Detector installation, experimental zone

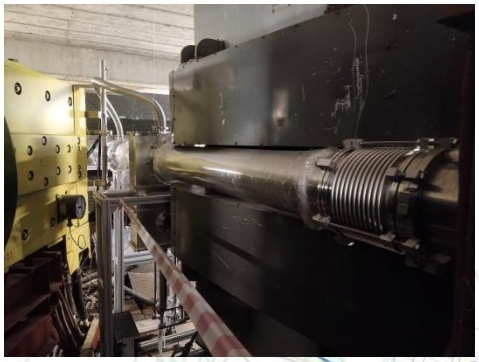
Piyadin S.M.

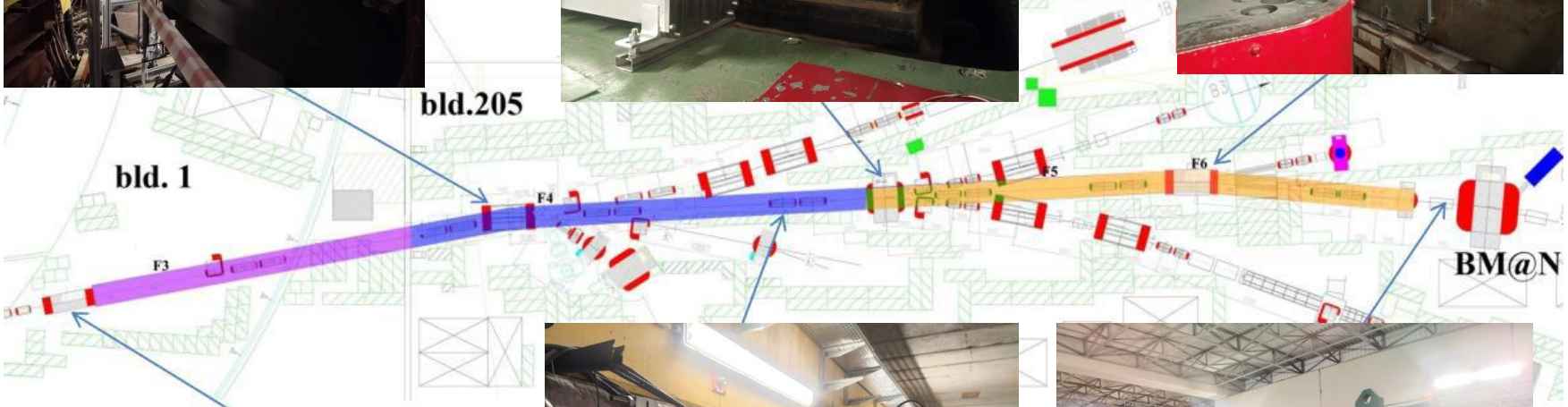
13.09.2022

Development of the ion beam pipe from Nuclotron to BM@N

S. Yu. Anisimov

LLC "Vacuum systems and technologies"





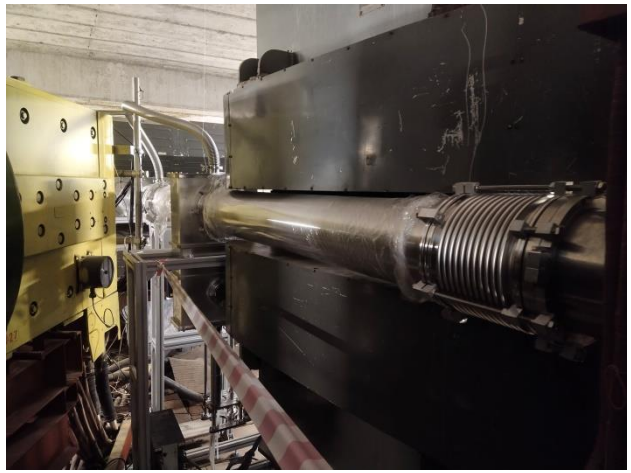
7 pairs of quadruple lenses; 6 magnets; 9 ion beam profilometers

Development of the ion beam pipe from Nuclotron to BM@N

Main elements of the beam pipe:

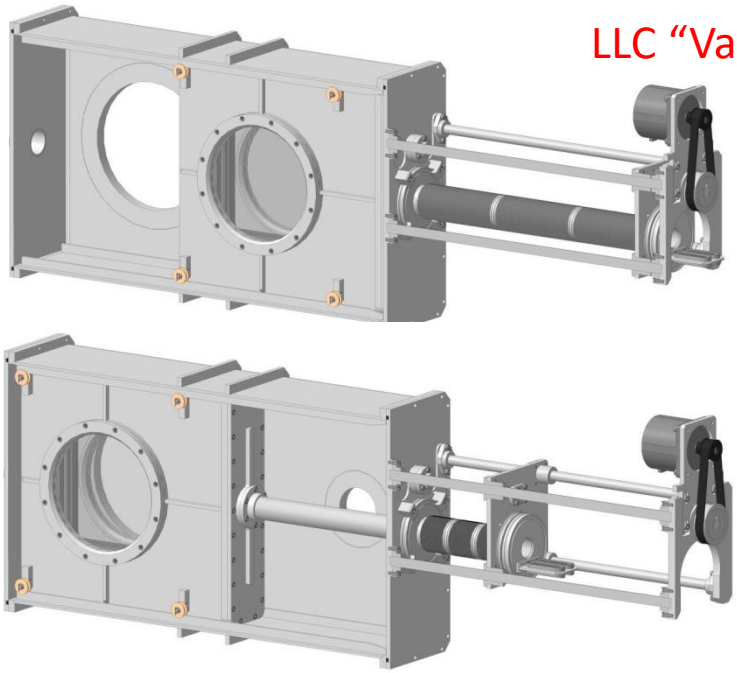
- Vacuum compatible tubes with ISO200 flanges (the total length is about of 63 m)
- Ion beam profilometers (9 pcs)
- Vacuum boxes for magnets (4 pcs)
- Vacuum pump stations based on roots vacuum pumps (6 pcs)
- Vacuum gate valves (14 pcs)
- Vacuum radiation resistant gauges with controllers (21 pcs)
- Support stages for the ion beam pipe elements (29 pcs)

100% of the elements are produced; 90% of the beam pipe is assembled and tested.

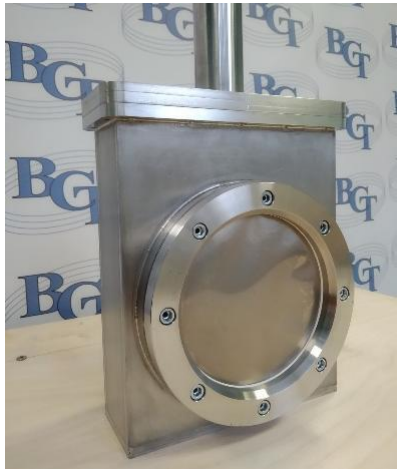


The vacuum compatible ion beam profilometers

S.Yu. Anisimov
&
LLC “Vacuum systems and technolog



Vacuum box with the beam profilometer: two positions of the profilometer.

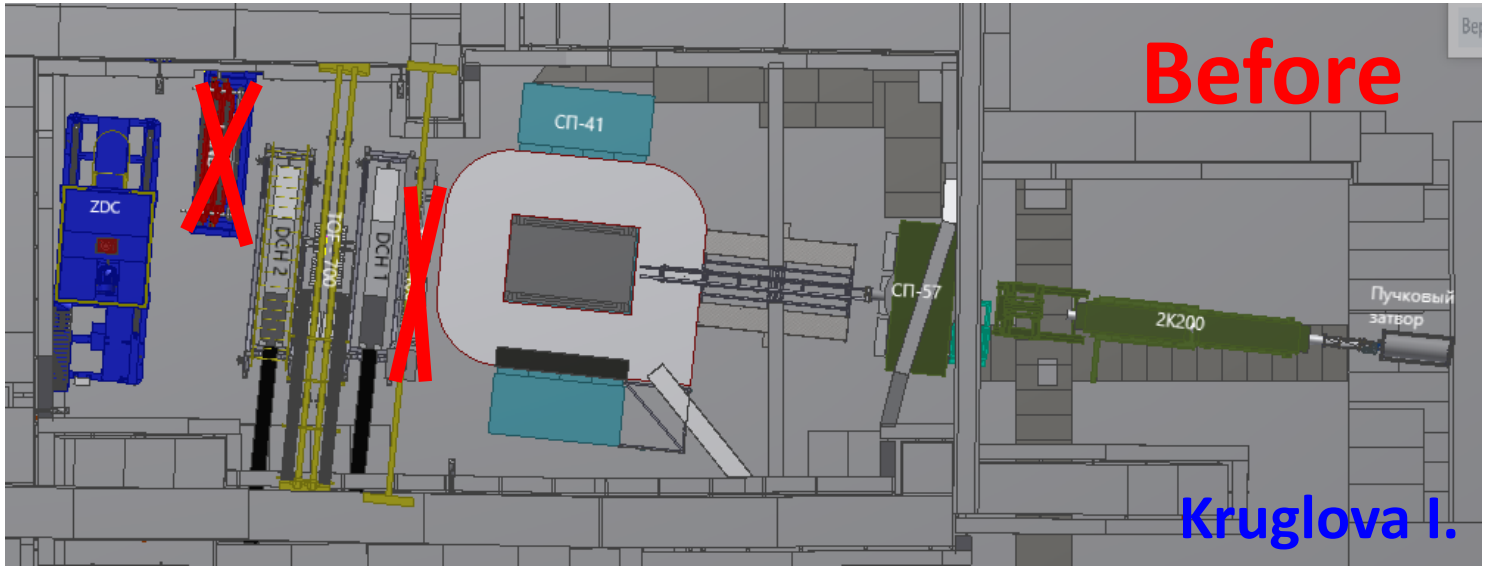


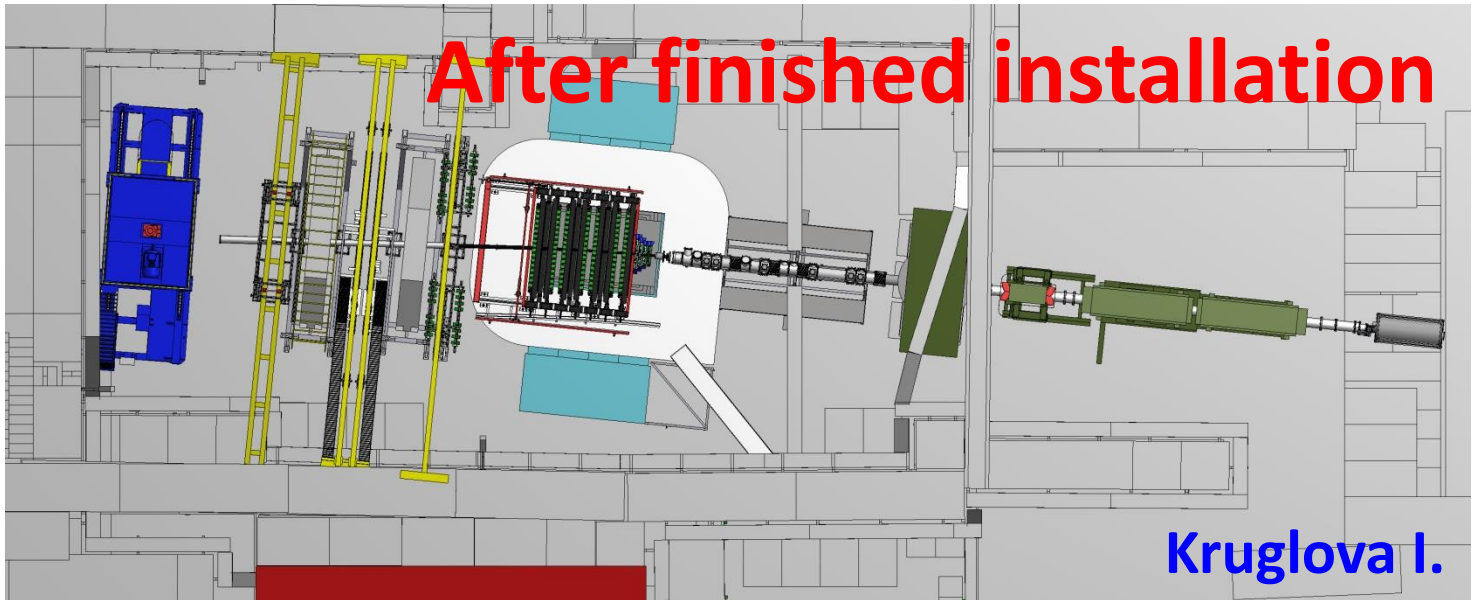
Vacuum body of the profilometer has a thin titanium window

Vacuum box with the beam profilometer instaled in chanell VP1

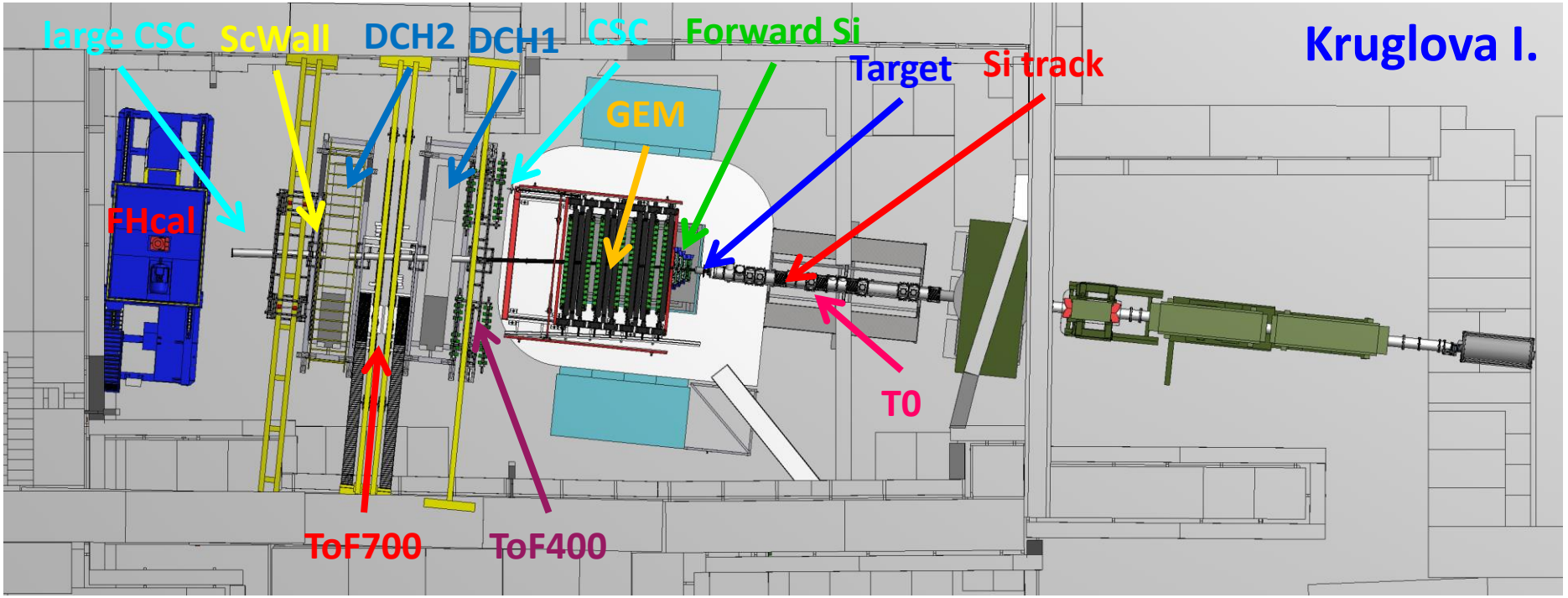
Current status: all part are ready. All detectors are ready. Beam test of all profilometers was performed the SRCrun. Profilometers are being installed.

Detector installation in BM@N experimental hall

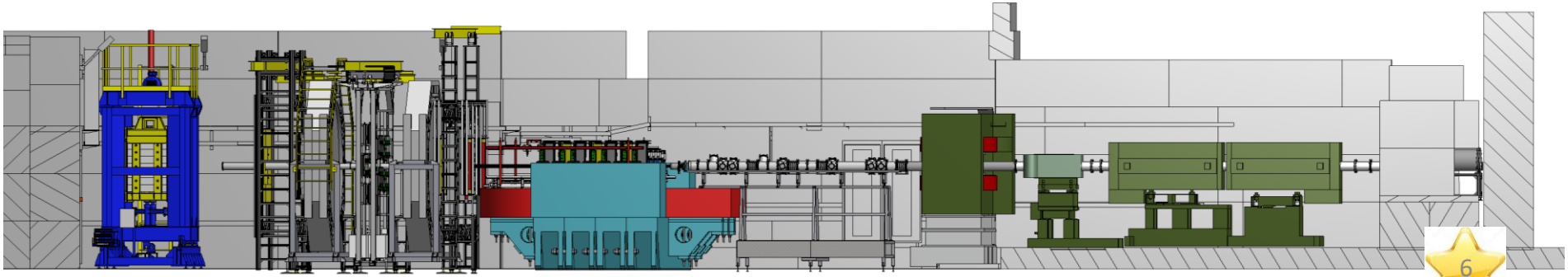




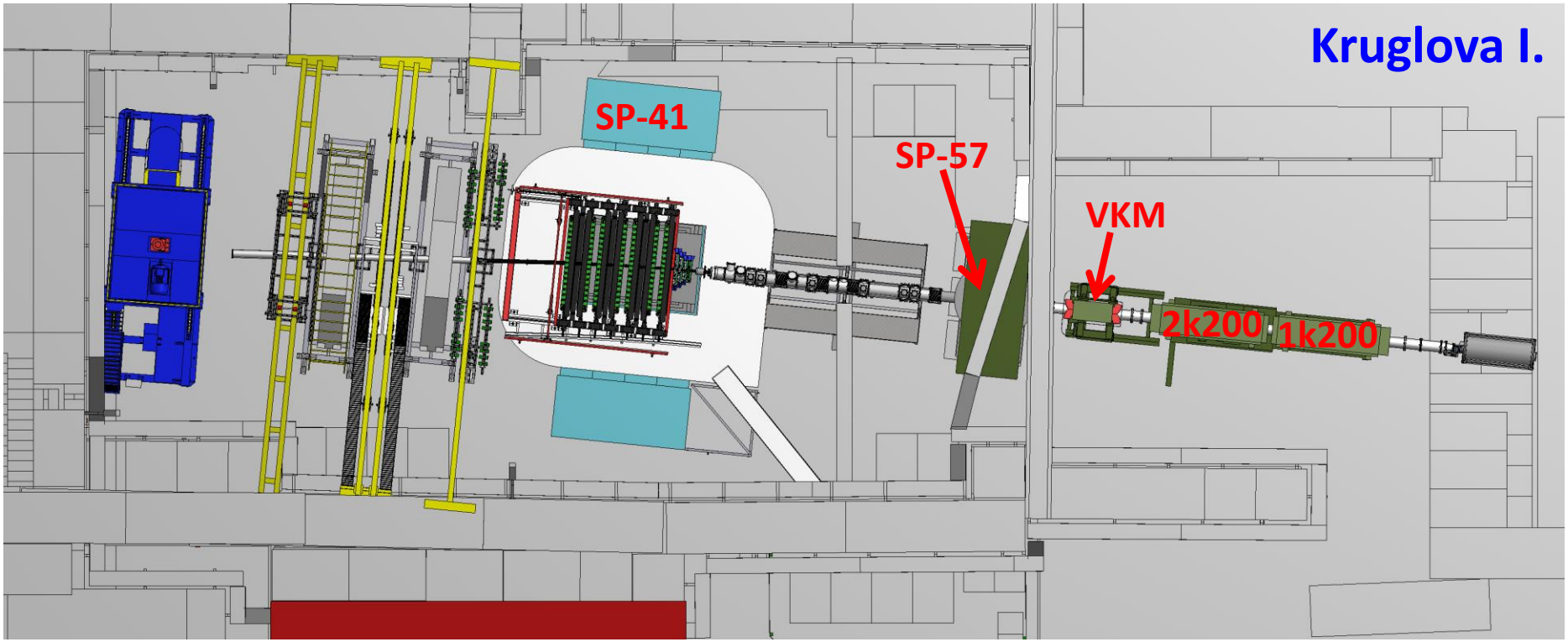
Detector installation in BM@N experimental hall



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

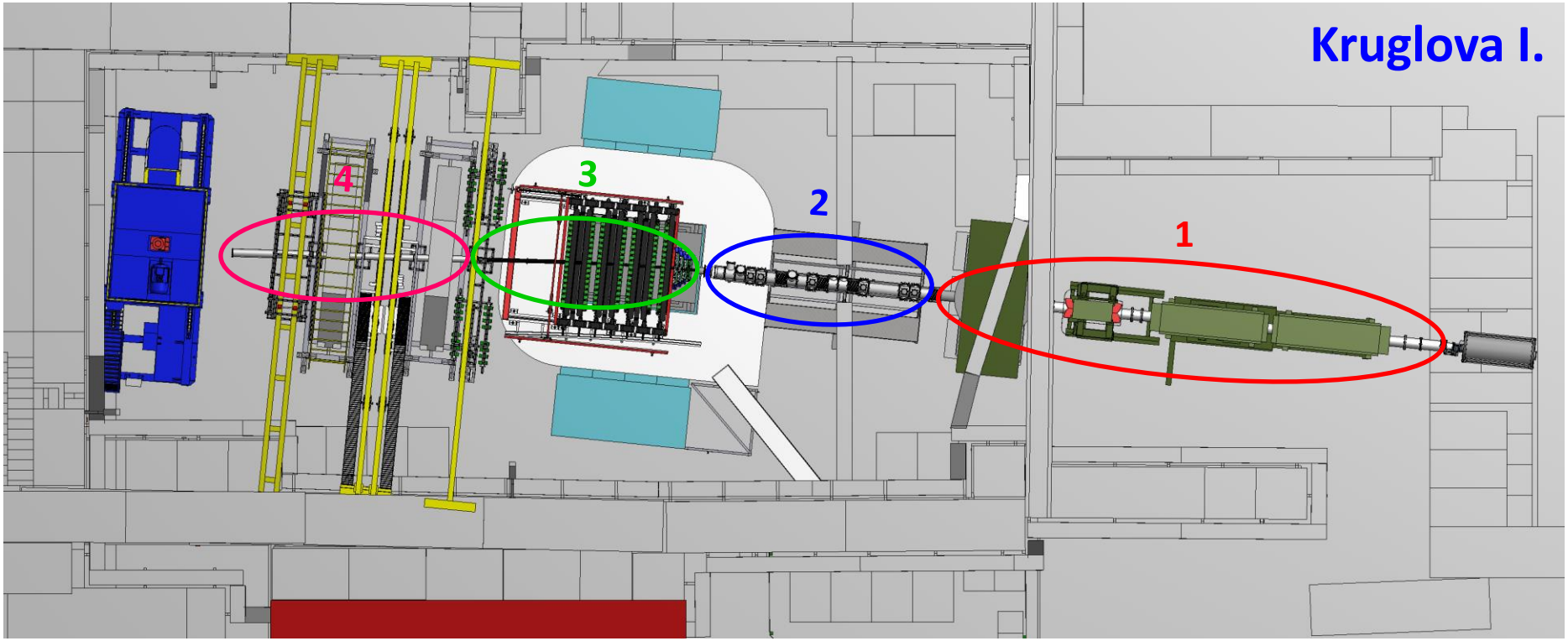


5 Magnet elements in experimental hall of BM@N



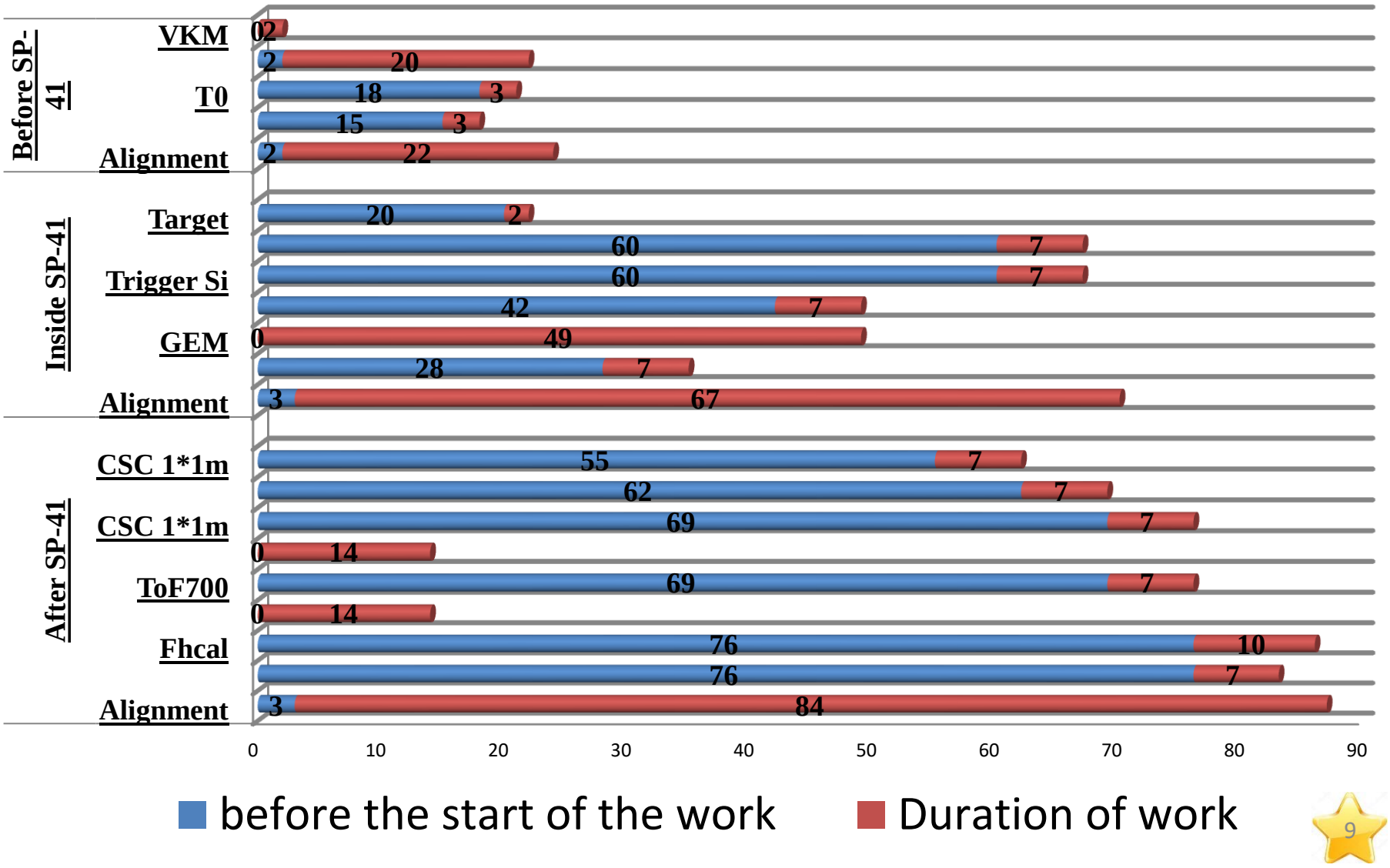
- 1k200 & 2k200 – quadruple lenses
- VKM – vertical correction magnet
- SP-57 – horizontal correction magnet
- SP-41 – analyzing magnet

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

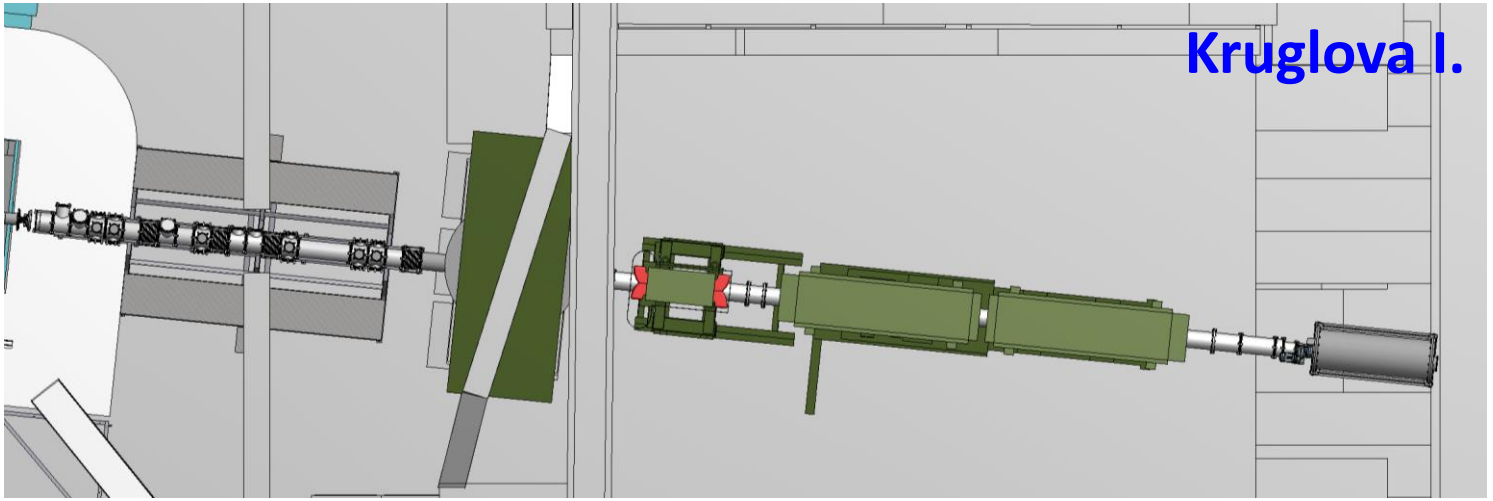


1. Beam pipe segment made of stainless steel
2. Stainless steel beam pipe + 4 aluminum elements
3. Carbon beam pipe
4. Aluminum beam pipe

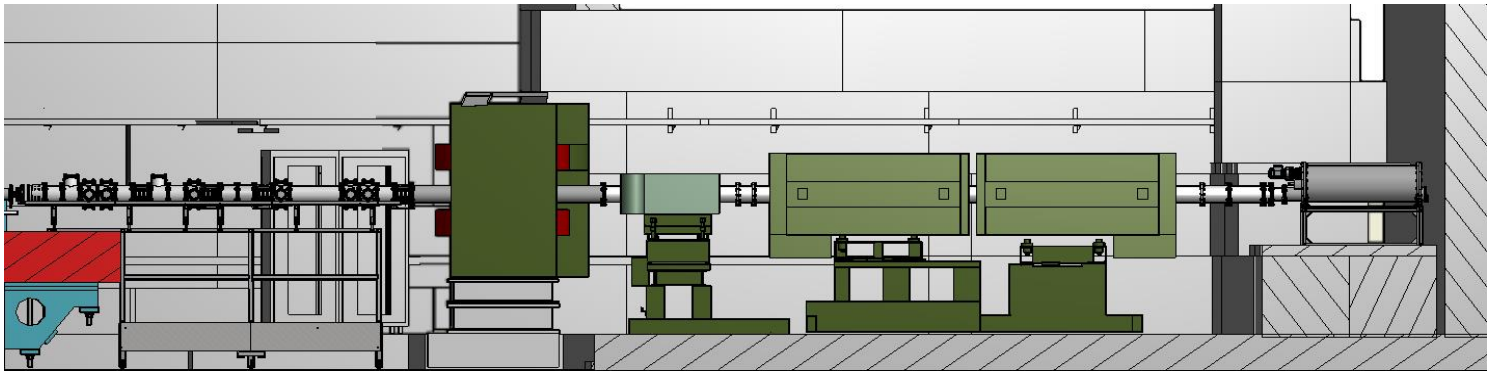
Time table for installation all elements of BM@N experiment



Beam pipe upstream the SP-41

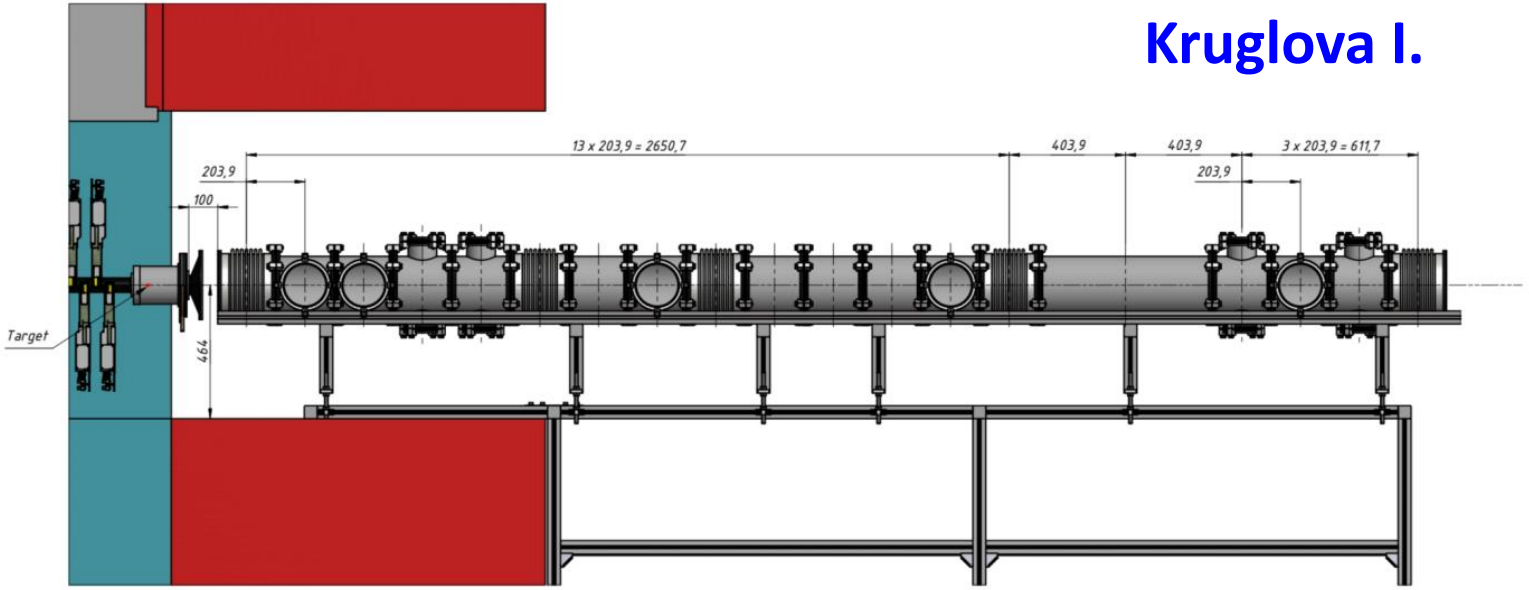


3D view of the beam pipe upstream the target

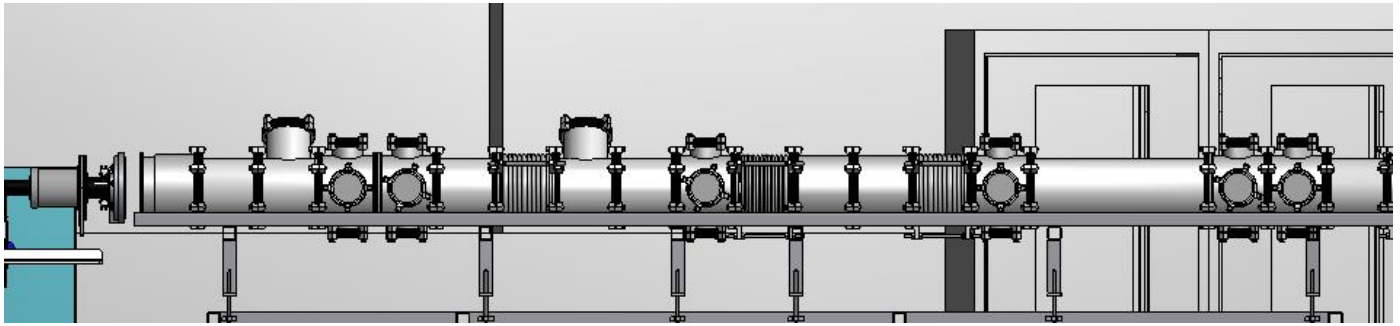


Beam pipe upstream the SP-41

Kruglova I.

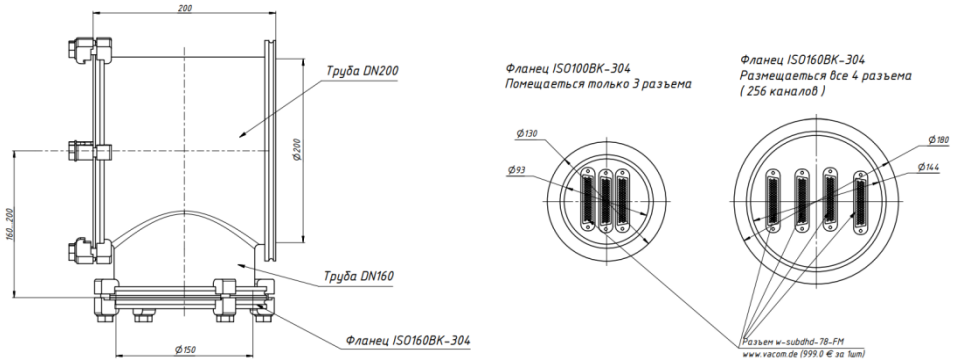


We have developed a design that allows you to arrange the elements of the beam pipe in a different order. The figure shows the selected configuration and sequence of vacuum boxes of the beam pipe.

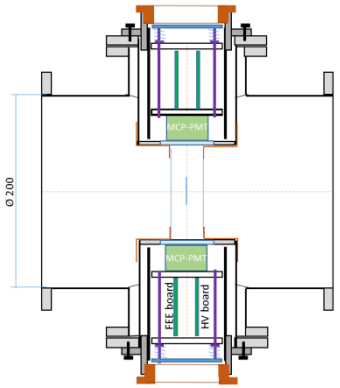


Current position of the beam pipe vacuum boxes

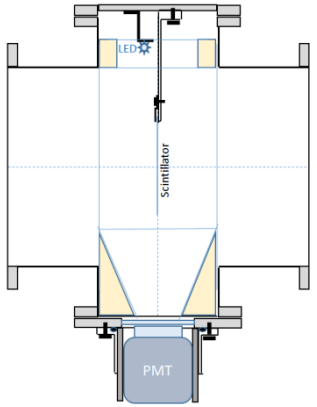
Beam pipe upstream the SP-41



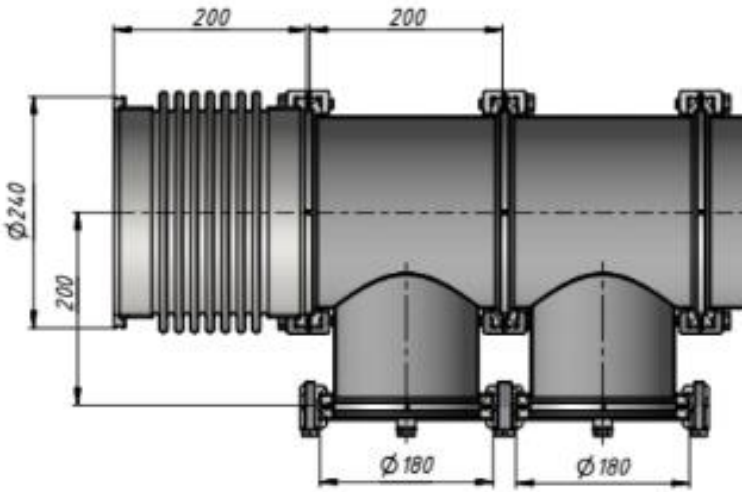
Vacuum boxes
for Si detectors

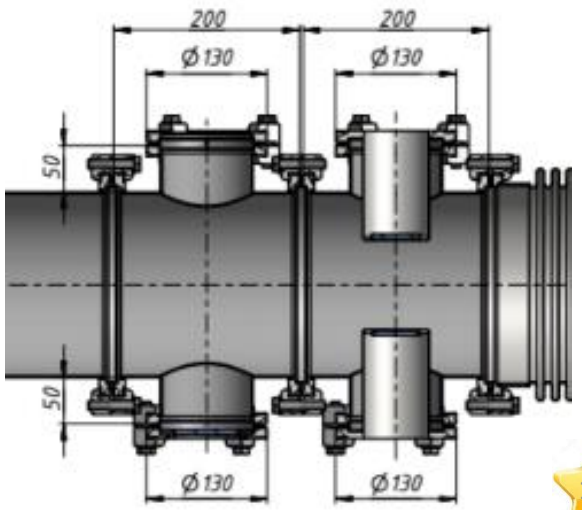


Vacuum box for
BC2

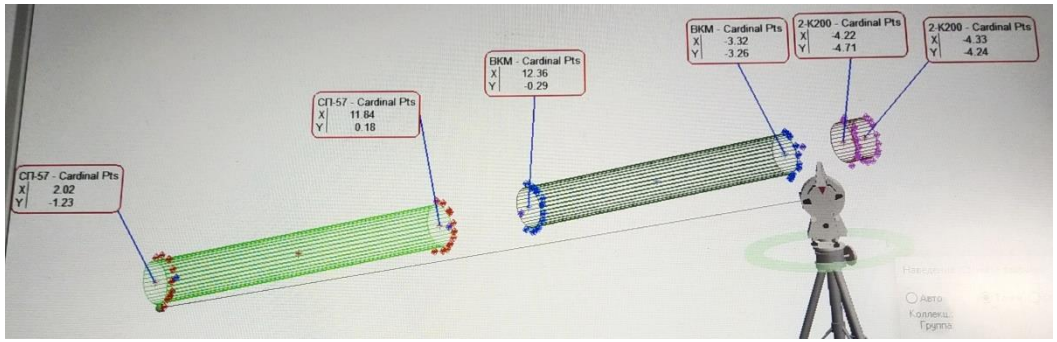


Vacuum boxes for
BC1 & VC

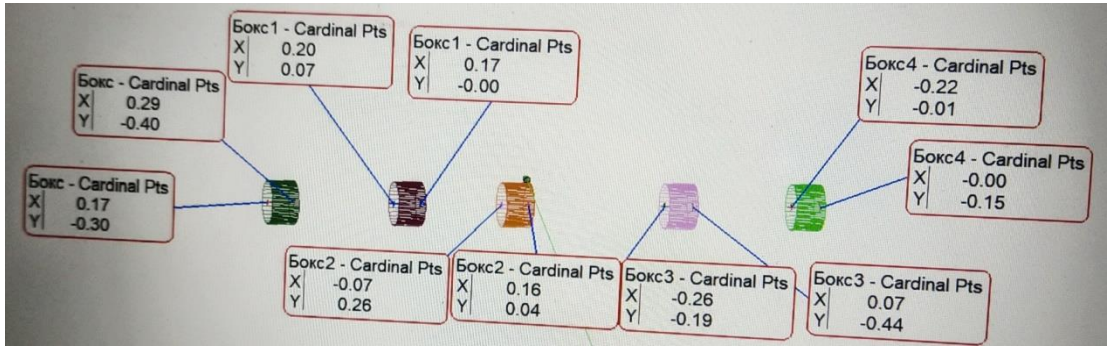




Beam pipe upstream the SP-41



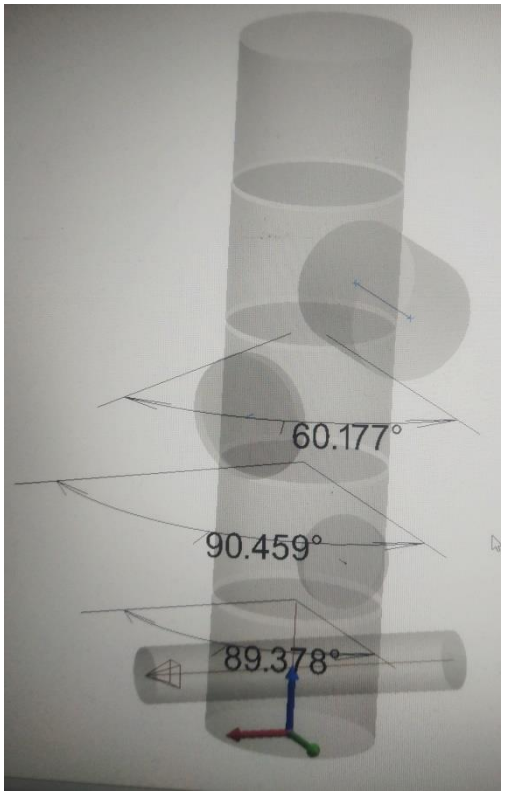
One of the moments of trial measurements.
Beam pipe elements installed in VKM and SP-57



Adjustment of the support for the beam pipe for different detectors

Taking measurements during adjustment

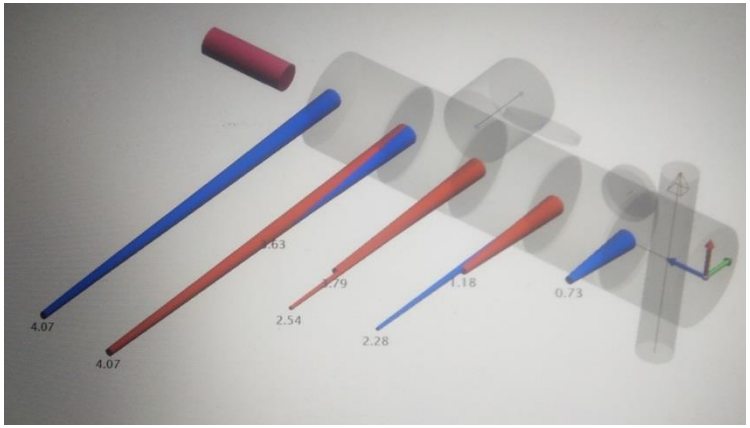
Beam pipe upstream the SP-41



Adjustment of angular dependencies of each block

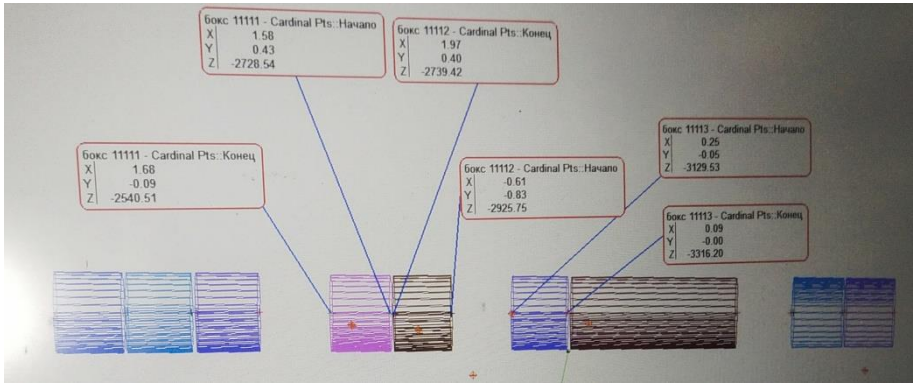
Inside view

The process of measuring beam pipe segments

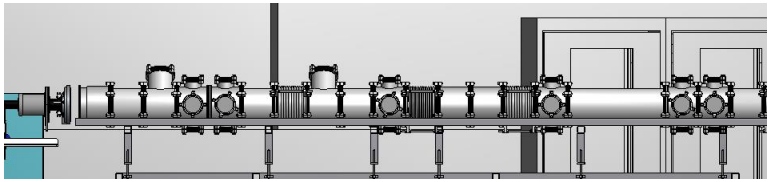


Offset adjustment of each box

Beam pipe upstream the SP-41



Screenshot at the moment of setting up the beam pipe elements

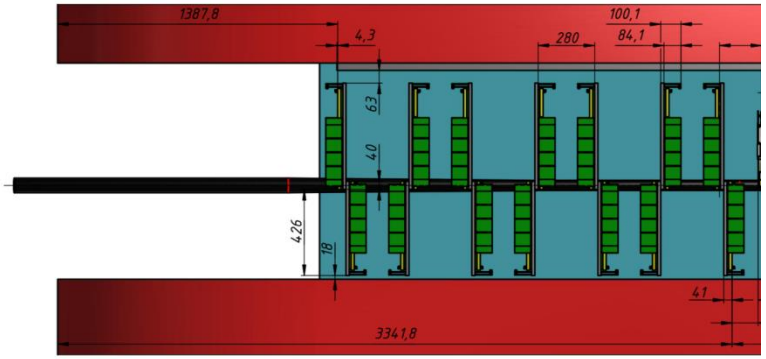


3D view of beam pipe

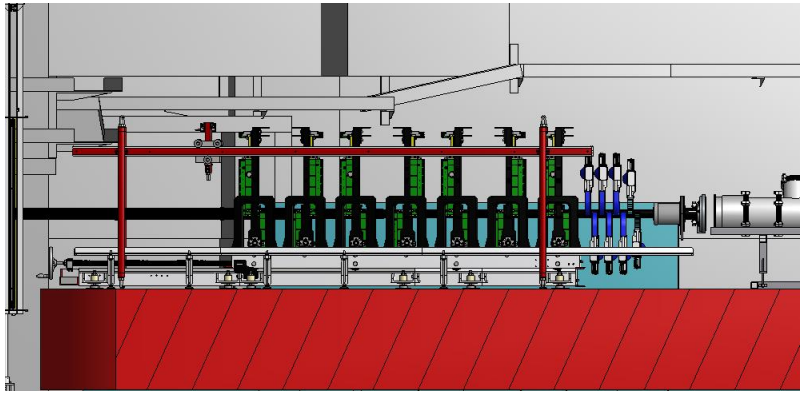
Photo of the installed beam pipe

Moment of target station adjustment

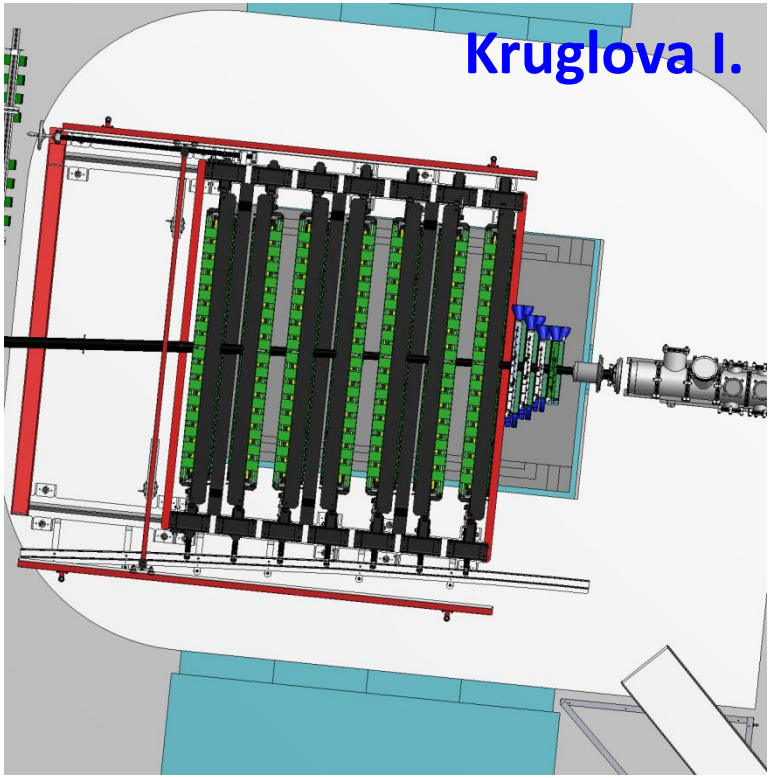
Inside the SP-41



Demonstration of distances between the surface of the analyzing magnet and the GEM detectors

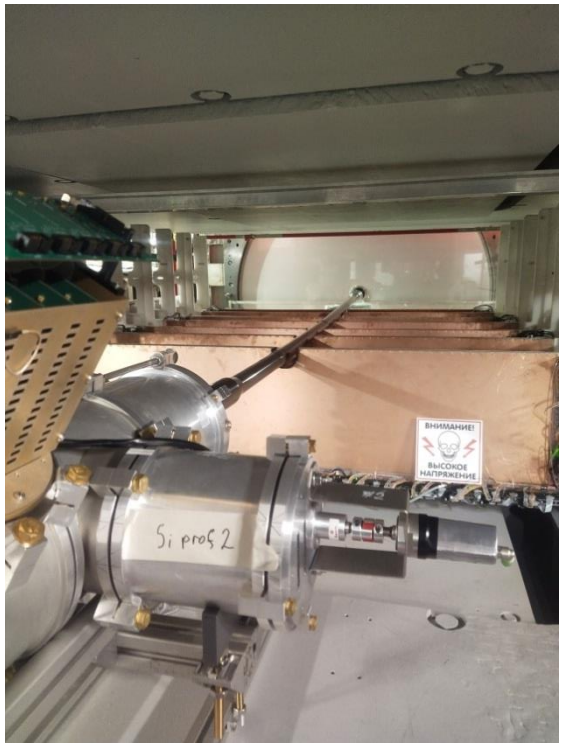


3D model of GEM detectors. Side view



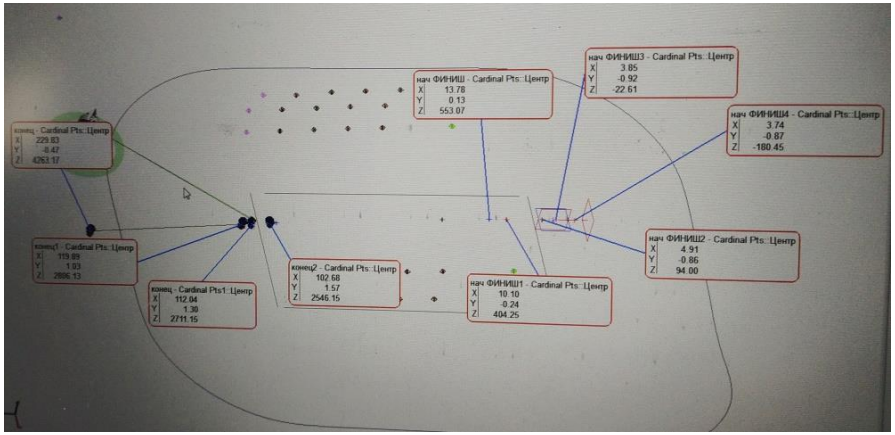
3D model of GEM detectors. Top view

Inside the SP-41

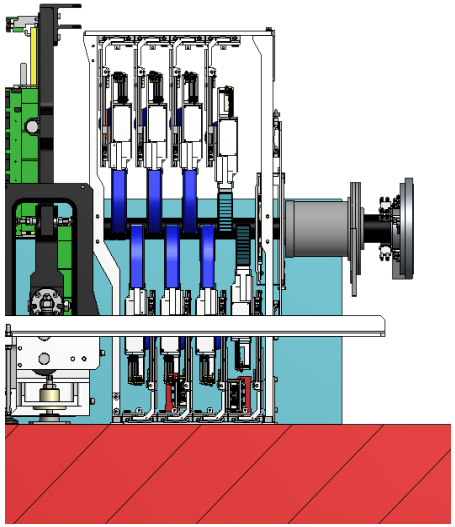


The position of the carbon beam pipe with installed lower GEM detectors

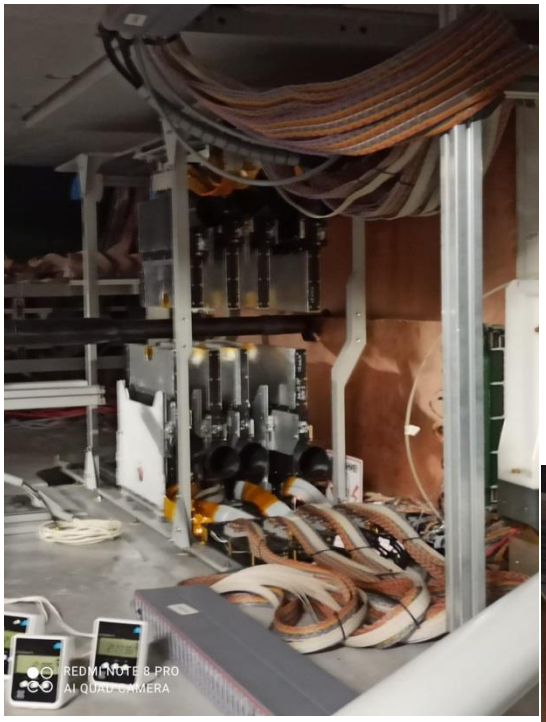
The moment of adjustment of the carbon beam pipe



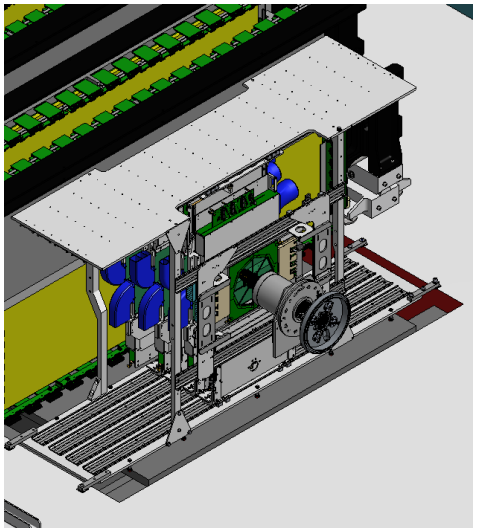
Inside the SP-41



3D view of forward Si

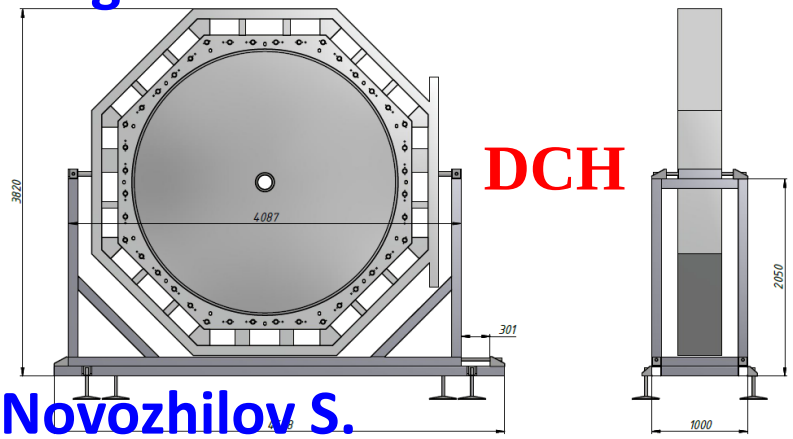


forward SI installed in BM@N



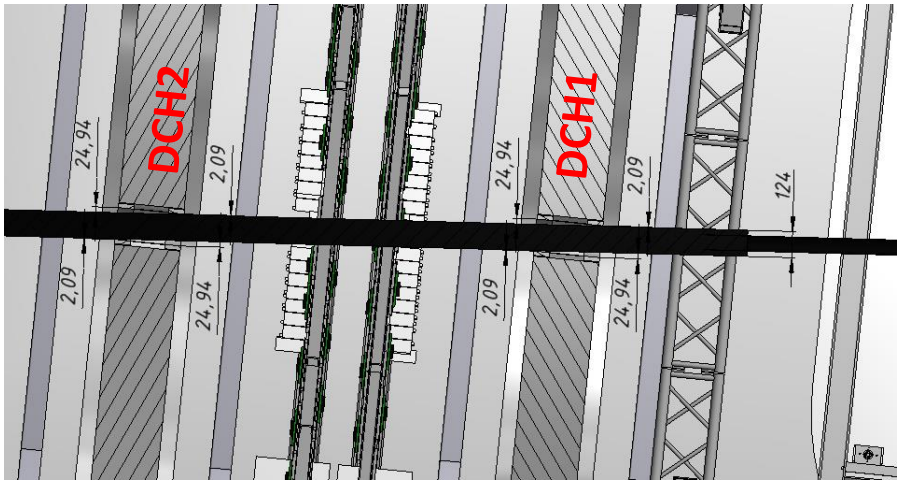
Beam pipe downstream the SP-41

Kruglova I.



Novozhilov S.

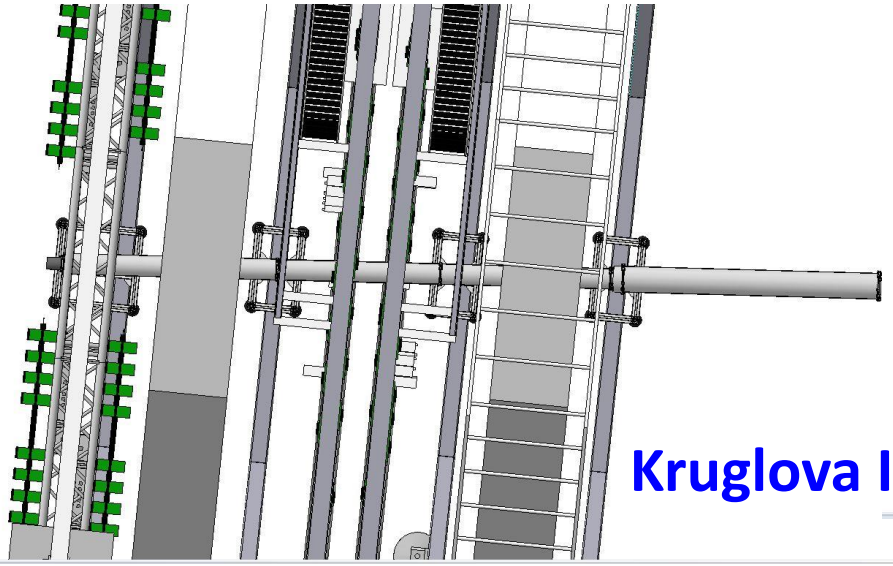
3D view of DCH

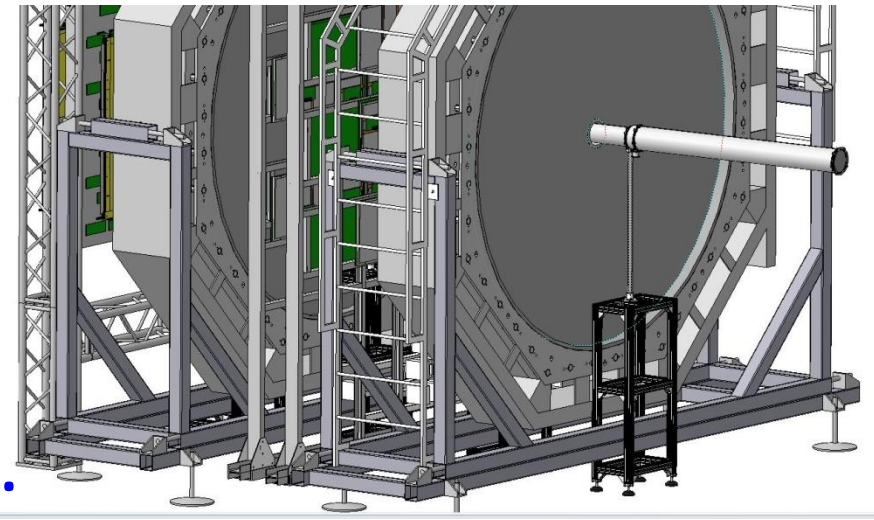


Gaps between DCH flanges and aluminum beam pipe

Researchers are connecting and testing the DCH after rearranging and aligning the detectors

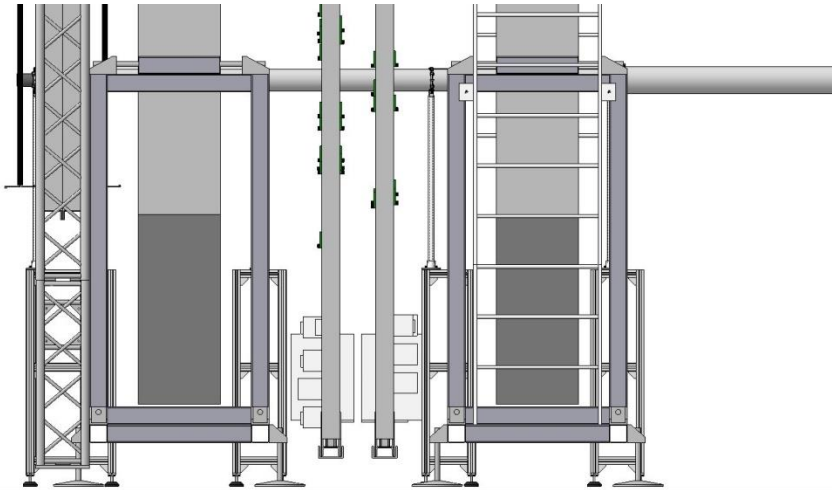
Beam pipe downstream the SP-41

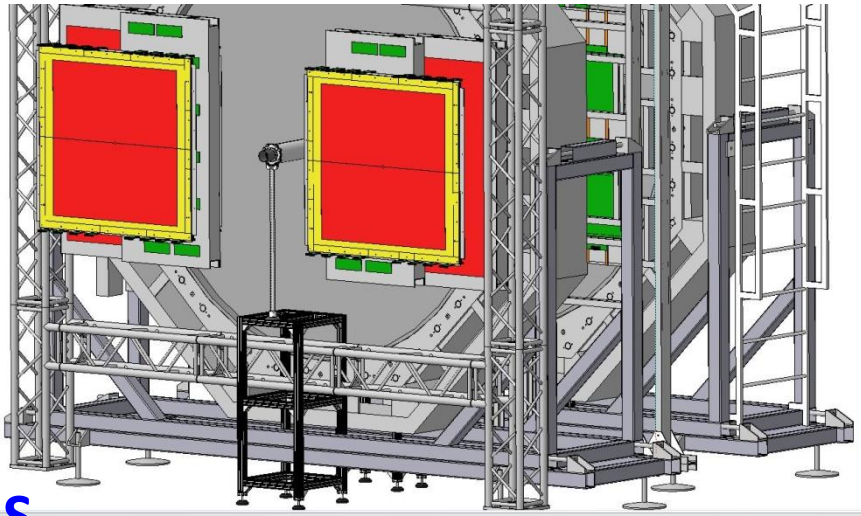




Kruglova I.

3D model of beam pipe tracing through outher tracker system of the BM@N setup

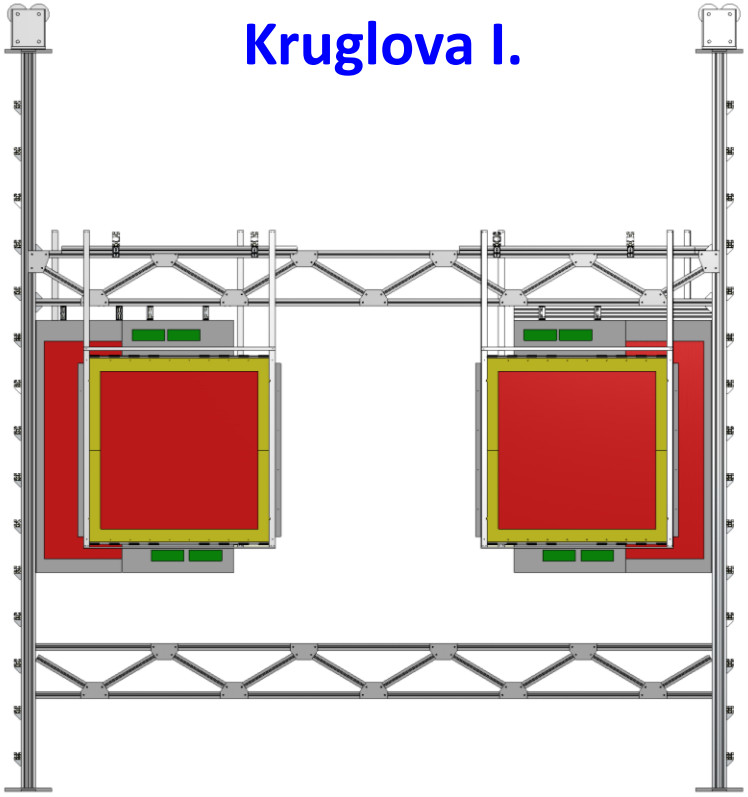


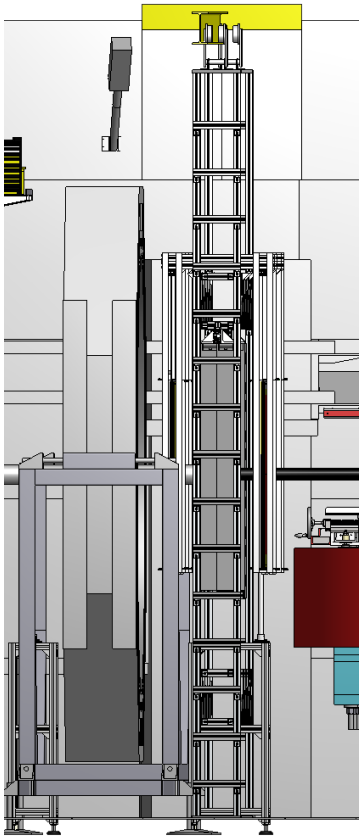


Novozhilov S.

Detectors downstream the SP-41

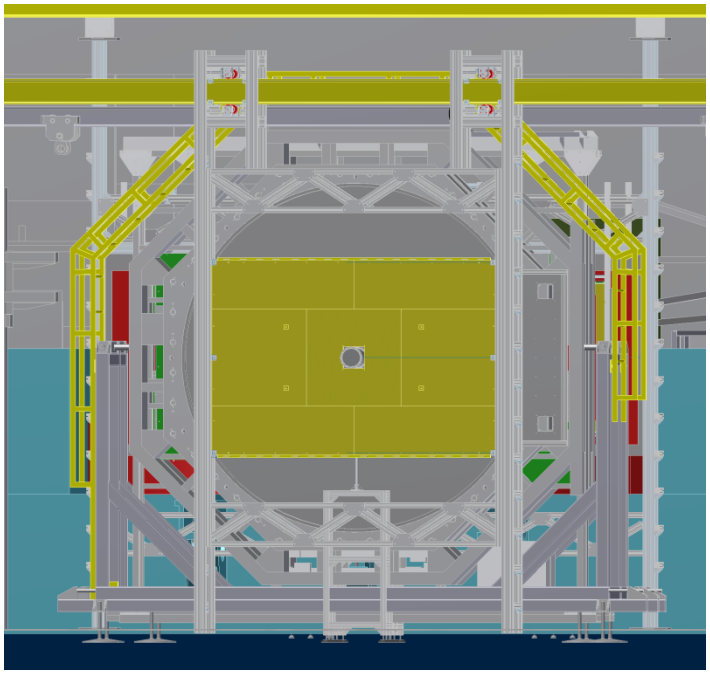
Kruglova I.

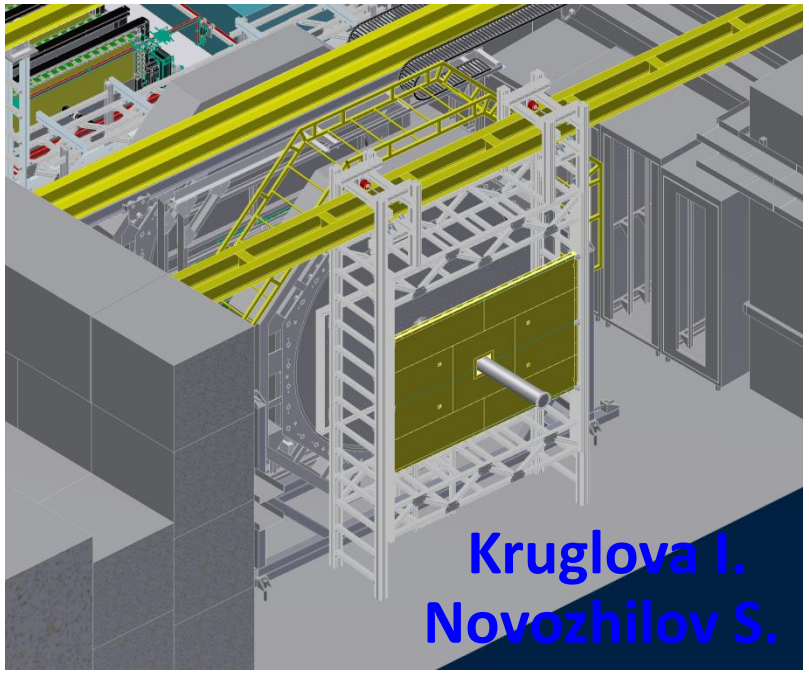




3D view of mechanical support of new type for Tof400 & CSC

Detectors downstream the SP-41





3D view of mechanical support for installation of SCWall & large CSC 1.5x2m

Stages of production

✓ Completed:

1. VKM
2. Beam pipe upstream the target
3. Si beam
4. T0
5. Target
6. forward Si
7. Gem
8. Carbon beam pipe
9. DCH1 & DCH2
10. CSC 1x1m after ToF400
11. ToF400
12. CSC 1x1m before ToF400
13. Alignment of all installed elements

✓ Will be done:

1. ToF700
2. Aluminum beam pipe
3. Barrel detector
4. Trigger Si
5. Mehanic for ScWall & big CSC
6. ScWall
7. large CSC

THANK YOU
FOR YOUR
ATTENTION