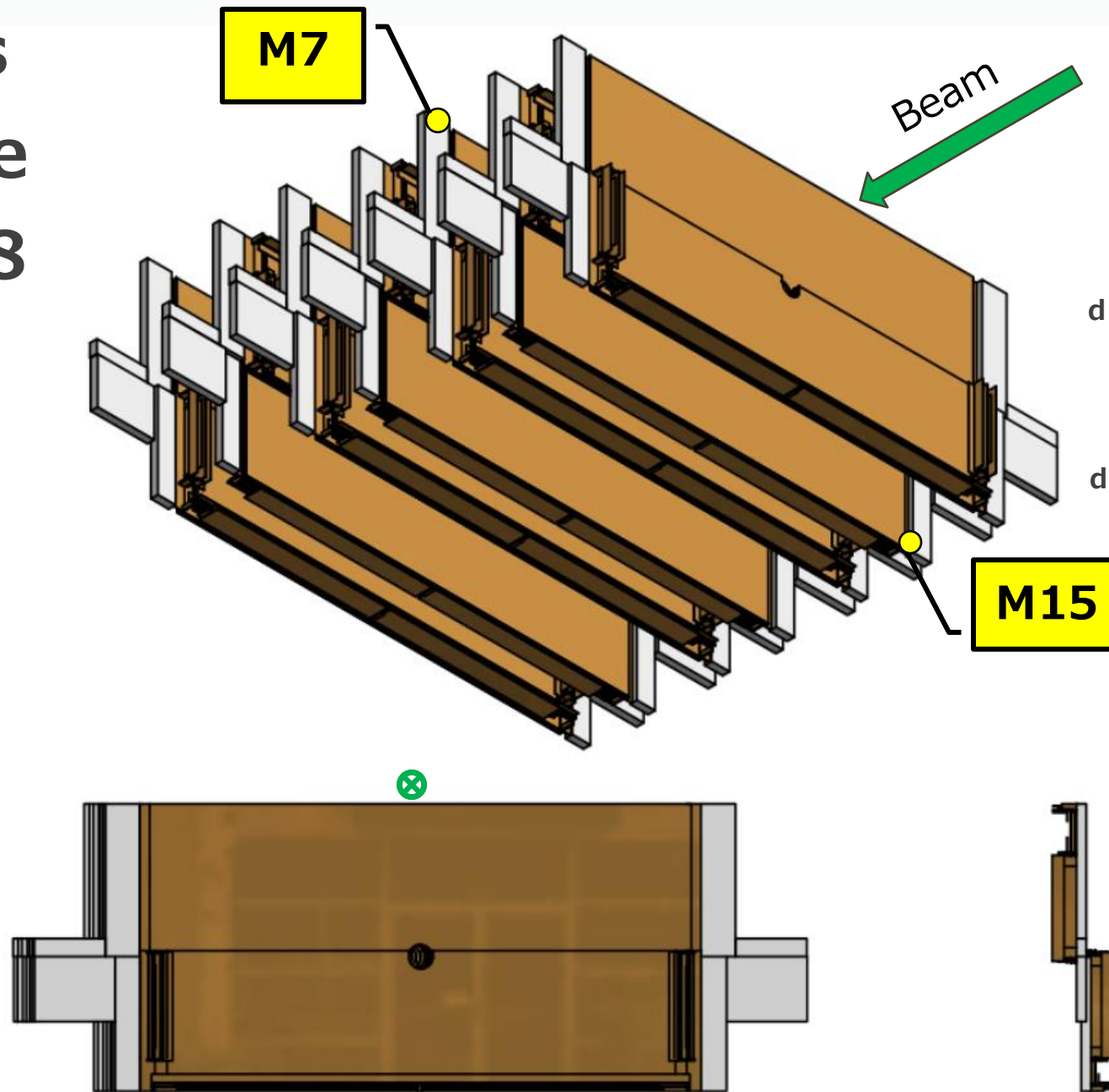


Status of the GEM and CSC systems

Elena Kulish on behalf of
the GEM and CSC groups



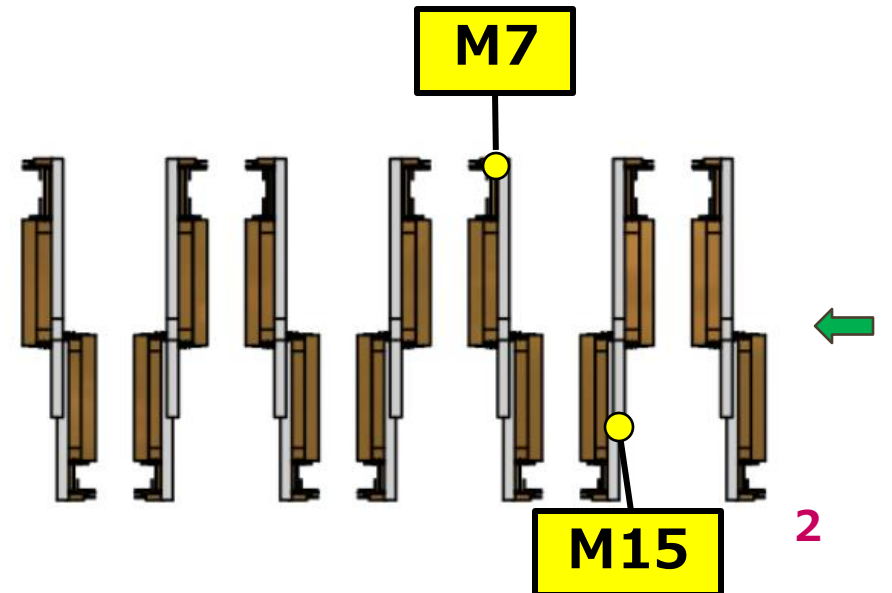
GEMs in the Run 8



M15 and M7 stopped working in the Run 2023.

It was necessary to pull them out of the magnet.

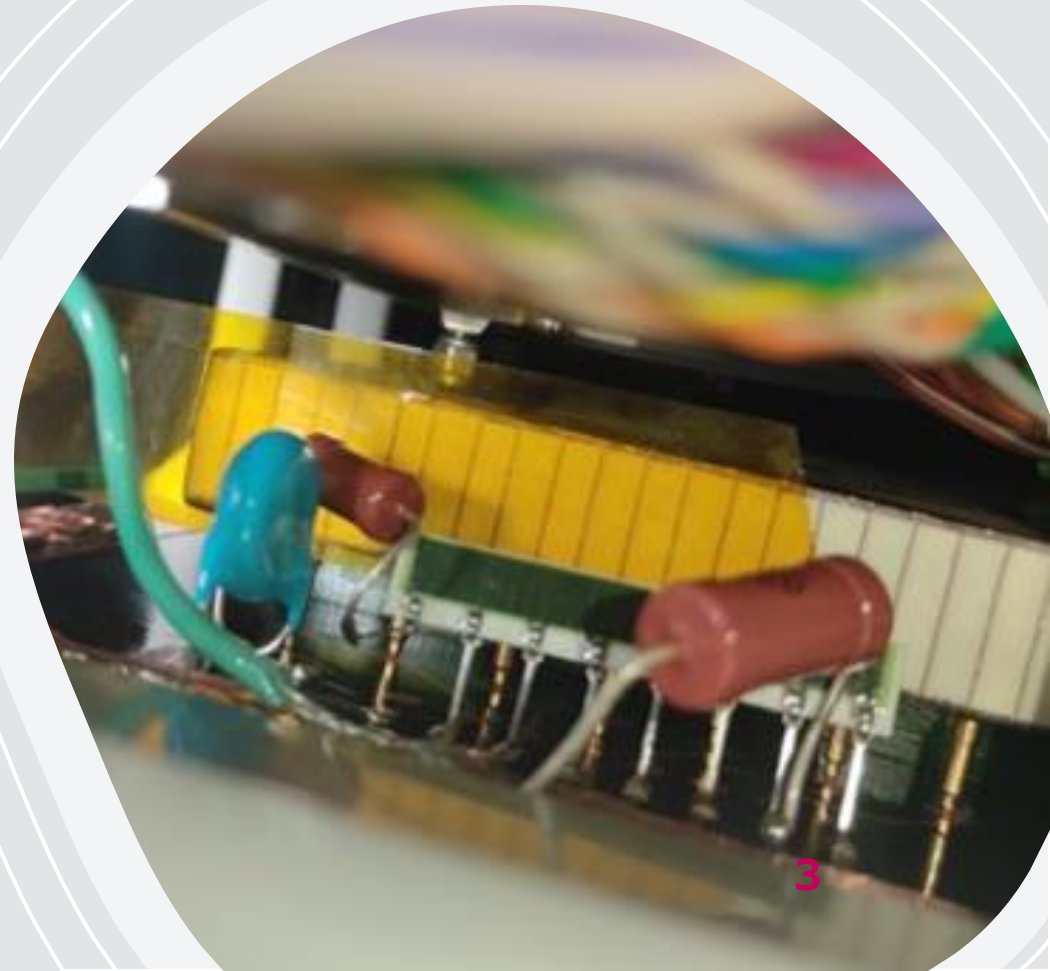
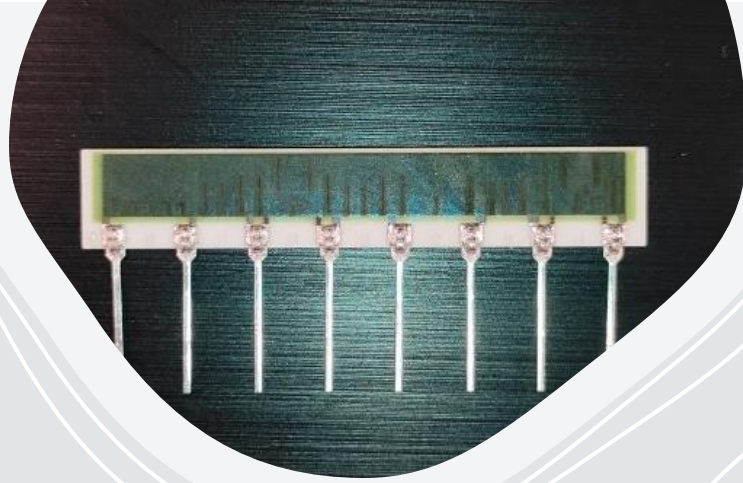
Disassembly began with the front detectors, but after that it was decided to remove all detectors. This is due to the fact that the adjustment is carried out sequentially after installing of each detector and will change when the system is partially disassembled. It was also decided to modernize the mechanical support.



M15

At the end of the Run 8, the detector M15 stopped working normally because the divider leg broke.

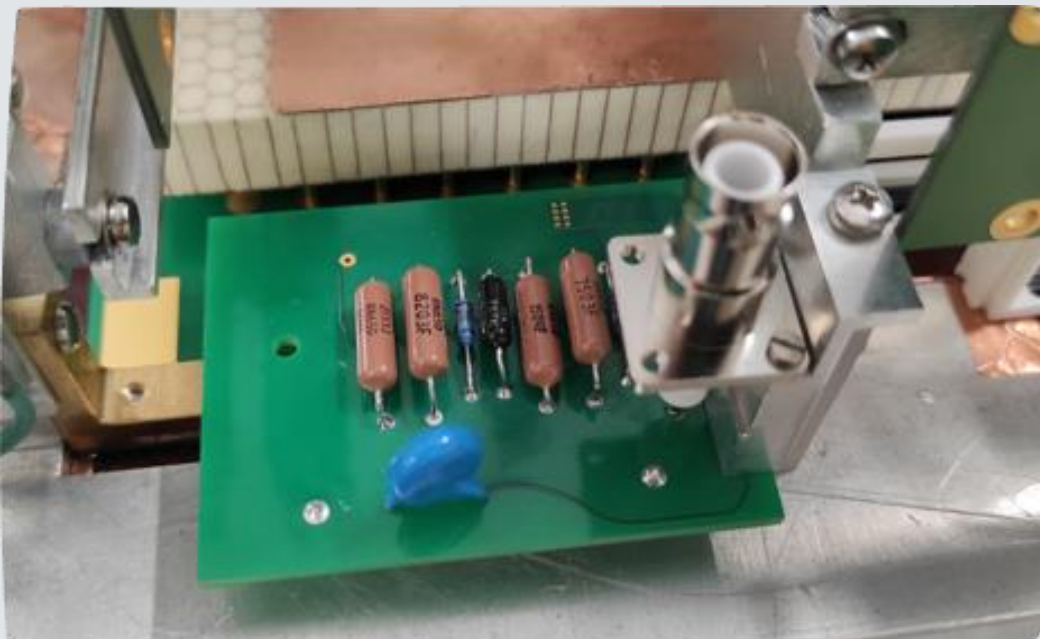
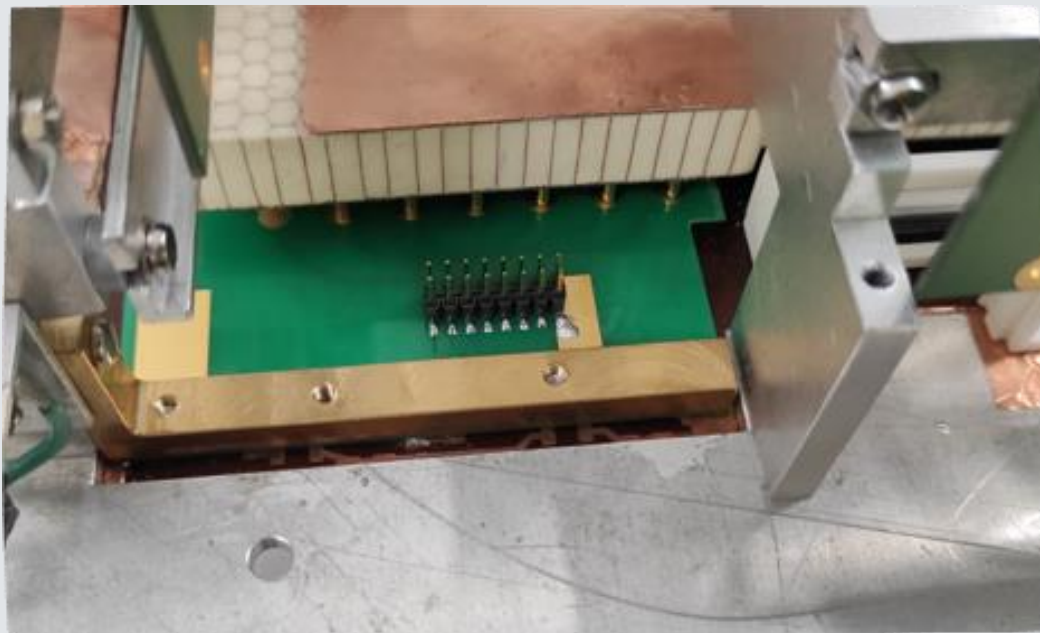
The existing divider design is not suitable for repair in the SP-41 magnet. Therefore it was decided to modernize the design of the divider.



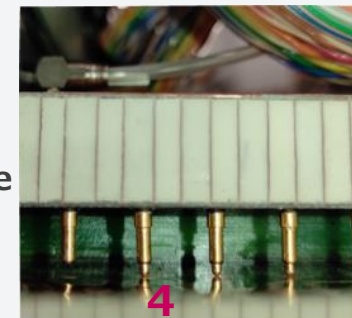
New type high voltage divider

New HV divider consists of two boards - stationary and removable, on which there are mating parts of the connector. Removable board contains resistors and a high voltage connector. Stationary board contains traces from the connector to the pads for pins contacts.

Thus, the part with resistors can be removed from detectors and replaced. And also, if necessary, it will be possible to replace resistors and change the parameters of the divider.



Problems (solved): pins get stuck and do not allow the board to move freely.

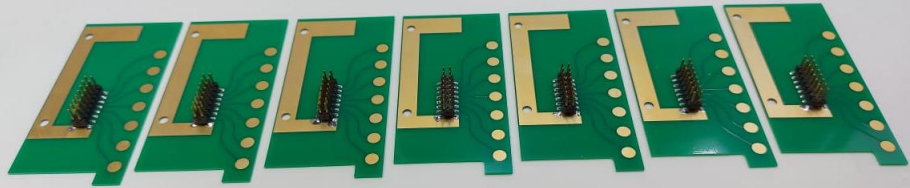


S. Khabarov,
S. Novozhilov

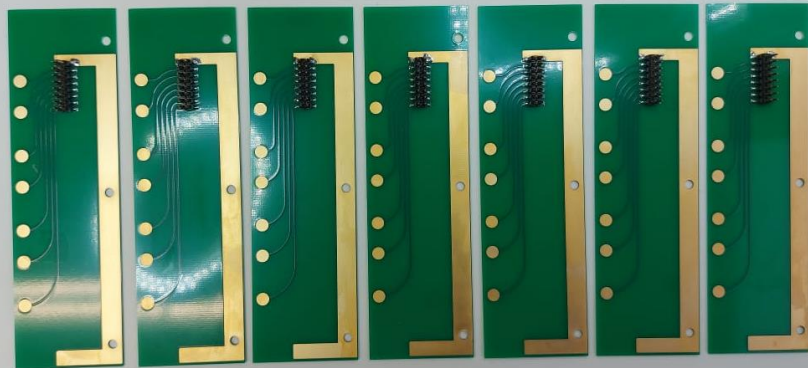
New type high voltage divider

All boards are manufactured and ready for installation. The boards provide space for two high-voltage capacitors in the last and penultimate gap. They are on order and will arrive at the end of the year.

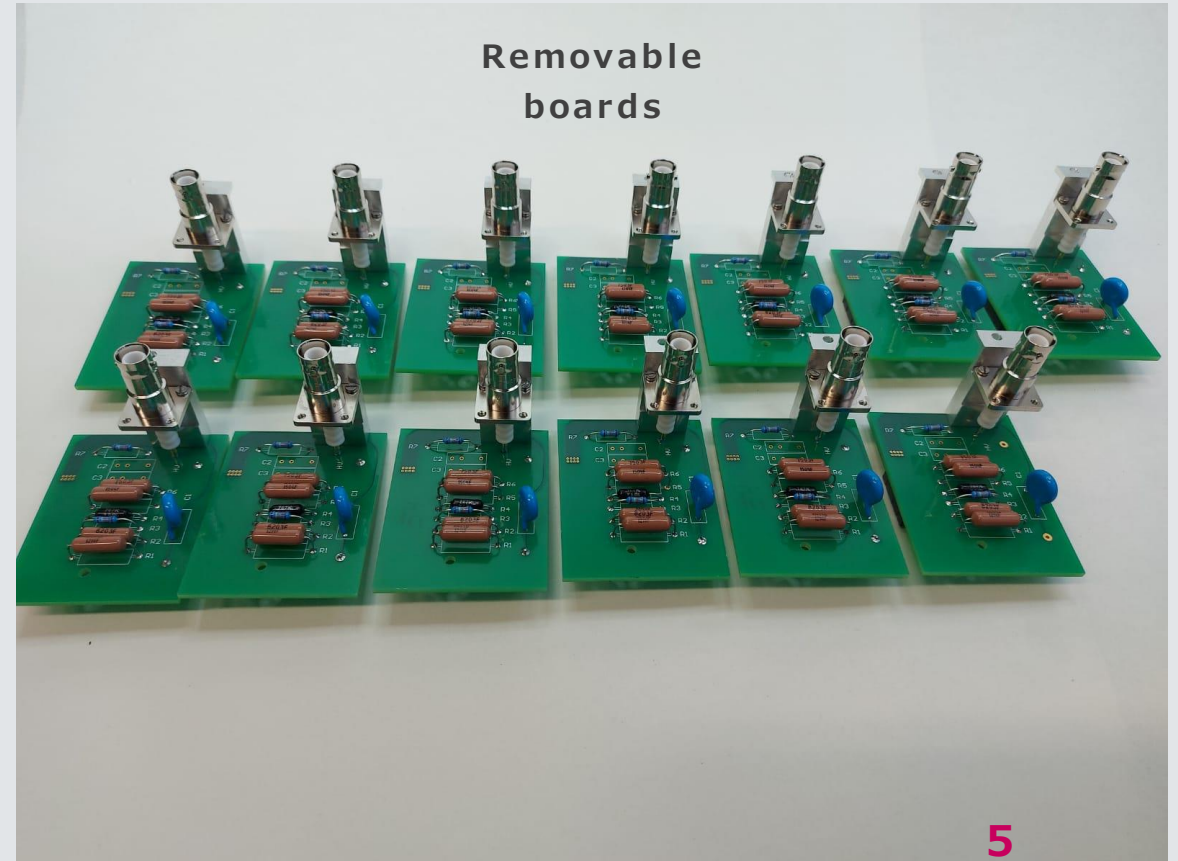
Stationary boards



Stationary boards



Removable boards



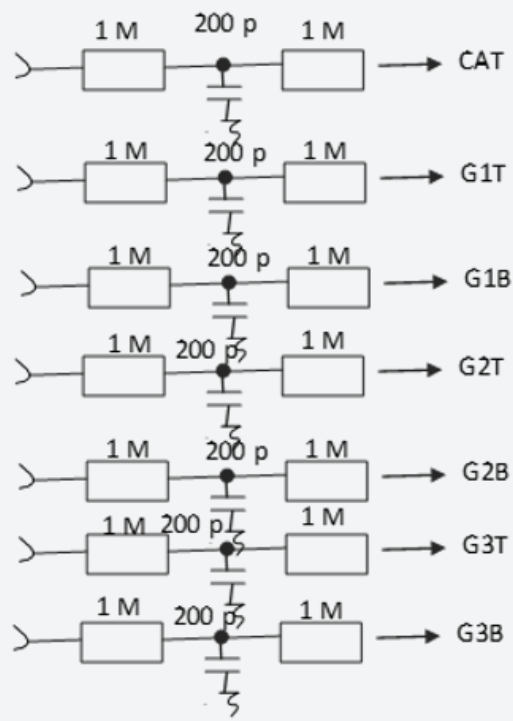
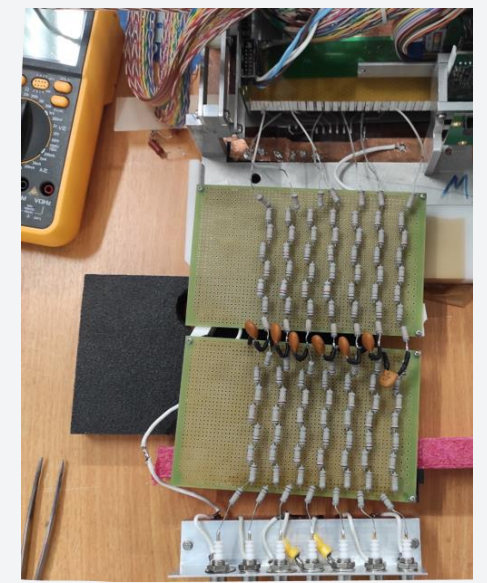
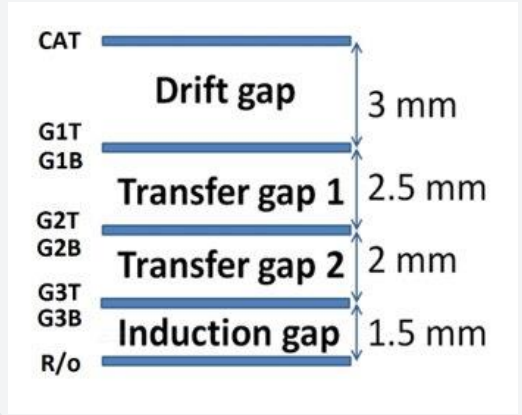
M7

The detector malfunctioned during the Run 8. There were trips, and it was impossible to set high voltage.

After the Run 8, we first replaced the divider with the same new one - it did not help. Then we assumed that there was a short circuit between the tracks on the readout board. Therefore, we isolated the readout from pins and connected HV divider directly to the pins - it also did not help. We discovered that during the trip we could hear clicking sounds somewhere in the central part of the detector. It is widely believed that the problem is somewhere in the internal part of the high-voltage traces of the detector, which can only be checked by disassembling the detector.

We decided to apply an independent voltage to each electrode.





Separate high voltage supply to each electrode

Due to this connection, the voltage on each electrode can be adjusted.

Using this scheme, we can check how the GE M foils behave when the voltage changes.

Also, if we observe the current in the channel, we can say that the connection between the electrode inside the detector and the pin is not broken.

Electrode	HV	Current	Up	Dn	OVC Trip	Enable
0						
1 CAT	4064.5	0.7	█	█	█	█
2 G1T	3419.5	0.4	█	█	█	█
3 G1B	2983.5	0	█	█	█	█
4 G2T	2293.5	2.8	█	█	█	█
5 G2B	1879.5	0	█	█	█	█
6 G3T	1082.5	9.6	█	█	█	█
7 G3B	729.5	0	█	█	█	█
8	1	0	█	█	█	█



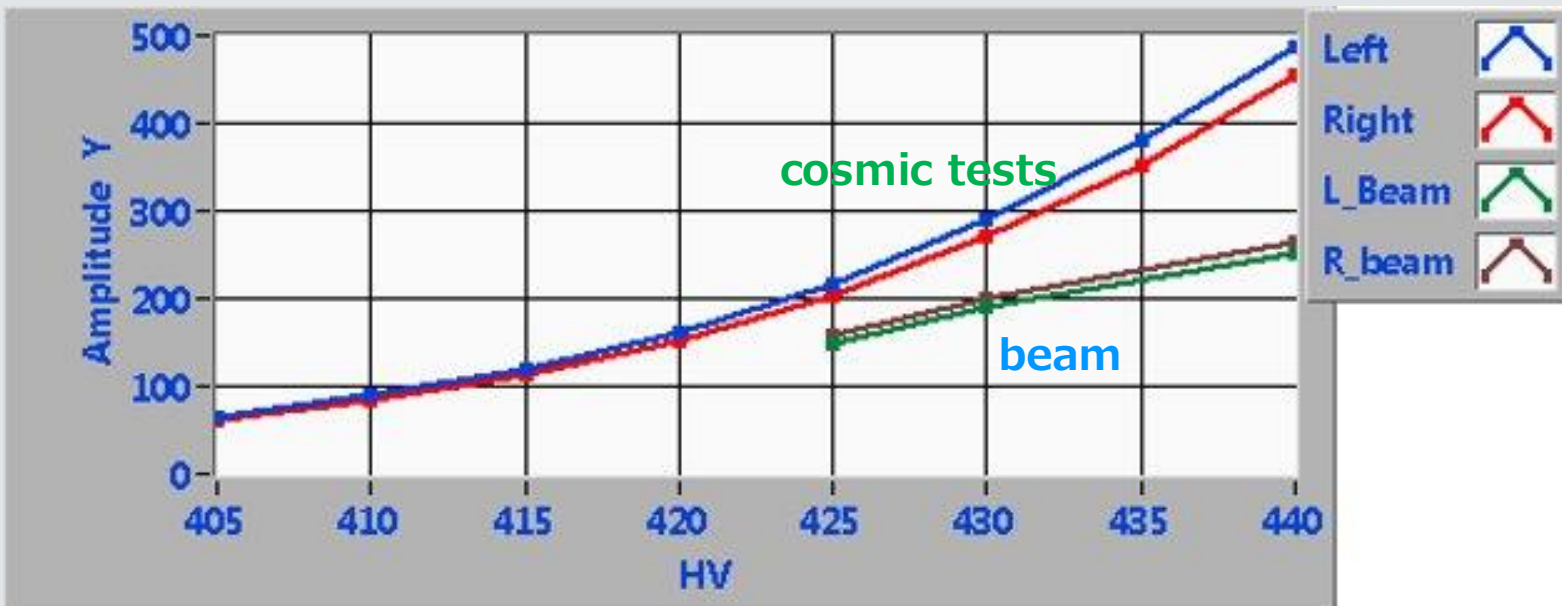
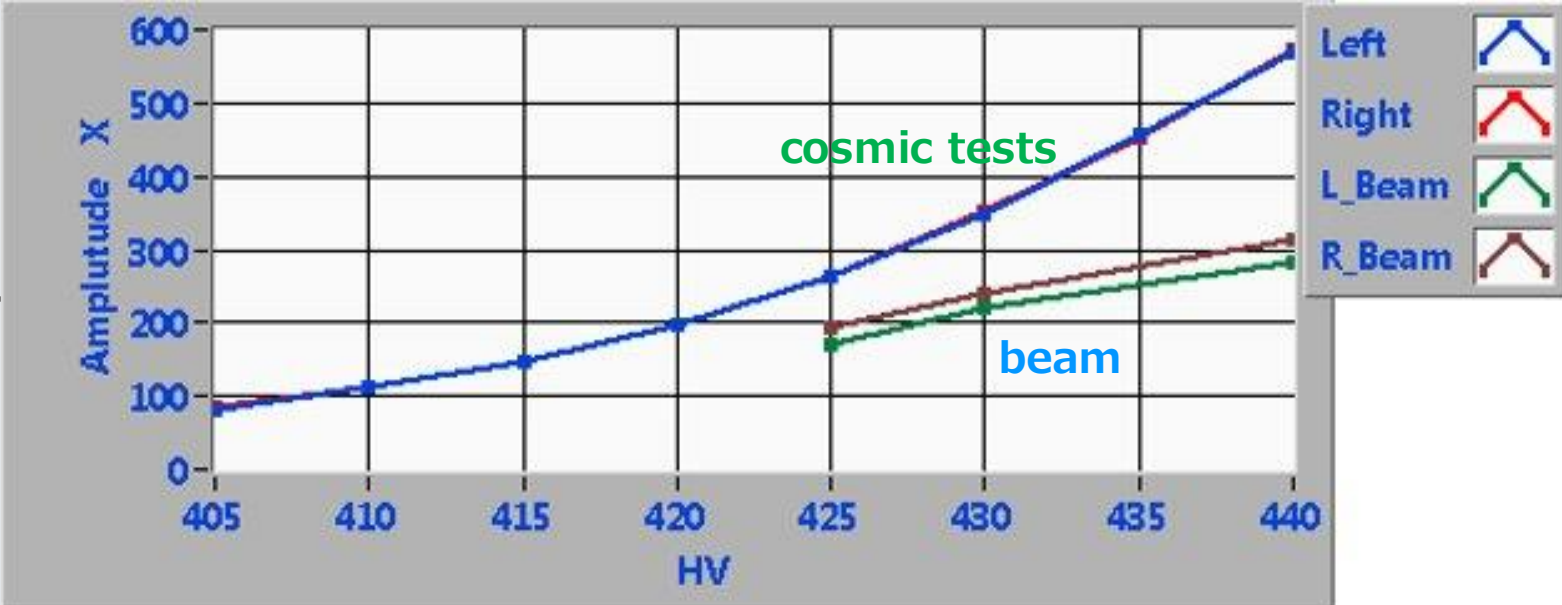
Mechanical support system upgrade

Additional supports were added to prevent the U-shaped profiles from tilting towards the beam axis, as well as strips to prevent the planes from tilting along the beam axis.

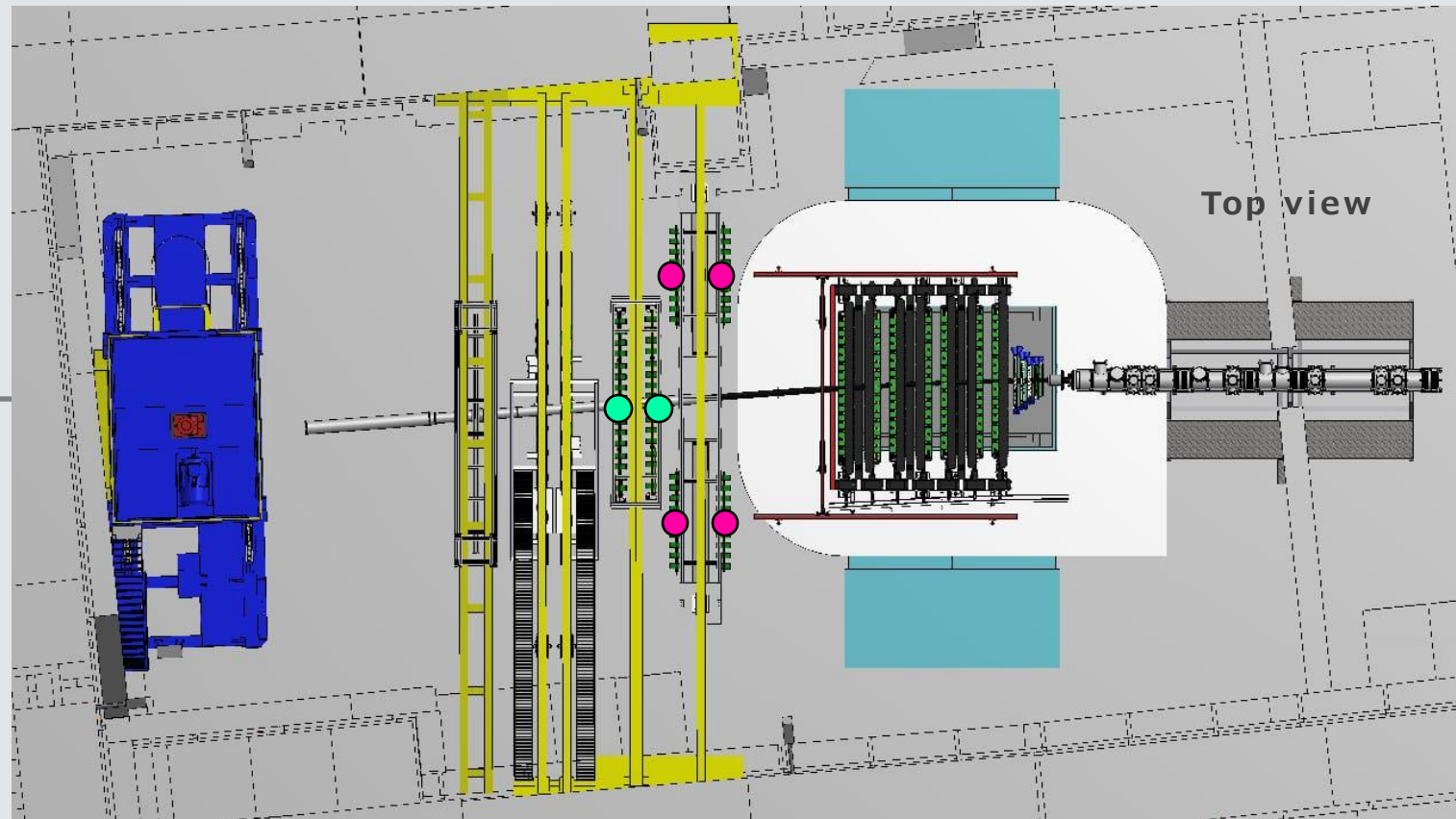
M10: amplitudes depending on the divider current

Distribution of X and Y amplitudes in the left and right sides of M10 for cosmic tests and for the beam depending on the divider current

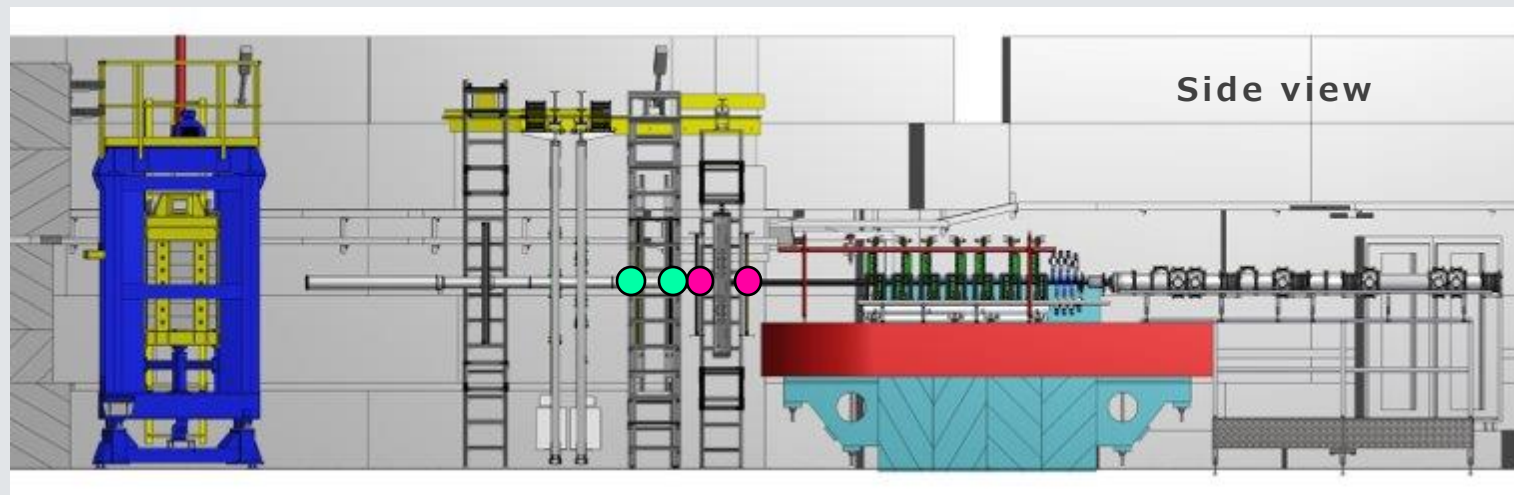
The reason for this difference is still under investigation



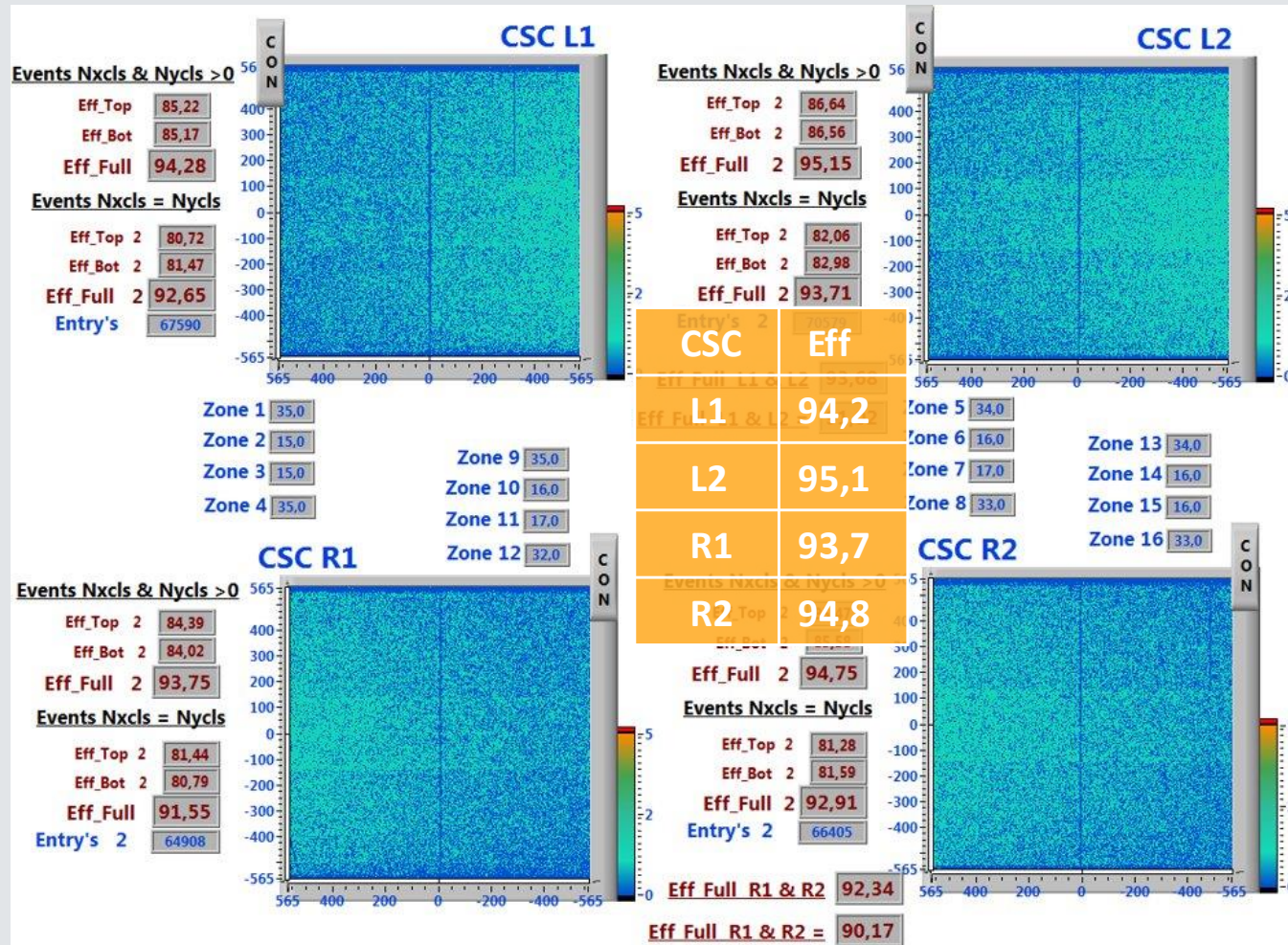
CSC system in the next Run



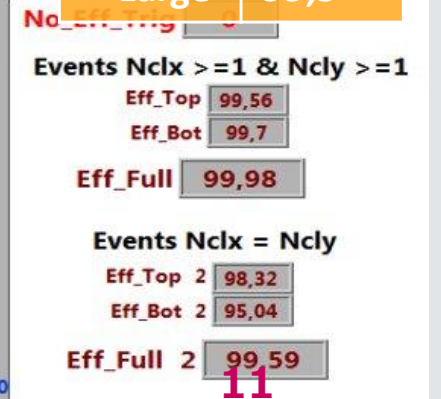
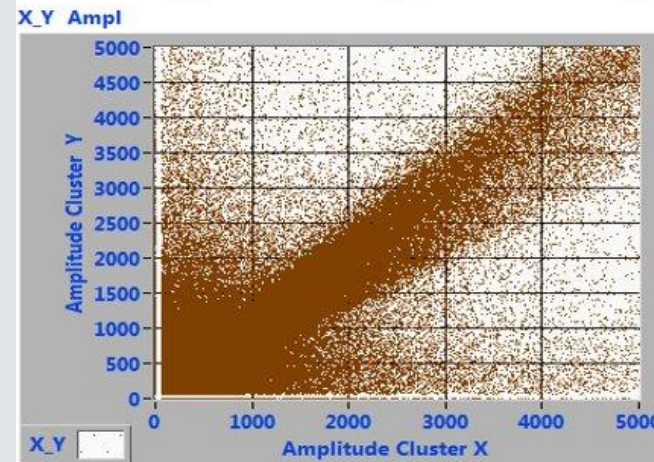
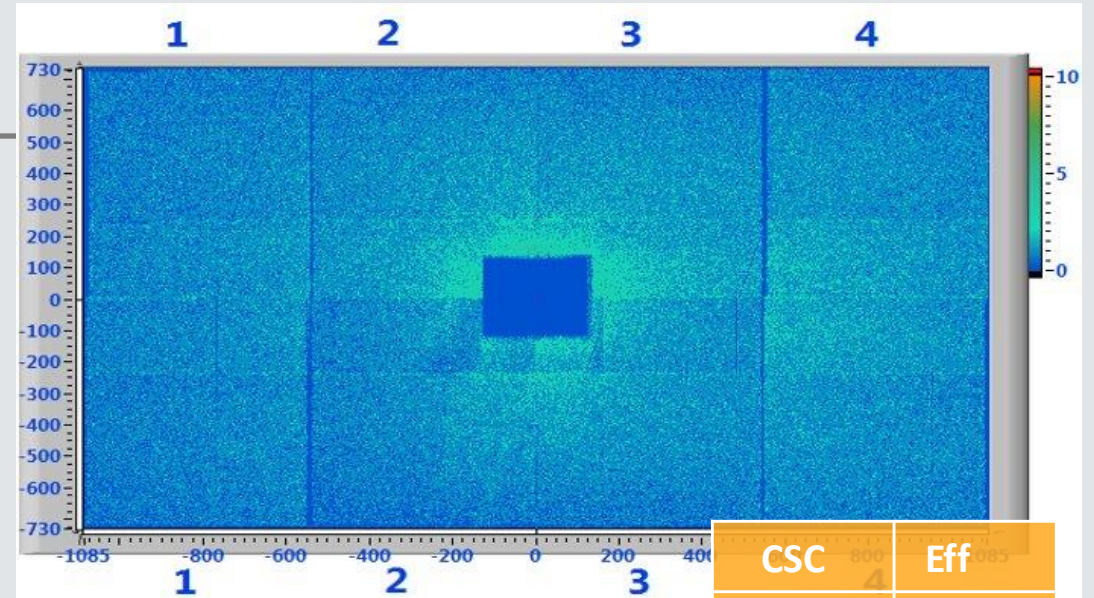
- CSC 1X1 m²
- CSC 1.5X2 m²



CSCs in Run 8



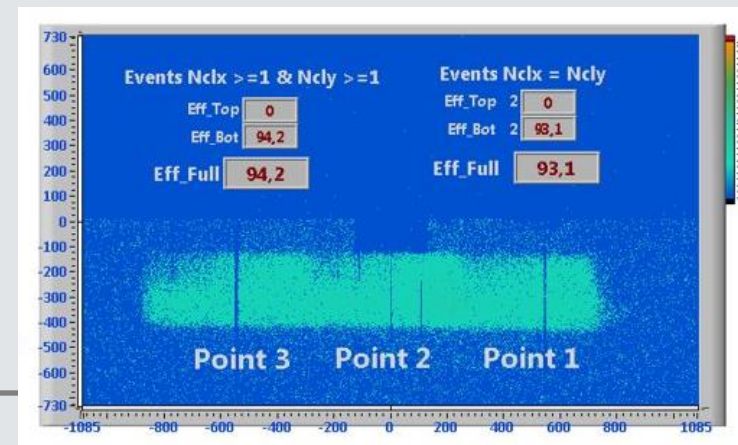
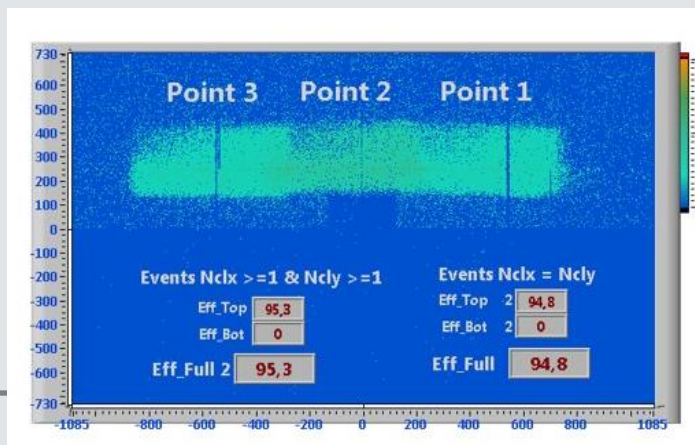
Entry's 2	Eff
L1	94,2
L2	95,1
R1	93,7
R2	94,8



New large CSC cosmic test

Top

Bottom

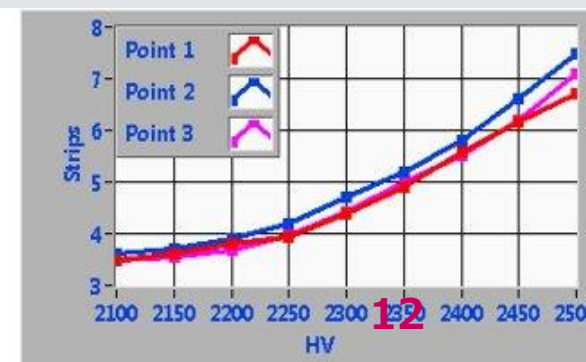
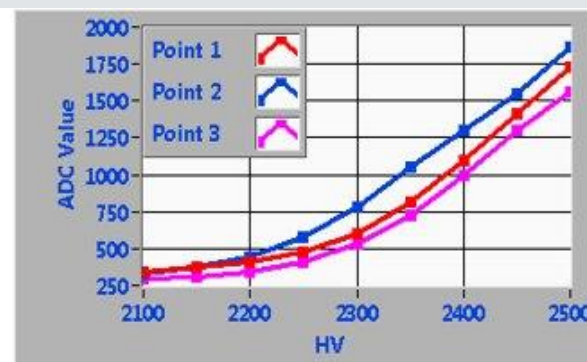
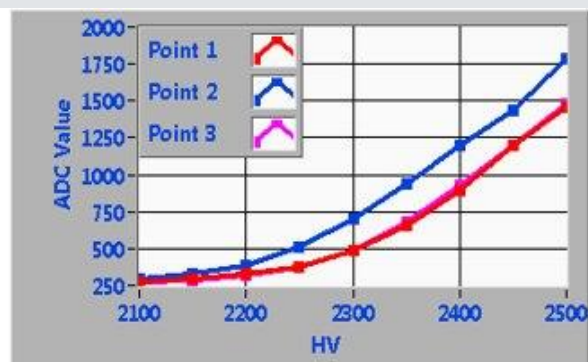
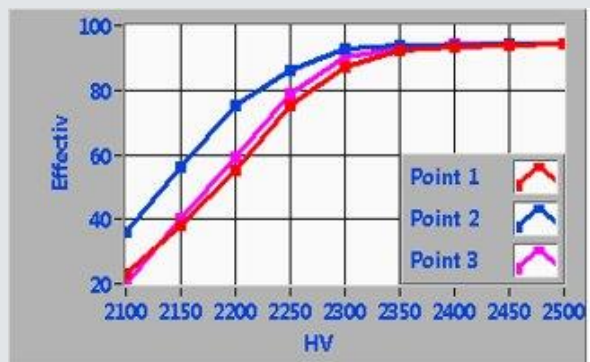
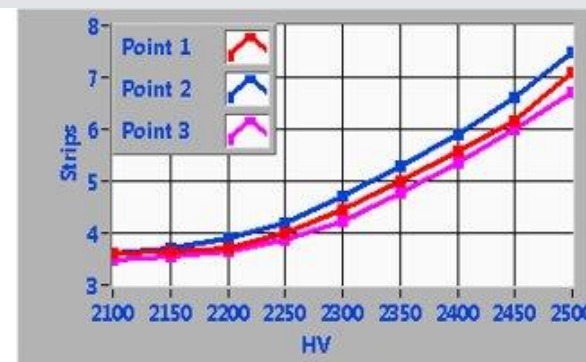
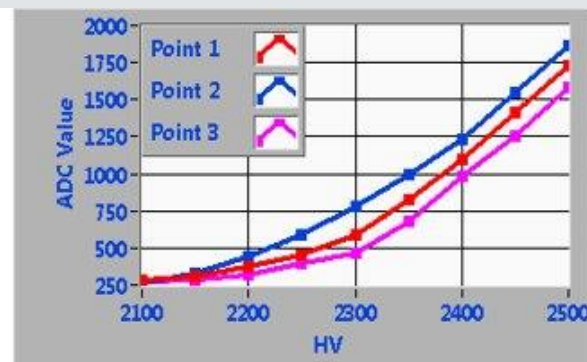
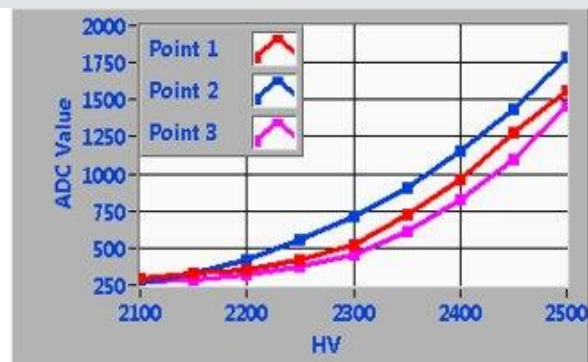


Efficiency

Amplitude X

Amplitude Y

Cluster size



Top

Bottom

Gas system

Eltochpribor LLC modernized the gas system in a gas house.

The mixture from the mixer passes through oxygen and moisture filters and enters the gas collector.

There are two gas collectors – for GEMs and CSCs.

For GEMs: New gas flow regulators are installed - max. Argon 60 l/h, max. Isobutane 60 l/h. Rotameters are installed on 8 channels of the collector (7 for each of the GEM planes + 1 for the test room).

For CSCs: Rotameters are installed on 6 channels of the collector (7 for the experimental area + 1 for the test room).

A control pressure gauge for pressure in the system is installed on 9th channel of each collector.



Gas collectors: GEM – left, CSC – right



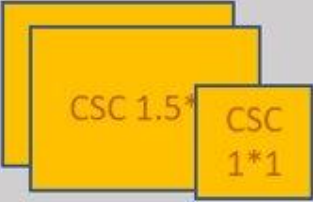
Переход день 3

Чистый домик

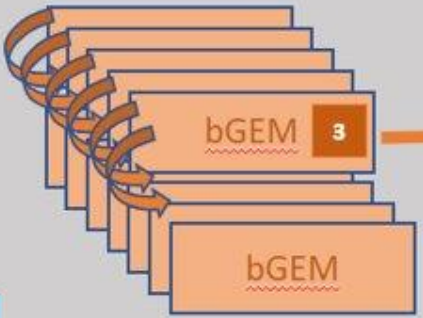
Нет компьютера
CSC

Нет компьютера
GEM

LV 30
Клеммная колодка
LV 30



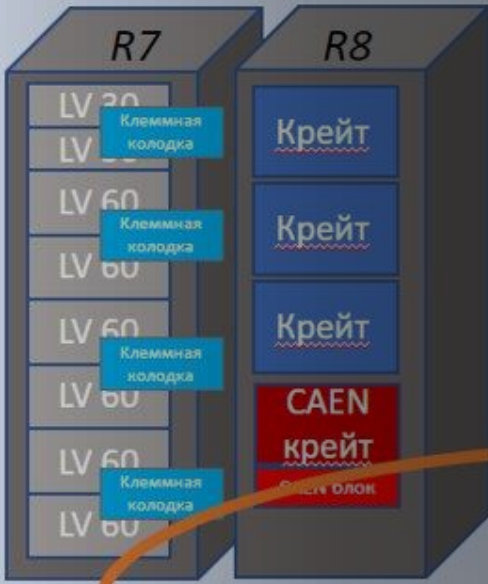
3 Отключить от газа и снять высокое, забрать из ЧД.



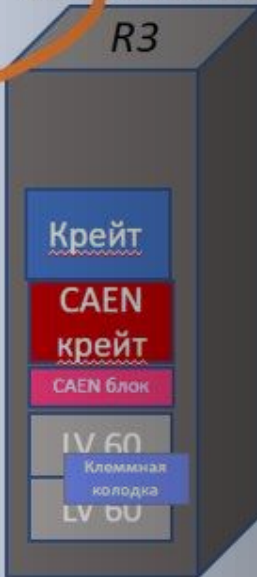
Установка

Компьютер
GEM

Компьютер
CSC



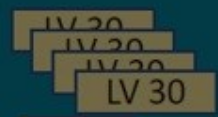
1-2 тренировать.
3 занести в магнит, поставить на свое место, подключить кабели к патч-панелям, подключить газ, проверить сигналы с карт (без HV). Поправить все, что можно. В конце дня подать 1000 В.
1-2 проверка карт.



Запас

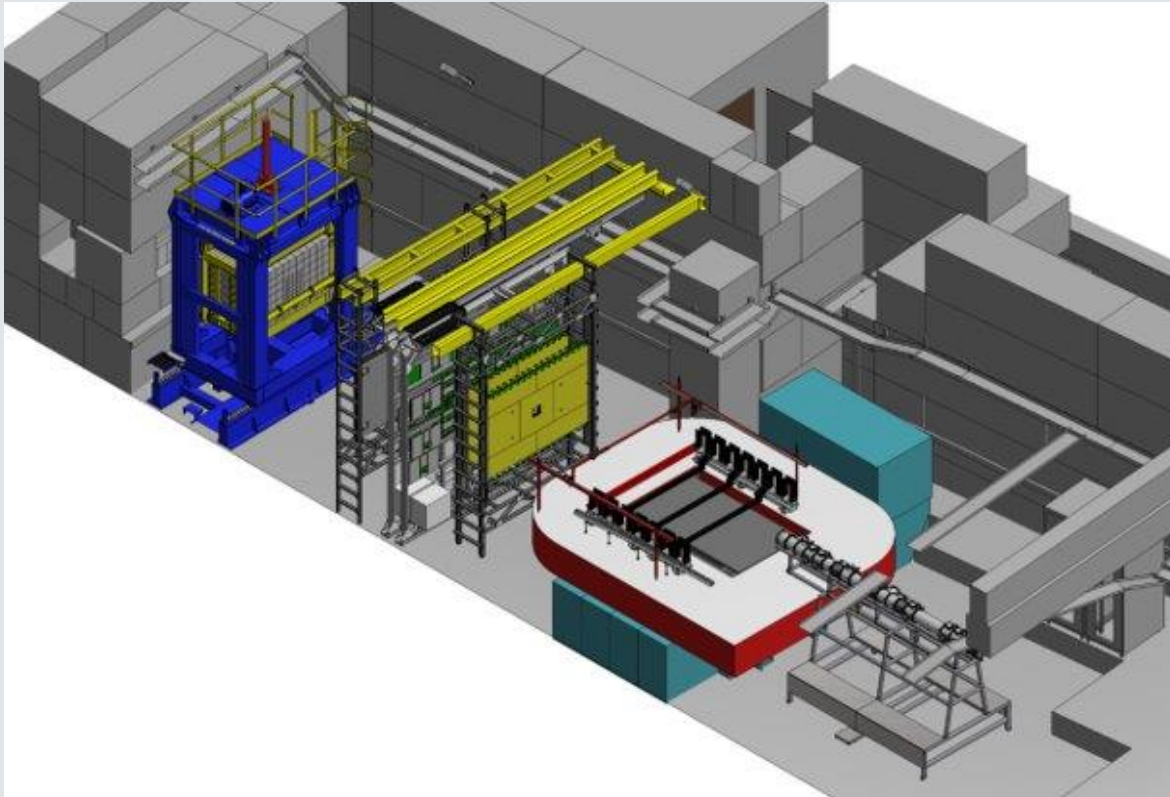


CAEN блок

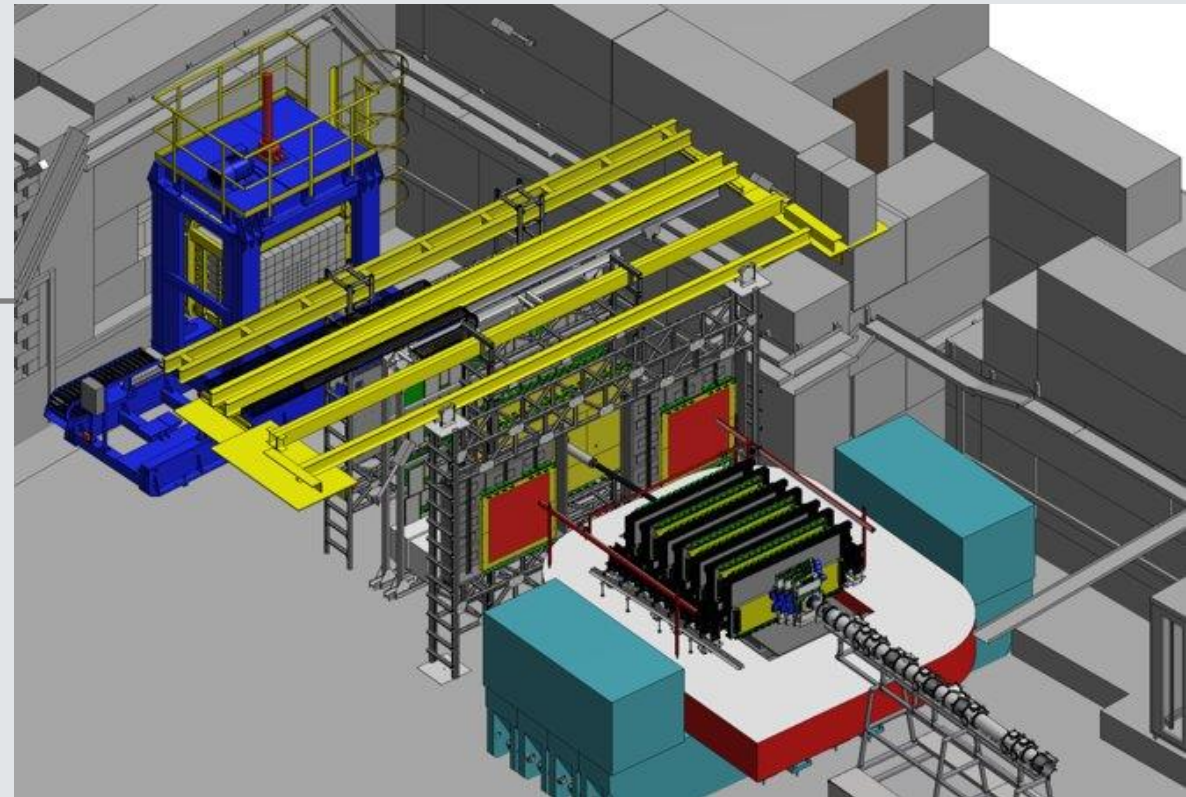


GEM detectors installation plan

CSCs installation plan



Support system for 2 Large CSC is ready. Installation of the mechanical support will start when the group of installers will be free - about 15.12.2023 (S. Piyadin report 28.11.2023)



Installation of 4 CSCs will be carried out after all GEM detectors in the following sequence:
2 CSC, 2 new ToF-400, 2 CSC

Current status of the GEM system

All detectors, equipped with electronics and cables, are located in the test room.

The racks, boxes and cables in the experimental area remained virtually unchanged.

The gas system continues to be modernized.

Current status of the CSC system

All detectors, equipped with electronics and cables, are located in the test room.

All detectors are ready for the installation to the experimental hall.

Work to be done before the next run

- check that the electronics on all detectors are installed correctly
- install and test new dividers with HV
- determine the sequence of the GEMs taking into account the rearrangement of M7 to the end of the system
- route the tubes from the gas collectors to the magnet and from the magnet outside, and also install oxygen sensors

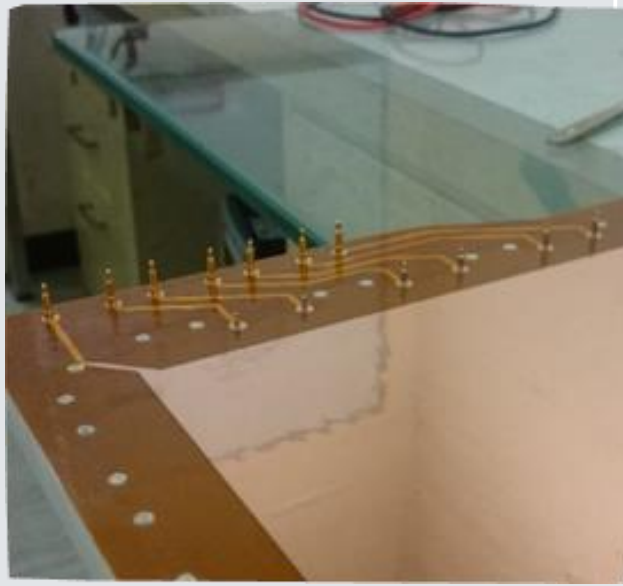
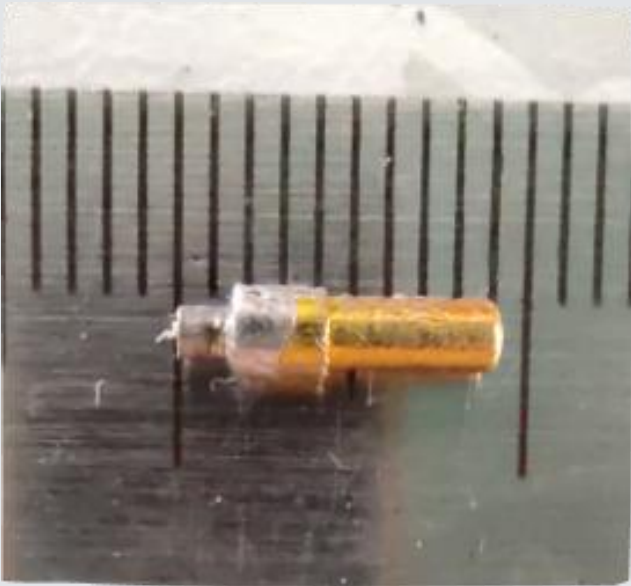
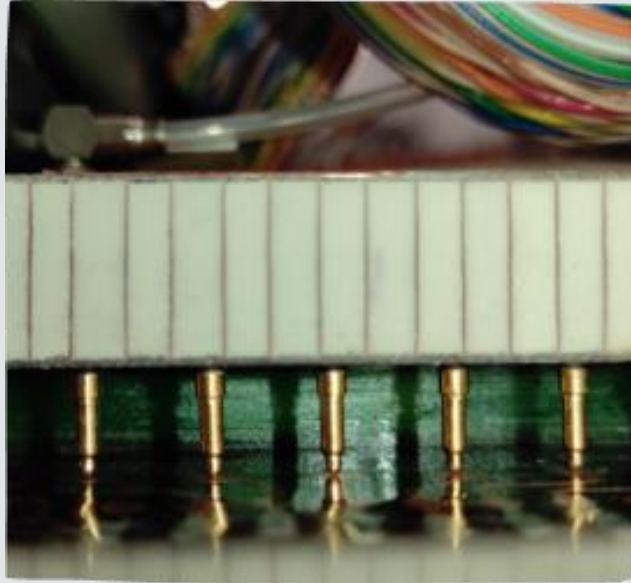
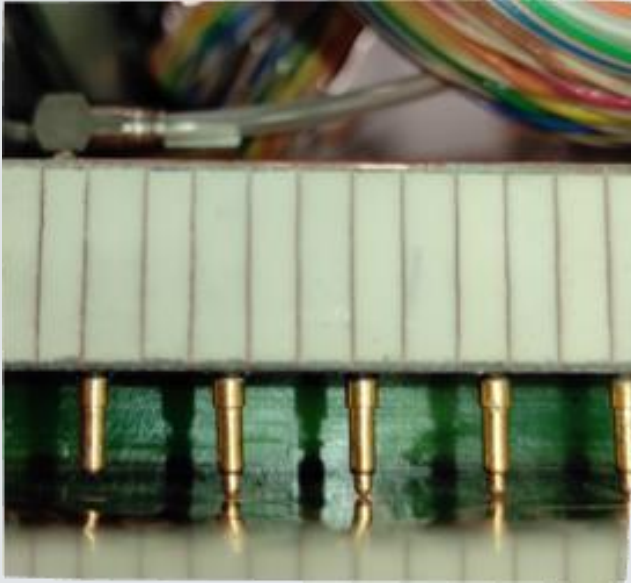
ЭКСПЕРИМЕНТАЛЬНЫЙ
КОРПУС 205



**Thank you
for your
attention!**

Pogo pins

New pogo pins

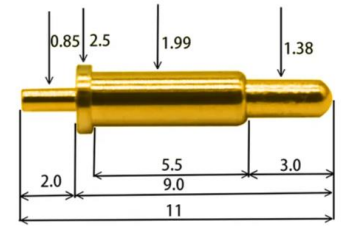


Cltgxdd



H009

Cltgxdd



H033

