Subject: Problem with TGeant4?
Posted by C. A. Douma on Mon, 27 Jun 2016 15:05:33 GMT
View Forum Message <> Reply to Message

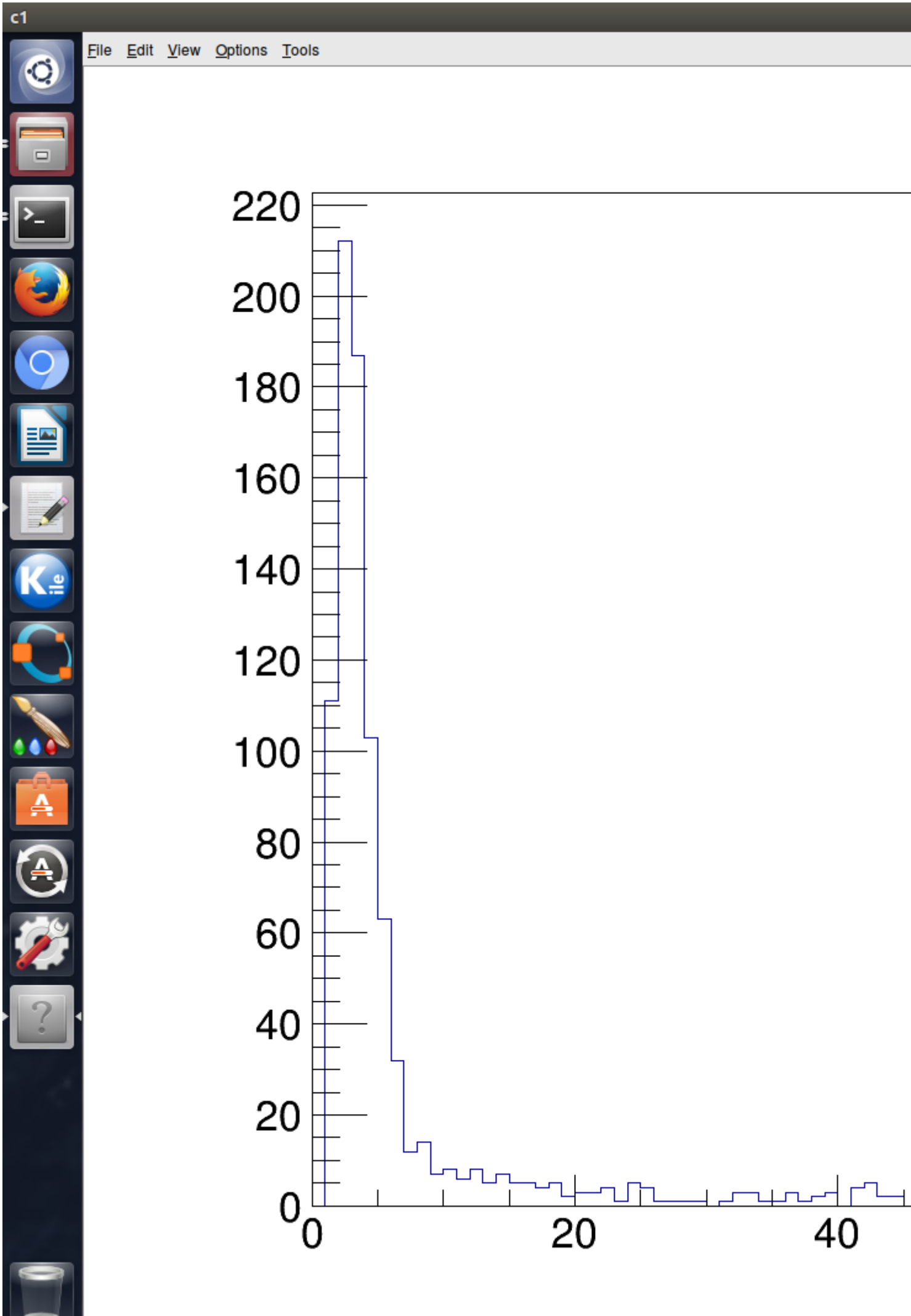
I run a simulation where I have only NeuLAND in the setup. I shoot 1 GeV neutrons onto NeuLAND (14 m distance, 4.5 degrees angular spread, box generator). When I run this simulation under TGeant4, I only find a few different tracks is the MCTrack-branch of the output-file. When I however run the same simulation under TGeant3, The MCTrack branch is much larger. In further analysis, this results in that Geant4 gives only 40% detection efficiency for NeuLAND, while Geant3 given 99%. Does anyone know why my Geant4 results are wrong?

Christiaan.

PS: The histogram included is the size of the MCTrack branch under Geant4.

File Attachments

1) MCTrack_Size.png, downloaded 1180 times


c1
File Edit View Options Tools
220
200
180
160
140
120
100
80
60
40
20
0
0
20
40

Subject: Re: Problem with TGeant4?
Posted by Hector Alvarez Pol on Tue, 28 Jun 2016 10:19:23 GMT
View Forum Message <> Reply to Message

Dear Christiaan,

we have experienced some problems with the simulation of XB due to an error in the energy cutoff in file xball/R3BXBall.cxx.
The value of the parameter

```
Double_t cutE = 0.01; // GeV-> 1 keV
```

is wrong, as 0.01 (10 MeV) does not represent a reasonable value for the XB.
We are now checking it and we will report and modify the value in the Git distribution.
I do not know if your problems could be related to the same parameter for NueLAND, but it would be reasonable to check.

Best regards,

Subject: Re: Problem with TGeant4?
Posted by Dmytro Kresan on Tue, 28 Jun 2016 10:43:39 GMT
View Forum Message <> Reply to Message

Geant3 is well known to reproduce neutron interaction accurately, also for lower energies. We urgently need a Geant3 / Geant4 / Experiment comparison and validation, in order to select the best suitable physics list. Till this is done, I would not trust any Geant4 simulations for NeuLAND.

But still, you can try to improve it. For that you need to modify the file R3BRoot/gconfig/g4r3bconfig.in

1. Comment out the old ion physics with #

#/R3B/phys/addPhysics binary_ion

2. And add two following lines:

/R3B/phys/addPhysics ion_inclxx
/R3B/phys/addPhysics qgsp_bert

3. In addition, in this file you can also set your electron cut (rangeCutForElectron):

/mcPhysics/rangeCutForElectron 1000000. mm

Attached is the distribution of MC tracks showing effect of this new physics list. I suppose the range cuts still have to be adjusted to achieve event better agreement.

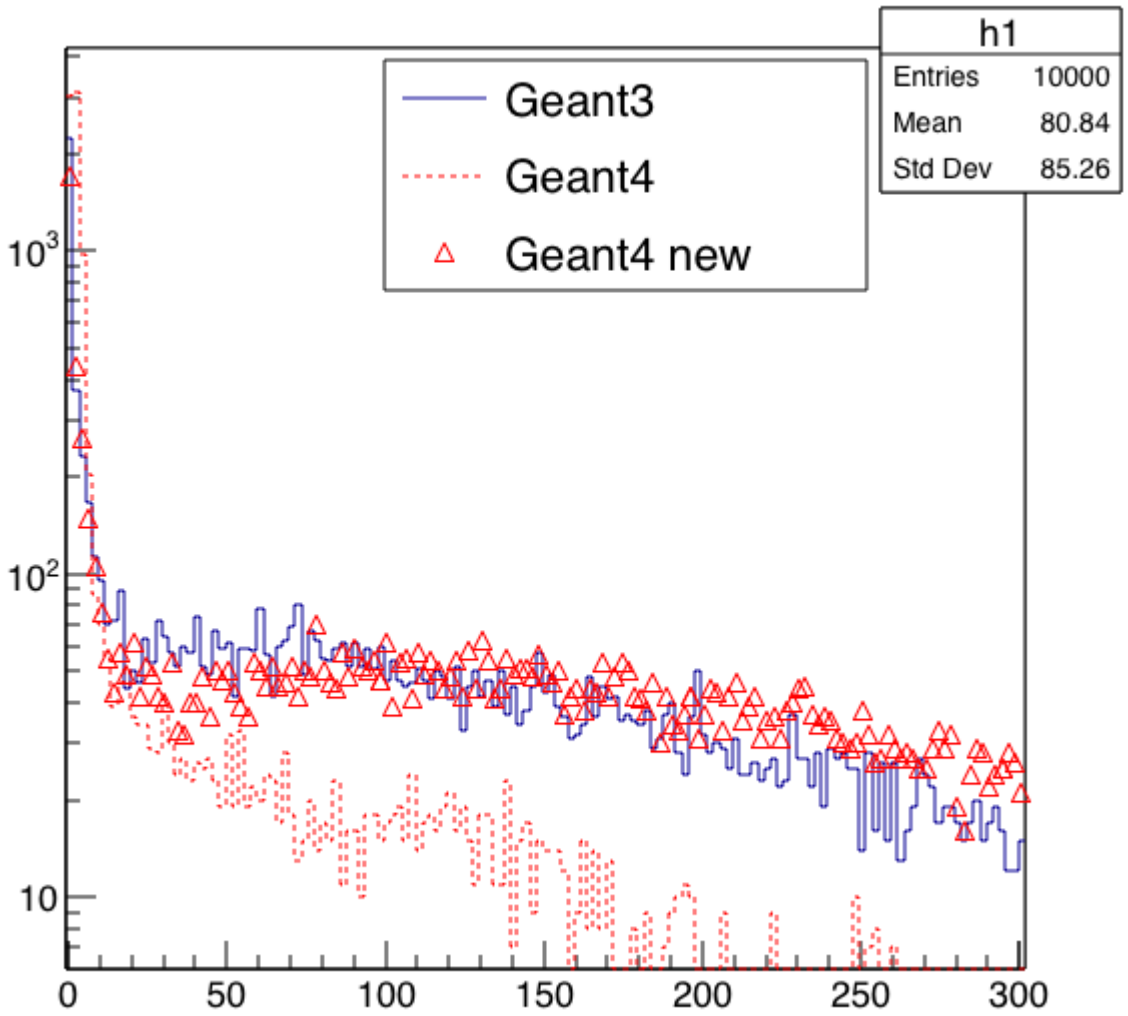
Please note. In case of Geant3, the secondary MC tracks are saved to output only if they produced at least 1 MC point in a detector. To have the same for Geant4, you need to open file R3BRoot/gconfig/g4R3bConfig.C and change line 62 to:

stack->SetMinPoints(1);

Best regards,
Dima

File Attachments

1) c1.png, downloaded 951 times



Subject: Re: Problem with TGeant4?
Posted by C. A. Douma on Tue, 28 Jun 2016 14:41:03 GMT
View Forum Message <> Reply to Message

Thank you for the advice. However, I need Geant4 for background simulations. (similar to Ken Miki his work). Geant3 does not include nucleon-nucleon interactions (at leats that's what I've been told), meaning that the target collisions and therefore background studies will be wrong.

In 2015 I also ran some Geant4 simulations and back then I got much better detection efficiencies. My presentation on the R3B collaboration meeting in June 2015 was all done with Geant4. Do you have any idea what changes/updates could have caused this

difference?

In the mean time I will try out your advice.

Christiaan.

Subject: Re: Problem with TGeant4?
Posted by C. A. Douma on Wed, 29 Jun 2016 09:27:47 GMT
View Forum Message <> Reply to Message

Dear Mr. Kresan,

Your advice reminded me of an earlier discussion we had about how to adapt the Geant4 Physics list to
cut of the delta electrons for heavy ions. When making those and your new modifications, all problems
were solved. The Geant4 detection effciency for NeuLAND is now about 99% (not resolving efficiency, that one
is about 95%).

I included the physics list that I used for this. It is indeed quite different from the current one!

Christiaan.

File Attachments

1) g4r3bconfig_Standard.in, downloaded 548 times
