

Geant4: Introduction & latest

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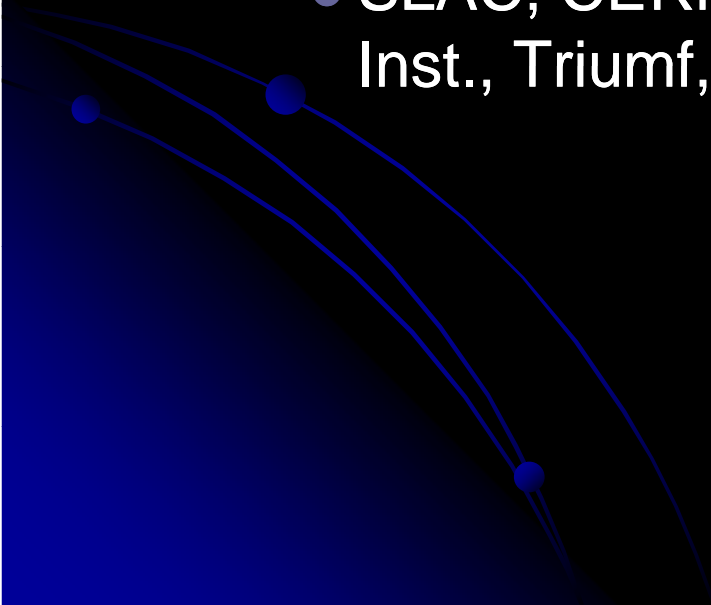
Geant4 Review, 16 April 2006

Outline

- The Geant4 Collaboration
 - New Collaboration Agreement
 - License
 - Active
- Ongoing key activities
 - From physics Validation to user support
 - Recent/open issues
 - CPU Performance
- Recent improvements and in-development

The Geant4 Collaboration

- Revised Geant4 Collaboration (started Feb 2006)
 - Collaboration Agreement agreed 2004/2005
 - Signing parties:
 - SLAC, CERN, ESA, KEK/Japan, IN2P3, Lebedev Inst., Triumpf, HIP, LIP, UK/PPARC, INFN



Active areas: people, effort

Working Group (/ activ.)	FTEs
Hadronic Physics	5.4
Electromagnetic physics – standard	4.8
Visualization	2.4
Geometry	1.7
Run, event and detector response	1.1
User Interfaces	1.1
Testing & QA	1.0
Generic processes & materials	0.9
Software Management	0.8
Documentation Mng	0.7
Particle	0.5
Tracking	0.2
Persistency	0.1
Collaboration matter (activity)	0.7
Advanced Examples	7.5*
Low energy Electromagnetic Physics	N/A
Total	28.6

- ‘Census’ Jan/Feb 2007
- 70 active collaborators
- Notes
 - To add new ~0.4 FTEs
 - * rough new estimate
 - Low E EM Phys.

Geant4 License

- Adopted Open Source license
 - First release Geant4 8.1, June 2006
- Geant4 license copied EGEE license
- Copyright holders maintain copyright
- ‘Users’, anyone can use, copy, redistribute
 - Specific clauses for redistribution of revised version(s)
 - nearly copyleft with opt-out clause
- Provision for commercial usage
 - Written license agreement option (the ‘opt-out’)

Inside Geant4

- Steering Board decides plan of work, papers, scientific/technical matters
 - Plan of 2007 developments March 2007
- Technical Forum provides interface with users on 'bigger' matters
 - Simple/small issues resolved directly
- Oversight Board
 - Review

Some of the Key activities

- Physics Validation
 - Regular, key activity of physics WGs
 - Several extensions in 2006-7
- Model improvement and new physics models
- Support of users
 - Tutorials
- Developments, new capabilities
- Testing

Recent/Open physics issues

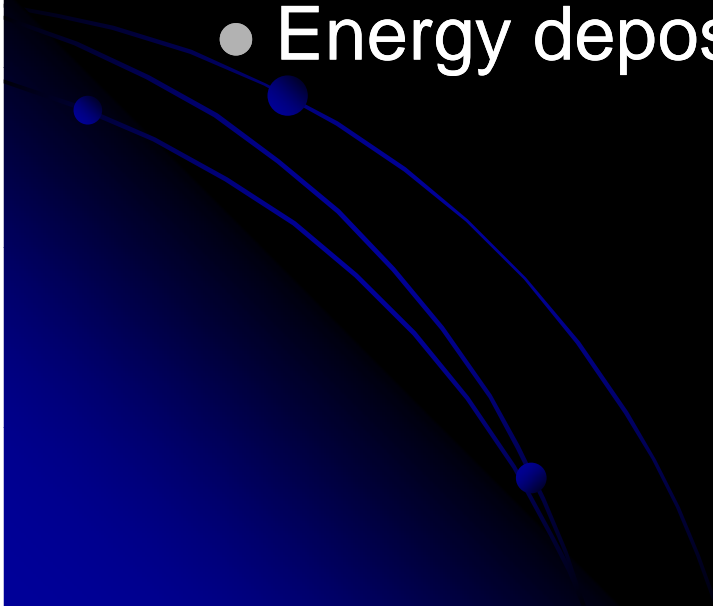
- Hadronic shower shape (LHC test beams)
 - Disagreed with test beam especially $E > 100$ GeV
- Stability of energy deposition near interfaces
 - Sampling calorimeters, medical setups
- Energy deposition in scintillators
 - Elastic scattering on hydrogen
- Need for nucleus-nucleus models

Performance

- New set of 'internal' benchmarks
 - Covering geometry, field, EM, hadronics
- Collaboration/communication on profiling full applications
 - IT (ATLAS, LHCb test cases), CMS
- Revised Multiple Scattering (8.x) impact
 - Kept 'old' CPU/physics trade-off in _EMV physics list
- Trade-off between physics accuracy and CPU speed
 - Physics lists offer options for this

Few highlights (Dec 2005-now)

- Revised multiple scattering algorithm (8.0)
 - Improved accuracy, stability of energy deposit
- New model for stopping particles
- New model elastic scattering (8.1/8.2)
 - Energy deposit in scintillators



In development

- Further refinement of EM energy loss
 - See 'Fano' cavity
- Accounting for diffraction and quasi-elastic 'channels'
 - See 'Shower shapes'
- Extend 'parallel' scoring for charged tracks
 - coupled parallel navigation for any number of geometries