



The New CLIC Detector Simulation Model

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- Have two options of the detector model: Main difference is the tracker layout
- Different versions for both options when wrong parameters are fixed, or changes requested
- Models currently in work: CLIC_o[23]_v06

- Recently discovered discrepancy in the layer structure of the ECal: Sensor layers too thin due to missing or too thin slices

Incorrect layer structure

Material	Thickness [mm]
Air	0.25
GroundOrHVMix	0.10
Silicon	0.50
Air	0.10
siPCBMix	0.80
Air	0.25
Total	2.00

Updated layer structure

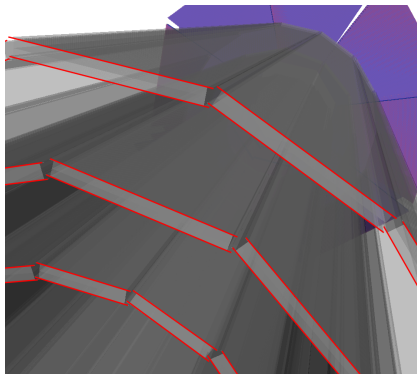
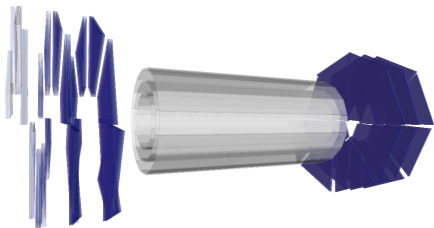
Material	Thickness [mm]
G10	0.15
GroundOrHVMix	0.10
Silicon	0.50
Air	0.10
siPCBMix	1.30
Air	0.25
G10	0.75
Total	3.15

- Approximately 1 mm thicker per layer, previously considered space insufficient
- Need to re-arrange tracker layers and calorimeters

- Do not extend detector in Z because of L^*
- Shorten ECal Endcap Z_{\min} , move tracker disks
- Reduce Z_{\max} of calorimeter barrels?
- Do not decrease radius of tracker disks to avoid re-arranging the sensor modules on the disks, keep ECal inner radius
 - ▶ Increase ECal/HCal Barrel R_{\max}
 - ▶ Can reduce space in solenoid vacuum tank? Keep Yoke as it is

Vertex Detector

- Double layers ($0.2\%X_0$ per detection layer)
- $R_{\text{in}} = 31 \text{ mm}$
- Spiral geometry in endcaps



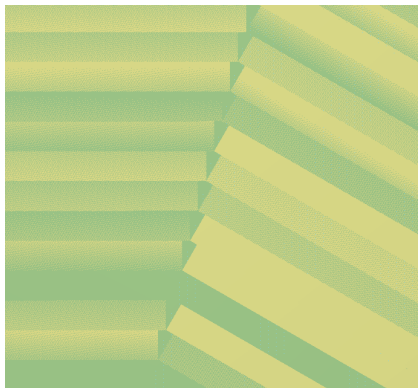
Inner and Outer Tracker



- Still keeping old and new layout of the tracker around
- Updated tracker disk positions (OTD3/4, ITD7) in CLIC_o3_v06



- ECal, HCal, Yoke – barrels and endcaps – are 12 sided polygons
- For Barrels: Trapezoids structure for individual staves, small gaps (see right side)
- For Endcaps: Single n-sided polygon for each layer, no gaps
- Simple layer stacks



- 40 layers
- Absorber thickness 1.9 mm
- Need to update Endcap Z_{\min} , Barrel Z_{\max}

Updated layer structure

Material	Thickness [mm]
G10	0.15
GroundOrHVMix	0.10
Silicon	0.50
Air	0.10
siPCBMix	1.30
Air	0.25
G10	0.75
Total	3.15

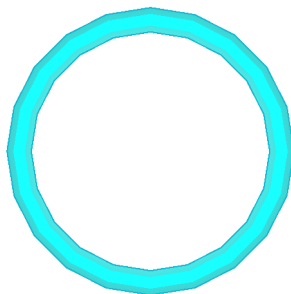
- 60 layers
- Total steel per layer 20 mm

Layer structure

Material	Thickness [mm]
Steel235	0.5
Steel235	19.0
Polystyrene	3.0
Copper	0.1
PCB	0.7
Steel235	0.5
Air	2.7

- Coil is aluminium cylinder
- Vacuum Tank surrounds coil on all sides, 4 cm steel (2 cm on the sides^a)

Parameter	Thickness [mm]
VacTank half length	4129
VacTank inner radius	3483
VacTank outer radius	4235
Coil half length	3900
Coil inner radius	3687
Coil outer radius	4031

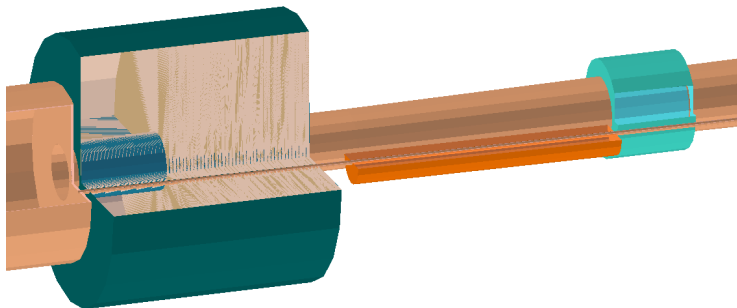


^aNeed to check

- Barrel: 6 layers, 39 cm steel and sensitive layers
- Endcap: 6 layers, 12.5 cm steel and sensitive layers
- Endcap inner shape is a circle

Parameter	Thickness [mm]
Barrel inner radius	4461
Barrel outer radius	7047
Barrel half length	4129
Barrel symmetry	12
EC inner radius	630
EC outer radius	7047
EC min z	4222
EC max z	5222
EC outer symmetry	12
EC inner symmetry	0

Very Forward Region, Beam Pipe



Request to increase incoming beam pipe radius behind ITF BPM

- Found discrepancy between BeamCal position in simulation model and engineering drawing
- Waiting for updated numbers for beam pipe
- Need to shrink beam pipe radius before QD0, but that is not part of the simulation model at the moment

- We need to make sure envelopes and calorimeter sizes from layer number and structure agree
- Need the definitive calorimeter radii and Z -positions?
 - ECal, HCal, Solenoid, Yoke
- Do we have the shapes we want for all the sub detectors?