

INFN GEM Update:

5/26/21-6/2/21

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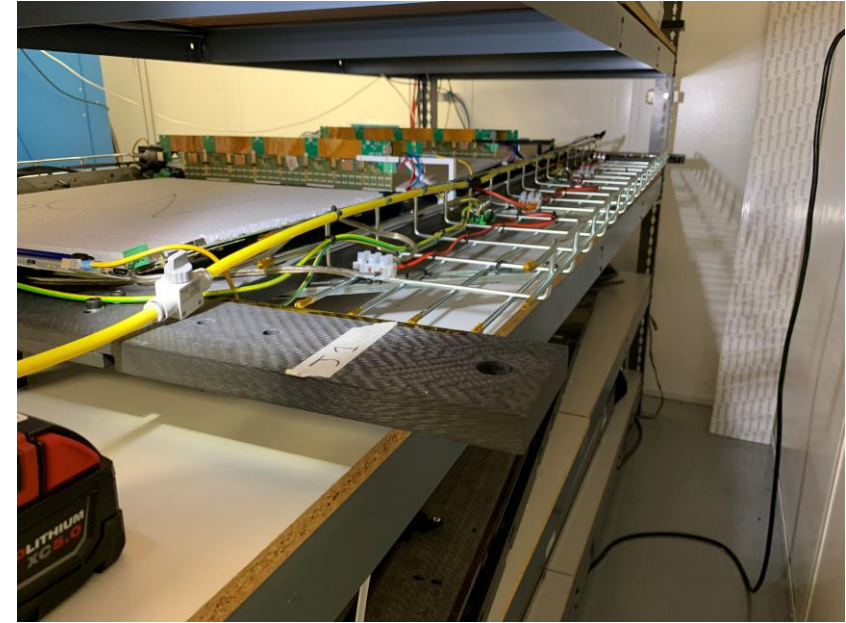


Recent Activities:

Test Lab Activities (May 26-June 1):

- Did cable tray replacement and recabling for layer J1.
- Started working on implementing simpler shielding prototype for layer J3.

Layer J1 Cable Tray Replacement, May 25-27



Top Left: Layer J1, DAQ side, with plastic cable tray
Bottom Left: After J1 cable tray replacement, DAQ side
Top Middle: Layer J1, door side, with plastic cable tray
Right: After J1 cable tray replacement, door side

XY Hit Map (Cosmic run 147) Nov. 6 2020

(statistics: ~ 504000 events)

AR/CO2 gas flow ~ ½ of “nominal” values

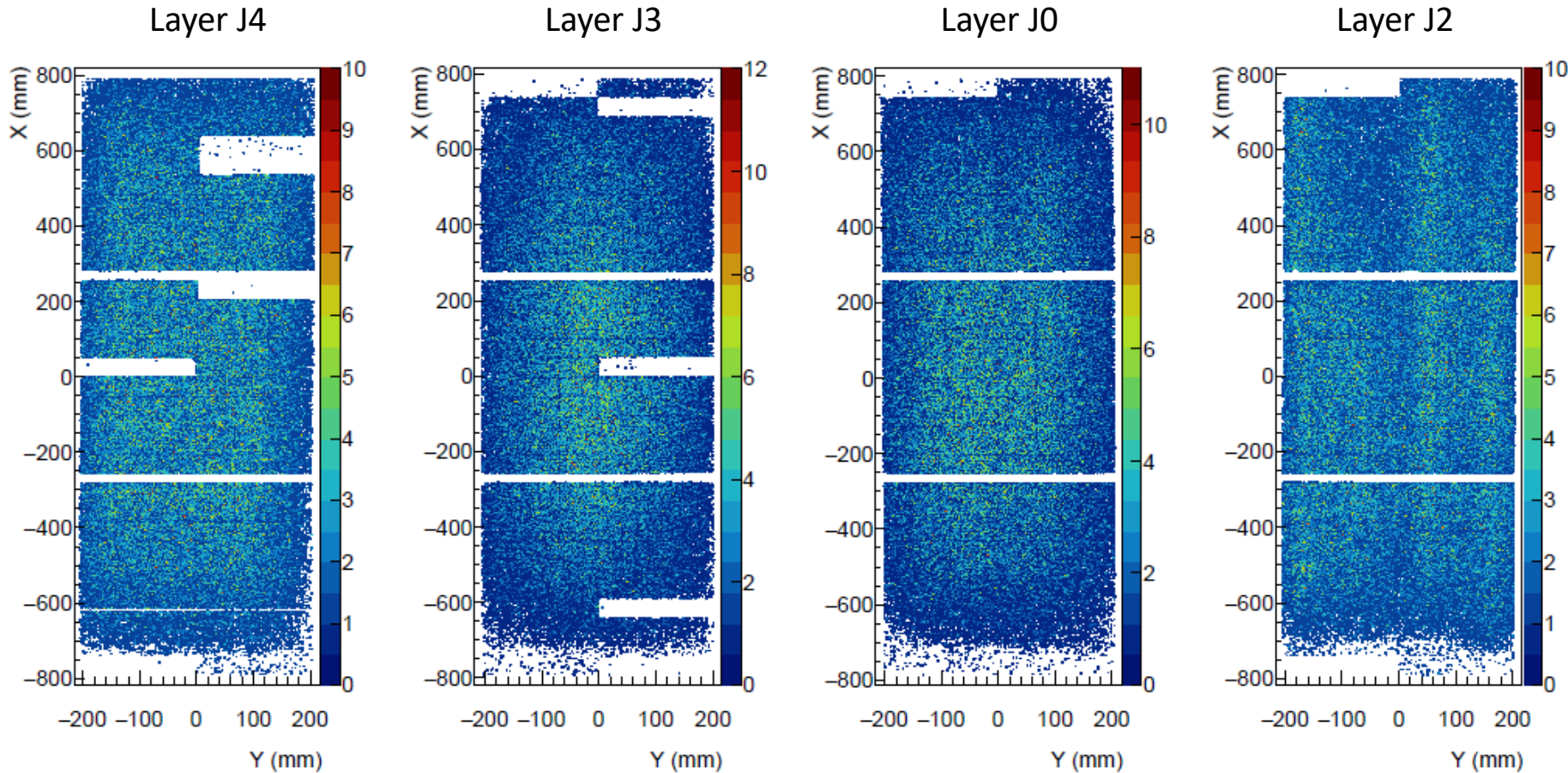
HV = 4100V

Includes pedestal subtraction

For BigBite: chambers J0 and J2

For Recoil Polarimeter: chambers J3 and J1

- Plot generated by offline analysis.
- Soldered Resistor on upper module of J2 works at higher voltage



Track-based Efficiency (Cosmic run 147) Nov. 6 2020

(statistics: ~ 504000 events)

AR/CO2 gas flow ~ 1/2 of "nominal" values

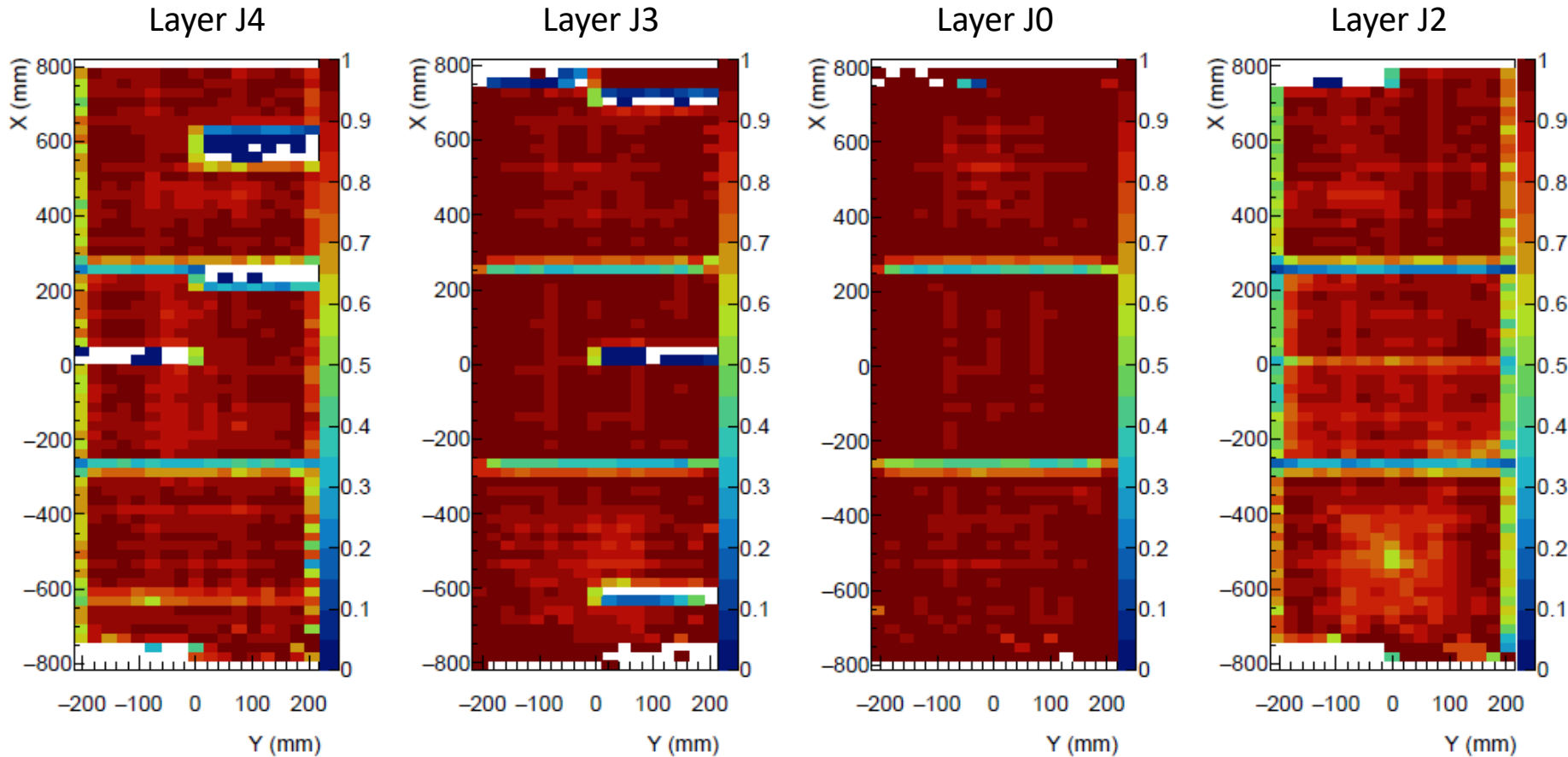
HV = 4100V

Includes pedestal subtraction

For BigBite: chambers J0 and J2

For Recoil Polarimeter: chambers J3 and J1

- Plot generated by offline analysis.
- For chambers J4, J3, J0 efficiency is greater than 90%, except for known shorted sectors.
- Chamber J2 efficiency is lower in this plot due to incorrect latency, digital cables are 10-meters long instead of 20-meters long.
- Altered latency for J2 to proper value in Feb 2021. Verified with cosmic data.



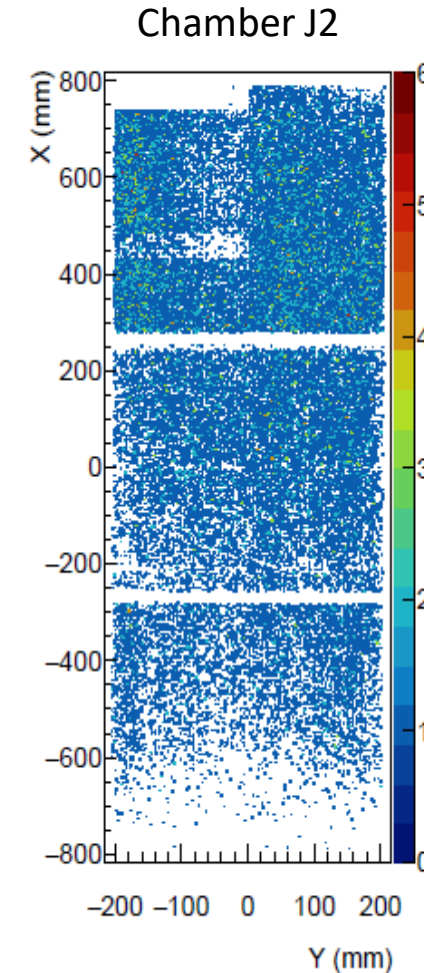
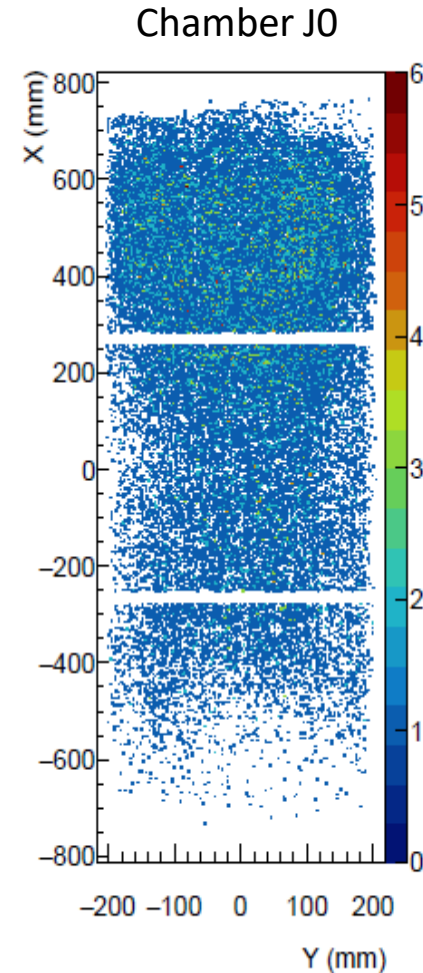
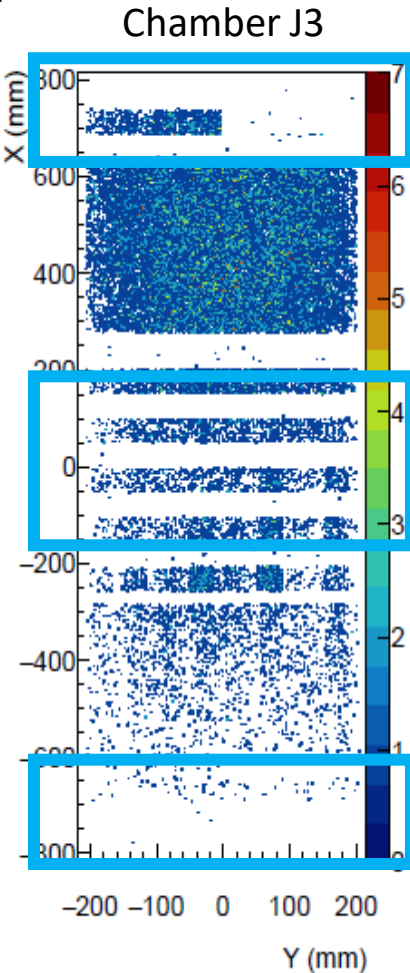
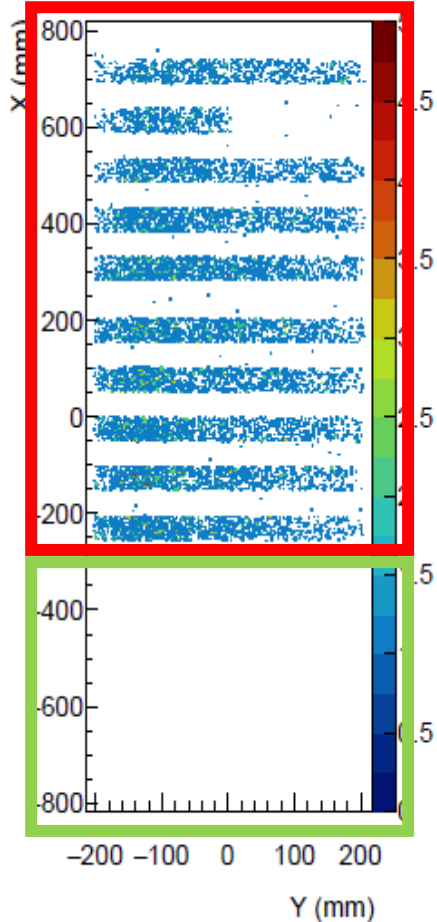
XY Hit Map (Cosmic run 421) Feb. 8-9 2021

(statistics: ~ 503000 events)
AR/CO2 gas flow ~ "nominal" values
HV = 4000V

Includes pedestal subtraction
Chamber J4

For BigBite: chambers J0 and J2

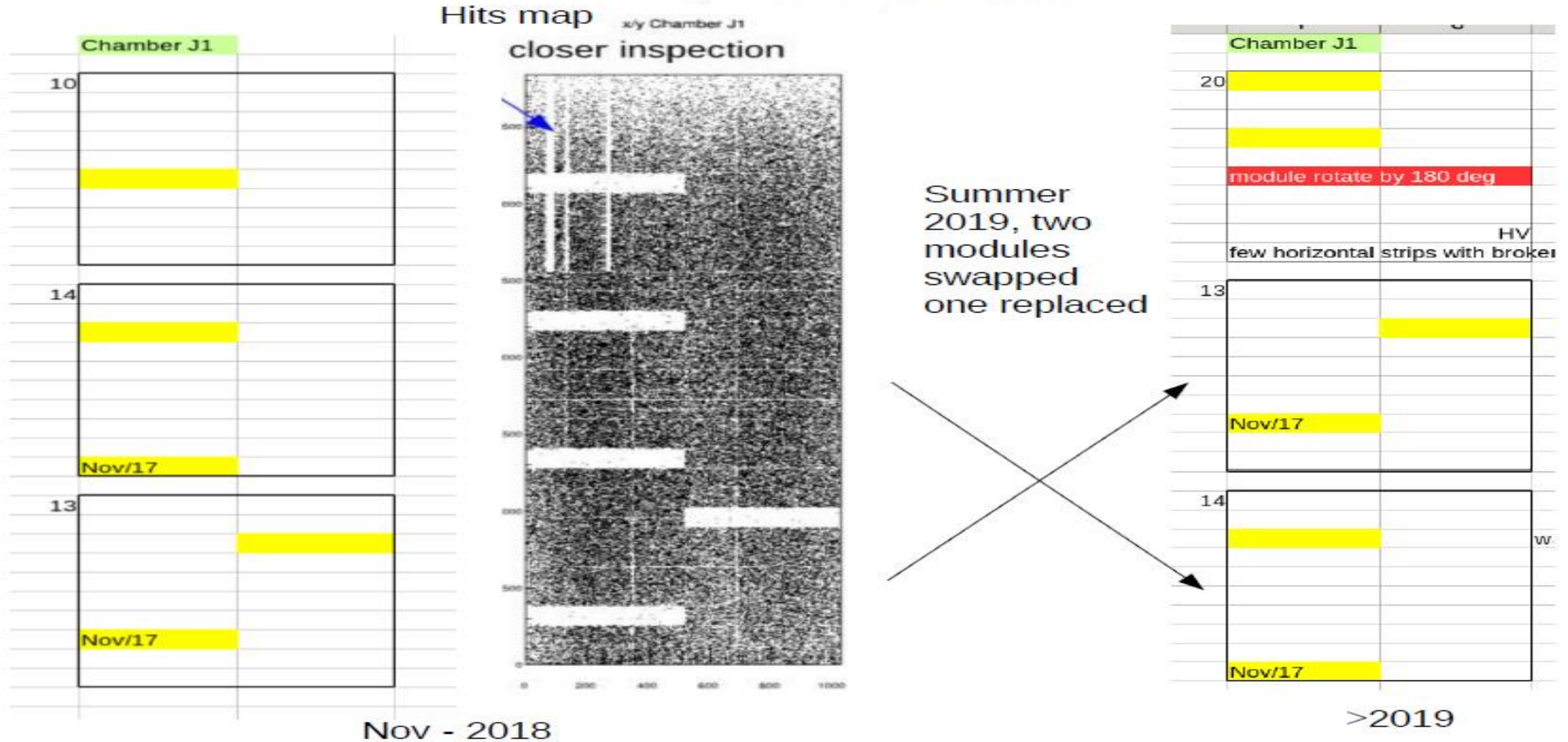
For Recoil Polarimeter: chambers J3 and J4



- Red on J4 is most likely due to issues with readout electronics on MPD 7
- Green is the module M23 with a shorted sector.
- Blue on J3 is most likely due to issues with readout electronics on MPD 15
- For red and blue, curious part is Low Level Tests, Pedestals, and DAQ do not provide errors. Present nominal response.
- Troubleshooting ongoing.

XY Hit Map Layer J1

yellow: shorted sectors



What to do next?

- Test Lab GEM Chambers
 - Make comparison between INFN Test Lab and TEDF. Data exists, just need to make plots
 - Change to metal cable trays for layers J3
 - Resolve Low Level Plots, due most likely to cable connections
 - Evaluate pedestal RMS plots and look for any noise cards, potentially altering APV cards
 - Once pedestals look good, take cosmic data and evaluate Hit Maps
 - Use these layers to make progress with shielding the GEMs.
 - If time permits resolve J4
- GEM Chambers in BigBite
 - Once BigBite is in place in the Hall, need to do the following:
 - Reconnect all cables.
 - Check Low Level Plots, check that all cables are connected.
 - Evaluate noise through pedestal data, because the Hall is different
 - Shield the layers, after design is finalized
 - Test GEM HV extensively, particularly the lowest module on J0
 - Probably more?
 - Setup any remaining software/programs for INFN GEMs in BigBite configuration.
 - Documentation for LV, Low Level Troubleshooting, and in general. Basically manual update.

Questions?

