



UNIVERSITÀ DEGLI STUDI
DI MILANO
BICOCCA



Status of the BAND-GEM detector: full module construction and plans

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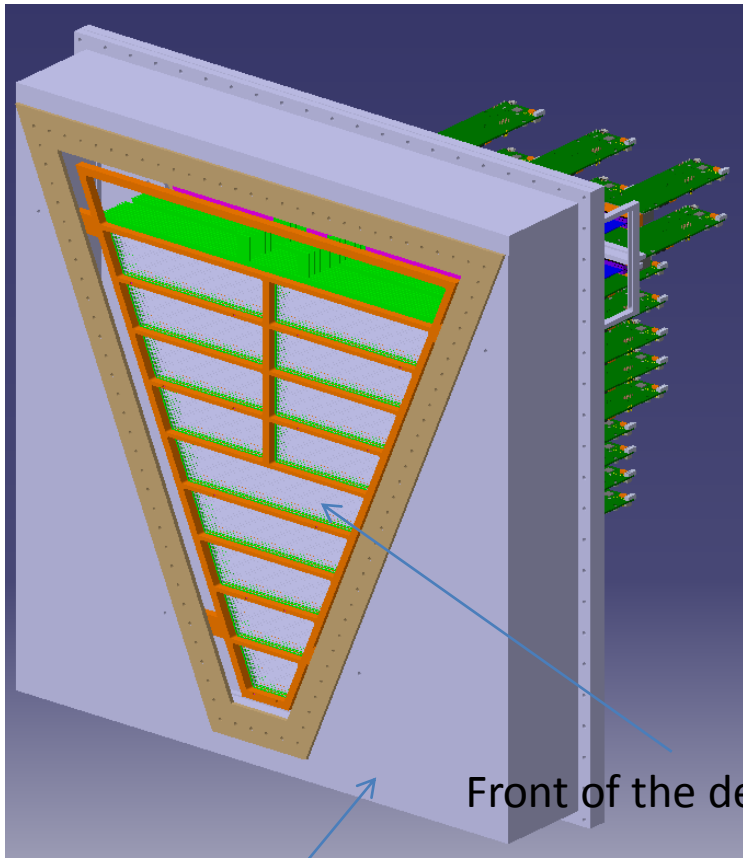
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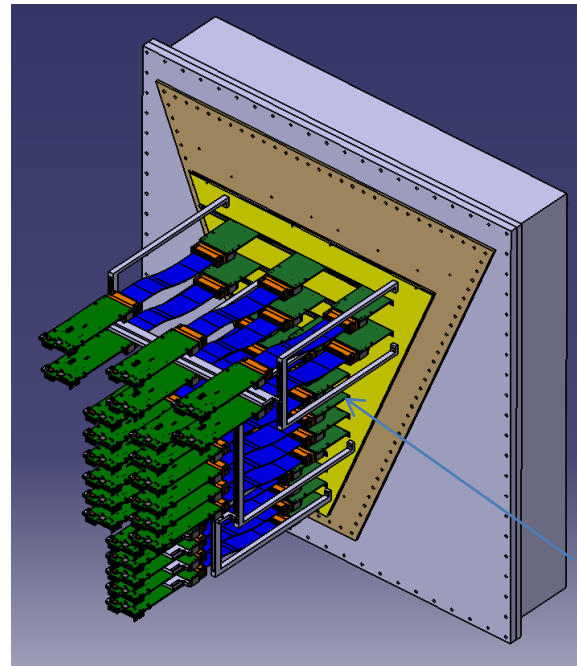
⁸*IFE: ⁸STFC-RAL, ISIS facility, Didcot, Uk*

Full-Module: CAD Overview

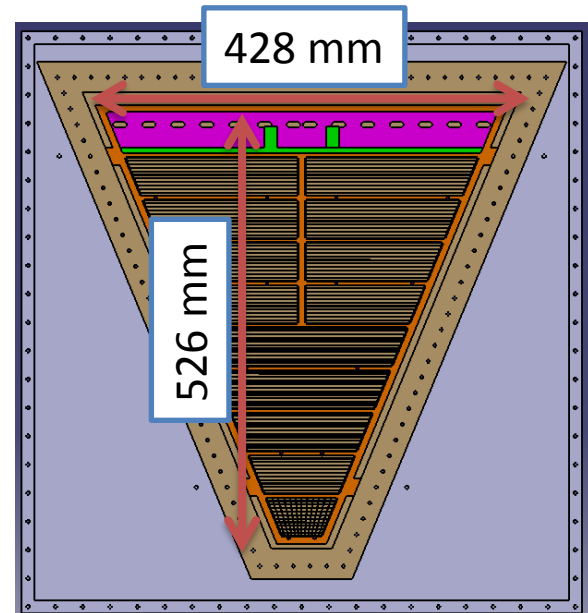


Front of the detector

Detector BOX

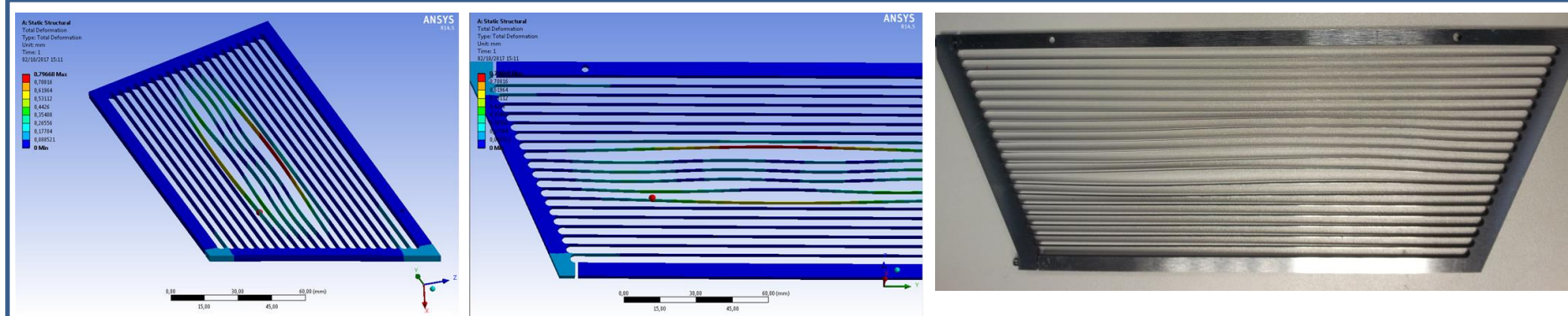


Read out electronics with support



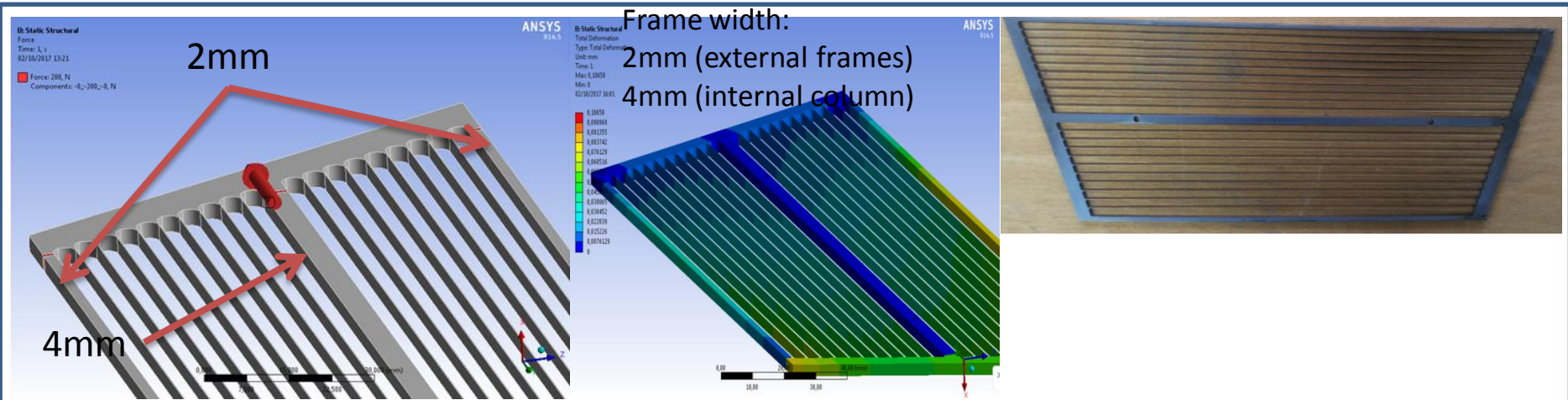
Full-Module: New grid design

- New grid design driven by non-linear mechanical simulations



Width: 6+6 mm

Plot of the mechanical deformation when the load due to the screws stretching is applied. The deformation reaches 0.8 mm in the middle: not acceptable



2mm

Frame width:

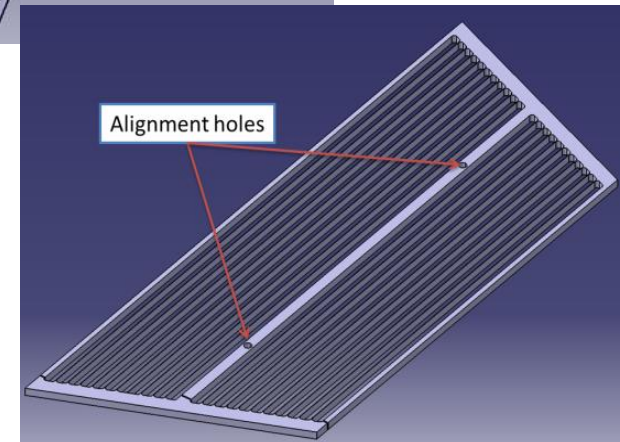
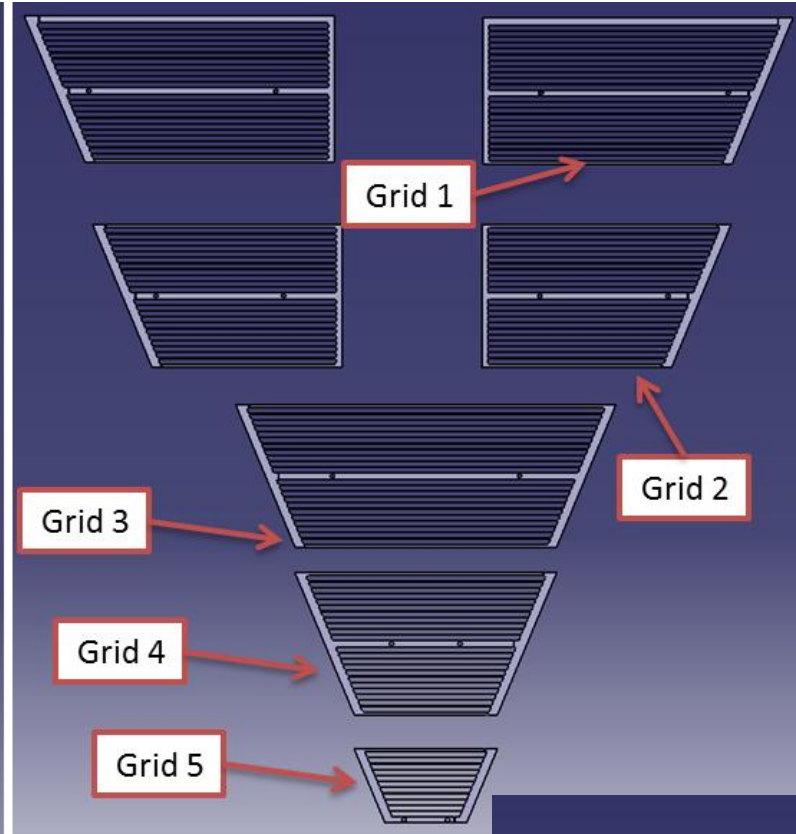
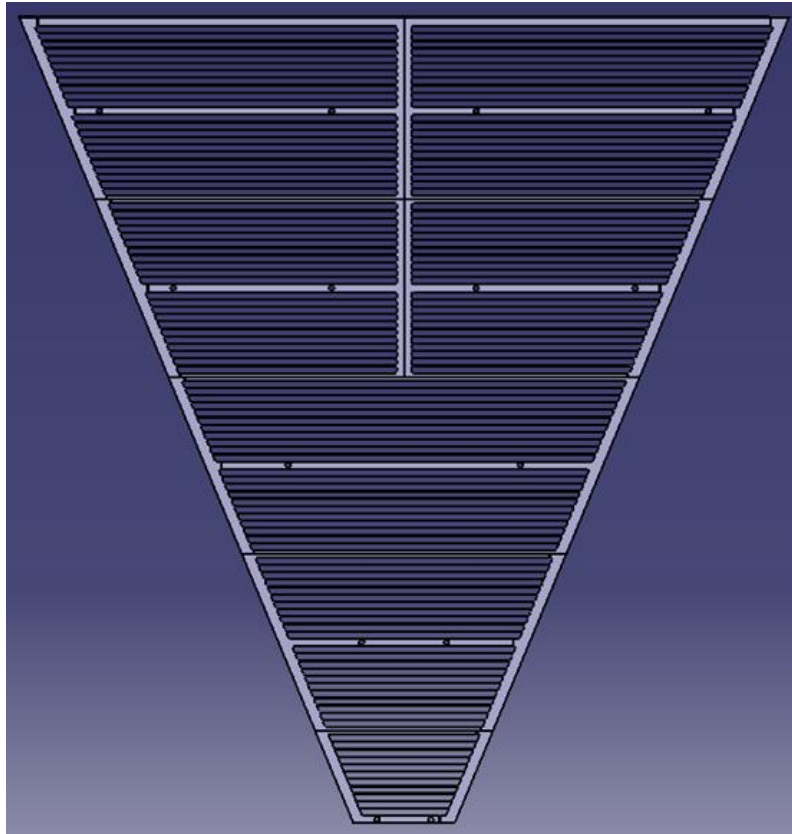
2mm (external frames)

4mm (internal column)

4mm

Plot of the mechanical deformation when the load due to the screws stretching is applied. The deformation reaches 0.05 mm in the middle: Acceptable!

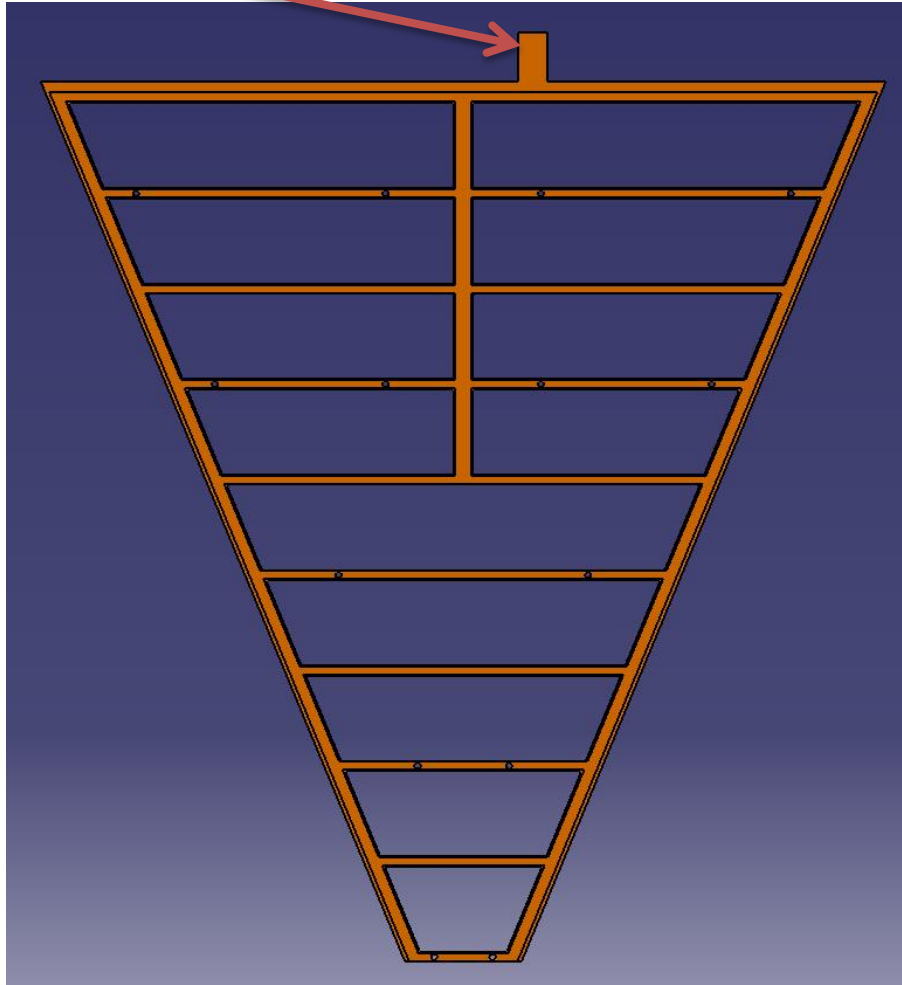
Full-Module: The grids plane



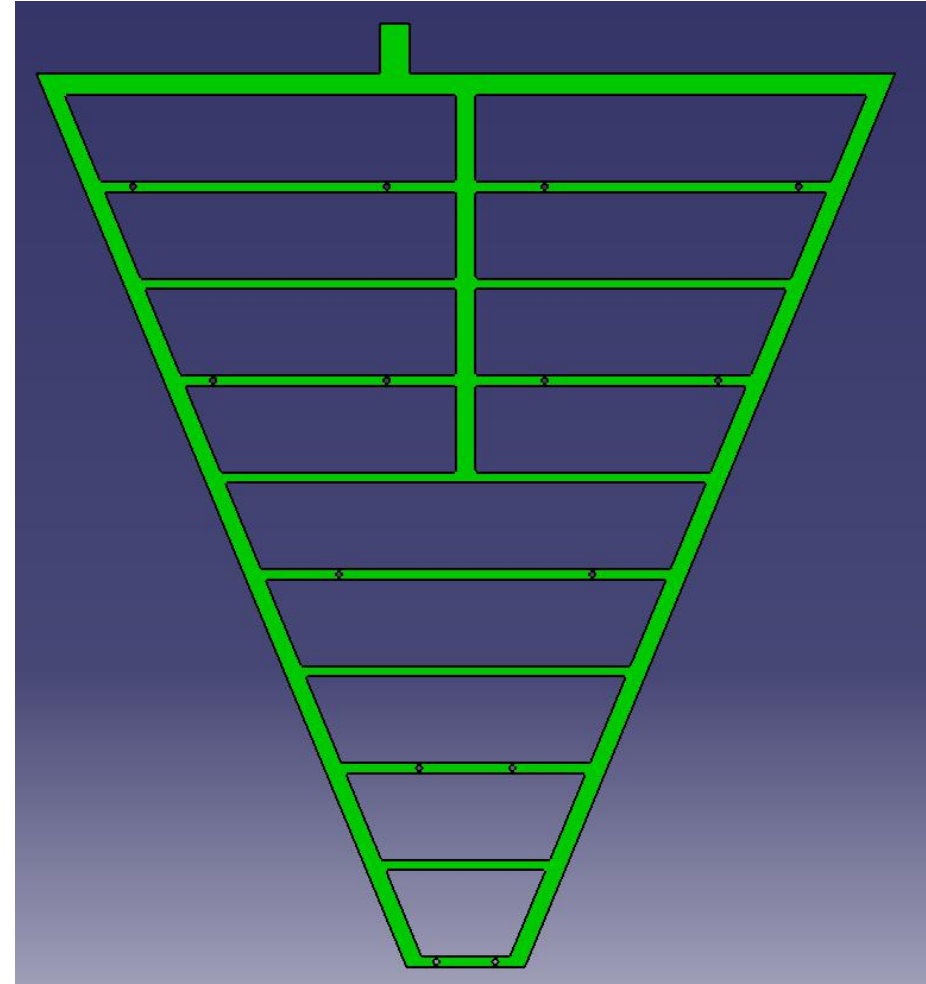
Full-Module: The FR4 spacer

Electrical contact

Upper side

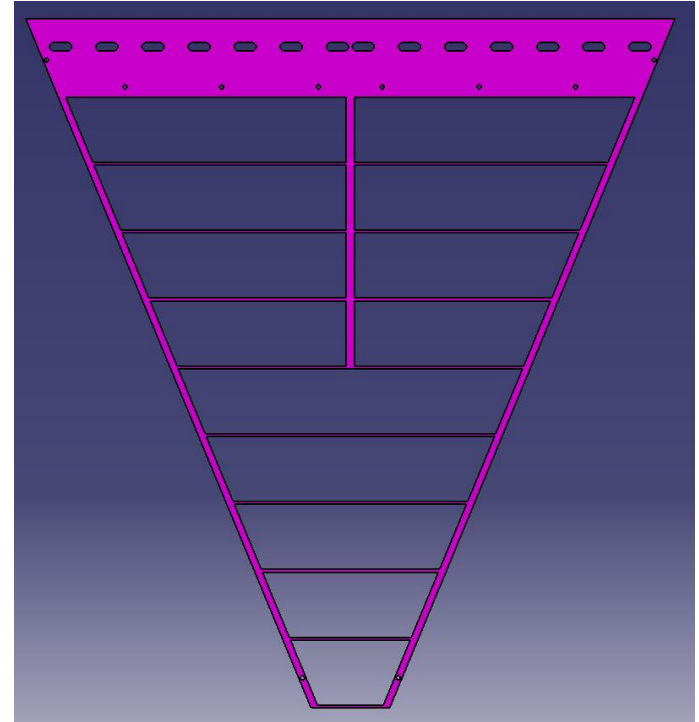
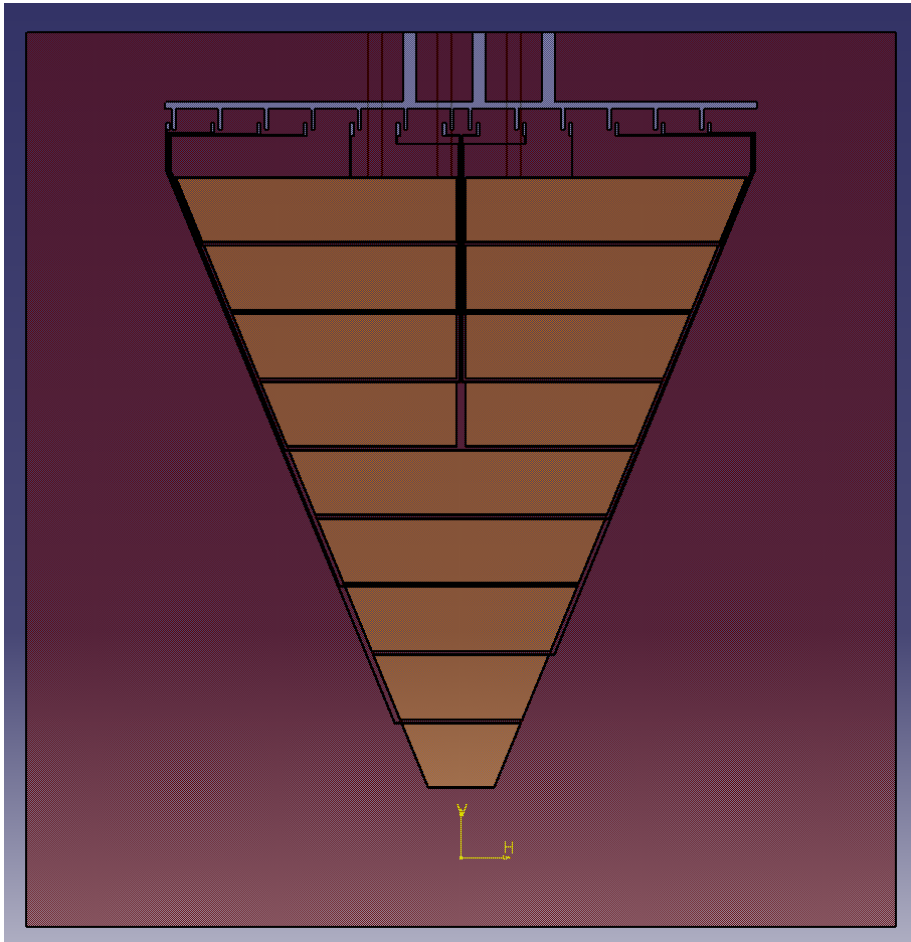


Bottom side



Copper layer only on one face of the spacer. Test of the electrical contact OK.

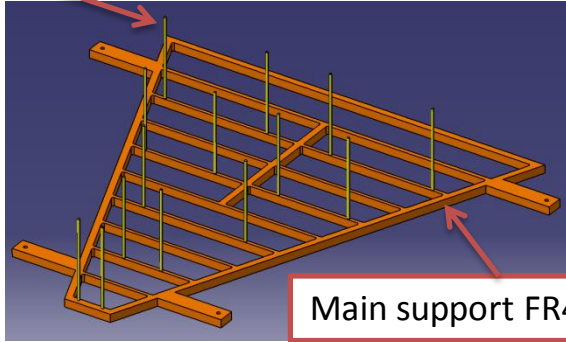
Full Module Detector: GEM foil and frame



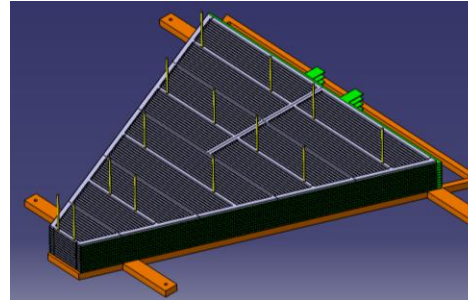
Sectorized GEM already produced.
GEM foil stretched and glued to its frame as usual.

Assembly of the 3D-C

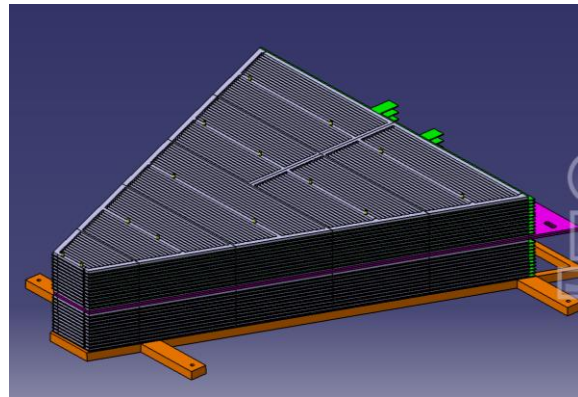
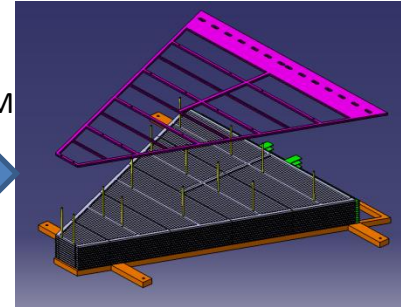
M3 rods



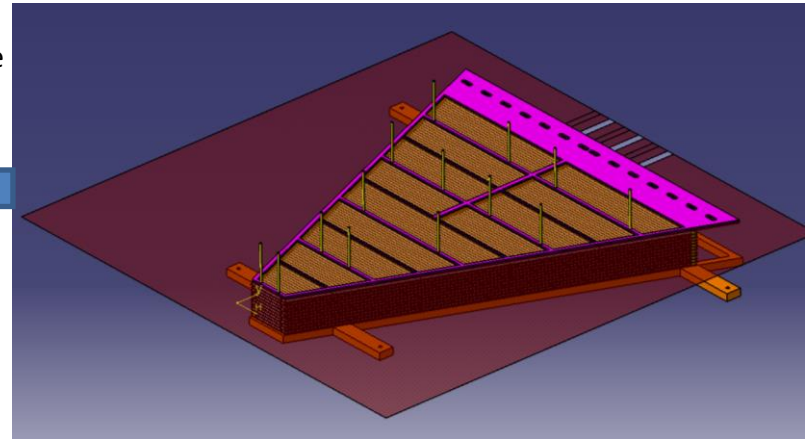
The first 12 grids plane and 12 FR4 frame are sandwiched



Installation of the middle GEM

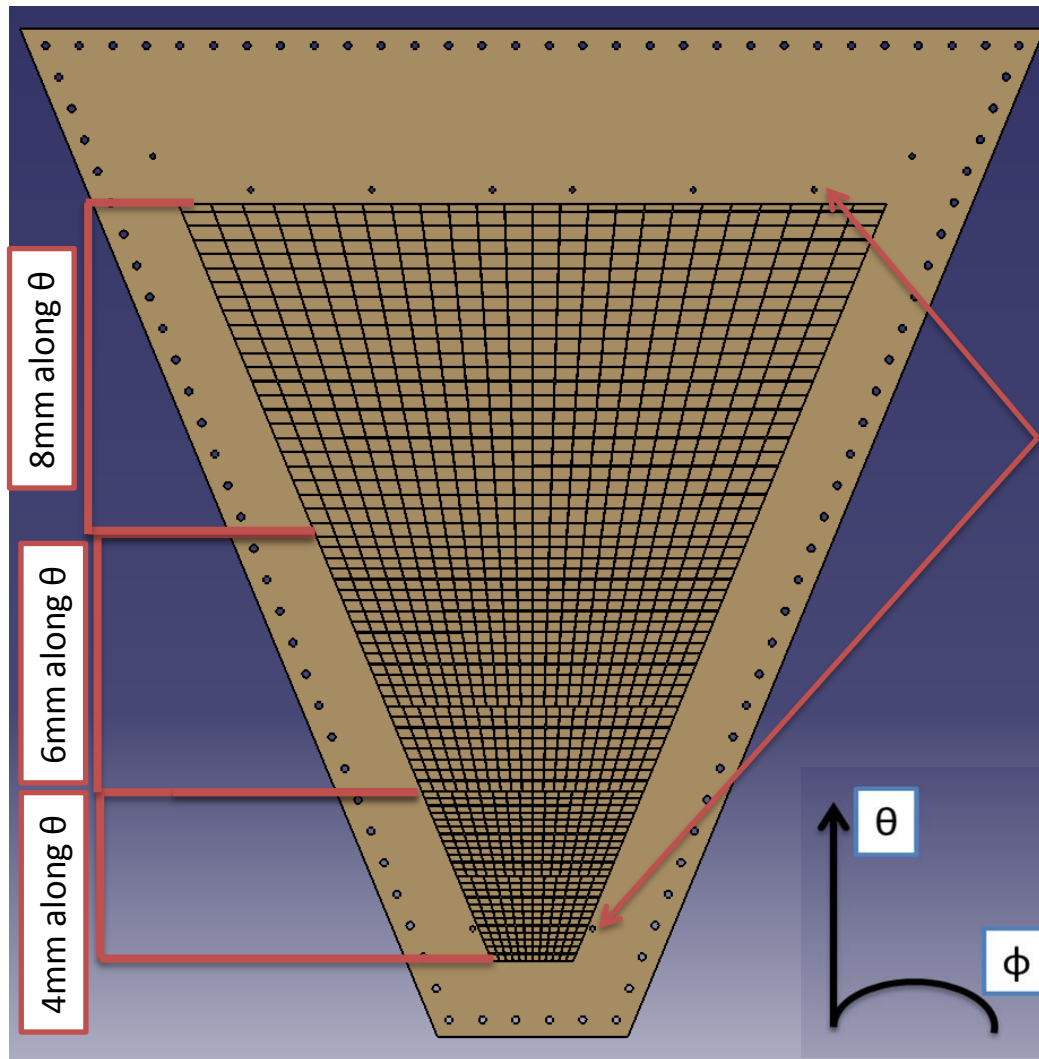


Installation of the upper 11 grids plane and 11 FR4 frames



The 3D-Cathode is ready

Full Module Detector: Padded anode



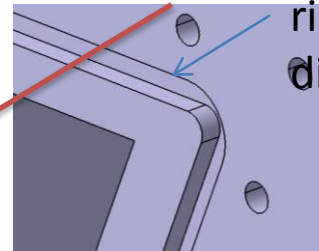
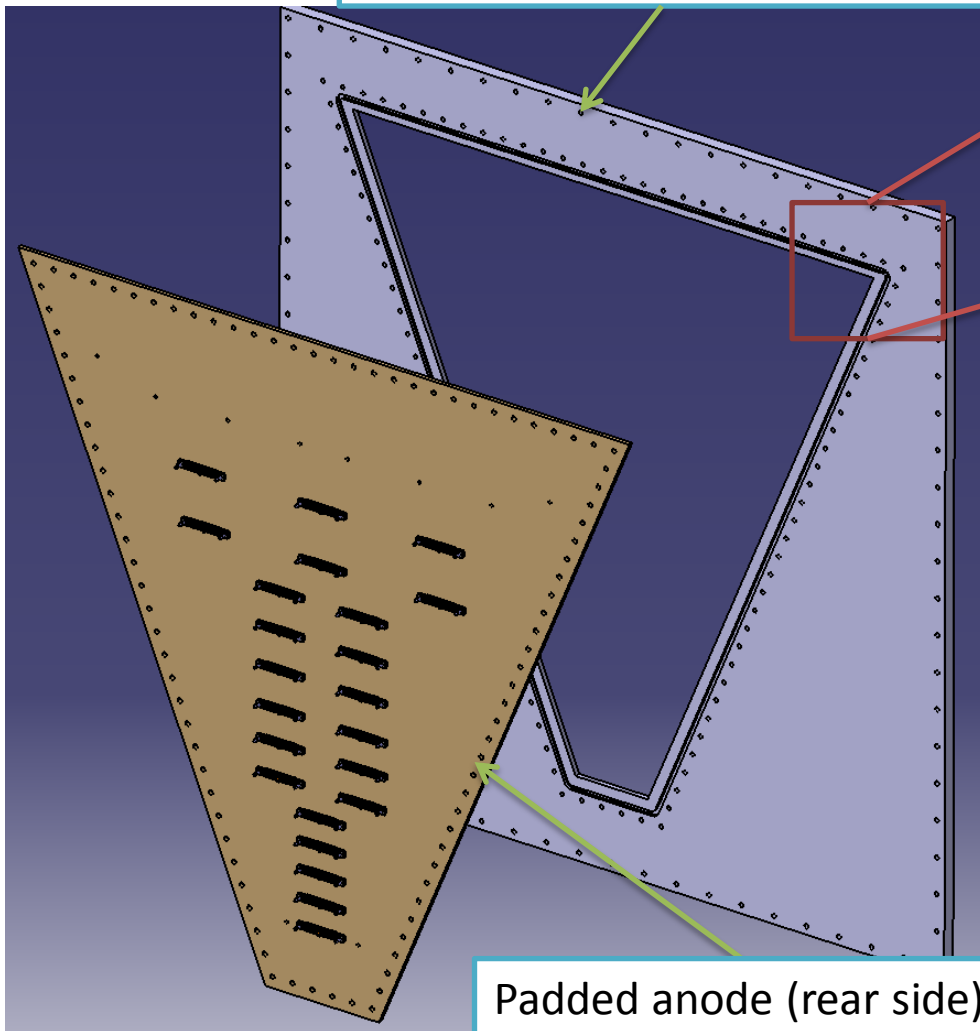
Total n° of channel: 950

Holes for TripleGEM alignment

Full module detector: TripleGEM assembly 1

Detector box lid (external side)

Groove for Viton O-ring (4 mm diameter)



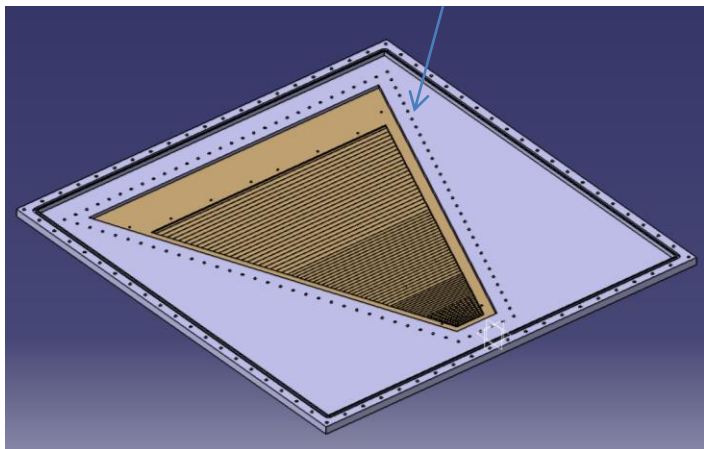
Padded anode fixed to the box lid by using sealbolts.



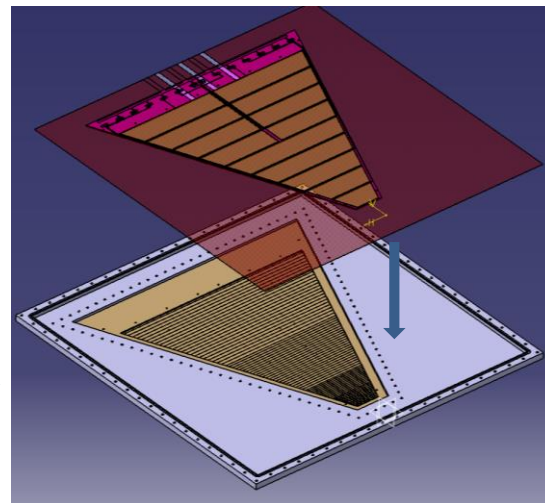
Padded anode (rear side)

Full module detector: TripleGEM assembly 2

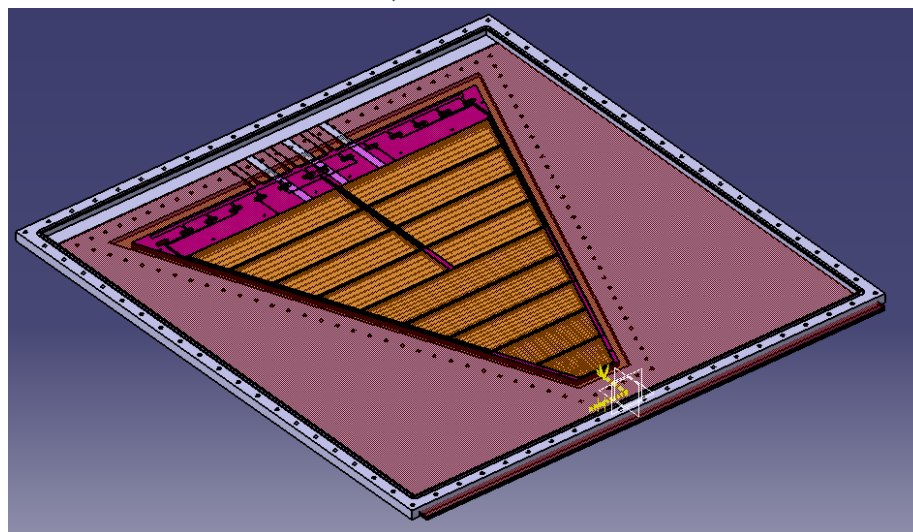
Inner side of the detector lid with the padded anode installed



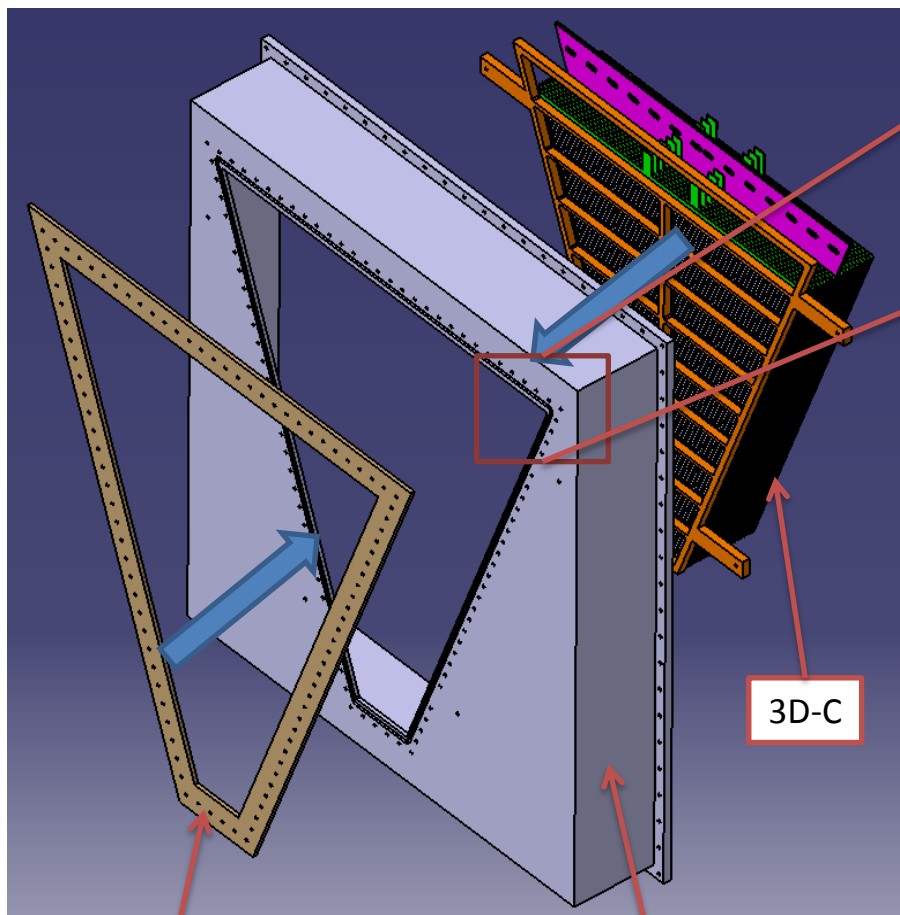
Installation of the 3 GEM foils by using the alignment holes present in the padded anode



The TripleGEM is installed on the detector lid and ready to be coupled to the 3D-C



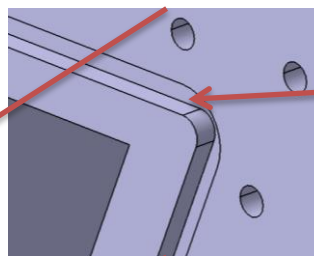
Full module detector: Detector Box



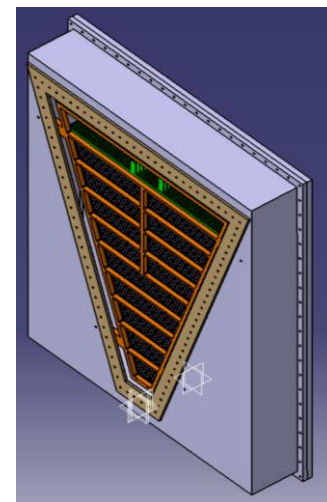
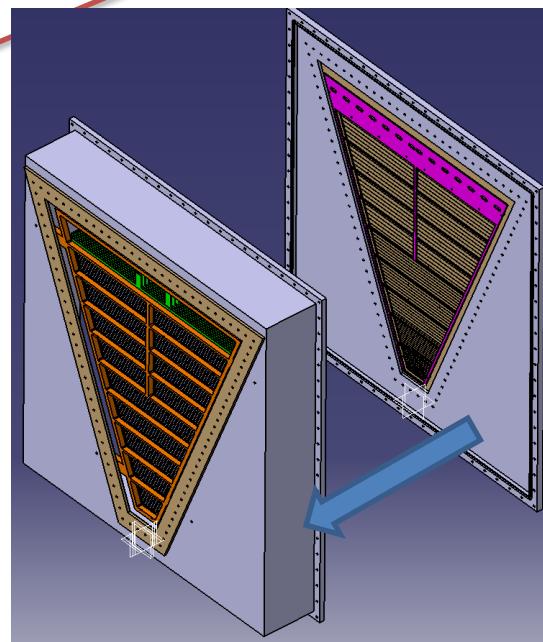
Front window (only the frame is shown)

Detector Box

3D-C



Groove for Viton O-ring (4 mm diameter)

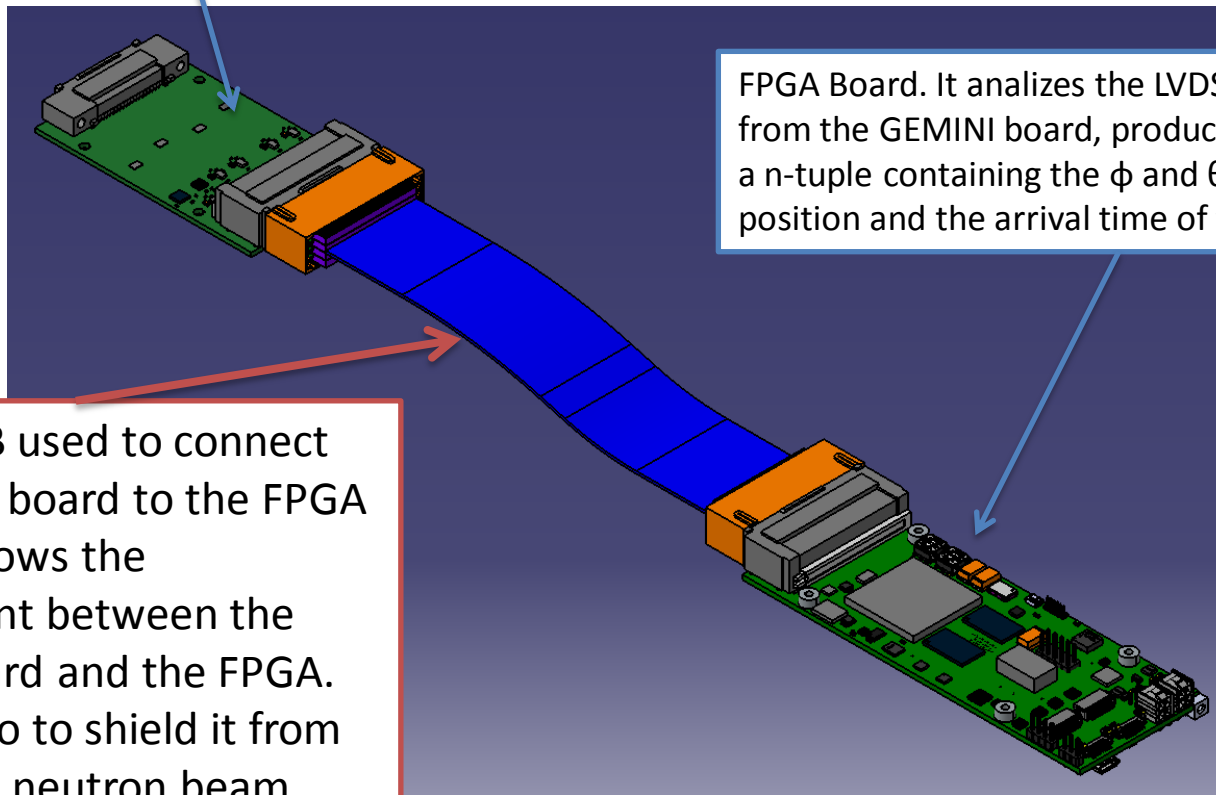


Full Module Detector: Electronics

GEMINI Board. In the GEMINI board 4 GEMINI chips are wire-bonded. They act as front-end electronics to read the signals coming from 64 pads (each GEMINI chip reads 16 pads).

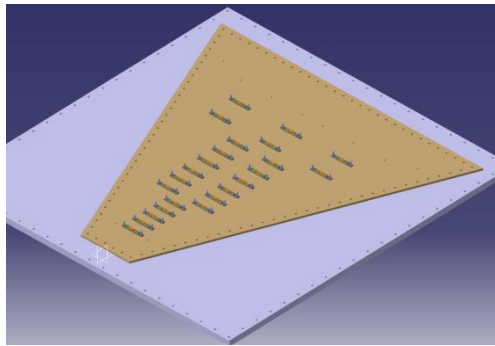
FPGA Board. It analyzes the LVDS signals coming from the GEMINI board, producing for each signal a n-tuple containing the ϕ and θ detection position and the arrival time of the event (tof)

Flexible PCB used to connect the GEMINI board to the FPGA board. It allows the misalignment between the GEMINI board and the FPGA. It allows also to shield it from the residual neutron beam (see next slide).

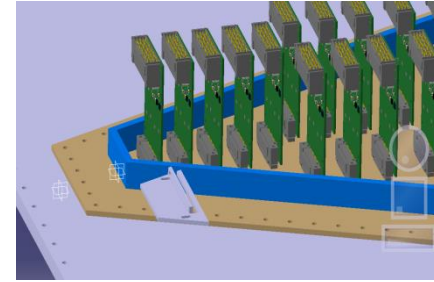
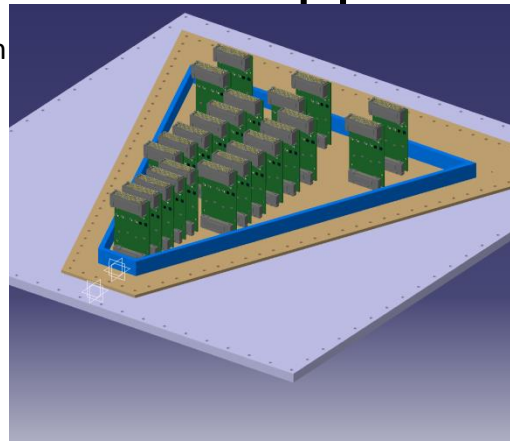


Total number of boards foreseen in the full-module: 23

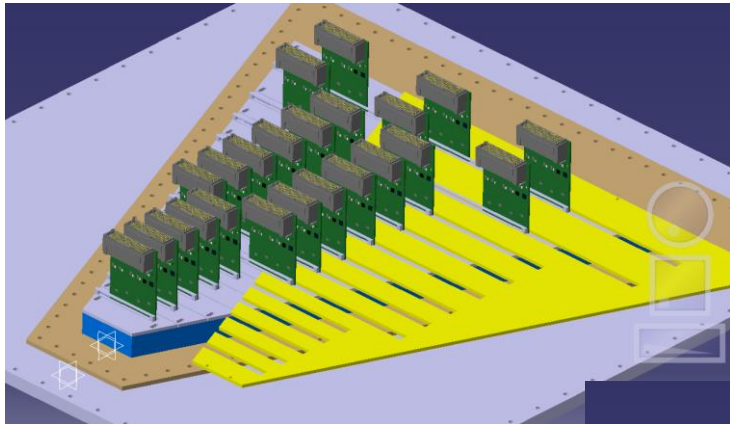
Full Module Detector: Electronics support and shielding



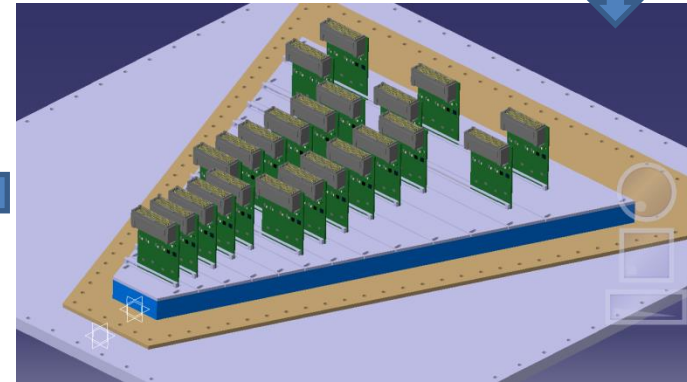
Installation of the main support frame of the electronics and connection of all the GEMINI boards to the anode



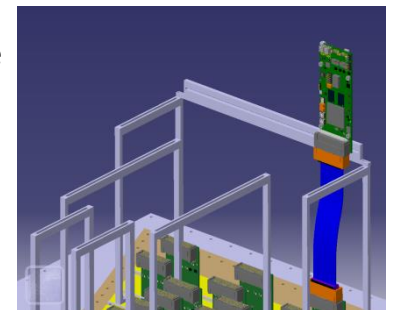
Each row of GEMINI boards is fixed to an aluminum support that is then fixed to the blue frame



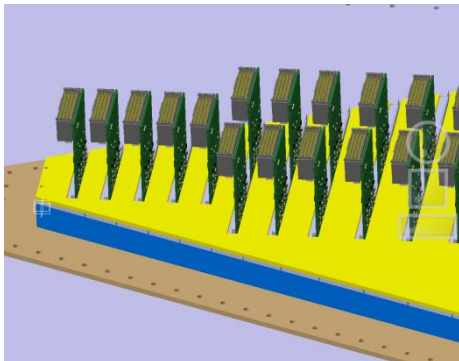
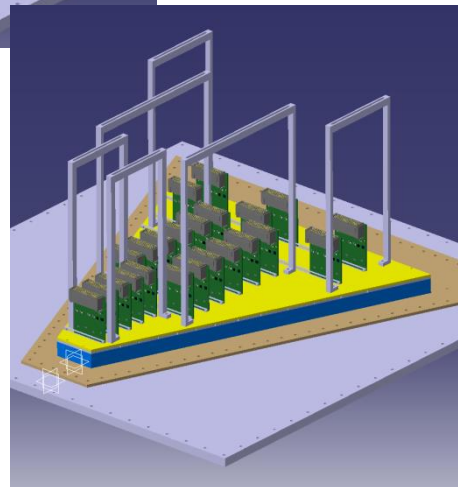
Installation of the neutron shielding (Al plate painted with Gd203 paint)



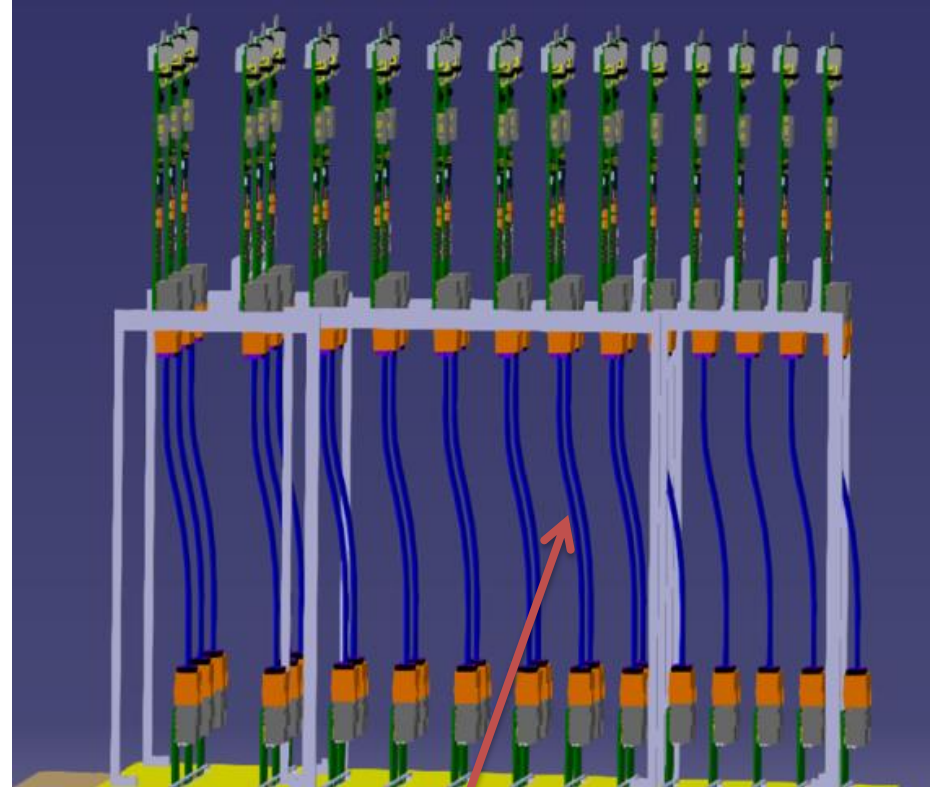
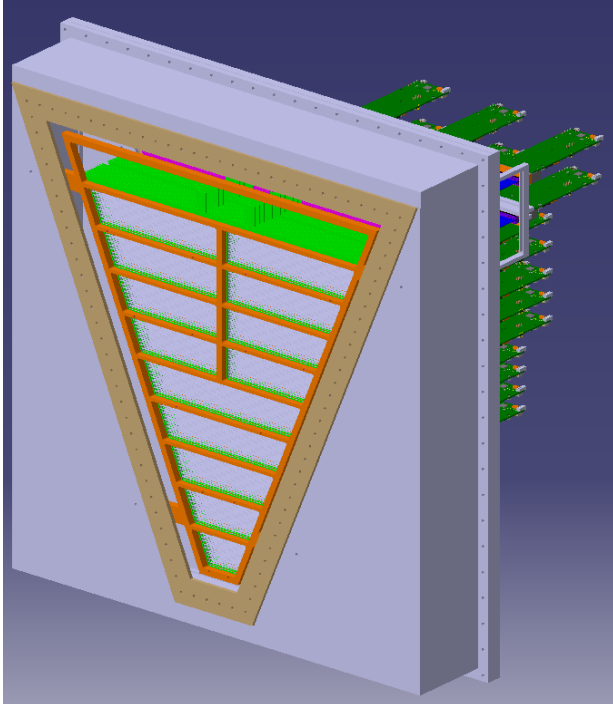
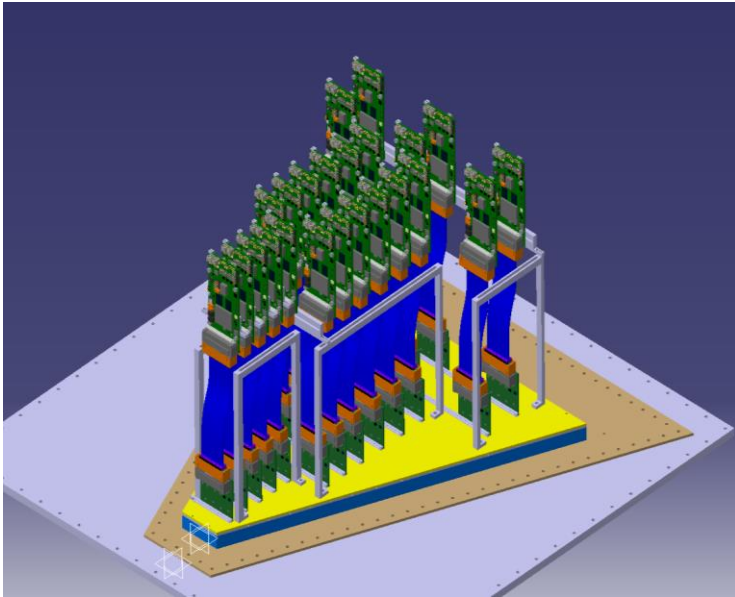
Installation of all the FPGA boards that are fixed to an Aluminum support



Installation of the support frame of the FPGA boards

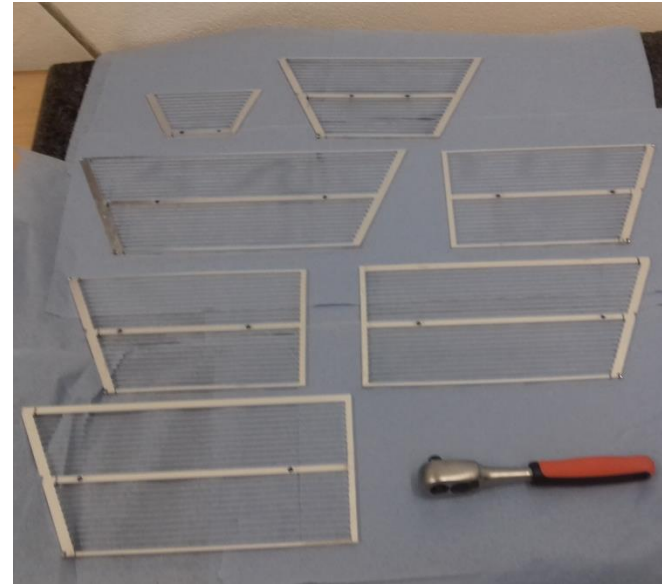


Full Module Detector: Electronics support and shielding



The FPGA boards are misaligned from the GEMINI boards

Full Module MockUp and First Grids

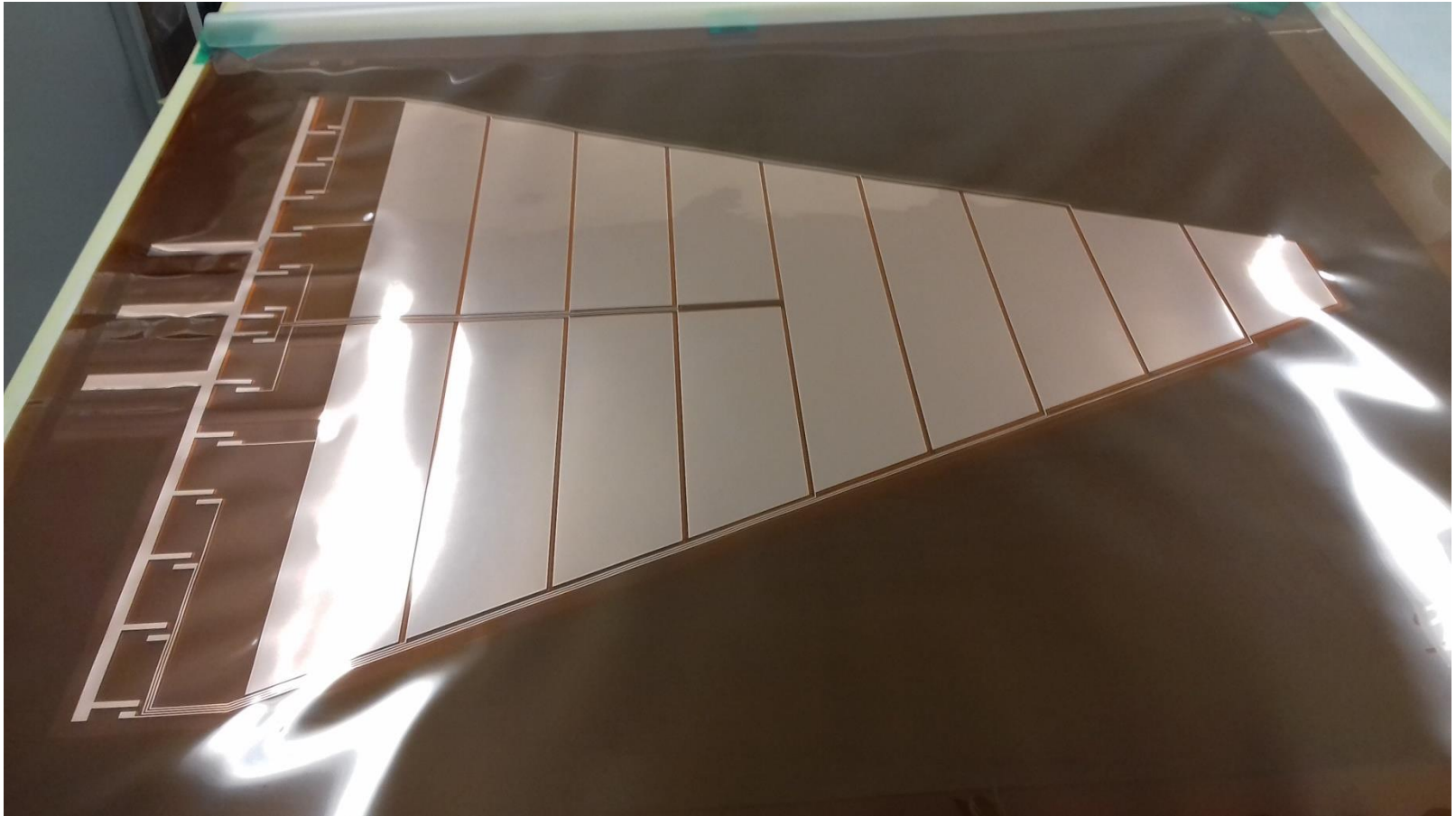


Two planes assembly test after coating (Late Sept 2017)

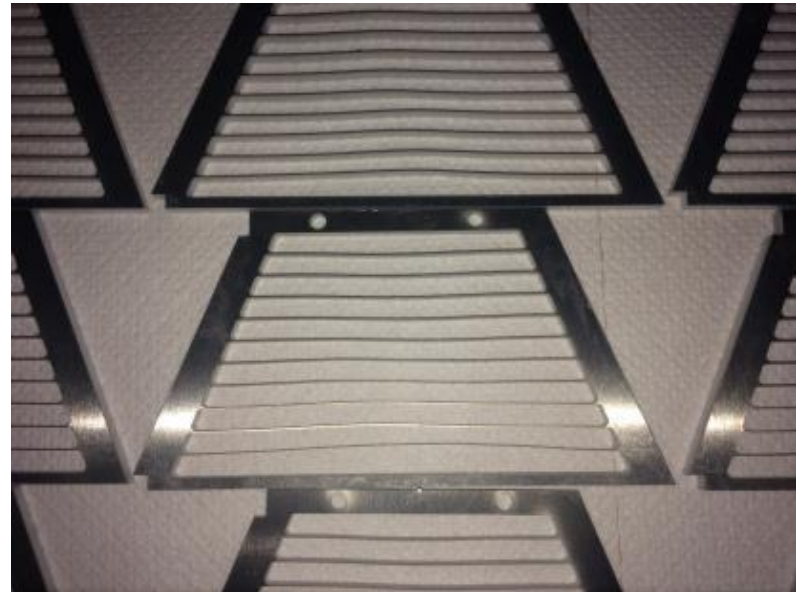
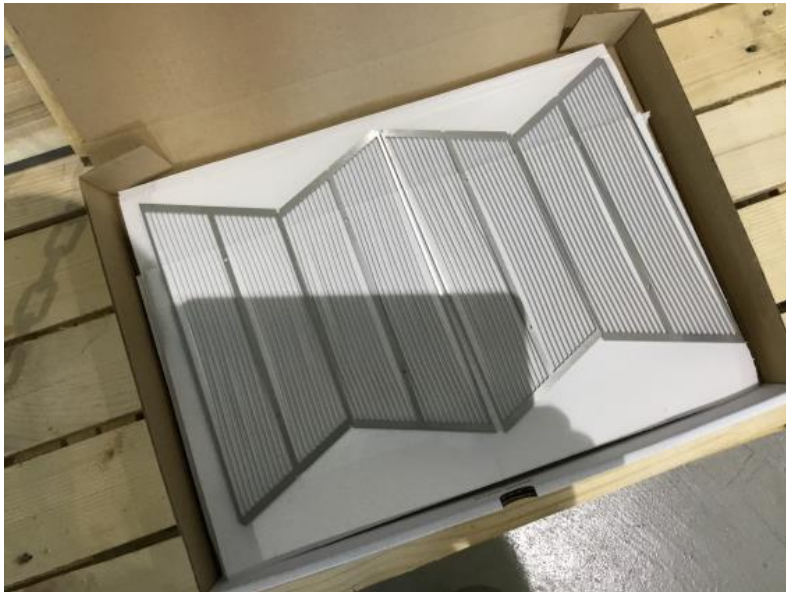
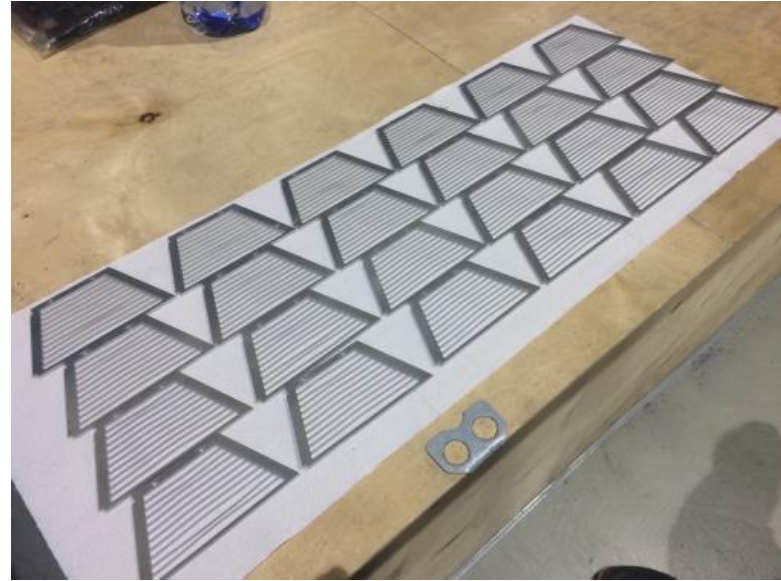
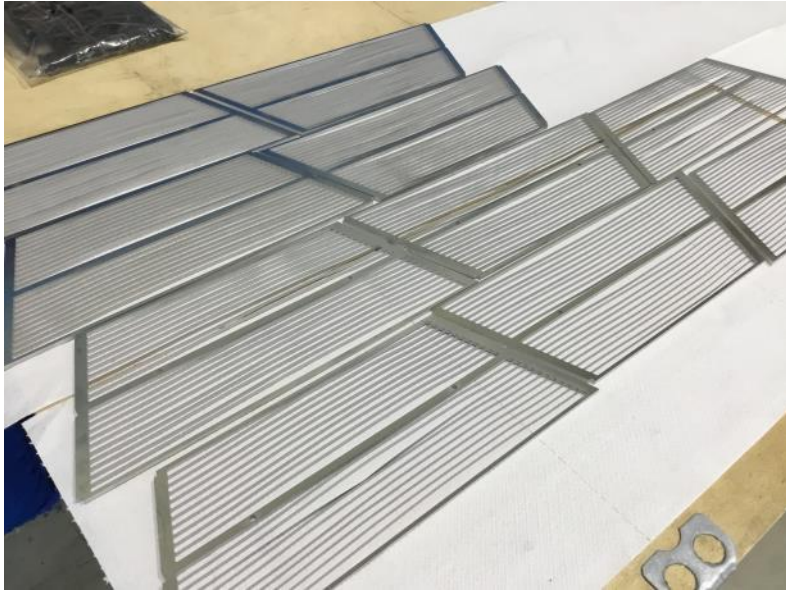


Mechanically and electrically ok!

GEM Foils (arrived 16/10/2017)



Grids in production (not yet stretched)



Electronics in production

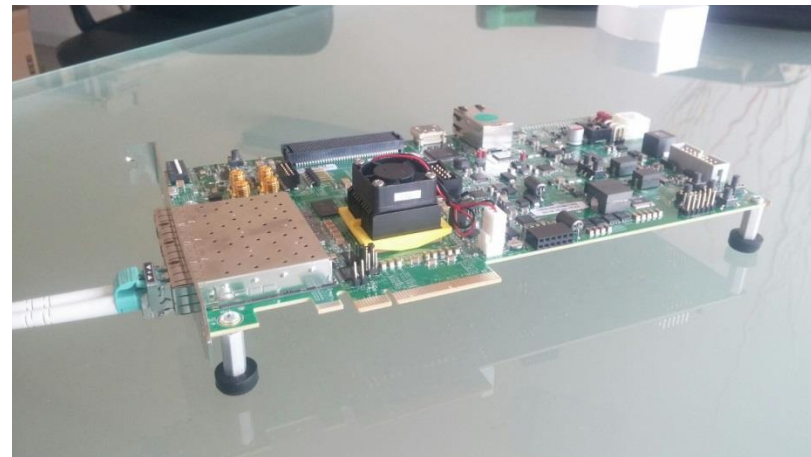
The FPGA board



Bag containing 140 GEMINI chips ready to be mounted



PCI card installed in the PC



END