



# Geant4 Installation

Alberto Sciuto

LNS Istituto Nazionale di Fisica Nucleare (INFN)

# Installation process

---

- 1) Check that you meet all the requirements**
- 2) Download Geant4 source code**
- 3) Configure the build using CMake**
- 4) Make & install**
- 5) Configure your environment to use Geant4**

# Supported platforms and requirements

## Operating system:

- “recent” Linux (e.g. Centos 7) best support
- macOS 10.10+
- Windows 7+ (limited support, not recommended)

*Virtual machine:*  
**Centos7** with **gcc 8.3.1**

## Compilers

- C++11 compliance
  - such as Gcc 8+, clang 8+, Visual C++ 2019+

**Cmake** (Configuration generation tool): 3.16+

**System libraries** (as development packages):

- expat, xerces-c

These may or may not be necessary. Just remember system libraries if installation fails.

# Cmake Installation (if not provided)

---

Depending on the OS installation, CMake may not be installed by default.

In that case, you have to install it:

- **Linux:** it is recommended to use the CMake provided by the package management system of your distribution.

If version 3.16+ is not available:

1. **download** the latest version (<http://www.cmake.org/>)
2. **unzip** the tarball
3. **./bootstrap, make, make install**

- **macOS:** install it using the Dawring64 dmg installerpackage
- **Windows:** install it using the Win64 exe installerpackage

# Optional libraries

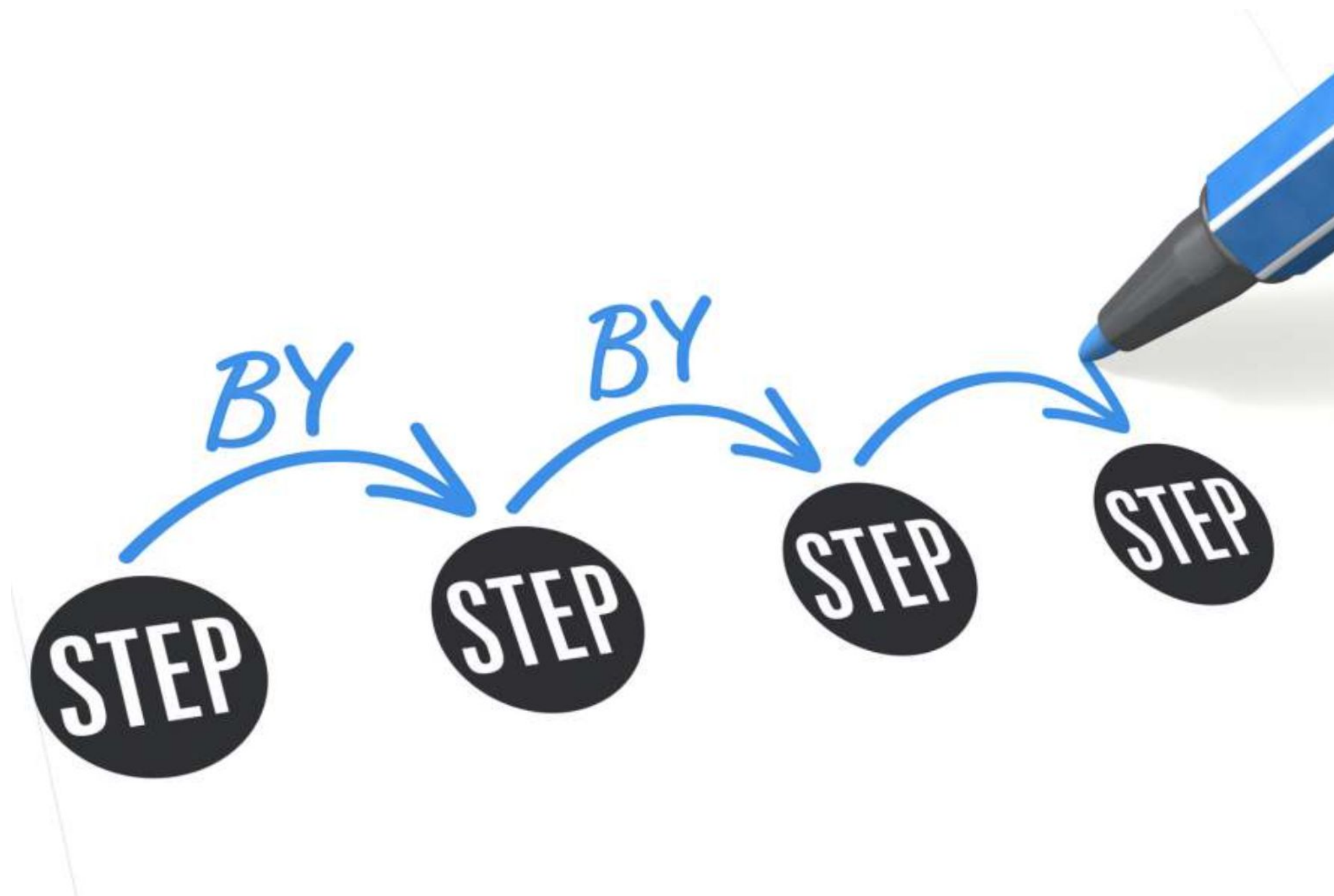
---

- **X11** for simple graphical user interface and ray-tracing
- **OpenGL** for visualization
- **Qt4** or **Qt5** for graphical user interface
- **ROOT** for data analysis (even inside Geant4)

Less frequently used libraries/tools:

Motif, OpenInventor, DAWN, RayTracer X11, HepRApp, WIRED JAS Plug-in, AIDA, VRML browser, (external) CLHEP, Wt, ...

**and now.... we can proceed with the Geant4  
installation**



# Geant4 Installation

## Download the code

**GEANT4**  
A SIMULATION TOOLKIT

Collaborator Login

Download | User Forum | Contact Us | Gallery

### Overview

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 three main reference papers for Geant4 are published in Nuclear Instruments and Methods in Physics Research A 506 (2003) 250-303, IEEE Transactions on Nuclear Science 53 No. 1 (2006) 270-278 and Nuclear Instruments and Methods in Physics Research A 835 (2016) 186-225.

#### Applications

A sampling of applications, technology transfer and other uses of Geant4

printer-friendly version

#### User Support

Getting started, guides and information for users and developers

#### Publications

Validation of Geant4, results from experiments and publications

#### Collaboration

Who we are: members, organizations, information

#### Events

- Geant4 Beginners Course, at TUM University, Munich (Germany), 16-20 April, 2018.
- Geant4 tutorial at Universite Paris-Saclay/LAL, Orsay (France), 14-18 May 2018.
- Geant4 Course at the 15th Seminar on Software for Nuclear, Sub-nuclear and Applied Physics, Porto Conte, Alghero, 20-24 June, 2018.
- Geant4 Tutorial, at the University of Texas MD Anderson Cancer Center, Houston (USA), 25-27 June, 2018.
- Geant4 Short Course at the African School of Physics 2018, University of Namibia, Windhoek (Namibia), 3 July, 2018.

### Software Download

Geant4 10.4 Software Download

Geant4 10.4  
first released 8 December 2017 (patch-01, released 28 January 2018)

The Geant4 source code is freely available. See the [licence conditions](#).

Please read the [Release Notes](#) before downloading or using this release.  
The patch below contains bug fixes to release 10.4, we suggest you to download and apply the latest patch for release 10.4 (see the additional notes for [patch-01](#)), or download the complete source with the patch applied; in any case, it is required to apply a full rebuild of the libraries.

#### Source files

Please choose the archive best suited to your system and archiving tool:

Download	GNU or Linux tar format, compressed using gzip (33.2Mb, 34842016 bytes) After downloading, <code>gunzip</code> , then unpack using <code>GNU tar</code> .
Download	ZIP format (46.9Mb, 49134809 bytes) After downloading, unpack using e.g. <code>WinZip</code> .

#### Data files (\*)

For specific, optional physics processes some of the following files are required. The file format is compatible with Unix, GNU, and Windows utilities.

Download	G4NDL4.5, Neutron data files with thermal cross-sections - version 4.5 (402.2Mb, 421710294 bytes)
Download	G4EMLOW7.3, data files for low energy electromagnetic processes - version 7.3 (71.4Mb, 74875087 bytes)

<https://geant4.web.cern.ch/geant4/>

Related Links

- Previous Releases of Geant4 (since release 9.6).
- LXR source code browser.
- GitHub
- GitLab @ CERN.

## Extract the file

```
$ cd Downloads
$ tar -xzf geant4-v11.0.1.tar.gz
```



# Geant4 Installation



Collaborator Login

[Download](#) | [User Forum](#)   
[Contact Us](#) | [Gallery](#)

## Data files (\*)

For specific, optional physics processes some of the following files are required. The file format is compatible with Unix, GNU, and Windows utilities.

<a href="#">Download</a>	G4NDL4.6, Neutron data files (with thermal cross-sections) - version 4.6 (572.1Mb, 599862135 bytes)
<a href="#">Download</a>	G4EMLOW8.0, data files for low energy electromagnetic processes - version 8.0 (311.7Mb, 326834565 bytes) <b>NEW</b>
<a href="#">Download</a>	G4PhotonEvaporation5.7, data files for photon evaporation - version 5.7 (9.6Mb, 10089240 bytes)
<a href="#">Download</a>	G4RadioactiveDecay5.6, data files for radioactive decay hadronic processes - version 5.6 (1.0Mb, 1059792 bytes)
<a href="#">Download</a>	G4SAIDDATA2.0, data files from evaluated cross-sections in SAID data-base - version 2.0 (37.6kb, 38502 bytes)
<a href="#">Download</a>	G4PARTICLEXS4.0, data files for evaluated particle cross-sections on natural composition of elements - version 4.0 (11.7Mb, 12242648 bytes) <b>NEW</b>
<a href="#">Download</a>	G4ABLA3.1, data files for nuclear shell effects in INCL/ABLA hadronic mode - version 3.1 (104.8kb, 107286 bytes)
<a href="#">Download</a>	G4INCL1.0, data files for proton and neutron density profiles in INCL - version 1.0 (93.6kb, 95840 bytes)
<a href="#">Download</a>	G4PII1.3, data files for shell ionisation cross-sections - version 1.3 (4.1Mb, 4293607 bytes)
<a href="#">Download</a>	G4ENSDFSTATE2.3, data files for nuclides properties - version 2.3 (283.9kb, 290745 bytes)
<a href="#">Download</a>	G4RealSurface2.2, Optional - data files for measured optical surface reflectance - version 2.2 (126.4Mb, 132506346 bytes)
<a href="#">Download</a>	G4TENDL1.4, Optional - data files for incident particles - version 1.4 (870.0Mb, 912261874 bytes) <b>NEW</b>

- Low Energy Nuclear Data (LEND) files can be downloaded from: <ftp://gdo-nuclear.ucllnl.org/>



# Create the “Environment”

---

## Geant4 folder

**Build**

**Source  
code**

**Install**

# Create the “Environment”

## Geant4 folder

**Build**

**Source  
code**

**Install**

**Automatically  
created**

# Copy the source code

---

**Choose a path for your installation**

```
$ cd Desktop
```

**Create a new directory**

```
$ mkdir Geant4  
$ cd Geant4
```

**Copy the source code in the new directory**

```
$ cd /home/user/Downloads  
  
$ cp -r geant4-v11.0.1 /home/user/Desktop/Geant4
```

# Copy the source code

---

Choose a path for your installation

```
$ cd Desktop
```

Create a new directory

```
$ mkdir Geant4  
$ cd Geant4
```

Copy the source code in the new directory

```
$ cd /home/user/Downloads  
$ cp -r geant4-v11.0.1 /home/user/Desktop/Geant4
```

What?

Where?

# Geant4 Installation

---

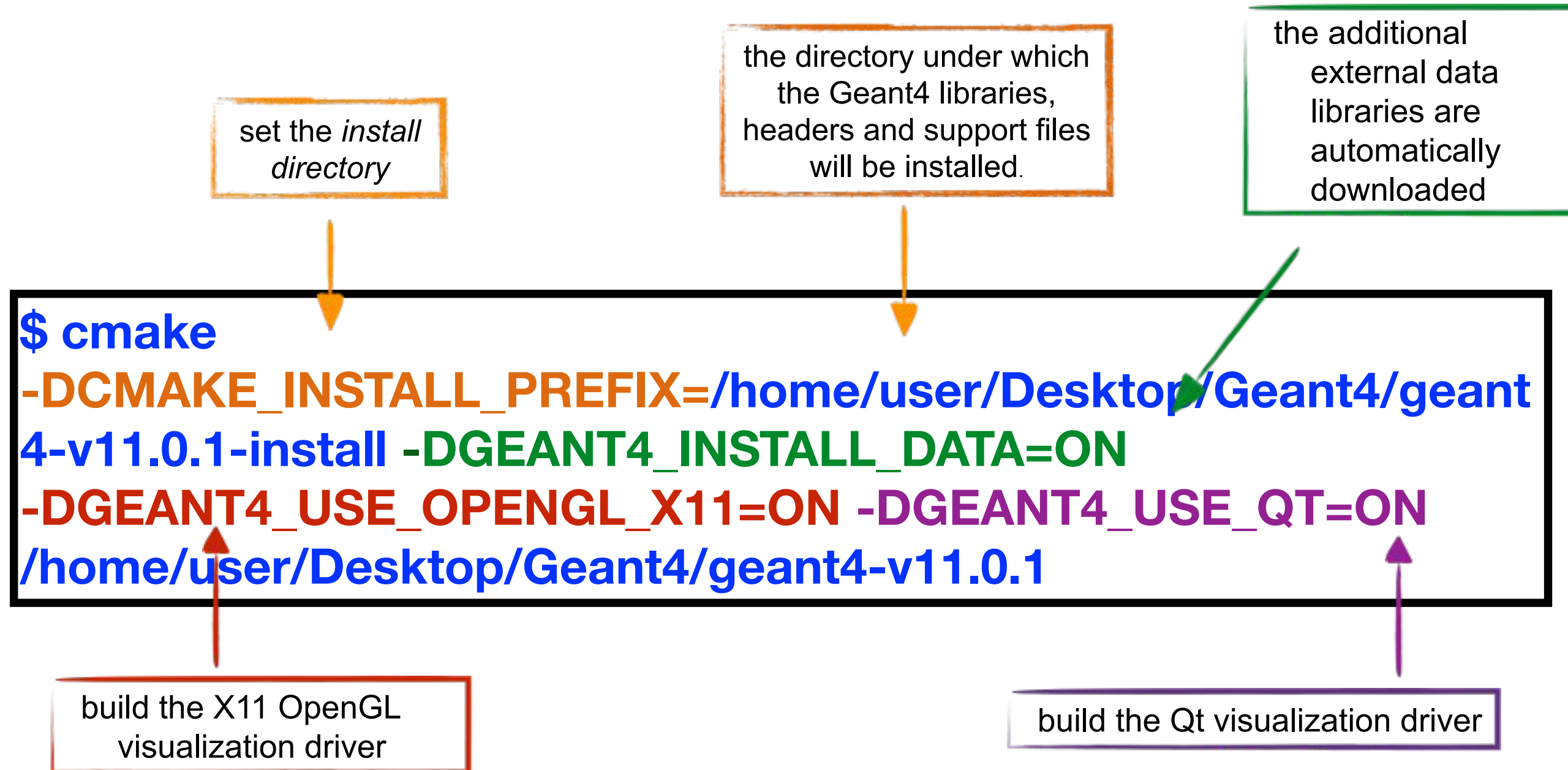
## Create the folder build

```
$ cd /home/user/Desktop/Geant4  
$ mkdir geant4-v11.0.1-build  
$ cd geant4-v11.0.1-build
```

```
$ cmake  
-DCMAKE_INSTALL_PREFIX=/home/user/Desktop/Geant4/geant4-v11.0.1-install -DGEANT4_INSTALL_DATA=ON  
-DGEANT4_USE_OPENGL_X11=ON -DGEANT4_USE_QT=ON  
/home/user/Desktop/Geant4/geant4-v11.0.1
```



# Geant4 Installation



# Other options

---

## **Important options:**

- DCMAKE\_INSTALL\_PREFIX= ... installation\_path
- DGEANT4\_INSTALL\_DATA=ON/OFF
- DGEANT4\_BUILD\_MULTITHREADED=ON/OFF

## **Further options:**

- DGEANT4\_USE\_OPENGL\_X11=ON/OFF
- DGEANT4\_USE\_QT=ON/OFF

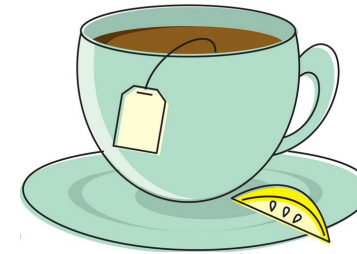
.....

# Geant4 Installation

## Start the Geant4 installation

\$ make **-jN**

\$ make install



and  
wait....

```
[ 0%] Built target G4EMLOW
[ 0%] Built target G4NDL
[ 1%] [ 1%] Built target G4NEUTRONXS
[ 1%] [ 1%] [ 1%] [ 1%] Built target RealSurface
[ 2%] Built target RadioactiveDecay
Built target G4PII
Built target PhotonEvaporation
Built target G4SAIDDATA
Built target G4zlib
[ 4%] Built target G4global
make[2]: *** Pas de règle pour fabriquer la cible « /usr/lib/x86_64-linux-gnu/libGL.so », nécessaire pour « outputs/library/Linux-g++/libG4gl2ps
.so ». Arrêt.
make[1]: *** [source/visualization/externals/gl2ps/CMakeFiles/G4gl2ps.dir/all] Erreur 2
make[1]: *** Attente des tâches non terminées....
Scanning dependencies of target G4intercoms
[ 4%] [ 4%] [ 4%] [ 4%] [ 4%] Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UIAliasList.cc.o
[ 4%] [ 4%] [ 4%] Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UicmdWith3Vector.cc.o
[ 4%] [ 4%] Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UicmdWith3VectorAndUnit.cc.o
Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UIbatch.cc.o
Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UicmdWithABool.cc.o
Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UicmdWithADoubleAndUnit.cc.o
[ 4%] Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UicmdWithADouble.cc.o
[ 4%] Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UicmdWithAString.cc.o
Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UicmdWithoutParameter.cc.o
[ 4%] Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UicmdWithAnInteger.cc.o
[ 4%] [ 4%] [ 4%] Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UIcommand.cc.o
Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UIcommandTree.cc.o
Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UIcontrolMessenger.cc.o
Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UImanager.cc.o
Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UIDirectory.cc.o
Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UImessenger.cc.o
[ 5%] Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UIparameter.cc.o
[ 5%] Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UISession.cc.o
/home/beilla/Software/geant4/geant4.9.6.p03/source/intercoms/src/G4UIcontrolMessenger.cc: In member function 'virtual void G4UIcontrolMessenger:
:SetNewValue(G4UIcommand*, G4String)':
/home/beilla/Software/geant4/geant4.9.6.p03/source/intercoms/src/G4UIcontrolMessenger.cc:328:21: warning: ignoring return value of 'int system(c
onst char*)', declared with attribute warn_unused_result [-Wunused-result]
    system(newValue);
    ^
[ 5%] Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4UnitsMessenger.cc.o
[ 5%] Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4VGlobalFastSimulationManager.cc.o
[ 5%] [ 5%] Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4GenericMessenger.cc.o
Building CXX object source/intercoms/CMakeFiles/G4intercoms.dir/src/G4AnyType.cc.o
Linking CXX shared library ../..../outputs/library/Linux-g++/libG4intercoms.so
```



each time you open a new shell **remember** to source the  
***geant4.sh*** script before executing an application !!!

**Okay  
that's all.**