
ILD Muon System Simulation Structure

N.D'Ascenzo, V. Saveliev
DESY, Germany,
National Research Nuclear University, Russia

The Magnet and Muon System of ILD

The tasks of the Muon System in ILD are

- Identification of muons and tracking as a part of PFA,
- Function of Tail Catcher for HCAL

Cryostat and Coil:

- Detailed Geometry,
- Coil Segmentation

Yoke:

- Detailed Geometry based on Segmented Mechanical Design
- Barrel: 10x(100mm Iron+40mm Air Gap) +3x(560mm Iron +40mm Air Gap)
- End Cup: 10x(100mm Iron+40mm Air Gap) +2x(560mm Iron+40mm Air Gap)

The Magnet and Muon System of ILD

Cryostat Instrumentation:

- Instrumentation 2 Scintillator/WLS/SiPM Double Sensitive Layers

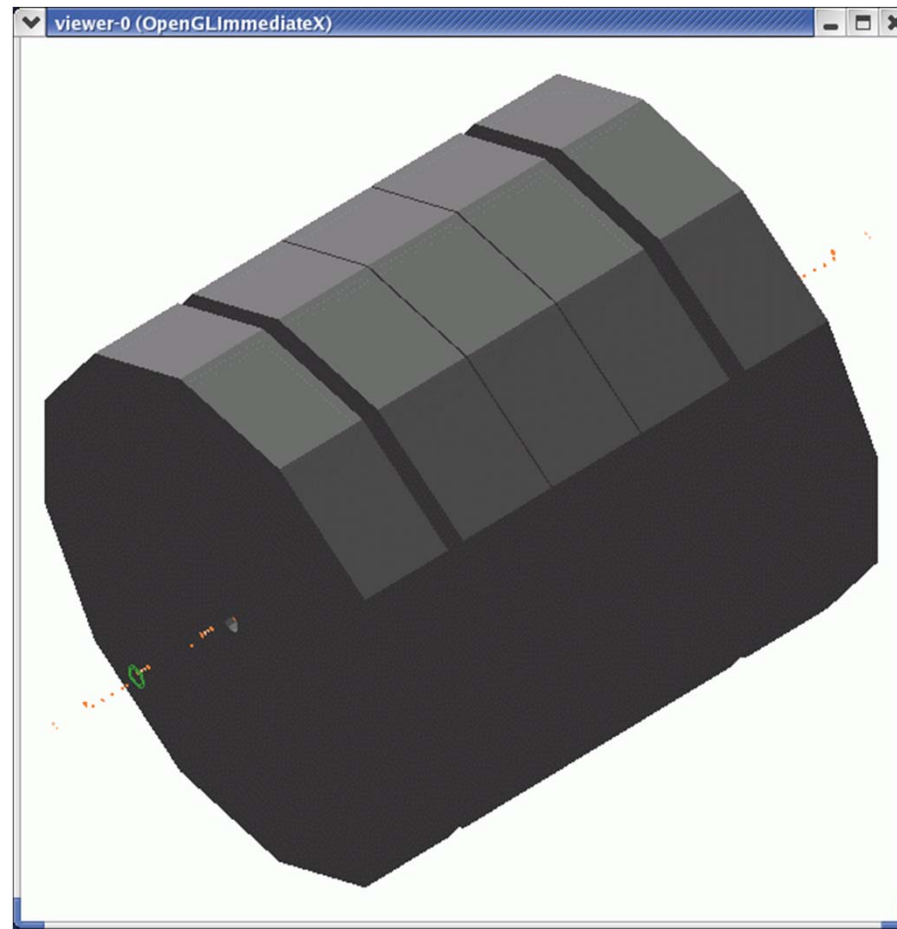
Yoke Instrumentation

- 13 Scintillator/WLS/SiPM Double Sensitive Layers Barrel Yoke
- 12 Scintillator/WLS/SiPM Double Sensitive Layers Endcap Yoke

10 first Sensitive Layers in Barrel and End Caps are positioned with constant step of 140 mm, for the purpose of the study of the Tail Catcher function

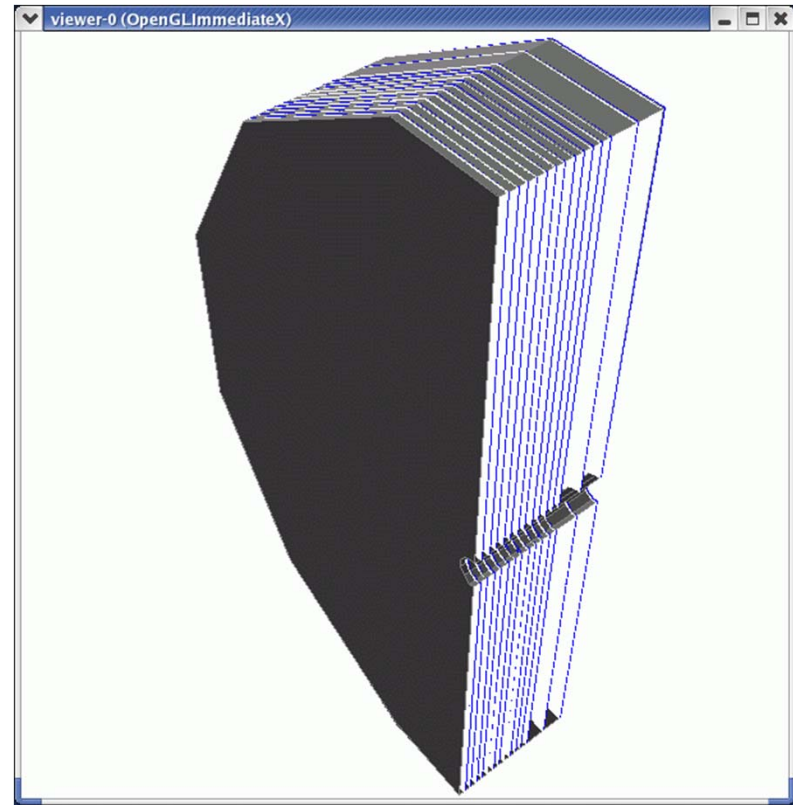
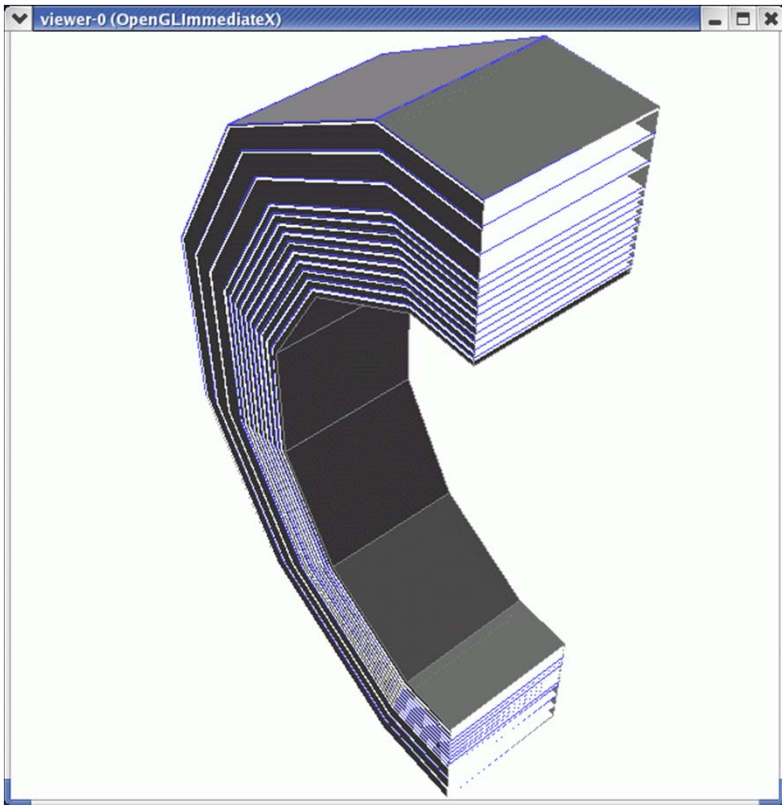
For the general use the sensitive elements are square 3x3 cm (Strip option will be described later)

General Geometry of the ILD Muon System



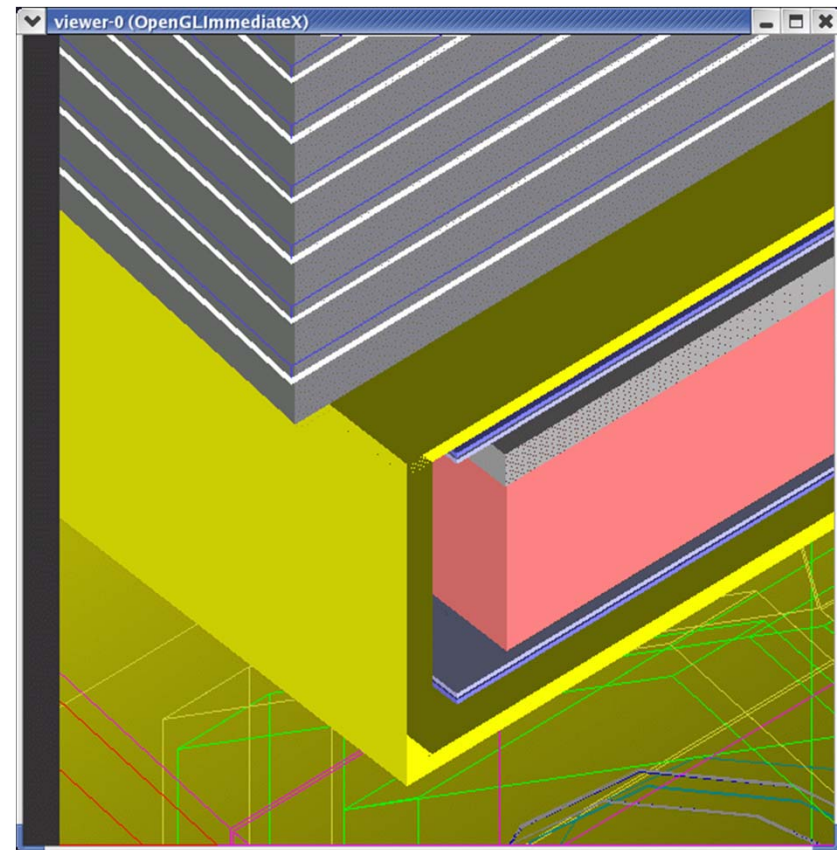
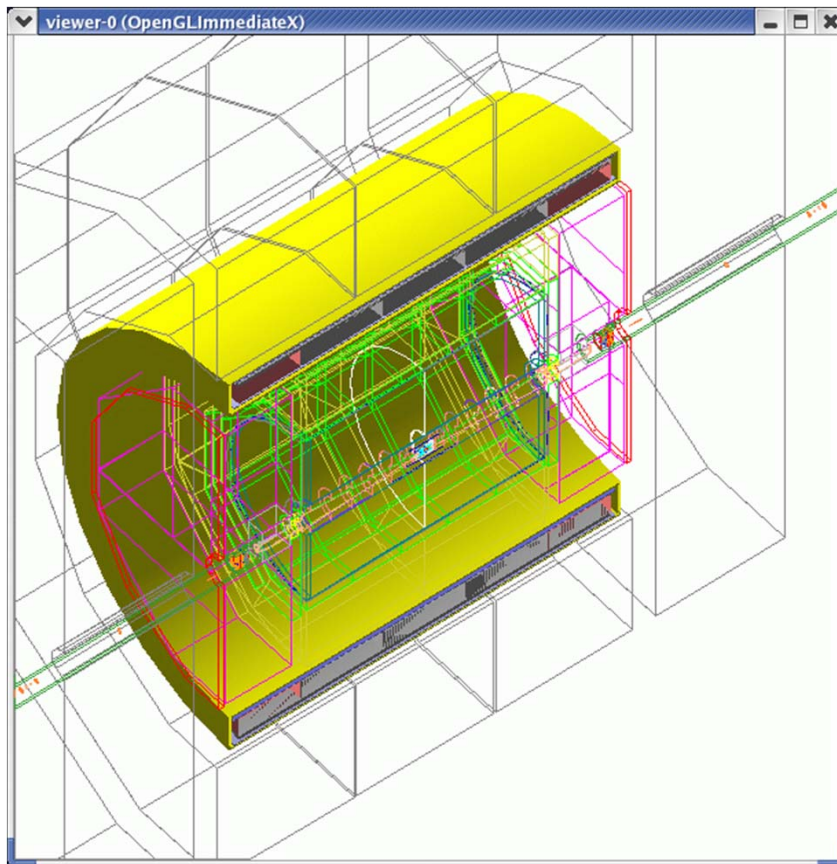
*General Geometry of the Yoke and Muon System ILD.
3 segments of Barrel and 2 segments of End Cap*

General Geometry of the ILD Muon System



*General Geometry of Barrel Segment (left) and End Cap (right)
(End Cap geometry was modified, see later),*

General Geometry of the ILD Muon System

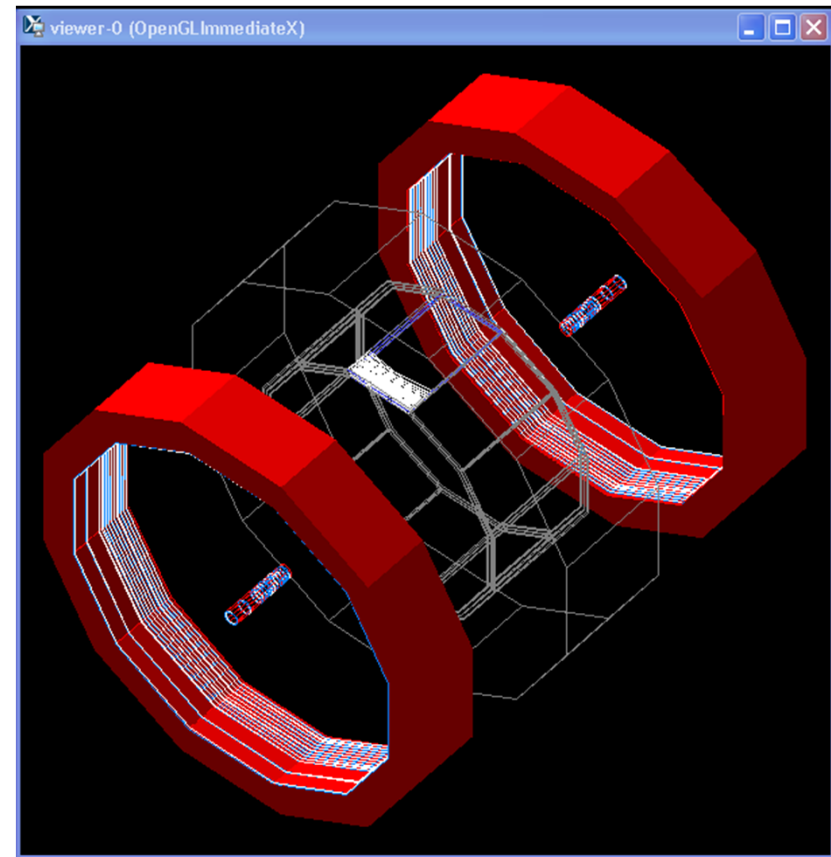
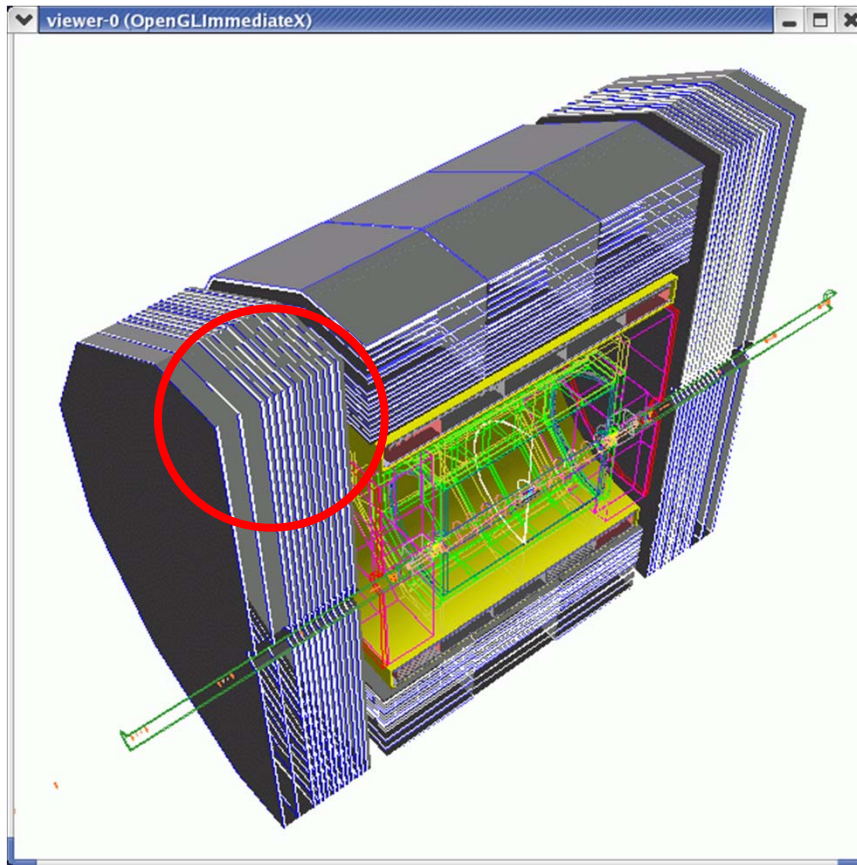


General Geometry of Cryostat and segmented coil (left)

Instrumentation of the Cryostat: 2 double sensitive layers before coil and after coil (right)

Instrumentation of the Cryostat will improve the identification of low energetic muons

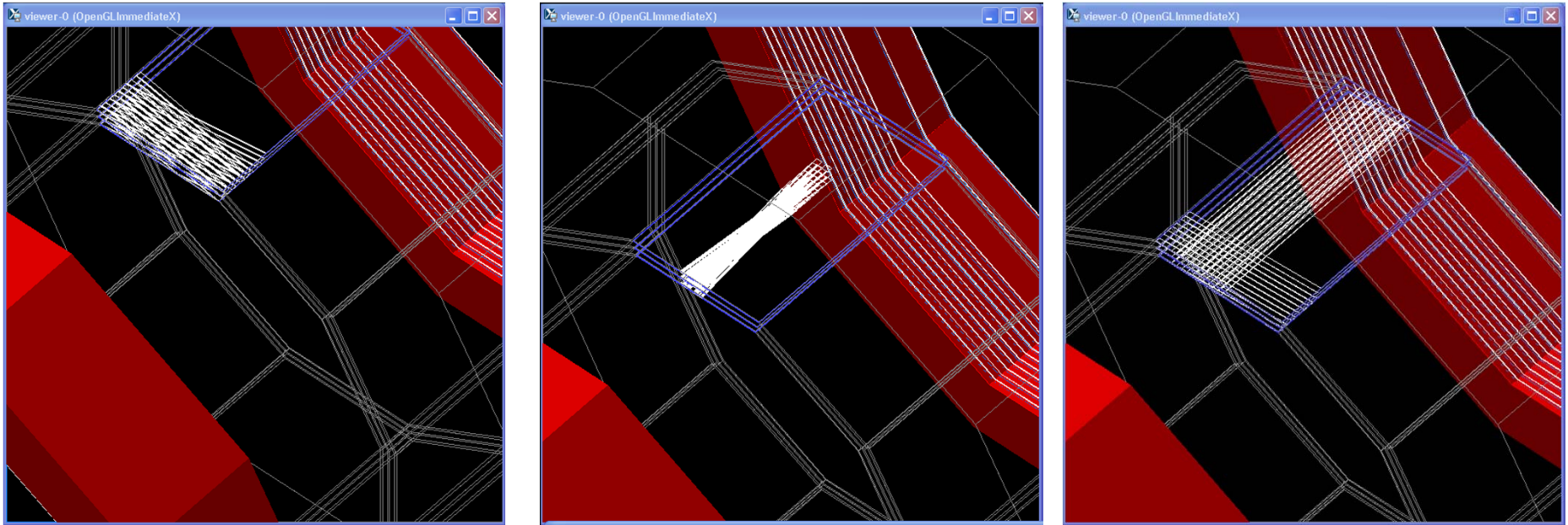
Last Correction of Geometry of the ILD Muon System



End Cap before were common vertical plates and did not close the magnetic line at the end (left)

Now the central parts of End Cap Segments are keeping the general structure of the vertical plates but the Outer Parts of the End Cap Segments are analogue to the Barrel Structure with 2 sensitive barrel layers (right – red color)

Special Purposes Geometry of the ILD Muon System



For a more detailed study of the Muon System Performance, a new geometry of the sensitive layers was implemented as a local variant of the Sensitive Elements with stereo angles:

Geometry with Strips, width 3 cm, placed with stereo angle $\pm G$ degree as shown on the pics: ± 15 degree along X, Z, and perpendicular

Summary of Muon System of ILD

The detailed description of the Muon System is ready for the performance studies

- **Realism of the Geometry:**

- detailed geometry model of ILD Magnet and Muon System on the basis of Scintillator/Wavelength Shifter/ Silicon Photomultiplier Sensitive Layers,
- local user model with strip sensitive elements is implemented for more detailed study,
- main features of gaps, dead material, cabling and services is included, but Muon System is not so much affected by this details,

- **Realism of digitalization:**

- digitalisation is performed on the basis of 3x3 cm sensitive tails,
- local model with implementation of the strip options, could implement the digitalization with the reproduction of strip signals,

- **Reconstruction:** now Muon System is described mainly as identification system. It could be included in the common tracking reconstruction chain in order to use the power of the particle Flow algorithm,

- **Model of Muon System allows study of performance as Tail Catcher,**