Subject: Bremsstrahlung and geant Posted by StefanoSpataro on Wed, 06 Oct 2010 10:29:18 GMT View Forum Message <> Reply to Message

Dear all,

let's assume that we have an electron moving inside our detector in our geant simulation. It emits a bremmstrahlung electron. In this case, I am wondering what is happening in geant about the particle indexes.

Option 1) It is like a decay, then we have the electron before bremsstrahlung as mother particle, the photon and the electron after bremsstrahlung as daughter particles -> in total 3 objects in our MCTrack

Option 2) The electron is always the same track, it emits a bremsstrahlung photon and lose energy. Then we have a primary electron, one daughter photon with mother id of the incoming electron -> 2 mc tracks

Option 3) The electron loses energy via bremmstrahlung and the photon is not produced -> 1 mc track

Does somebody have an idea on what will happen in Geant, thus in our MCTrack TClonesArray?

Is there a way to see if an electron has lost energy via bremsstrahlung or not?

Subject: Re: Bremsstrahlung and geant Posted by asanchez on Wed, 06 Oct 2010 12:46:40 GMT View Forum Message <> Reply to Message

Hi Stephano, you have to ask for the process Id . Each process in Geant4 or 3 is characterised by a number.

In the TVirtualMC,

TMCProcess ProdProcess(Int_t isec) const

Int_t StepProcesses(TArrayl& proc) const

regards ALicia.

Subject: Re: Bremsstrahlung and geant Posted by StefanoSpataro on Wed, 06 Oct 2010 12:51:40 GMT View Forum Message <> Reply to Message

The question is "what is geant3/4 exactly doing in case of bremsstrahlung"?

Subject: Re: Bremsstrahlung and geant Posted by asanchez on Wed, 06 Oct 2010 13:01:04 GMT View Forum Message <> Reply to Message

For each process,

In geant4 the mother particle has a trackId = -1 the secondaries are numerated as they are created, if you have created three secondaries the y get the track id's 0, 1, 2

In geant3, is the same , the only difference is that the mother particle is numerated with a trackId = 0 instead of -1.

If you want to really see what is going on, case geant4 : go to the gconfig directory and then edit the line 35 at g4Config.in, by removing the # symbol so /tracking/verbose 1, in this way you will switch on the verbosity of the tracking.

Try a few events,

i hope it can help you.

regards,

Alicia.

Subject: Re: Bremsstrahlung and geant Posted by StefanoSpataro on Wed, 06 Oct 2010 13:35:51 GMT View Forum Message <> Reply to Message

The point is that in our MCTrack we have no process id, this means that you will never know the process which has produced that secondary.

For this reason my question cannot be answered simply looking at data, I think, without playing with physics lists (I would avoid it).

Maybe we could think about adding in MCTrack a data member for the process id, in general.

Then, the question is still unsolved

Subject: Re: Bremsstrahlung and geant Posted by Olaf Hartmann on Wed, 06 Oct 2010 13:39:11 GMT View Forum Message <> Reply to Message

Hi Stefano,

are you sure that the process is implemented at all in Geant? I know that in Fluka, at least for

normal tracking in the magnetic field, it is not.

Cheers Olaf.

PS: ... question still not solved, but new question added

Subject: Re: Bremsstrahlung and geant Posted by StefanoSpataro on Wed, 06 Oct 2010 13:41:26 GMT View Forum Message <> Reply to Message

Olaf Hartmann wrote on Wed, 06 October 2010 15:39 PS: ... question still not solved, but new question added

You are a friend...

Subject: Re: Bremsstrahlung and geant Posted by Olaf Hartmann on Wed, 06 Oct 2010 14:00:07 GMT View Forum Message <> Reply to Message

To be more precise, this statement is only true for the synchrotron radiation part.

Olaf Hartmann wrote on Wed, 06 October 2010 15:39 I know that in Fluka, at least for normal tracking in the magnetic field, it is not.

Subject: Re: Bremsstrahlung and geant Posted by asanchez on Thu, 07 Oct 2010 09:37:57 GMT View Forum Message <> Reply to Message

So coming back to the issue of the Bremsstrahlung processes by electrons.

If i have well understood, in geant4/3 electrons are treated as mother particle(primary or secondary) losing energy according with the Bremsstrahlung process and emitting photons.

So the electron in MCtrack should remain as mother particle and the photons are treated as secondaries.

To check that, use the following

for example the pdgcode of the mother and daughter particles

in geant4

From your MC information PndEmcPoint * pop;

PndMCTrack* moc=(PndMCTrack*)fMcTr->At(pop->GetTrackID());

if(moc==0)continue;

```
MotherId= moc->GetMotherID();
```

if (MotherId==-1)Motherpdg = moc->GetPdgCode(); // case electron as primary mother
 else {
 PndMCTrack *mother =(PndMCTrack*)fMcTr->At(MotherId); // case electron as secondary
 mother

```
Motherpdg = mother->GetPdgCode();
}
```

See :

http://geant4.cern.ch/G4UsersDocuments/UsersGuides/PhysicsReferenceManua l/html/node42.html#SECTION044220000000000000000

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