rdecay01 (pure sim) Angular Correlations Extension Documentation

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"Evan's version" refers to the Geant4 Gamma-Gamma Angular Correlations extension written by Evan Rand. It is available on the GRIFFINCollaboration GitHub page under:

`Geant4GammaGammaAngularCorrelations10.01.p01`

SteppingAction

Header File

Additions to Evan's version:

- declarations for `foundelectron` variables and the variables associated with each particle's position (`G4ThreeVectors`)

Source File

Additions to Evan's version:

- added energy gates for both electrons
  - I noticed that Geant4 has a precedence in choosing which products of the cascade to process first, regardless of their order of emission. For e^- and γ particles, the order is:
    * e_1^- (the electron belonging to the first transition)
    * e_2^-
    * γ_1
    * γ_2
  - this precedence is important in determining when you can consider a particle to be "found". It is much easier to refer you here to the code; notice where the `found__ == false` checks are made: particles can only be marked `false` when a particle that appears above it in the precedence list has been found.
  - a similar issue may be present with other particles: if extending this code for α particles, for example, the programmer will have to identify this precedence/hierarchy in terms of when α particles are processed relative to γs and e^-s.
- the energy gates need to be reset for each species that is simulated
- this is also where the angular correlation graphs are filled

TrackingAction

Header File

Unchanged from Evan's version.

Source File

Modified which particles are tracked in the simulation because we were only interested in saving the γ and e^- energy spectra. Notably, the now e^- energy spectra used to track both neutrinos and electrons.

HistoManager

Header File

Unchanged from Evan's version

Source File

Additions to Evan's version:

- graphs for γe^-, $e^-\gamma$, and e^-e^- angular correlations
- modified energy spectra to only look at e^- and γ particles
- kept the same *number* of graphs, so this meant we got rid of graphs we had no interest in