Subject: Re: Group velocity for Cherenkov photon propagation in G3/G4
Posted by Jochen Schwiening on Wed, 26 Jan 2011 16:41:26 GMT
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Hi Mohammad,

thanks for the suggestion.

I used TrackLength() and TrackTime() in PndDrc to calculate the photon velocity in the bar at several times in the Cherenkov photon's life. What I see is that the apparent velocity does not behave as I expect. Here's an example for two photons in Geant3 in the same event as they pass their 30ns mark:

time: 30.1524, path: 532.029, velocity: 17.6447, energy: 4.16593, wavelength: 296.971
time: 30.0086, path: 537.002, velocity: 17.8949, energy: 1.5531, wavelength: 796.575

This is probably because the TrackTime() of the photon includes the time of flight of the primary particle. If I manually calculate the time of flight of the primary particle and subtract it I get velocity values around 19cm/ns, closer to the expected values.

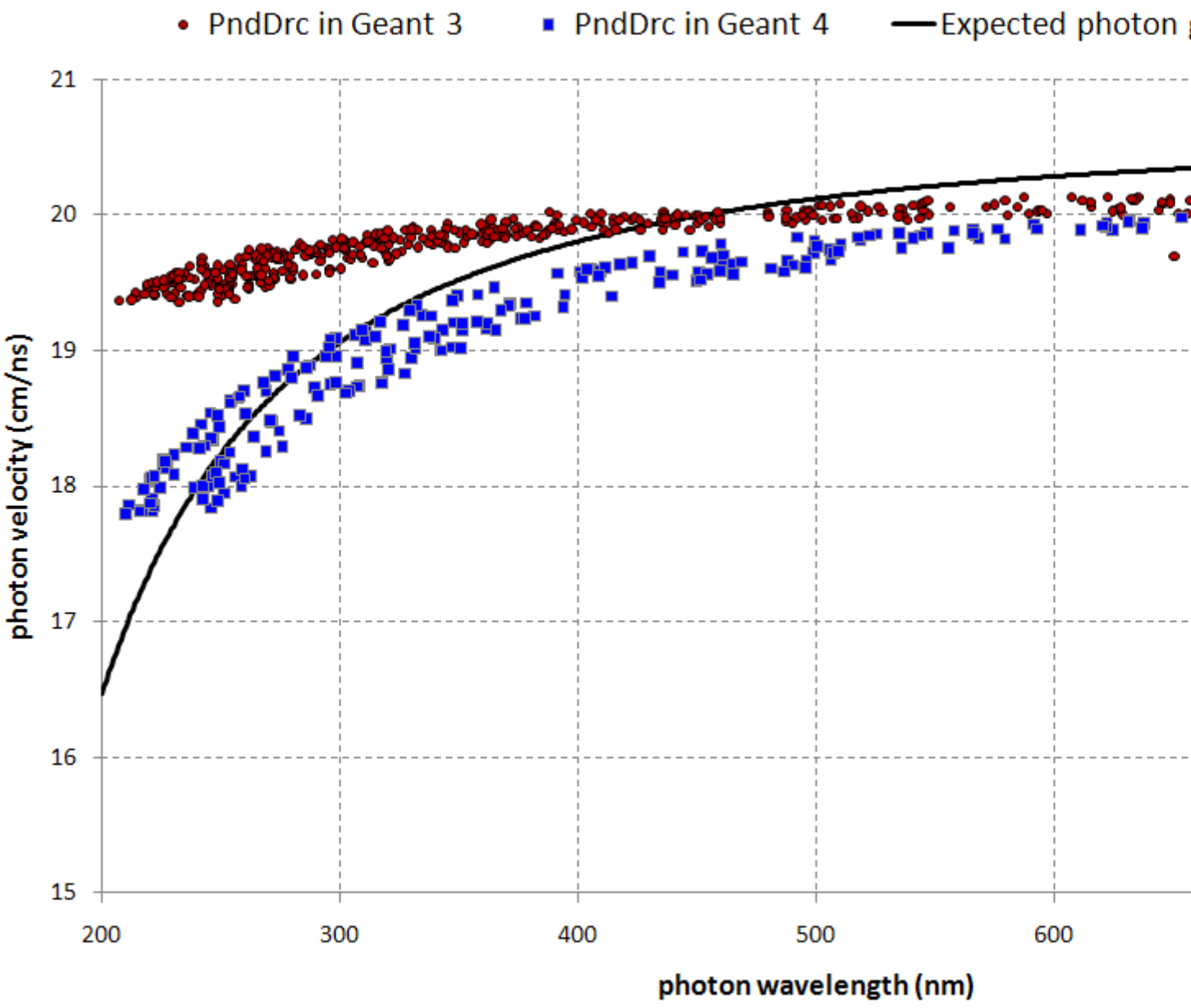
To illustrate the point I plotted (in excel, sorry) the observed velocity vs wavelength for a few hundred photons in G3 and in G4 as well as the expected group velocity. Please see the attached figure.

Would you have a suggestion how I can access in PndDrc.cxx the TOF of the particle and subtract it?
And is TrackLength() a "clean" quantity, which contains only the path inside the bar? Or do I need to make a correction to get the path that corresponds to the corrected TrackTime() value I need to use?

Thanks,
Jochen

File Attachments

1) pandaroot_geant_v_vs_lambda.png, downloaded 890 times


PndDrc in Geant 3
PndDrc in Geant 4
Expected photon
21
20
19
18
17
16
15
photon velocity (cm/ns)
200
300
400
500
600
photon wavelength (nm)