

Mechanical Constraints for the Barrel EMC



HG Zaunick
(for the Barrel-EMC group)



JLU Giessen, Germany



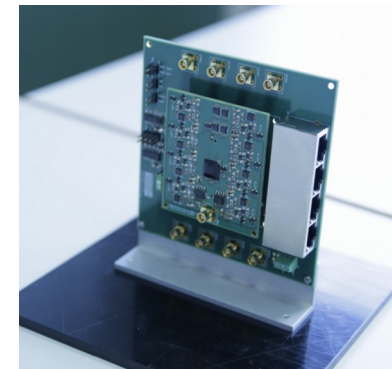
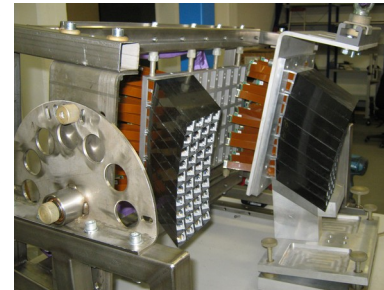
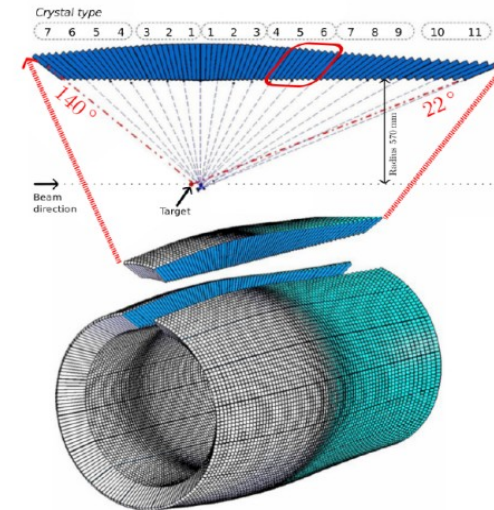
PANDA CM 22/3, MEC
June 13, 2023

PANDA Barrel EMC

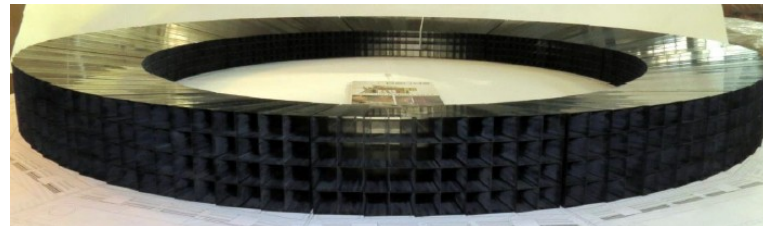
• Envisaged milestones:

Assembly of 1st full Barrel EMC slice

- Infrastructure ✓
- Mechanics (not approved yet) ✓
- 710 detectors ✓
 - 710 crystals in 11 different geometries ✓
 - 1420 APDS ✓
 - Screening including irradiation ✓
 - Matching ✓
 - Glueing ✓
 - Capsules ✓
 - Wrapping ✓
- Assembly of 18 modules ✓
- Assembly of Supermodules ✓
 - 360 left and 360 right handed APFEL-ASIC with flex PCBs ✓
 - ASIC housing or fixtures ✓
- Assembly of FOS slice (✓)
 - Cooling & thermal insulation in progress
 - Backplanes (✓) in production
 - Cables ✓
 - Light pulser fiber coupling in progress
 - Design Support Beam (✓) done, to be tested



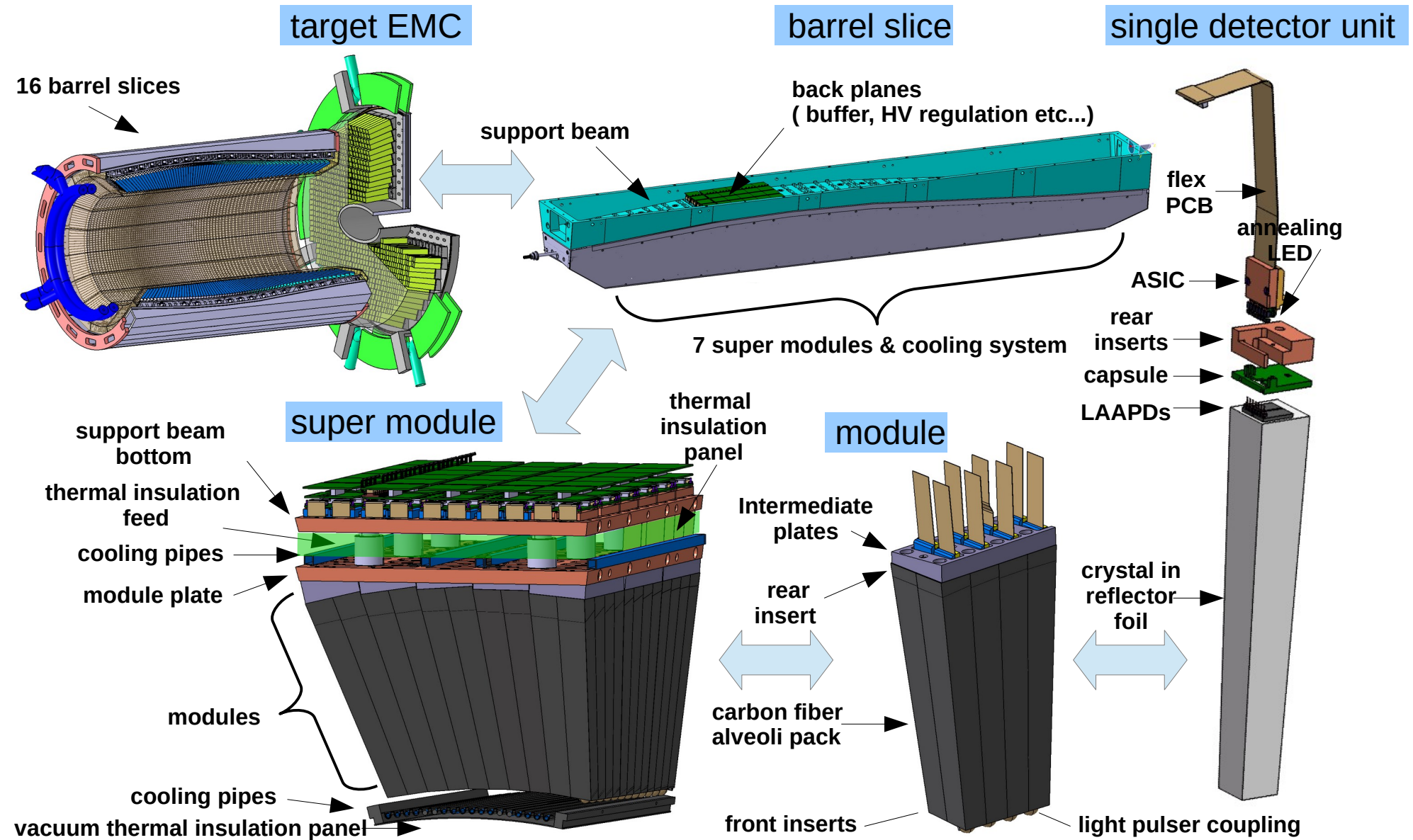
Mechanics



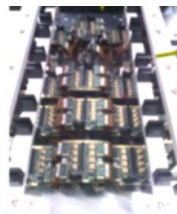
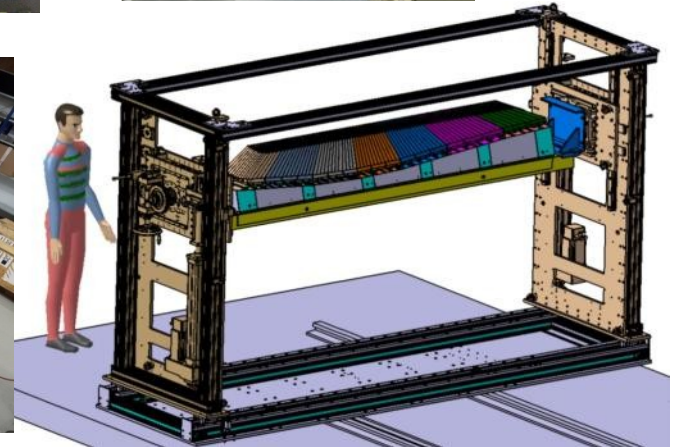
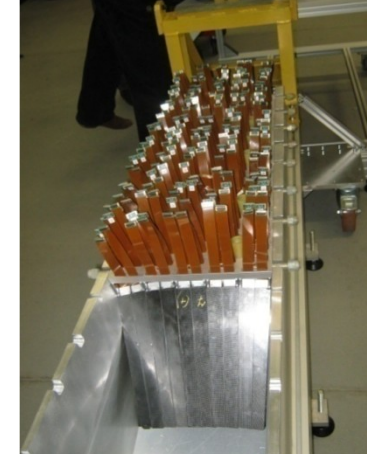
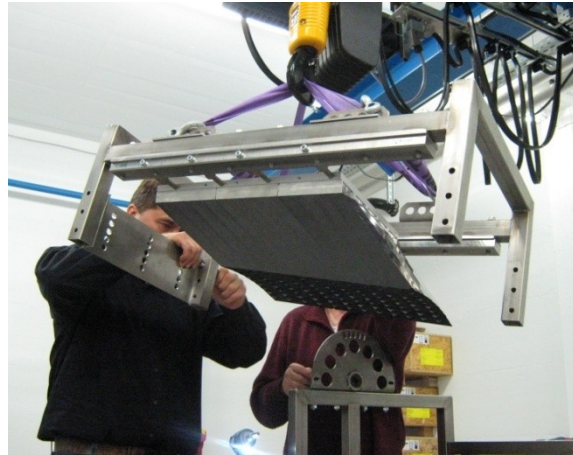
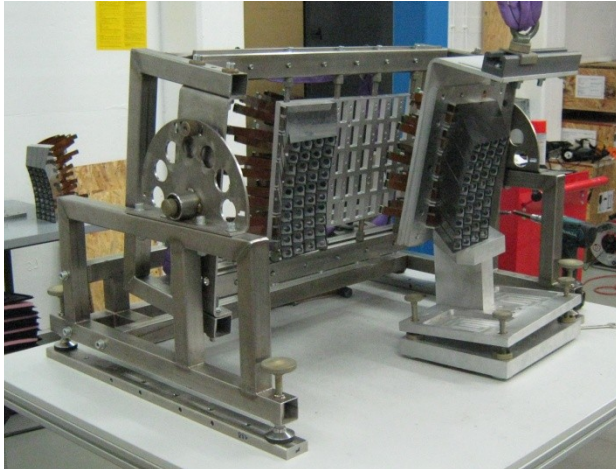
All mechanics parts for all barrel modules produced and delivered by IHEP Protvino until 2021



Current Slice Design



Support Beam

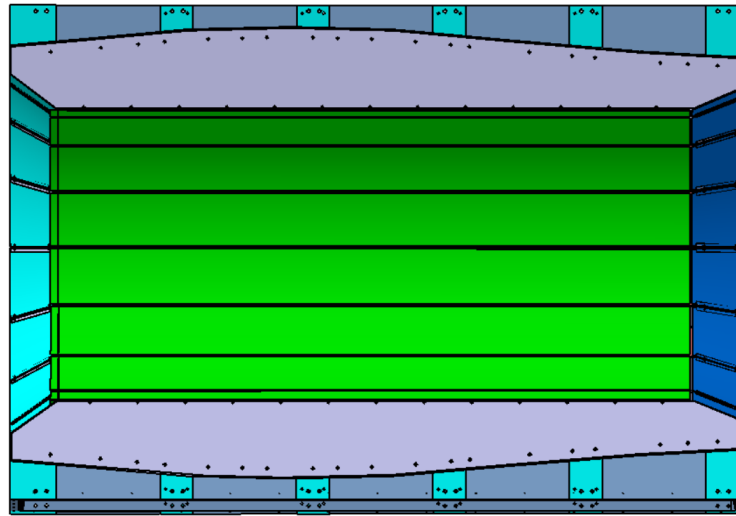
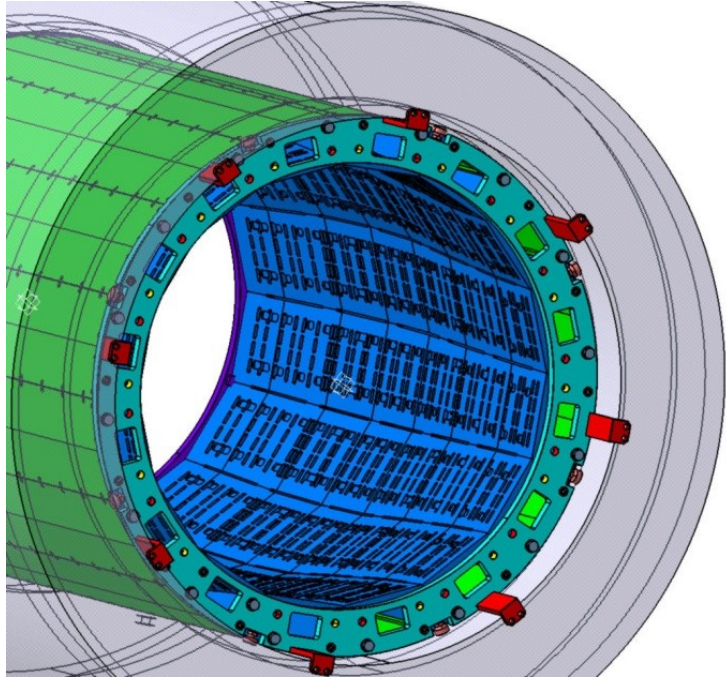


Backplanes will sit inside support beam



Thermal insulation feet between cooled crystal volume and support beam

Support Beam

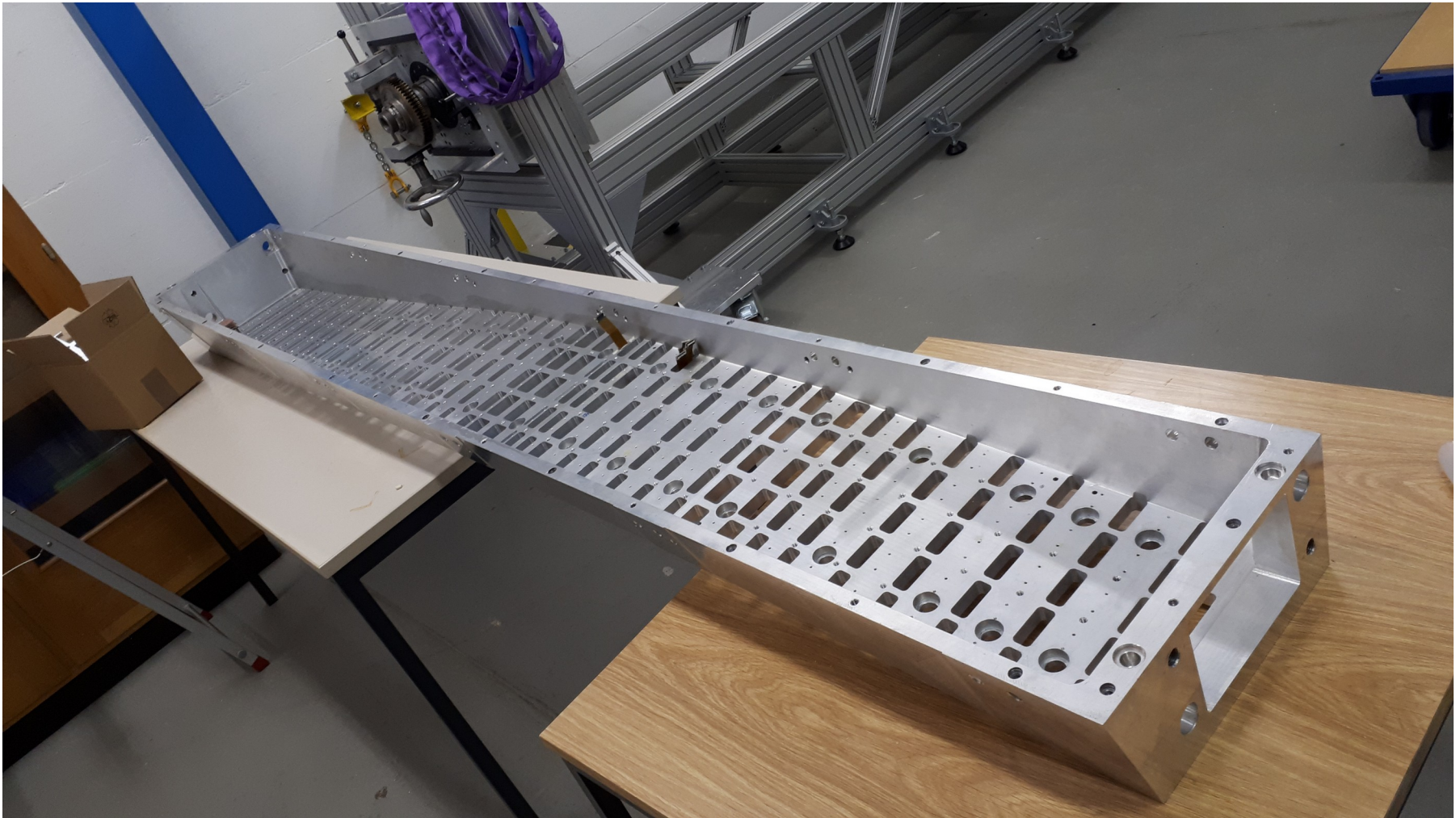


- cable feedthrough openings are individual for each position!
- Redesign in end of 2021 by IHEP Protvino. Not checked/tested with a prototype



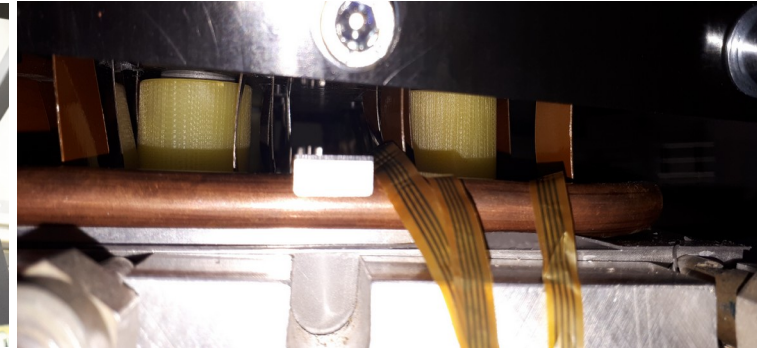
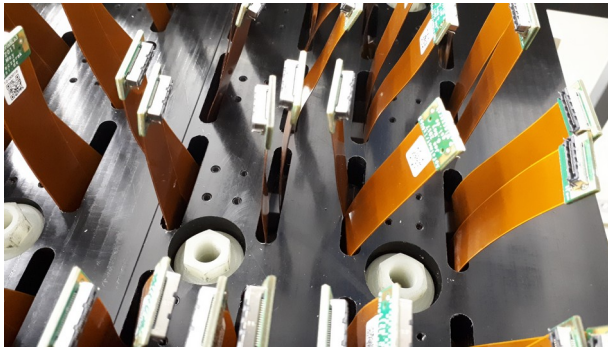
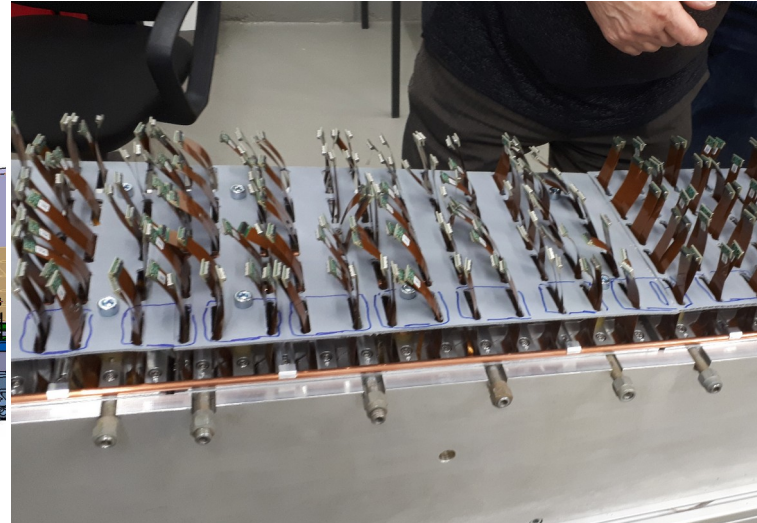
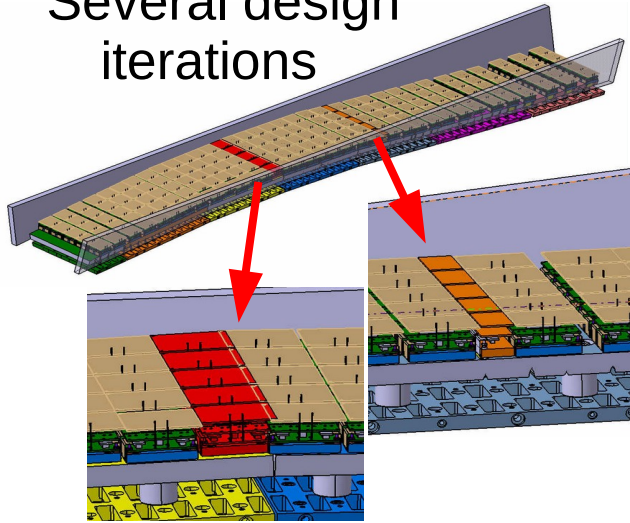
Support Beam

Modification of existing support beam: add additional openings to match position/tilt of flex cables



Support Beam - Redesign

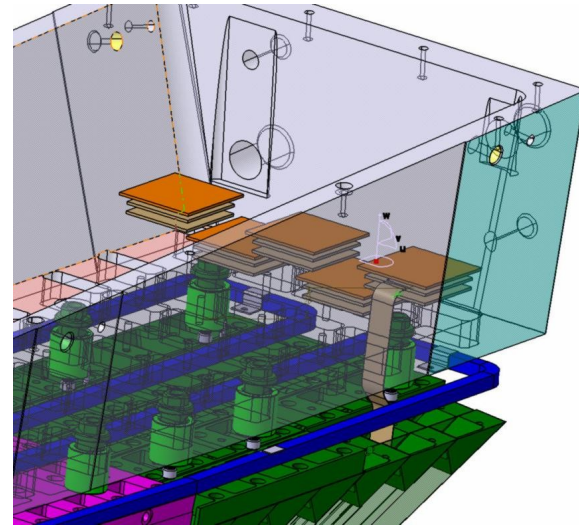
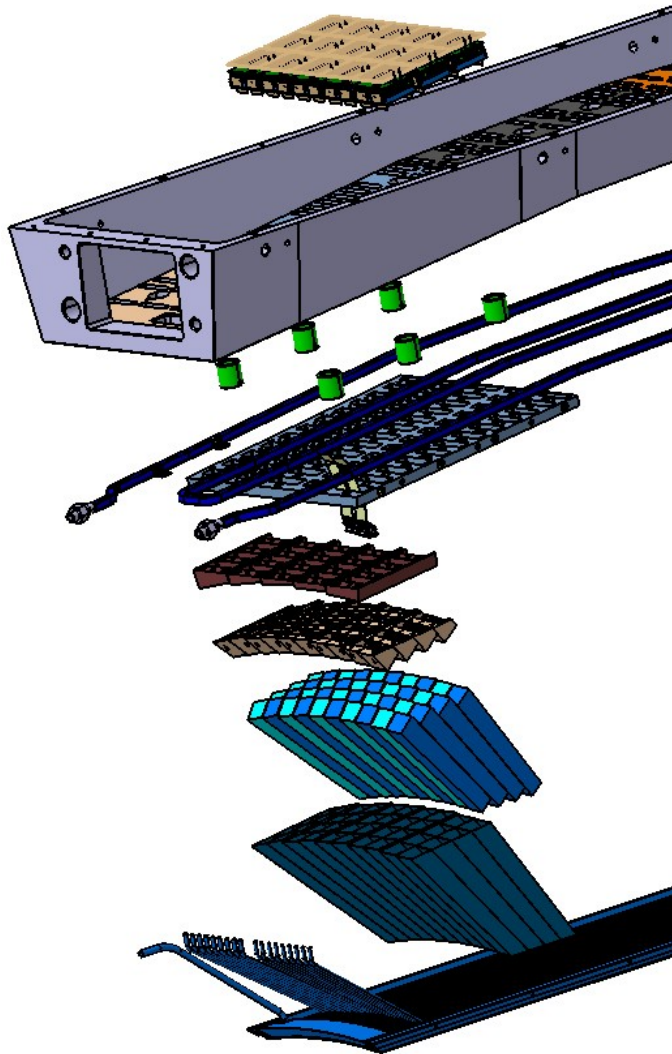
Several design iterations



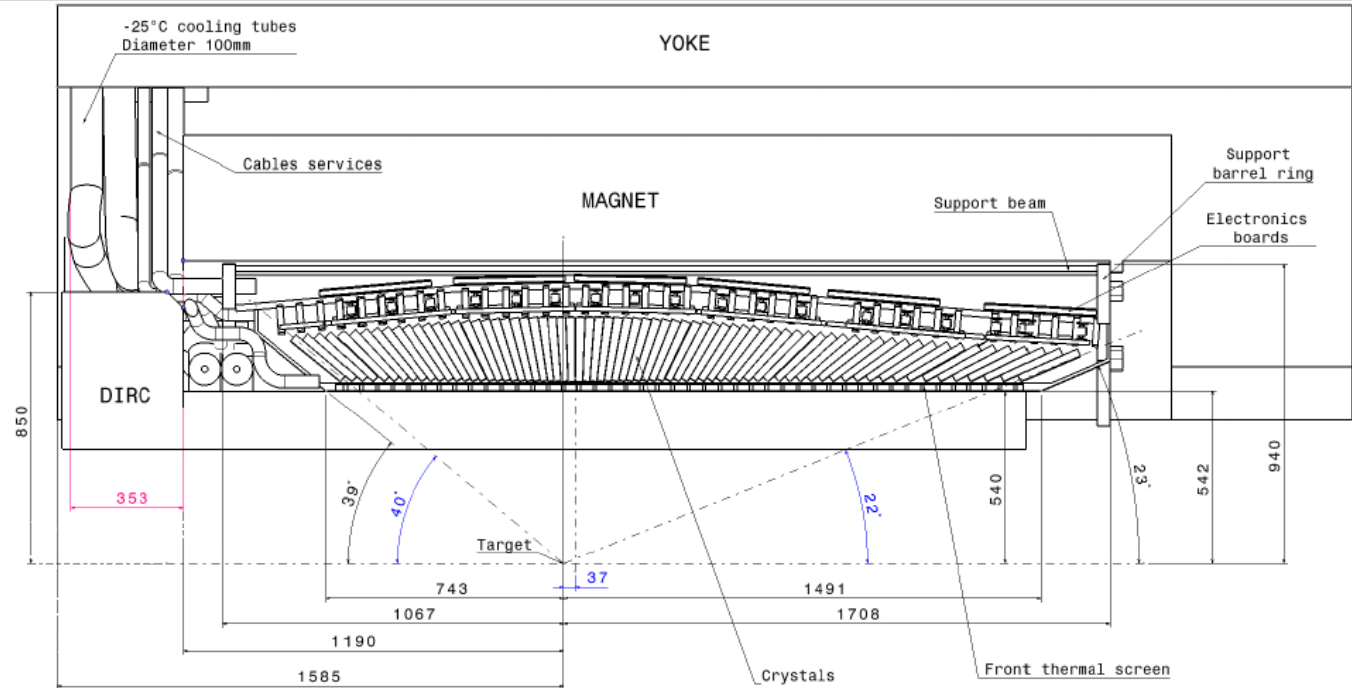
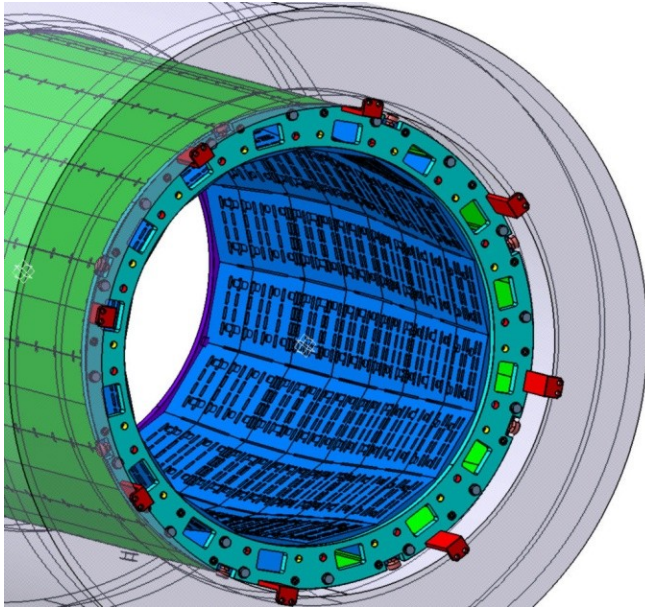
straight FlexPCB routing
now possible

Supp. beam mock-
up of final design

Assembly

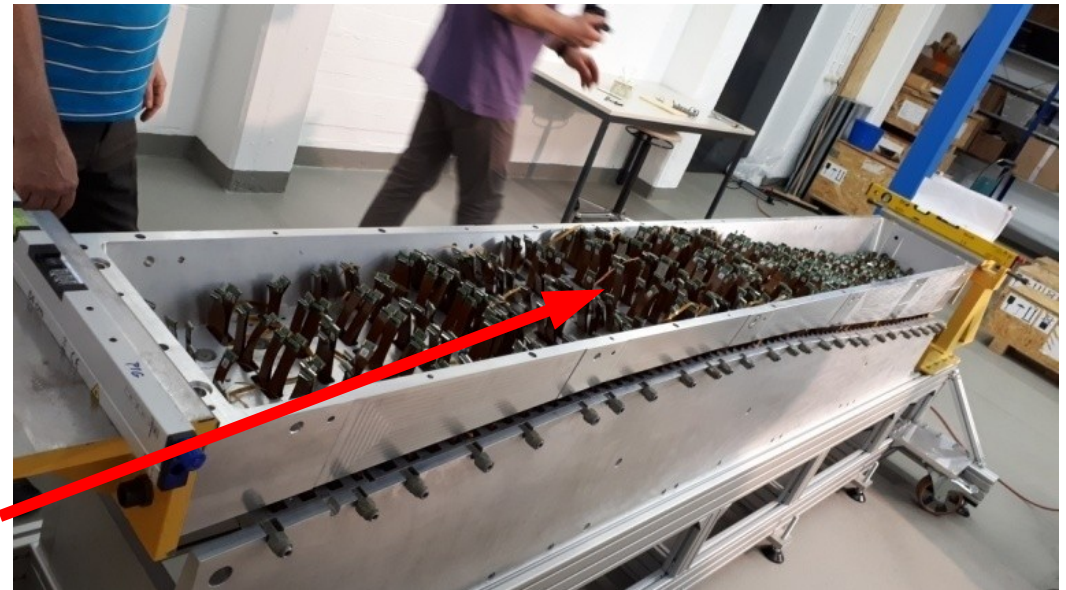


Current Slice Design

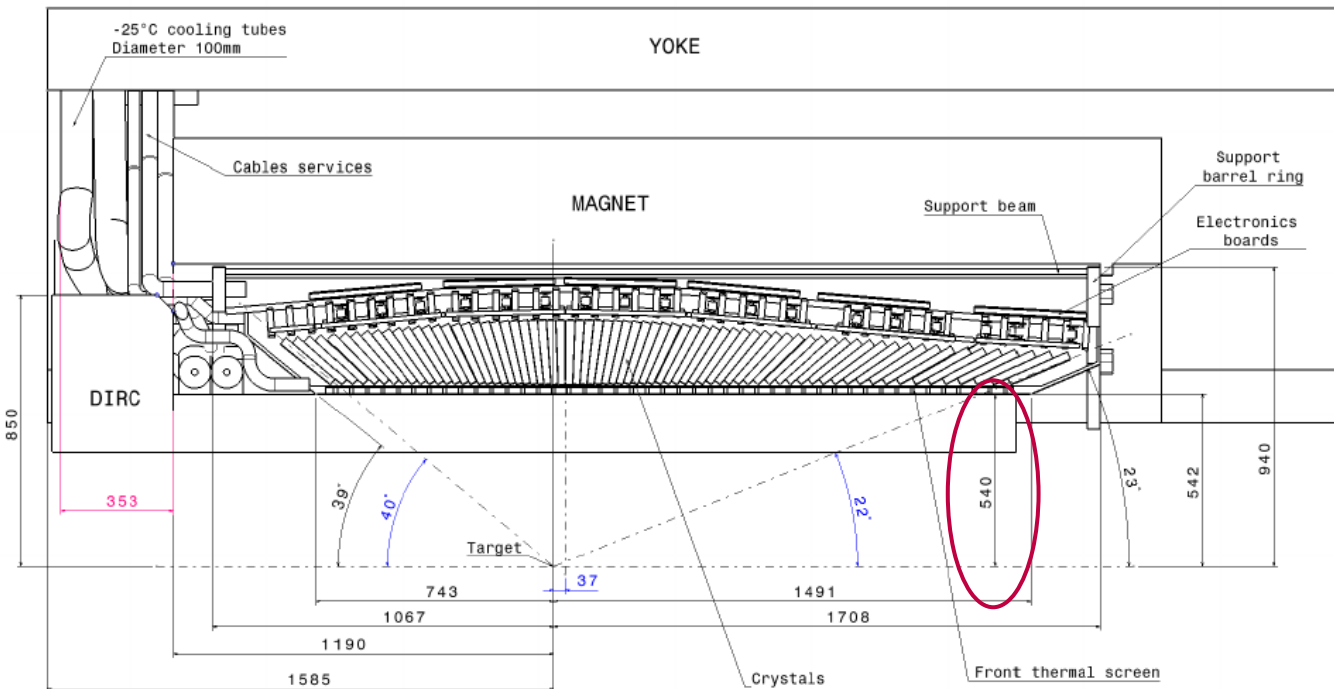


Design constants:

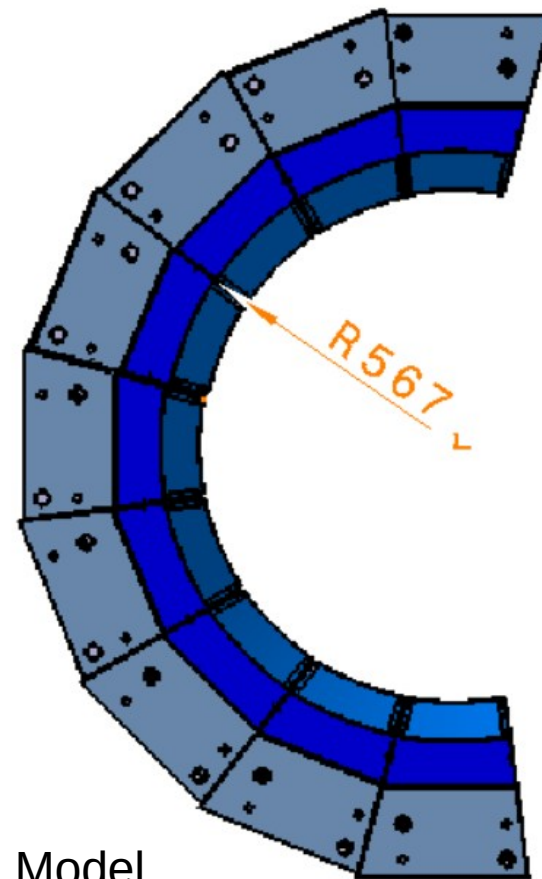
- Inner radius: 540 mm
- Service openings
- Additional mounting holes → Mechanical stability of support beam critical
- Minimum height of support beam due to space required for cabling in central part



What is Correct?



From EMC TDR (2008)



Current CAD Model