Outline

- User Documents
  - Installation Guide
  - Application Developers' Guide

- Novice Examples
  - Simple: trivial detector with non-interacting particles
  - Detailed: complex detector with full physics

- User Aids
  - LXR source code browser
  - HyperNews User Forum
Official Installation Guides

- Designed for use by software experts

- 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
Joseph’s Installation Guides

- Easier to use instructions
  geant4.slac.stanford.edu/installation
  - Installing Geant4 on Linux
  - Installing Geant4 on Mac
  - Installing Geant4 on Windows

- Tutorials for 3 Most Commonly Used Visualization Systems
  geant4.slac.stanford.edu/Presentations/vis
  - Geant4 Visualization Tutorial using OpenGL
  - Geant4 Visualization Tutorial using HepRAp
  - Geant4 Visualization Tutorial using DAWN
Application Developers Guide


- 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
Novice Example N01

- 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
Novice Example N02

- Pb target, Xe gas chambers (parameterized volumes)
- All EM processes + decay included for gammas, 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
Novice Example N03

- 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 $\gamma$, e+, e- (use for shower studies)
- Detector response: E deposit, track length in absorber and gap
- Visualization tutorial
- Random number seed handling
Novice Example N04

- Simplified collider detector
  - all kinds of volume definitions
- Magnetic field
- Events from PYTHIA primary 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
Novice Example N05

- 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
Novice Example N06

- 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
Novice Example N07

- 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 hyper-linked to classes and methods
  - tells where classes and methods are defined
  - also where they are referenced
- Also have a doxygen version:
  - www-geant4.kek.jp/Reference
HyperNews User Forum

- URL: hypernews.slac.stanford.edu/HyperNews/geant4/cindex
- See also top of Geant4 home page
- Discuss problems with other users, post questions for experts, etc.

- 22 forums roughly based on Geant4 categories
- 4 forums for specific application areas
- New forums may be requested by users
- To join: click on “New Member” at top of page and fill out form
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 (also doxygen)
- A **user forum** is available for sharing ideas, asking questions