

Detectors in the Xe run and plans

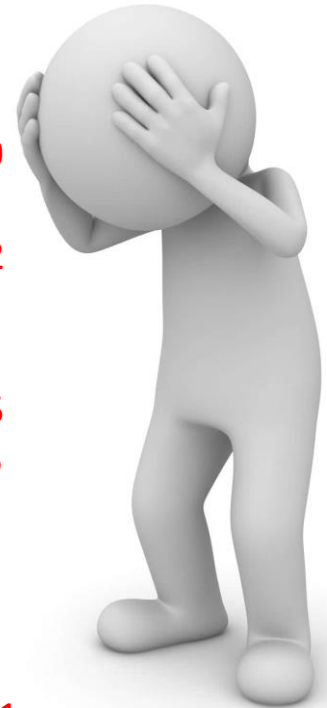
Piyadin S.M.

13.05.2024

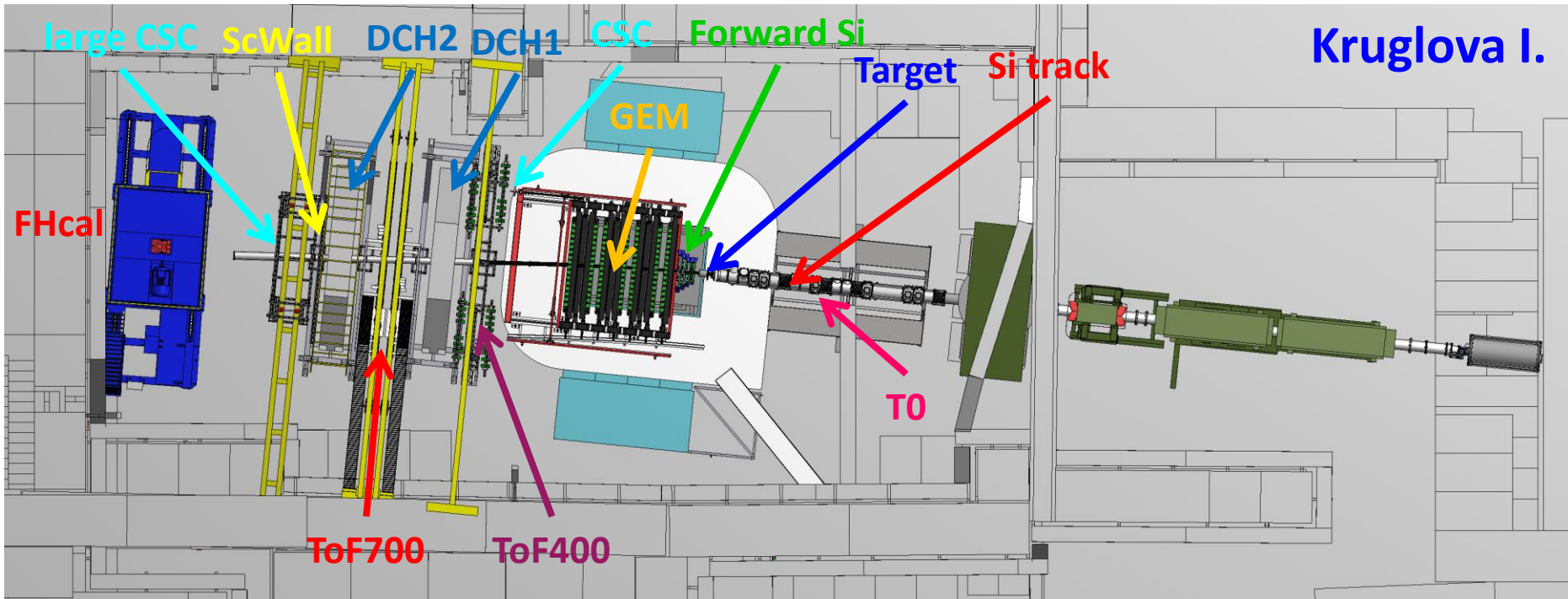


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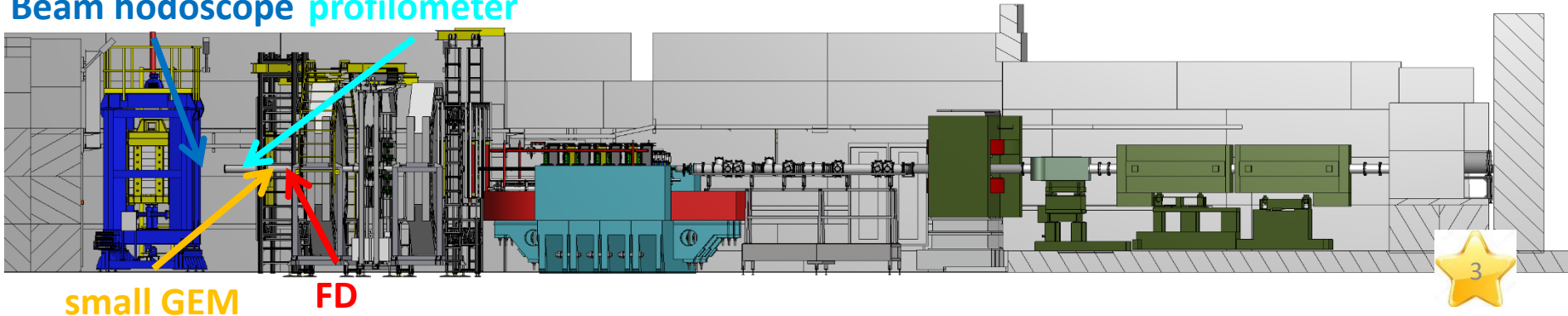


Detector installation in BM@N experimental hall for Xe run

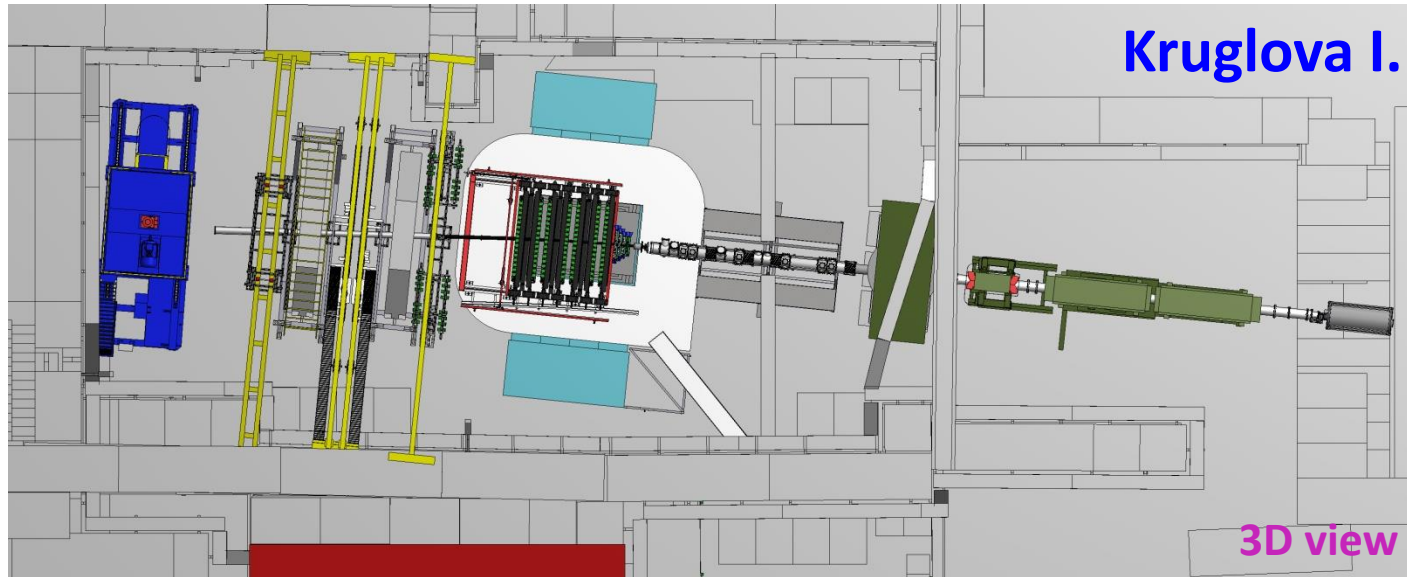


3D model of the entire experimental hall of BM@N

Beam hodoscope profilometer

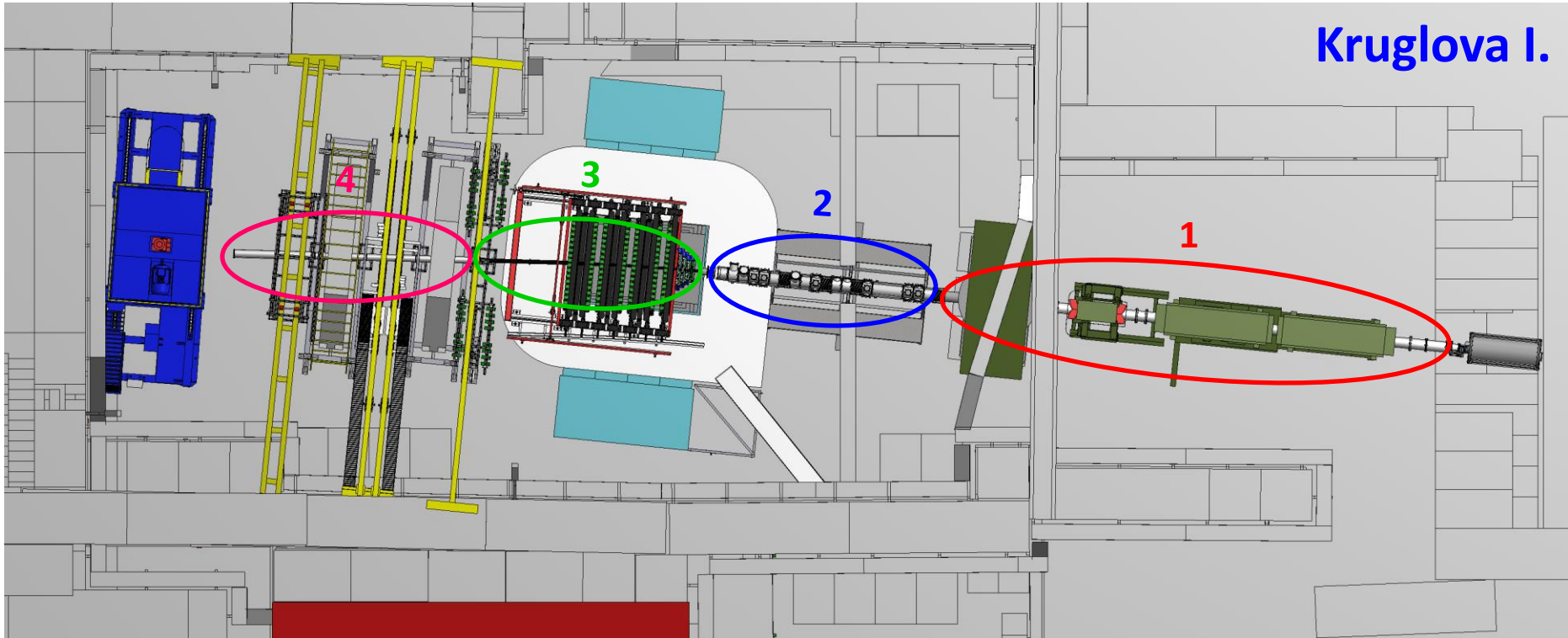


Detector installation in BM@N experimental hall for Xe run



4 segments of vacuum beam pipe in experimental hall of BM@N for Xe run

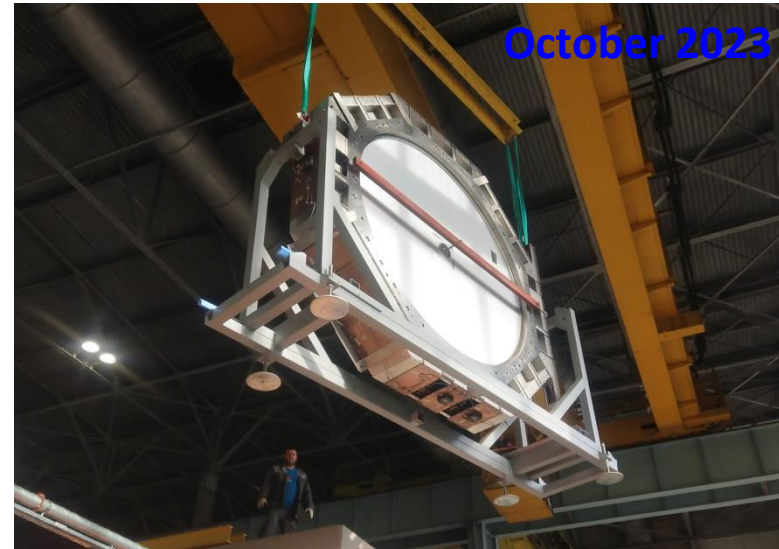
Kruglova I.



The vacuum beam pipe was also installed through all elements of the installation:

1. Beam pipe segment made of stainless steel;
2. Stainless steel beam pipe + 4 aluminum elements;
3. Carbon beam pipe;
4. Aluminum beam pipe.

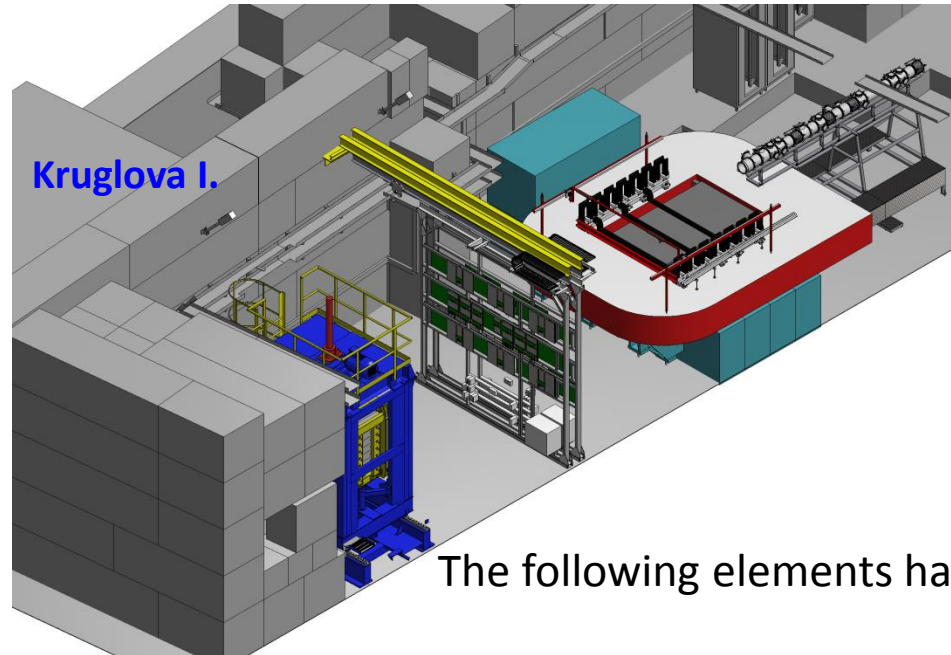
Dismantling the external tracking system after RUN8



Preparation for modernization of detectors

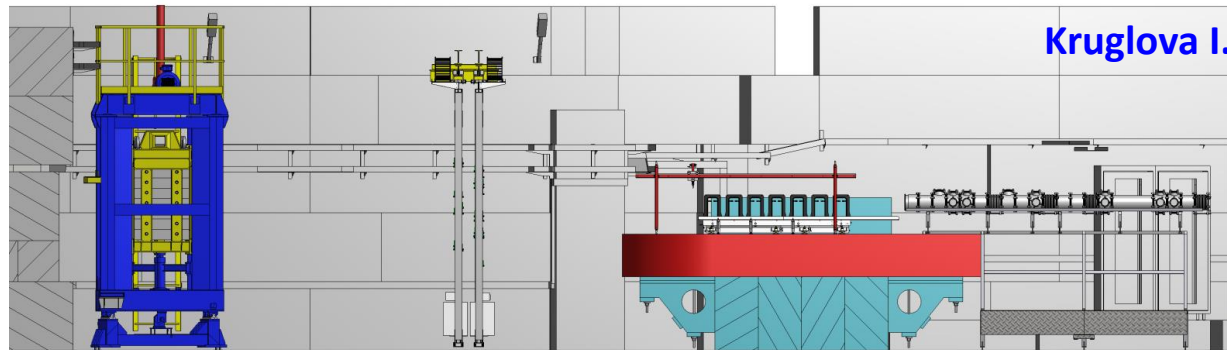
The following elements of the BM@N installation were removed after Run 8:

1. 4 detectors ToF400;
2. 4 detectors CSC 1x1m;
3. CSC 1,5x2m;
4. FD;
5. small Gem;
6. Aluminum beam pipe;
7. SiMD;
8. 8 planes forward Si;
9. 14 Gem;
10. Carbon beam pipe;
11. DCH1;
12. DCH2;
13. ScWall;
14. Target Station.



The following elements have not been deleted:

1. BC1;
2. BC2;
3. VC;
4. Barell;
5. ToF700;
6. BH;
7. FHcal.

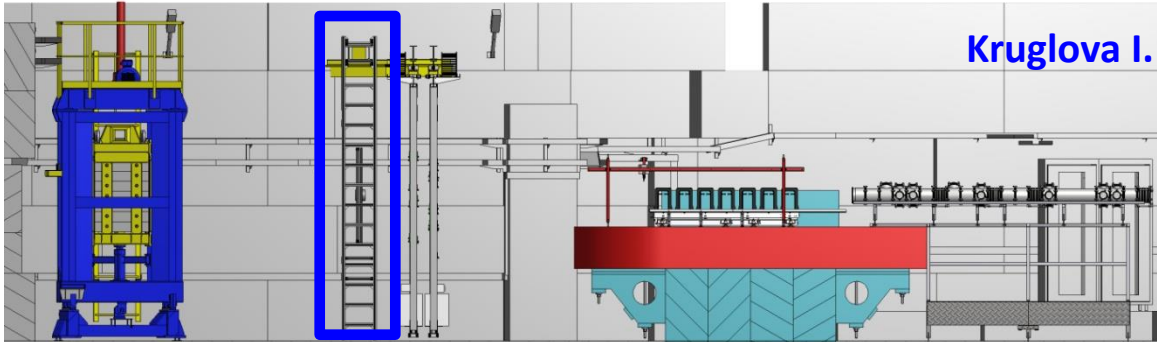


Installation of ScWall detector

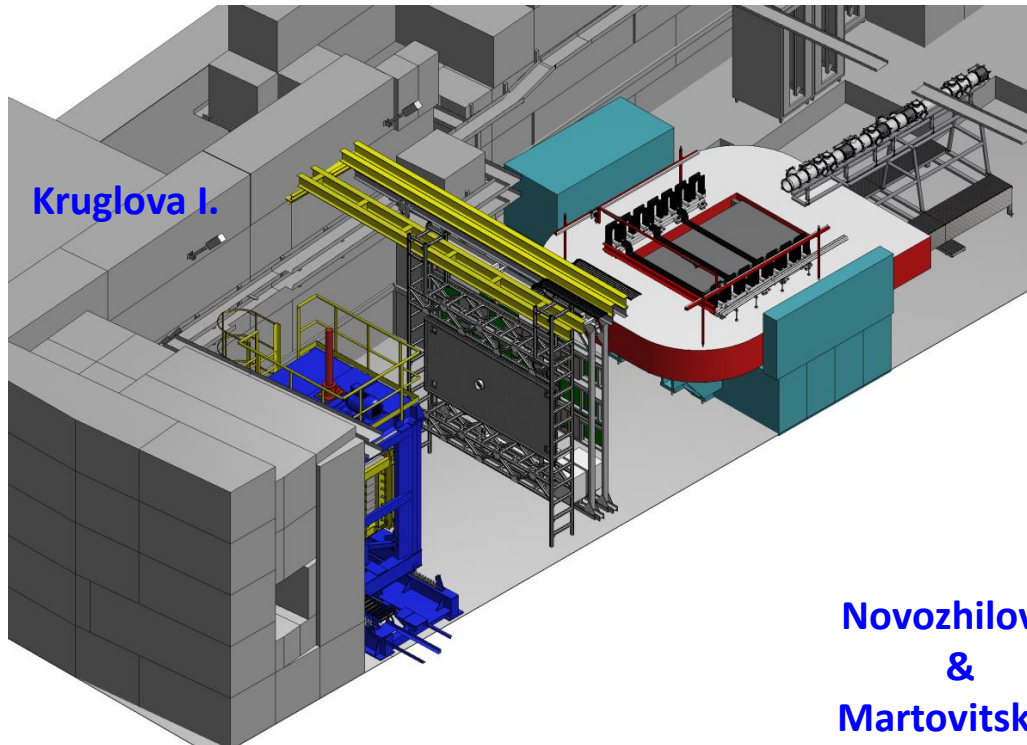
The following mechanical support elements have been prepared:

1. Mechanical support materials: **Yes**
2. Supporting structure for mechanical support : **Yes**
3. Brackets for fastening the supporting structure : **Yes**
4. Mechanical Support Project: **Yes**
5. The detector is ready for installation: **Yes**

ScWall is completely installed in the experimental hall now



Kruglova I.



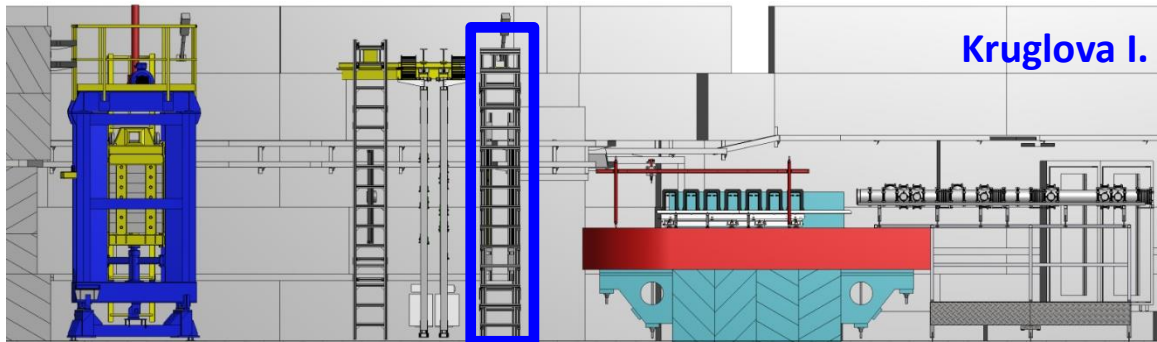
Kruglova I.

Novozhilov S.
&
Martovitsky E.



Installation of 2 CSC big detectors

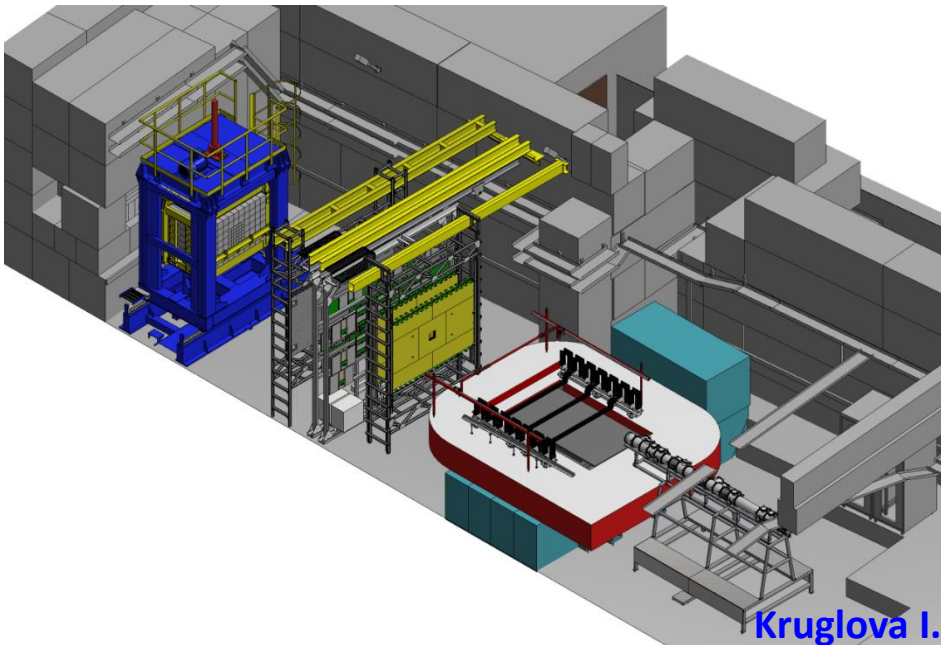
The following mechanical support elements have been prepared:



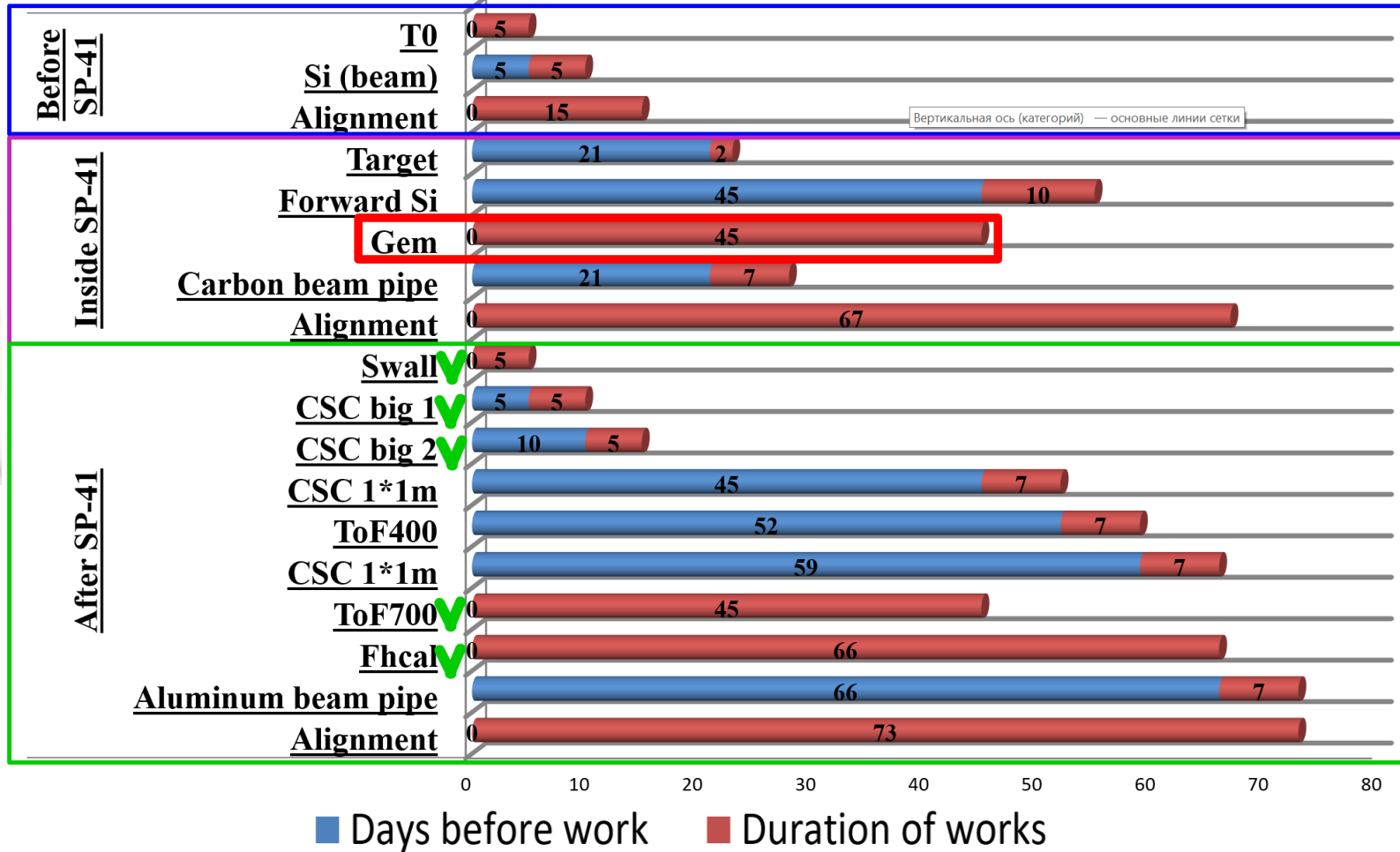
1. Mechanical support materials: **Yes**
2. Supporting structure for mechanical support : **Yes**
3. Brackets for fastening the supporting structure : **Yes**
4. Mechanical Support Project: **Yes**
5. The detector is ready for installation: **Yes**

2 CSC big are completely installed in the experimental hall now

Novozhilov S.
&
Martovitsky E.



Installation timetable



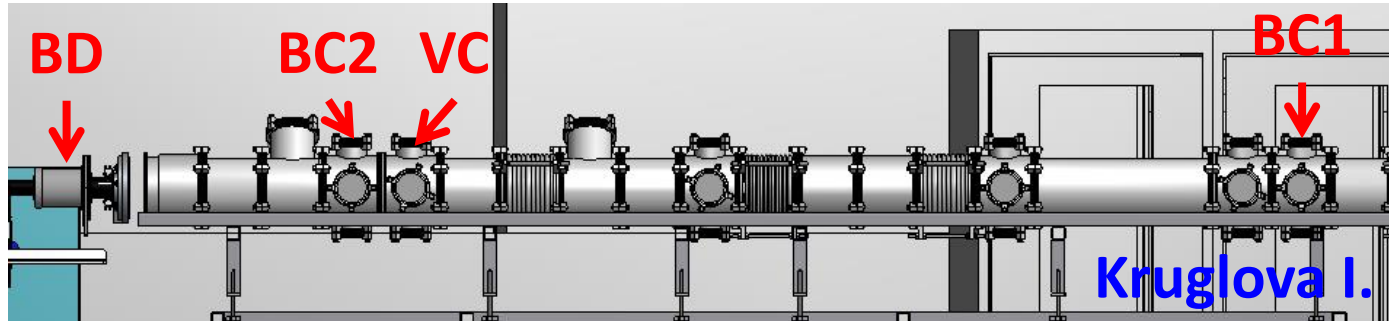
The table is divided into 3 zones.

In zone 3, work can be carried out in parallel.

But work on installing TOF 400 and Gem can only be carried out one after the other.



Beam pipe upstream the SP-41 Trigger detectors

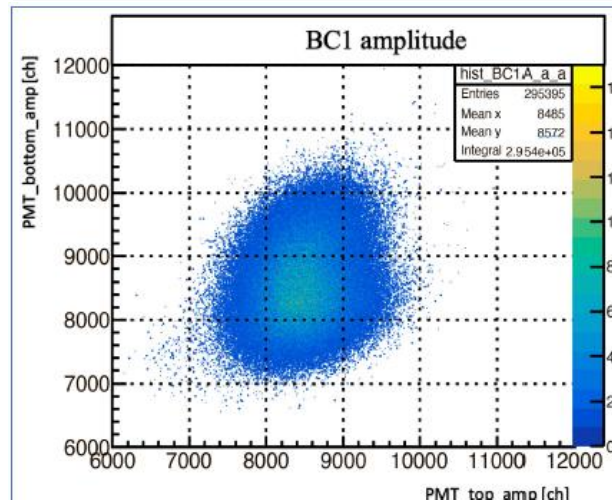


The position of the trigger detectors in a complete vacuum beam pipe configuration

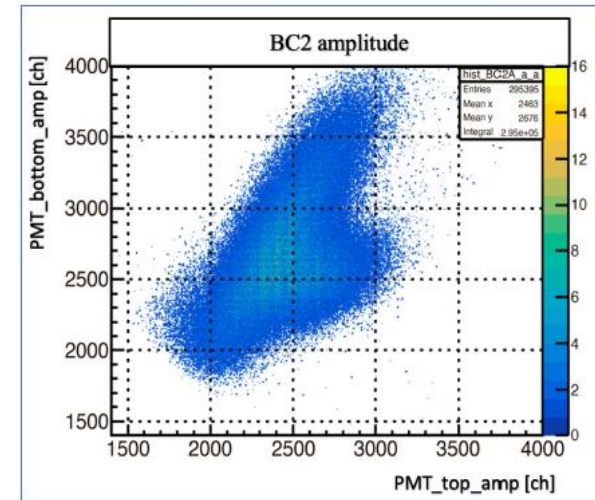
All elements counter **BC2**



Amplitude correlation from
two PMTs **BC1** counter

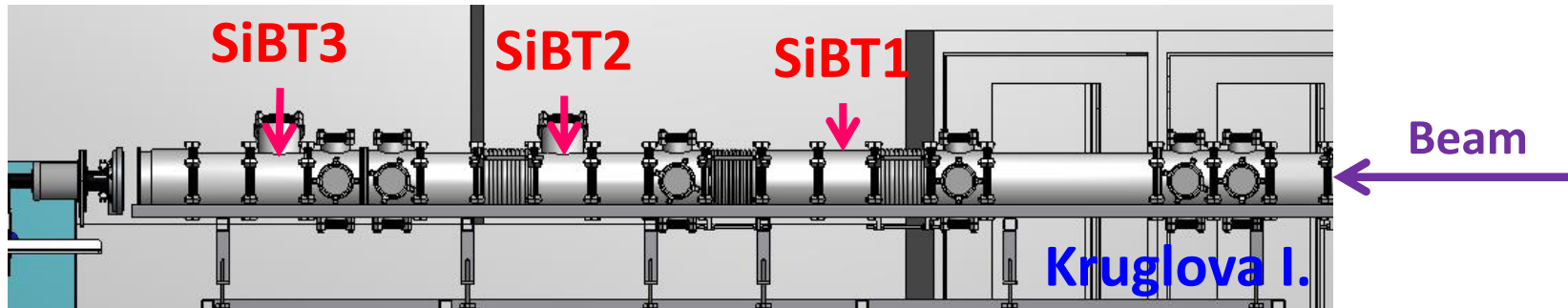


Amplitude correlation from
two PMTs **BC2** counter

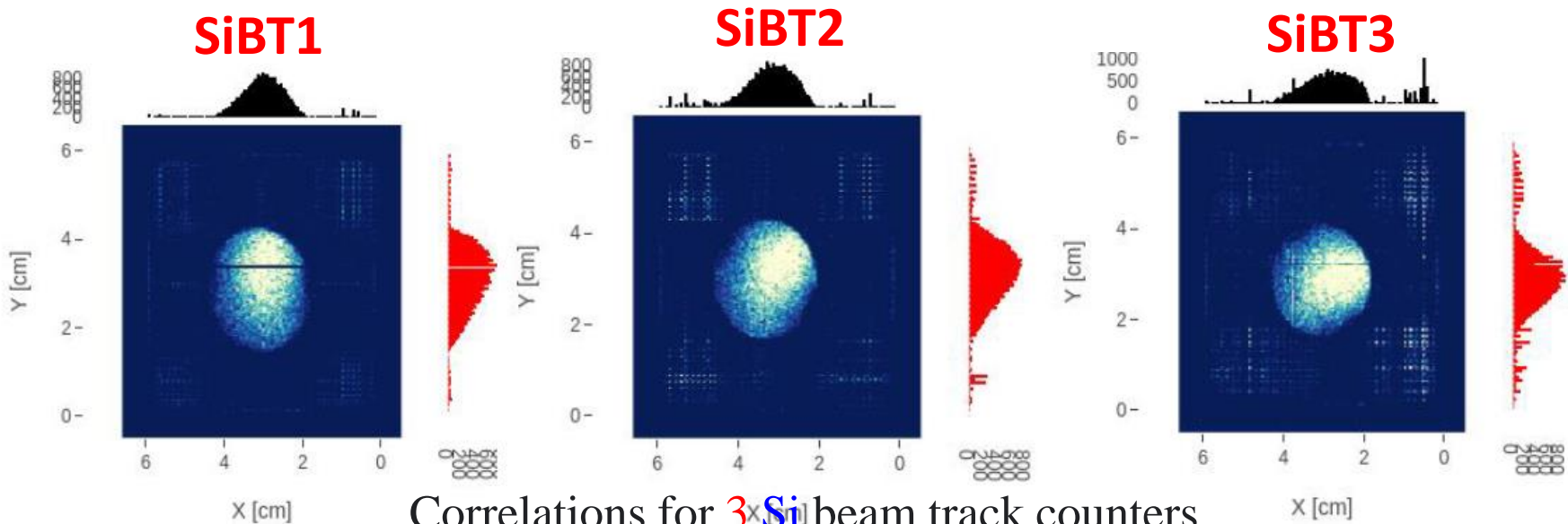


S.Sedykh & V.Rogov will talk in more detail about the operation of trigger detectors

Beam pipe upstream the SP-41 Si Beam Tracker detectors



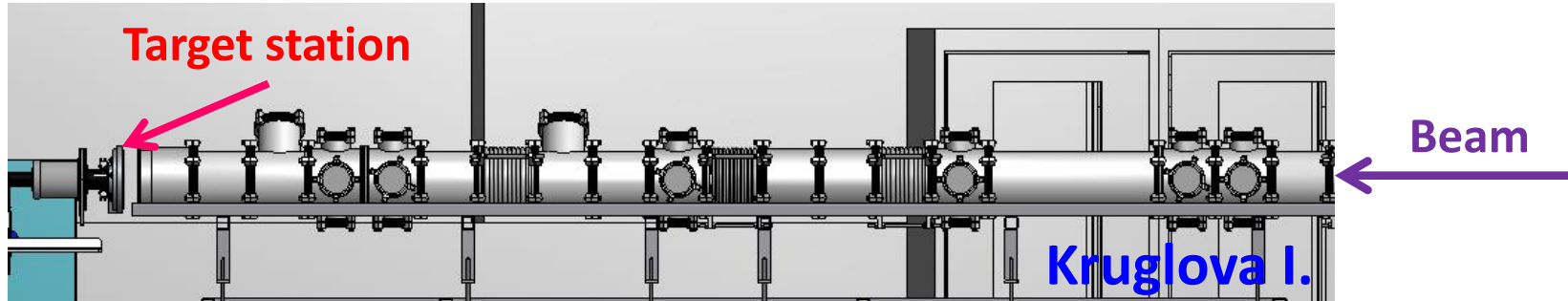
The position of the Si beam track counters in a complete vacuum beam pipe configuration



Correlations for 3x Si beam track counters

D.Chemezov will talk in more detail about the operation of
Si beam tracker detectors

Beam pipe upstream the SP-41 Target Station



The position of the Target Station in a complete vacuum beam pipe configuration

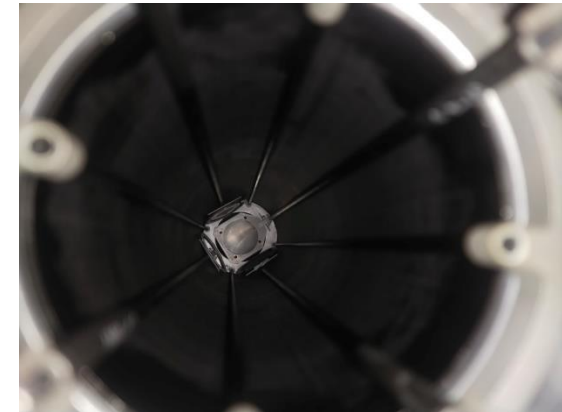
Target station with **pneumatic motors**:

3 target + 1 without target for evaluating background;

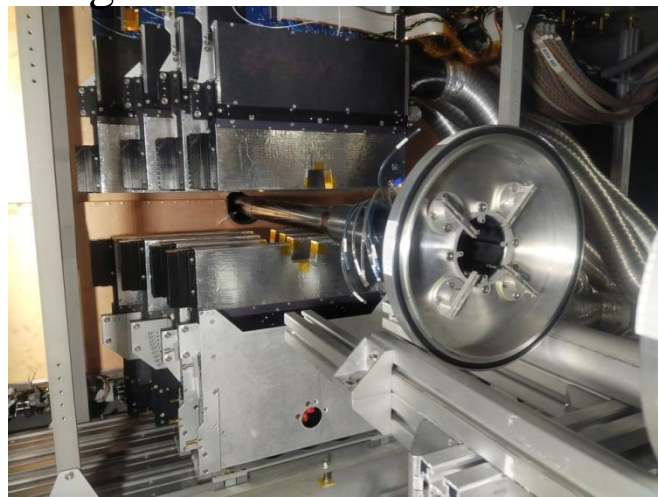
Drive: pneumatic motors;

Target elements: use with non-magnetic materials;

Target installation control: **KTIR0411S** optocoupler (4 pcs.).

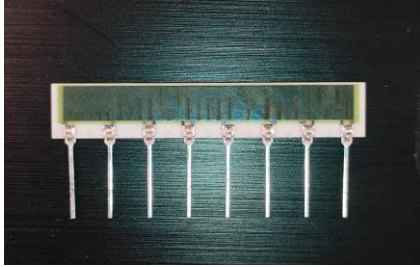


Currently, the design of a target assembly made of heat-conducting materials in the same design is being discussed.

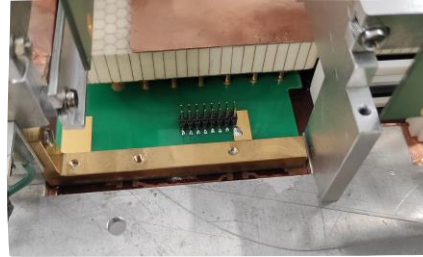


GEM modernization

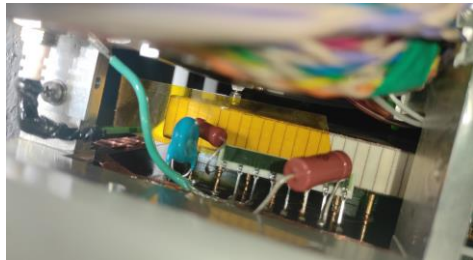
Divider old configuration



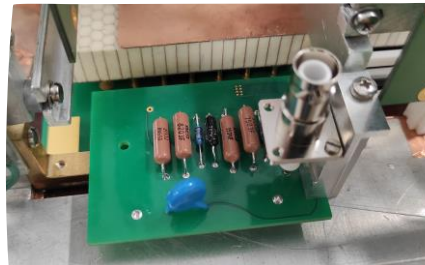
The board on the detector



Location of the old divider on the Gem detector



Divider new configuration



High voltage pin new configuration

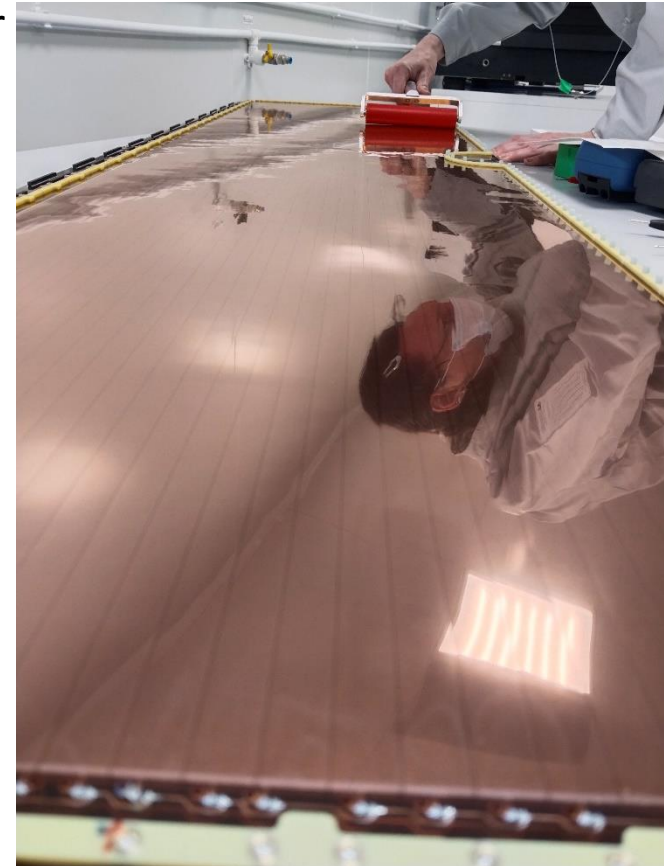
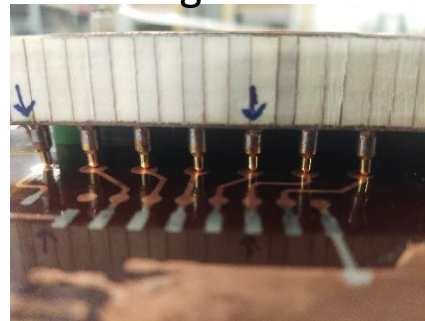
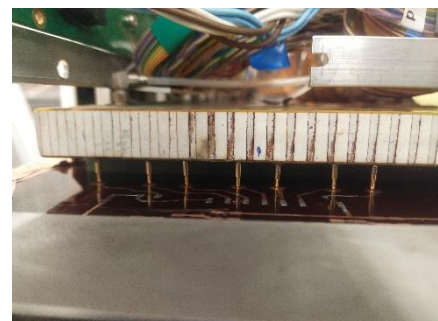


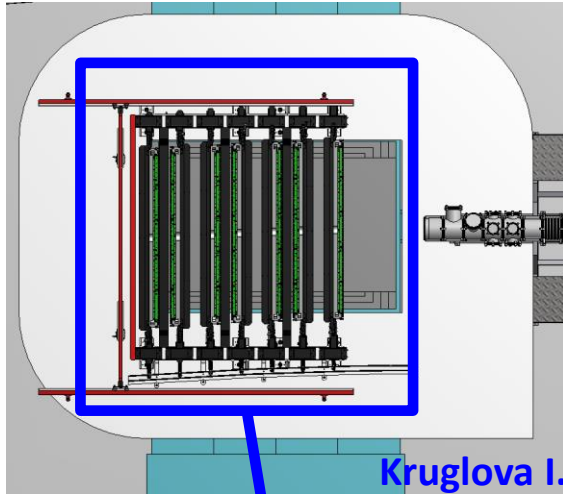
Photo of Gem repair

High voltage pin old configuration

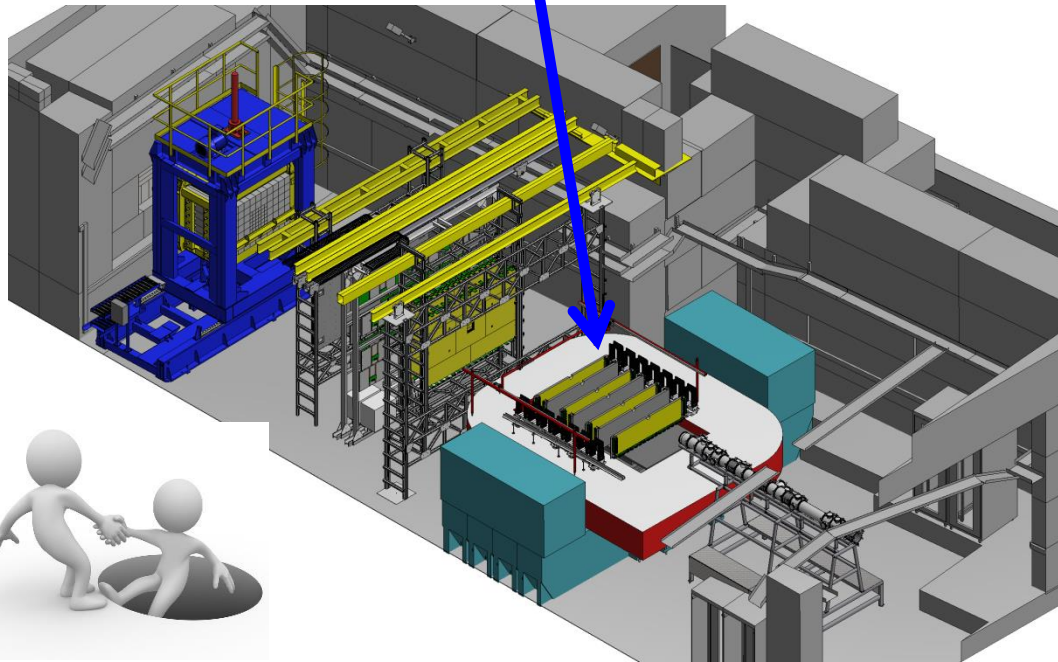


E. Kulish will talk in more detail about the operation of Gem detectors.

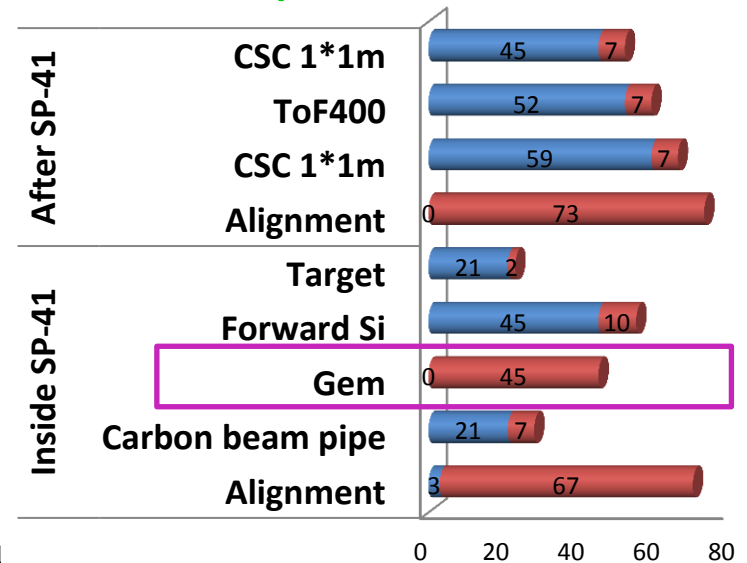
Installation of 7 GEM detectors



Kruglova I.



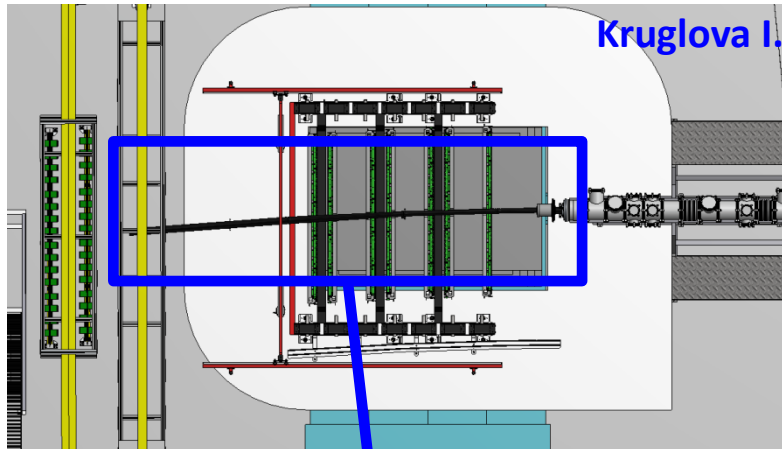
1. Mechanical support : **Yes**
2. The detector is ready for installation: **No**
(Modernization now)



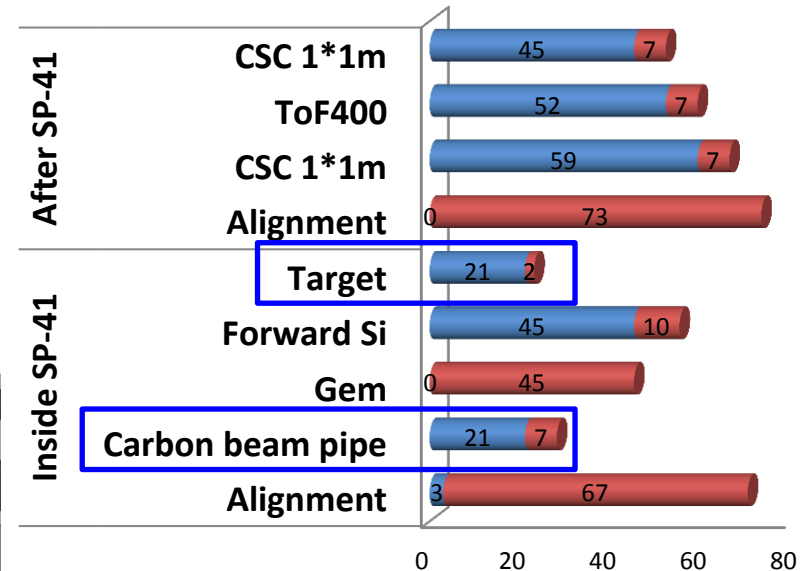
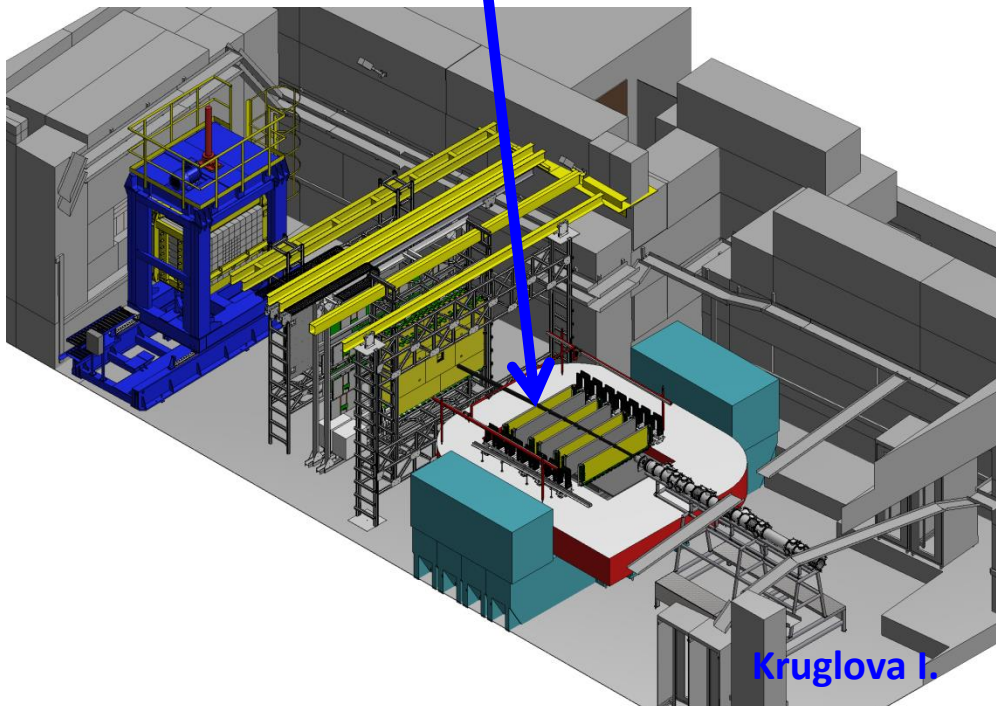
Only after installing all **Gem** will we be able to complete the installation of **CSC** and **TOF400**

We will begin installing detectors once the high power system is fully upgraded. (about **28.05.2024**)

Installation of carbon beam pipe & target station



1. Carbon beam pipe is ready for installation: **Yes**
2. Target station is ready for installation : **Yes**



We will start installing the target station and carbon tube after installing the 7 bottom Gem detectors.

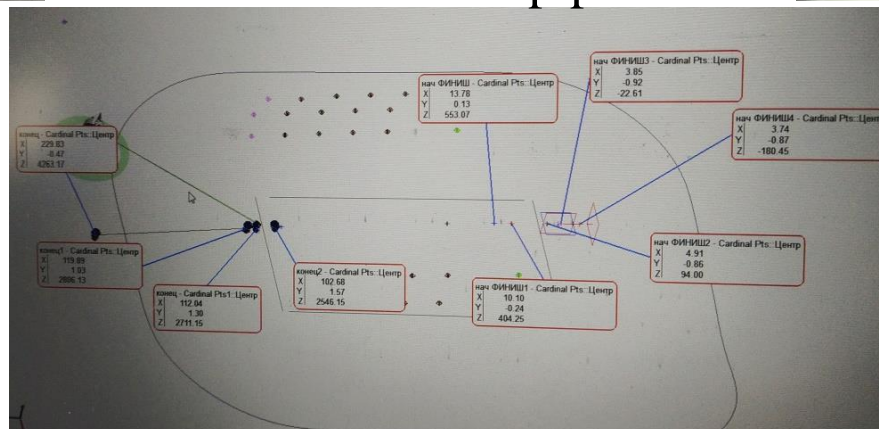
Installation of carbon beam pipe before RUN8



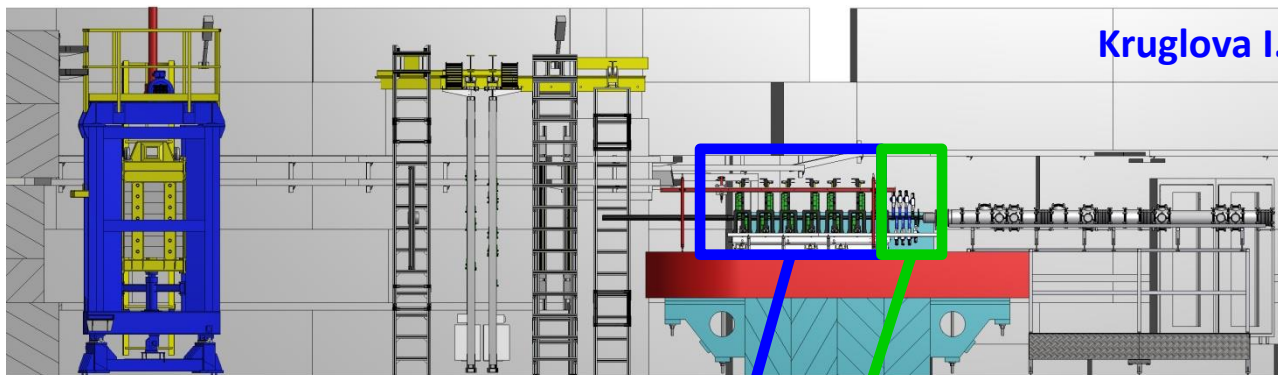
The position of the carbon beam pipe with installed lower Gem detectors before RUN8



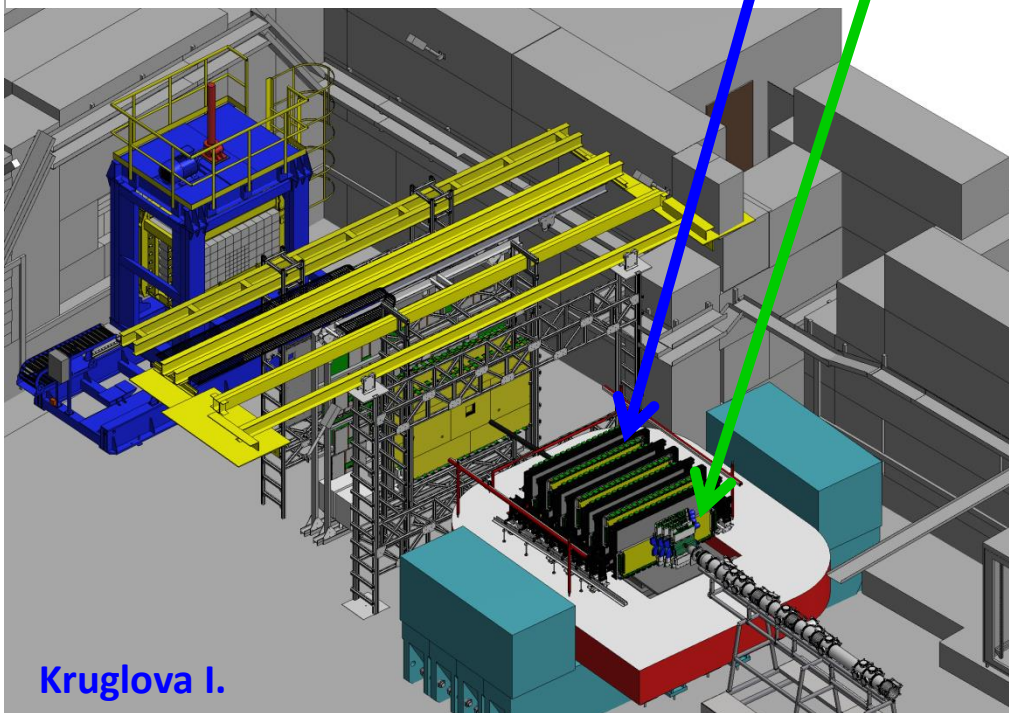
The moment of adjustment of the carbon beam pipe



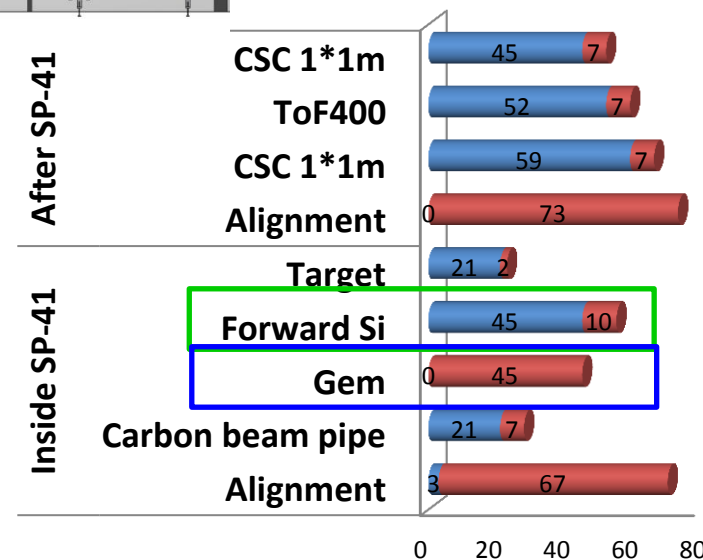
Installation of 7 GEM detectors & Forward Si



Kruglova I. We will start installing the 7 top Gem detectors after installing the carbon beam pipe and target station.



Kruglova I.

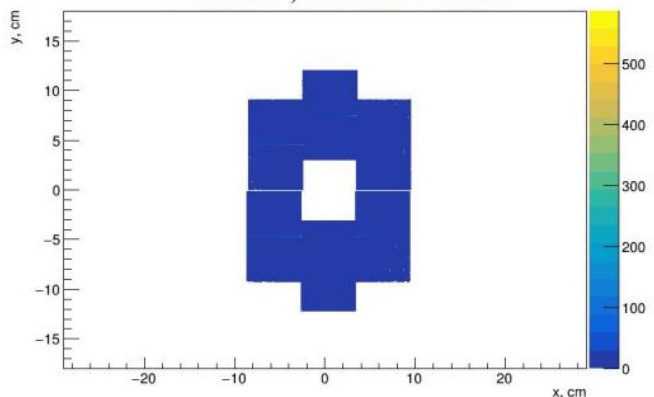


After installing all Gem detectors, Forward Si will be installed.

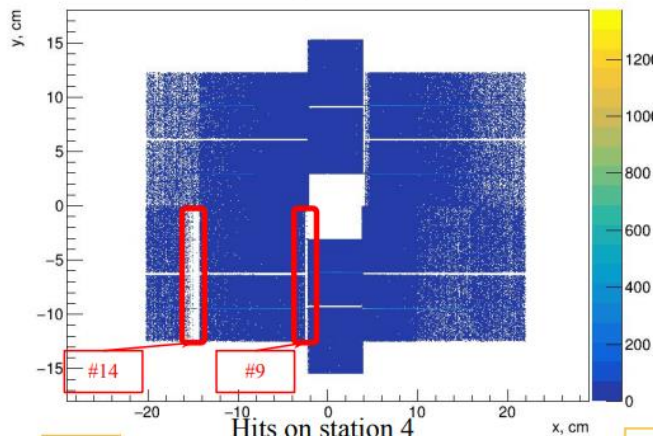
Forward Si modernization

FSD: before replacing

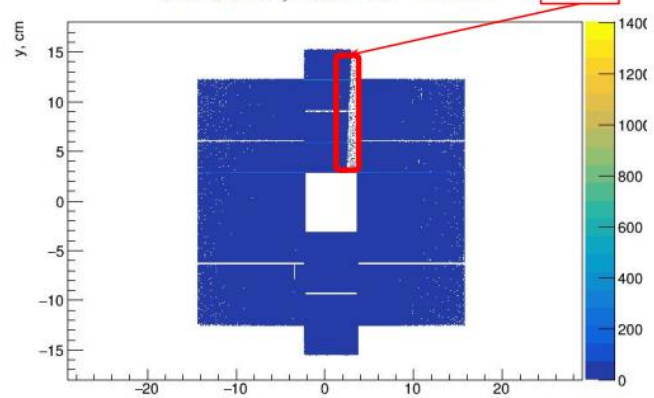
Hits on station 1
6 modules, DSSD $63 \times 93 \text{ mm}^2$



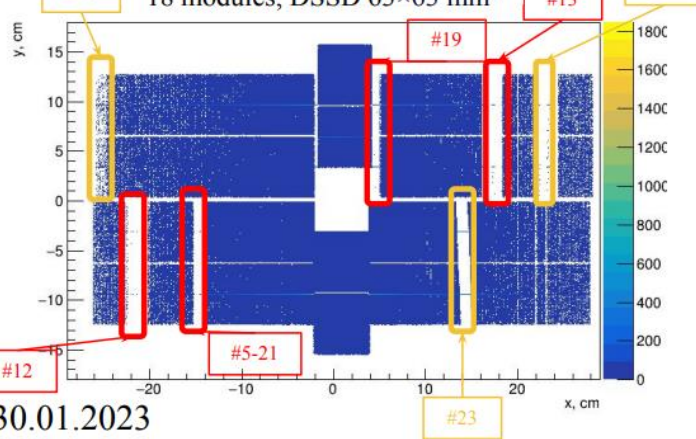
Hits on station 3
14 modules, DSSD $63 \times 63 \text{ mm}^2$



Hits on station 2
10 modules, DSSD $63 \times 63 \text{ mm}^2$



Hits on station 4
18 modules, DSSD $63 \times 63 \text{ mm}^2$



Summary:
10 dead zones, 3 were discovered before the run and 7 occurred during the run

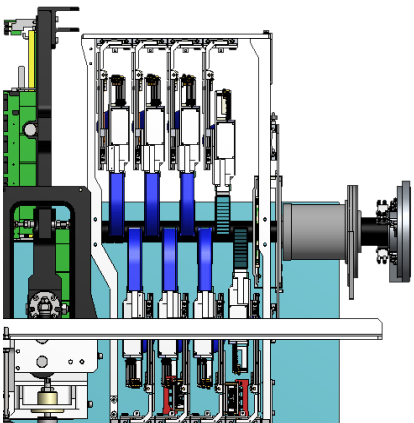
Run 8305, 30.01.2023

Forward Silicon experts are currently looking into underperforming sectors.

O.Tarasov will talk in more detail about the operation of Forward Si detectors

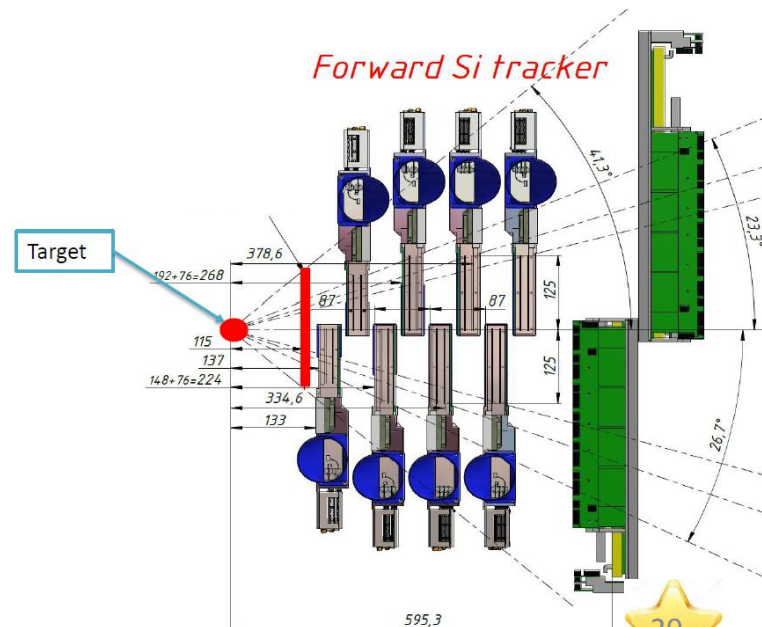
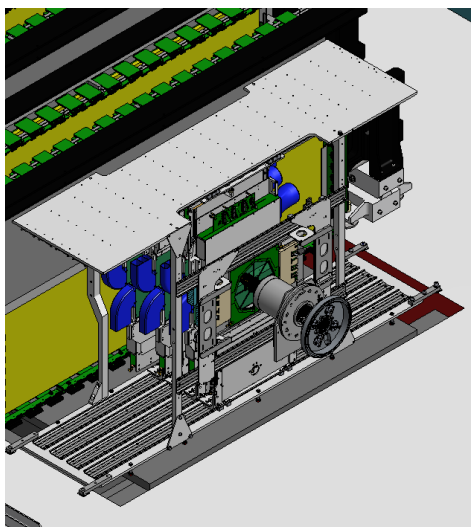
Installation of Forward Si detectors

O.Tarasov will talk in more detail about the operation of Forward Si detectors

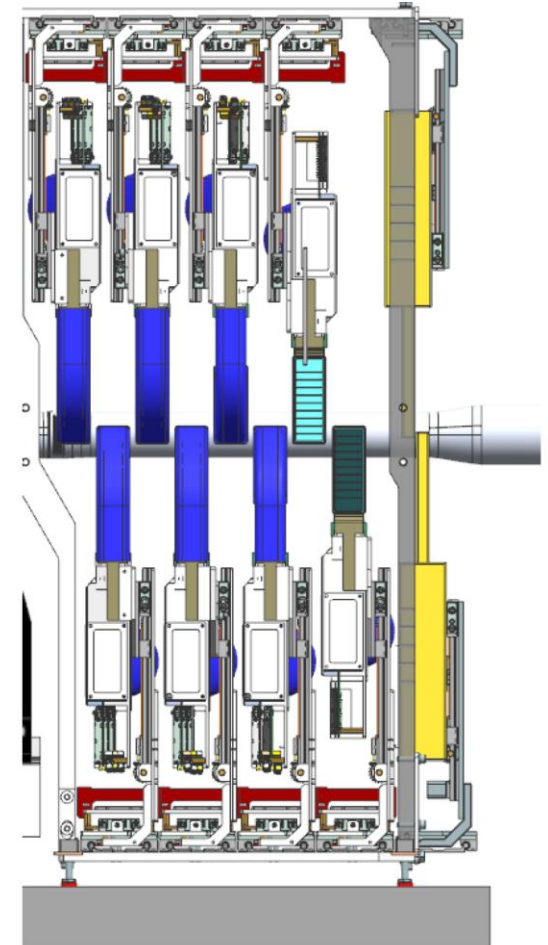
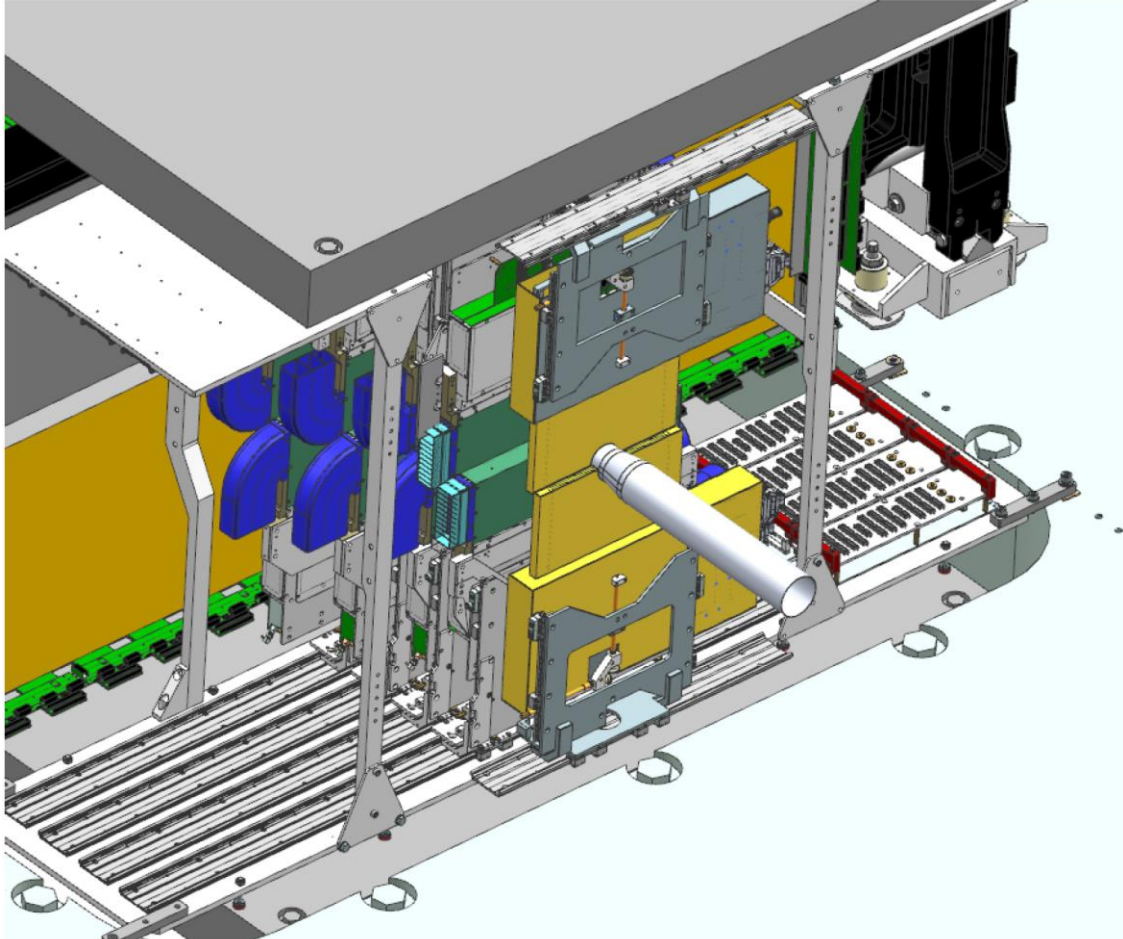


Forward SI installed in BM@N

3D view of Forward Si



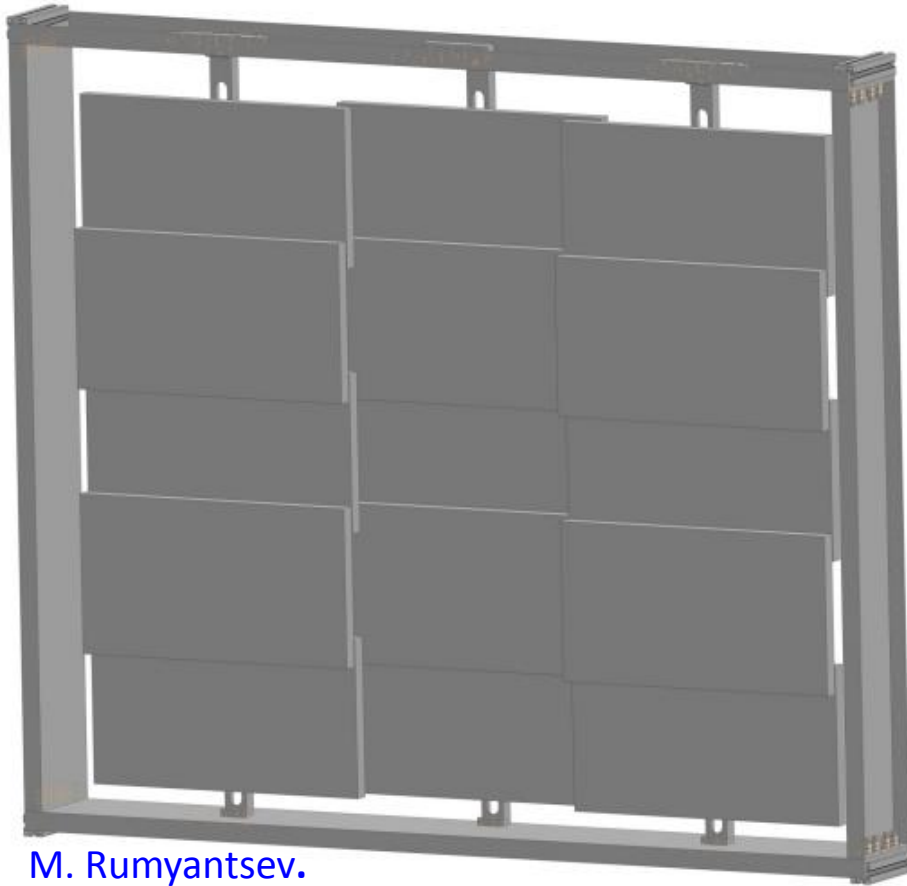
Installation of Si-station based on STS modules



D. Dementev will talk in more detail about the operation of Si-station

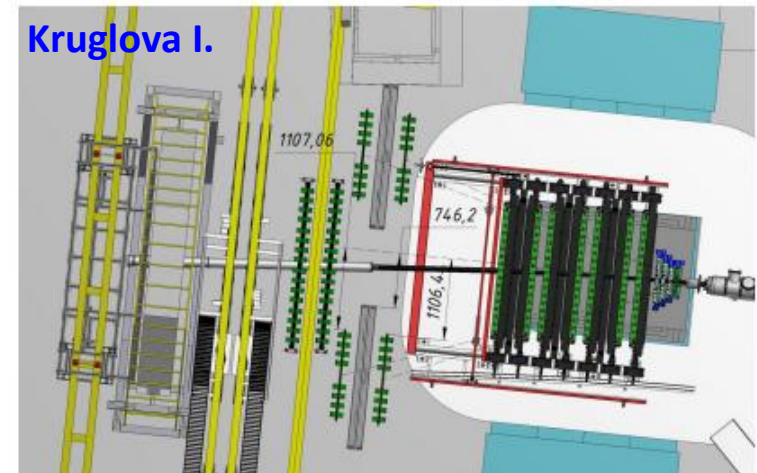
ToF400 modernization

We decided to expand ToF400 acceptance.
To do this we will have to change the detector boxes.



Box size - $\sim 1,5 \times 1,8 \text{ m}^2$
Material — aluminium
Minimizing material budget near to beam axis

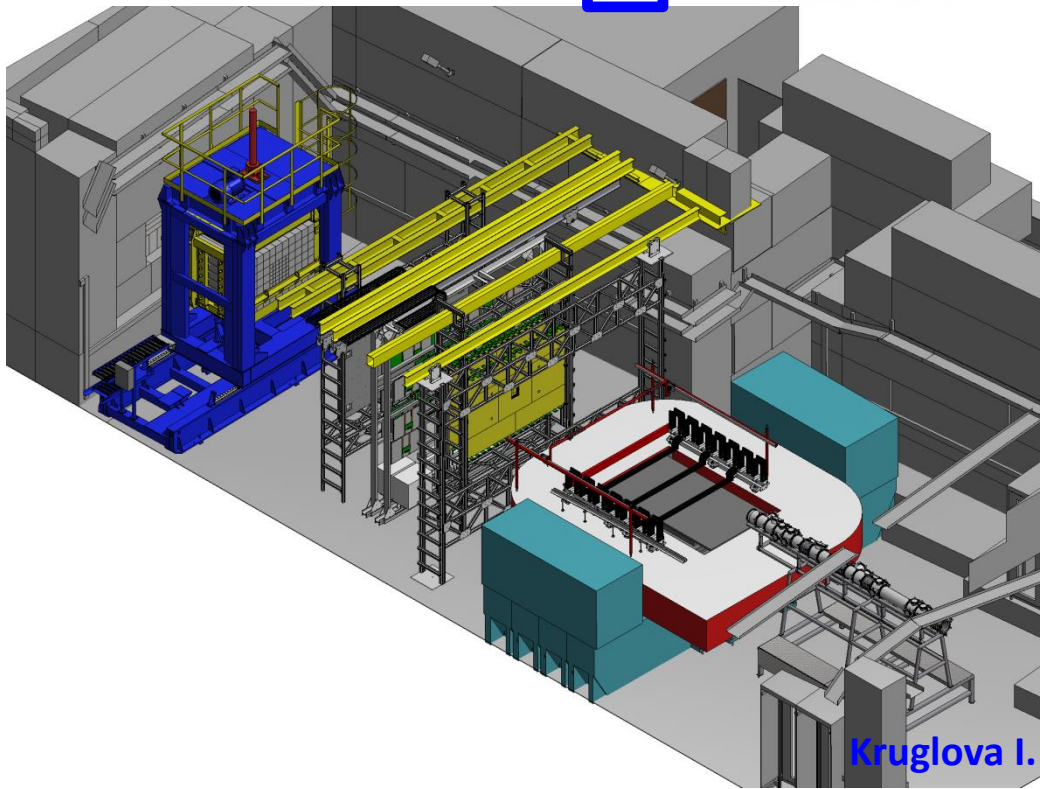
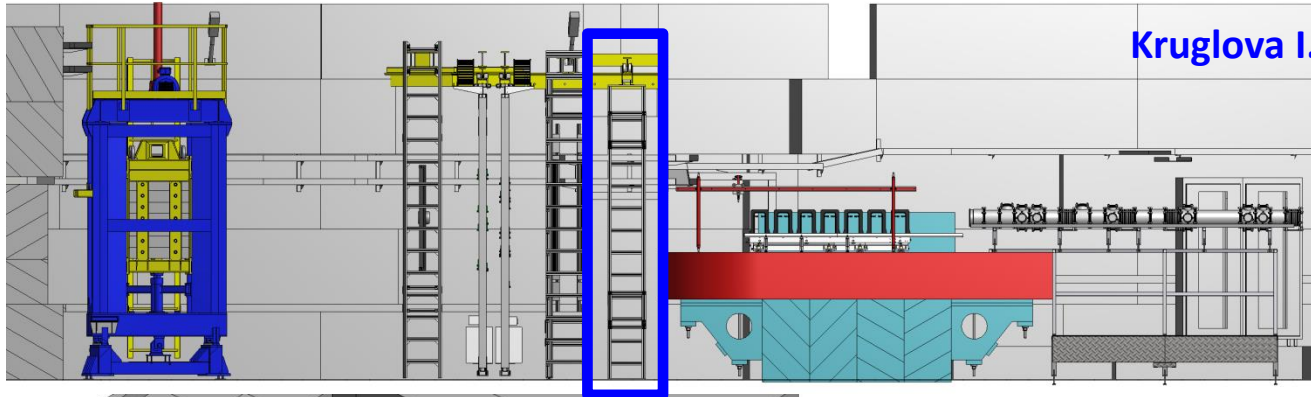
The aluminum box guides are currently fully manufactured



M. Rumyantsev.

Assembled detectors will be ready by **15 September 2024**

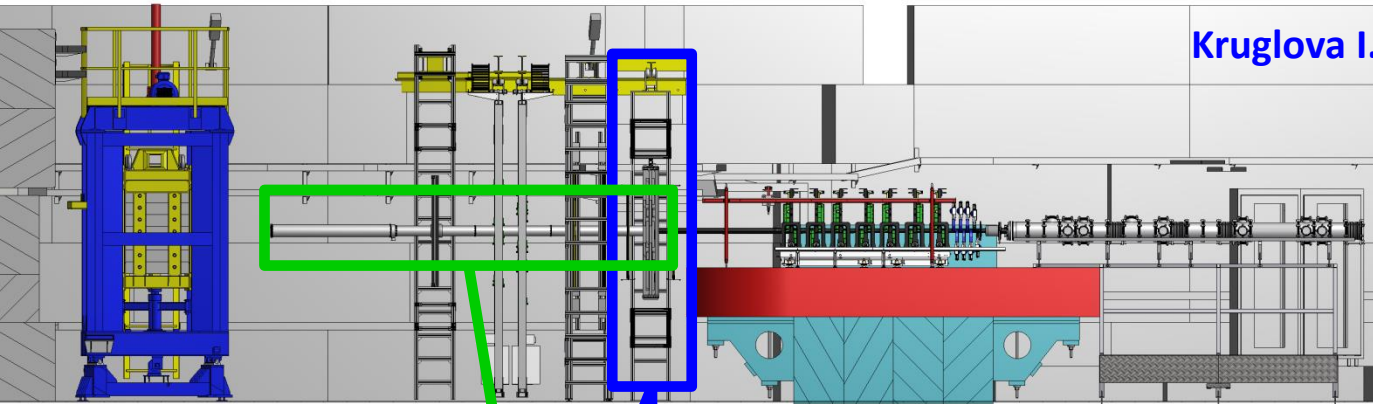
Installation of 2 new ToF400



1. Mechanical support materials: **Yes**
2. Supporting structure for mechanical support : **Yes**
3. Brackets for fastening the supporting structure : **Yes**
4. Mechanical Support Project: **Yes**
5. The detector is ready for installation: **No (Modernization now)**

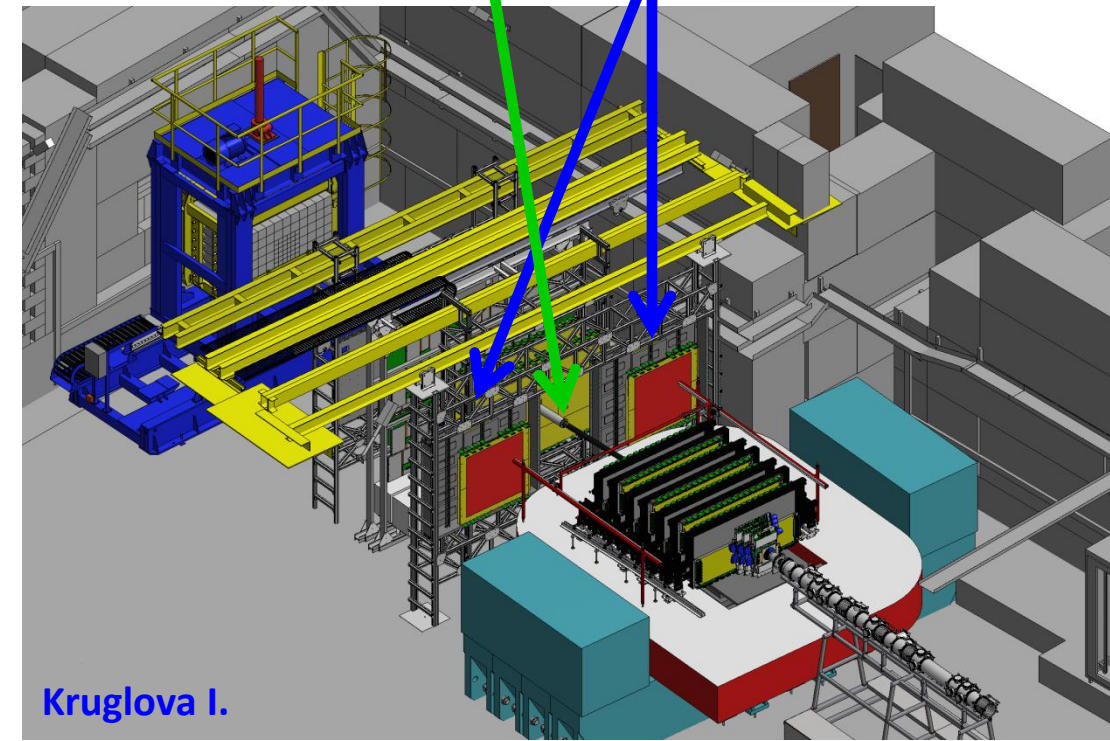
Mechanical support for new ToF400 modules installed in the experimental hall

Installation of 2 ToF400 & 4 CSC & aluminum beam pipe

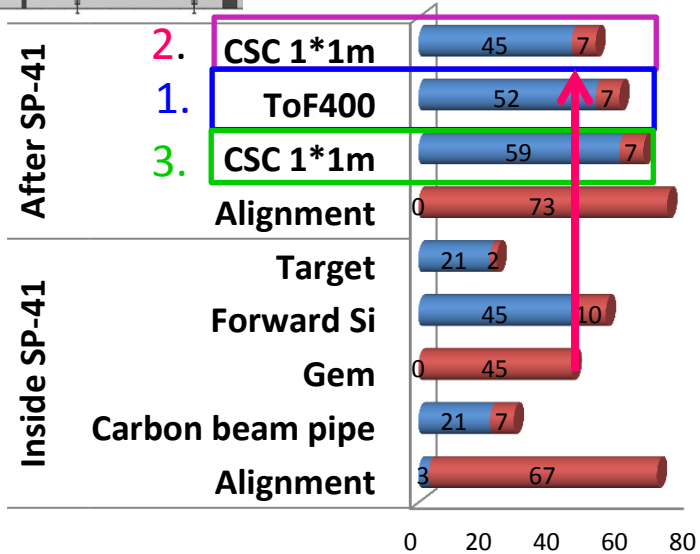


Kruglova I.

1. After installing all Gem detectors, 2 new ToF400 will be installed.
2. The next stage will be the installation of 4 CSC 1x1 m.

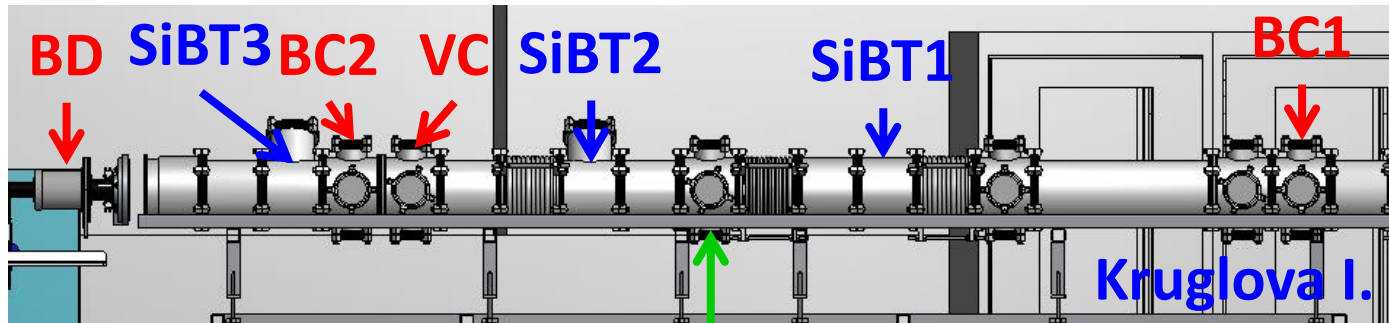


Kruglova I.



We will be able to install the last 4 CSC only after the 2 ToF400 detectors are fully installed.

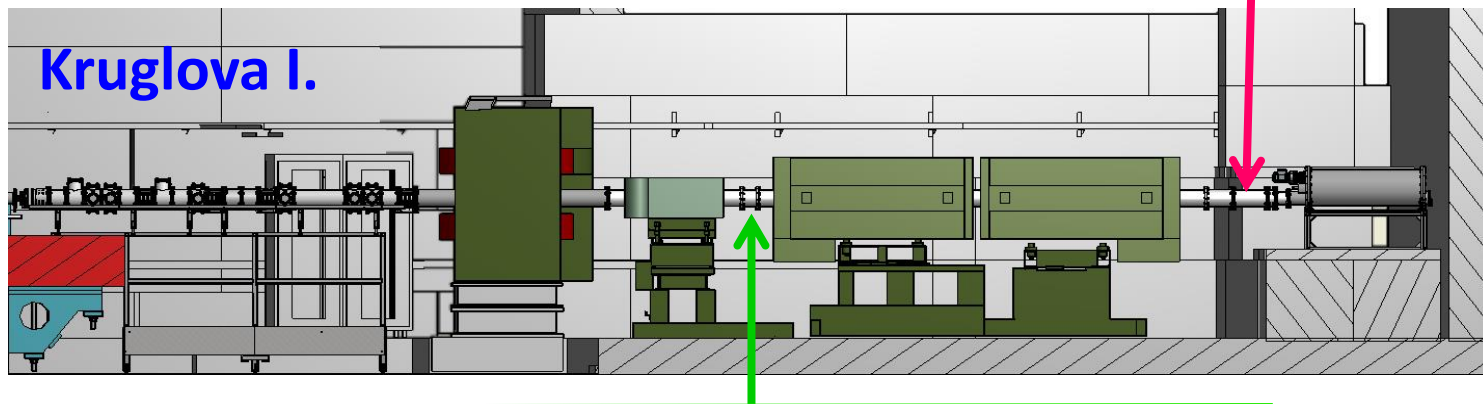
The location of new vacuum boxes to the target of the BM@N setup



Box for profilometer size 128x128mm

The contract for the production of this box has already been drawn up.

box for scintillation detector

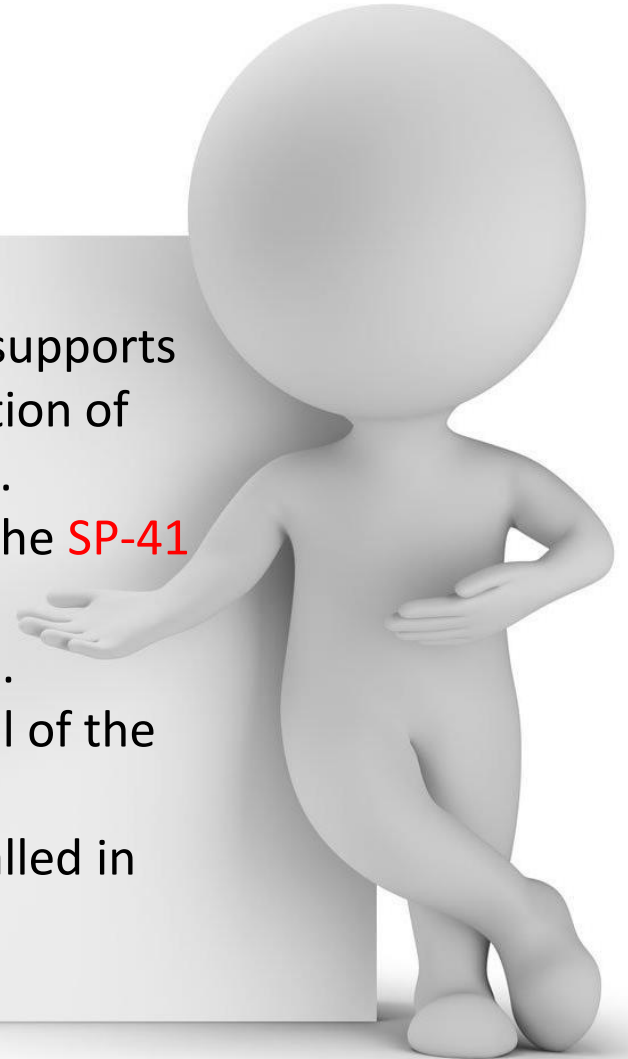


Box for profilometer size 200x200mm

Discussions are currently underway regarding the design and preparation of technical specifications for the manufacture of these boxes.

Conclusions

1. All work on the design and creation of mechanical supports was completed, taking into account the modernization of the external track system of the BM@N installation.
2. The installation of a central tracking system inside the SP-41 magnet will begin after the completion of the modernization process of the detectors themselves.
3. ScWall & 2 big CSC installed in the experimental hall of the BM@N installation.
4. Mechanical support for 2 new ToF400 & 4 CSC installed in the experimental hall.





**THANK YOU
FOR YOUR
ATTENTION**

