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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  $dE/dx=22\text{keV/cm}$  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:

$dx < 2.5\text{cm}$

$dx < 3\text{cm}$

$dx < 4\text{cm}$

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 expected value for the  $dE/dx$ .

How should we deal with this?

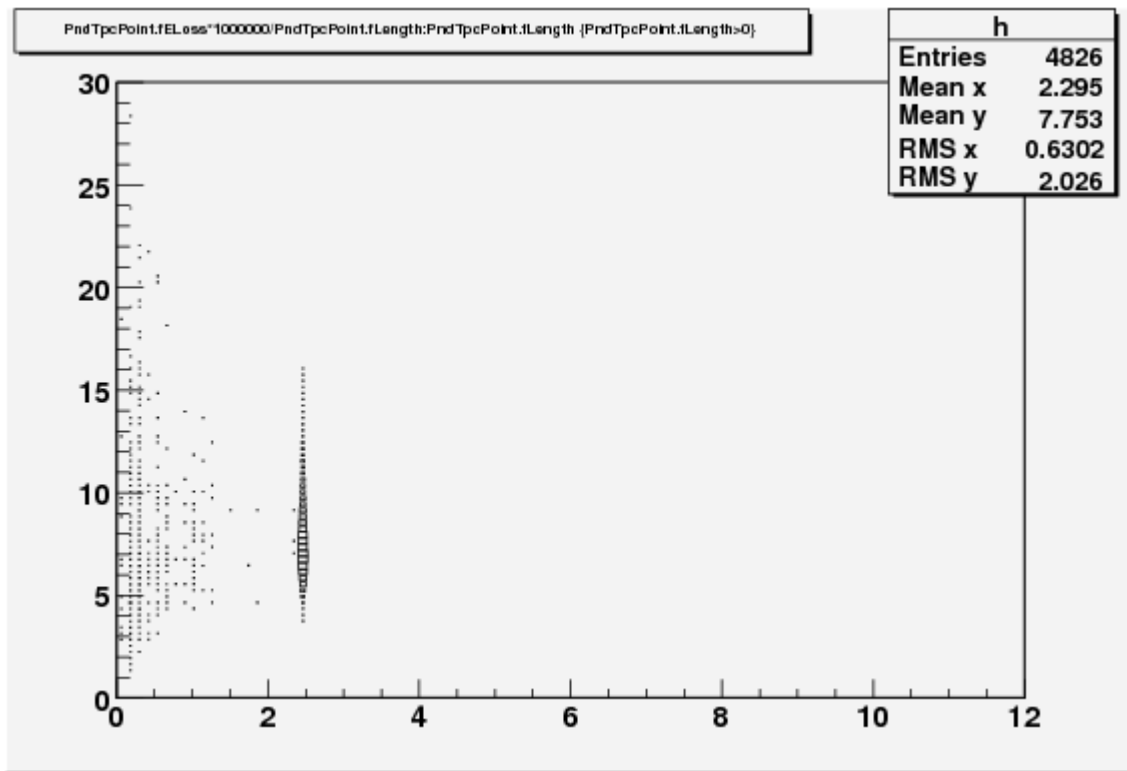
Cheers!

Viola and Sebastian.

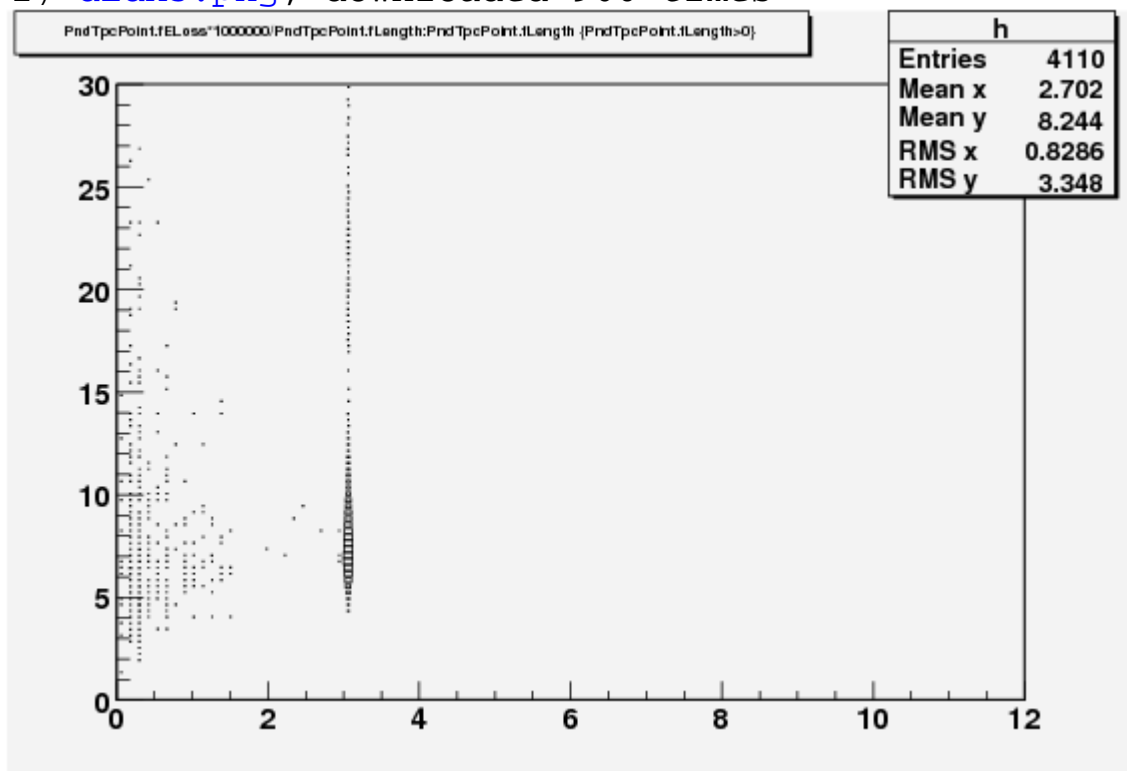
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### File Attachments

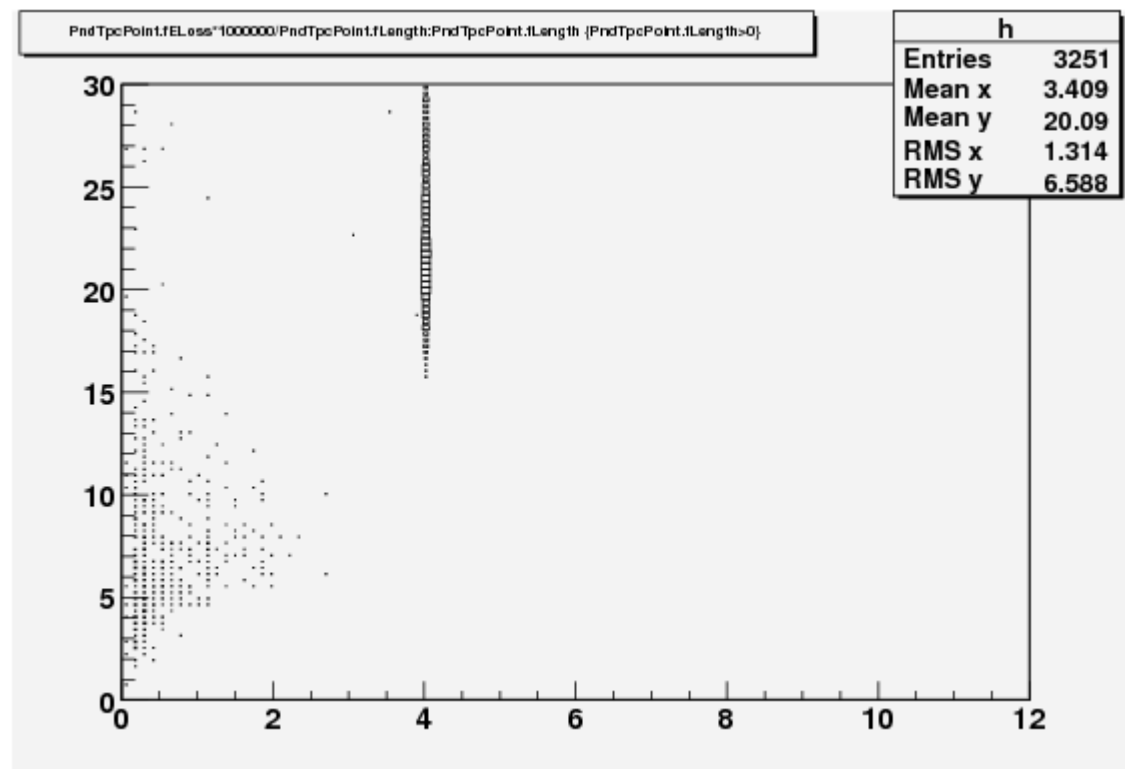
1) [dEdx2.5.png](#), downloaded 1037 times



2) [dEdx3.png](#), downloaded 960 times



3) [dEdx4.png](#), downloaded 1019 times



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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.

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Subject: Re: GEANT3 dEdx for low energy protons

Posted by [Stefano Spataro](#) 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.

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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.

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