

A 3D CAD model of a complex mechanical assembly, likely a Beam Gas Curtain (BGC) prototype. The model is rendered in a semi-transparent grey, revealing internal components. Several parts are highlighted in different colors: a large red section, a blue section, a yellow section, and an orange section. The model is set against a dark purple gradient background.

New prototype design

Beam Gas Curtain

1. BGC – New prototype design

Elements of the BGC system

Changes to the existing system

Agreed interfaces between the systems

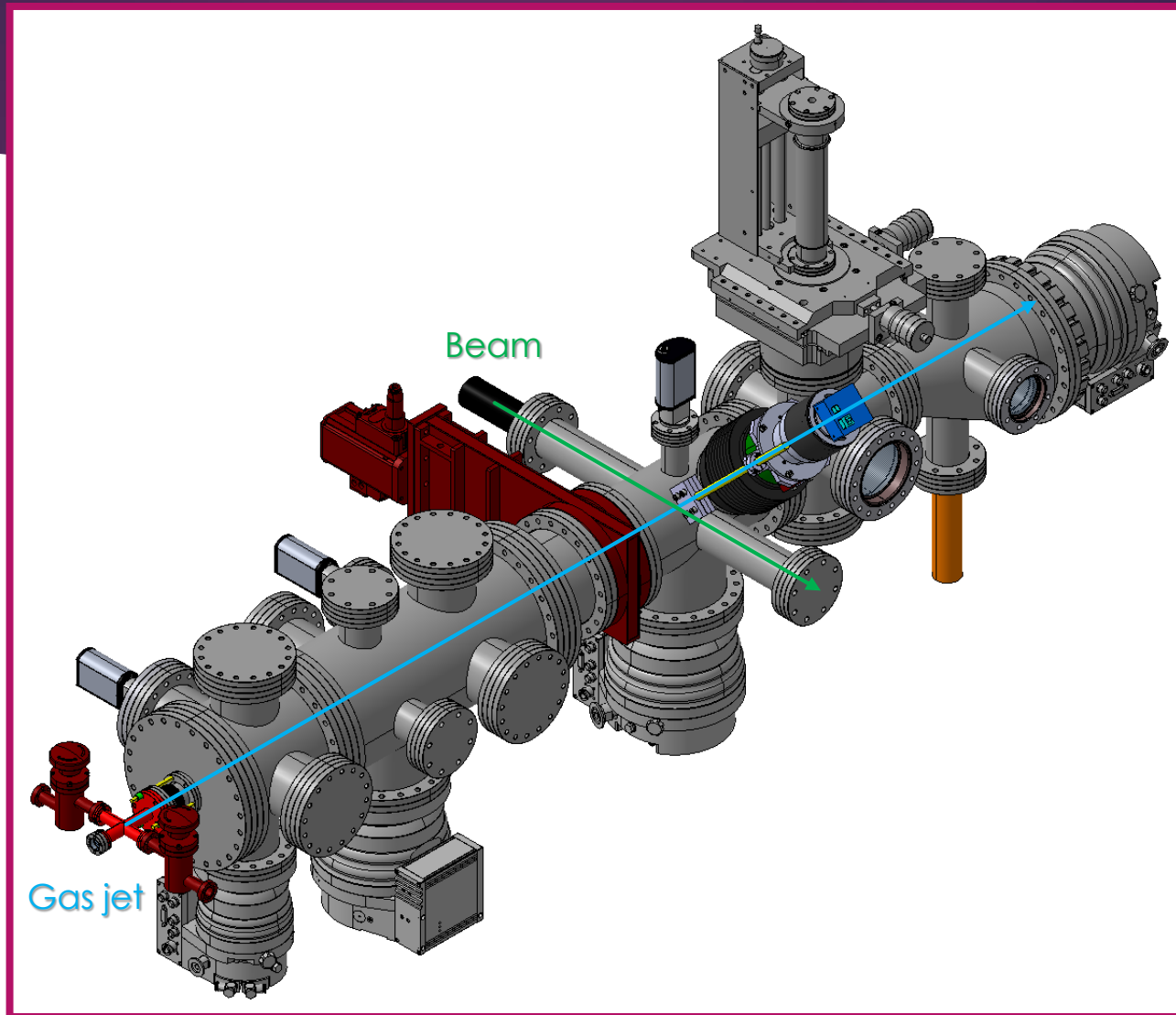
Alignment of the skimmers

Vacuum system and expected pressures

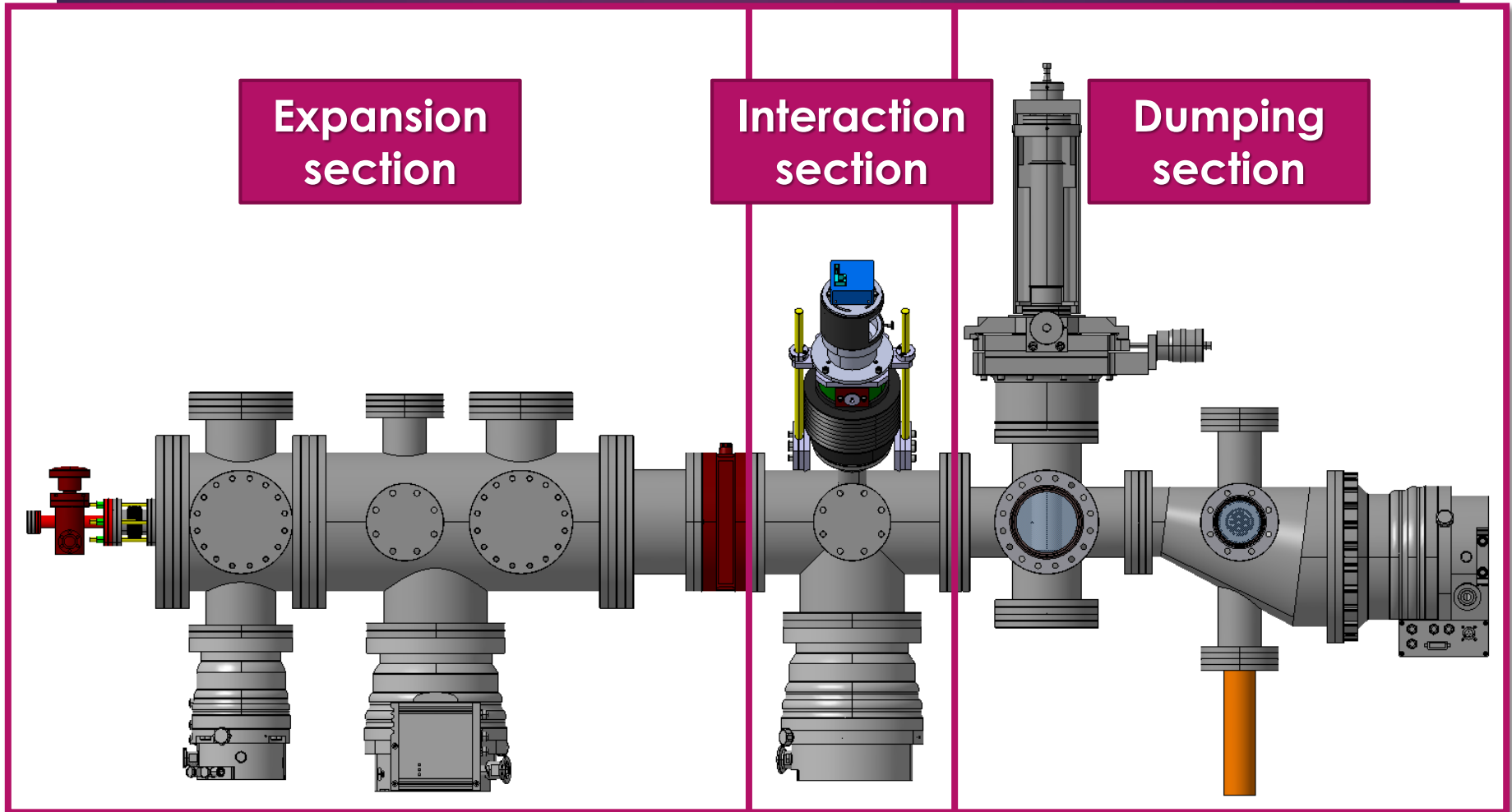
Flexibility of the system

Non-vacuum parts list

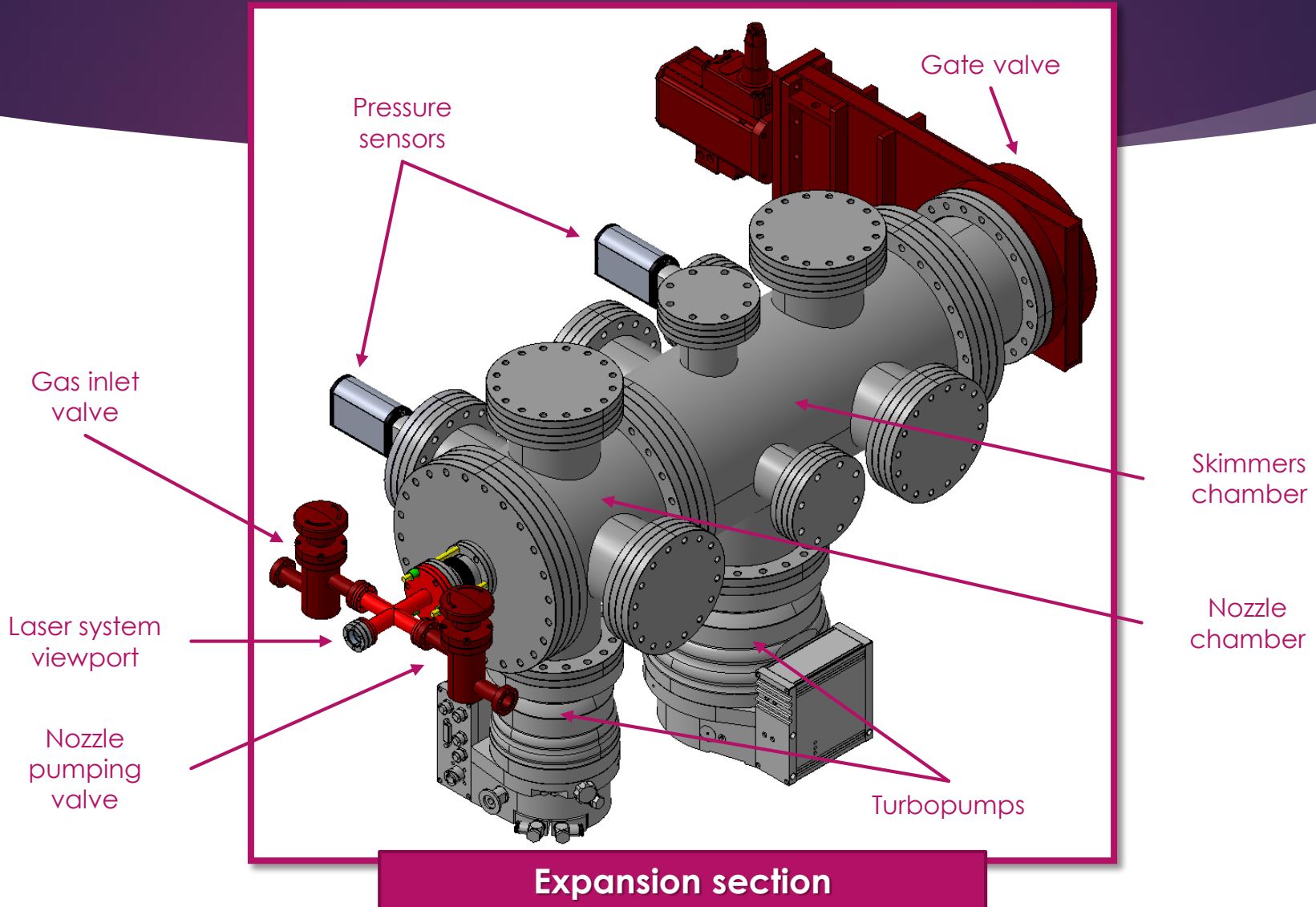
2. Elements of the BGC system



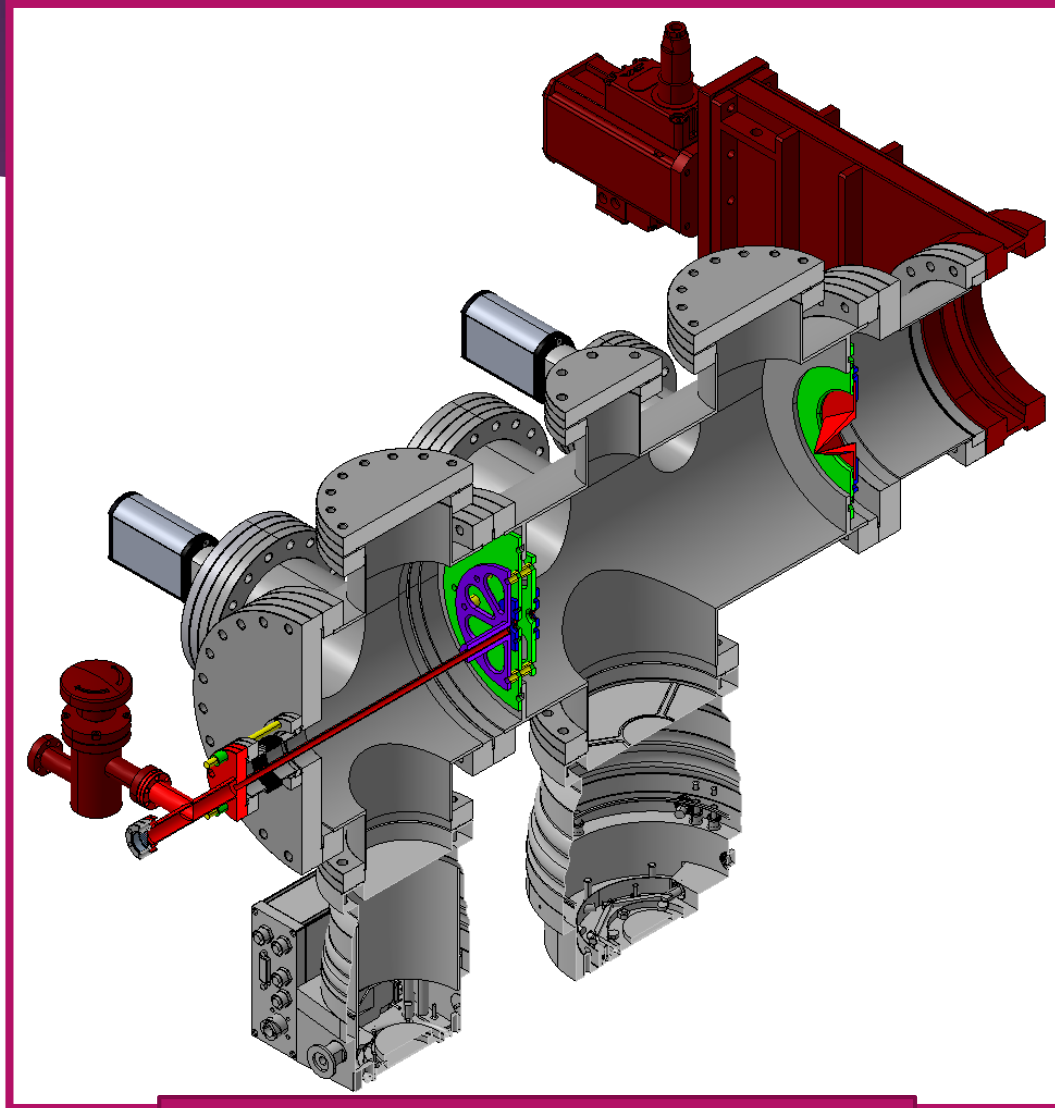
2. Elements of the BGC system



2. Elements of the BGC system

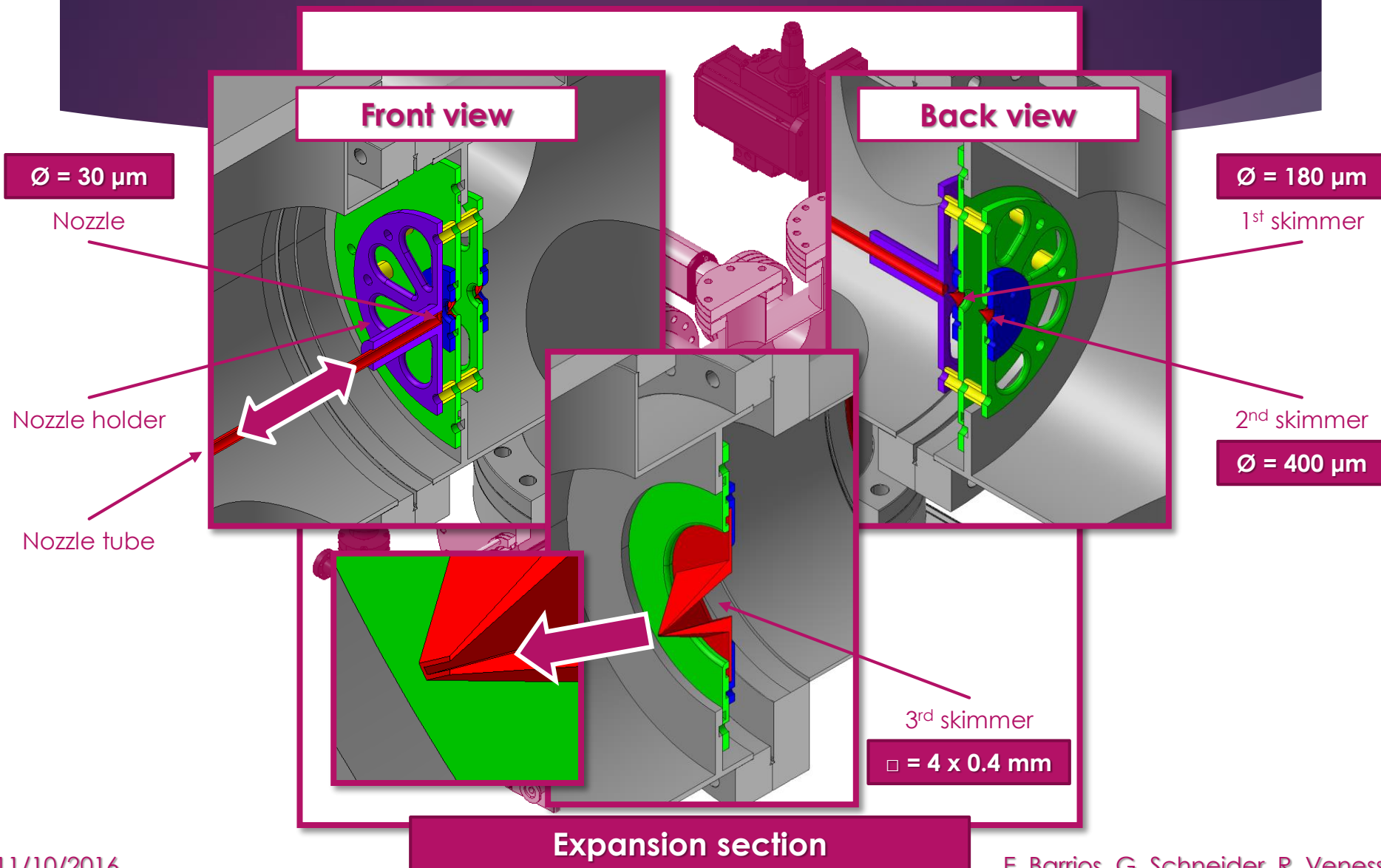


2. Elements of the BGC system

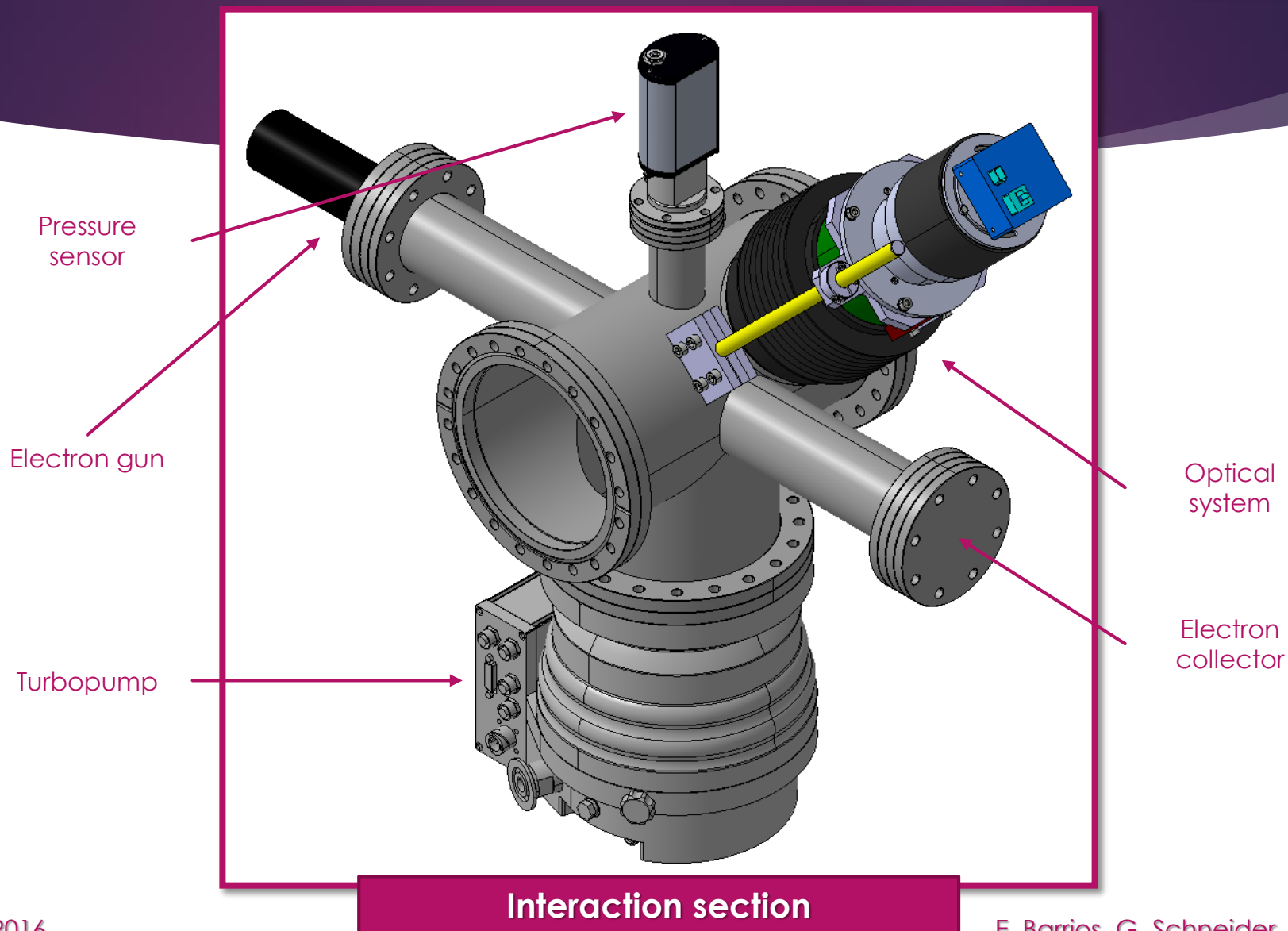


Expansion section

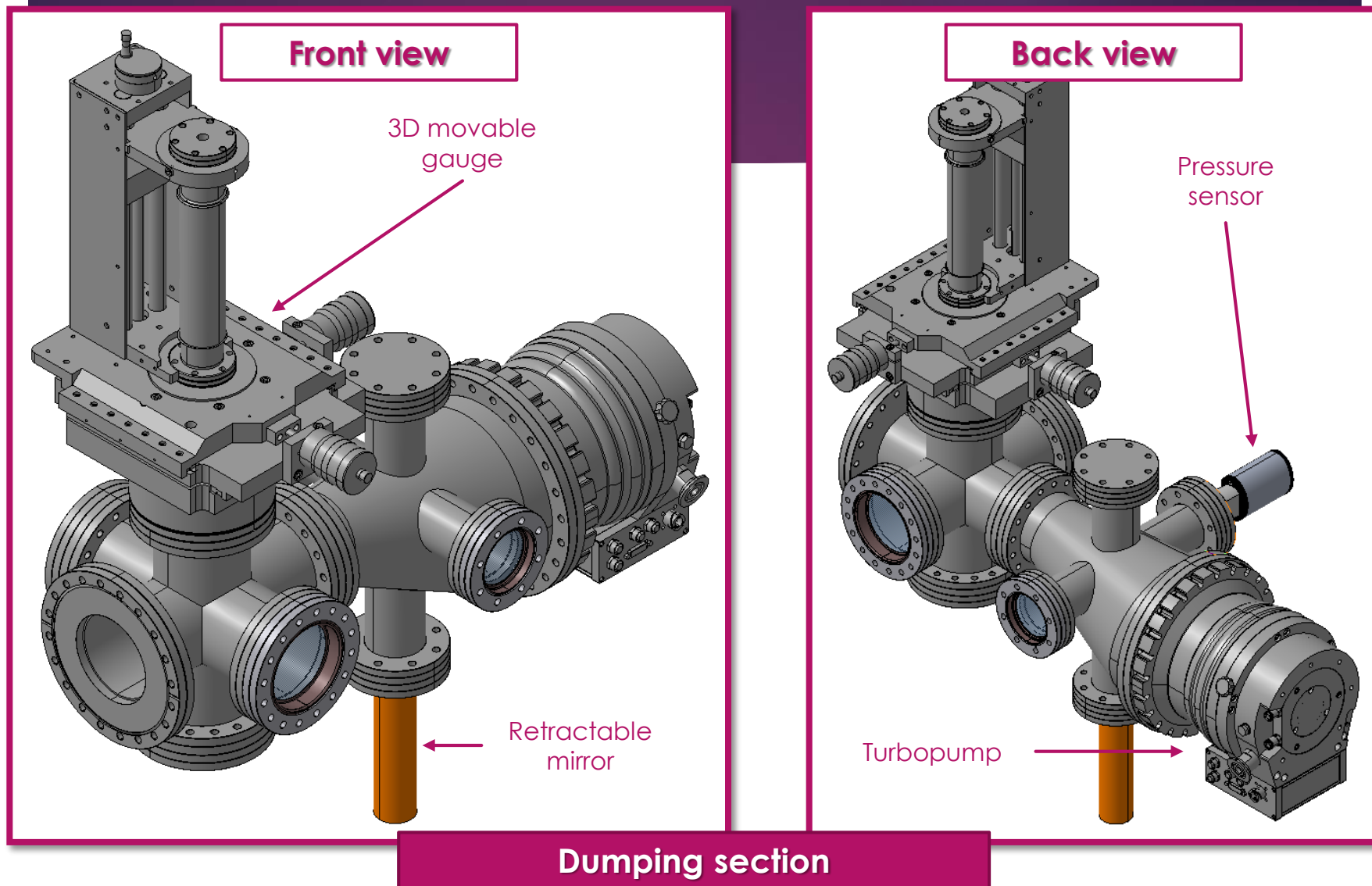
2. Elements of the BGC system



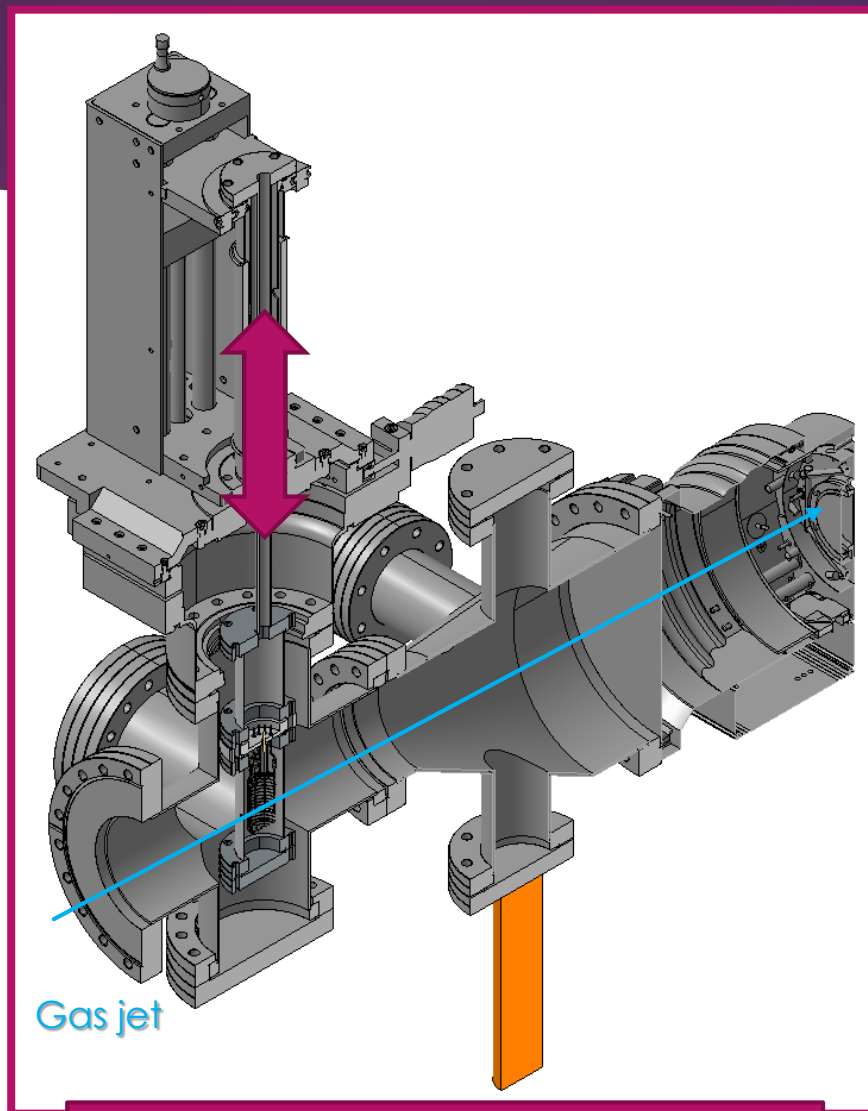
2. Elements of the BGC system



2. Elements of the BGC system



2. Elements of the BGC system



Gas jet

Dumping section

3. Changes to the existing system

Fully bakeable system up to a minimum of 200 °C

Alignment of the skimmers at metrology

Lower vacuum background pressure expected

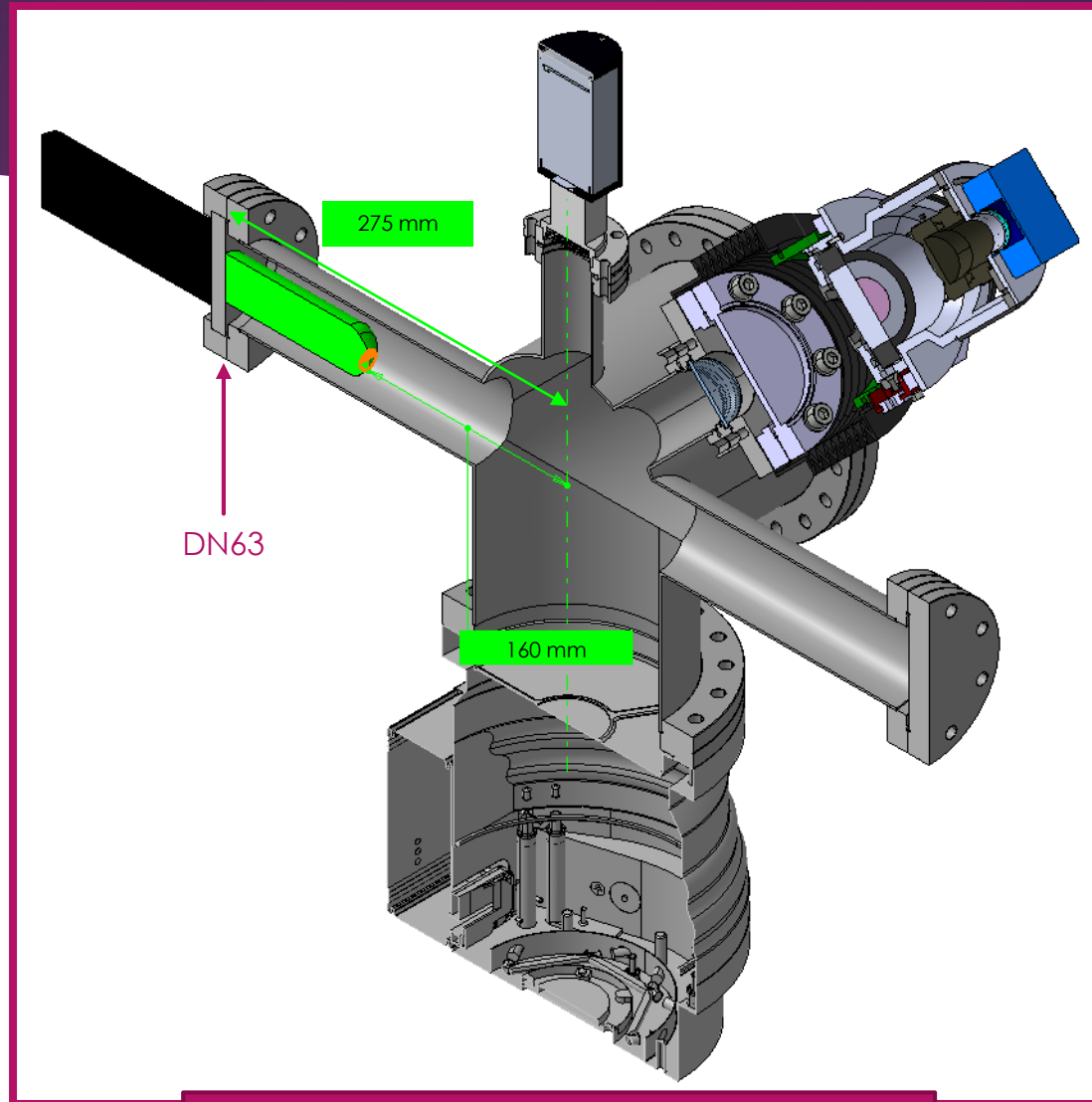
Expected pressure of 10^{-9} mbar without gas jet

Fast pressure recovery after opening

Flexible system in case we want to change the skimmers

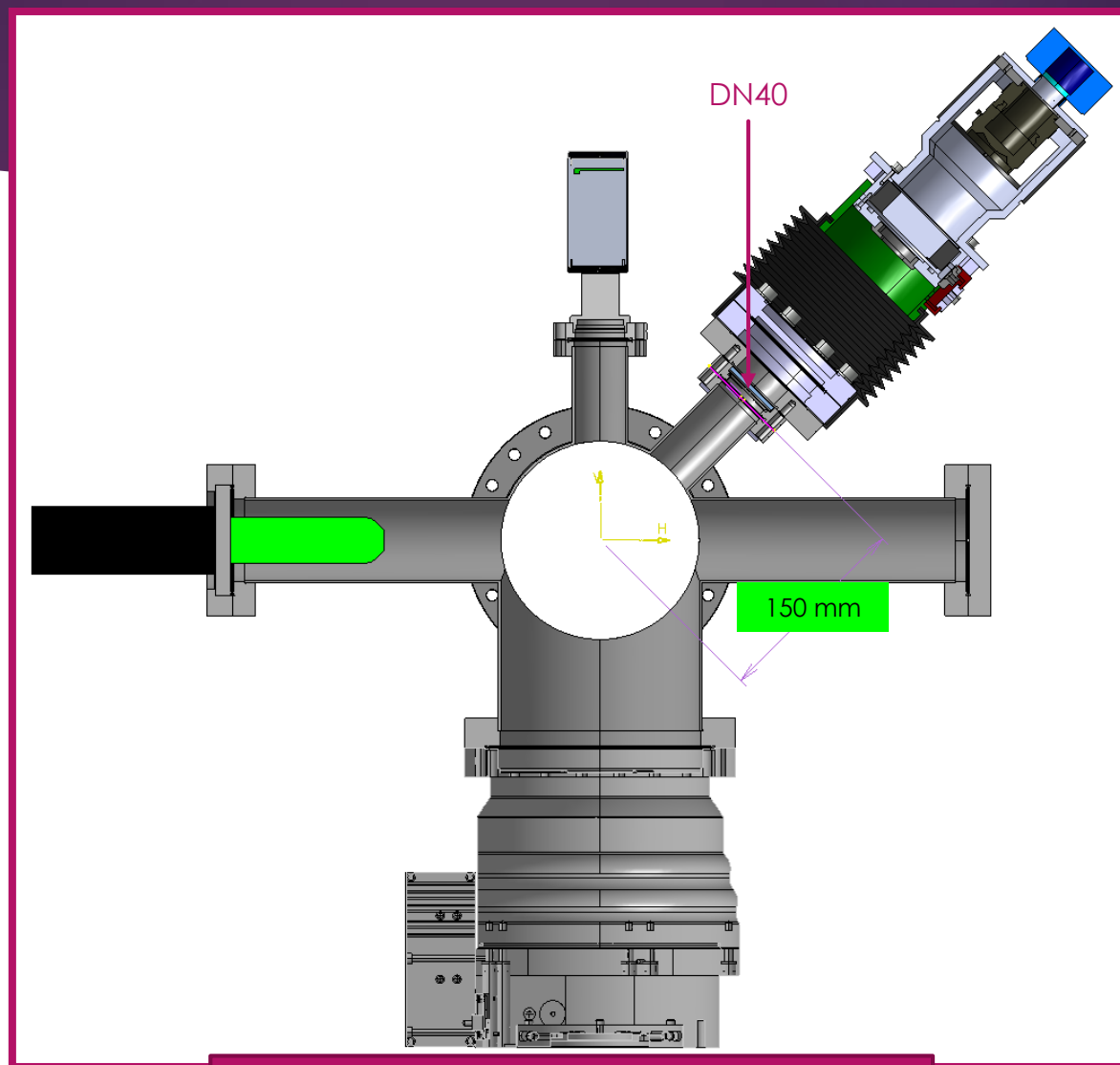
If we want to integrate the system in a setup with magnets, we would only need to change the interaction chamber

4. Agreed interfaces between the systems



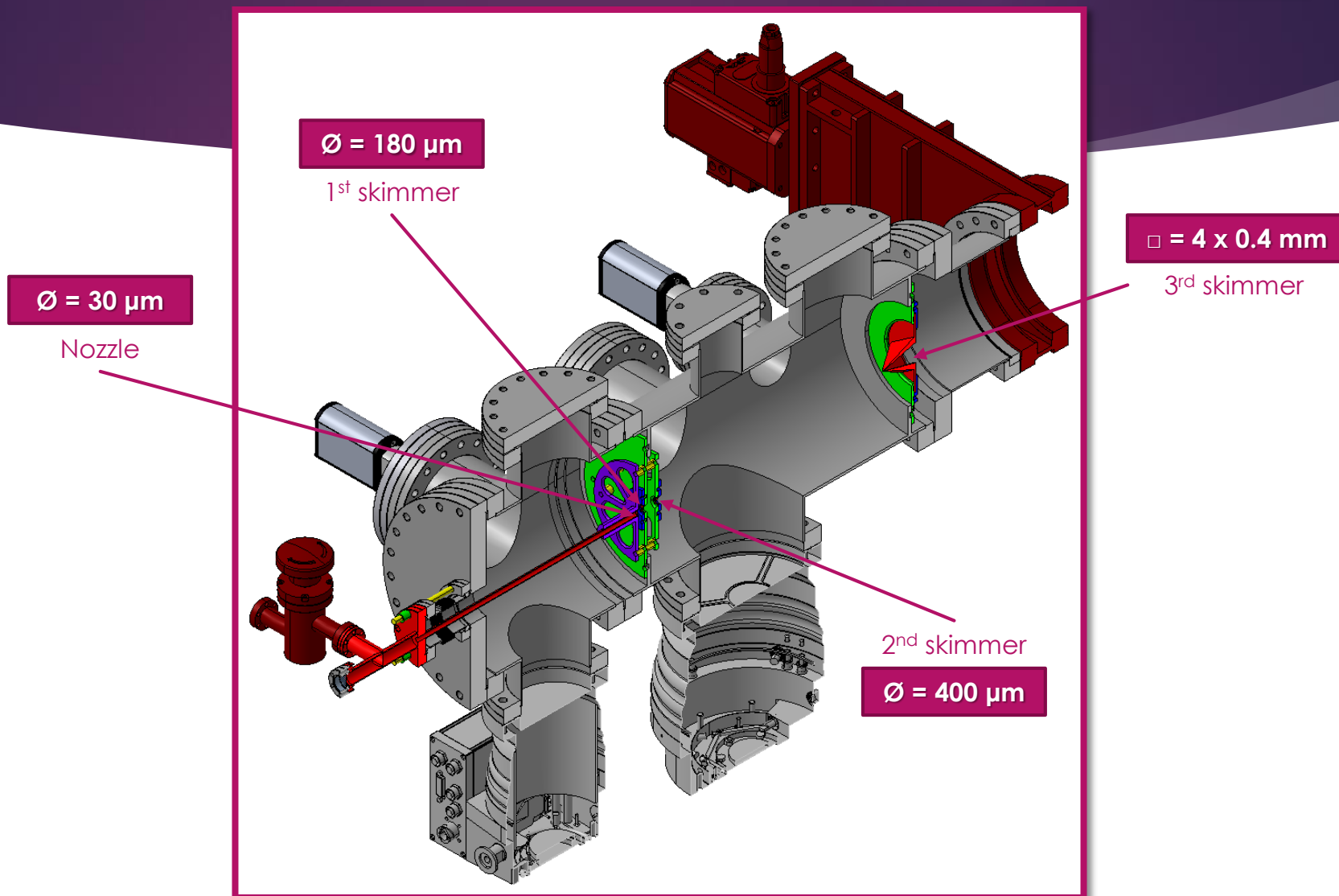
Electron gun

4. Agreed interfaces between the systems

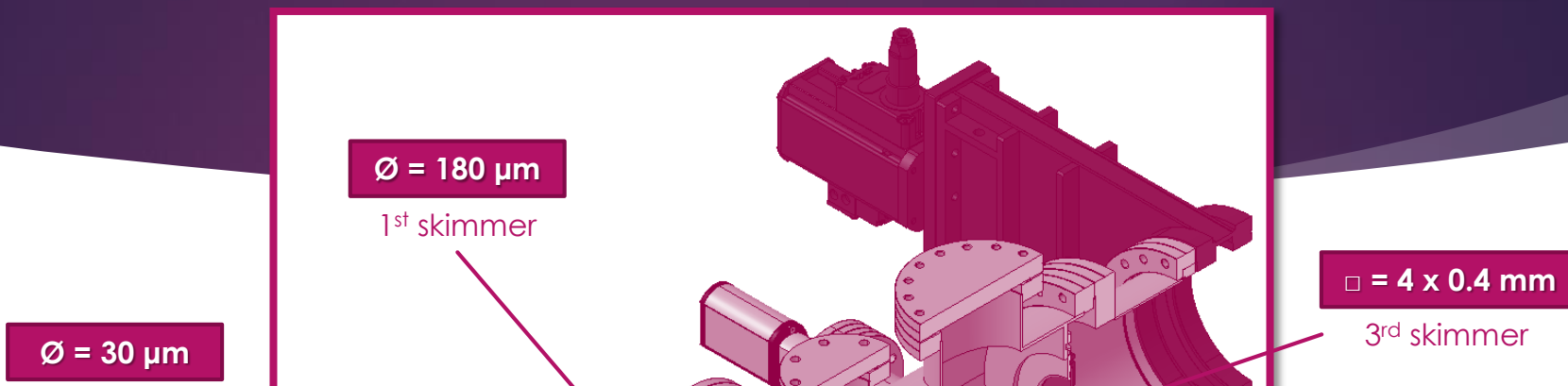


Optical system

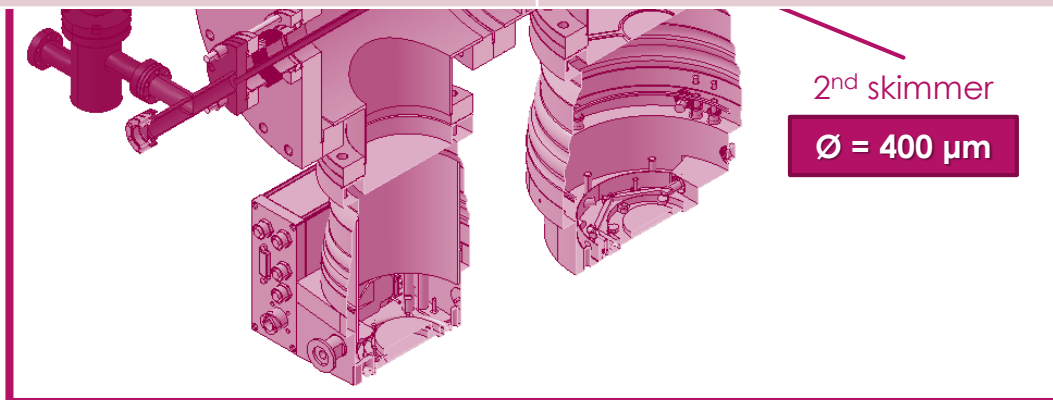
5. Alignment of the skimmers



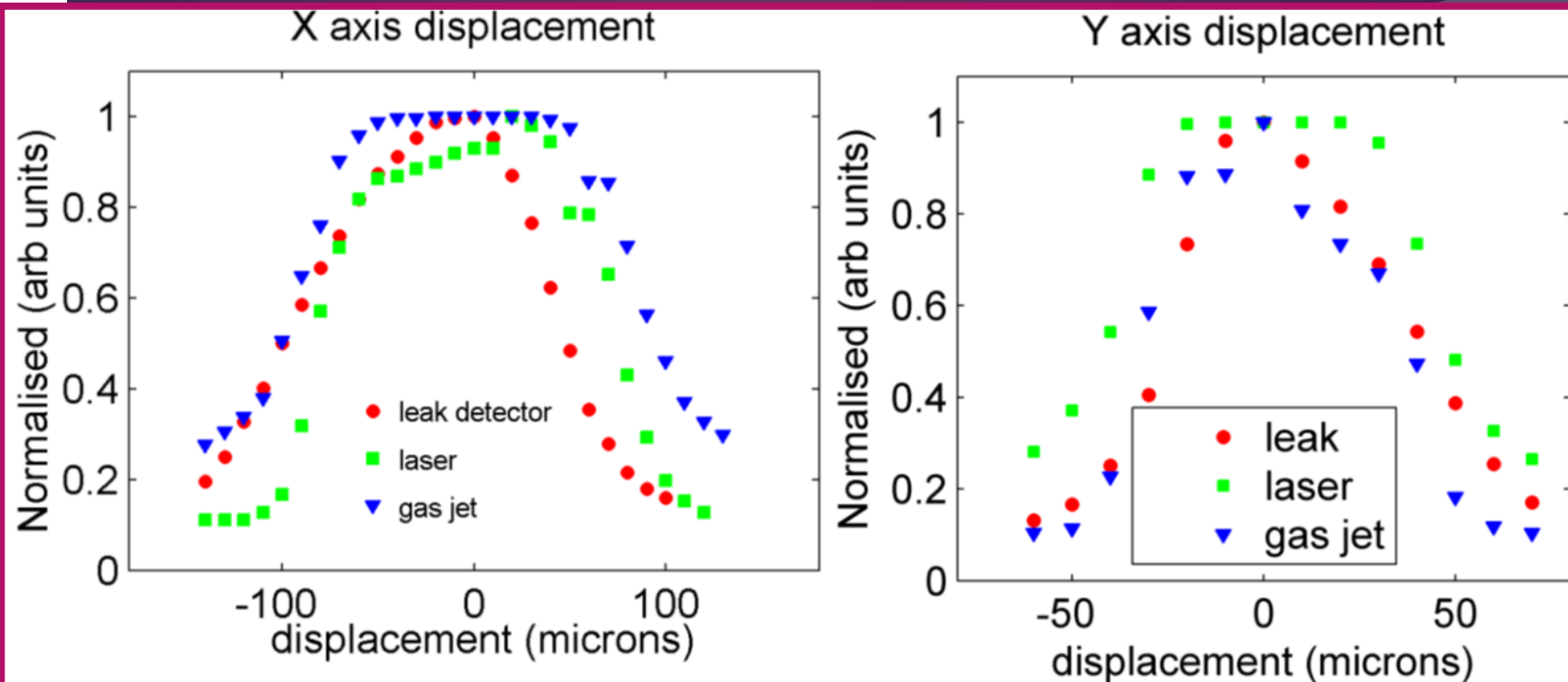
5. Alignment of the skimmers



	Distance
Nozzle – 1 st skimmer	3 – 13 mm
1 st skimmer – 2 nd skimmer	20 mm
2 nd skimmer – 3 rd skimmer	325 mm



5. Alignment of the skimmers



Source: V. Tzoganis

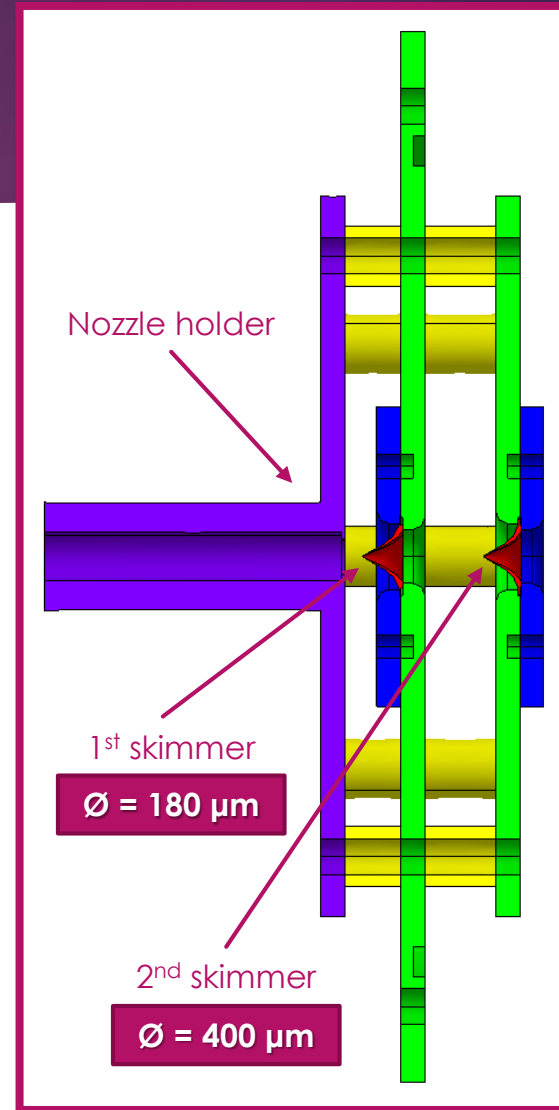
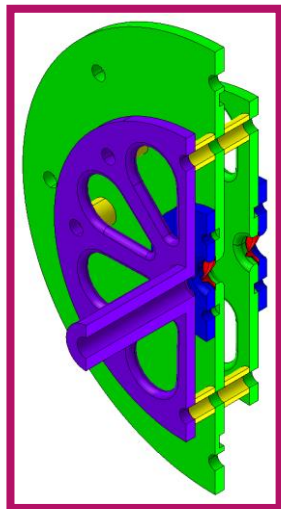
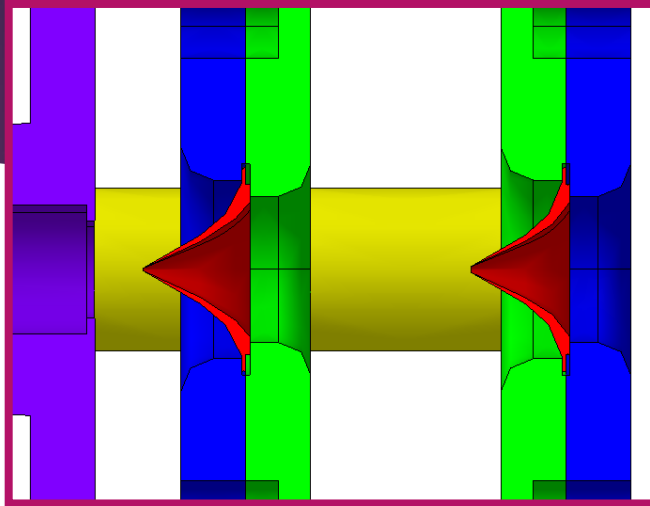
5. Alignment of the skimmers

1. Align the nozzle holder to the 1st and the 2nd skimmer in a metrology environment

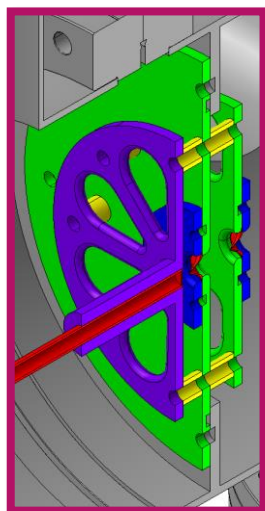
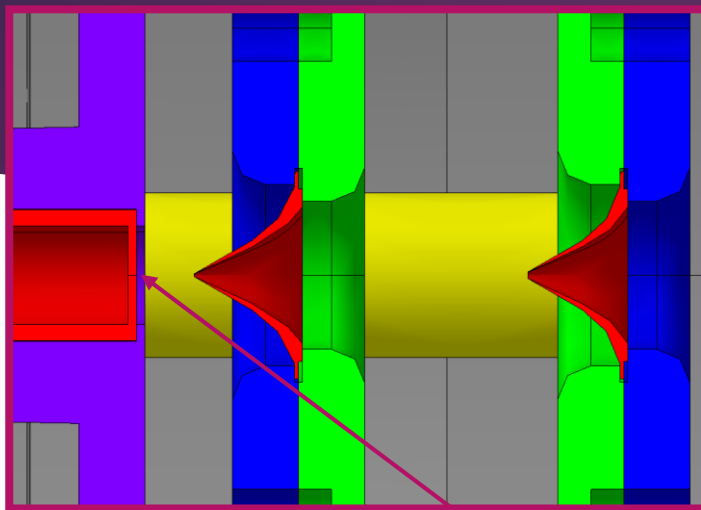
2. Mount the assembly to the skimmers chamber (possibility to note the internal centre line to external targets)

3. The nozzle tube must have a really good manufacturing concentricity

5. Alignment of the skimmers

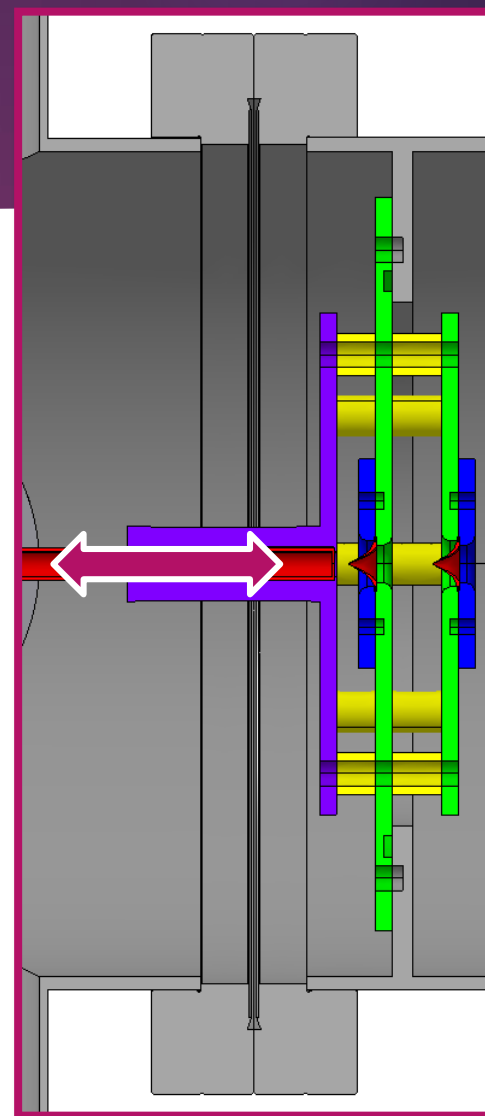


5. Alignment of the skimmers

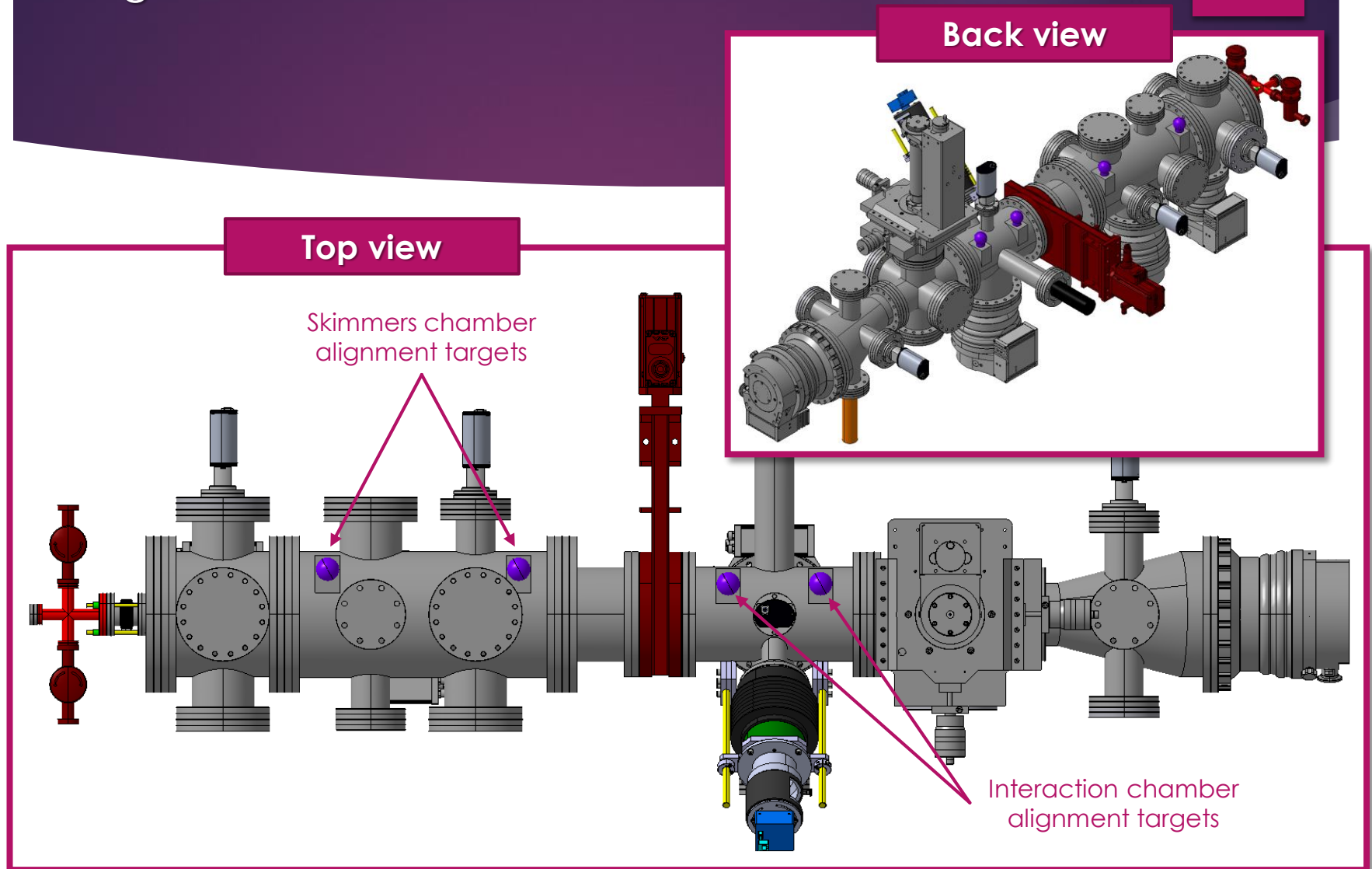


Nozzle

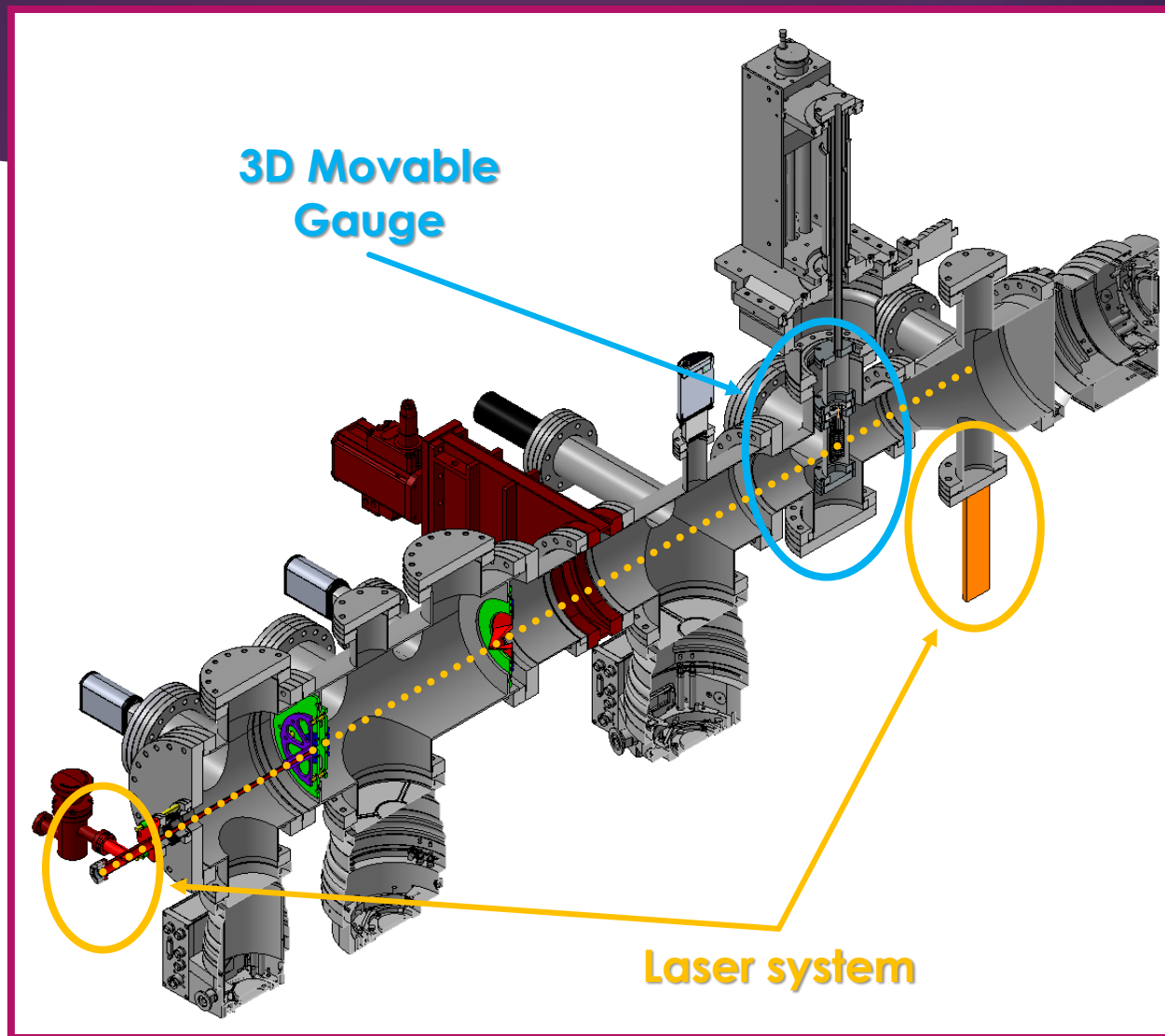
$\text{Ø} = 30 \mu\text{m}$



5. Alignment of the skimmers



5. Alignment of the skimmers



5. Alignment of the skimmers

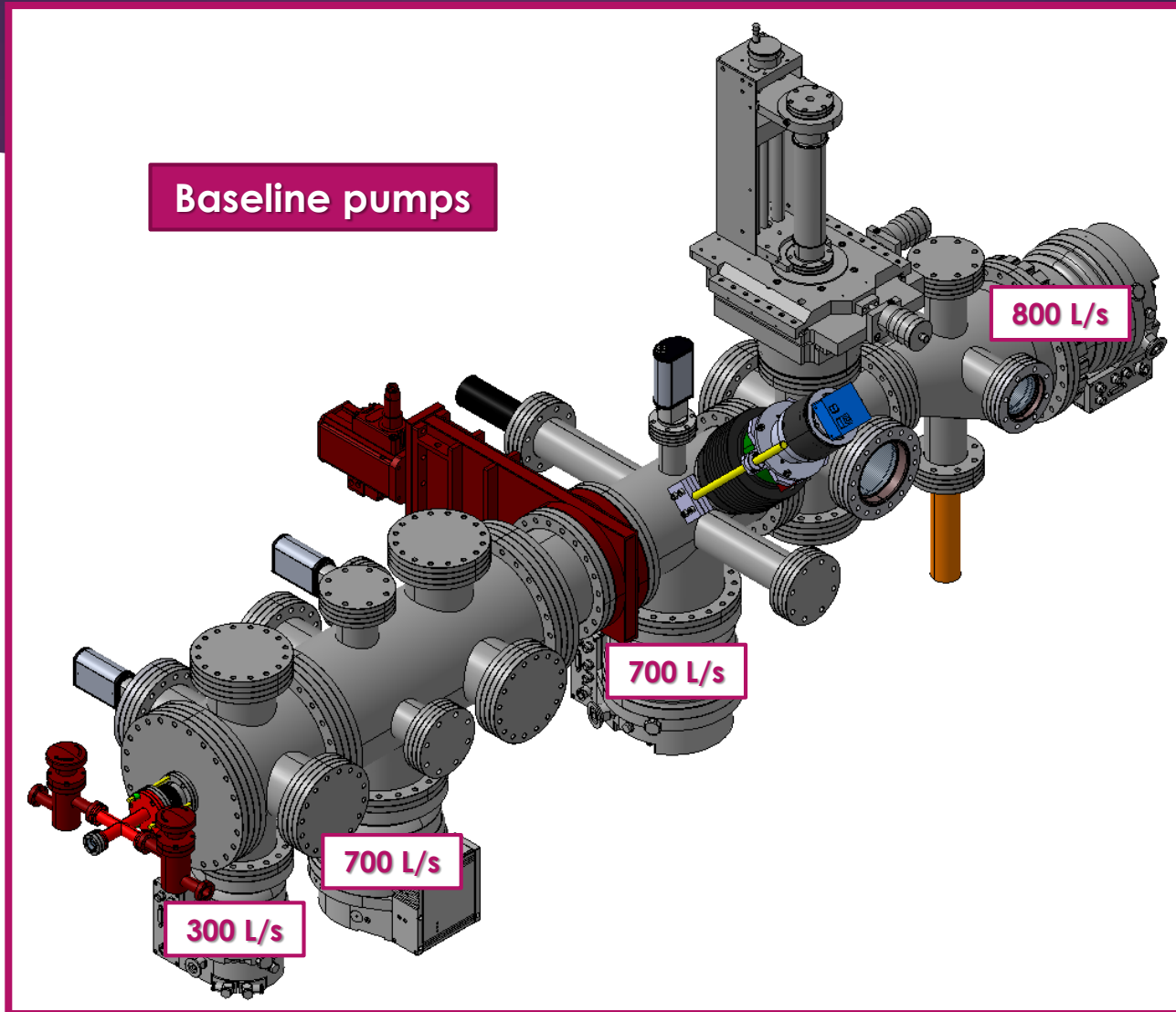
3D printing is not an option

- Alignment of Beam Gas Curtain (BGC) test plates
- **EDMS 1708792 v.1**

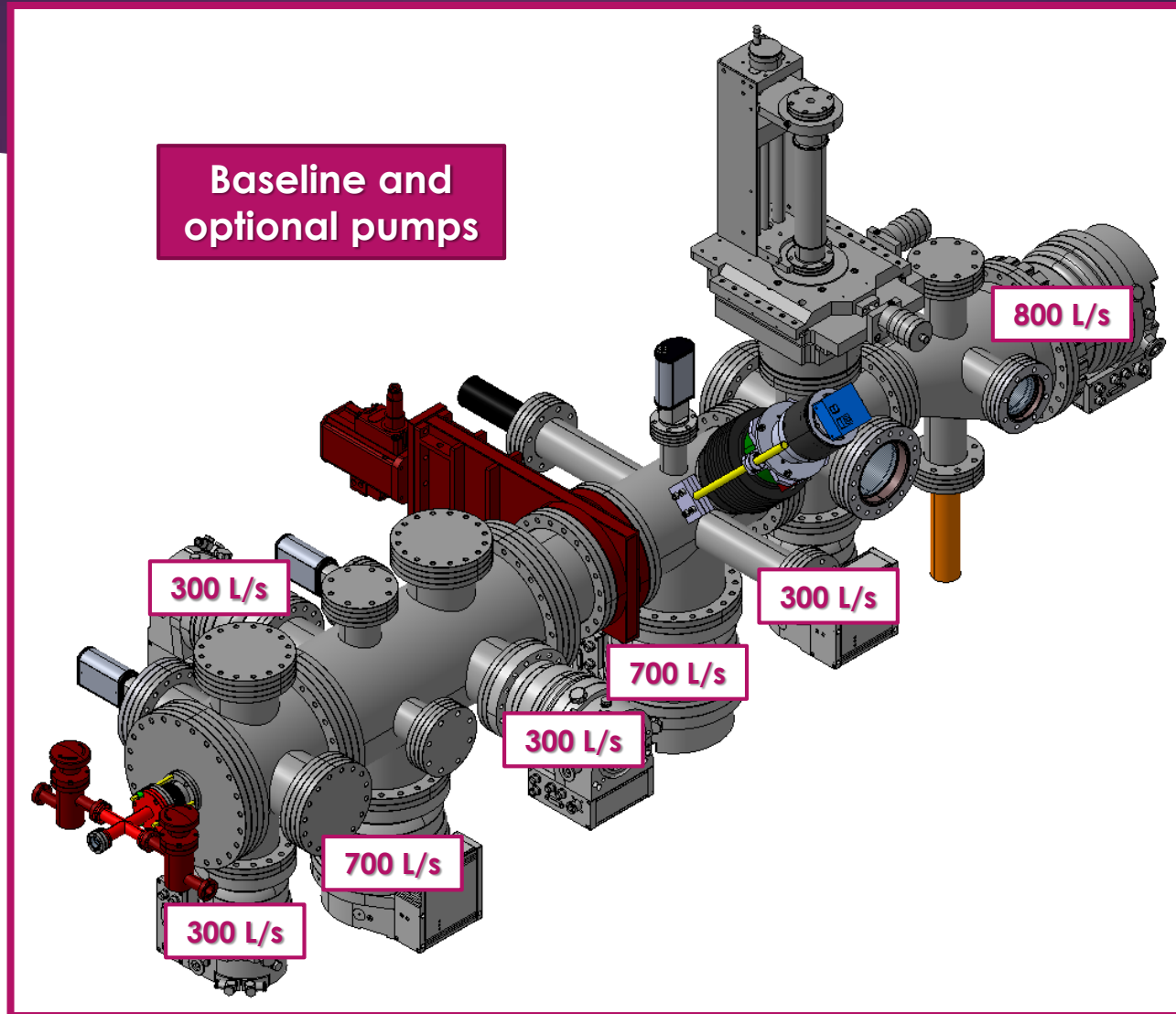
Starting investigation on how to align three elements in the micron range

- Analysis of Additive Manufacturing Technologies for the Beam Gas Curtain (BGC) instrument
- **EDMS 1708789 v.1**

6. Vacuum system and expected pressures



6. Vacuum system and expected pressures



6. Vacuum system and expected pressures

Baseline elements	Limit pressure (mbar)	Quantity	Total cost (kCHF)	Optional quantity	Optional cost (kCHF)
DN100 turbopump 300 L/s	$5 \cdot 10^{-10}$	1	5.5	3	16.5
DN150 turbopump 700 L/s	$5 \cdot 10^{-10}$	2	13.0		
DN200 turbopump 800 L/s	$5 \cdot 10^{-10}$	1	7.0		
Primary pumps		3	10.0		
Vacuum full range hot filament gauge (PBR 260)	$5 \cdot 10^{-10}$	4	6.0		
Gauge controllers		2	4.0		
3D movable gauge		1	6.0 ?		
Gate valve				1	6.0 ?
Small material (hoses, inline valves, cables, blanks, window flanges, seals...)			8.0		
Vacuum chambers (316LN flanges)		6	22.0		
Total			81.5		22.5 (additional)

6. Vacuum system and expected pressures

Static Pressure $< 10^{-9}$ mbar

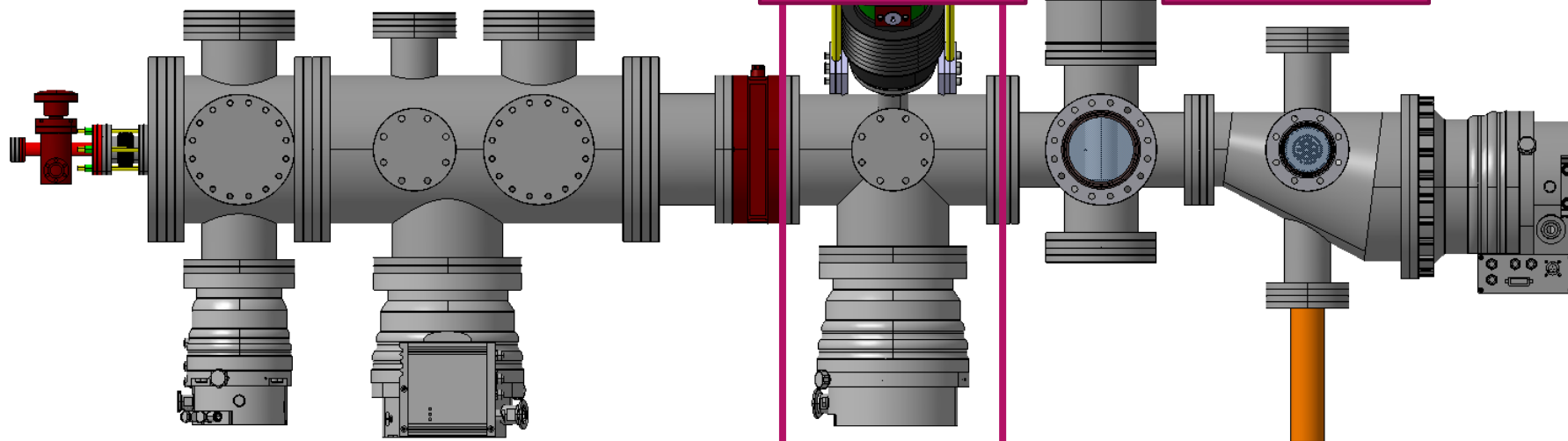
Dynamic Pressure Ranges (Order of Magnitude)

10^{-3} mbar

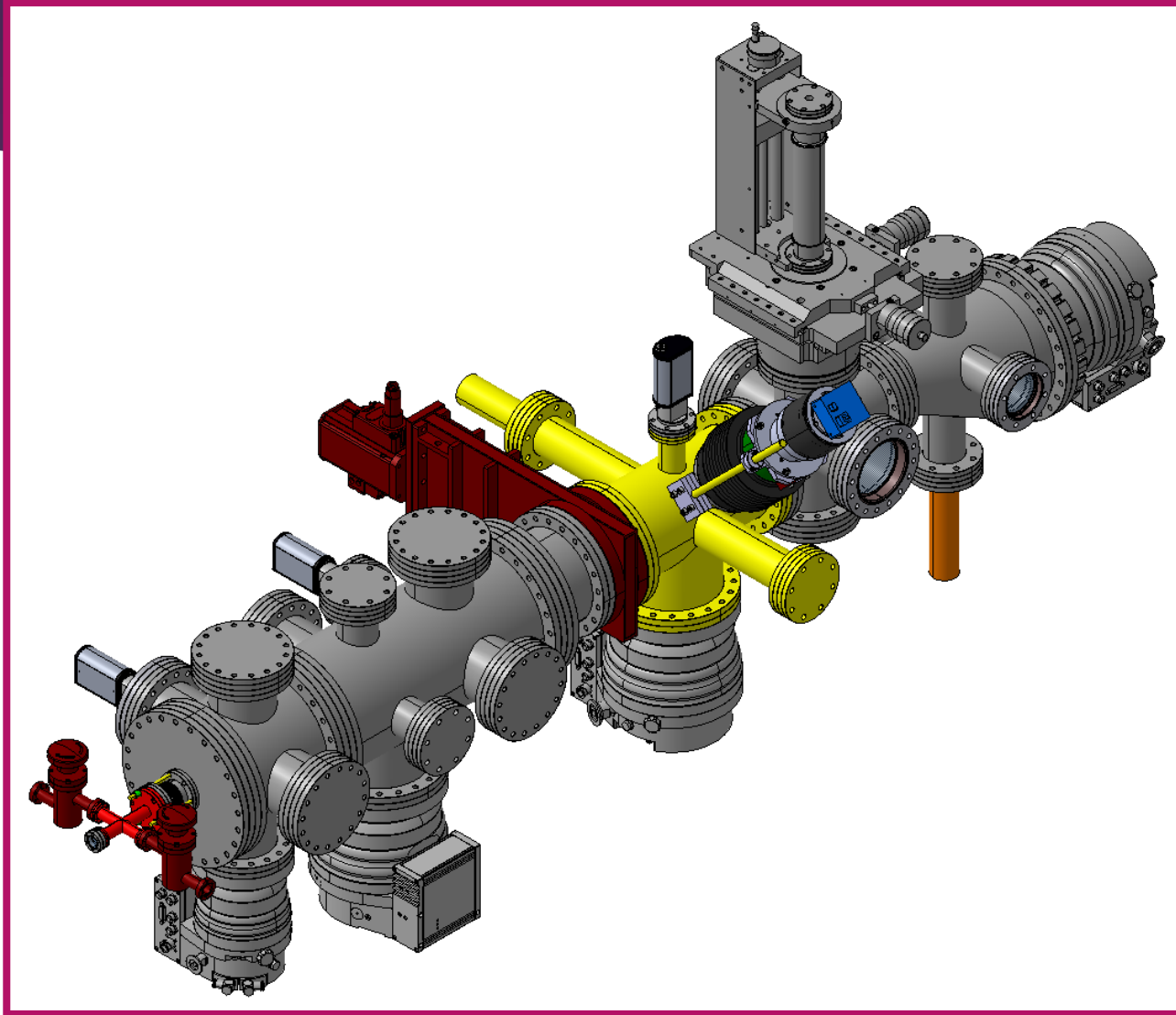
10^{-6} mbar

High
 10^{-9} mbar

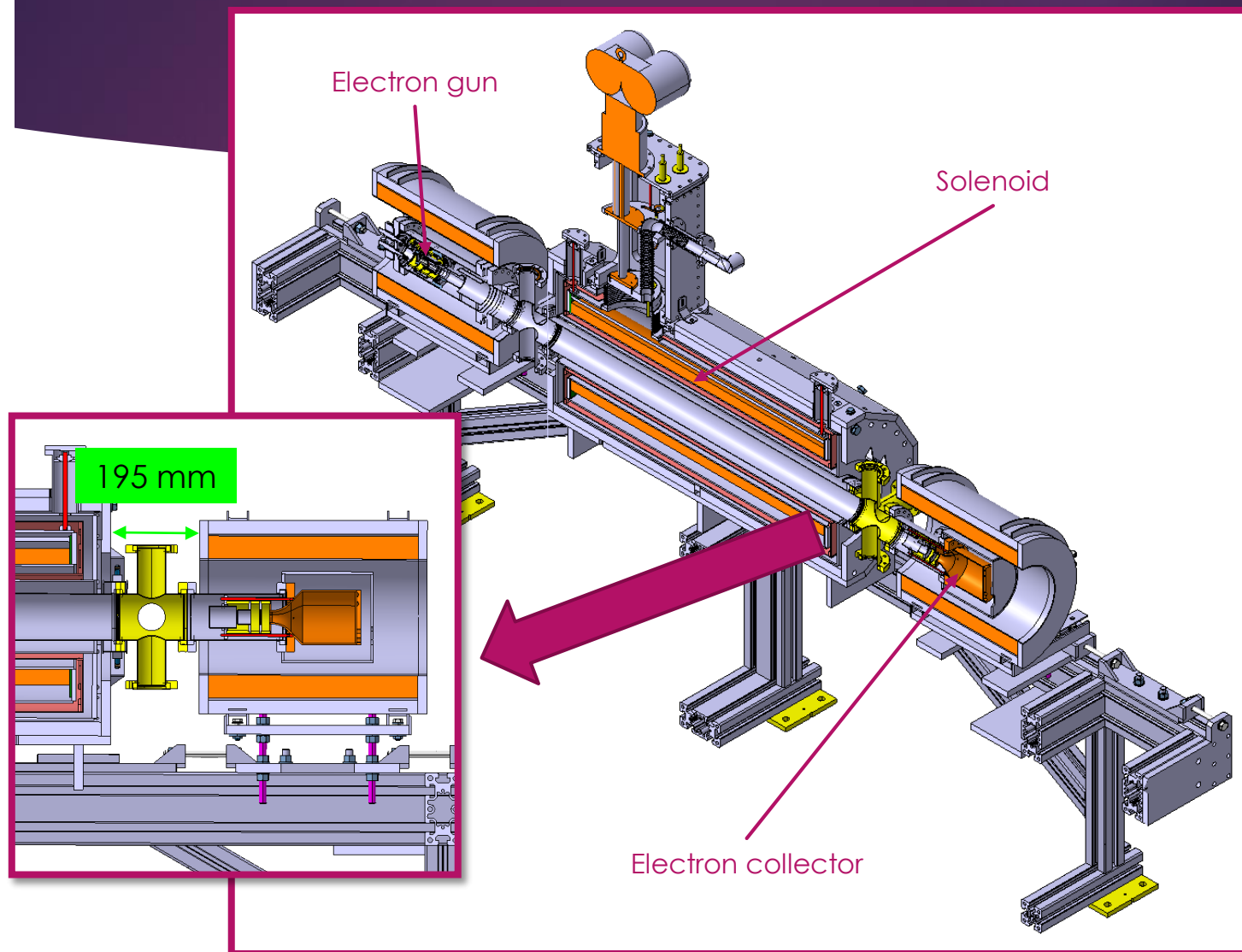
High
 10^{-9} mbar



7. Flexibility of the system



7. Flexibility of the system



8. Non-vacuum parts list

Part	Quantity	Total cost (kCHF)
Skimmers	3	3.0
Electron gun (e.g. Kimball Physics EGC-3103/EGPS-3103)	1	35.0
Electron collector ?	1	?
Support system	1	3.0
Alignment check laser and camera		1.0
Retractable mirror system	1	3.0
Optical system	1	
Total		45.0

Thank you!