Subject: Barrel DIRC in Geant 4 - Cherenkov photon propagation - [FIXED]
Posted by Jochen Schwiening on Tue, 14 Sep 2010 16:38:21 GMT
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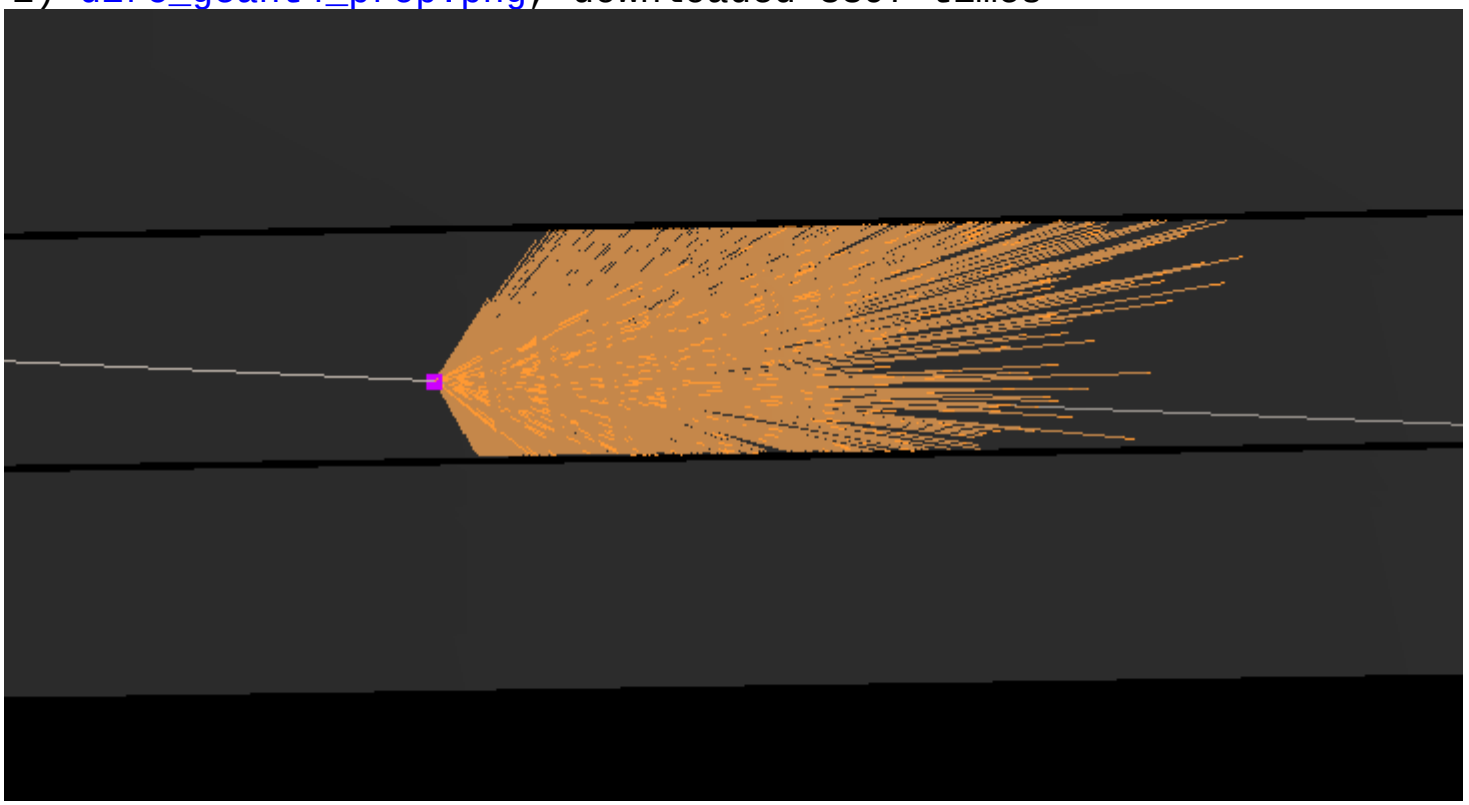
Hi folks,
in an effort to study our frustrating problems with the photon gun usage in G3 (see Maria's post titled "Cherenkov photons generation") I tried to run our usual macro /macro/drc/sim_dirc.C using Geant 4. I enabled the optical process ("+optical" in the g4 config file) and ran a couple of events, looked at them with the event display.
I see that Cherenkov photons are produced but I also see that they are all lost/killed/absorbed as soon as they hit the first bar surface. I am attaching a screen snapshot showing a side view, a muon track producing many photons that all die as soon as the first surface is hit. It looks as if G4 doesn't know what to do with the photons, how to propagate them inside the material.
I should mention that I see an enormous number of warning messages
"Warning: G4MaterialPropertyVector::GetProperty==> attempt to Retrieve Property above range"
which may very well indicate a fatal problem - sadly, I don't know where to look to fix the issue.
It's the first time I tried G4 in PandaROOT and so far I only heard that the barrel DIRC "doesn't work" in G4. It'd be nice to change that.
Any ideas?
Thanks, Jochen

File Attachments

1) dirc_geant4_prop.png, downloaded 3397 times



Subject: Re: Barrel DIRC in Geant 4 - Cherenkov photon propagation
Posted by Jochen Schwiening on Wed, 15 Sep 2010 11:49:30 GMT

Just a quick update: the photon propagation issues seems to be solved.
The photons were actually stopped by our own DIRC code PndDrc.cxx where we stop photons that leave the bar volume in a location other than the bar end. This was done to avoid tracking Cherenkov photons that left the bar because they were not internally reflected but then keep getting scattered around PANDA and use up tons of CPU time.
This cut worked well in Geant 3 but in Geant 4 there seems to be a volume change step even during internal reflections (seems wrong but at least that what it looks like), which caused all photons to be stopped by our PndDrc code.
After I removed this explicit stop command I get photons propagating down the bar and registering on the detector pixels, as can be seen in the attached snapshot. Looks fine to me.
(The photons seen leaving the bar close to where the track hits the DIRC - those are the ones we wanted to stop. Keeping them increases the time per event by a factor of 5...)

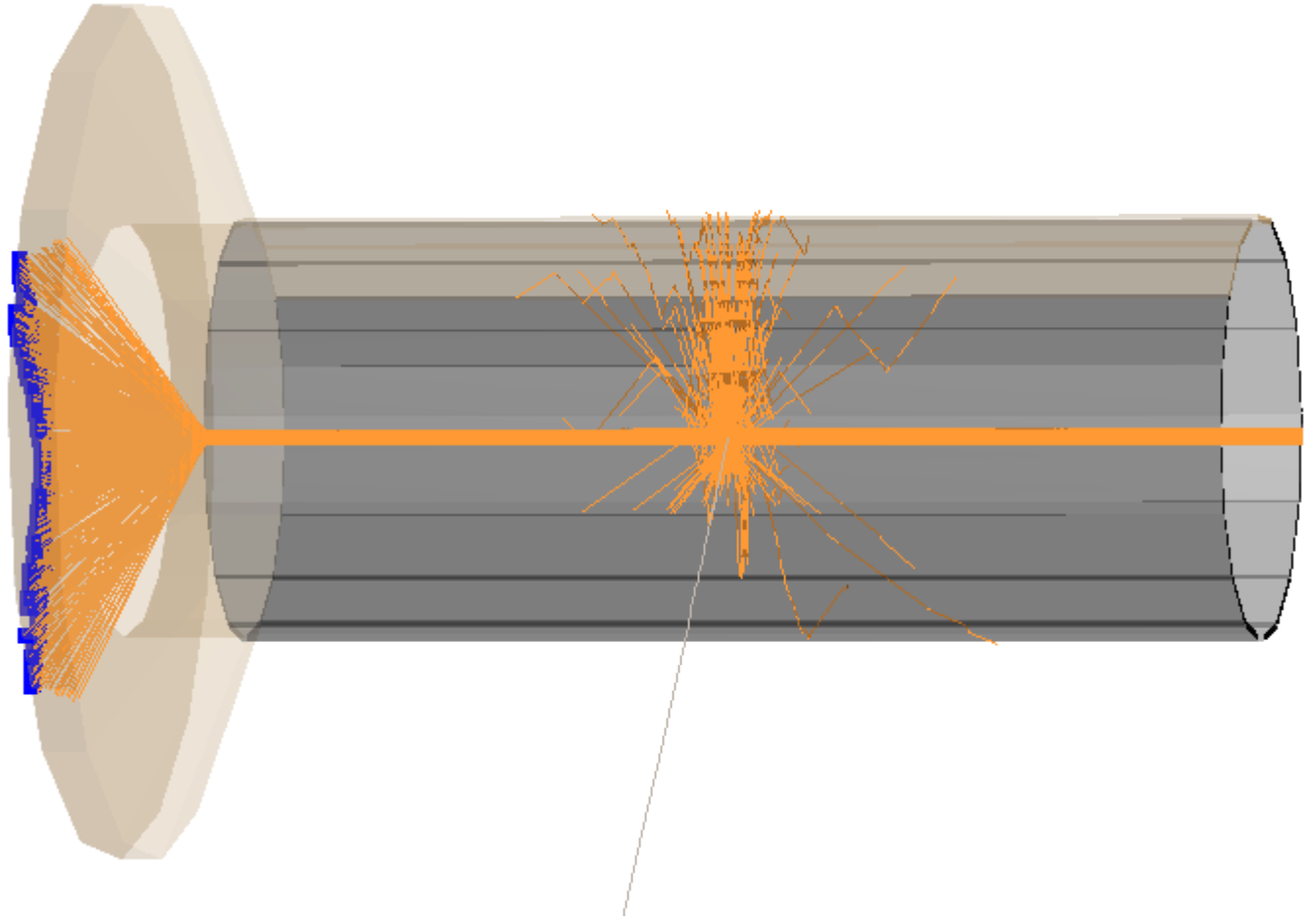
By adding additional entries for short and long wavelengths into the media_pnd.geo for DIRCairNoSens I was able to make most of the annoying warning message go away.

I'll follow up on the photon gun issue in G4 in Maria's thread.

Cheers, Jochen

File Attachments

1) dirc_geant4_prop_ok.png, downloaded 3274 times



Subject: Re: Barrel DIRC in Geant 4 - Cherenkov photon propagation
Posted by StefanoSpataro on Wed, 15 Sep 2010 12:25:51 GMT
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Hi,
yes you are right. Ages ago with Annalisa we have introduced that cut to speed up the simulation, but I had completely forgotten about its existence.

Nice to know that there is one problem less
Could you please add "[FIXED]" to the topic name of your first message? Thanks.

Subject: Re: Barrel DIRC in Geant 4 - Cherenkov photon propagation
Posted by Mohammad Al-Turany on Wed, 15 Sep 2010 12:27:28 GMT
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Hallo Jochen,

I got a mail from Peter Koch in Giessen (I forward it at that time to Dipanwita and Carsten) about a bug in the reflection of Cherenkov photons in G4.9.3 (http://bugzilla-geant4.kek.jp/show_bug.cgi?id=1103) this is corrected in the beta of G4.9.4 but it still not released. may be this is related to what you see with G4.

The other topic I am not sure about, I will answer Maria's mail and post there a macro because with the box generator I can create Cherenkov photon without problems!.

regards

Mohammad

Subject: Re: Barrel DIRC in Geant 4 - Cherenkov photon propagation
Posted by Maria Patsyuk on Wed, 27 Oct 2010 11:33:53 GMT
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As Jochen wrote in the topic "Barrel DIRC in GEANT4 - Cherenkov photons propagation [FIXED]" we are now able to generate cherenkov photons with box generator in GEANT4, but there are a lot of the following messages while the simulation:

*** G4Exception : ZeroPolarization
issued by : G4PrimaryTransformer::GenerateSingleTrack
Polarization of the optical photon is null. Random polarization is assumed.
*** This is just a warning message.
This warning message is issued up to 10 times.

Is it a harmless warning or should I do something about it?

Subject: Re: Barrel DIRC in Geant 4 - Cherenkov photon propagation
Posted by StefanoSpataro on Wed, 27 Oct 2010 16:06:27 GMT
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No idea,
but I fear that you have to wait for the next release of external packages (once new g4 v 9.4 will be ready) to have proper photon propagation in geant4...