

BEAM PIPE UPSTREAM AND DOWNSTREAM THE TARGET

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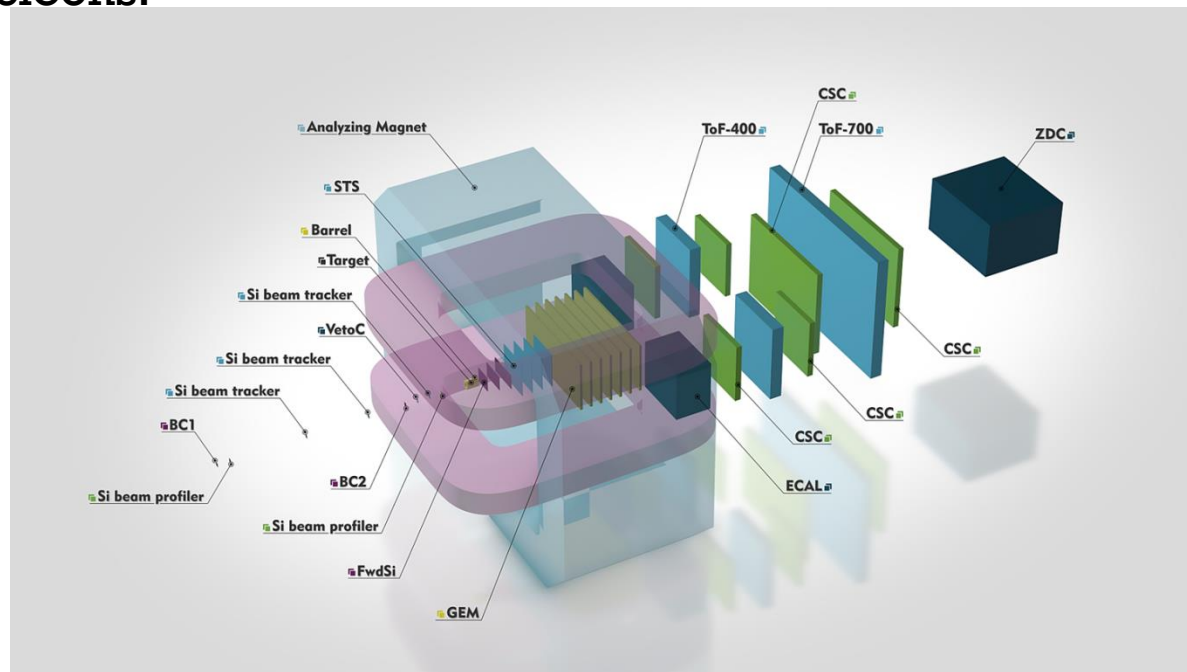
on behalf of BM@N Collaboration



Configuration of BM@N detector for heavy ion program

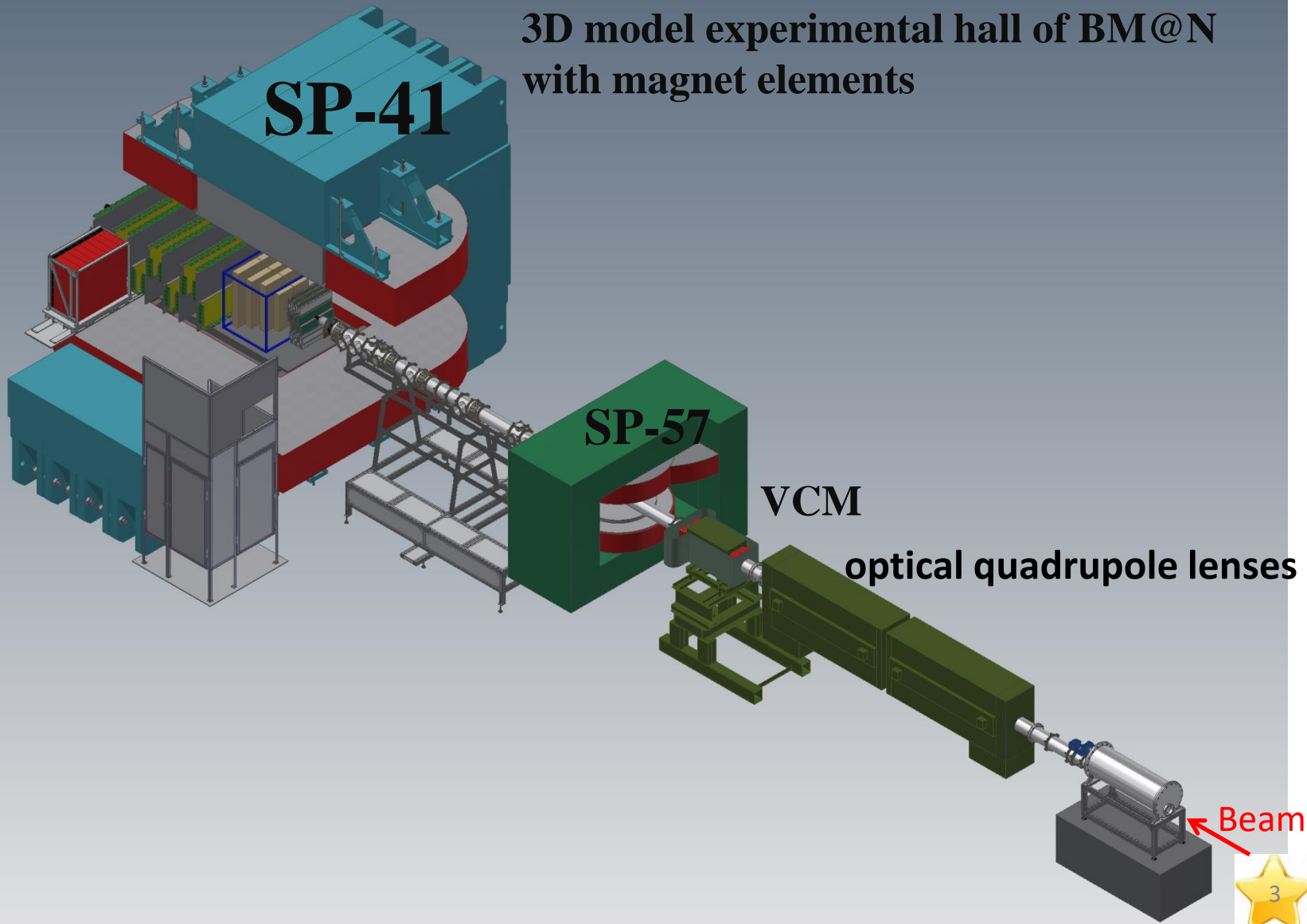
(without beam pipe)

Collisions of Nuclotron heavy ion beams with fixed targets provide a unique opportunity to study **strange mesons** and **multi-strange hyperons** close to the kinematic threshold. One of the main goals of the experiment is to measure yields of **light hyper-nuclei**, which are expected to be produced in coalescence of Λ -hyperons with nucleons.

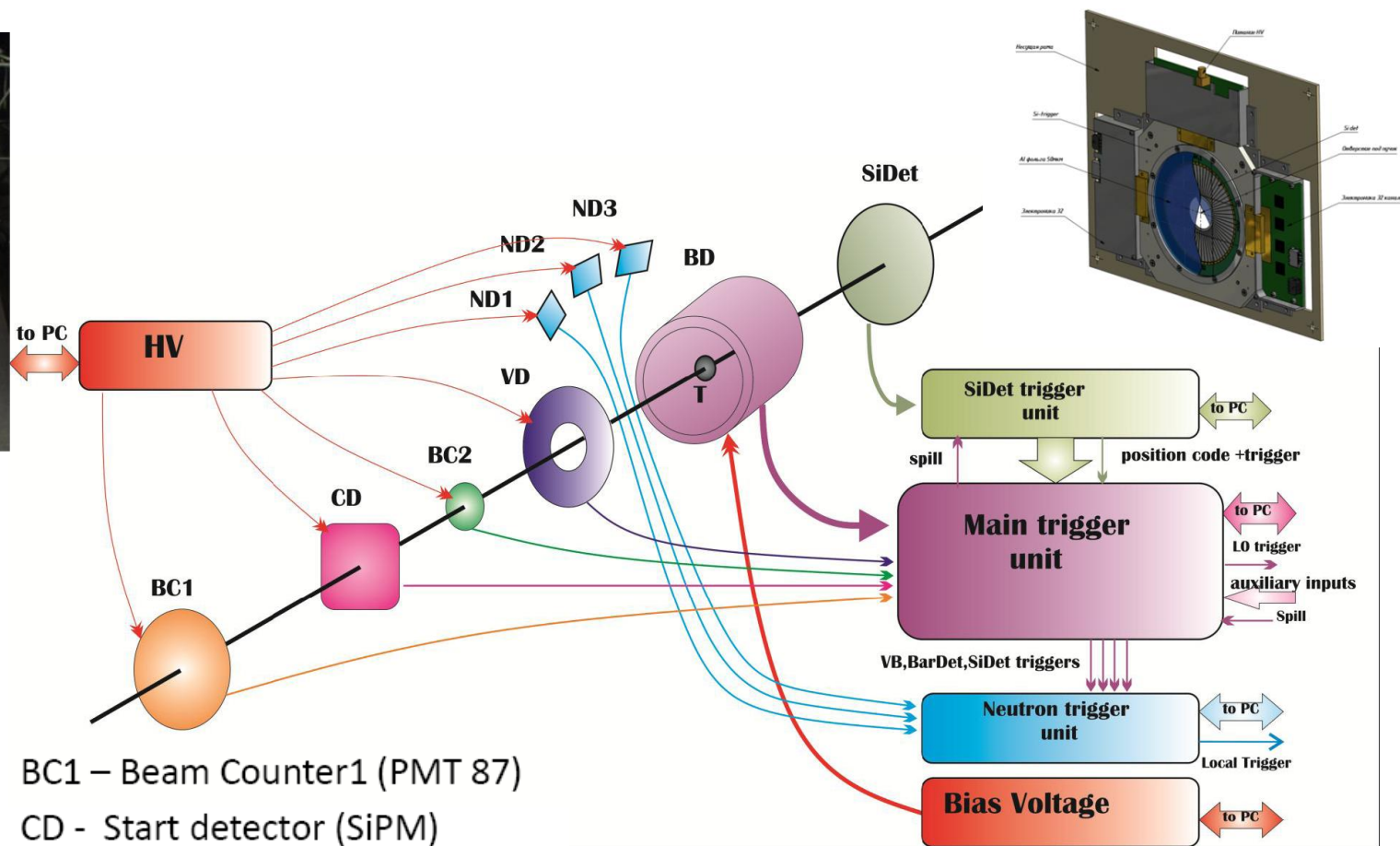
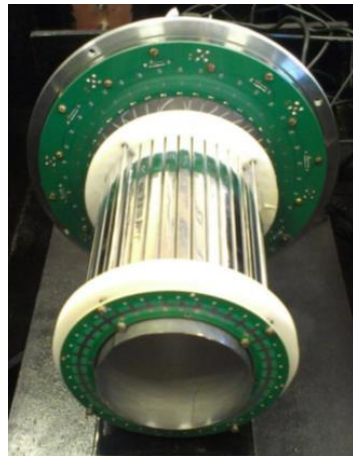


We have to transport accelerated ions through a vacuum beam pipe to reduce the probability of interaction of gold ions with air molecules. To achieve this, we need to install all beam detectors in vacuum boxes.

Beam pipe upstream the target



Trigger detectors and beam counters (March 2018)



BC1 – Beam Counter1 (PMT 87)

CD - Start detector (SiPM)

BC2 – Beam Counter2 (SiPM)

VC – Veto counter (XP2020)

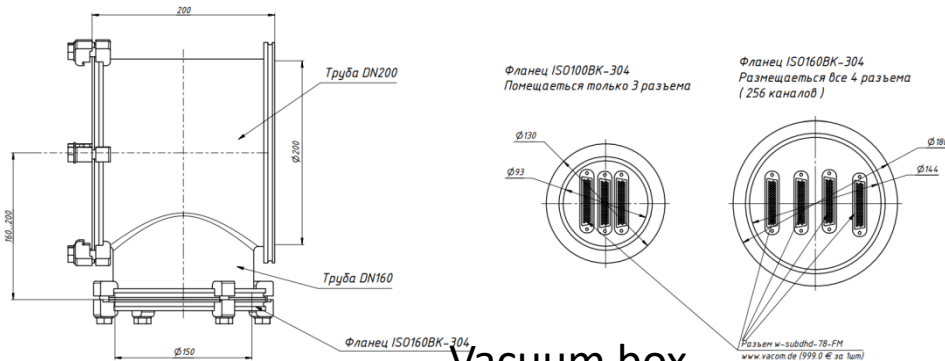
BD – Barrel Detector – 40ch. SiPM

T – target

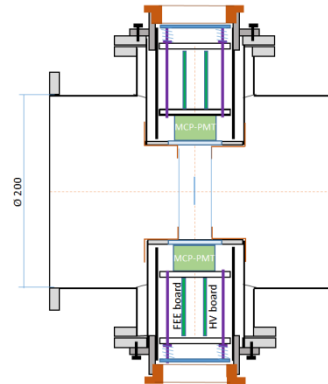
SiDet – Silicon Detector

Selection of events with activity in barrel detector: $BD \geq N$ or forward Si detector: $FD \geq N$

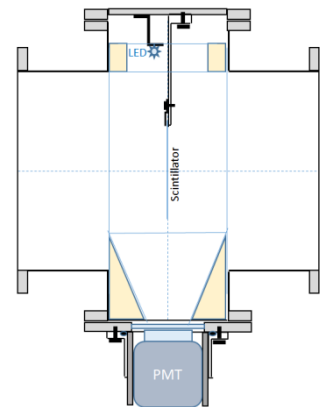
Beam pipe upstream the target



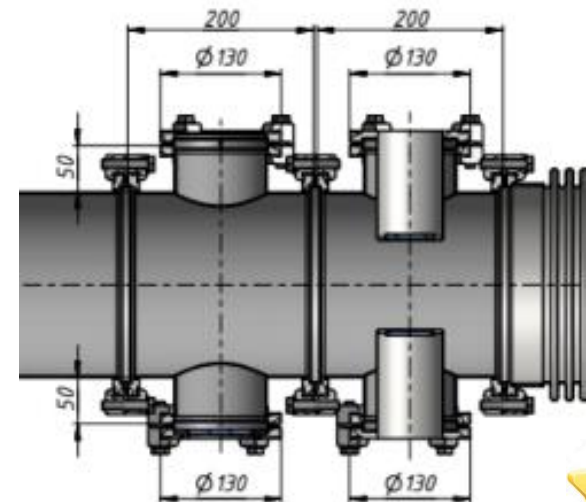
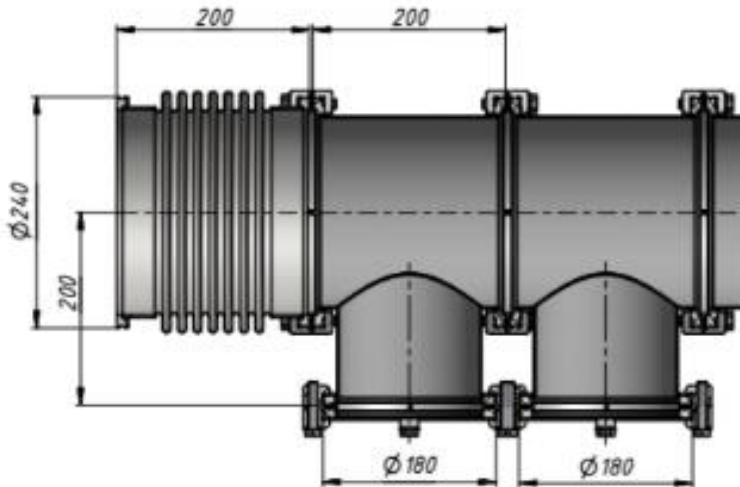
Vacuum box
for Si
detector



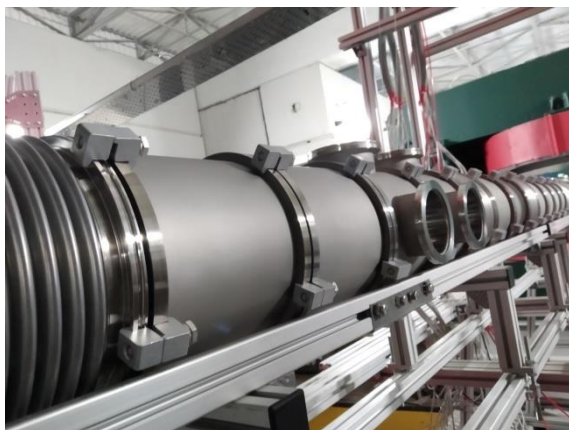
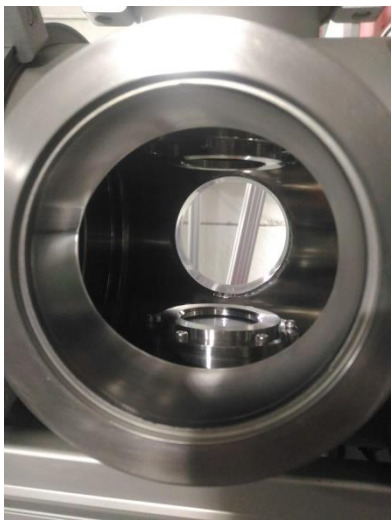
Vacuum box for
BC2 detector



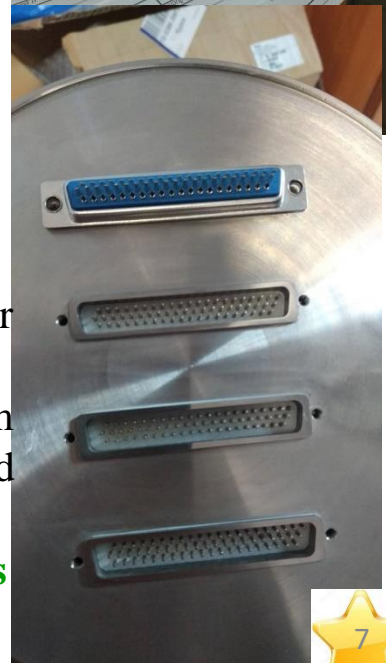
Vacuum box for
BC1 and VC
detectors



Beam pipe upstream the target

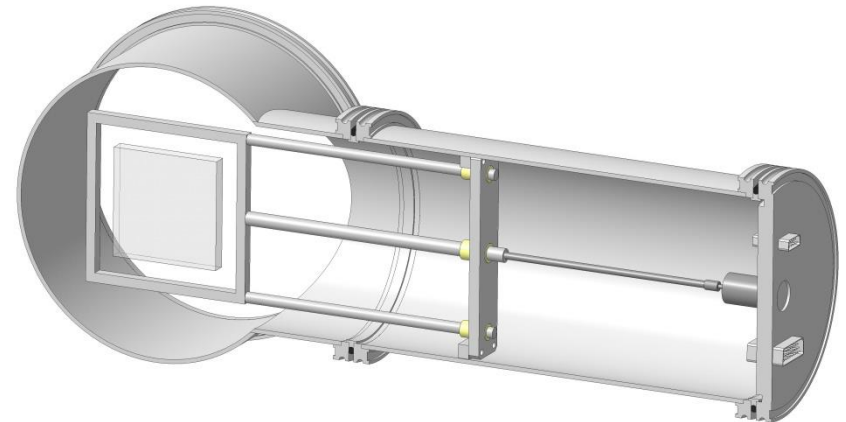
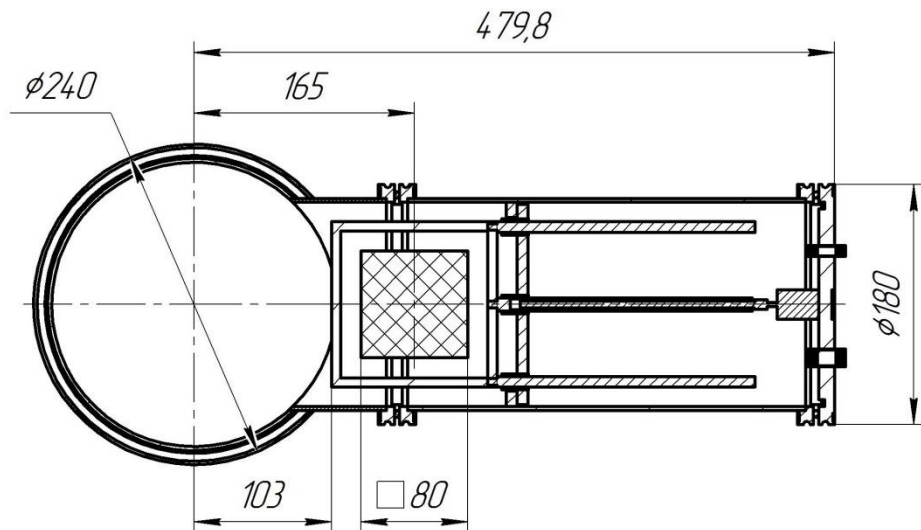
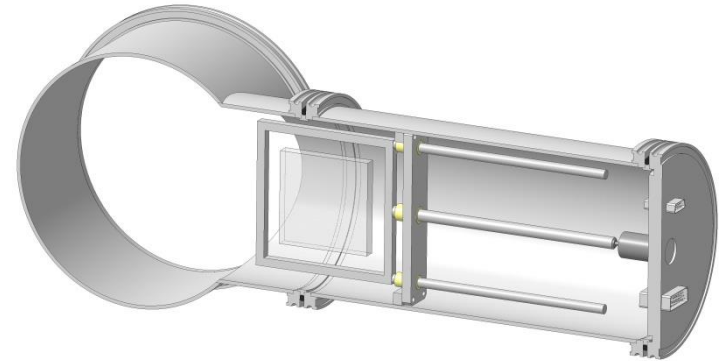
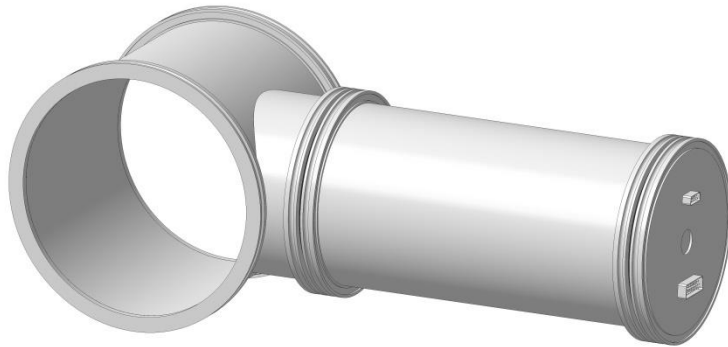


Beam pipe upstream the target with vacuum box for trigger and Si detectors. This configuration of beam pipe was manufactured and tested by **LLC Vacuum systems and technologies**



Beam pipe before target

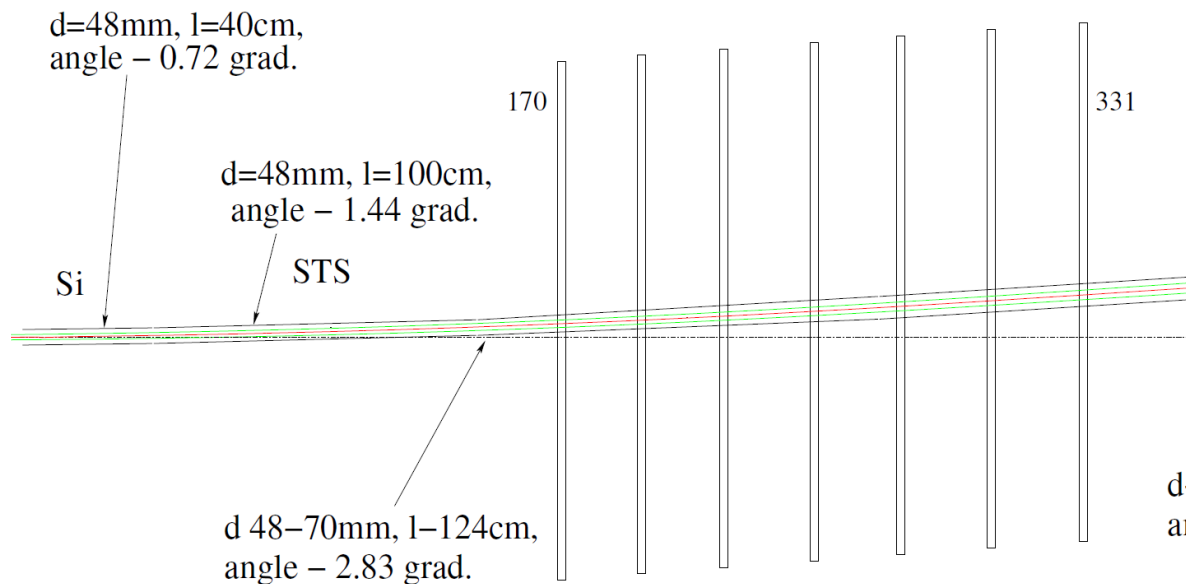
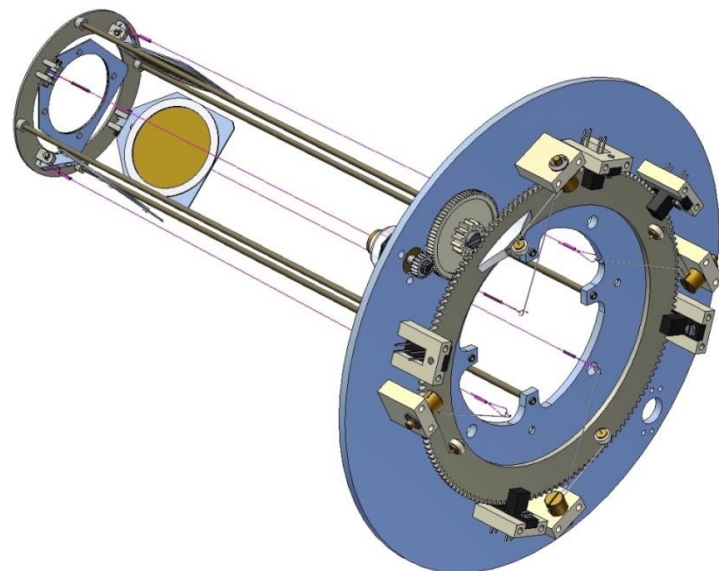
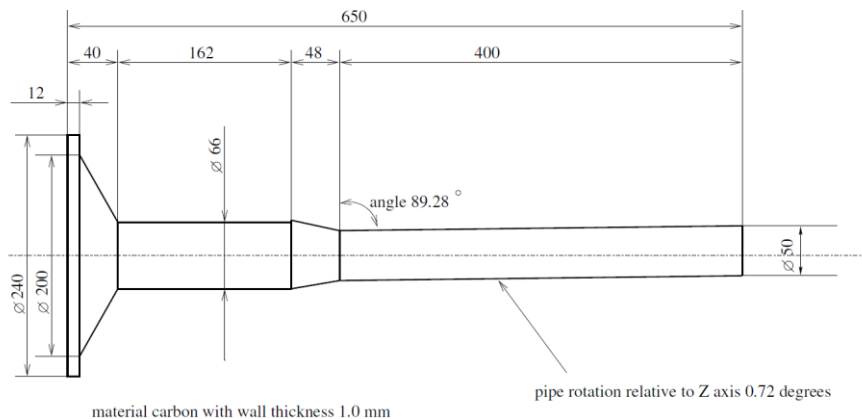
Vacuum box for Si detector - profilometer



Those detectors are beam profilometers.

They will be used at the beginning of the Nuclotron run. And they have to be moved when the physical data acquisition will start.

Target station and beam pipe configuration for tracker system



d=70mm, l=136cm, angle – 3.6 grad.

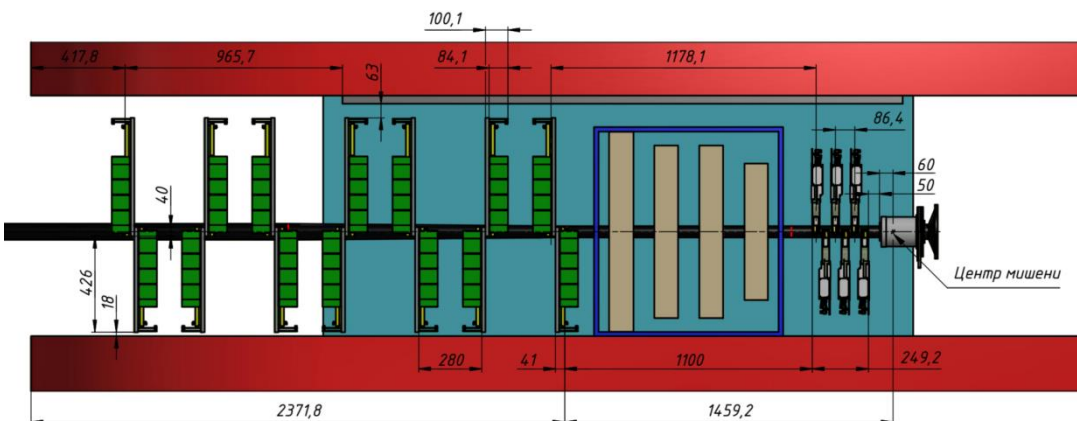
Beam pipe configuration for tracker system

Gem

Si

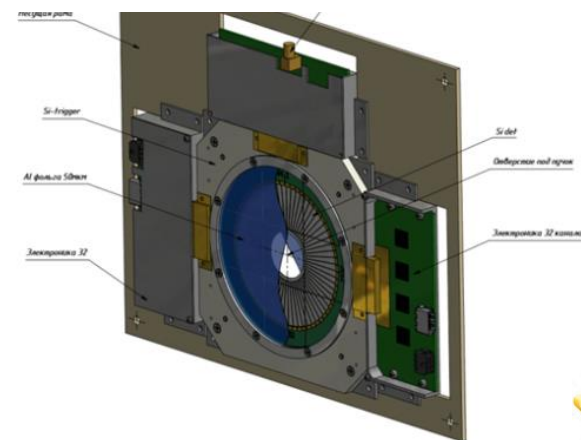
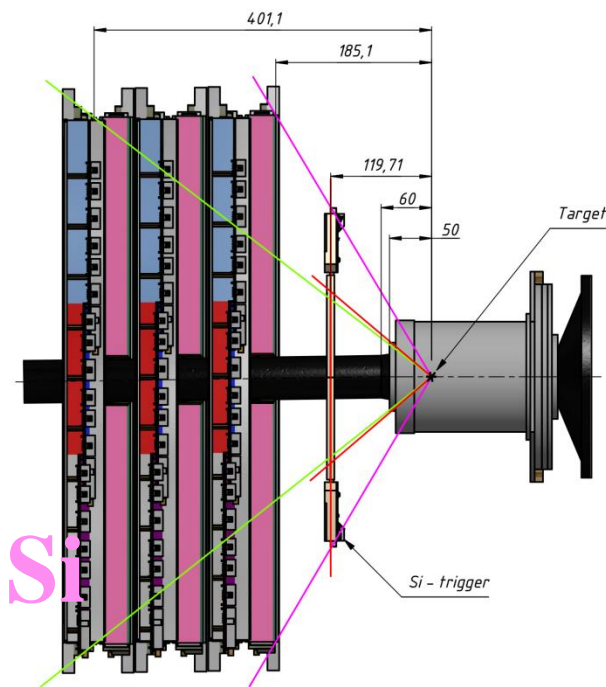
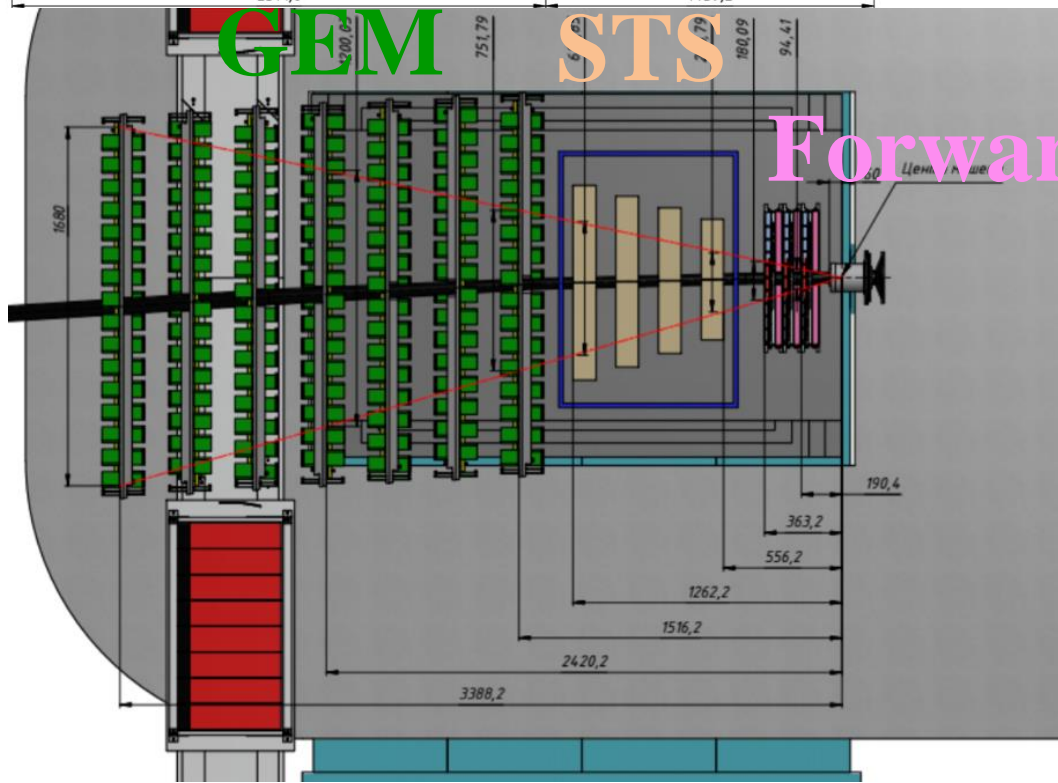
Barrel

Beam pipe configuration for tracker system

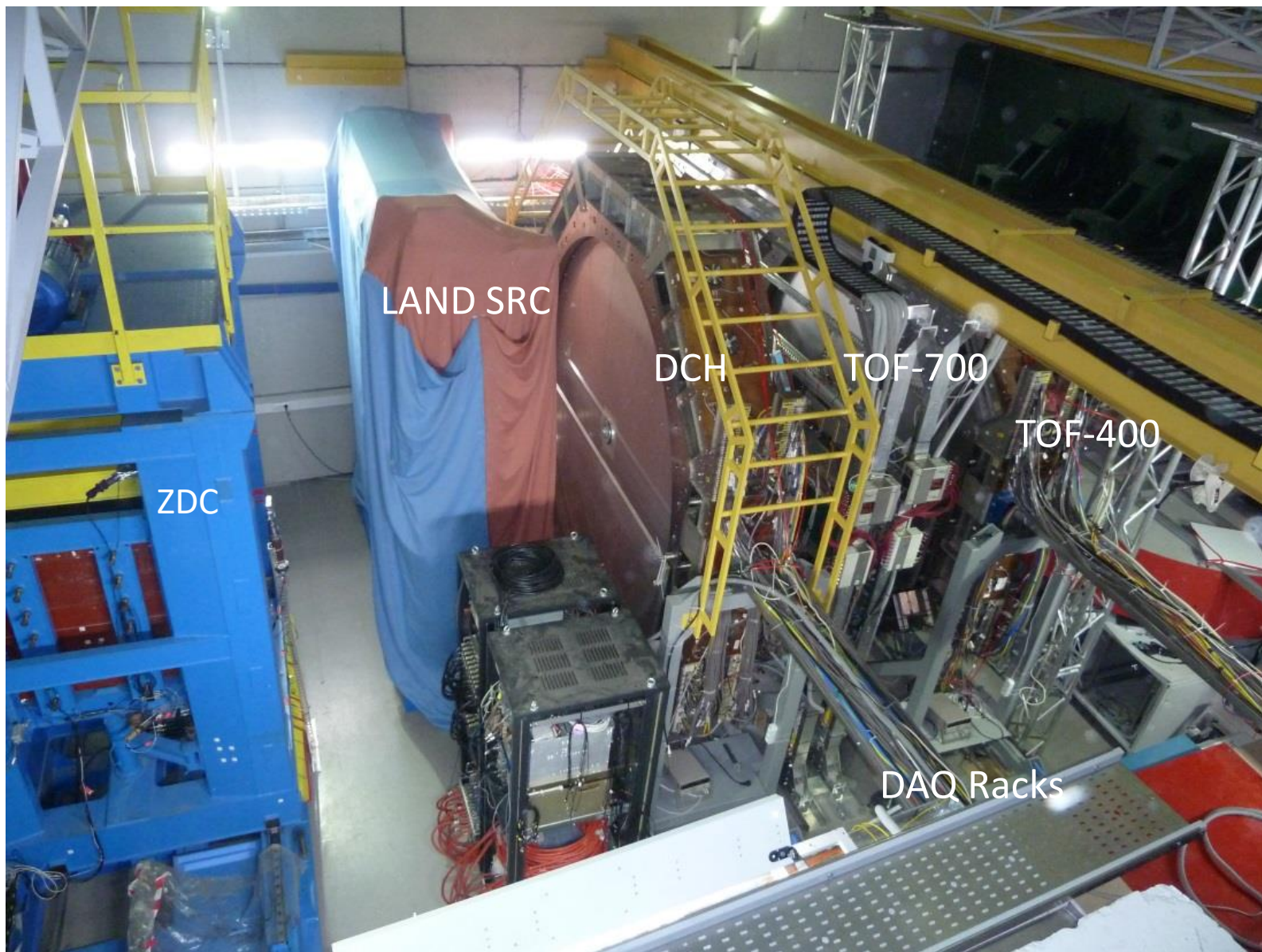


GEM STS

Forward Si



BM@N setup behind magnet, March 2018



1. Position of beam detectors were determined.
2. All vacuum boxes for beam detectors were developed.
3. Vacuum beam pipe configuration before the target was finished.
4. Beam pipe before the target and all vacuum boxes for beam detectors were produced.
5. Installation of all elements of beam pipe was started.
6. Construction of the target station was developed.
7. Configuration of beam pipe inside the analyzing magnet was simulated basing on different positions of central tracker detectors.
8. Production of first prototype of carbon beam pipe was started.
9. Development of beam pipe configuration behind the analyzing magnet was started.

Plans:

- 06.2020 - Production of the **target station** with control system.
- 09.2020 - Production of **carbon beam pipe** inside the analyzing magnet.
- 11.2020 - Development and production of **aluminum beam pipe** behind the analyzing magnet.



**THANK YOU
FOR YOUR
ATTENTION**

