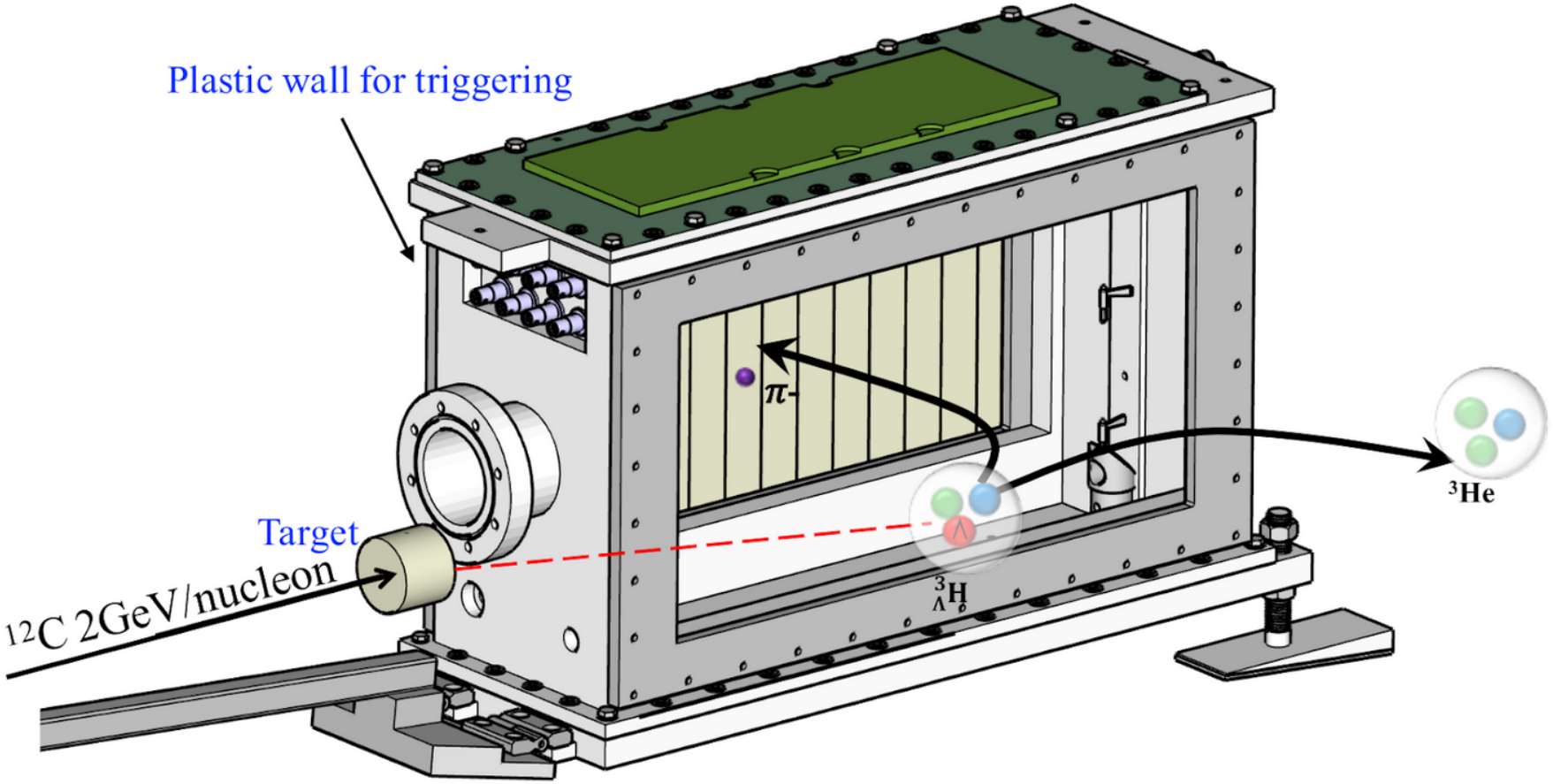
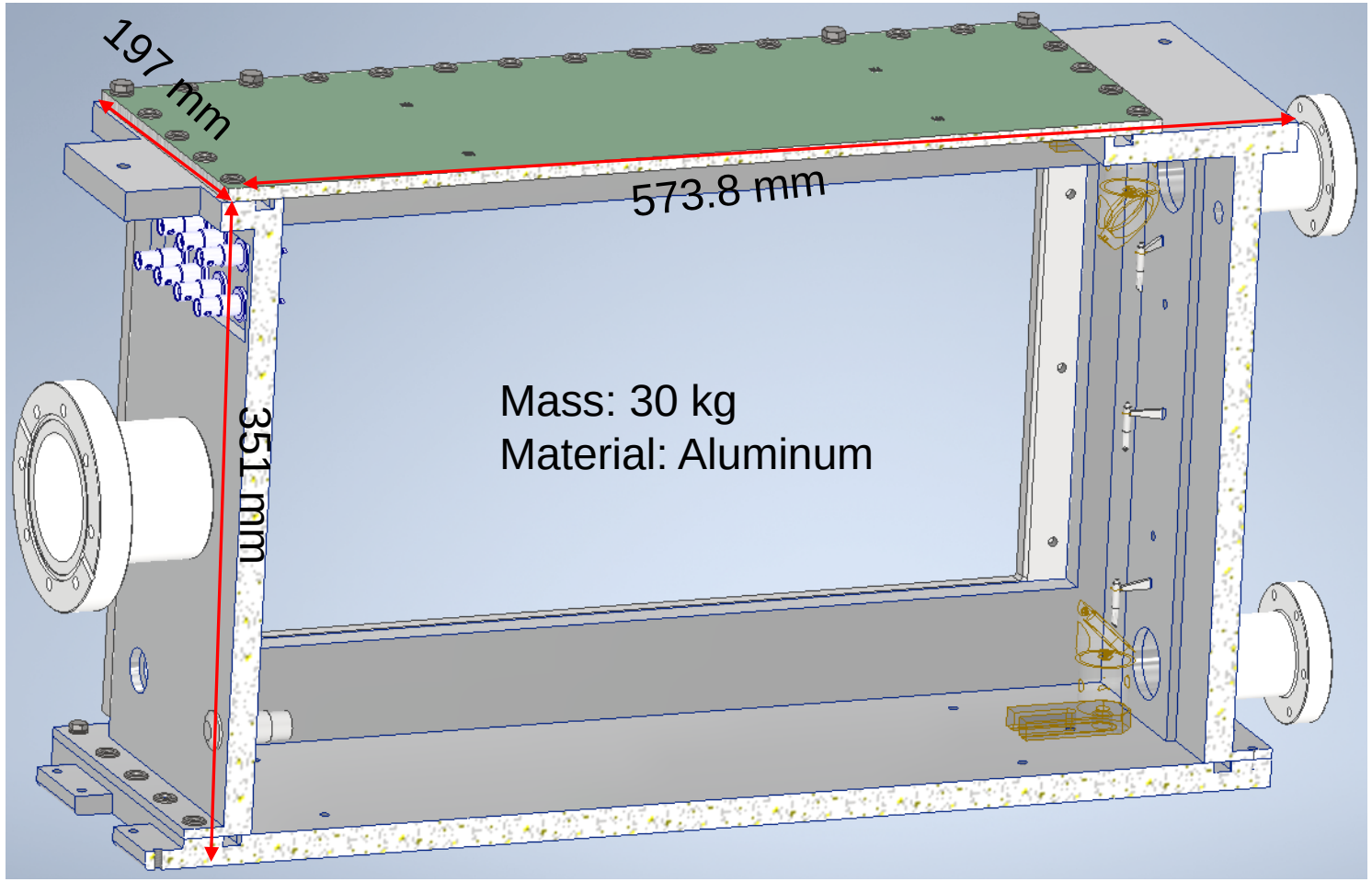
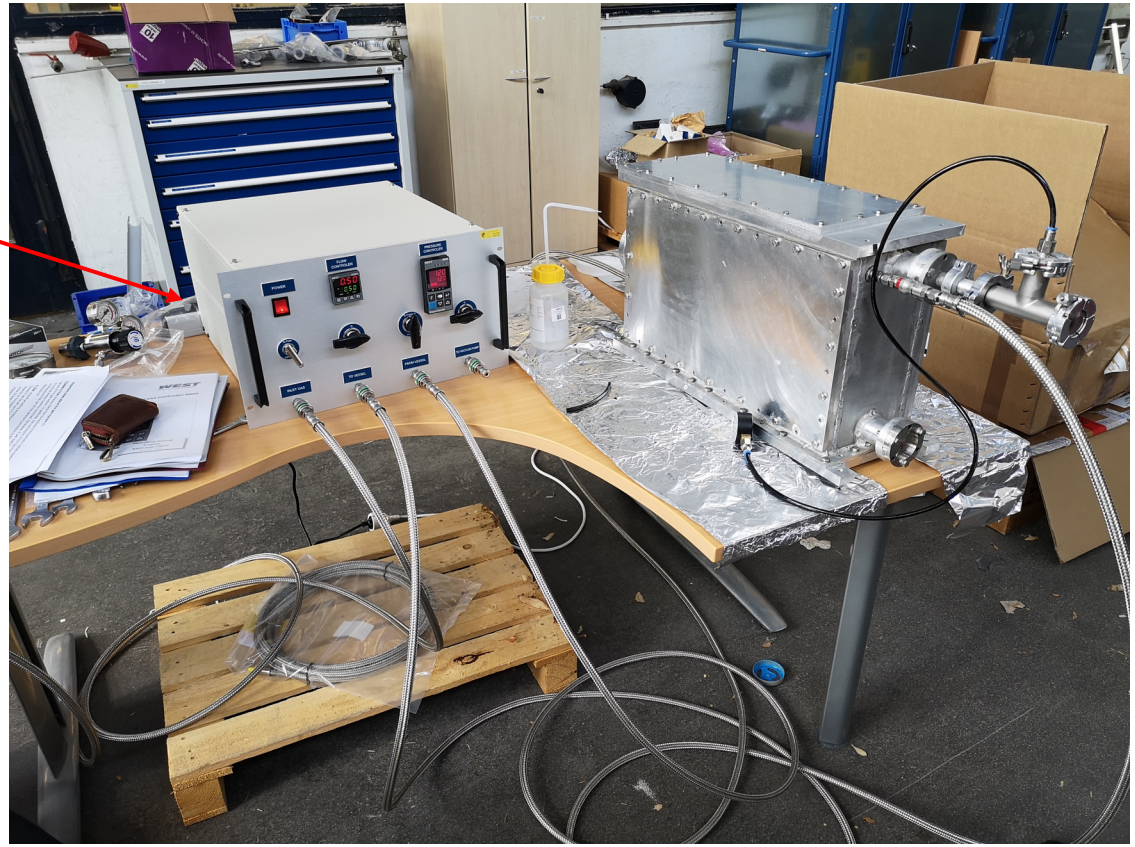
Construction and test of HYDRA TPC prototype

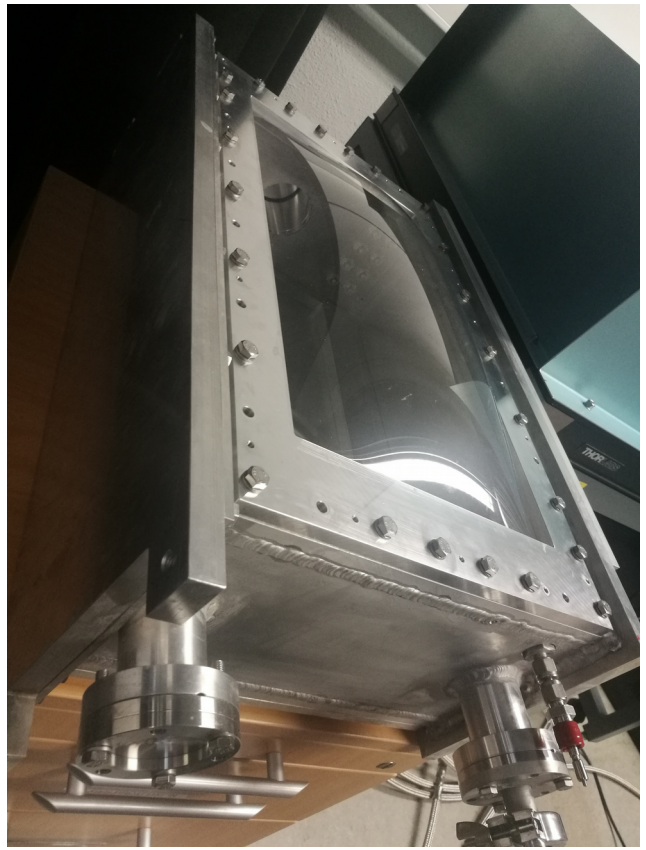


TPC chamber



Leakage test and window test



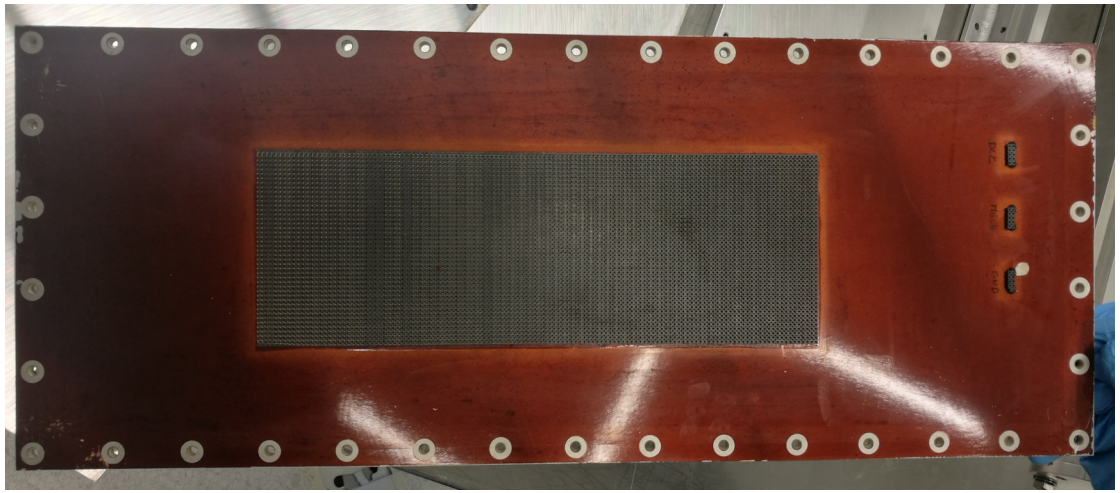


Operation pressure:
0 ~ 0.2 bar above atmosphere

Gas flow:
5 L / h

Gas Mixture:
96% Ar, 2% iC_4H_{10}, 2% CF_4

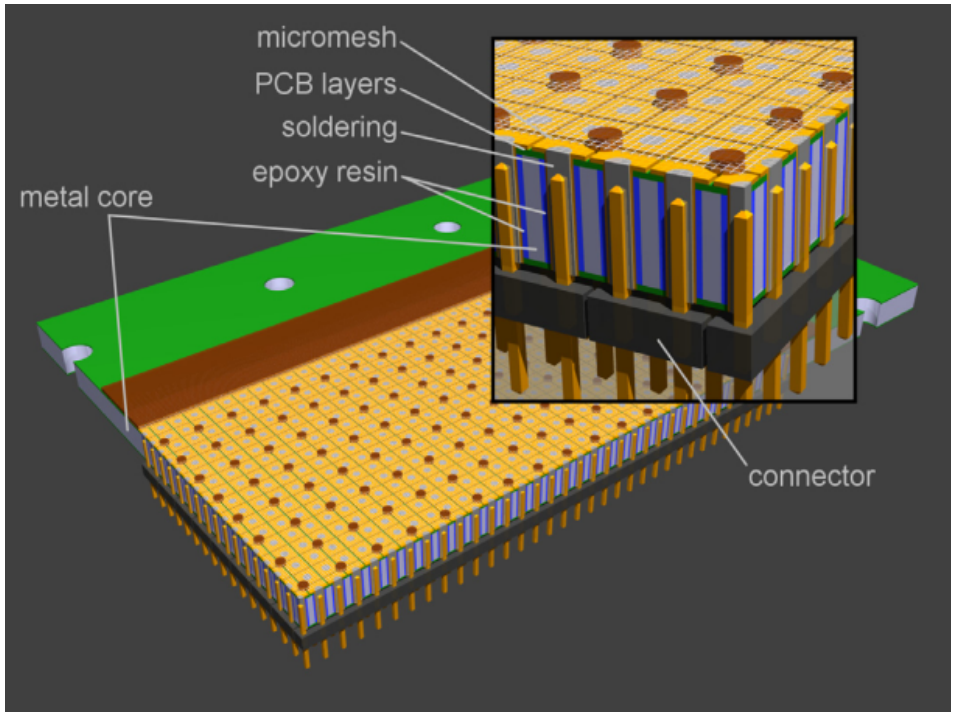
The metal core pad plane



Active area: 44 * 128 pads; Pixel dimension: 2 * 2 mm^2

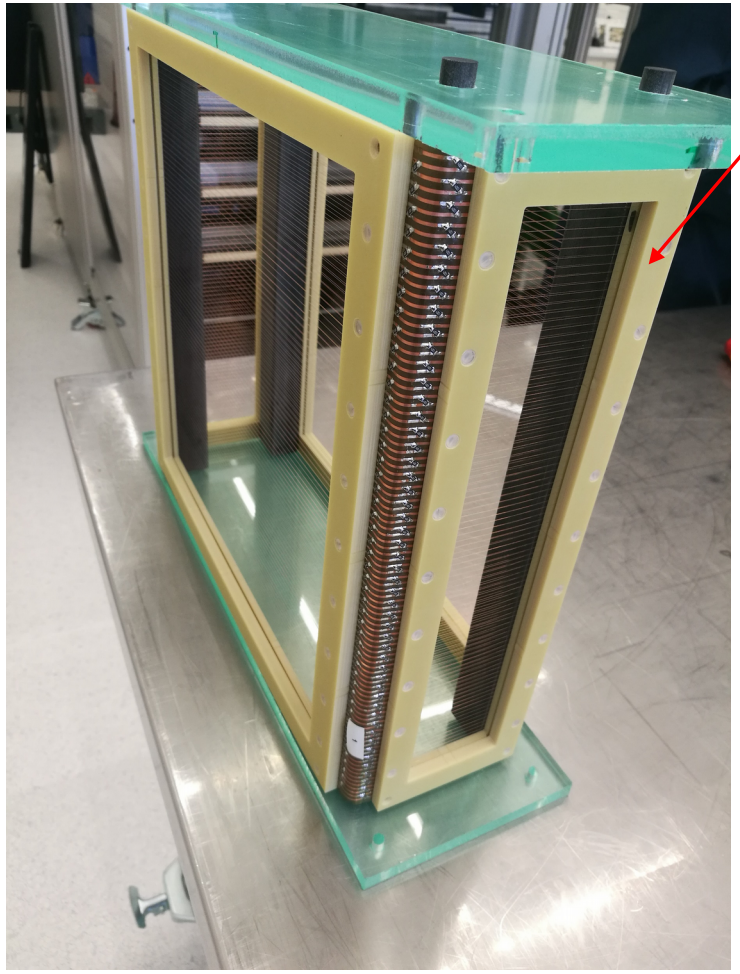
Dimensions: 197 * 497.8 * 7 mm^2

Signal collection: MTMM pin connectors

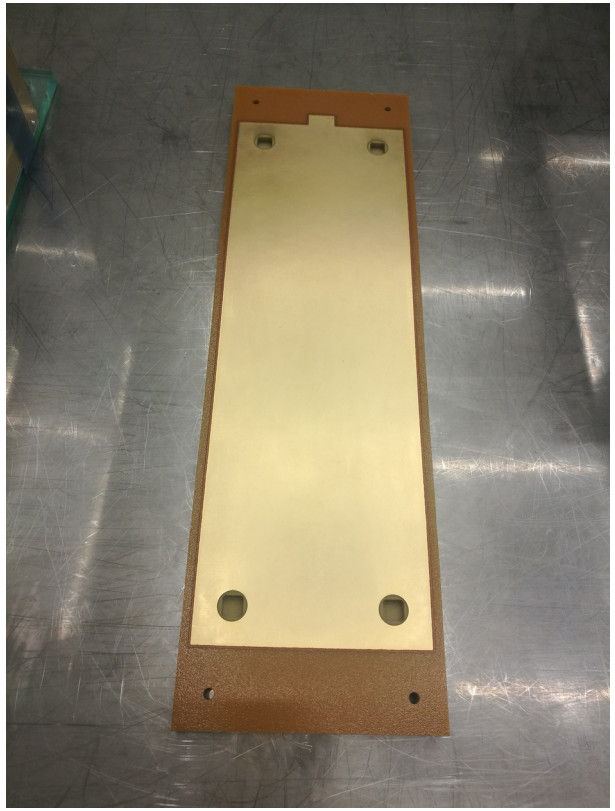


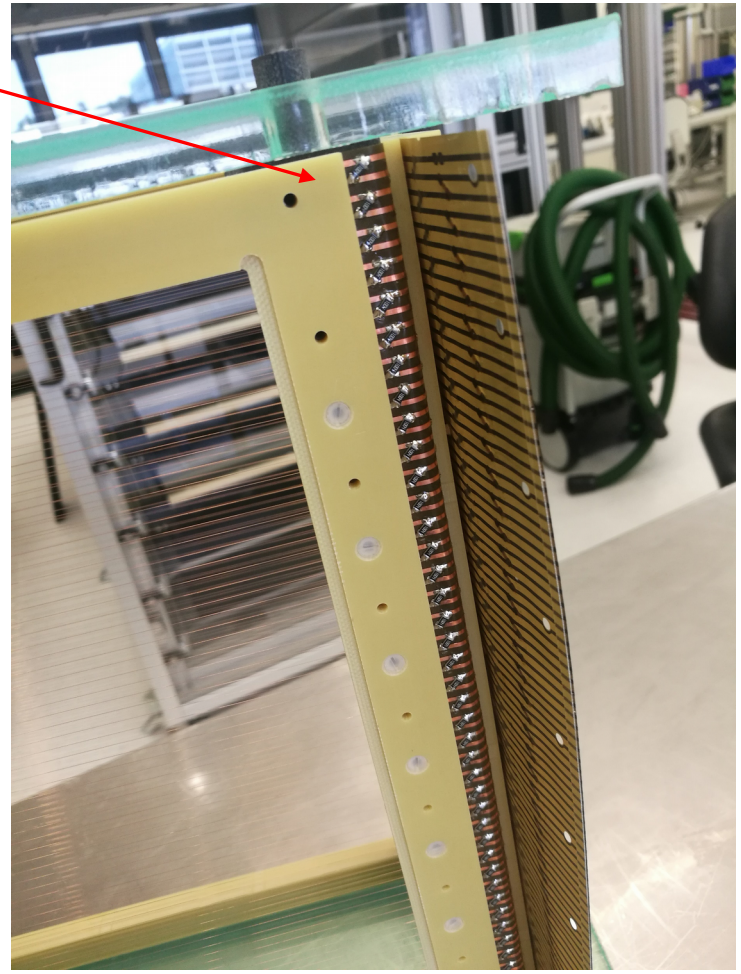
J.Giovinazzo, et al., NIM A, Volume 892, 1 June 2018, Pages 114-121

Field cage



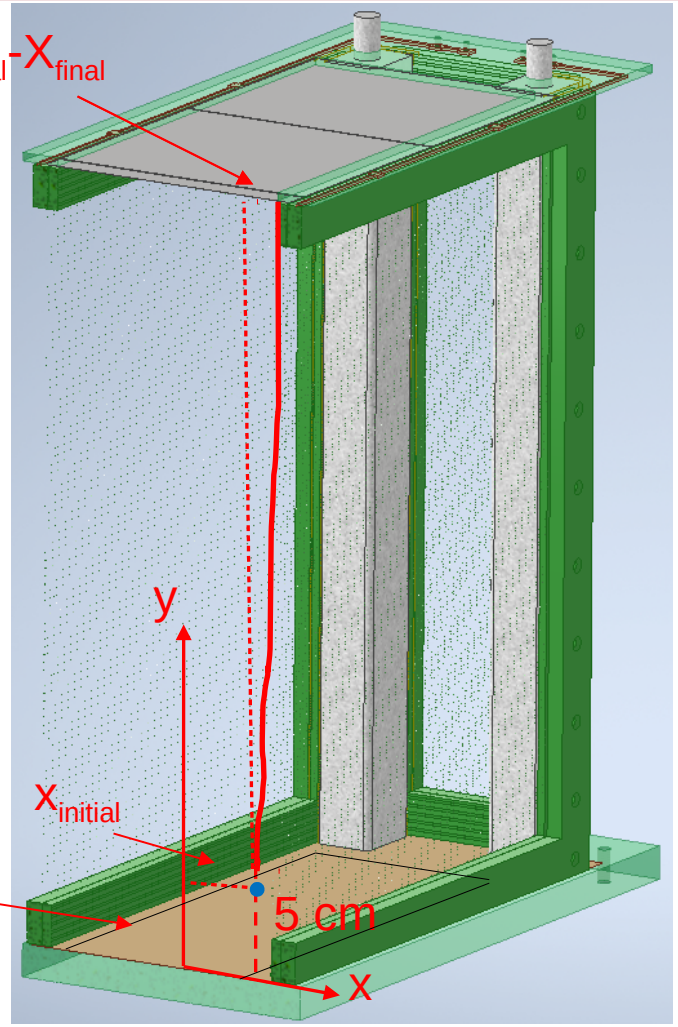
double-layer wires

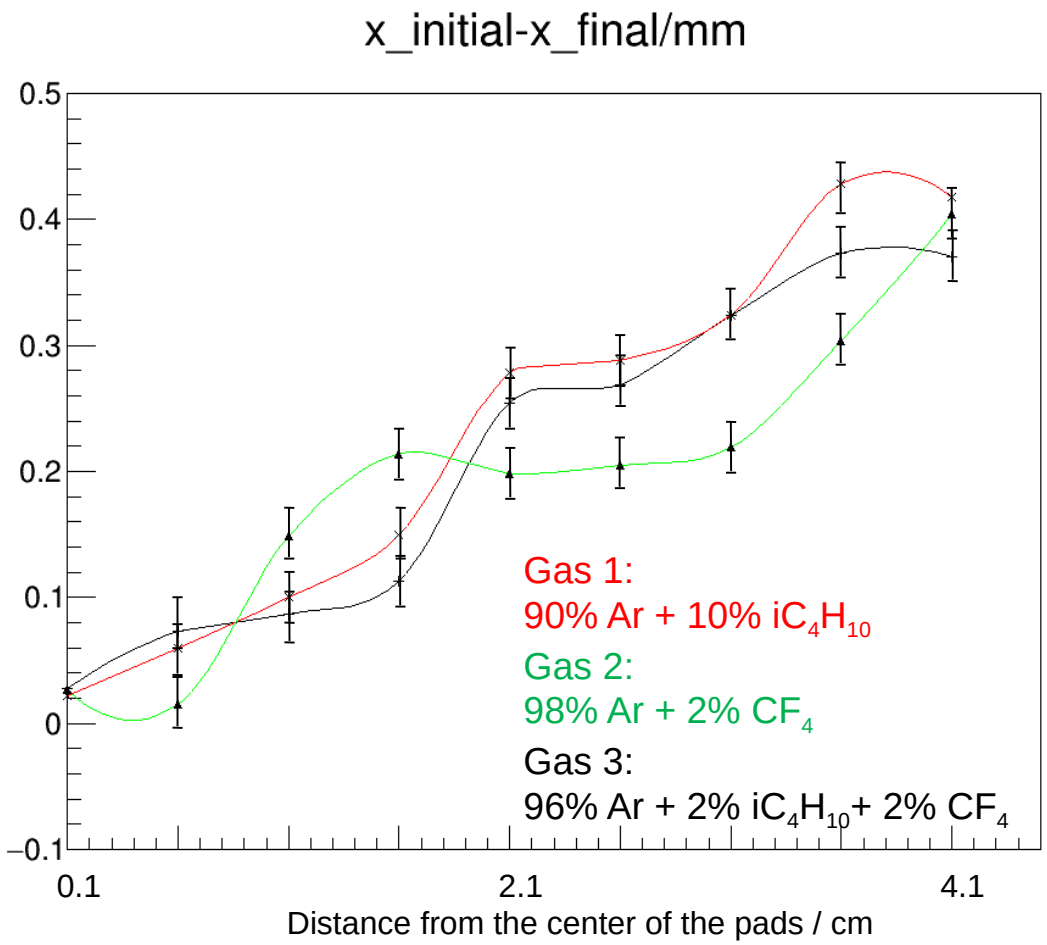




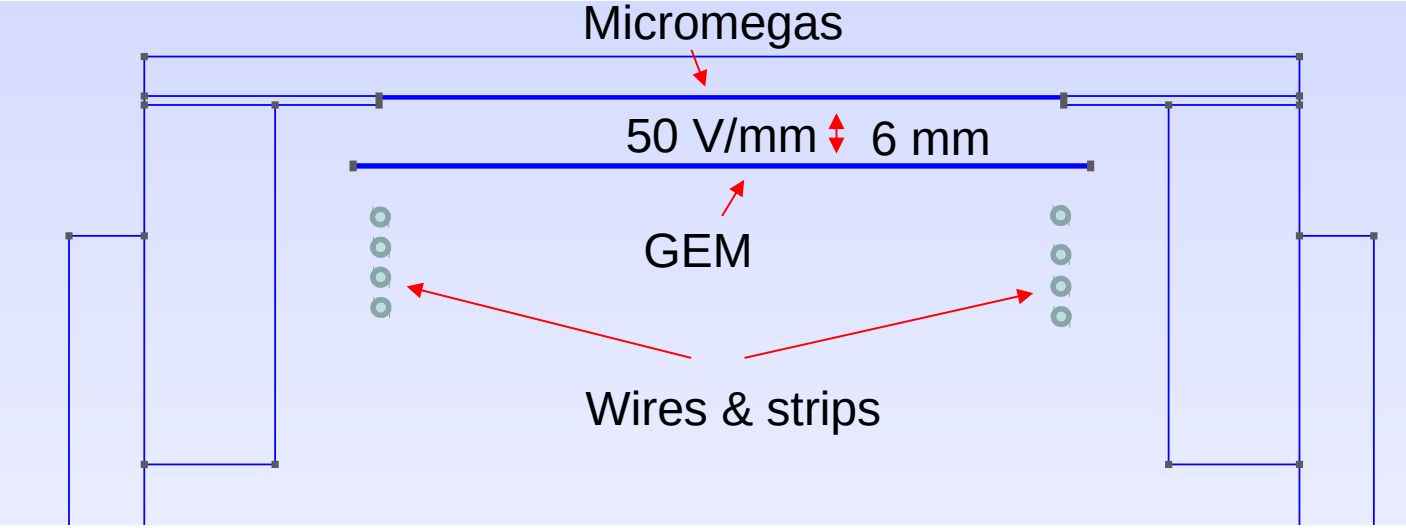
Cathode operation HV: 8.5 ~ 9 kV
Drift electric field = 17.5 V/mm

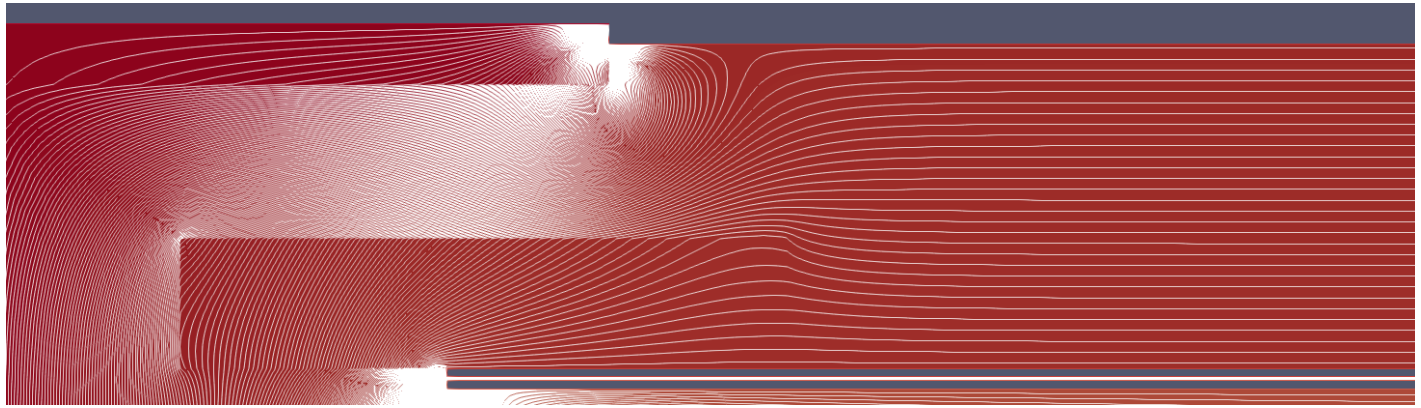
Simulation of the drift field





Transfer region and amplification region





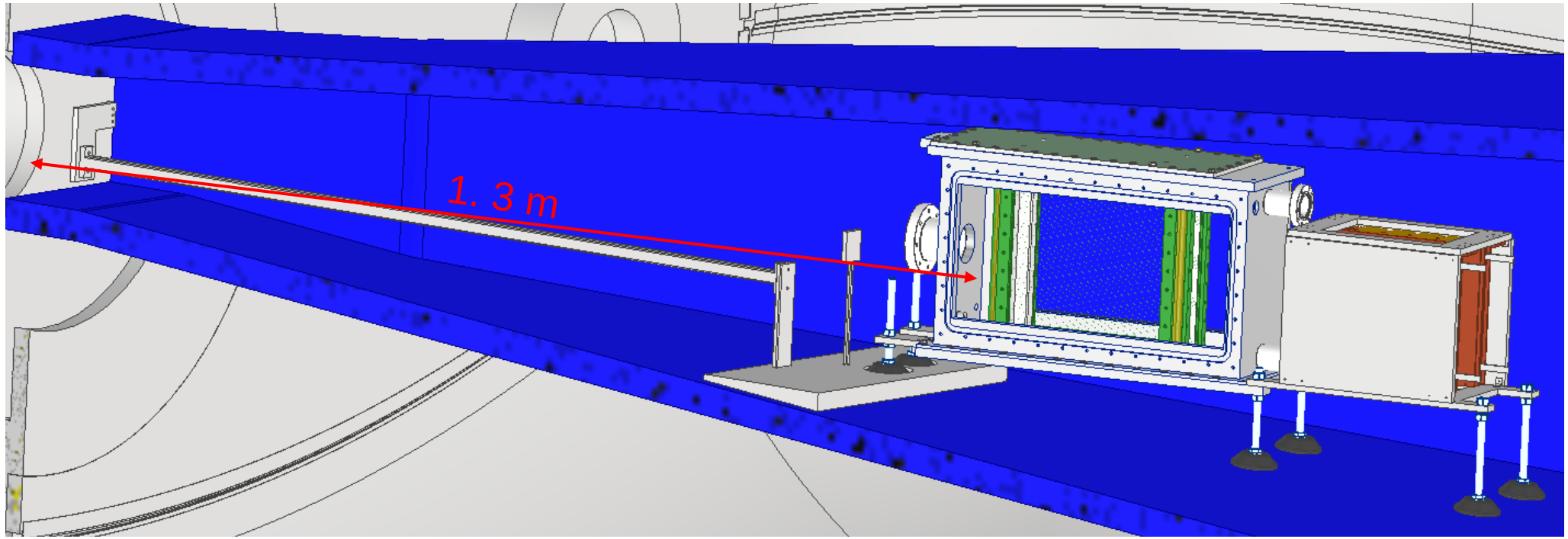
Drift deviation in the transfer region: < 20 um

Gain: 10 (GEM) * 200 (Micromegas Mesh)
= 2000

Anticipated ion back flow: <1%

3-GEM PCB

Prototype in GLAD



To do list

1. 20/11/2022 - 15/12/2022:
   Final assembly

2. 15/12/2022 - 31/01/2023:
   Cosmic ray test of TPC @ IKP / Cave C;
   Integration with electronics;

3. 31/01/2023 - 28/02/2023:
   Test of TPC with laser beams @ IKP;
   Investigation of space charge & ion back flow

4. 01/03/2023 - 30/04/2023:
   Integration with the plastic wall in GLAD;

5. 01/05/2023 - : in-beam tests with the full configuration