Integration and material budget studies of the CLIC_ILD inner region

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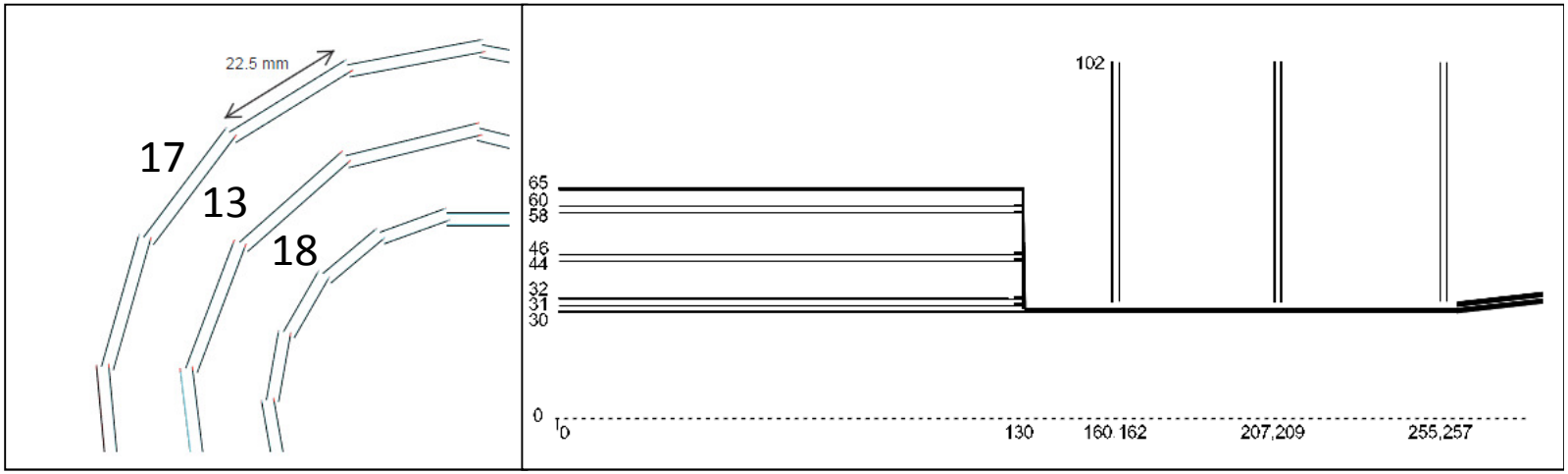
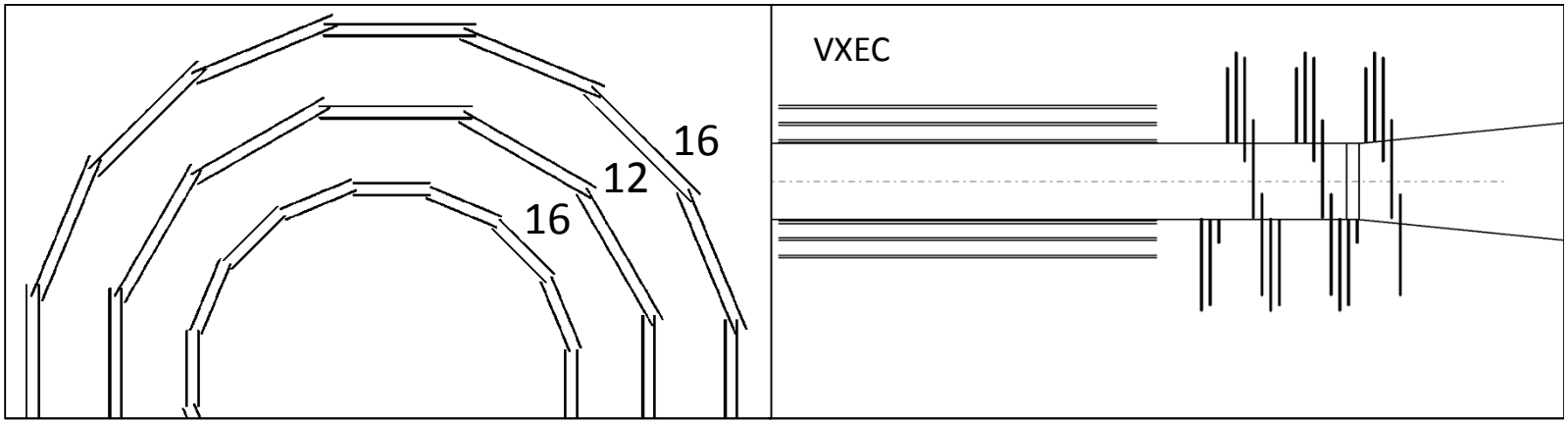
CLIC_ILD Inner Region Layout – Detectors

Physics layout (CDR)



Engineering layout



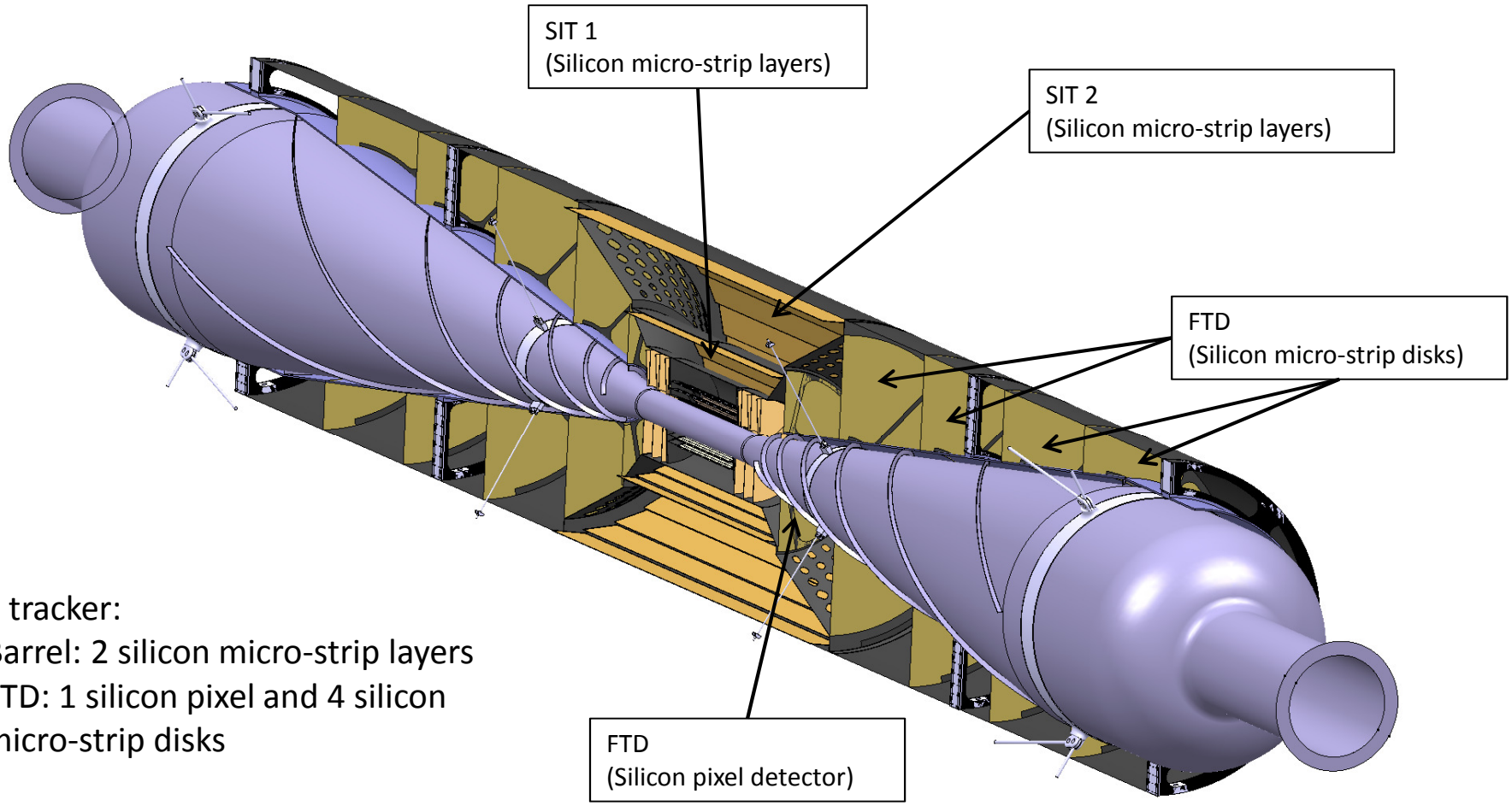
Vertex Barrel Detector:

- 3 double sided silicon pixel layers

Vertex Endcaps:

- 3 double sided silicon pixel “pseudo-disks”
- Helical and parallel distribution

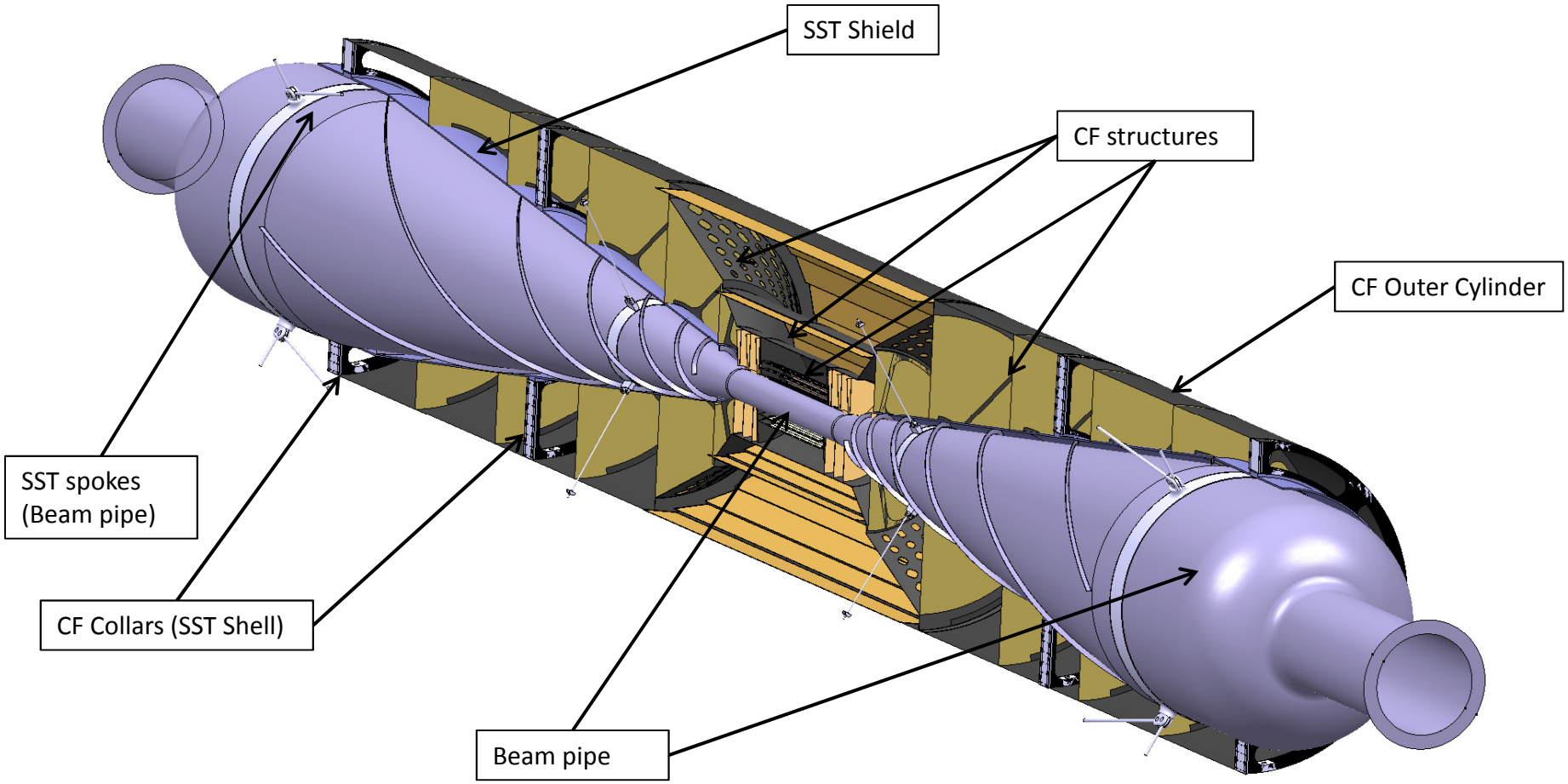
CLIC_ILD Inner Region Layout – Detectors



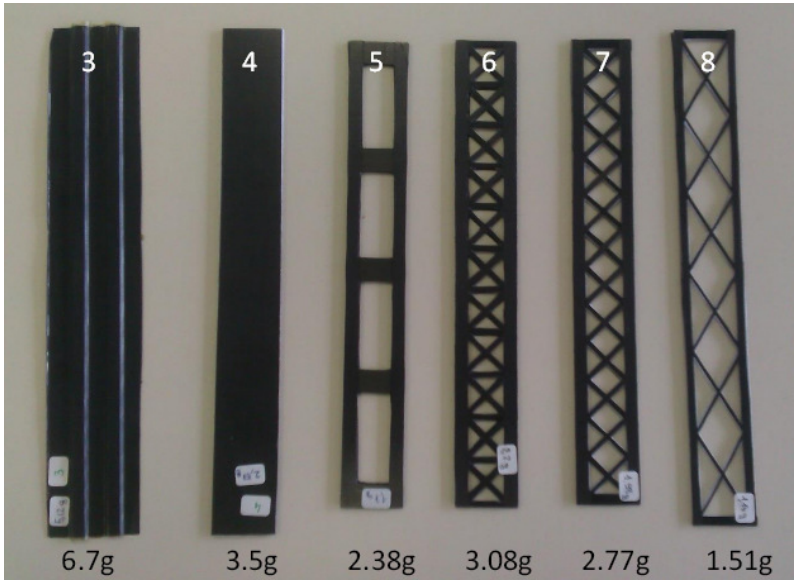
Inner tracker:

- Barrel: 2 silicon micro-strip layers
- FTD: 1 silicon pixel and 4 silicon micro-strip disks

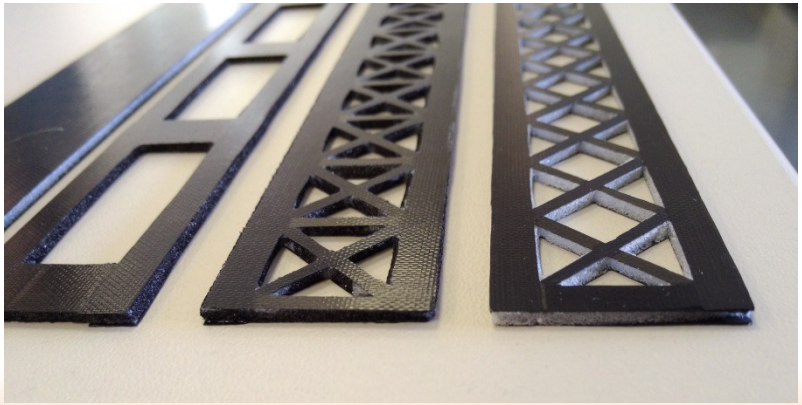
CLIC_ILD Inner Region Layout – Mechanical components

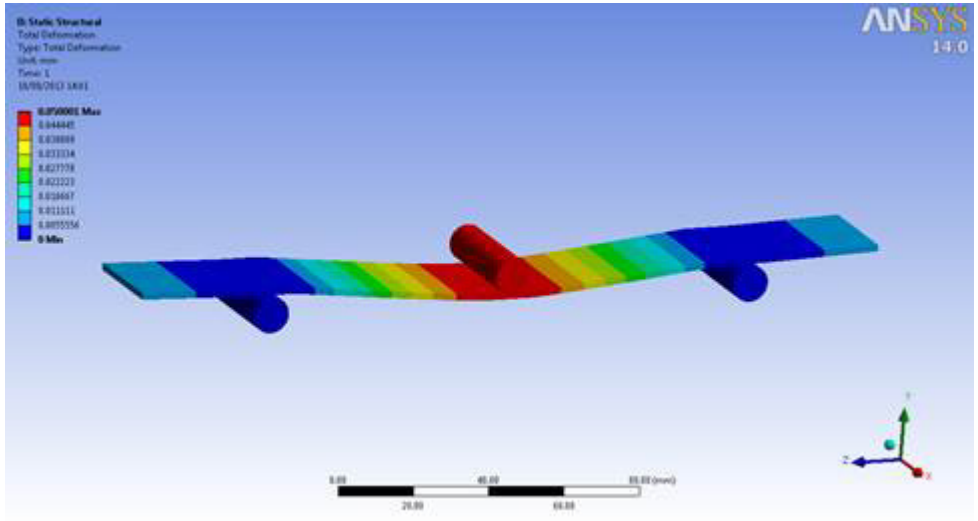


CF Structure – VXBD Staves



X/X0					
0,156 %	0,134 %	0,091 %	0,118 %	0,106 %	0,058 %

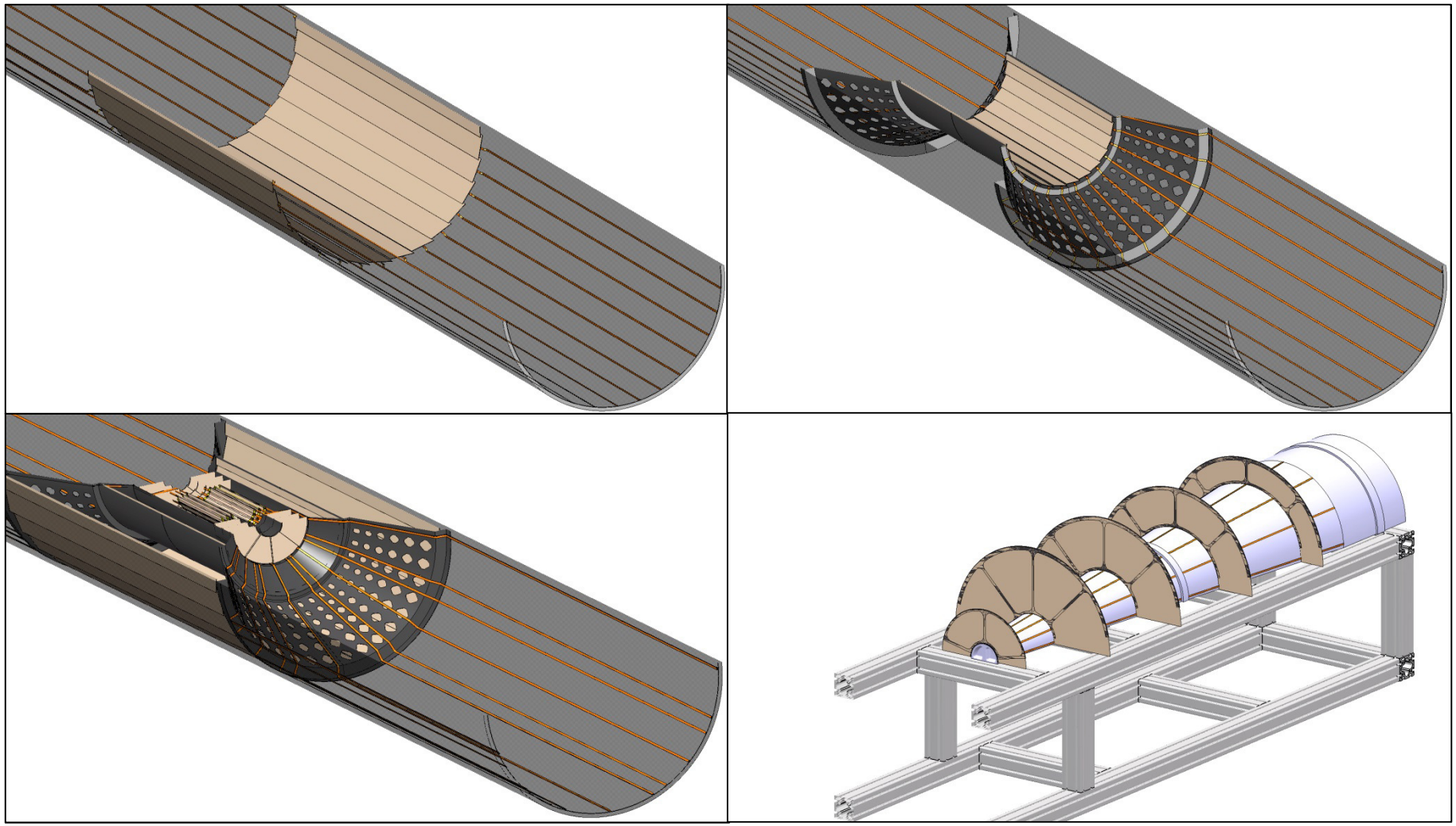




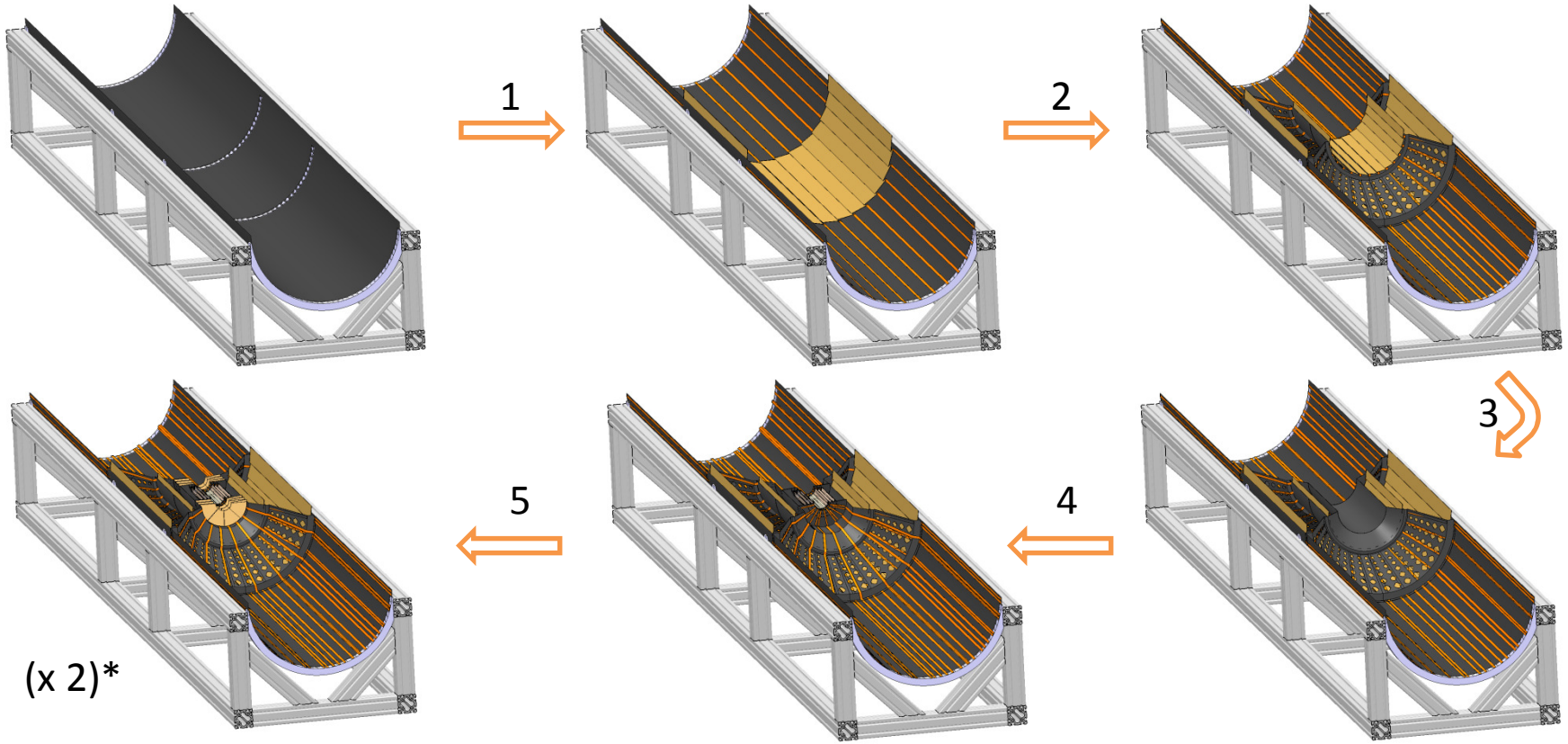
CERN | PH-DT Detector Technologies

- Thanks to François-Xavier Nuiry

Cabling layout



Assembly process



1- Assembly of the SIT 2 and its cables

2- Assembly of the SIT 1 and its cables

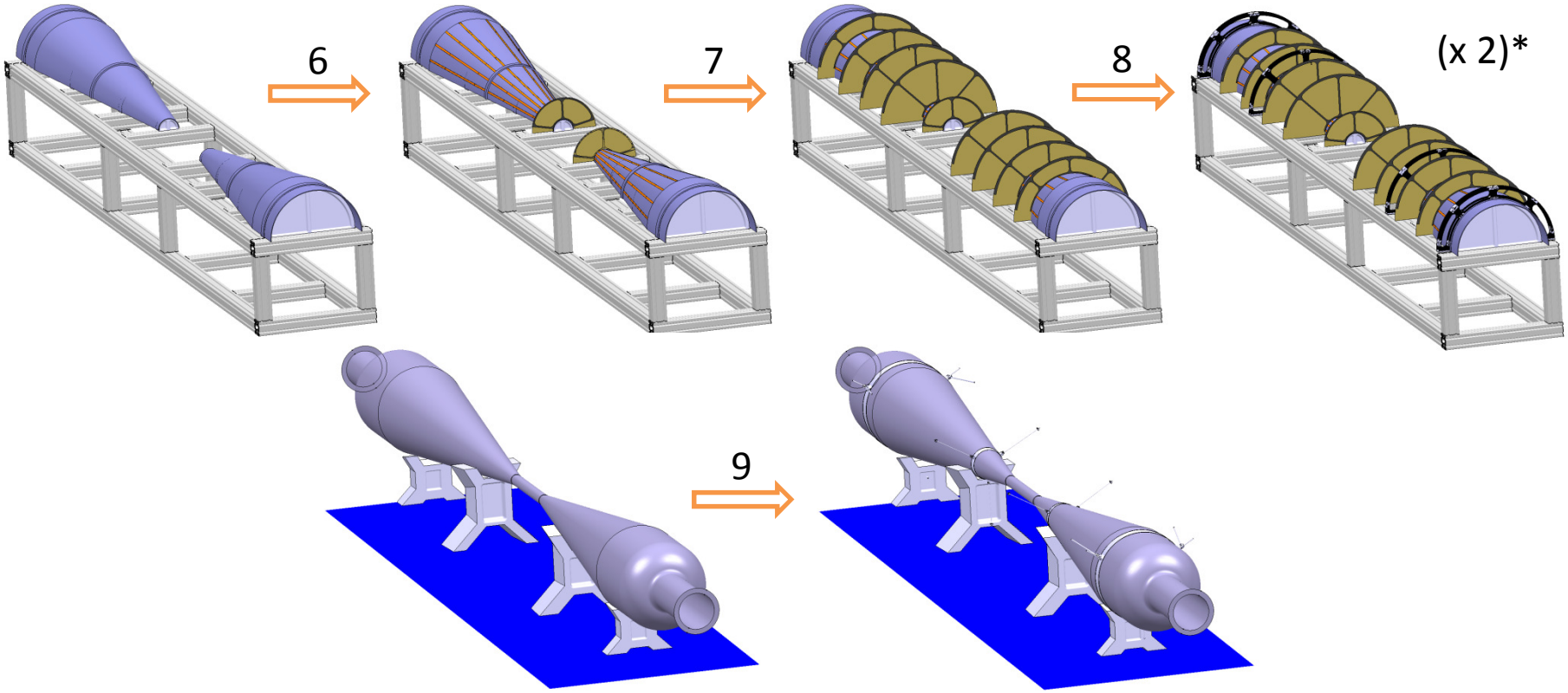
3- Assembly of the CF support

4- Assembly of the VXBD and its cables

5- Assembly of the VXEC and its cables

*the process is done two times (it is needed two half parts)

Assembly process



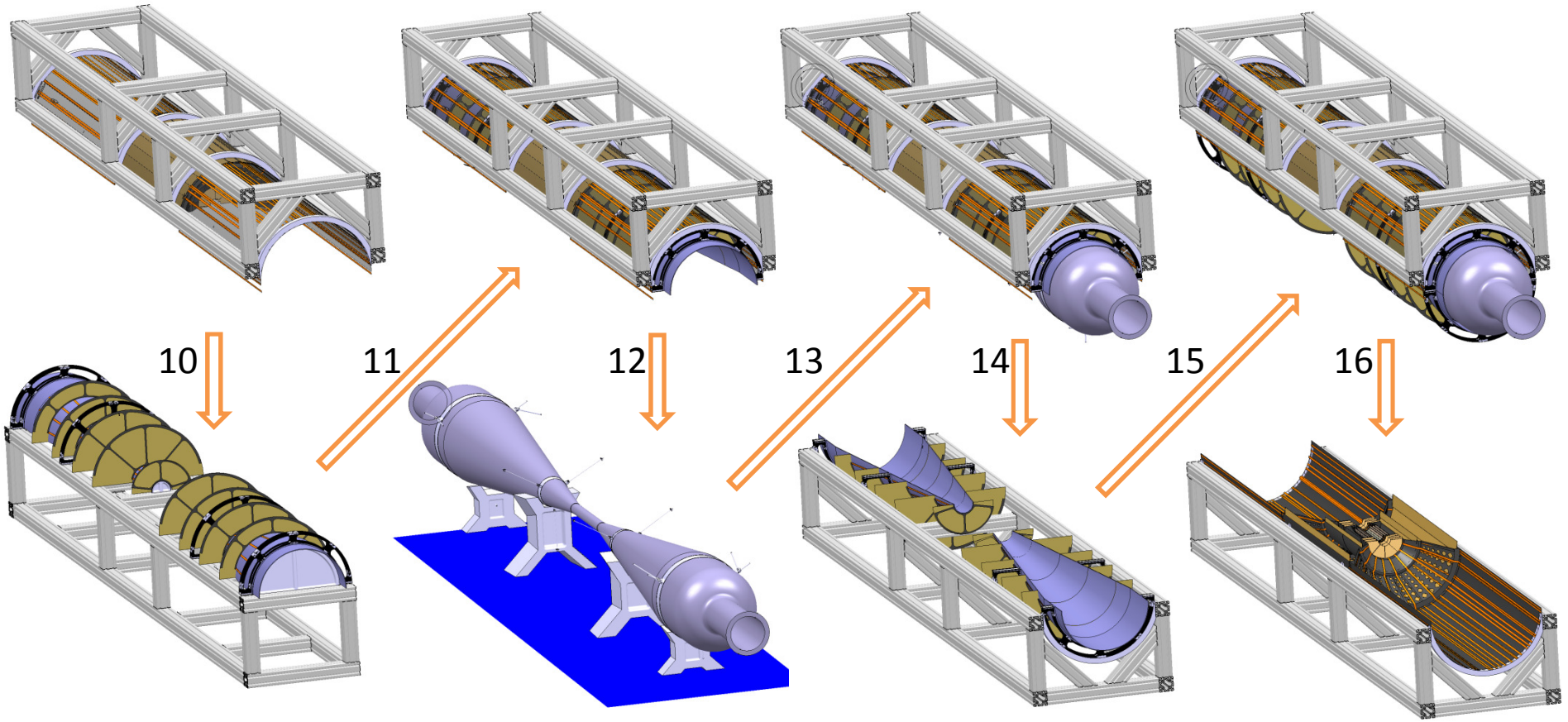
6- Assembly of the FTD 1 and its cables

7- Assembly of the FTD 2-5 and its cables

8- Assembly of the carbon fiber supports

9- Assembly of the collars for the beam pipe

*the process is done two times (it is needed two half parts)



10- Assembly of one half of the carbon fiber cylinder with VXBD, VXEC, SIT 1 and SIT2 to one half of the FTD

11- Elevation of the assembly

12- Assembly to the beam pipe

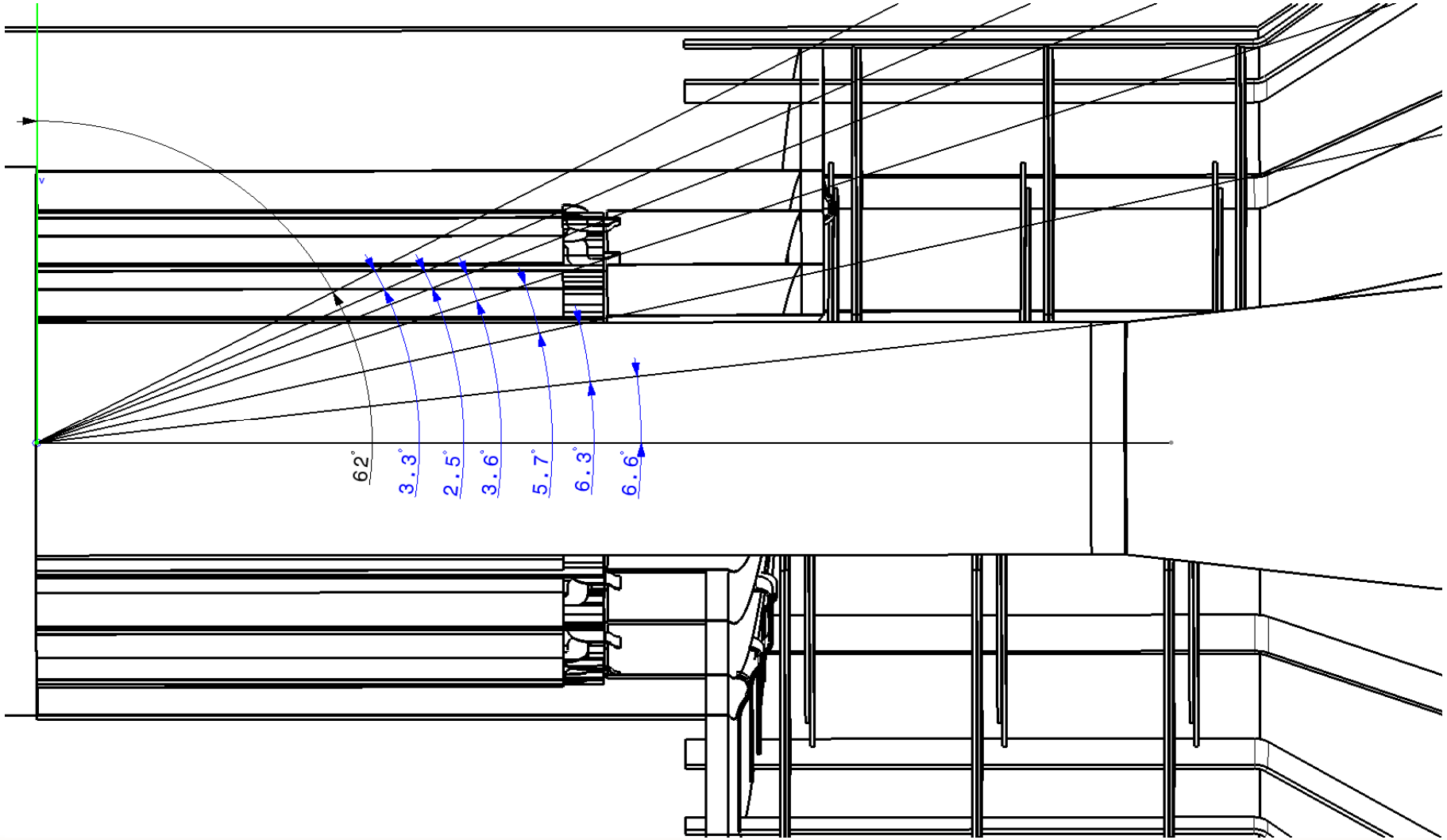
13- Elevation of the assembly

14- Assembly to the other half of the FTD

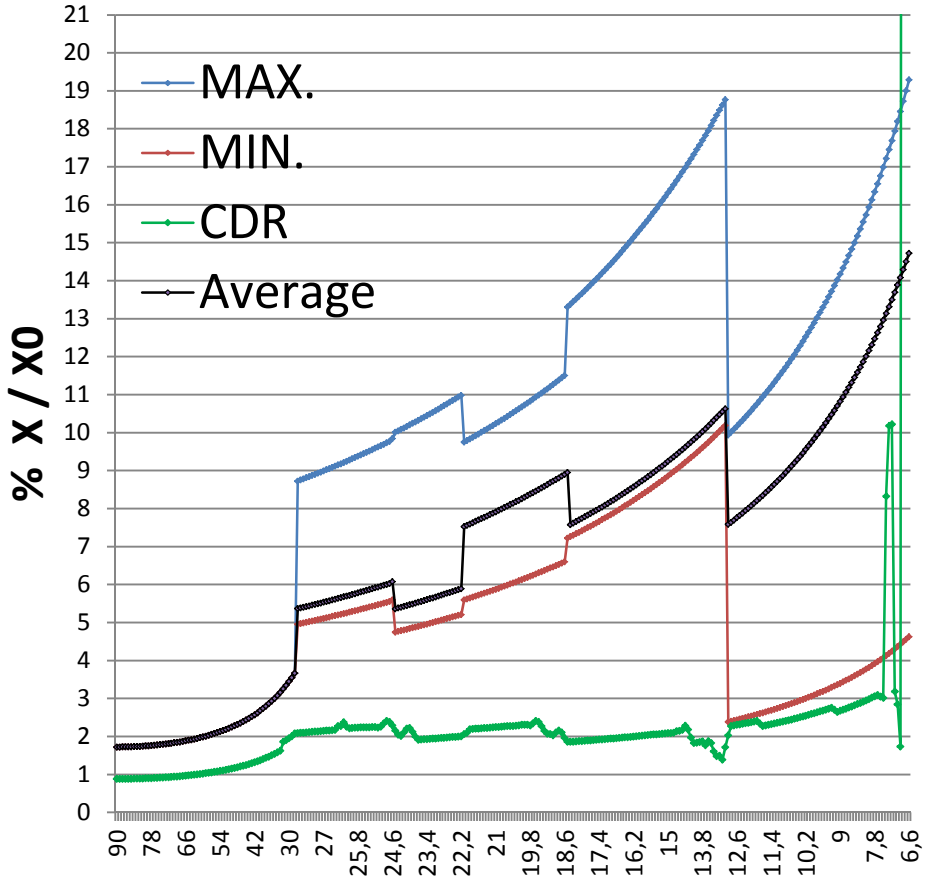
15- Elevation of the assembly

16- Assembly with the other half part of the carbon fiber cylinder with its sensors

Material Budget Calculations



Material Budget Calculations

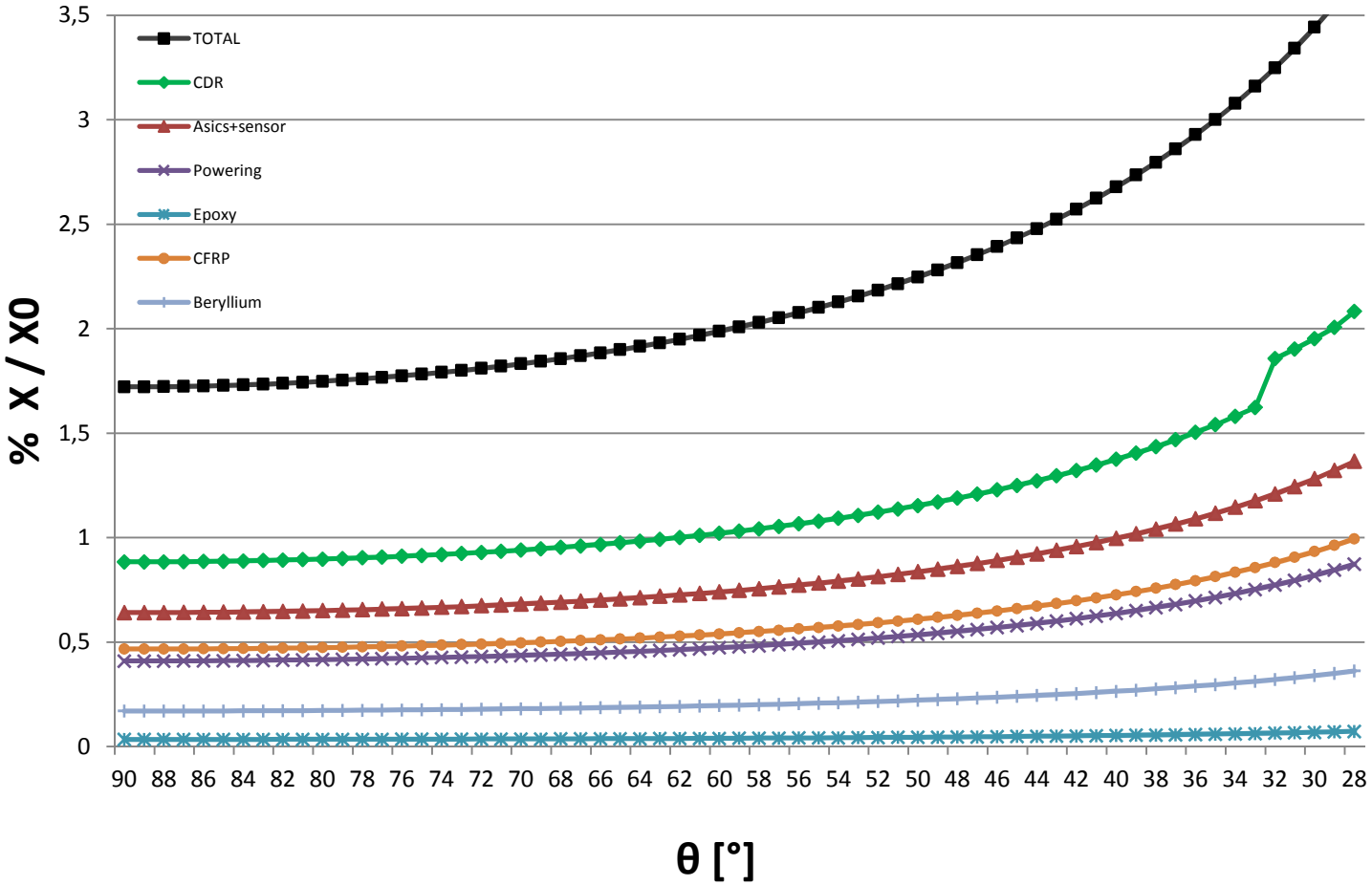


Total material budget per VXBD double layer

Component	CDR	Calculation
θ=90°	X/X0	
Beam pipe (beryllium)	0,17%	0,17%
Double Layers 1-2	0,18%	0,40%
Double Layers 3-4	0,18%	0,40%
Double Layers 5-6	0,18%	0,40%
Support Shell	0,14%	0,35%
Total	**0,85%**	**1,72%**

- Observations:
  - X axis **not** in scale

Material Budget Calculations – 90°



Component	% X/X0 (Component) / % X/X0 (Total)
Asics+sensor	0,372203535
Powering	0,238067452
Epoxy	0,019917796
CFRP	0,271012628
Beryllium	0,098798589

0.CLIC_ILD Layout

1.Cabling
1.1 Layout

2.Assembly process
2.1 Sub-assemblies
2.2 Full assembly

3.Material budget

Summary

- Presentation of the Physics and Engineering layout.
- Staves manufactured prepared for testing and for verification of the simulations and the design.
- Possible layout for all the cables without interference with other parts.
- Feasible assembly process.
- Material budget comparisons between engineering and CDR model.