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Subject: very high reconstructed momenta of muons

Posted by [Malgorzata Gumberidze](#) on Wed, 11 Apr 2012 22:58:18 GMT

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Dear tracking experts.

During test of the TMVA i was surprise to see some number of track with reconstructed momenta which are very high in comparison to the monte carlo value (Look into the attached plot: momentum.gif, keep in mind that i have also higher values, but i put limit on x-axis).

So let's me try to explain what i was dung.

I'm using PandaRoot version nov11 and externals may11.

I have simulated muons (flat distributions using pgun) in the momentum range: 0.2 GeV/c till 5GeV/c. They in my analysis i select

1. only primary tracks  
if (mctrack->GetMotherID() != -1) continue;
2. i check if the reconstructed track is correlated to the monte carlo one:  
if (pidCand->GetMcIndex() != mc) continue;
3. if i have more then one reconstructed track which belong to the same monte carlo i select one which has momentum closest to monte carlo one.

I tried to have a look (after some advices from Stefano) if one can find some topology of this high momenta looking into: number of hits in MVD or STT or theta or phi or chi2 from fit .....

SO in the attachment you can see several plots. All plots are done as a function of momentum, so you can see not only problematic region, but also good one. In the case when i plot theta vs phi i put cut on  $p > 6$  GeV/c.

In general looking into theta or phi it does not look that this high momenta comes from some specific region of the PANDA. In case of STT hits it looks that they have smaller number of the hits, below 28. But generally from the topology they do not look much different then good momenta track, but maybe i have overlook something.

I hope that the names of plots are self-explaining.

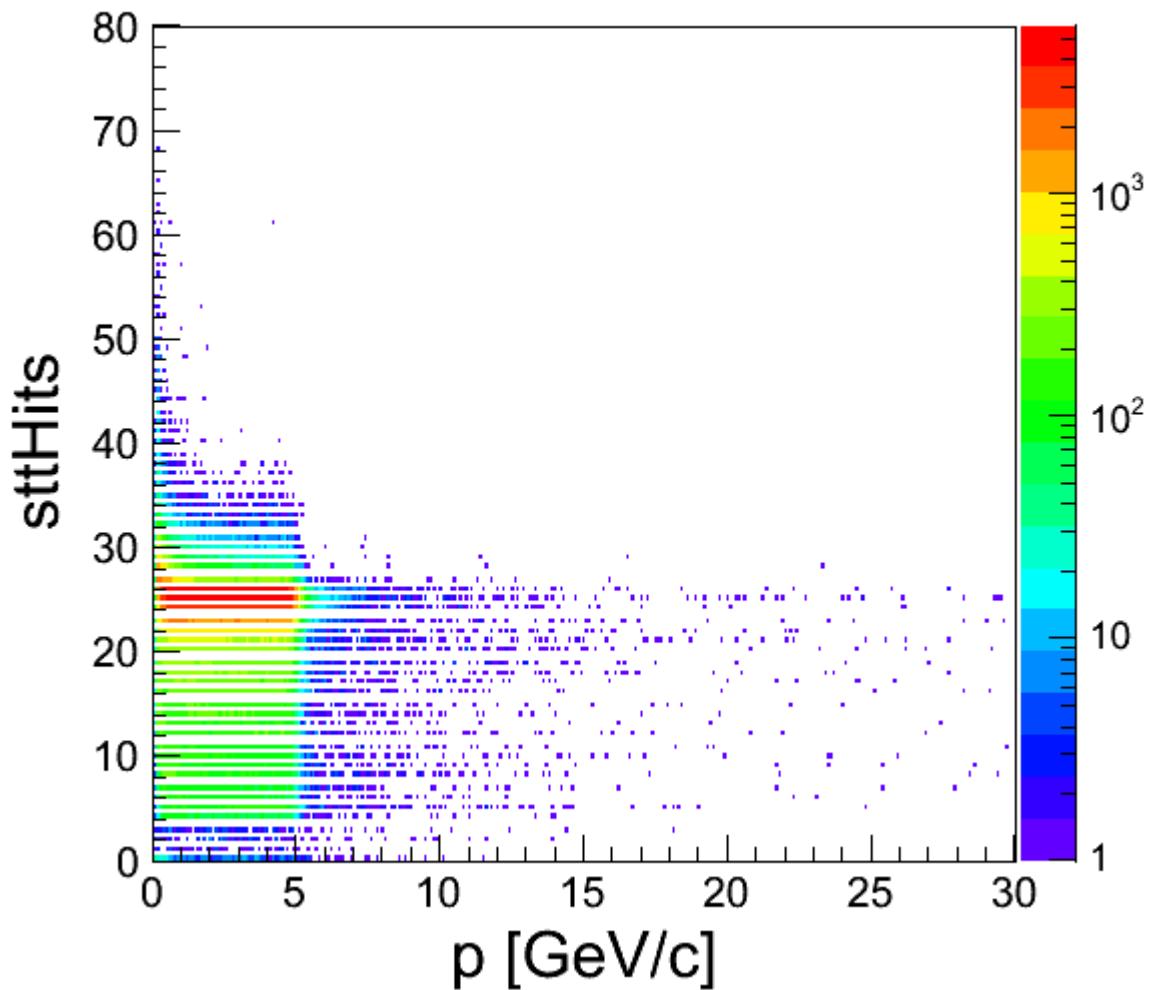
So i do not know if i do something wrong, or it is like it is .... at least it looks strange.

gosia

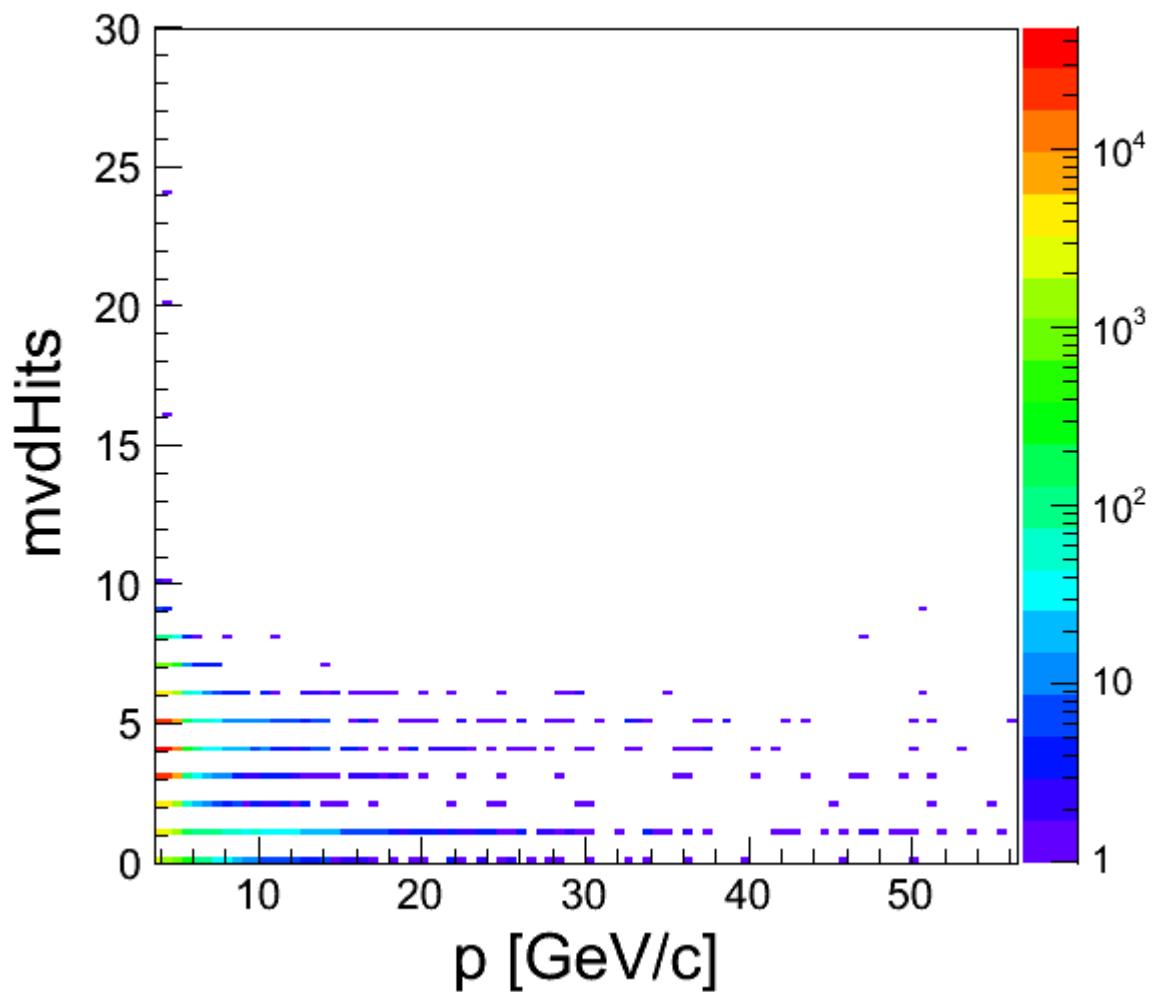
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#### File Attachments

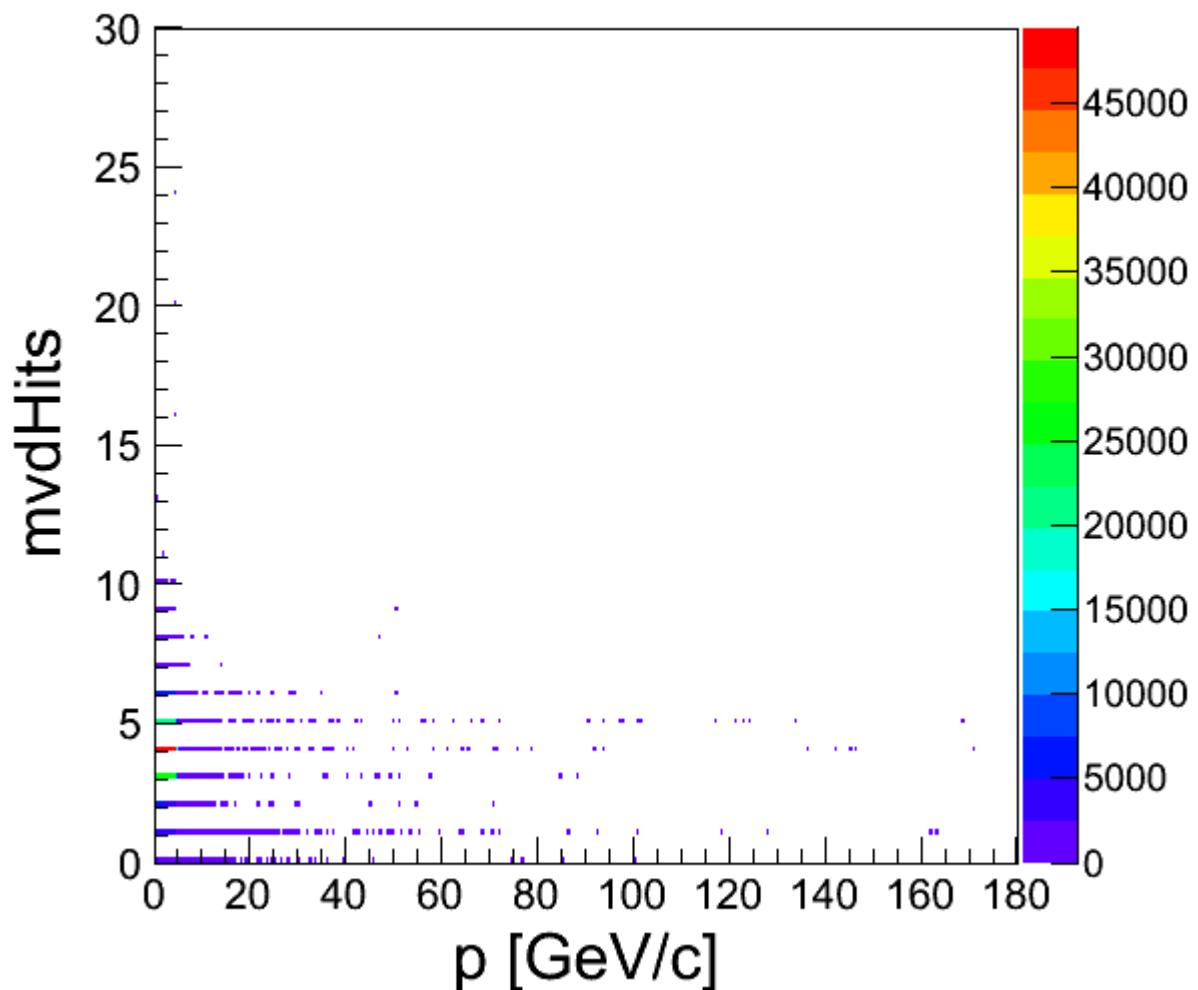
- 1) [muon\\_sttHits.gif](#), downloaded 720 times



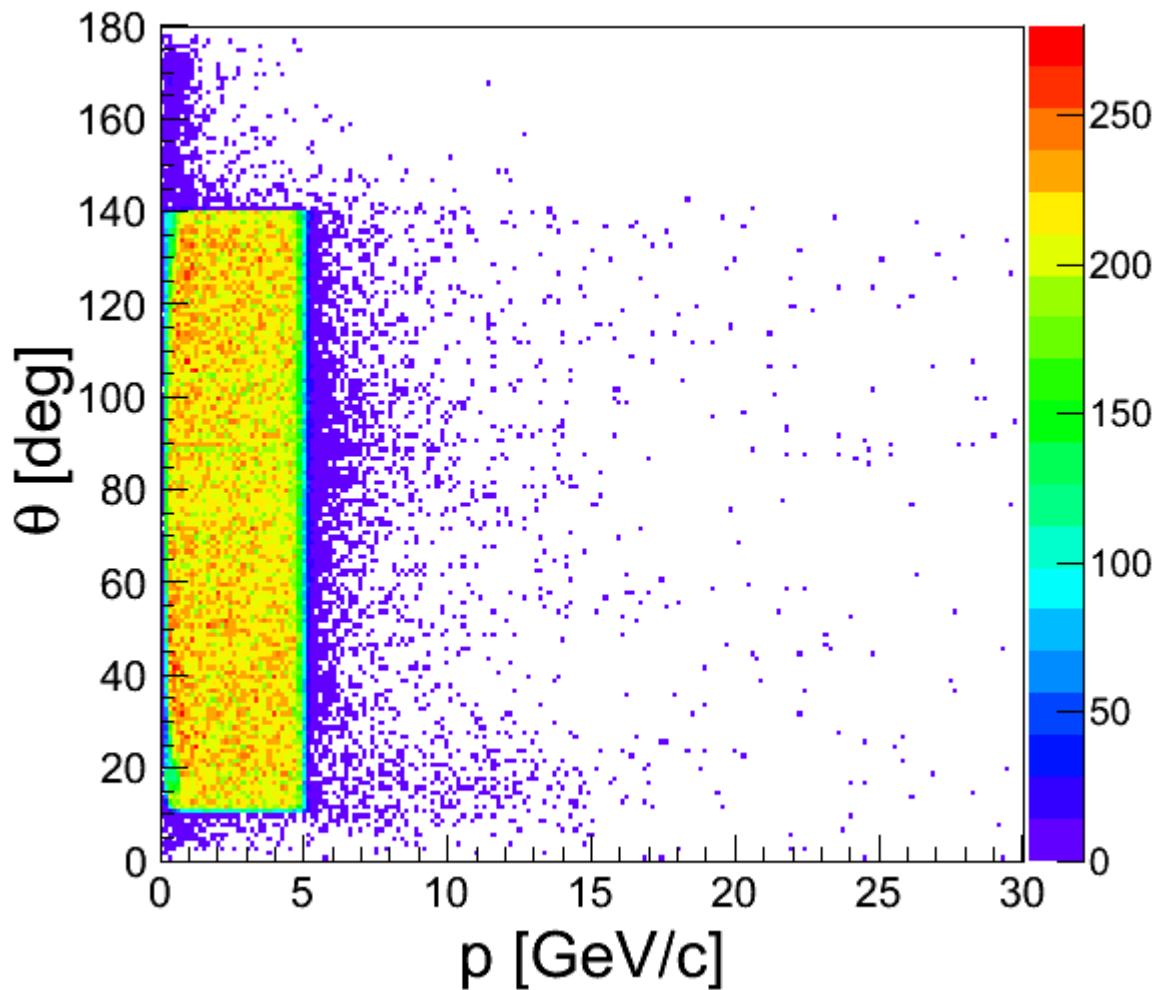
2) [muon\\_mvdHist\\_zoom.gif](#), downloaded 759 times



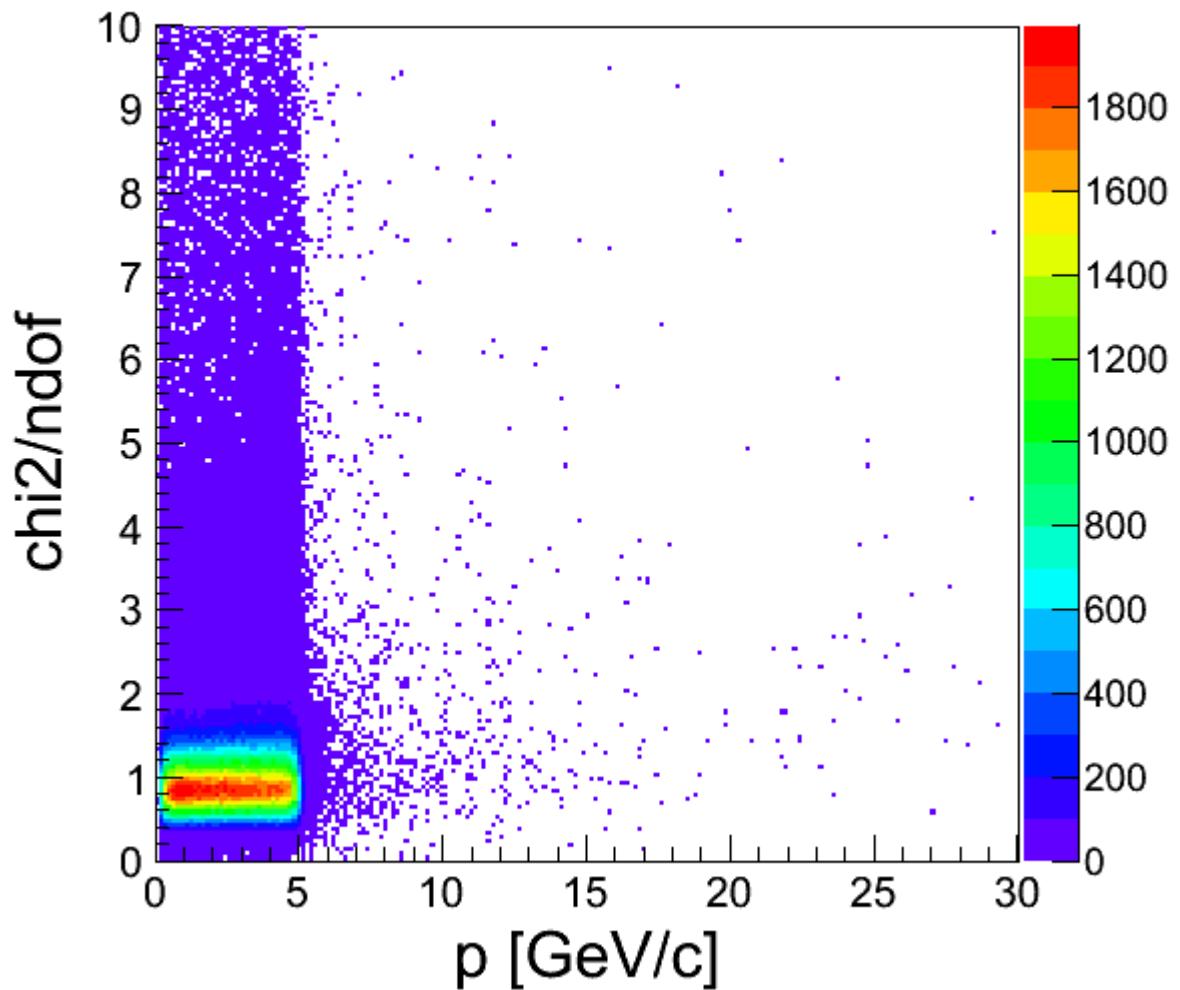
3) [muon\\_mvdHits.gif](#), downloaded 762 times



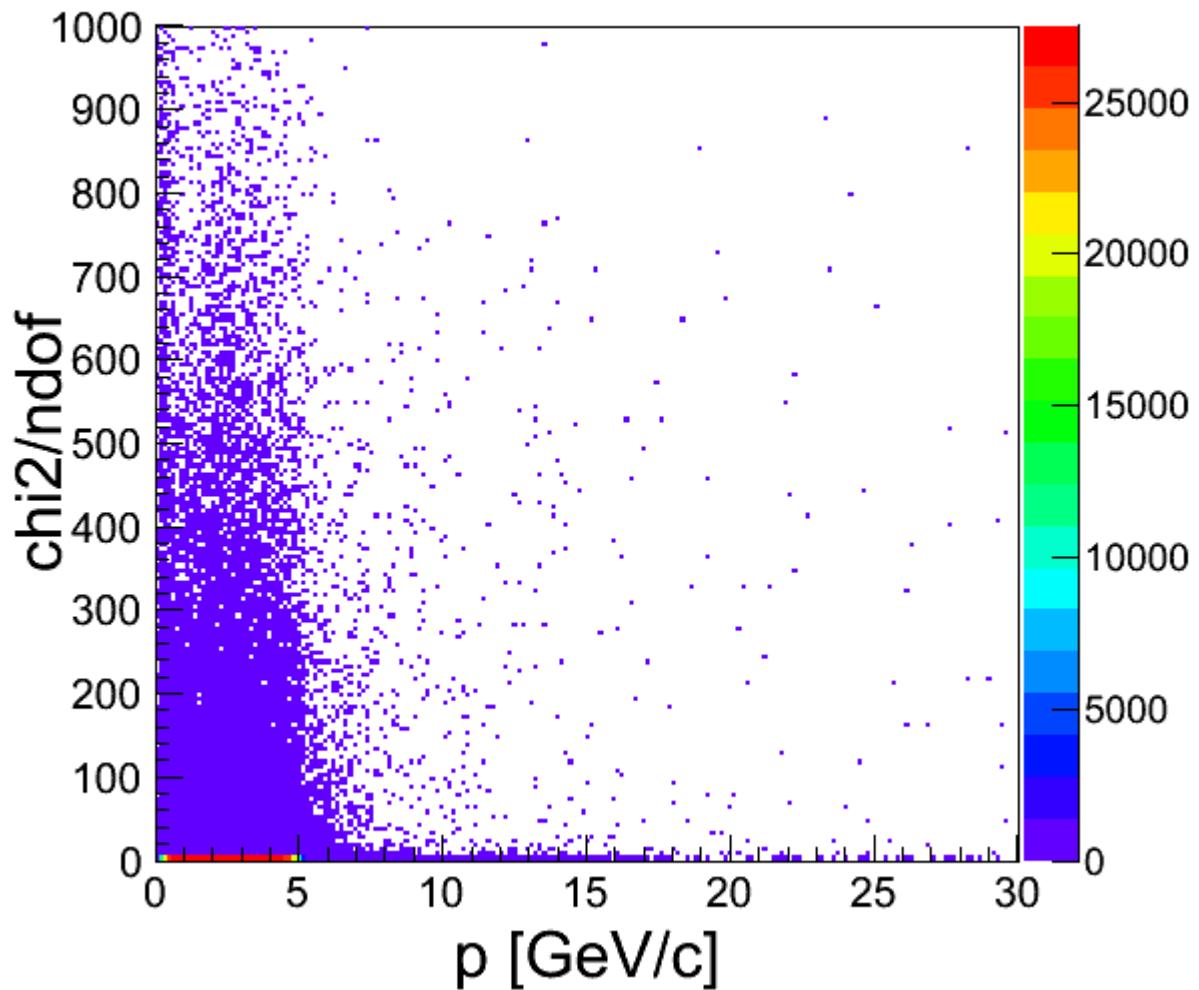
4) [muon\\_theta.gif](#), downloaded 769 times



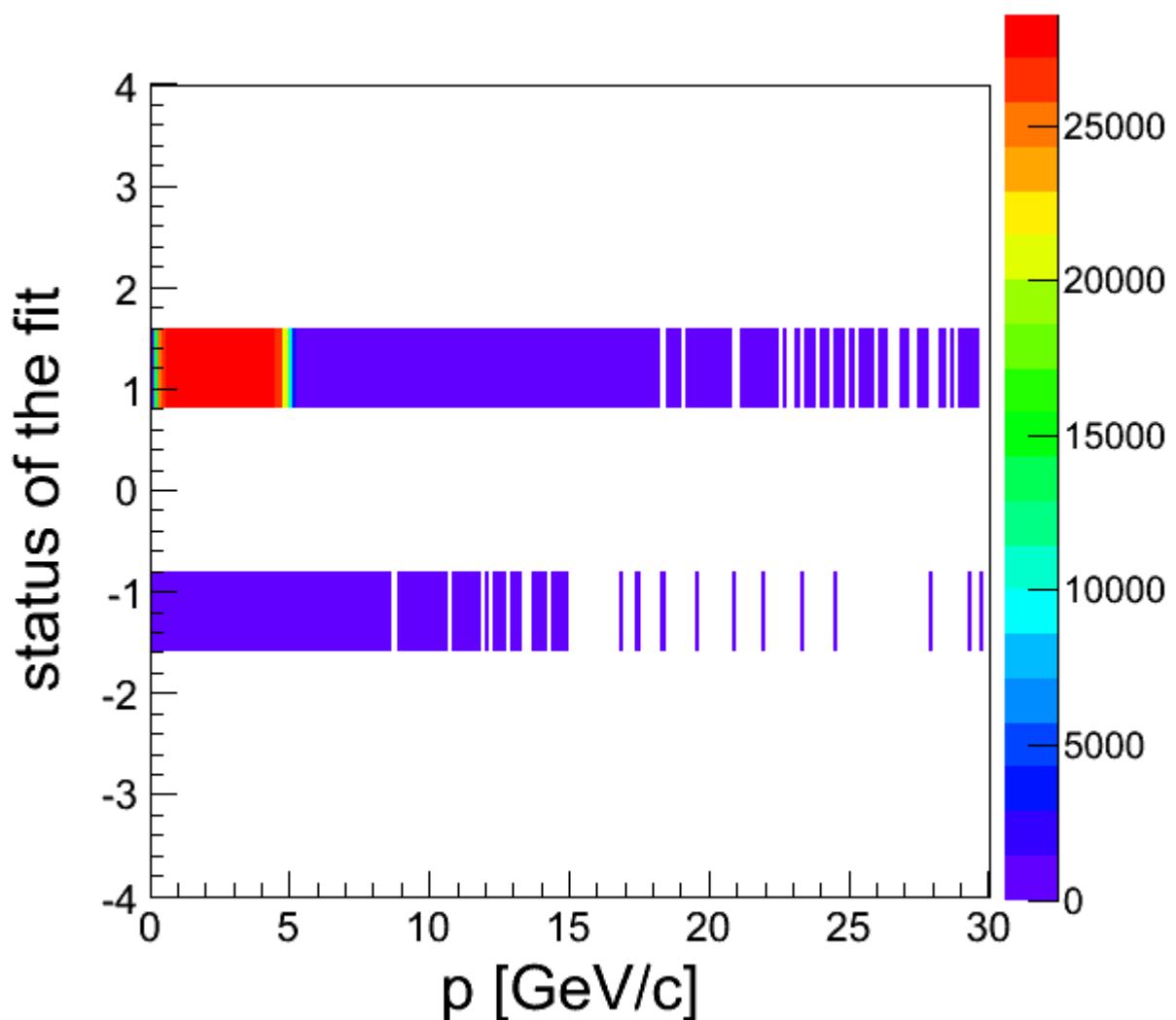
5) [muon\\_chi2ndof\\_zoom.gif](#), downloaded 776 times



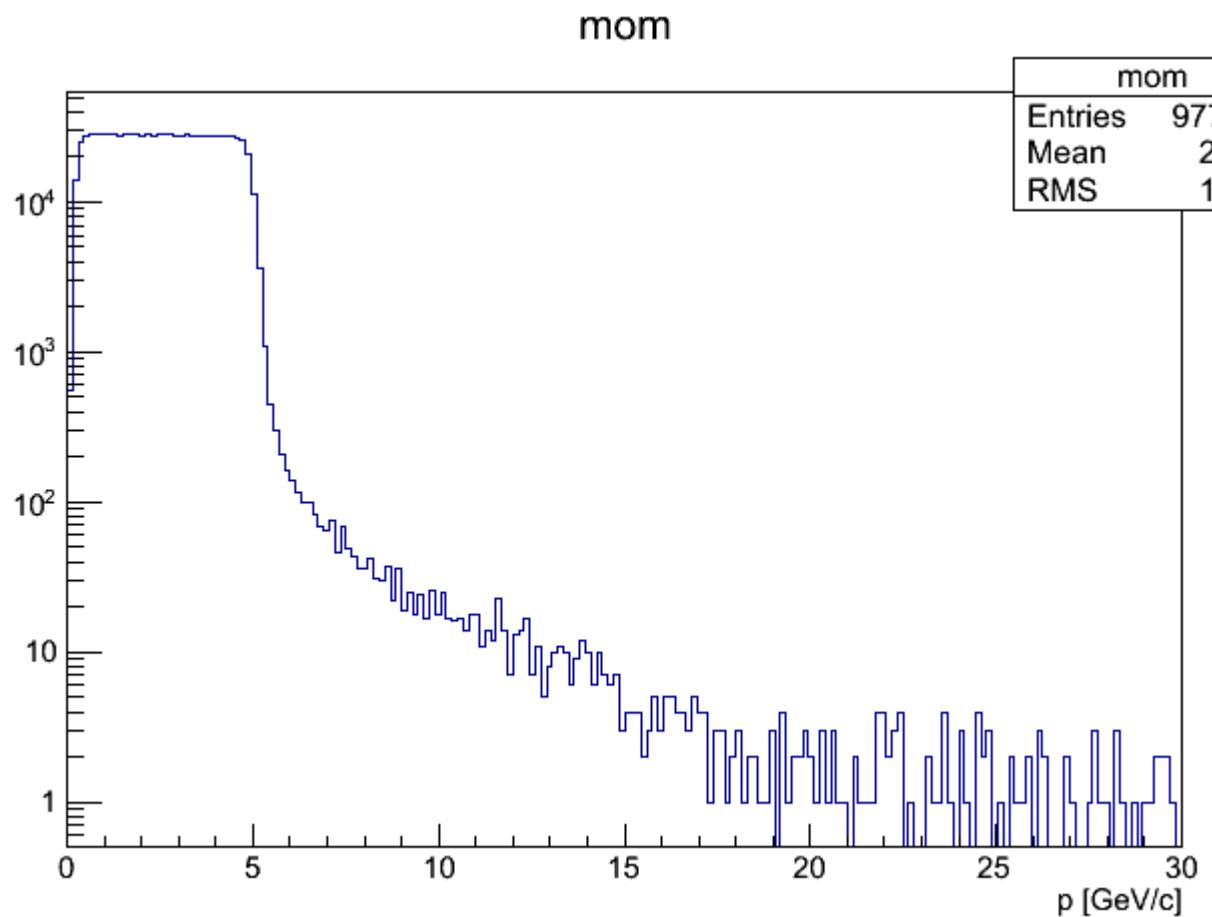
6) [muon\\_chi2ndof.gif](#), downloaded 778 times



7) [muon\\_fitstat.gif](#), downloaded 757 times



8) [momentum.gif](#), downloaded 775 times



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Subject: Re: very high reconstructed momenta of muons  
Posted by [Malgorzata Gumberidze](#) on Thu, 12 Apr 2012 20:12:33 GMT  
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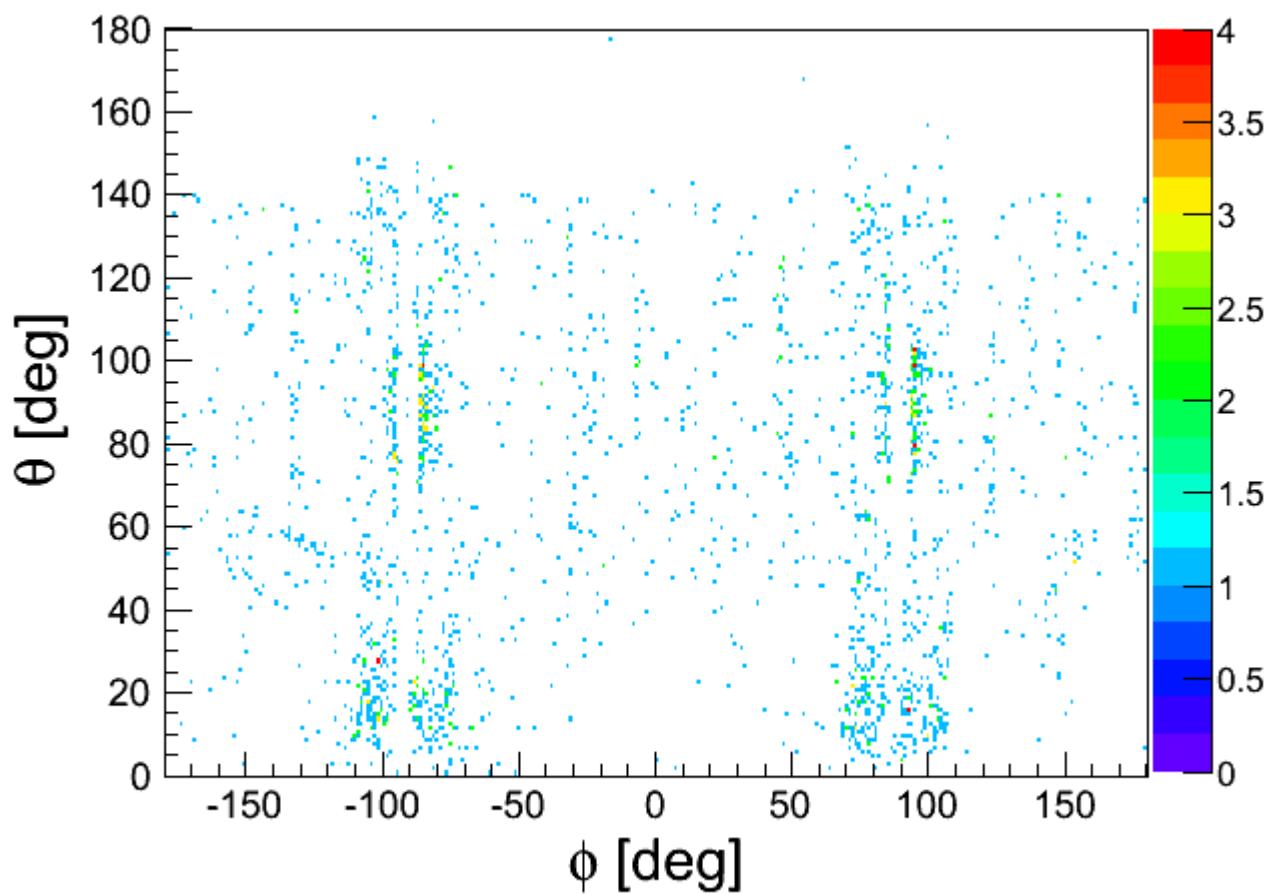
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Please find in the attachment 3 more plots, which maybe this time shows that big statistics of this high momenta come from the regions of phi around 90 degree, and 2 regions of theta: 90degree and below 30 degree.

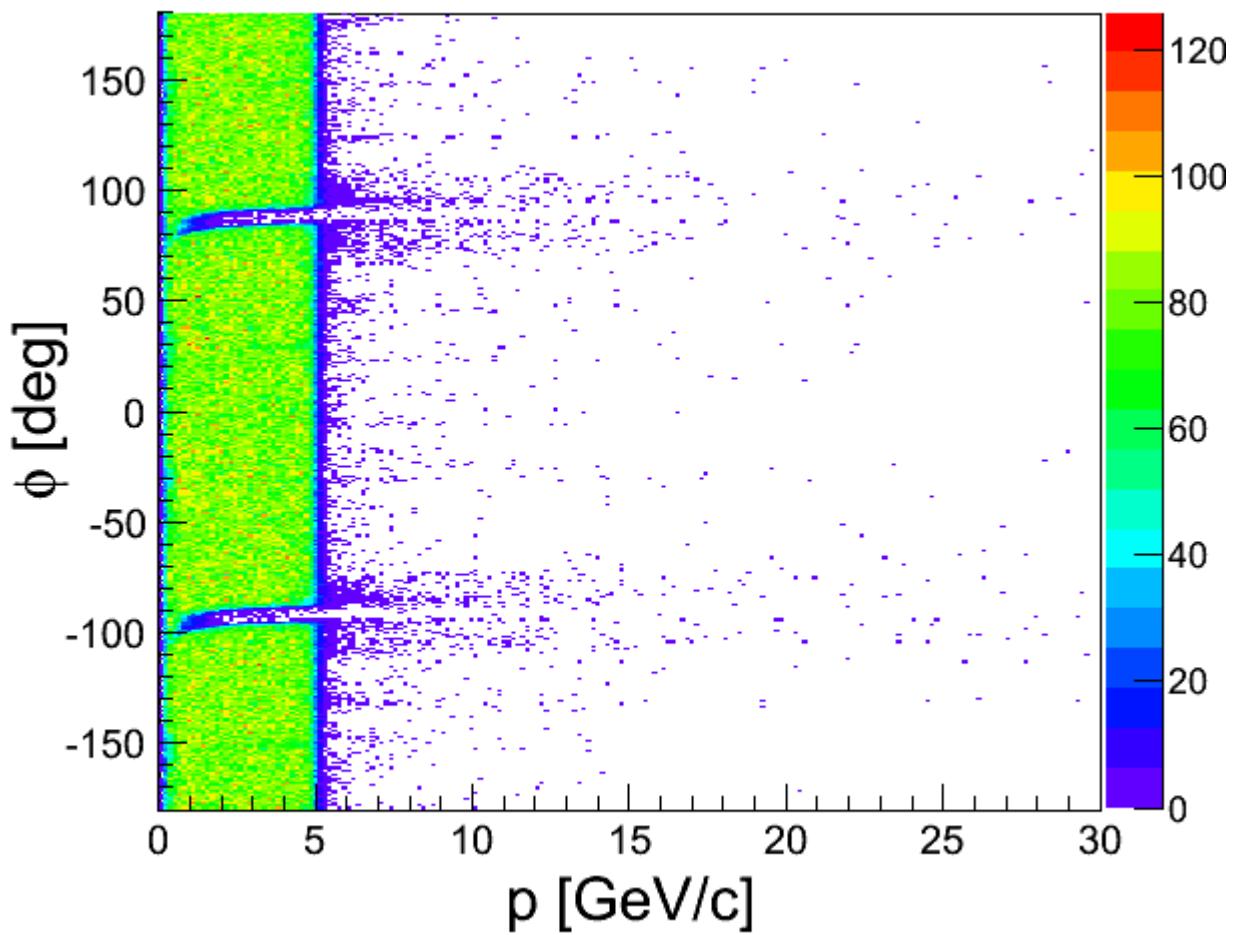
gosia

File Attachments

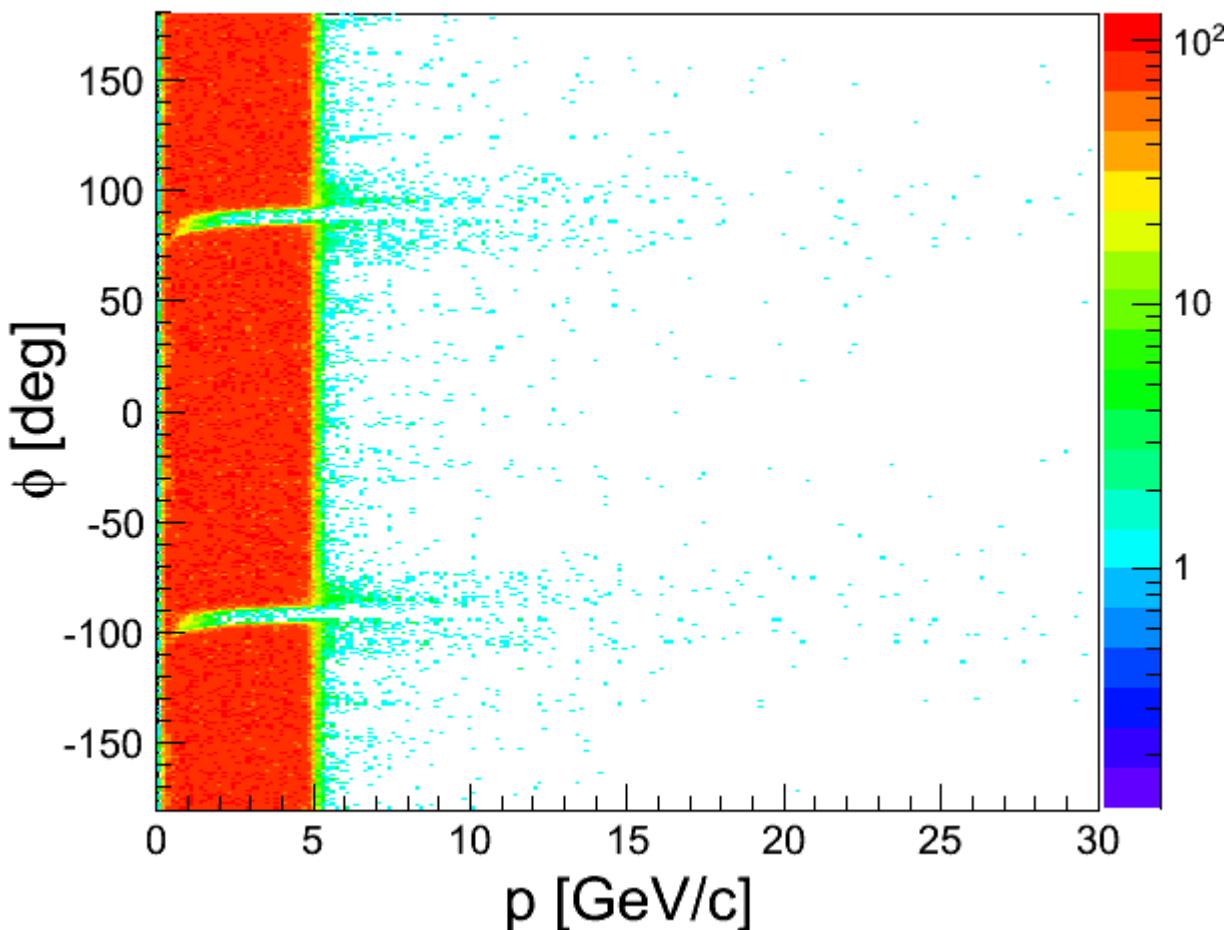
1) [muon\\_theta\\_phi.gif](#), downloaded 670 times



2) [muon\\_phi.gif](#), downloaded 680 times



3) [muon\\_phi\\_logZ.gif](#), downloaded 658 times




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Subject: Re: very high reconstructed momenta of muons  
 Posted by [Malgorzata Gumberidze](#) on Mon, 16 Apr 2012 22:42:33 GMT  
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Dear All,

I have made few more test after discussions with Stefano in order to check where the high momenta tail is coming from: tracking code or Kalman (as it was suggested by Gianluigi).

What i have done is to switch on native tracking by using in the pid level:

```
PndPidCorrelator* corr = new PndPidCorrelator();
corr->SetInputBranch("SttMvdGemTrack");
corr->SetInputIDBranch("SttMvdGemTrackID");
corr->SetDebugMode(kFALSE);
fRun->AddTask(corr);
```

One can see that the tail at high momenta (up to 15GeV/c) is present

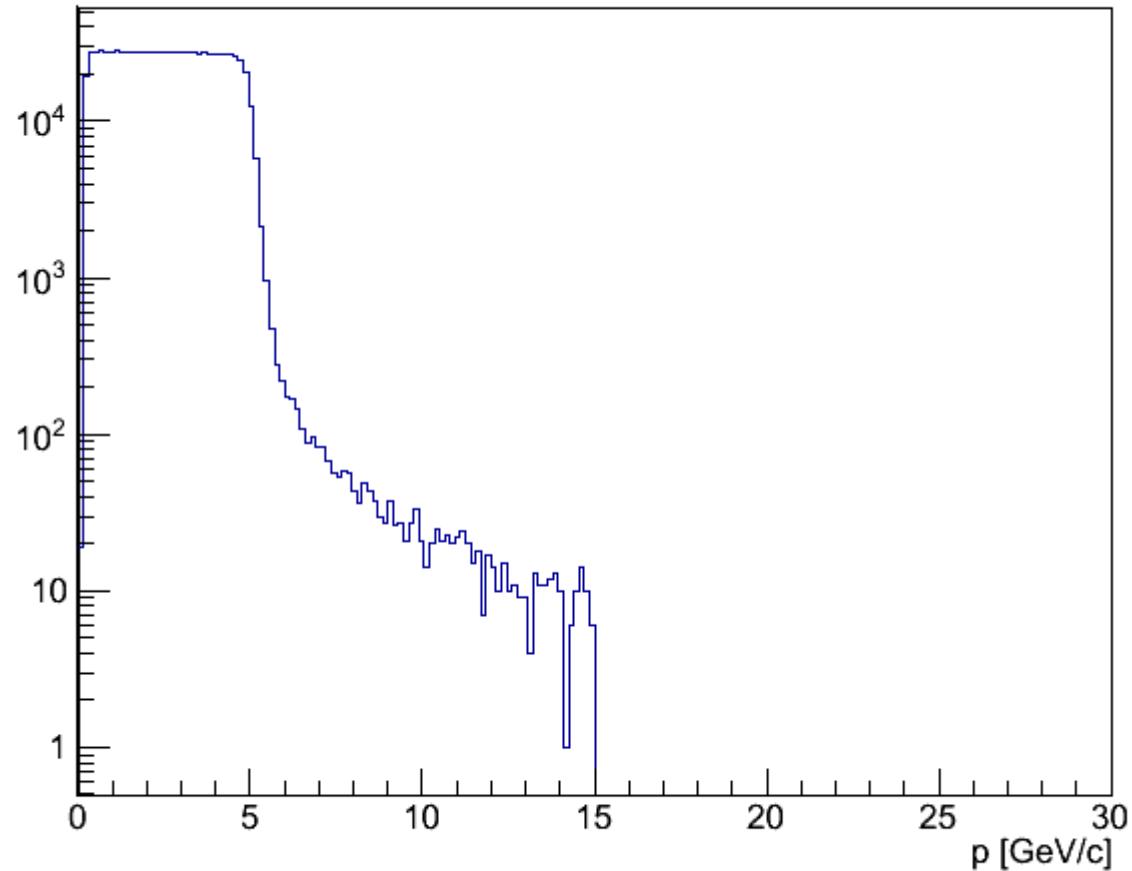
also with native tracking. So it means it is not coming from genfit.

It would be nice that experts can cross check this problem in the code as well.

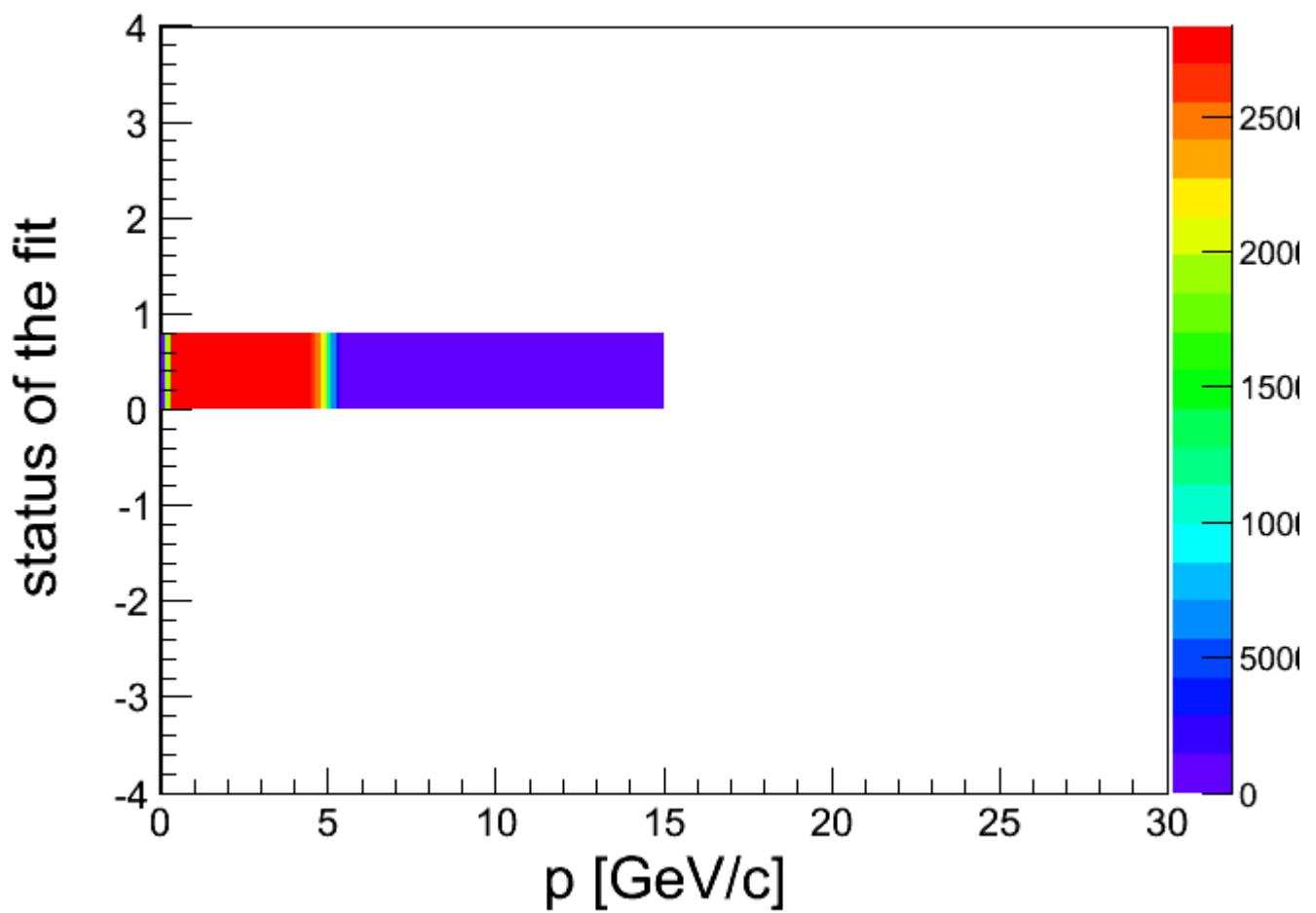
gosia

File Attachments

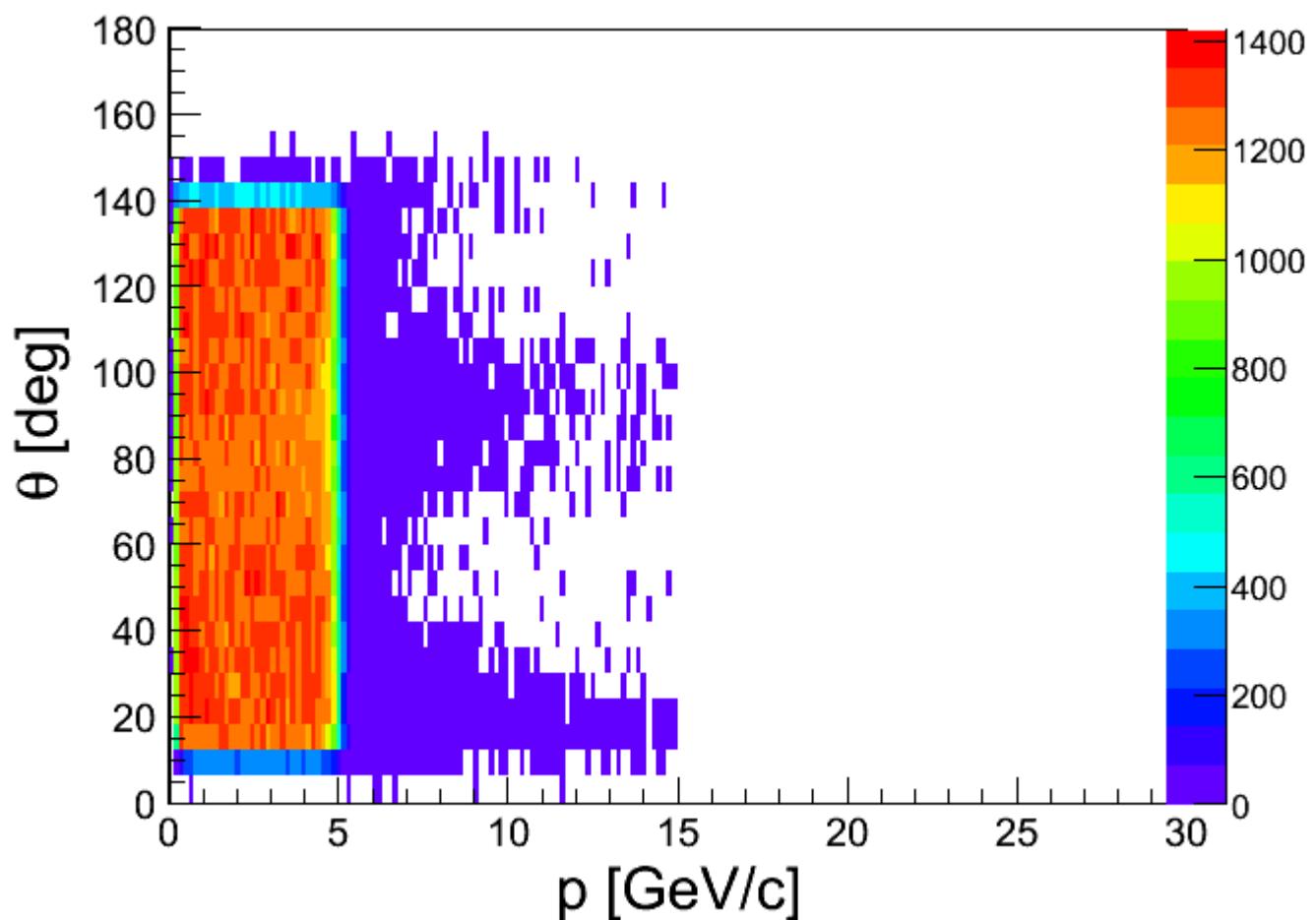
1) [muon\\_mom\\_noGen.gif](#), downloaded 709 times



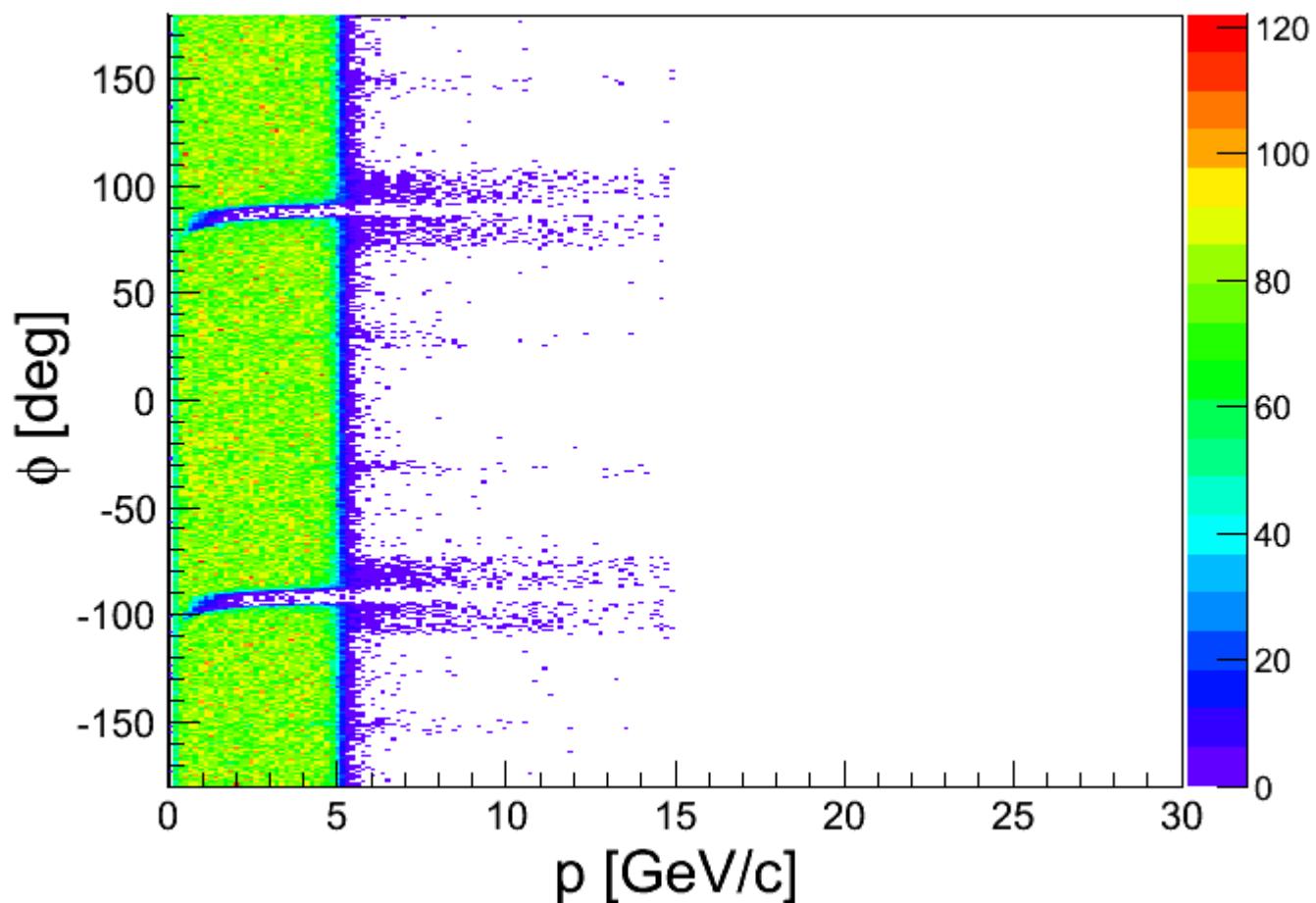
2) [muon\\_fitStat\\_p\\_noGen.gif](#), downloaded 731 times



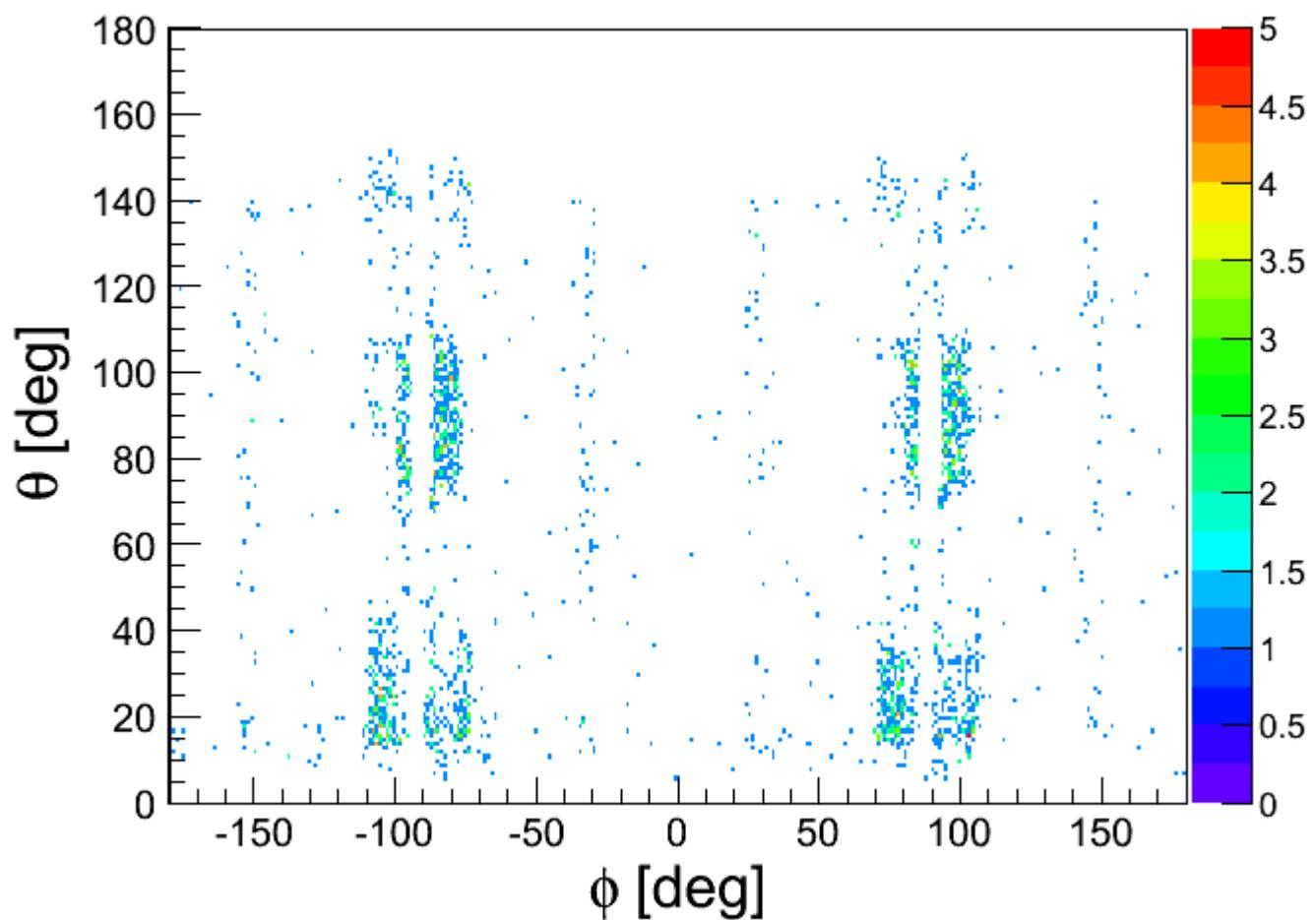
3) [muon\\_theta\\_p\\_noGen.gif](#), downloaded 703 times



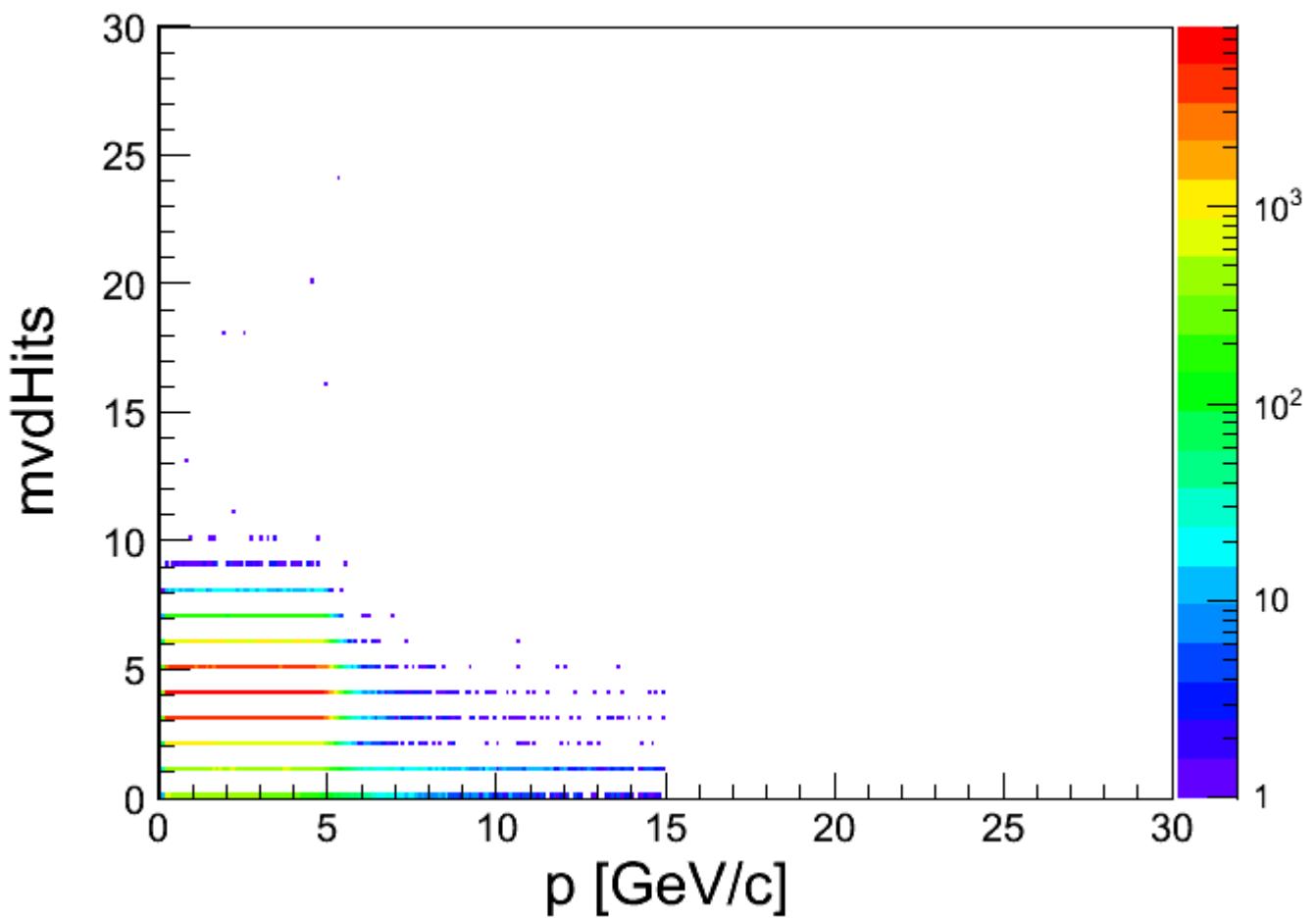
4) [muon\\_phi\\_p\\_noGen.gif](#), downloaded 644 times



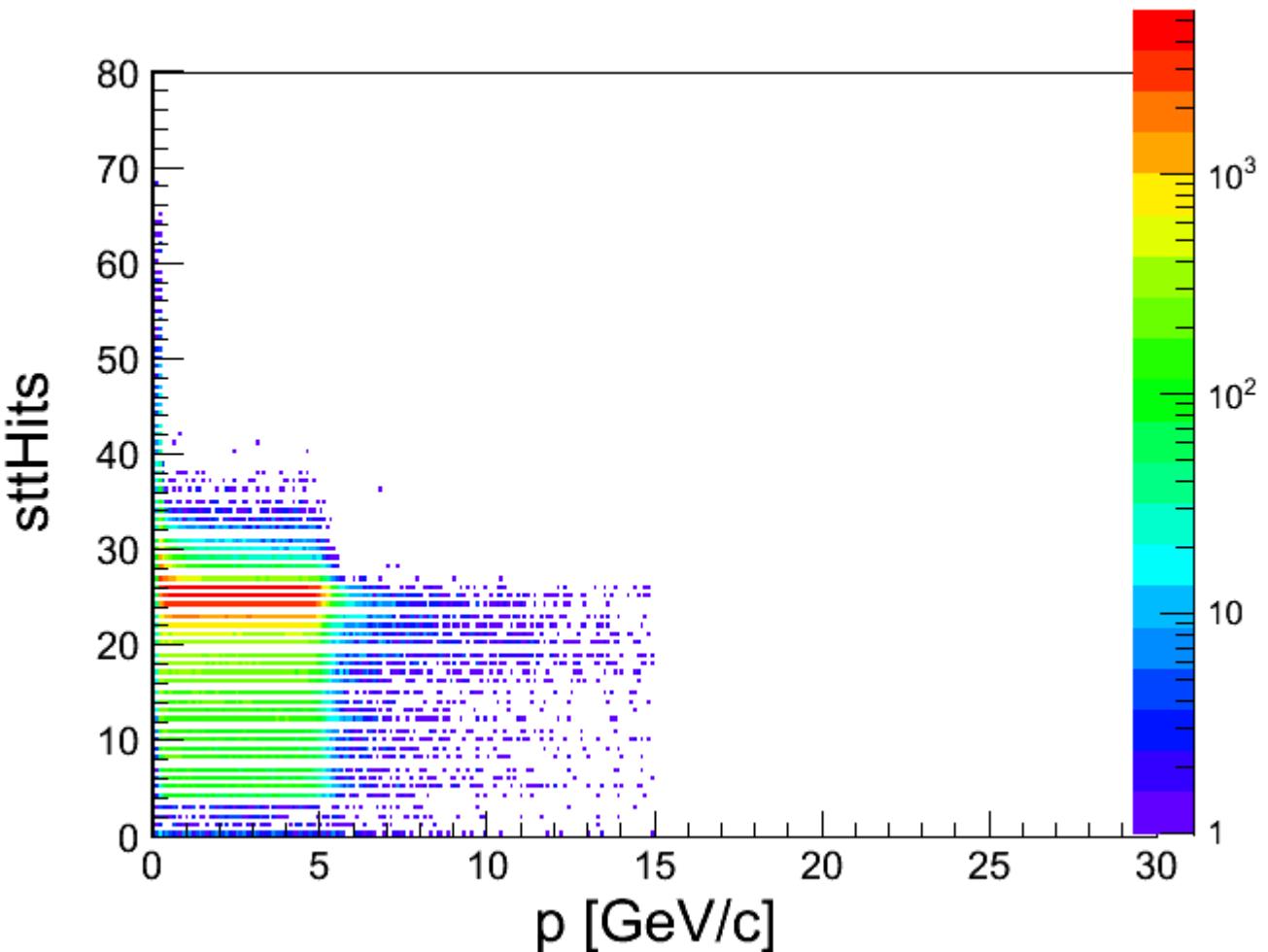
5) [phi\\_theta\\_muon\\_noGen.gif](#), downloaded 696 times



6) [mvdHits\\_p\\_noGen.gif](#), downloaded 694 times



7) [sttHit\\_p\\_muon\\_noGen.gif](#), downloaded 725 times




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Subject: Re: very high reconstructed momenta of muons  
 Posted by [StefanoSpataro](#) on Tue, 17 Apr 2012 09:13:01 GMT  
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I suppose that chi2 and ndf should be filled also by Gianluigi code, considering that a fit is performed, while at present such data members are empty.  
 Gianluigi, would it be possible to add such informations to the PndTrack?

From the plots is quite evident that tracks with far high momentum are present. Probably there is an upper cut at 15GeV/c in the reconstruction code, but still there are tracks with momenta higher than 5 GeV/c, coming from the edges of the detector.  
 Would it be possible to take a look? For sure they are not coming from genfit.

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Subject: Re: very high reconstructed momenta of muons  
 Posted by [Gianluigi Boca](#) on Tue, 17 Apr 2012 11:39:09 GMT  
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hi Gosia and all,  
 concerning these high momenta muons, please consider doing these

two preliminary steps :

- 1) please update your code with the latest trunk version and use the `jan12` externals; I believe it is always safer to use the newest versions of the code;
- 2) please quantify the percentage of muon tracks with 'anomalous' large momentum; from your plots it is not clear to me what is the level of the problem we are talking about

thanks

Gianluigi

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Subject: Re: very high reconstructed momenta of muons  
Posted by [Lia Lavezzi](#) on Tue, 17 Apr 2012 13:51:25 GMT

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Hi Gosia,

I just committed a fix to the class `PndSttTube`, so I would recommend to update the code to the last revision (15297) to be sure to include it.

Ciao,  
Lia.

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