# The ILD simulation model in lcgeo (DD4hep)

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## 1    Envelopes

The new ILD simulation model has mandatory envelope volumes defined for the
individual subdetectors. This section describes the current parameters for these
envelope volumes and their shapes.

| Envelope parameters for ILD_o1_v05 | | | | | |
|---|---|---|---|---|---|
| detector | inner radius | outer radius | half length min z, max z | additional parameters | |
| VXD | 16.0 | 60.0 | 177.6 | VXD_cone_min_z | 80.0 |
| | | | | VXD_cone_max_z | 150.0 |
| | | | | VXD_inner_radius_1 | 24.1 |
| FTD | 25.1 | 328.9 | 2350.0 | FTD_outer_radius_1 | 152.8 |
| | | | | FTD_outer_radius_2 | 299.7 |
| | | | | FTD_min_z_0 | 177.7 |
| | | | | FTD_min_z_1 | 368.2 |
| | | | | FTD_min_z_2 | 644.2 |
| | | | | FTD_cone_min_z | 230.0 |
| | | | | FTD_cone_radius | 184.1 |
| SIT | 152.9 | 324.6 | 644.1 | SIT_outer_radius_1 | 299.8 |
| | | | | SIT_half_length_1 | 368.1 |
| TPC | 329.0 | 1808.0 | 2350.0 | | |
| SET | 1808.1 | 1827.9 | 2350.0 | | |
| Ecal | 1843.0 | 2028.0 | 2350.0 | Ecal_Hcal_symmetry | 8.0 |
| | | | | Ecal_symmetry | 8.0 |
| EcalEndcap | 400.0 | 2088.8 | 2450.0, 2635.0 | | |
| EcalEndcapRing | 250.0 | 390.0 | 2450.0, 2635.0 | | |
| Hcal | 2058.0 | 3395.5 | 2350.0 | Hcal_inner_symmetry | 8.0 |
| HcalEndcap | 350.0 | 3395.5 | 2650.0, 3937.0 | EcalEndcap_symmetry | 8.0 |
| HcalEndcapRing | 2138.8 | 3137.0 | 2450.0, 2635.0 | HcalEndcapRing_symmetry | 8.0 |
| Coil | 3425.0 | 4175.0 | 3872.0 | | |
| Yoke | 4424.0 | 7725.0 | 4047.0 | Yoke_symmetry | 12.0 |
| YokeEndcap | 300.0 | 7725.0 | 4072.0, 7373.0 | YokeEndcap_symmetry | 12.0 |
| YokeEndcapPlug | 300.0 | 3395.5 | 3981.5, 4072.0 | YokeEndcapPlug_symmetry | 12.0 |
| BeamCal | 20.0 | 150.0 | 3475.0, 3695.0 | BeamCal_thickness | 220.0 |
| | | | | BeamCal_tubeIncoming_radius | 15.0 |
| LHCal | 100.0 | 325.0 | 2680.0, 3200.0 | LHCal_thickness | 520.0 |
| LumiCal | 80.0 | 195.2 | 2500.0, 2630.7 | LumiCal_thickness | 130.7 |

Table 1: Parameters of the envelope volumes in the simulation model. *Note: inner and outer radii describe the inscribing cylinder for regular polyhedral barrel detectors. See Fig.2 for the symmetries of the barrel envelopes.*
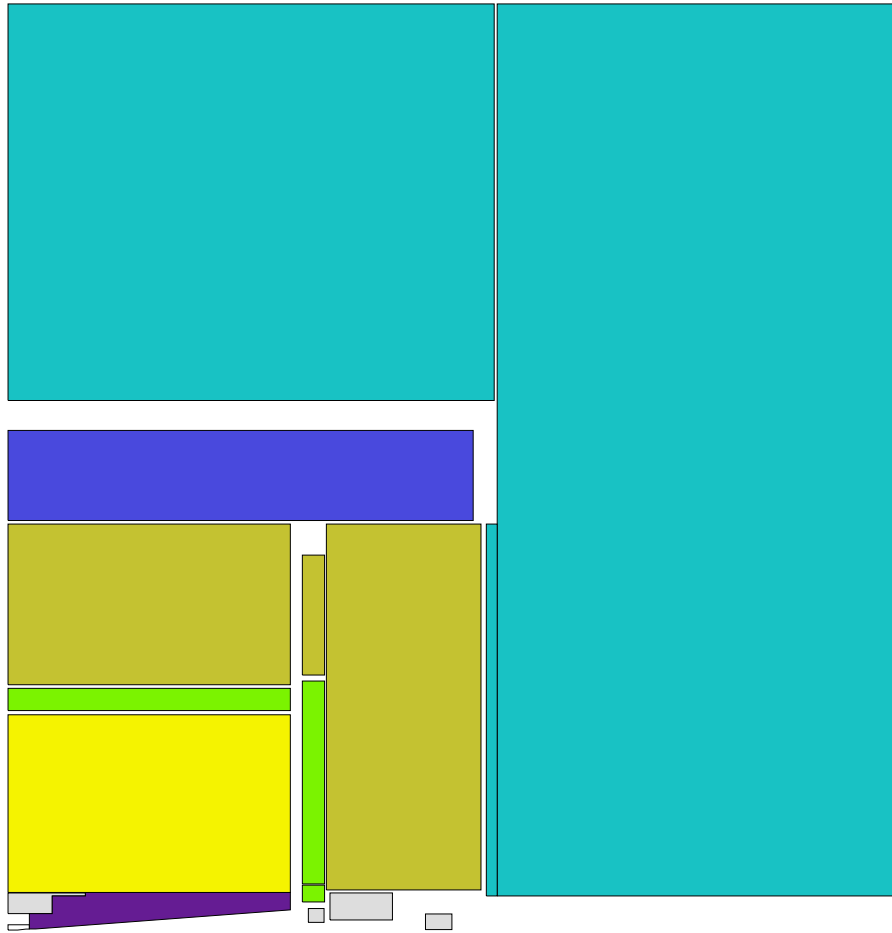
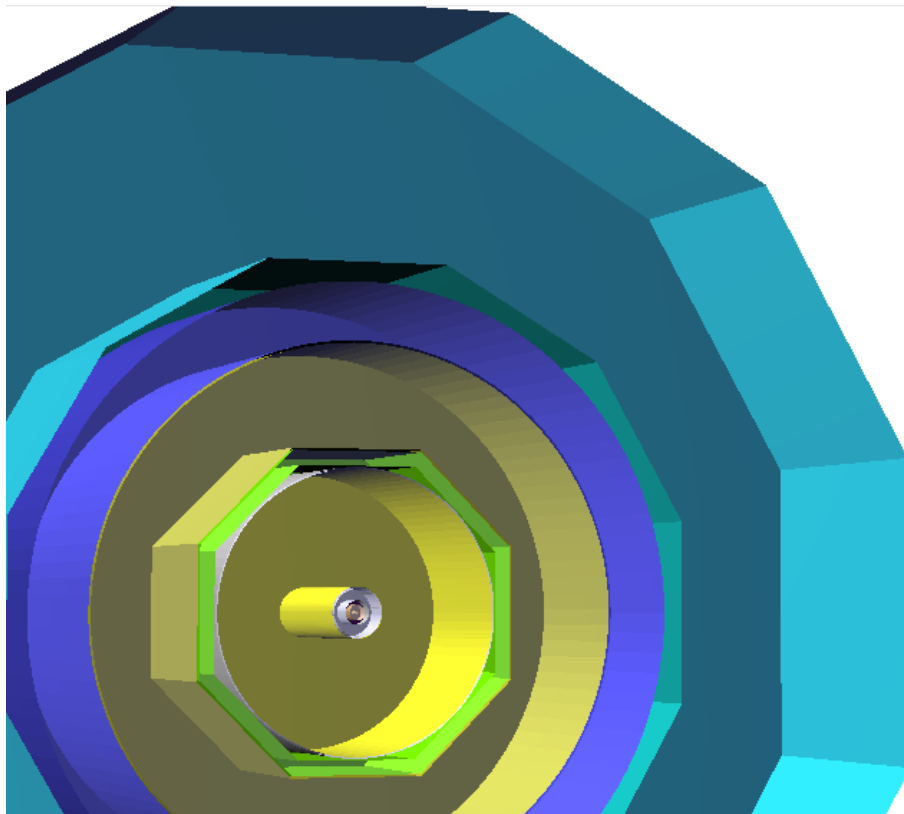Figure 1: Envelope volumes for ILD detectors in simulation model

Figure 2: Barrel envelope volumes for ILD detectors in simulation model as seen from the front
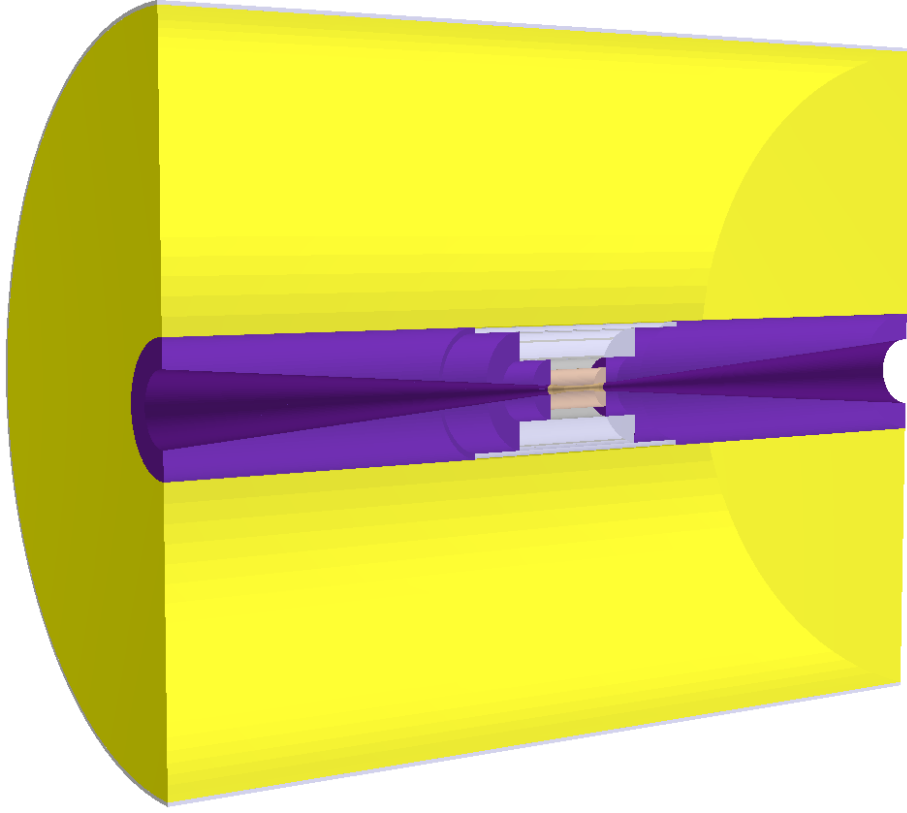
Figure 3: Envelopes for the tracking detectors in ILD: VXD, SIT, FTD, TPC, SET.
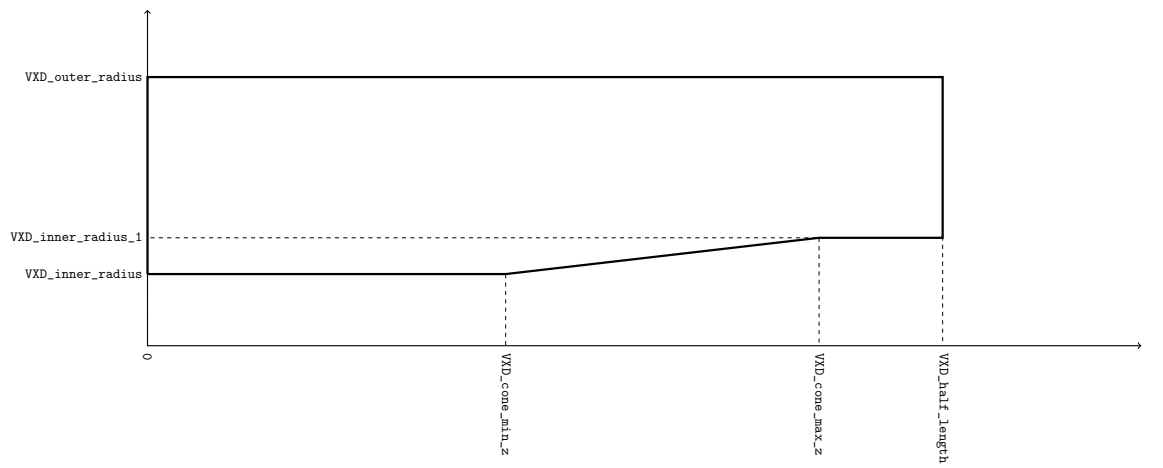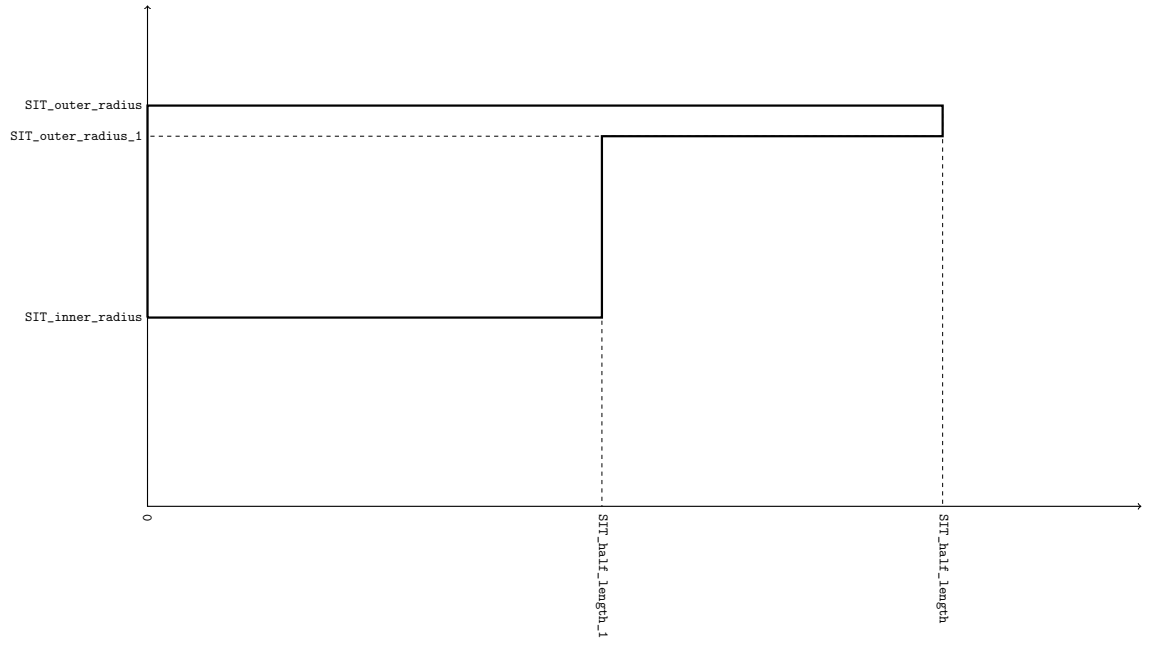


Figure 4: side view of the VXD envelope

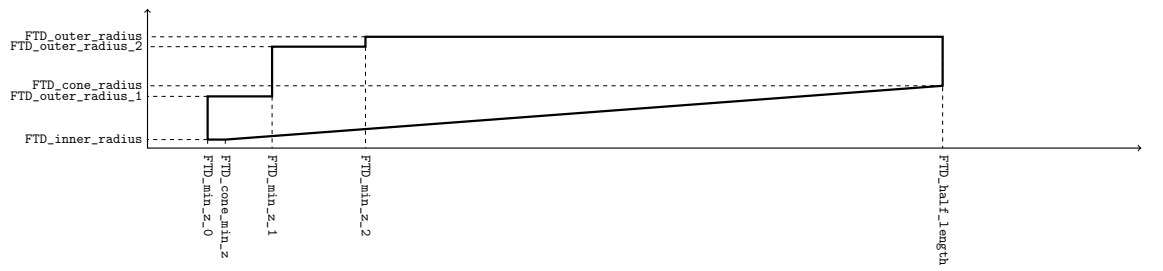Figure 5: side view of the SIT envelope

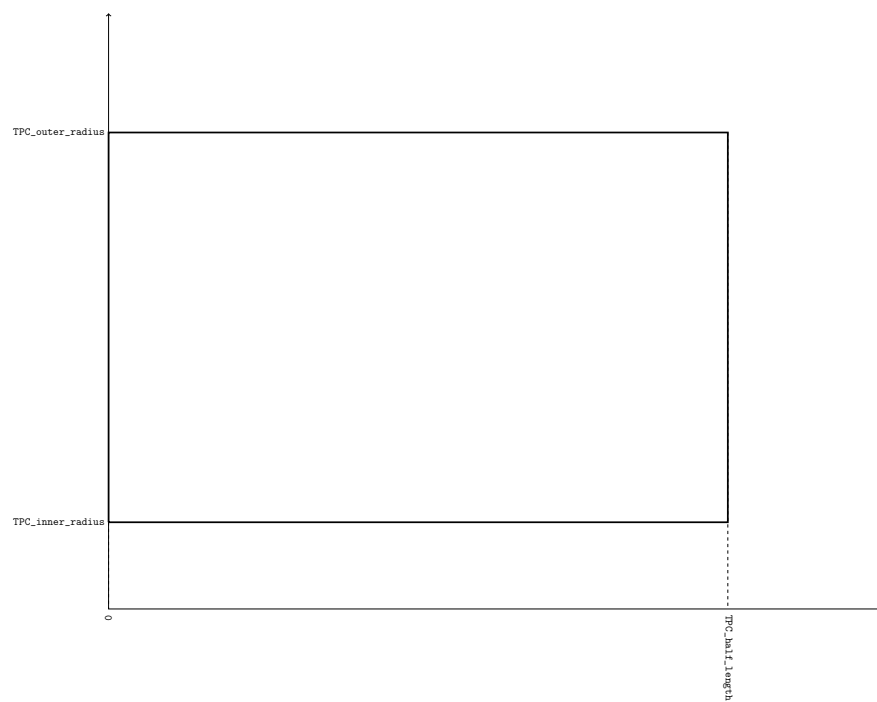

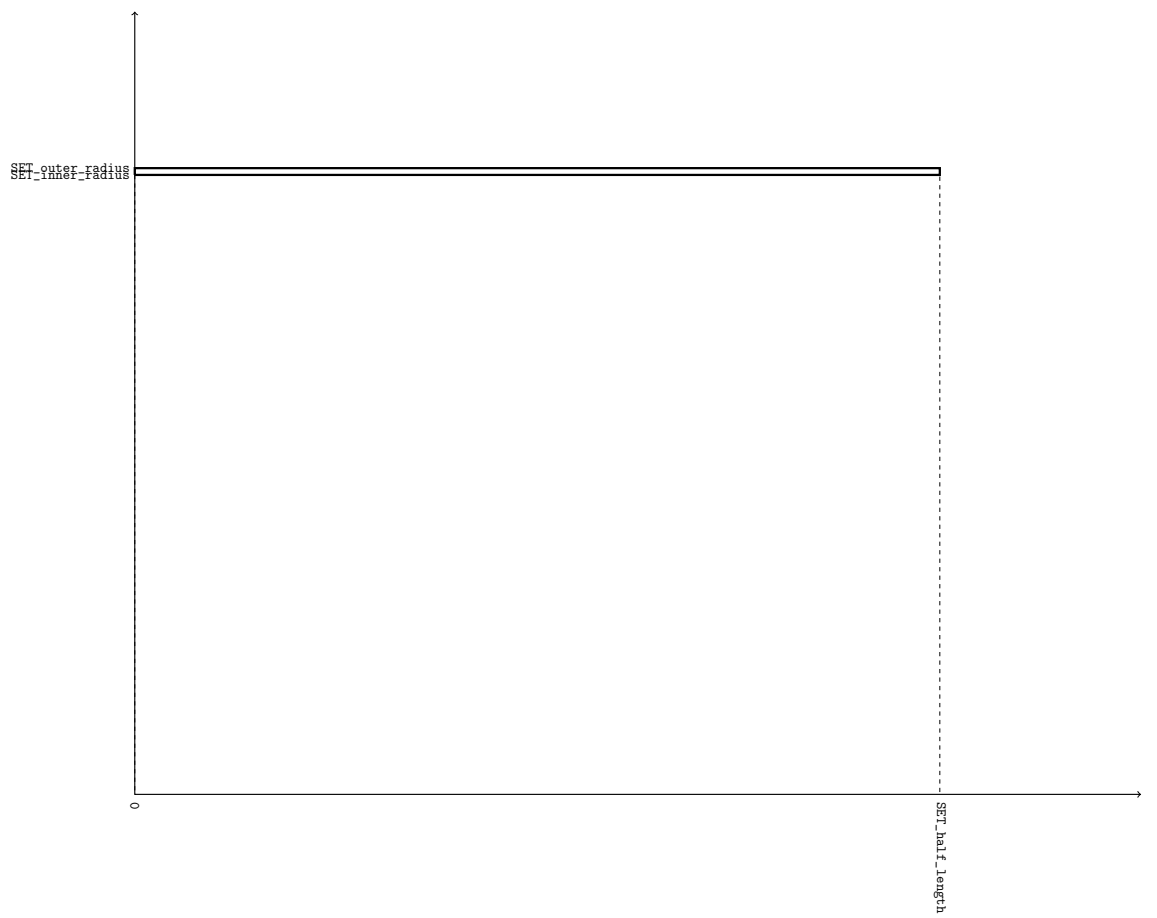Figure 6: side view of the FTD envelope

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Figure 7: side view of the TPC envelope

Figure 8: side view of the SET envelope