INTEGRATION TEST of the VMM3a in a GEM-TPC in TWIN CONFIGURATION

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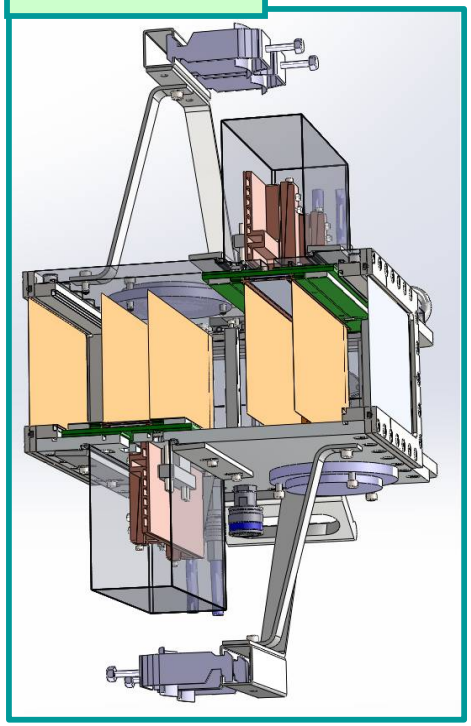
OUTLINE

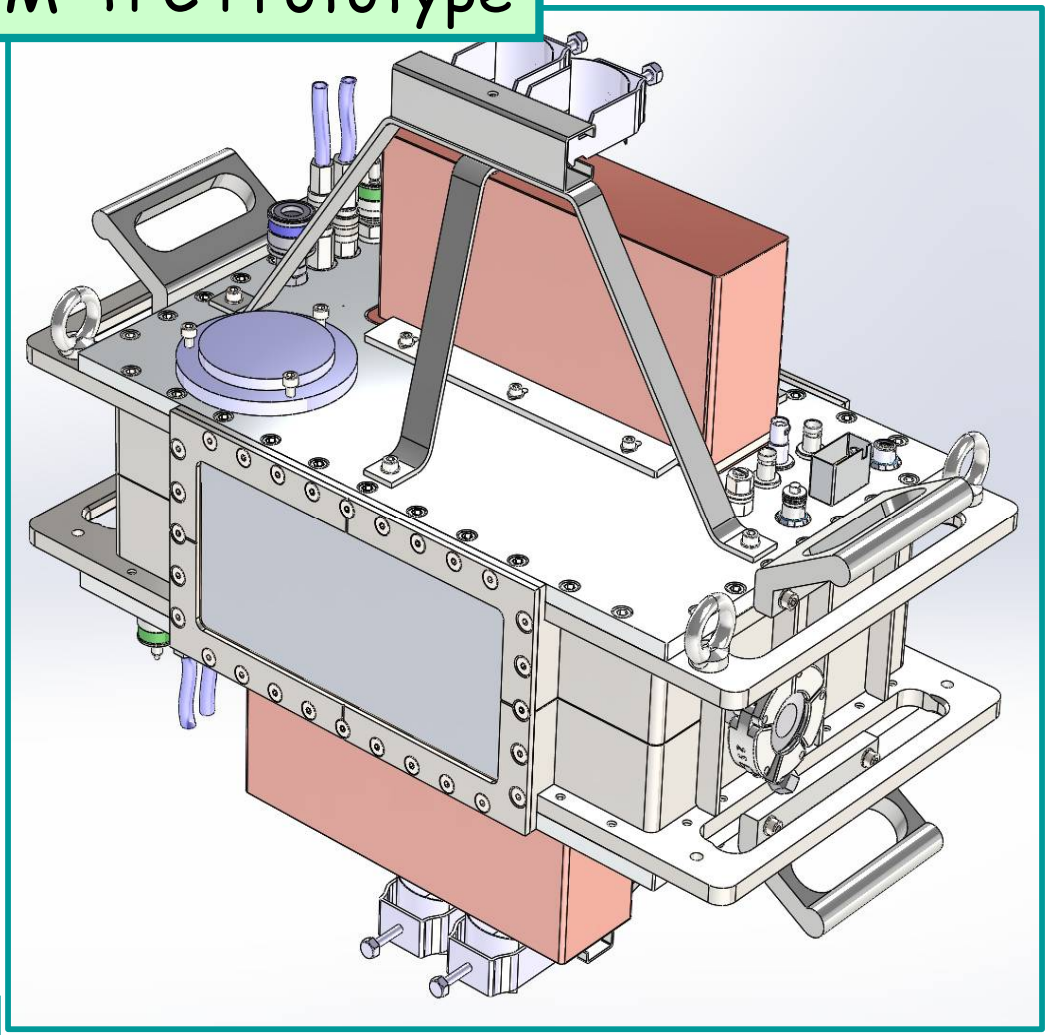
1. What is a GEM-TPC in TWIN
2. GEM-TPC in TWIN - Prototype
3. Integration of VMM3a
4. Both GEM-TPCs Response
5. Setup in the Beam
6. Test Beam Program

WHAT IS A GEM-TPC in TWIN

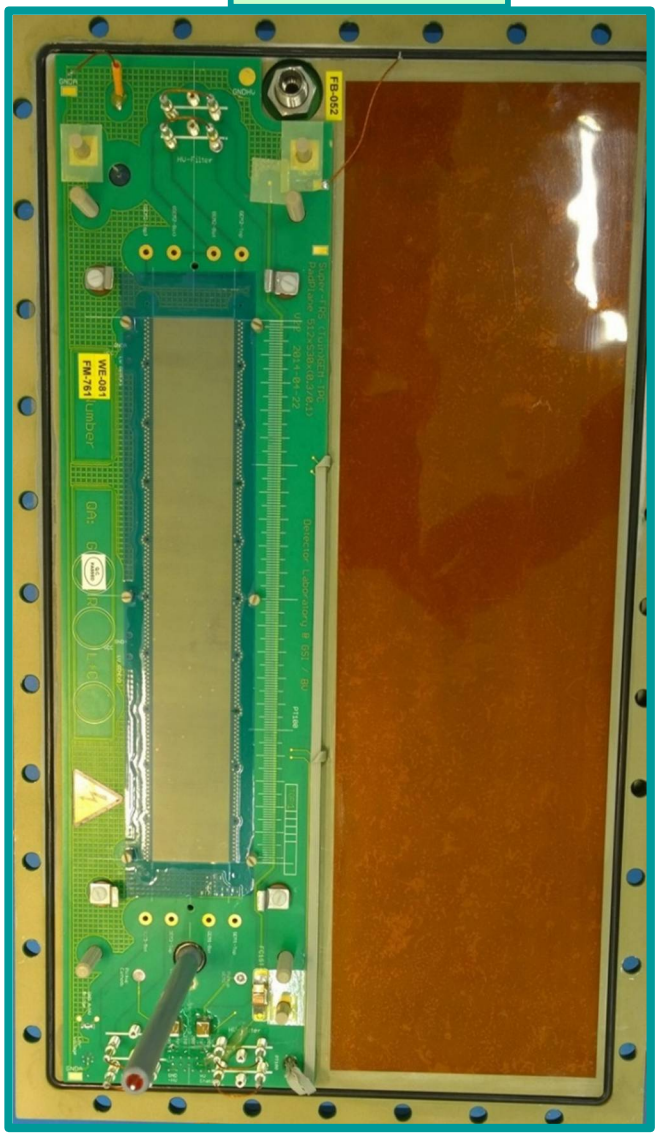
HGB4 - twin GEM-TPC Prototype

Lateral view



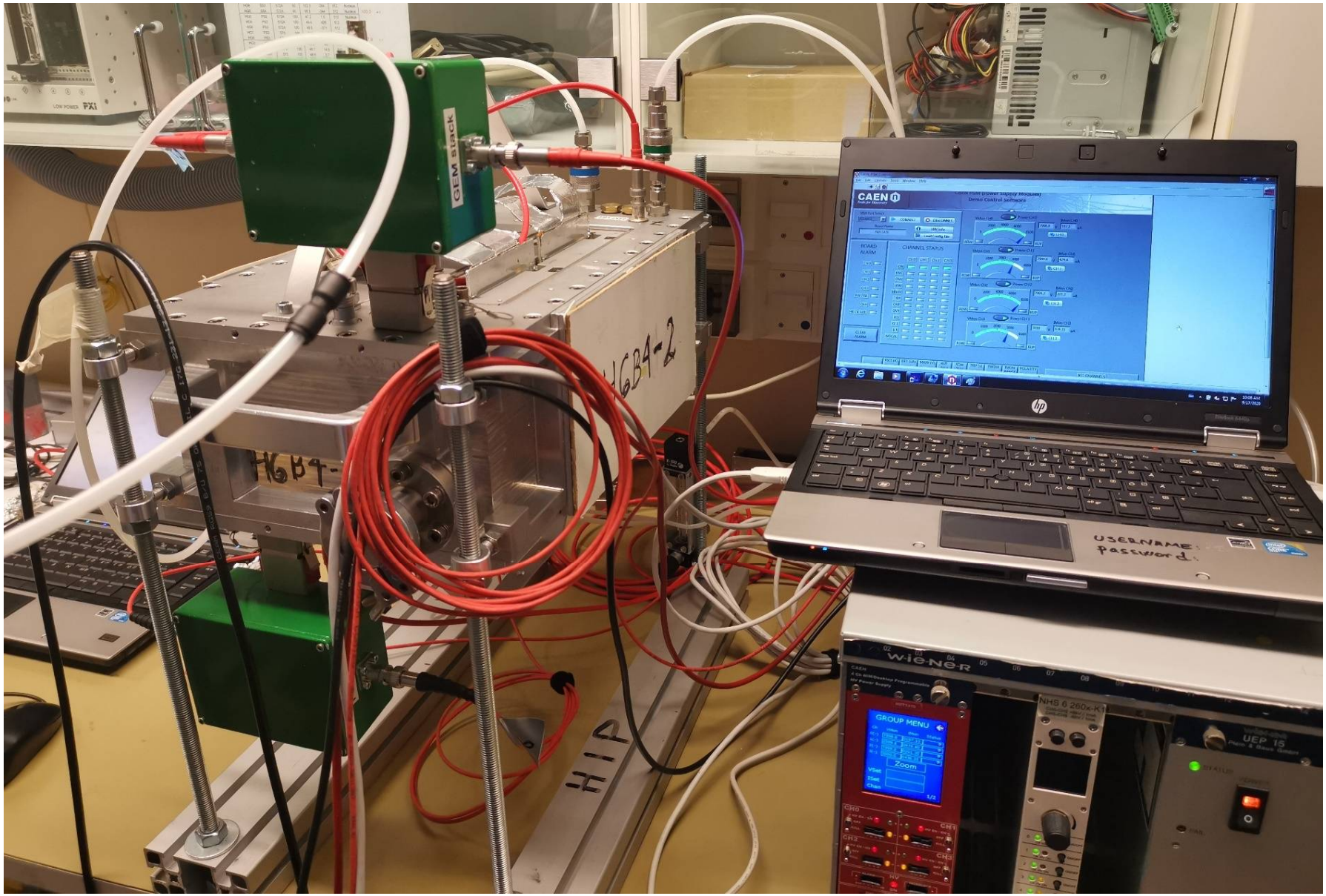


Readout plane



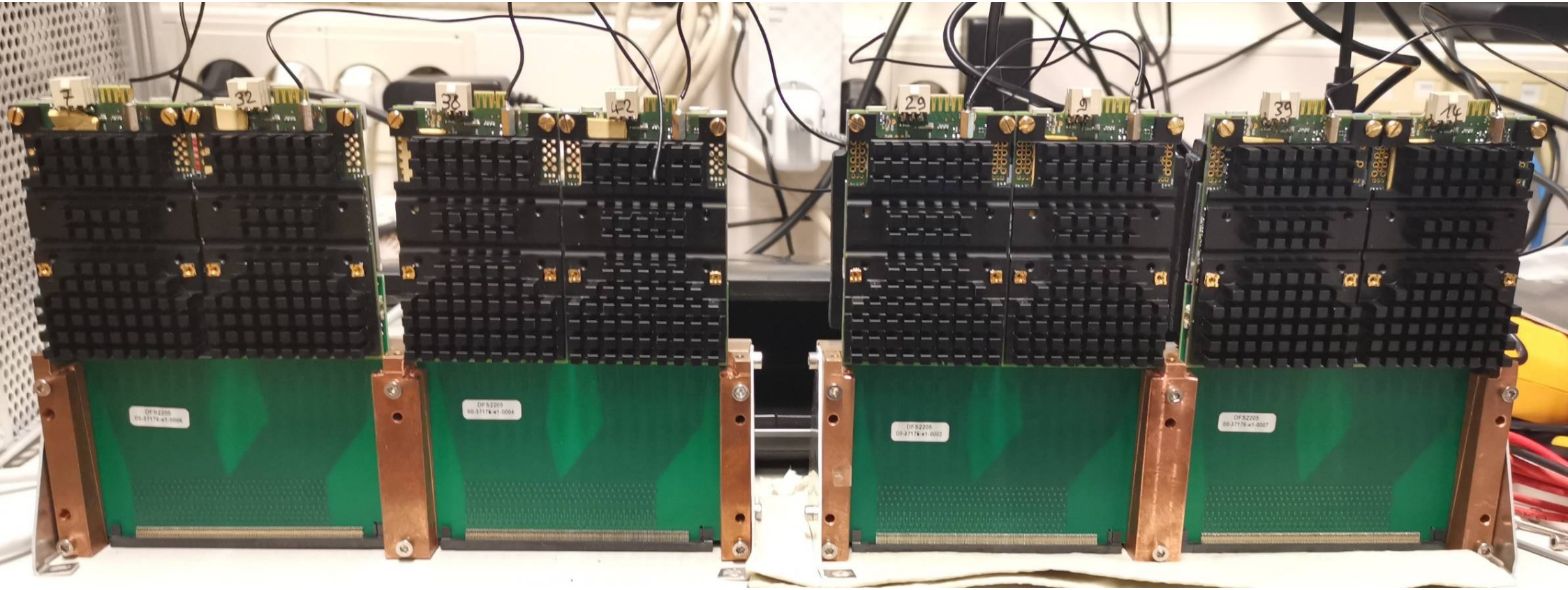
This GEM-TPC has a twin configuration, which means that two GEM-TPC are positioned back to back.

GEM-TPC in TWIN - PROTOTYPE

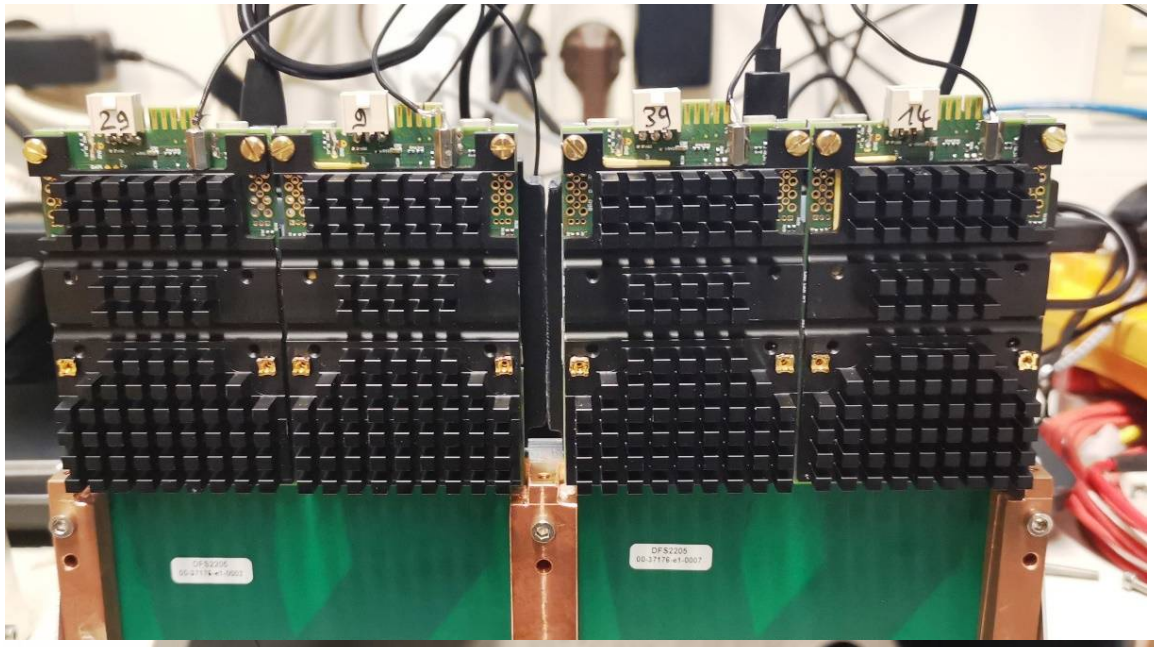


INTEGRATION of VMM3a

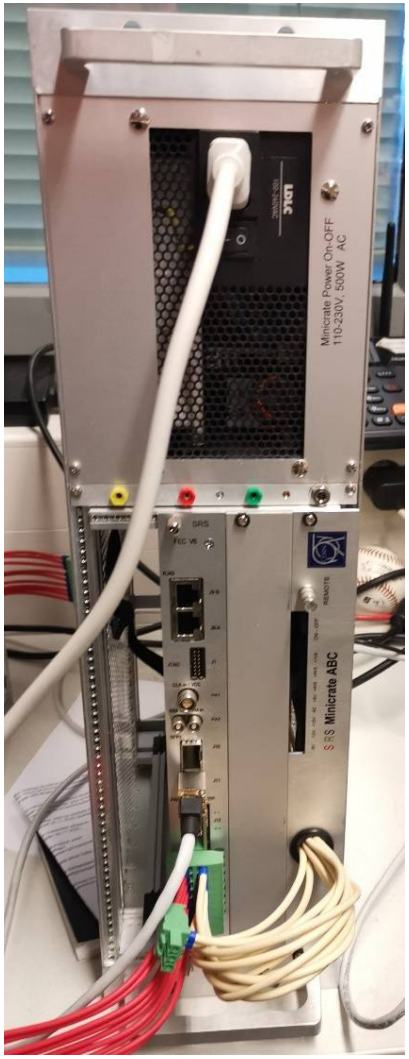
VMM3a hybrids + adapter



INTEGRATION of VMM3a (Cont.)



Create + SRS-FEC + DVM card



BOTH GEM-TPCs RESPONSE

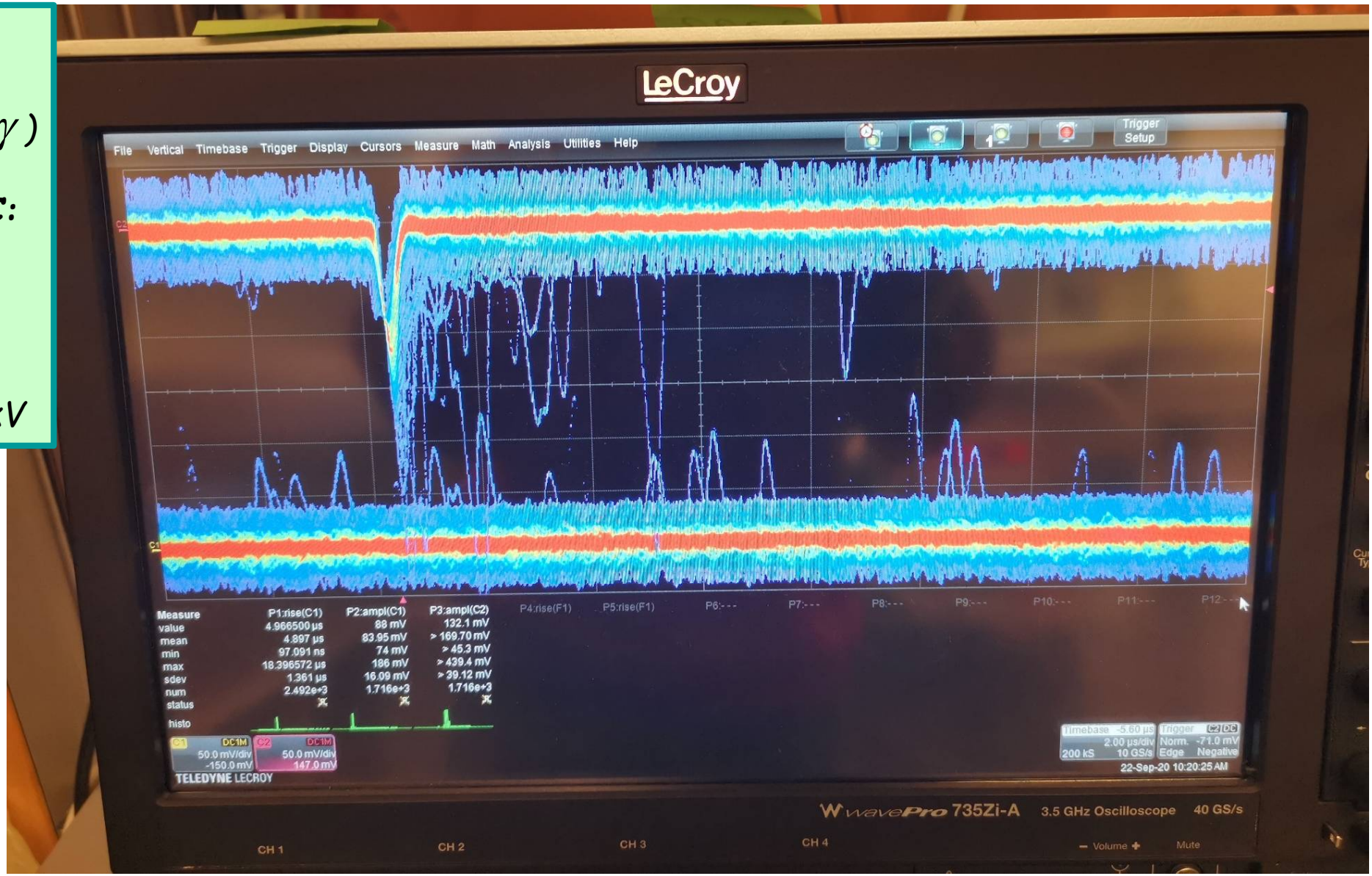
HGB4-2

^{241}Am (60 keV γ)

TOP GEM-TPC:

Cathode: 8kV
500V/cm

GEM stack: 3 kV



BOTH GEM-TPCs RESPONSE (Cont.)

HGB4-2

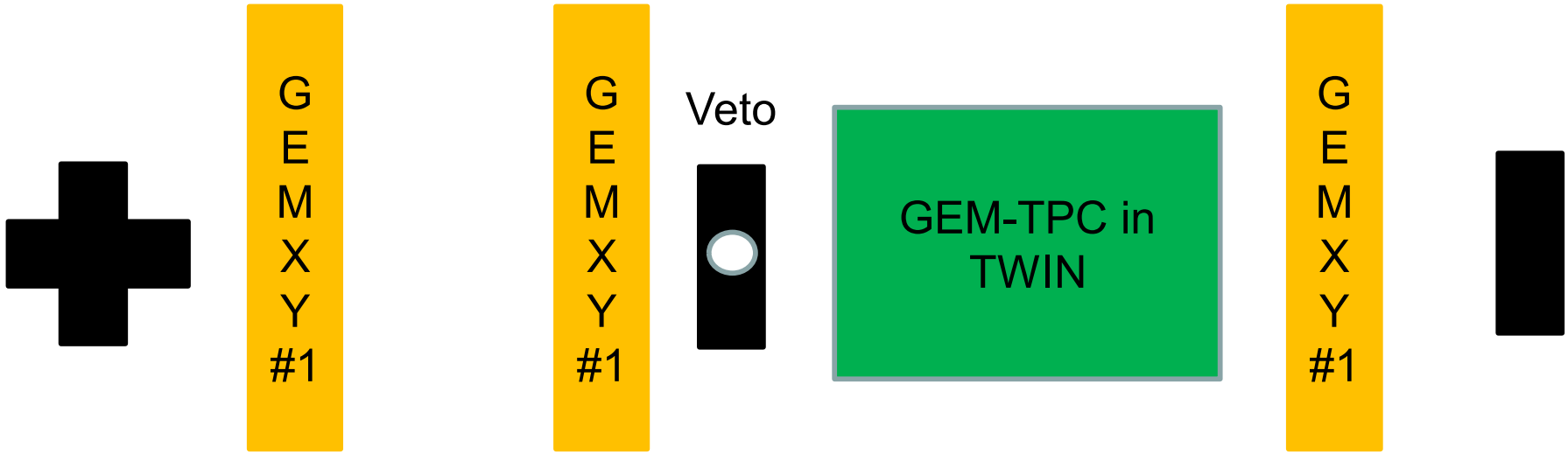
^{241}Am (60 keV γ)

BOTTOM GEM-TPC:

Cathode: 8kV
500V/cm

GEM stack: 3 kV

SETUP in the BEAM



Projectiles:
μ and π
(parallel beam)

Gas mixture:
$ArCO_2$ (70/30)
5 l/h

Powering:
Veto: 1kV
GEM-TPC: 8kV
3 kV
VMM3a: DVM

Electronics:
VMM3a - SRS

DAQ:
ESS based DAQ
(Virtual Machine)

TEST BEAM PROGRAM

1. Test the integration of VMM3a powering scheme via FEC/power suppliers
2. Working in ADC calibration (tets of existing tools)
3. Implementation of 1D clusterization to determine X coordinate
4. Work in the TDC calibration (tets of existing tools)
5. Implementation of the determination of Y coordinate
6. Merging data from RD51 tracker with GEM-TPC
7. Calibration of Drift velocity by the reference tracker
8. Test of T0 signal injection to a VMM3a hybrid
9. Mapping of Drift velocity
10. Mapping of spatial resolution in X and Y coordinates
11. Tracking Efficiency for low and moderated rate
12. Measure those observables as a function of the field of the fieldcage and as a function of GEM stack gain