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Subject: Multiple scattering model in GEANT3  
Posted by [Volker Friese](#) on Wed, 06 May 2009 10:34:19 GMT  
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I vaguely remember that in GEANT3, one could choose between the Gaussian and the Moliere model of multiple scattering. By looking in g3Config.C, I do not see a corresponding entry. So, what is the default model we employ when running VMC with GEANT3? And can this be changed in g3Config?

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Subject: Re: Multiple scattering model in GEANT3  
Posted by [Claudia Höhne](#) on Wed, 06 May 2009 10:51:31 GMT  
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.... Andrey writes in his tracking note  
<http://www.gsi.de/documents/DOC-2008-Dec-182-1.pdf>  
that in GEANT4 a "modified Highland formula is used".

Claudia

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Subject: Re: Multiple scattering model in GEANT3  
Posted by [Mohammad Al-Turany](#) on Sun, 17 May 2009 20:37:16 GMT  
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Hi,

Here is the explanation of the flags in g3config.C and SetCuts.C

Mohammad

DCAY

Decay in flight. The decaying particle stops. The variable IDCAY controls this process. See [CONS310, PHYS400].

0 - No decay in flight.

1 - Decay in flight with generation of secondaries. Default setting.

2 - Decay in flight without generation of secondaries.

MULS

Multiple scattering. The variable IMULS controls this process. For more information see [PHYS320 or 325 or 328].

0 - No multiple scattering.

1 - Multiple scattering according to Molière theory. Default setting.

2 - Same as 1. Kept for backward compatibility.

3 - Pure Gaussian scattering according to the Rossi formula.

PFIS

Nuclear fission induced by a photon. The photon stops. The variable IPFIS controls this process. See [PHYS240].

- 0 - No photo-fission. Default setting.
- 1 - Photo-fission with generation of secondaries.
- 2 - Photo-fission without generation of secondaries.

## MUNU

Muon-nucleus interactions. The muon is not stopped. The variable IMUNU controls this process. See [PHYS431] for more details.

- 0 - No muon-nucleus interactions.
- 1 - Muon-nucleus interactions with generation of secondaries. Default setting.
- 2 - Muon-nucleus interactions without generation of secondaries.

## LOSS

Continuous energy loss. The variable ILOSS controls this process.

- 0 - No continuous energy loss, IDRAY is set to 0.
- 1 - Continuous energy loss with generation of delta rays above DCUTE (common/GCUTS/) and restricted Landau fluctuations below DCUTE.
- 2 - Continuous energy loss without generation of delta rays and full Landau-Vavilov-Gauss fluctuations. In this case the variable IDRAY is forced to 0 to avoid double counting of fluctuations. Default setting.
- 3 - Same as 1, kept for backward compatibility.
- 4 - Energy loss without fluctuation. The value obtained from the tables is used directly.

## PHOT

Photoelectric effect. The interacting photon is stopped. The variable IPHOT controls this process. More info [PHYS230].

- 0 - No photo-electric effect.
- 1 - Photo-electric effect with generation of the electron. Default setting.
- 2 - Photo-electric effect without generation of the electron.

## COMP

Compton scattering. The variable ICOMP controls this process. For additional information see [PHYS220].

- 0 - No Compton scattering.
- 1 - Compton scattering with generation of e<sup>-</sup>. Default setting.
- 2 - Compton scattering without generation of e<sup>-</sup>.

## PAIR

Pair production. The interacting gamma is stopped. The variable IPAIR controls this process. More info [PHYS210]

- 0 - No pair production.
- 1 - Pair production with generation of e<sup>-</sup>/e<sup>+</sup>. Default setting.
- 2 - Pair production without generation of e<sup>-</sup>/e<sup>+</sup>.

## BREM

Bremsstrahlung. The interacting particle  $e^+$ ,  $e^-$ ,  $\mu^+$ ,  $\mu^-$  is not stopped. The variable IBREM controls this process. More details in [PHYS340].

0 - No bremsstrahlung.

1 - bremsstrahlung with generation of gamma. Default setting.

2 - bremsstrahlung without generation of gamma.

## RAYL

Rayleigh effect. The interacting gamma is not stopped. The variable IRAYL controls this process. See [PHYS250] for details.

0 - No Rayleigh effect. Default setting.

1 - Rayleigh effect.

## DRAY

delta ray production. The variable IDRAY controls this process. See [PHYS430]

0 - No delta rays production.

1 - delta rays production with generation of . Default setting.

2 - delta rays production without generation of .

## ANNI

Positron annihilation. The  $e^+$  is stopped. The variable IANNI controls this process. For reference see [PHYS350].

0 - No positron annihilation.

1 - Positron annihilation with generation of photons. Default setting.

2 - Positron annihilation without generation of photons.

## HADR

Hadronic interactions. The particle is stopped in case of inelastic interaction, while in case of elastic interaction it is not stopped. To simulate the interactions of hadrons with the nuclei of the matter traversed, four alternatives are provided:

1.The generator of the FLUKA hadron shower MonteCarlo and the interface routines to GEANT. See [PHYS520] for more information.

2.The generator of the GHEISHA hadron shower MonteCarlo and the interface routines to GEANT. See [PHYS510] for more details.

3.The generator of the GCALOR hadron shower MonteCarlo and the interface routines to GEANT.(works only on 32 bit )

The variable IHADR controls this process.

0 - No hadronic interactions.

1 - Hadronic interactions with generation of secondaries using GHEISHA package.

2 – same as 1.

3 – same as 1.

4 - Hadronic interactions are simulated using FLUKA package.

5 - Hadronic interactions are simulated using GCALOR package.

## LABS

Light ABSorption. This process is an absorption of light photons (particle type 7) in dielectric

materials. It is turned on by default when the generation of Cerenkov light is requested (data record CKOV). For more information see [PHYS260].

This process controlled by ILABS.

0 - No absorption of photons.

1 - Absorption of photons with possible detection.

## STRA

This flag turns on the collision sampling method to simulate energy loss in thin materials, particularly gases. For more information see [PHYS334].

The control variable is ISTRA .

0 - Collision sampling is switched off. Default setting.

1 - Collision sampling is activated.

## SYNC

Synchrotron radiation in magnetic field. Defined by variable ISYNC. See [PHYS360].

0 - The synchrotron radiation is not simulated. Default setting.

1 - Synchrotron photons are generated, at the end of the tracking step.

2 - Photons are not generated, the energy is deposited locally.

3 - Synchrotron photons are generated, distributed along the curved path of the particle.

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Subject: Moliere is default in G3

Posted by [Volker Friese](#) on Mon, 18 May 2009 14:02:07 GMT

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Thanks, Mohammad. So, since in SetCuts.C()

```
gMC->SetProcess("MULS",1); /**multiple scattering*/
```

the default in our VMC (both with G3 and G4) is Moliere scattering.

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Subject: Re: Multiple scattering model in GEANT3

Posted by [Christian Simon](#) on Tue, 13 Mar 2012 19:47:06 GMT

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Do I get it right that setting

```
gMC->SetProcess("MULS",1); to
```

```
gMC->SetProcess("MULS",0);
```

in "gconfig/SetCuts.C" is the only change I need to make in order to run a CBMroot (JUN11) simulation (e.g. "macro/run/run\_sim.C") without multiple scattering, using Geant3?

Subject: Re: Multiple scattering model in GEANT3  
Posted by [Volker Friese](#) on Wed, 14 Mar 2012 17:57:17 GMT  
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Yes, to my understanding that's all you have to do.

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