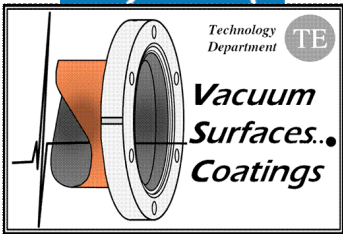




ALICE IP chamber aperture reduction (VASCO simulations)



G. Lanza

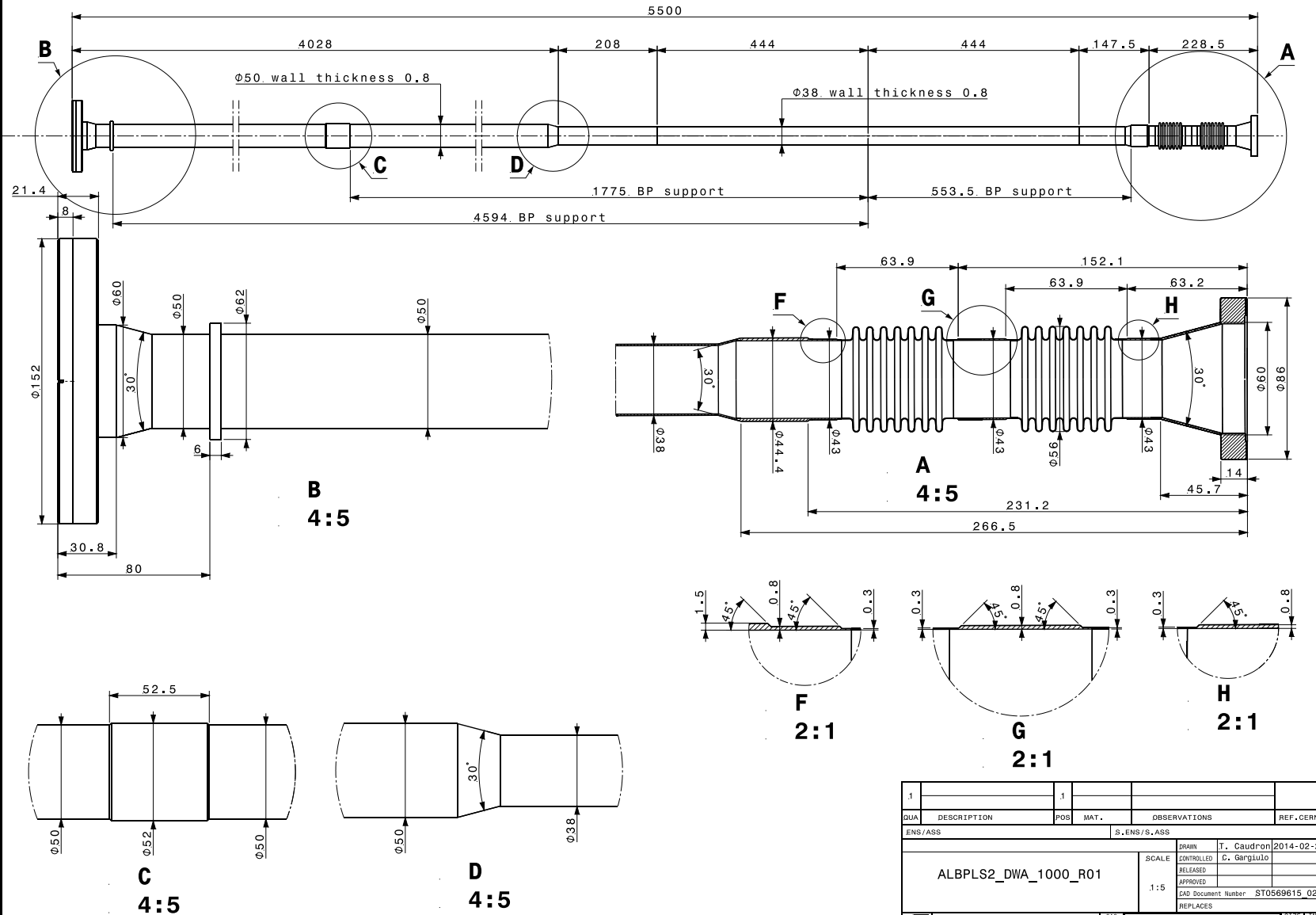
TREX meeting

1. Vacuum LHC baseline
2. ALICE new central beampipe
3. Static vacuum profile
4. Static vacuum gas composition
5. Dynamic vacuum profile with electron cloud
6. Dynamic vacuum gas composition
7. Vacuum Stability: critical current in case of pumping speed reduction
8. Vacuum layout

Vacuum LHC baseline

- To grant 100h beam lifetime:
 $P < 1 \times 10^{-8}$ mbar, H₂ equivalent
- Uncoated (no NEG) surfaces will suffer from e-cloud phenomena during machine startup
- The LHC strategy for vacuum cleaning and beam pipe conditioning (reduction of the SEY) is scrubbing
 - 1 to 10 mC/mm² are required
 - The achieved level of conditioning depends of the time spent above the multipacting threshold

ALICE new central beam pipe



DESIGN, DIMENSIONS, TOLERANCES
DRAWING, SURFACE FINISHES, ISO
PROJECTIONS

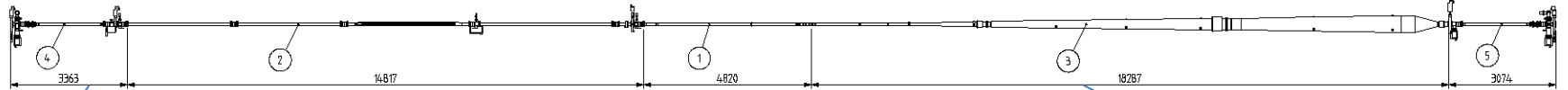


ORGANISATION RESPONSIBLE FOR
PROJECTIONS, DIMENSIONS, TOLERANCES
DRAWING, SURFACE FINISHES, ISO
PROJECTIONS

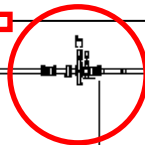
| 1 | | 1 | | | |
|---|-------------|-----|-------|---------------------|-----------------------|
| QIA | DESCRIPTION | POS | MAT. | OBSERVATIONS | REF. CERN |
| ENS/ASS | | | | S.ENS/S.ASS | |
| ALBPLS2_DWA_1000_R01 | | | SCALE | DRAWN | T. Caudron 2014-02-21 |
| | | | 1:5 | CONTROLLED | C. Gargulic |
| | | | | RELEASED | |
| | | | | APPROVED | |
| | | | | CAD Document Number | ST0569615_02 |
| | | | | REPLACES | |
| NON VALABLE POUR EXECUTION NOT VALID FOR EXECUTION | | | | DAC | |
| | | | | | SIZE 1/NO. |
| | | | | | 2 |

ALICE new central beam pipe

Since the beampipe is longer than the previous one, the vacuum layout changes



680mm



2

14817

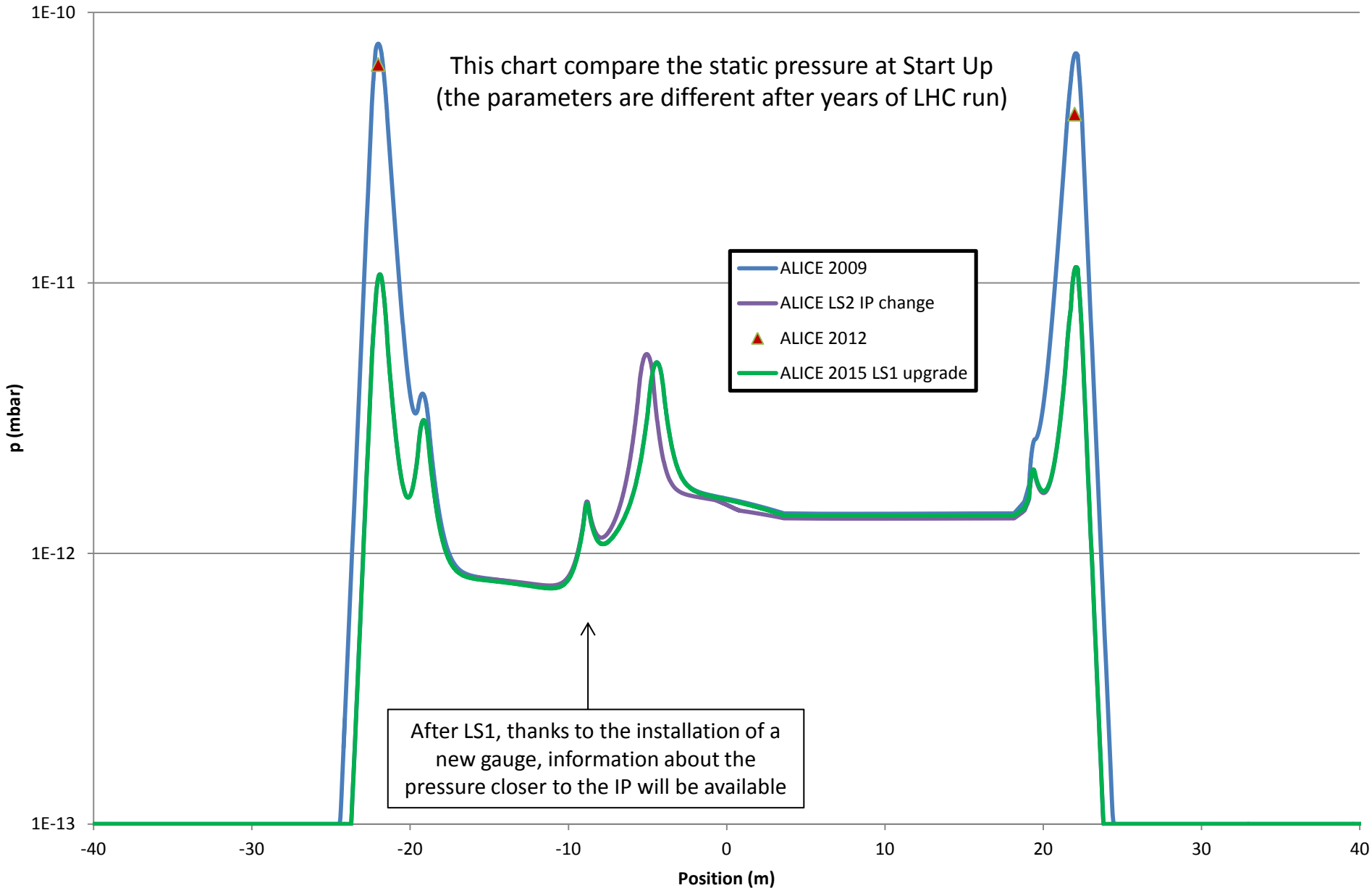
1

4820

3

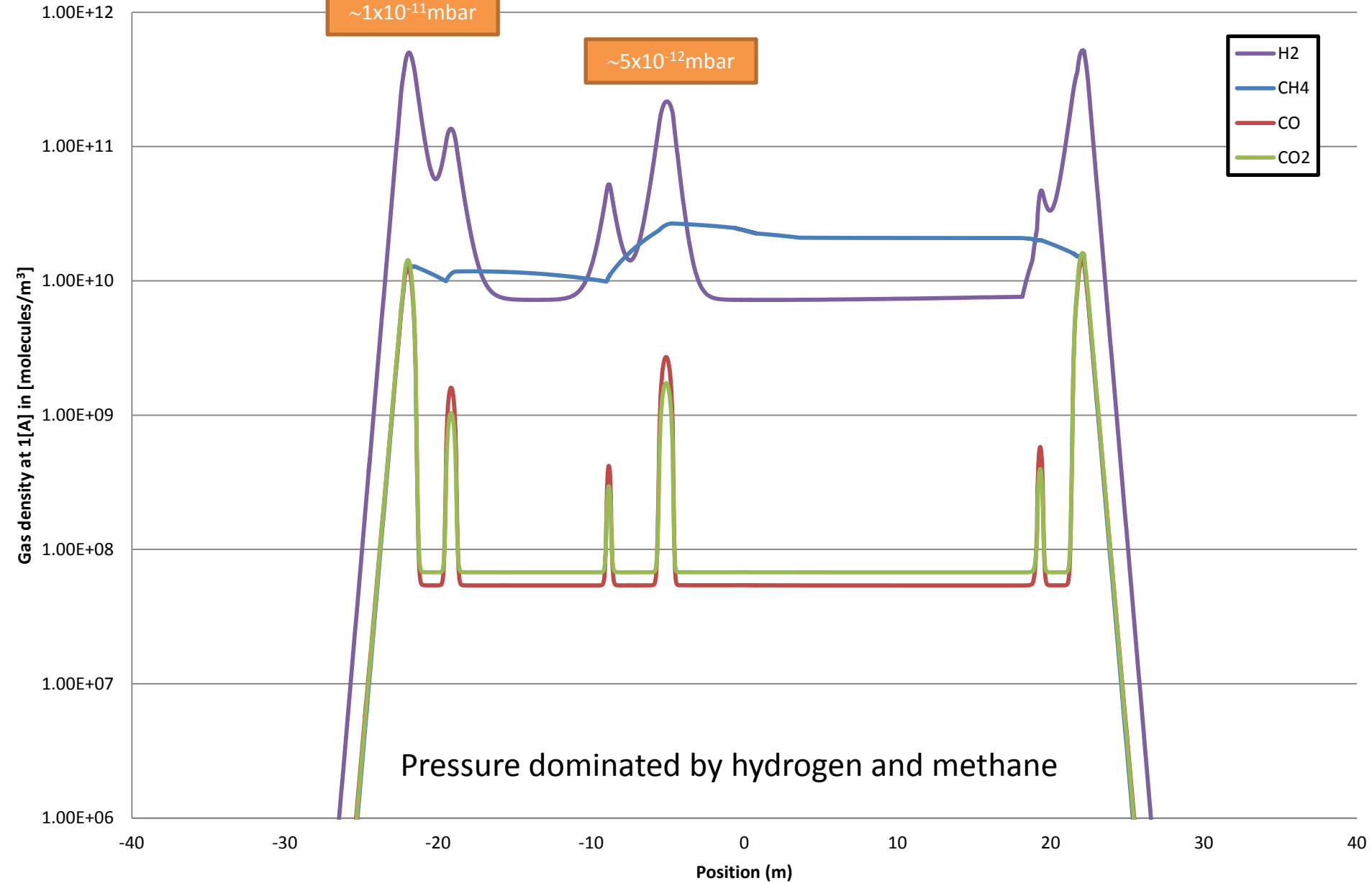
Moving the sector valve assembly towards the left side of RB24 will also distance the small pressure bump (see next chart) before the interaction point

Static Vacuum

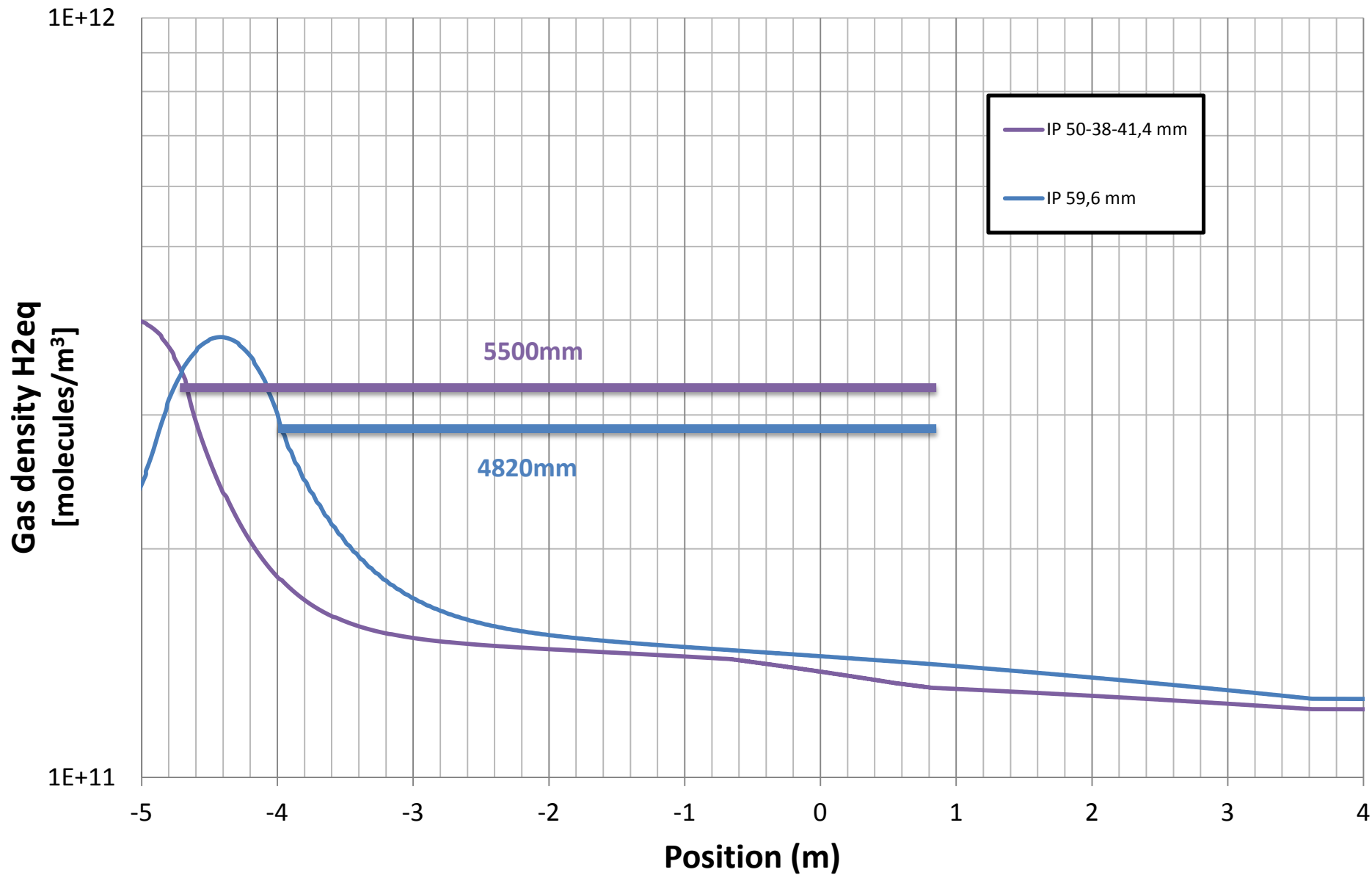


Static Vacuum

Gas composition

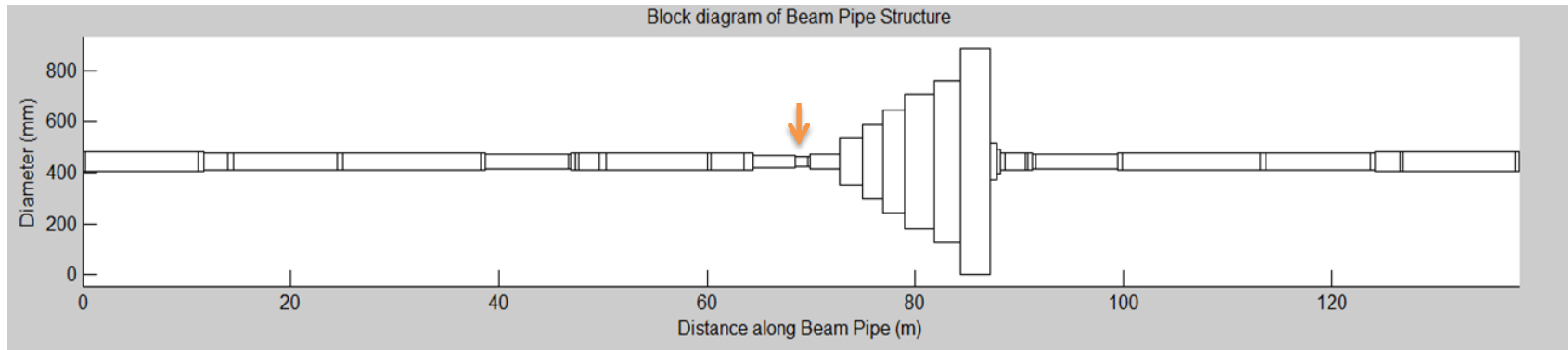
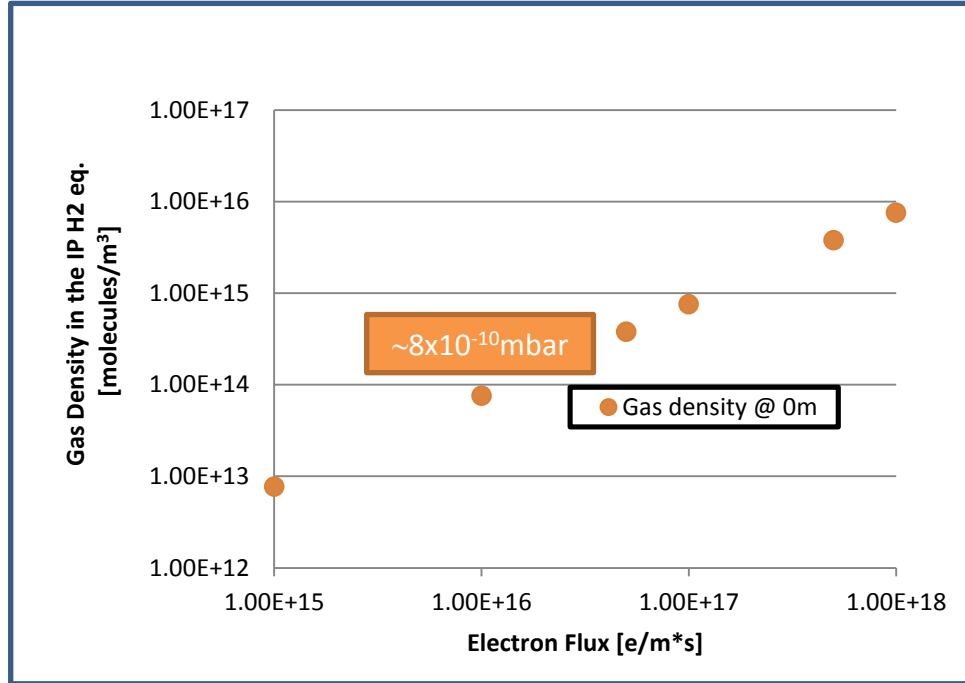


Static Vacuum



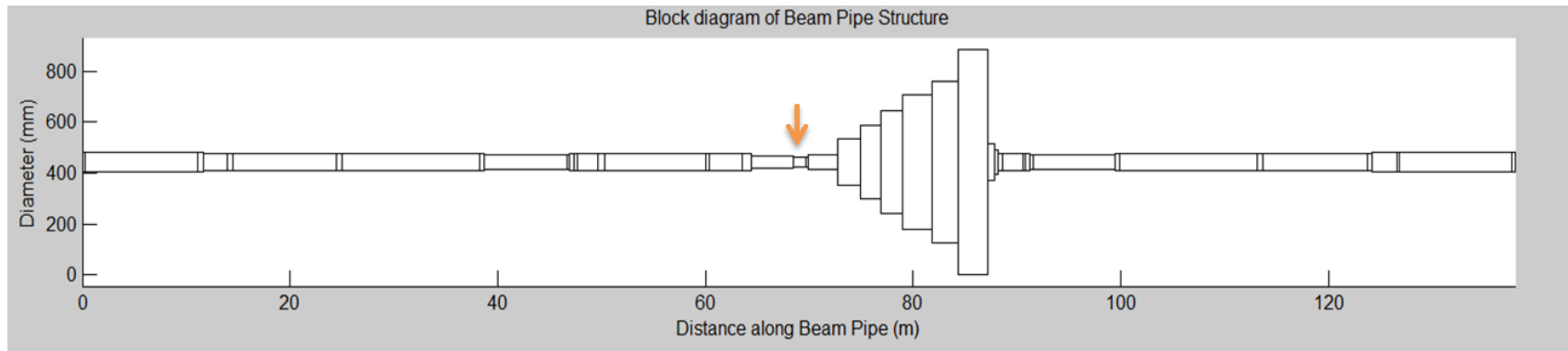
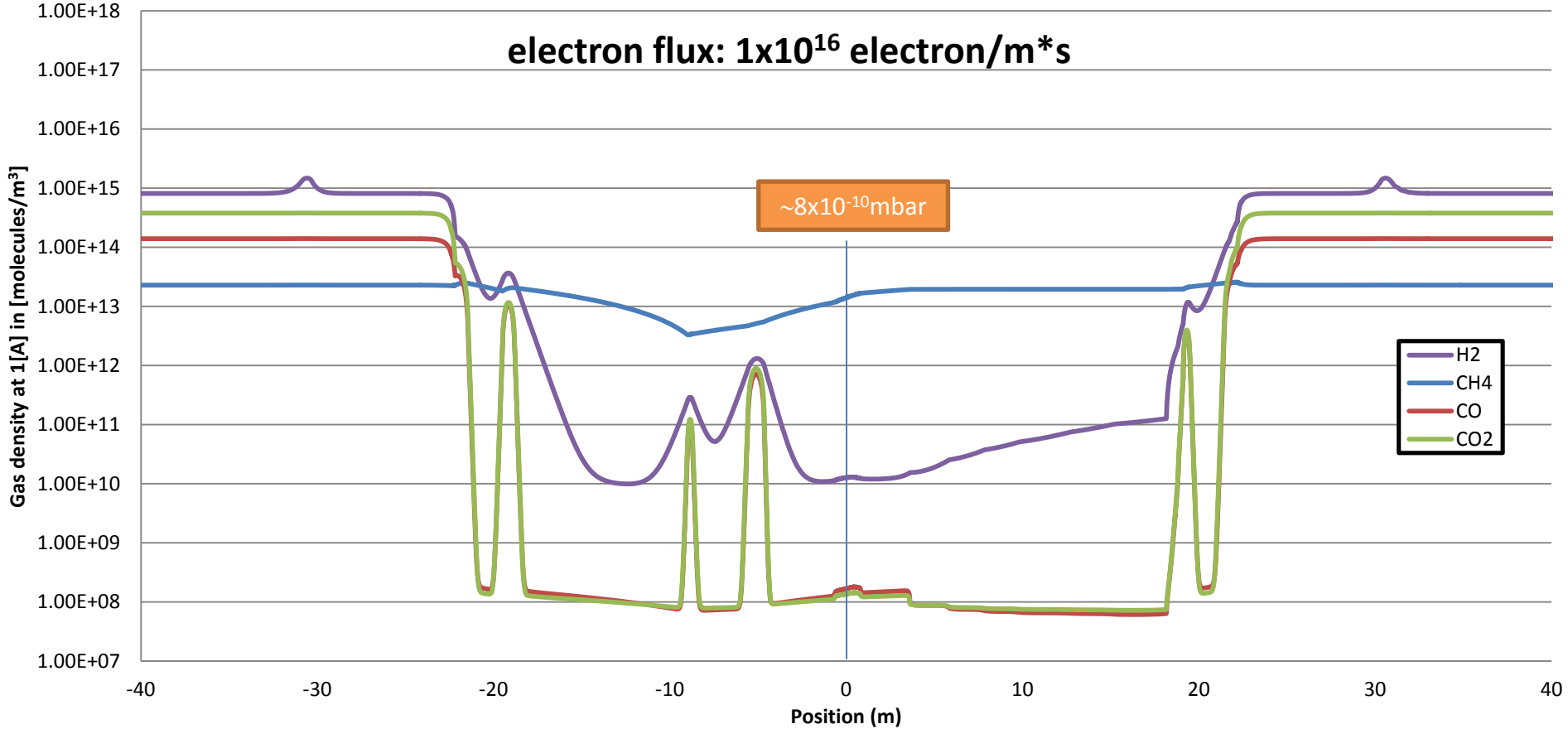
Dynamic Vacuum at IP

electron cloud

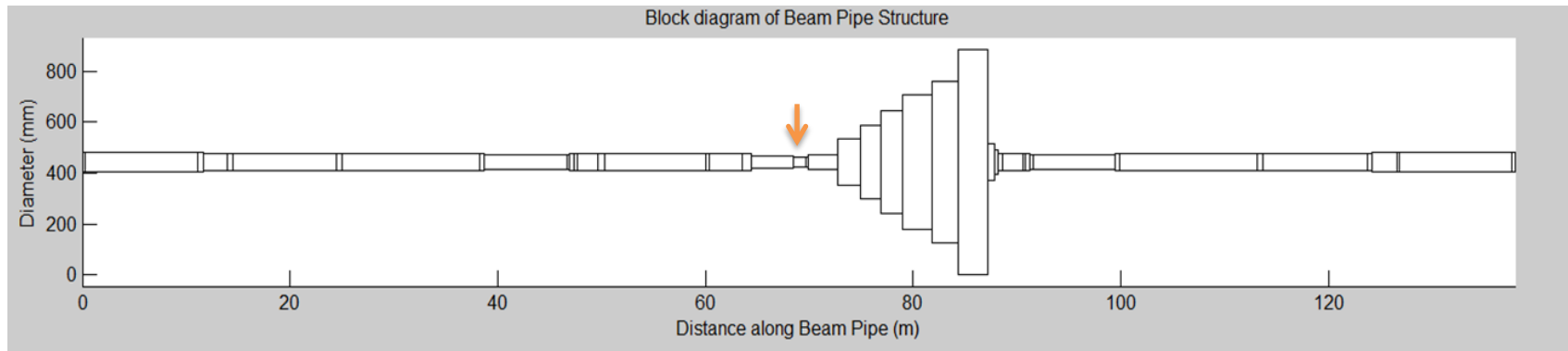
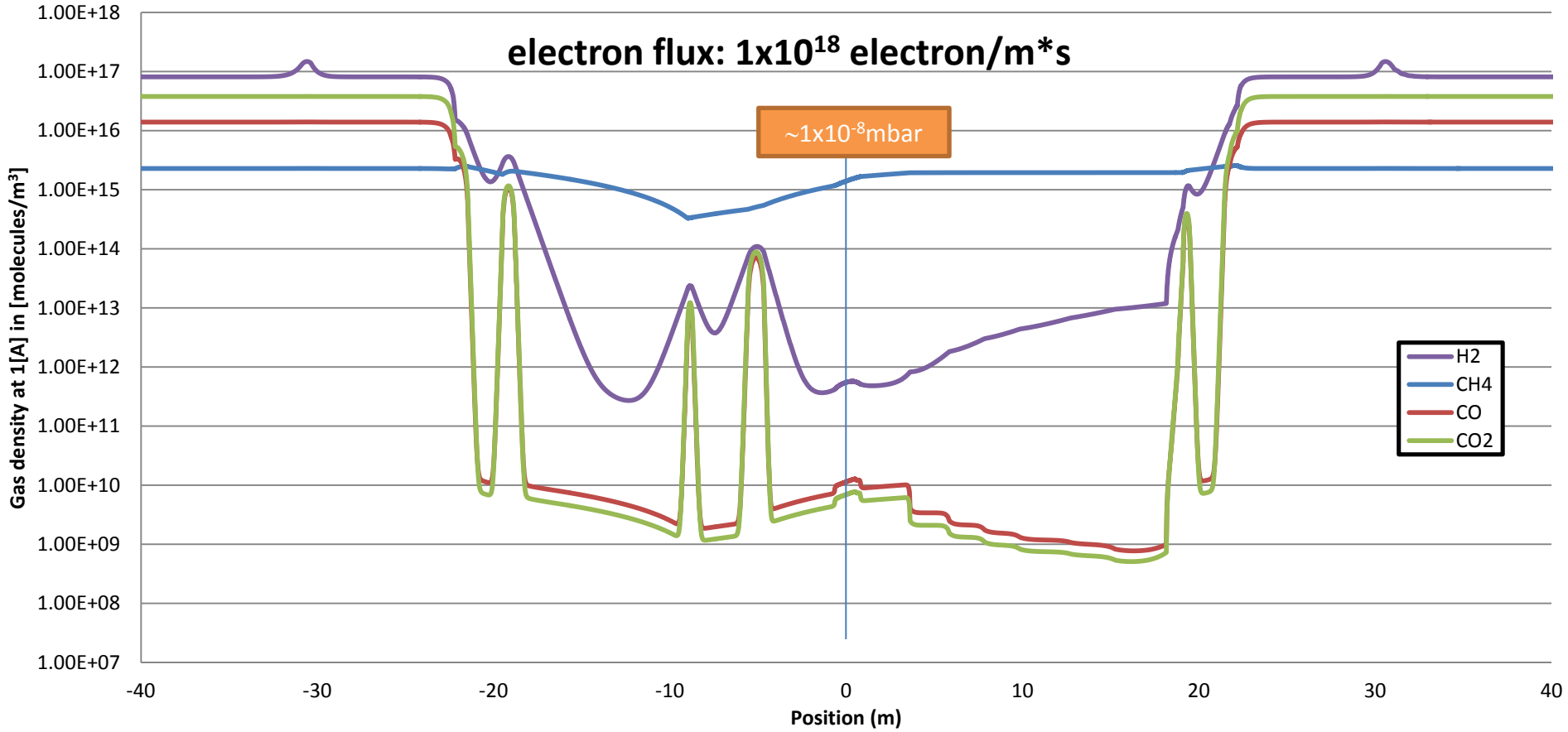


Dynamic Vacuum

electron flux: 1×10^{16} electron/m*s



Dynamic Vacuum

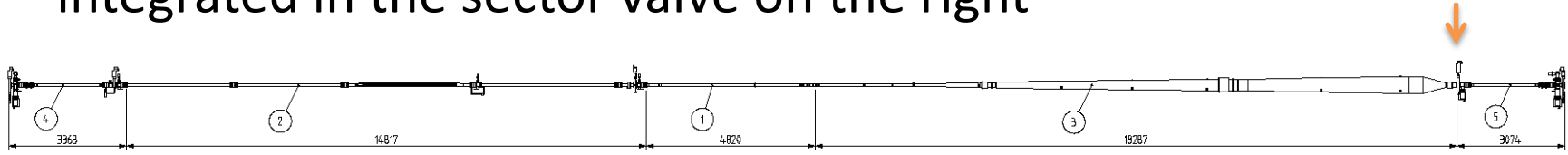


Vacuum Stability

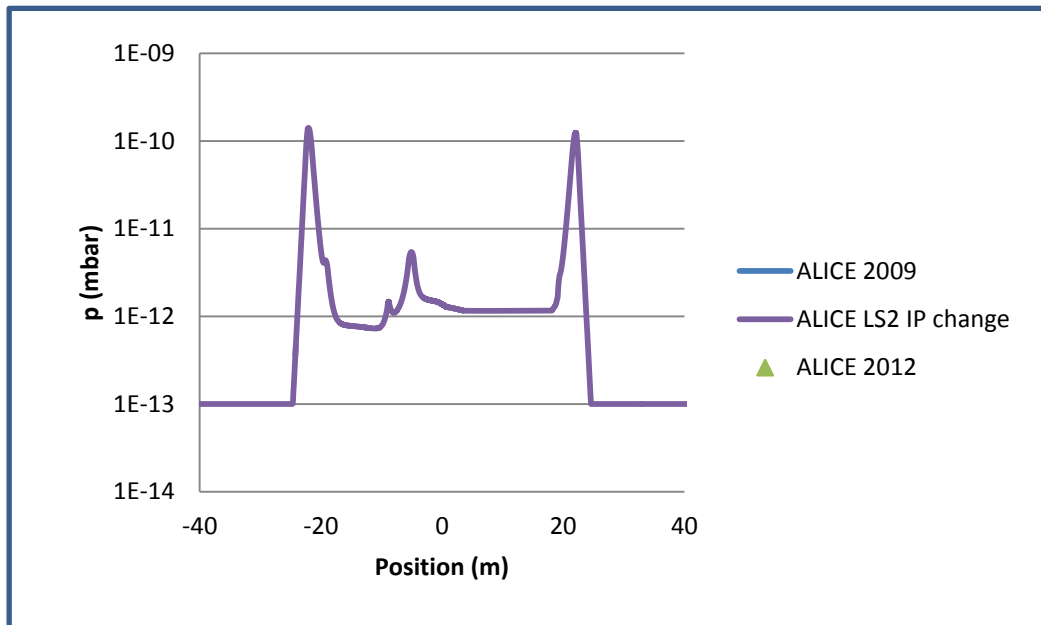
- No evidence of vacuum stability runaway issue in case of
 - NEG 90% saturated
 - Ion pumps all out of order
 - NEG 90% saturated and ion pumps all out of order
- Checked for HL-LHC current parameters
- The new central chamber is validated with this vacuum stability study.

Vacuum Layout

- Installation of a penning gauge on the IP sector: probably integrated in the sector valve on the right



- Move the sector valve further towards the left (and add a NEG chamber in the IP?!?) to distance the pressure bump from the interaction point.



The new layout will need a further vacuum acceptance study