

Geant 4

Short Course

Katsuya Amako (*KEK*)

Makoto Asai (*SLAC*)

Gabriele Cosmo (*CERN*)

Susanna Guatelli (*INFN Genova*)

Maria Grazia Pia (*INFN Genova*)

Dennis Wright (*SLAC*)

IEEE NSS/MIC 2003

Portland, 19 October 2003

<http://www.ge.infn.it/geant4/events/nss2003/geant4course.html>

<http://cern.ch/geant4>

Outline of the course: morning

- **Introduction - K. Amako (20')**
 - Brief overview of basic concepts in the simulation of particle interactions with matter
 - Geant4 vision: scope, fundamental concepts
 - **Basic structure of the Geant4 Simulation Toolkit - M. Asai (40')**
 - Geant4 architecture
 - System of units
 - Geant4 kernel (Run, Event, Tracking)
 - Primary particle generation
 - **Detector modeling - G. Cosmo, M. Asai (60')**
 - Materials (G.C.)
 - Geometry (G.C.)
 - Read-out and detector response (M.A. 15')
- Tea Break*
- **Interactions of particle with matter - M.G. Pia, D. Wright (110')**
 - Particles and physics processes (MGP 20')
 - Electromagnetic physics: standard, low-energy, optical processes (MGP 45')
 - Hadronic physics: parameterised and theoretical models (D.W. 45')

Outline of the course: afternoon

- **Interactive capabilities** - *G. Cosmo (45')*
 - Visualisation
 - User interface
 - Associated data analysis
- **Additional capabilities** - *M. Asai (15')*
 - Event biasing
 - Parameterisation (fast simulation)
 - Persistency
 - Parallelisation and integration in a distributed computing environment
- **Overview of Geant4 application in diverse domains** - *M. G. Pia (30')*
 - High energy and nuclear physics experiments
 - Astroparticle physics and astrophysics
 - Space science
 - Medical physics: radiotherapy, nuclear medicine, medical imaging
- **How to use Geant4** - *S. Guatelli (30')*
 - Design of a simple user application
 - User initialisation and actions

Tea Break

- **An application example** - *S. Guatelli (80')*
 - Design overview
 - Code overview
 - Demo
- **Installation** - *G. Cosmo (20')*
 - Geant4 installation, supported platforms
- **How to learn more** - *K. Amako (20')*
 - Documentation
 - User support
- Discussion

Course material

- All course material can be downloaded from <http://www.ge.infn.it/geant4/events/nss2003/geant4course.html>
- Geant4 User Documentation and further training material can be found at Geant4 web site: <http://cern.ch/geant4>
- After this course, you may profit of Geant4 user support, provided by the Geant4 Collaboration
 - including a User Forum accessible through HyperNews (link from Geant4 home page)

Geant4 Training and User Support

- This course is part of the training programme offered by the Geant4 Collaboration
 - an international collaboration of scientists, developing and maintaining the Geant4 Simulation Toolkit
- This course is a brief introduction to the architecture, modeling capabilities, physics, functionality and applications of the Geant4 Toolkit
 - it does not replace the study of Geant4 User Documentation
- More extensive courses, with hands-on exercises, are organized by the Geant4 Collaboration
 - information available from Geant4 web site <http://cern.ch/geant4>