

Crystal mapping for the backward EMC

Luigi Capozza

for the Mainz EMC group



HIM

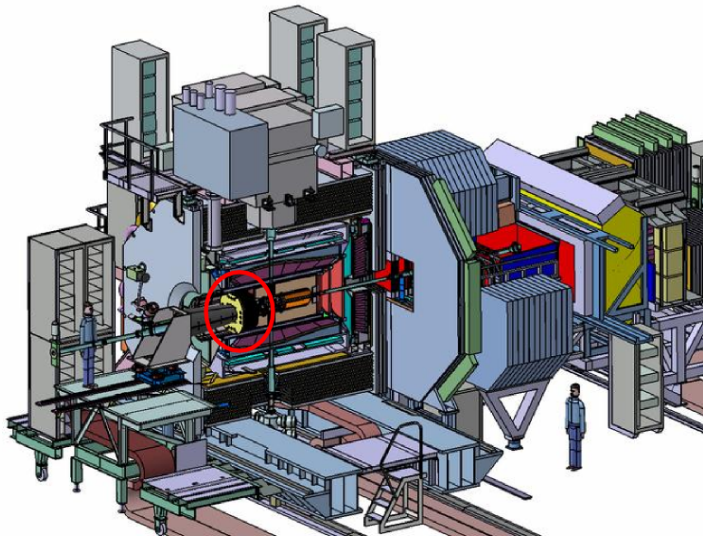
Helmholtz-Institut Mainz

PANDA CM 17/3, Novosibirsk – Computing Session
5 September 2017

Outline

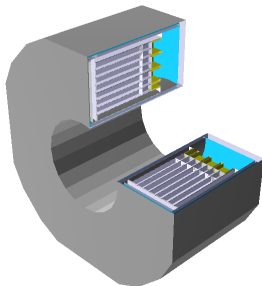
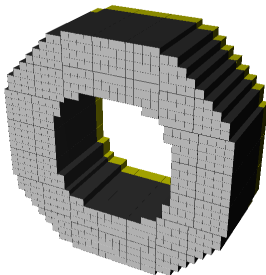
- ▶ Backward EMC crystal numbering
- ▶ Crystal mapping
- ▶ First checks and tests

The backward EMC



New geometry description

Presented in the last CM:



- ▶ Using ROOT geometry classes
- ▶ Latest crystal arrangement
- ▶ All relevant dead material volumes

Since:

- ▶ the number of crystal, and
- ▶ the type and number of submodules have changed

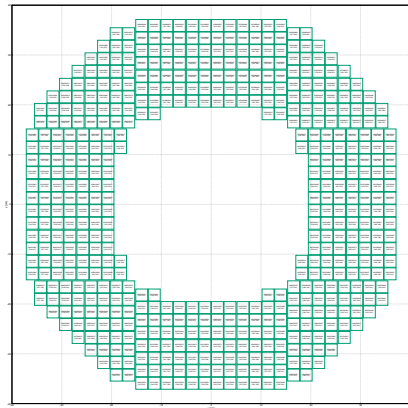
⇒ **crystal numbering to be redone!**

Crystal numbering

Numbering convention from e.g. `PndEmcStructure`

```
detId = module*100000000 + row*1000000 + copy*10000 + crystal;
```

for the backward EMC: `module = 4`

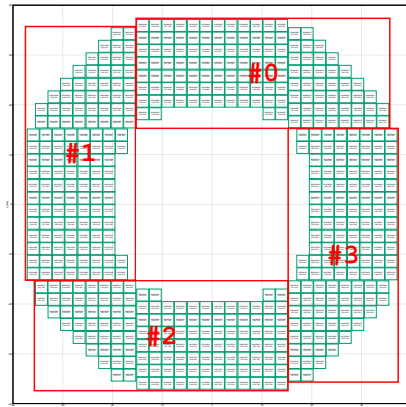


Crystal numbering

Numbering convention from e.g. `PndEmcStructure`

```
detId = module*1000000000 + row*1000000 + copy*10000 + crystal;
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for the backward EMC: `module = 4`



Crystal numbering

Numbering convention from e.g. PndEmcStructure

$\text{detId} = \text{module} * 100000000 + \text{row} * 1000000 + \text{copy} * 10000 + \text{crystal};$

for the backward EMC: $\text{module} = 4$



Crystal numbering

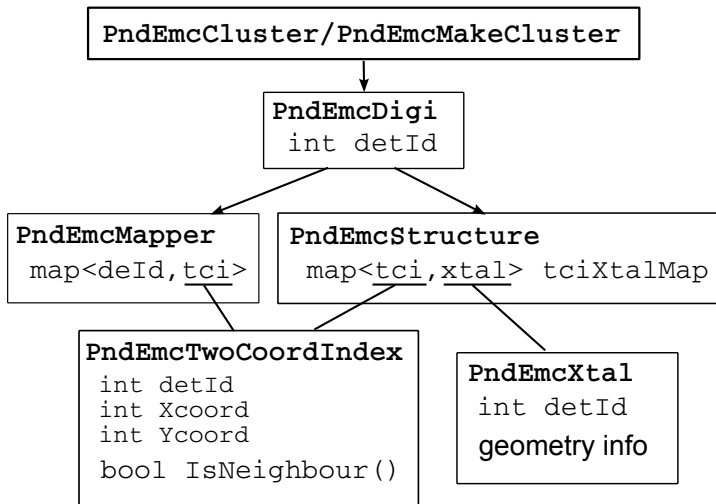
Numbering convention from e.g. PndEmcStructure

$\text{detId} = \text{module} \times 100000000 + \text{row} \times 1000000 + \text{copy} \times 10000 + \text{crystal};$

for the backward EMC: $\text{module} = 4$



EMC crystal mapping – review

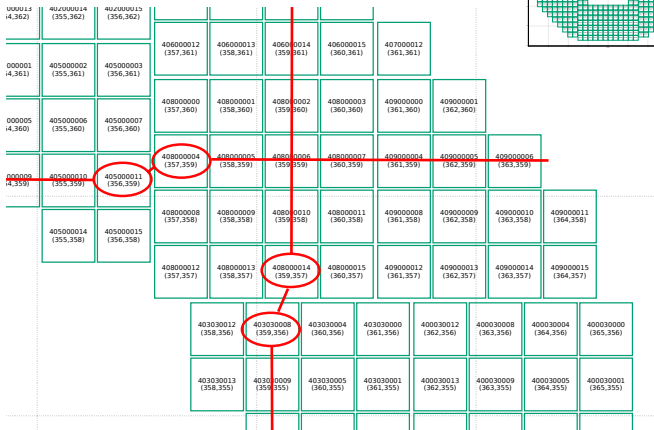
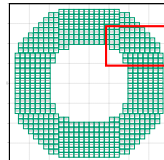


Code updates

- ▶ `PndEmcMapper:`
`new class PndEmcMapperGeo4RootV2`
 - ▶ `detId` → **two coordinate index** → `PndEmcTwoCoordIndex` **objects**
- ▶ `PndEmcStructure:`
`function crystal_name_analysis()`
 - ▶ **volume path and name (string)** → `detId` → `PndEmcXtal` **objects**
- ▶ `PndEmc:`
use of new geometry file `emc_module4_2017.root`
 - ▶ `SetGeometryVersion()`
 - ▶ `ConstructGeometry()`
 - ▶ `ConstructRootGeomMod4()`
`function ProcessHit()`
 - ▶ **copy numbers from volume hierarchy** → `detId` → `PndEmcPoint` **objects**

Crystal mapping for the bwd EMC

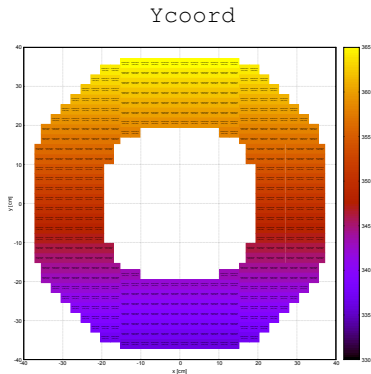
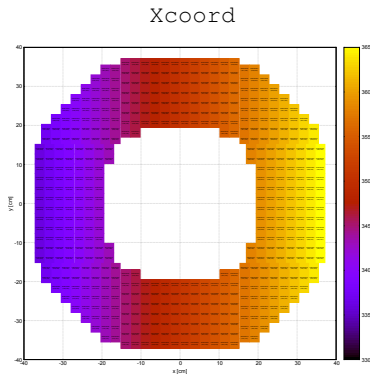
- ▶ X,Y indices in range: 335 – 365
- ▶ Crystals not aligned in the corners



- ▶ Tests of the cluster reconstruction ongoing

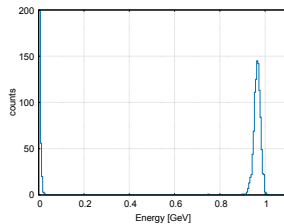
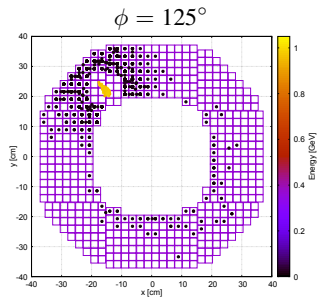
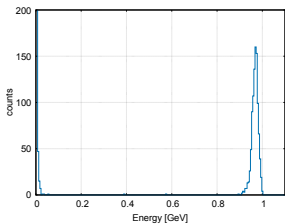
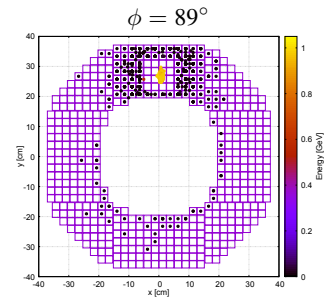
Map checks

- ▶ Printing out the `tciXtalMap`
- ▶ Position of crystals from geometry info in `PndEmcXtal` for objects
- ▶ Colours from the two coordinate index (`tci`) values



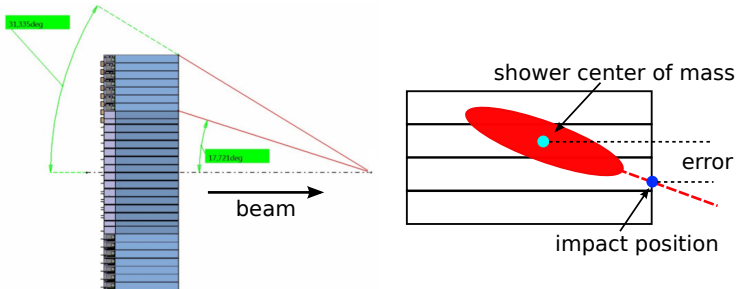
Cluster reconstruction tests

1000 events with γ @ 1 GeV, $\theta = 155^\circ$



To be done

Reconstruction upgrade?



- ▶ The crystals do not point to the target
- ▶ Error in the cluster position has to be taken into account (already done?) → **No!**
- ▶ Some simulations are needed to estimate the correction
- ▶ Prototype test data are available and will be used too (more beam tests are foreseen)

Summary

New pandaroot implementation of the backward EMC

- ▶ Crystal numbering for the new geometry description complete
- ▶ Mapping for the cluster reconstruction adapted
- ▶ Checks of the mapping are positive
- ▶ Cluster reconstruction works

To be done

- ▶ Some more tests on the reconstruction performances
- ▶ Cleaning and checking in the code
- ▶ Angle of incidence correction of the cluster position