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!

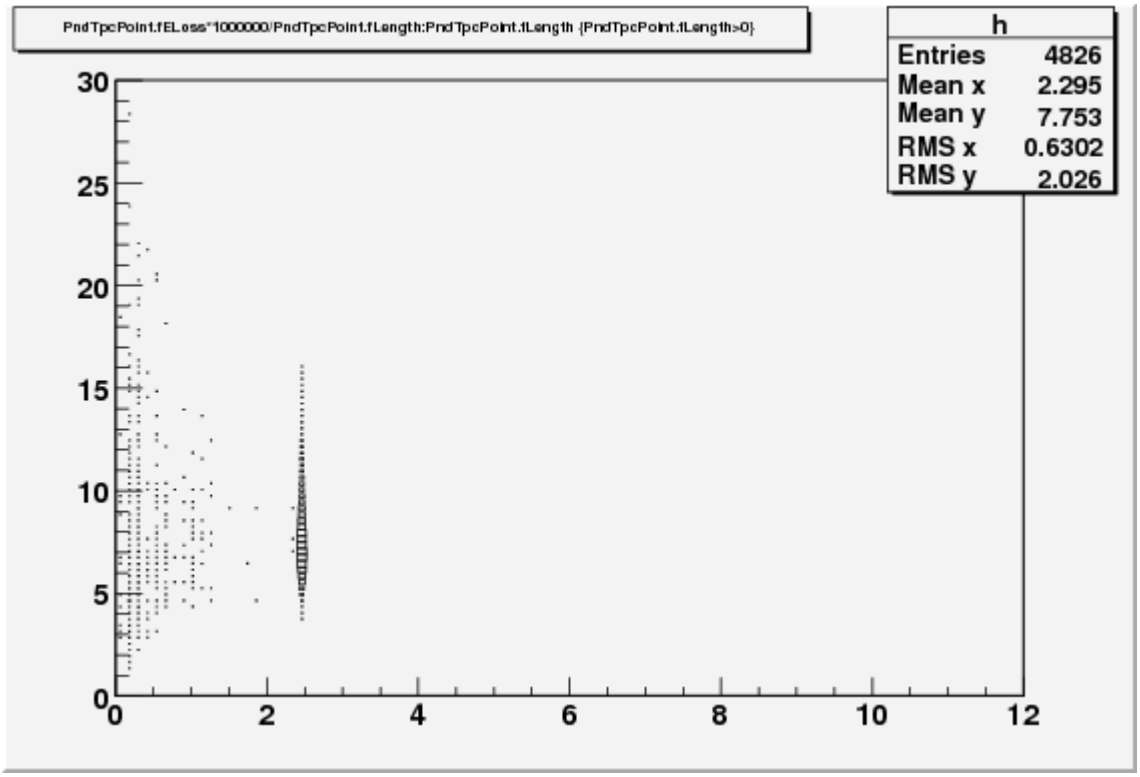
If we shut off the straggeling and just use the energy loss tables of GEANT (LOSS=4 option in SetCuts.C) we get the exepcted value for the dE/dx.

How should we deal with this?

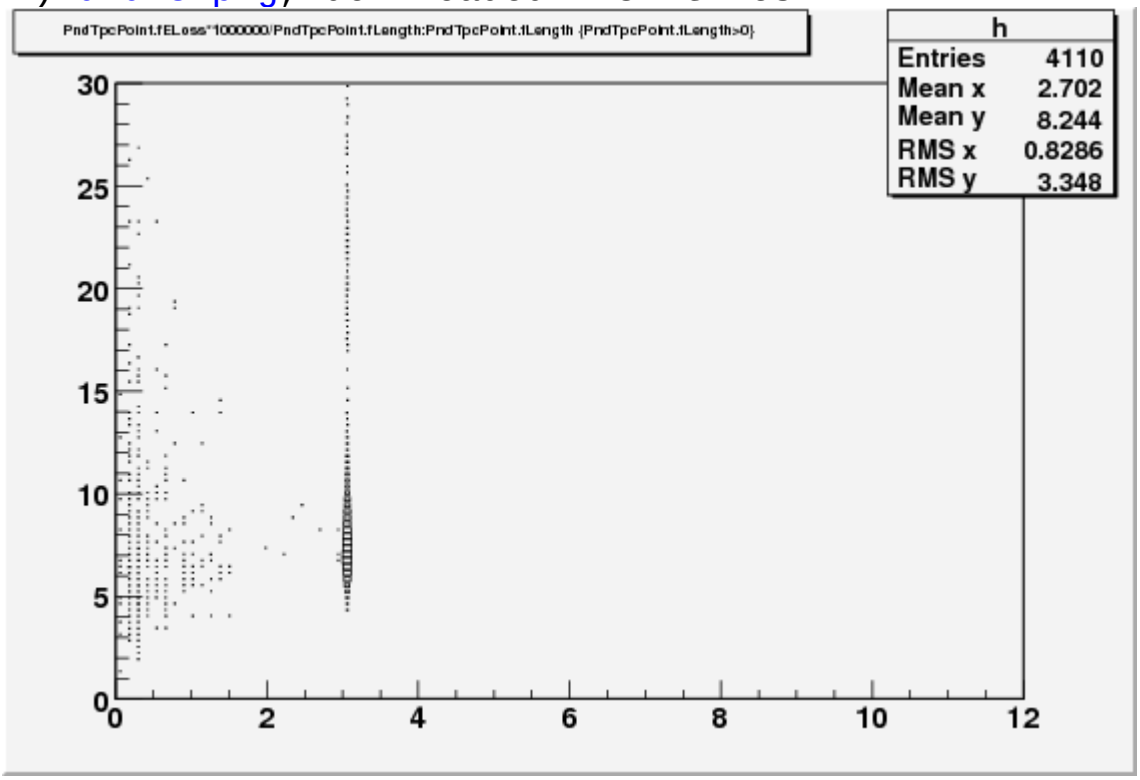
Cheers!
Viola and Sebastian.

File Attachments

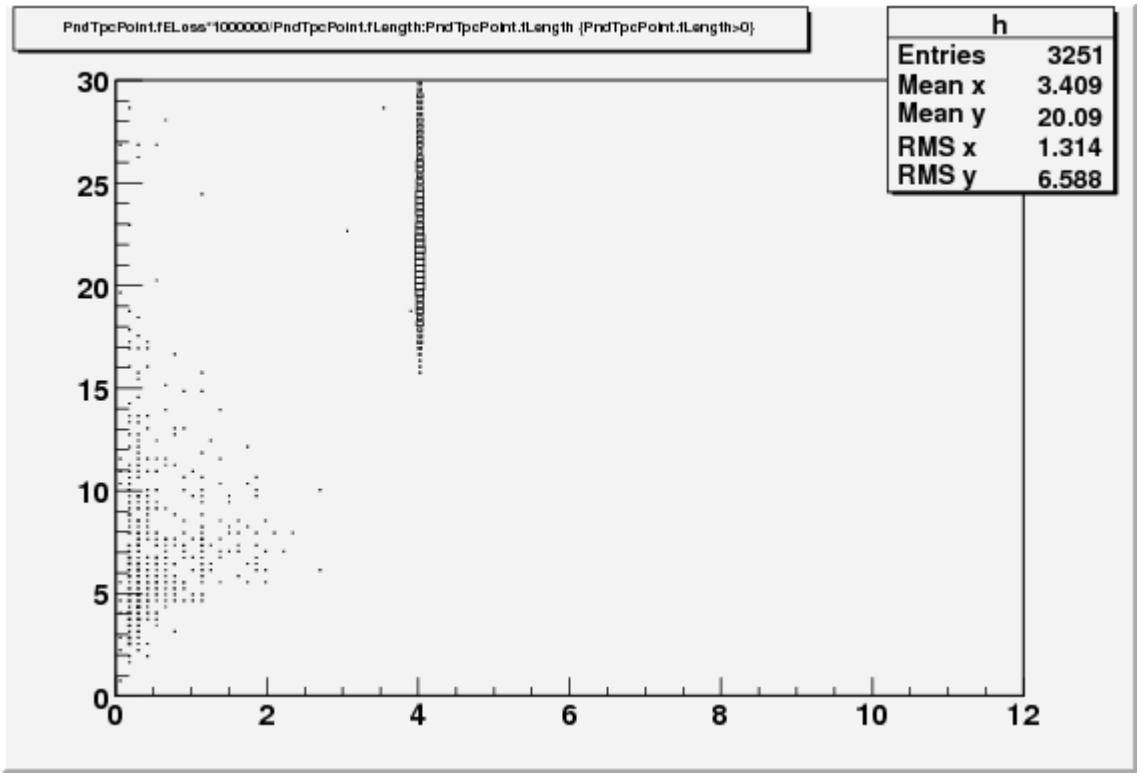
1) dEdx2.5.png, downloaded 1542 times



2) dEdx3.png, downloaded 1484 times



3) dEdx4.png, downloaded 1545 times


PndTpcPoint.fELoss*1000000/PndTpcPoint.fLength:PndTpcPoint.fLength {PndTpcPoint.fLength>0}
h
Entries 3251
Mean x 3.409
Mean y 20.09
RMS x 1.314
RMS y 6.588
30
25
20
15
10
5
0
0
2
4
6
8
10
12