Cryostat Mechanical Analysis - Very Preliminary

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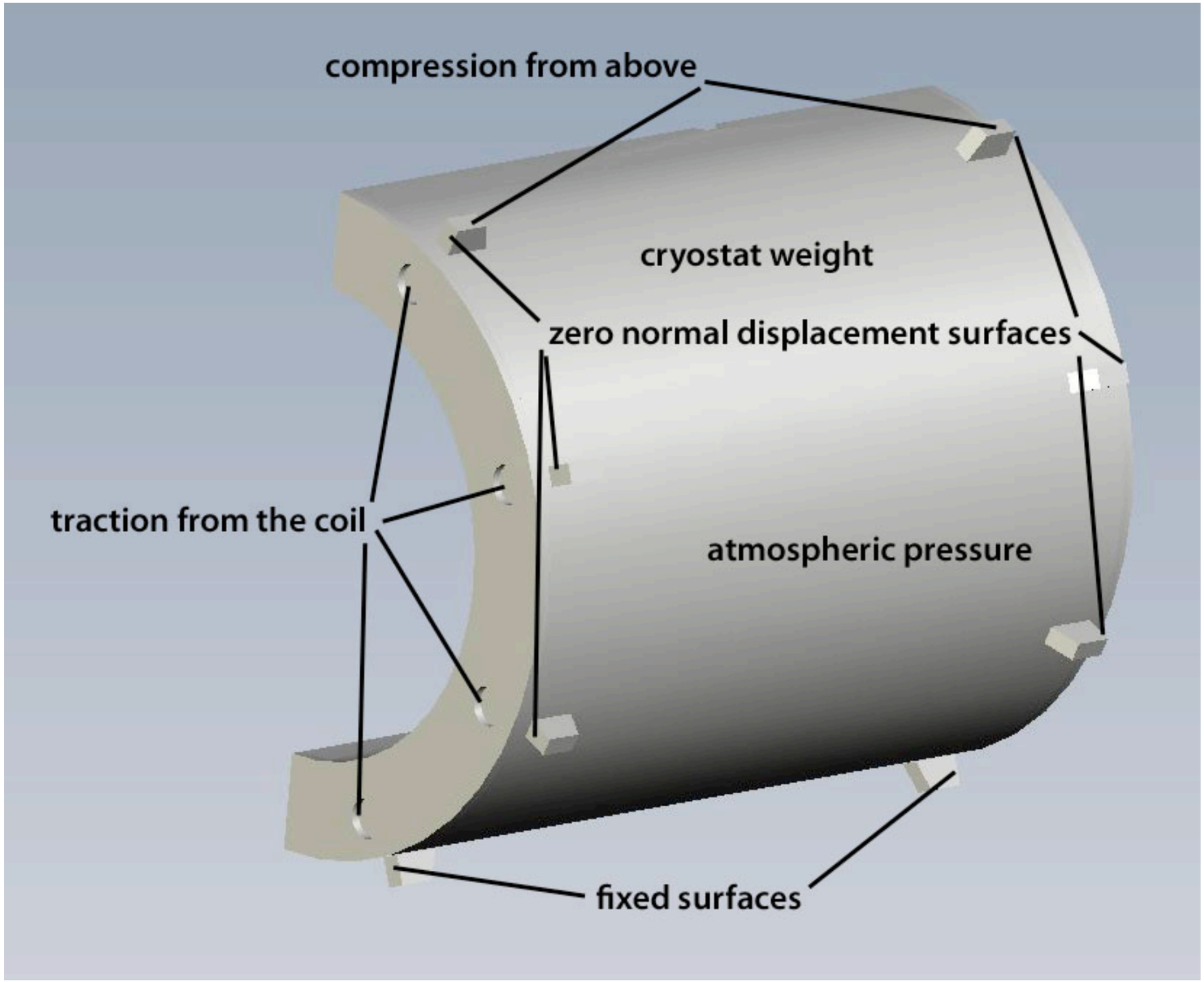
Outline

- A 3D model of the cryostat with supports was realised
- The model is not yet complete
- Some preliminary calculations were performed
- The results are very encouraging
- A check would be appreciated…

- Addendum: some hints on the cryo turret dimensions

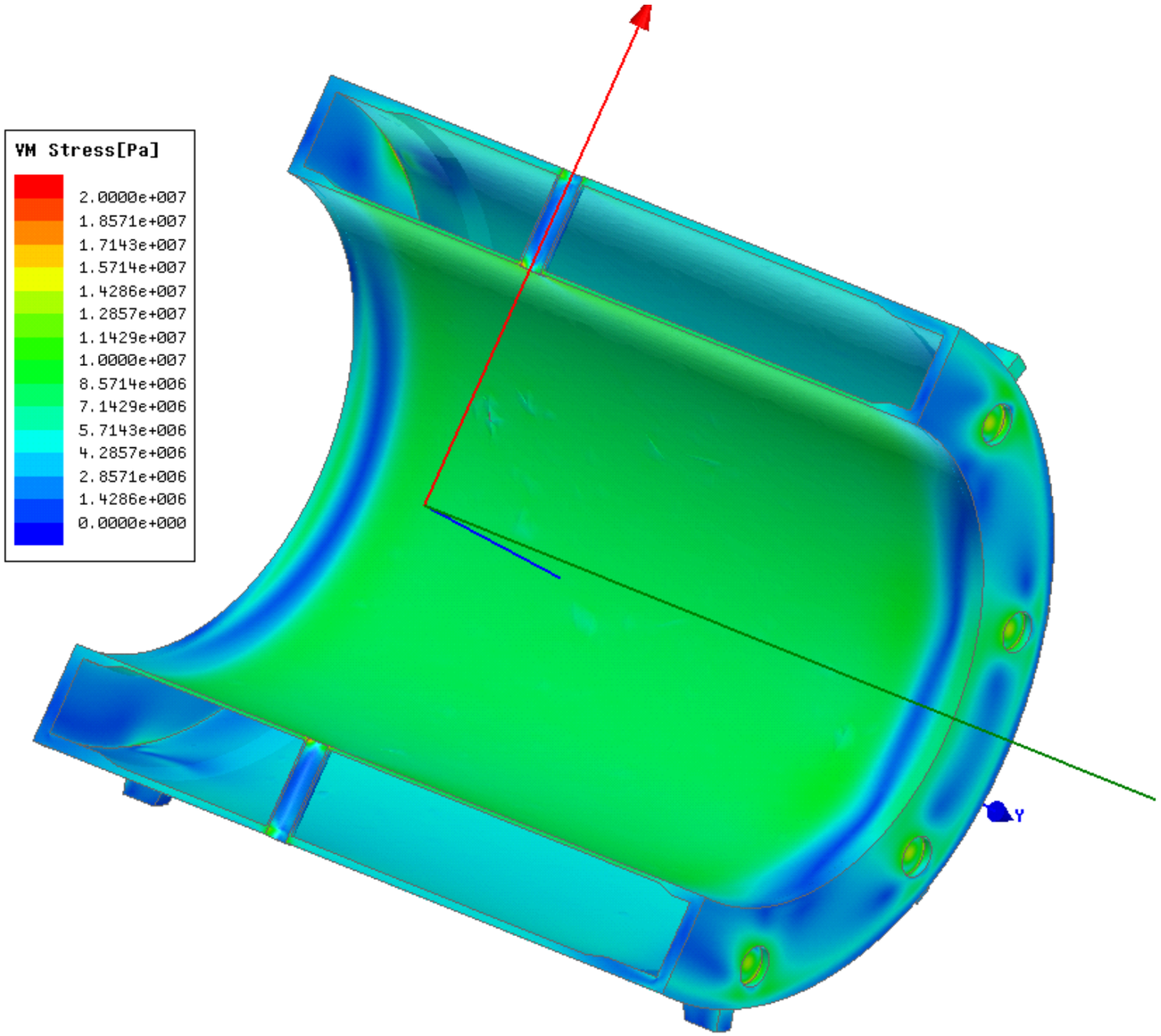
Excitations



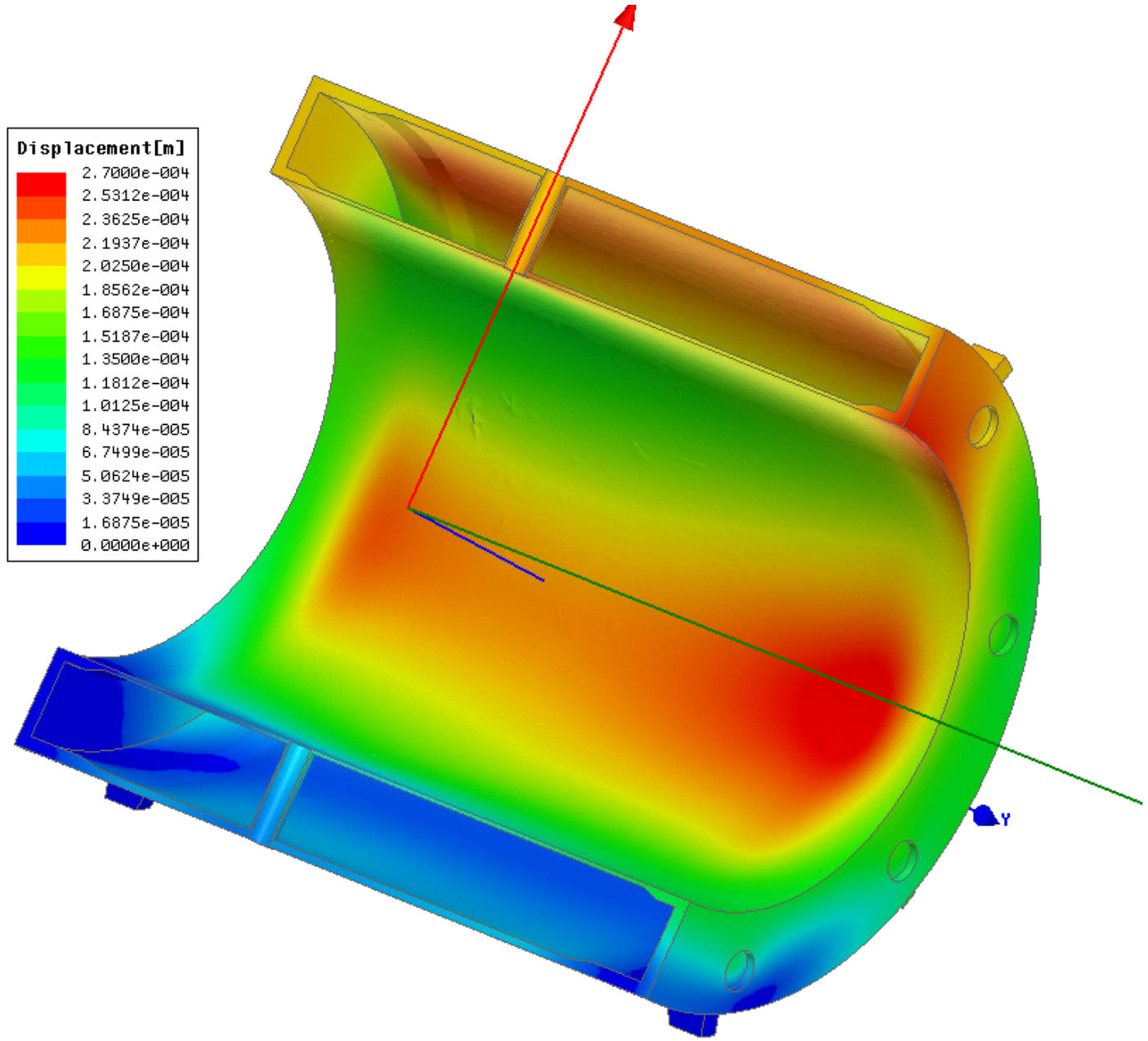
Materials & Excitations

- Stainless Steel
  - Elasticity Modulus: 193 GPa
  - Yield Strength: 205 MPa
  - Density: 8 kg/dm^3
- Aluminium Alloy (5083)
  - Elasticity Modulus: 75 GPa
  - Yield Strength: 195 MPa
  - Density: 2.66 kg/dm^3
- Nominal Excitations
  - Magnetic Force: 20t
  - Weight from Above: 10t

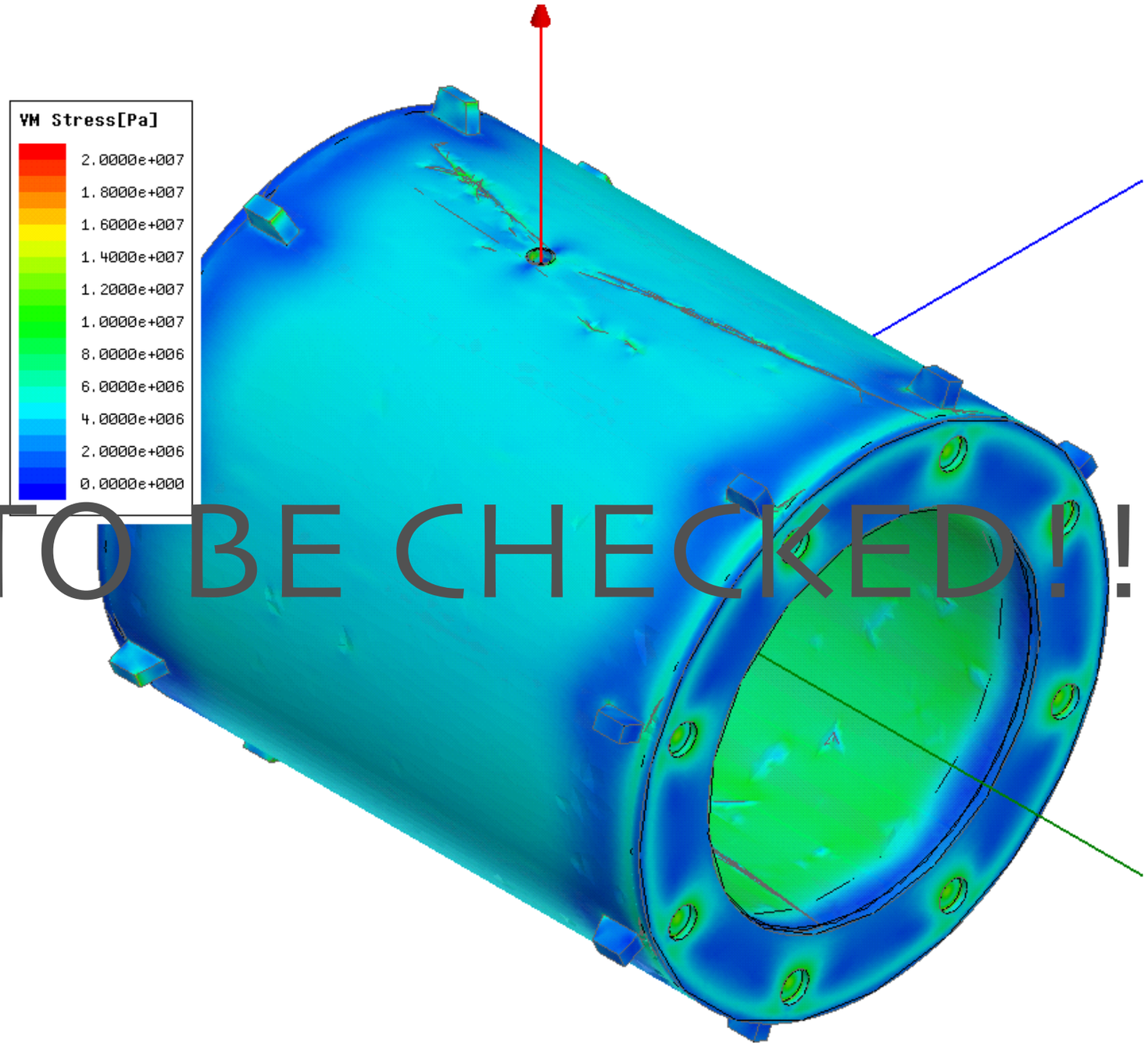
AA5083 Stress



AA5083 Displacement

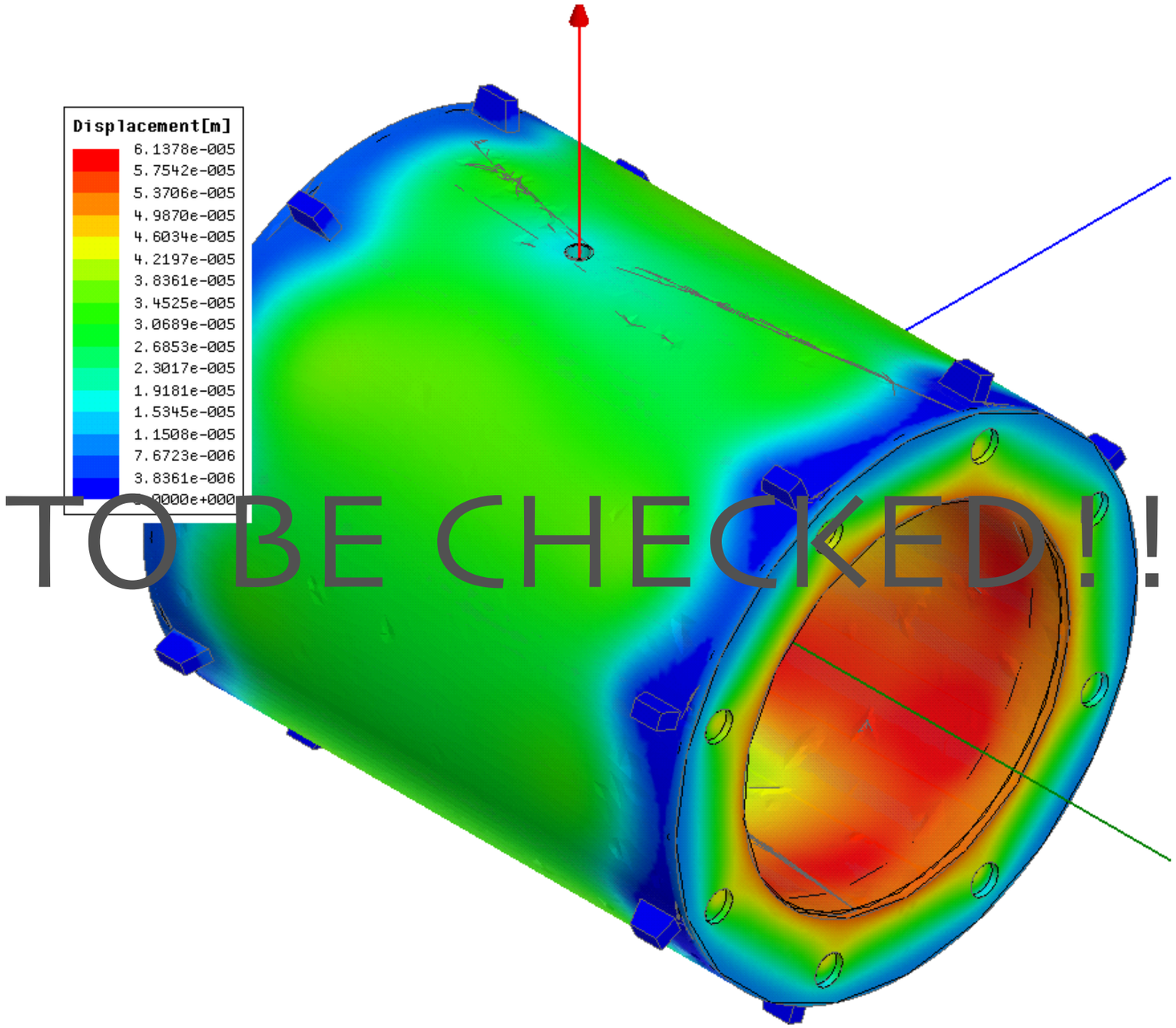


AISI304 Stress



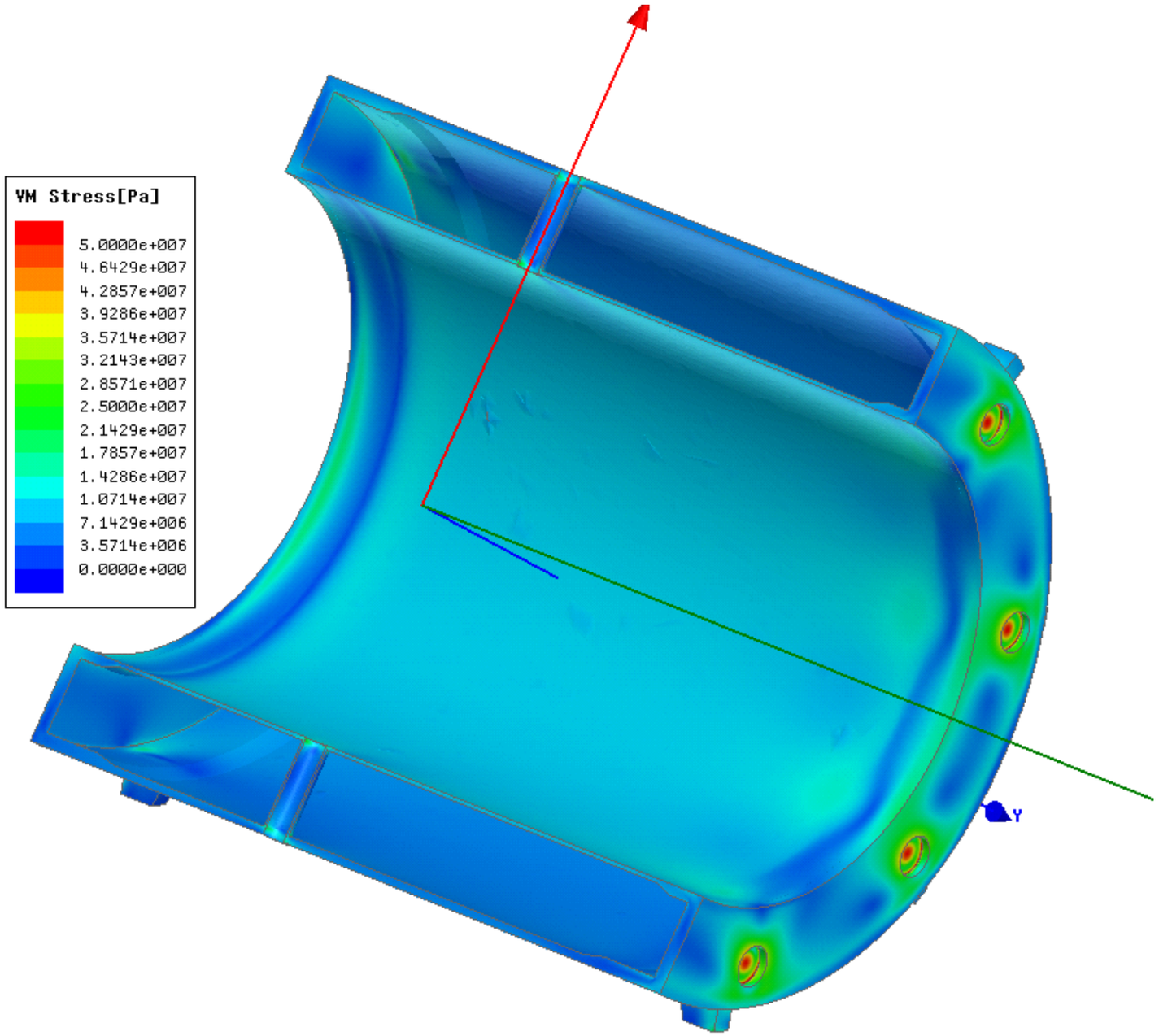
TO BE CHECKED!!!

AISI304 Displacement

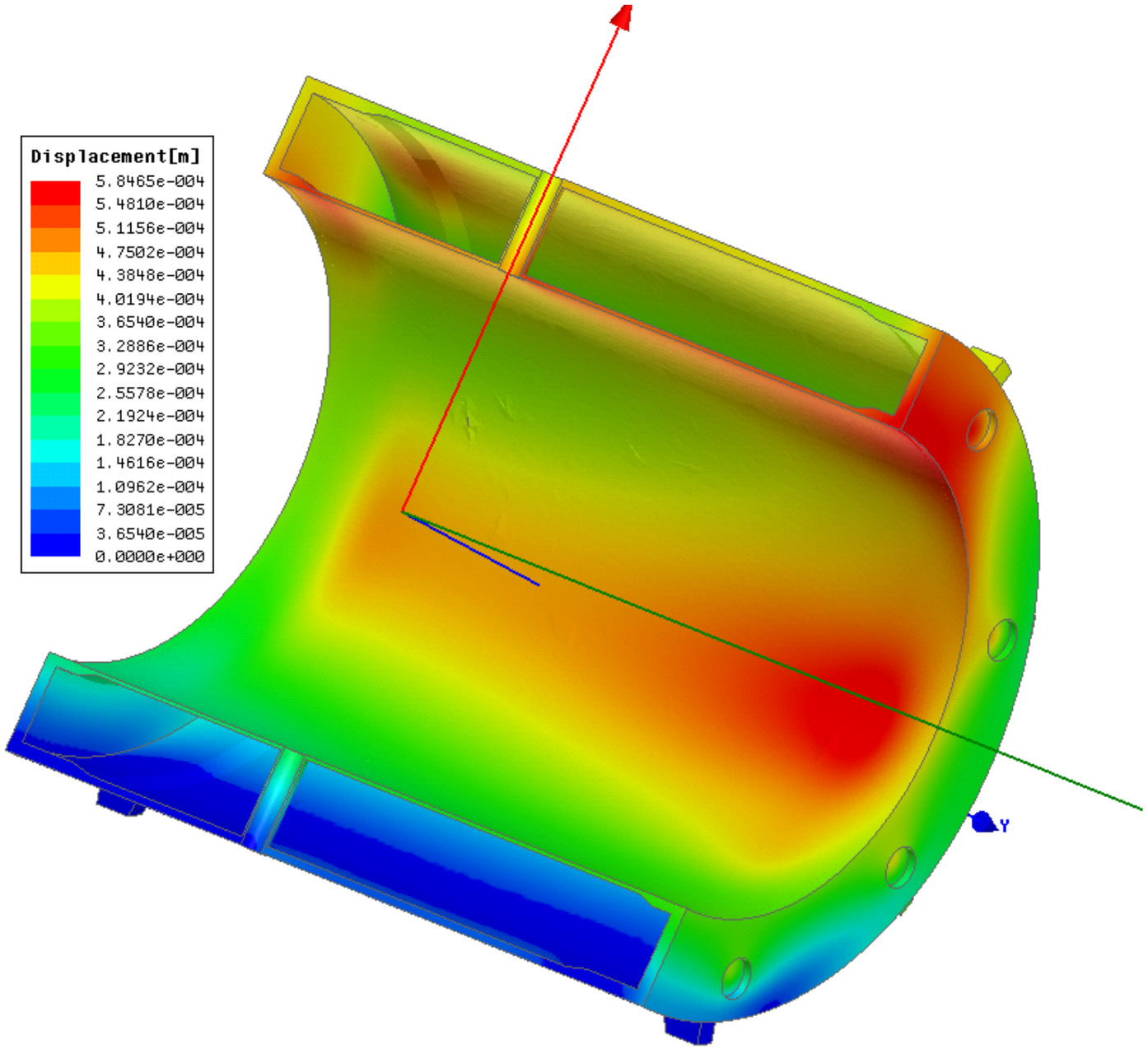


TO BE CHECKED!!!

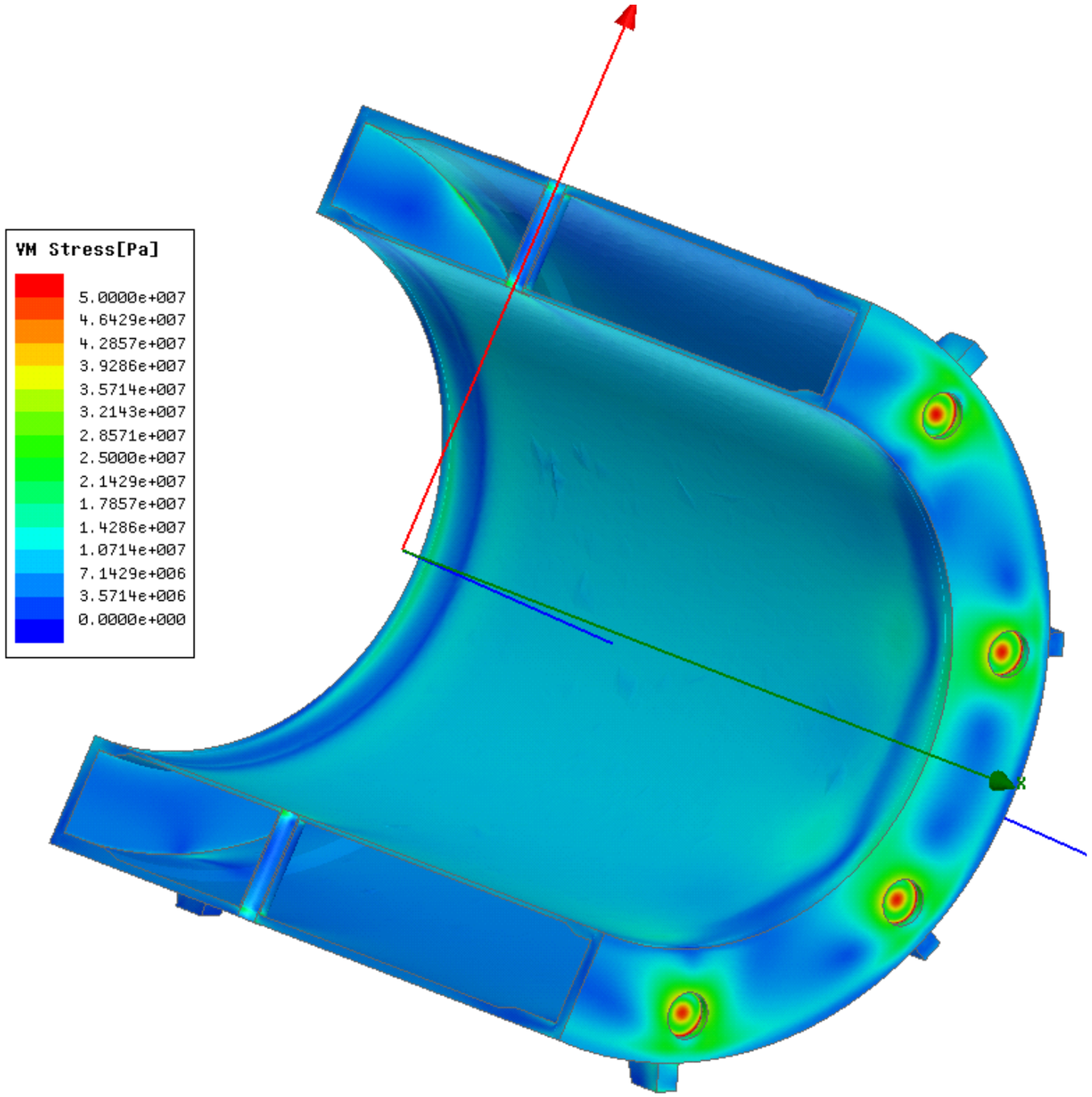
AA5083 Stress (Safety Factors)



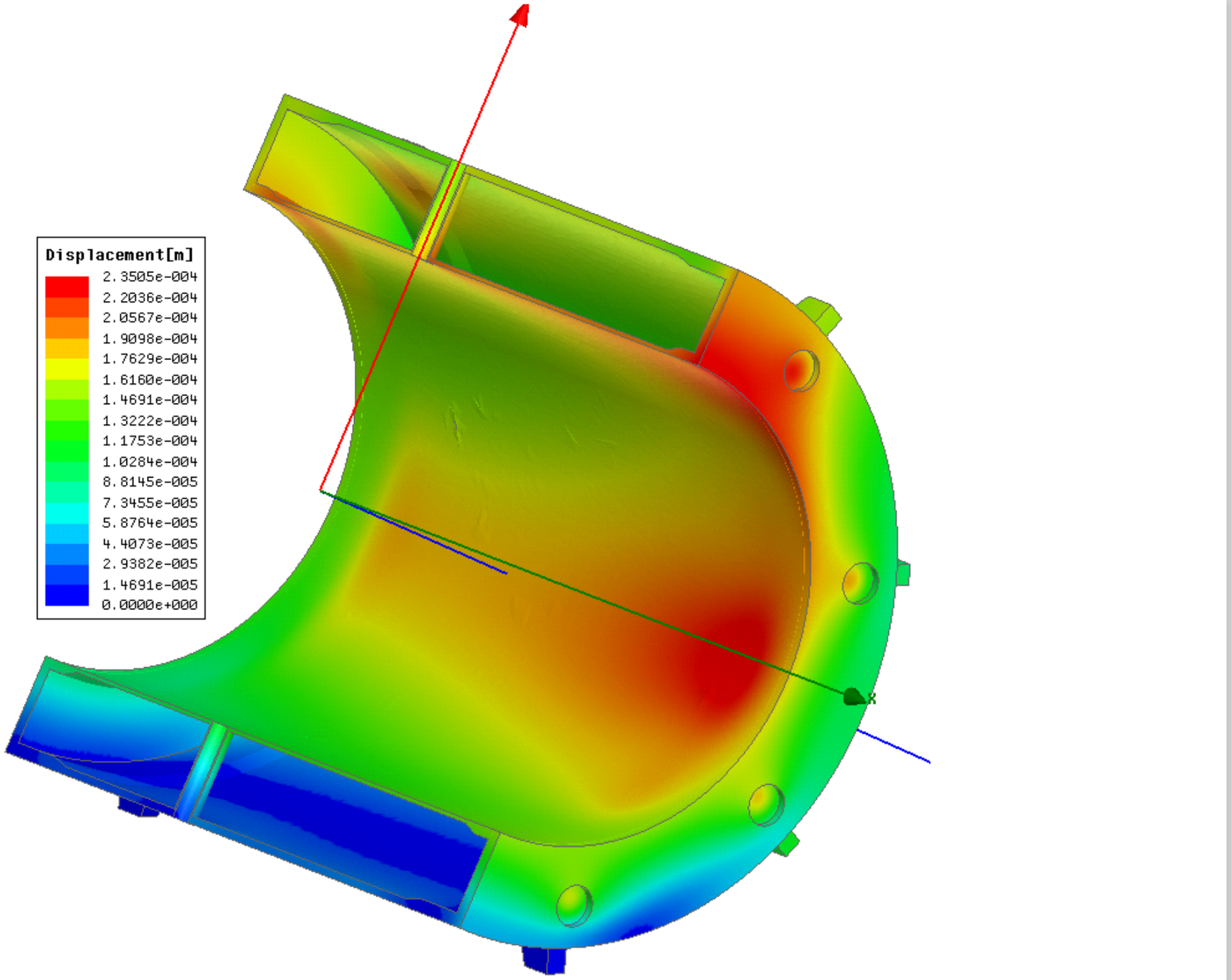
AA5083 Displ. (Safety Factors)



AISI304 Stress (Safety Factors)



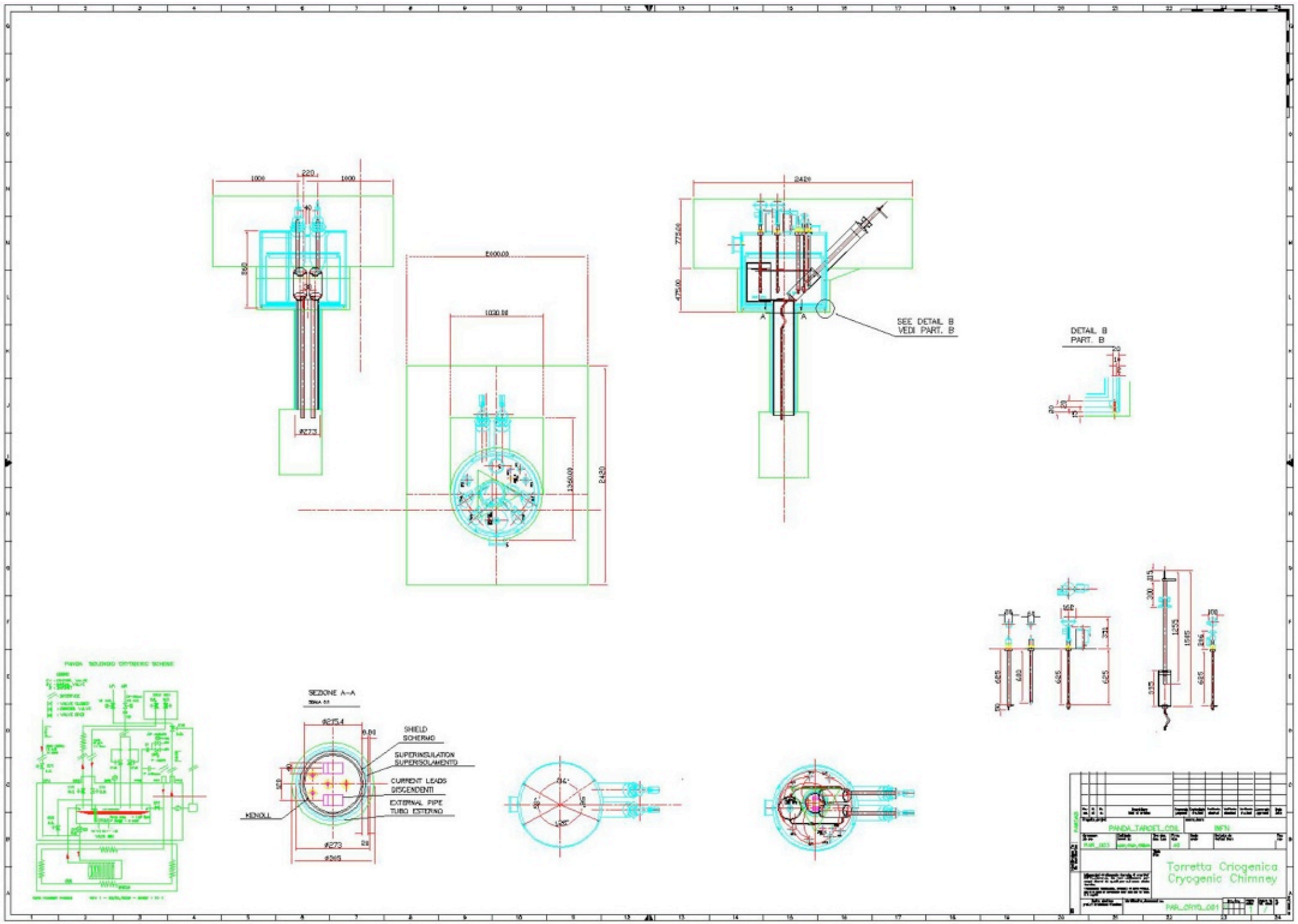
AISI304 Displ. (Safety Factors)



Summary

- The stresses in nominal conditions are ~10% o the maximum allowable
- With safety factors, the stresses are below 30% of the maximum allowable
- Deformations are under 0.5mm
- AISI304 is (obviously) more rigid
- AA5083 is lighter (good for muons?)
- A very preliminary analysis shows that the cryostat can partially compensate the yoke deformations

Addendum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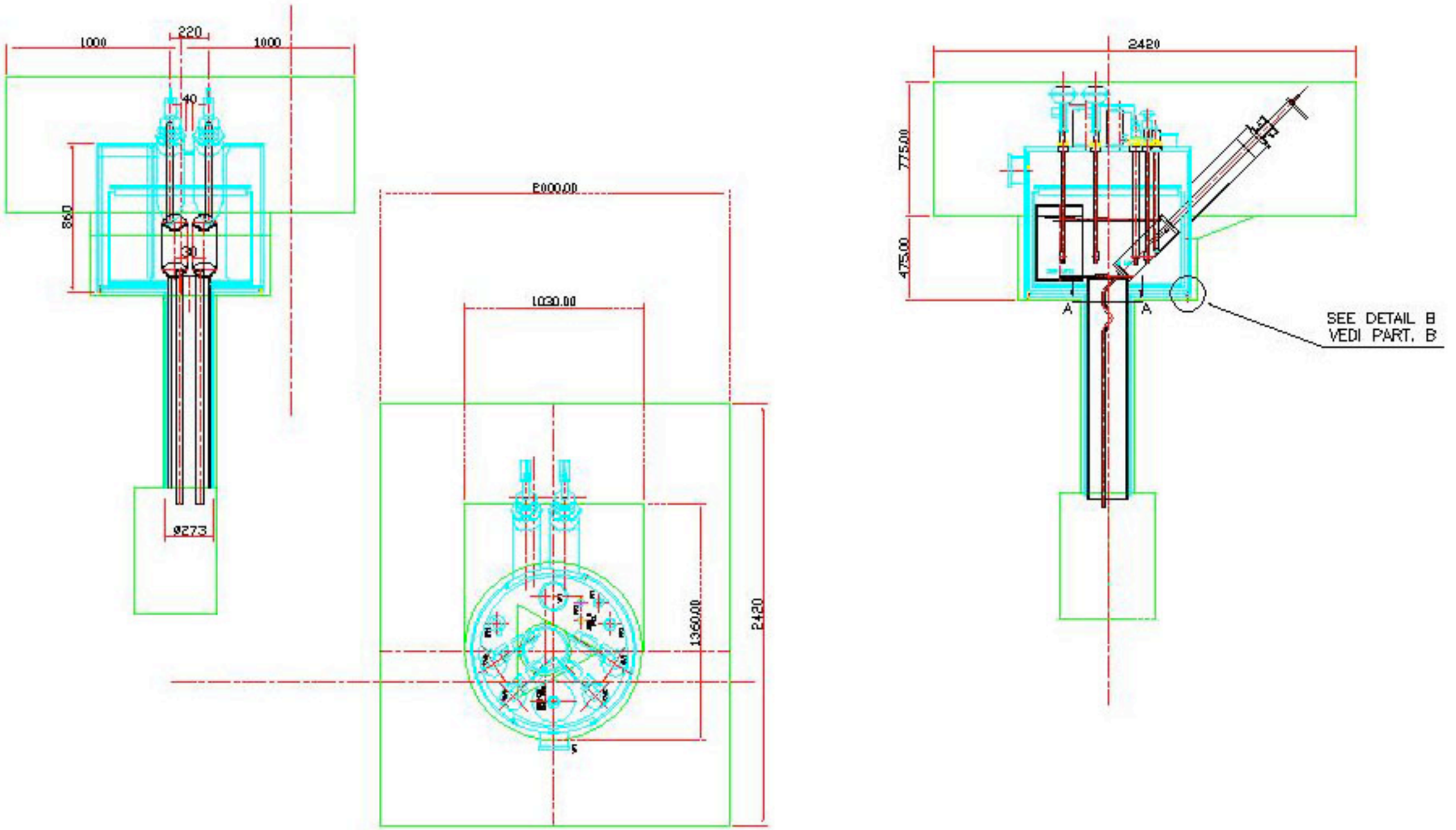
SEZIONE A-A
SHIELD
SCHERMO
SUPERINSULATION
SUPERISOLAMENTO
CURRENT LEADS
DISCENDENTI
EXTERNAL PIPE
TUBO ESTERNO
Torretta Criogenica
Cryogenic Chimney

Addendum 2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