Subject: GEANT3 dEdx for low energy protons
Posted by Sebastian Neubert on Tue, 08 Apr 2008 16:02:39 GMT
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Hi!

We observe a remarkable behaviour with GEANT3 when we look at the energy loss distributions for 200MeV protons.

From BetheBloch we would expect something like dE/dx=22keV/cm in the TPC gas.

Please have a look to the following plots, where you see the dE/dx (in keV/cm) from MC-Points plotted against the dx (in cm) for different step limitations:

dx<2.5cm

dx<3cm

dx<4cm

One observes that as soon as a step is smaller than 3cm the dEdx calculation gives a wrong result, which is too low by a factor of 3 to 4 (6keV/cm instead of 22keV/cm).

It is remarkable, that this behaviour is observed for any short step, regardless of if it was triggered by the step limiter or by anything else. You see this in the third plot, where the points with too low dEdx still persist!

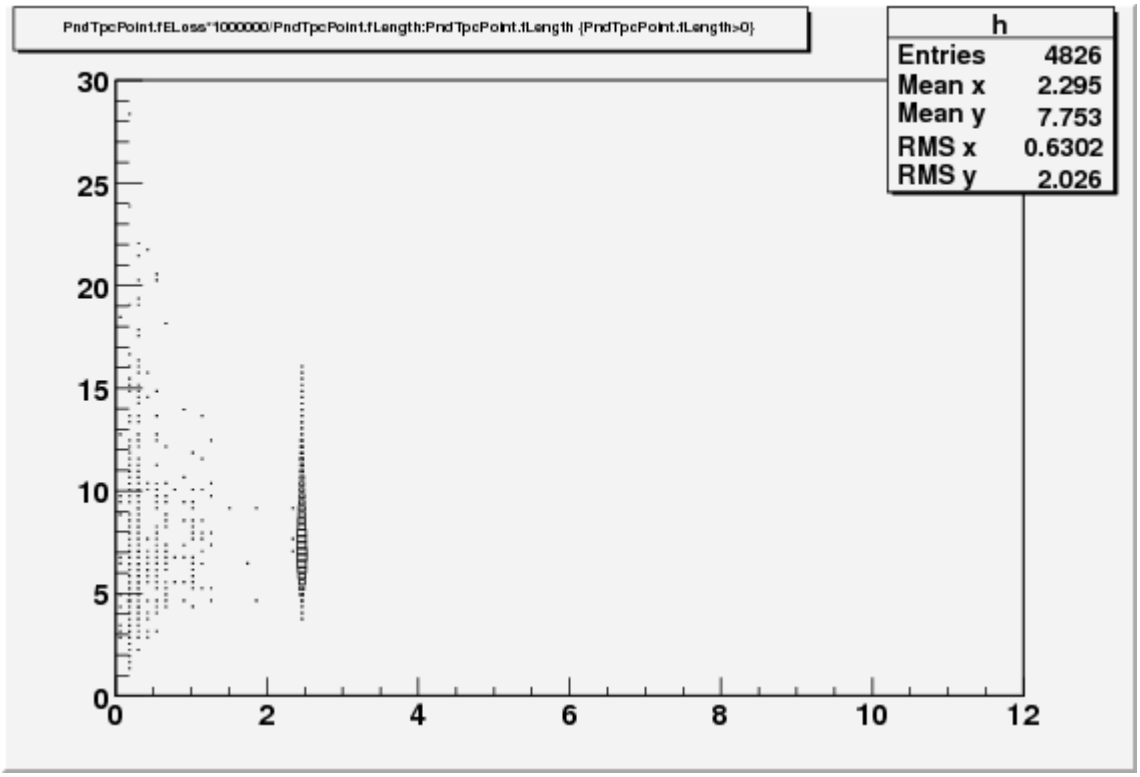
If we shut off the straggeling and just use the energy loss tables of GEANT (LOSS=4 option in SetCuts.C) we get the exepcted value for the dE/dx.

How should we deal with this?

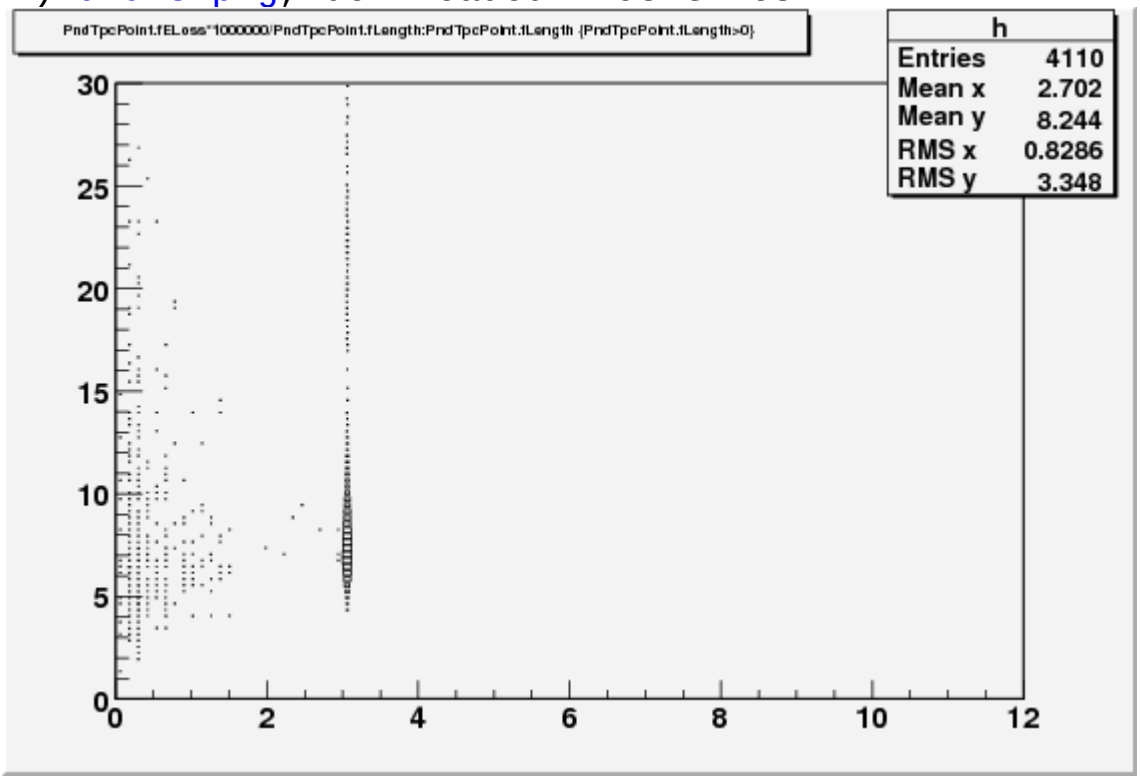
Cheers!
Viola and Sebastian.

File Attachments

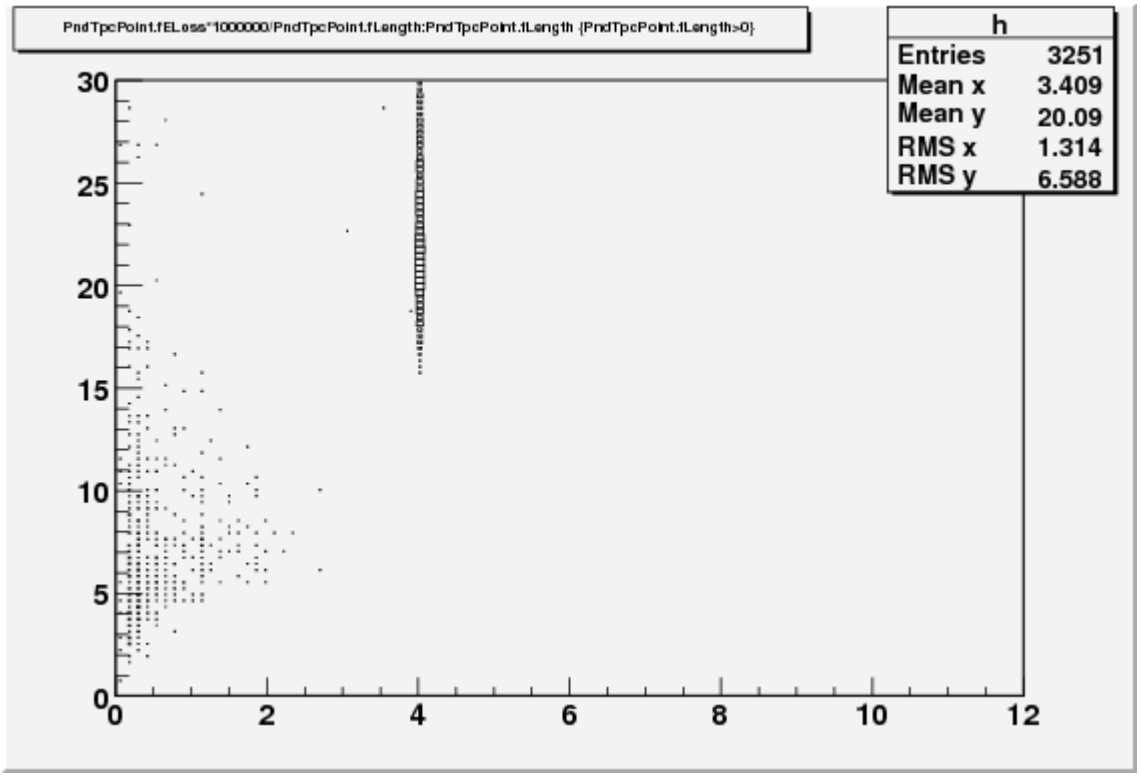
1) dEdx2.5.png, downloaded 1361 times



2) dEdx3.png, downloaded 1298 times



3) dEdx4.png, downloaded 1353 times



Subject: Re: GEANT3 dEdx for low energy protons
Posted by Sebastian Neubert on Wed, 16 Apr 2008 12:23:56 GMT
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Hi!

We have found out what was going wrong with the energy loss.

The option "STRA" was turned to 1 in g3config. As I read from the forum contributions from november Stefano suggested this, because this setting is used in Hades.

I have put some debug output into the geant3 code and observe that for STRA=1 only the G3STREN function gives a contribution to the energy loss with the behaviour that I have shown lately.

When you switch to the Urban model (STRA=0) it works.

What should we do?

Sebastian.

Subject: Re: GEANT3 dEdx for low energy protons
Posted by StefanoSpataro on Wed, 23 Apr 2008 08:00:27 GMT
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Could you please try to change in SetCuts.C the variable cut1 from 1MeV to 1keV?

In the MVD case it helped a bit. I wonder if it works even for TPC.

Subject: Re: GEANT3 dEdx for low energy protons
Posted by Sebastian Neubert on Wed, 23 Apr 2008 08:21:35 GMT
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Hi Stefano!

We have played around with the cut variable a lot. It does not change the picture. The only thing that helps is to use the Urban model which according to the GEANT3 manual is also the recommended thing to do.

Sebastian.
