

Status updates

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● Motivation

- Update the current MarlinACTSTracking (based on a very old version of Acts 13, effectively a copy&adaption from MuonCollider software) for LUXE tracking
- Possible next steps: geometry loading, DD4hep plugin for ACTS, etc

MarlinACTSTracking

Private

Marlin-based ACTS Tracking adapted from MuonColliderSoft

● C++ ☆ 0 📄 Apache-2.0 🧩 0 🔄 0 🔗 0 Updated on Nov 3, 2023

luxegео

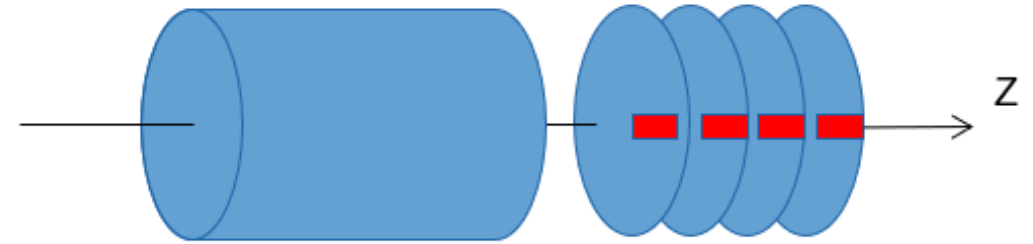
Public

Geometry description in DD4hep format for the LUXE experiment

● C++ ☆ 1 📄 Apache-2.0 🧩 0 🔄 0 🔗 0 Updated on Aug 7, 2023

● LUXE geometry and simulation

- Geometry
 - 4 “endcap” disk layer
 - each has 2 layers
 - each has 9 modules (1 overlap)
 - Parameters defined in LUXETrackerAsEndcap.xml, translated into LUXETrackerAsEndcap.root through TGeo



(↑ from Michal's report)

- Simulation
 - (Irrelevant to the ACTS updates)
- ```
ddsim --compactFile LUXETracker.xml
--numberOfEvents 1
--enableGun
--gun.multiplicity 100
--gun.particle e+
--outputFile positrons_100_sim.slcio
```



## ● Major changes w.r.t. Acts 13 version

Mainly taken from branch `porting_v32` of `MuonColliderSof/ACTSTracking`.

- New configuration parameters for seeding
- New way to get range of elements with requested `geoID`
- New `GridFinder` using `R` & `Z` parameters
- Particle hypothesis (muon, positron, ...) for seeding.
- New classes: `VectorTrackContainer`, `VectorMultiTrajectory`, `XXXContext...`
- Updates in some calibration & `SeedSpacePoint` functions
- Updates in `Surface`, `SourceLinkAccessor`
- ...

For ACTSv32 LUXE tracking:

- `apptainer shell --bind /cvmfs docker://ghcr.io/aidasoft/el9:latest`
- CentOS 7 triggers some weird bug.
- `source /cvmfs/sw-nightlies.hsf.org/key4hep/setup.sh -r 2024-05-06`
- the next nightly (2024-05-09) has ACTSv34, which triggers new bugs (smoother no longer used, etc).
- `export MARLIN_DLL=${MARLIN_DLL}${PWD}"/install/lib/libMarlinACTSTracking.so:'`
- `export LD_LIBRARY_PATH=/cvmfs/sw-nightlies.hsf.org/key4hep/releases/2024-05-06/x86_64-almaLinux9-gcc11.3.1-opt/acts/32.0.0-j6a6o7/lib64:$LD_LIBRARY_PATH`
- Don't know why but has to manually export the shared library for TGeoPlugin

## ● Results & a remaining bug

With the exact same input: geometry files, simulation (slcio) files

| COLLECTION NAME       | COLLECTION TYPE | NUMBER OF ELEMENTS |
|-----------------------|-----------------|--------------------|
| AllTracks             | Track           | 97                 |
| MCParticle            | MCParticle      | 133                |
| SeedTracks            | Track           | 97                 |
| SiHits                | SimTrackerHit   | 370                |
| SiTrackerHitRelations | LCRelation      | 365                |
| SiTrackerHits         | TrackerHitPlane | 365                |
| Tracks                | Track           | 86                 |

V13  
72 seeds found

Seeding is messed up:  
Each layer is 0.04 thicker (in z) than  
before, might affecting the grid for  
seeding.

e.g.  
49.97~62.03 → 49.95~62.05

| COLLECTION NAME       | COLLECTION TYPE | NUMBER OF ELEMENTS |
|-----------------------|-----------------|--------------------|
| AllTracks             | Track           | 0                  |
| MCParticle            | MCParticle      | 133                |
| SeedTracks            | Track           | 0                  |
| SiHits                | SimTrackerHit   | 370                |
| SiTrackerHitRelations | LCRelation      | 365                |
| SiTrackerHits         | TrackerHitPlane | 365                |
| Tracks                | Track           | 0                  |

V32  
0 seeds found