User Documents and Examples I

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Slides thanks to Dennis Wrigth, SLAC

Outline

- User Documents
 - Application Developers' Guide
 - Installation Guide
- Novice Examples
 - Simple: trivial detector with non-interacting particles
 - Detailed: complex detector with full physics
- User Aids
 - Linux Crossed Reference (LXR) source code browser
 - HyperNews User Forum

New Geant4 Web Pages http://geant4.web.cern.ch/geant4

Geant 4

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 two main reference papers for Geant4 are published in Nuclear Instruments and Methods in Physics Research, <u>NIM A 506 (2003) 250-303</u>, and J. Allison et al., IEEE Trans. Nucl. Sci. 53, February 2006 (in press).

Applications

User Support

developers





A <u>sampling of applications</u>, technology transfer and other uses of Geant4



Getting started, Validation user guides and information for results fro



Validation of Geant4, results from experiments and publications



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



News

- 10 February 2006 Patch 01 of release 8.0 is available from the <u>download</u> area.
- 16 December 2005 Geant4 release 8.0 is available from the <u>download</u> area.
- less recent news

Events

- <u>4-day Geant4 tutorial</u>, SLAC, Stanford (USA), 7-10 March 2006.
- 4-day Geant4 tutorial, Jefferson Lab, Newport News, Virginia (USA), 22-25 May 2006.
- past events

The original web pages will be available during the transition period.

Applications | User Support | Results & Publications | Collaboration | Site Map XHTML 1.0 | CSS2 Contact Webmaster

Last update: Fri 24 Feb 2006 02:30:52 PM PST

Installation Guide

URL:

geant4.web.cern.ch/geant4/G4UsersDocuments/ UsersGuides/InstallationGuide/html/index.html

- List of required software
 - C++ compiler, CLHEP, GNU make, Geant4 toolkit
 - choices for visualization software
- How to install on Linux
- Tips for installing on Windows

Application Developper guide

- URL: geant4.web.cern.ch/geant4/G4UsersDocuments/ UsersGuides/ForApplicationDeveloper/html/index.html
- Introduces new users to the Geant4 toolkit
- Describes the most useful tools
- Describes how to set up and run a simulation application
- Intended as an overview of the toolkit, not an exhaustive treatment. For more details:
 - Physics Reference Manual
 - Toolkit Developers Guide

- Fixed geometry: Ar gas mother volume with Al cylinder and Pb block with Al slices
- Incident particle is a geantino no physics interactions
- No magnetic field and only the transportation process is enabled
- Hard coded batch job and verbosity



- Pb target, Xe gas chambers (parameterized volumes)
- All EM processes + decay included for γ, charged leptons and charged hadrons
- Detector response
 - Trajectories and chamber hit collections may be stored
- Visualization of detector and event
- Command interface introduced
 - Can change target, chamber materials, magnetic field, incident particle type, momentum, etc. at run time



- Sampling calorimeter with layers of Pb absorber and liquid Ar detection gaps (replicas)
- Exhaustive material definitions
- Command interface
- Randomization of incident beam
- All EM processes + decay, with separate production cuts for γ, e+, e- (use for shower studies)
- Detector response: E deposit, track length in absorber and gap
- Visualization tutorial
- Random number seed handling



- Simplified collider detector
 - all kinds of volume definitions
- Magnetic field
- **PYTHIA** primary event generator
 - Higgs decay by Z0, lepton pairs
- Full set of EM + hadronic processes
 - Should use updated hadronic physics lists
- Event filtering by using stacking mechanism



- Fast simulation with parameterized showers
 - EM showers (derived from G4VFastSimulationModel)
 - Pion showers (for illustration only not used)
- EM physics only
 - Use of G4FastSimulationManagerProcess
- Simplified collider detector geometry
 - Drift chamber
 - EM, hadronic calorimeter
 - Ghost volume

- Water Cerenkov detector with air "bubble"
- Materials
 - Specification of optical properties
 - Specification of scintillation spectra
- Physics
 - Optical processes
 - Generation of Cerenkov radiation, energy loss collected to produce scintillation



- 3 simplified sandwich calorimeters (Pb, Al, Ar)
- Cylindrical ghost volume for scoring
- Run-based (as opposed to event-based) hit accumulation
- Changing geometries without rebuilding world
- Setting different secondary production cuts for each calorimeter using G4Region



LXR Code Browser

- URL: www-geant4.kek.jp/LXR/
- Search entire Geant4 source tree by
 - filename (e.g. G4Track.hh)
 - text
 - identifier
- Results: a source file fully hyperlinked to classes and methods
 - tells where classes and methods are defined
 - also where they are referenced

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Gean	t4 Cross Reference
Starting Points:	This is an interactive viewing and searching facility for the Geant4 source code. It offers:
Click here to start browsing at the root of the directory tree.	 Source-tree browsing and filename search to easily find source files and navigate through the source directories.
File Name Search:	 Full-text indexing for fast retrieval of source files containing a given word or pattern.
Use this field to search for files by name (case sensitive).	 Identifier cross-reference for fully hyperlinked source code. The names of classes, methods, and data can be clicked on to find the source files where they are defined and used.
Full- Text Search: Use this field to search	The full-text indexing and retrieval are implemented using <u>Glimpse</u> , so all the capabilities of Glimpse are available, including <u>regular expression</u> searches.
through all the text.	Note: All source files are rendered into HTML. Do not attempt to download the Geant4 source code from this site!
Search: Find Use this field to find a particular class, method, variable,	
etc.	

HyperNews User Forum

- URL: geant4-hn.slac.stanford.edu:5090/ Geant4-HyperNews/index
- See also top of Geant4 home page
- Discuss problems with other users, post questions for experts, etc.
- 18 forums roughly based on Geant4 categories
- 4 forums for specific application areas (education, medicine, space, industry)
- New forums may be requested by users
- To join: click on "Membership" at bottom of page and fill out form

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[<u>Membership</u> <u>Subscriptions</u> <u>Recent Index</u> <u>Search</u> <u>Geant4 Home</u> <u>Feedback</u> <u>Help</u>]	^
Geant 4	
Geant4 HyperNews Forums	
Search postings:	
Search!	
Welcome to the Geant4 HyperNews system.	
The Geant4 collaboration welcomes user participation in this forum through the exchange of questions about and experiences with the Geant4 toolkit. When possible, developers will monitor these contributions and provide assistance. To report a problem or program error please use the Geant4 Problem Reporting System.	
The following list is a short guide to what you can do from this page:	
 To read a forum, click on the title of the forum in one of the available indices. Available indices include a <u>Time</u> <u>Ordered Index</u>, and a <u>Recent Post Index</u>. To post a new message (start a new thread) in a forum, click on the Add Message button at the bottom of the 	
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• To create a membership, follow the directions <u>here</u> .	
 To edit your membership information in the system, go to the <u>Membership</u> page. To subscribe (once you are a member) to any forum or to see what forums you are currently subscribed to, go 	
to the Central HyperNews Subscription Page. You can also see which else is subscribed to a forum from there.	
 To search the messages in the HyperNews system, go to the <u>HyperNews Search Page</u>. 	
 To request a new forum be created, use the <u>Request a New Forum</u> page. 	
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Summary

- Installation and Application Developers Guides tell you how to get started building and running a simulation
- There are 7 novice examples ranging from very easy to complex
 - Can use these as templates for your application
- A cross reference browser (LXR) is available for studying source code
- A user forum is available for sharing ideas, asking questions