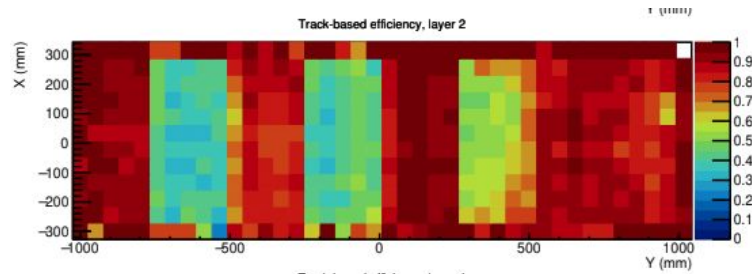# Test to see the effect of HV change on APV configuration

(to explain the issues we saw in the first 3 modules of the 3rd layer over the last 2 weeks)

Malinga, Thir and Anuruddha
10/14/2020

We are doing this "controlled" test to see whether there is an effect from changing the HV in the modules that causes the APVs of the modules to go bad in some way (just a suspicion)

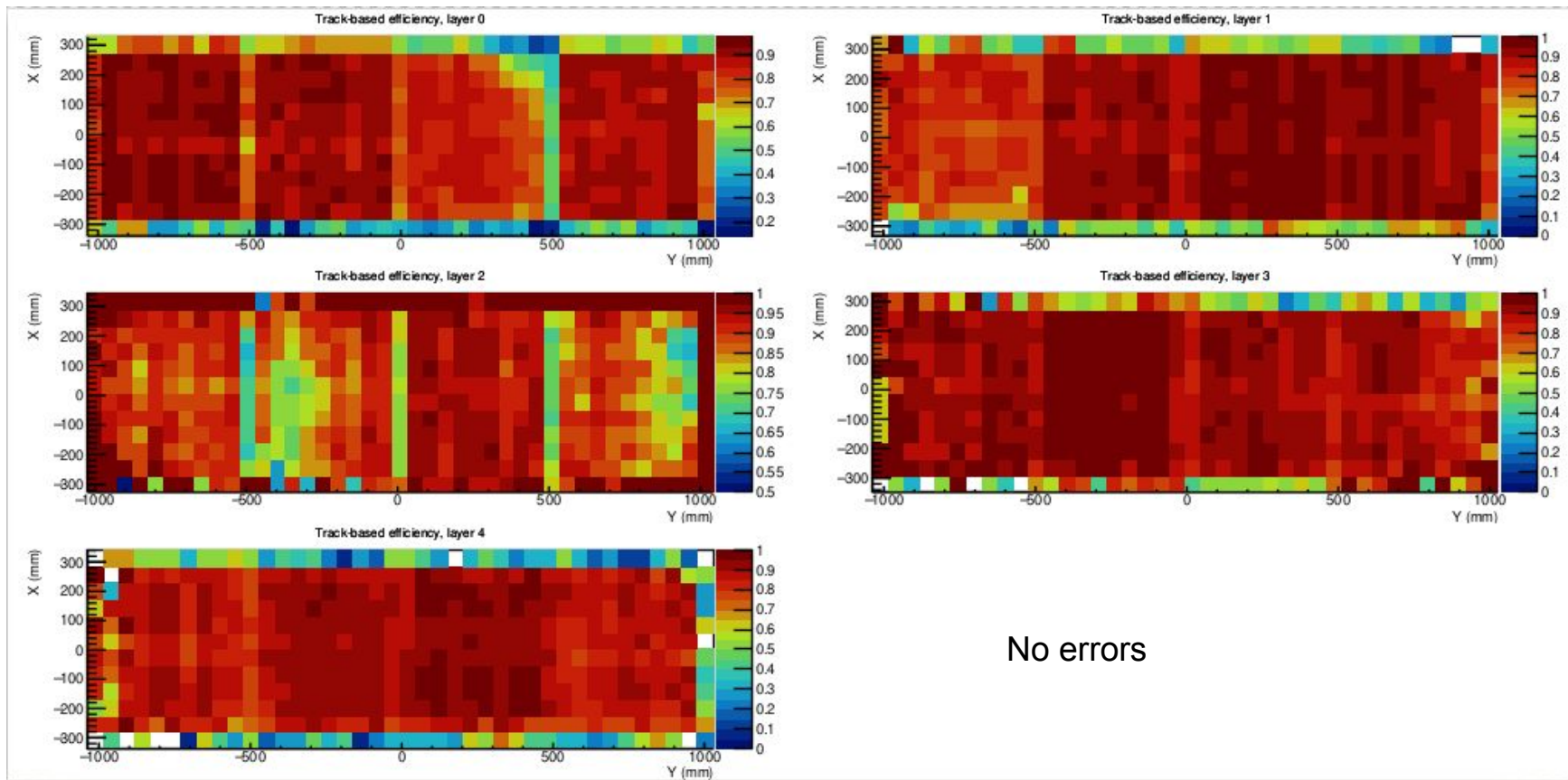## Procedure we followed and the results we have gotten so far

- Took 2 sets of data for 3 HV values (4050 V, 4075 V, and 4100 V equivalent)
- First set -> we re-configured the APVs every time we changed the HV in the modules
- Second set -> we didn't re-configure the APVs between each HV change. Just hit start/stop in CODA
- First Set -> The problem in the 3rd layer still persists at 4100 V equivalent. 4050 V and 4075 V equivalent are fine
- Second Set -> No problem in the 3rd layer for all three HV values
- Started seeing similar problem in the 3rd module of the 4th layer in x direction (see slides 3, 7 and 8)
- Those are crate0 MPD14 and crate1 MPD12 which also showing occasional readout errors
- But having MPD errors doesn't necessarily mean that track based efficiency results are always bad (slides 7 and 8)
- Also, not having MPD errors in crate0 MPD14 and crate1 MPD12 doesn't necessarily mean track based efficiency results are going are always good (slides 3 and 7)
- From the above 2 bullet points -> no clear relationship between MPD errors and bad track based efficiency results; however it's the parts of the detectors connected to these 2 MPDs (that gives occasional readout errors) that we see the issue always when it happens
- Conclusion from the test -> The problem we are experiencing is not related to changing the HV in the modules
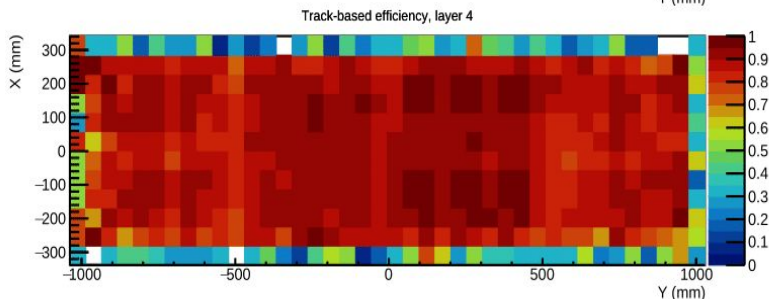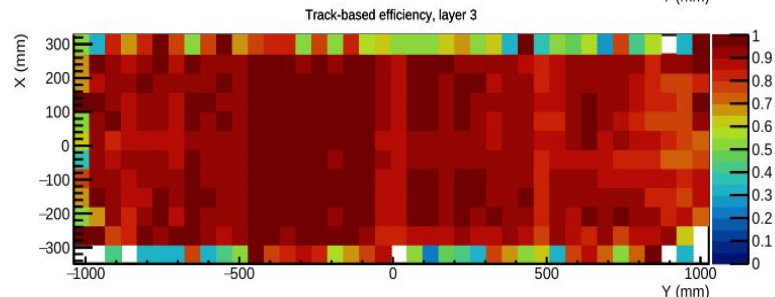
4050 V equivalent with configuring APVs

Track-based efficiency, layer 0

Track-based efficiency, layer 1

Track-based efficiency, layer 2

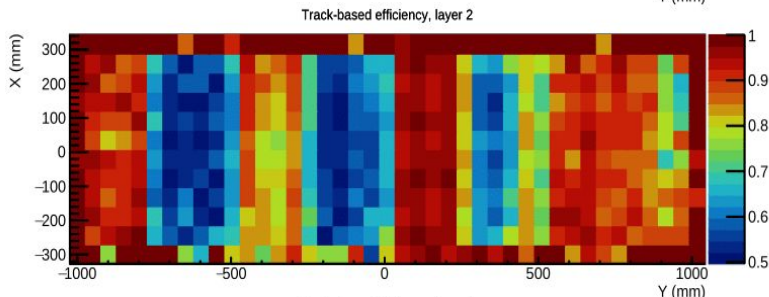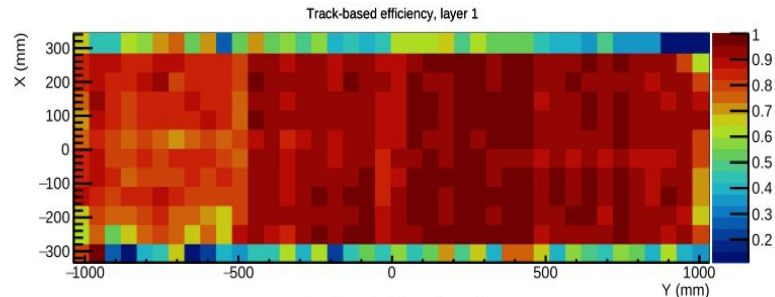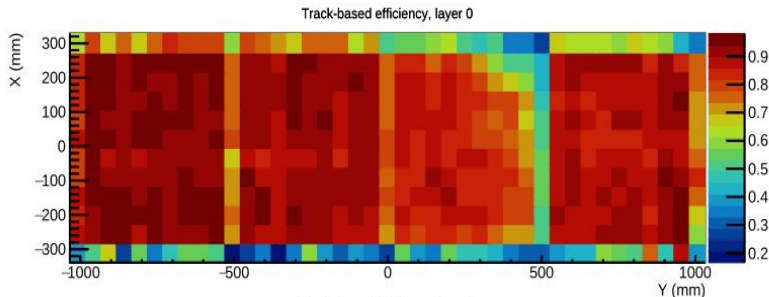Track-based efficiency, layer 3

Track-based efficiency, layer 4
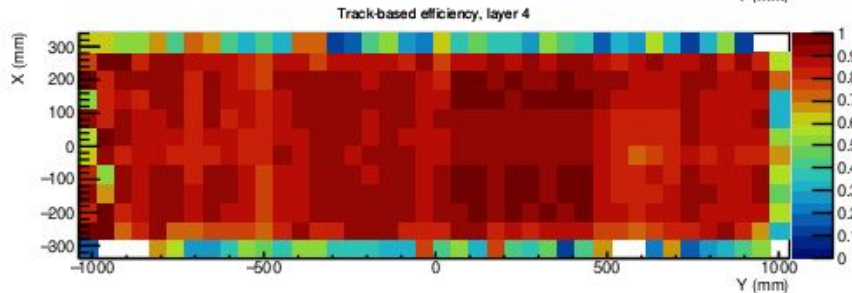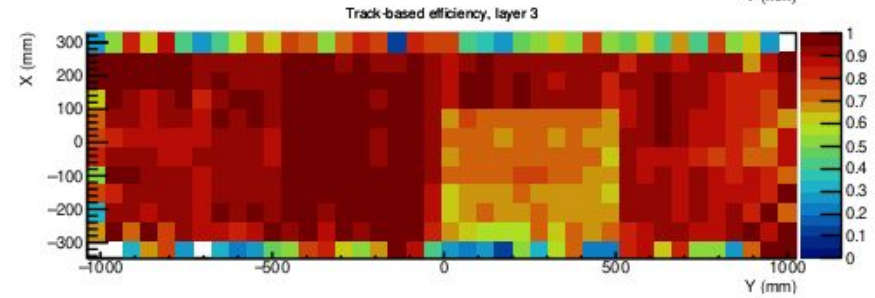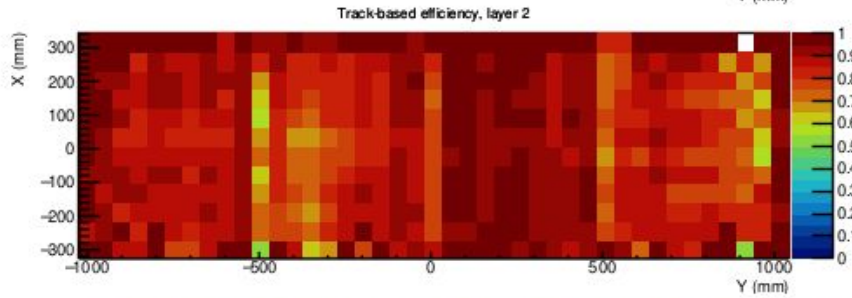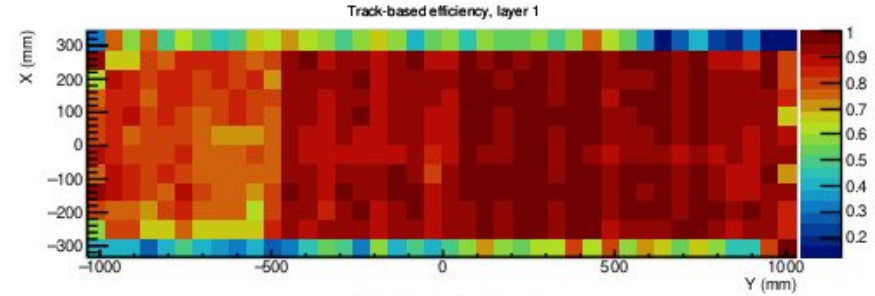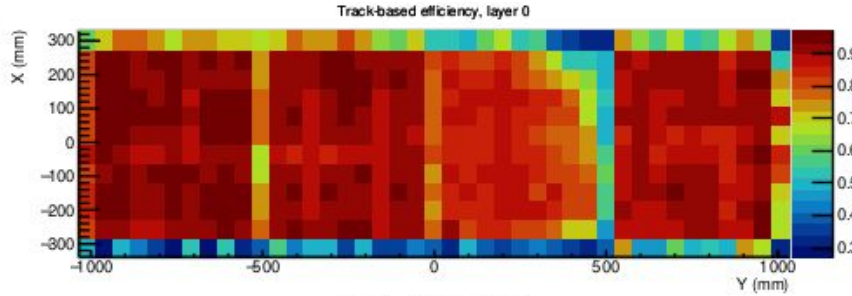
No readout errors

4075 V equivalent with configuring APVs

No errors

4100 V equivalent **with** configuring APVs

Track-based efficiency, layer 0
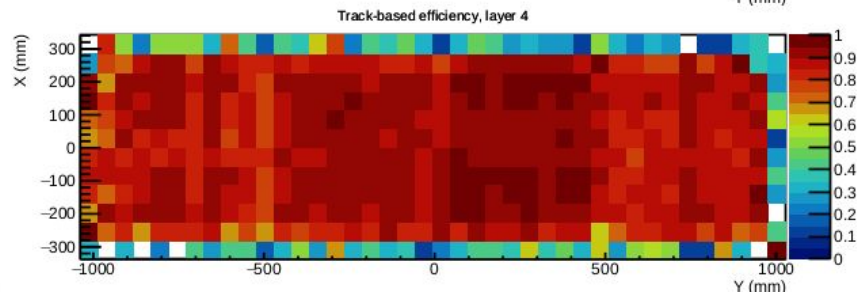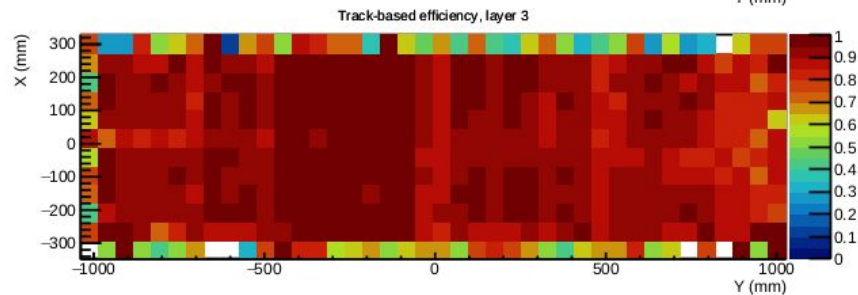
Track-based efficiency, layer 1

Track-based efficiency, layer 2

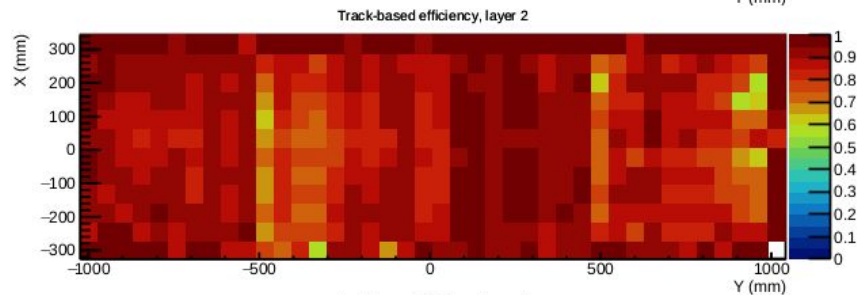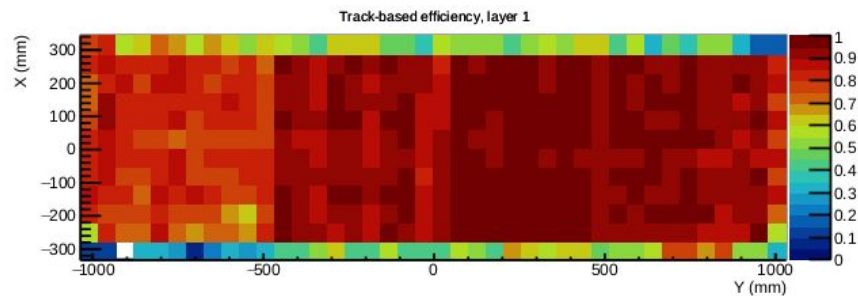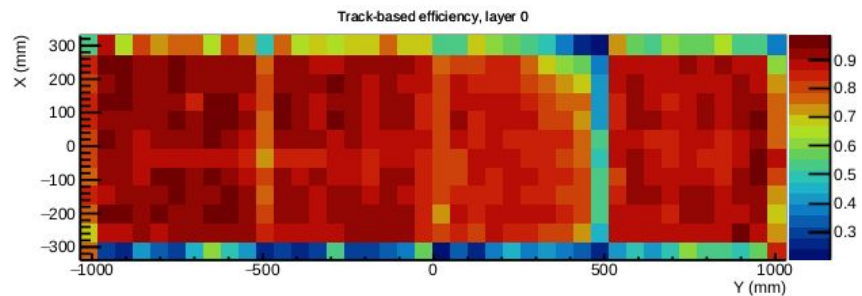Track-based efficiency, layer 3

Track-based efficiency, layer 4

Readout errors with crate0 MPD14 and crate1 MPD12

Crate0 MPD14 => right 3*5 slot 3rd layer
Crate1 MPD12 => 12 slot attached to the 3rd module of 4th layer
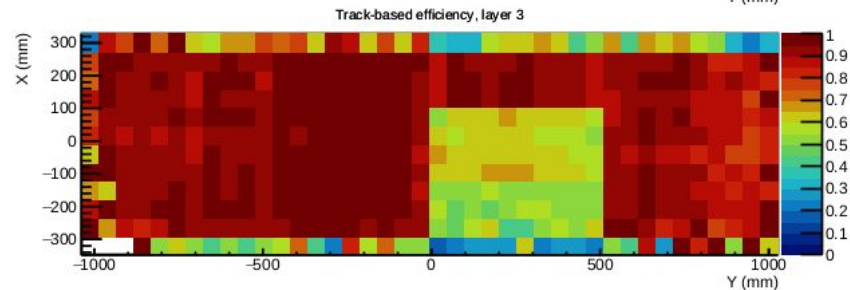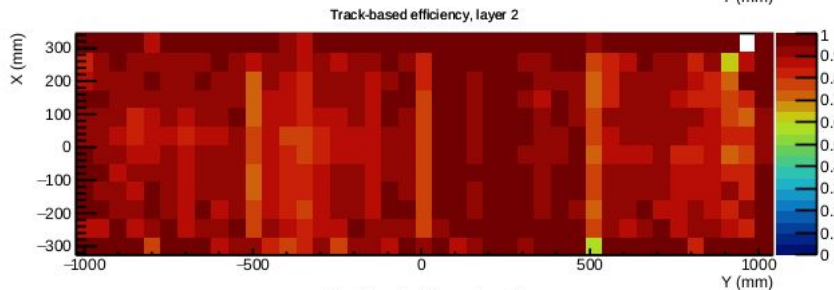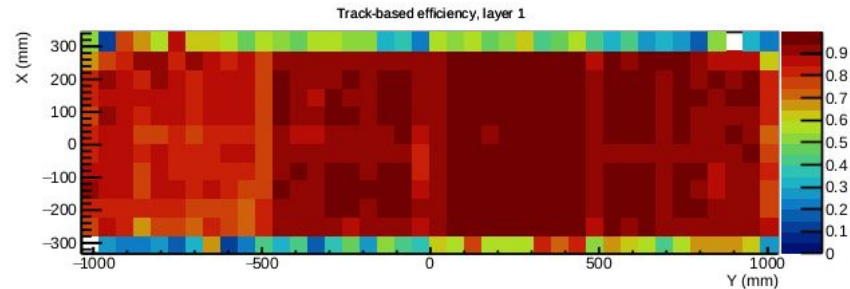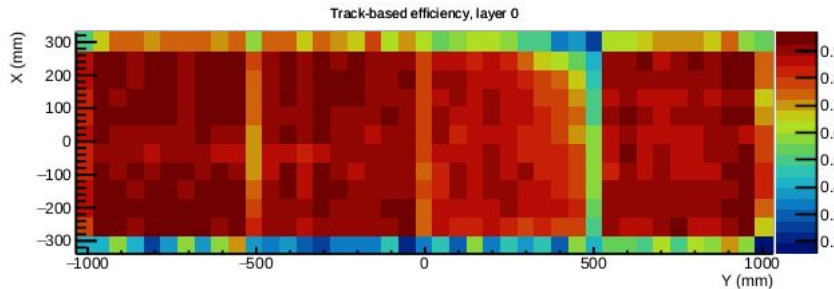
4050 V equivalent no configuring APVs

Track-based efficiency, layer 0

Track-based efficiency, layer 1

Track-based efficiency, layer 2
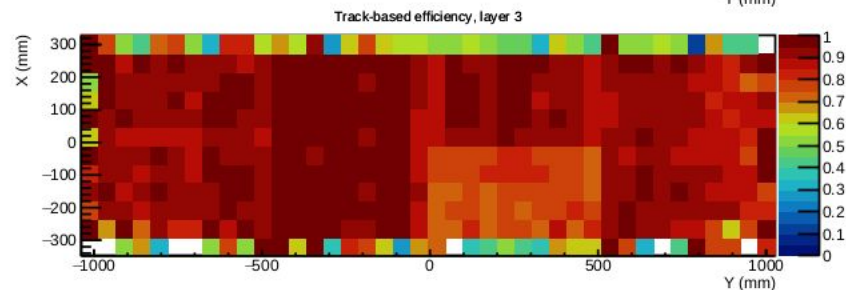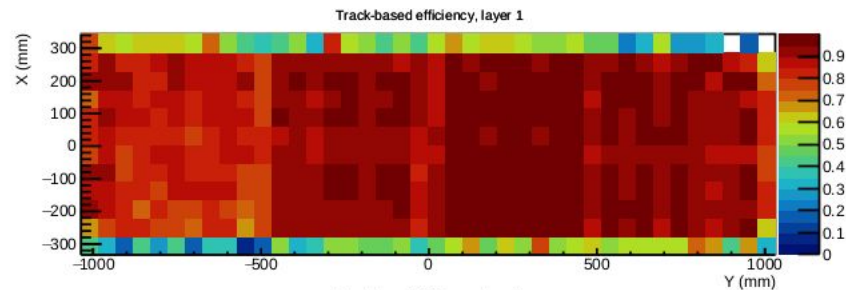
Track-based efficiency, layer 3

Track-based efficiency, layer 4

No readout errors

4075 V equivalent no configuring APVs

Track-based efficiency, layer 0

Track-based efficiency, layer 1

Track-based efficiency, layer 2

Track-based efficiency, layer 3

Track-based efficiency, layer 4
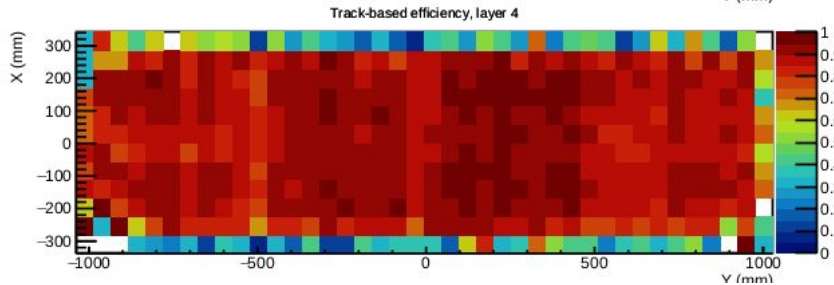
Readout error with crate0 MPD14

4100 V equivalent no configuring APVs

Track-based efficiency, layer 0

Track-based efficiency, layer 1

Track-based efficiency, layer 2

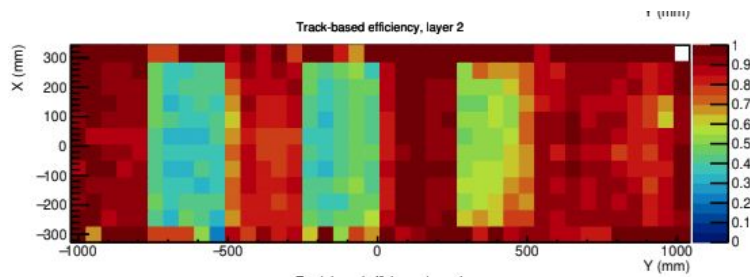Track-based efficiency, layer 3

Track-based efficiency, layer 4
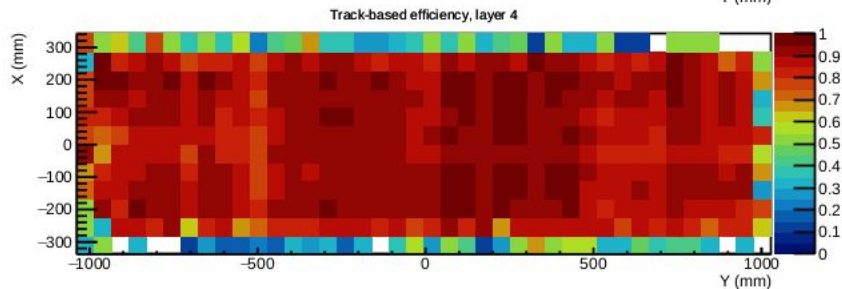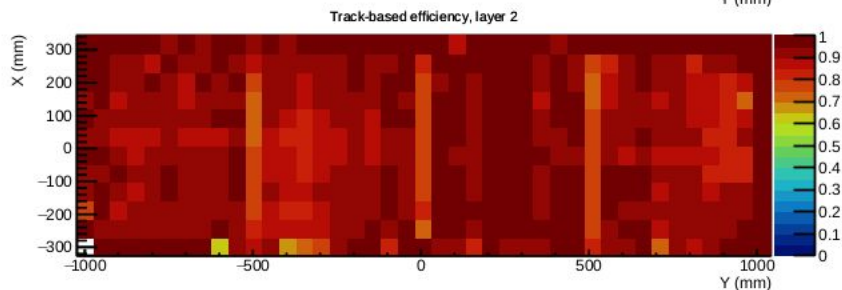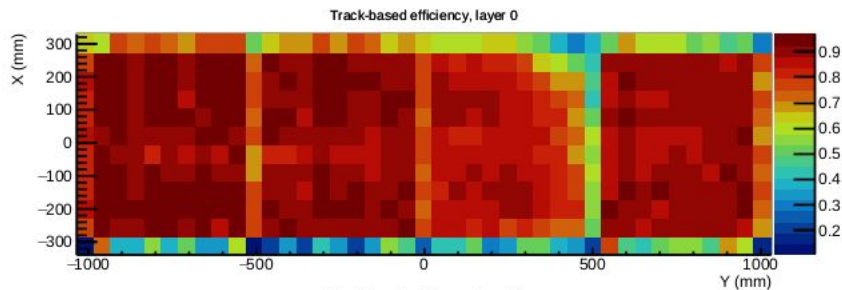
Readout errors with crate0 MPD14 and crate1 MPD12

Test to see whether a certain module (3rd layer G_0 or G_1 or G_3) causes the crate0,MPD14 to go bad

(to explain the issues we saw in the first 3 modules of the 3rd layer over the last few weeks)

Malinga, Thir and Anuruddha
10/19/2020

Procedure we followed and results we got

- We ran 3 cosmic runs with each run having only one of the 1st 3 modules of the 3rd layer on HV at a time
- 1st run -> only 1st module on HV; 2nd run -> only 2nd module on HV; 3rd run -> only 3rd module on HV
- In the beginning of each run, lights inside the cleanroom was turned off and we observed whether we could see any sparks/discharges in the new HV divider -> we didn't see any
- We didn't spot the efficiency issue we saw (which by now we have come to realise to be random from our observations)over the last two weeks in any of these 3 runs
- We also didn't see the new issue with the 3rd module of the 4th layer (crate1,MPD12) that we saw a several times over the last test we did
- Conclusion -> From these two tests we did, we are quite convinced that this issue is not caused by the new HV divider/modules but rather coming up randomly probably due to an issue of the crate0, MPD14 (and crate1, MPD 12 as we saw in the last test)
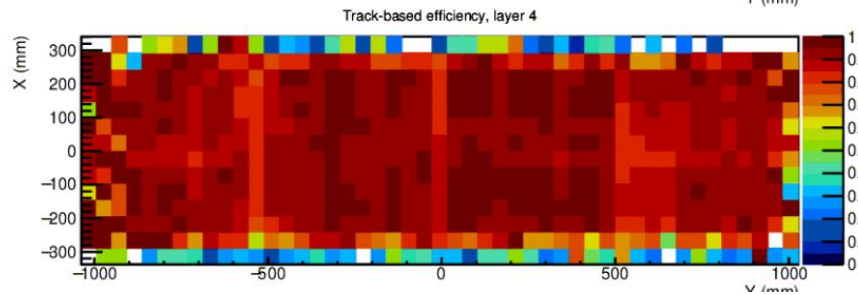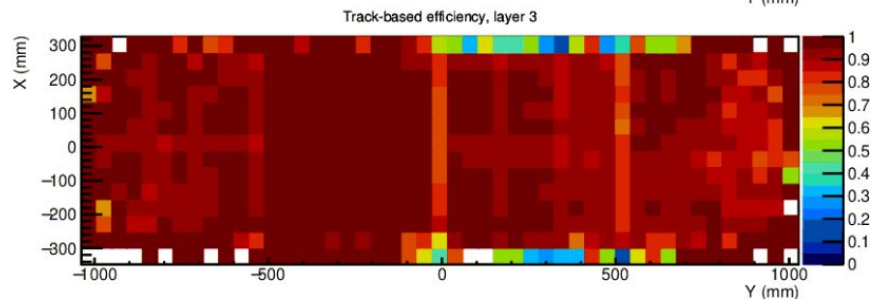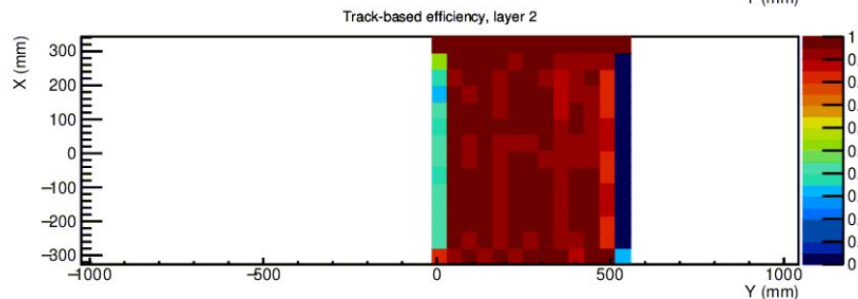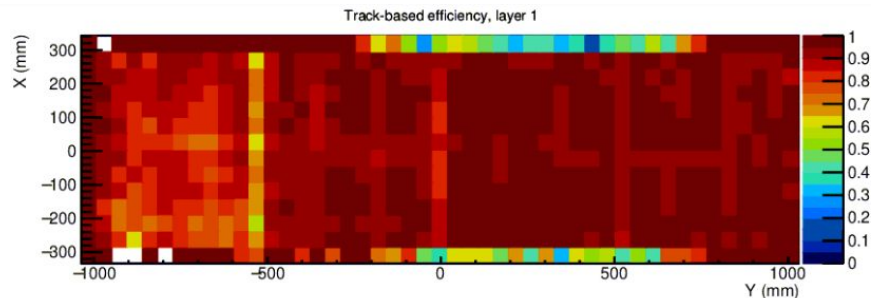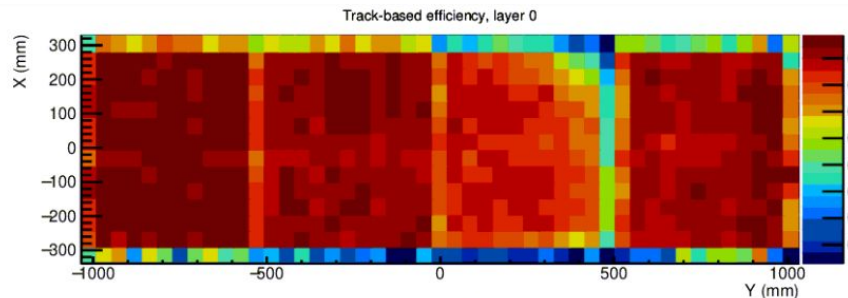
G_0 on 4100 V equivalent
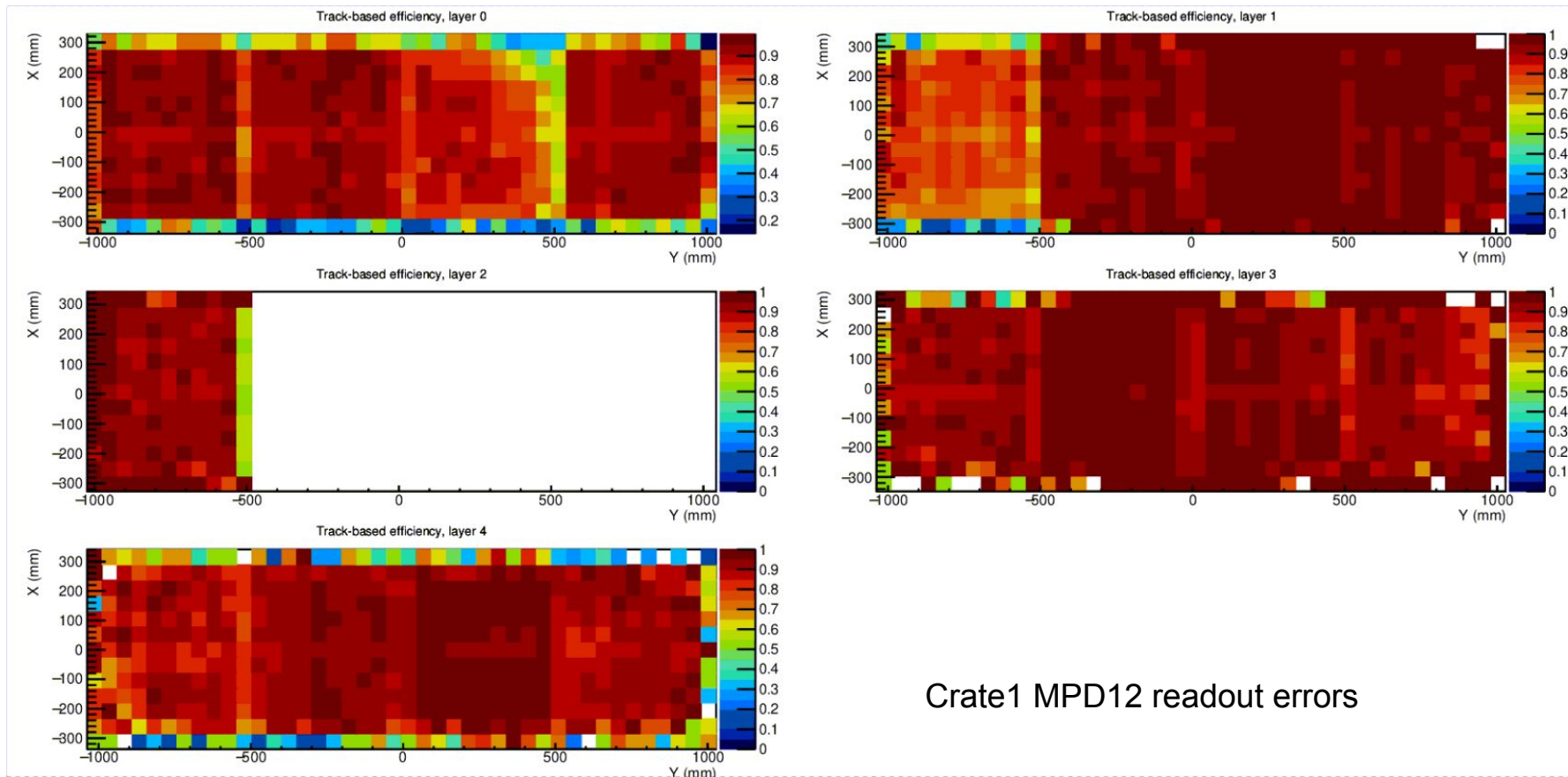
Crate1 MPD12 readout errors

G_1 on 4100 V equivalent
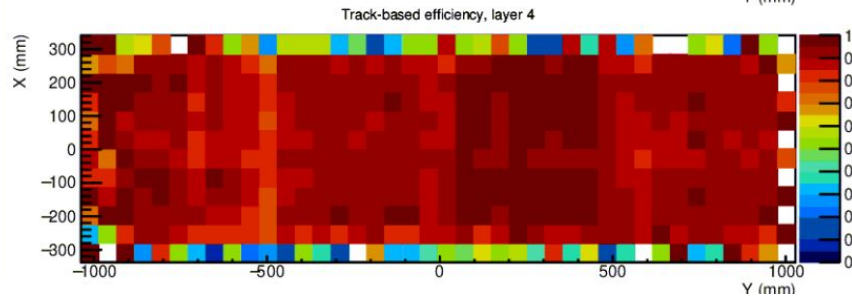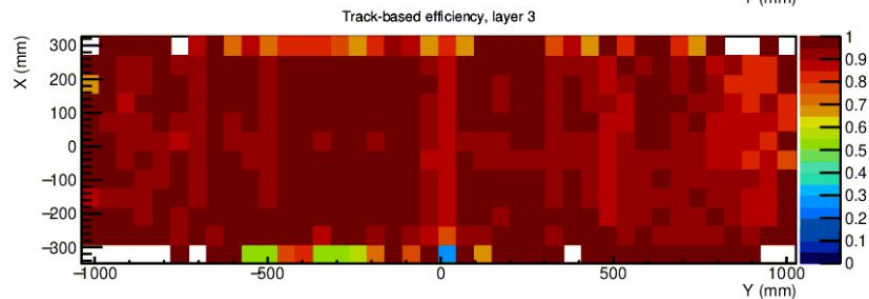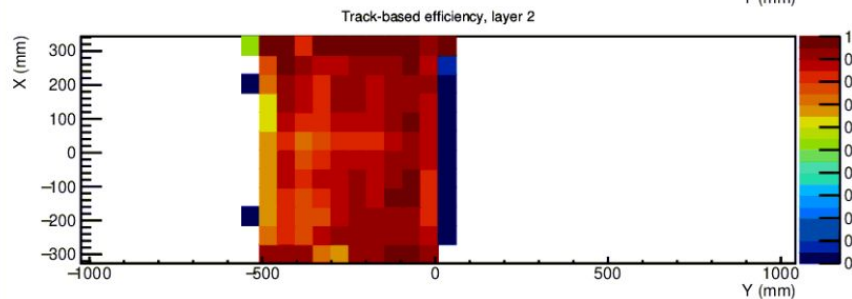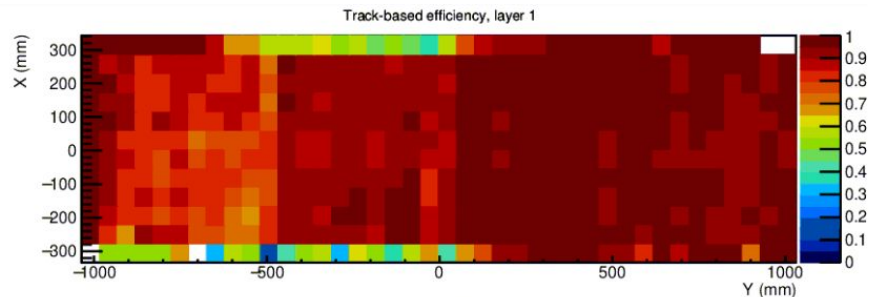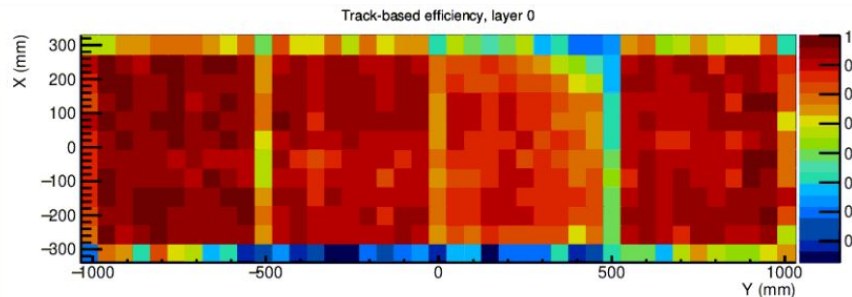
Crate0 MPD14 readout errors

Crate1 MPD12 readout errors

G_2 on 4100 V equivalent

Crate1 MPD12 readout errors