

Geant4 Review

**Part I – Focus on
Functionality**

[1] Introduction

general considerations,
miscellaneous

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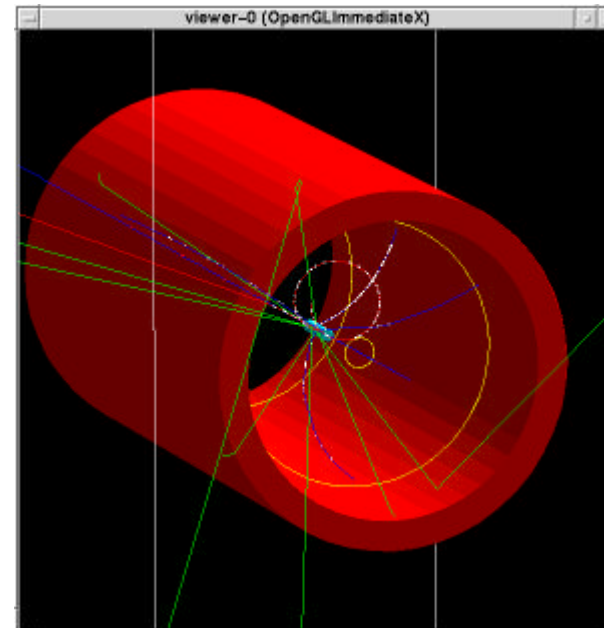
Introduction

- Class Category Diagram
- Working Groups
- Different Stage of developments
 - kernel: stable
 - physics models: additions, new developments
 - underlying libraries
 - moving to standard C++ (STL, namespaces)

What other presentations will cover

Overview, activities and highlights of

- Kernel (tracking, geometry, ...)
- EM physics (standard, low energy)
- Hadronic Physics
- Interactivity

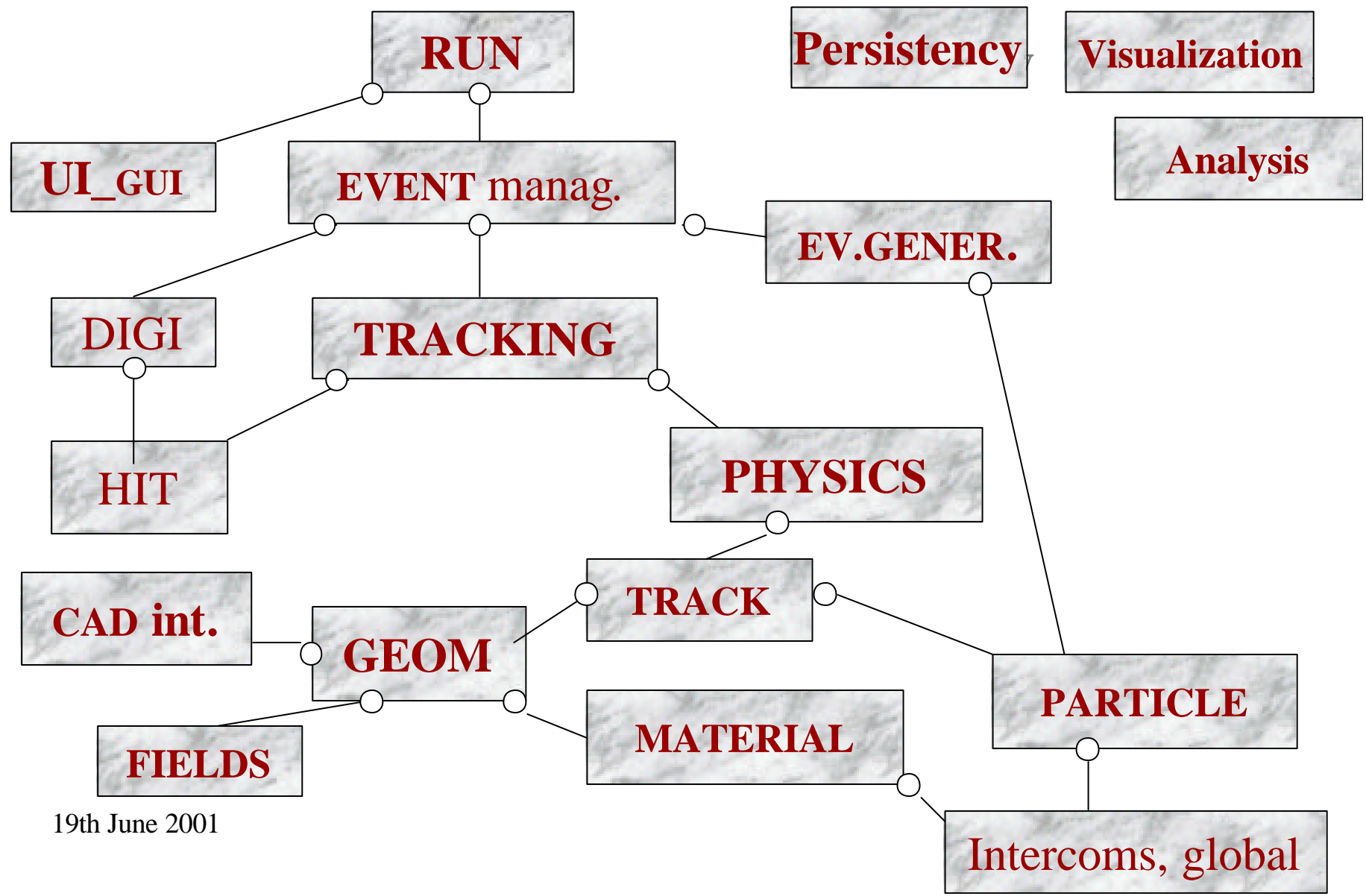


What this introduction covers

Structure of toolkit

- Class Category Diagram
- Stages of development
 - stability vs. development
 - maintenance,
- Full and Fast Simulation
- Underlying libraries

Class Category Diagram



19th June 2001

Class Categories

- Class Category \longleftrightarrow Working Group
- Different Stage of developments
 - kernel: stable
 - physics models: additions, new developments
 - underlying libraries
 - moving to standard C++ (STL, namespaces)

Physics OO Design

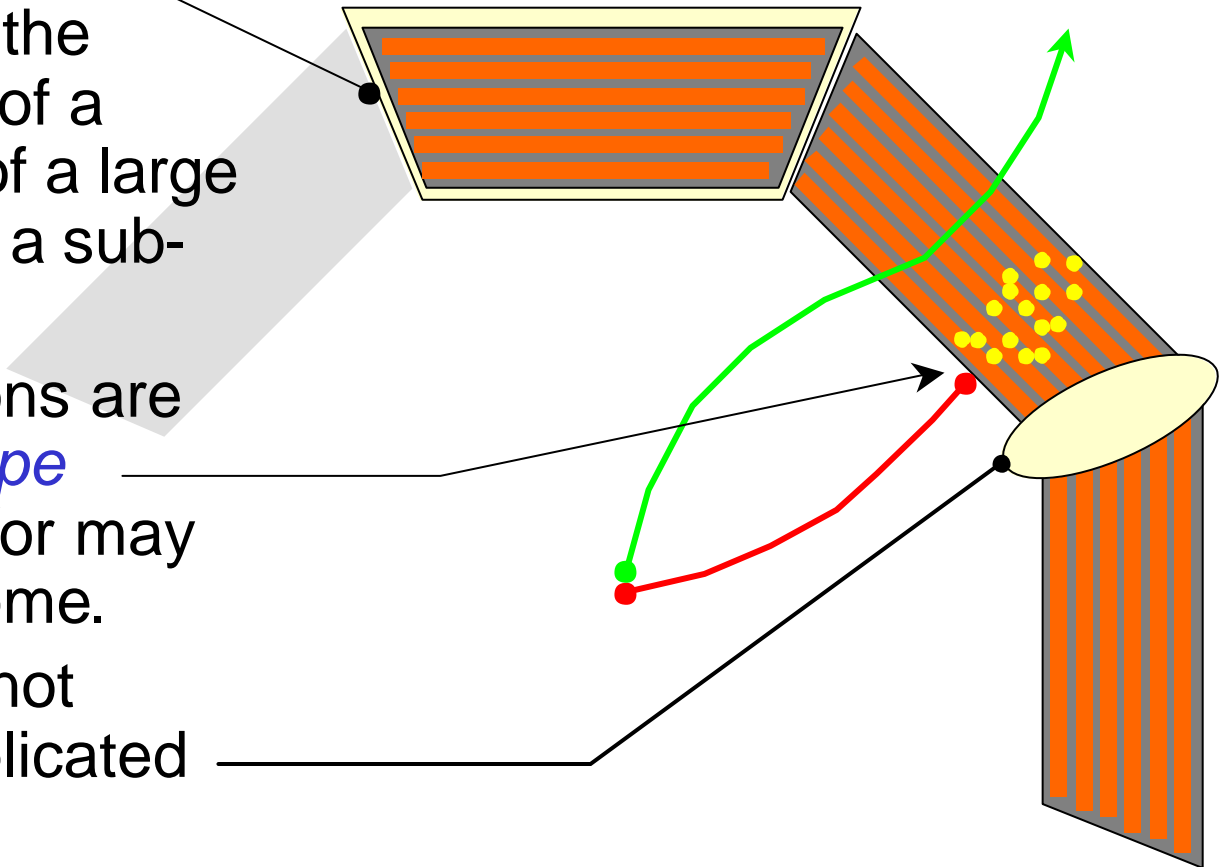
- Limit step: `GetPhysicalInteractionLength()`
- Compute final state: `DoIt()`
- Independence from physics units
- Transparent access to cross-sections from files, tables, analytical formulae
- Multiple implementation of physics models for processes and channels, by energy range, materials/elements and particle types (had. physics)

Parameterization/Fast Simulation

- Fast Simulation Manager
 - Framework for parameterization
 - Takes over from detailed simulation
 - can return to detailed simulation (ex. cracks)
- Can **trigger** on particle, volume, ..
 - Parallel geometrical description
- BaBar developed Bogus based on this.

Parameterisation features

- Parameterisations take place in an *envelope*. This is typically the mother volume of a sub-system or of a large module of such a sub-system.
- Parameterisations are often *particle type* dependent and/or may apply only to some.
- They are often not applied in complicated regions.



THE END

Hadronic physics

- The goal: A hadronic shower simulation toolkit suitable for LHC experiments.
 - Tunable code in the test-beam region
 - Detailed neutron tracking at low energies
 - Safe extrapolation beyond test-beam region
 - Possibility to use variance reduction techniques
 - Easy customizability and extendibility of the underlying physics modeling