Global Overview of EMC software

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The beginning of EMC detector

One of the first detectors implemented in PandaRoot

2-5 September 2006 – PANDA Meeting, Vienna – Stefano Spataro
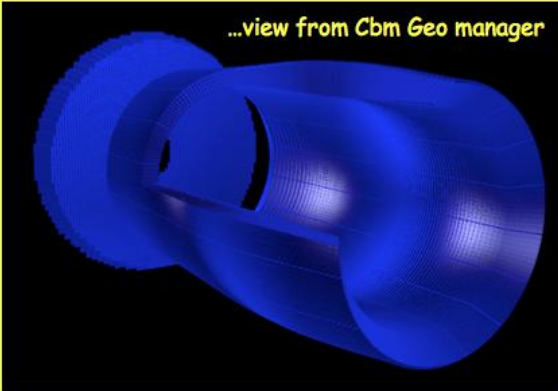MUON/EMC detector implementations in CBMROOT framework

Detector Implementation: Electromagnetic calorimeter

from EMC ASCII table

...view from Cbm Geo manager

> Barrel
> Forward endcup

✓ Geometry from Philippe Rosier drawings (me)
✓ Digitization and realistic reconstruction from Babar-like software (Dima)
✓ In the Physics Book analysis of pbarp➔γγ (Irina Brodski)

Since the beginning realistic response for analysis, the most advanced software

Developments of EMC detector

- ✓ Backward endcap and Shashik geometry
- ✓ More details in the forward endcap
- ✓ Non linear light collection
- ✓ Time based simulation
- ✓ Interface with analysis
- ✓ Electron PID
- ✓ Correction for Bremsstrahlung

Ongoing projects

- • Time based reconstruction (KVI/Bonn)
- • EMC Calibration (Stockholm)
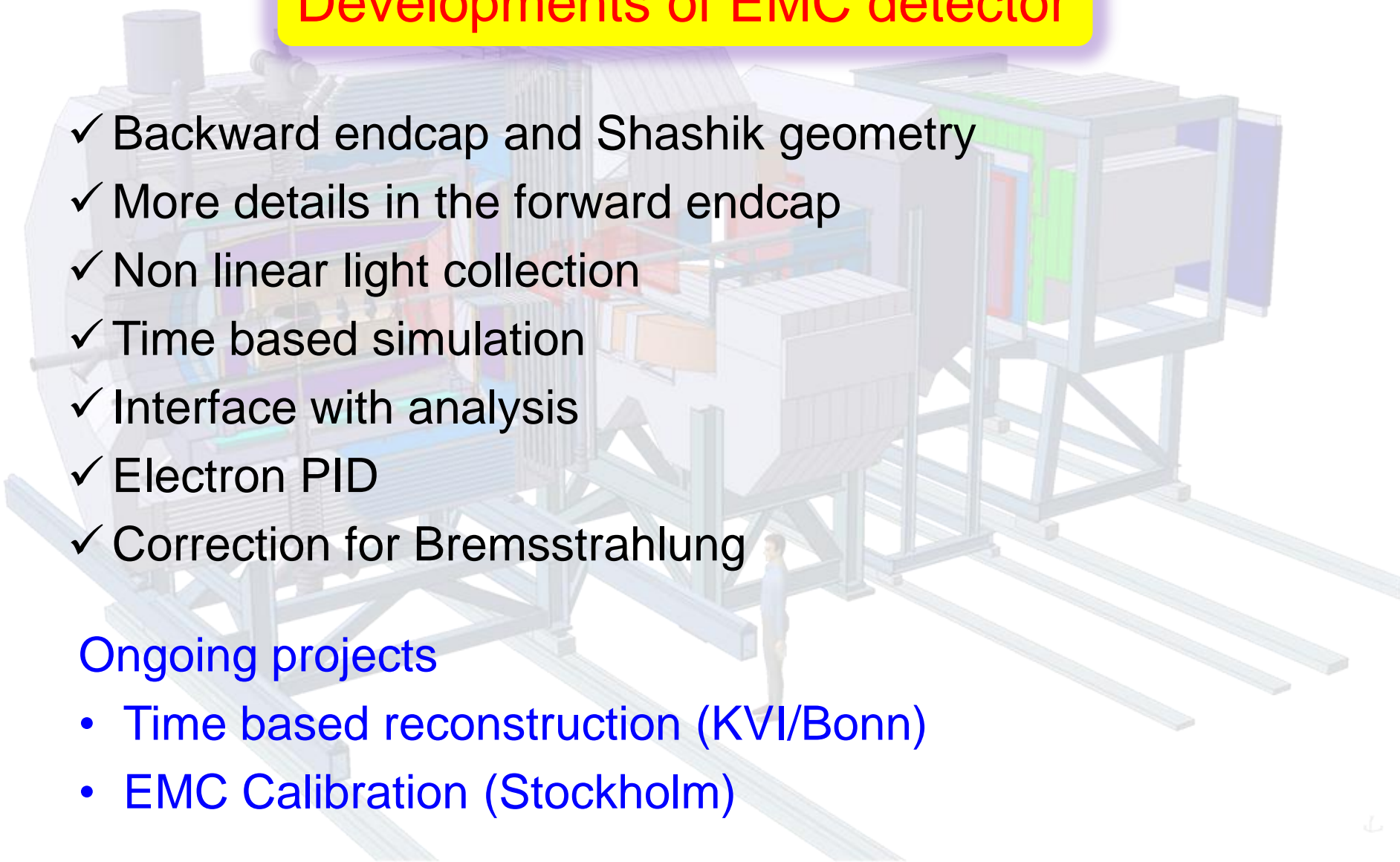
Recent Problems

In the recent years lack of active EMC coordination and of an EMC software groups (like in the "early years")

- Digitization changed but response in energy and covariance matrices were not reparametrized
- Bug in the parameters (non uniform light collection switched off) lead to a too good energy resolution, and this was realized only after 6 months
- All the people doing analysis focused on charged channels and not on neutrals in the past
- When new people are starting analysis with neutrals, many problems are occurring (problems with fitter, good neutral selection, …)
- Bug in emc covariance matrix was found after long time, due to lack of dedicated manpower
- Shashlik activities were never reported to the computing group
- Two independent groups worked on the same subject (time based simulation)
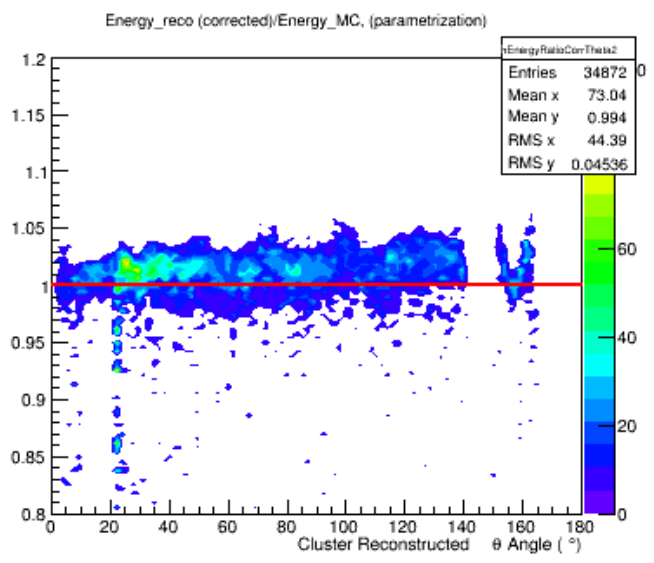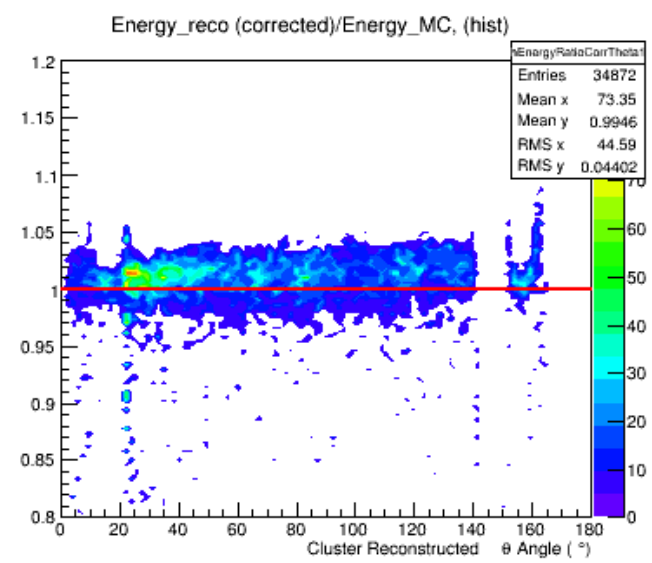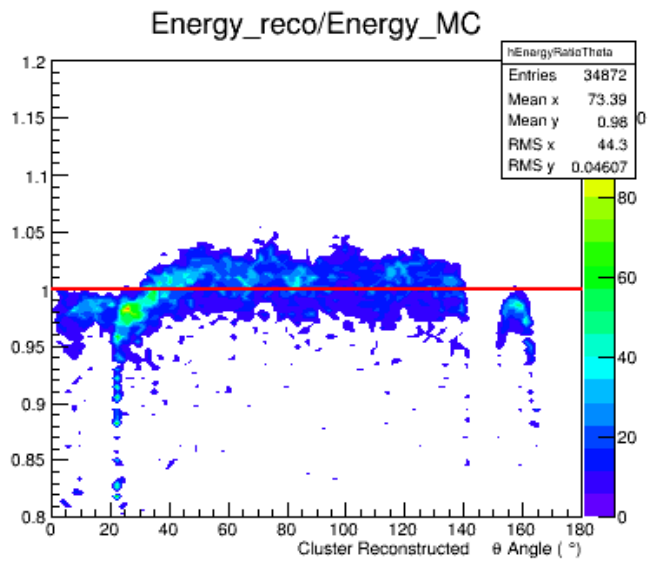
EMC Energy Calibration

Geometry Issues

Currently EMC geometry has problems with the new ROOT version
Most problems hidden bugs (voxelization) which are now appearing with more restrictive ROOT code. Most probably in the backward endcap

- Barrel and Backward endcap geometries are made only of PWO, without alveoles or passive structures which should affect the shower shape
- Recent version of the target pipe overlaps with barrel
- Shashlik has internal overlaps and overlaps with the beampipe

More in general, geometry needs an update and also passive elements should be included

Moreover, the geometry code suffers from the many people which were involved, and needs a cleaning to remove obsolete parts

- Calibration of photon energy response
- Parametrization of photon covariance matrix
- Check of MC Truth Matching

- Detection of charged signals in EMC using tracking information
- Detection of charged signals in EMC using SciTil/GEM/MDT information
- Criteria for good neutral candidate selections

- Characterization/improving of bump splitting algorithms, pi° reconstruction
- Hadronic and em split-off recognition
- PreShower detection and correction
- Validation of hadronic signal in calorimeter with G3 and G4
- Validation of electromagnetic signals in forward calorimeter with G3 and G4

- Particle Identification in the Shashlik

- Alignment algorithms
- Automatic Quality Assurance

Difference of neutral candidate between Geant4 and Geant3

Box generator : 0.1 < E < 5.0 GeV
5° < θ < 150°
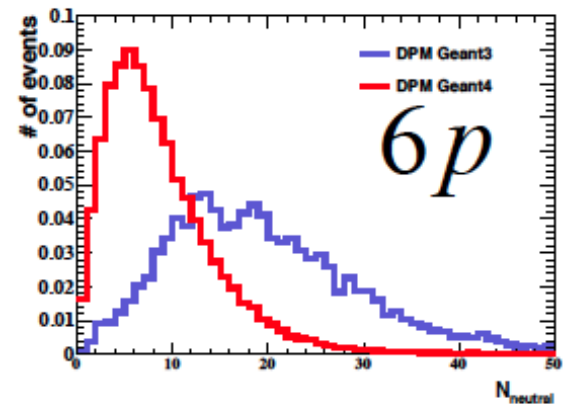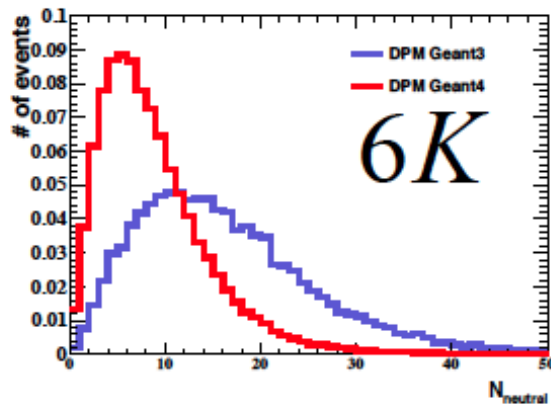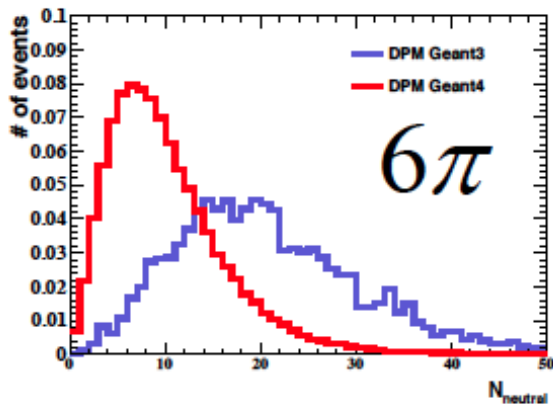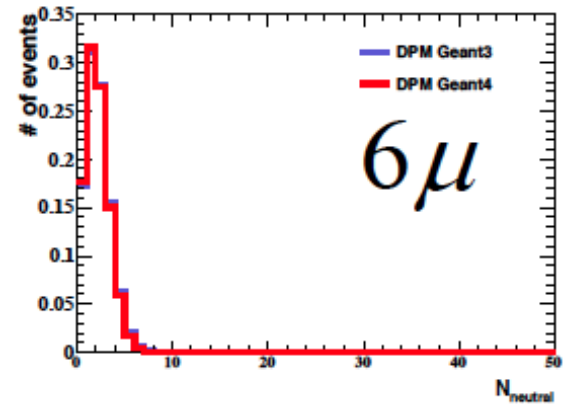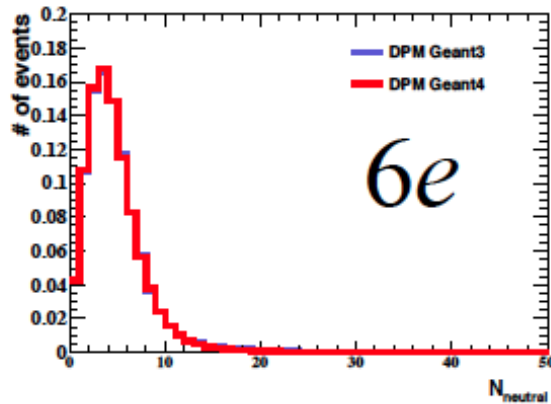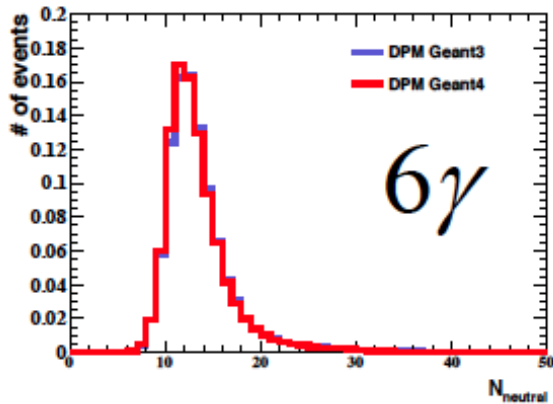
Trying to Summarize

➢ We need an active EMC software coordination

➢ We need automatic Quality Assurance macros which allow us to find eventual problems in a short time, and people reacting in a short time

➢ The reconstruction code needs improvements, if not analysis with neutrals is seriously compromised

➢ A better communication between EMC and computing

- EMC geometry problems with new ROOT version. Most probably in the bw endcap
- Barrel and bw endcap made only of PWO, without alveoles or passive structures
- Internal overlaps of FSC, and overlaps with recent target and beam pipe

- Calibration of photon energy response
- Parametrization of photon covariance matrix
- Check of MC Truth Matching

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