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Subject: Re: EMC resolution

Posted by [Dima Melnychuk](#) on Mon, 14 Oct 2013 12:47:47 GMT

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Hi,

Some additional comments from my side on EMC resolution.

I have more or less the same numbers as Binsong and I tried to look what are main contributions to these numbers.

By the way I used apr13 release of pandaroot for these studies and did simulation for barrel in 30-130 degree range.

So first of all I made a comparison of resolution which includes and does not include digitization.

The resolution without digitization can be obtained if PndEmcMakeDigi class is used for digitization and in emc.par  
UseDigiEffectiveSmearing:Int\_t 0

In this case the resolution is only due to energy leakage below threshold. With single crystal threshold 3 MeV the resolution is 1.08 %

The resolution in my case is obtained from Novosibirsk fit  
(root/pandaroot/trunk/macro/emc/dedicated/fit\_resolution.C)

When digitization is included two additional contributions to resolution are photostatistics and electronics noise. With current parameters in emc.par/all.par photostatistics for case of barrel for 1 GeV photon should give 0.43 % (94 p.e. per MeV and 1.7 excess noise factor). 1.5 MeV noise gives 0.15% contribution accordingly.

Adding these three contribution quadratically  
 $\sqrt{1.08^2+0.15^2+0.43^2}=1.17$  %

Simulation of 50 k photons with digitization included gives 1.20 % resolution which is in agreement with simple estimation.

If we want to compare the results of simulation with prototype measurements the non-uniformity of ligh yield should be included in simulation and it will give a sizeble effect.

But otherwise it seems that electronics noise and photon statistics are treated reasonably well and I can only imagine that the energy leakage could be underestimated.

Dima

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