PANDA FW Endcap EMC: Mechanical constraints For the TOF detector

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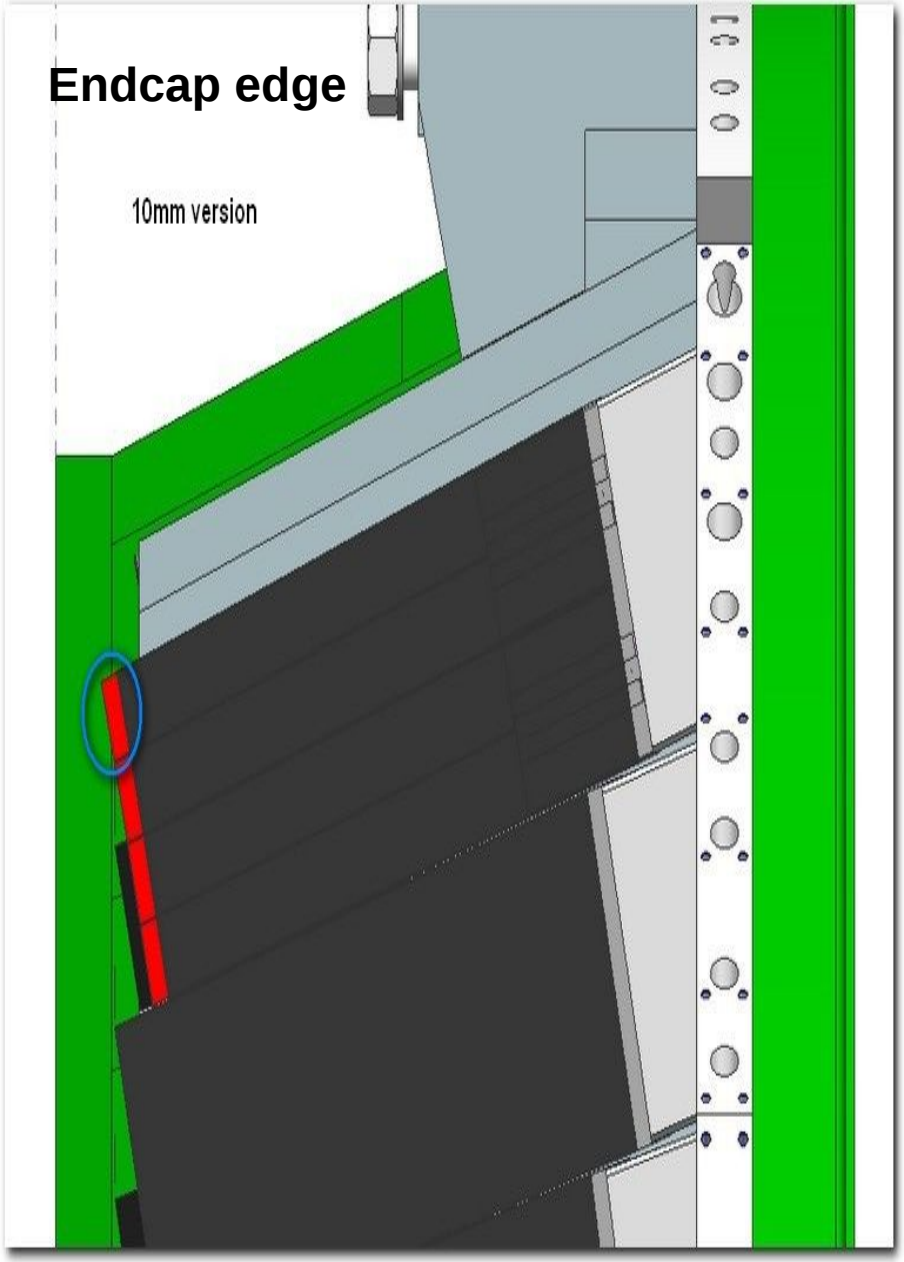
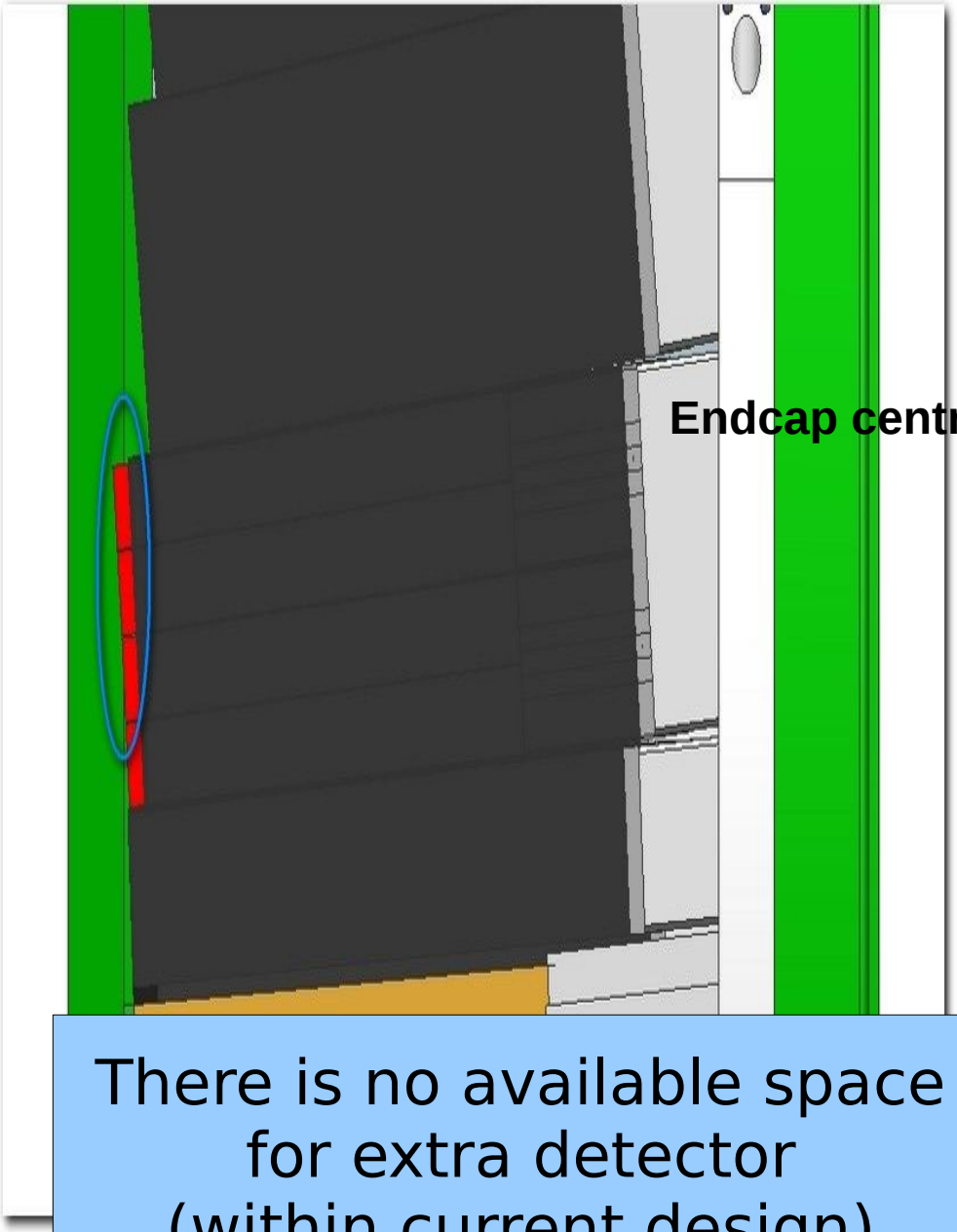
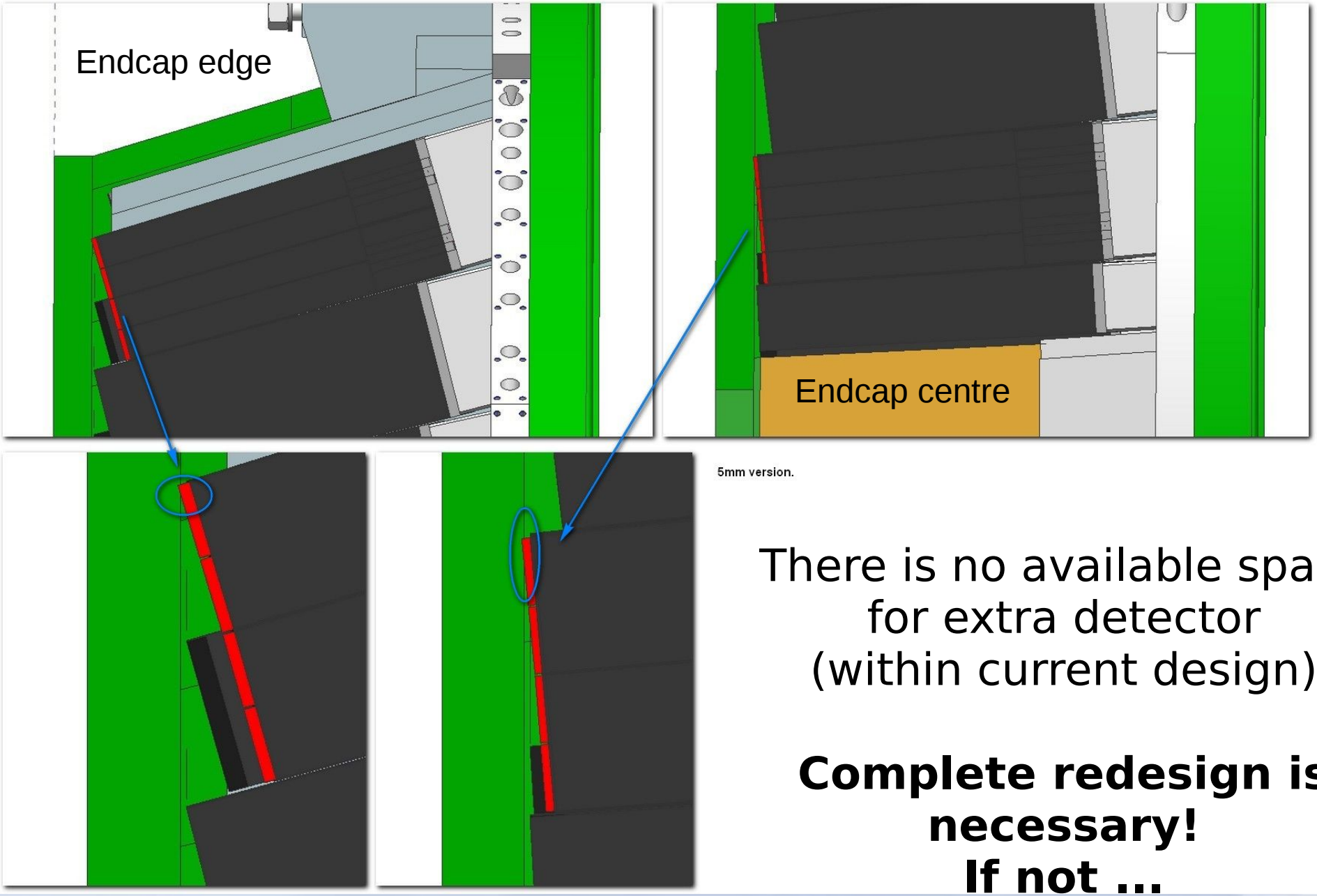
Extra detector in front of PWO crystal (10 mm)





There is no available space for extra detector (within current design)

Extra detector in front of PWO crystal (5 mm)



There is no available space for extra detector (within current design)

Complete redesign is necessary!
If not ...

Thermal shielding

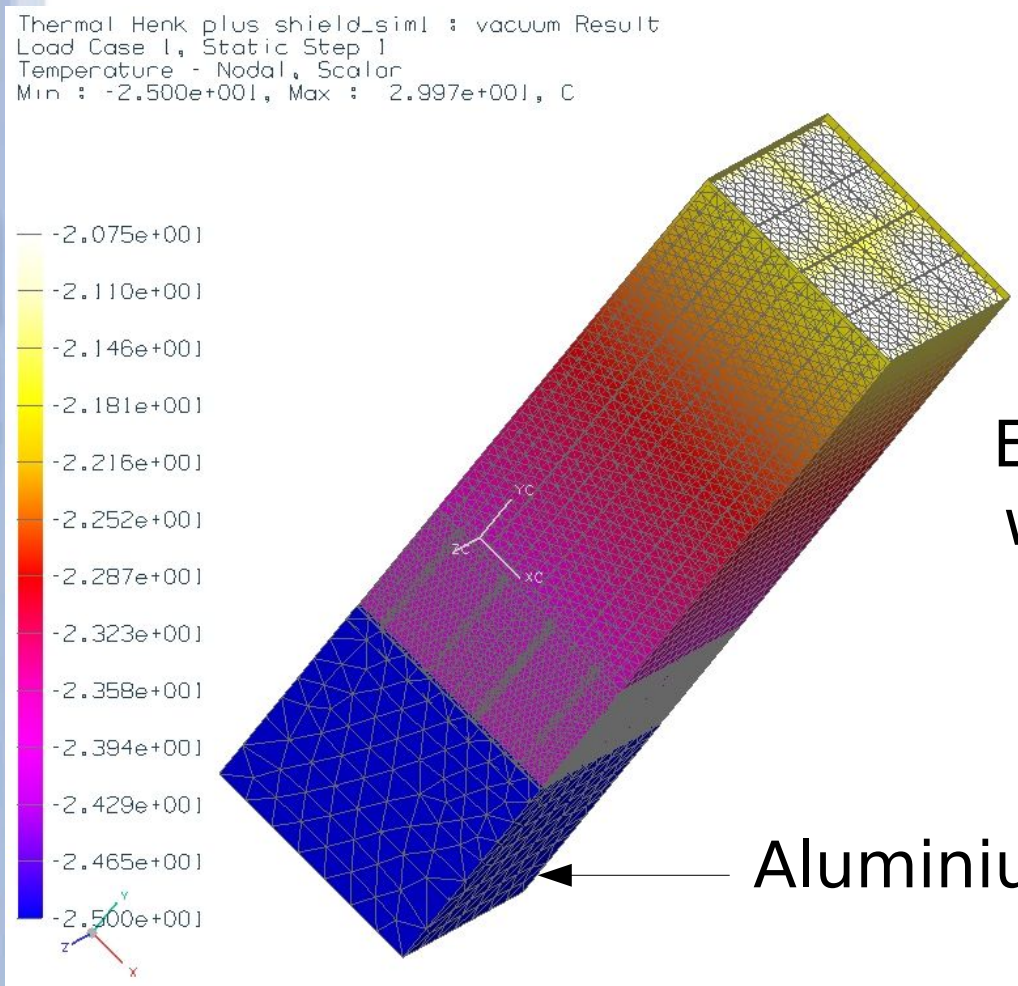
To fit new TOF detectors into the endcap we have to reduce thickness of the thermal shield.

The consequences:

- Have to increase power of the cooling machine
- Temperature of the crystals will not be affected (if the first point is fulfilled)
- The temperature of the front (warm) surface may drop to +10 °C (currently +20 °C) → **danger of condensation!**

Thermal shielding

Front cooling of crystals is absolutely necessary



Thermal simulation for one alveole (without front cooling)

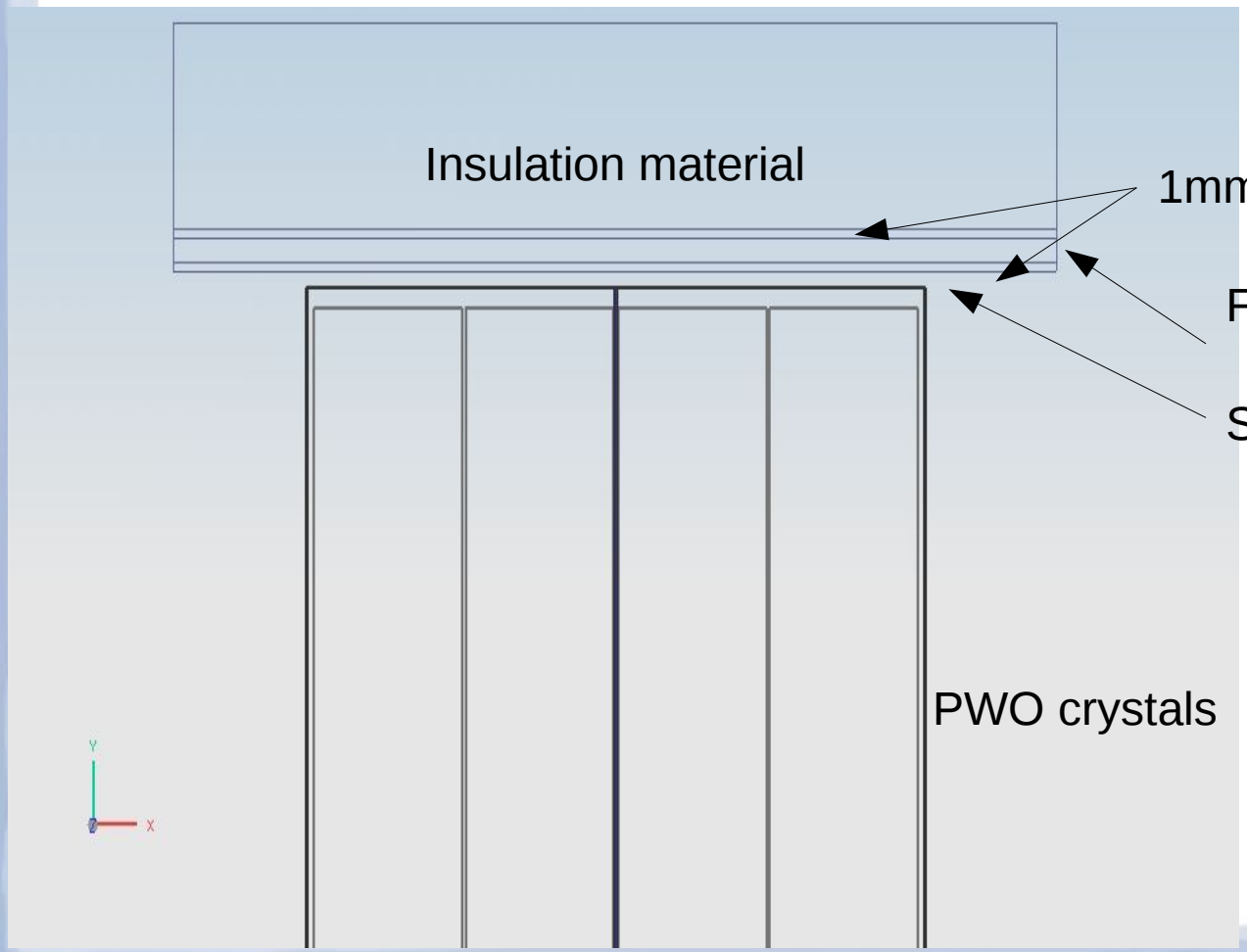
End of the PWO crystal -20 °C with a perfect vacuum shield

Aluminium insert (infinite cooling sink)

Thermal shielding

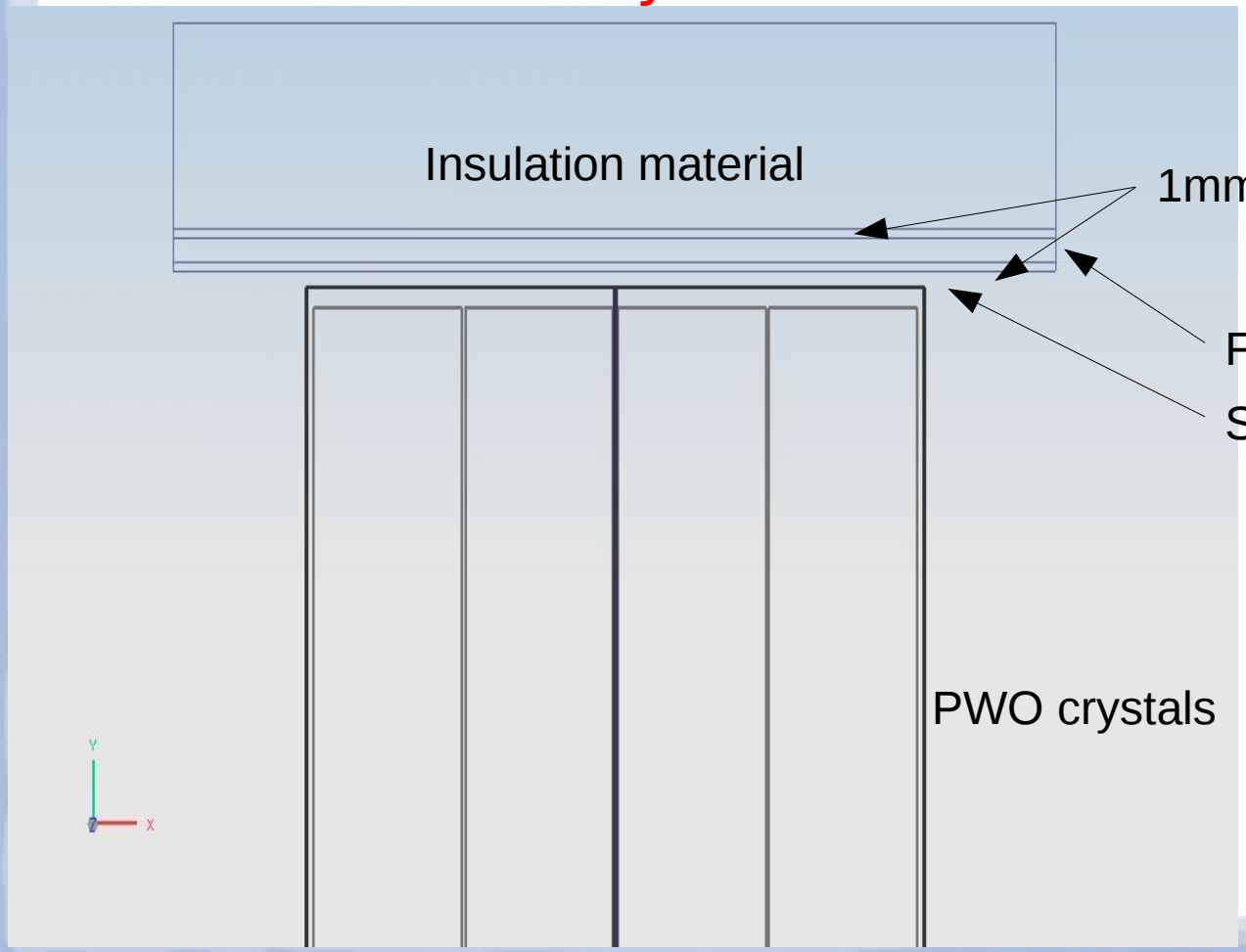
Front cooling of crystals is absolutely necessary

Current solution: Composite thermal shield



Composite thermal shielding

- Slow flow of cooled nitrogen can remove only little amount of heat.
- Additional heat from SiPM preamplifiers will destroy the thermal stability



Conclusions

- There is no space for additional detectors in front of PWO crystals
- To include TOF detector into forward endcap complete redesign is necessary.