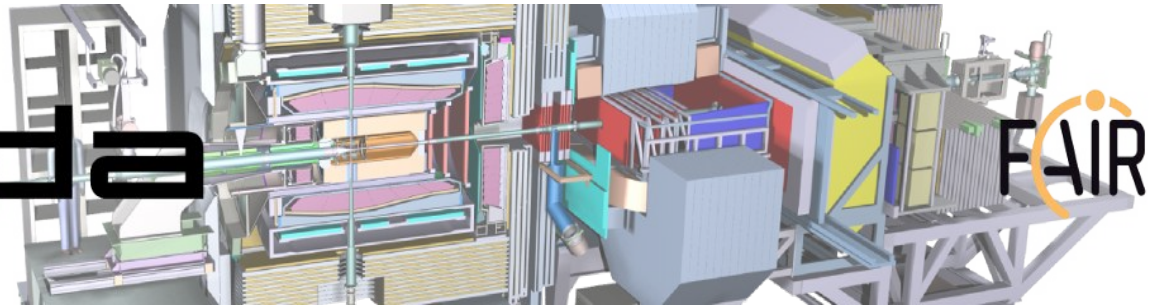
JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN



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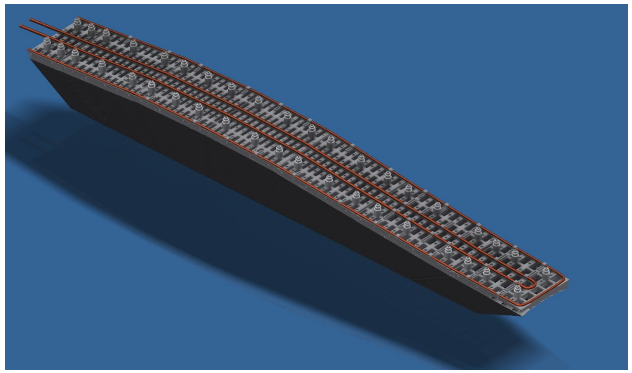
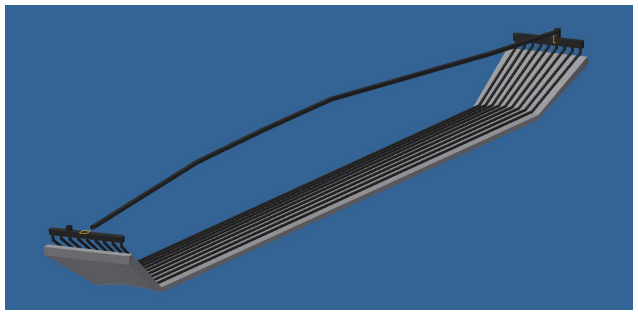
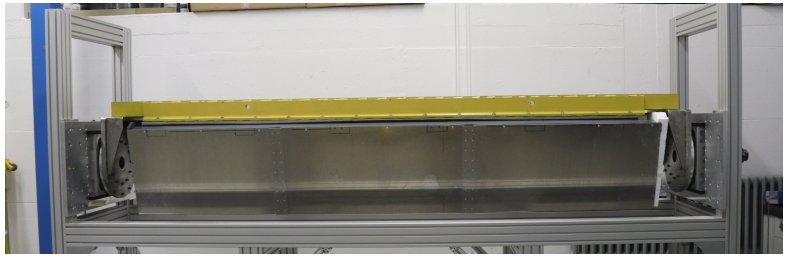
PANDA CM March 2023 – Barrel EMC Slice Cooling Status

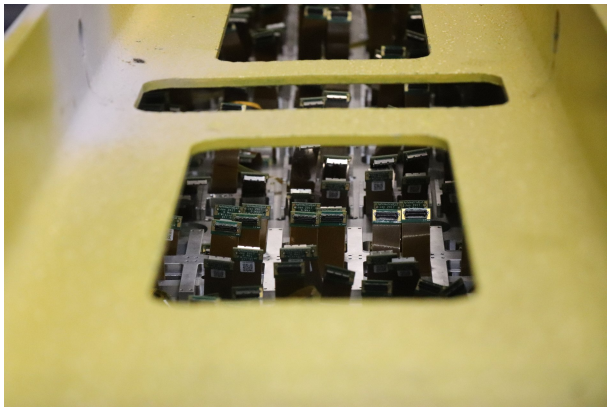
Testing the Barrel EMC cooling design - General Setup



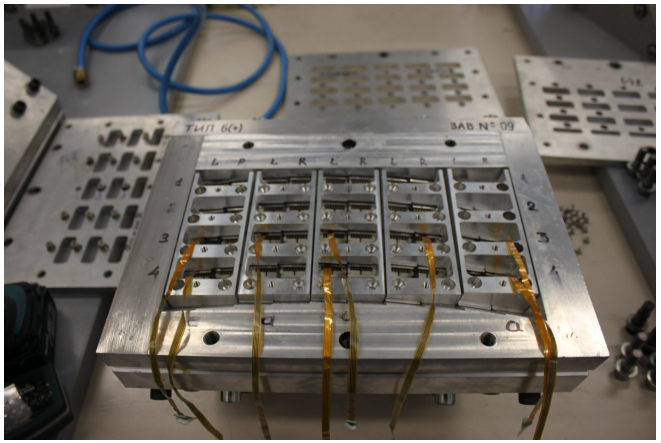


- Main and Front cooling are installed
- THMP readout of PT100, humidity and air pressure sensors
- Additional sensors : Coolant pressure, commercial airtemp and humidity sensor (SHT31), digital temp sensor DS18B20
- Slice is installed in VIP-insulated Test box on rotating device, lid of Support Beam currently not installed
- Box is constantly flushed with dry air (100l/min)

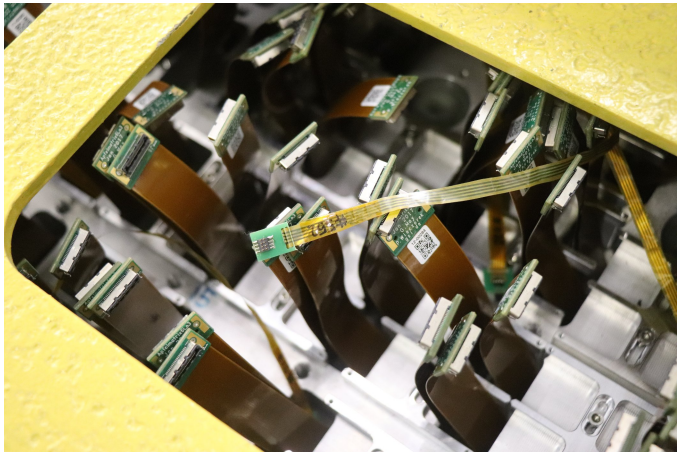


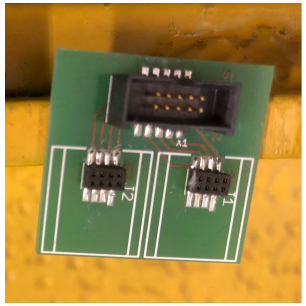


Testing the Barrel EMC cooling design – Sensors

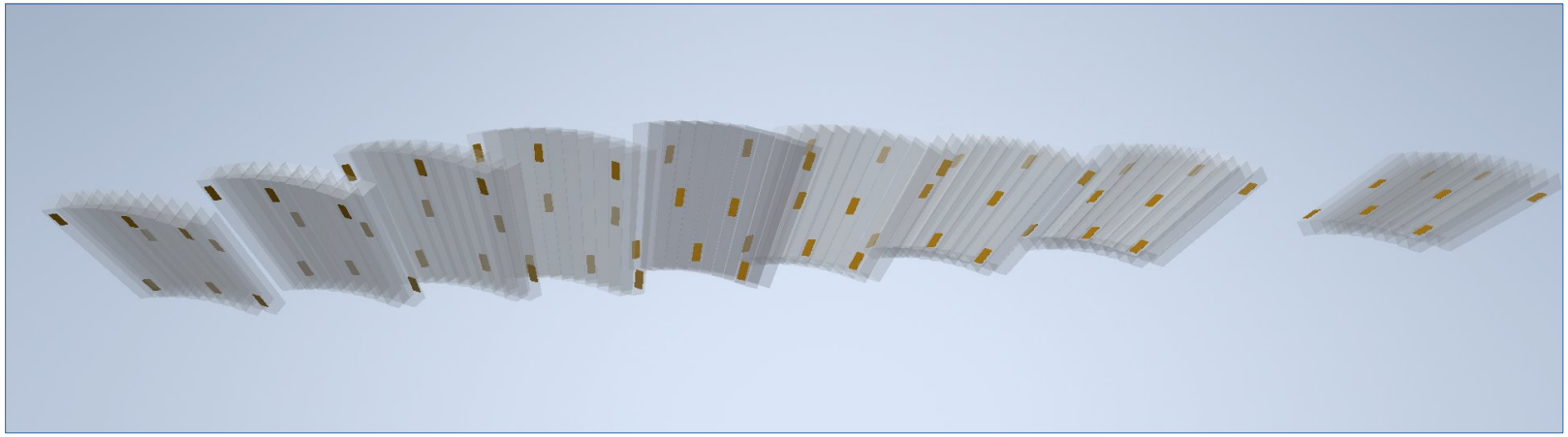


- During assembly of the Pre-Series Slice 72 PT-100 sensors were build into the slice, can not be removed/recovered/replaced
- 9 rows of 8 sensors each, 3 APD side, 3 beam-side and 2 center put on the crystals
- Pt100 cables are fragile and easily lose the connector when support beam is moved by crane - some sensors are broken beyond repair
- Adapter boards can not be integrated into barrel electronics because of footprint



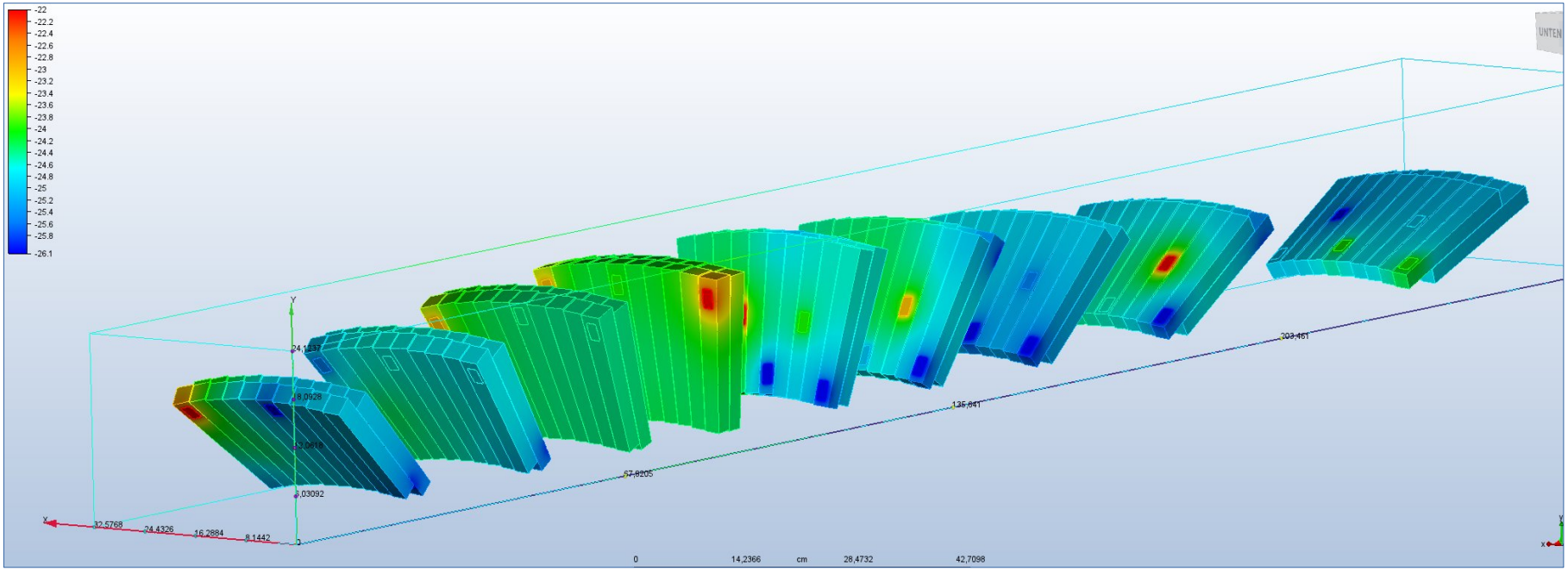


Barrel EMC Cooling Status – PT100 Sensor aging



- Positions of Preseries Slice ThinPT100 sensors
- 25-50cm sensor to sensor
- Testing revealed broken sensors (open circuit, shorts, missing plugs) and degeneration of sensors with what appears to be a linear offset
- PreSeries Slice (to my knowledge) has not seen many temperature cycles before coolings test
- Aging/degeneration in ThinPT100 without temperature cycling needs to be understood for production

Barrel EMC Cooling Status -



- Temperature readings from available sensors, corrected by a simple offset measurement at room temperature – for lack of options without disassembly: assuming offset is linear
- Visualization shows “hot/cold spots” -> further investigation required
- Homogeneity and time stability will be remeasured using additional sensors and compared in detail to requirements

Testing the Barrel EMC cooling design – Testing Station

- Testbox will be removed to allow new setup
- Additional PT100 sensors added, old sensors calibrated, when possible
- Degeneration of sensors investigated
- LEDPulser/Fibers fitted for FEE testing @ Pre-Series Slice
- Testing station equipment to be used for production