

Recent developments of the Geant4 Advanced Examples for medical applications

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Background: The Geant4 Advanced Examples provide the Users with a set of ready-to-use applications aiming at realistically reproducing realistic applications in typical experimental environments. They are developed in collaboration with user groups expert in the corresponding experimental domain. Almost 30 different examples are publicly released inside the public version of the Geant4.

Material and Methods: More than 50% of the currently developed Geant4 Advanced Examples belong to the medical domain. These examples span from the simulation of a typical radiotherapy system to more complex beamlines for multidisciplinary applications, through simulations reproducing the damage at the microscopic level for radiobiology studies. The advanced examples, beyond providing the Users with realistic environment properly reproducing a specific application, include more general functionalities which are often re-used by Users for different purposes and applications, demonstrating how the several developments included in these examples also represent a tool for more general Monte Carlo computations.

Preliminary results: In this contribution the most recent developments and results related to the Geant4 Advanced examples dedicated to medical applications will be reported. Last developments in terms of new functionalities, additional modules and performance improvements of the examples relevant for the medical domain will be discussed in detail, also showing a few comparisons against experimental data obtained by groups involved in the example development. The most relevant updates recently carried out will be described, showing how some examples and the related developments have supported the experimental research activity in specific fields of the medical domain, such as advanced radiotherapy modalities, microdosimetry and radiation protection, providing a powerful tool for supporting these studies.