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Subject: g3Config.C

Posted by [Jens Sören Lange](#) on Fri, 02 Nov 2007 08:47:53 GMT

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Dear all,

Florian brought up a maybe important point for the 2.0 release.

In combination with the geant the

gconfig/g3Config.C

was updated. See

[http://forum.gsi.de/index.php?t=msg&th=1439&rid=0&S=bbde01292b20e2454231cc514702ac1c#msg\\_4722](http://forum.gsi.de/index.php?t=msg&th=1439&rid=0&S=bbde01292b20e2454231cc514702ac1c#msg_4722)

in particular:

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[...snip...]

which we have asked Rene Brun at Cern to update in the VMC cvs, and the files:

in pandaroot

gconfig/Geane.C

gconfig/g3Config.C

[...snip...]

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However, Florian noticed that the physics settings changed.

```
geant3->SetDCAY(1);
geant3->SetPAIR(1);
geant3->SetCOMP(1);
geant3->SetPHOT(1);
geant3->SetPFIS(0);
geant3->SetDRAY(1);
geant3->SetANNI(1);
geant3->SetBREM(1);
geant3->SetMUNU(1);
geant3->SetCKOV(1);
geant3->SetHADR(3);
geant3->SetLOSS(1);
geant3->SetMULS(1);
geant3->SetRAYL(1);
geant3->SetSTRA(1);
```

In the repository right now, the g3Config.C (and also you will find there a g3Config\_new.C) have still the old settings, as they were during the whole year (because Florian did this intentionally for now). They are also consistent with Stefano's talk in

<http://panda-wiki.gsi.de/pub/Computing/PresentationsCMMarc2007/20070326-GenovaSpataro.ppt>

page 6

But maybe the new settings were also intentional?  
(Andrea, could you please take a look?)

It means, we might have differences between g3 for PandaRoot 1.X and g3 for PandaRoot 2.X (now that maybe g3 and g4 hopefully are consistent, this keeps it interesting, and Stefano might enjoy to do many more comparisons ...).

So, can everyone please take a look if she/he thinks that the above settings are correct?

cheers, Soeren

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Subject: Re: g3Config.C  
Posted by [Stefano Spataro](#) on Fri, 02 Nov 2007 10:31:58 GMT  
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What was changed exactly?

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Subject: Re: g3Config.C  
Posted by [Jens Sören Lange](#) on Mon, 05 Nov 2007 14:43:05 GMT  
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Hi all, Florian found the file with the other switches.

```
geant3->SetDCAY(1);
geant3->SetPAIR(1);
geant3->SetCOMP(1);
geant3->SetPHOT(1);
geant3->SetPFIS(0);
geant3->SetDRAY(0);
geant3->SetANNI(1);
geant3->SetBREM(1);
geant3->SetMUNU(1);
geant3->SetCKOV(1);
geant3->SetHADR(1); //Select pure GEANH (HADR 1) or GEANH/NUCRIN (HADR 3)
geant3->SetLOSS(2);
geant3->SetMULS(1); //1=Moliere,3=Gaussian
geant3->SetRAYL(1);
geant3->SetSTRA(0);
```

Note that STRA is zero (not 1), HADR is 1 (not 3) and LOSS is 2 (not 1).

Maybe that's needed for the Urban model?

Soeren (for Florian who is just busy with grid).

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Subject: Re: g3Config.C

Posted by [Stefano Spataro](#) on Mon, 05 Nov 2007 15:23:17 GMT

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Quote: Note that STRA is zero (not 1), HADR is 1 (not 3) and LOSS is 2 (not 1).

Hi,

STRA is for collision sampling to simulate energy loss in thin materials or gases, and I think it should be ON for the gaseous detectors. By default it is OFF, but in HADES we have turned it on.

LOSS is for energy loss, 1 means continuous energy loss with generation of delta rays above DCUTE and restricted Landau fluctuations below DCUTE, while 2 means continuous energy loss without generation of delta rays and full Landau-Vavilov-Gauss fluctuations. Option 2 is the default one and in HADES we kept it.

About HADR, I have no idea on the different models for hadronic interactions.

Hope it helps somehow.

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Subject: Re: g3Config.C

Posted by [Mohammad Al-Turany](#) on Mon, 05 Nov 2007 17:45:52 GMT

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Hi,

Here is something which may help

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.

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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-. Default setting.

2 - Compton scattering without generation of e-.

## 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-/e+. Default setting.

2 - Pair production without generation of  $e^-/e^+$ .

## 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  $e^-$ . Default setting.

2 - delta rays production without generation of  $e^-$ .

## 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: Re: g3Config.C

Posted by [Stefano Spataro](#) on Mon, 05 Nov 2007 17:53:45 GMT

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Quote: 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.

Does it mean that HADR = 1 and HADR = 3 are exactly the same, or have I understood wrong? In each case probably one should try to choose between options 1 4 or 5. Do I remember well that gcalor is good for hadron calorimetry?

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Subject: Re: g3Config.C

Posted by [Mohammad Al-Turany](#) on Mon, 05 Nov 2007 22:39:52 GMT

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Hallo Stefano,

In the TGeant3.cxx:

```
// To control hadronic interactions.  
// par =0 no hadronic interactions.  
//   =1 Hadronic interactions. secondaries processed.  
//   =2 Hadronic interactions. No secondaries stored.
```

which is the same as the old FORTRAN documentation,

So grepping inside the FORTRAN I found:

```
C    20-JUN-1990 RB/NVE CERN GENEVA  
C    NEW OPTION IHADR=3 INTRODUCED TO SELECT INVOKATION  
C    OF THE NUCRIN PACKAGE FROM "GHEISH" FOR ENERGIES  
C    BELOW 5 GEV
```

which appears in some documentations! but searching further I found:

```
*====> 18/04/93  
*    Old Hadrin/Nucrin interface deleted. HADR 3 flag has  
*    no meaning any more. Warning message introduced in  
*    GPHYSI, when IHADR=3 then reset it to 1 and use GHEISHA.  
*    Thanks to F.Carminati.
```

for GCALOR you can look at:

<http://www.staff.uni-mainz.de/zeitnitz/Gcalor/gcalor.html>

Mohammad

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