Subject: GEM Tracking inside LHETRACK
Posted by StefanoSpataro on Mon, 22 Jun 2009 20:20:35 GMT
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Dear all,
under Ralf's suggestion I have extended the lhetrack code in order to be able to use even GEM hits.
The code is inside svn and it seems to work.

I have simulated 500 muons at 2GeV/c, from 5° to 20°, using tpc + mvd + 3 stations of gem detector.

I plot the momentum distribution for tracks reconstructed by lhetrack, with and without gems, and also after genfit.

You can see the blue lines coming from MVD+TPC tacking, without GEMs.
Once I add even GEMs to the tracking, with only lhetrack fit (which means helix fit) I can see a peak but not at the correct position (dashed red line). Once I give my hits to genfit, the peak (continuous red line) goes to the proper position, and the improvement is quite evident with respect to the blu line (without GEMs).
In case of MVD+TPC+GEM genfit, the resolution at 2GeV/s seems something like 1.2%.

I would suppose that there is a lot of space for improvements (i.e. ideal tracking does not work yet for gems, and it is not so clear to me why I have an average GEM hit multiplicity at 7), and that the code should be checked for different momentum ranges and also for STT (volunteers are kindly requested), but I think this is a good starting point.

If you want to try, I have put inside tutorials/lhetrack the following macros:

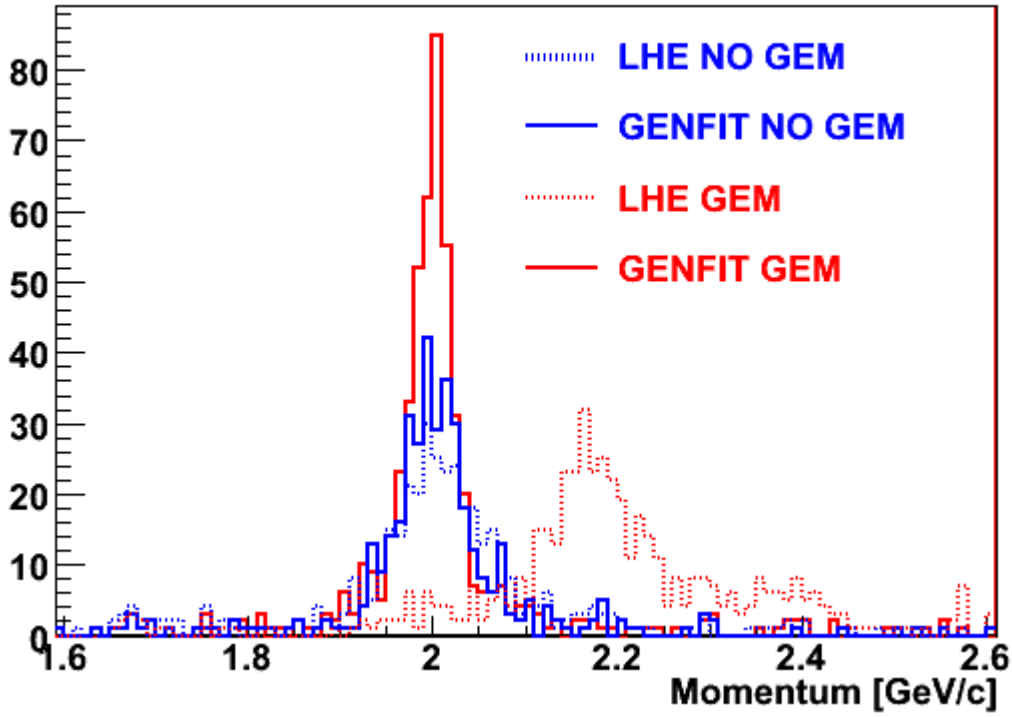
run_sim_tpccombigem_pgun.C
run_digi_tpccombigem.C
run_reco_tpccombigem.C

(the standard run_kalman_tpc.C is working without any changes).

Feedback and comments are welcome.

File Attachments

1) gem_tracking.gif, downloaded 645 times



Subject: Re: GEM Tracking inside LHETRACK
Posted by Ralf Kliemt on Fri, 26 Jun 2009 14:56:28 GMT
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Hi all.

As feedback/comment I reproduced Stefanos Plots with 1000 pions each at 1 GeV/c. Theta ranges from 20 to 140 Deg. Just to check if there is no big flaw.

You need to implement the gem library with gSystem->Load("libGem");.

Simulation:

```
FairDetector *Gem = new PndGemDetector("GEM", kTRUE);
Gem->SetGeometryFileName("gem_3Stations.root");
fRun->AddModule(Gem);
```

Digi & Reco:

```
// -----   GEM hit producers   ---------------------------------
PndGemDigitize* gemDigitize = new PndGemDigitize("GEM Digitizer", iVerbose);
fRun->AddTask(gemDigitize);

PndGemFindHits* gemFindHits = new PndGemFindHits("GEM Hit Finder", iVerbose);
fRun->AddTask(gemFindHits);
```

Find the parameters in pandaroot/macro/params/all.par

Add to LHETrack with:
  trackMS->SetGemMode(2); // 0 OFF, 1 GEMPoint, 2 GEMHit   // GEMPoint smearing [cm], if negative no smearing

Here the plots with STT

and TPC

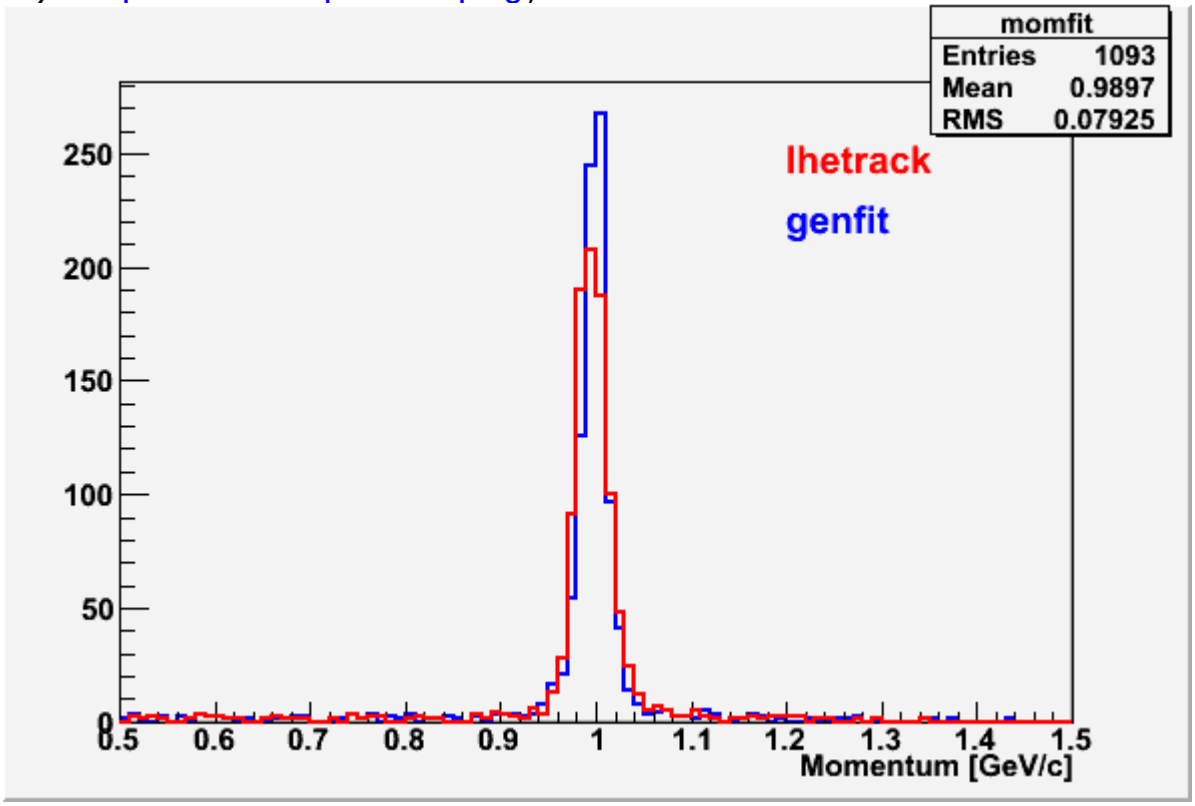
I will update the Torino tutorial macros in pandaroot/tutorials/analysis.

Thanks to Stefano.

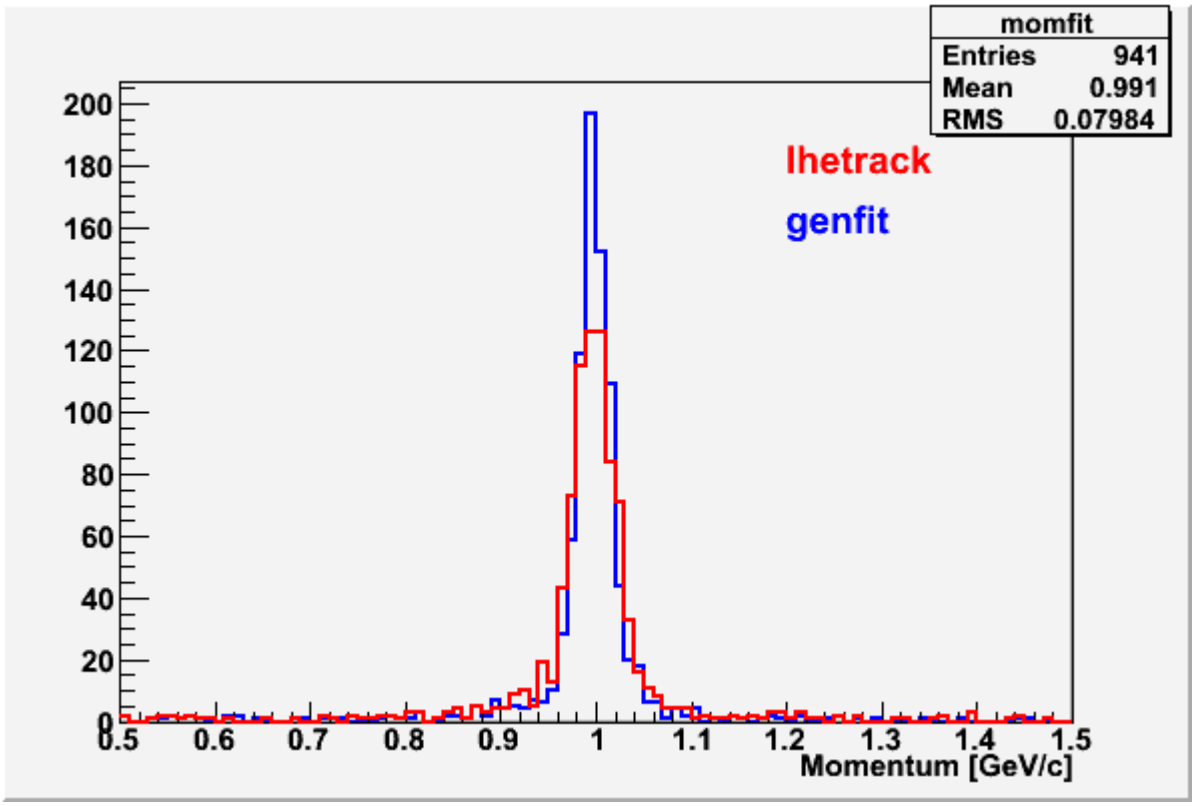
Cheers, Ralf.

File Attachments

1) 1kpionsMvdTpcGem.png, downloaded 528 times



2) 1kpionsMvdSttGem.png, downloaded 561 times


momfit
Entries 941
Mean 0.991
RMS 0.07984
lhetrack
genfit
200
180
160
140
120
100
80
60
40
20
0
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
Momentum [GeV/c]