



*An Introduction to Geant4
and this workshop*

CERN Geant4 User's Workshop

November 2002

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Goals of Geant4

- ◆ Detector simulation toolkit for HEP
- ◆ World-wide collaboration
- ◆ Requirements from physicists in:
 - ◆ LHC, heavy ion and CP violation experiments
 - ◆ cosmic rays, medical and space science applications
- ◆ Software Engineering and OO technology

Since RD44 1994



Geant4 production releases

- ◆ Dec '98 - Geant4.0.0 release

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- ◆ Dec '00 – Geant4 3.0 release

 - ◆ Jun '01 – Geant4 3.2 release

- ◆ Dec '01 – Geant4 4.0 release

 - ◆ Jun '02 – Geant4 4.1 release

- ◆ Dec '02 – Geant4 5.0 release (scheduled)

Scheduled public releases: two per year.

Development releases: every one/two months.

Patches & minor releases with fixes, improvements: as required.



Workplan: methodology

- ◆ Software Engineering
 - ◆ User Requirement Document: PSS-05
 - ◆ OOA&D: Booch/**UML** (CASE tool: Rose)
- ◆ Testing
 - ◆ unit tests (per class), sub-system tests
 - ◆ system integration tests
- ◆ Standards:
 - ◆ C++, RW/**STL**, STEP, ODMG, OpenGL, VRML, CVS,
- ◆ Assumptions on external dependencies:
 - ◆ Contribute to and use CLHEP.
 - ◆ Use of abstract interface for visualisation & persistency



Class Category Diagram (1998)



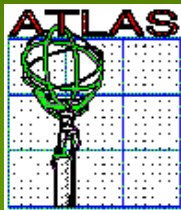
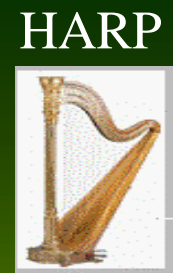
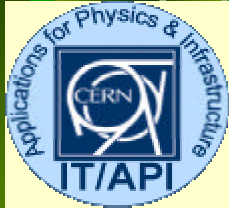


The last major release of Geant4

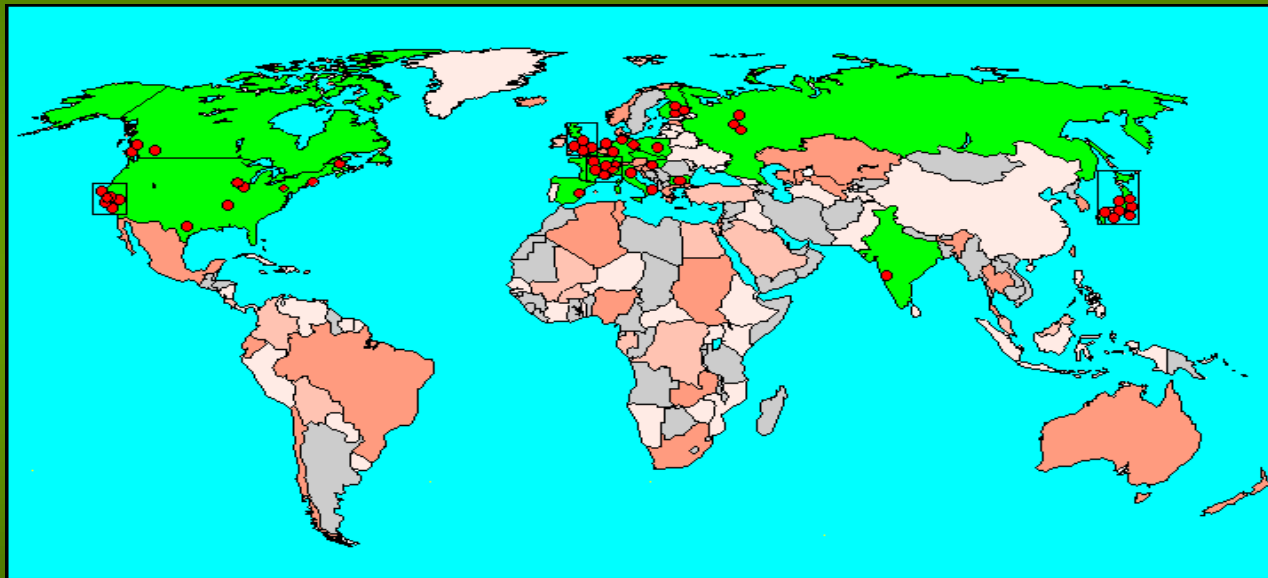
The last major release of Geant4 was 4.0, a major release in December 2001 included

- ◆ **New theoretical hadronic models, including**
 - ◆ CHIPS for gamma-Nucleus, π capture and intra-nuclear transport
- ◆ **Ability to reduce initialisation time**
 - ◆ By saving/retrieving physics processes' table
- ◆ **A field can now be set to any volume or volume tree**
 - ◆ Overriding a potential global 'default' field
 - ◆ Note that, for now, all fields must be addressed in global coordinates

Geant4 Collaboration



Lebedev



Helsinki Inst. Ph.

Univ. Barcelona



PPARC



Collaborators also from non-member institutions, including
 Budker Inst. of Physics
 IHEP Protvino
 MEPHI Moscow
 Pittsburg University



Geant4 platforms today

◆ Platforms supported:

- ◆ **Linux:** g++ 2.95.2, egcs 1.1.2 (to be replaced by gcc 3.2)
- ◆ **SUN:** CC 5.2
- ◆ **Windows NT/2000:** Visual C++ 6.0 SP6, g++
- ◆ **Note:** all platforms use native STL

◆ Not supported

- ◆ DEC, HP – Geant4 4.0 worked
- ◆ MacOS X: user-provided configuration file only.
- ◆ AIX, SGI – status unknown



Quality assurance

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- ◆ Insure++ and Logiscope for software reliability and metrics
- ◆ CASE Rose (also with reverse engineering) for design reviews
- ◆ Coding guidelines automatic checking
- ◆ Code inspections within subdomains
- ◆ Code and design inspection for categories interfaces