

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

This is where we decide whether or not the current particle is one of interest through the use of energy gates. This is also where the angular correlation graphs are filled.

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 γ s and e^- s.
- the energy gates need to be reset for each species that is simulated

TrackingAction

This is where the energy and momentum spectra are filled.

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 e^+ and e^- .

HistoManager

This is where all the graphs are initialized.

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

Deletions from Evan's version:

- kept the same *number* of graphs as Evan, so this meant we got rid of graphs we had no interest in (ie. neutrino energy spectra)