Subject: Charged Hits in Neutral List
Posted by Lu Cao on Fri, 08 Aug 2014 11:54:15 GMT
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Dear PID experts,
I simulated 10 charged kaon in box generator with the momentum (1,4) GeV/c and checked the photon multiplicity in this K+ box like this:

```
---event loop---
theAnalysis->FillList(neu,"Neutral");
hgeve->Fill(neu.GetLength());
```

As shown in the attached .png, in the 10 evt K+, we got avg. 5.7 neutrals and 2 of those events got surprising 16 neutrals.

To understand this in a deeper level, Tobias helped to check the EMC cluster in MCTrack:

```
fMCMatch->CreateArtificialStage("MCTrack");
Int_t nCluster = fClusterArray->GetEntriesFast();
Int_t nTracks = fMCTrackArray->GetEntriesFast();
//loop to test Cluster
 for (Int_t iCluster=0; iCluster<nCluster; iCluster++)
 {
  PndEmcCluster* theCluster = (PndEmcCluster*) fClusterArray->At(iCluster);
  std::vector<Int_t> mcIndexes = theCluster->GetMcList();
  for (Int_t iMcIndex = 0; iMcIndex < mcIndexes.size(); iMcIndex++){
   std::cout << "Tracks in Cluster " << iCluster << " TrackId: " << mcIndexes.at(iMcIndex); // <<
std::endl;
   PndMCTrack* myTrack = (PndMCTrack*)fMCTrackArray->At(mcIndexes.at(iMcIndex));
   std::cout << " PdgCode: " << myTrack->GetPdgCode() << std::endl;
  }
 }
```

Then, we got this info:

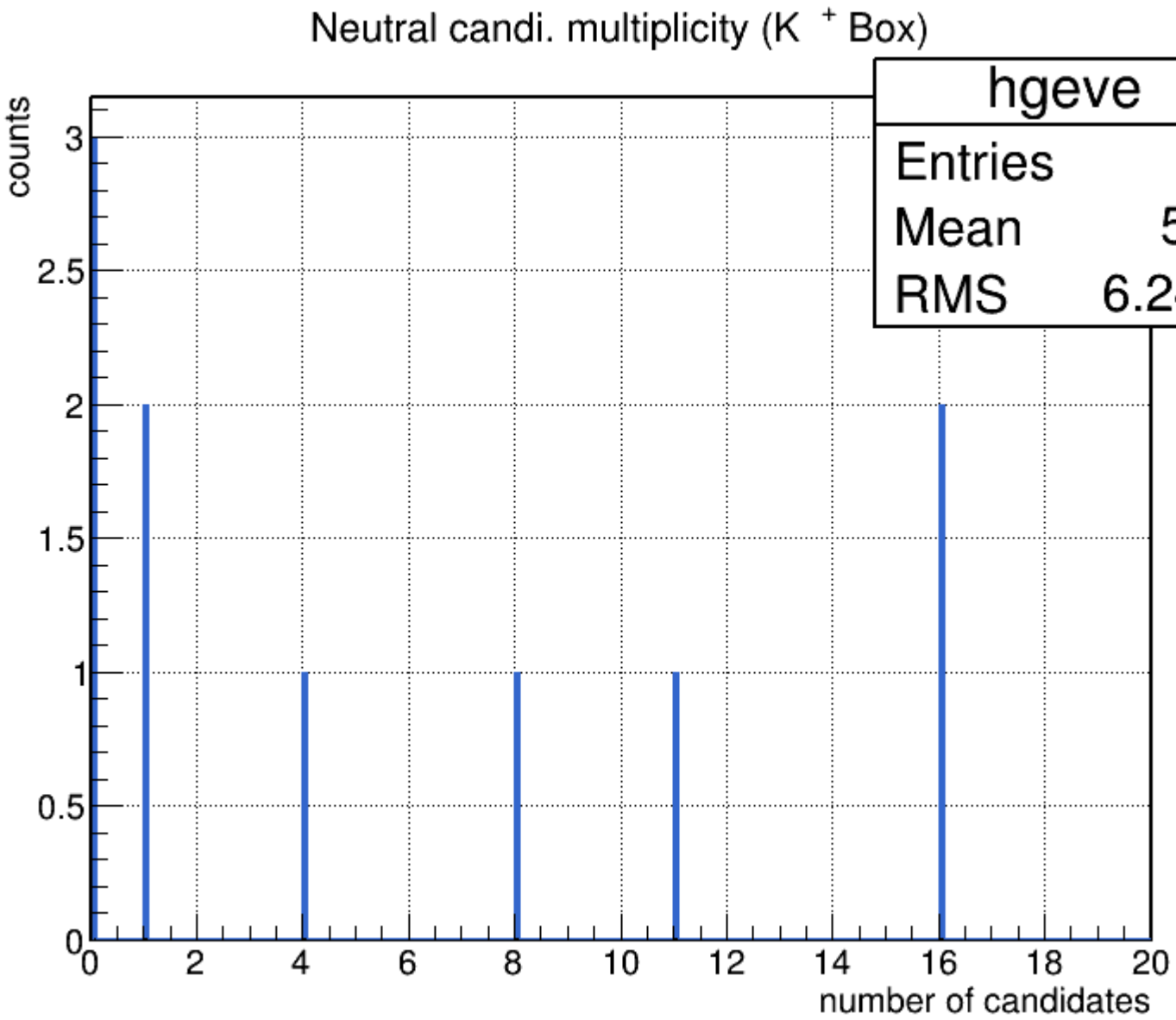
```
Tracks in Cluster 1 TrackId: 0 PdgCode: 321
Tracks in Cluster 2 TrackId: 0 PdgCode: 321
Tracks in Cluster 3 TrackId: 0 PdgCode: 321
Tracks in Cluster 4 TrackId: 0 PdgCode: 321
Tracks in Cluster 5 TrackId: 0 PdgCode: 321
...
```

It looks some charged particles fired the EMC crystals but they are treated as "neutral candidates".

With best regards,
Lu

File Attachments

1) Canvas_1.png, downloaded 1884 times



Subject: Re: Charged Hits in Neutral List
Posted by StefanoSpataro on Fri, 08 Aug 2014 13:25:54 GMT
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This means they are not correlated to the charged track. Try to check the GetEmcQuality, which is the distance?2 to the closest track. You should put a cut on minimum distance there.

Subject: Re: Charged Hits in Neutral List
Posted by Lu Cao on Fri, 08 Aug 2014 14:22:17 GMT
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Dear Sefano,

I checked the EmcQuality in the output of pid, but I don't understand why they're all -1.

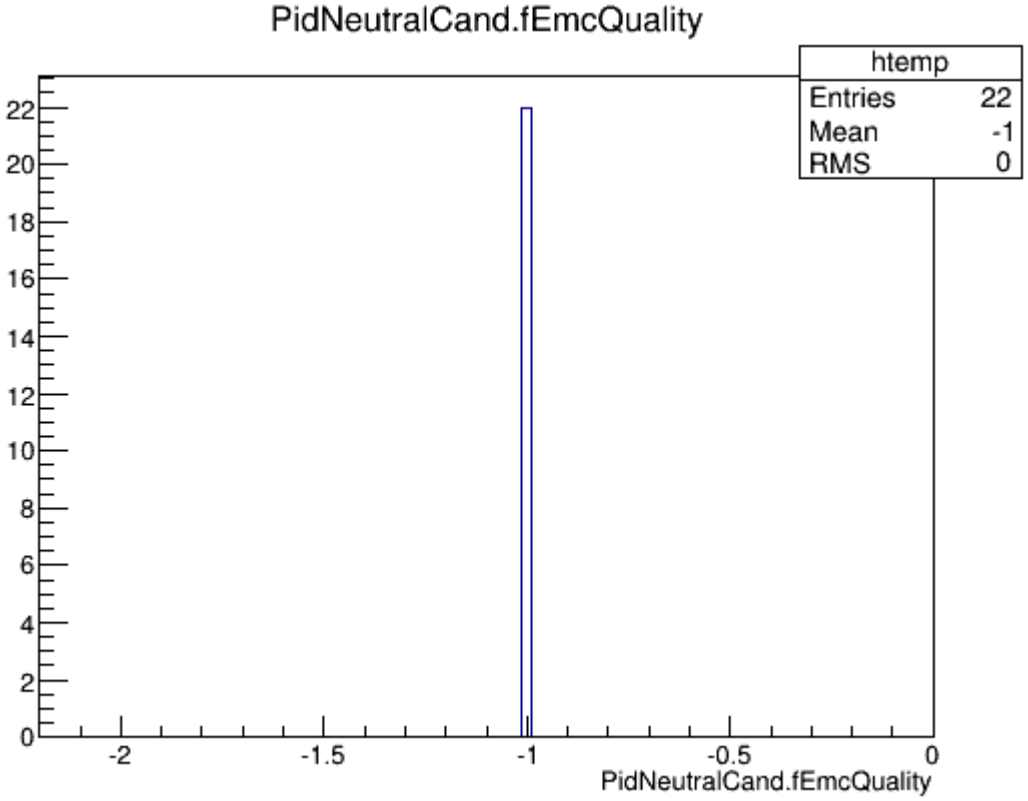
Do I need to enable any functions at somewhere? The code I'm using is a copy of macro/run/*_complete.C.

And one more interesting thing we found within the eventdisplay, is that several photons (light pink) from the charged kaon (light yellow) fly backward to hit the emc:

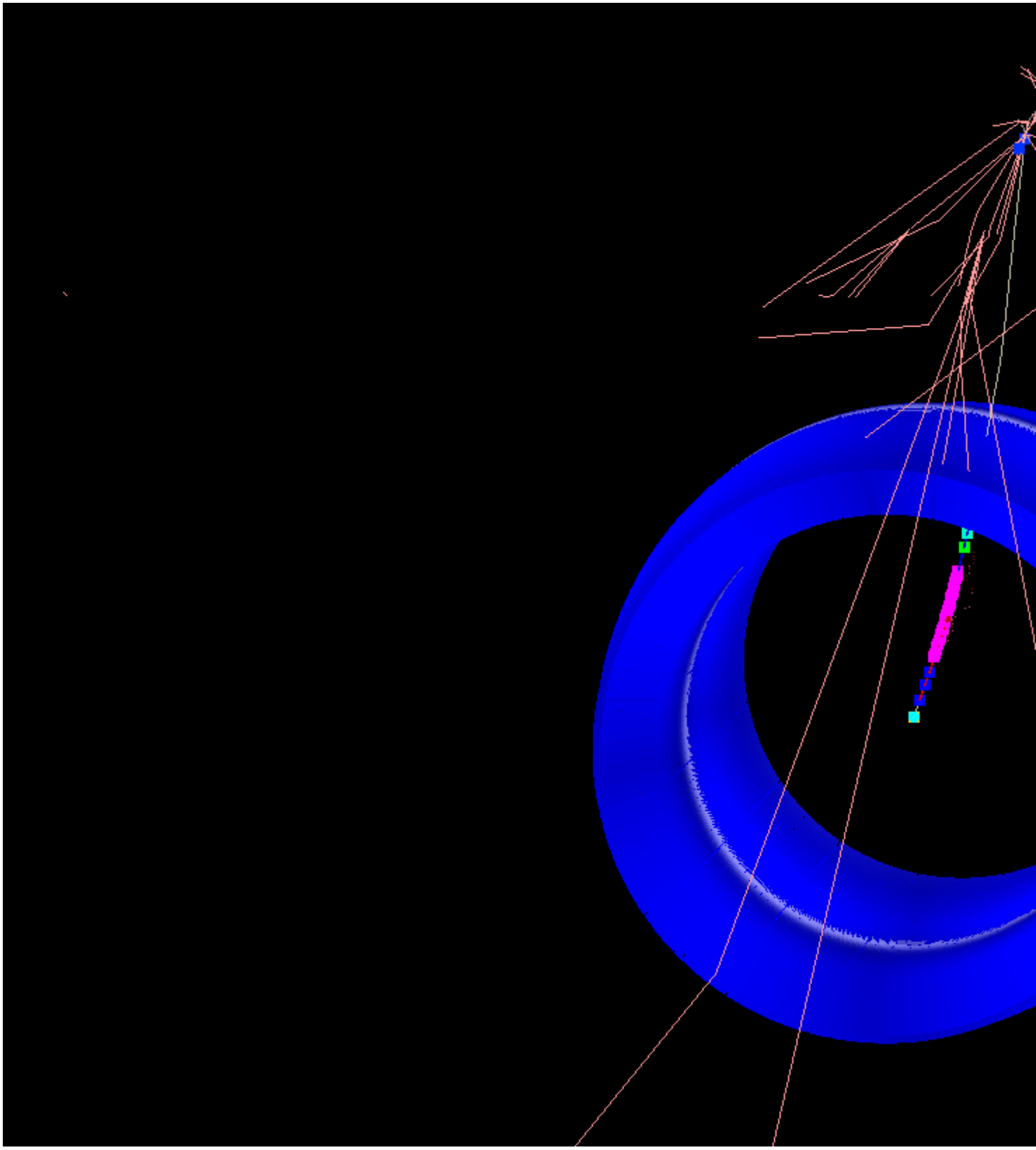
Best,
Lu

File Attachments

1) Canvas_1.png, downloaded 1430 times



2) photons.png, downloaded 1544 times



Subject: Re: Charged Hits in Neutral List
Posted by StefanoSpataro on Fri, 08 Aug 2014 16:56:03 GMT
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Those numbers should be different from -1. Could you please check with higher statistics?

Subject: Re: Charged Hits in Neutral List
Posted by Lu Cao on Mon, 11 Aug 2014 07:14:11 GMT
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Dear Stefano,

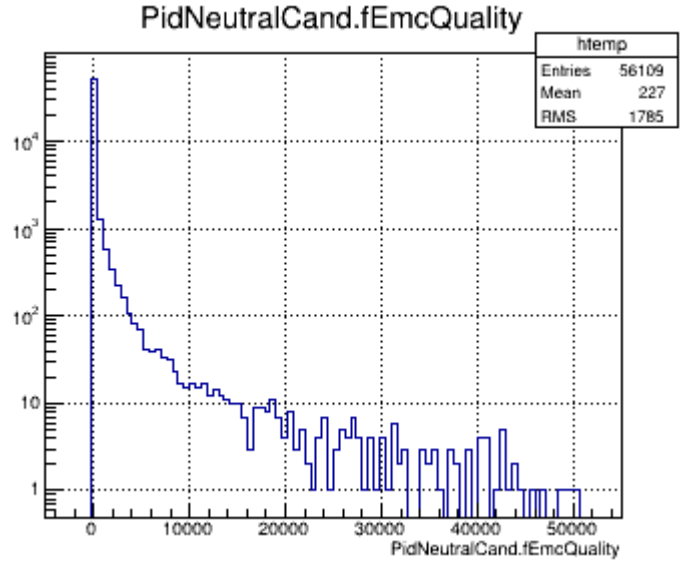
I tried 10k evt and got this following output:

Should I cut at some value?

Best,
Lu

File Attachments

1) Canvas_1.png, downloaded 1470 times



Subject: Re: Charged Hits in Neutral List
Posted by StefanoSpataro on Tue, 12 Aug 2014 10:59:55 GMT
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This should be the distance squared of the cluster position (in cm^2) from the projected track. This means that EmcQuality>2500 means that you consider neutral candidates only when the closest track is at at least 50 cm.
You could try with several selections, to see that happens.

Subject: Re: Charged Hits in Neutral List
Posted by Lu Cao on Thu, 14 Aug 2014 06:33:35 GMT
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Many thanks. I'll have a try.
One more question...What's the meaning when it equals to -1 ?

Subject: Re: Charged Hits in Neutral List
Posted by StefanoSpataro on Thu, 14 Aug 2014 06:48:56 GMT
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-1 should mean that there is no charged track nearby.

Subject: Re: Charged Hits in Neutral List
Posted by Lu Cao on Thu, 21 Aug 2014 14:21:57 GMT
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Hi Stefano,
I just looked into the PidCorrelator code and found some reasons for -1:

* no MC or no MCindex found when ideal pid is used
* cluster energy below emc barrel threshold 20 MeV
* hit not come from emc or fsc
* no propagation at module when geane is used

** too low momenta (< 0.1) or too high momenta (> 15) // ?? why 0.1 GeV/c
** track flag <= 0
** no track info

And the "nearby" criteria of emcquality < 2500 is distinguishing the neutral candidate and the track-correlated hit. Then, the track-correlated hit will be constructed as a charged candidate. Do I understand it right?

Best regards,
Lu

Subject: Re: Charged Hits in Neutral List
Posted by StefanoSpataro on Thu, 21 Aug 2014 20:06:07 GMT
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These are criteria for the charged tracks, but you are interest in the neutral candidates.

Subject: Re: Charged Hits in Neutral List
Posted by Lu Cao on Thu, 21 Aug 2014 21:51:17 GMT
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What I've checked is these criteria also affect on the neutral candidates. In the function of ConstructNeutralCandi, the emc quality is obtained from the map fClusterQ, which is stored and updated in the function of GetEmcInfo. GetEmcInfo is only called by ConstructChargedCandi.

This means that once the fClusterQ[i] is assigned as -1 in the step of constructing charged candidate, the emc quality of cluster/bump i for neutral candidate will be also -1.

Could you please have a look at the code, especially the operations regarding to fClusterQ? If it doesn't perform as expectation, there would be something "strange".

Thanks in advance.
Lu

Subject: Re: Charged Hits in Neutral List
Posted by StefanoSpataro on Mon, 01 Sep 2014 20:32:46 GMT
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This code was written as placeholder but never checked carefully. We need somebody taking care of neutral reconstruction.

Subject: Re: Charged Hits in Neutral List
Posted by Lu Cao on Tue, 02 Sep 2014 09:34:27 GMT
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I'd like to be a volunteer and have a discussion for more details in the coming CM.
Best regards,
Lu

Subject: Re: Charged Hits in Neutral List
Posted by Shyam Kumar on Wed, 10 Sep 2014 15:58:03 GMT
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Hi Lu,
I am also doing the same thing for the cut parameter optimization for Ftof, It will be useful in every case whichever algorithm I use. I have read in detail about it. I can give some idea what i understand stefano can tell whether it is correct.

Actually when a charged particle passes through medium and detector it deviates its actual trajectory (multiple scattering) so only from the actual hit it is very difficult to get the actual path. so kalman filter is used for this. It has three steps extrapolation, filtering, and smoothing. In the extrapolation we predict the theortical value and one is the measured hit on detector then in filtering we do the weighted mean of this to get kalman fitted value and then smoothing is used to get the true point.

So In my case Tof quality (as TofCut in all.par file) is the distance square of the measured position (actual hit) and extrapolated position(theortical predicted value) if it will be small then we will get the better result.

The all parameter is in all.par file
https://subversion.gsi.de/trac/fairroot/browser/pandaroot/release/dec13/ macro/params/all.par (412-428). EmC quality should be Emc12Cut in all.par in line 418.

Thank you
Shyam

Subject: Re: Charged Hits in Neutral List
Posted by Lu Cao on Thu, 11 Sep 2014 07:23:29 GMT
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Hi Shyam,
good to know the correlator with tof, but the situation is quite different with the case of emc. For a more detailed info on the emc issue, you can have a look at my slides which has been presented in the collaboration meeting:
https://indico.gsi.de/conferenceDisplay.py?confId=2943
The problem we have now is not only parameter optimization, but deeper in the level of algorithm itself.

With best regards,
Lu