

## **Description of theoretical and practical lessons on the Monte Carlo Geant4 code and prerequisites for the course**

Lessons on Geant4 consist of a theoretical part on the capabilities of the code and practice exercises with the computer. Purpose of the lessons is to provide a basic understanding of the main features and tools available in Geant4 toolkit, including a description of geometry and physical processes. The course wants to make the participants able to install Geant4 and to implement and run user applications, simple but comprehensive, based on Geant4. Lessons will be divided over 4 days (from Monday to Thursday) and will include approximately 6 hours of lectures and 8 hours of practical exercises at the computer, on Linux platform. The teachers will be two members of the Geant4 International Collaboration.

### **Geant4**

Geant4 (<http://geant4.cern.ch/>) is a software toolkit, written in C++, for simulating the passage of particles through matter with the Monte Carlo approach. The software is developed and maintained by an International Collaboration (<http://geant4.cern.ch/collaboration/index.shtml>) of scientists belonging to different institutions, including INFN.

Geant4 can be used in applications in high energy physics, astrophysics, medical physics, particle astrophysics and nuclear physics. The software provides all the tools needed to a complete Monte Carlo simulation of the experimental set-up, including modeling of geometry, detector response, event management and user interface. In Geant4 exists a wide range of physical models capable of describing interactions of particles with matter; there are several alternative models, which can be chosen by the user, for many physical processes.

Download of Geant4 source code and libraries are freely available, along with manuals, from Internet.

### **Prerequisites**

Participants must have their own laptop, equipped for supporting ssh connections to a Linux machine with graphical windows. Wi-Fi connection will be available for the participants.

For Windows users, it is suggested to use SSH Secure Shell (or putty) and Xming-mesa (both freeware).

Xming-mesa program installer is available at:

[http://geant4.lngs.infn.it/corso\\_infn/Xming-mesa.exe](http://geant4.lngs.infn.it/corso_infn/Xming-mesa.exe)

Additional fonts (necessary only if you want to use emacs as text editor) can be downloaded from here:

[http://geant4.lngs.infn.it/corso\\_infn/Xming-fonts-7-5-0-8-setup.exe](http://geant4.lngs.infn.it/corso_infn/Xming-fonts-7-5-0-8-setup.exe)

(documentation is at: <http://www.straightrunning.com/XmingNotes/>).

SSH Secure Shell program is available at:

<http://software.dartmouth.edu/Windows/Connectivity/SSHSecureShell.zip>.

Xming server must be launched before starting the SSH connection. To configure the SSH connection with graphics windows, just open menu Edit->Settings->Tunneling SSH Secure Client, select "Tunnel X11 connections" option and click OK.

Presentations and other teaching materials (including Geant4 installation code) will be available online and/or distributed in electronic format (e.g. CD-ROM).