Subject: Re: Momentum resolution and reconstruction efficiency of LHE tracking
Posted by Gianluigi Boca on Sat, 13 Feb 2010 22:06:57 GMT
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Sorry for the late reply.
Yes it is possible now to use the real pattern recognition for
the Straw Tube system.
As I have already said in my previous message, one example is in
$VMCWORKDIR/macro/stt/runreco.C

where one needs to substitute
PndSttTrackFinderIdeal* sttTrackFinder = new PndSttTrackFinderIdeal(iVerbose);

with

PndSttTrackFinderReal* sttTrackFinder = new PndSttTrackFinderReal(iVerbose);

This macro produces the famous Helix Hits with the statement

```
  PndSttHelixHitProducer* sttHHProducer = new PndSttHelixHitProducer();
  fRun->AddTask(sttHHProducer);
```

Notice that in this macro there is also Lia's fit to the tracks just after the
pattern recognition, with the statement

```
  // trackfitting ....
  PndSttTrackFitter* sttTrackFitter = new PndSttHelixTrackFitter(iVerbose);
  PndSttFitTracks* sttFitTracks = new PndSttFitTracks("STT Track Fitter", "FairTask",
sttTrackFitter);
  sttFitTracks->AddHitCollectionName("STTHit");
  fRun->AddTask(sttFitTracks);
```

From the study that I am going to show at the next EVO meeting, I conclude
that for muon tracks, the resolution on the Momenta component are in general better
after Lia's fit compard to the values obtained directly by the Pattern Recognition
(with the exception of the resolution on Pz at momenta < 1. GeV/c).
Therefore today I think that the best is to use the real pattern recognition and then Lia's fit.

Typically the resolution on the Transverse Momentum ranges from 1.5% for 300 Mev/c
total momentum muons, to 20% for 10 GeV/c muons.
Typically the resolution on Pz ranges from 5% for 300 MeV/c muons up to 34% for
10 GeV/c total momentum muons.

Consequently, I would expect a not so bad resolution on the J/Psi mass after
real pattern recognition + Lia's fit.

One comment on the resolution obtained in the J/Psi channel using the Ideal Straw Tube
pattern recogniton.
Lia-Susanna-Alberto last year obtained a good resolution with the Ideal Pattern

recognition + fit with muon tracks of different total momentum.

Now David Pohl claims he obtains a quite worse result.

I think that in his study the J/Psi decays hadronically or maybe even in e+e- ??
That could make things worse.

I would suggest first of all to study the decay channel into mu+mu- and see what happens.
In that case the results would be directly comparable to those of the Pavia group.

Gianluigi

Johan Messchendorp wrote on Thu, 11 February 2010 09:47Stefano Spataro wrote on Thu, 11 February 2010 07:47As I as writing before, lhe is based in 3D points -> XYZ.
In the case of SttHit this information is not available, and the helix fit transforms straw hits into point of closest approach to the central wire, used by lhe for the finding.
Maybe one could write an "ideal" stt helix hit producer, which does not take the reconstructed PCA but the MC point -> points for the finder, hits for the fitter.
But I am not so sure if this is want we want/need.

I see. In any case we need to understand what the origin is of the loss in efficiency. I understand that most probable it is related to the (x,y,z) reconstruction for the STT that troubles the helix fit. It would, nevertheless, be nice to confirm it in some way or the other. What about comparing directly with the track finding code of Gianluigi? That is available now and should be easy to do, right?

Greetings,

Johan.