09.12.2020

Update of the "*frozen*" geometry

MuColl_v1

Theta asymmetry bugfix

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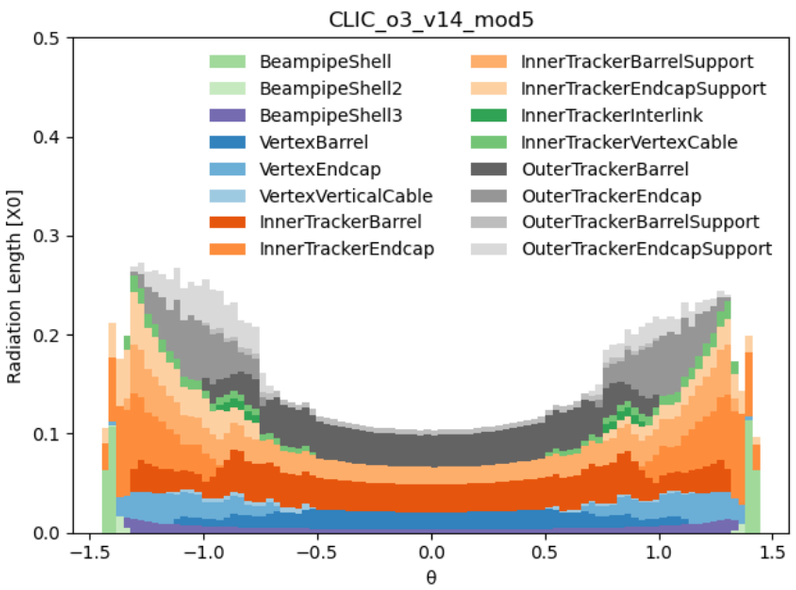
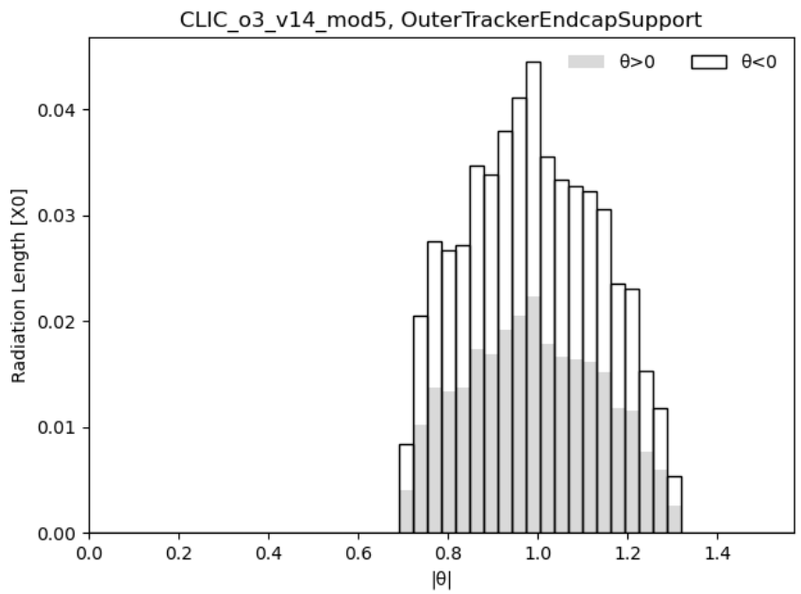
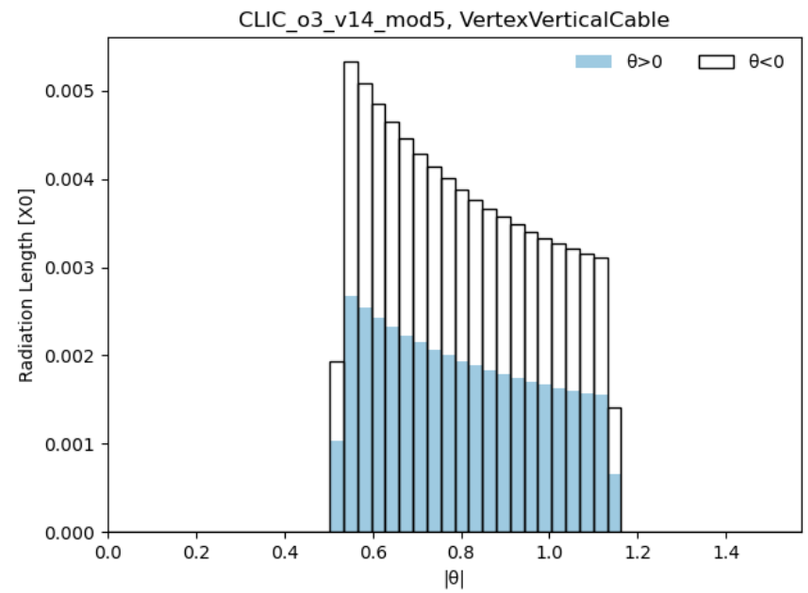
Theta asymmetry: original geometry

A frozen geometry for SnowMass studies has been prepared: [MuColl_v0]

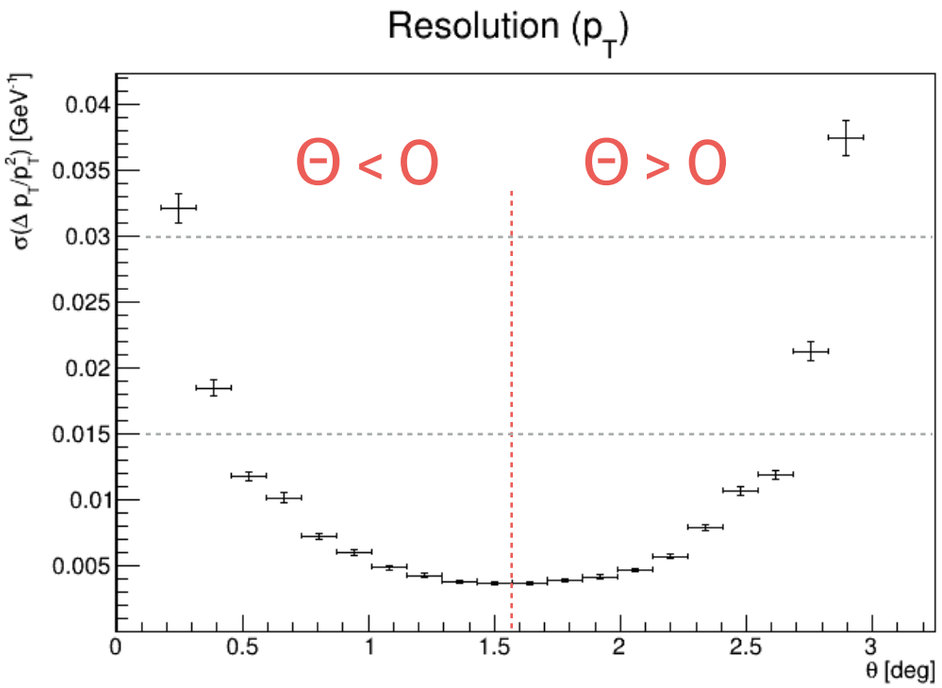
An asymmetry has been observed between positive-negative Tracker sides:







material budget plots
by Carol Krizka



track p_T resolution
by Alessandro Montella

The reason: bug in C++ code

All the affected elements share the same type: TrackerEndcapSupport_o1_v01

```
<detector name="VertexVerticalCable" type="TrackerEndcapSupport_o1_v01" reflect="true"  region="VertexEndcapRegion">
```

Creates a reflected copy in the negative side

but implemented as a simple copy&paste with wrong thickness: GitHub

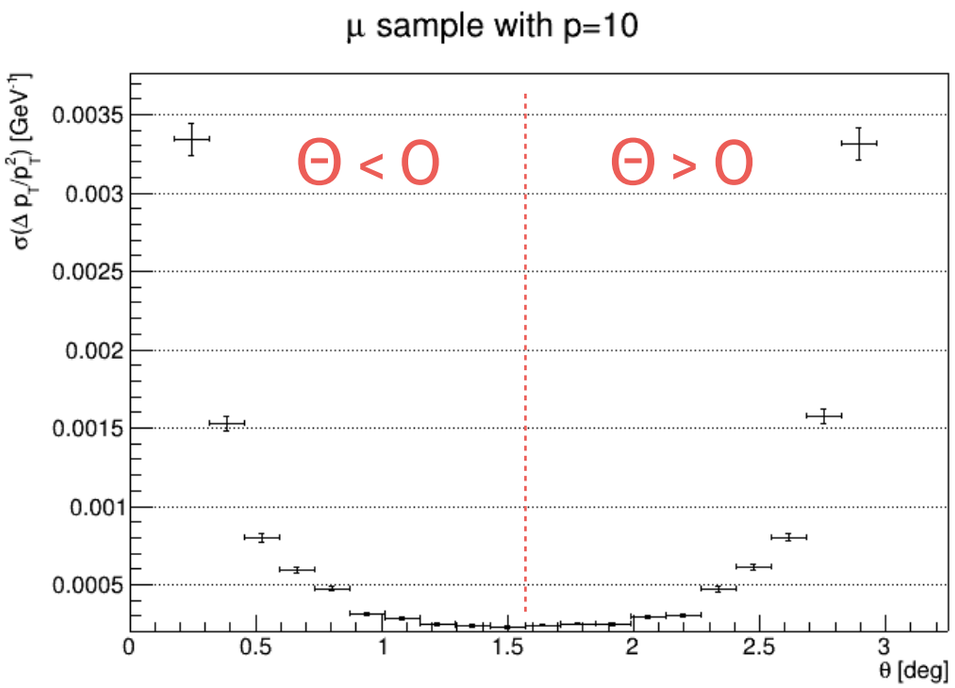
```
Volume s_vol(s_nam, Tube(rmin, rmax, thick/2.), mat); //NN: Tube is a MyConeSeg, takes half thickness
. . .
Volume s_vol2(s_nam, Tube(rmin, rmax, thick), mat);
```

+ side

- side

A fix without code duplication implemented in TrackerEndcapSupport_o1_v02

- the bug affecting also CLIC geometry → PR #245 submitted to iLCSoft/lcgeo



Separate new geometry version created for backward compatibility: MuColl_v1

pT resolution is symmetric now

track p_T resolution
by Alessandro Montella

Summary

A bug in C++ code for the Tracker Endcap Support structures inherited from CLIC
assigning x2 more material to elements in the negative side

Bug is fixed in the new geometry → p_T resolution seems to be symmetric now

↳ **to be verified with new material budget simulations**

↳ **new software release required with up-to-date lcgeo code**

30 BX of BIB have been simulated with the old geometry

↳ **to be rerun with updated geometry for 100% consistency**