

Software Aspects of the Geant4 Validation Repository

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Geant4 is a toolkit for the simulation of the passage of particles through matter. Its areas of application include high energy, nuclear and accelerator physics as well as studies in medical and space science. The Geant4 collaboration regularly performs validation and regression tests through its development cycle. A validation test compares results obtained with a specific Geant4 version with data obtained by various experiments. On the other hand, a regression test compares results of two or more versions of Geant4 for any observable. To make validation materials easily available to both collaborators and the user community in general, most of the validation data are stored in one central repository. The availability of this data should help experimenters to find answers to questions like:

- What data is used to validate Geant4 physics?
- How well does Geant4 describe the data of interest to the experiment?
- Which model provided by Geant4 best describes the data of interest for the experiment?
- What are the benefits of switching to the latest improved version of Geant4?

Having easy access to this data might also help in estimating the systematic uncertainties stemming from the simulation of physical processes like the response of a detector or predicting the flux of neutrinos produced when a target is illuminated with protons.

The repository consists of a relational database that stores experimental data and Geant4 test results, accessed through a Java API and a web application, which allows search, selection and graphical display of the data. In this presentation we will describe these components and the technology choices we made.

Future plans include providing a web API, expanding the number of experimental data sets and providing quantitative statistical tests. We also want to stress that the project is not specific to Geant4 and it can be used with other Monte Carlo (e.g. GENIE) tools as well.

Tertiary Keyword (Optional)

Secondary Keyword (Optional)

Preservation of analysis and data

Primary Keyword (Mandatory)

Simulation

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