Cavity BPM Beam Test

- Beam Test with 1Hz Band Width
- EPICS Readout
- Low Current VDC tacks
- Summary and Outlook

Beam Test Procedure

New cavity BPM firmware---From John and Chad

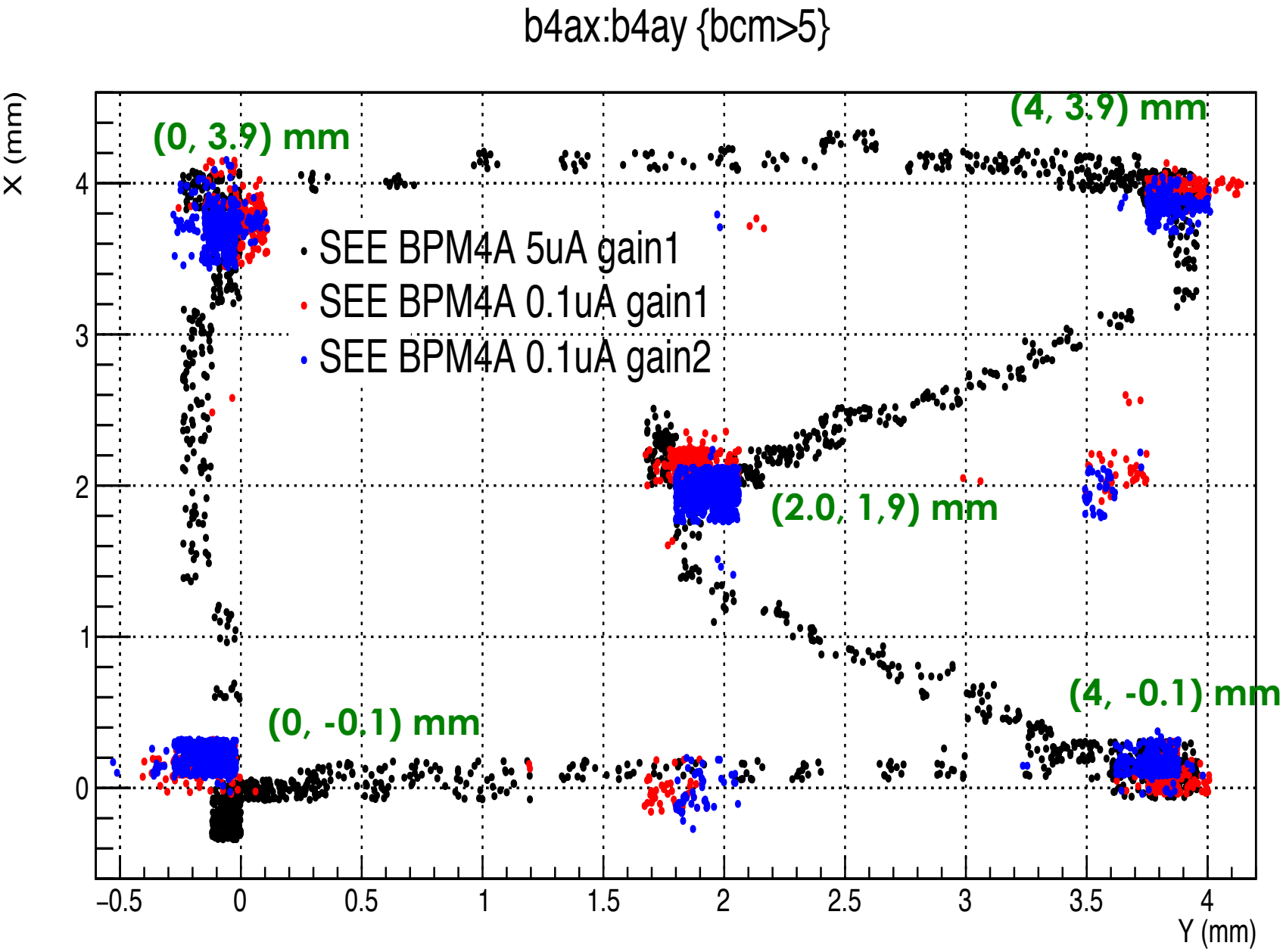
✓ Switch { **100 kHz: Parasitic test**
1Hz: Beam test }

Currently: Internal gain factor Out of our control → Before PREX: Under our control

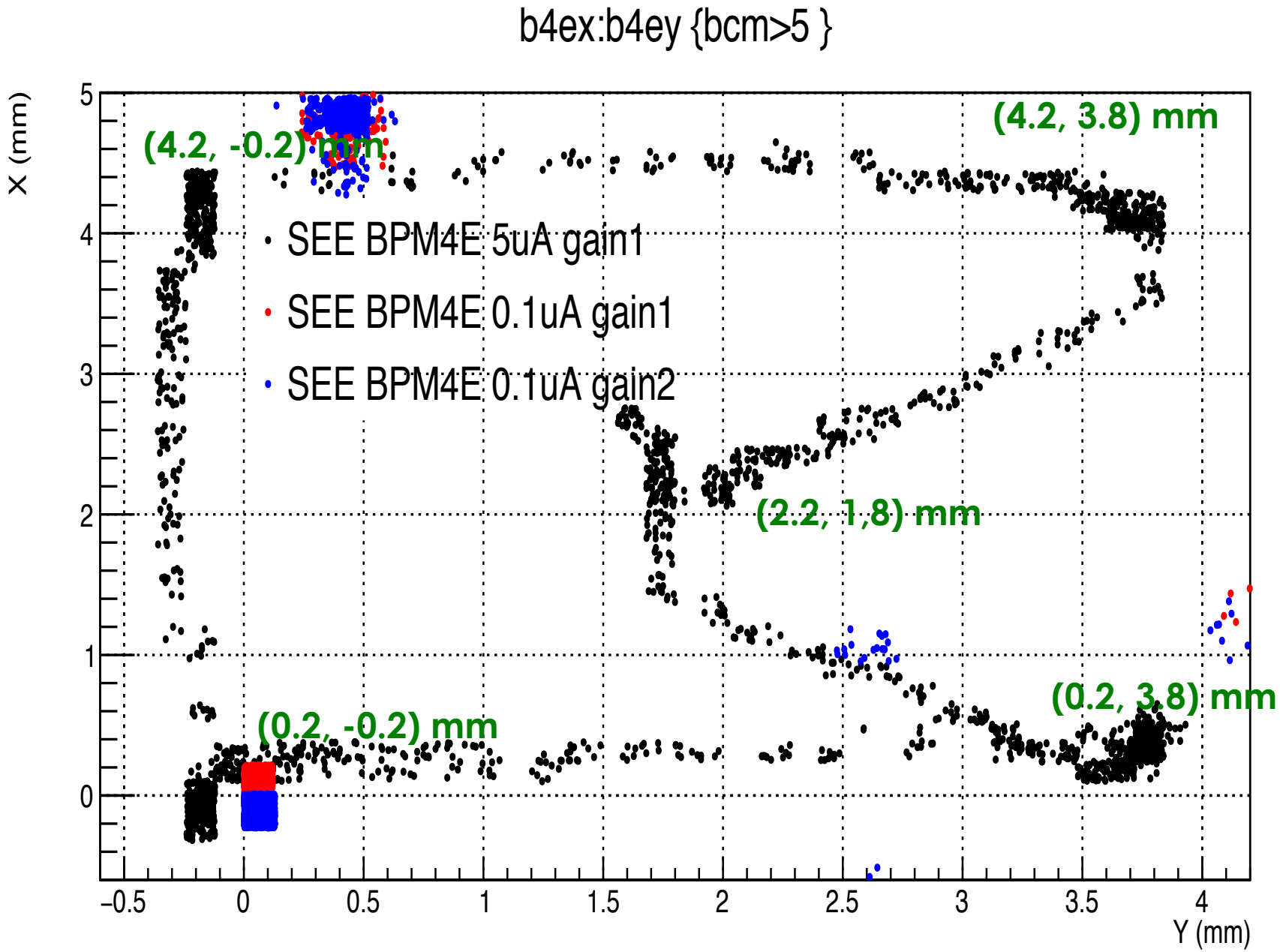
1. 5 μA CW beam with cavity BPMs gain1, move the beam 2mm around the Tungsten APEX target center. Saturated
2. 100nA CW beam with cavity BPMs gain1 to repeat step 1.
3. 100nA CW beam with cavity BPMs gain2 to repeat step 1.
4. 10nA CW beam with cavity BPMs gain2 to repeat step 1.

} HRS data

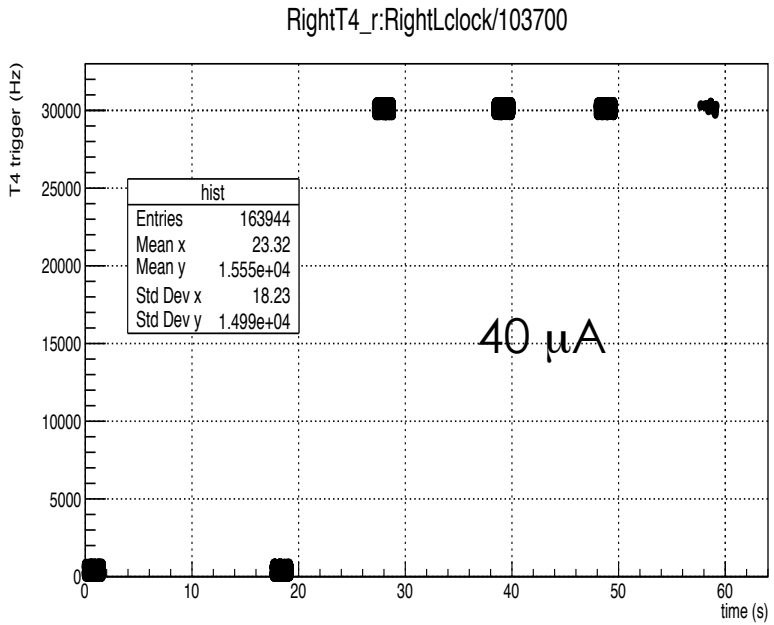
SEE BPM4A X vs Y Position

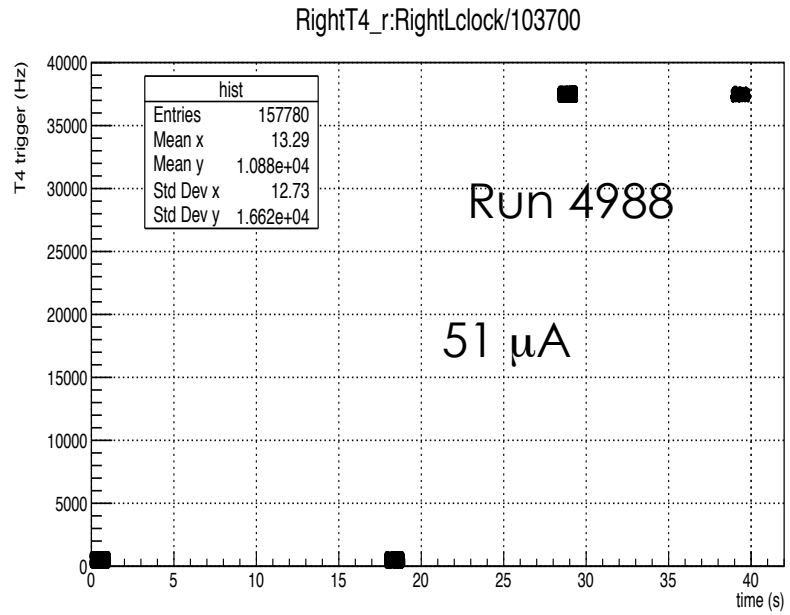


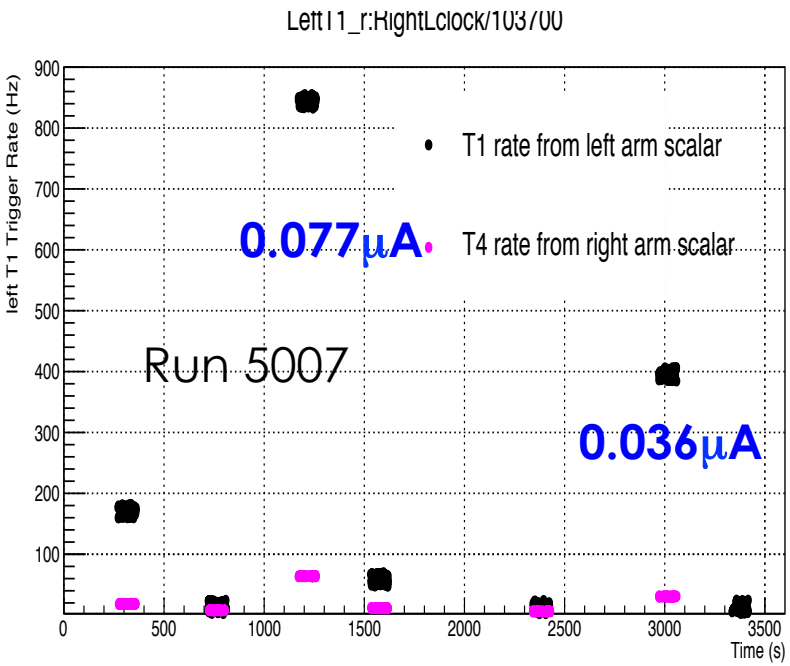
SEE BPM4E X vs Y Position



HRS S0 Trigger Rates



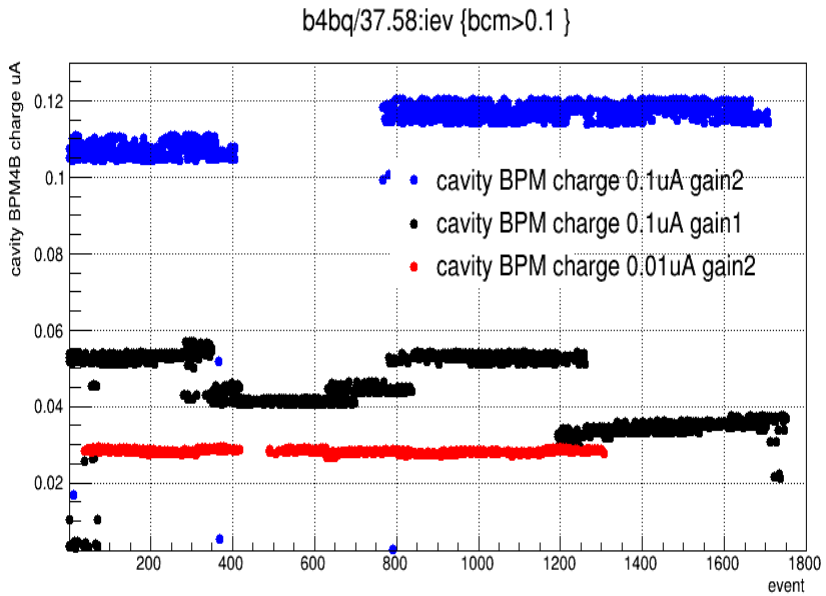


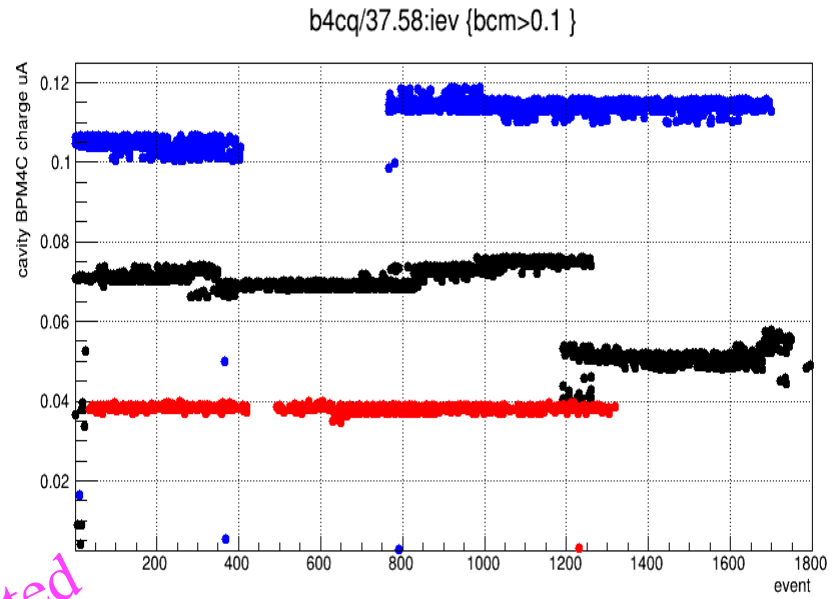


Using scalar rate to calibrate the cavity BPMs current

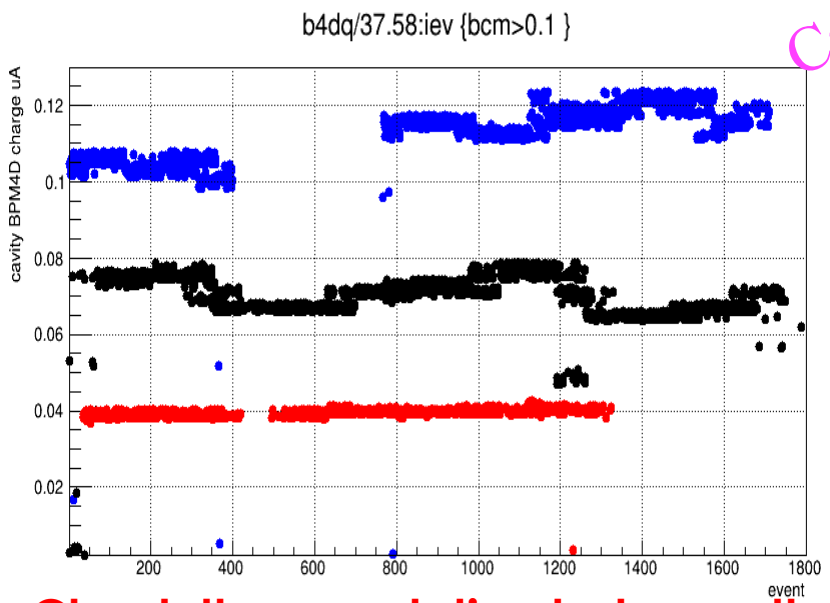
Need to be understood

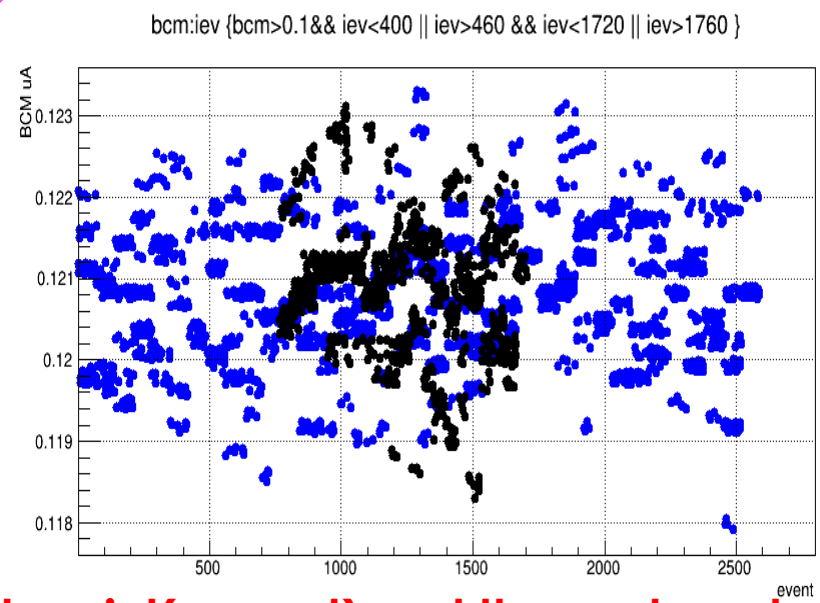
Cavity BPMs Current





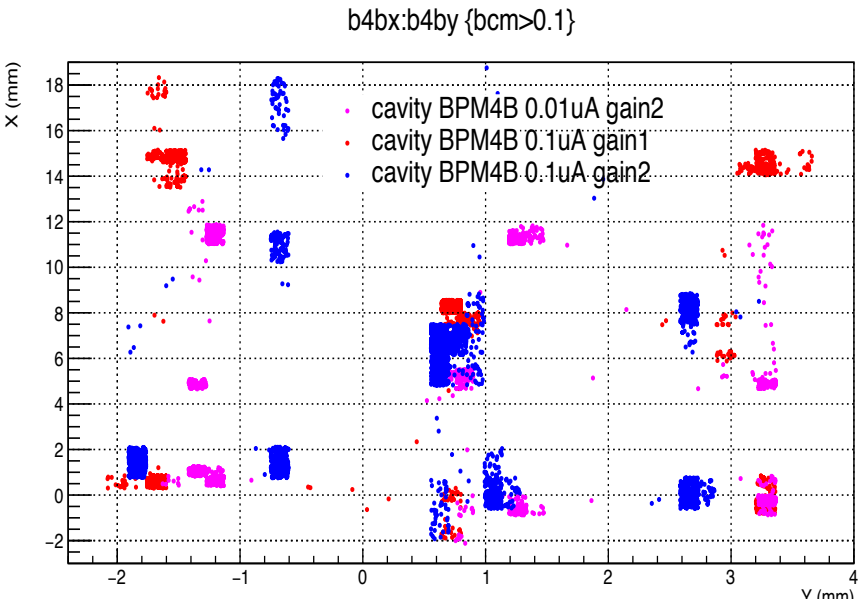
Calibrated

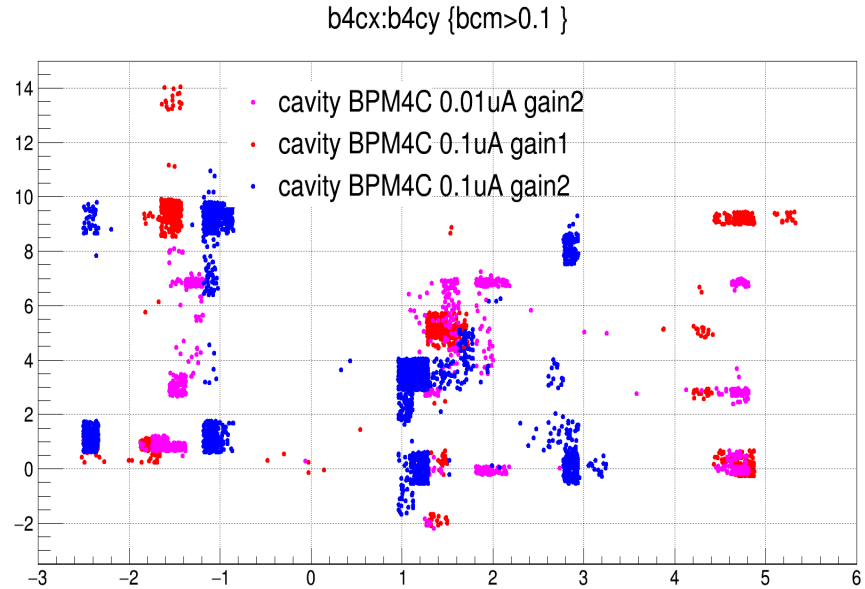


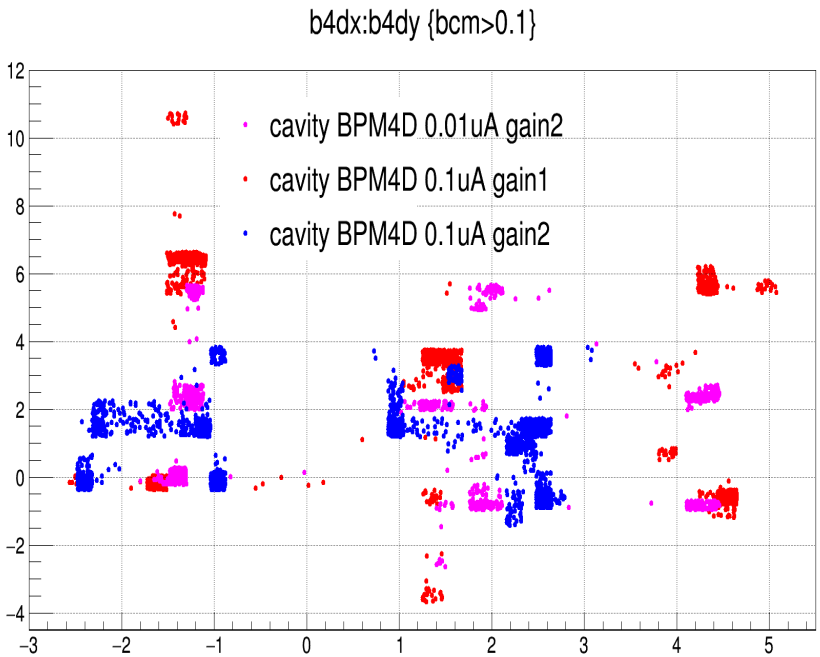


Check the correlation between the back point(current) and the scalar rate

Cavity BPMs X vs Y Position



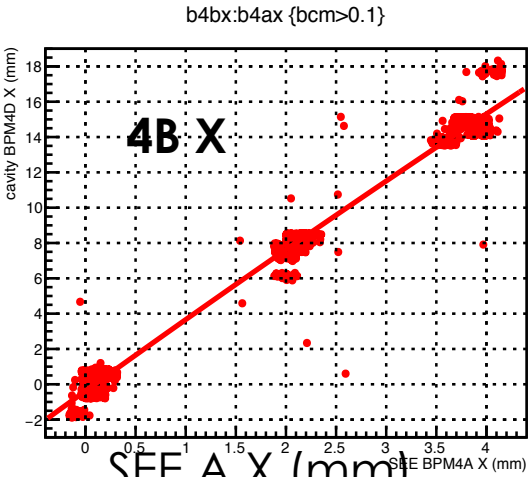


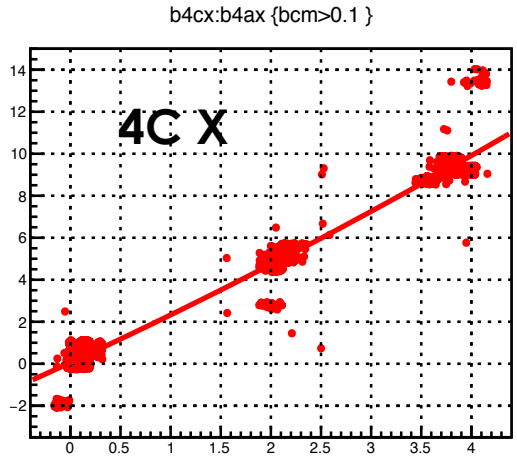


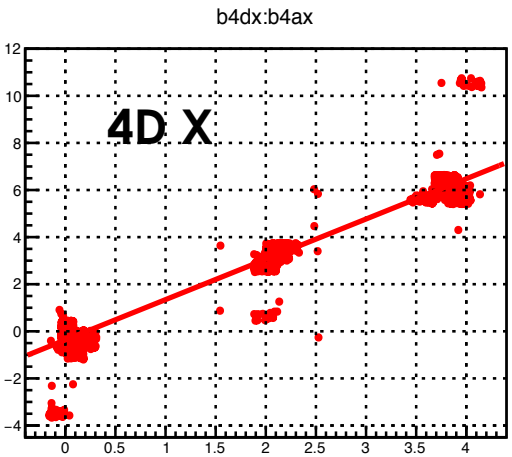
Need to check the steering coil current to clean up the position information

Cavity BPMs X vs Y Position

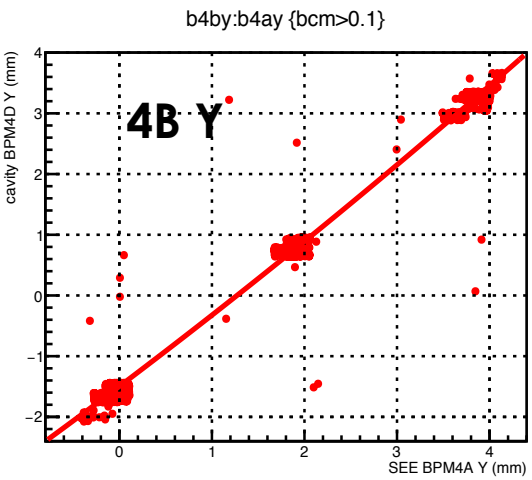
100nA gain1 data

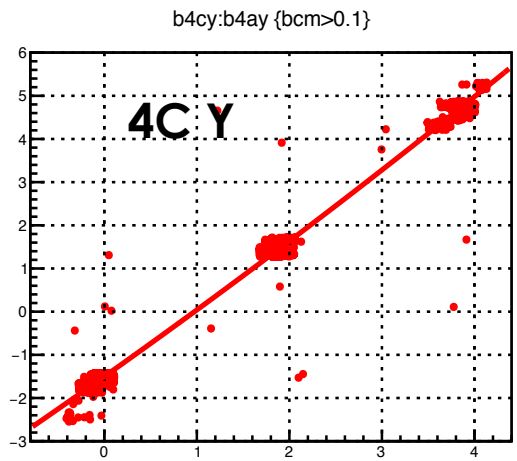


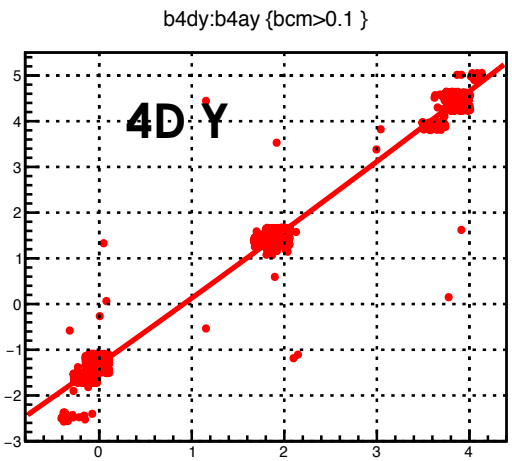




SEE A X (mm)

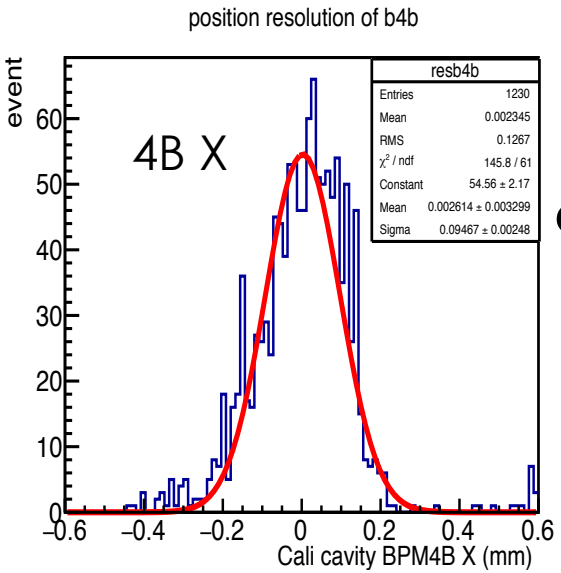


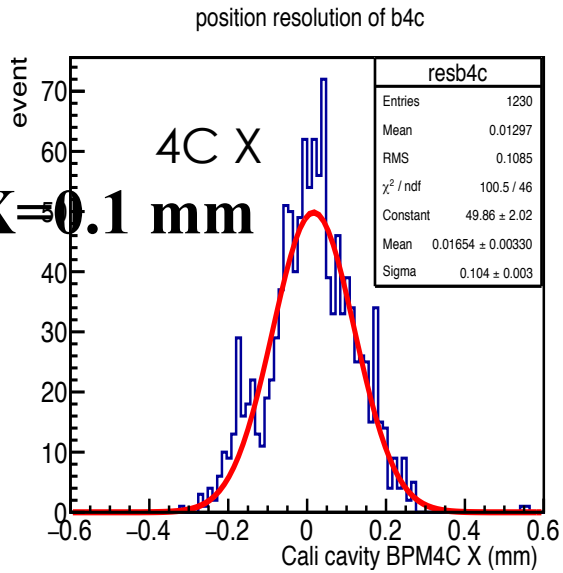




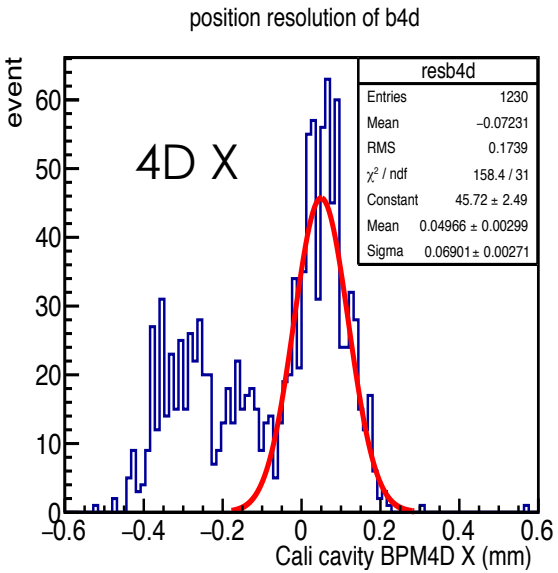
SEE A Y (mm)

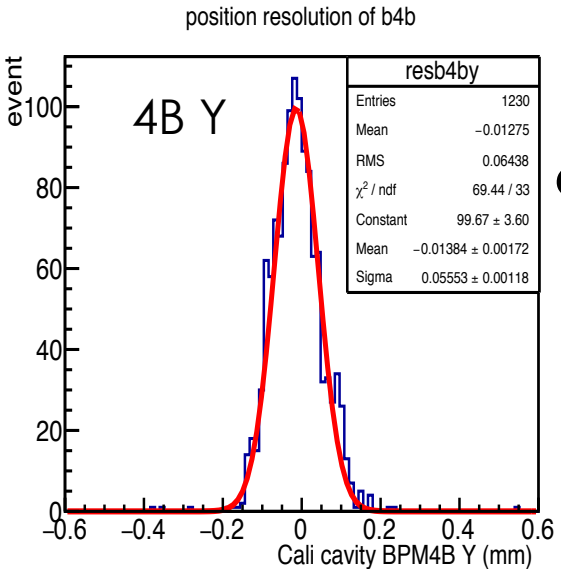
BPMs Position Resolution at 100nA

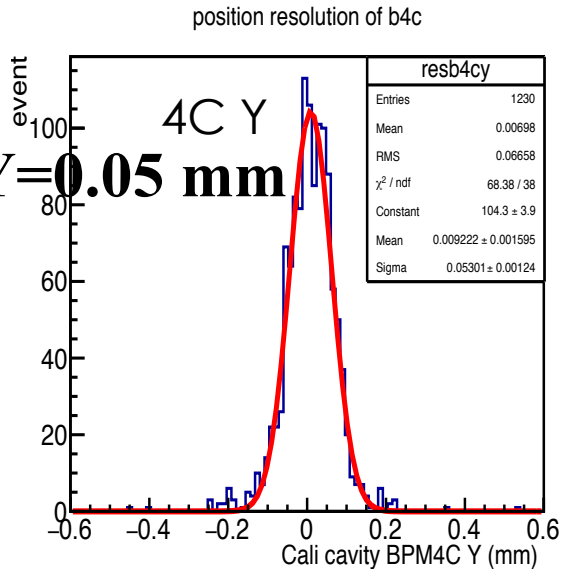




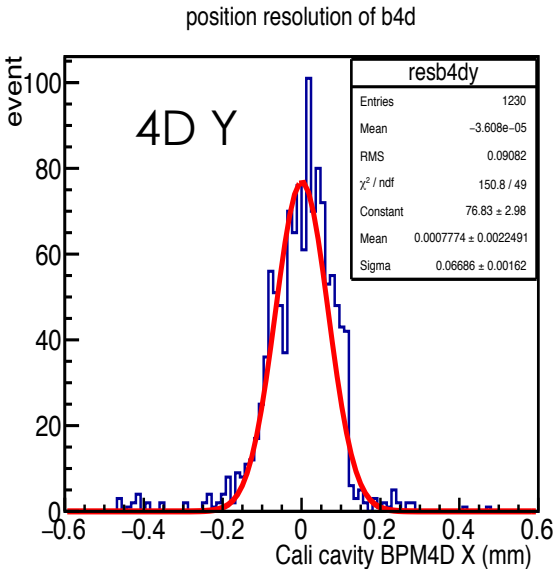
σX=0.1 mm



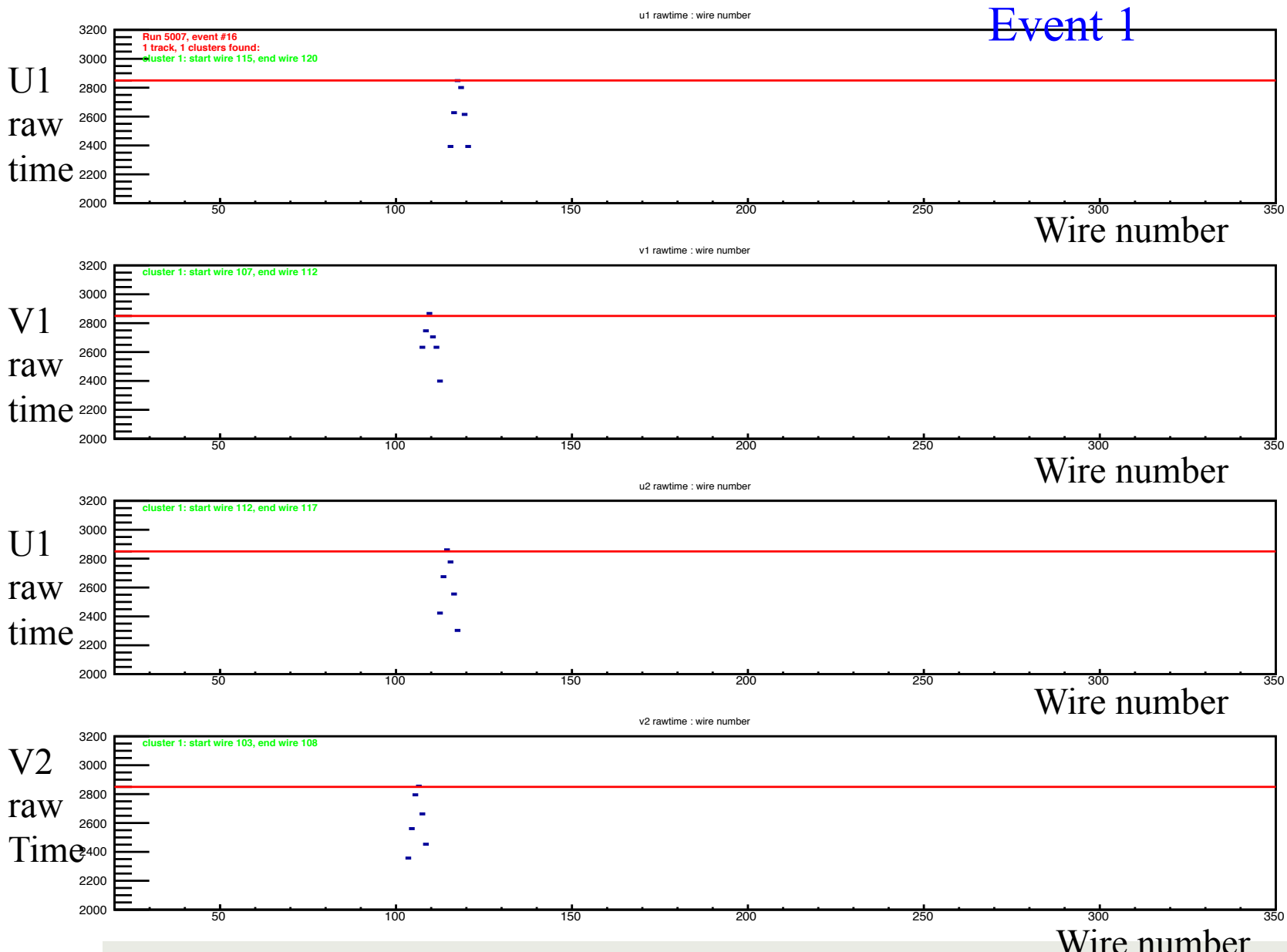




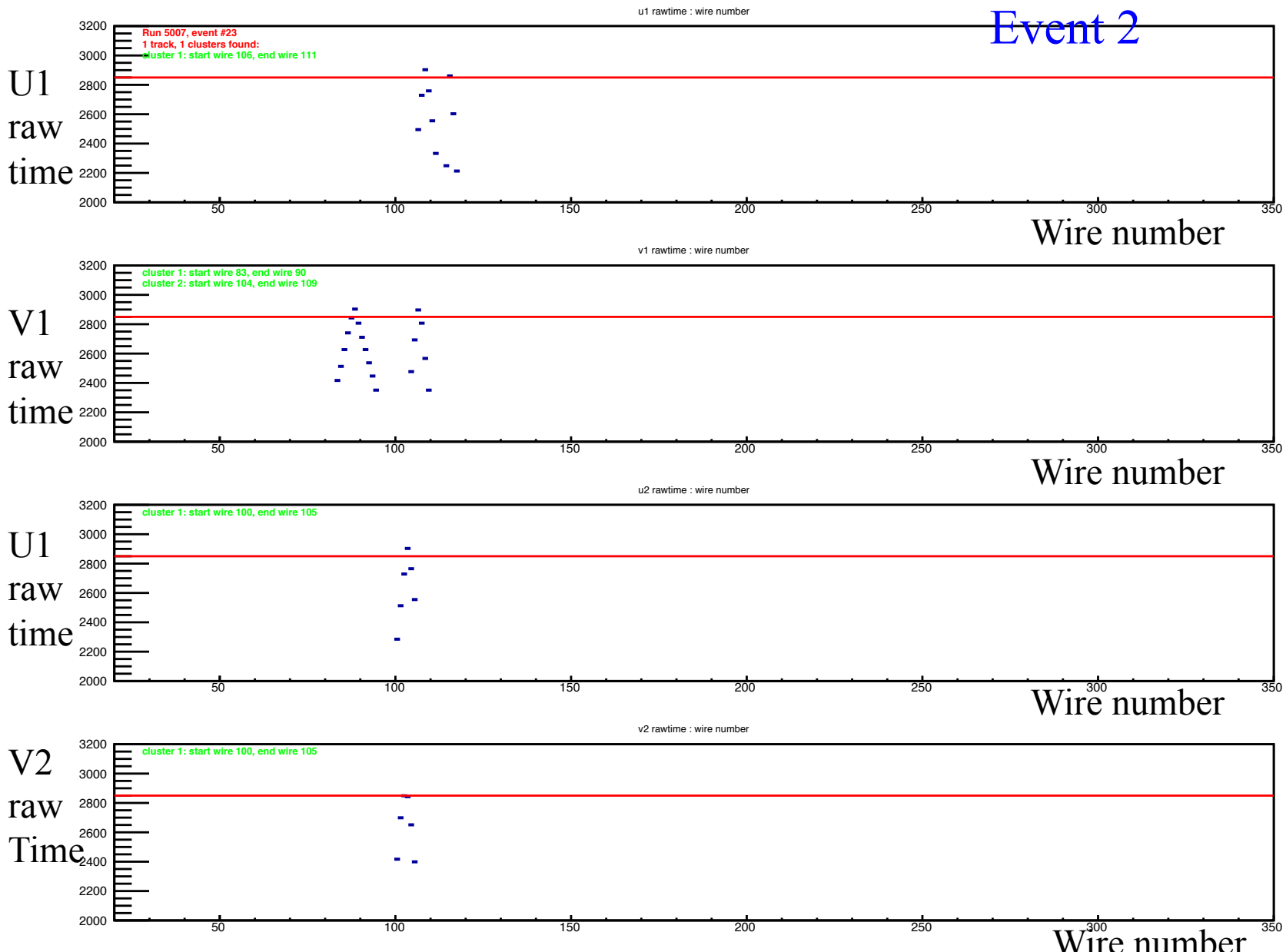
σY=0.05 mm



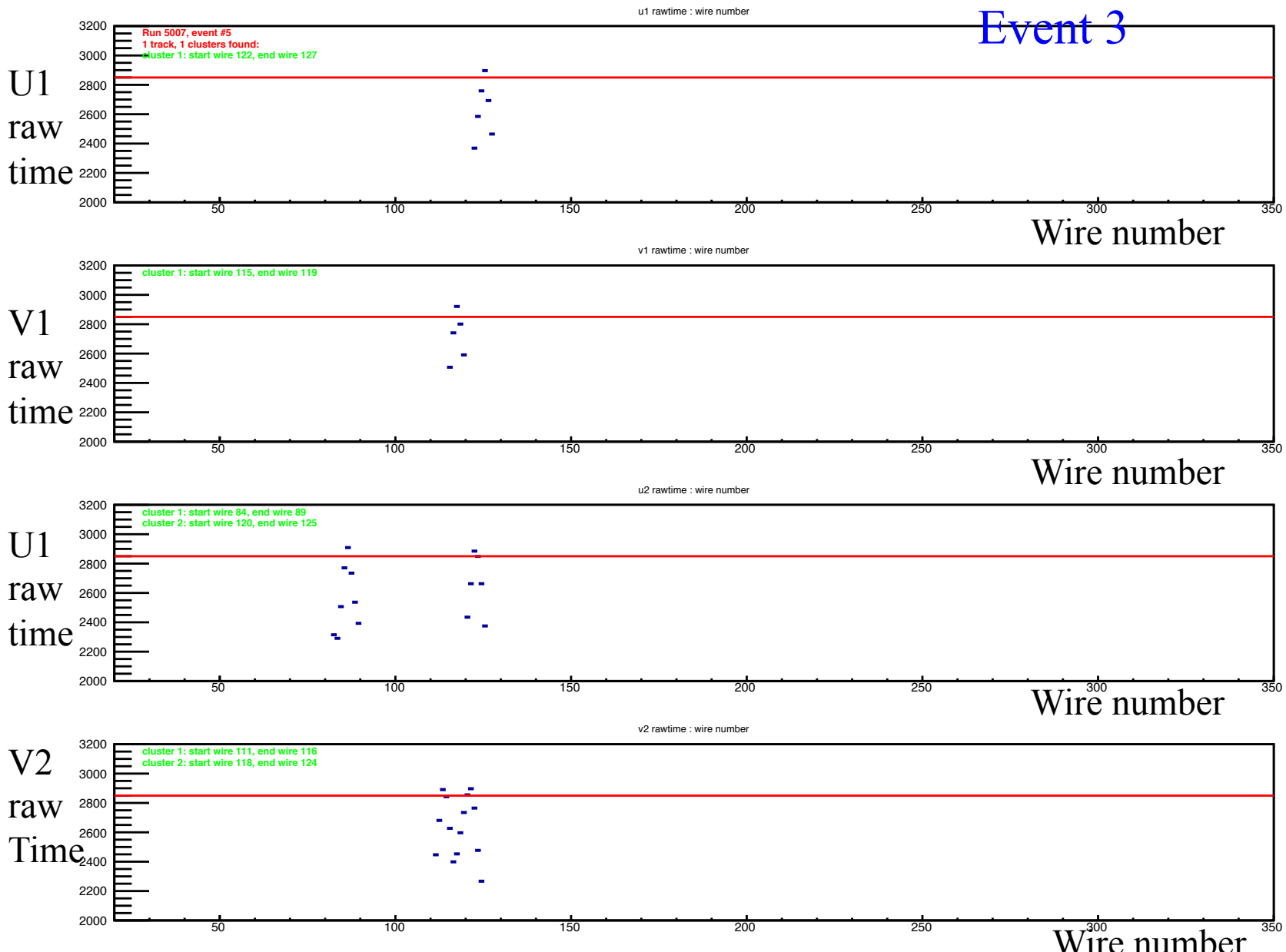
VDC tracks at Low Beam Current ≤100 nA



VDC tracks at Low Beam Current ≤100 nA



VDC tracks at Low Beam Current ≤100 nA



Summary and Outlook

1) Update the firmware based on the test results. ----John

2) Check the correlation between the cavity BPMs current and HRS scalar rate

3) Use the steering coil current to clean up the cavity BPMS position information

4) Prepare a checking list for the next beam test to avoid issues.

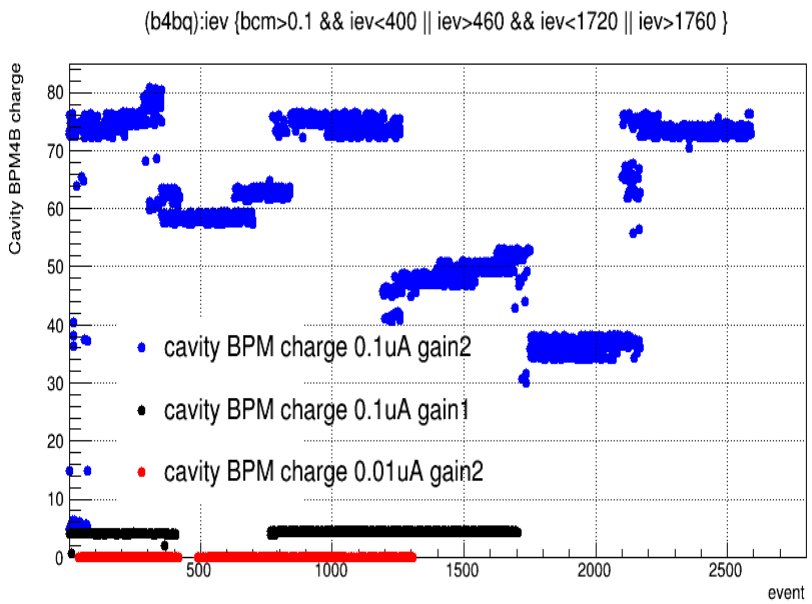
Thank you !

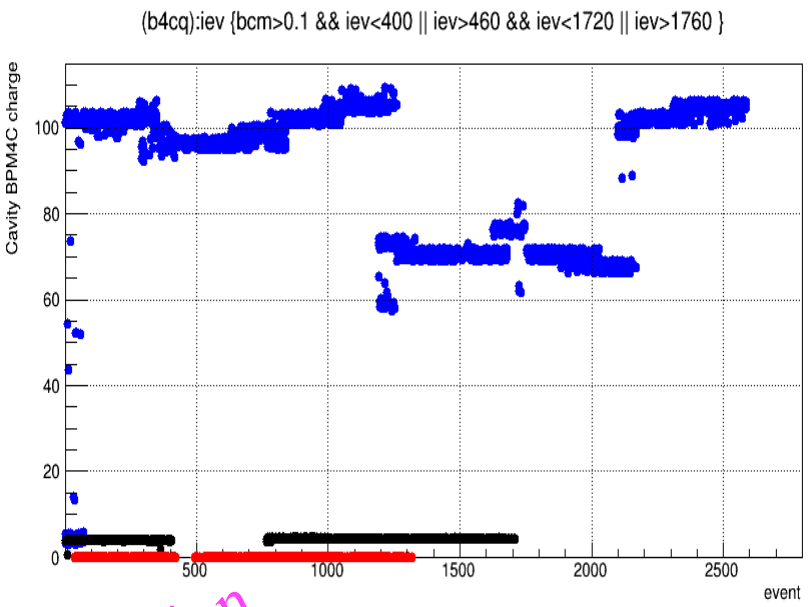
Thanks to Bob, John, Chad, Ciprian and …..

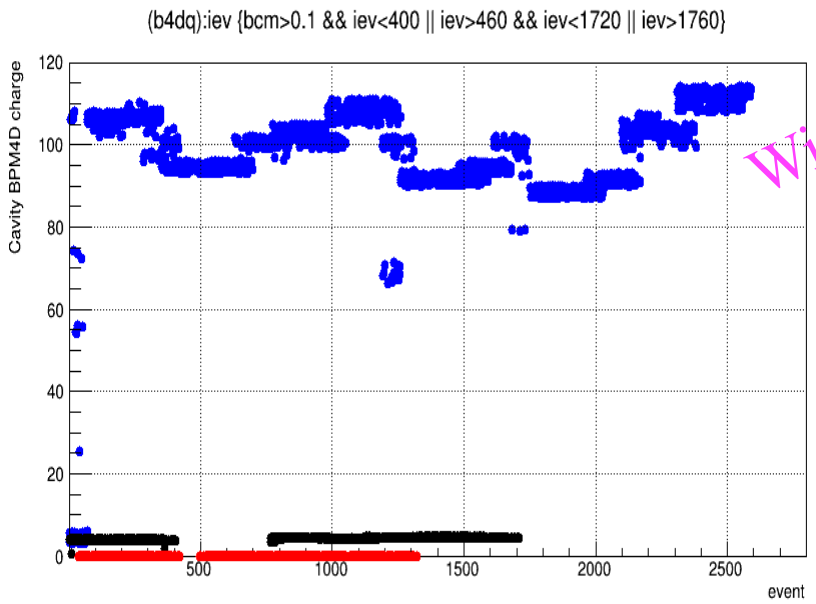
Any comments and suggestions ?

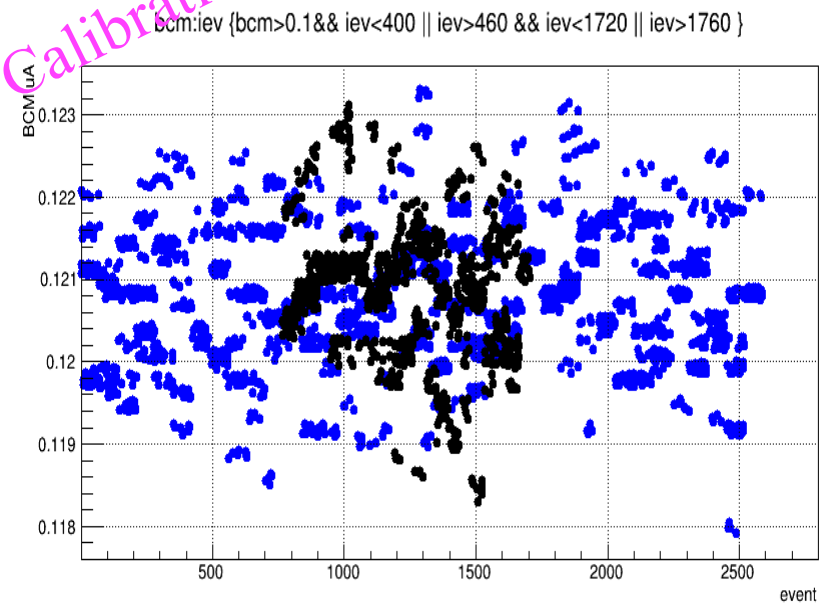
Backup

Cavity BPMs Current



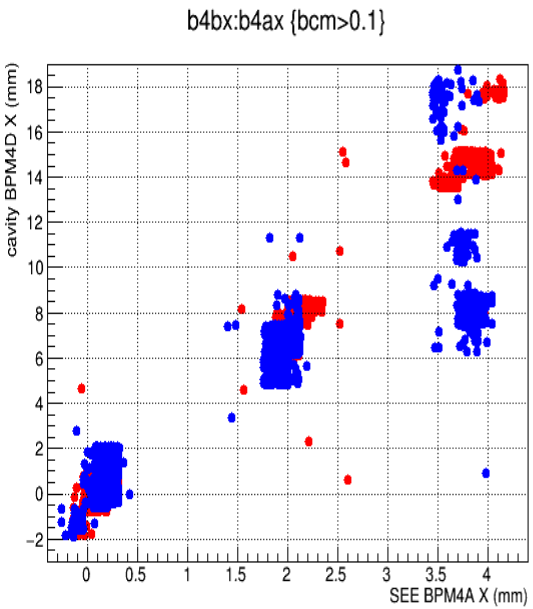


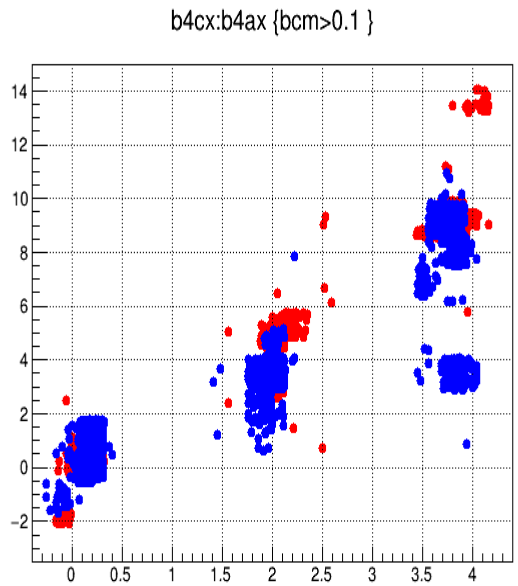


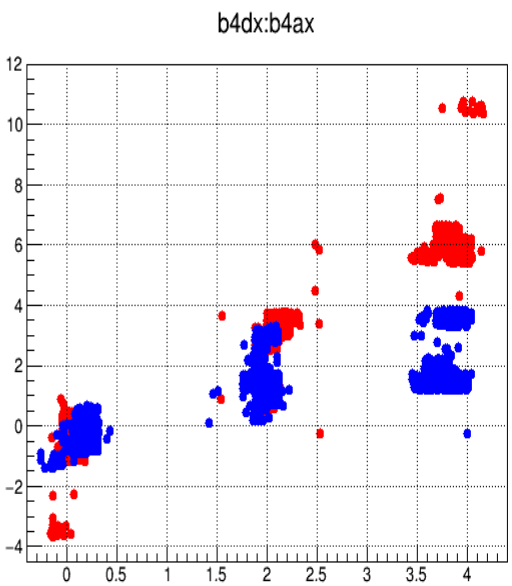


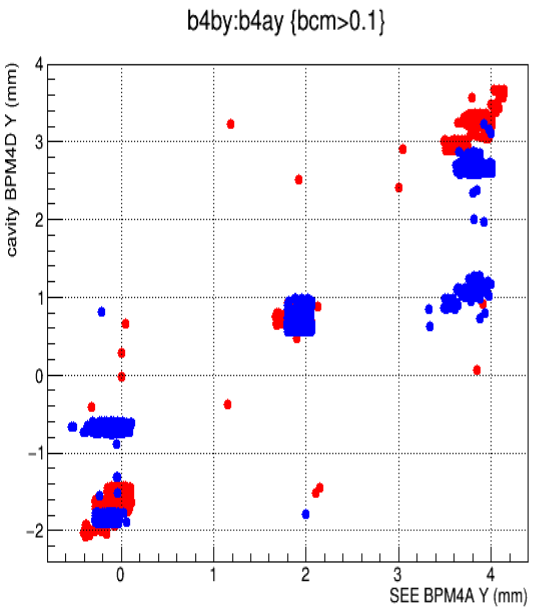
Without Calibration

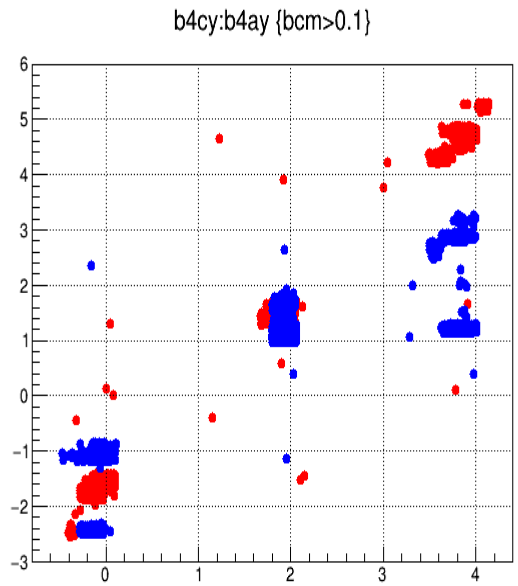
Cavity BPMs X vs Y Position

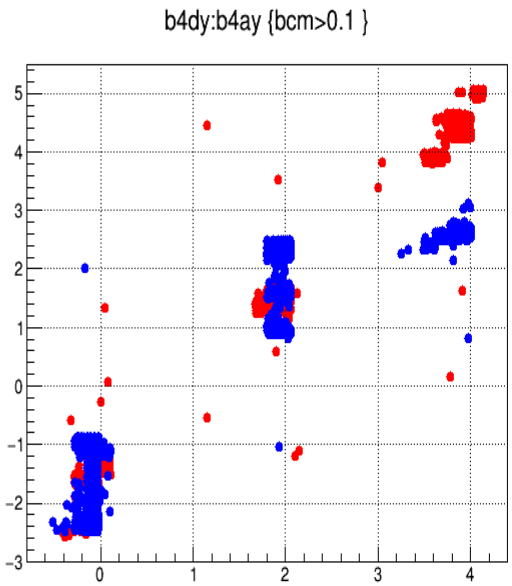


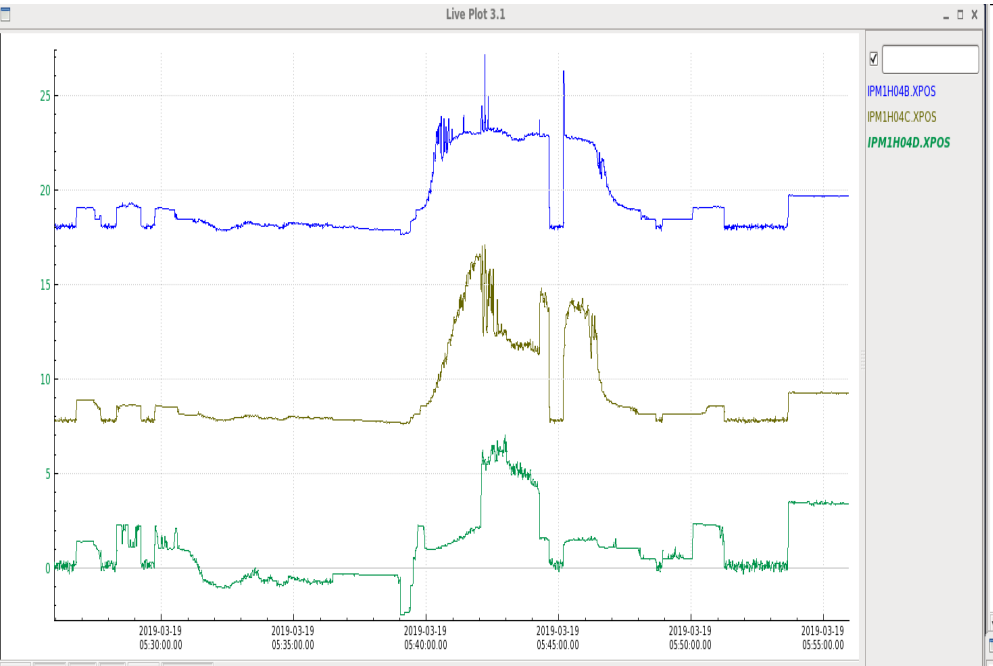


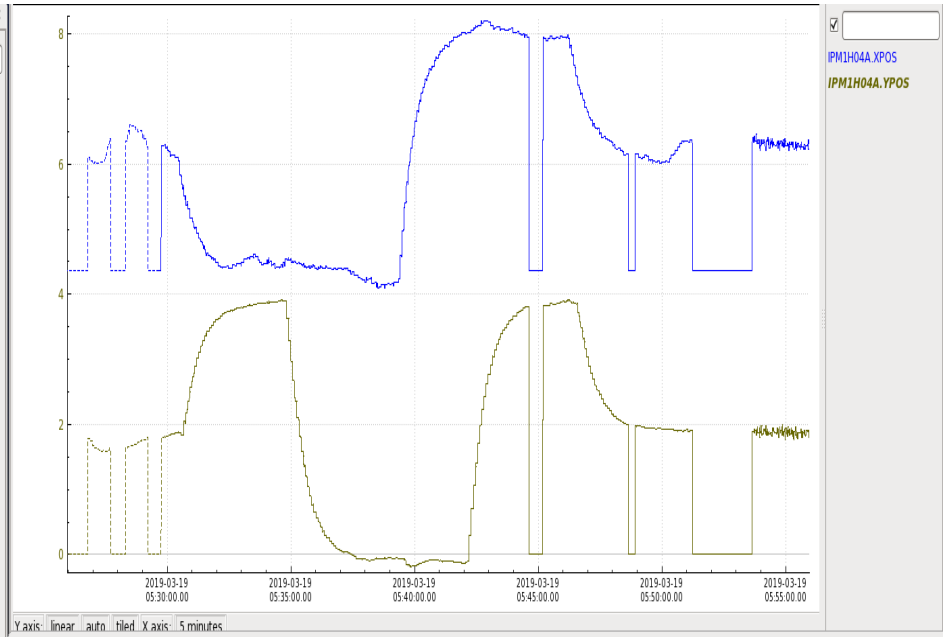


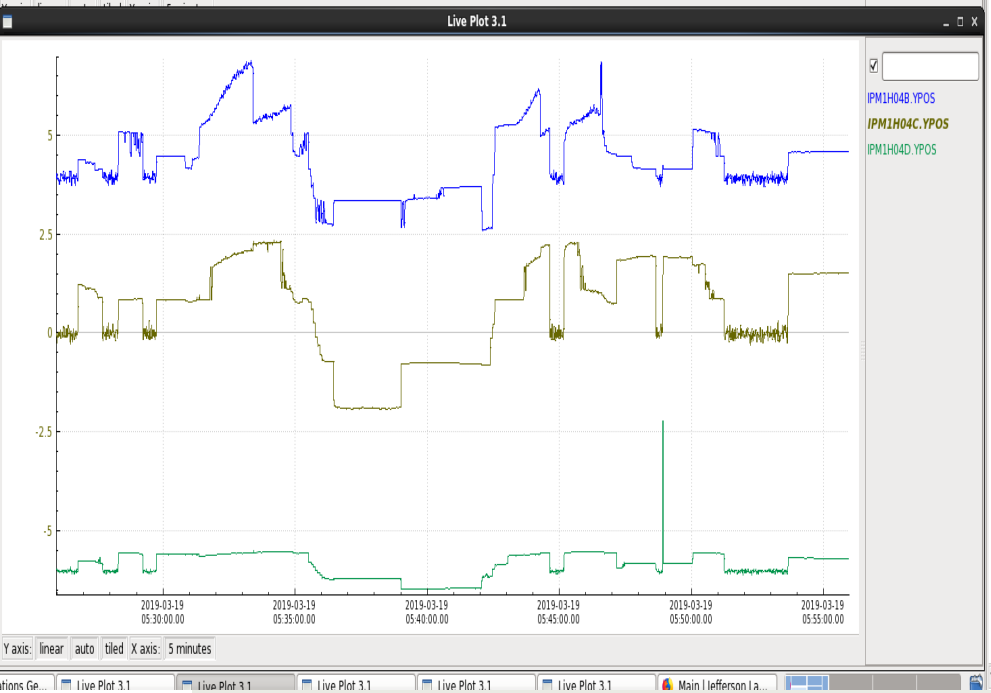


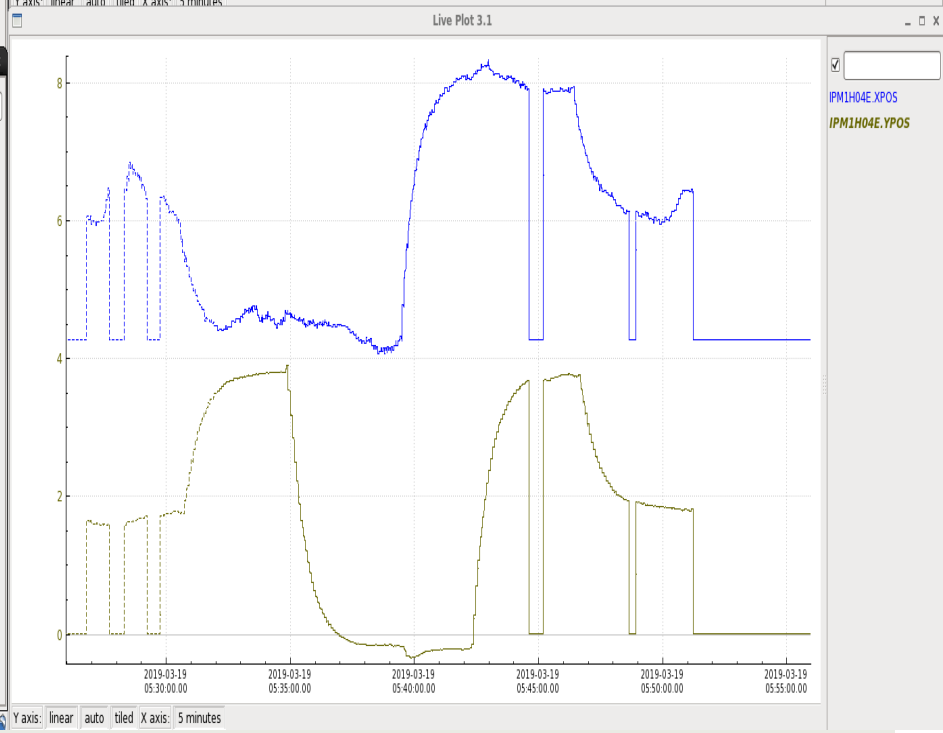





Live Plot 3.1
IPM1H04B.XPOS
IPM1H04C.XPOS
IPM1H04D.XPOS
25
20
15
10
5
0
2019-03-19 05:30:00.00
2019-03-19 05:35:00.00
2019-03-19 05:40:00.00
2019-03-19 05:45:00.00
2019-03-19 05:50:00.00
2019-03-19 05:55:00.00


IPM1H04A.XPOS
IPM1H04A.YPOS
8
6
4
2
0
2019-03-19 05:30:00.00
2019-03-19 05:35:00.00
2019-03-19 05:40:00.00
2019-03-19 05:45:00.00
2019-03-19 05:50:00.00
2019-03-19 05:55:00.00
Y axis: linear auto tiled X axis: 5 minutes


Live Plot 3.1
IPM1H04B.YPOS
IPM1H04C.YPOS
IPM1H04D.YPOS
5
2.5
0
-2.5
-5
2019-03-19 05:30:00.00
2019-03-19 05:35:00.00
2019-03-19 05:40:00.00
2019-03-19 05:45:00.00
2019-03-19 05:50:00.00
2019-03-19 05:55:00.00
Y axis: linear auto tiled X axis: 5 minutes


Live Plot 3.1
IPM1H04E.XPOS
IPM1H04E.YPOS
8
6
4
2
0
2019-03-19 05:30:00.00
2019-03-19 05:35:00.00
2019-03-19 05:40:00.00
2019-03-19 05:45:00.00
2019-03-19 05:50:00.00
2019-03-19 05:55:00.00
Y axis: linear auto tiled X axis: 5 minutes