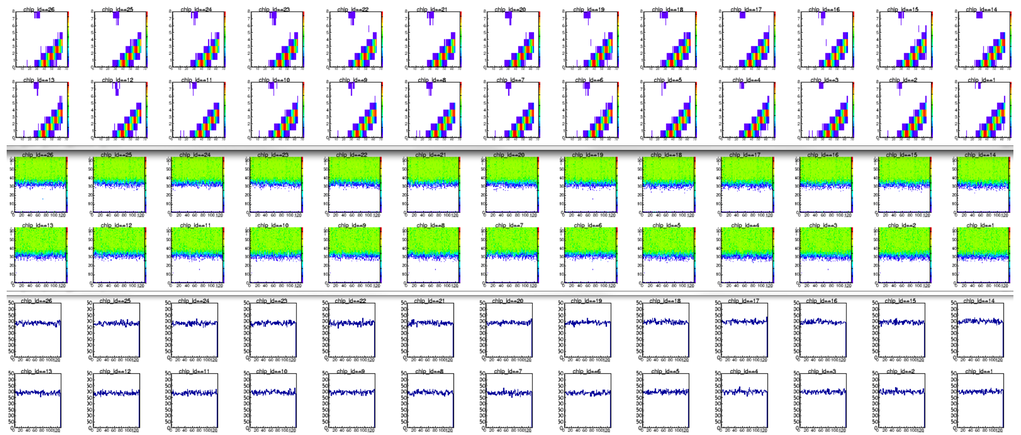
ROC: NE4, C2

South

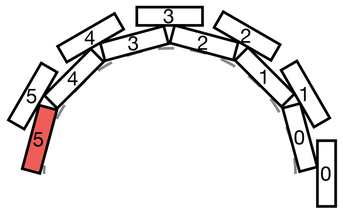
ROC: #29, C1

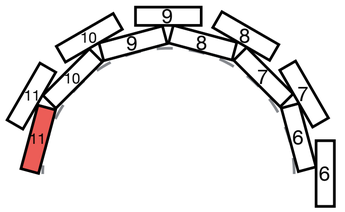


ROC: #29, C3



The barrel calibration tests: Results





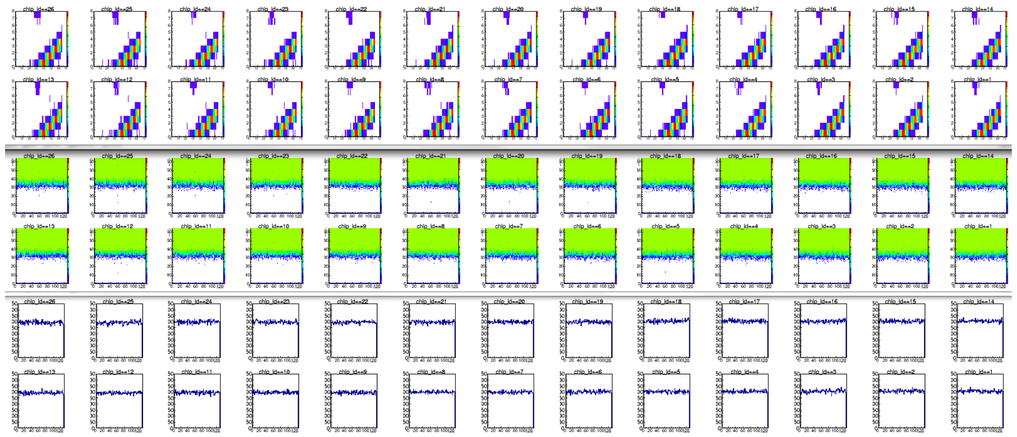
East barrel

West barrel

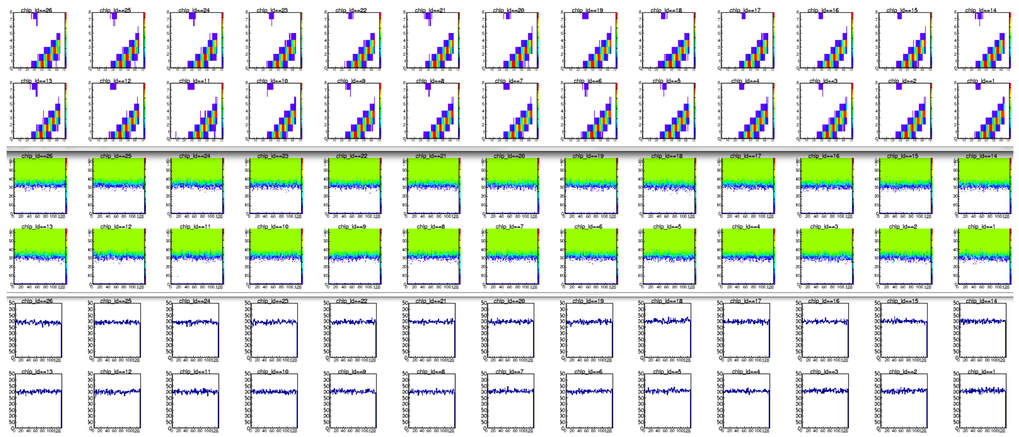
B0L005

B0L011

North



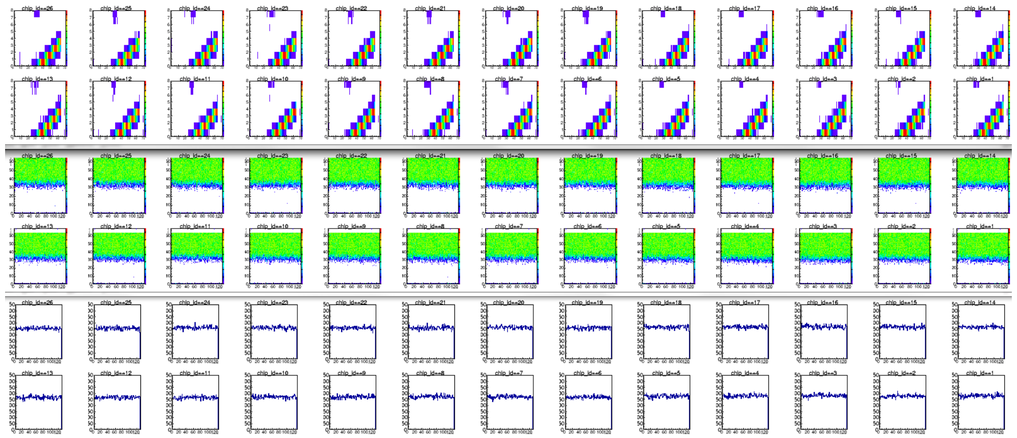
ROC: NE4, C3



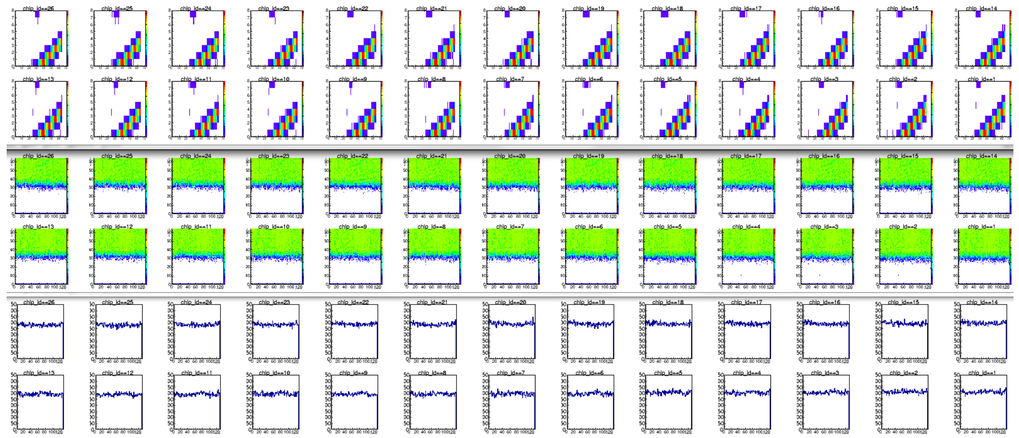
ROC: NE4, C3

South

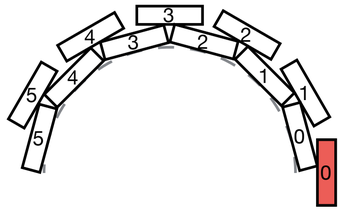
ROC: #29, C3

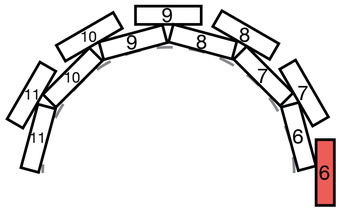


ROC: #29, C3



The barrel calibration tests: Results





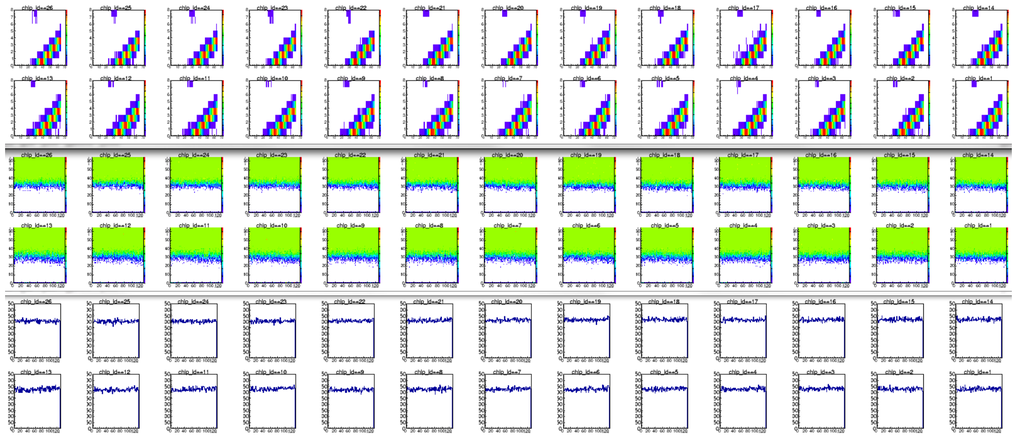
East barrel

West barrel

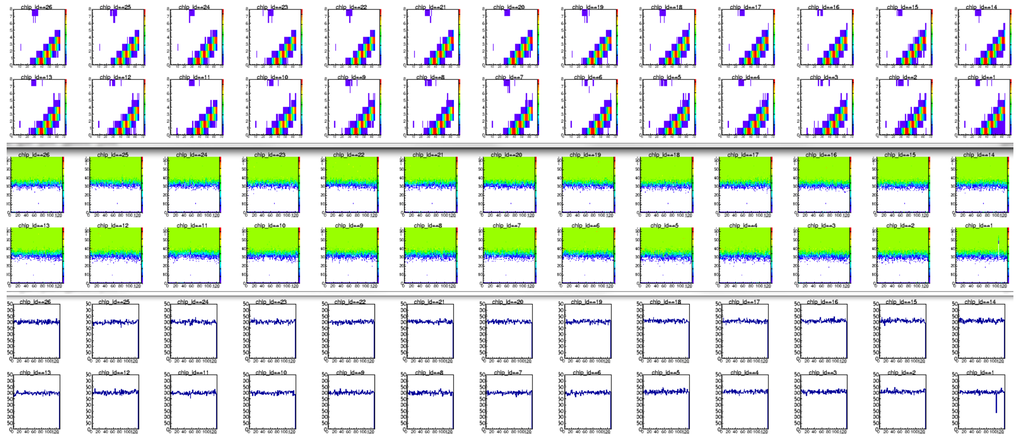
B0L100

B0L106

North



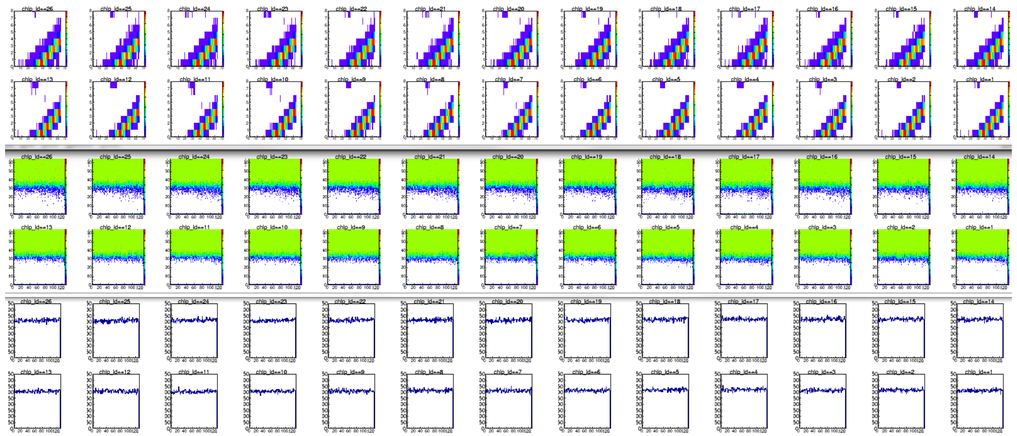
ROC: #29, D2



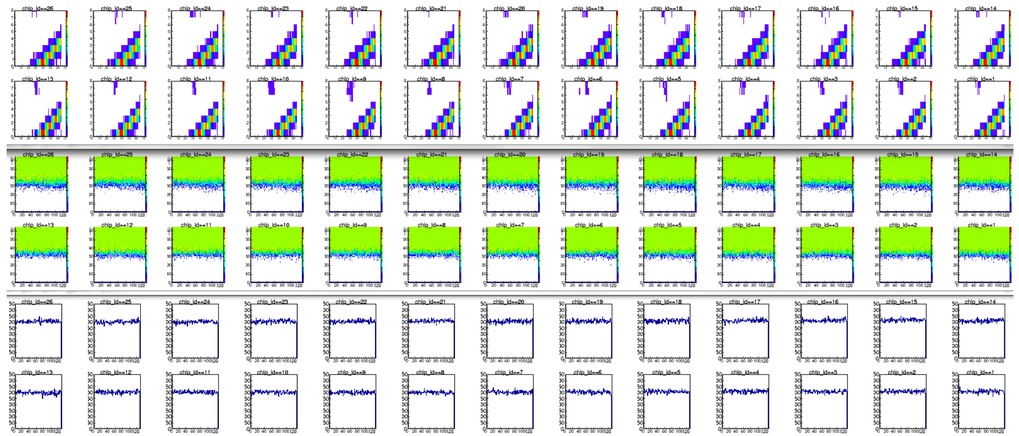
ROC: #29, C2

South

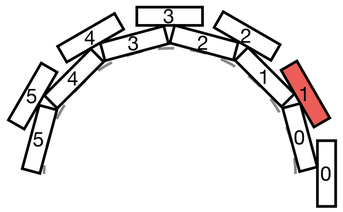
ROC: #29, B1

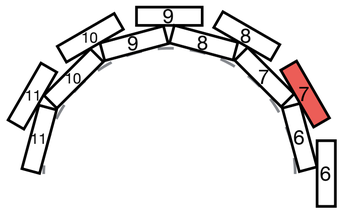


ROC: NE2, A1



The barrel calibration tests: Results





East barrel

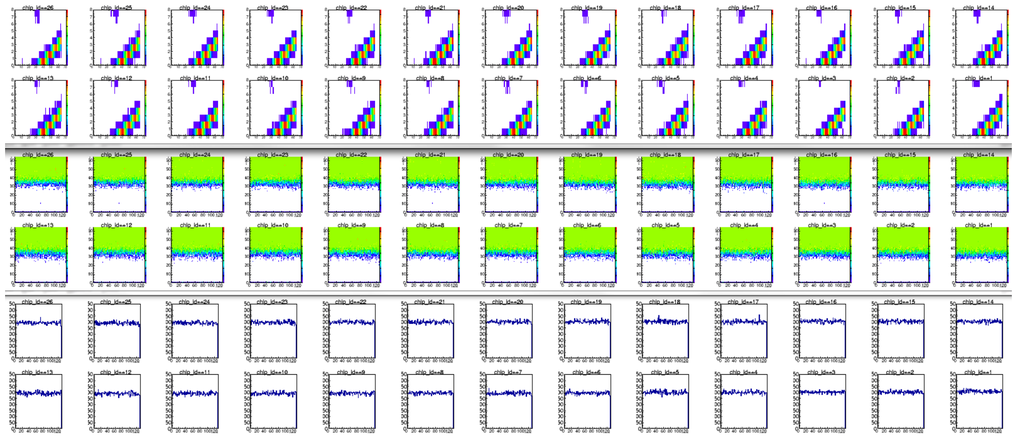
West barrel

B0L101

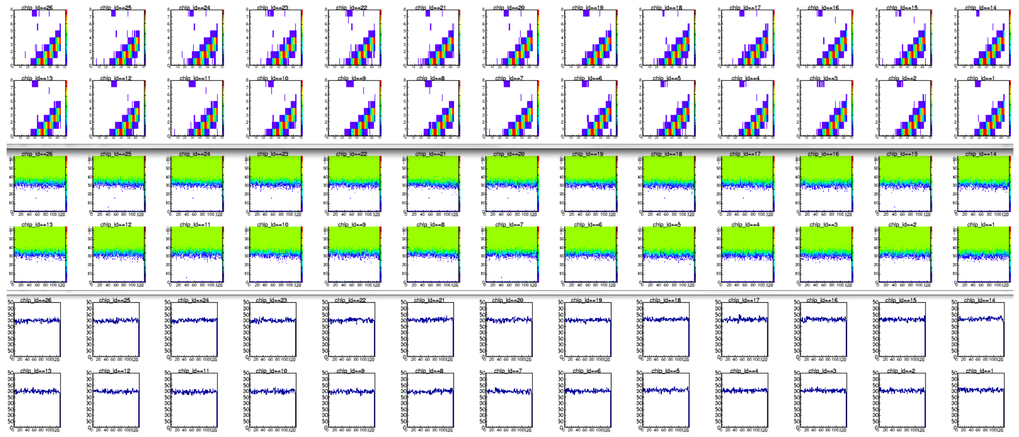
B0L107

North

South

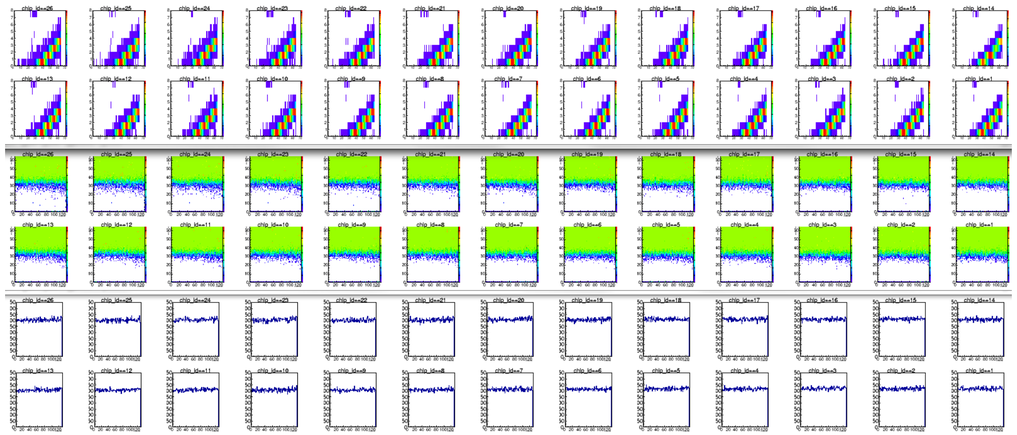


ROC: #29, A1

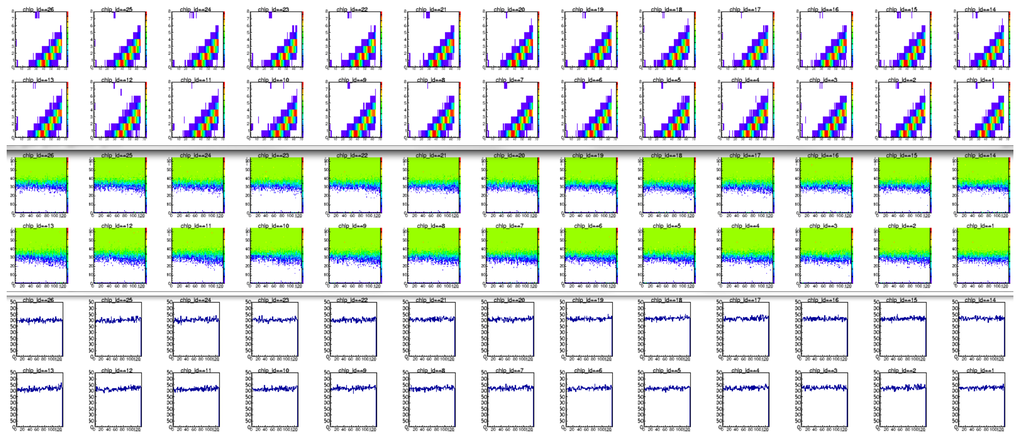


ROC: #29, C3

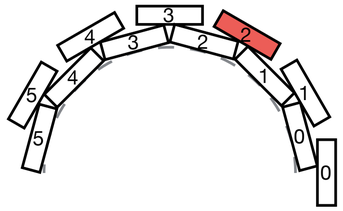
ROC: #29, C3

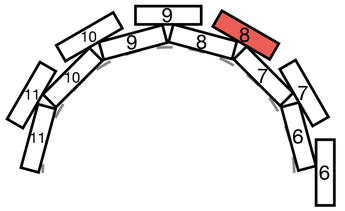


ROC: NE2, C3



The barrel calibration tests: Results





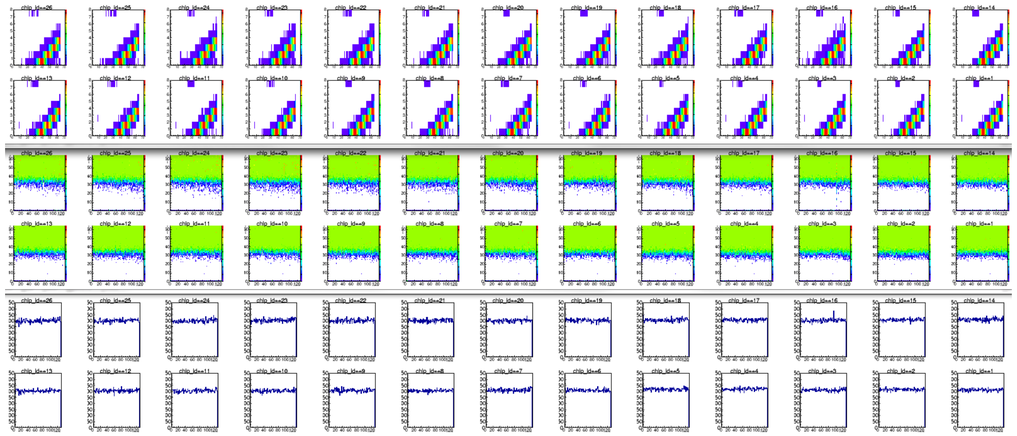
B0L102

East barrel

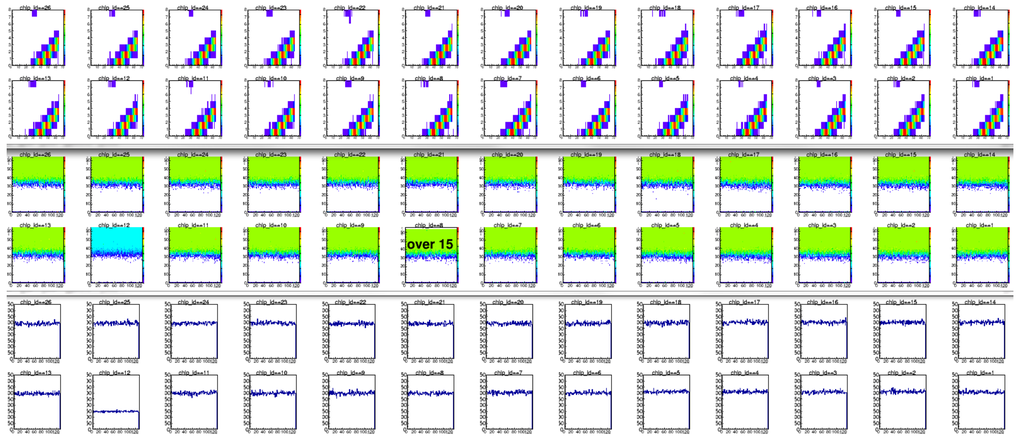
B0L108

West barrel

North



ROC: NE2, C3

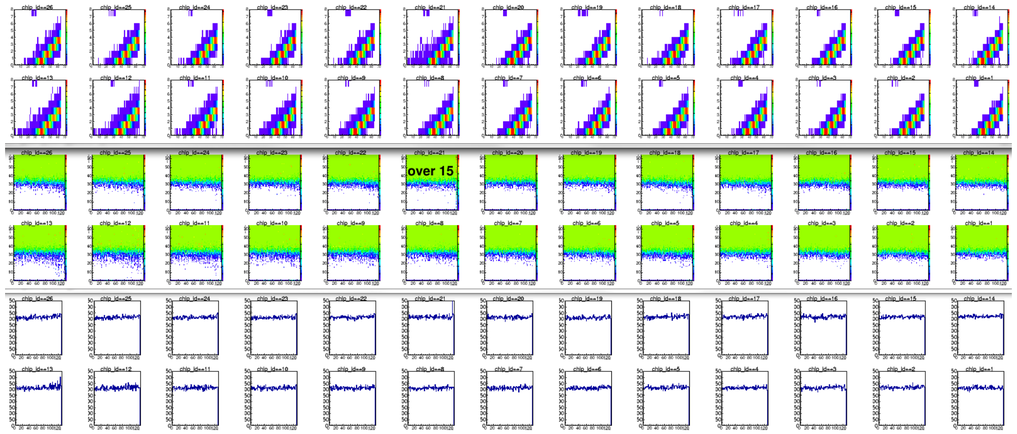


ROC: NE2, C2

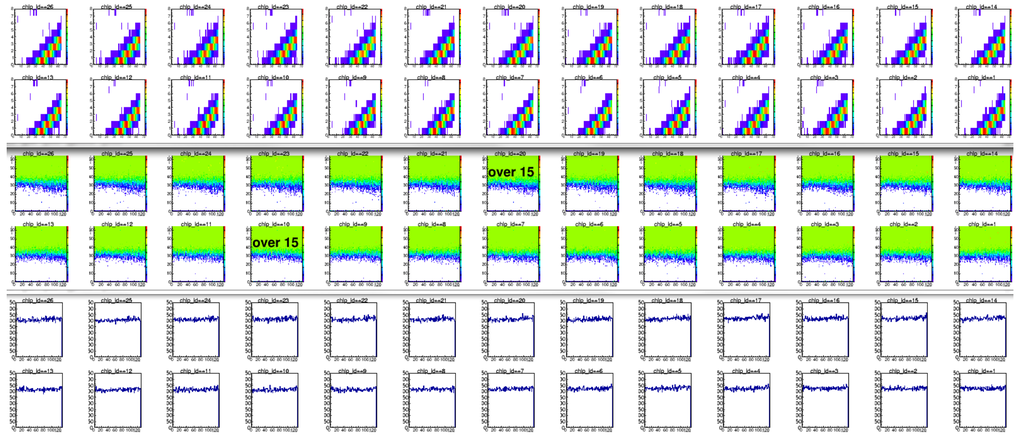
Chip12 always has only half entries

South

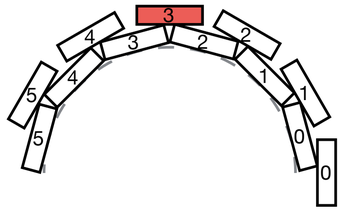
ROC: NE2, A3

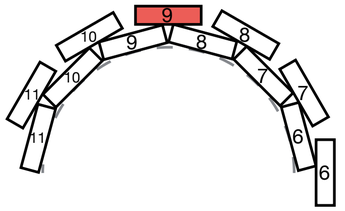


ROC: NE2, C3



The barrel calibration tests: Results





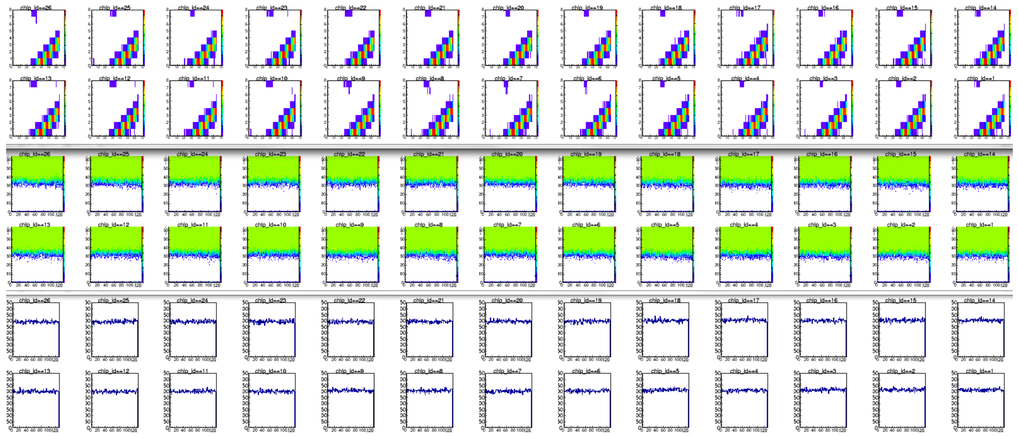
East barrel

West barrel

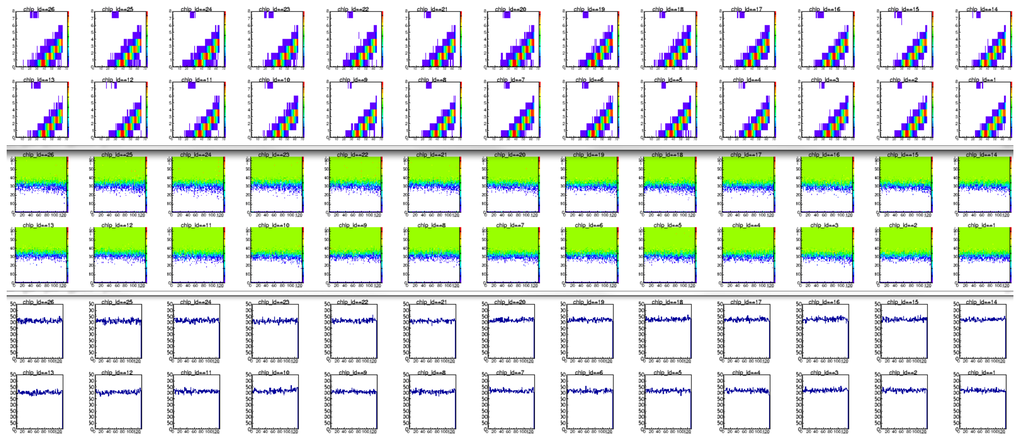
B0L103

B0L109

North



ROC: NE2, C3

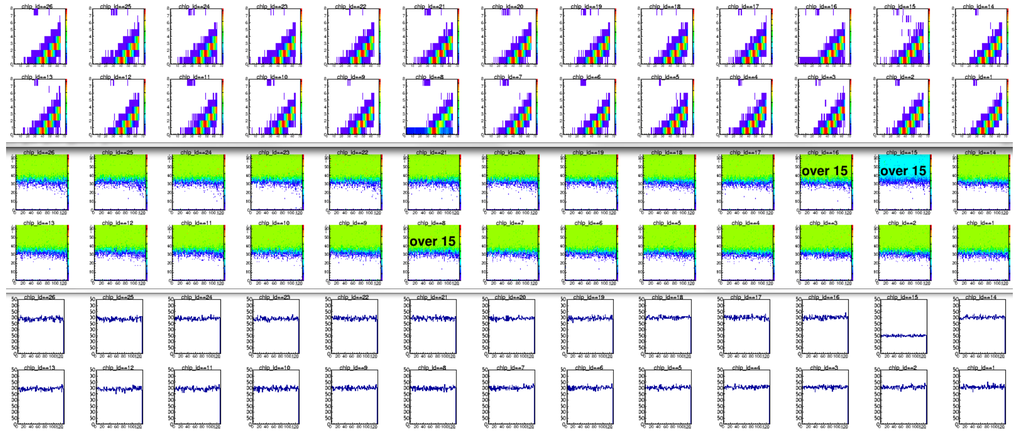


ROC: NE2, A2

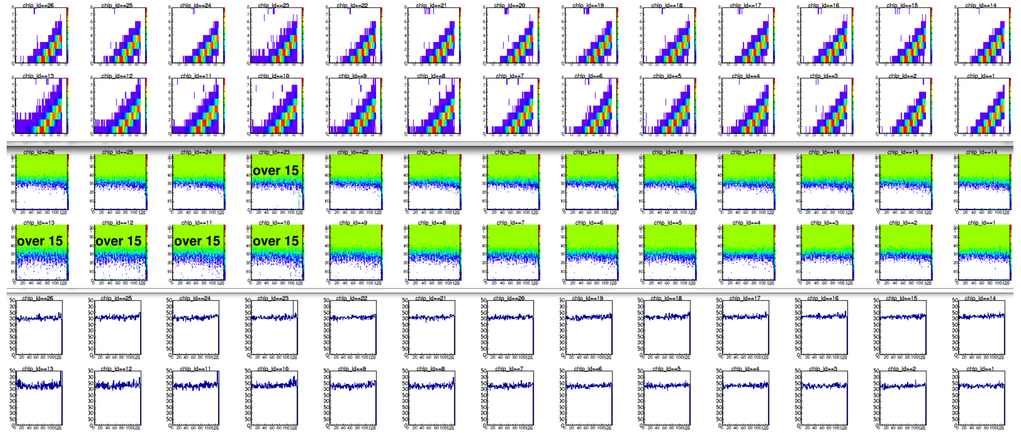
South

Chip14 always has only half entries or strange results

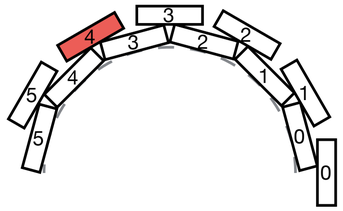
ROC: NE2, C2

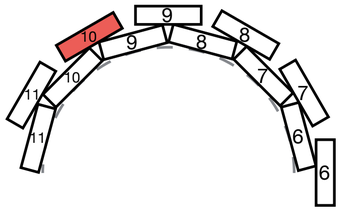


ROC: NE2, C3



The barrel calibration tests: Results





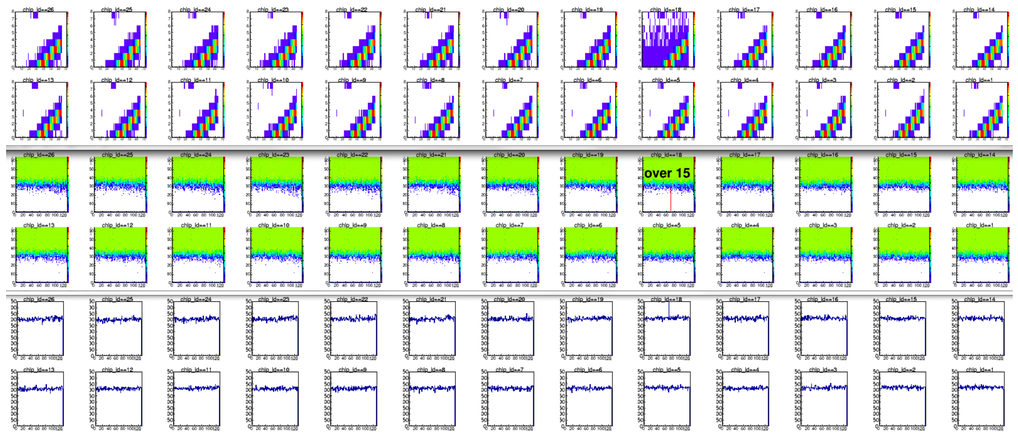
East barrel

West barrel

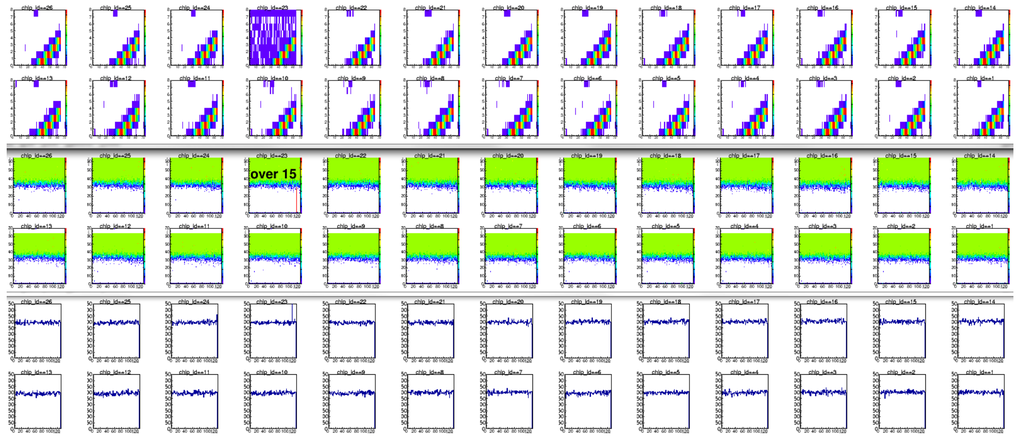
B0L104

B0L110

North



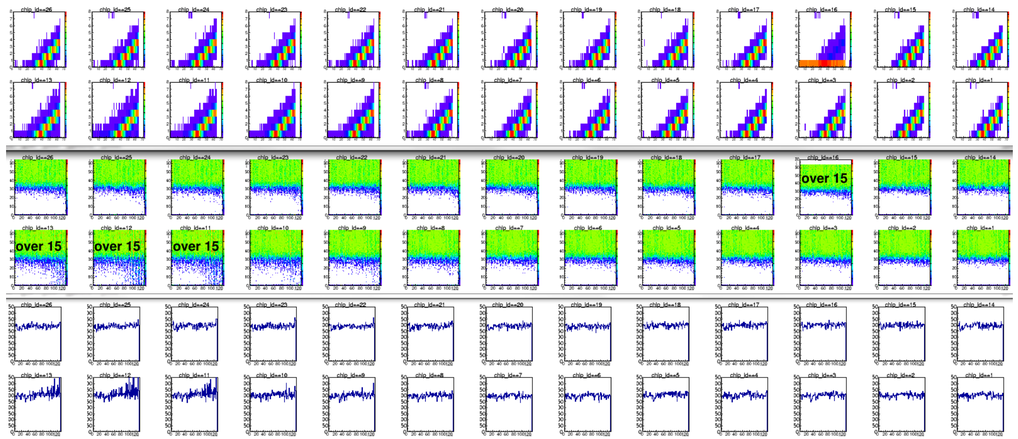
ROC: NE2, C3



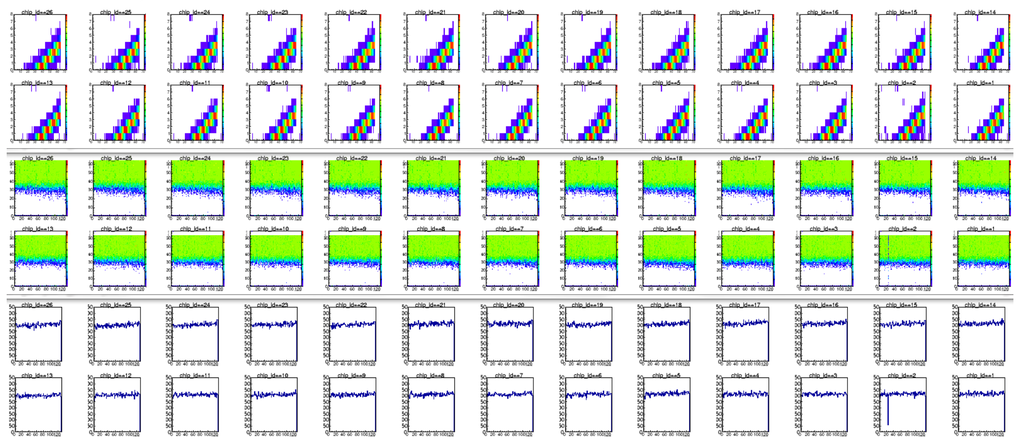
ROC: NE2, A3

South

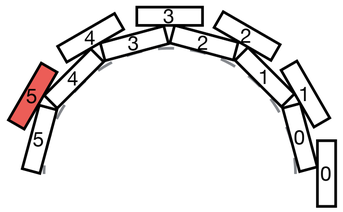
ROC: NE2, C3

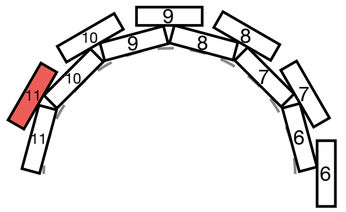


ROC: NE2, C3



The barrel calibration tests: Results





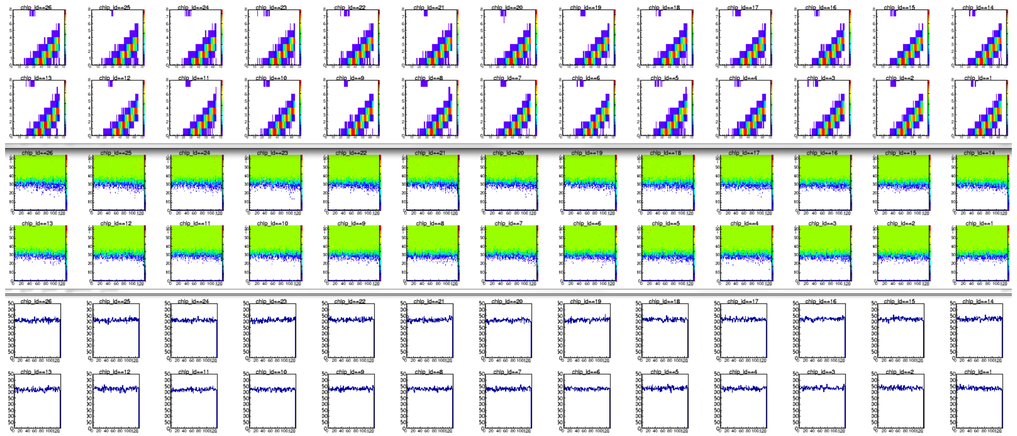
East barrel

West barrel

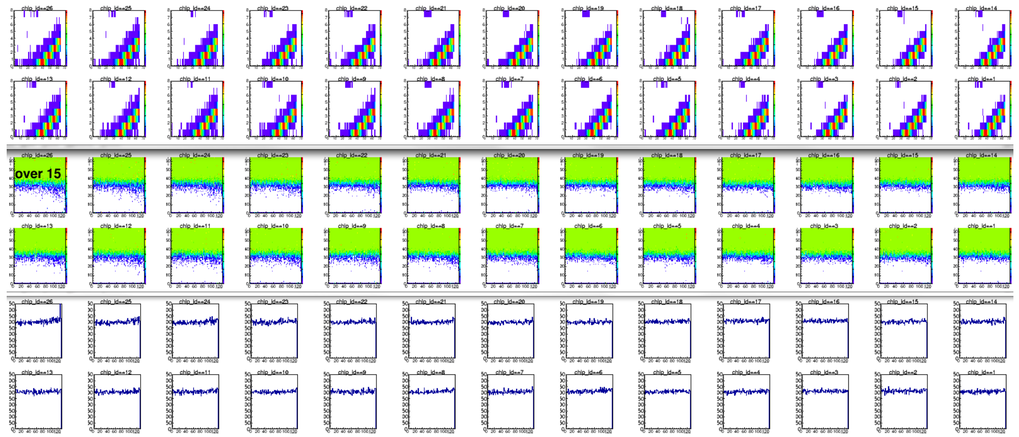
B0L105

B0L111

North



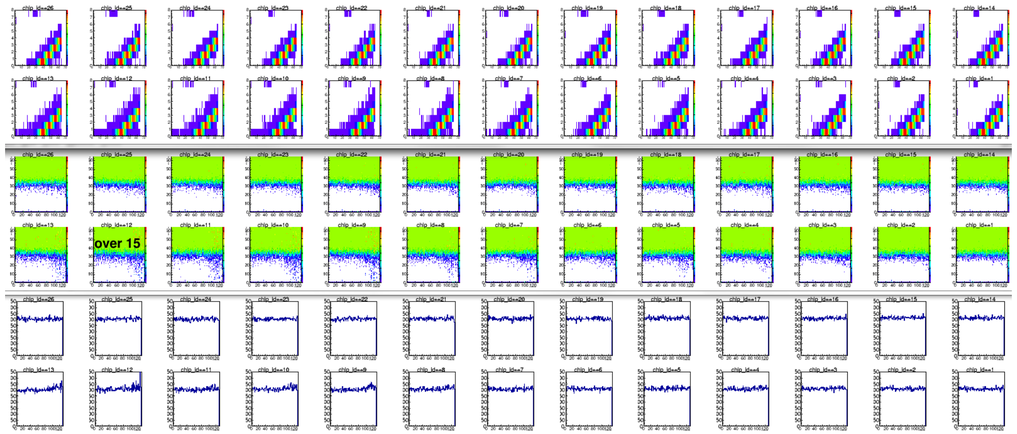
ROC: NE4, C1



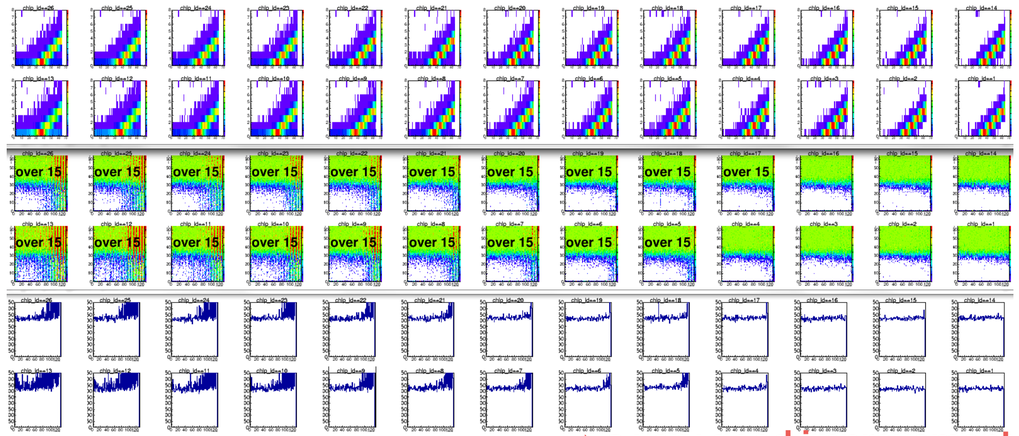
ROC: NE4, C2

South

ROC: NE4, C2



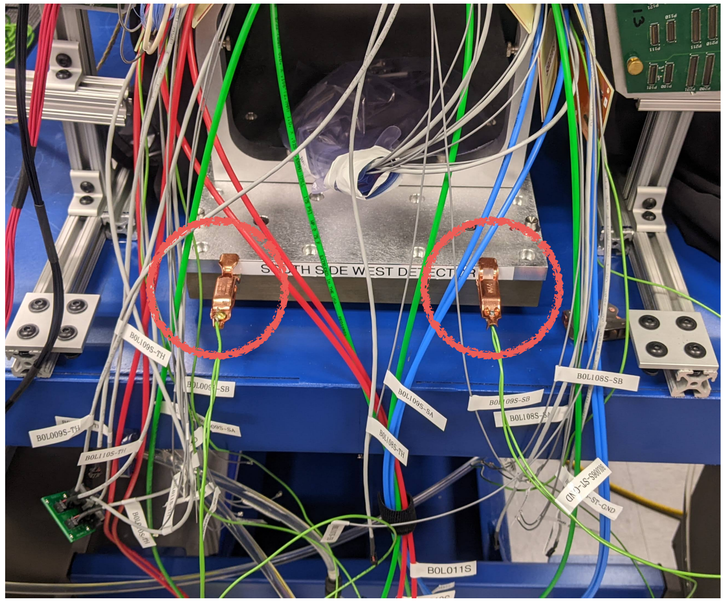
ROC: NE2, C3



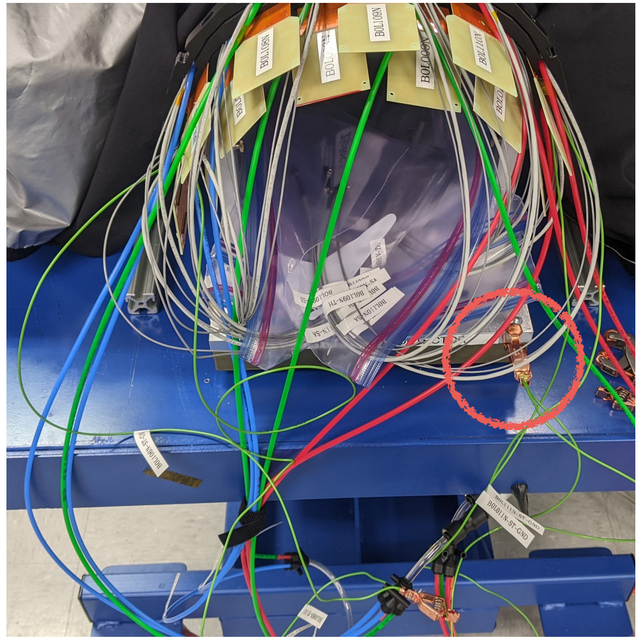
→ a very good improvement obtained today

The barrel calibration tests: Good news

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



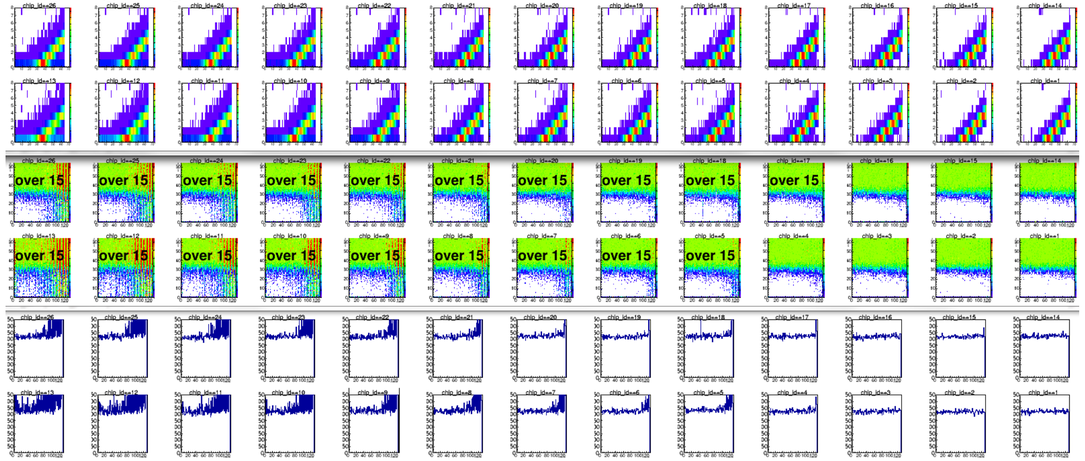
South side



North side

B0L111S

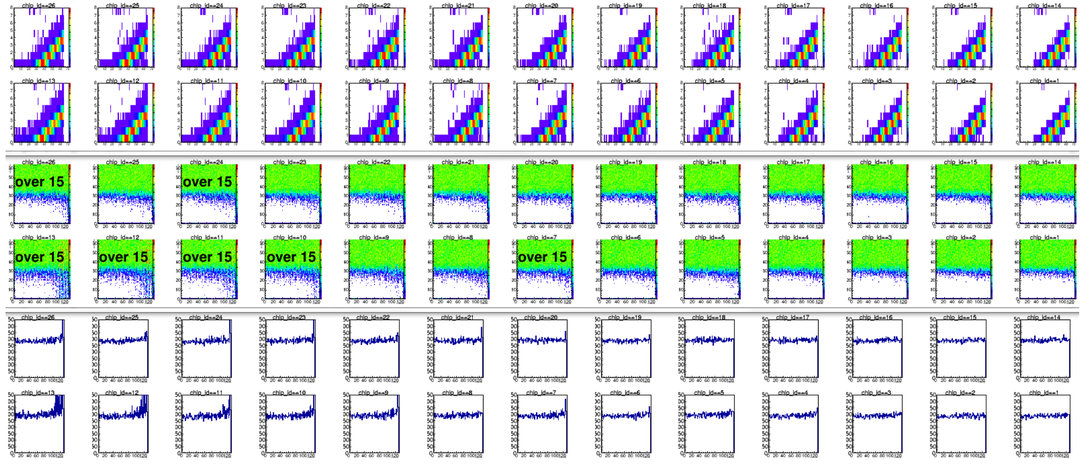
June/29



B0L0 ↔ the supporting structure: ~0 Ω

B0L1 ↔ the supporting structure: 180 Ω

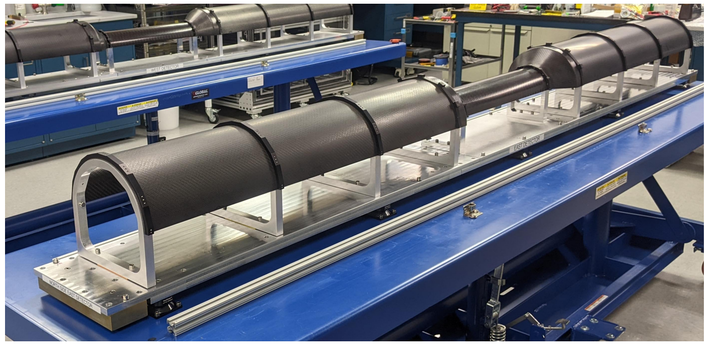
July/07

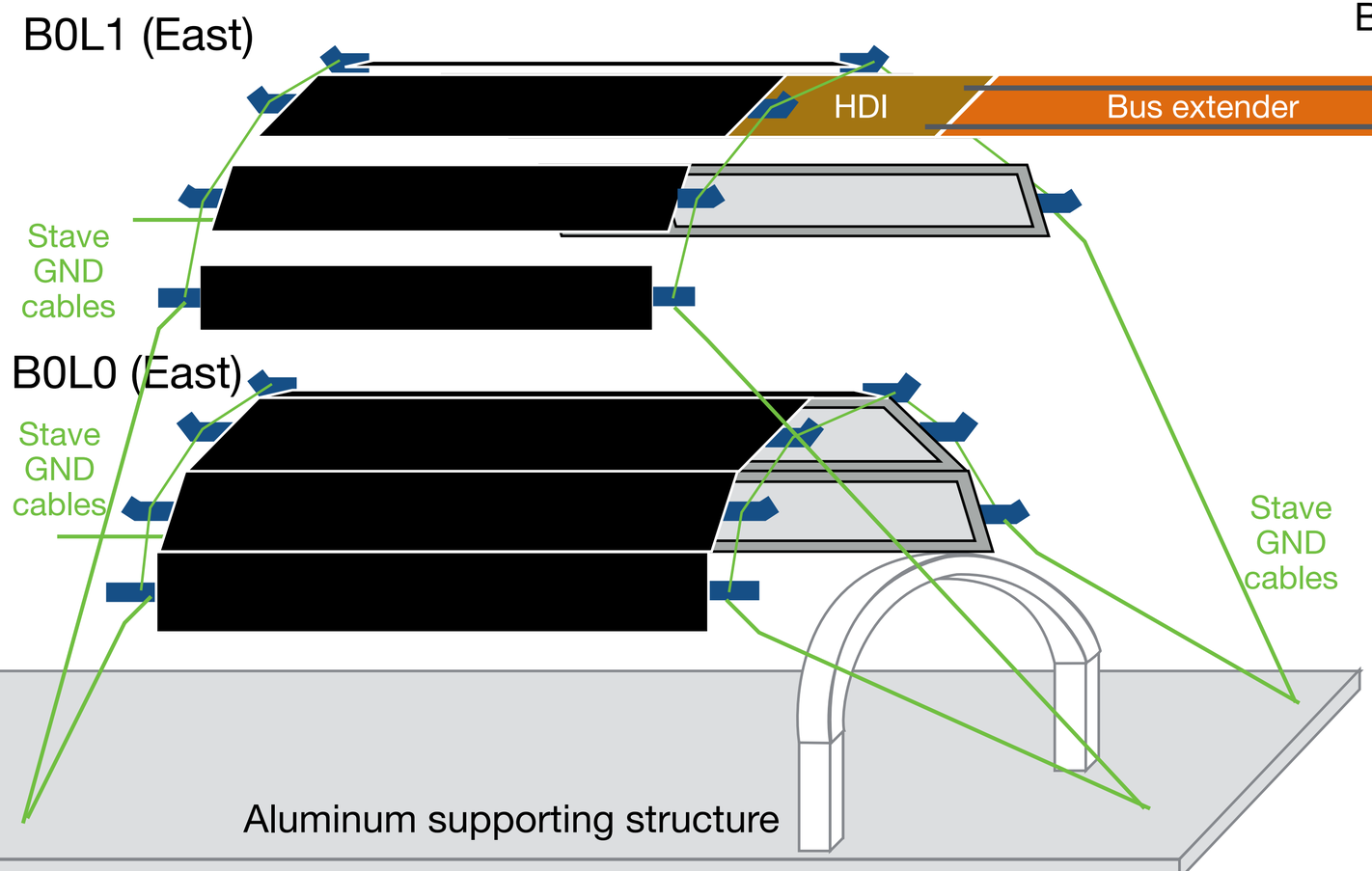


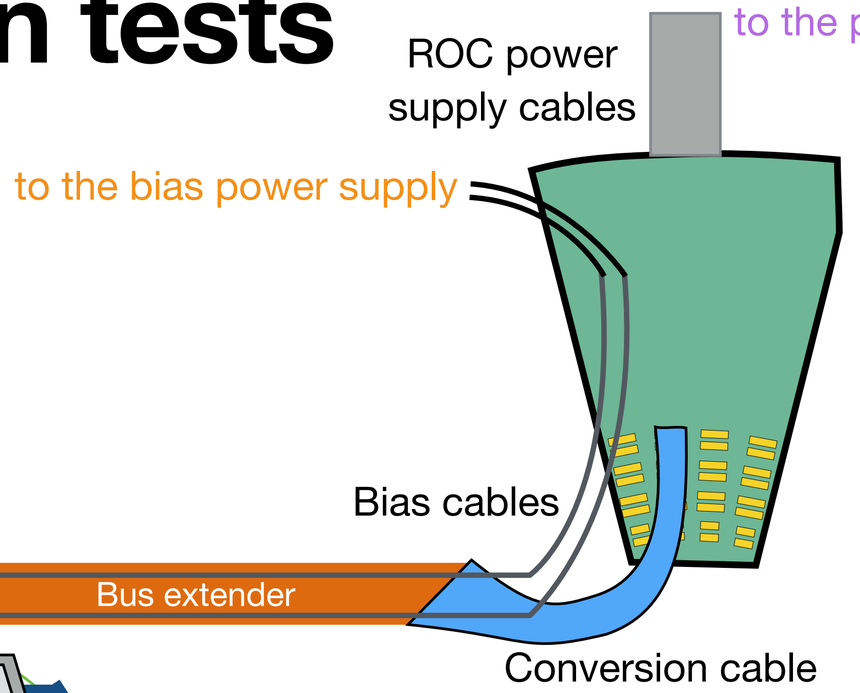
B0L0 ↔ the supporting structure: ~0 Ω

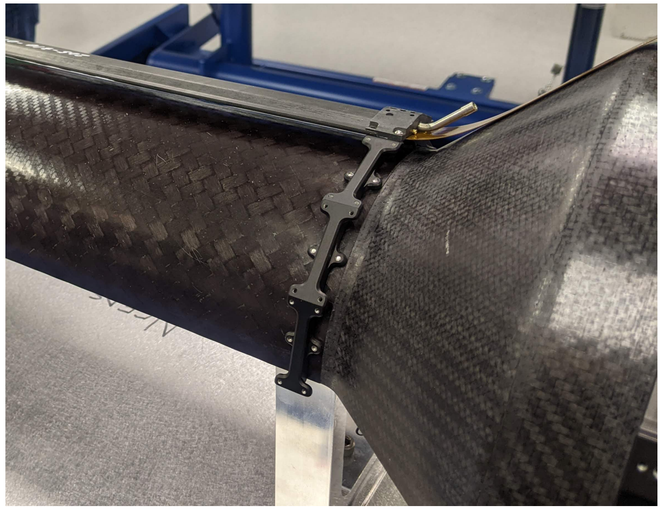
B0L1 ↔ the supporting structure: ~0 Ω

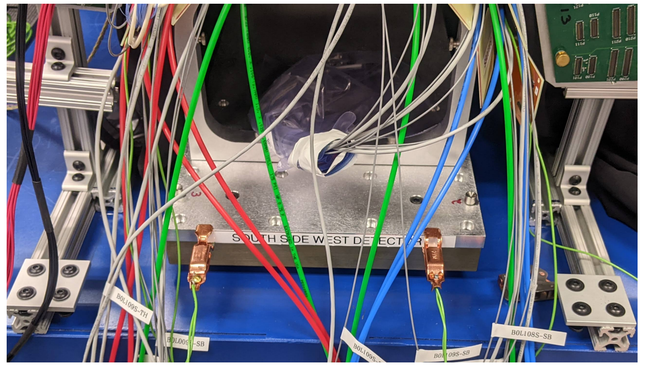
The barrel calibration tests











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