

INFN GEM Update:

Hardware Troubleshooting and Cosmic Data

10/14/20-10/21/20

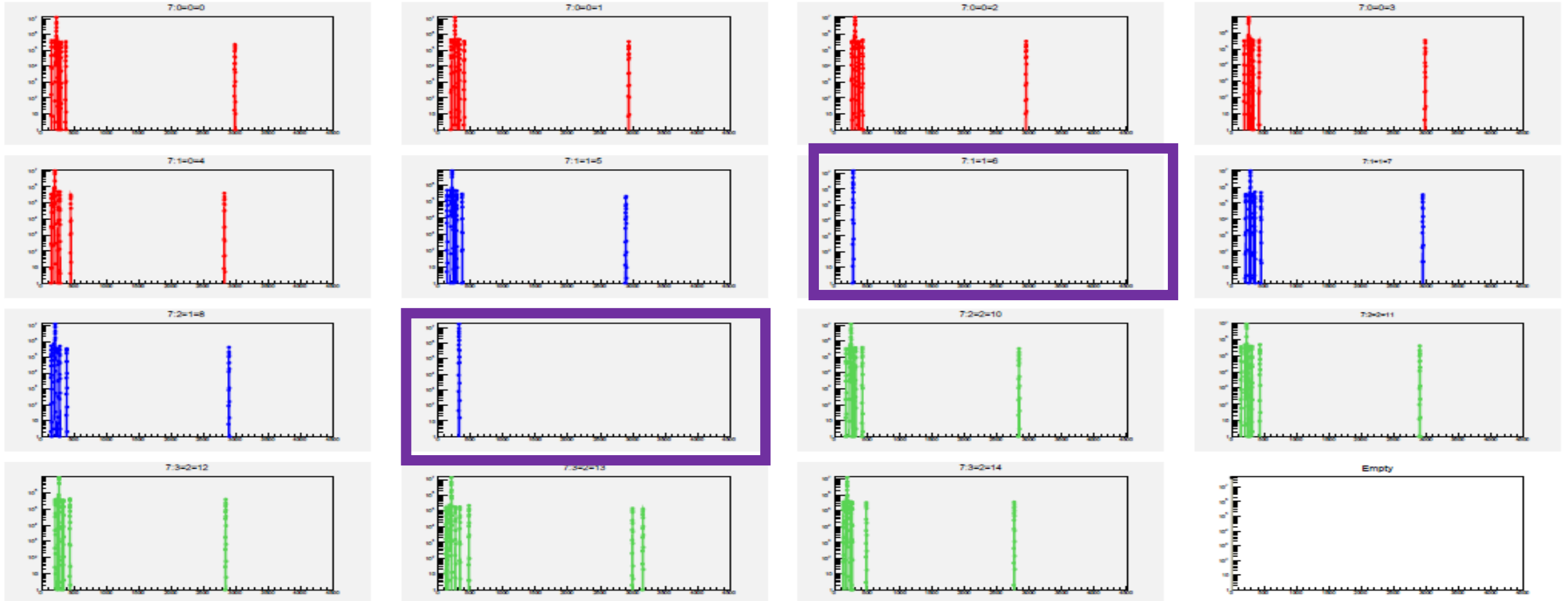
Ezekiel Wertz (onsite), Robert Perrino(remote), Evaristo Cisbani (remote)

Recent Activities at JLab:

- Data Analysis (Oct. 14-15):
 - Decoded the recent cosmic and HV scan data. Runs 4607-4626 or about 785 .dat files (2.5 million events)
 - Analyzed Hit Map data, stepped through by increments of 10 .dat files to investigate transition when J3 loses APV cards. Still need to understand the cause of this issue
- Hardware, Lots of work to fix issues with MPD 7 (Oct. 15, 19):
 - Switched/Replaced long HDMI cables
 - Replaced MPD 7 and swapped MPDs 7 and 6 (MPD 6 is good), problem is not with MPD itself
 - Spare MPDs in the INFN Clean Room are labeled “Bag Digital Control Bus” by Jlab Electronics. Paulo Musico knows about the label, but is not sure what it’s referring to
 - Many iterations of replacing HDMI cables and patch panels for both the analog and digital case
 - Current conclusion is that either the second backplane or a few APV cards are bad and need replaced

GEM readout Test: MPD 7 Oct. 15

Best Low Level Readout Test so far

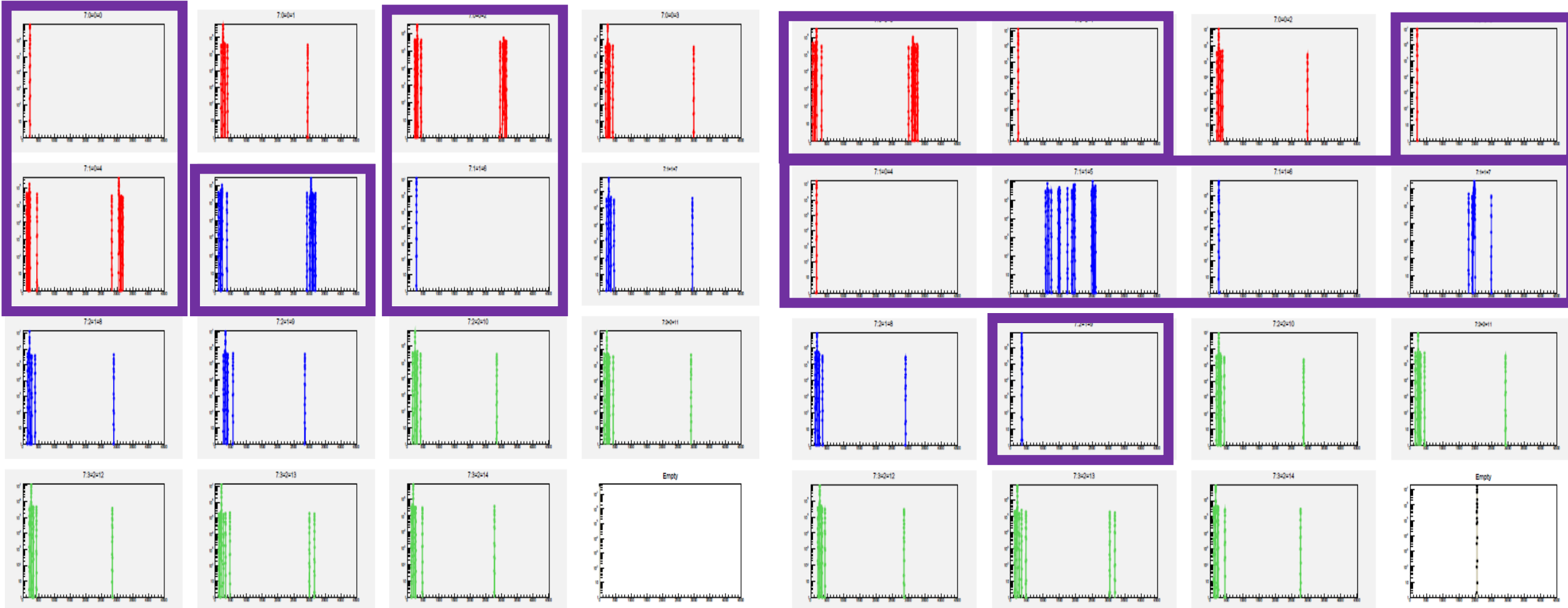


GEM readout Test: MPD 7 Oct. 19

- Thought MPD itself was the problem so replaced MPD 7

Before New MPD 7

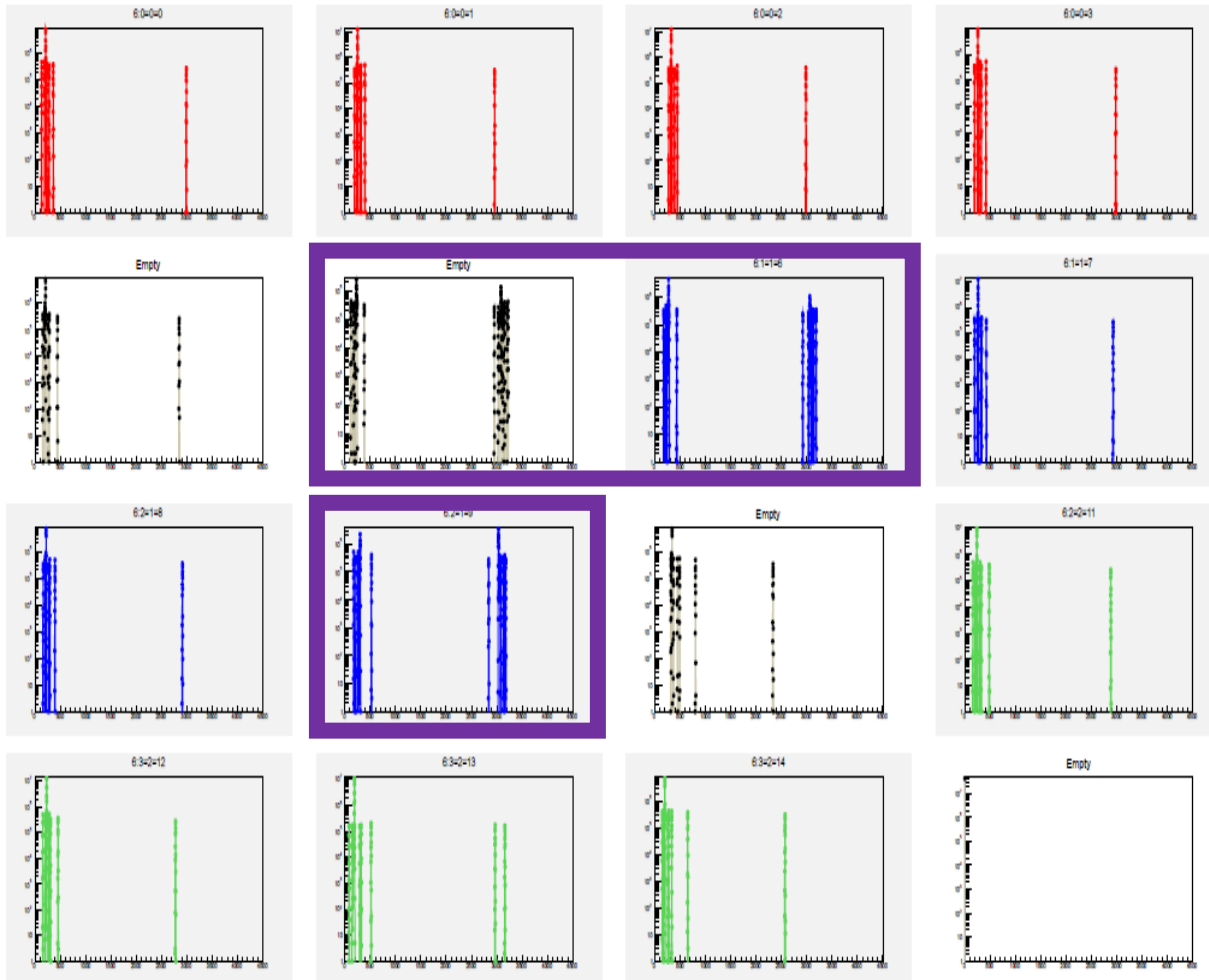
After MPD 7 is changed with spare
MPD



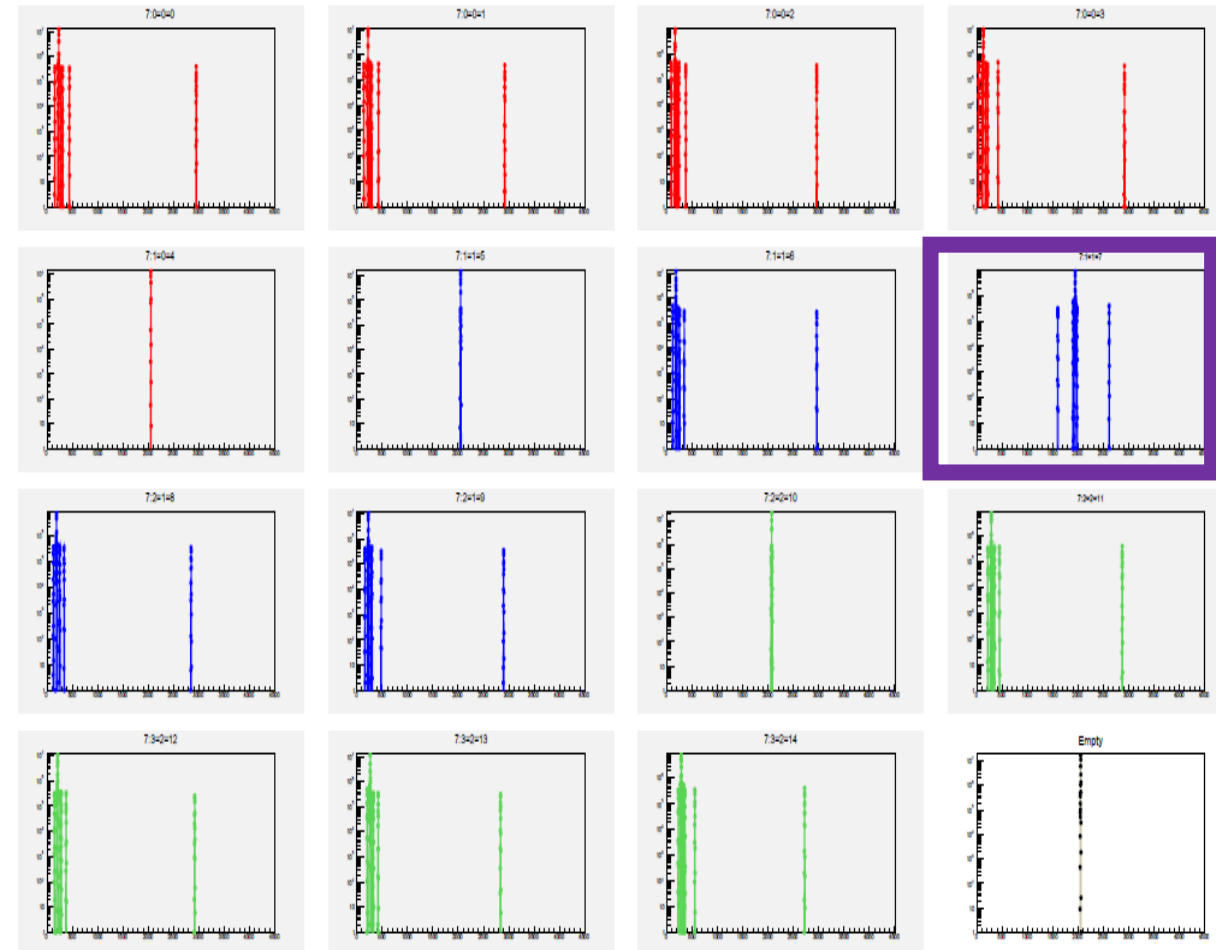
GEM readout Test: MPD 7 Oct. 19

- Wanted to be sure new MPD 7 is not a problem so switched HDMI cables with good MPD 6
- This shows MPD is not problem

MPD 6 with MPD 7 electronics

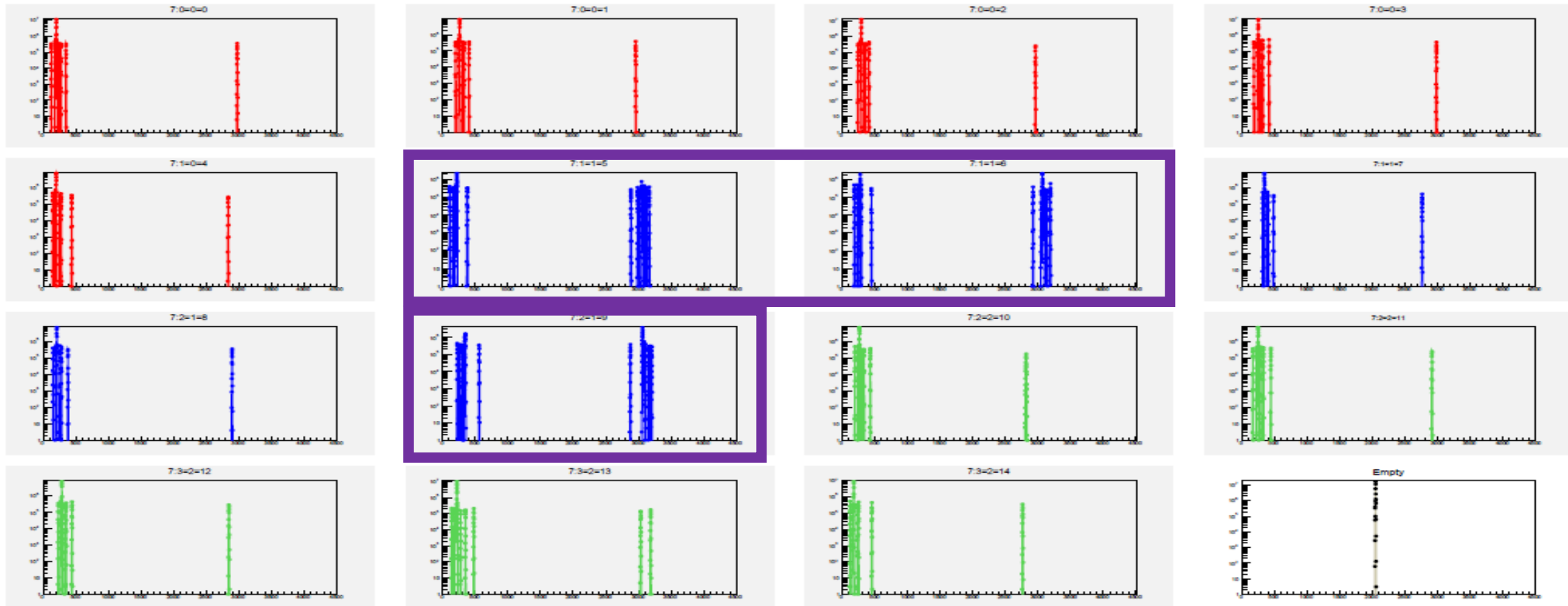


MPD 7 with MPD 6 Electronics



GEM readout Test: MPD 7 Oct. 19

- Current readout test after swapping back cables between MPD 6 and 7, multiple checks with replaced path panels, replaced short cables. The resolution was verifying the connection for the short digital cable for the first backplane.
- Last option to test is replacing the second backplane or some of the APV cards



What to do next?

- Fixing Main cards/backplanes:
 1. Check digital cables for second backplane of MPD 18, looks very similar to recent MPD 7 issue
 2. Take spare backplane with APV cards and connect in place of the second backplane of MPD 7, double-check the GEM Readout test
 3. Figure out what to do with second backplane of MPD 7 based from spare backplane check
- 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
- 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