Subject: Reconstruction efficiency of LHE tracking
Posted by donghee on Wed, 29 Jul 2009 10:55:41 GMT
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Hi all,

I have one question about LHE tracking.
Does anybody make some study for dependence of LHE tracking on the different interaction point.

I have tested LHE tracking only with electron.
You can find generated electorn theta angle distribution in the attached figure.
It turned out that the tracking efficiency depends strongly on the interaction point(or primary vertex).
If I simulate the LHE tracking with electron in the z-range with z=(-10,10), I have ~ 50% reconstruction efficiency at the starting from 60 upto 160 degree electron.

But if I'm going to z=(10,30) by z smearing, which is moved to 20cm downstream from the target region, the reconstructed electron is only ~12.0%.
Is the LHE tracking optimised only at the (x=0,y=0,z=0)?

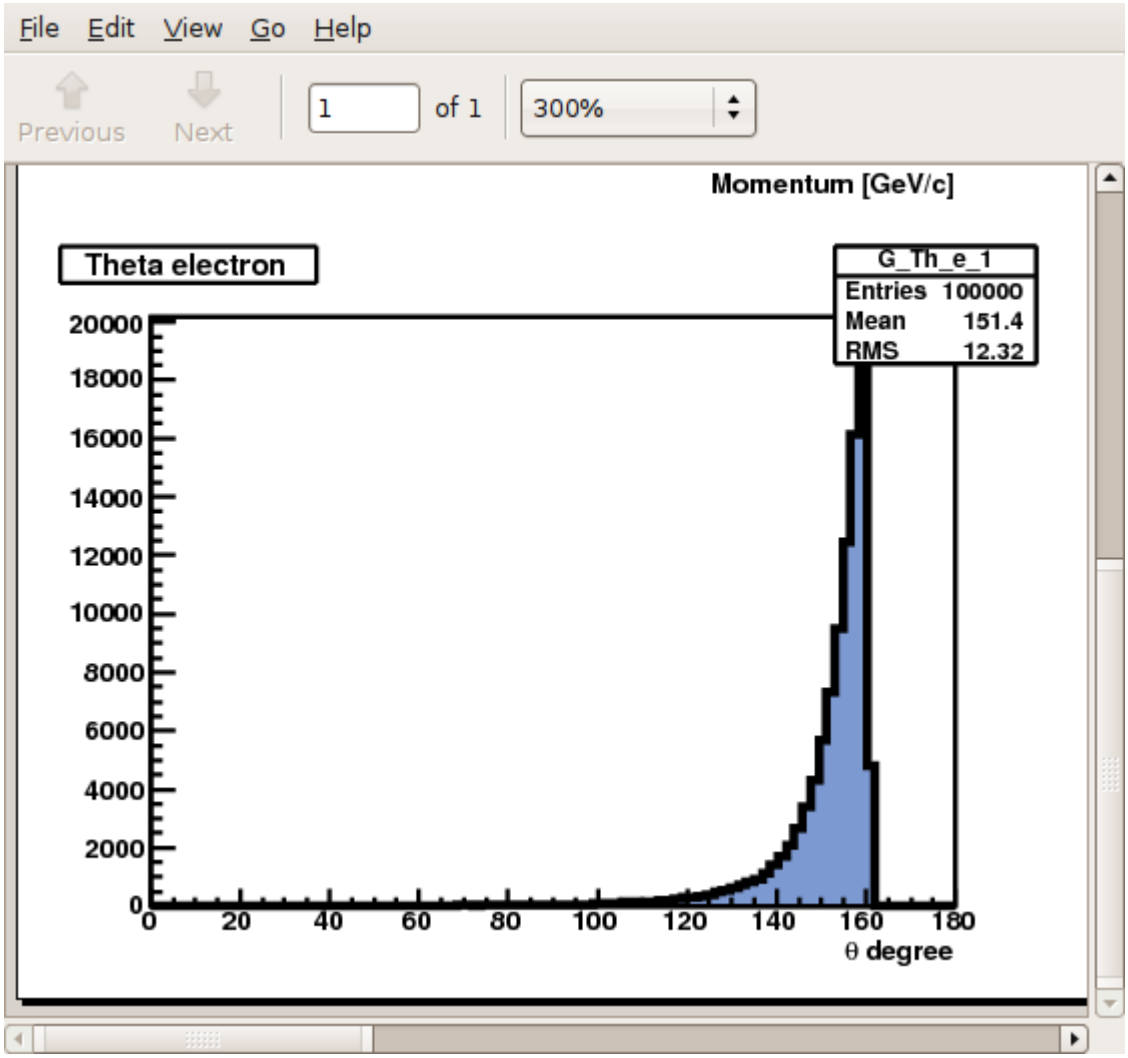
If I do simulation same data without delta z, i.e., only at (x=0,y=0,z=0), the efficiency increase slightly as 56%.

Can you already expect this trend?

Best wishes,
Donghee Kang

## File Attachments

1) electron.png, downloaded 1031 times




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Subject: Re: Reconstruction efficiency of LHE tracking
Posted by StefanoSpataro on Wed, 29 Jul 2009 11:07:08 GMT
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Quote:Hi all,
I have one question about LHE tracking.
Does anybody make some study for dependence of LHE tracking on the different interaction point.

Never.
However, could you please tell which is the momentum range you are considering, and if you are using tpc or stt?

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Subject: Re: Reconstruction efficiency of LHE tracking
Posted by donghee on Wed, 29 Jul 2009 12:04:24 GMT
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Dear stepano,

find 3 eps files, that contain reconstructed lhe tracking for electron.
Red histogram is generated event in each plot.
Blue corresponds to reconstructed one from LHE tracking without Dirc detector.
Below two panel indicate the resolution as a function of momentum and theta, respectively.

lhe_e_momentum_theta_z_origin.eps is without z-smearing, every
event are produced at the interation point (0,0,0).

lhe_e_momentum_theta_z_-10cm_10cm.eps shows the events are distributed from the -10cm to 10cm, total length is 20cm and also x and y smearing is given by 0.2cm sigma of gaussian.

lhe_e_momentum_theta_z_10cm_dz_30cm.eps is produced z range between 10cm and 30cm, it is more downstream from target.

First bad thing is that EMC gap (142 - 149 degree) result in bad
efficiency.

Secondly, I think that the problem is due to the design of LHE tracking package.
If you move your interaction point to the downstream, for instance at z=20cm, then you have many MVD hit near the 8 or 16cm, where is located MVD station, these hits didn't used at LHE tracking, or make some confusing in the starting point of hit in TPC.

This is the time and good chance to think about LHE tracking for backward direction.

Best regards,
donghee

## File Attachments

1) lhe_e_momentum_theta_z_origin.eps, downloaded 509 times
2) lhe_e_momentum_theta_z_-10cm_10cm.eps, downloaded 489 times
3) lhe_e_momentum_theta_z_10cm_30cm.eps, downloaded 458 times

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Subject: Re: Reconstruction efficiency of LHE tracking
Posted by StefanoSpataro on Thu, 30 Jul 2009 14:05:09 GMT
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Hi,
first of all, I suppose you are using tpc and not stt. Please correct me if youa re using stt macros.
The problem appears probably because you are hitting particles at very back angles. where the detector is nto well performant for tracking (and where we expect very few tracks).

If you see the first plot, starting from 0,0,0, you can see that the code does not reconstruct

tracks with theta>155°, due mainly to the detector geometry (non enough points to reconstruct the track).

While in the first plot you see a sharp cut, once you smear the vertex in -10, 10, of course the corresponding emission angle will be different, then the sharp cut becomes smooth aroung 155° (you expect that tracks at -10 cm will suffer the cut at thete a bit lowert than 155, while for tracks at +10mm the acceptance should increase a bit at theta more than 155°, but this are small effect. And the tracking is stuill fine.

In the third polot, first of all the hole is not connected to EMC, becuase emc are not used for tracking. Probably at some particular angle there is some geometry effet from the pipe, and than simply tracks are scattered and not reconstructed properly. However, I am quite surprised that you reconstruct up to 160°, apart from the hole due probably to pipe material (if i remember well int he back aprt is not titanium anymore but steel).

Then, it seems there is nothing so awful in the back tracking, or at least it does nto appear from the plot.

My question is now, do we really expect particles at theta < 150°? These should be quite rare events, isn't it?

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Subject: Re: Reconstruction efficiency of LHE tracking
Posted by donghee on Mon, 03 Aug 2009 11:52:12 GMT
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Dear Stefano,

I'm actually using TPC, and I'm interesing the electron detection from 1 GeV to 3.5 GeV momentum range
Quote:
Probably at some particular angle there is some geometry effet from the pipe, and than simply tracks are scattered and not reconstructed properly. However, I am quite surprised that you reconstruct up to 160°, apart from the hole due probably to pipe material (if i remember well int he back aprt is not titanium anymore but steel).

I didn't expect many hit over 150 degree in LHE tracking.
But actually, I'm not doing anything, LHE tracking decide to show the event more than 150 degree when the interaction point is moved into the point at 30 cm.
If some low monentum electron is produced near 30cm, then probably some TPC hit can be recorded due to the solenoid magnet even though the electron has small angle. This is my rough guess.

I couldn't catch your comment for material, what is the difference between titanium and steel. Is the cone shape pipe in backward composed with steel? and steel produce more secondary particles than titanium?
Sorry for stupid question!

Best wishes,

Donghee

Subject: Re: Reconstruction efficiency of LHE tracking
Posted by StefanoSpataro on Mon, 03 Aug 2009 13:06:07 GMT
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Titanium is much lighter, while steel has a higher interaction length.