Endcaps simulation

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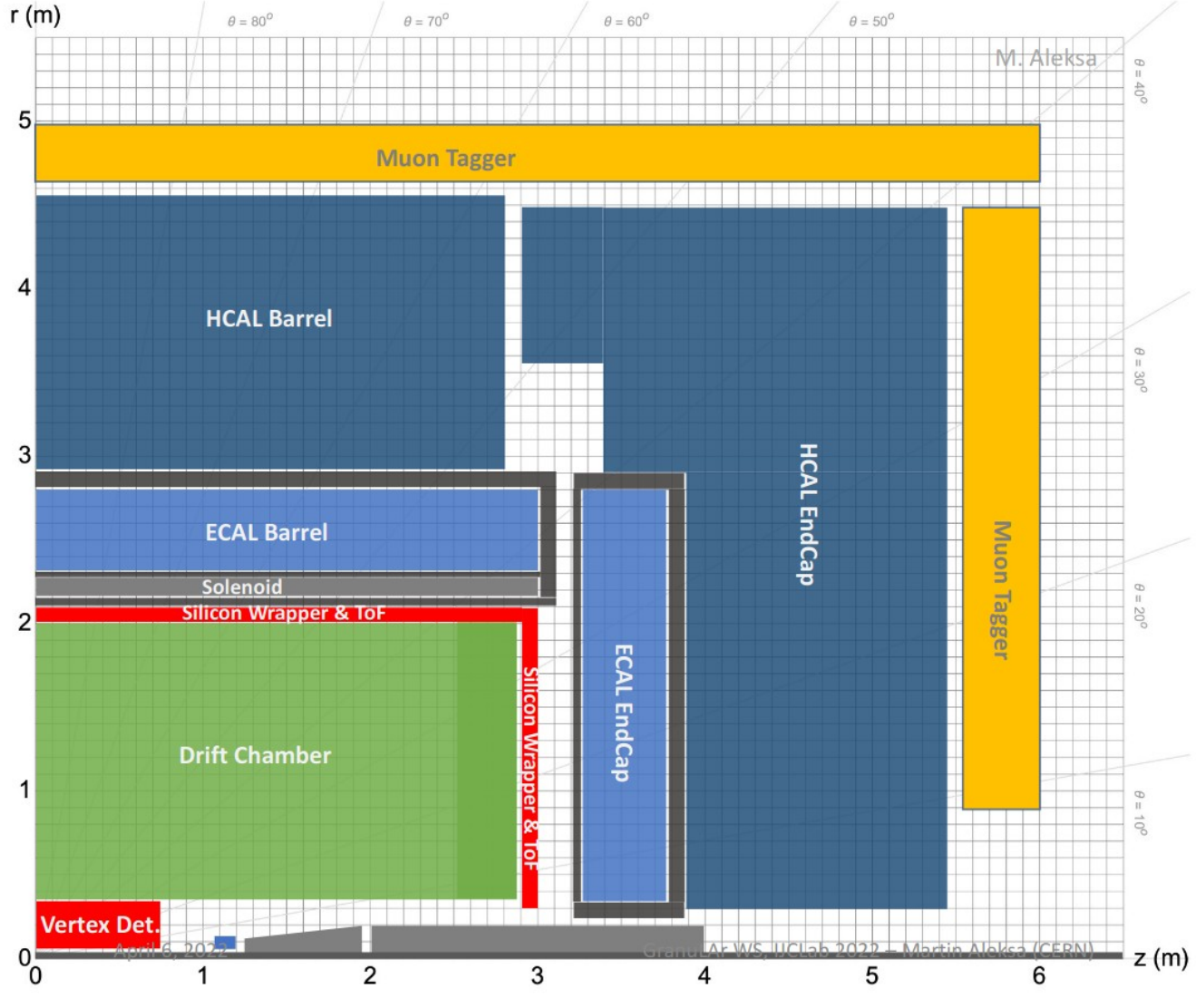
Detector concept

- Full detector concept prepared by Martin

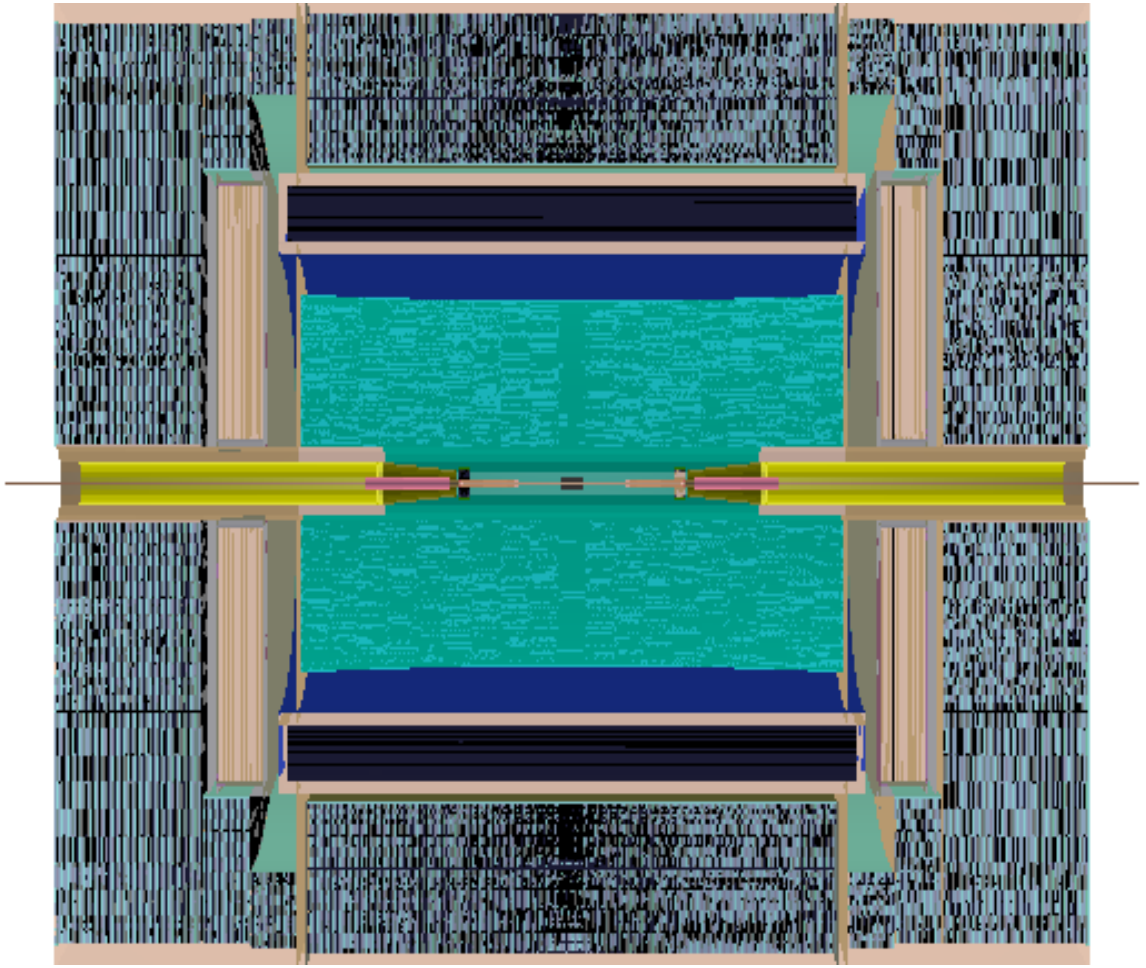


Detector Concept 1

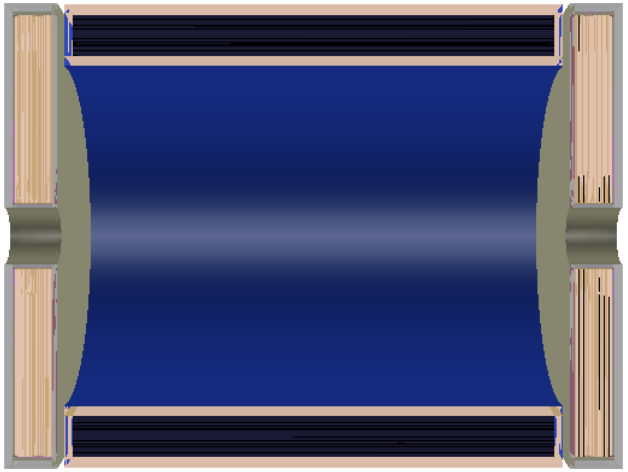
- Vertex Detector:
  - MAPS or DMAPS possibly with timing layer (LGAD)
  - Possibly ALICE 3 like?
- Drift Chamber (±2.5m active?)
- Silicon Wrapper + ToF:
  - MAPS or DMAPS possibly with timing layer (LGAD)
- Solenoid B=2T, sharing cryostat with ECAL
- High Granularity ECAL:
  - Noble liquid + Pb or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

Full detector in FCC SW

- Problem in the hadronic endcaps fixed
- Full geometry in the SW



ECAL Barrel & endcaps



ECAL barrel

- Cryostat of 5 cm / 10 cm
- Solenoid in front (7 cm of Aluminium corresponding to 0.78 X_0)
- 45 cm of active region
- 12 longitudinal layers with sampling fraction changing from 0.11 (strips) to 0.30 (presampler)

ECAL endcaps

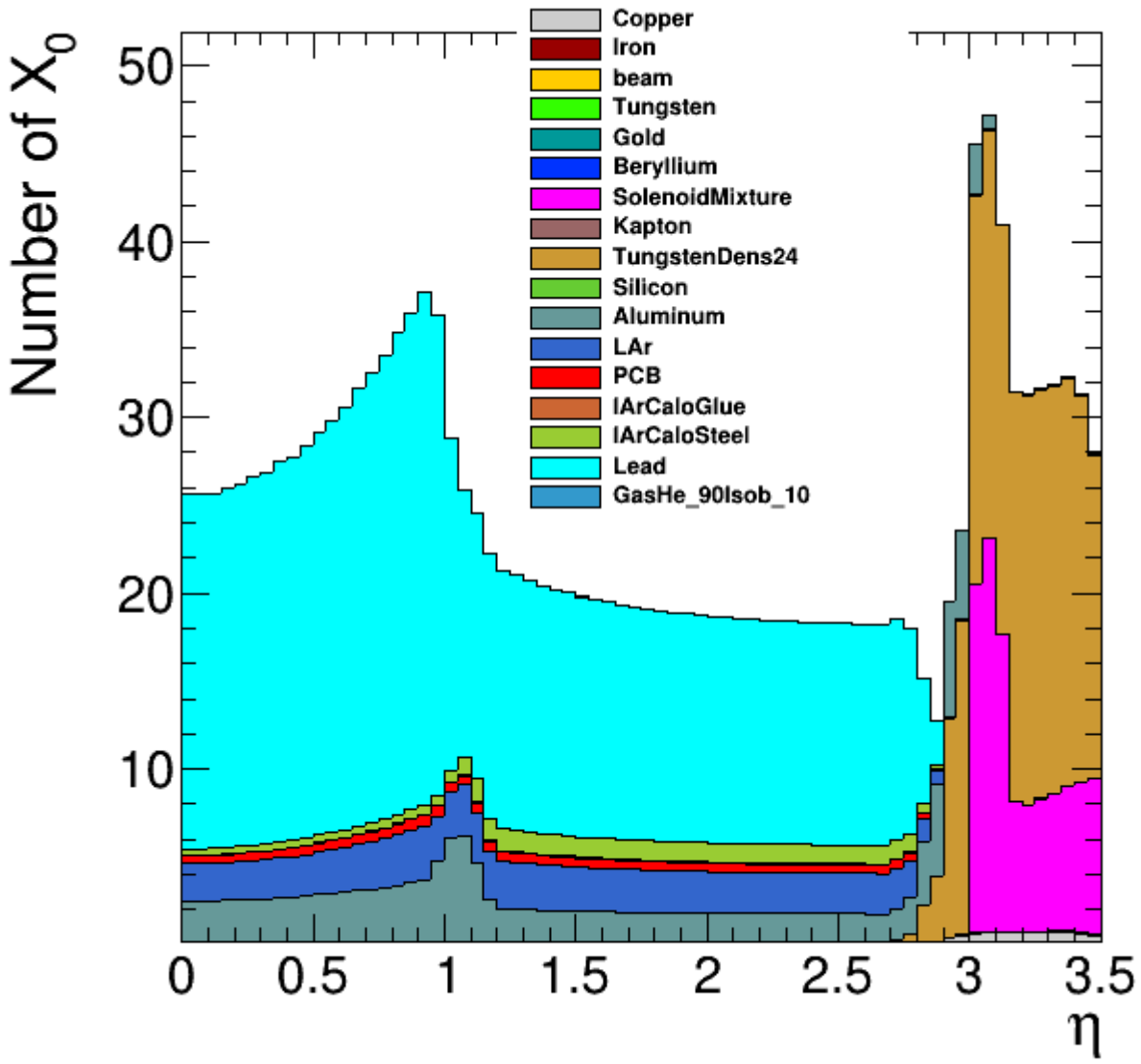
- Cryostat of 5 cm (front and inner radius) / 10 cm (back and outer radius)
- Total thickness: 45 cm
- Number of absorber disks: 67
  - Passive (Pb+steel+glue): 1.5 mm
  - Active (LAr): 2 x 2 mm
  - Readout (PCB): 1.2 mm
- First two layers in **z** (presampler): |readout|LAr|
- Inverse sampling fraction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

Material budget after ECAL

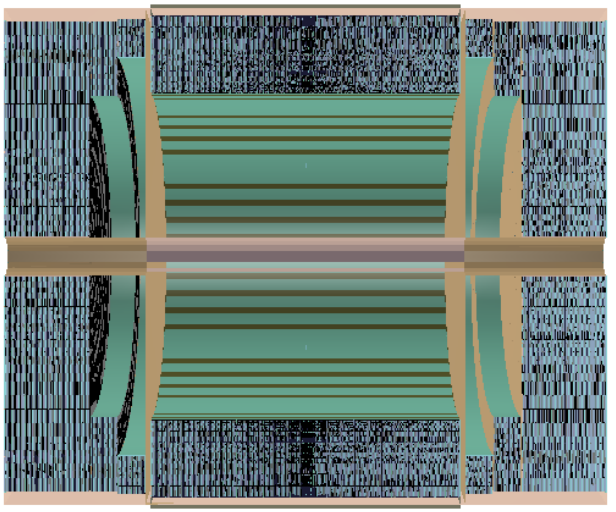
Detectors included:

- Vertex detector, lumicalc, drift chamber,
- ECAL barrel and endcaps

- 25 – 35 X_0 in the barrel
- 18 – 21 X_0 in the EMEC
- Peak at 3 from lumicalc
  - r = 0.145 m and z = 1.074 m → $|\eta|$~2.7



HCAL Barrel & endcaps



HCAL Barrel (TileCal)

- Segmentation in φ x η: 0.024 x 0.025
- 10 compartments in radius (50, 100 and 200 mm)
- Material: Iron + 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)

HCAL Endcaps (TileCal)

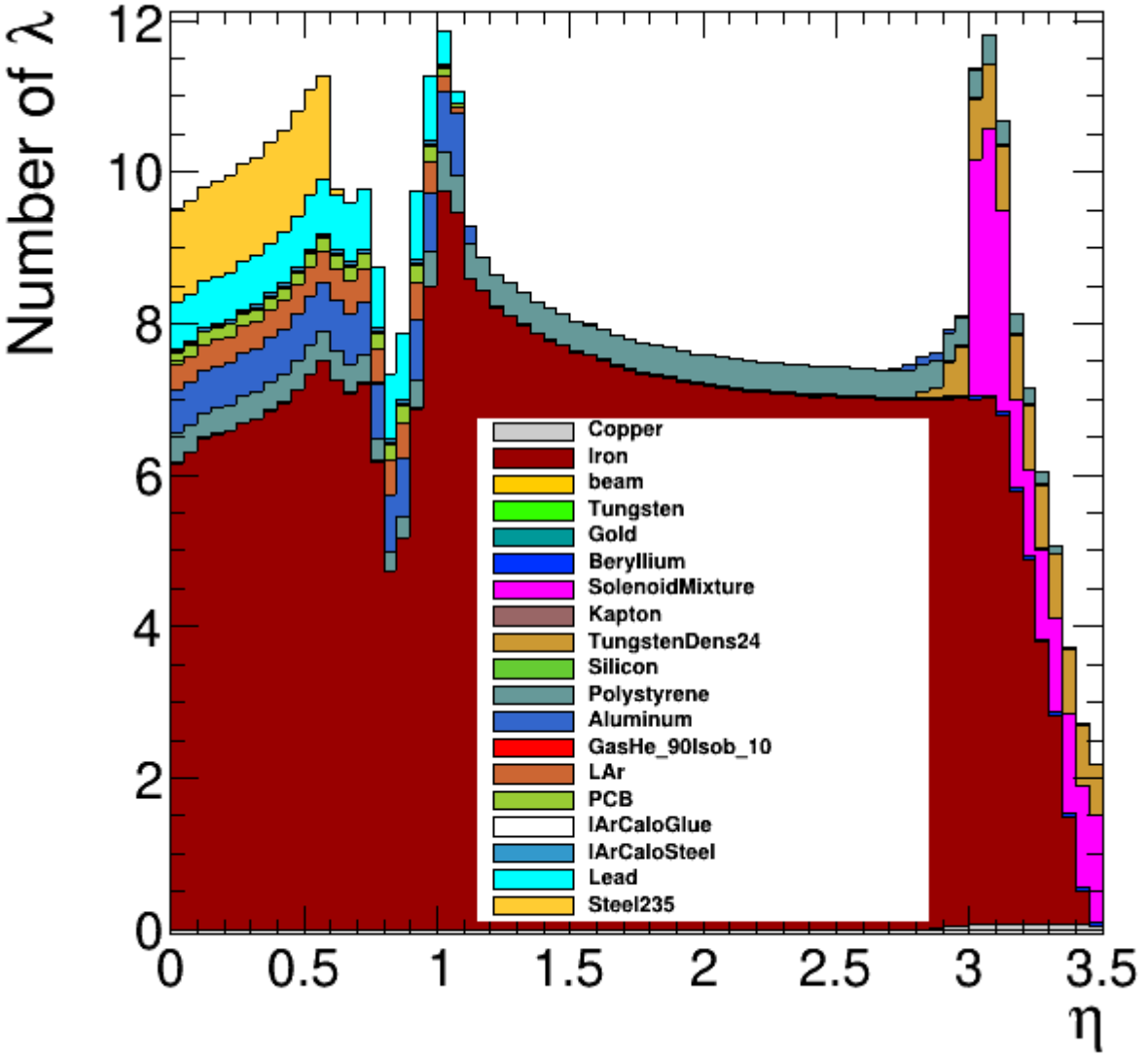
- Three disks in z
- Compartments of 100, 150 and 250 mm (22 layers in the last disk) in radius
- Material: Iron + scintillator
  - sequences of 18 mm
- Inv. sampling fraction of 31.7 (at 20 degrees)

Material budget: Full detector

Detectors included

- Vertex detector, lumicalc, drift chamber
- ECAL barrel and endcaps
- HCAL barrel and endcaps

- 9.5 – 11 λ in the barrel
  - The material of absorbers changed to iron (it is steel + Pb in the current version FCC SW)
  - Steel support (20 cm)
- ~7.5 λ in the endcaps



Conclusions

- Detector Concept 1 in FCC SW implemented
  - I will clean the code and make a PR in the official SW
- TODO
  - Start with the optimisation of the endcap region

BACKUP