Update on the muon system in the ILD detector

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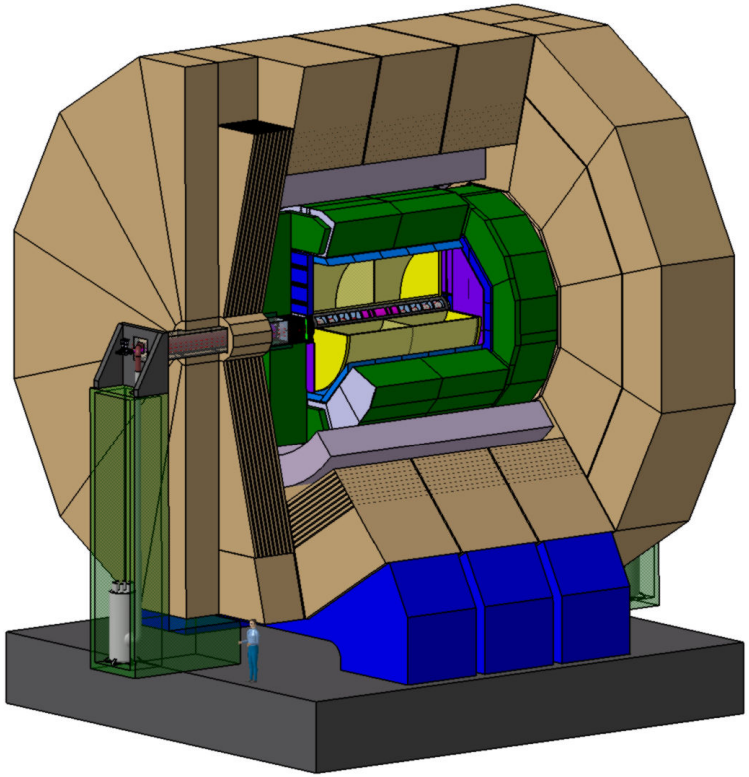
The muon system in the ILD detector



ILD detector for the International Linear Collider

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.

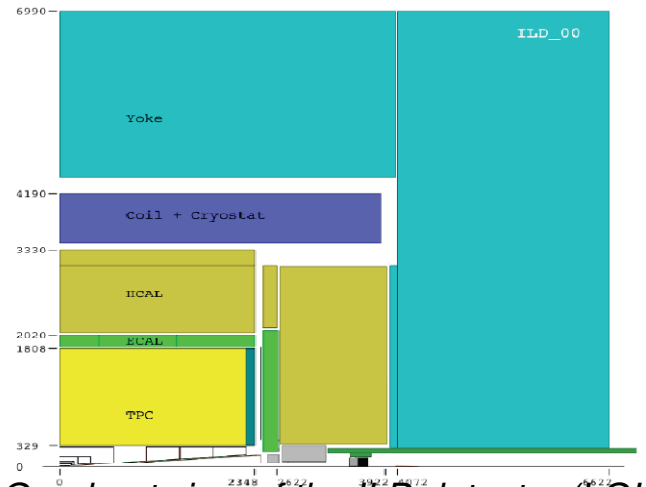
Cryostat
- *Radial size 90 cm*

Coil:
- *Shape 12-fold*
- *Thickness 385 mm*

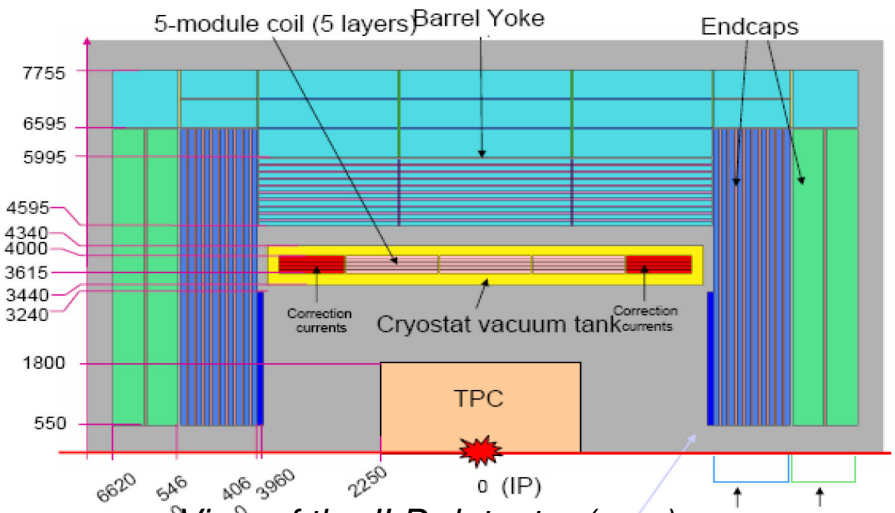
Yoke:
- *Radial size (barrel) : 316 cm*
- *Thickness (end-cap) : 266 cm*
- *Equipment : scintillator strips (0.5 cm) / steel (10 cm)*
- *Segmentation 10 (100mm + 40 mm gap)*

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



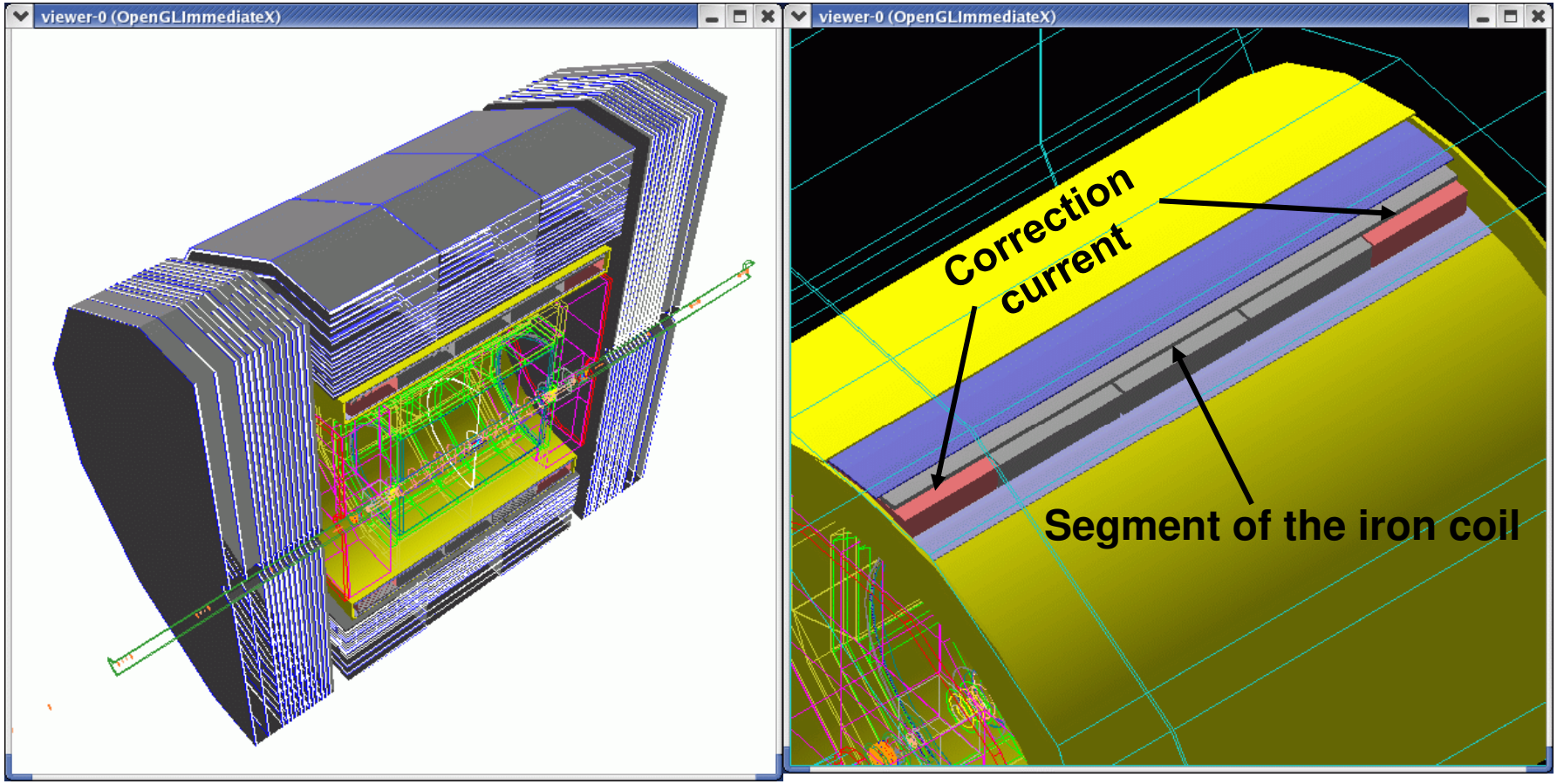
Quadrant view of the ILD detector (LOI)



View of the ILD detector (new)

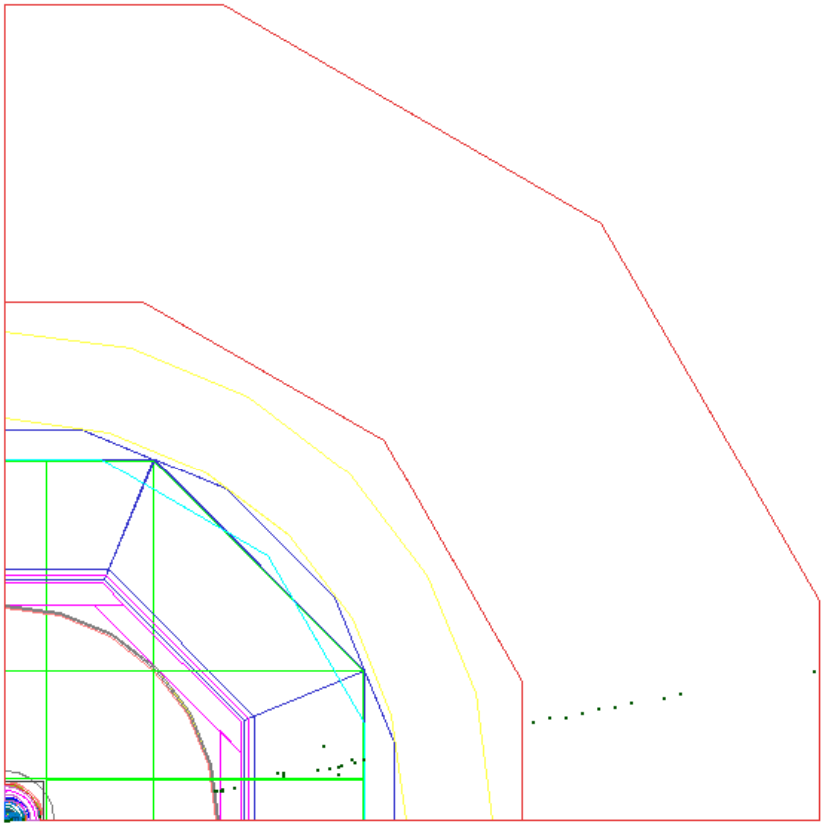
	LOI geometry	**New Geometry**
Cryostat	One block with coil	*stainless steel, outer and inner tank wall, 2 double scintillator layers (0.5 cm) Total radial size: 900 mm*
Iron Coil	Iron, single block Thickness cryostat + coil 750 mm	385 mm thick, mixture of 0.992 Al, 0.048%, Cu, 0.030% NbTi 3 segments + 2 Correction current segments.
Yoke	10 RPC layers/steel abs. + 1 sensitive layer a the end of the barrel	Scintillator sensitive layer/steel abs. Additional 2 sensitive layers in end-cap and barrel

New geometry of the muon system in ILD

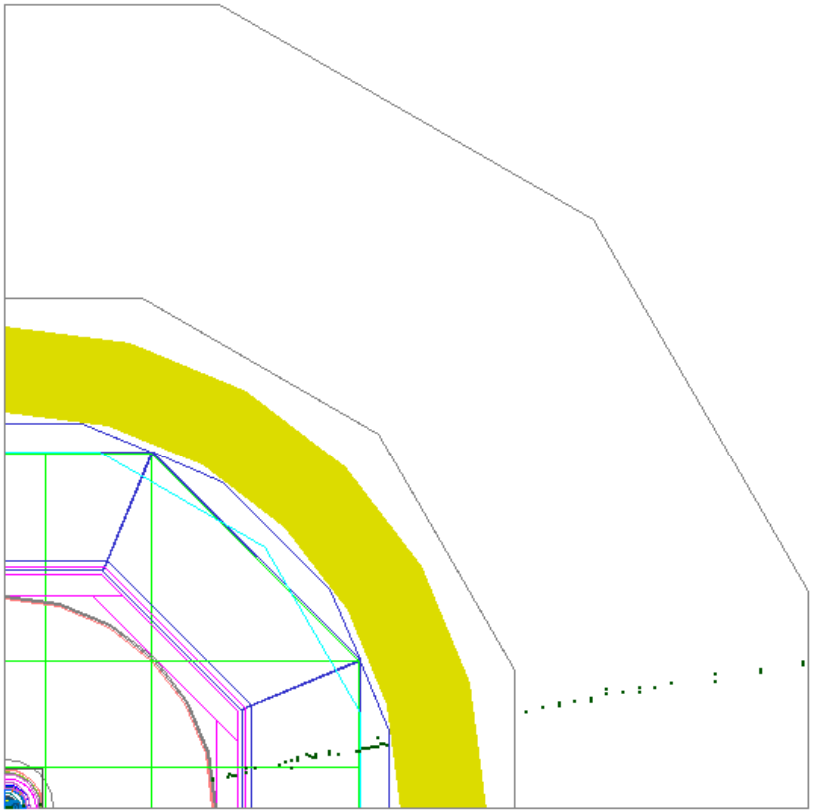


New geometry of the ILD detector in MOKKA. Details of the yoke and of the cryostat

Muons in the new geometry

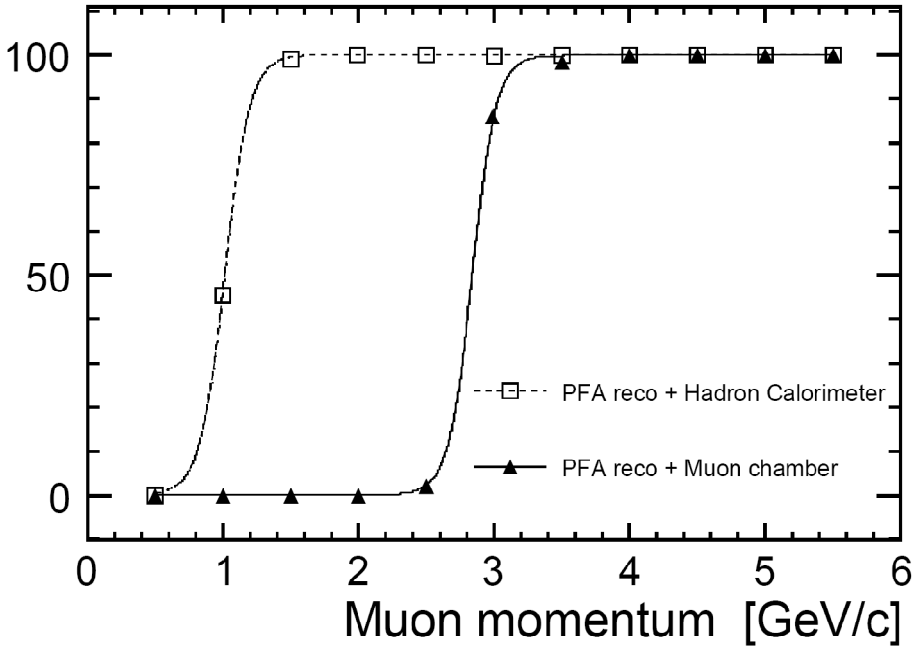


20 GeV muon simulated in the ***LOI -*** *ILD detector geometry*

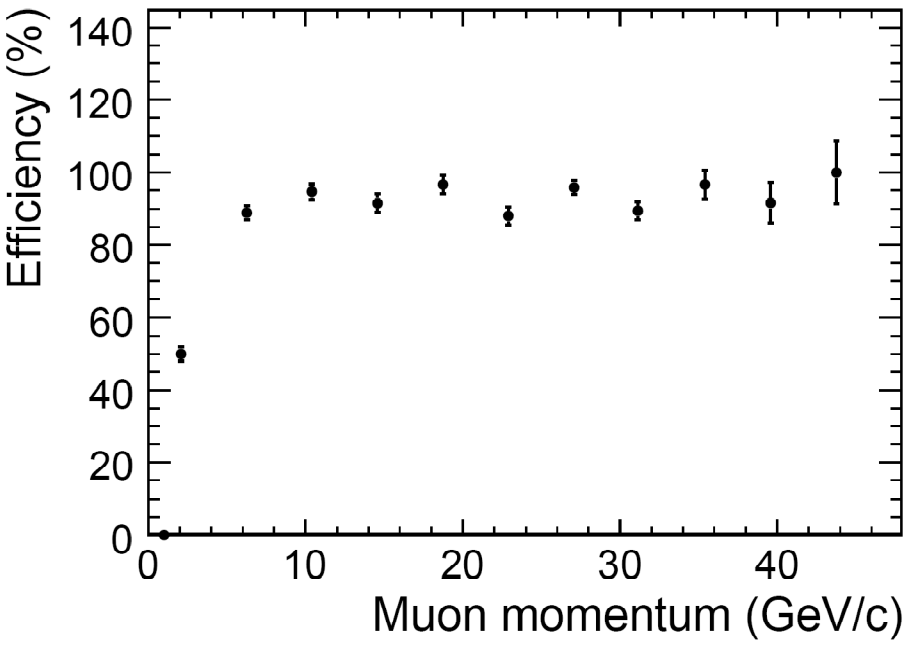


20 GeV muon simulated in the ***new*** *ILD detector geometry*

Muon system performance



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



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

- 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

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