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Precision validation of Geant4 electromagnetic physics

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The Geant4 Toolkit provides an ample set of alternative and complementary physics models to handle the electromagnetic interactions of leptons, photons, charged hadrons and ions.
Because of the critical role often played by simulation in the experimental design and physics analysis, an accurate validation of the physics models implemented in Geant4 is essential, down to the quantitative understanding of the accuracy of their microscopic features.
Results from a series of detailed tests with respect to well established reference data sources and experiments are presented, focusing in particular on the precision validation of the microscopic components of Geant4 physics, such as cross sections and angular distributions, provided in the various alternative physics models of Geant4 electromagnetic packages.
The validation of Geant4 physics is performed by means of quantitative evaluations of the comparison of Geant4 models to reference data are presented, making use of statistical analysis algorithms to estimate the compatibility of simulated and experimental distributions.
Such precision tests are especially relevant for critical applications of simulation models, such as tracking detectors, neutrino and other astroparticle experiments, medical physics

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