

INFN GEM Chambers – 14/Nov/2018

Report on ongoing GEM Commissioning

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Roberto, Evaristo, ...

Latest activities:

- Fix issues emerged in October cosmic test
- Found curious electrostatic effect due to a chair
- Taken new cosmic runs to test adopted solutions

- Two-wire soldering in MPDs (and loaded new firmware) started: will permit to read back the APV-cards configuration. ~20 MPDs reworked so far

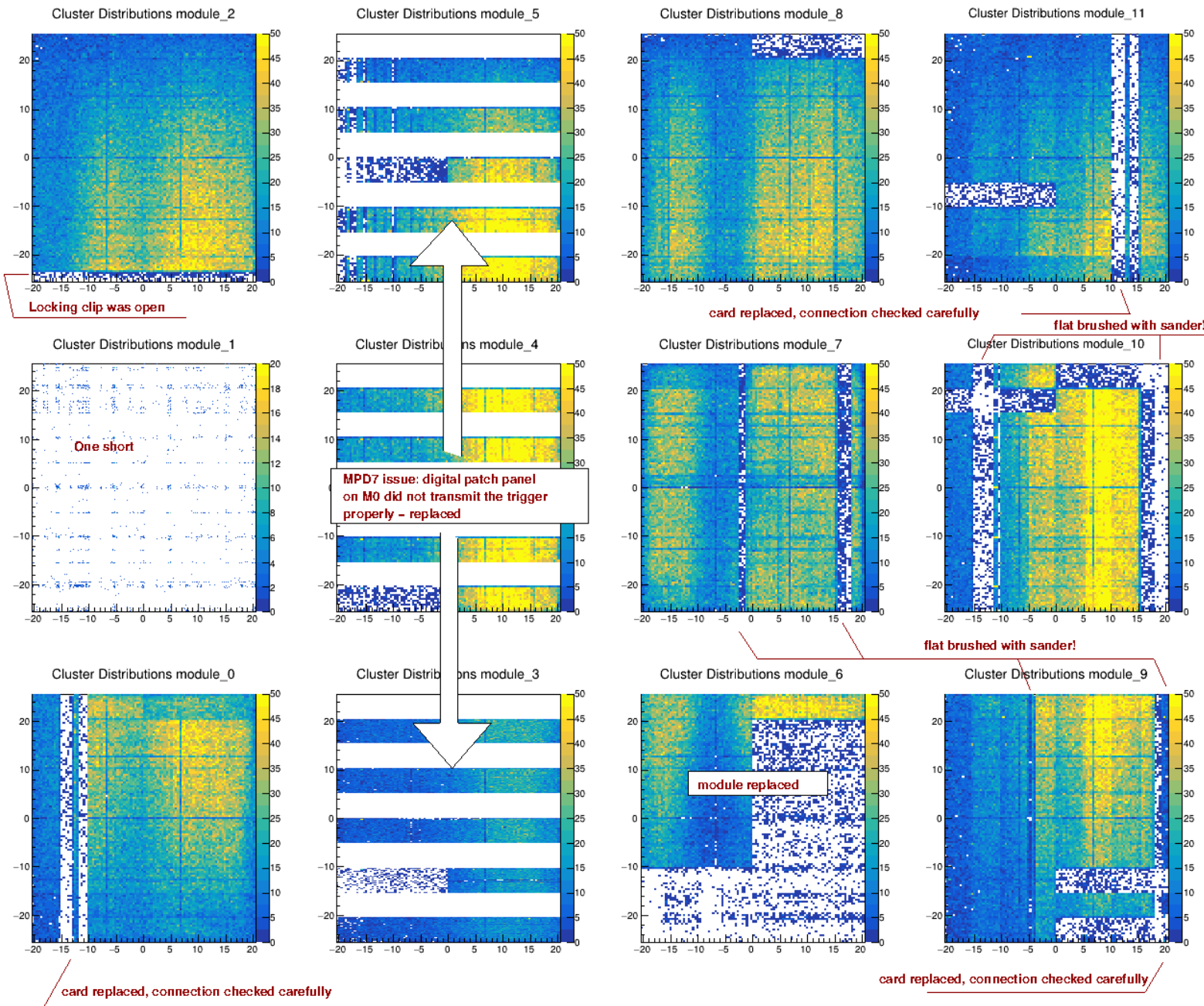
- First look at the BigBite front GEM frame

Cosmic Setup (4 chambers = 12 GEM modules)



GEM Hit Map – end of October/2018

BigBite Front Gem – As of end of October/2018



Main issues

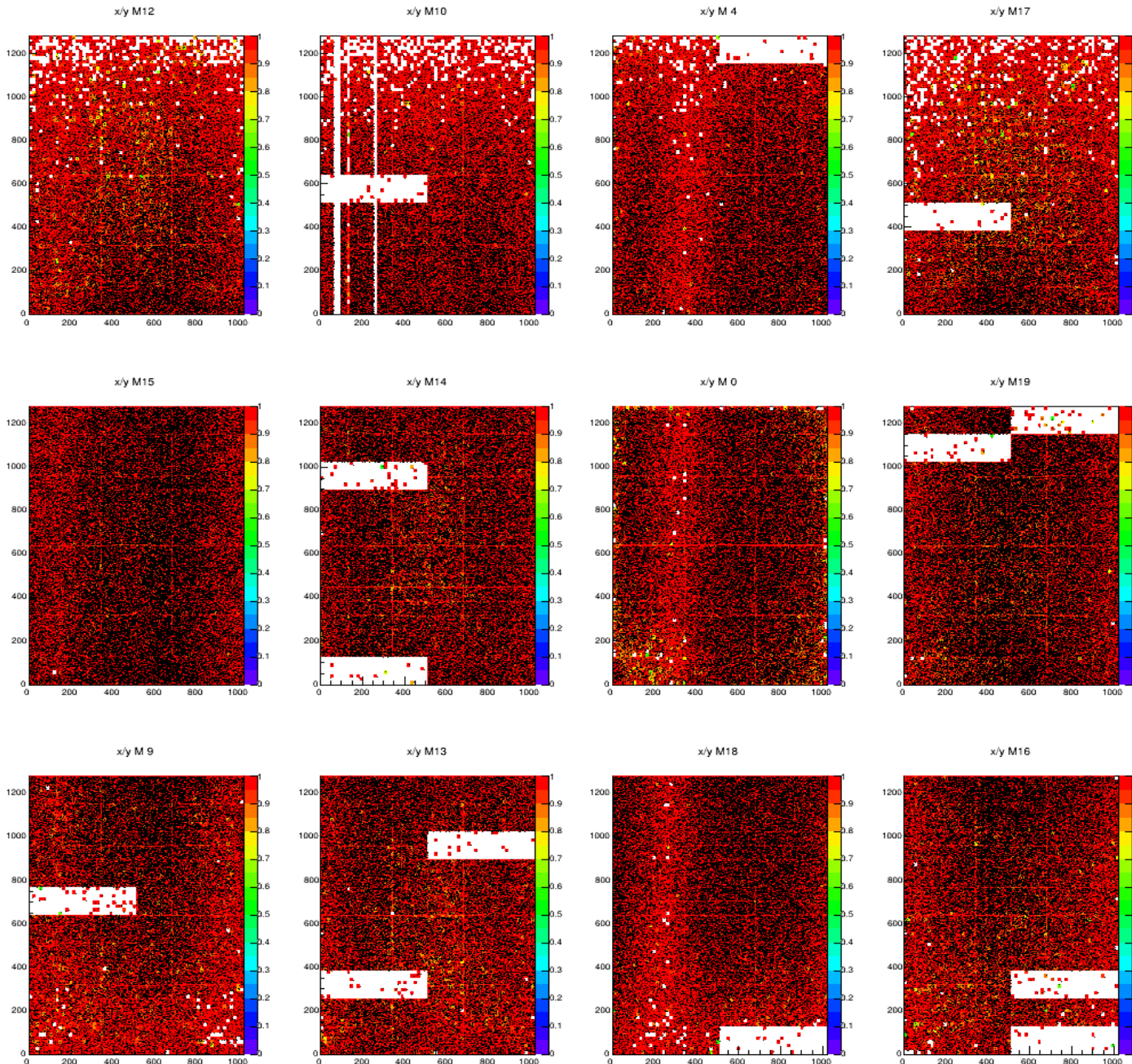
Apparent MPD7 problem causing half of chamber J1 being off

(Vertical) blank bands

Puzzling, partially dead GEM module_6 (J2M0)

Short in one GEM module_1 (J0M1)

GEM Hit Map – 13/Nov/2018



Solutions

Apparent MPD7 problem causing half of chamber J1 being off
bad trigger distribution in a digital patch panel - replaced

(Vertical) blank bands
Flex strip terminals brushed and reconnected into ZIF with additional care

Puzzling, partially dead GEM module_6 (J2M0)
Module replaced (but source of the problem remains unclear)

Short in one GEM module_1 (J0M1)
protective resistor identified and removed; modules in J0 reorganized

GEM Hit Map – chamber view

x/y Chamber J0

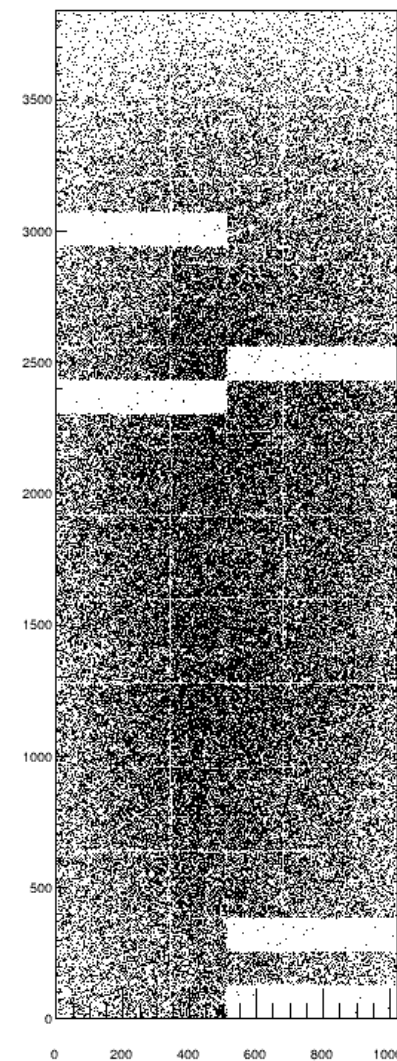
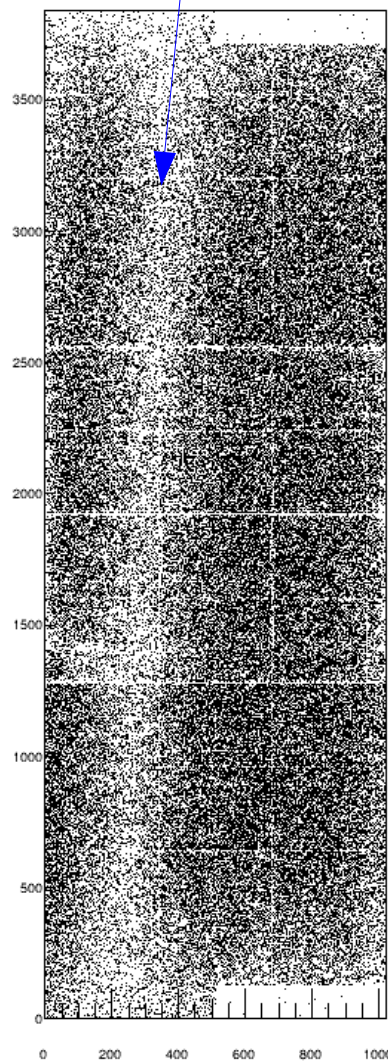
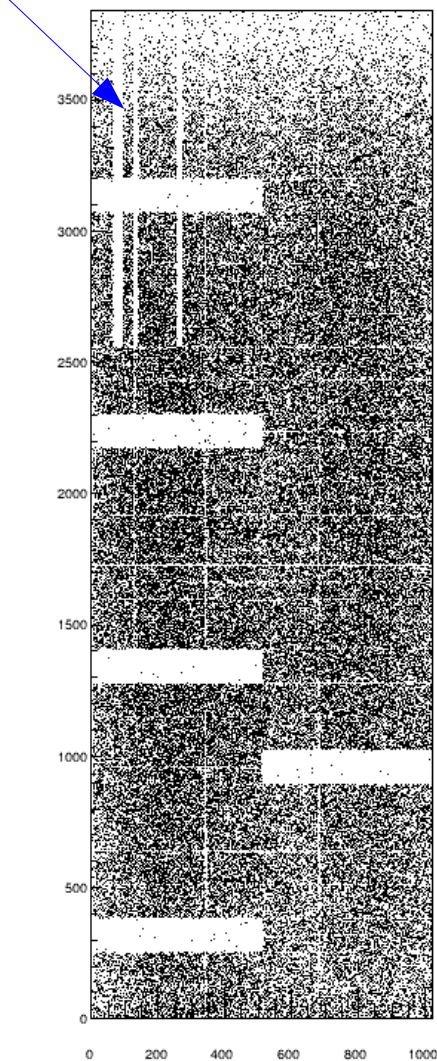
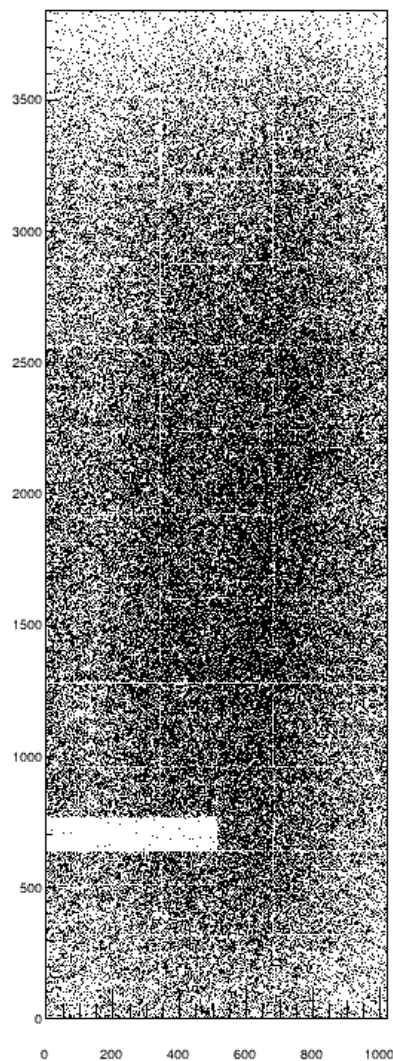
x/y Chamber J1

x/y Chamber J2

x/y Chamber J3

Strip paths likely damaged, need closer inspection

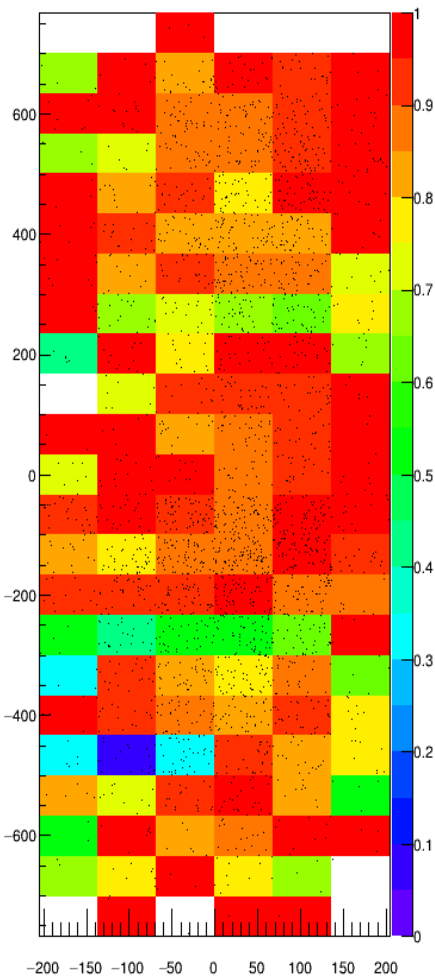
Trigger Acceptance (one scintillator off)



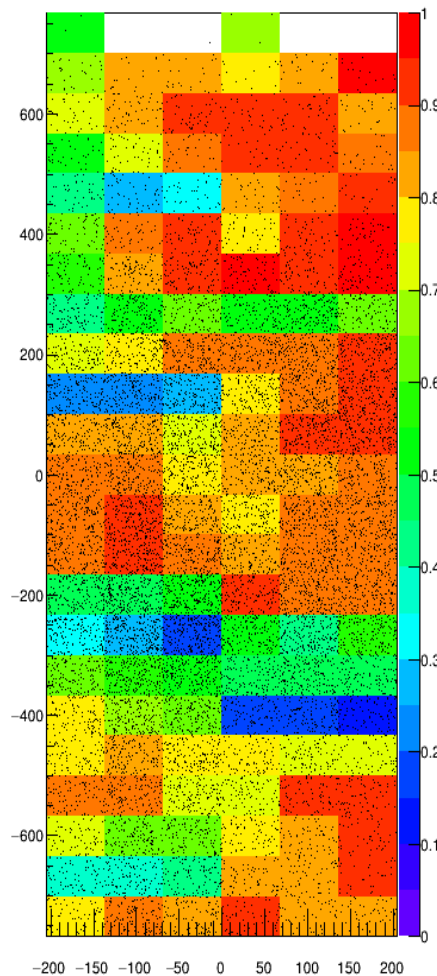
White sectors have shorts; they cannot be recovered (as far as we know)

GEM Efficiency – preliminary!

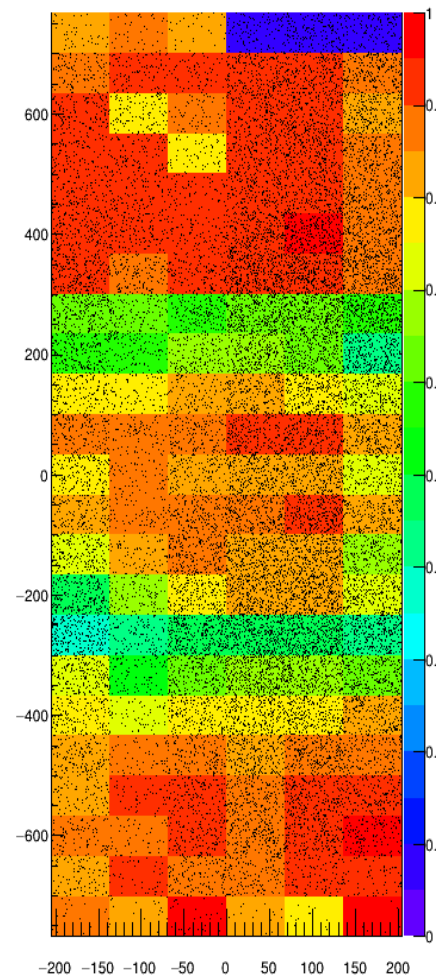
Efficiency: matched/reco hits in J0



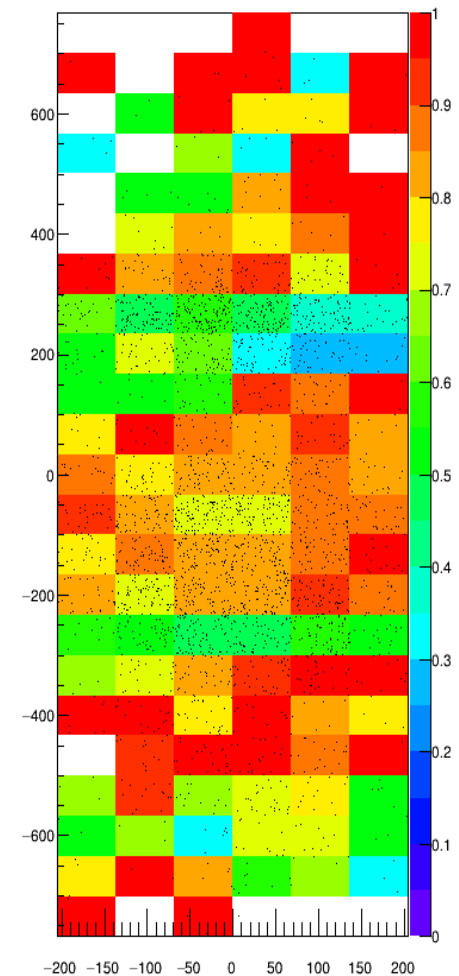
Efficiency: matched/reco hits in J1



Efficiency: matched/reco hits in J2



Efficiency: matched/reco hits in J3

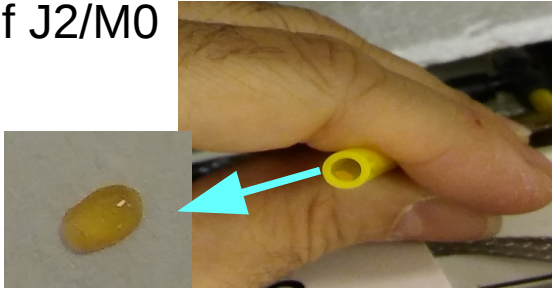


HV = 4000 V (effective 3955 V)
Gas Flow ~ 140 ccpm/chamber
Statistics ~ 150 kevents

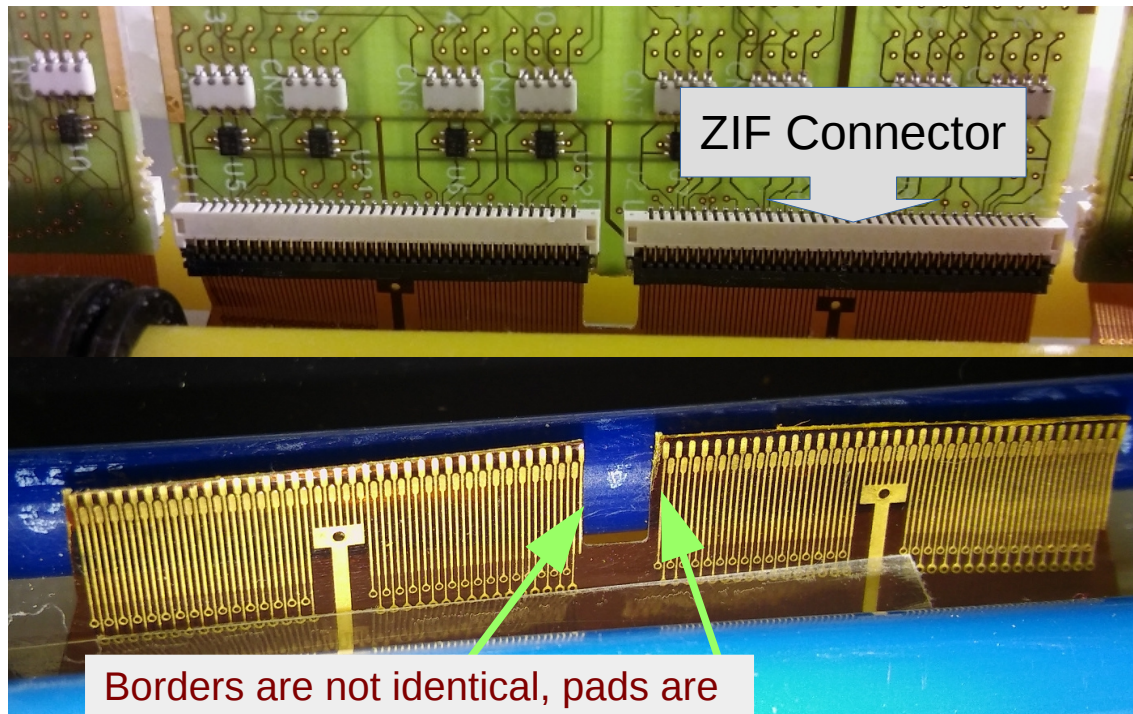
Manual course alignment, no HV tuning
Condition: Hit Position Residual < 3 cm

Issues discovered during fixing

Intruder in the gas pipe
of J2/M0



Some flat terminals not properly cut



Borders are not identical, pads are not centered into ZIF connector. (Larger border brushed, need additional care when inserted)



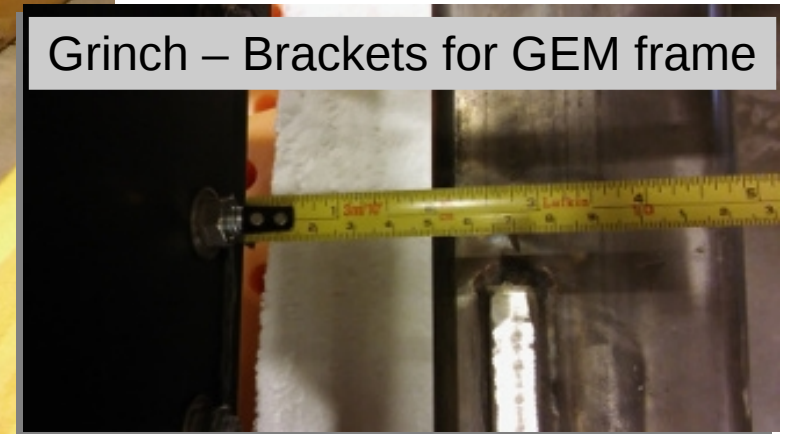
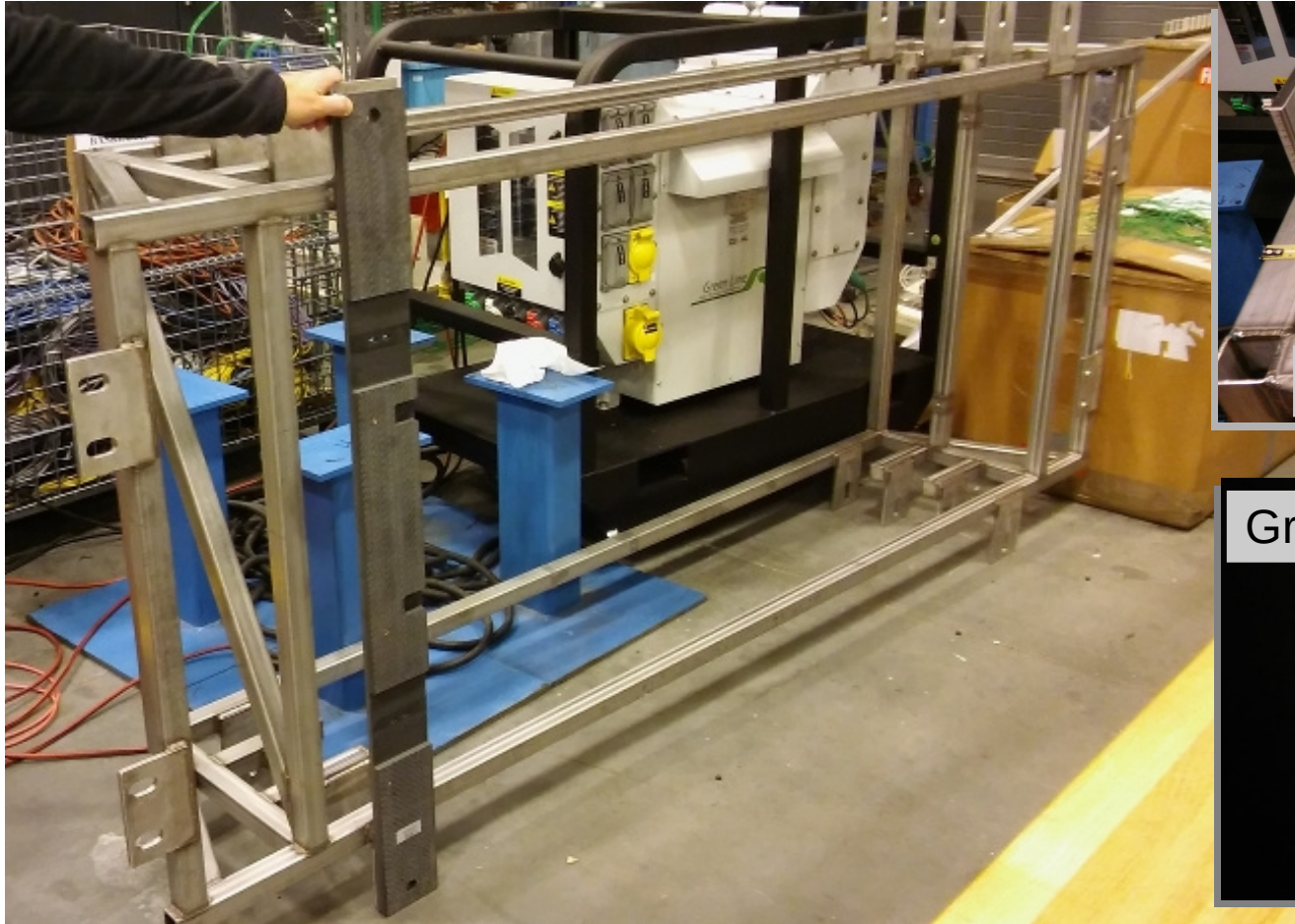
Curious electrostatic effect:
when seat on the above chair, rub a little bit, and then stand out, the DAQ starts showing messages like:

... MPDx ... buffer empty

Need to stop the run and then restart to cure (no APV configuration required)

Well reproducible effect (basically from any location in the room)

BigBite Frame



First impressions after closer look at the BigBite frame for the front-tracker:

- integration and cabling/piping of the GEM chambers look very tricky!
- space between frame and GRINCH (~6.5 cm), where the last chamber shall seat, is not enough (should be ~13 cm at least)
- the last chamber is critically exposed

Remarks and Plan

- Chambers response significantly improved ... *As Much As Reasonably Achievable (AMARA)*
- DAQ/Electronics looks pretty stable excepts few “segmentation fault”, “EB1-disconnect” and data frame corruption issues
- Short Term Plan (Paolo Musico and Leo Re coming tomorrow):
 - Test reworked MPDs (and other electronics improvements)
 - Continue cosmic “stress” tests and consolidate analysis (with UVa support)
 - Complete two additional modules by end November (in Italy)
- Possibly replace worst modules in Feb/2018
- Investigate integration issues of chambers into BigBite frame