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++11compliance
  - 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

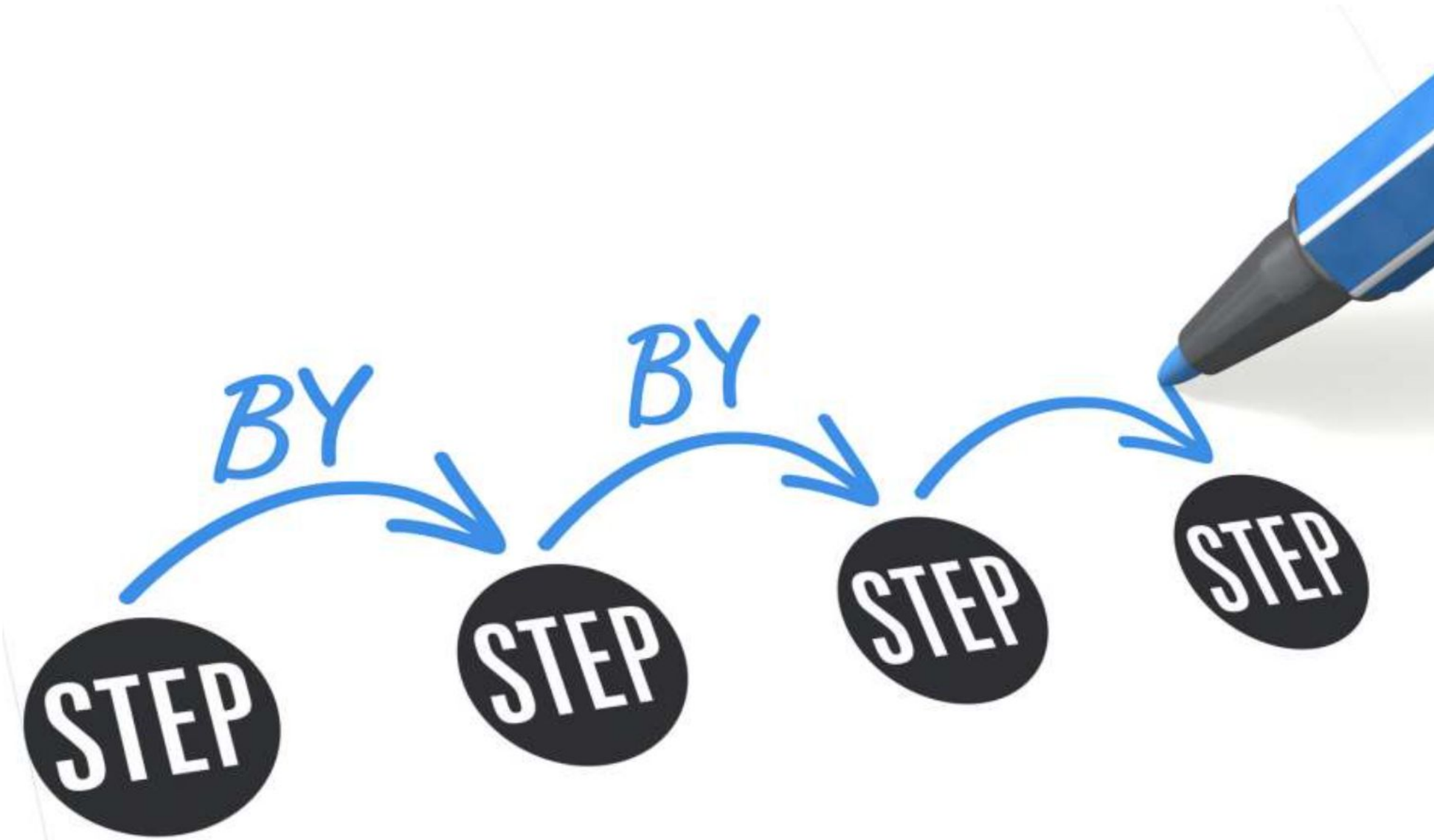
Optional libraries

- **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, …

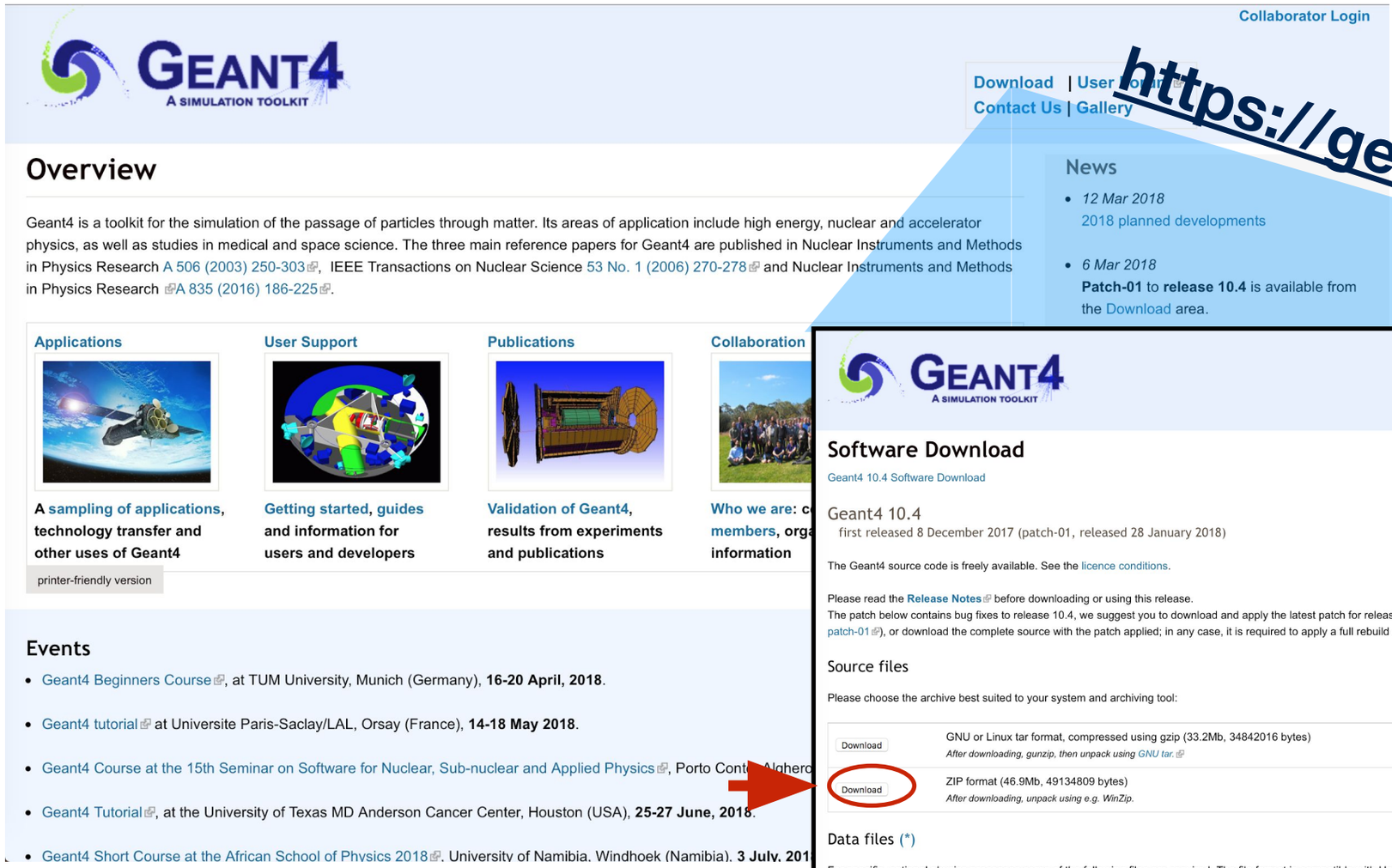
and now…. we can proceed with the Geant4 installation

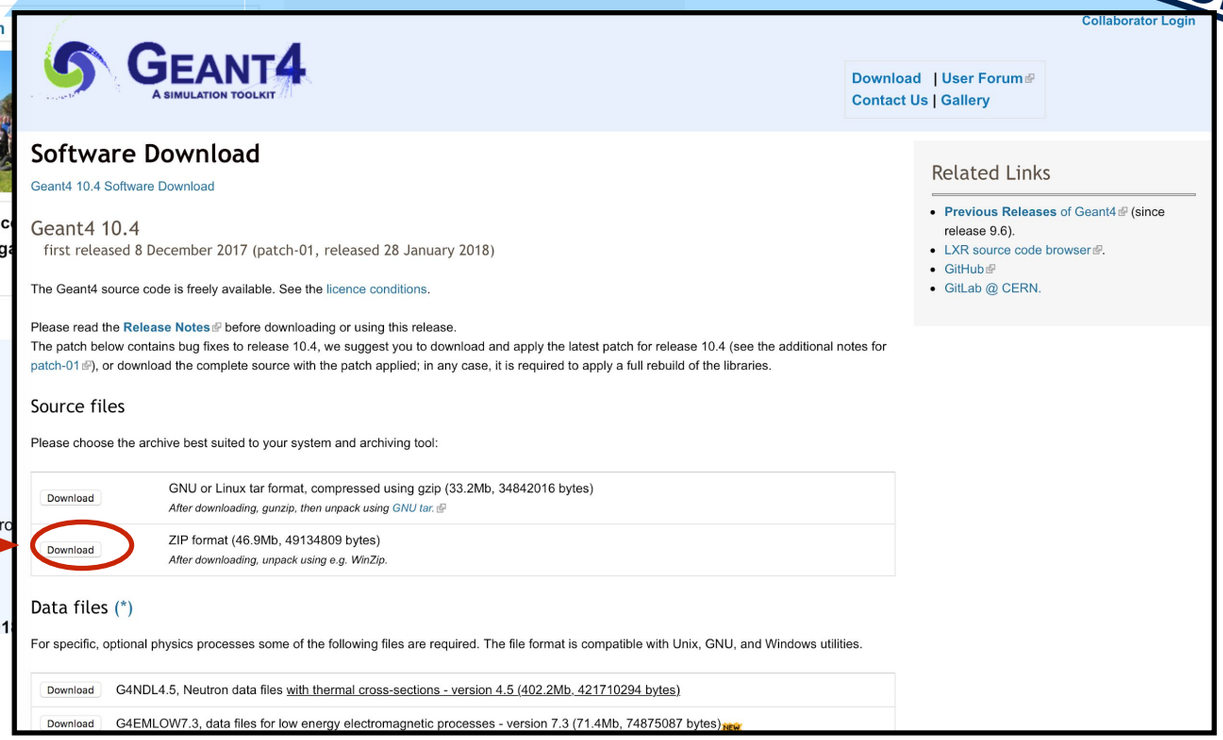


Geant4 Installation

Download the code

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





Extract the file

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

Geant4 Installation

Collaborator Login

GEANT4 A SIMULATION TOOLKIT

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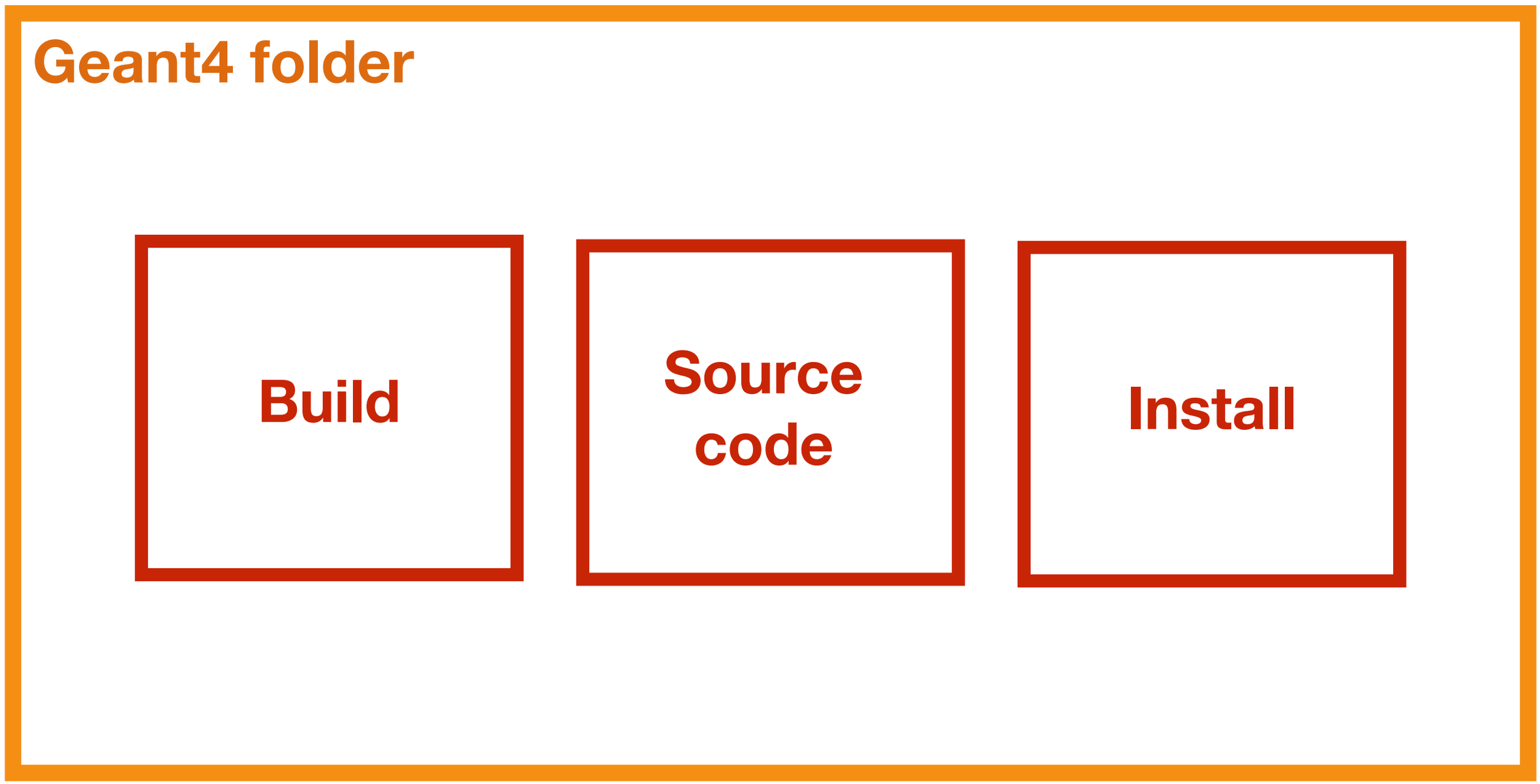
Data files (*)

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

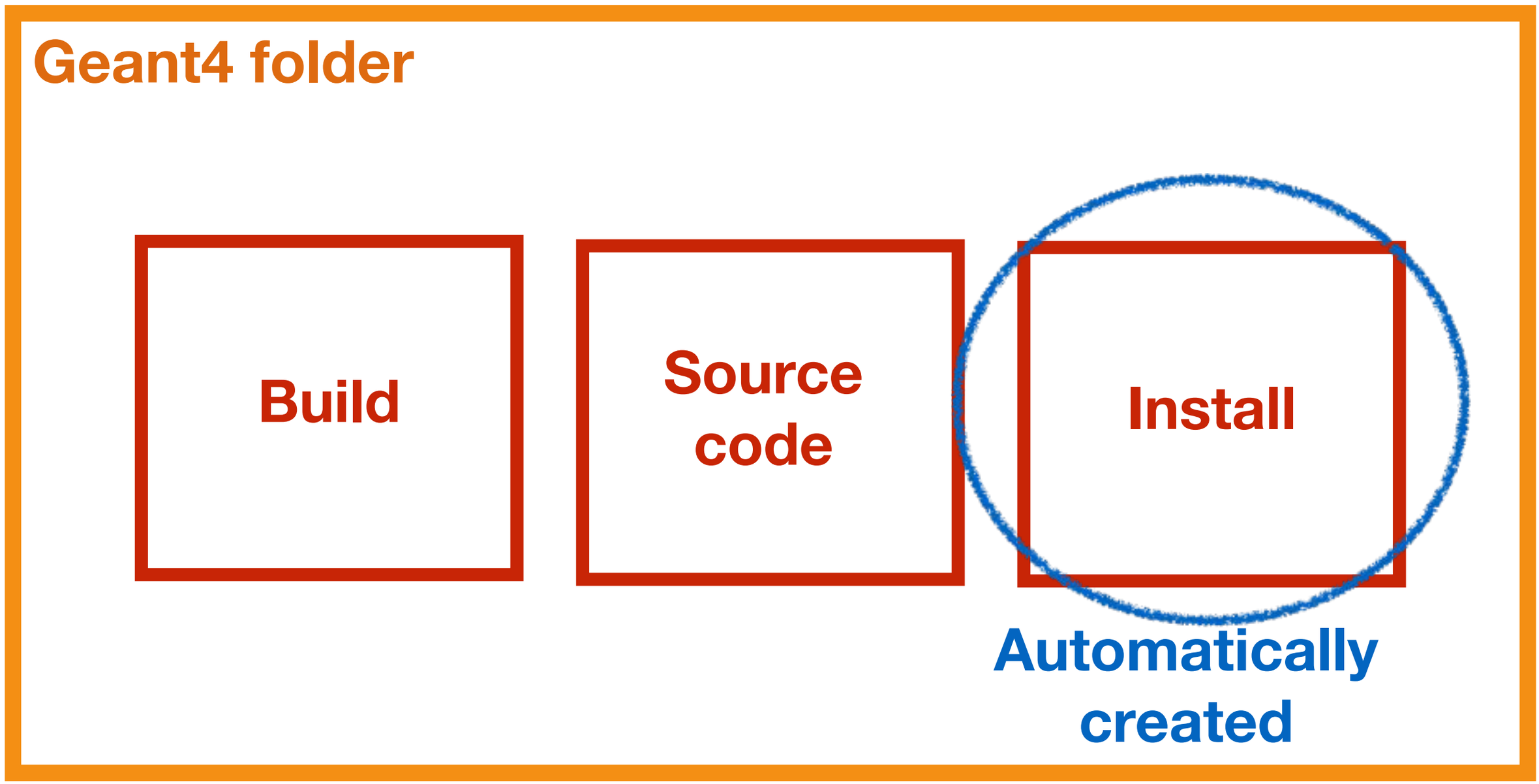
Download	G4NDL4.6, Neutron data files (with thermal cross-sections) - version 4.6 (572.1Mb, 599862135 bytes)
Download	G4EMLOW8.0, data files for low energy electromagnetic processes - version 8.0 (311.7Mb, 326834565 bytes) NEW
Download	G4PhotonEvaporation5.7, data files for photon evaporation - version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

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

Create the “Environment”



Create the “Environment”



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

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$ cd Desktop
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$ mkdir Geant4
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```

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/g
eant4-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

set the *install directory*

the directory under which the Geant4 libraries, headers and support files will be installed.

the additional external data libraries are automatically downloaded

```
$ cmake
-DCMAKE_INSTALL_PREFIX=/home/user/Desktop/Geant4/geant
4-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
```

build the X11 OpenGL visualization driver

build the Qt visualization driver

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%] 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 <u>remember</u> to source the***

`geant4.sh` script before executing an application !!!

Okay that's all.