

# Delivery of BGC v4.1 for EBTS

CI team & EBTS team



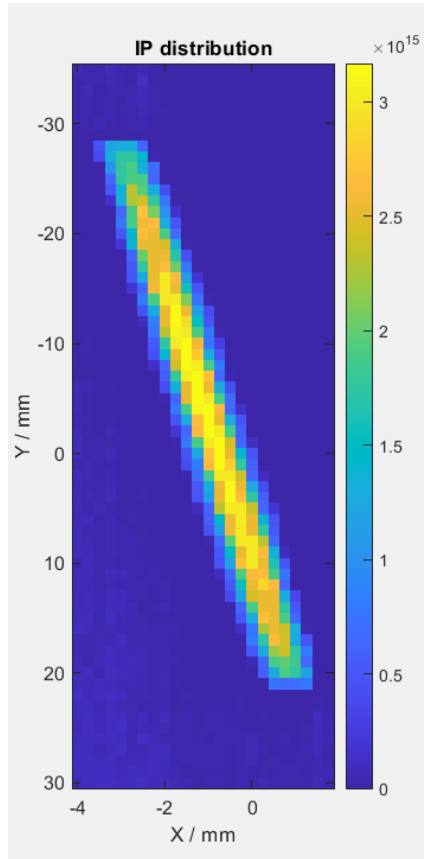
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# Content

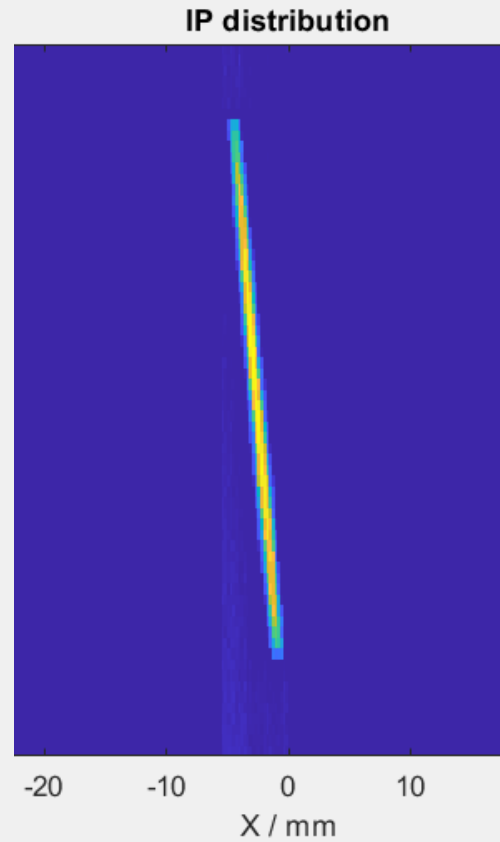
- Demonstration of ~60 mm curtain.
- V4 final design.
- Simulated geometry => Manufactured geometry.
- Procurement status.
- Plan.

# V4.1: Simulation and test on Jeremy setup

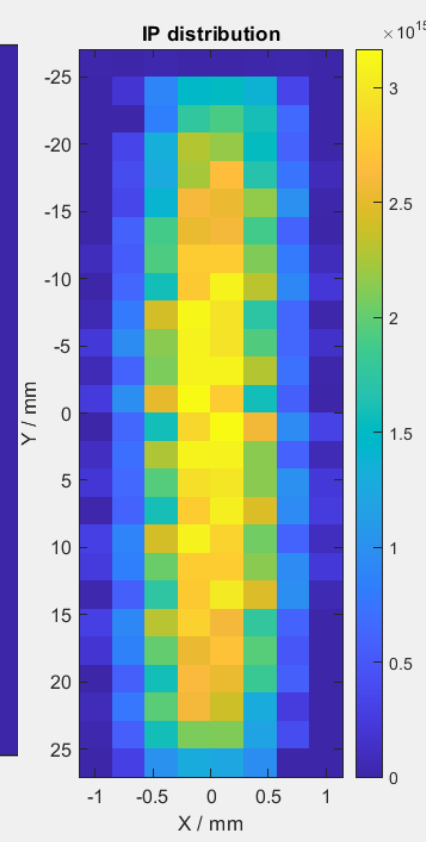
Measured ROI



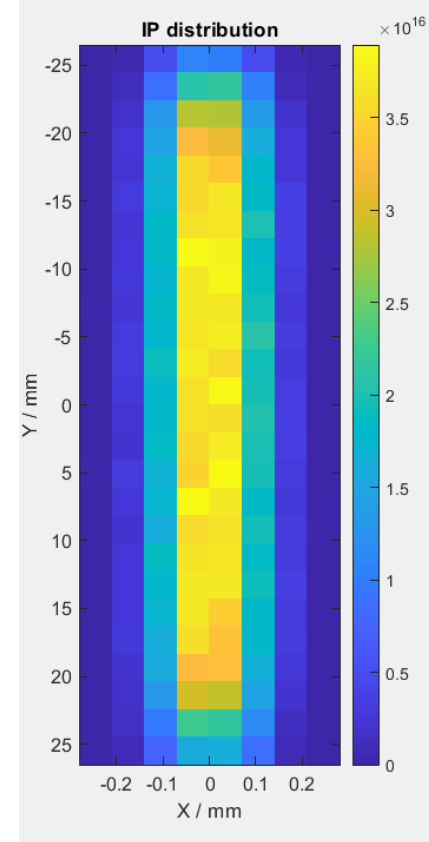
Measured (1:1 axis)



Measured, Rotated

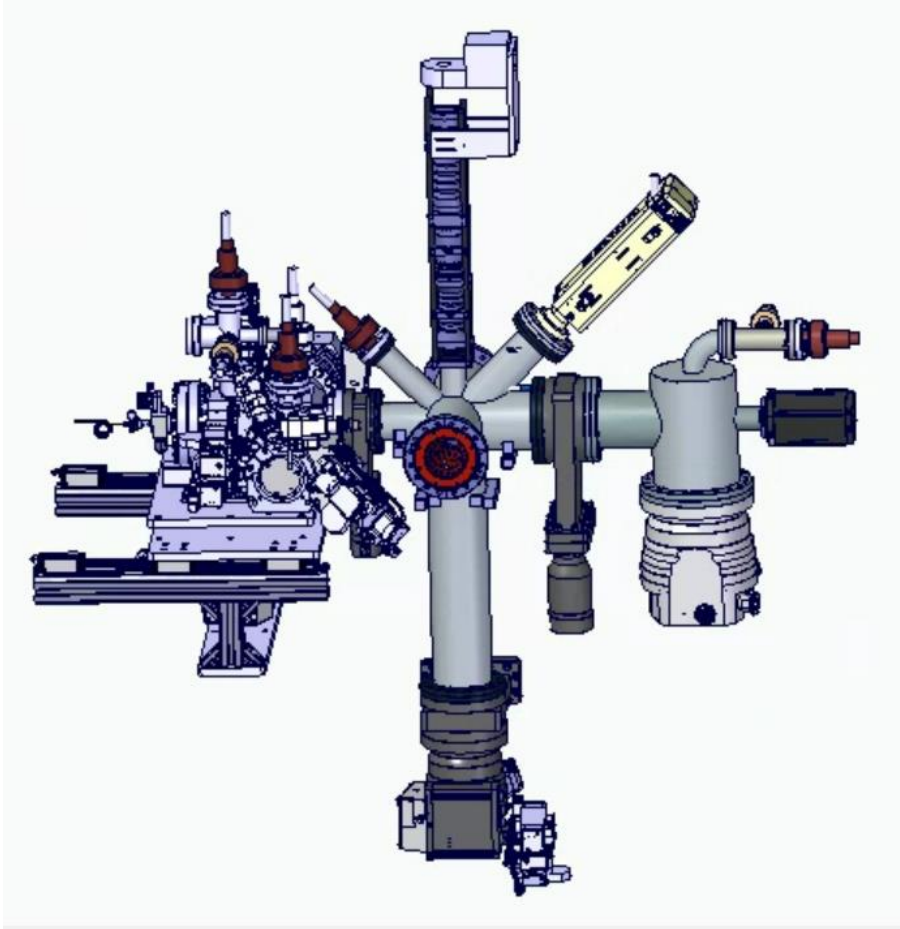


TPMC Simulation



**Conclusion: The criteria of the BGC@EBTS can be met.**

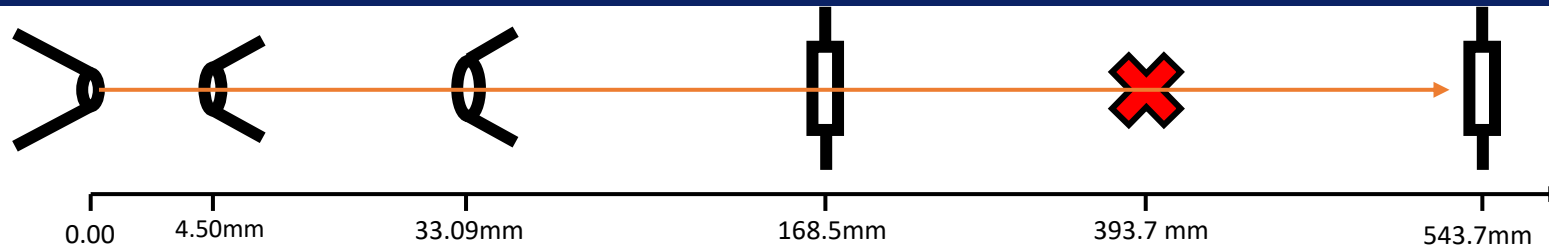
# V4.1 design



Details at <https://indico.cern.ch/event/1394592/>

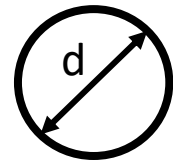
- Gas curtain formation
  - Using the design of v3 injection with new skimmer sizes for 60 mm curtain.
  - Could be used as spares for the LHC.
- Interaction chamber
  - Redesigned to host BTV and target for direct comparison.
  - Optics will stay the same for now.
  - 4<sup>th</sup> skimmer will be installed in this chamber
- Dump chamber
  - Simplified to reduce cost. Most likely to be one time usage.

# v4.1 design: nozzle skimmer assembly

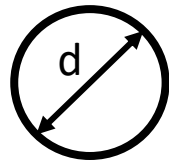


**Nozzle**   **1<sup>st</sup> Skimmer**   **2<sup>nd</sup> Skimmer**   **3<sup>rd</sup> Skimmer**   **IP**   **4<sup>th</sup> Skimmer**

Optimised value  
suggested by simulation



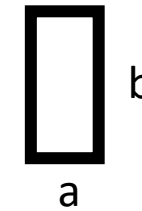
d: 700  $\mu\text{m}$



d: 5.10 mm



a: 0.10 mm b: 25.9 mm



a: 1.1 mm b: 95.2mm



Experiment planed value

d: 600  $\mu\text{m}$   
d: 700  $\mu\text{m}$   
d: 800  $\mu\text{m}$

d: 5.1 mm  
d: 5.3 mm  
d: 5.5 mm

a: 0.10 mm b: 26.0 mm  
a: 0.20 mm b: 26.0 mm

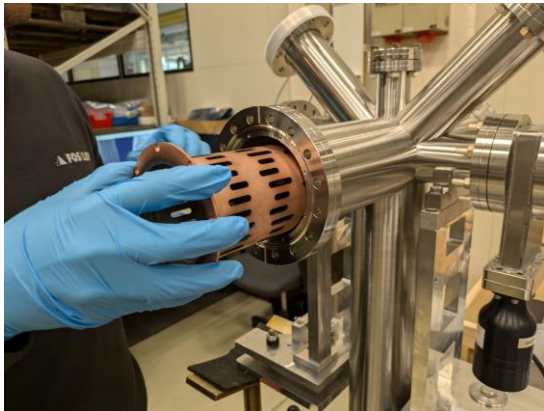
a: 3 mm b: 100mm

Installed in the EBTS  
interaction chamber  
mechanical tolerances

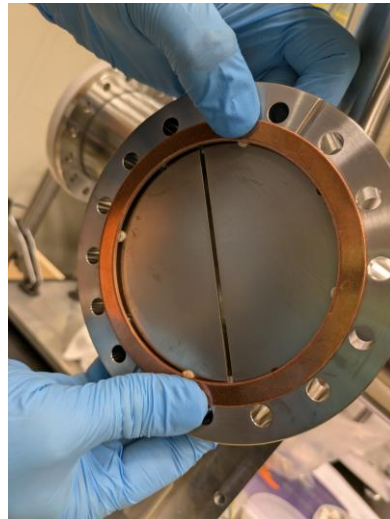


# Procurement status

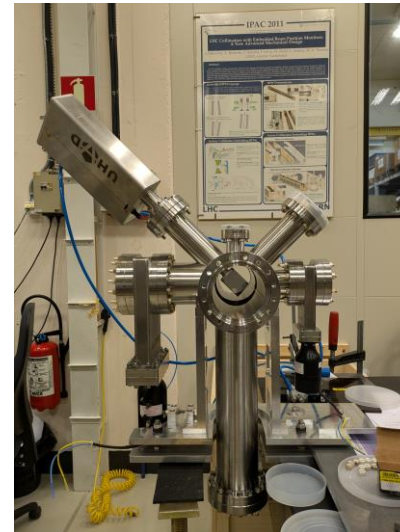
- The interaction chamber built by CERN (Adriana) is ready together with 4th skimmers: 100mm x3mm. (done)
- The 3 gate valves + 1 turbopump for the interaction chamber have been recovered at CERN as: 2 from the previous BGC @ test stand, 1 (100mm diam) from the current EBTS collector+pump. (Done)
- The inner liner (at CERN) has been cut to accommodate the larger curtain.



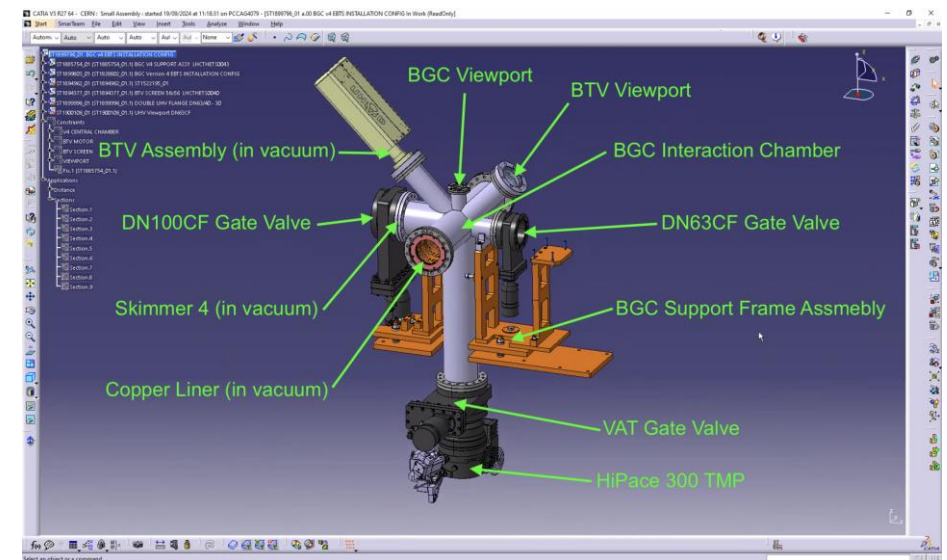
Machining of the copper liner



4<sup>th</sup> skimmer 100 mm\*3mm



New interaction chamber



# Procurement status

- Chiara has already ordered the pumps to go with the BGC, and they will be delivered at CERN in 8 weeks, expected in December.
- The injection chamber and dump will be ordered and delivered at CI (December).
- Gerhard shipped the bellows in December.
- 2<sup>nd</sup> and 3<sup>rd</sup> skimmers and alignment system in quotation.



# Plan ahead

- Gas injection test (December-January).
  - Alignment of nozzle skimmers with the new geometry tested in the JEREMY setup.
  - Pumping down time. Vacuum pressure of each chamber with jet on and off.
  - Measurement of a 60 mm curtain with both Neon and Nitrogen gas.
  - Measurement with CI e-beam (If time allowed).
- Ship to CERN by February 2025
- CI people will travel to CERN for the installation with the local help in February-March 2025.