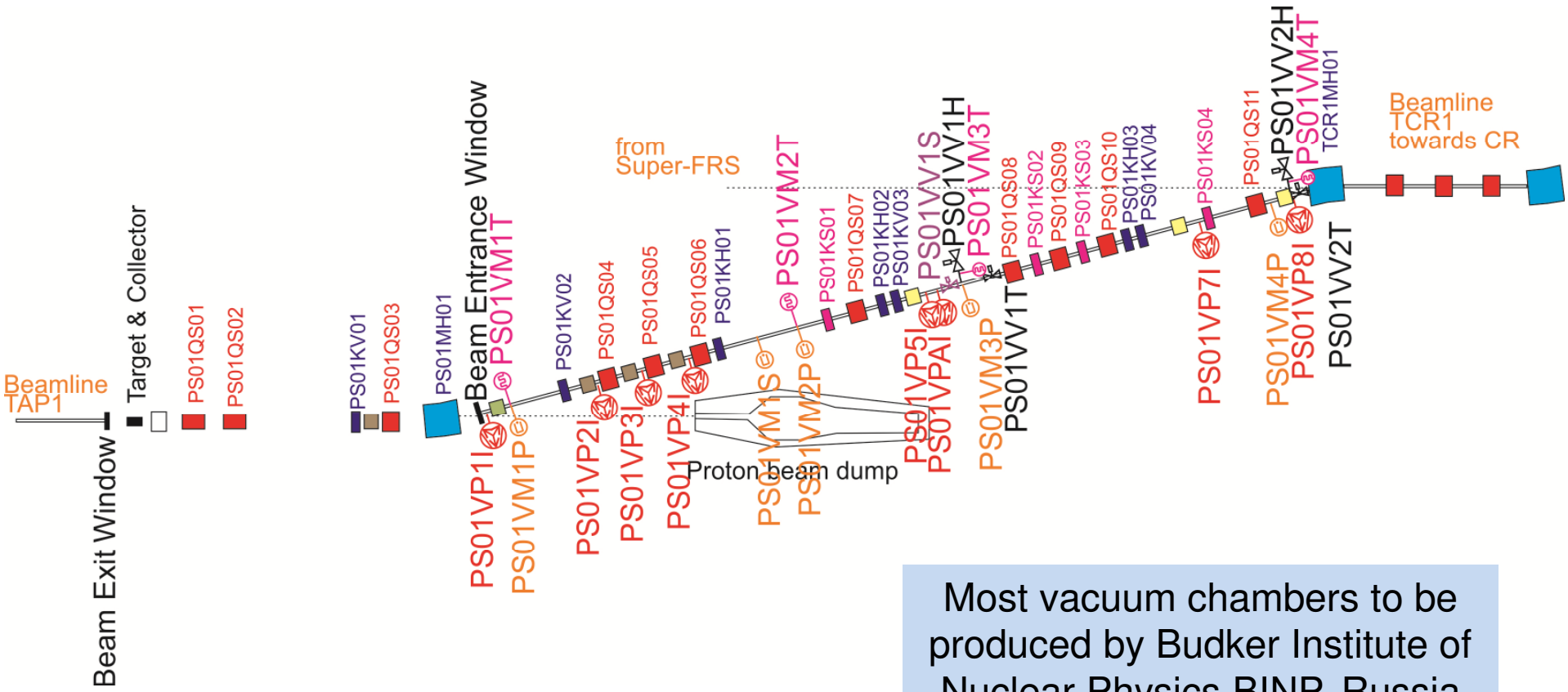
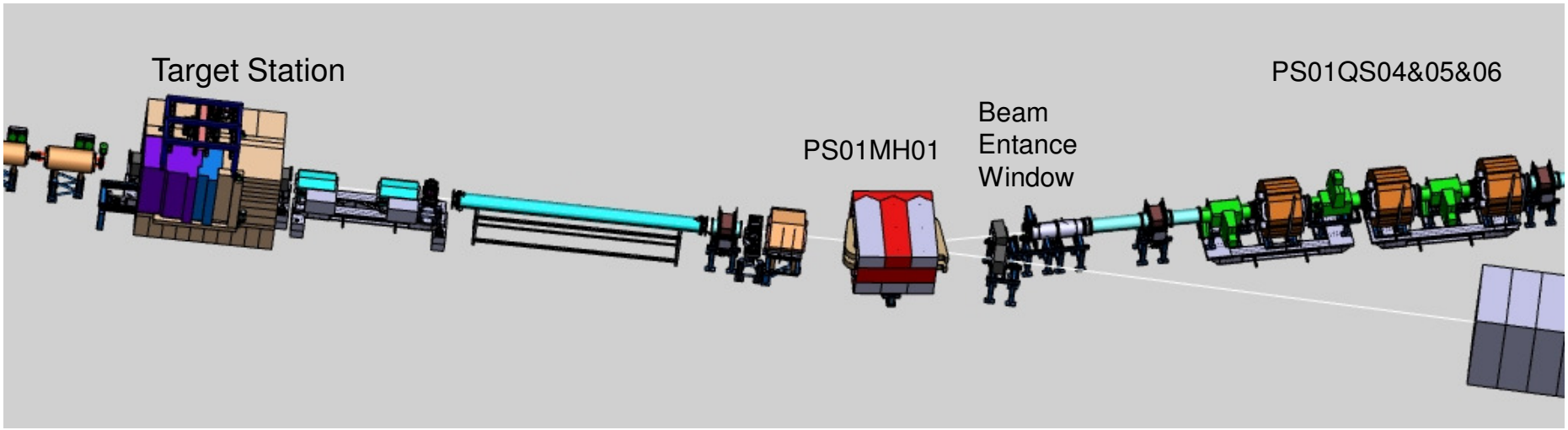
Vacuum System of the pbar-Separator

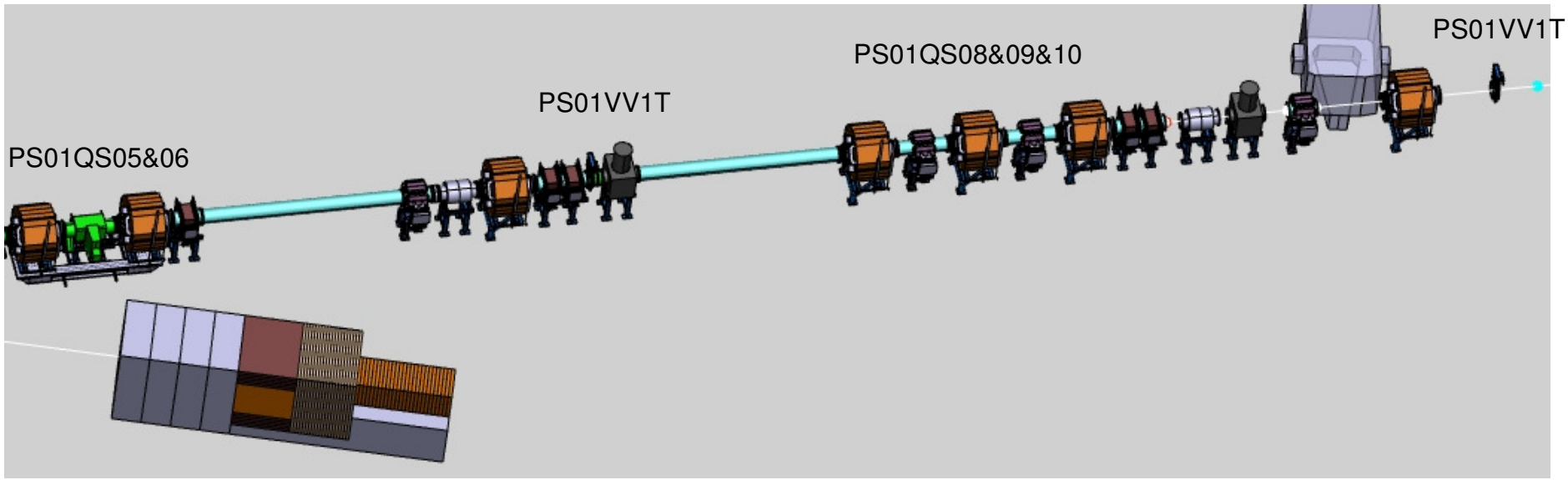
- Pbar-target is in air. Vacuum System ends with an exit window in HEBT and starts with entrance window after first dipole behind target.



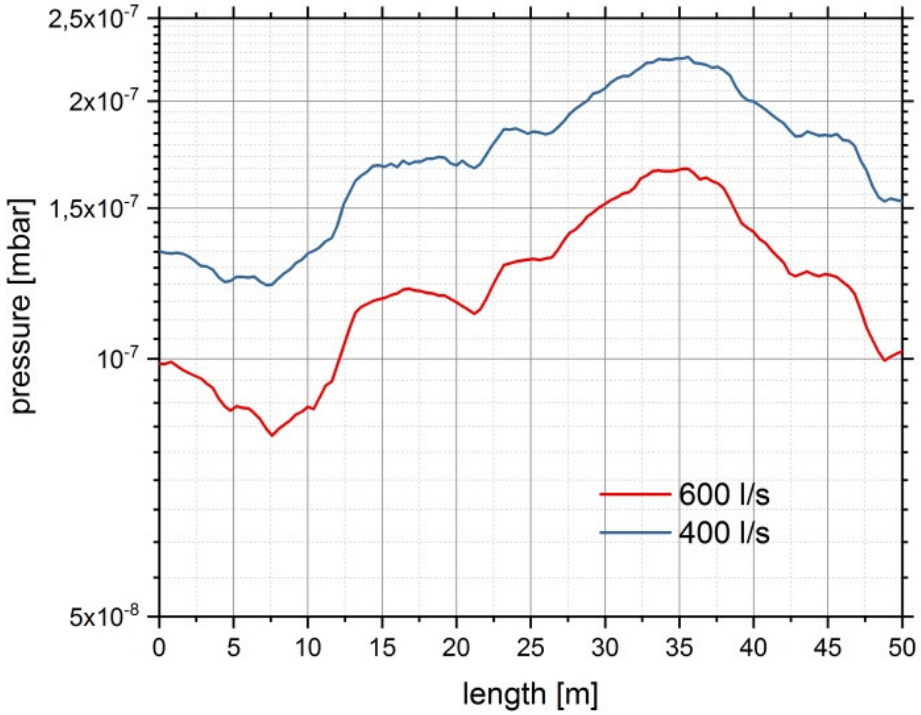
Most vacuum chambers to be produced by Budker Institute of Nuclear Physics BINP, Russia

pbar-Separator: Draft 3D Model





pbar-Separator
Pressure Profile Calculations (MOLFLOW+)



Vacuum components pbar Separator

- Vacuum system design not yet finalized

Components	Quantity	Remarks
Roughing Stations	1	Mobile (TMP&forepump 700l/s&30m3/h)
Ion Getter Pumps	8	Pumping Speed 400l/s
Sector Gate Valve	2	all-metal, DN400
Angle Valves	2	DN160CF for roughing stations
Fast Valves	1	
Cold Cathode Gauges	4	
Pirani Gauges	4	
Fast Valve Sensor	1	

Technical properties of vacuum chambers

Vacuum properties	Non-bakeable
Integral leak rate	≤ 1x 10^{-10} $\frac{\text{mbar l}}{\text{s}}$
Outgassing rate (after **10h** of pumping)	≤ 5x 10^{-10} $\frac{\text{mbar l}}{\text{s cm}^2}$
Residual gas analyse (after **24h** of pumping)	1. All peaks between mass 18 and 45 must be **100** times lower than mass 18, except mass 28 and 44. 2. All peaks higher mass 45 must be **1000** lower than mass 18.

Mechanical requirements:

- Check of welding seam according to DIN EN ISO 9712, quality class DIN EN ISO 5817 B
- Surface quality R_z=25
- Magnetic permeability:
  - Parts of the body of vacuum chamber that are located at a distance less than the magnetic gap from the yoke edge → μ_{rel} ≤ 1.01
  - Parts of the body of vacuum chamber that are located at a distance greater than the magnetic gap from the yoke edge → μ_{rel} ≤ 1.05
  - Components of the vacuum chamber such as flanges, bellows, and other fixed elements such as supports, bolts, nuts, washers, etc. → μ_{rel}≤ 1.05
- Chamber material according DIN EN 10088: 1.4306, 1.4307, 1.4404, 1.4429 or 1.4435
- Flange Material according DIN EN10088: 1.4306, 14307 or higher quality

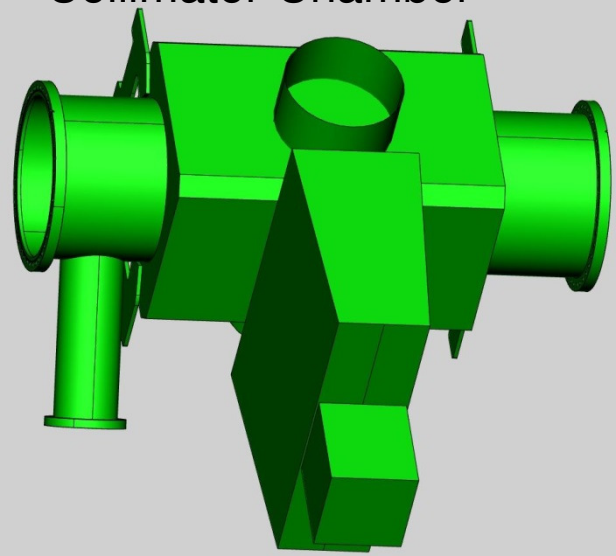
Vacuum Chambers pbar-Separator

- Large aperture beam pipe DN400/450,
- Mainly round and straight chambers
- Vacuum chambers not designed in detail

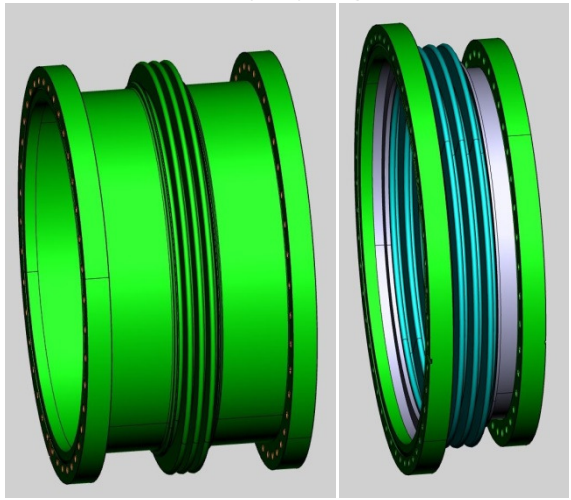
Chamber Type	Pieces	Shape	Dimensions
Bellows	~31	round	L= , d=400mm
Round Chambers	~18		~1000<L<6000mm, d=400mm
Pumping/roughing Chamber	~3		
Wide Quadrupole Chamber	~8	octagonal	L=1300mm, 400x180mm2, flange DN450
Vert./Horiz. Collimator Chamber	~3		

Draft 3D Model of Chambers

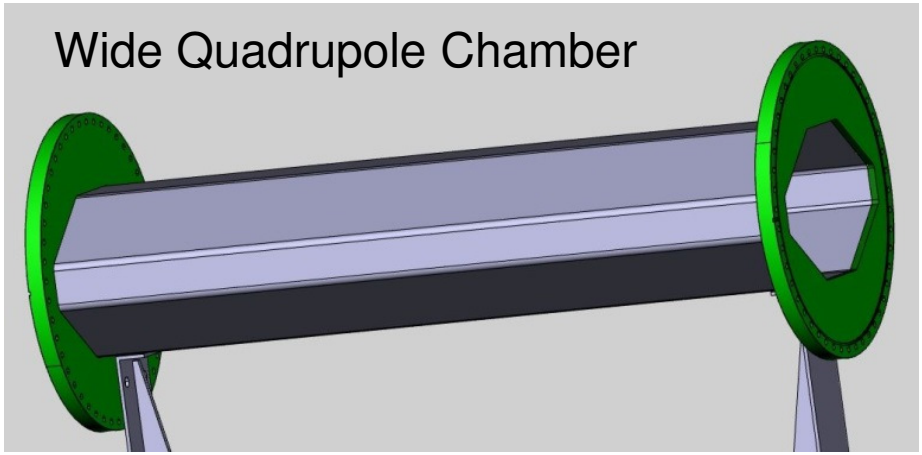
Collimator Chamber

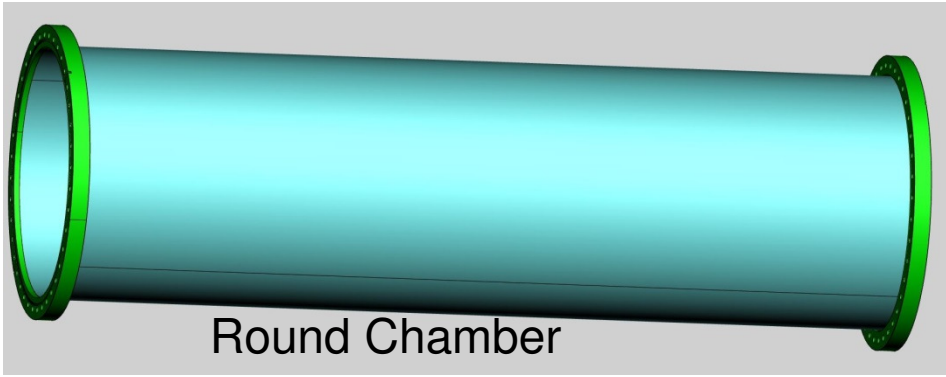


Bellows



Wide Quadrupole Chamber





Round Chamber