Subject: Lhe tracking results: reconstruction error for transverse momenta <= 1 GeV/c, all five particles
Posted by David Pohl on Tue, 23 Nov 2010 17:09:32 GMT
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Hallo everybody,

I just want to show you some results for the reconstruction error of the transverse momentum. The following simulation parameters are used:

- Panda Root trunk version, revision 10334
- Geant3
- Boxgenerator with vertex (0,0,0)
- theta = 60°, phi = 0:360°
- one primary track per event, only primary tracks are taken into account in the analyses
- 1e4 events
- Lhe tracking package: ideal track finder + helix prefit + kalman task with correct particle hypothesis
- MVD+TPC+GEM tracking detectors, new MVD geometry: Mvd-2.1_AddDisks_FullVersion
- used particles: electrons, pions, myons, kaons and protons
- transverse momenta: 0,1; 0,2; 0,3; 0,4; 0,5; 0,6; 0,7; 0,8; 0,9; 1 GeV/c

The following plot shows the relative reconstruction error ||pt_MC|-|pt_reco||/|pt_MC| in percent:

Every point is a Gausfit for the reconstructed transverse track momentum. The error bars are the sigmas of the fits.
Some examples are attached to this message.

One can see that the reco error for protons@300MeV/c pt and for kaons@200MeV/c is bad. The reason is a failed kalman fit.
This I already mentioned in the thread 'GENFIT for transverse momenta < 200 GeV/c strange?!'.

Also there was no track reconstruction for kaons and protons with a momentum <200MeV/c possible.
I think the low momentum particles stuck in the detector material and do not create enough hits?

Another interesting thing is a systematic offset of the reconstructed momentum for electrons:

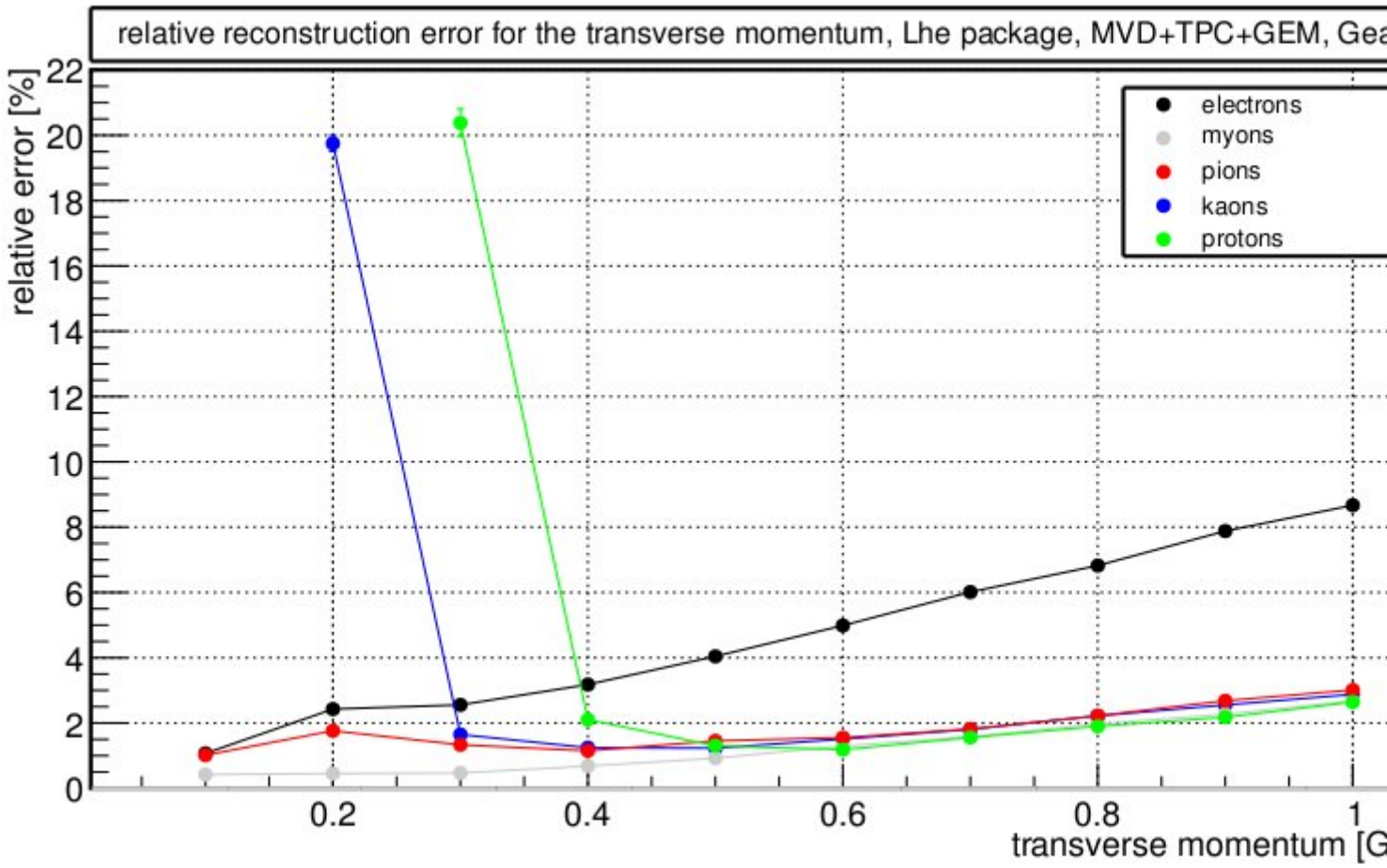
All offsets should be around zero. Especially this is not the case for lower momenta. Do you have an explanation for this?

By the way the kalman output for electrons doesn't look better than the helix prefit.

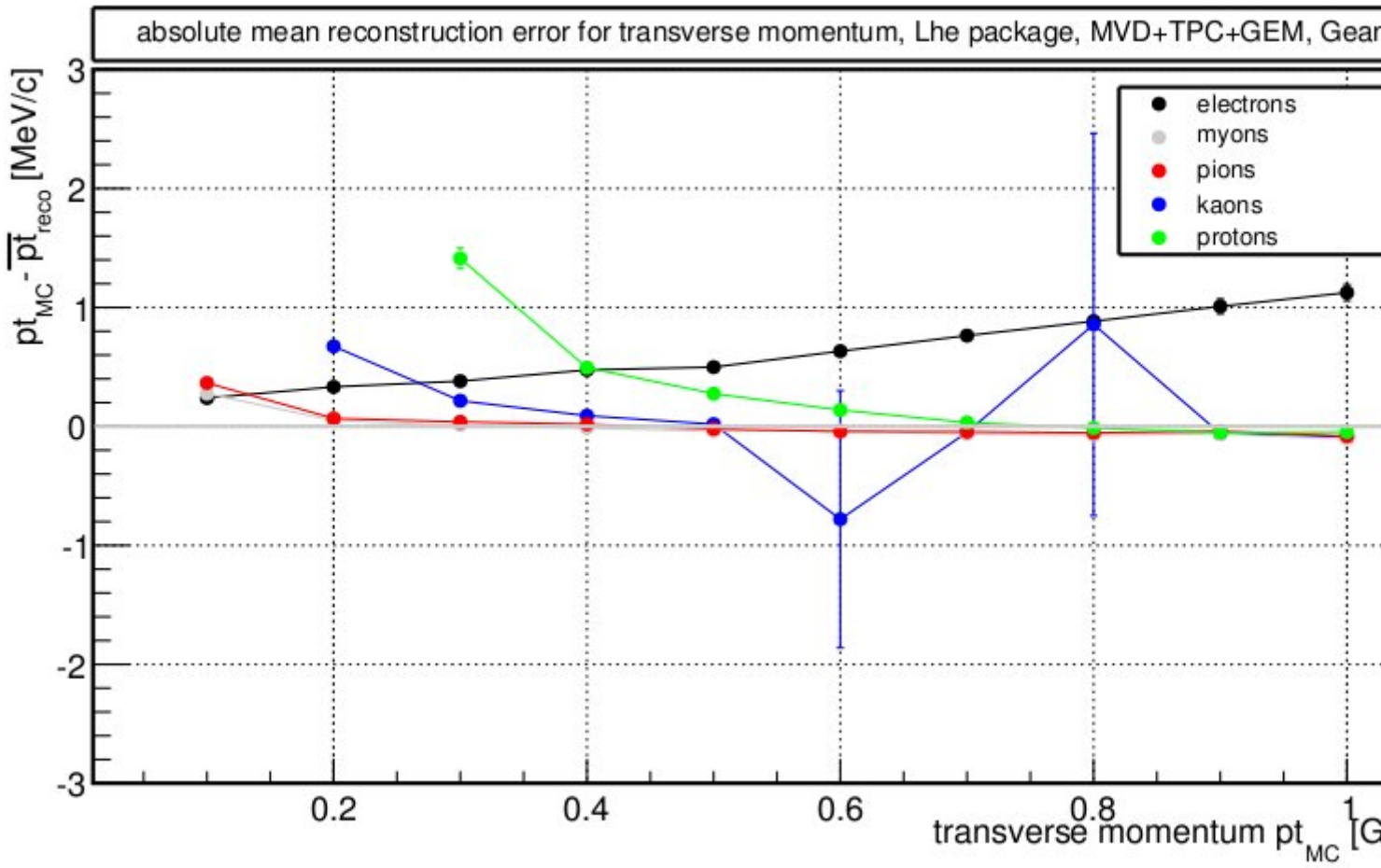
greetings
David

File Attachments

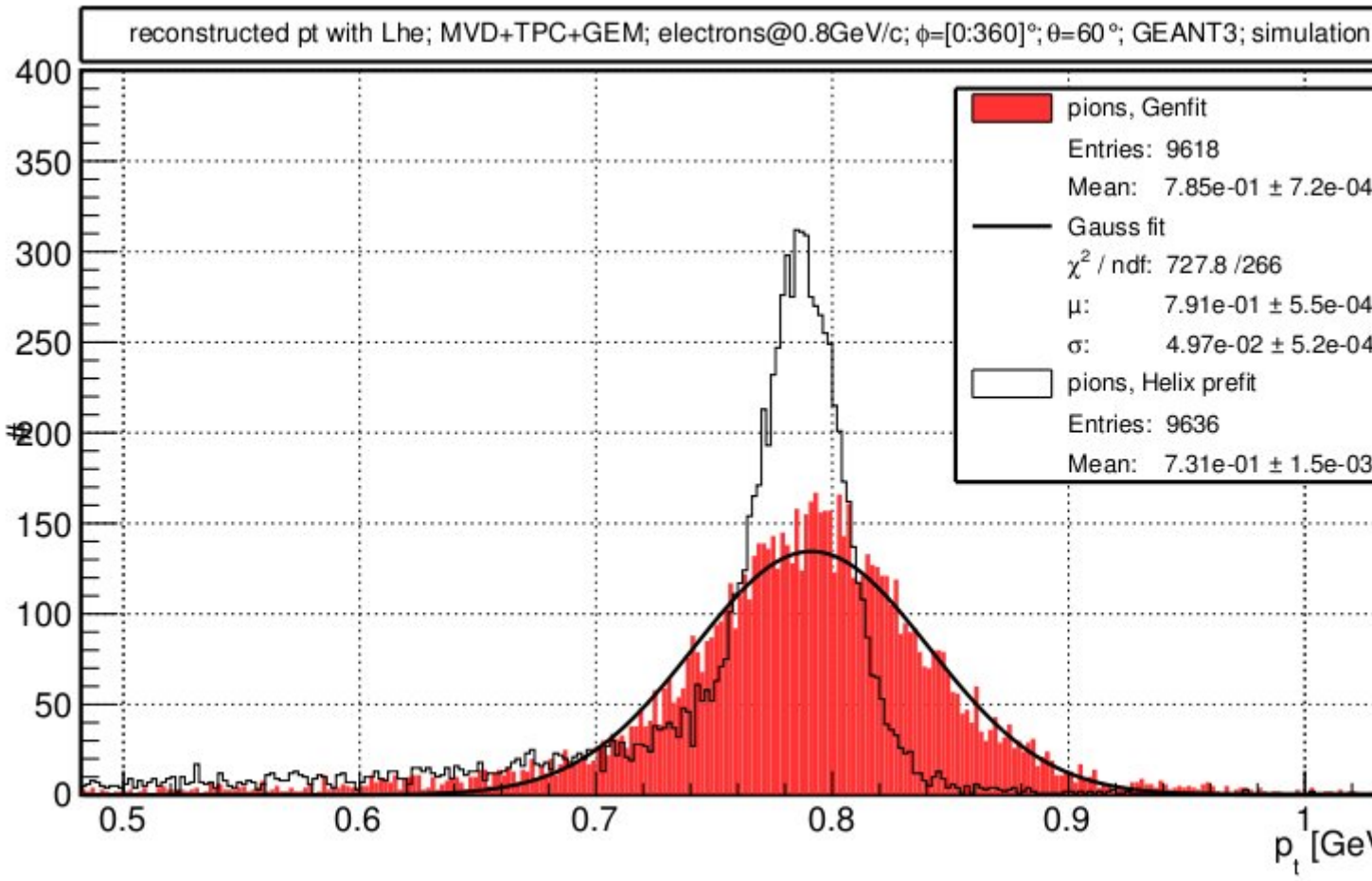
1) trackrecoerror_graph.jpg, downloaded 1902 times



2) trackrecoerrorabs_graph.jpg, downloaded 1884 times



3) pt_reco_tpc_400_myons.pdf, downloaded 431 times
4) pt_reco_tpc_200_electrons.pdf, downloaded 487 times
5) pt_reco_tpc_400_electrons.pdf, downloaded 495 times
6) pt_reco_tpc_300_protons.pdf, downloaded 465 times
7) pt_reco_tpc_200_kaons.pdf, downloaded 460 times
8) pt_reco_tpc_100_myons.pdf, downloaded 468 times
9) pt_reco_tpc_600_protons.pdf, downloaded 497 times
10) pt_reco_tpc_800_electrons.jpg, downloaded 1822 times


reconstructed pt with Lhe; MVD+TPC+GEM; electrons@0.8GeV/c; ϕ=[0:360]°; θ=60°; GEANT3; simulation
pions, Genfit
Entries: 9618
Mean: 7.85e-01 ± 7.2e-04
Gauss fit
χ² / ndf: 727.8 /266
μ: 7.91e-01 ± 5.5e-04
σ: 4.97e-02 ± 5.2e-04
pions, Helix prefit
Entries: 9636
Mean: 7.31e-01 ± 1.5e-03
400
350
300
250
200
150
100
50
0
0.5
0.6
0.7
0.8
0.9
1
p_t [GeV