Implementation of GEMs Virtual Planes in Remoll

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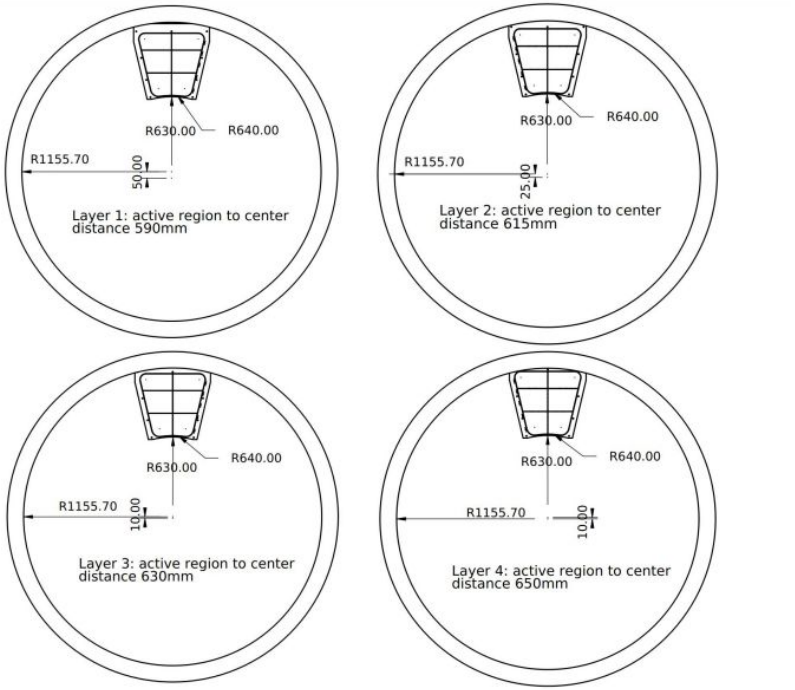
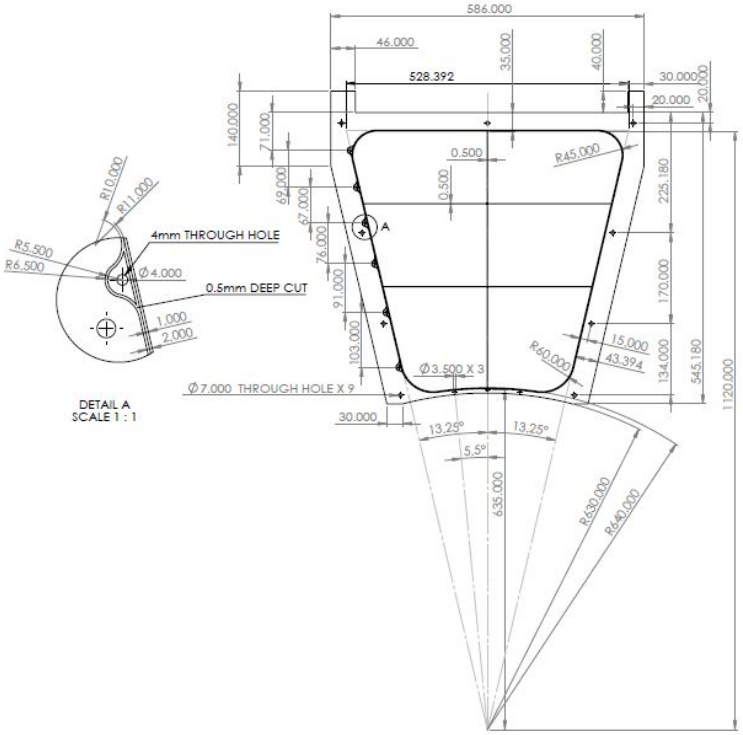
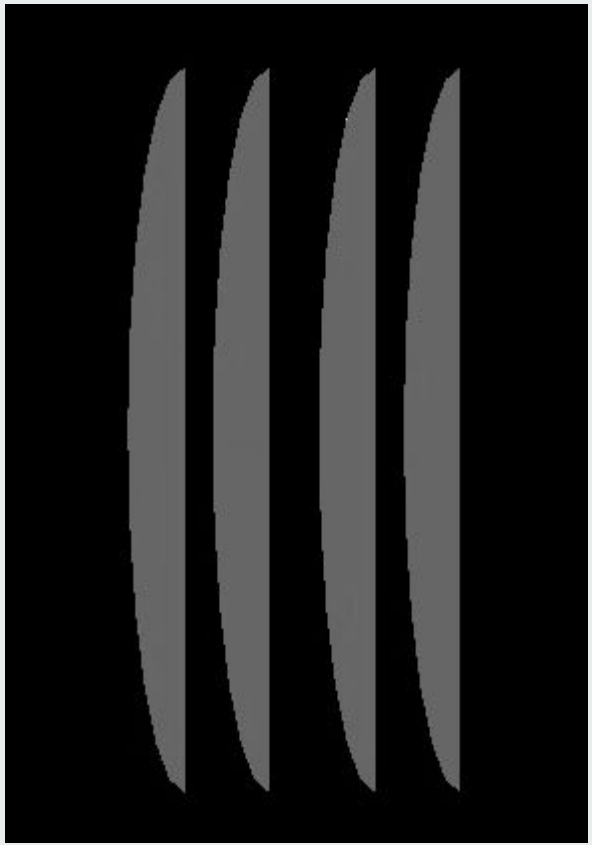
Available Information





Current Configuration



Distance of first GEM layer from the target center = 24 m

Distance between 1st and 2nd layer = 45 cm

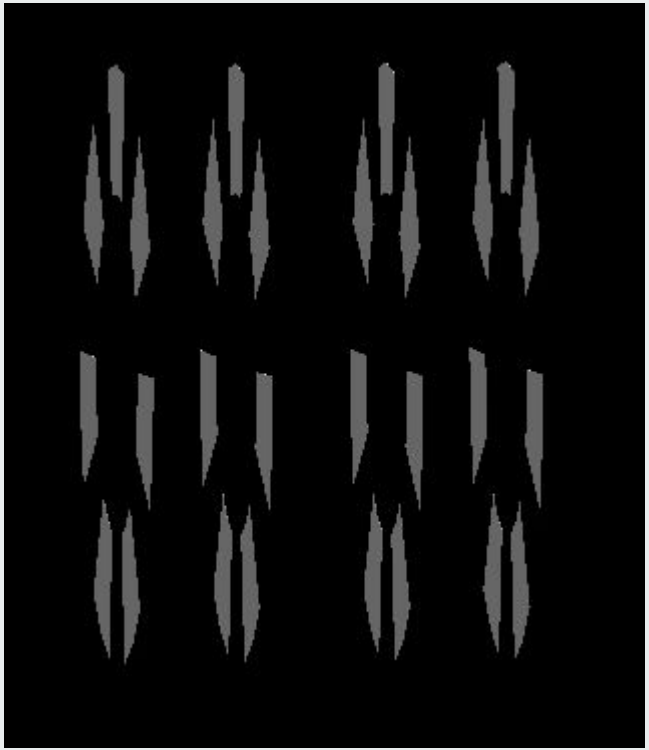
(also between 3rd and 4th layer)

Distance between 2nd and 3rd layer = 56.33 cm

} Defined in positions.xml file

```
<!-- Virtual planes in the parallel world -->
<position name="trackingDetectorVirtualPlaneFront1_pos" z="19502.9" unit="mm"/>
<position name="trackingDetectorVirtualPlaneFront2_pos" z="19502.9+450" unit="mm"/>
<position name="trackingDetectorVirtualPlaneBack1_pos" z="20516.2" unit="mm"/>
<position name="trackingDetectorVirtualPlaneBack2_pos" z="20516.2+450" unit="mm"/>
```

Modifications made



- The distances between the layers is not changed.
- However to take into account the relative differences between the radial distances of the layers from the center the following changes were made.

```
<!-- Virtual planes in the parallel world -->
<position name="trackingDetectorVirtualPlaneFront1_pos" x="-50" z="19502.9" unit="mm"/>
<position name="trackingDetectorVirtualPlaneFront2_pos" x="-25" z="19502.9+450" unit="mm"/>
<position name="trackingDetectorVirtualPlaneBack1_pos" x="-10" z="20516.2" unit="mm"/>
<position name="trackingDetectorVirtualPlaneBack2_pos" x="10" z="20516.2+450" unit="mm"/>
```

Some more details on the implementation

These planes are defined in the mollerParallel.gdml file using the loop functionality of GDML.

```
<loop for="x1" to="7" step="1">

  <physvol name="trackingDetectorVirtualPlaneFront1_module[x1+1]_phys">
    <volumeref ref="gemVirtualPlane1_log"/>
    <positionref ref="trackingDetectorVirtualPlaneFront1_pos"/>
    <rotation name="trackingDetectorVirtualPlaneFront1_rot[x1+1]" unit="deg" z="x1*(360/7) + GEMRotation1"/>
  </physvol>

  <physvol name="trackingDetectorVirtualPlaneFront2_module[x1+1]_phys">
    <volumeref ref="gemVirtualPlane2_log"/>
    <positionref ref="trackingDetectorVirtualPlaneFront2_pos"/>
    <rotation name="trackingDetectorVirtualPlaneFront2_rot[x1+1]" unit="deg" z="x1*(360/7) + GEMRotation1"/>
  </physvol>


  <physvol name="trackingDetectorVirtualPlaneBack1_module[x1+1]_phys">
    <volumeref ref="gemVirtualPlane3_log"/>
    <positionref ref="trackingDetectorVirtualPlaneBack1_pos"/>
    <rotation name="trackingDetectorVirtualPlaneBack1_rot[x1+1]" unit="deg" z="x1*(360/7) + GEMRotation2"/>
  </physvol>

  <physvol name="trackingDetectorVirtualPlaneBack2_module[x1+1]_phys">
    <volumeref ref="gemVirtualPlane4_log"/>
    <positionref ref="trackingDetectorVirtualPlaneBack2_pos"/>
    <rotation name="trackingDetectorVirtualPlaneBack2_rot[x1+1]" unit="deg" z="x1*(360/7) + GEMRotation2"/>
  </physvol>

</loop>
```

Single rotation parameter for the first two planes.

A separate parameter for the other pair of planes.