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Subject: Re: Geant3 tracking cuts for the EMC

Posted by [Mohammad Al-Turany](#) on Mon, 19 Oct 2009 13:29:33 GMT

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Hi,

One should differentiate between production cuts (Geant3) and tracking cuts in G4! So you cannot simply compare the two! Anyway Geant4 uses the mm cuts, and in the VMC the energy cuts are translated to mm cuts internally but they are applied as tracking cuts, i.e. particle loses energy by generation of secondaries down to an energy corresponding to the range cut, then the particle is tracked down to zero energy using continuous energy loss. To summarize, the range cut-off represents the accuracy of the stopping position. It does not mean that the track is killed at that energy like in Geant3. (see Geant4 Physics Reference Manual)

And if you look at the output in a G4 simulation session you will see the cuts applied in mm for all particles, by default this is 1 mm, one can also change this but this is not the subject of the discussion.

In fact the 1 MeV cut in PandaRoot is too high for the calorimeter, and one should go down with the energy cuts for sure, but this should be done on the EMC level and not globally otherwise the simulation will take ages. To do this one should implement (over-write) the method FairDetector::SetSpecialPhysicsCuts() in the EMC, in this method you have to set:

```
//for electrons
gMC->Gstpar(MediumId,"CUTGAM",cutE);
gMC->Gstpar(MediumId,"CUTELE",cutE);
gMC->Gstpar(MediumId,"BCUTE",cutE);
gMC->Gstpar(MediumId,"BCUTM",cutE);
// for hadrons
gMC->Gstpar(MediumId,"CUTNEU",cutH);
gMC->Gstpar(MediumId,"CUTHAD",cutH);
gMC->Gstpar(MediumId,"CUTMUO",cutH);
gMC->Gstpar(MediumId,"PPCUTM",cutH);
```

MediumId is the medium Id for the material you want to set its property, this you can get usually by:

```
MediumID = gGeoManager->GetMedium("YourMediumName")->GetId();
```

cutE and cutH are your favorite cuts.

These are the parameters which one usually uses for calorimeter simulation in G3, and thanks to the VMC this is also valid for G4.

Just a final remark, even though it is possible to use range cuts in native G4 format I would not encourage at all. Because it will be valid only for G4, and it will be hard to convert to energy! On the other hand the energy cuts are valid and more logical for all! G3/G4 and fluka.

Hope this will help!

P.S.

In the newest G4 it is possible to use energy cuts instead of the range cuts, even without the VMC!

Mohammad

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