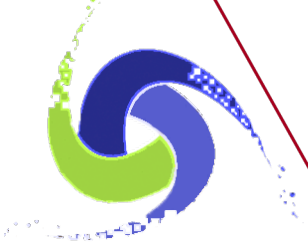

GEANT4
A SIMULATION TOOLKIT
Version 10.7.p02

Geant4 Installation

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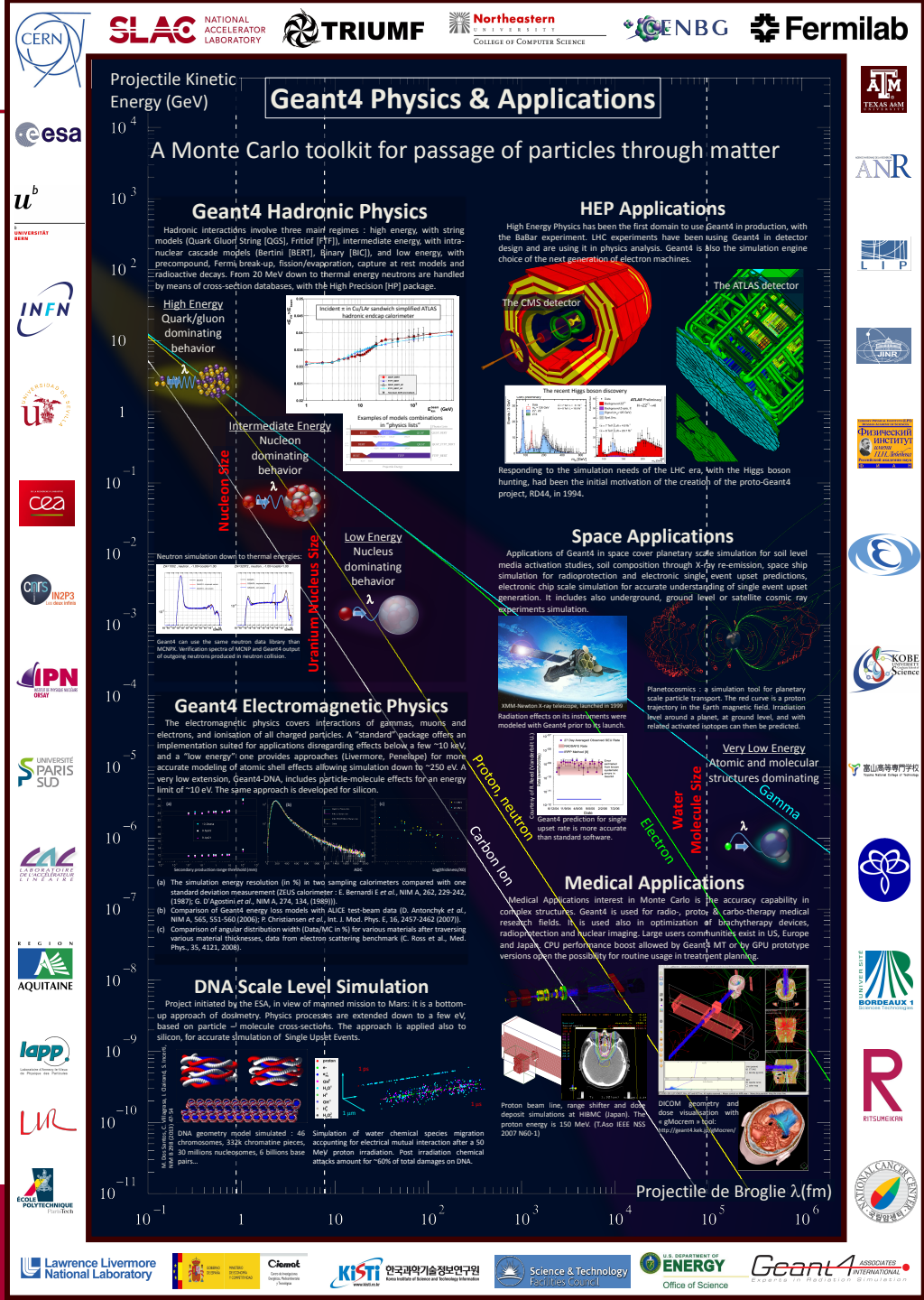
Contents

- This installation instruction is for Linux and Mac.
- Alternative installation options are appended at the bottom of this presentation.



Your first step – http://www.geant4.org/

Download | User Forum
Contact Us | Bug Reports

Geant4

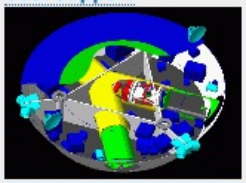
Overview

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

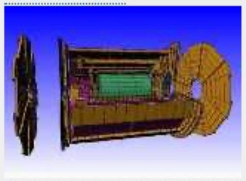
A sampling of applications, technology transfer and other uses of Geant4

User Support



Getting started, guides and information for users and developers

Publications



Validation of Geant4, results from experiments and publications

Collaboration

Who we are: collaborating institutions, members, organization and legal information

News

2021-03-10
2021 planned developments.

2021-02-05
Patch-01 to **release 10.7** is available from the Download area.

2020-11-06
Patch-03 to release **10.6** is available from the Download archive area.

Events

[Virtual] Geant4 Beginners Course @ CERN, CERN (Geneva), **25-31 May 2021**.

[Virtual] 26th Geant4 Collaboration Meeting, **20-24 September 2021**.

Past events

User Support

1. Getting started
2. Training courses and materials
3. Source code
   a. Download page
   b. LXR code browser
   c. doxygen documentation
   d. GitHub
   e. GitLab @ CERN
4. Frequently Asked Questions (FAQ)
5. Bug reports and fixes
6. User requirements tracker
7. User Forum
8. Documentation
   a. Introduction to Geant4 [pdf] [epub] [kindle]
   b. Installation Guide: [pdf] [epub] [kindle]
   c. Application Developers Guide [pdf] [epub] [kindle]
   d. Toolkit Developers Guide [pdf] [epub] [kindle]
   e. Physics Reference Manual [pdf] [epub] [kindle]
   f. Physics List Guide [pdf] [epub] [kindle]
9. Examples
10. User Aids
    a. Tips for improving CPU performance
11. Contact Coordinators & Contact Persons

Related Links

- Object Oriented Analysis & Design
- Archive of previous releases
- Mailing list subscription
- User requirements document (pdf)
- Technical Forum

Installation guide

Installation Guide

There are several ways to install Geant4 on your computer either from binary packages or by compiling from scratch, and these are described below. Which one is available or best for you depends on both your operating system and usage requirements. In all cases, always use the most recent Geant4 release to ensure use of the latest bug fixes, features, and help the developers and community to provide quick user support.

Build and Install Geant4 from Source

Geant4 uses CMake to configure a build system for compiling and installing the toolkit headers, libraries and support tools from scratch. To follow this method, please see Geant4 System/Software Prerequisites for the operating system and software requirements, followed by Building and Installing from Source.

Whilst every effort has been made to make this installation method robust and reliable, the multitude of platforms and system configurations mean we cannot guarantee that problems will not be encountered on platforms other than those listed in Supported and Tested Platforms.

In case of issues with building and installing Geant4, we welcome questions as well as feedback via our Discourse Forum. To help us deal with your problem as quickly as possible, please include as much detail as possible on the problem you have encountered. At minimum, you should let us know the platform and operating system version, C++ compiler type and version, CMake version, and any error messages. It also helps to list the sequence of commands you used so we can try and reproduce the issue.

If you feel you have found a genuine bug in the Geant4 CMake build, please report it to the CMake category on our Bugzilla. As with reports to Discourse, please include as much information as possible so that we can triage the bug and track it down quickly. We also welcome general feature requests and feedback on the system through both Discourse and Bugzilla.

Download page

Geant4 10.7

first released 4 December 2020 (patch-01, released 5 February 2021)

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 10.7, we suggest you to download and apply the latest patch for release 10.7 (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 (34.5Mb, 36217226 bytes) *After downloading, unpack using GNU tar.*
Download	ZIP format (48.9Mb, 51279540 bytes) *After downloading, unpack using e.g. WinZip.*

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

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	G4EMLOW7.13, data files for low energy electromagnetic processes - version 7.13 (284.8Mb, 298636910 bytes)
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	G4PARTICLEXS3.1.1, data files for evaluated particle cross-sections on natural composition of elements - version 3.1.1 (8.2Mb, 8613102

Related Links

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

Prerequisites

- C++ Compiler and Standard Library supporting the C++11 Standard:
  - Linux: GNU Compiler Collection 4.9.3 or higher
  - macOS: Apple Clang (Xcode) 11 or higher
    - The command line tools must also be installed by running *xcode-select --install* from the terminal.
- CMake 3.8 or higher
- Xerces-C++ headers and library (v3.0 or higher) must be installed, compiled against the same C++ compiler as Geant4 (C++11 by default).
  - On Unix systems, it should also be configured and built with *netaccessor-curl*, and the used *libcurl* should support SSL in order to access schema files over https.
- Qt5 headers and libraries
  - You will need to register personally as an open software developer to obtain a free personal version of Qt.
- X11 headers and libraries (XQuartz on macOS)
  - OpenGL or MesaGL headers and libraries

Installing Geant4

- Create a clean directory and locate the downloaded Geant4 tar-ball.
  - $ cd ~
  - $ mkdir *myG4*
  - $ cd *myG4*
  - $ mv *your_download_directory*/geant4.10.07.p02.tar.gz .
- Unpack the tar ball
  - $ tar -xzf geant4.10.07.p02.tar.gz
  - $ ls

    geant4.10.07.p02 geant4.10.07.p02.tar
- Create *build*, *install* and *work* directories
  - $ rm geant4.10.07.p02.tar.gz
  - $ mkdir build install work
  - $ ls

    build geant4.10.07.p02 install work
- Go to build directory and start ccmake
  - $ cd build
  - $ ccmake ../geant4.10.07.p02

ccmake and then make

CMAKE_INSTALL_PREFIX	/*full_path_to_your_home*/*myG4*/install
GEANT4_BUILD_MULTITHREADED	ON
GEANT4_INSTALL_DATA	ON
GEANT4_INSTALL_DATADIR	/*full_path_to_your_home*/*myG4*/install/data
GEANT4_USE_GDML	ON
GEANT4_USE_OPENGL_X11	ON
GEANT4_USE_QT	ON
GEANT4_USE_RAYTRACER_X11	ON

- Apply “c” repeatedly until “g” command is available, and then “g”.

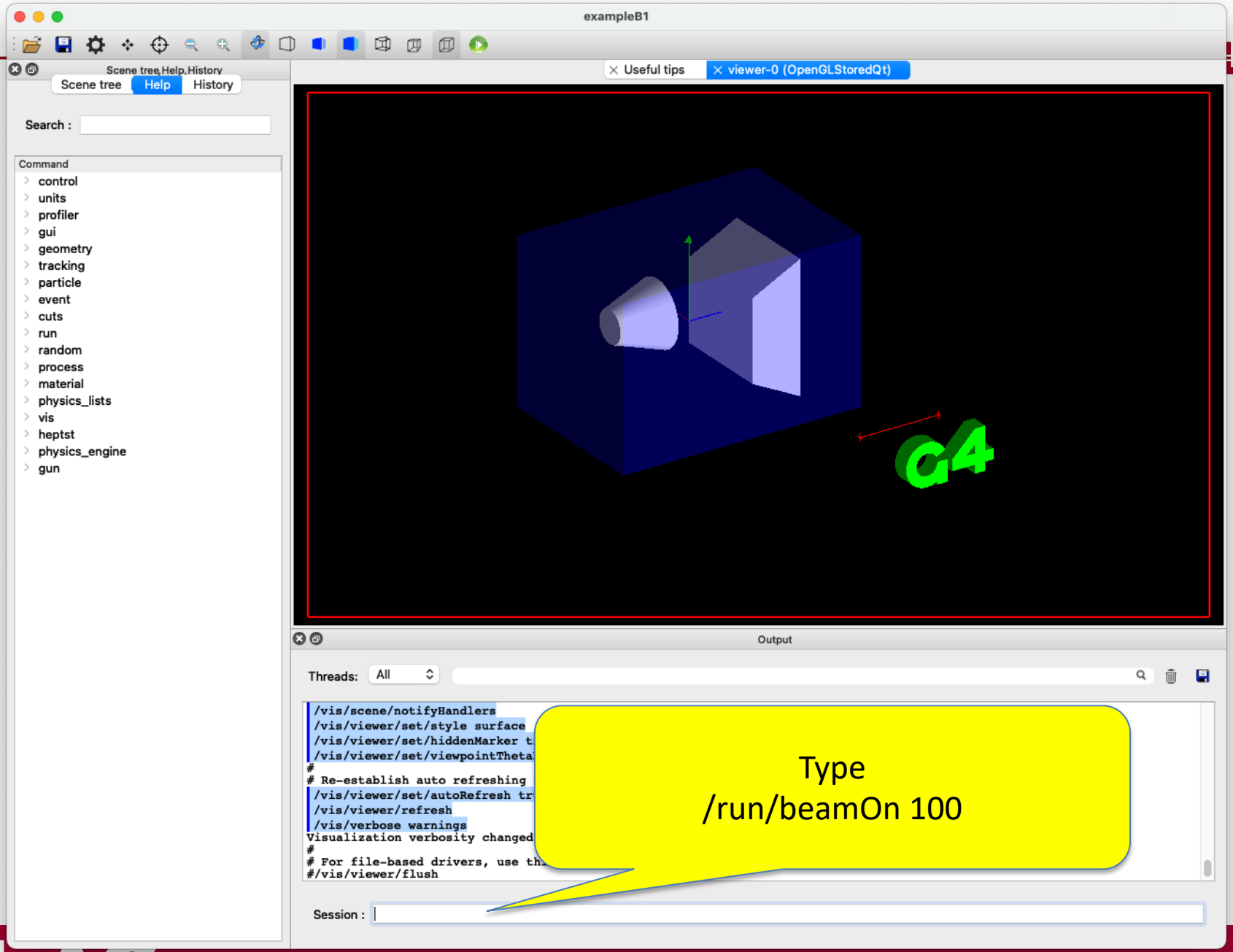
```
$ ccmake ../geant4.10.07.p02
$ make –j 8
$ make install
```

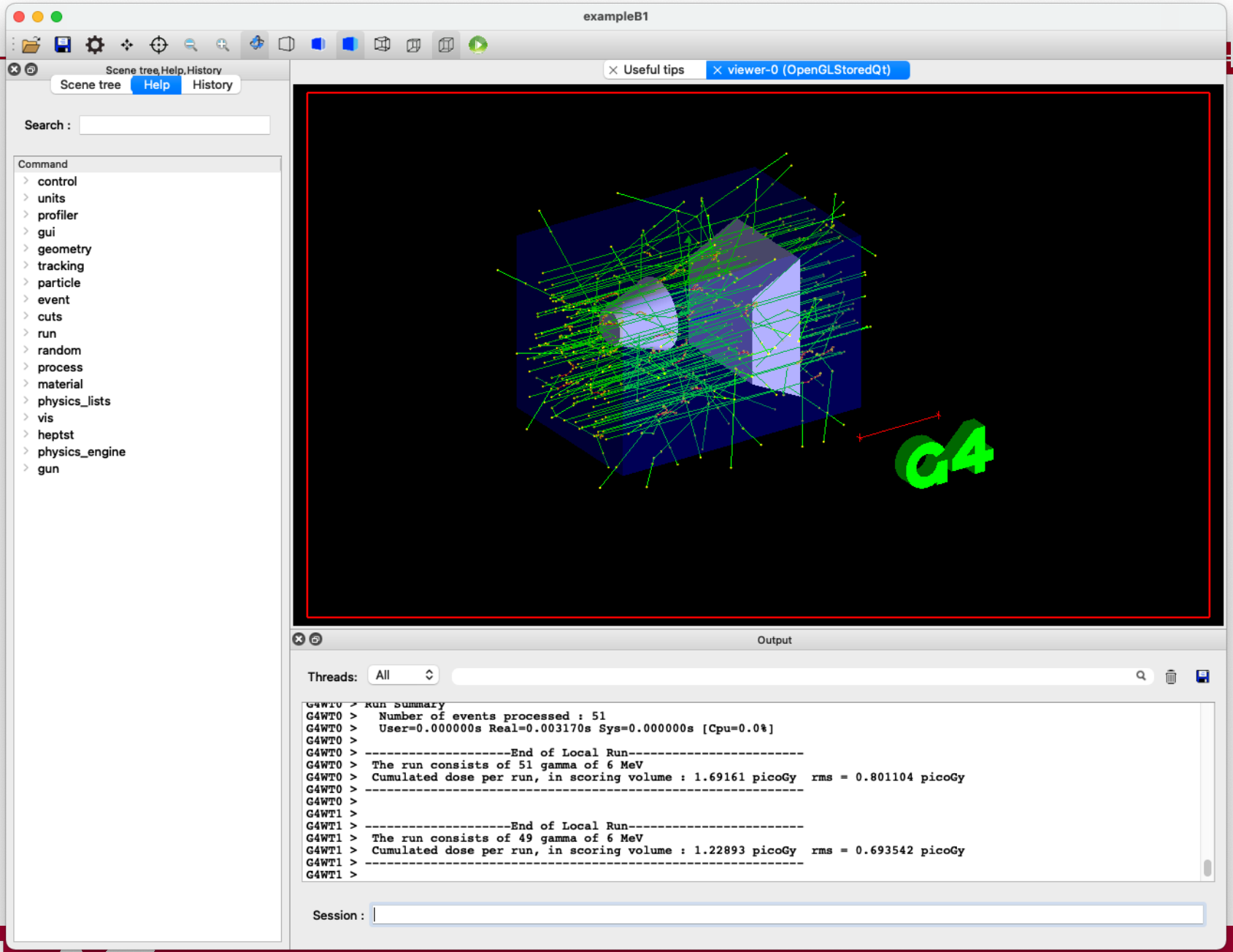
Make and run the first example

- VERY IMPORTANT
  - Every time you open a new terminal window, make sure to set the necessary environment variables.

    $ source ~/*myG4*/install/bin/geant4.csh (or .sh)

```
$ cd ~/myG4/work
$ cp –r ../geant4.10.07.p02/examples/basic/B1 .
$ ls
    B1
$ cd B1
$ ls
  CMakeLists.txt  History  exampleB1.cc  exampleB1.out  init_vis.mac  run2.mac  vis.mac
  GNUmakefile     README   exampleB1.in  include        run1.mac      src
$ cmake .
$ make –f Makefile
$ ./exampleB1
```


exampleB1
Scene tree,Help,History
Scene tree
Help
History
Search :
Command
control
units
profiler
gui
geometry
tracking
particle
event
cuts
run
random
process
material
physics_lists
vis
heptst
physics_engine
gun
Useful tips
viewer-0 (OpenGLStoredQt)
Output
Threads:
All
/vis/scene/notifyHandlers
/vis/viewer/set/style surface
/vis/viewer/set/hiddenMarker t
/vis/viewer/set/viewpointTheta
#
Re-establish auto refreshing
/vis/viewer/set/autoRefresh tr
/vis/viewer/refresh
/vis/verbose warnings
Visualization verbosity changed
#
For file-based drivers, use th
#/vis/viewer/flush
Session :
Type
/run/beamOn 100


exampleB1
Scene tree,Help,History
Scene tree
Help
History
Search :
Command
control
units
profiler
gui
geometry
tracking
particle
event
cuts
run
random
process
material
physics_lists
vis
heptst
physics_engine
gun
Useful tips
viewer-0 (OpenGLStoredQt)
G4
Output
Threads:
All
G4WT0 > Run Summary
G4WT0 > Number of events processed : 51
G4WT0 > User=0.000000s Real=0.003170s Sys=0.000000s [Cpu=0.0%]
G4WT0 >
G4WT0 > ------------------End of Local Run------------------------
G4WT0 > The run consists of 51 gamma of 6 MeV
G4WT0 > Cumulated dose per run, in scoring volume : 1.69161 picoGy rms = 0.801104 picoGy
G4WT0 > --
G4WT0 >
G4WT1 >
G4WT1 > ------------------End of Local Run------------------------
G4WT1 > The run consists of 49 gamma of 6 MeV
G4WT1 > Cumulated dose per run, in scoring volume : 1.22893 picoGy rms = 0.693542 picoGy
G4WT1 > --
G4WT1 >
Session :

Alternative installation

- If your platform can use or has CVMFS installed, Geant4 is available through the LCG Releases from the *sft.cern.ch* repository for CentOS7.

```
$ source /cvmfs/sft.cern.ch/lcg/releases/gcc/8.3.0/x86_64-centos7/setup.sh
$ export GEANT4_DIR=/cvmfs/geant4.cern.ch/geant4/10.7.p01/x86_64-centos7-gcc8-optdeb-MT
$ export QT5_HOME=/cvmfs/sft.cern.ch/lcg/releases/LCG_97/qt5/5.12.4/x86_64-centos7-gcc8-opt
$ export Qt5_DIR=$QT5_HOME
$ export QT_QPA_PLATFORM_PLUGIN_PATH=$QT5_HOME/plugins
$ export QT_XKB_CONFIG_ROOT=/usr/share/X11/xkb
$ cd ${GEANT4_DIR}/bin
$ source ./geant4.sh

$ cd ~/myG4/work
```

Yet another installation options

- Install Geant4 via a Package Manager
- Warning
  - These packages are not maintained by the Geant4 developers, but by helpful members of the community. Please go through each package manager's standard channels to report any installation issues or to request packaging of the latest release/patch.

- Spack on Linux/macOS
  - Spack 's Geant4 package may be installed with
    $ spack install geant4
  - Spack allows different variants of Geant4 to be installed, and to see these run
    $ spack info geant4

- Homebrew on macOS/Linux
  - Homebrew's Geant4 formula may be installed with
    $ brew install geant4

- Conda on Linux/macOS
  - A Conda package for Geant4 is available via conda-forge and may be installed into an environment via
    $ conda create -c conda-forge --name <my-environment> geant4
    $ conda activate <my-environment>
  - Please see the associated feedstock for further information and support.

- Macports
  - MacPorts supplies a port for Geant4 which may be installed with
    $ sudo port install geant4