

INFN GEM Update:

Hardware Troubleshooting and Cosmic Data

10/7/20-10/13/20

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Recent Activities at JLab:

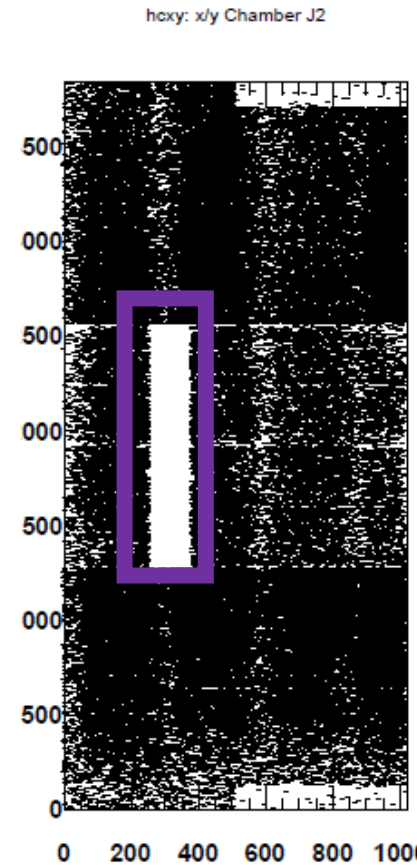
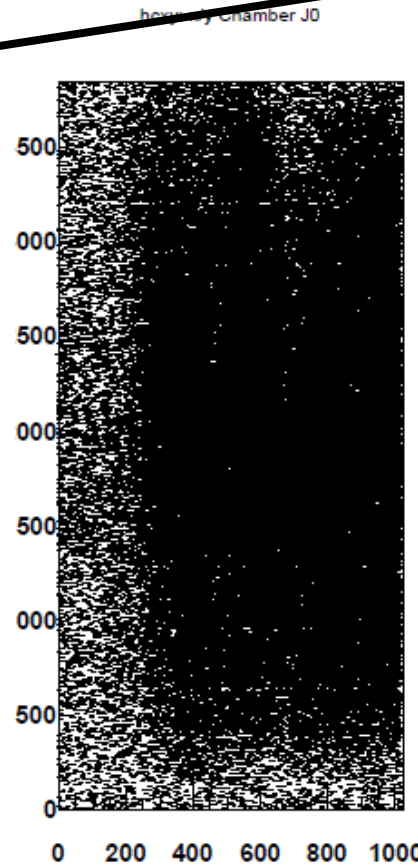
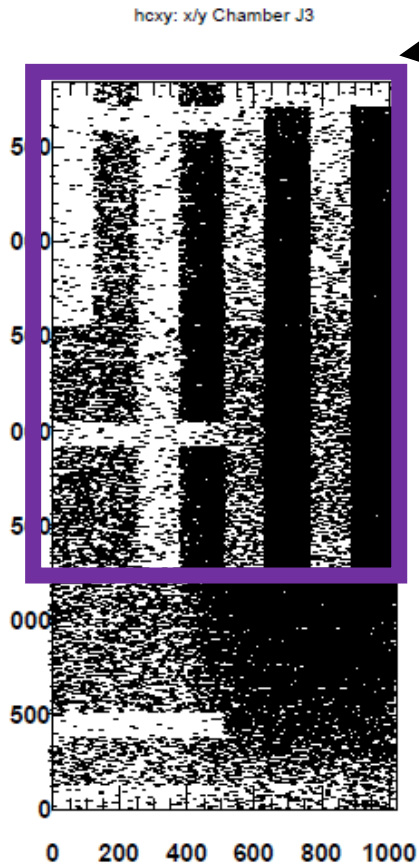
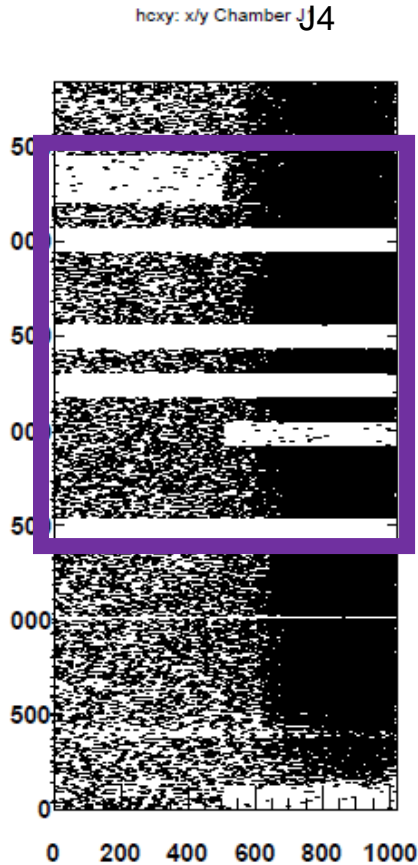
- HV currents has been very stable (except one channel trip, which was restored) and gas flow $\sim 1/2$ nominal value
- Oct. 7-8: Cosmic Data
 - CODA does not give errors after power cycling LV, but first backplane of MPD 18 does not show up on Hit Plots
 - After starting new run backplanes on MPD 18 return to Hit Plots
 - 2/3 scintillators were improperly left off. Looked at PMT HV GUI more carefully, set the proper voltage and took pedestal and cosmic data. Mistook for centering problem, but didn't actually move PMTS!
- Oct. 9-12: Cosmic Data, HV Scans, DAQ pretty stable
 - Took approximately 1,500,000 events of cosmic data at nominal HV= 4000 V.
 - MPD 7/J4: 3 cards disabled, 1 not recognized
 - MPD 14/J2: 1 card not recognized
 - MPD 17/J3: 3 cards (and sometime more) stop collecting hits during the runs (very similar to last week data from UVa GEM)
 - On Oct. 10 ROC is reset by power cycling VME crate , error message was related to ROC memory. Unable to make log entry. After CODA collects data fine.
 - Completed HV scans at 3900 V, 4050 V, 4100 V. Still need to do HV Scans at 3800 V and 3850 V
- Oct. 13:
 - Ramped down GEM HV
 - Attempted to troubleshoot APV cards on MPD 7 and 17. Verified LV settings for all backplanes on J4 and J3, with a multimeter. Adjusted overall LV on J3 of increase in 0.1 V.
 - Verified that APV cards on backplanes connected to MPD 7 and 17 are actually connected.
 - Checked that the 20 m HDMI cables for MPD 7 analog input were properly plugged. Maybe some of these cables are bad

Hit Map (Cosmic run 4602) Oct 5-6

MPD18 returned in Pedestal but not Hit

- shows turned off 2/3 top PMT

MPD7 removed from analysis decoder



Card on MPD 14

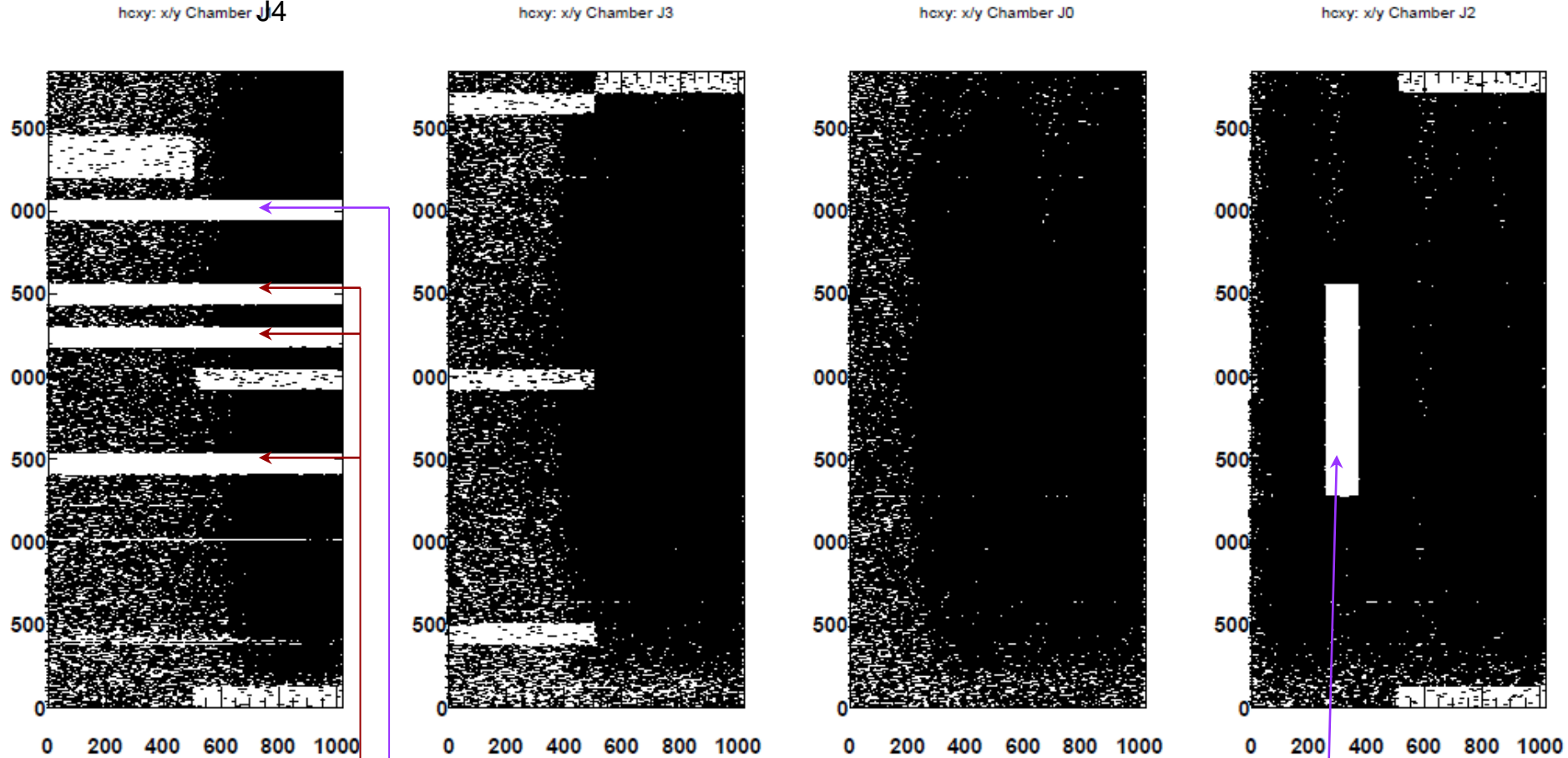
(statistics: files _35-94)
gas flow ~ 1/2 of "nominal" values
HV = 4000V

NOTE: use pedestal 4601 at HV= 0 V

Hit Map (Cosmic run 4605) Oct 7-8

(statistics: files _0-101)
gas flow ~ 1/2 of "nominal" values
HV = 4000V

*NOTE: use
pedestal 4603
at HV=4000 V*



disabled cards in MPD7
bad histos, gives timeout
when enabled

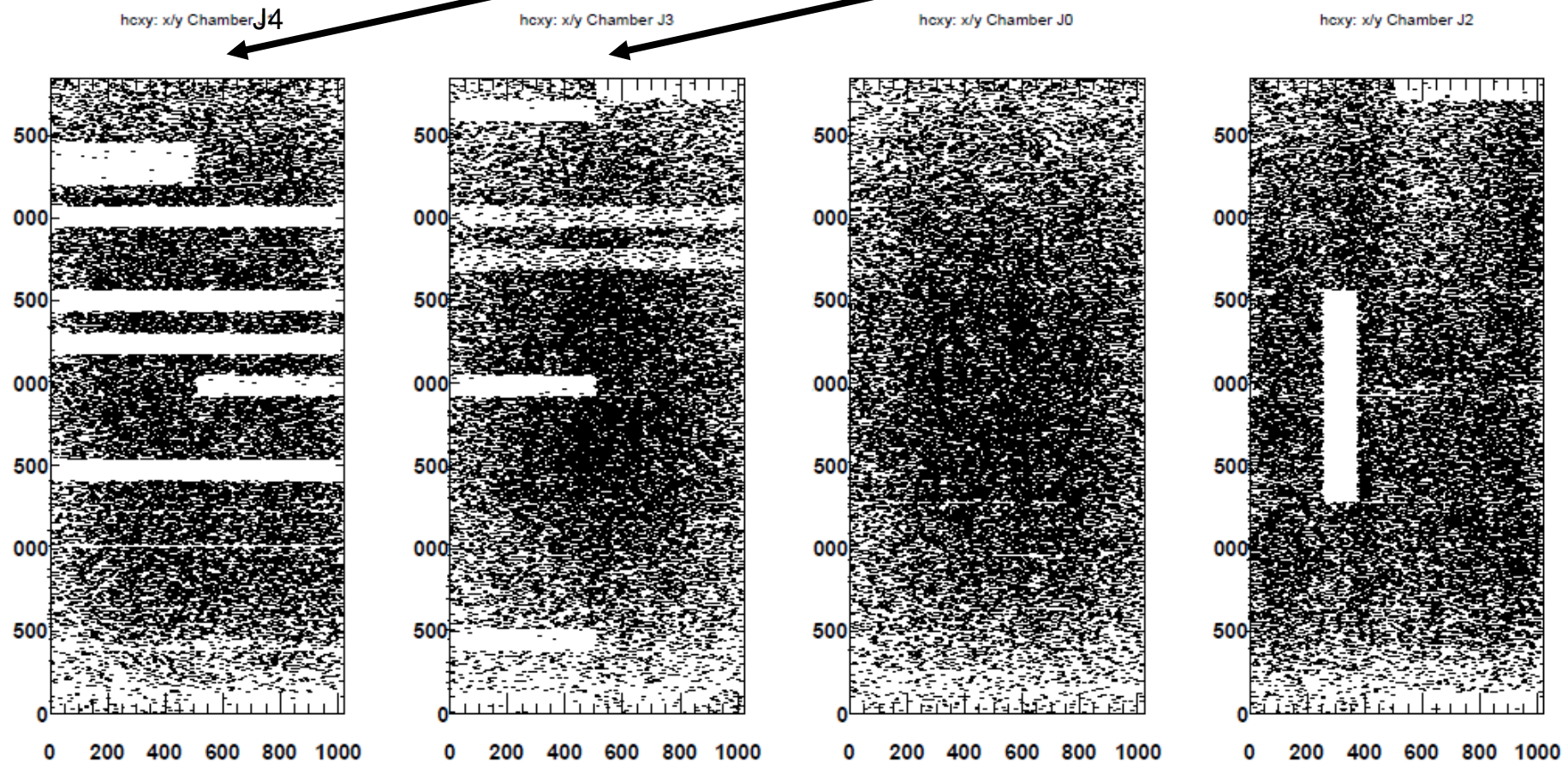
Card on
MPD 14

"missing" / not detected cards

Hit Map (Cosmic run 4607) Oct 8 start

- All top PMTs on

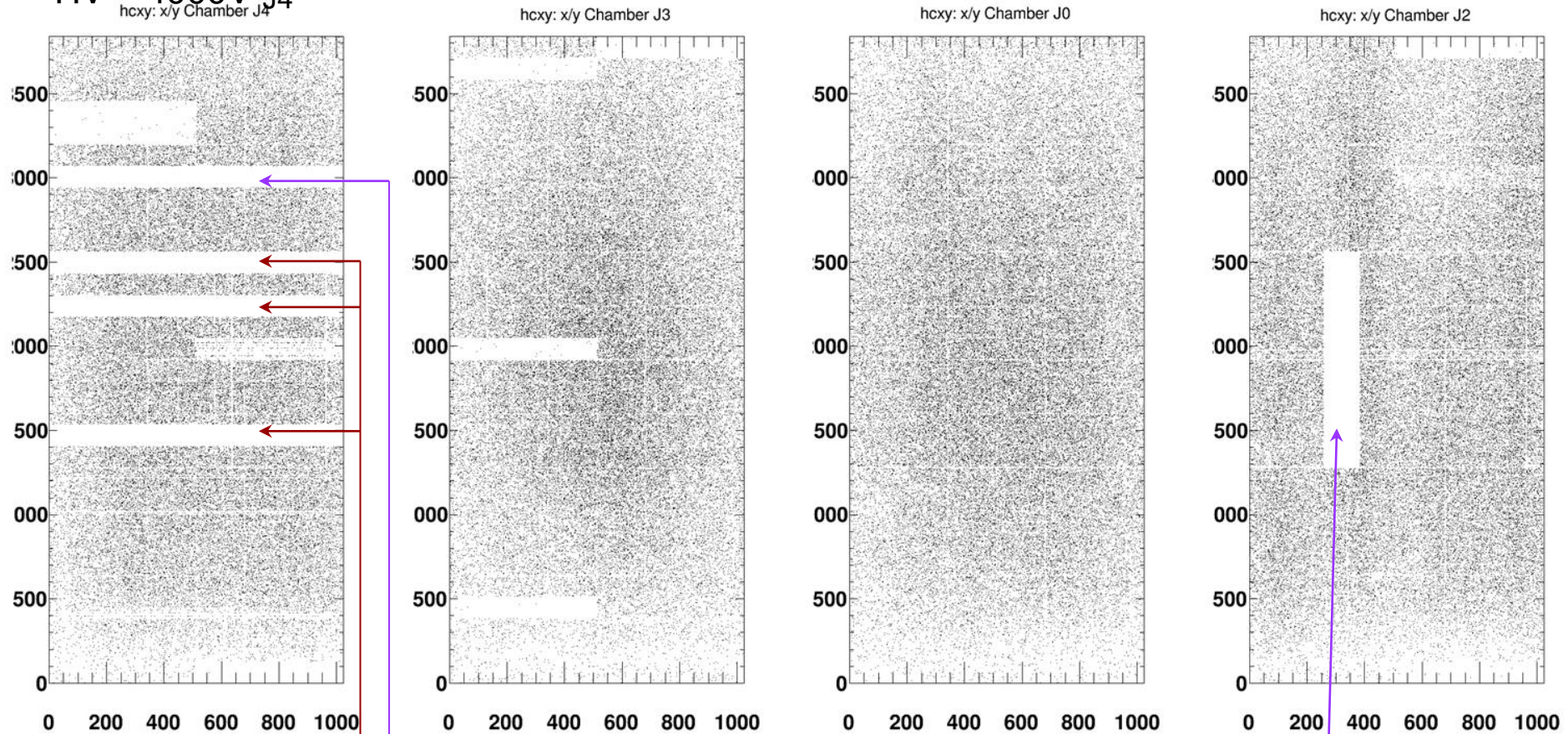
Looks like PMTs working with ~40000 events



Hit Map (cosmic run 4617) Oct 10

(statistics: files _0-40)
gas flow ~ 1/2 of "nominal" values
HV = 4000V J4
hctx: x/y Chamber J4

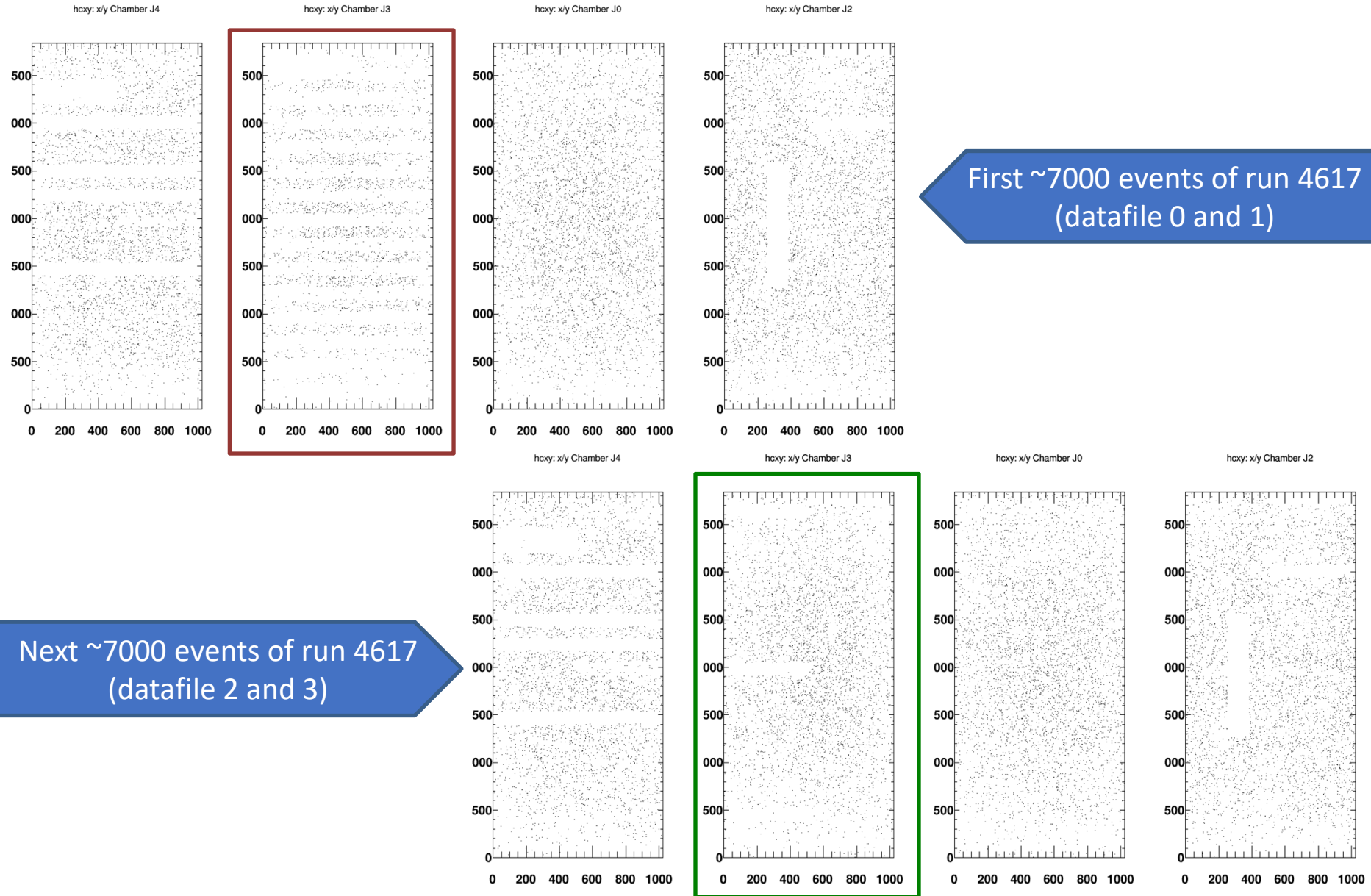
NOTE: use pedestal 4606 at HV=4000 V



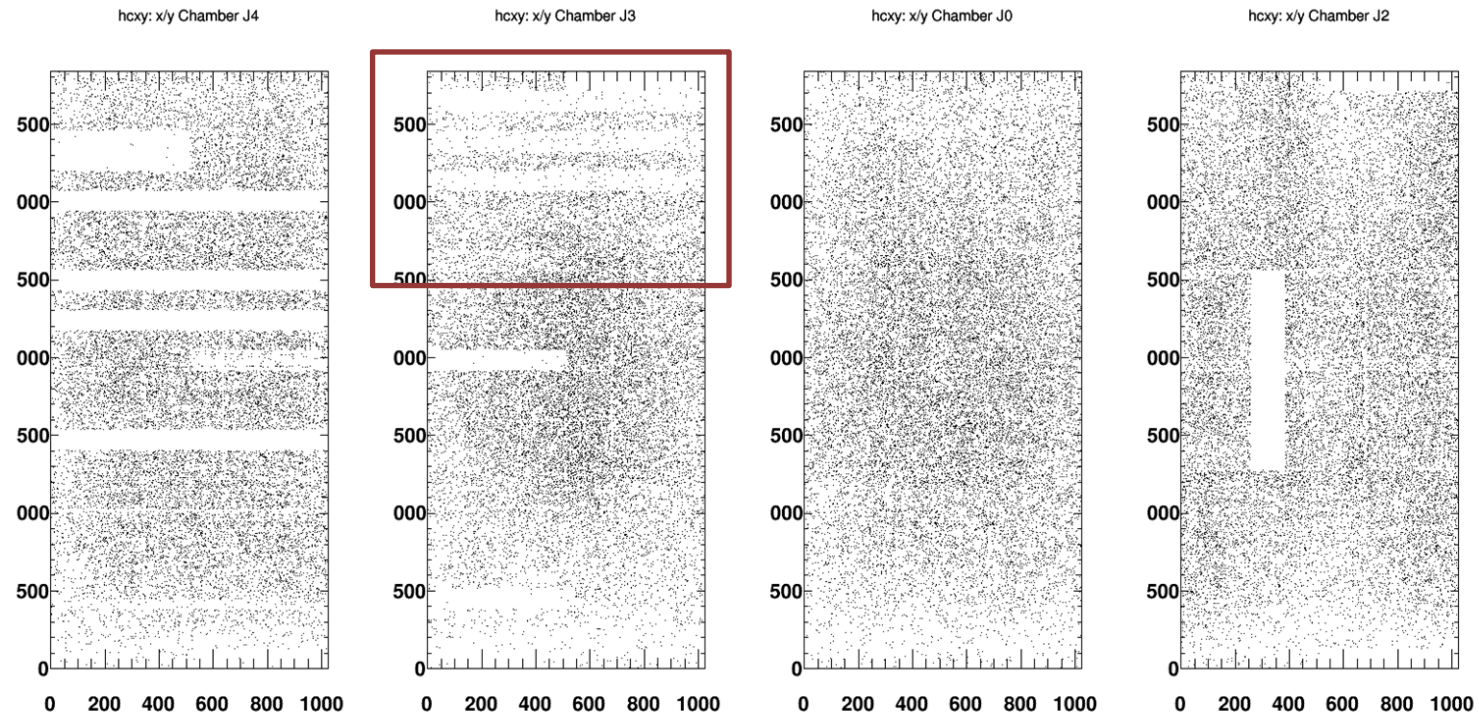
disabled cards in MPD7 —
bad histos, gives timeout
when enabled

“missing” / not detected cards

Cards Readout instabilities on MPD17



Cards Readout instabilities on MPD17



- Card Instabilities likely identical to problem UVA GEM report last week.

What to do next?

- Test if the 2 20m HDMI cables for the first 2 analog inputs on MPD 7 are good by swapping the cables with new ones.
- Analyze and Decode the recent cosmic and HV scan data. Runs 4607-4626. Carefully investigate when the 3 cards on the top layer of J3 appear/disappear during runs.
- Get new cosmic data for HV= 3800 V and 3850 V. Also check for MPD 17 instability, after 0.1 V LV increase
- Replace 2 unrecognizable APV cards on MPD 7 and MPD 14. Ezekiel would first learn how to change APV cards on a mock setup similar to the GEM layer to gain experience.
- Change plastic cable trays to metal cable trays
- Bogdan once to start building the GEM frame in the next few weeks, so talk to Evaristo and Roberto about how to start assembling the frame for just one dummy GEM layer