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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  $dE/dx$ .

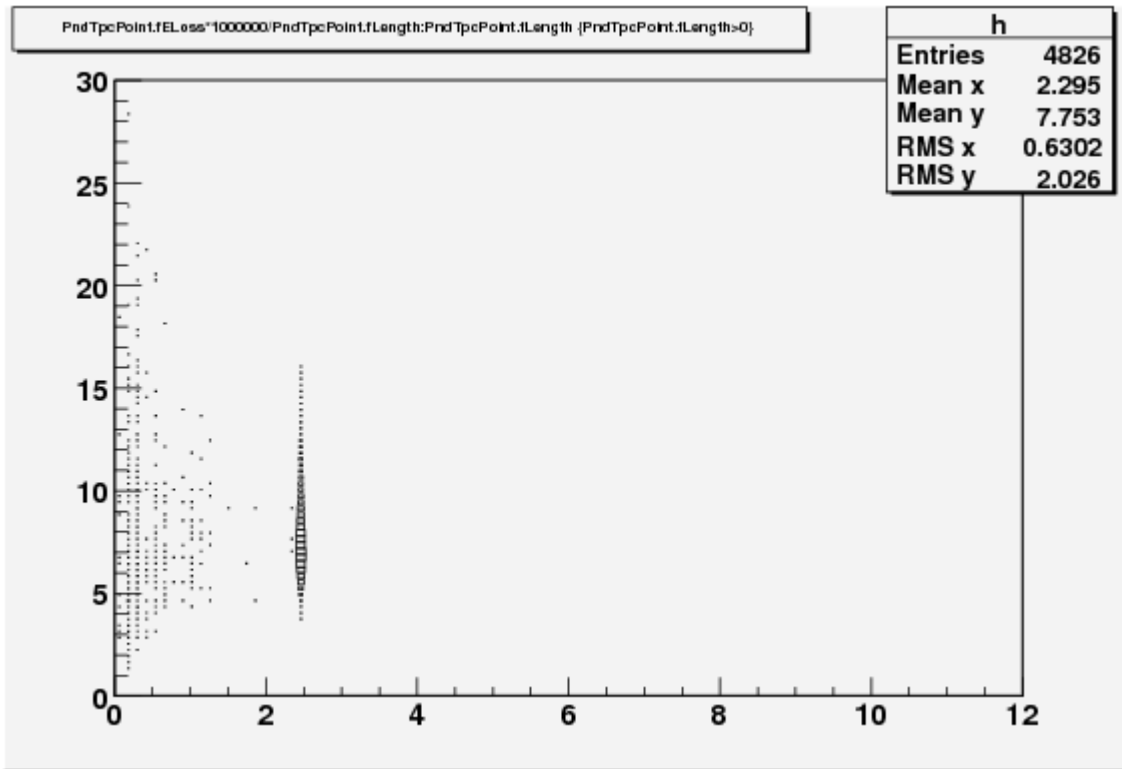
How should we deal with this?

Cheers!  
Viola and Sebastian.

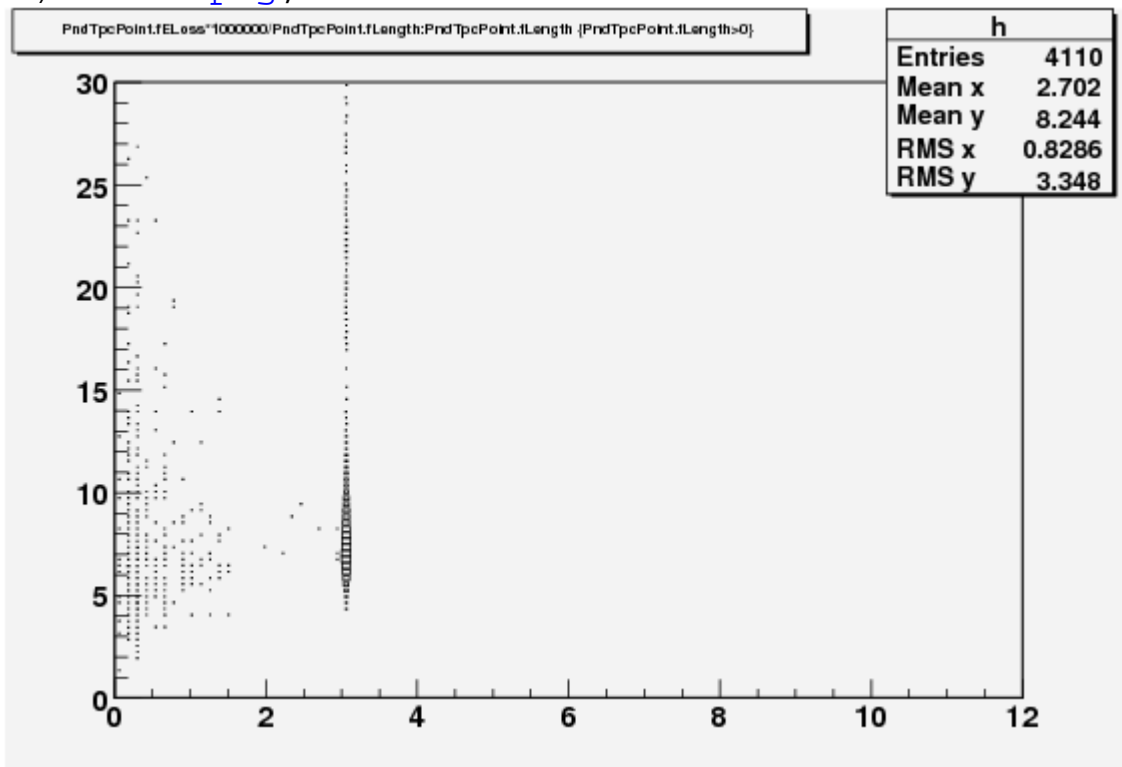
### File Attachments

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1) [dEdx2.5.png](#), downloaded 1316 times



2) [dEdx3.png](#), downloaded 1252 times



3) [dEdx4.png](#), downloaded 1303 times

PndTpcPoint.fELess\*1000000/PndTpcPoint.fLength:PndTpcPoint.fLength {PndTpcPoint.fLength>0}

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Entries	3251
Mean x	3.409
Mean y	20.09
RMS x	1.314
RMS y	6.588

