
Subject: Re: Group velocity for Cherenkov photon propagation in G3/G4

Posted by [Jochen Schwiening](#) on Wed, 26 Jan 2011 13:12:54 GMT

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Hi Stefano,

thanks for the quick response.

I know from past work with (standard, non-Panda) Geant4 that G4 does in fact use the wavelength-dependent photon group velocity to calculate the propagation time. It uses the formula $n_{\text{group}} = n_{\text{phase}} - \lambda \cdot (dn_{\text{phase}}/d\lambda)$. It even comes out at the correct values, about 19.1cm/ns for 300nm photons, 20.3cm/ns for 600nm photons.

My quick and dirty check in our Panda simulation data finds almost constant values of 19cm/ns \pm 0.1ns/cm for the entire wavelength range from 300-650nm.

I don't think that I know how to find out in ProcessHits in PndDrc.cxx how far the photon traveled since the path is defined by the many internal reflections. We instead calculate the path from the photon production angle and then calculate the velocity from this path and the photon propagation time. It's possible that this code has a bug and that's why I would like to debug the (group) velocity of the photon in the medium using something like the GetVelocity function but I don't see that in our VMC environment.

Any other (simple) way to check the photon speed?

Thanks,
Jochen
