TECHNOLOGY BRIEF

GEANT4

A toolkit for simulating the passage of particles through matter.

It is the reference simulation engine for the LHC experiments at CERN and other high energy physics labs worldwide.

Geant4 covers all relevant physics processes, electromagnetic, hadronic, decay, optical, for long and short lived particles, for energy range spanning from tens of eV to TeV scale. The transport of low energy neutrons down to thermal energies can also be handled. The software can also simulate remnants of hadronic inter-actions, including atomic de-excitation and provides extension to low energies down to the DNA scale for biological modelling.

The software is based on a sound object-oriented design which favours a variety of application development by the community, like for example the propagation of acoustic phonons in cryogenic crystals, the Geant4 Application for Tomographic Emission (GATE), the beam line simulation (G4BEAMLINE) and others
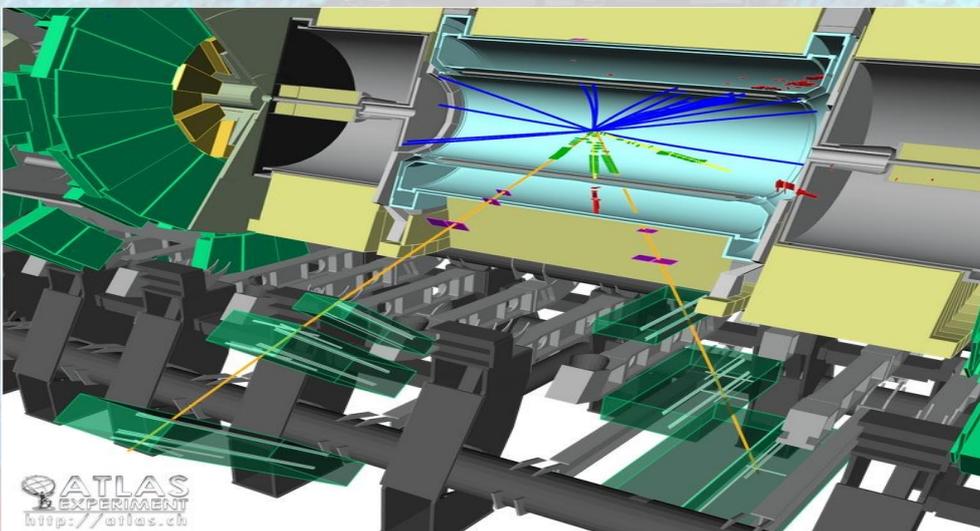
Benefits of Working with CERN

Outputs of the world's leading scientific research institute

Research-developed and experimentally-validated technologies

World-class infrastructures and facilities

Possibility of using CERN labels for your branding and marketing

CERN ATLAS experiment detector simulation with GEANT4

IP Status:

EGEE Open Source licence.

Copyright, GEANT4 collaboration.

Technology Readiness Level:

Production

Applications

Wide range of applications covering:

- High-Energy Physics experiments and detector design • Radiation shielding

- Calorimetry

- Cosmic rays

- Neutrino physics

- Dosimetry

- Radiotherapy

- Biological damage studies

- Assessment of radiation damage to the electronics of satellites

- Study of the radiation environment of planets

Features

- State-of-the-art physics models, regularly checked and validated against experimental data, combinable to achieve the highest simulation quality

- Support for complex 3D geometries and models in motion of the human body

- Geometry modeller able to efficiently track particles within complex geometries ranging from the molecular scale to the size of a planet

- Full description of materials making up specific setups in terms of their elements and isotopes.

- Biasing techniques to reduce computational time for intensive applications including 'reverse Monte Carlo' techniques for concentrating the radiation effects on very small targets

- Easily extendible and adaptable to external software frameworks

- Powerful user interface and visualisation engine

- C++ application. Available runs on Linux, Mac OS, Windows and different types of UNIX flavours, 32 or 64 bits, and on modern parallel architectures.

- User support and documentation through the Geant4 website

Find out more:

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