



IHEP group Shashlyk activity towards TDR

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PANDA collaboration meeting, GSI 2-6 March 2009



Outline

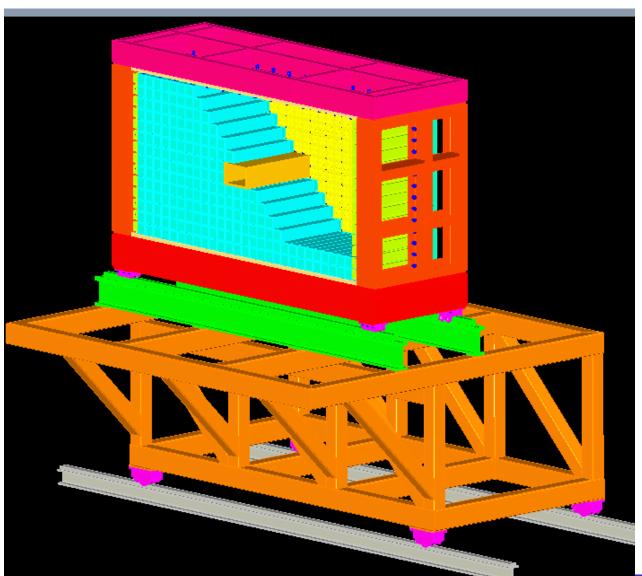


- Mechanical design of the calorimeter
- Assembling and maintenance
- MC simulations
- Last run results



Overall design of the FS EMC





27x14 modules (4cells each)

Massive closed frame

Back plate to fix modules in Z direction (modules position from one side and photodetectors from the other side of the plate)

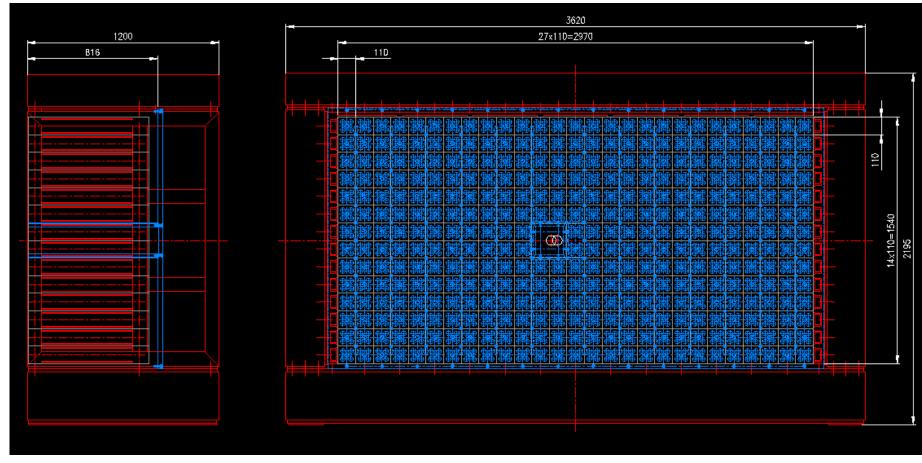
Accelerator pipe hole (2x2 modules) shifted from the center

Dedicated rail system for maintenance procedure



Detector sizes





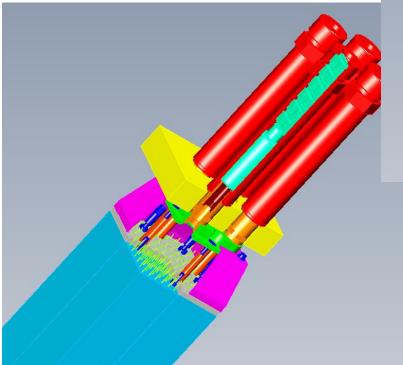
Active zone 2970x1540 mm²

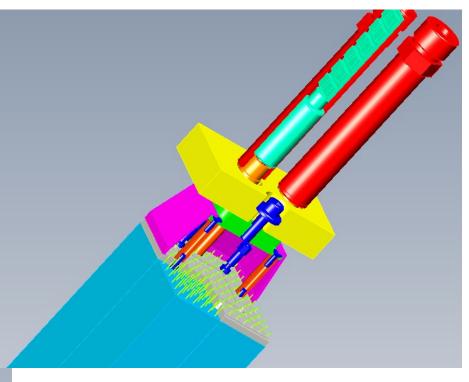


Shashlyk module tail stucture



Two types of possible mounting of the module: 4 tubes or 1 screw

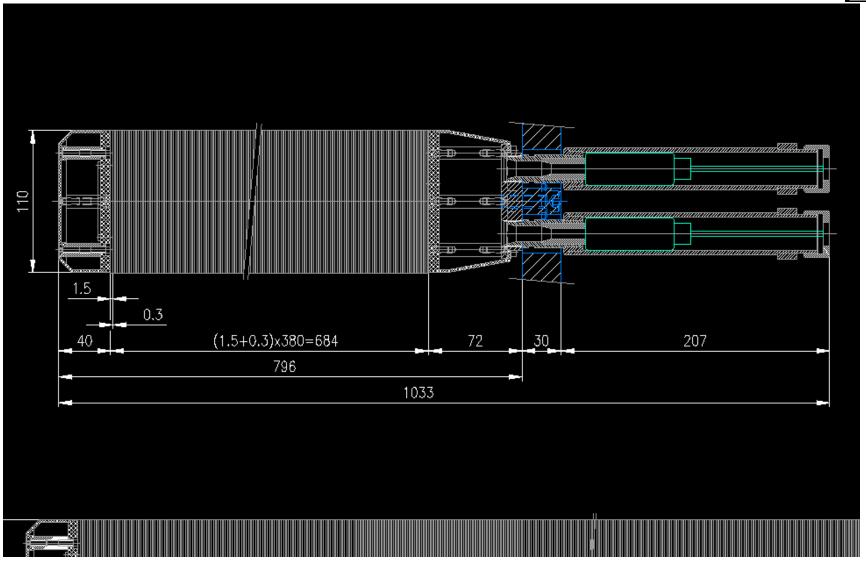






Shashyk module sizes

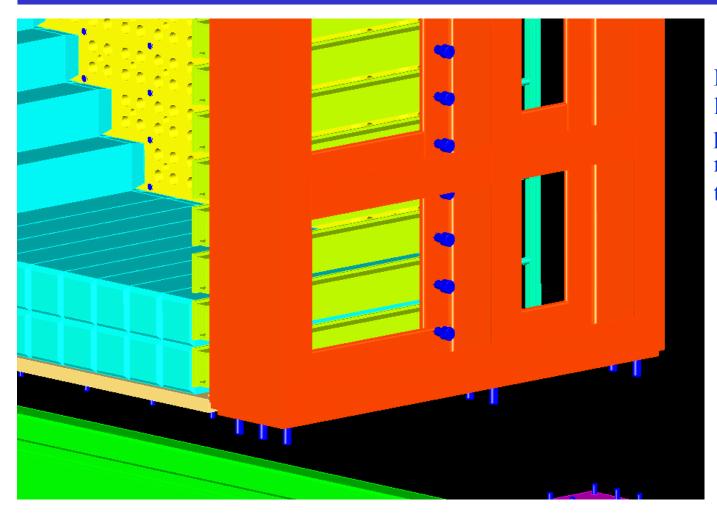






Calorimeter assembling



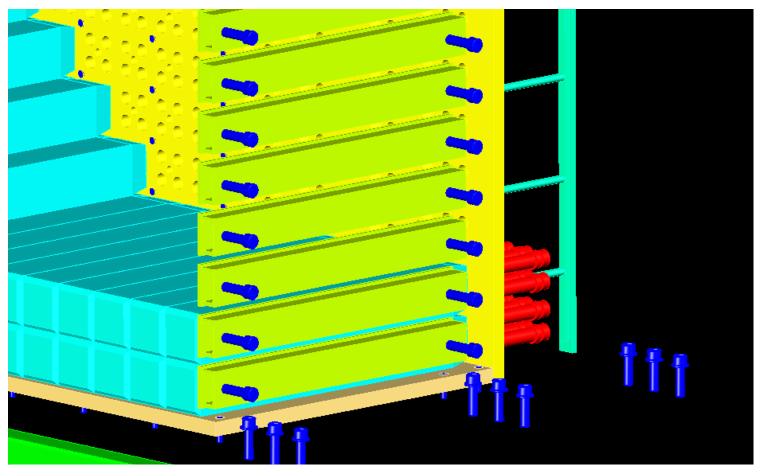


Modules installation: layer by layer, positioning each module according to the back plate holes



Calorimeter assembling (press bars)



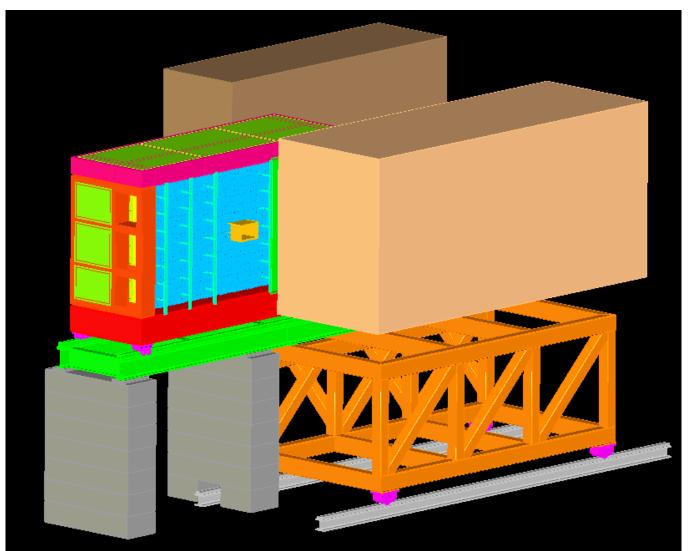


Press bars to minimize the gap between modules and fix positions



Calorimeter at the maintenance position





To provide a possibility of Shashlyk maintenance A dedicated extensible rail system is proposed.

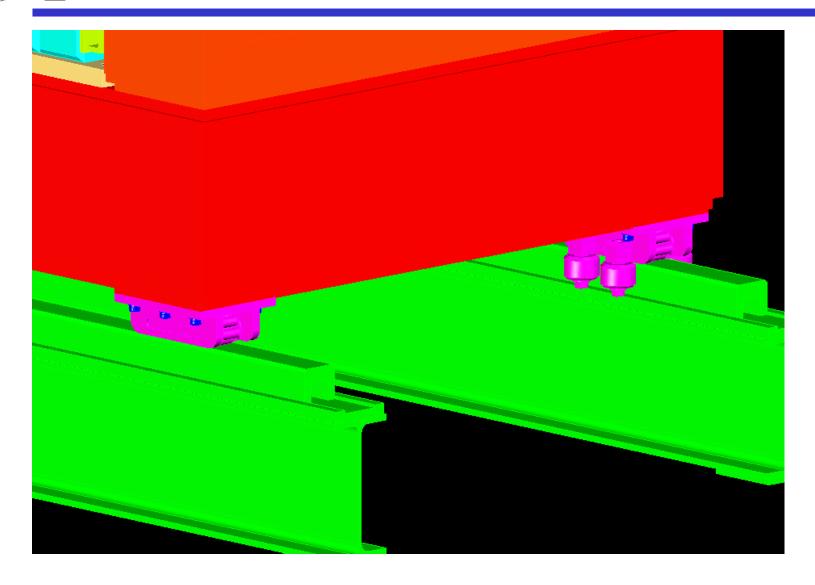
Calorimeter can be shifted out to the left or the right side of the Forward Spectrometer.

At the working position it fixed by lock pins with high precision



Calorimeter rollers

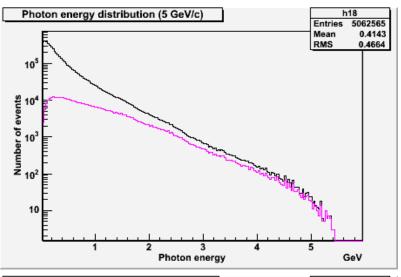




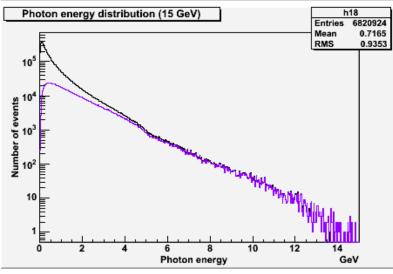


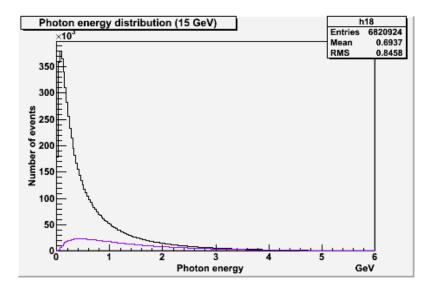
Fast MC (photons energy distribution)





All photons energy (upper curve) over photons at the Shashlyk aperture (color curves)

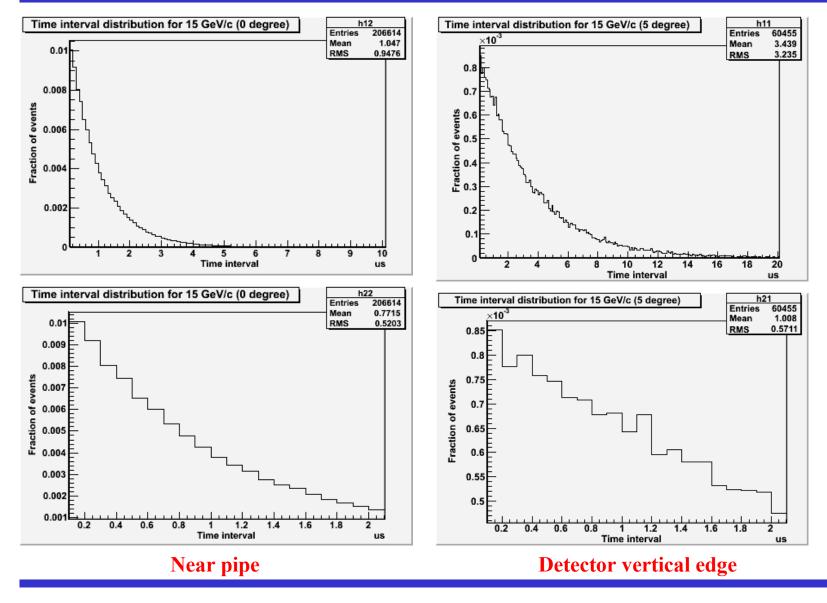






Time between energy depositions (one cell)

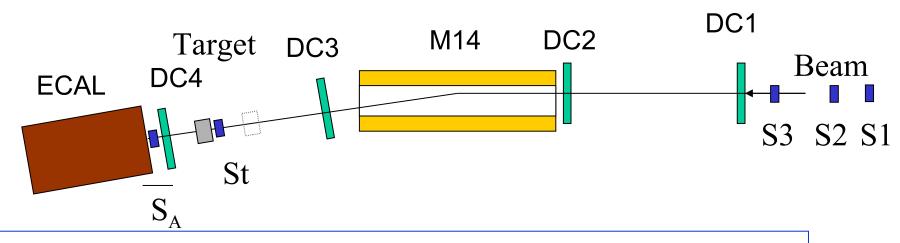






Testbeam setup



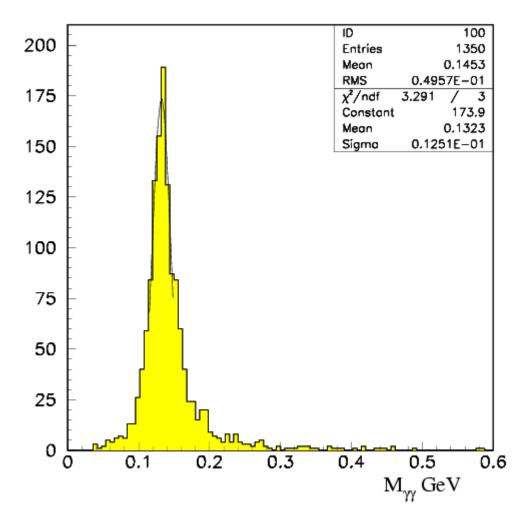


- Spectrometer consisted of 4 drift chamber stations and a magnet to measure beam particle momentum precisely
- Calorimeter prototype
- Al target at 1.5m and 3 m before the prototype



Testbeam results for 1.5 m (more sophisticated analysis)





Shower profile fit, Charged hadrons removed (drift chamber), Rough calorimeter calibration

 π^{0} 1-2 GeV, σ_{m} 12.5 MeV

Next steps:

Precise calibration,
All data analysis,
Big and small cell
performance comparison



Open questions to answer before TDR



- Shashlyk module length
- Size of the cell (55 mm vs 110 mm)
- Readout electronics
- Full MC





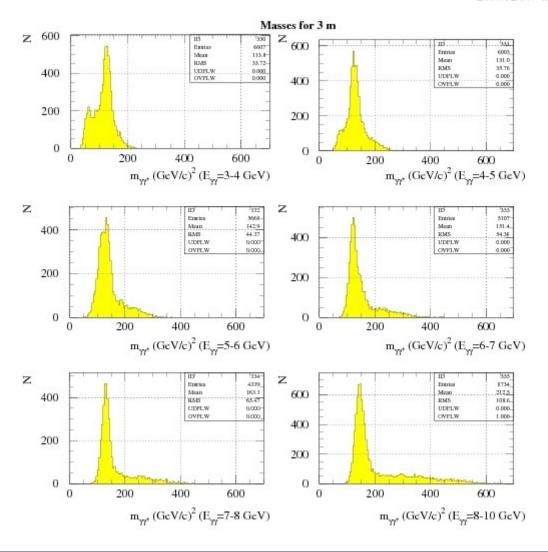
Backup slides



Registered neutral pions energies at 3 m target position



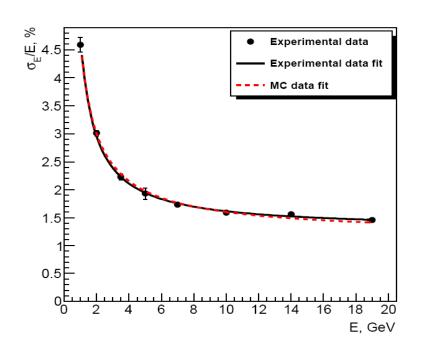
2008/12/07 19.56

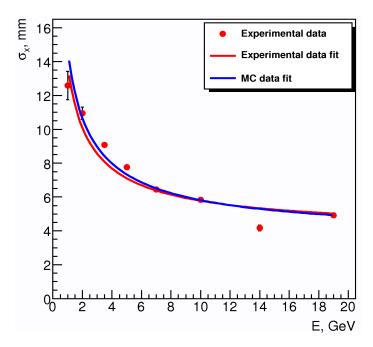




Energy and position resolution in "big" modules







$$σE /E = 3.5/E \oplus 2.8/\sqrt{E} \oplus 1.3$$
 [%], E in GeV $σx = 13.1/\sqrt{E} \oplus 4.0$ [mm], E in GeV



New prototype parameters



64 cells (16 supermodules) assembled in matrix

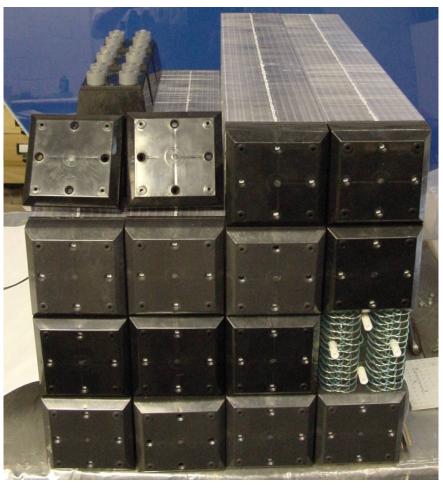
- 380 layers of 0.3-mm lead and 1.5-mm scintillator, total length 680 mm
- Transverse size 55x55 mm²
- Effective Moliere radius: R_M=59 mm
- Effective radiation length: $X_0=34$ mm
- Total radiation length: 20X₀
- Light collection: 36 fibers BCF-91A (Ø1.0 mm)



Prototype modules production









Prototype testbeam setup



