Update on the muon system in the ILD detector

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The muon system in the ILD detector

The task of the muon system in ILD is the identification of muons, the momentum measurement is performed in the tracker. Muon system, tail catcher.

Cryostat
- Radial size 90 cm

Coil:
- Shape 12-fold
- Thickness 385 mm

Yoke:
- Radial size (barrel) : 316 cm
- Thickness (end-cap) : 266 cm
- Equipment : scintillator strips (0.5 cm) / steel (10 cm)
- Segmentation 10 (100mm + 40 mm gap)

Recent studies about the design of the coil an of the yoke: see U.Schneekloth, Seoul ILD workshop
New geometry of the muon system in ILD

LOI geometry

Cryostat
- One block with coil

Iron Coil
- Iron, single block
- Thickness cryostat + coil 750 mm

Yoke
- 10 RPC layers/steel abs. + 1 sensitive layer at the end of the barrel

New Geometry

- Stainless steel, outer and inner tank wall, 2 double scintillator layers (0.5 cm)
- Total radial size: 900 mm

- 385 mm thick, mixture of 0.992 Al, 0.048%, Cu, 0.030% NbTi
- 3 segments + 2 Correction current segments

- Scintillator sensitive layer/steel abs.
- Additional 2 sensitive layers in end-cap and barrel
New geometry of the muon system in ILD

Segment of the iron coil

Correction current

Segment of the iron coil

New geometry of the ILD detector in MOKKA. Details of the yoke and of the cryostat
Muons in the new geometry

20 GeV muon simulated in the **LOI - ILD detector geometry**

20 GeV muon simulated in the **new ILD detector geometry**
Muon system performance

- Use Pandora PFA reconstruction of tracks and clusters
- Simple muon id: Muon identified connecting the tracks in the tracker and the AHCAL and the energy deposit in the muon chambers
- AHCAL-based muon id: Muon identified connecting the tracks in the tracker and the mip-like clusters in the AHCAL

Single muon detection efficiency in the ILD detector (LOI geometry).

Muon detection efficiency in b jets, the ILD detector (LOI geometry).
Conclusions

• Interplay between technological studies and simulation of the muon system

• New geometry for the muon system developed in the MOKKA framework and now available

• Studies on the muon identification efficiency with the new geometry in preparation