Subject: Abnormal distribution
Posted by Jifeng Hu on Mon, 21 Jan 2013 17:45:17 GMT
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In this simulation, a box generator was used to shoot three 1GeV energy photons. Then their energy was reconstructed (E_{rec}, and compared to the energy in Monto Carlo truth (E_{truth}).

please see the plot in the attachment.

The X-axis shows the polar angle in unit rad, the Y axis shows the energy difference (E_{rec}-E_{truth}) in unit GeV.

We can find,
a) the Shashlyk calorimeter has a worse resolution, but a longer right-side tail, it implies a incorrect reconstruction in EMC cluster or bump.
b) for the intersection between forward calorimeter and shashlyk calorimeter, still a longer right-side tail exists.

c) barrel calorimeter looks good, a left-side tail arises from the energy leak in crystal and energy loss before hitting crystals.

d) for the intersection between barrel and backward, there exists a large gap, but abnormal reconstruction near theta value 2.5.

e) energy reconstruction near the edge of backward calorimeter need more correction.

What are your opinions?
The energy reconstruction determines the photon detection efficiency.

File Attachments
1) energy_vs_theta.eps, downloaded 558 times

Subject: Re: Abnormal distribution
Posted by Dima Melnychuk on Tue, 22 Jan 2013 09:59:18 GMT
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Hi Jifeng,

Could you clarify which reconstructed cluster energy do you use, i.e.

PndEmcCluster::GetEnergyCorrected()

or from

PndEmcClusterCalibrator::Energy()

May be just better post your analysis macro here.

Dima

Subject: Re: Abnormal distribution
Posted by Jifeng Hu on Tue, 22 Jan 2013 10:40:28 GMT
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Here I show the codes slice,

```
PndEmcBump* theHit = (PndEmcBump*) fRecoHitArray->At(HitIndex1);
      fEnergy1 = theHit->energy(); // E1
      fEnergy1C = theHit->GetEnergyCorrected()/1.009; //E1C
      PndEmcCorrection* theCorr = (PndEmcCorrection*)fCluCorrArray->At(HitIndex1);
      fEnergy1CC = theCorr->EnergyCorrPhoton();  //E1CC
```

since the peak energy provided by theHit->GetEnergyCorrected() has a shift, temporarily I made a further correction by a factor 1.009.

Attachment eps file shows the difference between
E1C-E1, E1CC-E1, and E1CC-E1C.

PndEmcClusterAna class is used to save information from PndEmcBump.
PndEmcMcTruthWriter class is used to save information from PncMCTrack.

best regards.

File Attachments

1) 3energy_diff.eps, downloaded 383 times
2) 3energy.eps, downloaded 393 times
3) PndEmcClusterAna.cxx, downloaded 430 times
4) PndEmcClusterAna.h, downloaded 377 times
5) PndEmcMcTruthWriter.cxx, downloaded 375 times
6) PndEmcMcTruthWriter.h, downloaded 405 times

Subject: Re: Abnormal distribution
Posted by Dima Melnychuk on Tue, 22 Jan 2013 11:55:55 GMT
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The first approach for energy correction

theHit->GetEnergyCorrected()

is obsolete and should be in principle removed.

What I personally used/implemented is the class
PndEmcClusterCalibrator(method),
which for
method=1 uses the same approach, but with corrected parametrization
and for
method=2 uses the same approach as in PndEmcCorrection class
but with recalculated histograms

See my old post (https://forum.gsi.de/index.php?t=tree&th=3457&start=0&rid=78
&S=6d7276e6f9612e28feff1e110f9d321d) for details.

Example how to use it is in
/macro/emc/dedicated/EnergyPosCorrection/emc_correction_QA.C

But in short

```
PndEmcAbsClusterCalibrator * calibrator1=
PndEmcClusterCalibrator::MakeEmcClusterCalibrator(1);
PndEmcAbsClusterCalibrator * calibrator2=
PndEmcClusterCalibrator::MakeEmcClusterCalibrator(2);

PndEmcCluster *cluster=(PndEmcCluster*)cluster_array->At(i);

Double_t energy=cluster->energy();
Double_t energyC1 = calibrator1->Energy(cluster);
Double_t energyC2 = calibrator2->Energy(cluster);
```

Method 1 and 2 give in principle close results.

Could you recalculate you initial plot with these corrections?

Dima

Subject: Re: Abnormal distribution
Posted by Jifeng Hu on Wed, 23 Jan 2013 09:38:31 GMT
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Hi, Dima,
  With your suggestion, some new plots are got. you can find
them in the eps file attached.

here lists my brief code slice.

```
PndEmcAbsClusterCalibrator * calibrator1=
PndEmcClusterCalibrator::MakeEmcClusterCalibrator(1);
     PndEmcAbsClusterCalibrator * calibrator2=
PndEmcClusterCalibrator::MakeEmcClusterCalibrator(2);

PndEmcBump* theHit = (PndEmcBump*) fRecoHitArray->At(HitIndex1);
fEnergy1 = theHit->energy();
fEnergy1C = calibrator1->Energy(theHit);
fEnergy1CC = calibrator2->Energy(theHit);
```

conclusions:
a> calibration still needs further improvement for crystals near backward endcap edges.
b> calibrator2 looks better for intersection between forward and barrel calorimeter, but a little problem in theta ranges near value 2.5.

However, results looks much better.
Thanks for your correction.

best regards,

Jifeng Hu

File Attachments

1) energy_cor.eps, downloaded 505 times