
Subject: Bremsstrahlung and geant

Posted by [StefanoSpataro](#) on Wed, 06 Oct 2010 10:29:18 GMT

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Dear all,

let's assume that we have an electron moving inside our detector in our geant simulation. It emits a bremsstrahlung 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 bremsstrahlung 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

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Hi Stephano, you have to ask for the process Id .

Each process in Geant4 or 3 is characterised by a number.

In the TVirtualMC ,

```
TMCPProcess ProdProcess(Int_t isec) const
```

```
Int_t StepProcesses(TArrayI& proc) const
```

regards
ALicia.

Subject: Re: Bremsstrahlung and geant

Posted by [StefanoSpataro](#) on Wed, 06 Oct 2010 12:51:40 GMT

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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
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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 they 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
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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
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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 [Stefano Spataro](#) on Wed, 06 Oct 2010 13:41:26 GMT
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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
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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
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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/PhysicsReferenceManual/html/node42.html#SECTION04422000000000000000>
