Subject: Energy correction for gammas
Posted by Dima Melnychuk on Fri, 28 Nov 2008 17:22:16 GMT
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Hi all,

I made an attempt to implement the energy correction in emc just porting correction from Panda Emc in Babar framework.

The results are not very promising.

I simply have taken parametrisation of energy correction from EmcCalibToo/EmcPhotonSimpleCalib.cc and implemented it as a method of PndEmcBump::GetEnergyCorrected().

The results are the following.

For the barrel emc, gamma with energy 1 GeV emitted in theta [25;135] degree, phi [0;360] degree.

The following plot is obtained with macro\emc\reco_analys4.C.
The top plot is without correction and bottom with correction.

So the correction is too large. It seems than that correction for 3 percent energy loss would be closer to generated energy.

For the shaslyk emc, gamma with energy 1 GeV emmited in theta [0;5] degree, phi [0;360] degree.

And correction is too small.

And I am really sorry but I do not have time at the moment to investigate the discrepancy (i.e. why this parametrisation of the energy correction works in Babar framework but not in pandaroot).

And one general remark how to implement energy correction in the proper way. Of course the EmcBump is not the proper place to apply energy correction. It should be applied at least after Cluster-Track matching to reject clusters produced by the charged particles.

But it seems than it cannot be applied in exactly the same way as in Babar framework, since as I can see there it is strongly coupled with PID. At least correction is applied to the object which is produced after identification of the Bump/Cluster as Neutral Candidate. And in pandaroot the PID procedure is foreseen to be different and I do not see now how to couple energy correction with it at the moment. So it's a point for discussion.

Best regards,
Dima

File Attachments
1) emc_energy_barel.png, downloaded 672 times
2) emc_energy_shashlyk.png, downloaded 708 times

Subject: Re: Energy correction for gammas
Posted by Johan Messchendorp on Sun, 30 Nov 2008 19:55:07 GMT
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Hi,

I ran this weekend simulations with more than two million photon events (boxgenerator, G3&G4) with only the EMC as geometry using the Nov08 release of PandaRoot. I looked at the averaged deposited energy (note: cluster energy!) with respect to the incident photon energy for bins over the full range in polar angle (0-180 degrees, 62 bins) and for an incident energy interval from 0-15 GeV in 34 bins (binning inhomogeously chosen according to variations in the response). The results, e.g. mean cluster energy/incident photon energy, for G3 are depicted in the figure. In the attached root file, you can find the corresponding 2D histogram together with a simulation using G4 and simulations for the Slashlyk calorimeter. In principle, one could use this file to correct the data accordingly. If there is a need for other information, let me know.

Kind wishes,

Johan.

File Attachments
1) geant3_photon_response.gif, downloaded 344 times
2) photon_eresponse.root, downloaded 271 times

Subject: Re: Energy correction for gammas
Posted by Dima Melnychuk on Sun, 30 Nov 2008 21:20:41 GMT
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Hi all,

I have an update to my previuos post.

The previous plots were shown for G3 simulation, but in case of G4 simulation the energy correction taken from Babar framework works better.

The barrel emc - 25-135 degree, 1 GeV gamma.

At least the mean value of corrected histogramm is at 1 GeV.

And shashlyk calorimeter, 0-5 degree, 1 GeV.

The match is not perfect but much closer than in G3 case.

Best regards,
Dima

File Attachments
1) emc_energy_barel_g4.png, downloaded 448 times
2) emc_energy_shashlyk_g4.png, downloaded 536 times

Subject: Re: Energy correction for gammas
Posted by StefanoSpataro on Sun, 30 Nov 2008 22:07:28 GMT
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As I have already told to Dima,
I think that the Shashlick, which is made of different thin layers of lead+scintillator, suffers from the same problem of MVD in geant3, due to the straggling option and then delta electrons below geant cuts which are absorbed by the material.

Subject: Re: Energy correction for gammas
Posted by Johan Messchendorp on Sun, 30 Nov 2008 23:36:07 GMT
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Hi,

something we need to discuss and settle on on how to proceed here...(as we already planning to do for a long time) What about the upcoming collaboration meeting?

Johan.

Subject: Re: Energy correction for gammas
Posted by Bertram Kopf on Mon, 01 Dec 2008 12:39:54 GMT
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Hi Dima,

thanks for checking the emc correction in the PandaRoot software. The results - at least for the TS EMC with VM G4 - look reasonable to me. As far as I know Jan corrected the energies to the mean value and this seems to match more or less well. The correction for the shasklyk calorimeter cannot be reproduced perfectly but I think one can also use it as a work around for the PB gamma gamma studies.
This would require that Irina uses VM G4 as simulation engine together with the correction from the BaBar like software.

I think the following general things have to be done in the near future:

1. the VM G3 results (especially for the shashlyk calorimeter) look very strange and - in case that one would also make use of VM G3 - it is necessary to fix it.

2. To implement a propper calibration. A quick solution would be to calibrate it with mc truth informations. For a long term project one should get rid of the mc truth calibration and to replace it by a more realistic one, e.g. based on DPM events (pi0-, eta- calibration and maybe also calibration with electrons).

3. In case that different simulation engines should be supported it is necessary to calibrate the EMC seperately for all the supported engines (VM G3, VM G4, fluka, etc.).

Best regards,
Bertram.

Subject: Re: Energy correction for gammas
Posted by Dima Melnychuk on Tue, 02 Dec 2008 23:36:51 GMT
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Subject: Re: Energy correction for gammas
Posted by Dima Melnychuk on Wed, 03 Dec 2008 11:38:13 GMT
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Hi all,

I have just made the small modification in the parameter file /macro/params/emc.par (svn revision 4091).

The threshold for shashlyk was there by default 3 MeV. I changed it to 8 MeV, to be consistent with what is written in Physics book and correspondingly is used in Babar framework.

Best regards,
Dima

Subject: Re: Energy correction for gammas
Posted by Aleksandra Biegun on Wed, 03 Dec 2008 12:20:12 GMT
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Hi Dima,

could you please change the map version (MapperVersion:i 1)
in that file:

/macro/params/emc.par

from 1 to 2, since now the new version of the Forward End-Cap

is used, see: macro/emc/sim_emc.C

Emc->SetGeometryFileNameDouble("emc_module1245.dat","emc_module3new.root "); // if you want to use new geometry for FwEndCap

There was version 2 some time ago, but now,
version 1 appeared back.

Thanks a lot!

Ola.
