

# Endcaps simulation

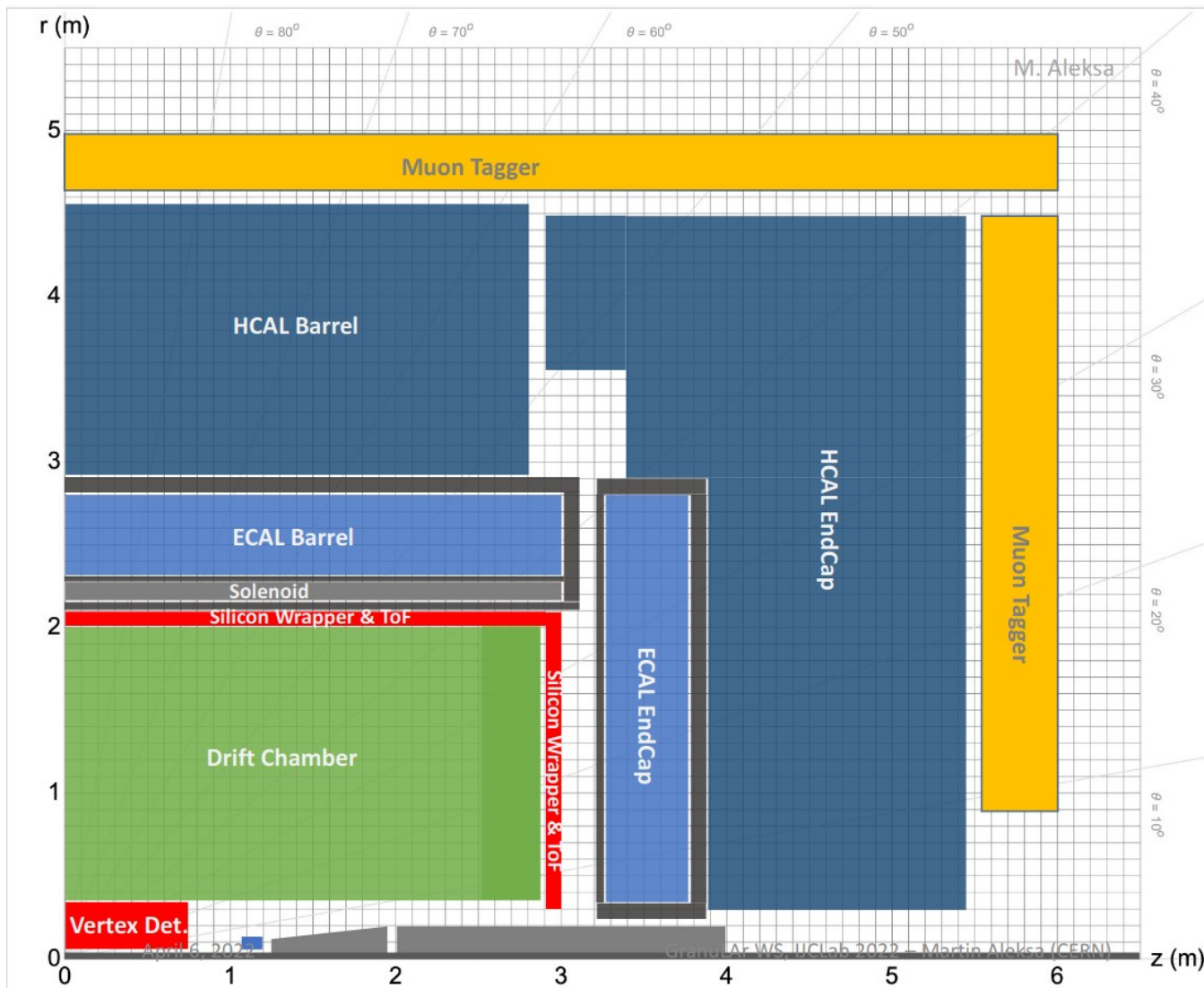


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GranuLAr calorimeter workshop, IJCLab

# Detector concept

- Full detector concept introduced by Martin
- SW implementation of Concept 1 (very preliminary)

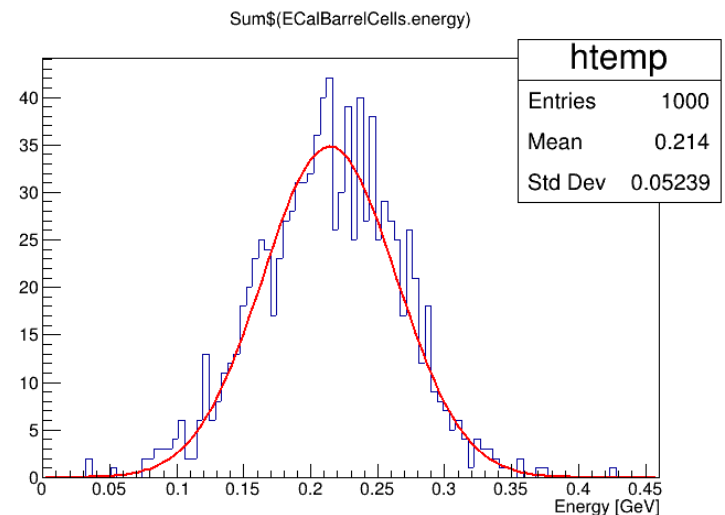
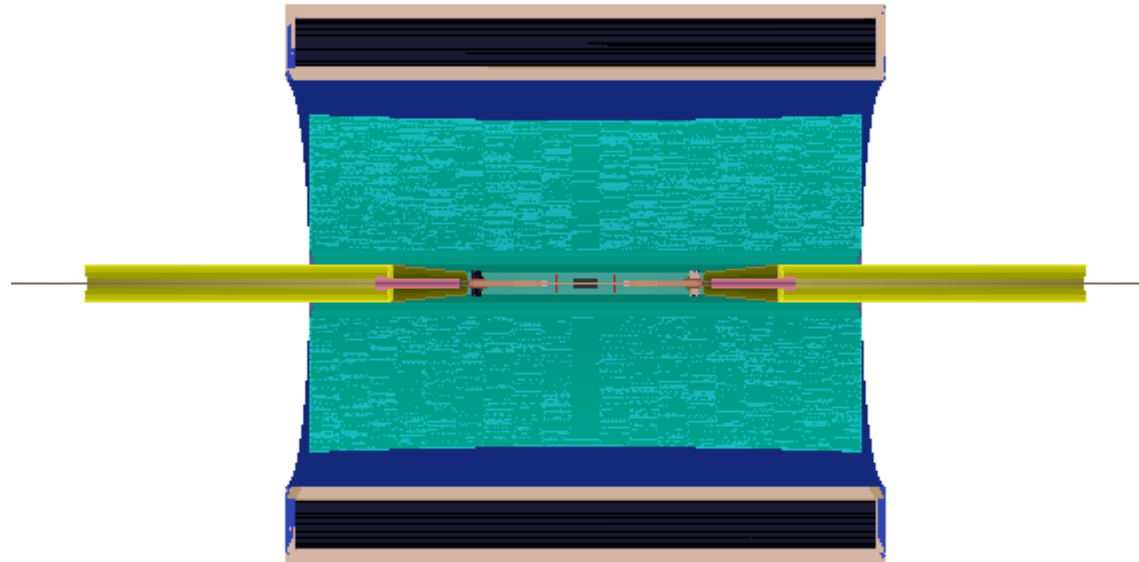


## Detector Concept 1

- Vertex Detector:
  - MAPS or DMAPS possibly with timing layer (LGAD)
  - Possibly ALICE 3 like?
- Drift Chamber ( $\pm 2.5\text{m}$  active?)
- Silicon Wrapper + ToF:
  - MAPS or DMAPS possibly with timing layer (LGAD)
- Solenoid  $B=2\text{T}$ , sharing cryostat with ECAL
- High Granularity ECAL:
  - Noble liquid + Pb or W
- High Granularity HCAL / Iron Yoke:
  - Scintillator + Iron
  - SiPMs directly on Scintillator or
  - TileCal: WS fibres, SiPMs outside
- Muon Tagger:
  - Drift chambers, RPC, MicroMegas

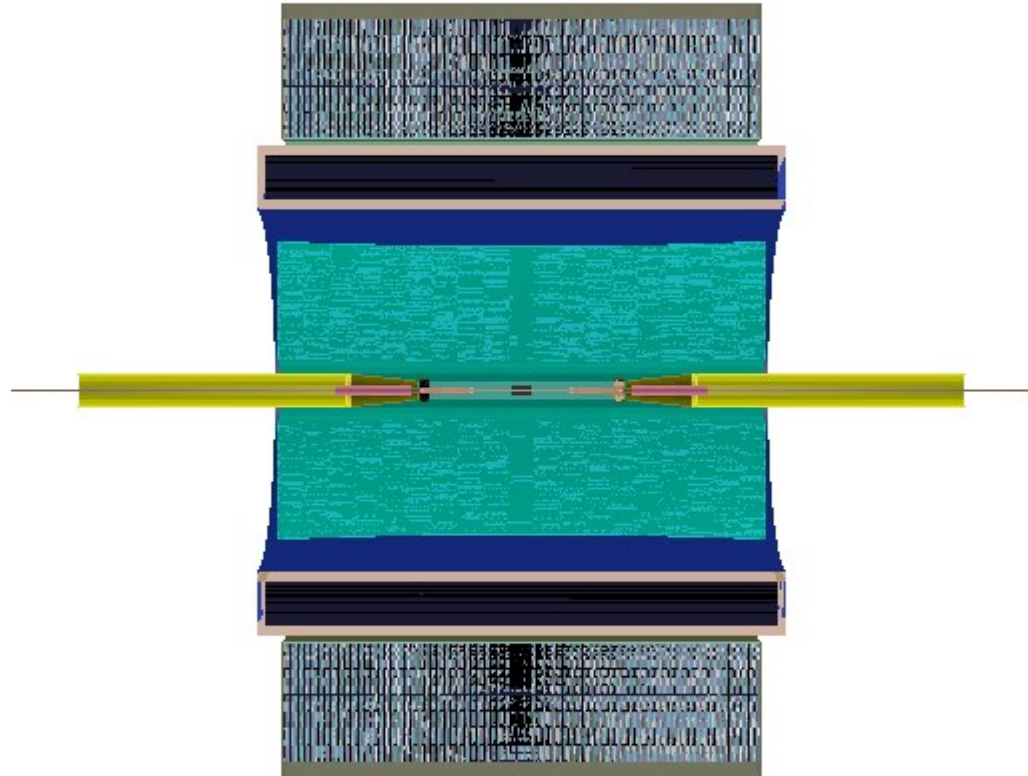
# Barrel

- Vertex, Lumicalc
- Parametrized Drift chamber
- ECAL
  - Cryostat of 5 cm / 10 cm
  - Solenoid in front (7 cm of Aluminium corresponding to 0.78 X0) **NEW**
  - 50 cm of active region
  - 12 layers with sampling fraction changing from 0.11 (strips) to 0.30 (presampler)
- Solenoid in front of ECAL: First look at low energy electrons (300 MeV)
  - Electrons reaches the ECAL



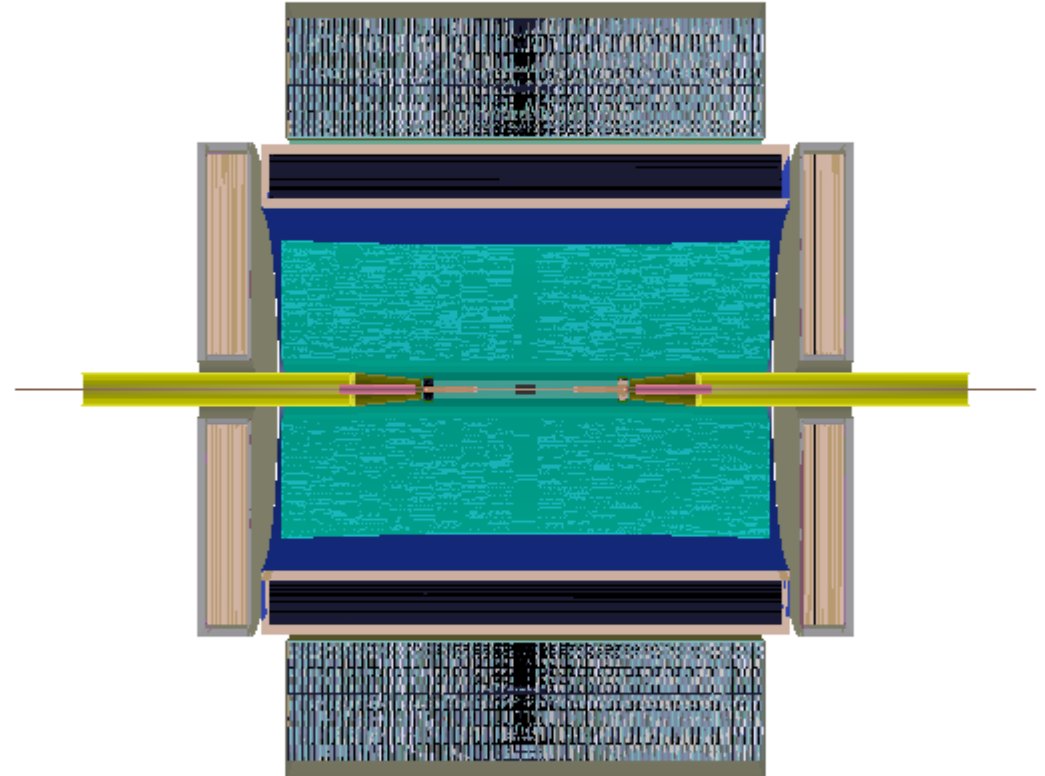
# HCAL barrel

- TileCal HCAL
  - Segmentation in  $\phi \times \eta$ :  $0.024 \times 0.025$
  - 10 compartments in radius (50, 100 and 200 mm)
  - Material: Iron **NEW** + scintillator sequences of 18 mm: master (5 mm) - spacer (4) - master (5) - air (0.5) - scint. (3) - air (0.5)
- Inv. sampling fraction of 31.4 (defined at 70 degrees)



# Endcaps: EMEC

- EMEC
  - Cryostat of 5 cm in front and inner radius, 10 cm in back and outer radius
  - Total thickness: 45 cm
  - Number of Pb disks: 67
  - Passive Pb: 1.5 mm
  - Active LAr: 2 x 2 mm
  - Readout: 1.2 mm
- First two layers in z (presampler): |readout|LAr|
- Inverse sampling fraction of 4.27

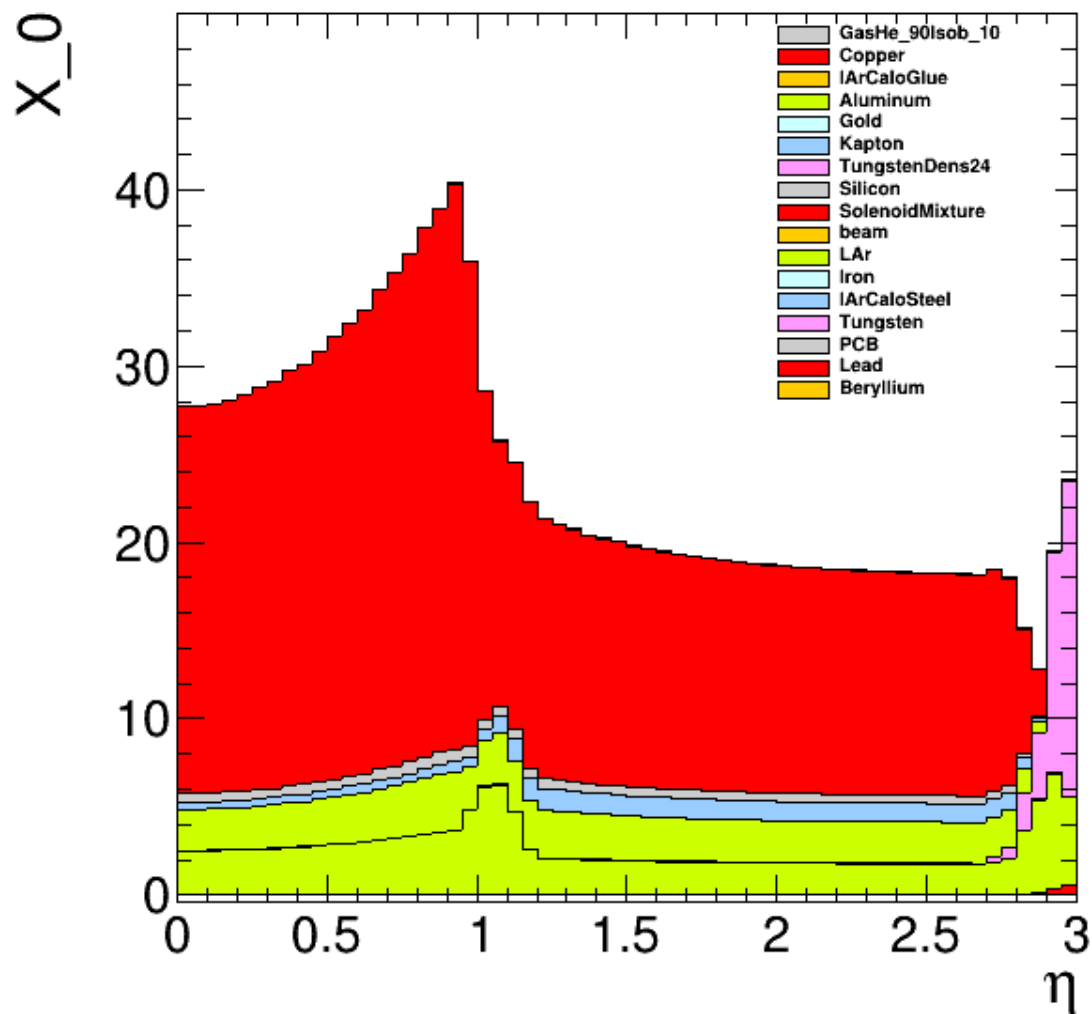


# Material budget after ECAL

**Very preliminary**

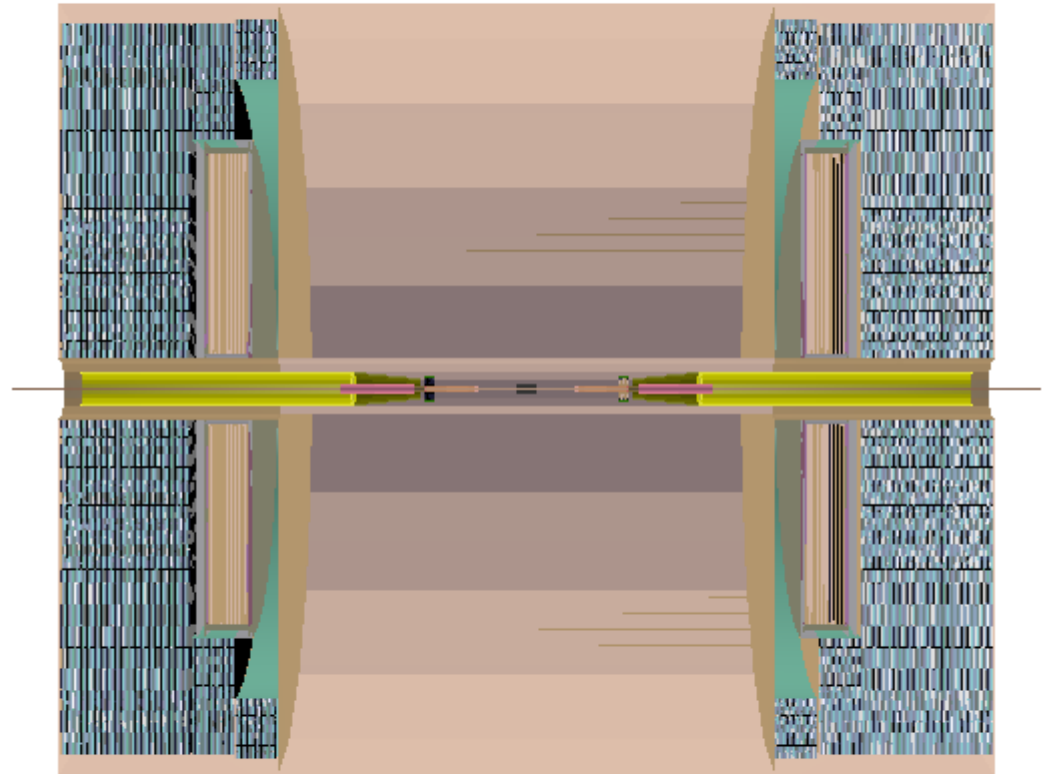
Vertex detector, lumicalc, drift chamber, ECAL barrel and endcap

- ~18 X<sub>0</sub> in the EMEC -> to be optimised



# Endcaps: HEC

- Geometry
  - 3 disks
  - Compartments of 100, 150 and 250 mm (22 layers in the last disk) in radius
- Inv. sampling fraction of 31.7 (at 20 degrees)
- Problem in the envelope (?) – overlap with HCAL barrel → to be fixed





# Conclusions

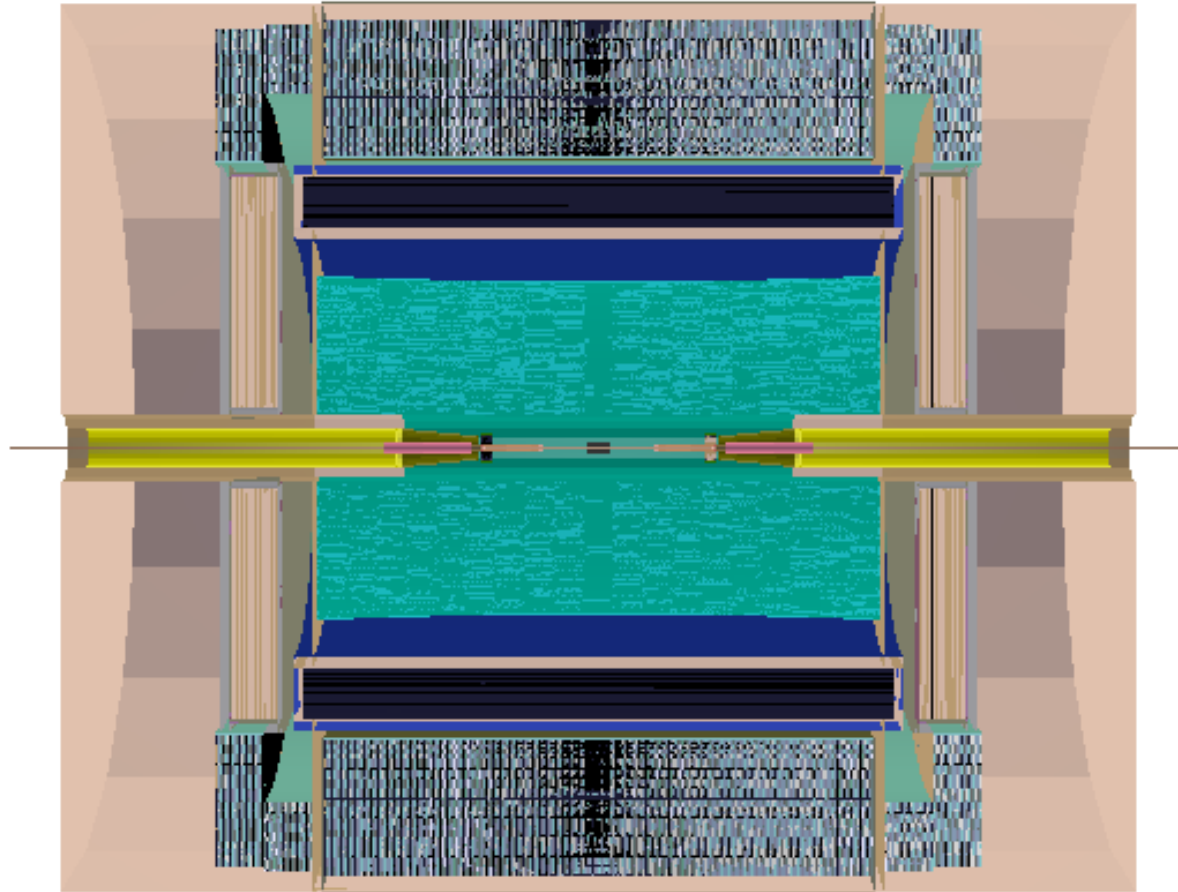
- Implementation of Concept 1 in the SW ongoing
  - Have to fix the problem in HCAL barrel and ext. barrel overlap
  - Double-check the geometry
- Next steps
  - Optimisation of the endcap region





# BACKUP

# HCAL and HEC overlap problem



# Material budget - ECAL + endcaps

**Very preliminary**

Vertex detector, lumicalc, drift chamber, ECAL barrel and endcap, HCAL endcap

- No HCAL barrel