Subject: Problem of energy loss of proton in FairROOT
Posted by Genie on Mon, 26 Jan 2015 14:51:13 GMT
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Hello.

I'm writing a package for a TPC experiment using FairROOT.
Recently we found that the energy loss of proton and alpha doesn't match to the TRIM/LISE++ result.
So, I posted a thread in GEANT4 electromagnetic process mailing list,
but it comes to my mind that it might be more related to the FairROOT forum so I registered.

I put the copy of the post in GEANT4 electromagnetic process mailing list.

If you have any comments or recommendation or hints, please let me know.
Anything would be helpful

Thank you in advance.
Genie

Link: http://hypernews.slac.stanford.edu/HyperNews/geant4/get/emprocess/1333.h tml
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Hello.

I'm currently writing a simulation package for an experiment.
Prior to using it, we're checking if the energy loss of proton and alpha is the same as the other simulation.
We're comparing GEANT4 energy loss data with TRIM/LISE++ data.

Attached links are proton and alpha energy loss plot with TRIM/LISE++ result.

Attachment:
http://hypernews.slac.stanford.edu/HyperNews/geant4/get/AUX/2015/01/22/15.07-13310-0atGMsC.png
http://hypernews.slac.stanford.edu/HyperNews/geant4/get/AUX/2015/01/22/15.07-54093-KDTlfHd.png

As you can see, in relatively low energy, energy loss curves doesn't match each other.
We couldn't find what the problem is.

Currently, we're writing our code on top of FairROOT package.
So, GEANT4 is steered over G4VMC interface.
Cuts used for running simulation is following.

If you have any clue or comments or recommendation, please don't hesitate to mail us.
Anything could be helpful

Thank you in advance.

Best regards,
Genie

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g4config.in:
/mcPhysics/rangeCuts 0.001 mm

/cuts/setLowEdge 10 eV
/cuts/setHighEdge 1 MeV

g4Config.C:
```
 TG4RunConfiguration* runConfiguration = new TG4RunConfiguration("geomRoot",
"QGSP_BERT_HP_EMY", "stepLimiter+specialCuts+specialControls");
TGeant4 -> SetMaxNStep(1.E7);
```

SetCuts.C
```
gMC->SetProcess("PAIR",1); /** pair production **/
gMC->SetProcess("COMP",1); /** Compton scattering **/
gMC->SetProcess("PHOT",1); /** photo electric effect **/
gMC->SetProcess("PFIS",1); /** photofission **/
gMC->SetProcess("DRAY",1); /** delta-ray **/
gMC->SetProcess("ANNI",1); /** annihilation **/
gMC->SetProcess("BREM",1); /** bremsstrahlung **/
gMC->SetProcess("HADR",1); /** hadronic process **/
gMC->SetProcess("MUNU",1); /** muon nuclear interaction **/
gMC->SetProcess("DCAY",1); /** decay **/
gMC->SetProcess("LOSS",1); /** energy loss **/
gMC->SetProcess("MULS",1); /** multiple scattering **/

Double_t cutC = 1.0E-5;
//Double_t cutB = 1.E4;
Double_t cutB = -1;
Double_t cut1 = 1.0E-8; // [GeV]
Double_t cutp = 0.01; // [GeV]
Double_t tofmax = 1.E10; // seconds

gMC->SetCut("CUTGAM",cutC); /** gammas (GeV)*/
gMC->SetCut("CUTELE",cut1); /** electrons (GeV)*/
gMC->SetCut("CUTNEU",cutC); /** neutral hadrons (GeV)*/
gMC->SetCut("CUTHAD",cutC); /** charged hadrons (GeV)*/
gMC->SetCut("CUTMUO",cutC); /** muons (GeV)*/
gMC->SetCut("BCUTE",cutB); /** electron bremsstrahlung (GeV)*/
gMC->SetCut("BCUTM",cutB); /** muon and hadron bremsstrahlung(GeV)*/
gMC->SetCut("DCUTE",cutB); /** delta-rays by electrons (GeV)*/
gMC->SetCut("DCUTM",cutB); /** delta-rays by muons (GeV)*/
gMC->SetCut("PPCUTM",cutp); /** direct pair production by muons (GeV)*/
gMC->SetCut("TOFMAX",tofmax); /**time of flight cut in seconds*/
```