
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 ($E_{\text{rec}} - E_{\text{truth}}$) 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 387 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 219 times
 - 2) [3energy.eps](#), downloaded 240 times
 - 3) [PndEmcClusterAna.cxx](#), downloaded 257 times
 - 4) [PndEmcClusterAna.h](#), downloaded 219 times
 - 5) [PndEmcMcTruthWriter.cxx](#), downloaded 225 times
 - 6) [PndEmcMcTruthWriter.h](#), downloaded 244 times
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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 335 times
