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KLOE EmCal

- Eres = 5.7%/sqrt{E} with negligible constant term
- Tres=54ps/sqrt{E}⊕50ps
- PosRes along length: ~1cm
- Transverse Position depends on 4.4x4.4cm2 readout cell size which leads to ~1.3cm resolution for isolated showers, comparable to average shower size.

However, such coarse granularity does not allow to disentangle two nearby energy deposits, which in KLOE may occur quite frequently and have a high probability to be merged if the distance between their centroids is less than 20 cm. This limitation is particularly nasty in all physics analyses in which the photon counting is crucial to separate signal and background. Moreover, the coarse granularity does not allow to track the details of the energy deposition development, which are essential to identify the different kind of particles entering the calorimeter.

A detailed FLUKA simulation of one KLOE calorimeter module showed that, increasing the elementary readout cells), couples of readout granularity by a factor of 16 (i.e. making 1.1 x 1.1 cm2 particles impinging into the calorimeter with a separation down to few centimetres can be easily disentangled, and that the energy deposition shape for electrons and muons can be reconstructed to a level that allows efficient particle identification on an event by event basis.

KLOE EmCal2

- Small 1x1cm light guides did not introduce significant cross talk
- 1.1x1.1cm2 segmentation has superior cosmics tracking.

NIM A 494 (2002) 326–331

KLOE EMCal

- 5.4%/sqrt{E} with negligible constant term, 2.4% from photostatistics
- photon efficiency >95%
- 56ps/sqrt{E}⊕133ps
- linearity ~1% for Egamma>50MeV

NIM A 482 (2002) 364–386

KLOE EMCal - detailed, including construction

- 5.7%/sqrt{E} with negligible constant term
- 200 fibre layers

- readout: planes 1-4 are 4.4cm deep, plane 5 is 5.2cm deep
- readout segmentation results in r-φ or x-z res of 1.3cm
- photon efficiency >95%
- 54ps/sqrt{E}⊕140ps with photons, intrinsic is 54ps/sqrt{E}⊕50ps

NIM A 461 (2001) 344–347

KLOE EMCal

- 5.7%/sqrt{E} with negligible constant term
- linearity ~1% for Egamma>50MeV, ~4% at 20-50MeV
- 54ps/sqrt{E}⊕147 with photons, intrinsic is 54ps/sqrt{E}⊕50ps

NIM A 379 (1996) 511-514

KLOE EMCal

- 4.7(±0.5)%/sqrt{E}, 2.7% from photostatistics
- z-res ~0.93/sqrt{E}
- 58ps/sqrt{E}⊕147 with photons, intrinsic is 54ps/sqrt{E}⊕50ps