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Geant4 implementation of inverse Compton scattering

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Inverse Compton scattering [1, 2] is a promising instrument for engineering of a bright, compact and versatile X-ray source: with dimensions being significantly smaller, the brightness of this source is comparable with that of synchrotron radiation. Here we report on the creation of a new C++ module for inverse Compton scattering simulation and its implementation into Geant4 [3]. The module operates with a light target, which is virtual volume transparent for any particle and having properties of laser beam. The module allows simulation of laser and electron beams interaction under arbitrary angles, which can be of primary importance for reaching maximum luminosity of the radiation source [4]. We implemented it into Geant4 as a discrete physical process [5]. Such a form of integration makes it possible to combine new physical processes with those already built into Geant4 (for example, different types of scattering of both photons and primary particles), which significantly increases the quality of simulation. The direct simulation of inverse Compton scattering in Geant4 allowed us to create a model of a full-scale light source without using additional external programs. Comparison with other simulation programs and experiments shows that created physical module provides correct results.

References

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