

Baseline Muon Collider tracking detector

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with inputs from

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Detector freezing procedure

- Following the sequence of the sample production steps:
 - ▶ GEANT simulation;
 - ▶ hit digitization/reconstruction/filtering;
 - ▶ BIB overlaying;
 - ▶ tracking.

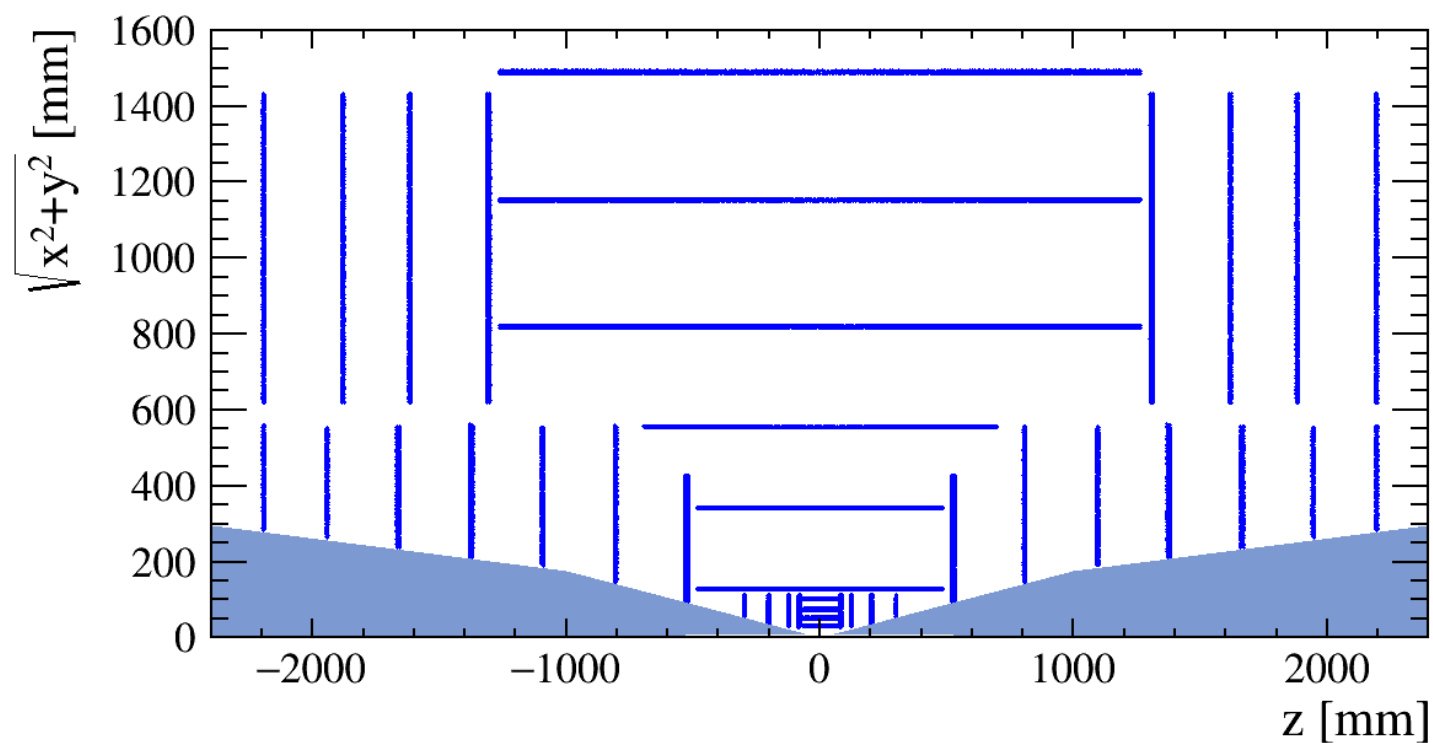
Simulation step

- For the GEANT simulation step we needed to decide:
 - ▶ tracker geometry;
 - ▶ magnetic field value.
- Official ddsim steering file in preparation.

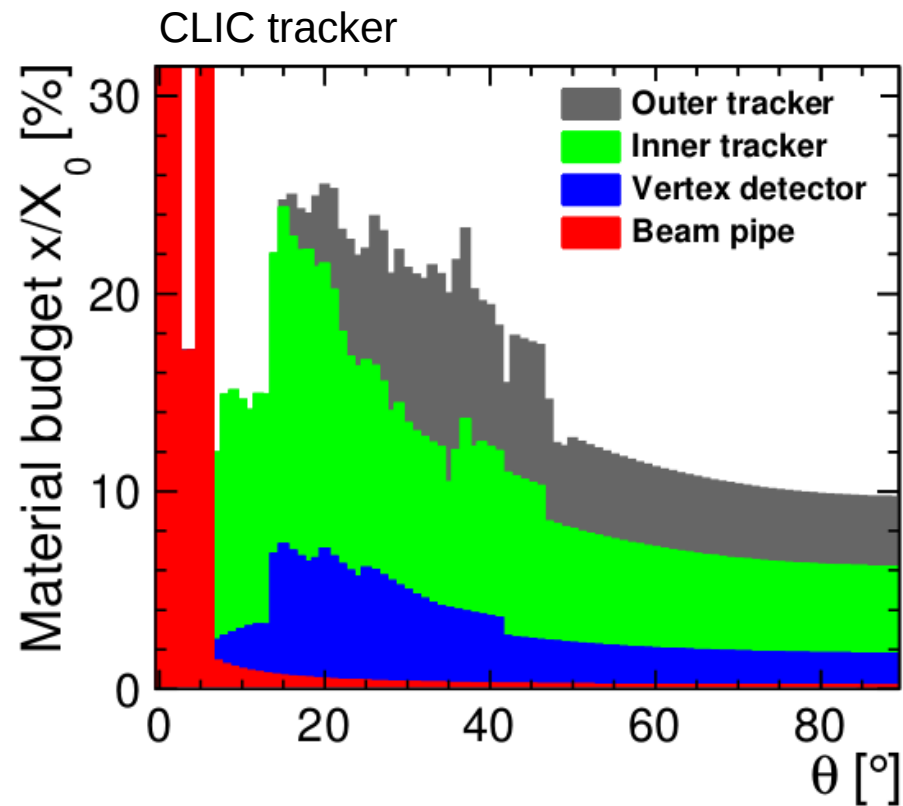
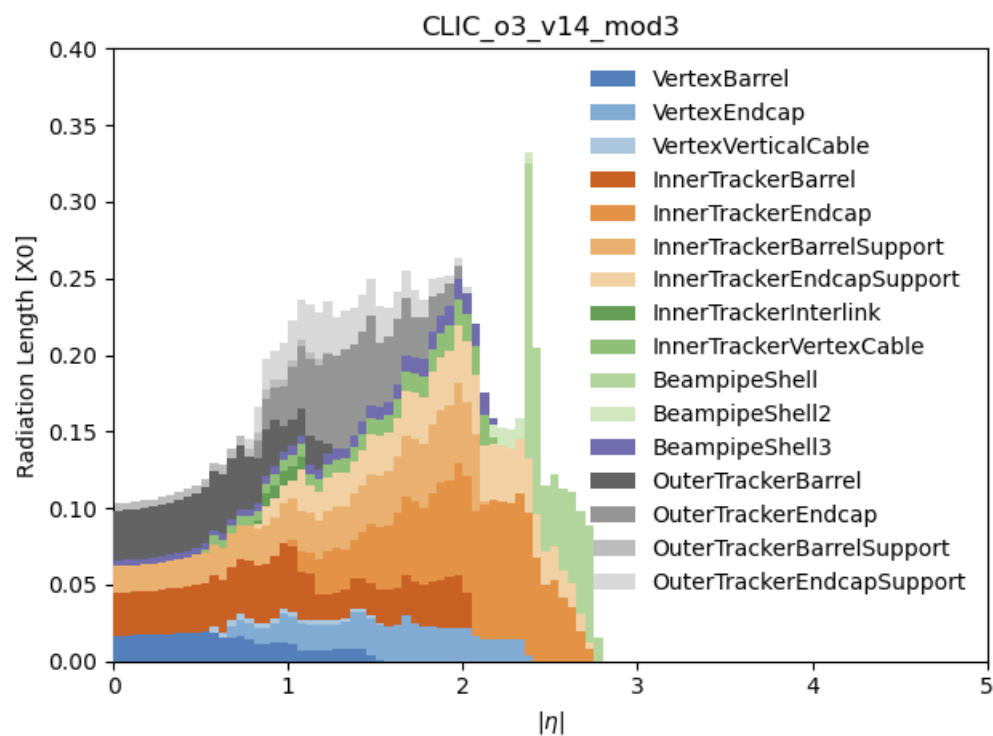
Tracker geometry

- New geometry:

- ▶ MuColl_v0 = CLIC_o3_v14_mod4 + B = 3.57 T.



Tracker material budget

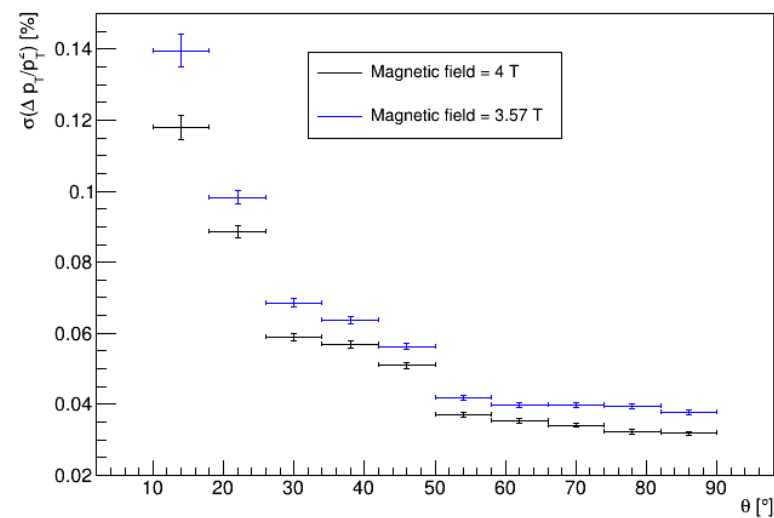
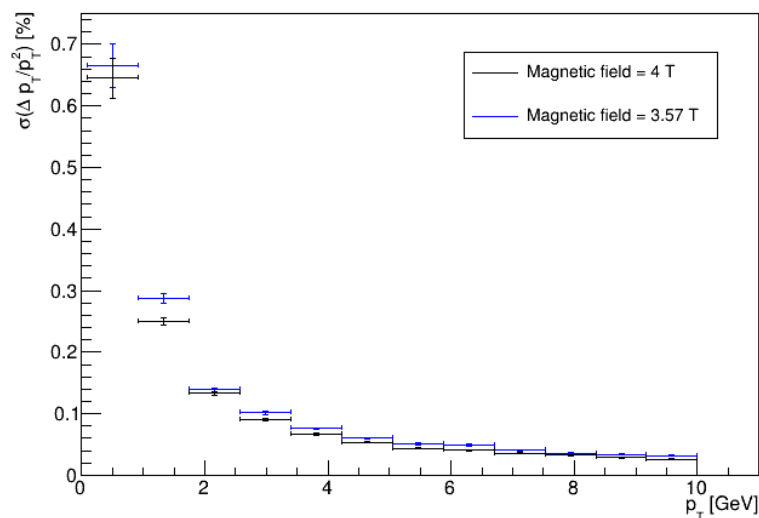
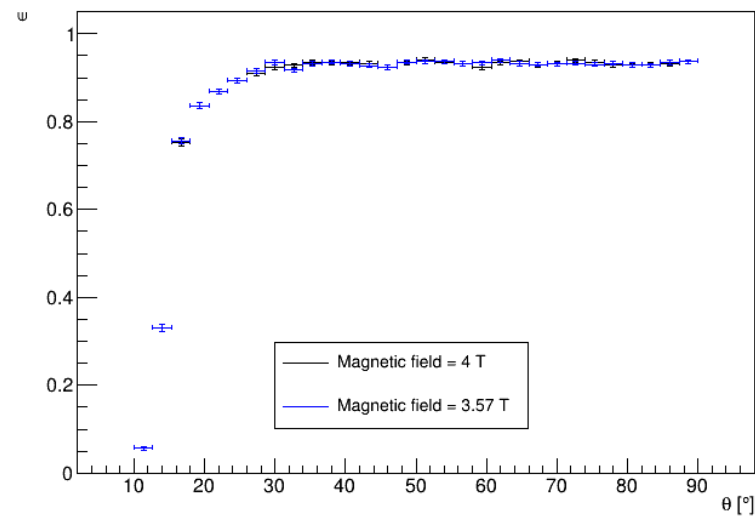
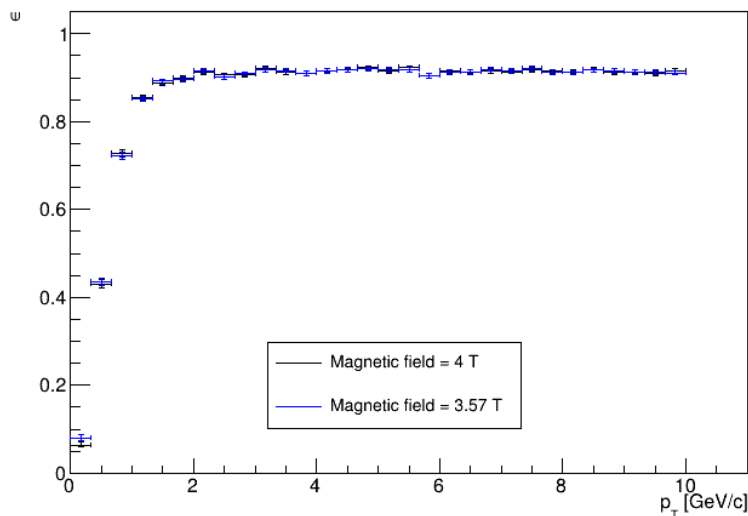


K. Krizka

Tracking performance w/ $B = 3.57$ T

● Prompt single muon sample:

A. Montella



Hit digi/reco/filtering

- Hit digitization/reconstruction:
 - ▶ Si modules segmentation → spatial resolution;
 - ▶ time resolution.

- Hit filtering:
 - ▶ minimum hit energy;
 - ▶ time windows (currently $\pm 3\sigma_t$) → ongoing check by Federico;
 - ▶ double-layer filter configuration.

- BIB overlaying:
 - ▶ time integration windows →

```
<parameter name="Collection_IntegrationTimes" type="StringVec" >
  VertexBarrelCollection      0.3
  VertexEndcapCollection      0.3

  InnerTrackerBarrelCollection 0.6
  InnerTrackerEndcapCollection 0.6

  OuterTrackerBarrelCollection 0.6
  OuterTrackerEndcapCollection 0.6
</parameter>
```

Tracker overview

		cell size	sensor thickness	time resolution	spatial resolution	number of cells
VXD	B	25 μm $\times$ 25 μm pixels	50 μm	30 ps	5 μm $\times$ 5 μm	729M
	E	25 μm $\times$ 25 μm pixels	50 μm	30 ps	5 μm $\times$ 5 μm	462M
IT	B	50 μm $\times$ 1 mm macropixels	100 μm	60 ps	7 μm $\times$ 90 μm	164M
	E	50 μm $\times$ 1 mm macropixels	100 μm	60 ps	7 μm $\times$ 90 μm	127M
OT	B	50 μm $\times$ 10 mm microstrips	100 μm	60 ps	7 μm $\times$ 90 μm	117M
	E	50 μm $\times$ 10 mm microstrips	100 μm	60 ps	7 μm $\times$ 90 μm	56M

Tracking step

- Tracking:
 - ▶ defining a new tracking strategy (currently two simple steps: building tracks in VXD and extending them into the IT and OT) ;
 - ▶ tuning of the conformal tracking configuration.