

# Update on ECAL reconstruction with v3 geometry

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# Updated classes

- Description of v3 geometry *replaced* v2 geometry:
  - emc/emcKI/MpdEmcGeoUtils.\*
- Tracking updated:
  - emc/emcKI/MpdEmcKI.cxx
- Geometry description, medium description taken from Maxim:
  - geometry/media.geo
  - macro/mpd/geometry\_stage1.C
  - geometry/emc\_v3.root
- Track matching updated to use better parameterization
  - MpdEmcMathchingKI

# Use case

Simulation:

modify/copy macros used by runMC.C  
macro/mpd/geometry\_stage1.C:

```
FairDetector *Emc= new MpdEmcKI("EMC", kTRUE );  
Emc->SetGeometryFileName("emc_v3.root");  
fRun->AddModule(Emc);
```

\*Already in new version of mpdroot

To run, include to reco.C:

```
//Change reconstruction parameters if necessary  
MpdEmcSimParams * par = MpdEmcSimParams::GetInstance() ;  
par->fSmearLightCollection = false;  
par->fSimulateNoise = false ;  
....
```

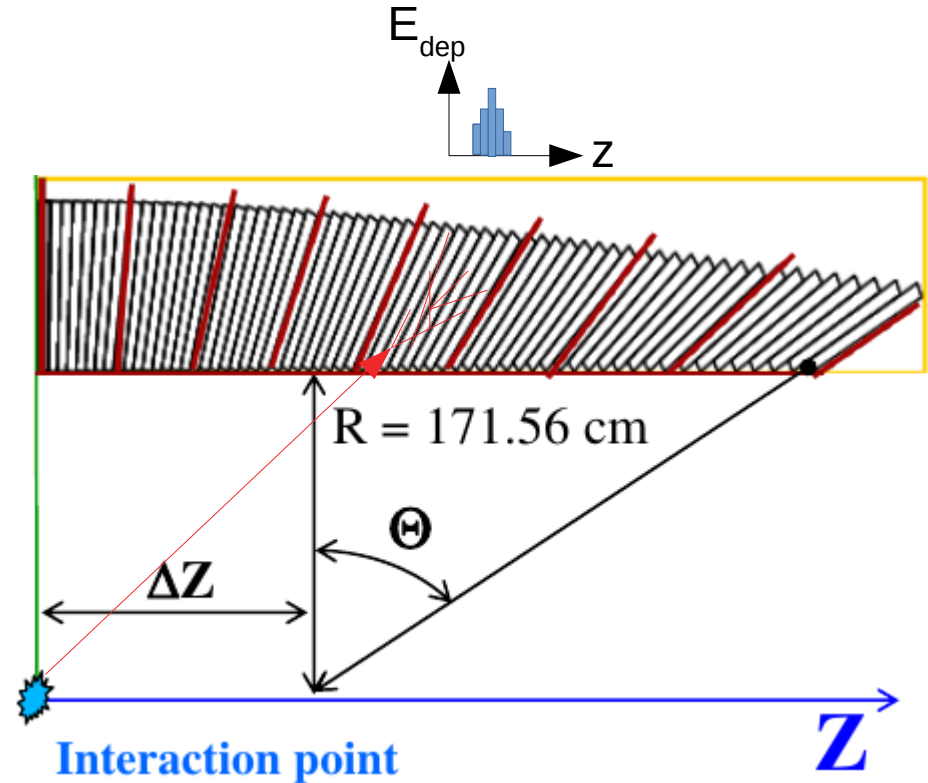
```
FairTask * emcDig = new MpdEmcDigitizerKI() ;  
fRun->AddTask(emcDig) ;
```

```
MpdEmcClusterizerKI *EmcCluster = new MpdEmcClusterizerKI();  
fRun->AddTask(EmcCluster);
```

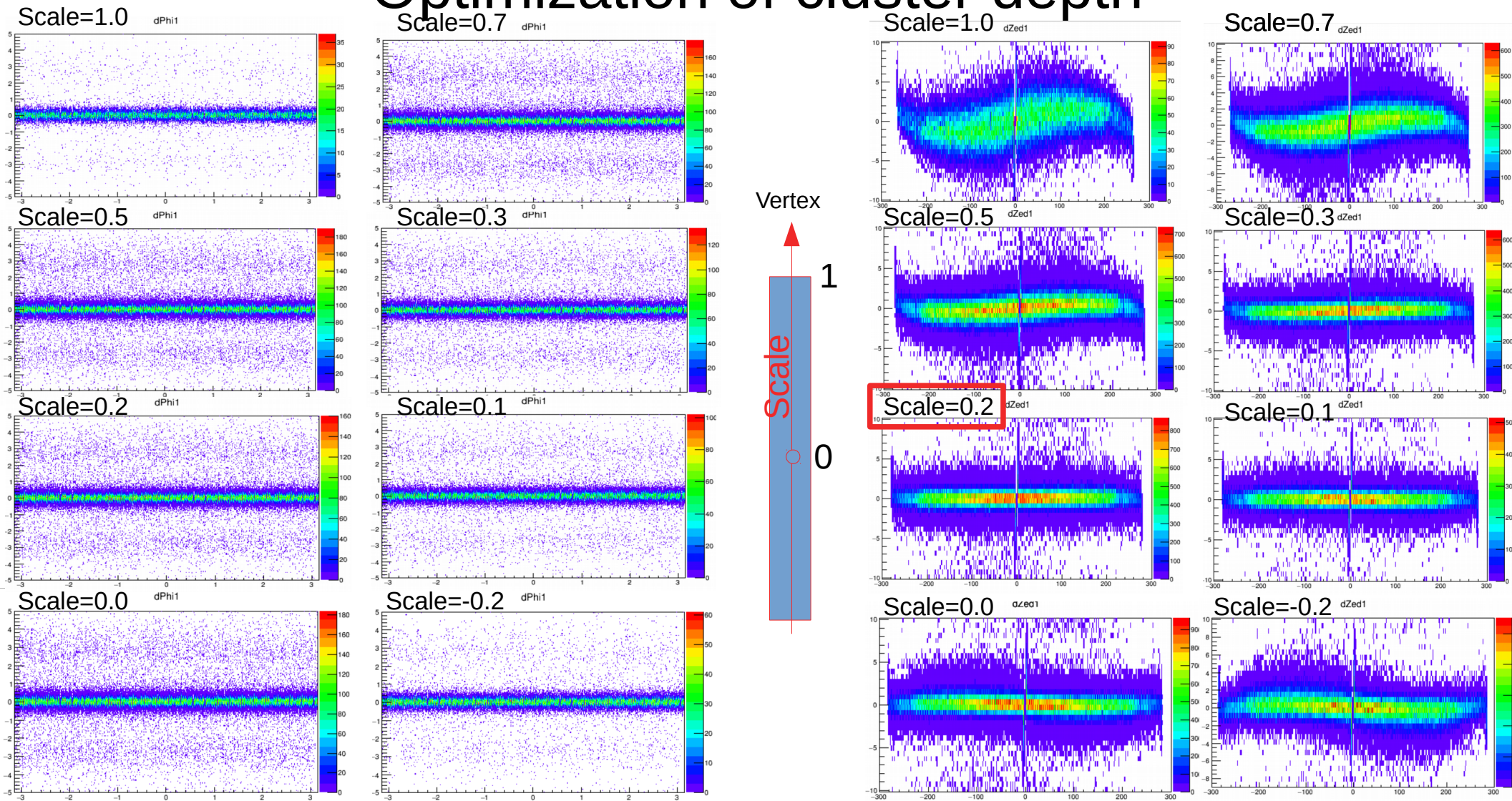
```
MpdEmcMatchingKI * EmcMatcher = new MpdEmcMatchingKI() ;  
fRun->AddTask(EmcMatcher) ;
```

# How to calculate cluster coordinates?

- In experiment only energy depositions in cells will be known. How to extract cluster coordinates?
- Options:
  - Project to front surface assuming particle came from vertex
  - At some depth in calorimeter
    - Expected maximum of photon shower
    - Minimizing dZ correction
    - ...?



# Optimization of cluster depth



# Conclusions

- Status:
  - Code with V3 geometry committed to git (Thanks, Alexandr)
  - Changes in resolutions, efficiency and purity are studied (see Viktor's talk)
  - To be tested by community
- Todo:
  - **Validate MC simulations with beam-test data in consistent configuration**
    - <https://indico.jinr.ru/event/965/contribution/3/material/slides/0.pdf>
    - **Realistic beam-test results are necessary as resolution, shower shape etc. depend on prototype shape**
    - Single electron energy resolution and single electron non-linearity
      - Implement/fix realistic response parameters once beam-test results will be available
    - Check shower shape for EM shower (electrons,  $\pi^- + A \rightarrow \pi^0 + A \rightarrow 2\gamma + X$ )
      - Optimize Dispersion cuts
    - Implement realistic time resolution (need parameterization from beam-test)
  - Test options of track matching
  - Implement (de-) calibration, mis-alignment, bad map
    - Interface with calibration database?
  - Develop class for realistic analysis using clever mixing
    - Develop general analysis manager?
  - More requests?