

Geant4 release 9.6+P02


From slides by J. Perl (SLAC)

HOW TO UPGRADE YOUR GEANT4 RELEASE ?

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Upgrading Your Geant4 Release

<http://geant4.org>



The screenshot shows the Geant4 website homepage. At the top right, there are navigation links: [Download](#), [User Forum](#), [Gallery](#), and [Contact Us](#). A red arrow points to the [Download](#) link. Below the navigation is a search bar with the text "Search Geant4". The main content area features a description of Geant4 as a simulation toolkit, followed by four columns: Applications, User Support, Results & Publications, and Collaboration. Each column has an image and a brief description. On the right side, there is a "News" section with a list of recent updates. A red arrow points to the "Patch-01 to release 9.5" entry in the news section.

Geant 4

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Search Geant4

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 two main reference papers for Geant4 are published in *Nuclear Instruments and Methods in Physics Research A* [506 \(2003\) 250-303](#), and *IEEE Transactions on Nuclear Science* [53 No. 1 \(2006\) 270-278](#).

Applications



A [sampling of applications](#), technology transfer and other uses of Geant4

User Support



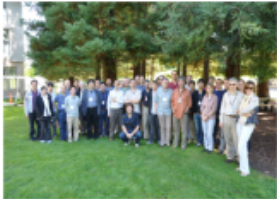
[Getting started, guides](#) and information for users and developers

Results & Publications



[Validation of Geant4](#), results from experiments and publications

Collaboration



[Who we are](#): collaborating institutions, [members](#), organization and legal information

News

- 15 August 2012 - **Geant4-MT prototype 9.5.p01** is available from the [download](#) area.
- 29 June 2012 - **Release 9.6 BETA** is available from the [Beta download](#) area.
- 20 April 2012 - **Patch-04** to release 9.4 is available from the [archive download](#) area.
- 27 March 2012 - **Patch-01** to release 9.5 is available from the [download](#) area.
- 8 March 2012 - [2012 planned developments](#).

Major versus Minor releases

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- Geant4 release numbers are of the form X.Y
 - X is the Major release number
 - Y is the Minor release number
- Release 9.6 is a Minor release
- Release 10.0 will be the next Major release

- Minor releases ARE NOT ALLOWED to break user code
 - So, for example, when you move from release 9.5 to 9.6, you should not need to change your user code
 - You will likely get slightly different results in the new minor release
 - And you may have access to additional new features
 - But nothing in your code should break as a result of the upgrade

- Major releases ARE ALLOWED to break user code
 - So, for example, when you move from release 9.6 to 10.0, you may need to change your user code
 - The release notes will tell you what you might need to change

Patch releases

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- A patch release **corrects bugs** in a regular release
 - Release number ends in **p01**, p02, etc.
 - Such as **Geant4.9.6.p02**
- Contains only bug fixes
 - No new features
- It is always advisable to **download the latest patch**
 - The patch release notes will tell you exactly what has changed, so you can decide whether you absolutely need to upgrade

Beta releases

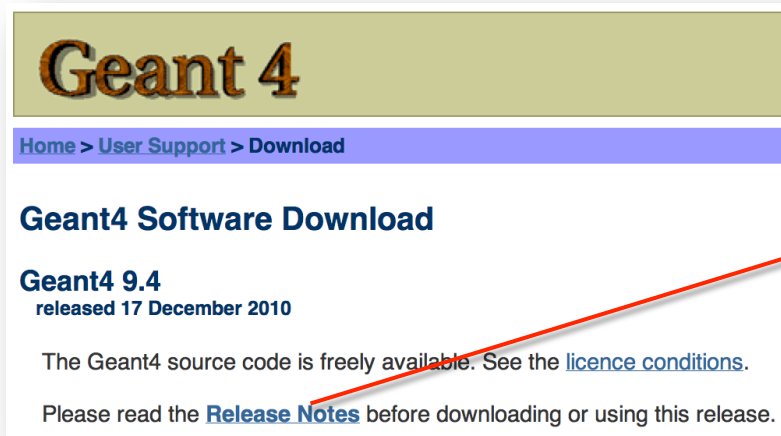
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- A Beta release introduces **new features before they have been deemed sufficiently tested for general users**
 - ▣ Release number ends in **Beta1**, Beta2, etc.
 - ▣ Such as **Geant4.9.4.Beta1**
 - ▣ A chance for a thorough user test of many of the changes intended for the December release
 - ▣ Not intended for general users but only for those who are willing to take the **risk** inherent in a beta
 - ▣ Users should move to this release only if they really love testing things, or if a Geant4 collaborator informs them that this Beta **will solve their specific problem**

What to look for in the release notes

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- Each Geant4 release comes with a **set of release notes**. **Read them** before you move to the new release.



The screenshot shows the 'Geant4 Software Download' page. At the top, it says 'Geant 4' in a large, stylized font. Below that is a navigation bar with 'Home > User Support > Download'. The main heading is 'Geant4 Software Download'. Underneath, it says 'Geant4 9.4 released 17 December 2010'. The text continues: 'The Geant4 source code is freely available. See the [licence conditions](#). Please read the [Release Notes](#) before downloading or using this release.'

Geant4 9.4 Release Notes

December 17th, 2010

The code and binary libraries for the supported systems are available through our [Source Code Web page](#).

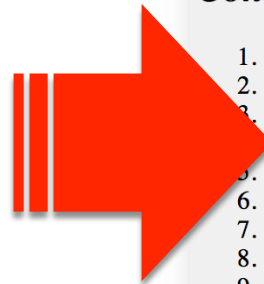
We are grateful for the efforts of Geant4 users who have provided detailed feedback or comprehensive reports of issues. We thank in particular those who have contributed corrections, improvements or developments included in this release.

Please refer to the [Geant4 User Documentation](#) for further information about using Geant4.

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- In particular, read
 - Supported platforms/compilers
 - CLHEP version
 - Items for migration of the user code
 - Expected effects on physics and performance



Supported **platforms and compilers**

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- **May change** at Major or Minor release
- If your platform and compiler are no longer in the supported list, you can either upgrade them or just try with what you have
 - If Geant4 still builds and starts OK, don't worry
 - If there are problems with build or startup, try upgrading to the new supported platform or compiler

1. Supported and Tested Platforms

Officially tested platforms:

- Linux, gcc-4.1.2 and gcc-4.3.2 (SLC5).
Tested on 32 and 64 bit architectures (Intel or AMD) with Scientific Linux CERN 5 (SLC5) (based on RedHat Linux Enterprise 5).
- MacOSX 10.7 with gcc-4.2.1
- Windows7 with Visual C++ 10.0 (Visual Studio 2010)

More verified configurations:

- Linux, gcc-4.6.2
- Linux, Intel-icc 11.1, 12.0
- MacOSX 10.6 with gcc-4.2.1
- Windows/XP with Visual C++ 9.0 (Visual Studio 2008)

Items for **migration** of the user code

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- For a **Minor release**, there will not be much here

3. Items for migration of the user code

Listed here is some relevant information on developments included in this release, some of which may require migrations (mainly for users of advanced Geant4 features) in order to upgrade from release 9.4 to release 9.5. Note that for all users a full re-installation of libraries (or a full recompilation) and a recompilation of user applications is required.

- For a **Major release**, pay careful attention to this section

3. Items for migration of the user code

Listed here is some relevant information on developments included in this release, some of which may require migrations (mainly for advanced uses of features in Geant4) in order to upgrade from release 8.3 to release 9.0. Note that a full re-installation of libraries (or a full recompilation) and a recompilation of user applications is anyhow required.

Geometry

The static constants for the geometrical tolerance `kCarTolerance`, `kRadTolerance` and `kAngTolerance` which used to be defined at global scope, have been now removed.

Advanced applications making use of such constants in the code are required to retrieve the values for Cartesian, Angular and Radial tolerances through the class `G4GeometryTolerance`, a new class providing the methods, respectively: `GetSurfaceTolerance()`, `GetRadialTolerance()` and `GetAngularTolerance()`.

Applications with setups of unusual dimensions (e.g. smaller than 1 mm or larger than 1 km) can now adjust these values, and must do so before creating any part of the geometry description. Please see the User's Guide for Application Developers for the details.

Expected effects on **physics and performance**

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- This section tells you **what to expect** in terms of changed results, changed running time and changed memory

5. Expected effects on physics and performance

Standard Electromagnetic physics and cuts

- Small increase of visible energy deposition in sampling calorimeters (e.g. 0.5% for a simplified setup with materials of the ATLAS EM barrel calorimeter) due to improvements in the multiple scattering model.
- Improved tails of energy deposition in thin absorbers.

Hadronic physics

- Improved treatment of low mass strings in the FTF model allows the model to be used at lower energies and provides a smoother transition in energy response in the region where string models give way to cascade models.
- Improved memory management in the Bertini cascade model results in a 10-fold reduction of object creation and destruction. The model also conserves energy and momentum better.
- Fermi Break-up Model and GEM evaporation are used by default providing improved production of light fragments in nuclear fragmentation at low energy.
- Improved spectra of nuclear gamma deexcitation including Doppler broadening simulation.

How to Upgrade – 1 / 3

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- Check the release notes to see if your existing Platform and Compiler versions are still OK
 - ▣ Minor release upgrades generally do not require changes to either of these, but check the notes
 - ▣ Upgrade if need be

- If you've followed the recommended installation instructions, you will have your user code in a directory that is **NOT** inside your Geant4 installation directory
 - ▣ Good
 - `~/mydir/Geant4/geant4.9.5/...`
 - `~/mydir/g4work/myUserCode`
 - ▣ **Not so Good**
 - `~/mydir/Geant4/geant4.9.5`
 - `~/mydir/Geant4/geant4.9.5/myUserCode`

- ▣ The point of keeping your user code separate from the Geant4 installation is that your user code may work with several different Geant4 versions, and if you decide later to delete a particular Geant4 version, you won't accidentally delete your user code

How to Upgrade – 2/3

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- Refer to instructions in the **Installation Guide: For setting up Geant4 in your computing environment**

- Make sure you do not have any left over Geant4 environment variables
 - ▣ `printenv | grep "G4"`
 - ▣ Get a new session, clean up your `.login` or `.cshrc`, or do whatever is necessary

- **First step : installation of Geant4**
 - ▣ Unpack the new Geant4 version to a **source directory**
 - For example, to `~/mydir/Geant4/geant4.9.5/...`
 - ▣ Create the **build directory** alongside the **source directory**
 - For example, create `~/mydir/Geant4/geant4.9.5_build`
 - ▣ In your **build directory**, configure the build with
 - `cmake -DCMAKE_INSTALL_PREFIX=installDirectory sourceDirectory`
 - `installDirectory` is the directory under which the Geant4 libraries, headers and support files will be installed
 - ▣ Run the build with `make -jN`
 - `N` = number of cores on your machine
 - ▣ Put the build into your installation area you specified earlier in `CMAKE_INSTALL_PREFIX` with `make install`

How to upgrade – 3/3

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- **Second step: how to compile your user code**
 - Assume your code is in the `/home/local1/mycode` directory
 - Create alongside a **build** directory
 - `cd`
 - `mkdir build`
 - Go into this directory
 - `cd build`
 - Configure the build
 - `cmake -DGeant4_DIR=installDirectory ../mycode`
 - `installDirectory` is `$G4DIR` in your Virtual machine
 - Run the build
 - `make -j2`
 - Run the code
 - `./executable_name`
 - Later, you can clean up the old compilation products of your user code by removing your build directory

In case of **trouble**

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- Did you review the **Release Notes** ?
- Did you remember to **remove all pre-existing G4 environment variables** ?
 - ▣ Otherwise you may be pointing to some mix of old and new releases
- Did you remember to **delete the old build** of your user code ?
- Check the **Geant4 Installation and Configuration Forum**
 - ▣ <http://hypernews.slac.stanford.edu/HyperNews/geant4/get/installconfig.html>
 - ▣ There's a very good search function at the top of that page
 - ▣ Someone might have had the same issue and the solution might already be there
 - ▣ If the problem is something new, post it to the forum