Geant4 Tutorial 2015 @ MIT

Ray and Maria Stata Center - Room 32-124

Agenda

(last revision June.05.2015)

Tuesday (May/26/2015)

12:00 - 12:30 Registration

12:30 - 12:40 Welcome (Areg Danagoulian)

12:40 - 12:50 Tutorial Introduction (Makoto Asai)

- Network, logistics
- Tutorial structure
- Lecturer introduction

12:50 - 13:40 Kernel I (Makoto Asai)

- General introduction
- Global structure of Geant4
- Run, event, track, step, trajectory, etc.
- User classes

13:40 - 14:10 User Documents and Examples (Dennis Wright)

- Installation Guide
- Application developer's manual
- Toolkit developer's manual
- Physics reference manual
- Novice examples in Geant4 distribution
- Extended and advanced examples in Geant4 distribution
- LXR source code browser
- HyperNews

14:10 - 14:40 User Interface I (Makoto Asai)

- Syntax of UI command
- Interactive mode / batch mode
- G4UIExective class

14:40 - 15:00 Visualization I (Andrea Dotti)

- Introduction to Visualization
- Quick Looks at Seven Visualization Drivers
- Basic Visualization Commands

15:00 - 15:30 Break

15:30 - 16:00 Scoring I (Makoto Asai)

- Introduction to sensitivity
- Command-based scoring
- Add a new scorer/filter

16:00 - 16:30 Multithreading I (Andrea Dotti)

- Introduction to multithreading
- UI commands for multithreading

16:30 - 17:30 Hands-on I

- Complete Geant4 installation if you have not already done so

  -- Installation guide

- Execute a few novice examples to confirm the installation
- Troubleshooting: Installation and Configuration Hypernews

Wednesday (May/27/2015)

10:00 - 10:20 Material Definition (Dennis Wright)

- Defining Materials
- NIST Material database

10:20 - 10:50 Analysis (Andrea Dotti)

- G4Tools : built-in analysis tool

10:50 - 12:00 Geometry I (Makoto Asai)

- Introduction
- G4VUserDetectorConstruction class
- Solid
- Logical volume
- Region
- Physical volume
- Placement

12:00 - 13:30 Lunch Break

13:30 - 14:00 Physics I (Dennis Wright)

- Introduction
- G4VUserPhysicsList class
- Modular physics list
- Packaged physics lists
- Choosing appropriate Physics List

14:00 - 14:30 Physics II (Andrea Dotti)

- Processes
- Production thresholds
- Cuts per region

14:30 - 15:00 Physics III (Dennis Wright)

- Decay
- Optical
- Phonon, electron/hole
- Channeling

15:00 - 15:30 Break

15:30 - 16:30 EM Physics (Andrea Dotti)

- EM standard overview

- Multiple scattering
- Low-E EM overview

16:30 - 17:30 Hands-on II
- Material and a simple geometry
- Visualization of geometry
- Command-based scoring

Thursday (May/28/2015)

10:00 - 10:40 Geometry II (Makoto Asai)
- Parametrized volume
- Replicated volume
- Divided volume
- Nested-parameterization
- Assembly volume
- Reflected volume
- Touchable

10:40 - 11:30 Hadronic Physics I (Dennis Wright)
- Overview
- Pre-compound/de-excitation models
- Cascade models
- Parameterized models

11:30 - 12:00 Scoring II (Makoto Asai)
- Define scorers in the tracking geometry
- Reduction of user data
- Sensitive detector
- Hits

12:00 - 13:30 Lunch Break

13:30 - 14:10 Hadronic Physics II (Dennis Wright)

- Elastic process
- Neutron physics
- Ion physics

14:10 - 14:40 Primary Particle (Makoto Asai)

- G4VUserPrimaryGeneratorAction class
- Primary vertex and primary particle
- Built-in primary particle generators
- More on Particle Gun

14:40 - 15:00 Visualization II (Andrea Dotti)

- Advanced Visualization

15:00 - 15:30 Break

15:30 - 16:30 Geometry III (Makoto Asai)

- Magnetic field
- Field integration and other types of field
- GDML interface
- CAD interface
- Geometry checking tools
- Geometry optimization
- Parallel geometry
- Moving objects

16:30 - 17:30 Hands-on III

- Complete geometry
- Define scorers
- User Actions I: printing information on the screen

17:30 - 20:00 Social event

Friday (May/29/2015)

10:00 - 10:45 Hadronic Physics III (Dennis Wright)

- String models
- Electro-nuclear models
- Capture / fission models
- Radioactive decay
- Process at rest

10:45 - 12:00 Hands-on IV

- User Actions II: Accumulating information from a run
- Use g4tools to create histograms and output ntuple files

12:00 - 13:30 Lunch Break

13:30 - 14:00 User Interface II (Makoto Asai)

- Define user commands

14:00 - 14:45 Event Biasing (Andrea Dotti)

- Overview
- Geometrical biasing
- Physics biasing
- Bremsstrahlung splitting

14:45 - 15:00 How to Upgrade Your Geant4 Release (Dennis Wright)

- Major versus minor releases
- What to look for in the release notes

15:00 - 15:30 Break

15:30 - 16:00 Kernel II (Makoto Asai)

- User limits
- User information classes
- Shower parameterization
- Stack management

16:00 - 16:45 Multithreading II (Andrea Dotti)

- Thread safety

- User thread initialization

- MPI

- Compiling Geant4 for Xeon Phi coprocessor

16:45 - 17:30 Q/A and Closing remarks (Makoto Asai)

Saturday (May/30/2015)

n.b. - new room : 32-155

10:00 - 12:00 Additional discussions on selected topics

10:00-10:15 Field map from a file

10:15-10:45 Reading input file for primary particles in MT mode

(including Connecting to Fortran event generator)

10:45-11:15 Layered mass geometry

11:15-11:30 Differences between Geant4 and MCNP6

11:30-12:00 Any further discussion

12:00 Adjourn