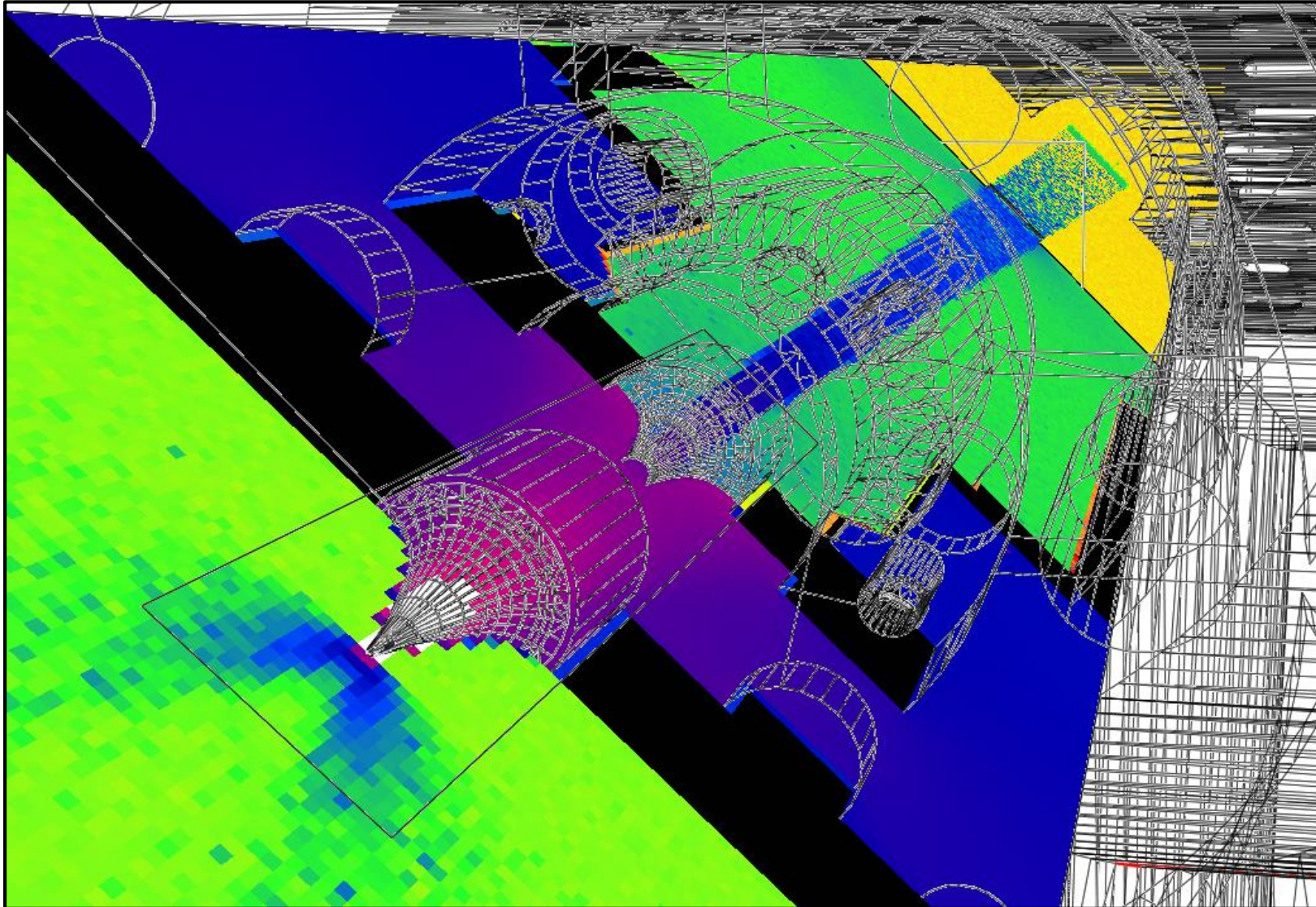
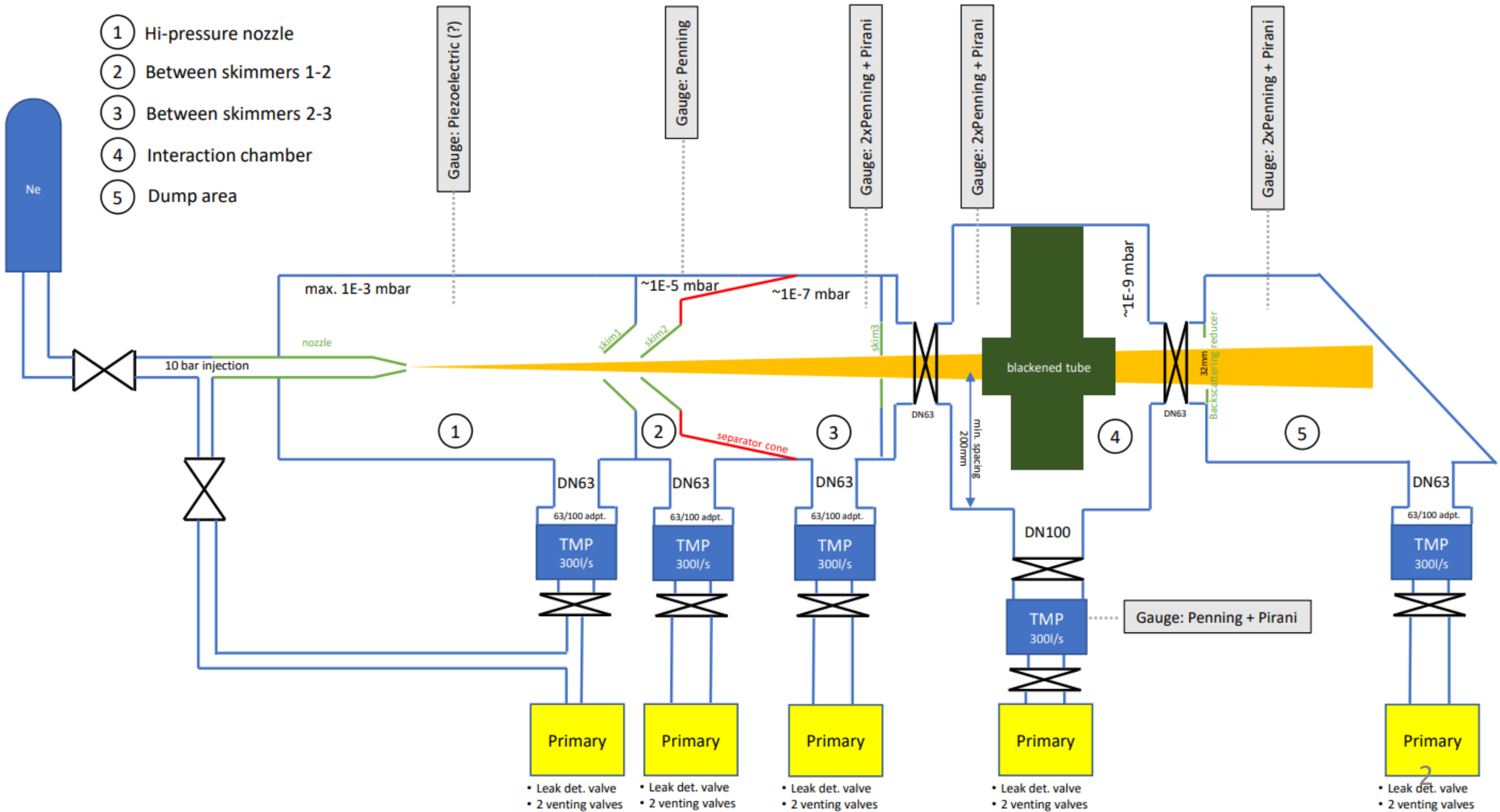


# Pressure profiles for the latest setup

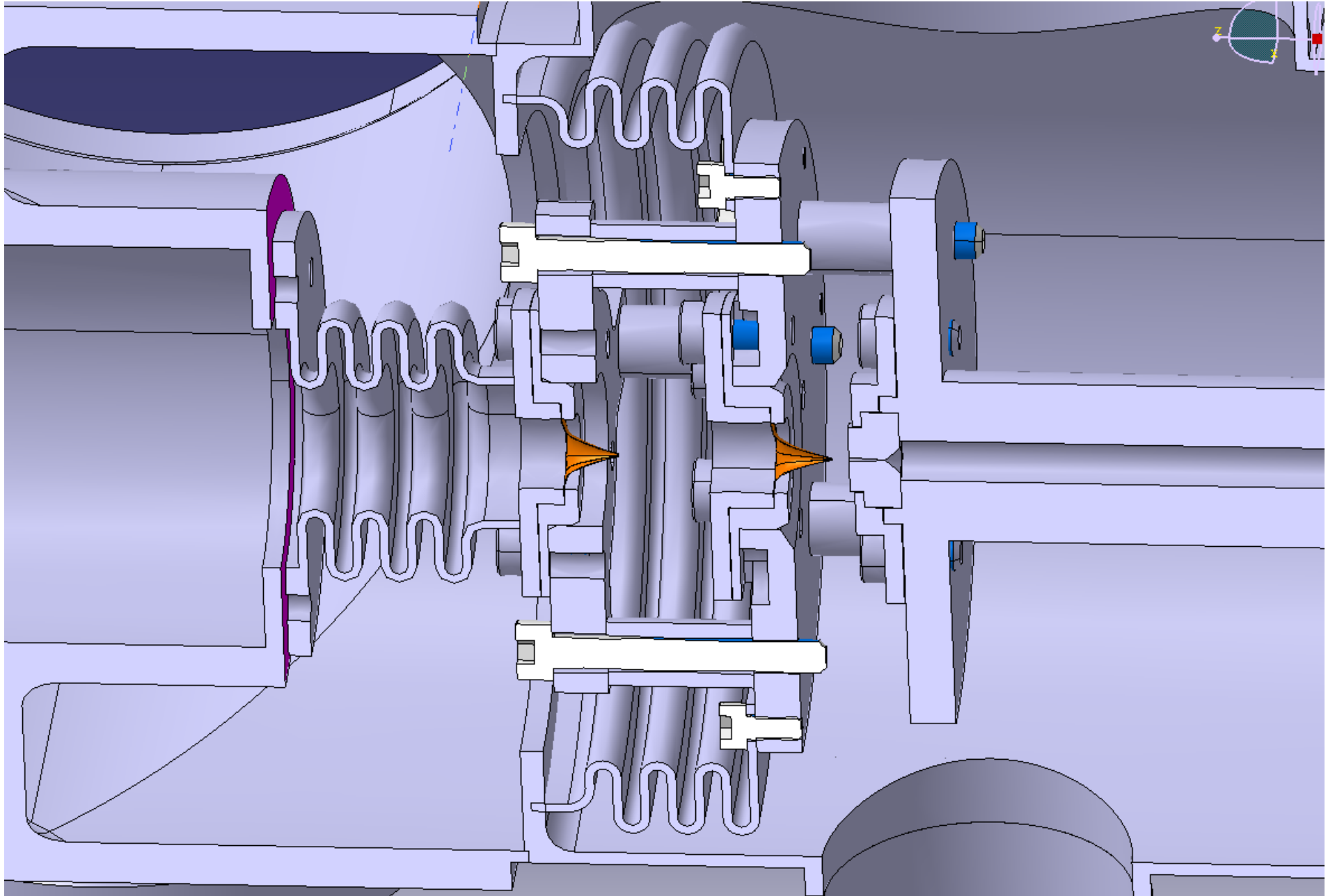


Marton Ady  
BGC Collaboration Meeting  
Vidyo, 31 March 2020

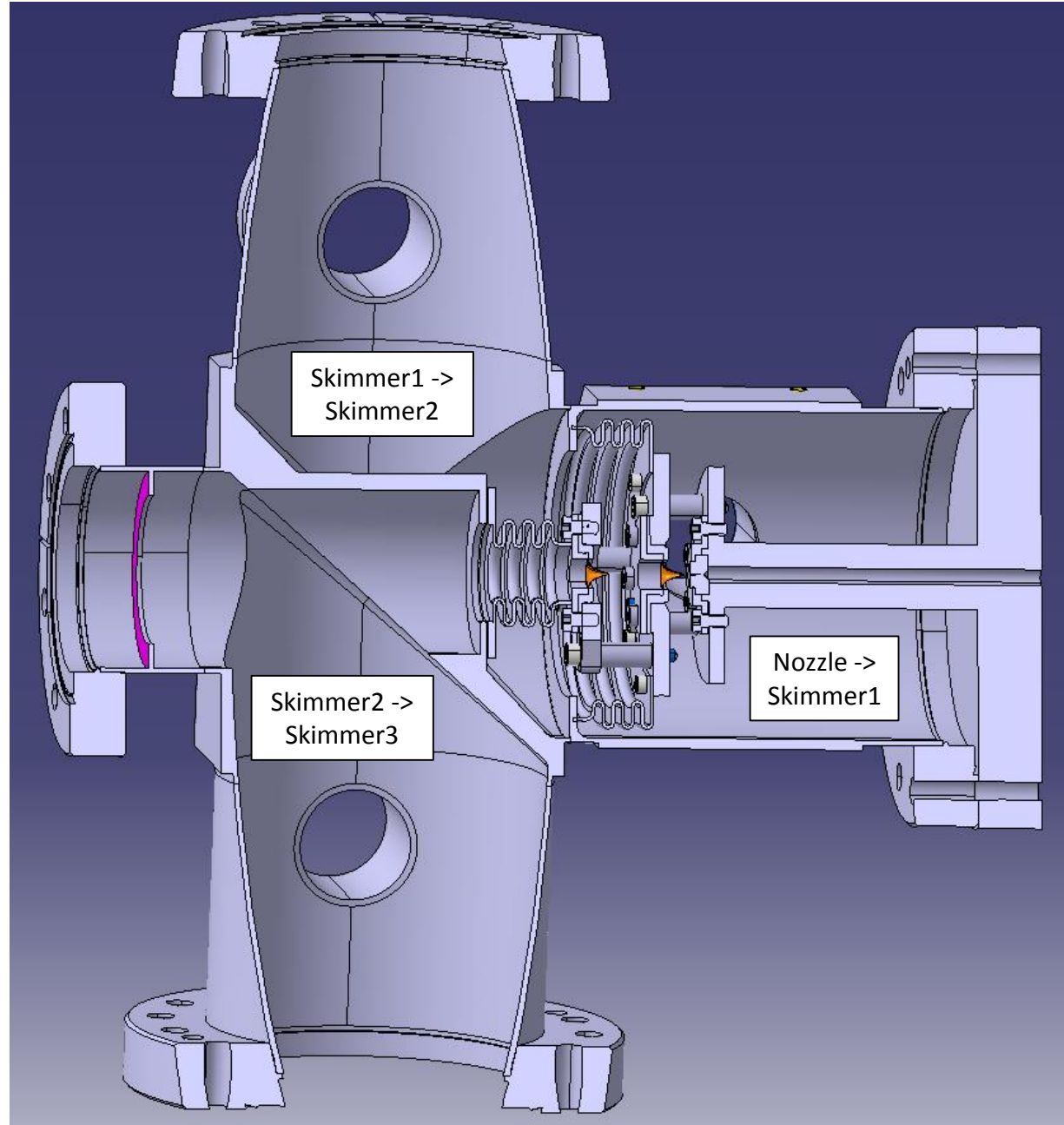
# System overview – “version 3 - LHC”



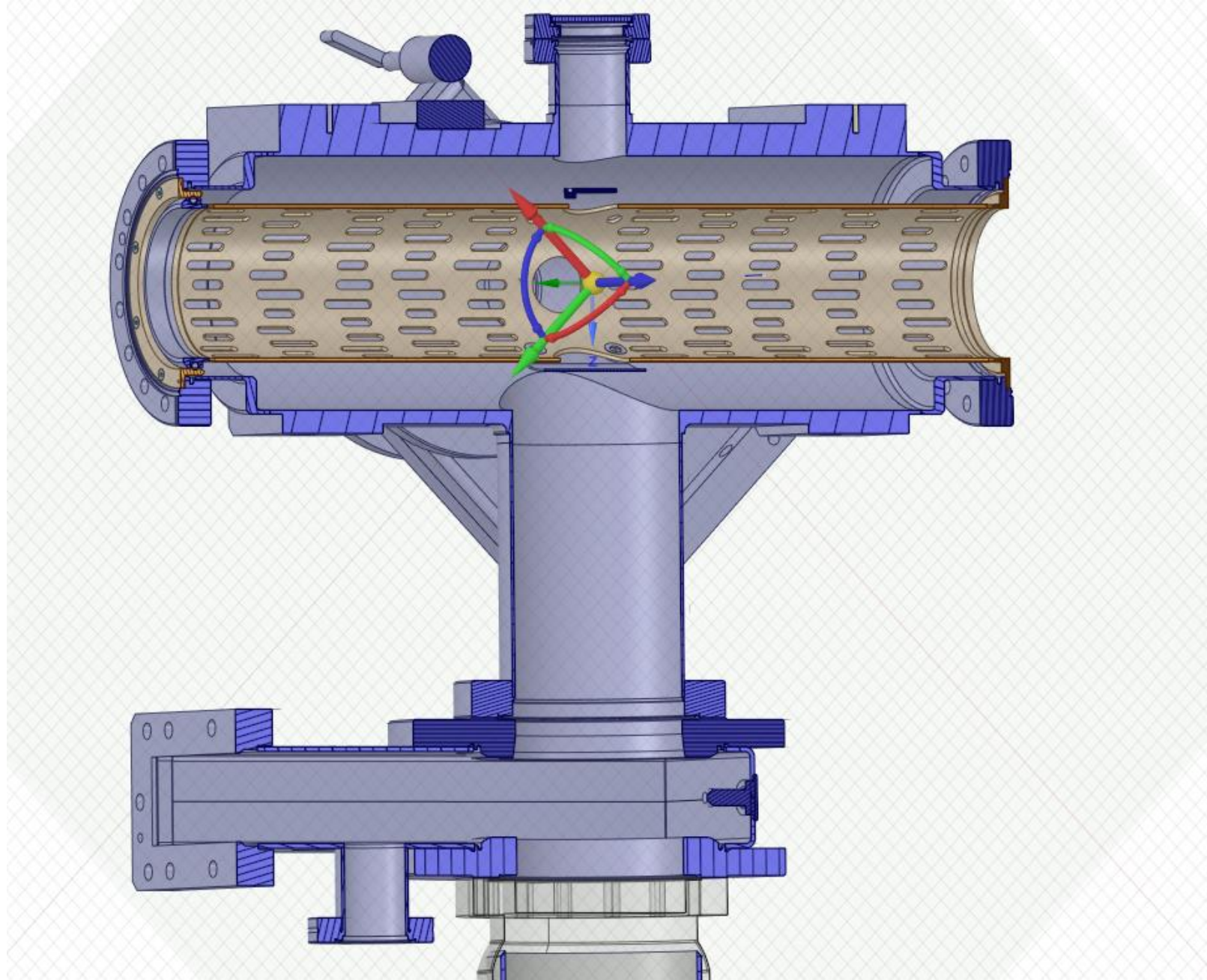
# Injection: nozzle assembly



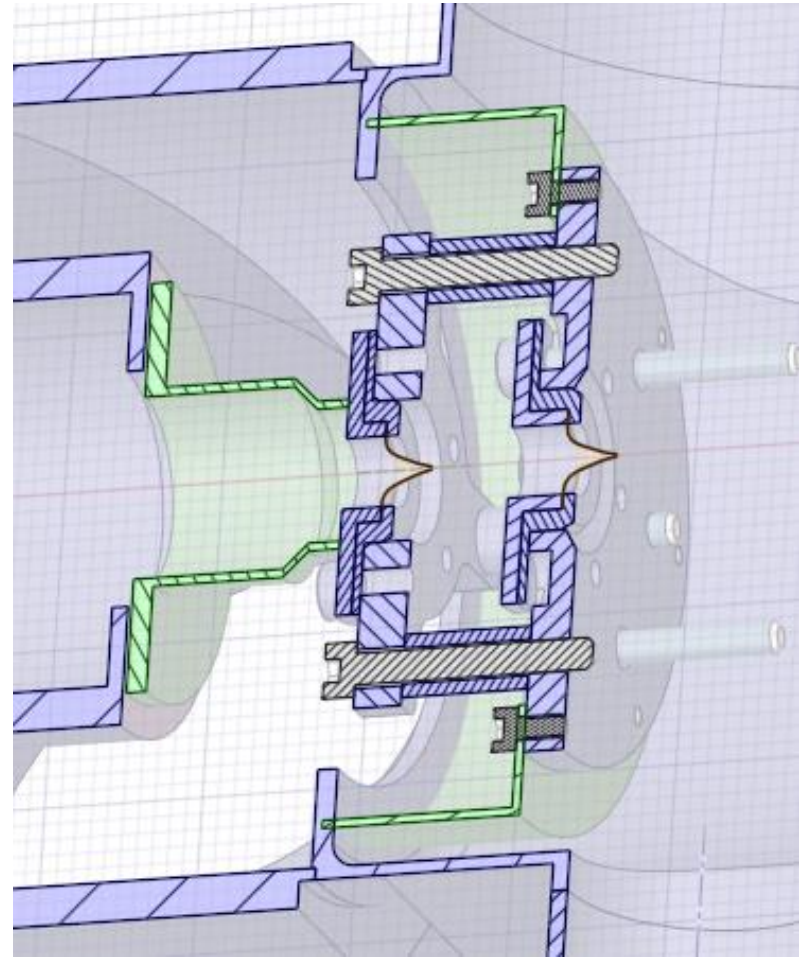
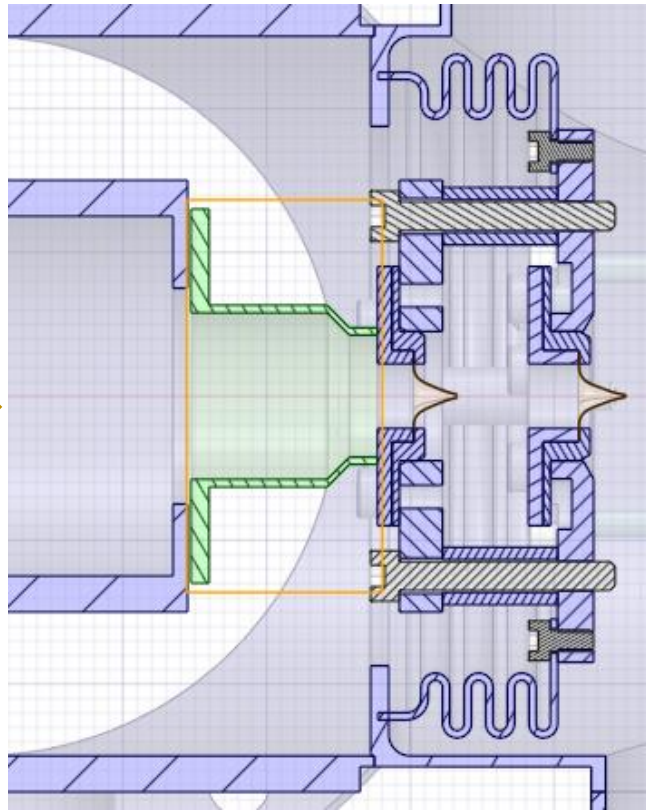
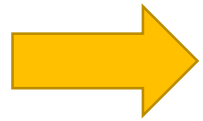
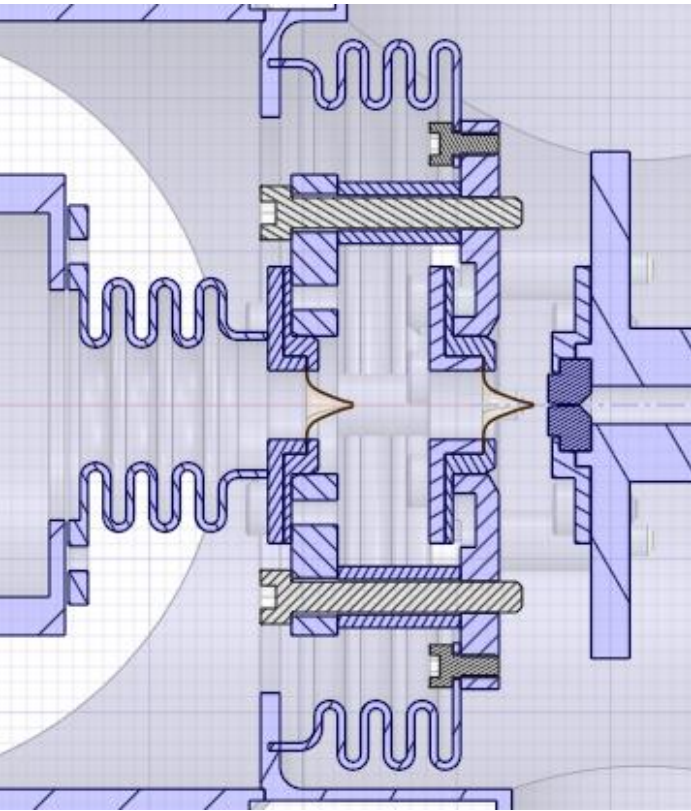
# Injection: individual pumping for each stage



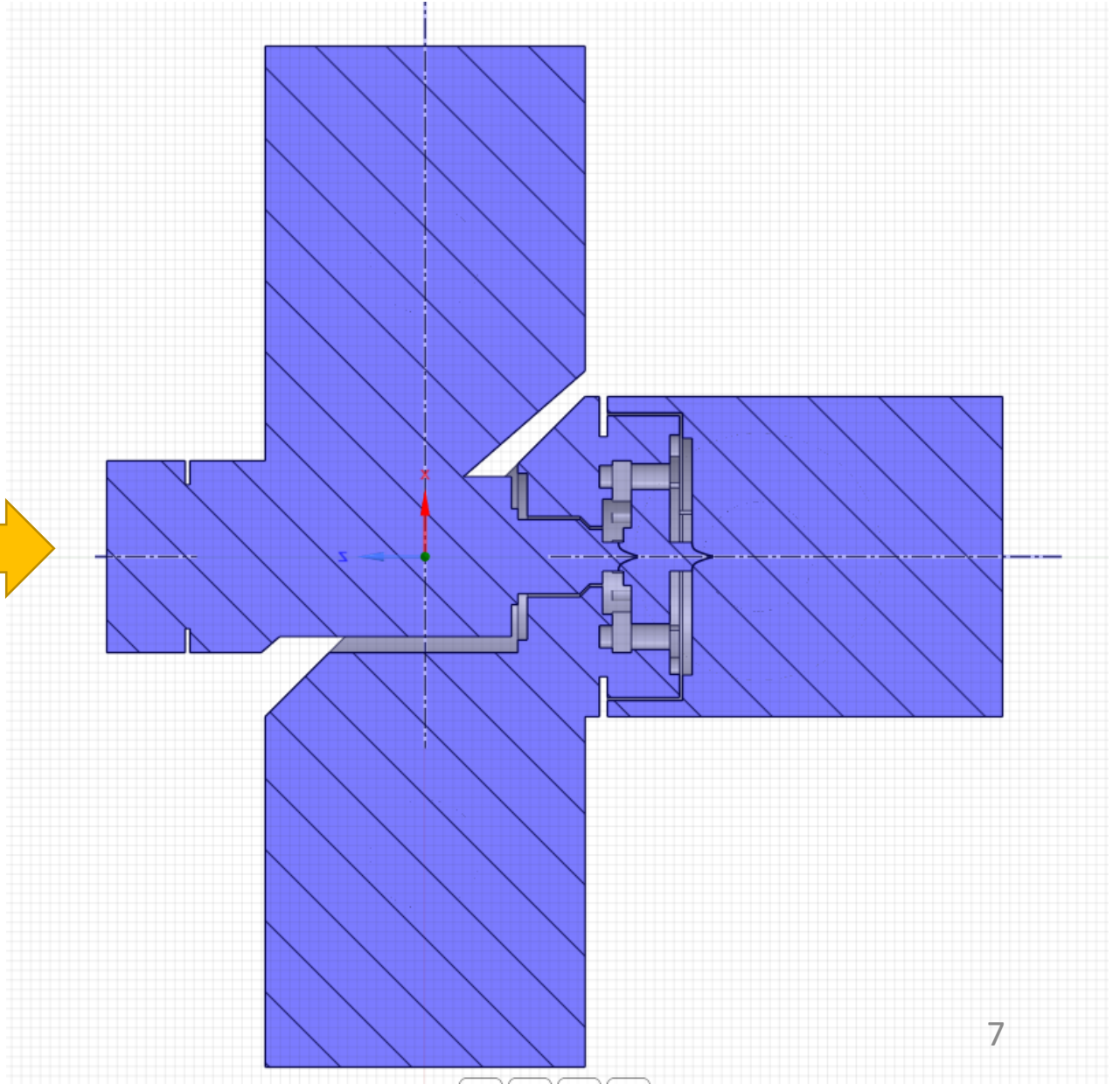
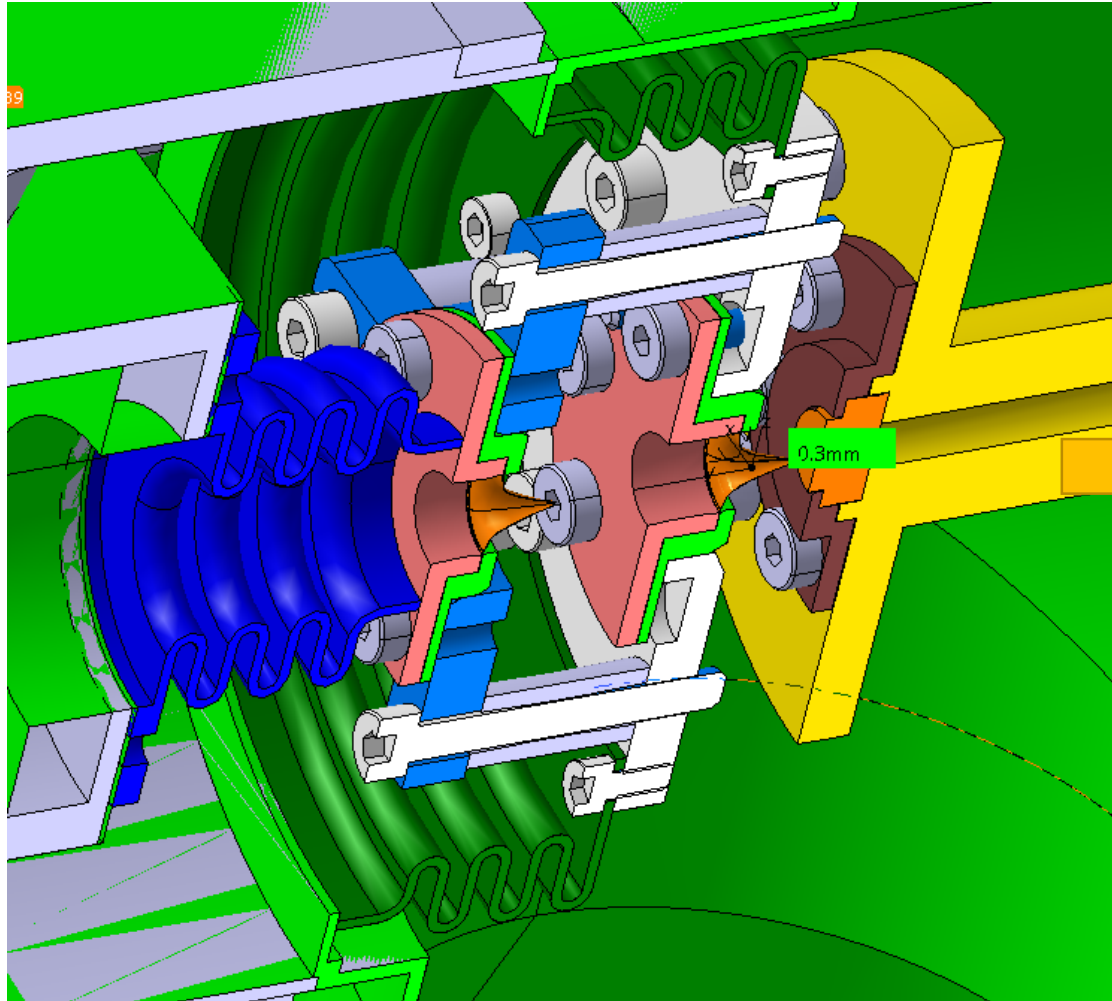
# Interaction chamber



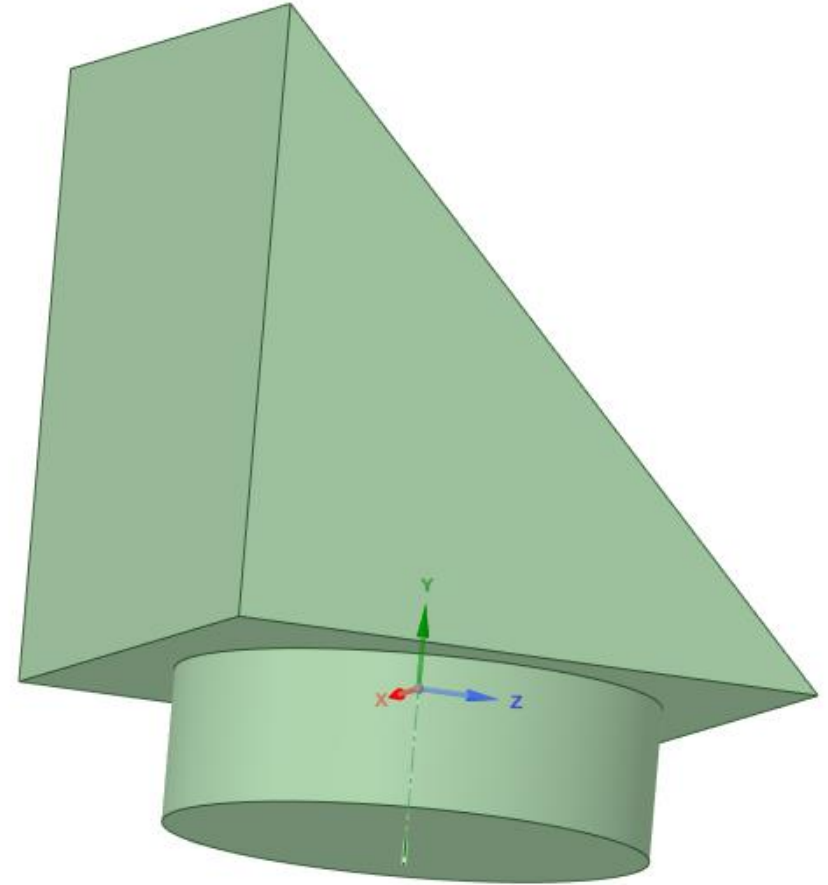
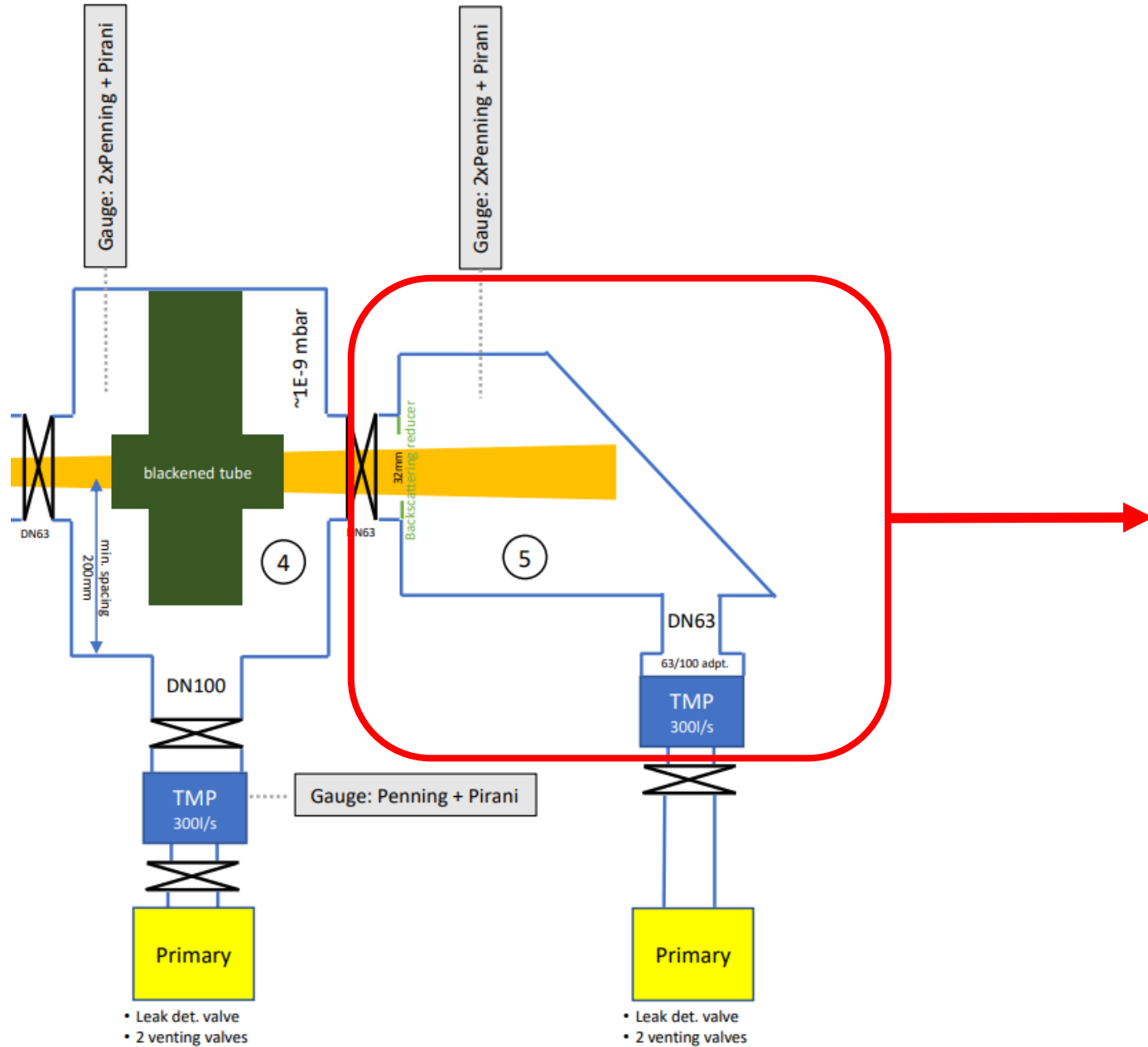
# Direct modeling with Spaceclaim (ANSYS)



# Direct modeling with Spaceclaim (ANSYS)

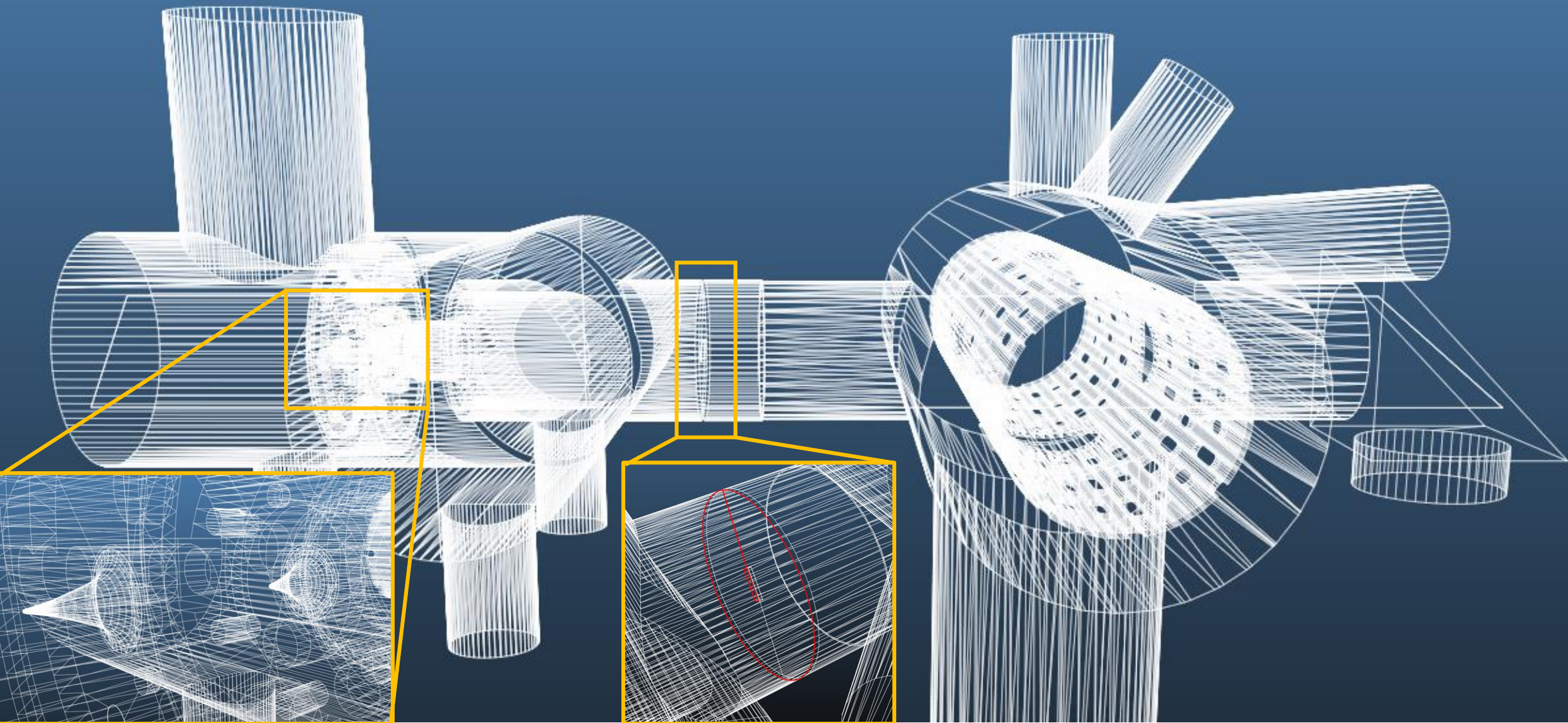


# Dump area



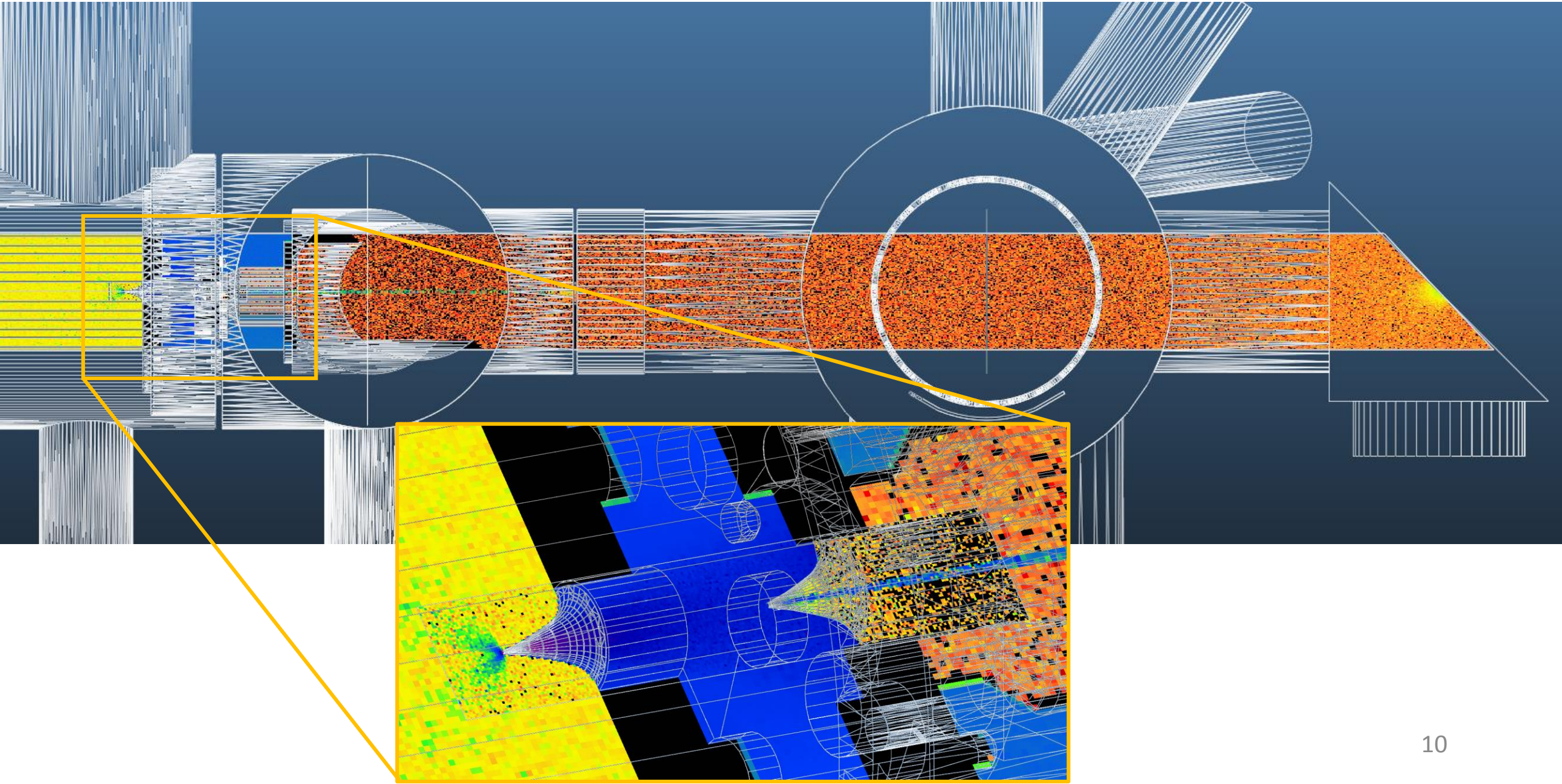


# Baseline Molflow model

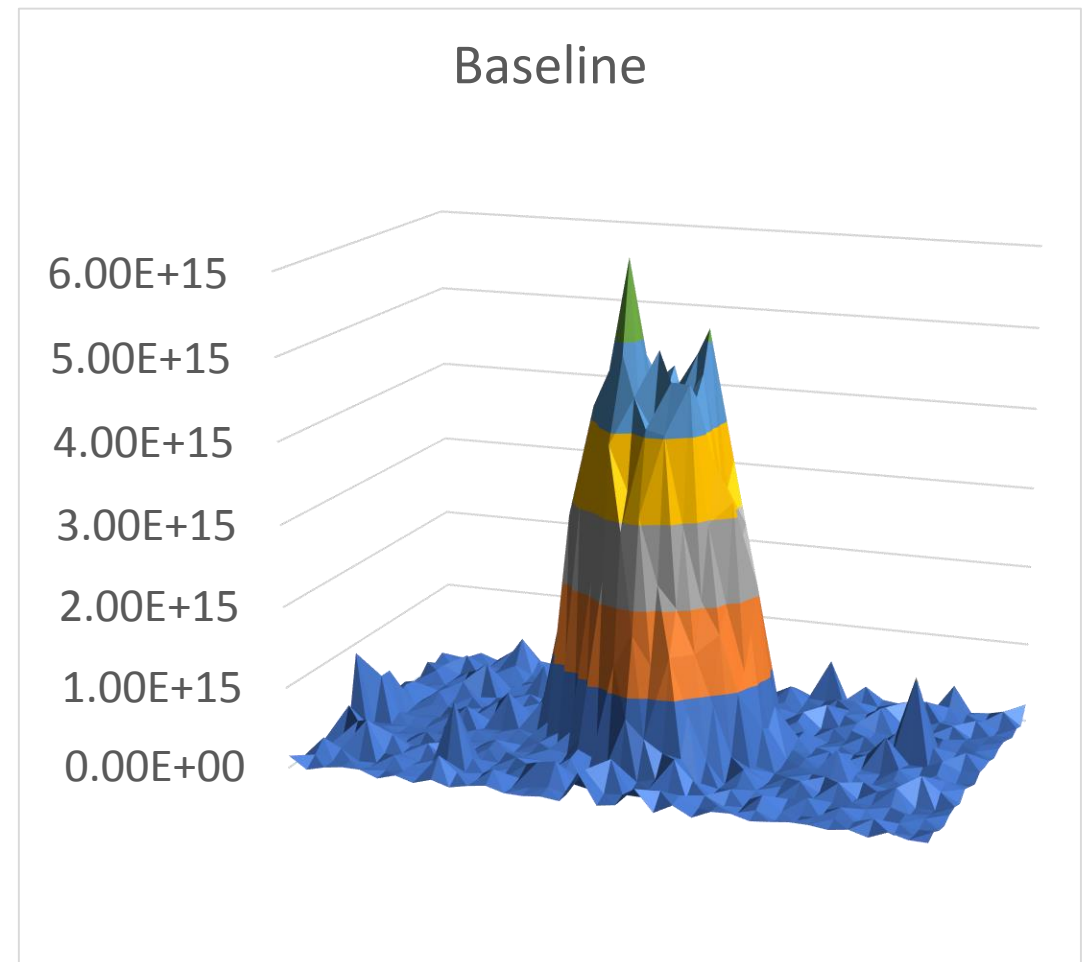
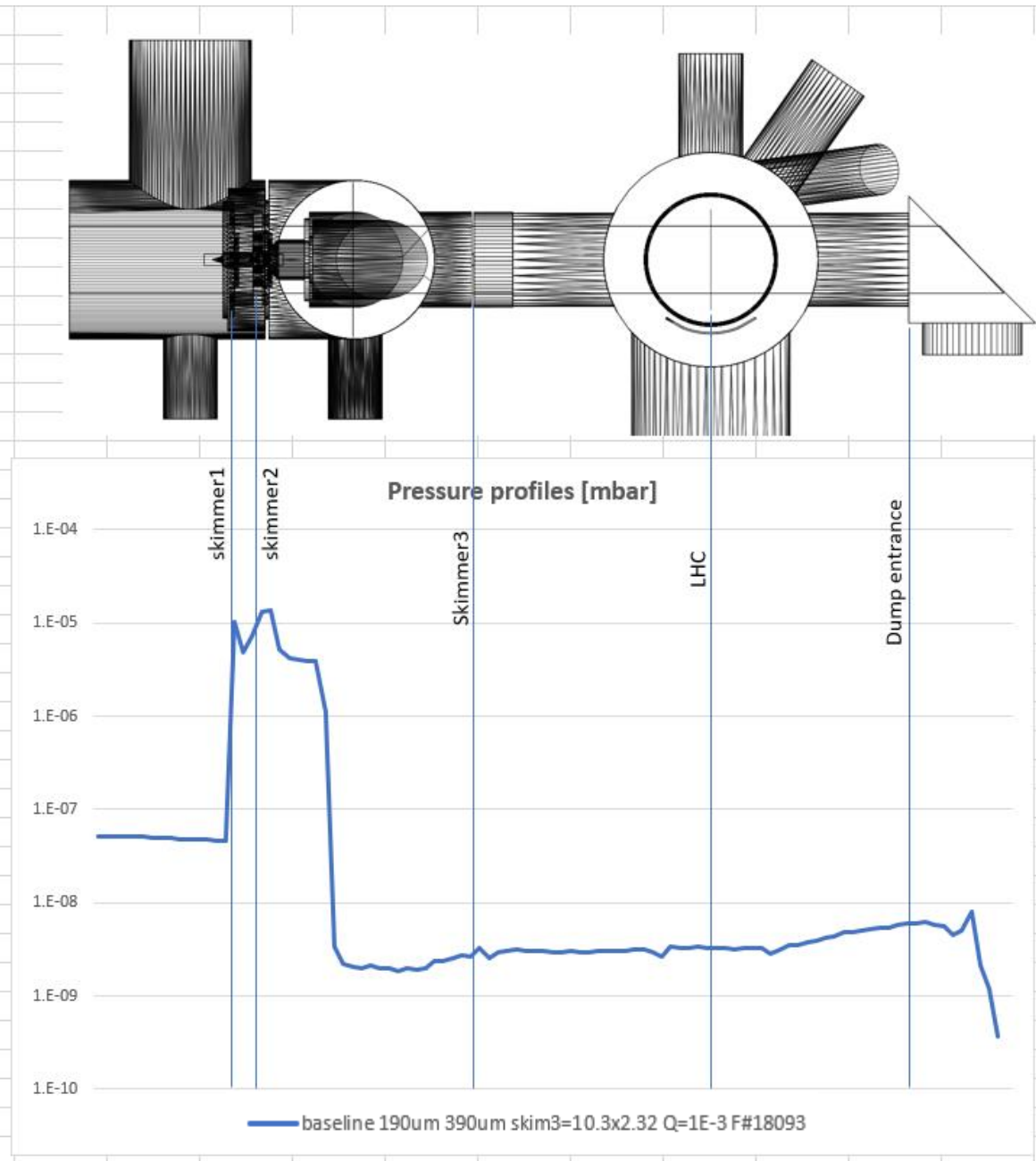


Skimmer1: 190um  
Skimmer2: 390um  
Skimmer3: 10.3x2.32mm  
(Earlier "v2" dimensions)

# Baseline simulation



# Baseline simulation



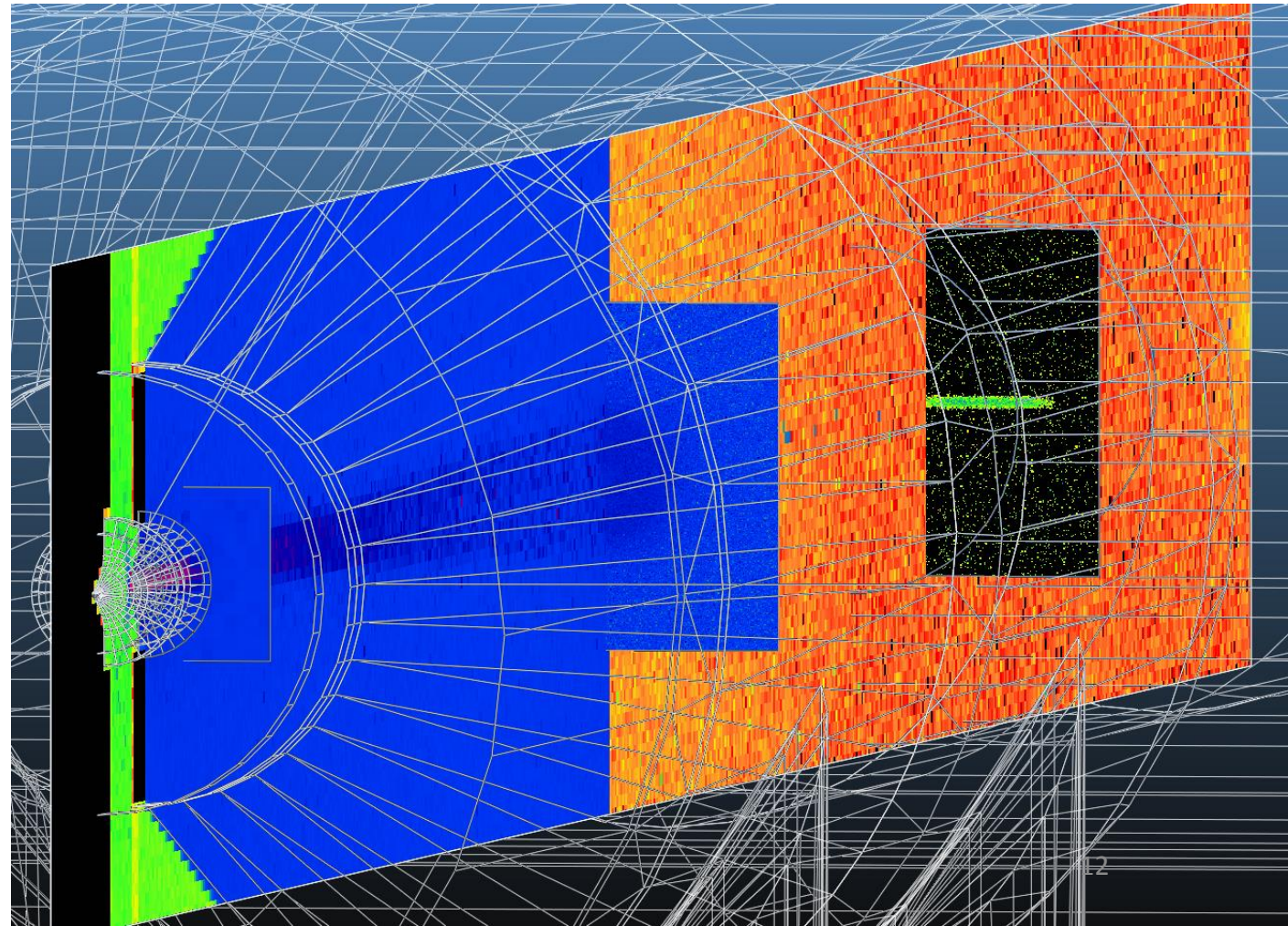
Q	1.00E-03
avg	4.2E+15
bg	7.6E+13
ratio	55

From BGC collaboration meeting in November 2018 (at CERN):

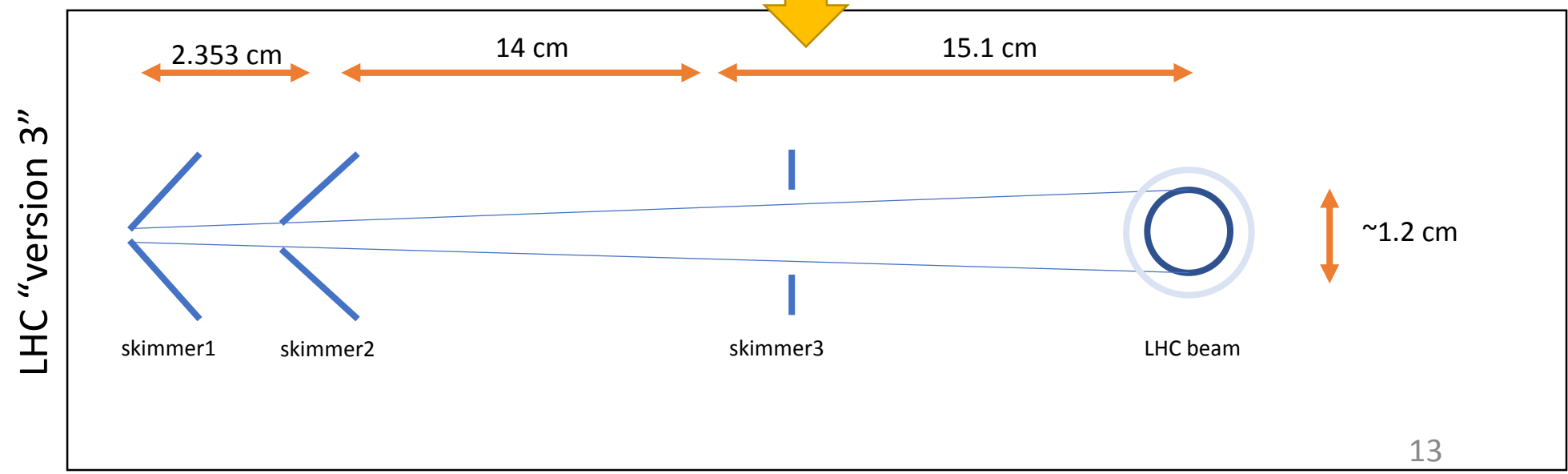
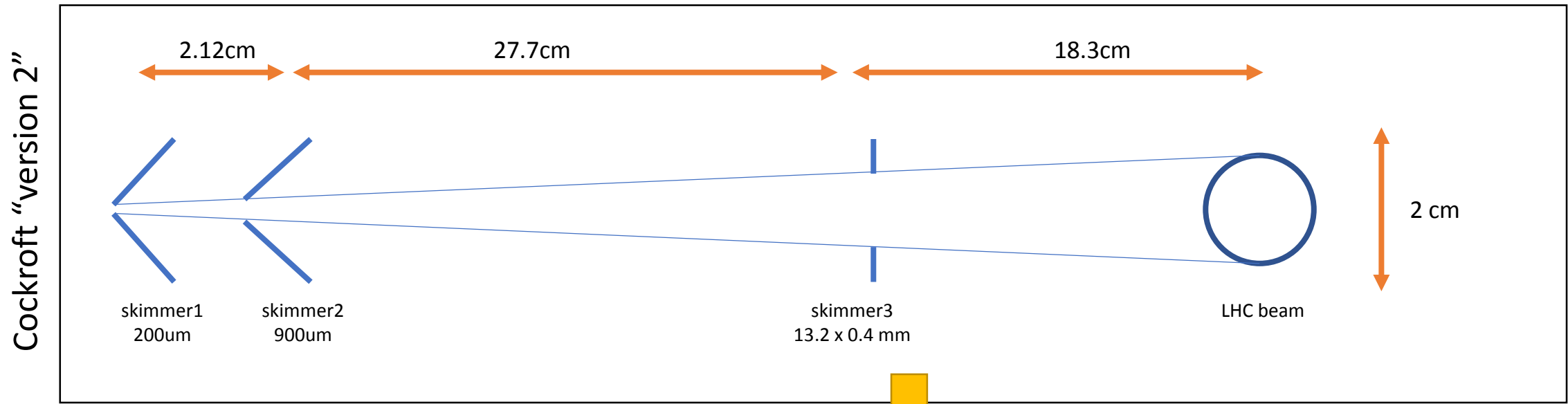
Gas jet -> 20mm: skimmer 2 and 3 need to be increased

Gas jet **diameter**

Skimmer1	Skimmer2	Skimmer3	IP	Dump entrance
190 um	400 um	4 mm	6.43 mm	8.26 mm
		0.4 mm	0.64 mm	0.83 mm
190 um	900 um	13.2 mm	21.3 mm	27.36 mm
		0.4 mm	0.64 mm	0.83 mm



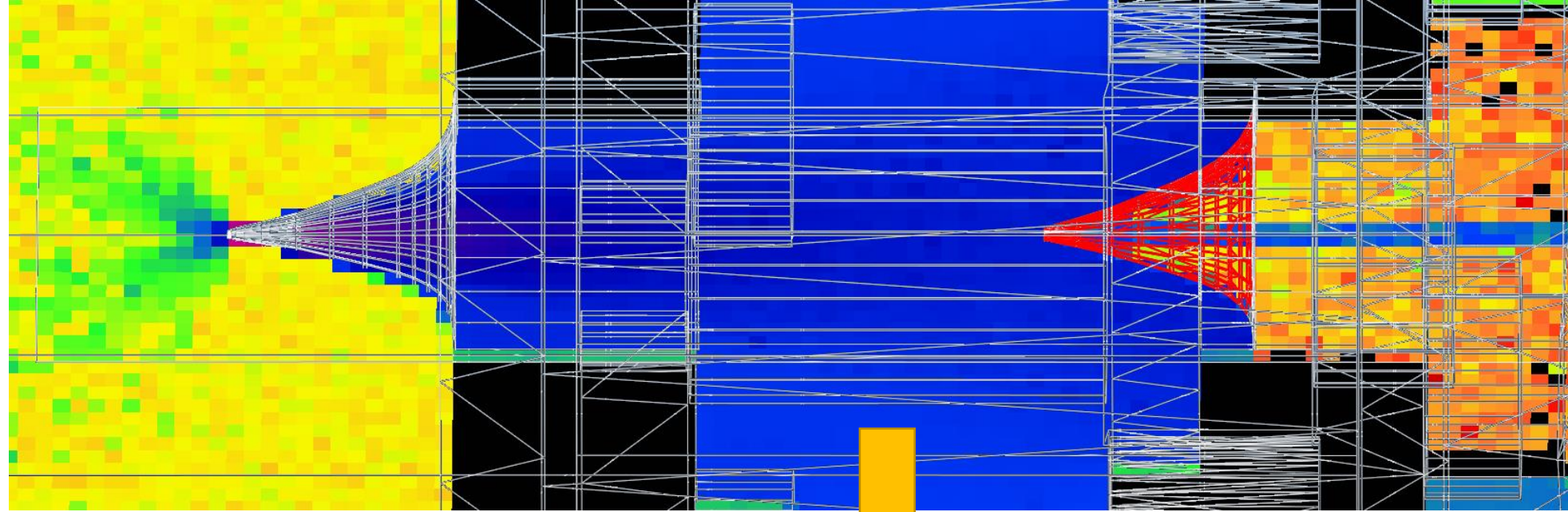
# Why not rectangular?



# Attempt2: increase skimmer 2

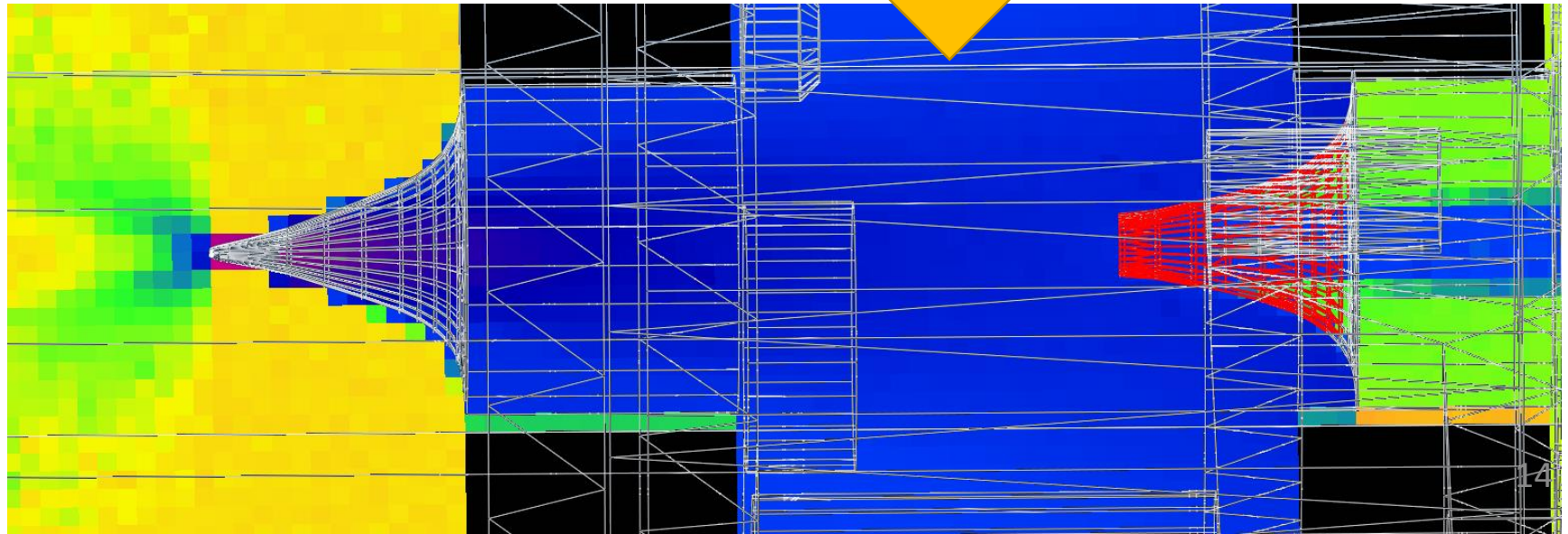
## Baseline

Skimmer1: 190um  
Skimmer2: 390um (900um)  
Skimmer3: 13.2x0.4mm

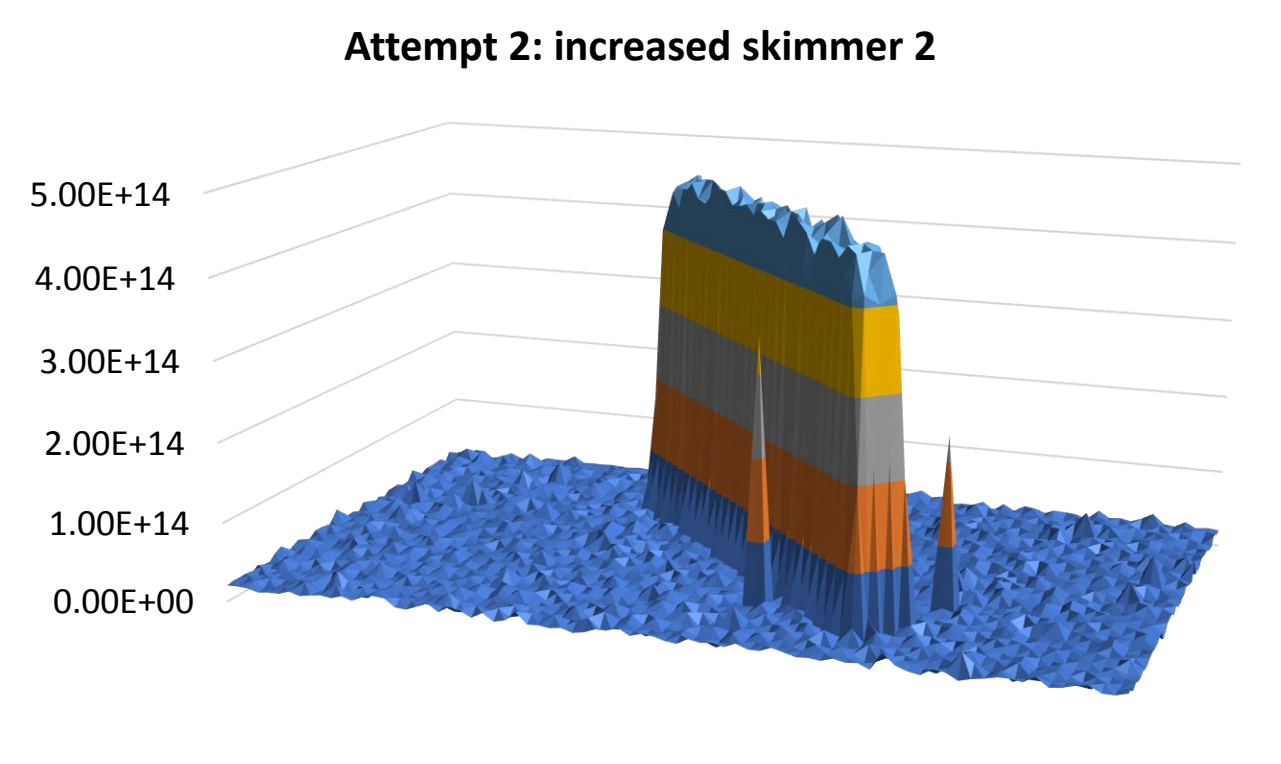
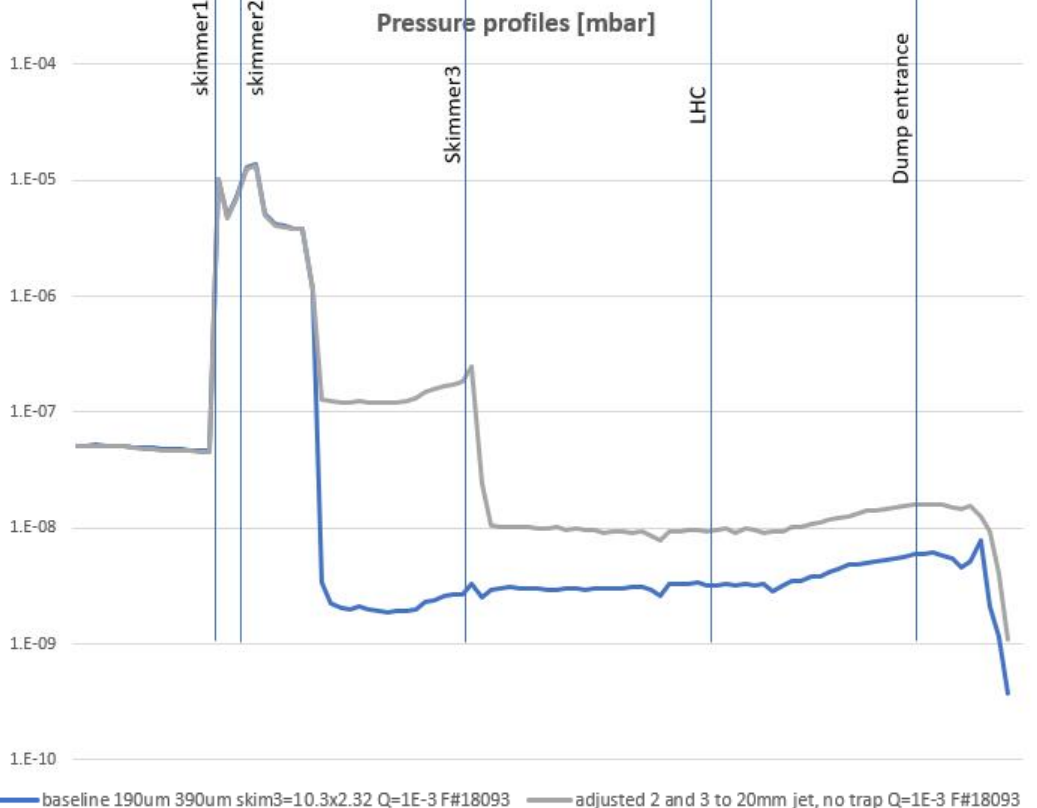
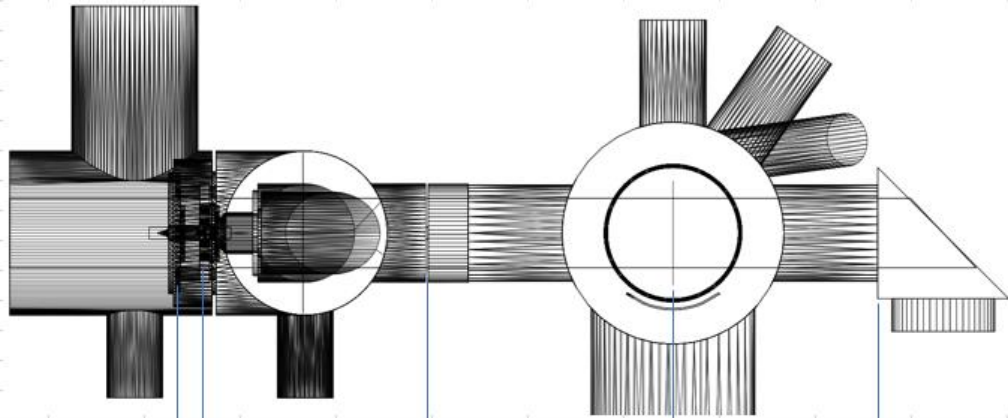


## Increased skimmer 2

Skimmer1: 190um  
Skimmer2: 1.5mm  
Skimmer3: 10.4mm x 1.33mm

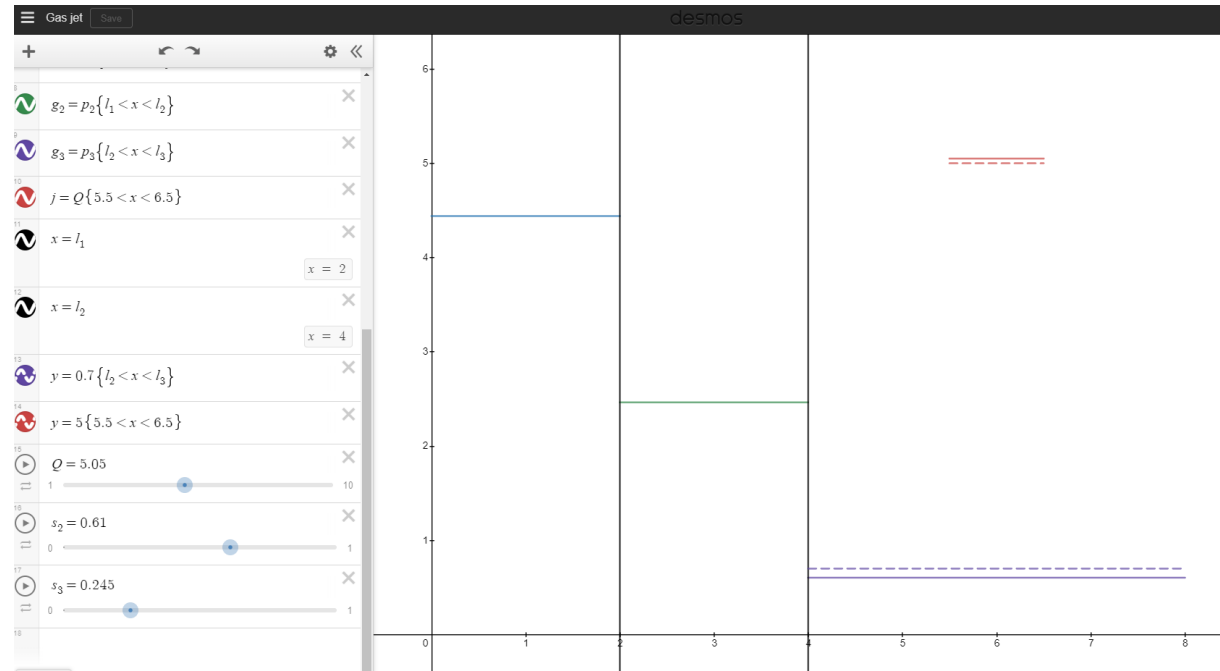


# Attempt2: increase skimmer 2



Q	1.00E-04
avg	4.6E+14
bg	2.3E+13
ratio	20

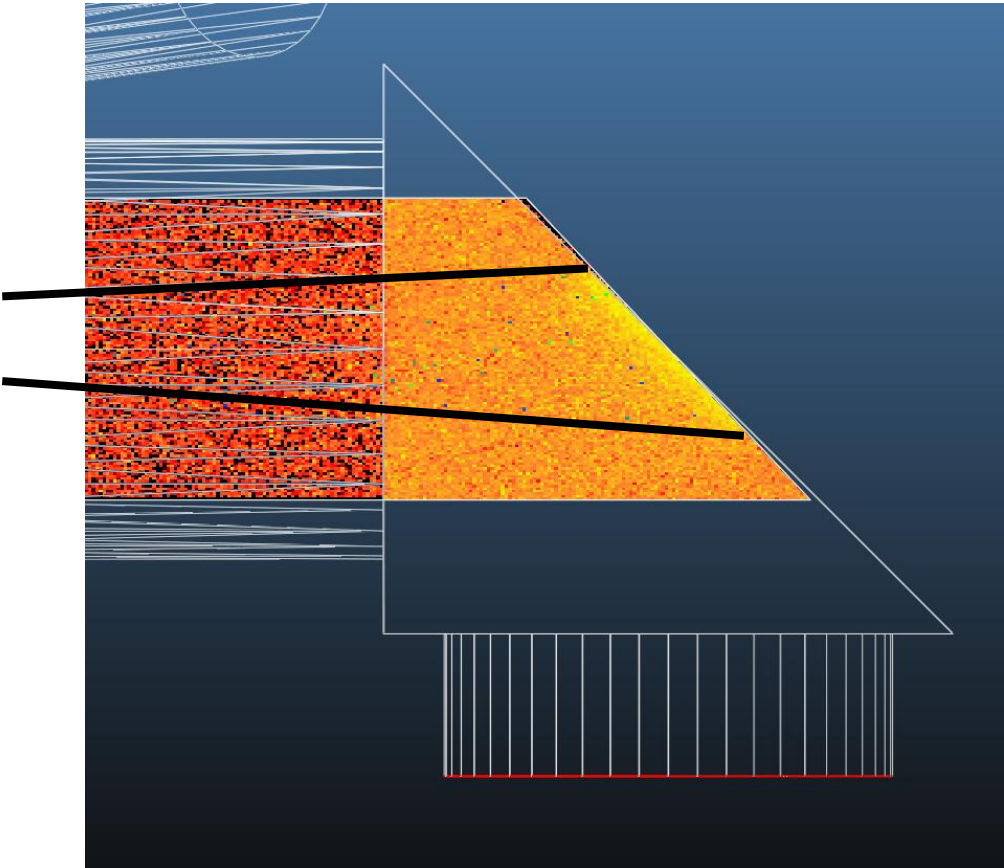
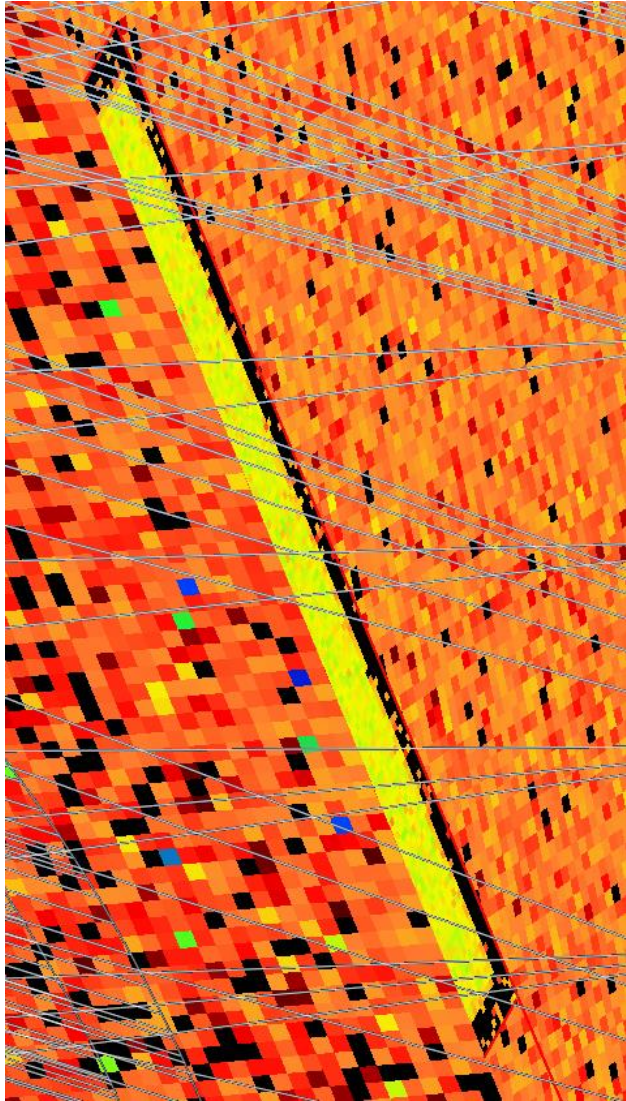
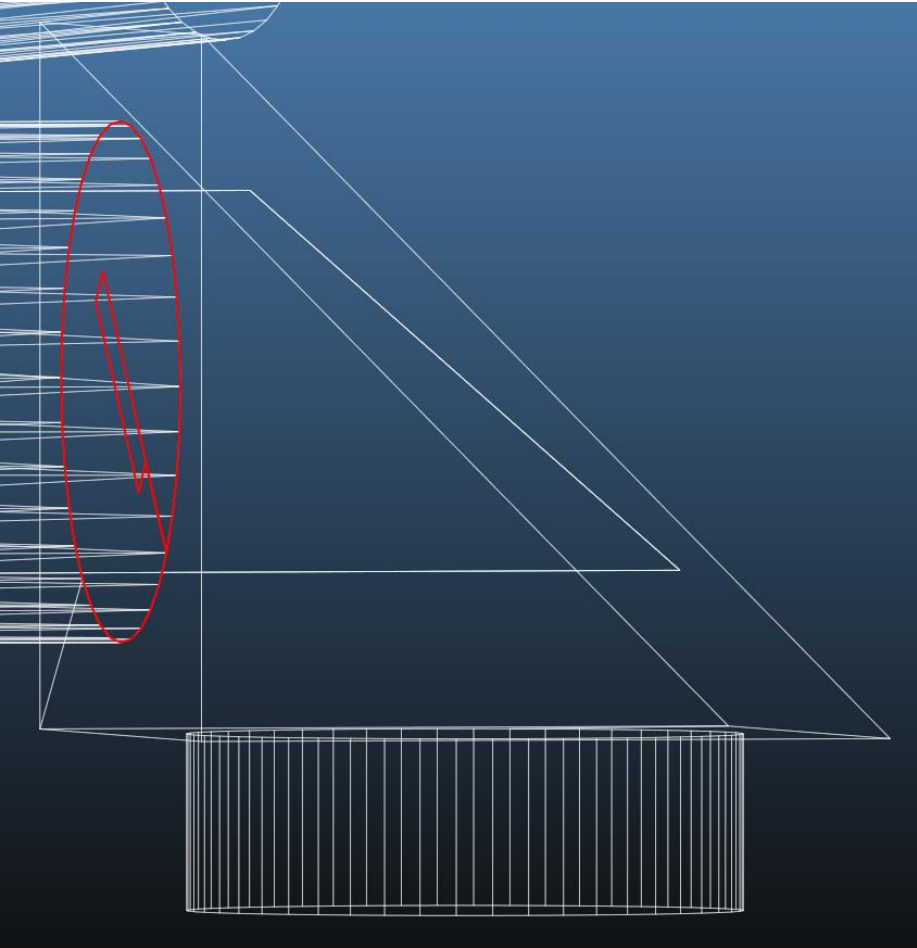
# Why the background increased



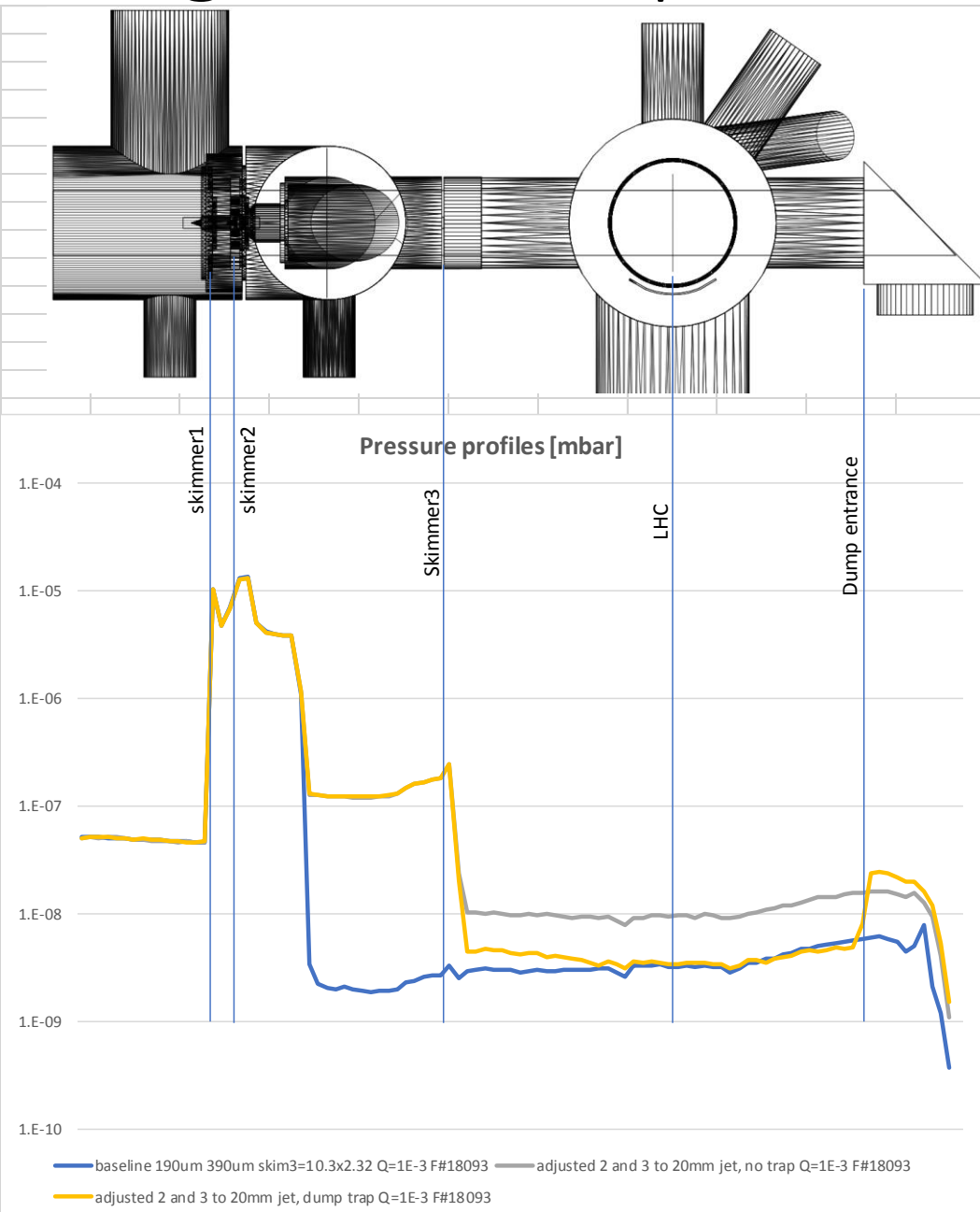
<https://www.desmos.com/calculator/7003iiux2h>



# Mitigation: add particle trap to dump

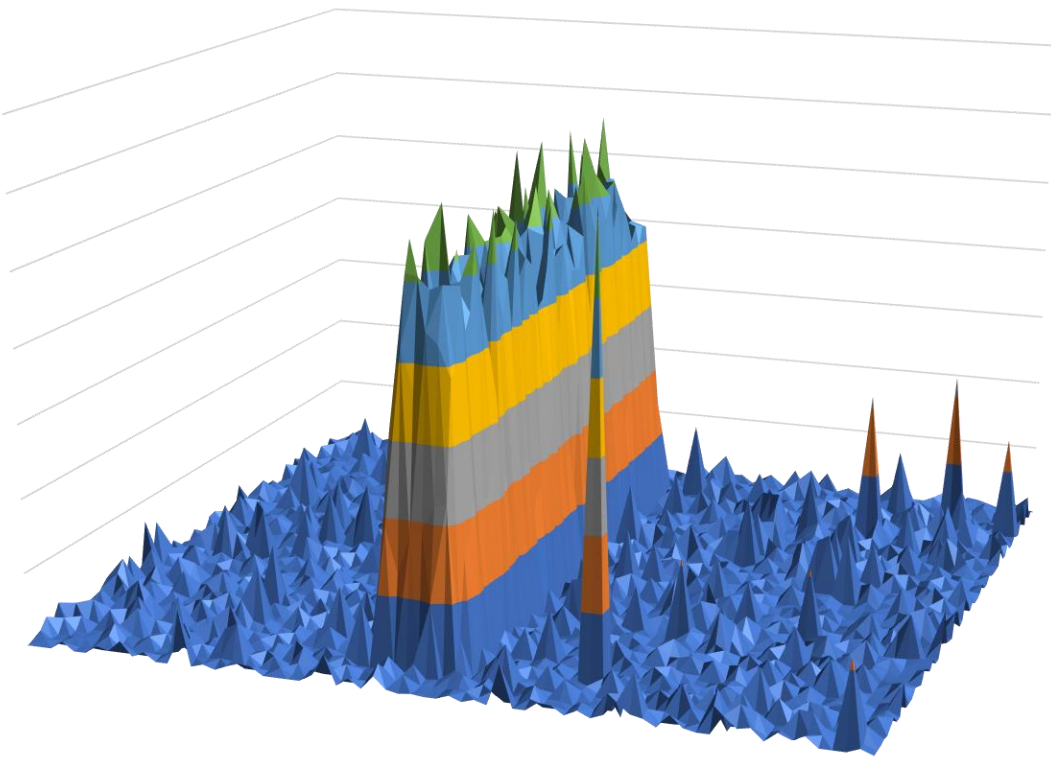


# Mitigation: add particle trap to dump



Increased skimmer 2, with dump trap

7.00E+15  
6.00E+15  
5.00E+15  
4.00E+15  
3.00E+15  
2.00E+15  
1.00E+15  
0.00E+00



Q	1.00E-03		
avg	4.5E+15	vs	4.6E+15
bg	8.5E+13	vs	2.2E+14
ratio	52	vs	20.31

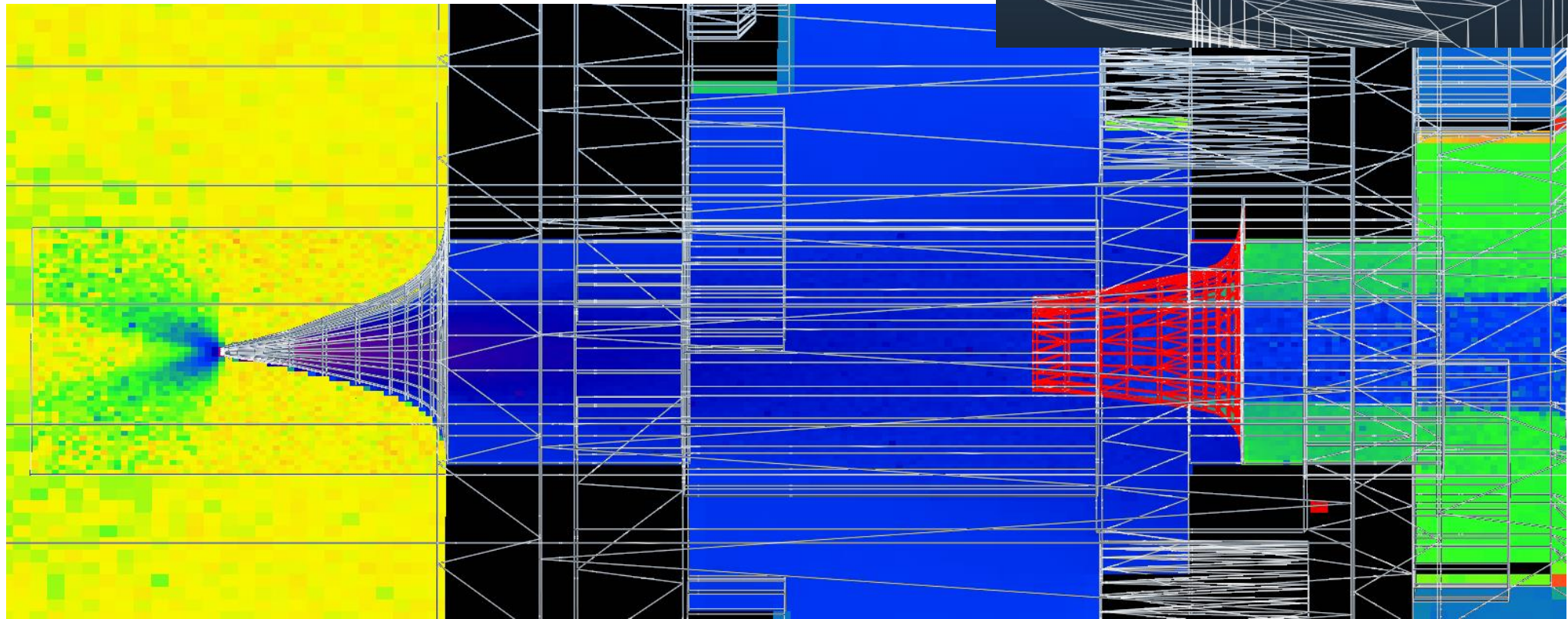
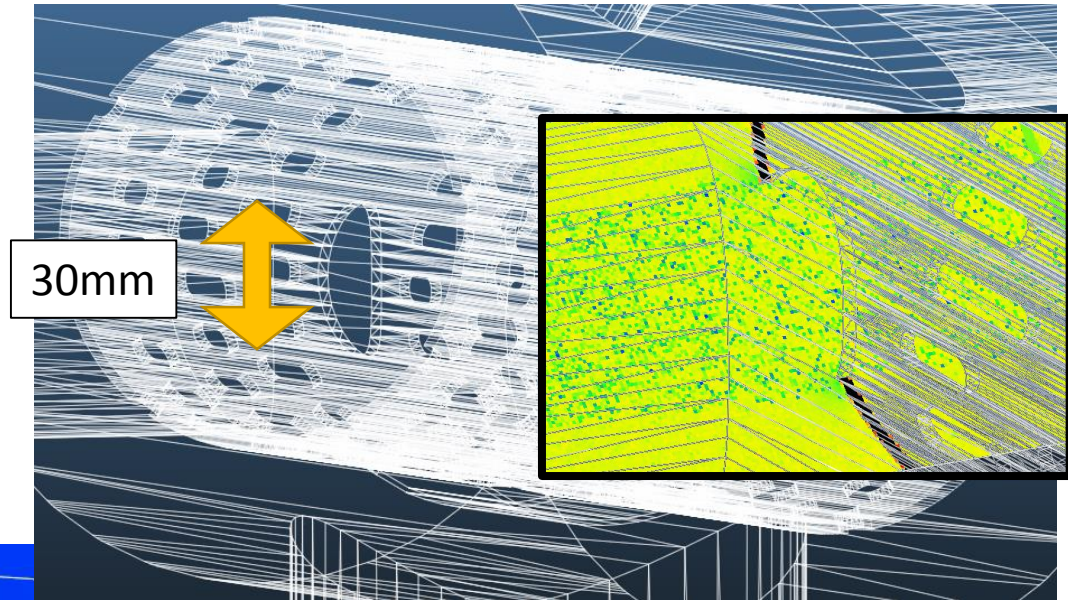
# HEL: Can we go for a 40mm jet?

## 40mm jet

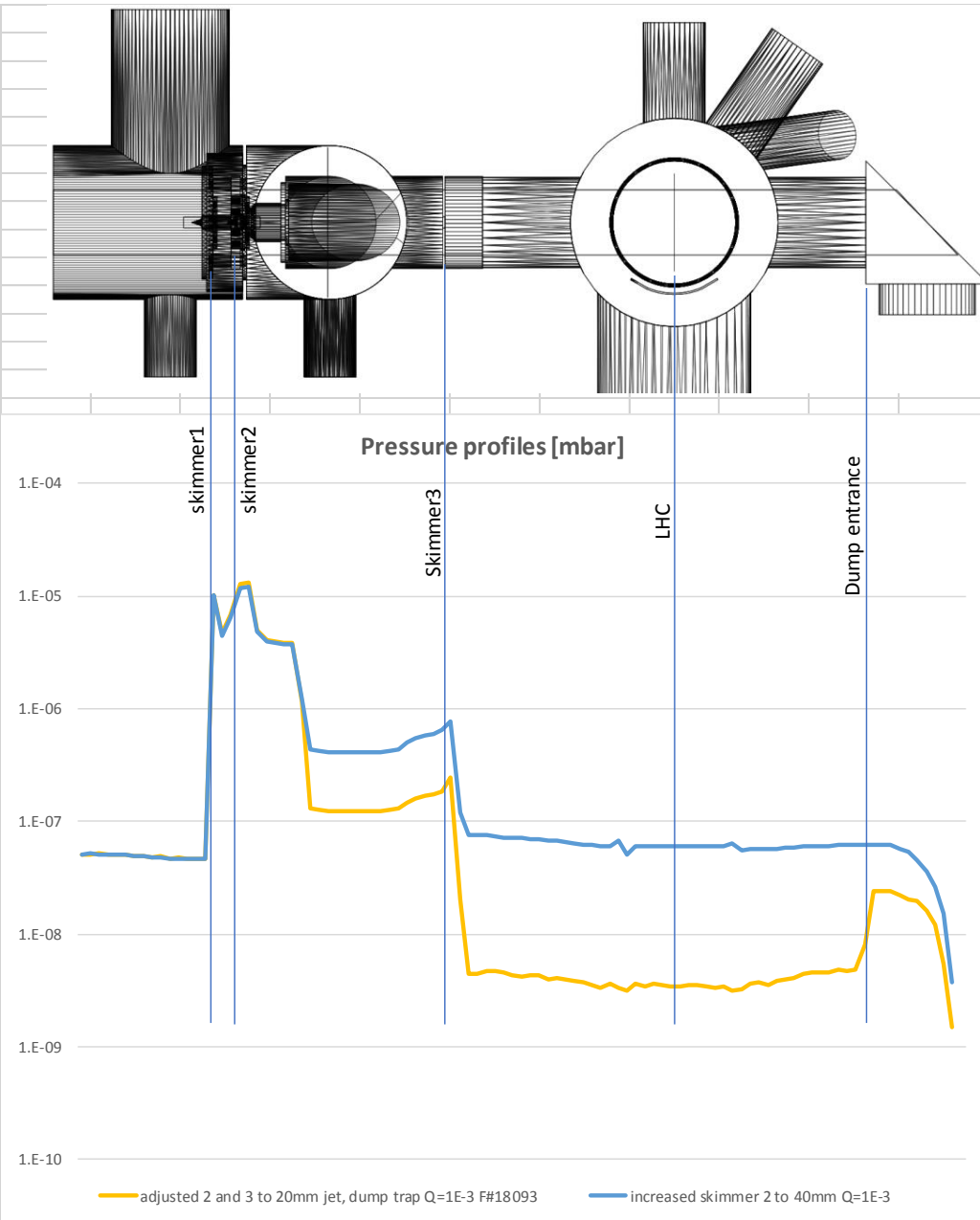
Skimmer1: 0.19mm

Skimmer2: 3 mm

Skimmer3: 21.8mm x 2.8mm

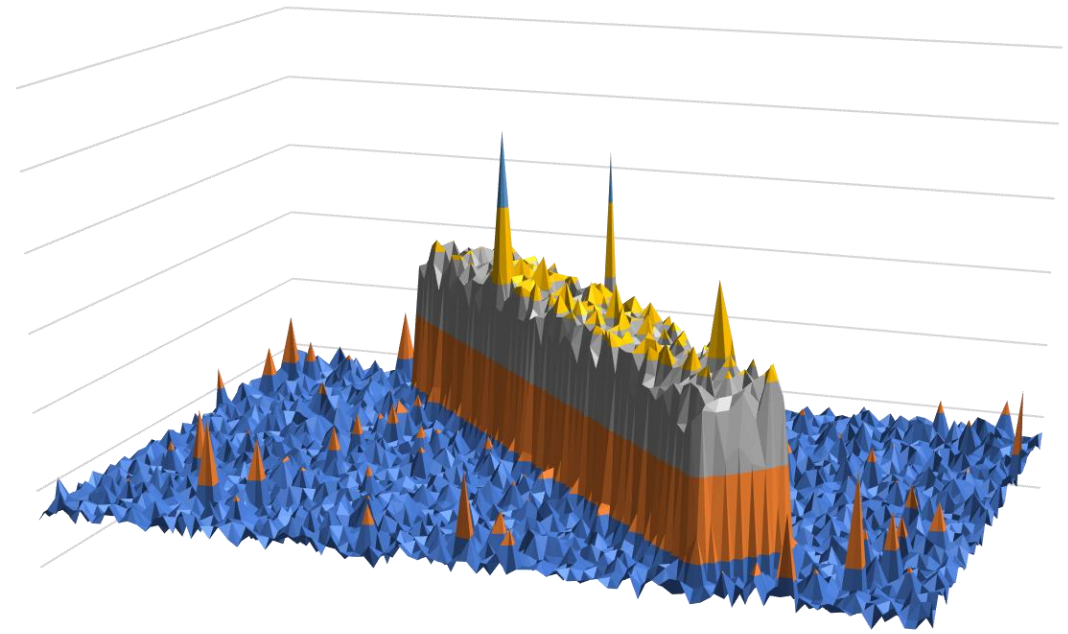


# HEL: 40mm jet



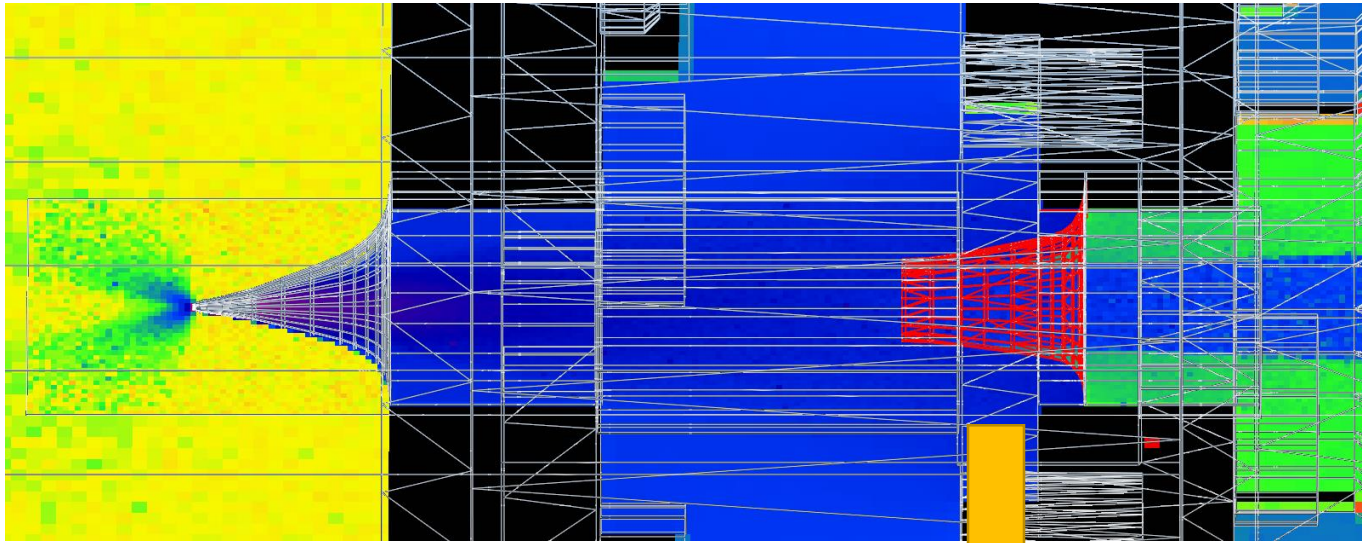
# HEL 40mm jet

1.20E+16  
 1.00E+16  
 8.00E+15  
 6.00E+15  
 4.00E+15  
 2.00E+15  
 0.00E+00



Q	1.00E-03
avg	5.8E+15
bg	1.5E+15
ratio	4

# 40mm jet (v4): make skimmer 2 rectangular?

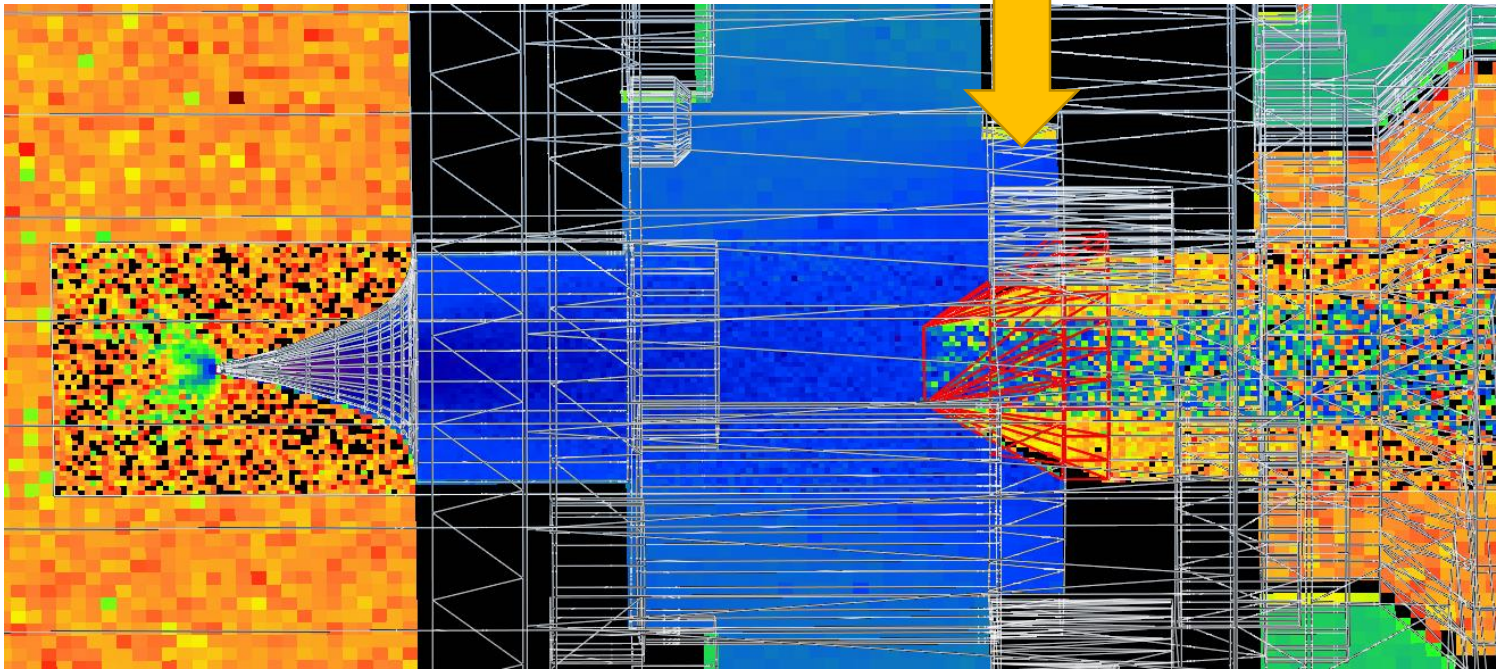


**40mm jet, rectangular skimmer2**

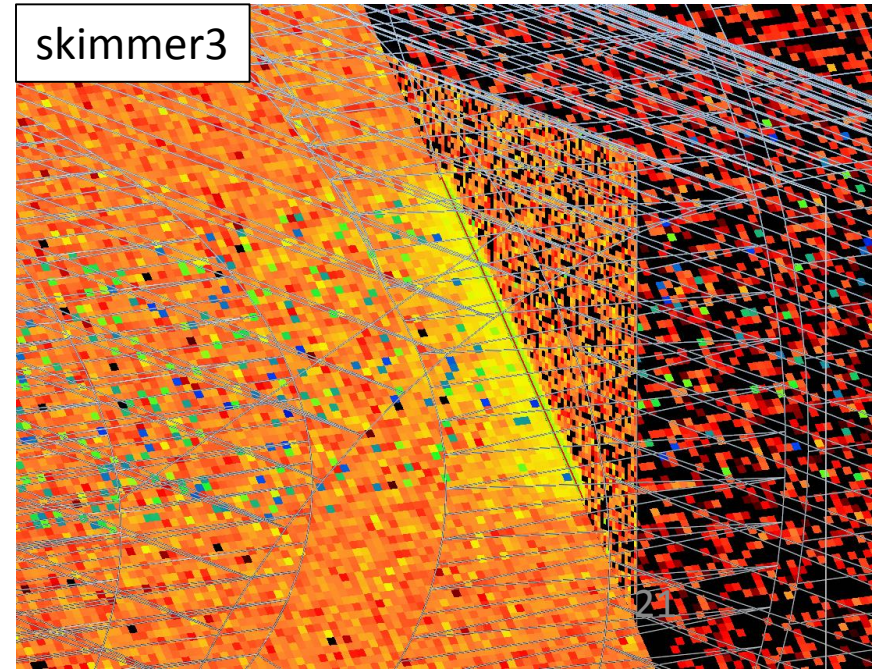
Skimmer1: 0.19mm

Skimmer2: 3.05 x 0.15 mm (manufacturable?)

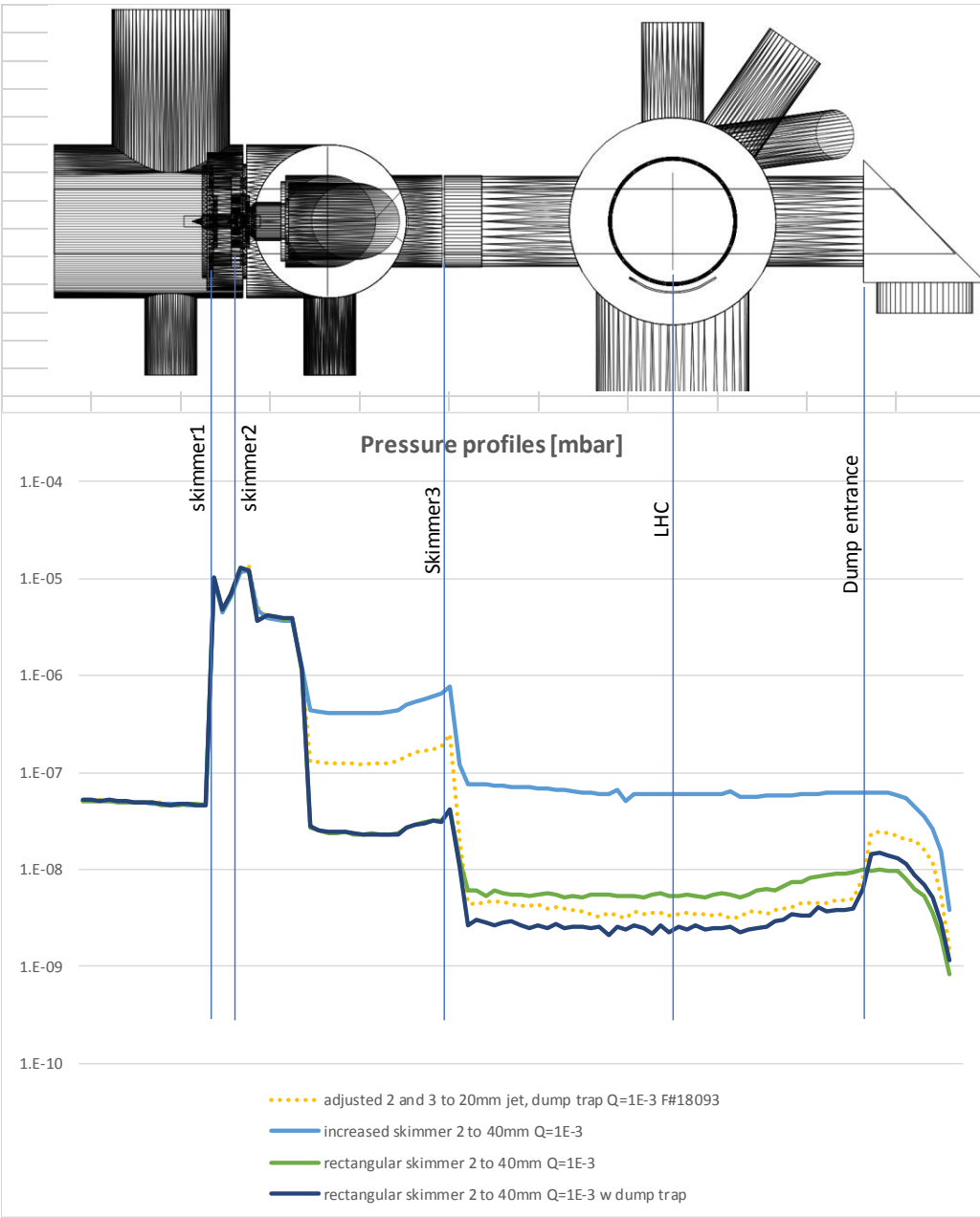
Skimmer3: 21.8mm x 0.5mm



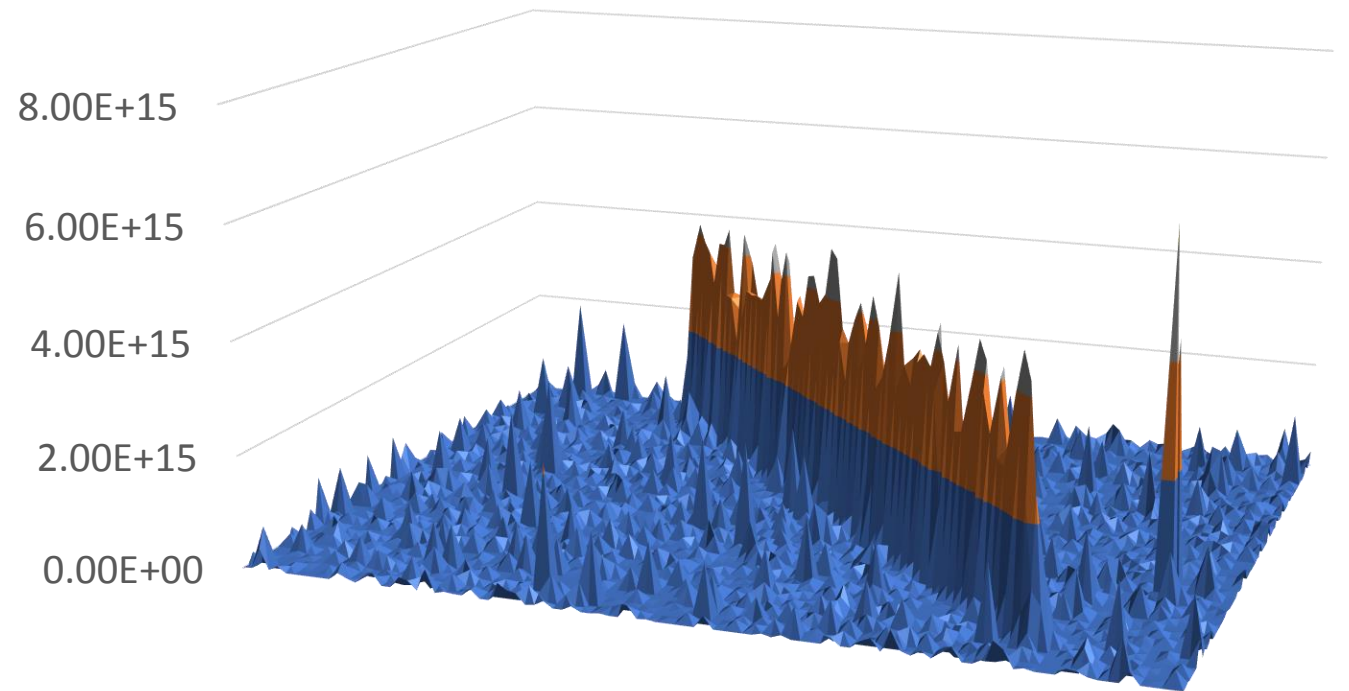
skimmer3



# 40mm jet: make skimmer 2 rectangular?

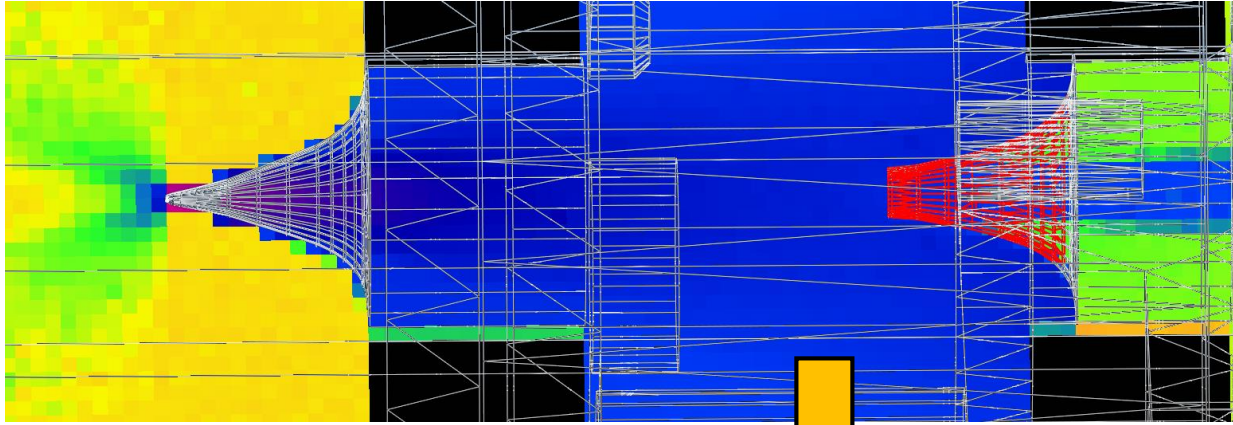


40mm jet, rectangular skimmer 2, dump trap



Q	1.00E-03		
avg	3.7E+15	vs	5.8E+15
bg	5.4E+13	vs	1.5E+15
ratio	69	vs	4

# Applying the new idea to the 20mm jet

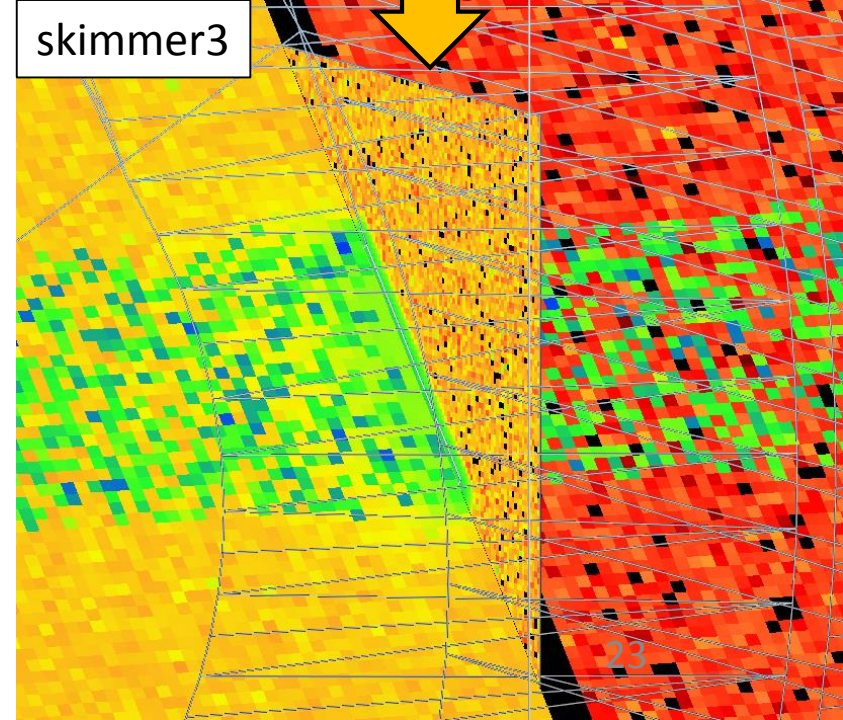
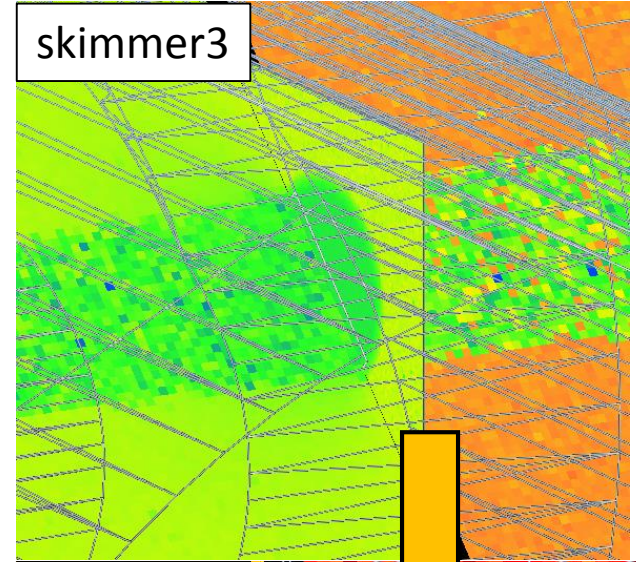
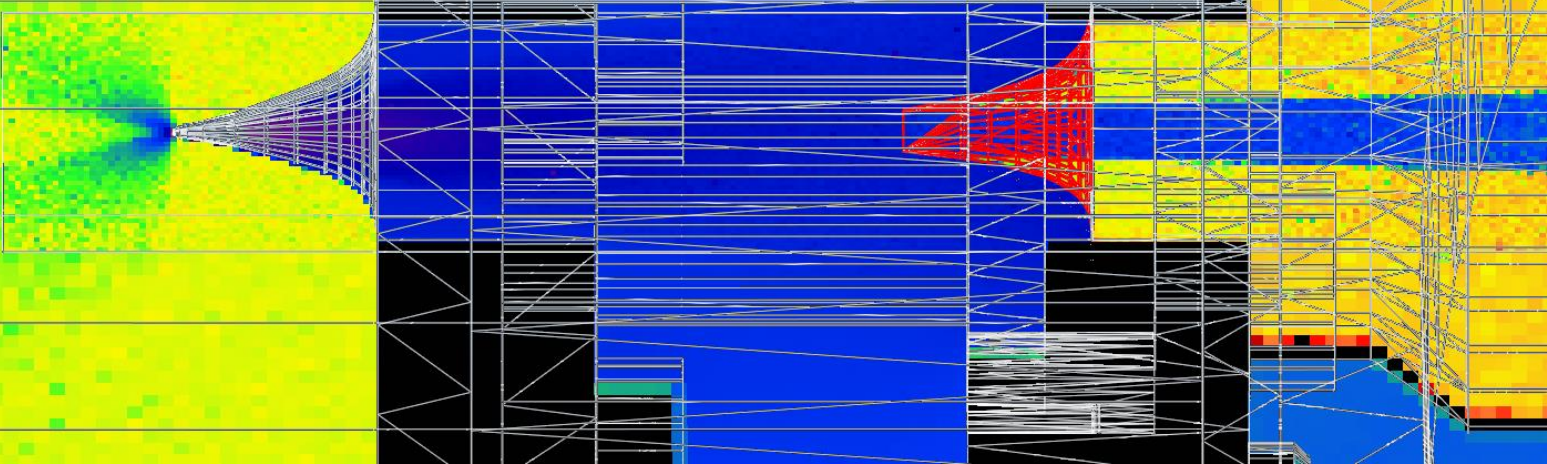


20mm jet, rectangular skimmer2

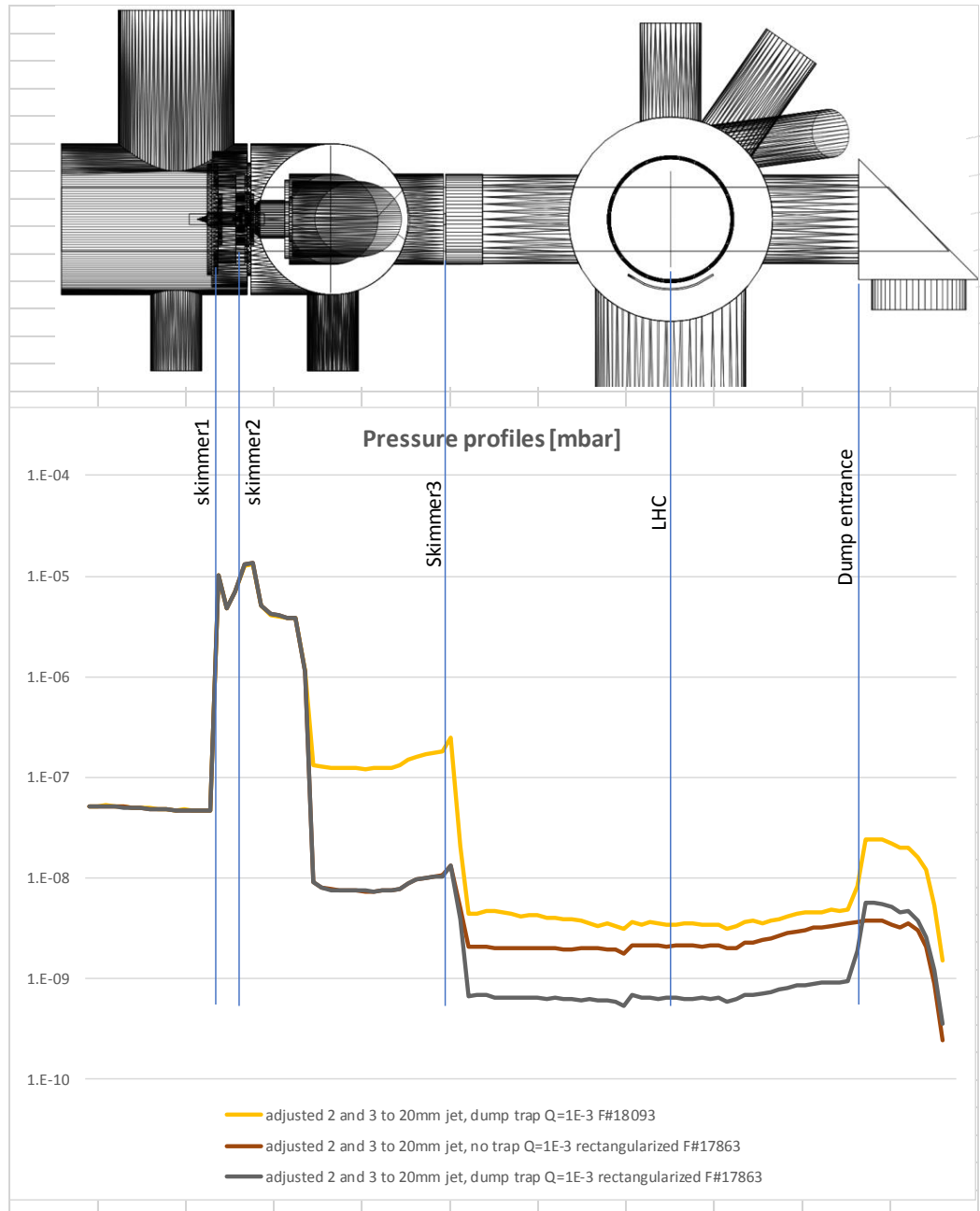
Skimmer1: 0.19mm

Skimmer2: 1.7 x 0.09 mm (manufacturable?)

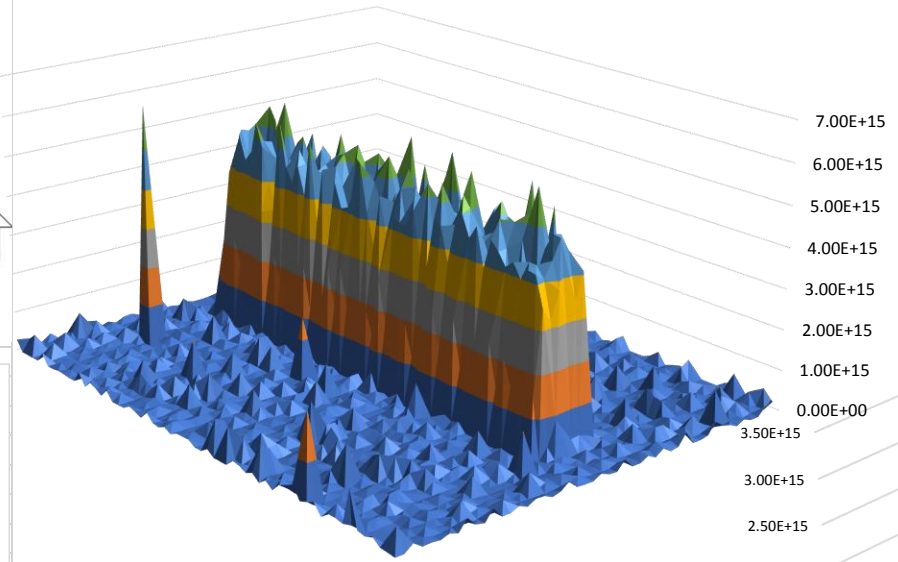
Skimmer3: 10.4mm x 0.5mm



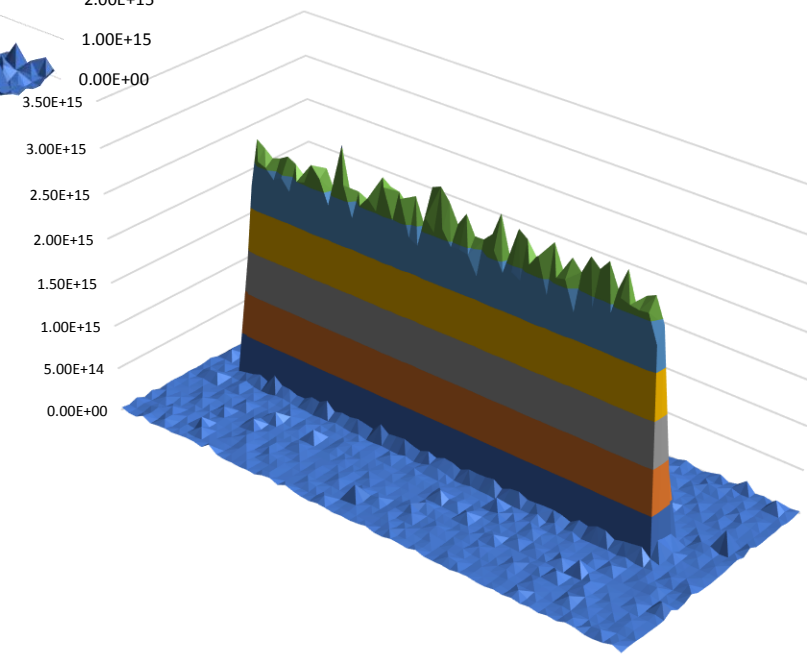
# Applying the new idea to the 20mm jet



Increased skimmer 2, with dump trap



20mm jet, rectangular skimmer 2, dump trap



Q	1.00E-03		
avg	2.1E+15	vs	4.5E+15
bg	1.6E+13	vs	8.5E+13
ratio	138	vs	52



# Conclusion

- Making the instrument shorter increases skimmer sizes
- Increased skimmer sizes let more gas through
- Further increase to 40mm is really challenging
- Mitigation 1: particle trap with rectangular orifice
- Mitigation 2: rectangular skimmer 2
  - Can it be manufactured?
  - Is alignment (position and 3 angles) possible?
  - Time to test it for the 20mm jet?

# All profiles (with trap)

