

# High Granularity Timing Detector (HGTD) Mechanics-Integration Studies

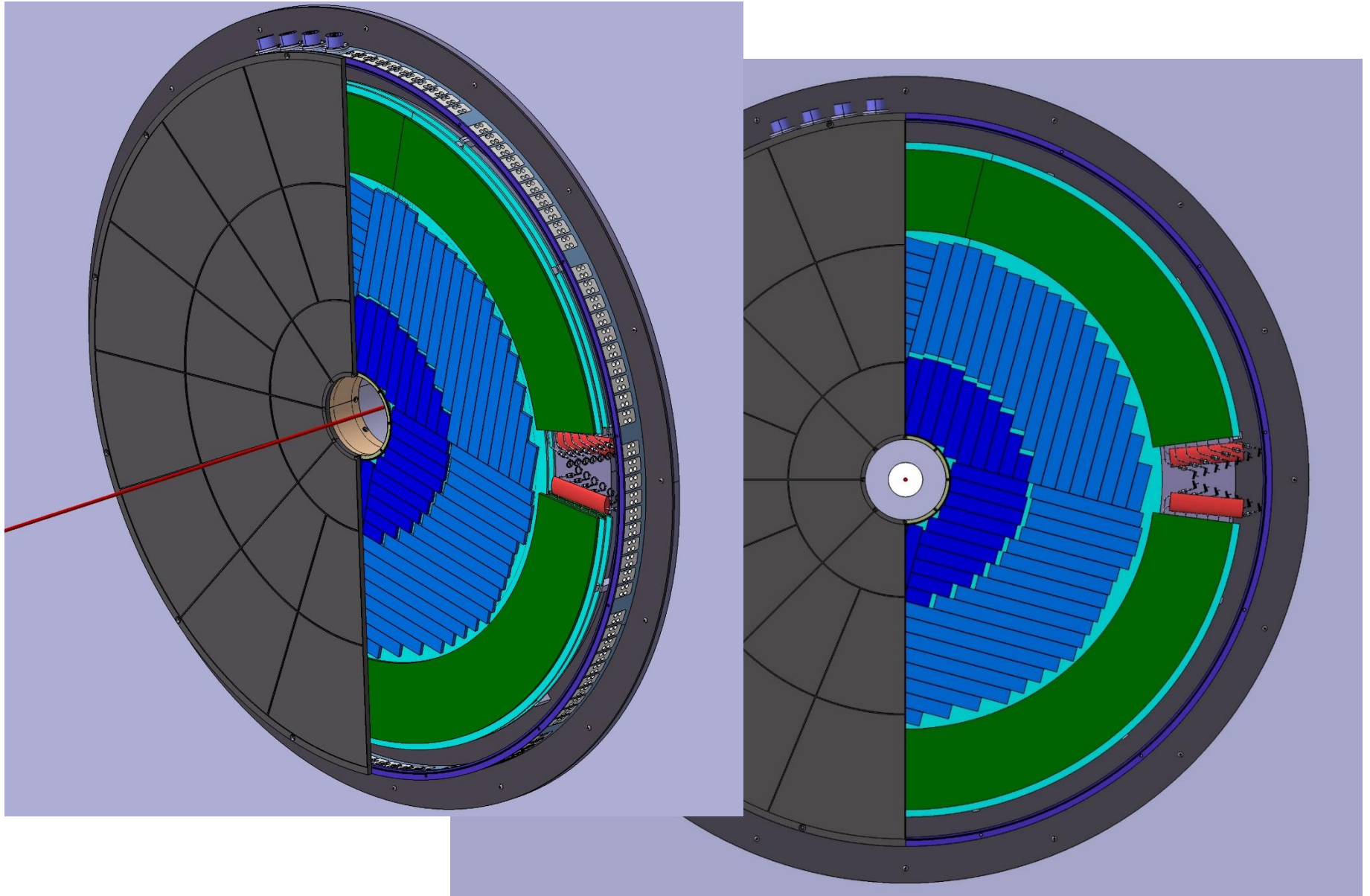
ITK/HGTD Envelope/CERN/3162-2-C01 - 2019.05.17

*Aboud.Falou-LAL-Orsay/ on behalf the HGTD Team*

## Summary

1. Two parts assembly of front cover
2. Anti-condensation heaters of both HGTD front cover & LARG cryostat wall
3. Backup slides

# Two parts assembly of the front cover



# Two parts assembly of the front cover (tightening gaskets study)

Front cover Left part (US wall)

Front cover Right part (USA wall)

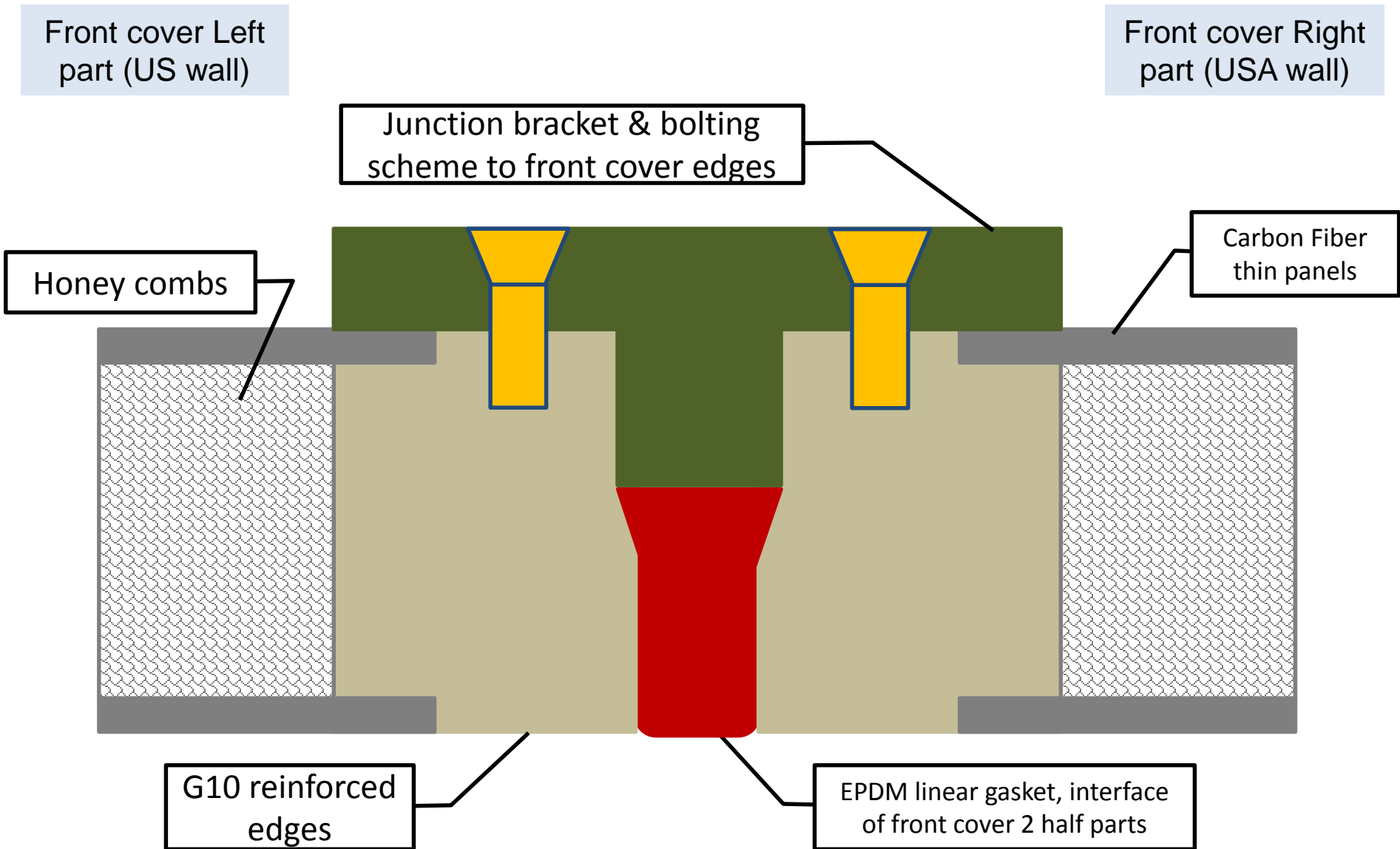
Junction bracket & bolting scheme to front cover edges

Honey combs

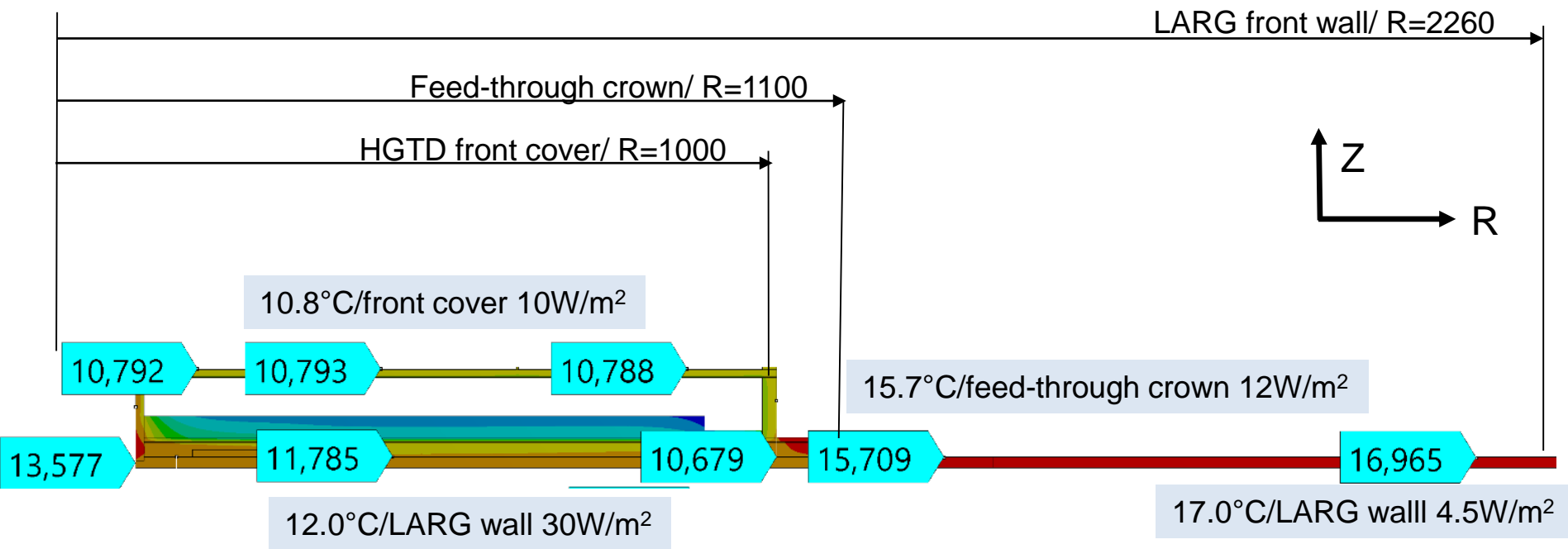
Carbon Fiber thin panels

G10 reinforced edges

EPDM linear gasket, interface of front cover 2 half parts



# Fig.11-9 Ambient temperature and anti-condensation heaters



## Material thermal conductivity used for this FEM analysis

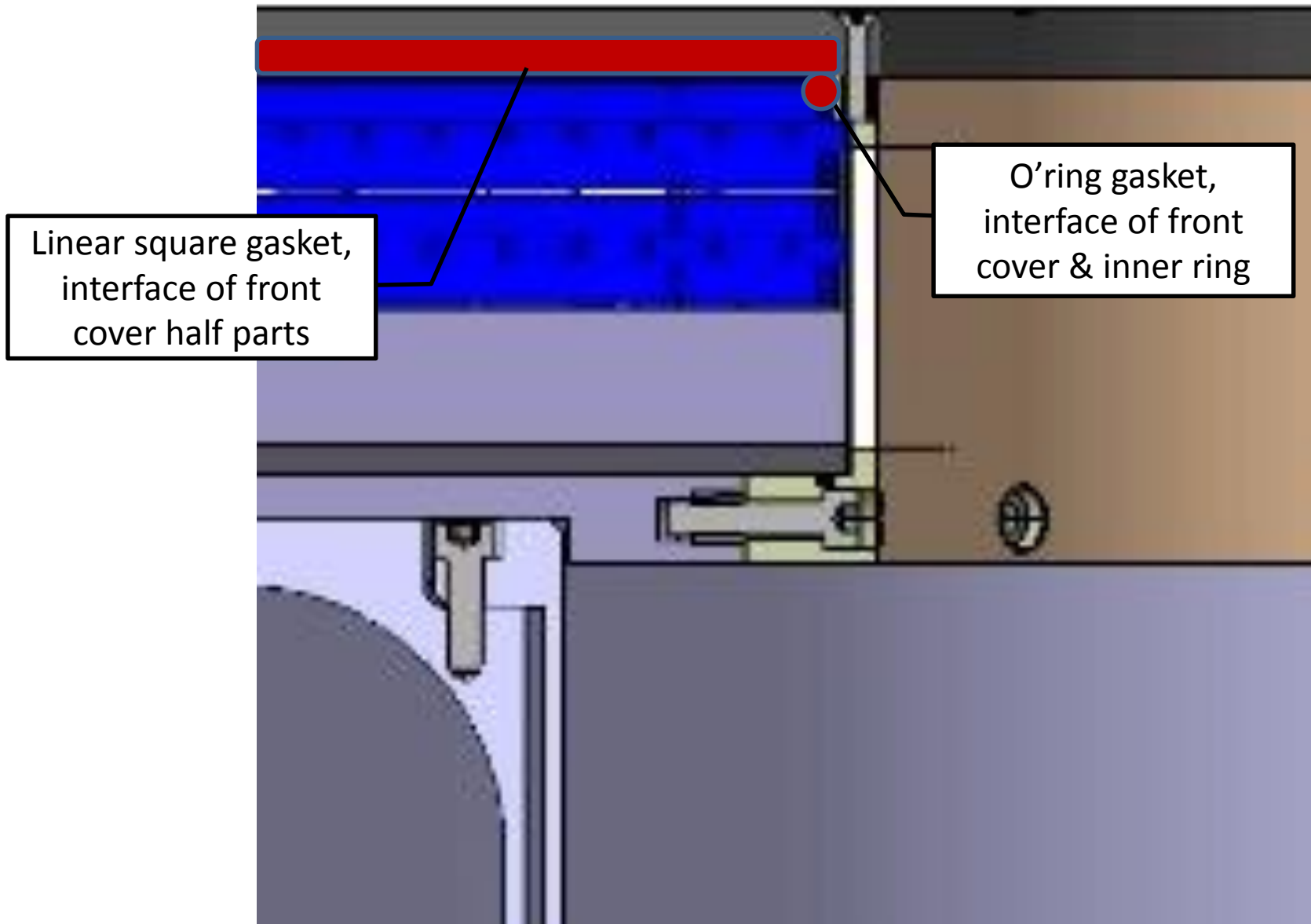
- HGTD front cover (CFRP): X-Y 130 W/m.K & Z thickness 1.0 W/m.K
- HGTD foam core of the front cover (honeycomb): 0.5 W/m.K (0.15 W/m.K is the TDR target)
- HGTD inner & outer rings (G10 glass fiber resin): 0.75 W/m.K
- Moderator (polyethylene boron): 0.5 W/m.K

*N.B: Air convection: 10. W/m<sup>2</sup>.k at 20°C & hermetic volume convection: 2.5W/m<sup>2</sup>.K at -35°C*

*All thermal contact resistance are neglected for this FEM analysis. LARG wall (aluminum): 237 W/m.K*

**# Thanks for your attention #**  
**# Backup Slides #**

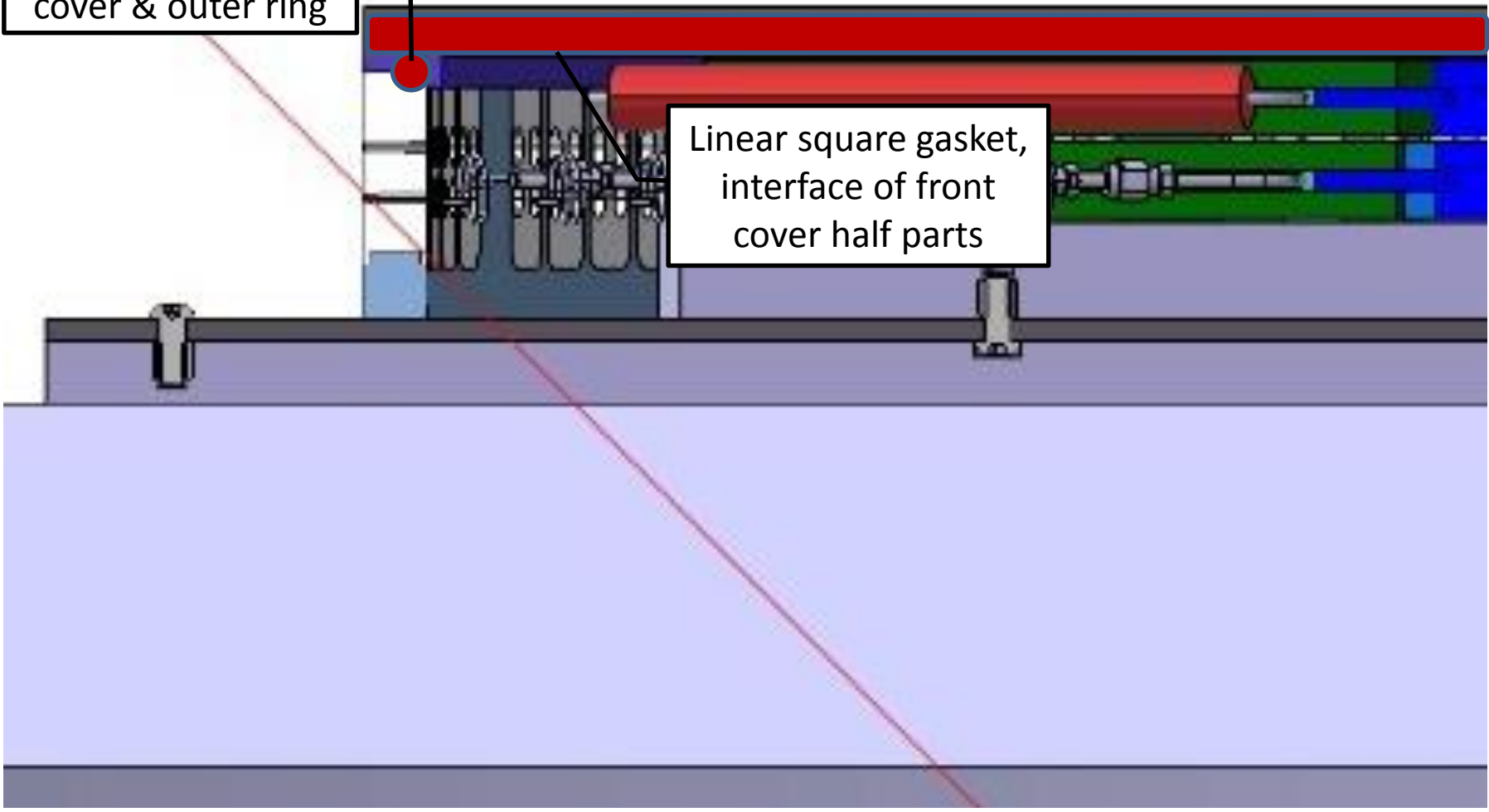
# Two parts assembly of the front cover (inner ring gaskets study)



# Two parts assembly of the front cover (outer ring gaskets study)

O'ring gasket,  
interface of front  
cover & outer ring

Linear square gasket,  
interface of front  
cover half parts



# Fig.11-# Proximity transfer lines of CO2 cooling system

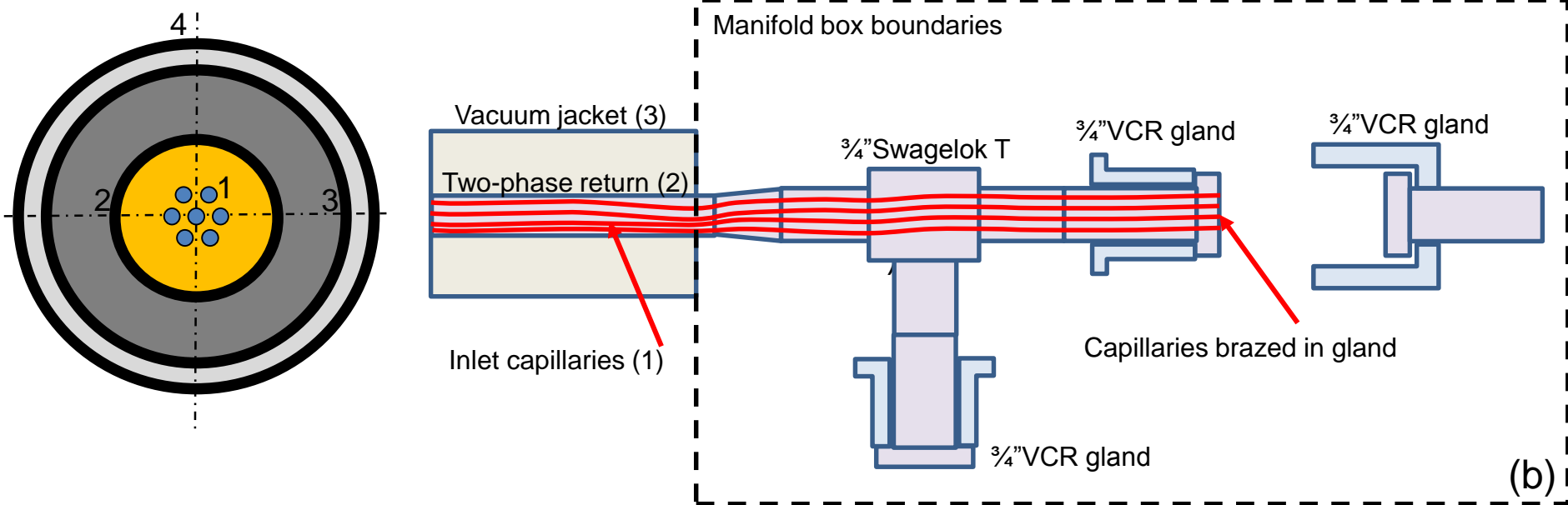


Figure 11.##: CO2 proximity transfer lines (a) connecting the manifold box (b) to the hermetic vessel, the capillary inlet lines (1) are inside the two-phase return line (2) which is thermally insulated by a vacuum jacket (4). The outer envelope of each line is limited to 50mm OD based on a rigid vacuum jacket OD in the range of 40-45mm.



# Fig.11-7 Temperature profile of CO2 transfer lines

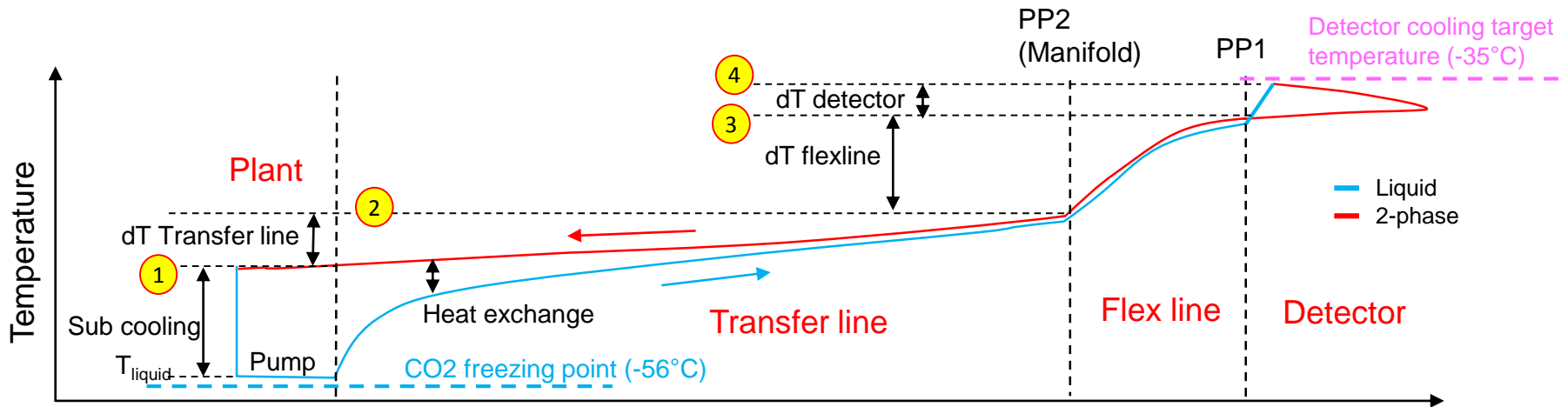


Figure 11.7: typical temperature profile along the CO2 transfer lines from the cooling plant up to on detector Loops and return (the delta-T flex line of ATLAS-ITK will be reduced with the rigid line design of HGTD)