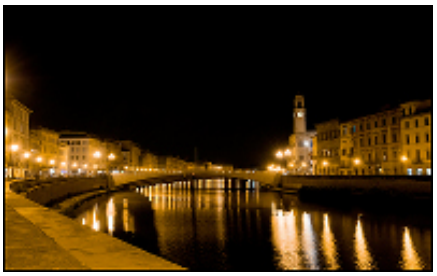

Contribution ID: **9** Type: **Talk**

CHARACTERISATION AND COMPARISON OF EVENT GENERATORS FOR PAIR CONVERSION: A CRUCIAL STEP FOR FUTURE LOW ENERGY GAMMA TELESCOPE

Tuesday, 18 October 2016 17:40 (20 minutes)

Gamma ray astronomy suffers from a sensitivity gap between 0.1 and 100MeV.
The lower end can be covered by improved Compton telescopes, while the higher end needs to use photon conversion to electron-positron pairs.
With high angular resolution for the electrons, it will also be possible to probe the linear polarisation of the photons.
There is a fierce competition to build high sensitivity pair telescopes for this energy range, with electron tracking technologies such as: silicon (e-ASTROGAM, Compair, PANGU), gas (HARPO, Adept), or nuclear emulsions (GRAINE).
An accurate simulation is necessary to correctly design and compare these detectors.

I will establish baseline distributions of key kinematic variables as simulated by a Bases/Spring-based, 5D, exact down to threshold, and polarised event generator.
I will compare them to simulations with the low energy electromagnetic models available in Geant4 (in particular G4PenelopeGammaConversion, G4LivermoreGammaConversionModel, and G4LivermorePolarizedGammaConversionModel) and with EGS5.
I will focus in particular on the effects of the recoil momentum of the nucleus, which is often neglected and becomes a dominant effect at low energies.

I will show that different generators give a different picture of the optimal angular resolution of pair telescopes.
I will also show that, of all the simulations we used, only the full 5D generator describes accurately the angular asymmetry in the case of polarised photons.

Summary

We compare event generators for photon conversion into electron-positron pairs and we assess their capacity to estimate the angular resolution and polarimetry potential of a detector.

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