

Upgrading Your Geant4 Release

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Geant4 Tutorial at Lund University

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Upgrading Your Geant4 Release

as of application include high energy,
three main reference papers for Geant4
250-303 [↗](#), IEEE Transactions on
Physics Research [↗](#)A 835 (2016) 186-

Collaboration



Who we are [↗](#): collaborating
institutions,

News

- *25 May 2018*
Patch-02 to release 10.4 is
available from the [Download](#) area.
- *12 Mar 2018*
[2018 planned developments](#) [↗](#)
- *20 Oct 2017*
Patch-03 to release 10.3 is
available from the [source
archive](#) area.

Major versus Minor Releases

- **Geant4 release numbers are of the form X.Y**
 - X is the Major release number
 - Y is the Minor release number
- 10.0 was a Major release
- 10.1 is a Minor release

- **Minor releases ARE NOT ALLOWED to break user code.**
 - So, for example, moving from release 10.0 to 10.1, 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.**
 - going from release 10.0 to 11.0, you may need to change your user code.
 - The release notes will tell you what you might need to change.

Patch Releases

- **A Patch release corrects bugs in a regular release**
 - Release number ends in p01, p02, etc.
 - Such as Geant4.10.1.p01
- **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

- **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

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



The screenshot shows the Geant4 website header with the logo and navigation links: "Download | User Forum | Contact Us | Geant4". Below the header is a "Software Download" section with the sub-heading "Geant4 10.4 Software Download". The main heading is "Geant4 10.4" with a sub-heading "first released 8 December 2017 (patch-02, released 25 May 2018)". A paragraph states: "The Geant4 source code is freely available. See the [license conditions](#)." Below that, it says: "Please read the [Release Notes](#) before downloading or using this release."

Geant4 10.4 Release

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

We are grateful for the efforts of Geant4 users who have provided detailed feedback or code in particular those who have contributed corrections, improvements or developments in

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

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8. [Geant4 Software License](#)
9. [Detailed list of changes and fixes](#)

- In particular, read:

- Supported platforms/compile
- CLHEP version
- Items for migration of the user code
- Expected effects on physics and performance

Supported Platforms and Compilers

- **May change at Major or Minor release**
- **If your platform and compiler are no longer in the supported list, 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-4.4.7.**
Tested on 64 bit architectures (Intel or AMD) with Scientific Linux CERN 6 (SLC6)
- **MacOSX 10.8 with gcc-4.2.1 and clang-3.3**
- **Windows7 with Visual C++ 11.0 (Visual Studio 2012)**

More verified configurations (64 bits):

- **Linux, gcc-4.7.2, gcc-4.8.2**
- **Linux, Intel-icc 14.0**
- **MacOSX 10.9 with gcc-4.2.1 and clang-3.3**
- **Windows7 with Visual C++ 9.0, 10.0, 12.0**

CLHEP Version

- May change at Major or Minor release
- We don't change CLHEP versions very often, but when we do change it is for a good reason
- If you use the wrong CLHEP version, your code may still link and run but your results may not be correct.
- If you follow default installation procedure, you'll use the internal CLHEP version and so won't have to pay attention to this issue at all.

2. Supported CLHEP version

This release of Geant4 has been verified with [CLHEP](#), release **2.1.4.1**. Use of a different
NOTE: an internal module of the relevant CLHEP classes is provided and can be used as

Items for Migration of the User Code

- 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 9.3 to release 9.4. 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 in order to upgrade from release 9.x series to this release. Note that for all users a full re-installation of libraries (or a full re-compilation) and a re-compilation of user applications is required.

General

- Multi-threading:
 - This release includes support for multi-threaded Geant4 applications. Parallelism is achieved at the event level, with events dispatched to different threads. To use multi-threading it is necessary to build and install Geant4 with the option of multi-threading ability activated.
 - The default build of Geant4 is sequential.
 - Existing (or new sequential) applications can be built and run without code changes, on either a sequential and a multi-threading capable installation of Geant4 - provided, of course, that mandatory changes are made to address other migration issues.

Expected effects on physics and performance

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

5. Expected effects on physics and computing performance

Electromagnetic physics

- About 5% speedup is expected mainly due to migration from `std::log`, `std::exp` to `G4Log` and `G4Exp` functions.

Hadronic physics

- Simulated hadronic showers with the recommended physics list `FTFP_BERT` remain similar to those obtained with `Geant4 9.6`, except for tungsten-based calorimeters, where the energy response becomes lower, and lateral shape narrower, mainly due to the improved simulation of neutron capture.
- Slight (few percent) CPU improvement for the simulation of hadronic showers with `FTFP_BERT` physics list with respect to `Geant4 9.6`.
- Possible larger variations (for both observables and CPU speed) for the simulation of hadronic showers with other physics lists (e.g. `QGSP_BIC`) with respect to `Geant4 9.6`, mainly due to the replacement of parameterized (Gheisha-like) model `LEP/HEP` with `Fritiof` and/or `Bertini` models.

How to Upgrade (1)

- Check release notes to see if your existing OS and Compiler are still OK
 - Minor release upgrades generally do not require changes to any of these, but check the notes
 - Just because your versions are no longer “supported” doesn’t mean they won’t work. It only means we are not testing them any more. So if your versions are not supported and it is not convenient for you to update, go ahead and try building with your old setup.
 - Upgrade your OS or Compiler if you need to
- If you’ve followed the recommended installation instructions, you will have your user code in a work area that is NOT inside your Geant4 installation directory
 - Good:
 - ~/mydir/geant4.10.0
 - ~/mydir/myUserCode
 - Not so Good:
 - ~/mydir/geant4.10.0
 - ~/mydir/geant4.10.0/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)

- If you are getting a patch version, take the full new Geant4
 - If you instead just take the minimal patch and try to overlay it on your Geant4, you are more likely to have problems

- Unpack the new Geant4 version to a new place.

- For example: `~/mydir/geant4.10.0.p01`
- You do not need to delete your old Geant4 version unless you really want to.

It is perfectly fine to have multiple Geant4 versions, such as:

`~/mydir/geant4.9.6.p01`

`~/mydir/geant4.10.1.p01`

- Make sure you do not have any left over G4 environment variables

- `printenv | grep "G4"`
- Get a new session, clean up your `.login` or `.cshrc`, or do whatever is necessary

- Make a fresh `geant4-build` directory and do a fresh `cmake` and make from there

- Make a fresh `application build` directory and do a fresh `cmake` and make from there

In Case of Trouble

- 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 do your new build in a new build area?
 - Otherwise you may have part of your code compiled against one Geant4 release and part of your code compiled against another Geant4 release
- Check the Geant4 Installation and Configuration Forum
 - <http://geant4-hn.slac.stanford.edu:5090/Geant4-HyperNews/index>
 - 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