Test lab update

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Fastbus ADC specification

- LeCroy 1881M Module - Can take 64 inputs (can be configured for input impedance)
- 13-bit resolution above pedestal (V965 -12 bit)
- 50 fc/count (V965 - 25 or 200 fc/count)
- Gate - 50 - 500 ns
- Conversion time: 12 (9) μs/64 channel for 13 (12)-bit resolution (5.7 μs/16 channel)

Fastbus adc is good for our requirement

GEM-4 Problem

- Connection showing in red introduces very small (~5pF) in series with the GEM foil (~6 nF)
- This is board problem!!
- The two segments of the bottom most foil (near to the readout) are connected.
- Purge nitrogen for one day. Applied HV (-4.2 kV) in nitrogen environment.
- Purge Ar-Co2 for one day and applied HV (-4.0 kV).
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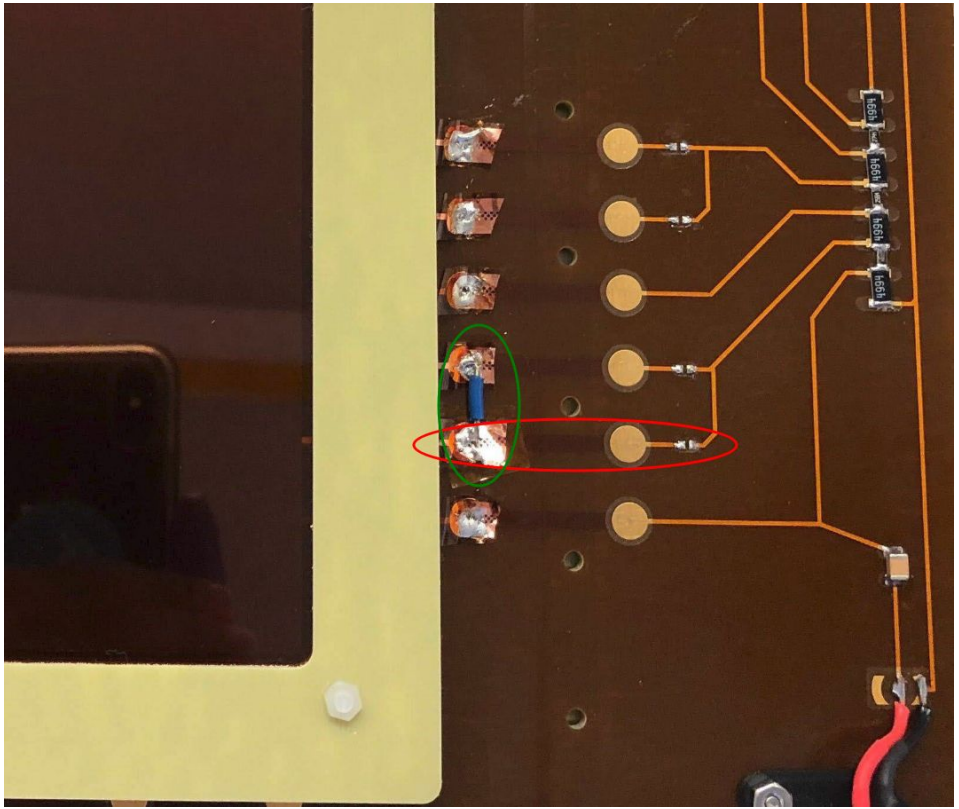
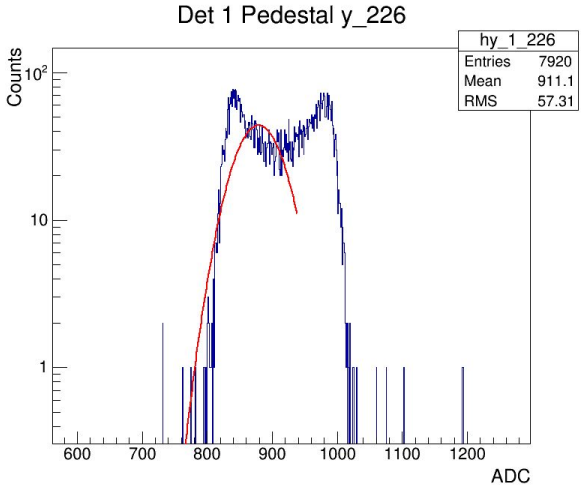
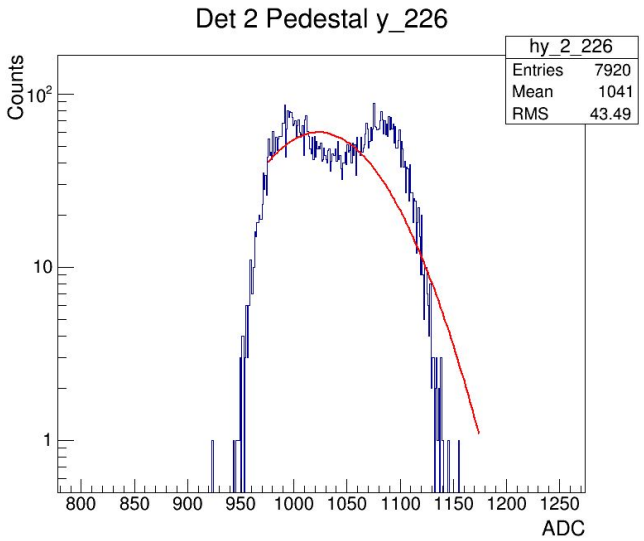
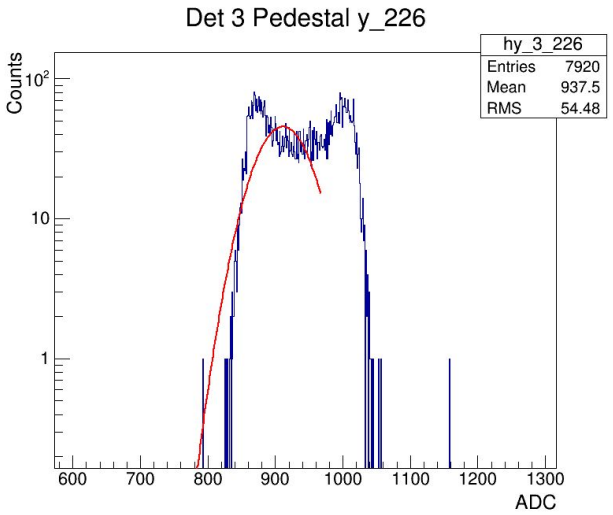


Pedestal problem

With Bob's VME crate



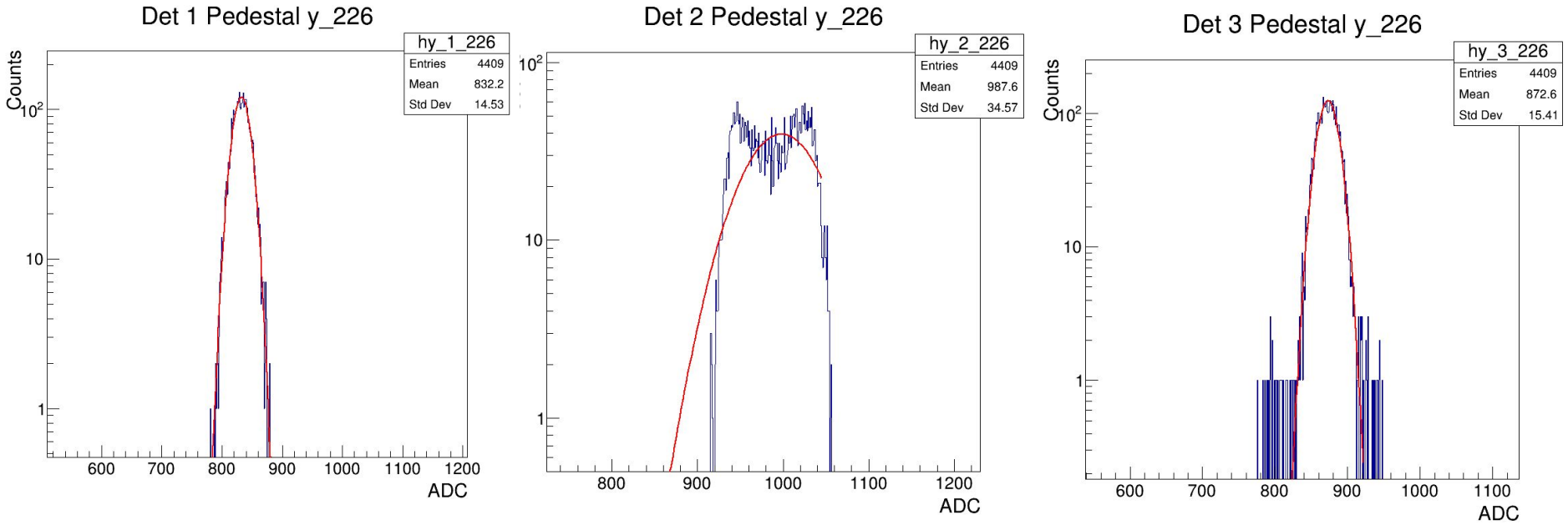




Changed HV unit channels, LV power supply, APV ground connections, different power port. But nothing helped

Pedestal problem

Change the VME crate: Used ISU crate

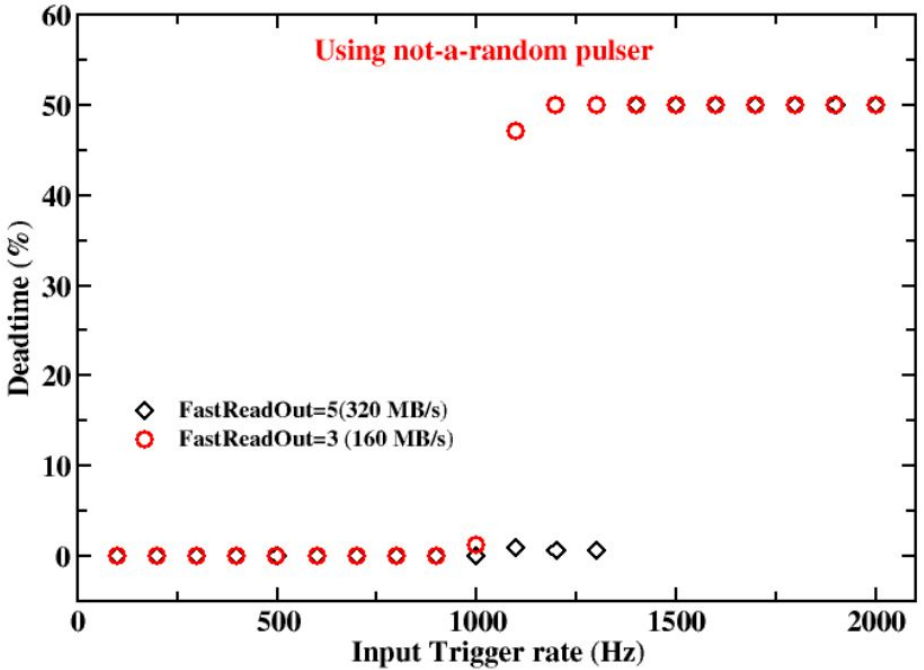


- Tried HV swapping - didn't help
- Will swap APV card and MPD channel and test - If not improved - could be the board problem

Deadtime issues

- The ISU DAQ was connected with 1GB ethernet switch, the SBU DAQ was connected to a router (300 Mbps)
- The ‘daq3’ computer has some problem (may be with OS or network card) - tested with standalone data transfer program (can go upto ~13 MB/s).
- The DAQ is tested with another computer (sbs1.jlab.org) - it reaches upto 1 kHz event-rate without losing data.

Using 18 APVs (12+6) and with two MPDs



Ryan did this measurement

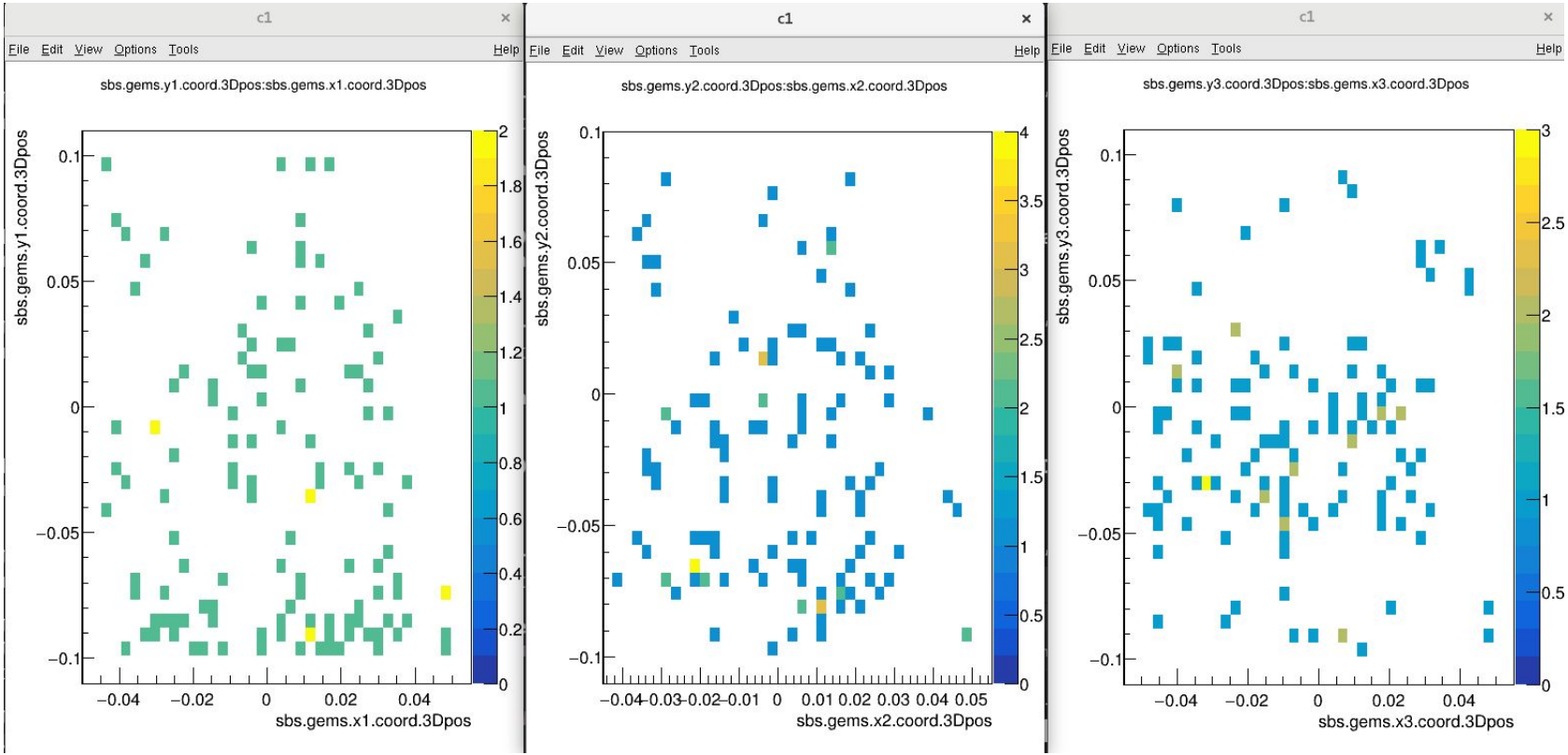
Trigger rate estimation based on data processing time (6 samples/strip)

- With FastReadout=5 (320 MB/s): The busy signal ~ 760 μs
  - MPD data processing ~ 450 μs
  - MPD data readout ~ 178+94 = 272 μs ~ 15 us/APV data reading
  - Data rate ~ 53 MB/s (for 1 kHz trigger)
- For 84 APVs: Readout = 15*84 = 1260 μs
- Busy signal ~ 1260+450 ~ 1700 μs ~ Trigger rate ~600 Hz
- At 600 Hz, data rate ~ 150 MB/s (beyond transfer capability (max 100 Mbps) network cable!!) - we have to use at least two crate if we readout 84 APVs without zero-suppression
- For 100 Mbps - two crates (having 42 APV cards in each) - maximum trigger rate can be achieved = 100/(42*768*32/(8*1024^2) ~ 800 Hz
- For 42 APV cards, the busy signal would be ~ 15*42+450 = 1080 μs ~ trigger rate ~925 Hz

Even for two crates the bottleneck is the data transfer rate through network cable, not the DAQ

TreeSearch

- Implemented individual strip pedestal subtraction, common-mode-noise calculation



- Hit reconstruction efficiency is very bad (123/2000). Now debugging this