

Intro and miscellanea

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Informal detector team meeting 19/10/2023

BIB overlay updates

Got new set of high-statistics BIB files from Daniele (Thanks!!)

- Now 1/10 of BX (up from 1/100). “Ordered” another 2x for the other beam

Opportunity to implement better treatment of overlay

Previous scheme:

- Generate $\sim 100x$ particle clones per incoming particle, randomizing ϕ
- Overlay the same 1060 pseudo-events (i.e., all) to all events
- Trust the digitisation smearing to make things independent enough (sub-optimal for Calorimeters, where position is fixed by the cell)

New scheme:

- Generate $\sim 40x$ particle clones per incoming particle, randomizing ϕ
- Overlay a random subset of 260 pseudo-events (i.e. $\sim 1/4$ of the total)
- Digitisation-related smearing is the same

Seems to be working well:

- average number of “BIB jets” per event went from 67 to 11

Key4hep-based image

<https://hub.docker.com/r/madbaron/k4test-ubuntu>

```
docker pull madbaron/k4test-ubuntu
```

```
docker run -it -e DISPLAY=$IP:0 -v /path/to/local/data:/data --rm  
madbaron/k4test-ubuntu
```

```
source setup.sh
```

Updated overlay processor

- Will update calo thresholds soon (so new image incoming...)
 - Will re-do all BIB samples as soon as I get extra 2x stats from Daniele
- **Make sure you grab the latest version!**

Updated detailed instructions at

<https://docs.google.com/document/d/1YBCttRKfxUpVErEqADR5hXOZUmc6VlaH2huvRlcrOjo/edit?usp=sharing>

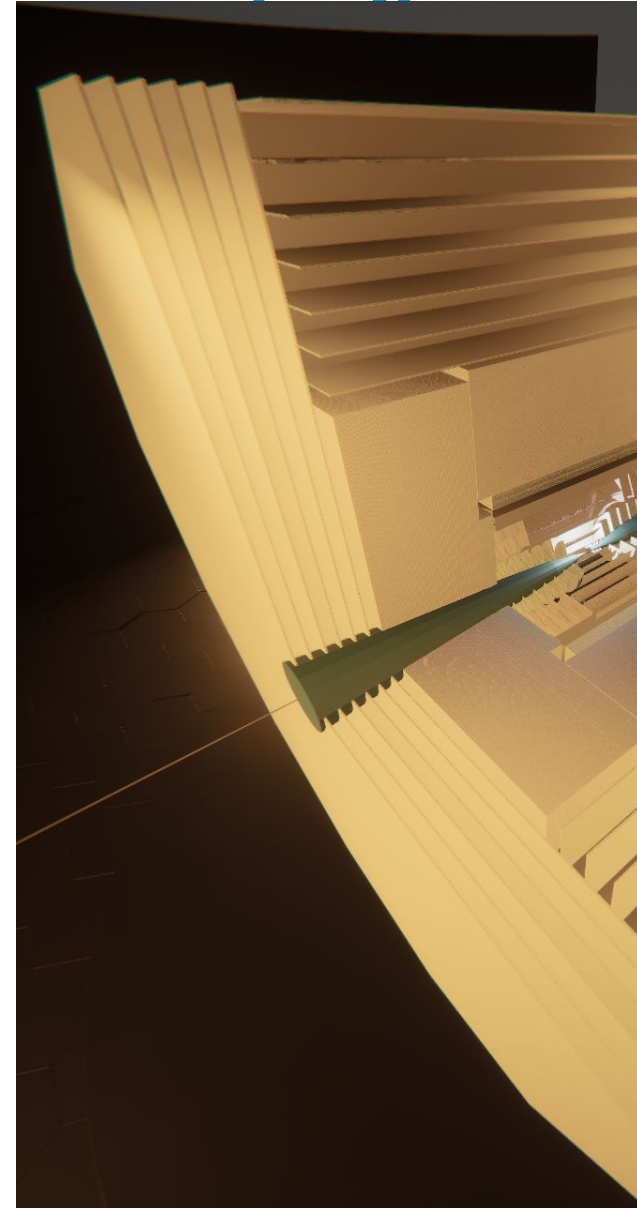
Reminder: muon system partial descoping

The current detector has toroidal field implemented

- Toroids not in geometry
- Reconstruction not optimised → momentum resolution dominated by inner tracker

Use muon detectors only for PID

- Reduce number of layers of muon chambers?
 - Samples in preparation



Activities status - quick roundtable

Occupancies:

- trackers **DONE**
- calorimeters **DONE**
- Source of calorimeter hits in cell vs E, time

Tracks: - UChicago WIP

- reco efficiency vs pT, eta
- fake rate vs pT, theta
- Track momentum resolution
- impact parameters resolution

Electrons:

- reco efficiency vs pT, eta [Adam Vendrasco is having a look at this]
- energy resolution vs E, eta

Photons:

- reco efficiency vs E, theta **DONE - to be updated with fixed BIB**
- energy resolution vs E, eta **DONE - to be updated with fixed BIB**

Muons:

- reco efficiency vs pT, eta
- pT resolution vs pT, eta

Jet:

- multiplicity [Ben Johnson is having a look at this]
- selection efficiency vs pT, eta
- energy resolution vs pT, eta

Taus:

- reco efficiency vs pT, theta [Rose and Sergo]

Thank you!

Links

Documentation

[Google doc with notes, list of tasks](#)

[Muon Collider Software Tutorial](#)

[Shared Overleaf](#)

[Key4Hep Documentation](#)

[LCIO Documentation](#)

Snowmass Connect Documentation

Data files: `/tank/data/snowmass21/muonc/fmeloni`

Communication channels:

#10tev-simulations channel on SCHEMA slack.

muoncollider-detector-physics@cern.ch IMCC eggroup for physics and detector