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A new Photon Evaporation model for Geant4

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Geant4 uses the so called G4ParticleHP package to model the low energy neutron and charged particle interactions according to the information available in ENDF-6 format data libraries. In these libraries the photon production is presented in some cases in an uncorrelated way, for example for neutron capture reactions. Thus, this information can not be used to produce the secondary γ -rays for simulations requiring energy conservation event by event.

We have developed a code capable to generate de-excitation γ -rays in a correlated way using as much information as possible available in the RIPL-3 and ENSDF nuclear structure data libraries, among other useful information. The code follows the same philosophy of the DICEBOX or DECAYGEN codes. It generates the complete level scheme and branching ratios of the nucleus by using all the information experimentally known (known level scheme and known branching ratios) and completing the missing information with the most reliable statistical models. This code is able to generate automatically cascades for a large variety of nuclei (at least 100-200) without requiring a specific input for each particular isotope. The code has been implemented into GEANT4, which will allow performing more reliable GEANT4 simulations in a large variety of fields.

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