Subject: Energy loss in this silicon layer
Posted by StefanoSpataro on Tue, 22 Apr 2008 18:21:00 GMT
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Just to follow the discussion about G3/G4 comparison of energy loss, I did some studies.

I have used EmcApd geometry to have one vertical plane of silicon, and I shoot it with a pion/electron gun, theta = 0°, phi 0°->360°, momentum 1GeV.

I have analysed 1000 events for geant3 and geant4, for pions and electrons, using as thickness 2mm, 350um (such as MVD). In particular, for 350um, I have tested two cuts in SetCuts.C: 1MeV (the standard one), and 1keV.

You can find the results in the attached file. The plots show dE/dx (so total energy loss divided by sensor thickness).

You can see that using 2mm as thickness, both G3 and G4 give the same results, even for both pions and electrons.

Using 350um (1MeV standard cut) G3 and G4 give the same peak for pions, but for electrons we have two well separated peaks, as shown in the MVD case. It seems G4 electrons are at the same position of pions.

Using 350um but a smaller cut (1keV), you can see now that G3 and G4 give results which are similar, but not exactly the same. We have a sort of convergence, now electrons and pions have the same energy loss, but in this case G3 gives less energy than G4.

If we compare the plots with 1MeV cut and 1keV cut, we can see that G4 peaks are exactly the same, is the G3 peak who has moved. I am wondering if I reduce further the cuts what could happen (I have tried with 1eV, but it seems our PandaRoot does not digest so well cuts so small).

Comments are welcome.

File Attachments
1) dedx_comp.pdf, downloaded 902 times

Subject: Re: Energy loss in this silicon layer
Posted by Tobias Stockmanns on Wed, 23 Apr 2008 06:16:34 GMT
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The most probable value of the Landau distribution for 320 µm thick silicon is approx. 260 MeV/mm. This is in good agreement with the geant4 values.

Cheers,

Tobias

Subject: Re: Energy loss in this silicon layer
Posted by StefanoSpataro on Tue, 06 May 2008 09:10:18 GMT
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Dear all,
I put here my slide with the dE/dx plots for g3 and g4 using the flag SetSTRA(0), for pions and electrons (MVD geometry).

As you can see, whit this option the discrepancy vanishes.

File Attachments
1) mvdpid_stra0.pdf, downloaded 677 times

Subject: Re: Energy loss in this silicon layer
Posted by StefanoSpataro on Tue, 06 May 2008 16:28:41 GMT
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Just to complete the topic,
I did the dE/dx plots for a silicon layer of 2mm and 350um, for electrons and pions, geant3 and geant4. For 350um I have studied 1MeV and 1keV energy cuts (SetCuts.C).

The attached pdf shows on the first page the plots for SetSTRA(1), and on the 2nd page the SetSTRA(0) distributions.

As you can see, with SetSTRA(0) everything seems stabler.

File Attachments
1) dedx_comp.pdf, downloaded 801 times