Update of DD4hep for FCAL

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CERN-EP-LCD

29th FCal Collaboration Workshop
Tel Aviv University, Tel Aviv, Israel
September 18, 2016

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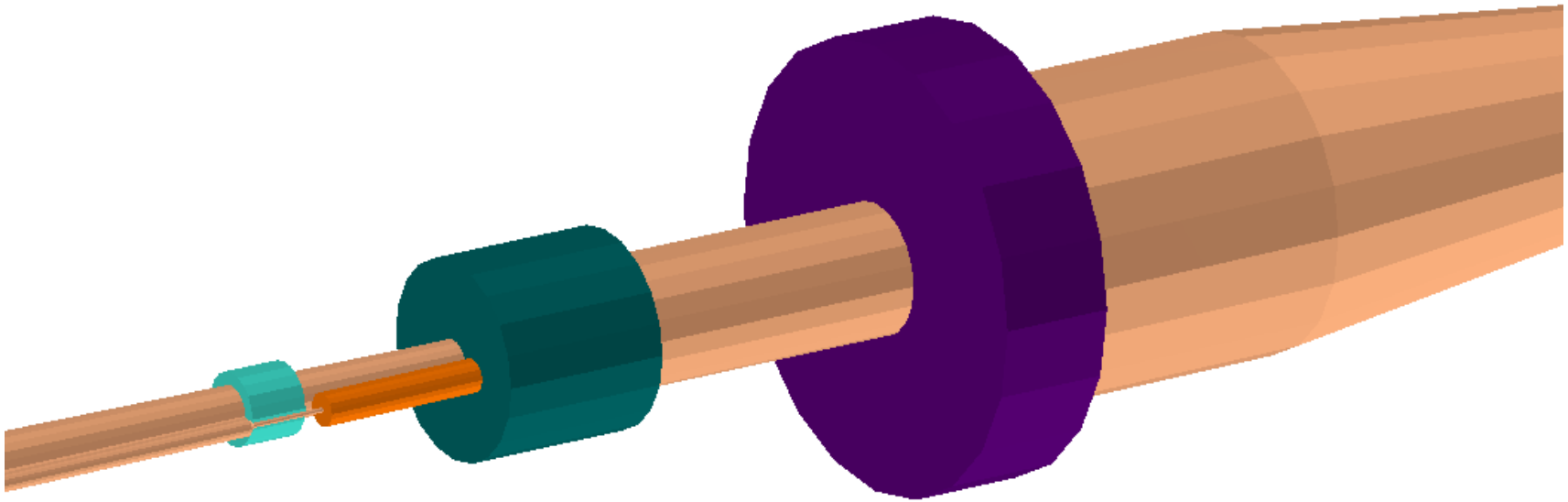
Simulation

LumiCal and BeamCal implemented in DD4HEP for quite some time

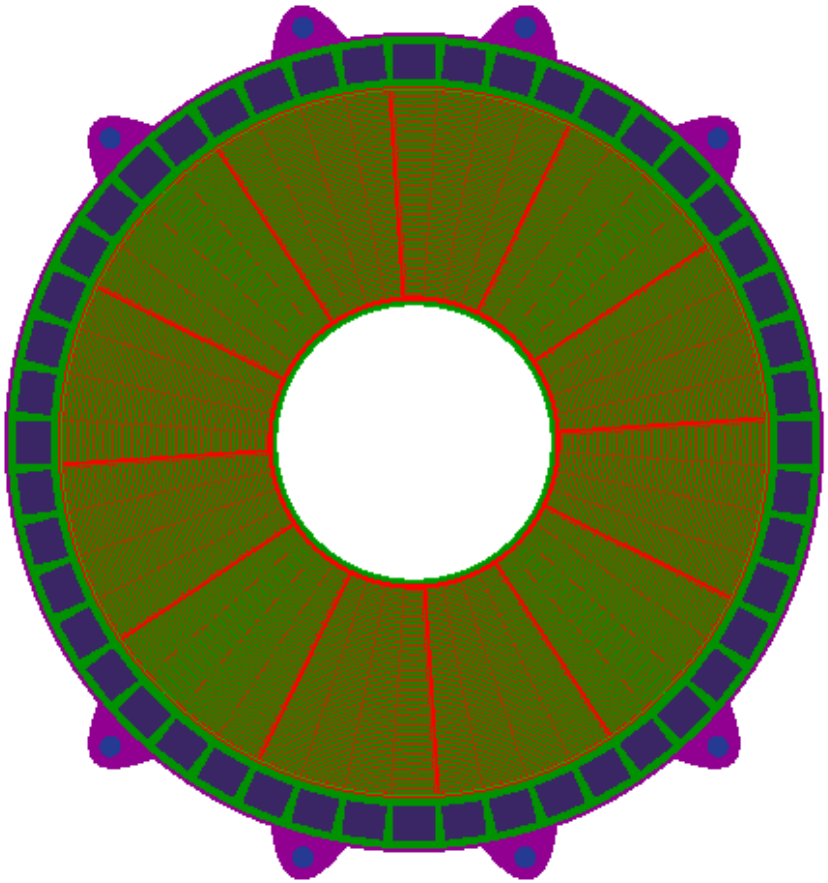


BPM,Kicker,BeamCal, LumiCal

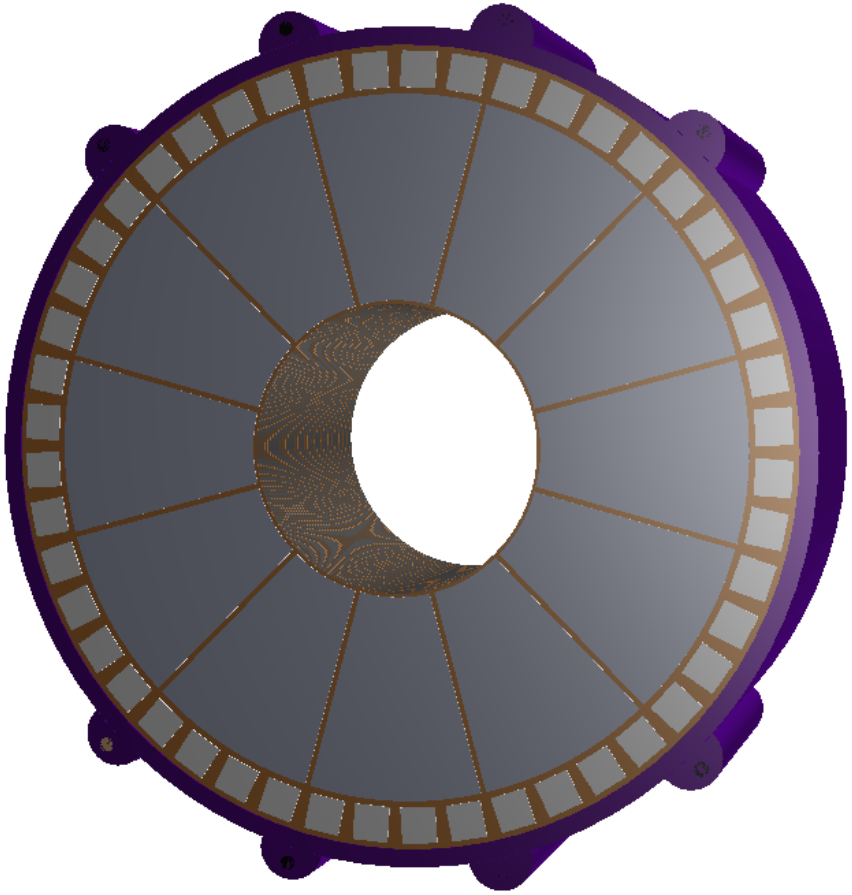
Detailed LumiCal

Detailed LumiCal still not completely implemented and needs some fixes

MOKKA



DD4HEP (from March 2015)



How to Run Simulation

- ddsim python executable part of the lcgeo package
- `ddsim --help`
-
```
ddsim
--compactFile $lcgeo_DIR/CLIC/compact/CLIC_o2_v05/CLIC_o2_v05.xml
--runType batch
--enableGun
--gun.distribution uniform
--gun.particle e- # any particle known to geant
--gun.energy 1.5*TeV # any unit
--gun.thetaMax="pi-10*mrad"
--gun.thetaMin="pi-40*mrad"
--numberOfEvents 10 # or -N 10
```

BeamCal Reconstruction

Implemented reading of parameters from DD4hep geometry description

→ Because Geometry information is accessed via an interface no change to reconstruction necessary

All changes committed to repository
`https://svnsrv.desy.de/viewvc/FCAL/Software/FCalClusterer/`

Accessing Geometry Information

- Overall dimensions from `LayeredCalorimeterData`: Radii, position, size, layer positions
- Segmentation information from the `Segmentation` object: radial and azimuthal cell sizes, empty segment of the BeamCal
  - Could use more functionality from segmentations(e.g., neighbouring cells), but would require re-factoring
- Obtain crossing angle from position of BeamCal `DetElements`
  - Could eventually be used for other rotations as well

Accessing Encoding Information for Hits

- Cell ID encoding fields different between MOKKA and DD4HEP (standardized for all detectors)
  - DD4HEP: `system:8,barrel:3,layer:8,slice:5,r:16,phi:16`
  - MOKKA: `I:10,J:10,K:10,S-1:2`
- Automatically switch depending on geometry source used
- cell IDs are used to calculate a *global* index for the cell, the rest of the reconstruction does not use the cell encoding from the hits

BeamCal Geometry Driver

Some changes needed for BeamCal geometry driver

- No changes in geometry, just in information readers and containers
- Bug in layer data of `LayeredCalorimeterData` for BeamCal
- Added `DetElements` for calorimeters to be able to access them in reconstruction

LumiCal Reconstruction

Started implementation of access to DD4HEP based geometry and and hits

- Similar addition of `DetElements` to LumiCal as for BeamCal
- Use of cell IDs and positions more complicated in LumiCal reconstruction than in BeamCal reconstruction
  - or I am just much more familiar with the use in the BeamCal Reconstruction...

Need to work together with Bogdan

Code Repository

As reported by Sasha before lunch: iLCSoft is slowly moving to git(hub)

- Any objections to using github as mainrepository for FCalClusterer?
- Software source code currently automatically mirrored from svn to github
- `https://github.com/FCALSW`

Summary

- DD4hep based simulation can be run with LumiCal and BeamCal
- BeamCal reconstruction is running with DD4HEP now
- LumiCal reconstruction is not yet running with DD4HEP

Start exercising simulation and reconstruction with DD4HEP