INFN GEM Update:

Hardware Troubleshooting and Cosmic Data

10/21/20-10/28/20

Ezekiel Wertz (onsite), Robert Perrino(remote), Evaristo Cisbani (remote)
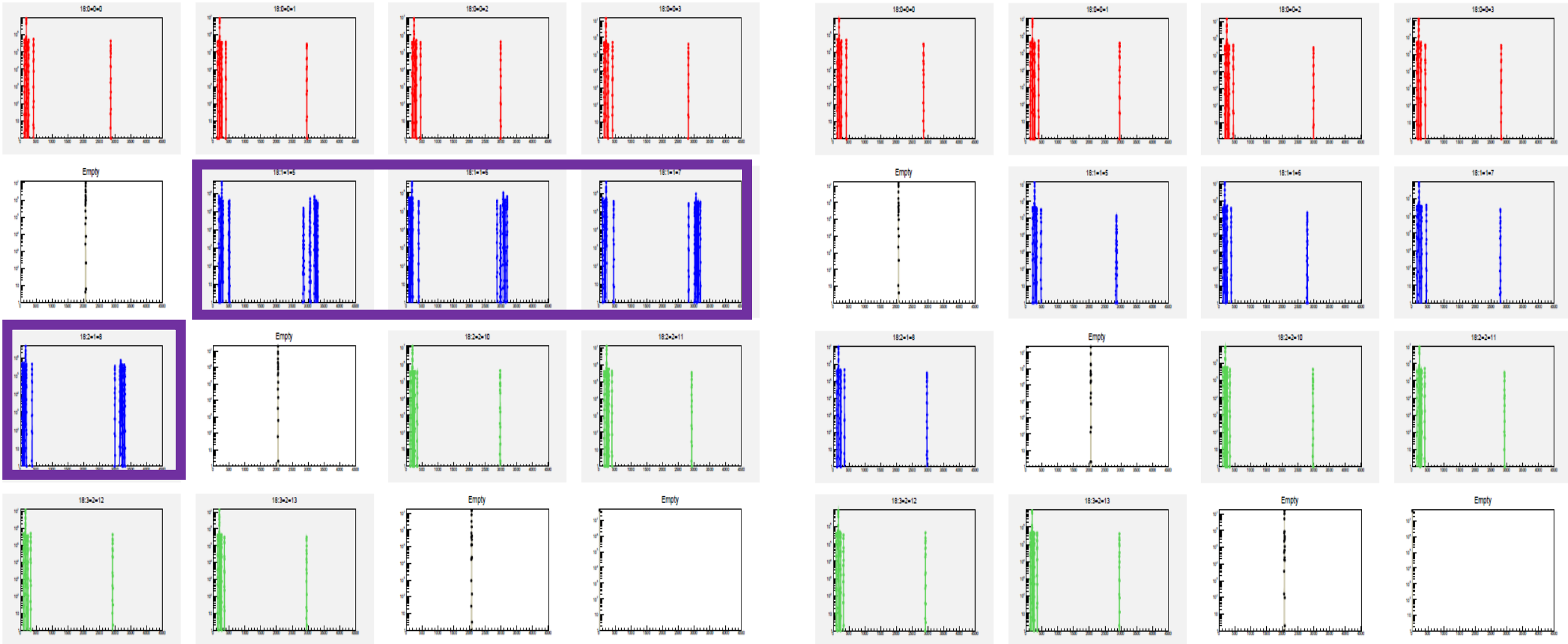
Recent Activities at JLab:

- Hardware, MPD 7 and MPD 18 (Oct. 22)
  - APV cards on second backplane of MPD 18 were noisy, unplugged/replugged short digital HDMI cables fixes issue.
  - Plugged spare backplane into second backplane of MPD 7, shows good LV readout plot behavior. So can conclude the backplane or a few APV cards are the problem on the original backplane.
  - Evaristo sends instructions on how to replace just backplanes near GEM layers. Ezekiel follows instructions, replaces second backplane of MPD 7 with new backplane. One APV card comes off unexpectantly, Ezekiel replaces with new APV card.

- Data Analysis (Oct. 23)
  - Meeting with Andrew to discuss how to make Offline Analysis plots, mainly efficiencies and residuals similar to UVa folks. Will alter code soon and try to make plots from cosmic data taken about 2 weeks ago.

- Hardware, MPD 7, 17, 18 (Oct. 26,27)
  - Checked LV Readout test and second backplane of MPD 7 looks good for all plots after replacement
  - Went to check for CODA errors and event rate was 0 Hz. Talked to Bryan and Ben, turns out the NIM source for the trigger got turned off. Turned it back on and can now use CODA again.
  - Did LV power cycle and unplug/replub short digital HDMI cables at the patch panel for MPD 17 and 18. This seems to fix the LV readout plots
  - Setup rejected module M10, practice replacing APV cards with Kapton fingers.
  - Replace 4th APV card on third backplane of MPD 7. This does not fix issue, so replace backplane itself. This fixes the problems for MPD 7. Run CODA, no errors for MPD 7.

LV Readout Test: MPD 18 Oct. 22

- Readout test before and after unplug/replug of short digital HDMI cables at patch panel

No Change

After unplug/replug of short digital HDMI cables at patch panel
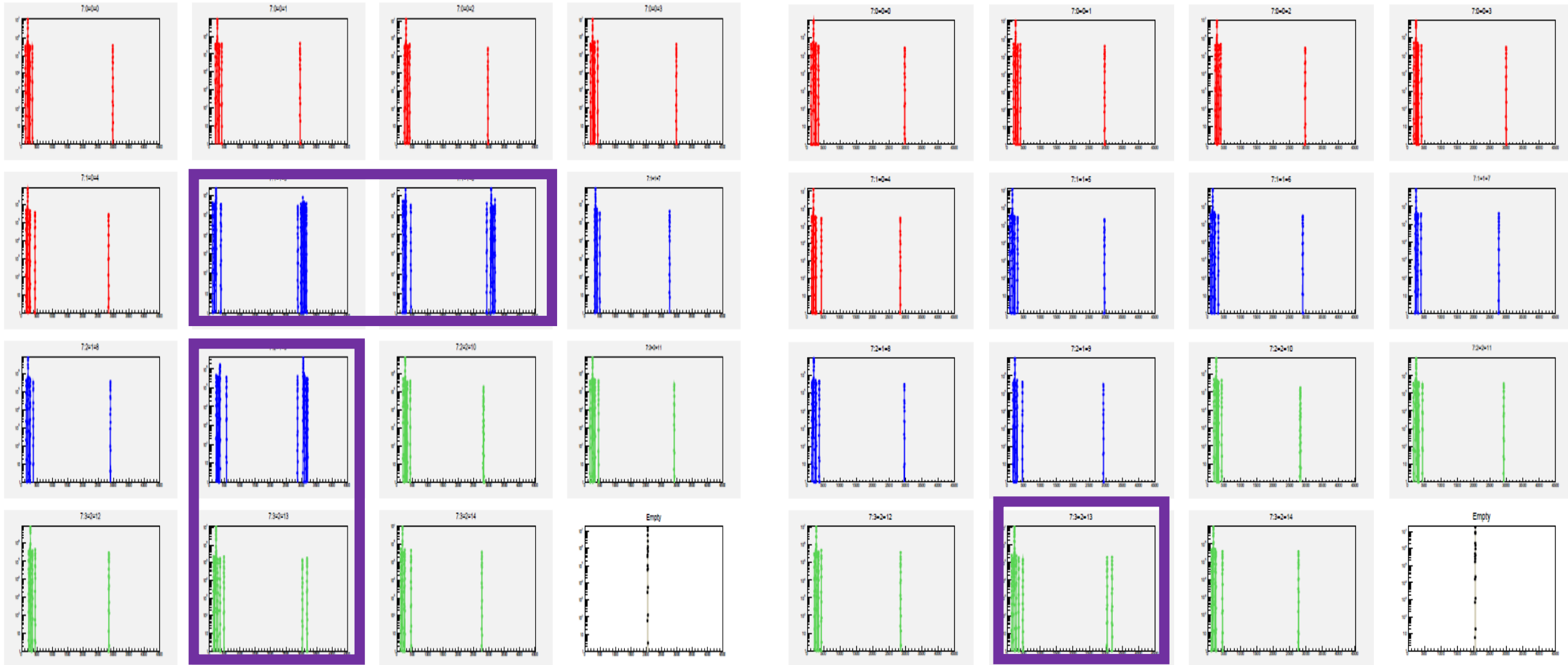
LV Readout Test: MPD 7 Oct. 22

- Readout test before and after plugging in the good spare backplane

Original Second Backplane
(connected to GEM)
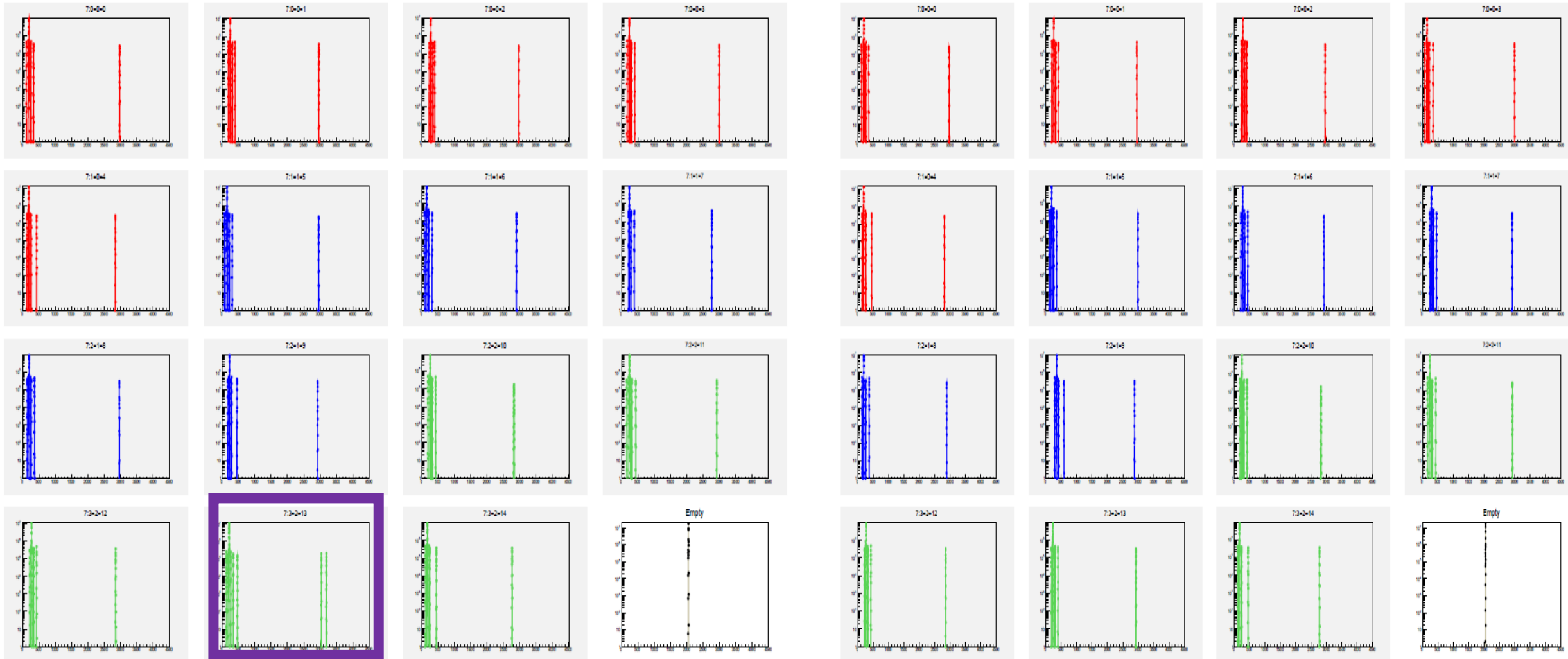
Good Spare Backplane
(not connected to GEM)

LV Readout Test: MPD 7 Oct. 26 & 27

- Replaced both 4th APV card on 3rd backplane and backplane itself. Also ran CODA and no errors for MPD 7
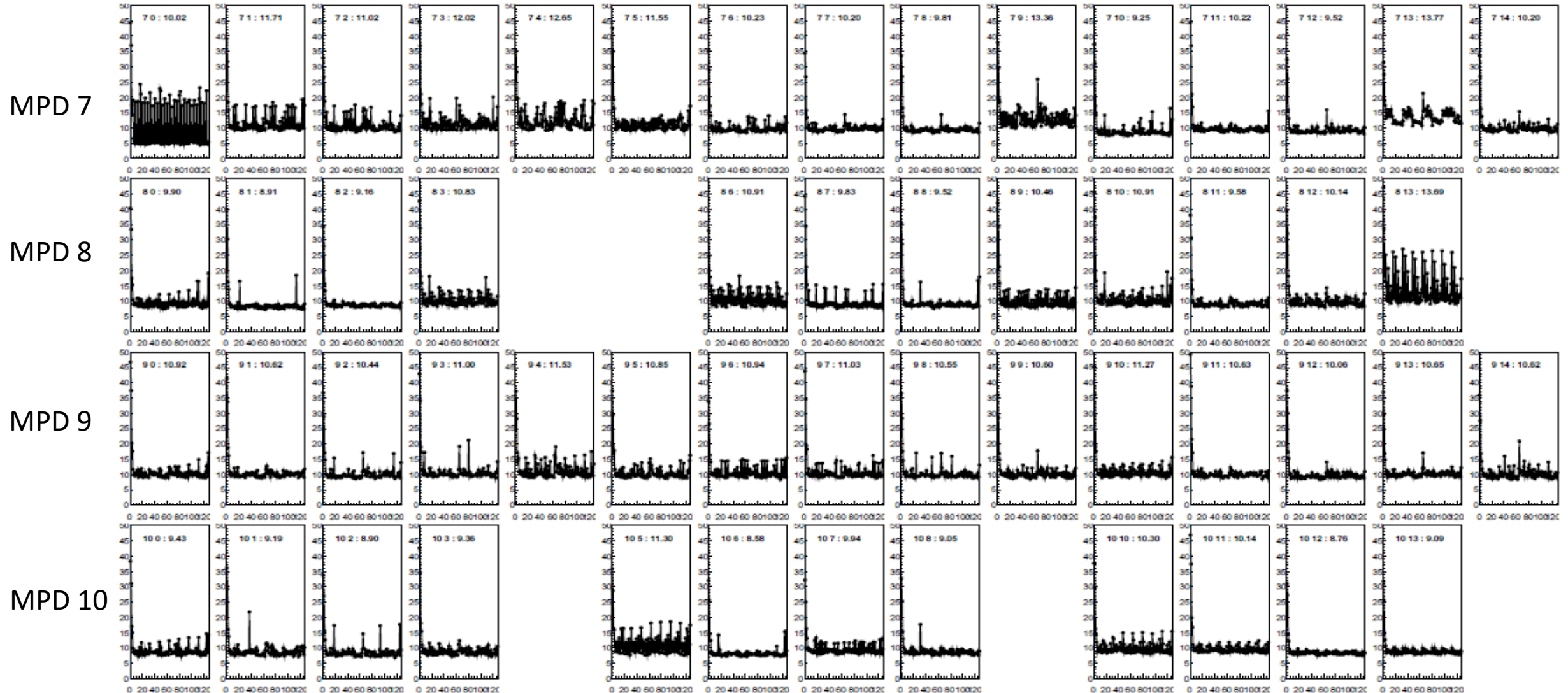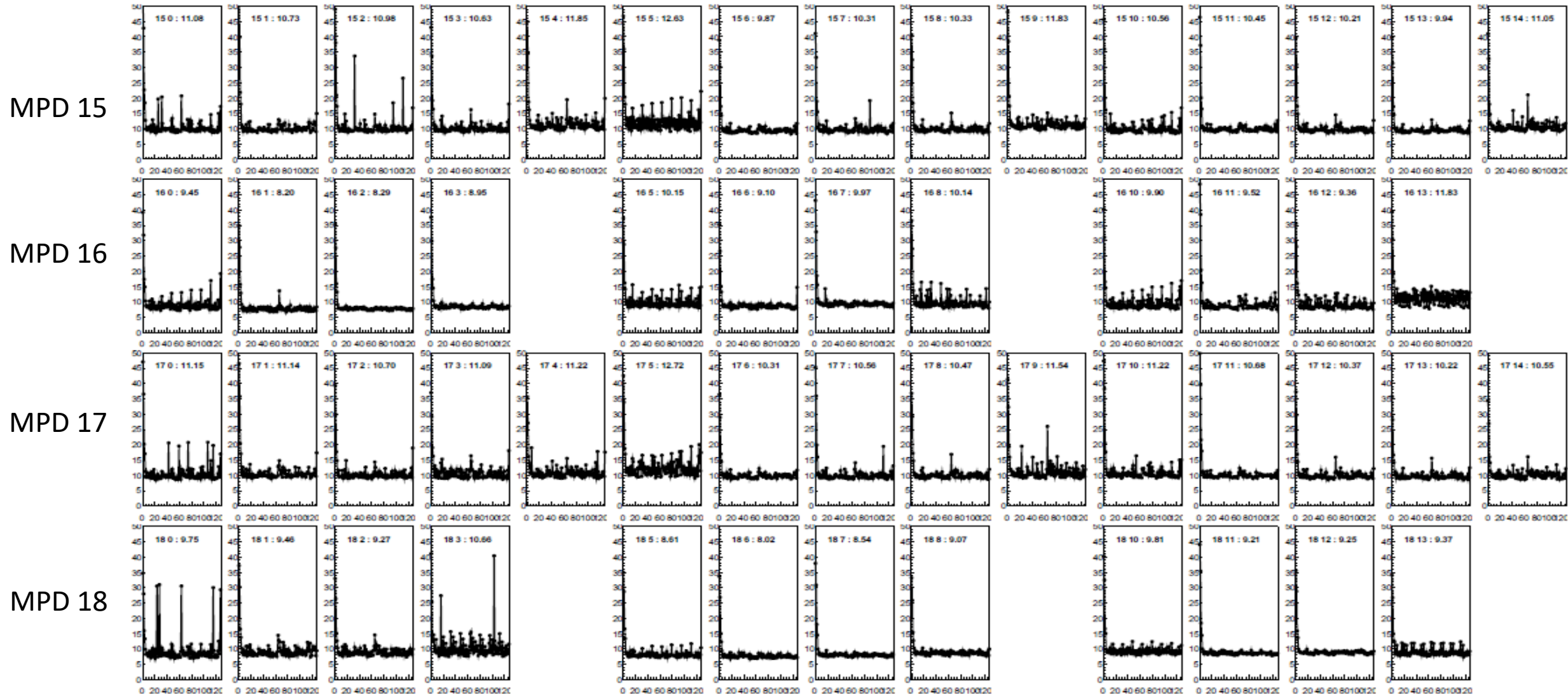
Before

After Replacement

Pedestal RMS, Run 4642 Oct 27, HV=0 V, N2 gas

- Plots for each APV card by MPD on Layer J4.

- All Cards on MPD 7 now present

Pedestal RMS, Run 4642 Oct 27, HV=0 V, N2 gas

- Plots for each APV card by MPD on Layer J3.

- All Cards on MPD 17 and 18 now present

What to do next?

- Replace 1 unrecognizable APV cards on MPD 14. Ezekiel would first learn how to change APV cards on a mock setup for flexible backplanes.

- Get new cosmic data for HV= 3800 V and 3850 V. Also check for MPD 17 instability, after 0.1 V LV increase

- Change plastic cable trays to metal cable trays

- 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

Recent Activities at JLab:

- Hardware, MPD 7 and MPD 18 (Oct. 22)
  - Noticed all APV cards on second backplane of MPD 18 were noisy, unplugged/replugged short digital HDMI cables fixes this issue.
  - Wanted to check spare backplane in second backplane of MPD 7, switched out backplane of spare backplane since it was missing a connector. New spare backplane has all connectors.
  - Plugged spare backplane into second backplane of MPD 7, this shows nominal behavior. So can conclude that either the backplane or a few APV cards are the problem on the original backplane.
  - Evaristo sends instructions on how to replace just backplanes near GEM layers. Ezekiel follows instructions, replaces second backplane of MPD 7 with new backplane. One APV card comes off unexpectantly, Ezekiel replaces with new APV card.

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  - Did LV power cycle and unplug/replub short digital HDMI cables at the patch panel for MPD 17 and 18. This seems to fix the LV readout plots
  - Setup rejected module M10, practice replacing APV cards with Kapton fingers.
  - Accidentally replaced 4th APV card on first backplane of MPD 7 and backplane itself. Probably fine as plots show nominal behavior. Meant to replace things on third backplane.
  - Realized had ordering of backplanes mixed-up, actually replace 4th APV card on third backplane of MPD 7. This does not fix issue, so replace backplane itself. This fixes the problems for MPD 7. Run CODA, no errors for MPD 7.