Subject: GEANT3: of energy loss and delta rays
Posted by Felix Boehmer on Fri, 13 Feb 2009 15:56:43 GMT
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Hello everyone,

first of all: sorry for the double post, accidently posted this in the event generater section first - please delete

some fundamental work for my diploma thesis has led me down the troublesome path of investigating GEANT3's (and partly GEANT4's) energy loss behavior for the TPC volume.

In a nutshell, I am stuck with GEANT3's funny behavior when it comes to delta ray creation.

I am using the ALICE setting for MC point creation (GEANT is forced to create points in the volume based on the actual mean free path rather than based on an energy loss value).
I understand that there are at least 2 (coupled) parameters in GEANT3 responsible for delta creation, namely DCUTE and CUTELE. The official manual (long writeup) states:
Quote:The variable DCUTE is the kinetic energy cut-off for the generated delta-rays. Below this threshold the soft electrons ejected are simulated as continuous energy loss by the incident e+/e-, and above it they are explicitely generated
Since I want to study the effect of delta rays in detail, I have set DCUTE (and CUTELE) to 1 keV, which I specify in the SetCuts.C for the VMC. DRAY is set so 1. Applying this low cut considerably blows up MC run time and filesize, as I would expect. However, when I loop over ALL TpcMCPoints created, I only see electron tracks in about 5% of the events, and I don't see any electron tracks below approx. 700 keV! Considering the above quote I would expect G3 to EXPLICITELY create ALL delta ray tracks above 1 keV...

I have tried this for the following settings of the LOSS parameter (see http://forum.gsi.de/index.php?t=msg&th=1594&rid=0&S=0f52b86d3e60ad239a8e44defb67bc91]), which generally steers G3's treatment of the landau-vavilov theory. While I am not surprised that for LOSS=2 there are only electron tracks in 4.3% of the events, this number almost stays the same for LOSS=1 (5.0%), still with no elecctron tracks below approx. 700 keV. LOSS=5, the secret unofficial ALICE interpretation of this parameter, blows up MC points by a factor of 2 (ok), filesize by a factor of almost 4 (not ok!) but doesn't give me any deltas at lower energies either.

I do not understand why on the one hand G3 becomes horribly slow (as expected for explicit delta generation which such a low cut) but I don't see them in the data!
Is it possible that there is some "feature" of the VMC interface that overwrites my settings or even causes G3 to discard already simulated tracks? Are there more hidden cuts doing evil things in the dark?

Maybe someone here has some experience he wants to share, I would be very thankful!

Cheers

Felix

Subject: Re: GEANT3: of energy loss and delta rays
Posted by Felix Boehmer on Mon, 16 Feb 2009 21:32:52 GMT
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UPDATE:

Initially (time of the above post) I missed an important thing: I ignored the DCUTM cut of GEANT3. While in the SetCuts.C macro there is a comment that it only affects delta rays created by MUONS (hence the 'm' I figured...) - the G3 manual claims it steers muon AND HADRON delta ray creation. For my purposes this would be the right cut

Anyway, even with this cut set low I do not see any electron tracks below 700 keV . Does anybody have any idea for some mechanism supressing these tracks ?