The Generator Sub-project In The LCG Simulation Project

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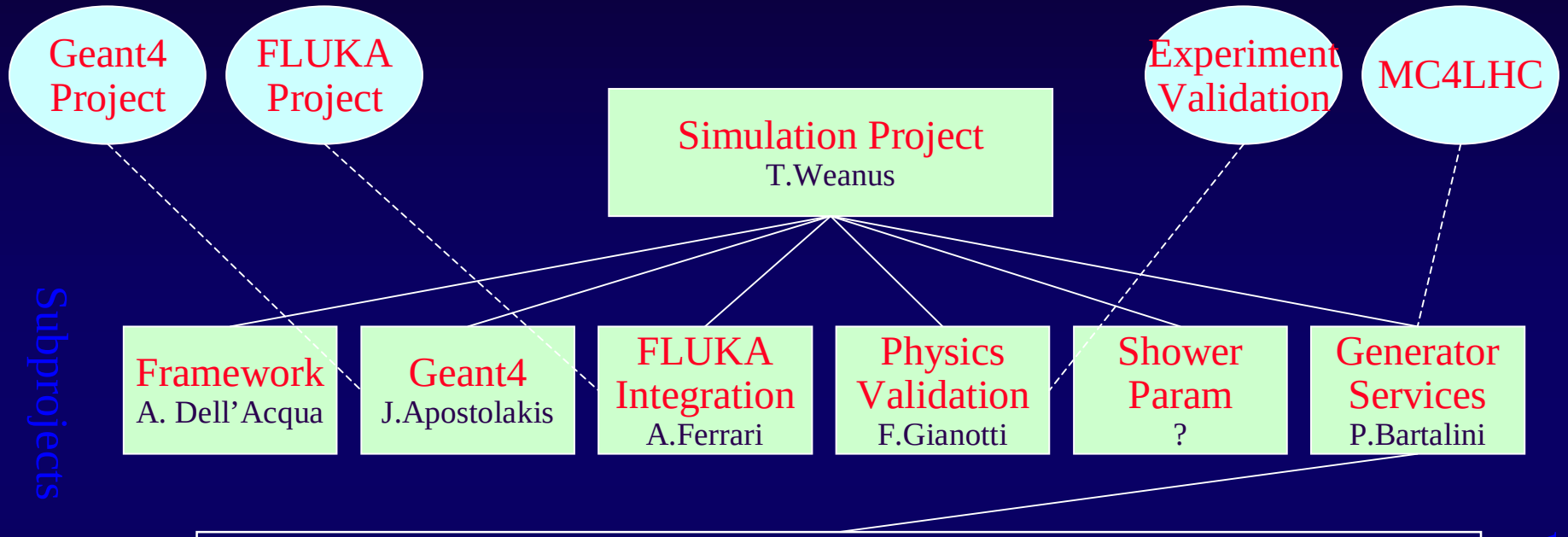
Simulation project in LCG-APP



Work packages

- -- GENERATOR LIBRARY
- -- STORAGE, EVENT INTERFACES AND PARTICLE SERVICES
- -- COMMON EVENT FILES, EVENT DATA BASE
- -- TUNING AND VALIDATION OF EVENT GENERATORS

MC generator RTAG report: http://lcgapp.cern.ch/project/simu/generator/MCGenRtag.doc

Milestones of LCG-Generator

- **ALPHA version of the generator repository (GENSER) ready by 06/30/2003 (OK!)**
- **BETA version of GENSER (with top priority packages) ready by 09/15/2003**
- **Complete migration of MCDB (with persistency) by 11/30/2003**
- **Migration of the first C++ generator package by end 2003**

-- Resources (>=1FTE) allocated by MSU, ITEP and other Russian institutions participating to LCG. Some expression of interest from Italy too.

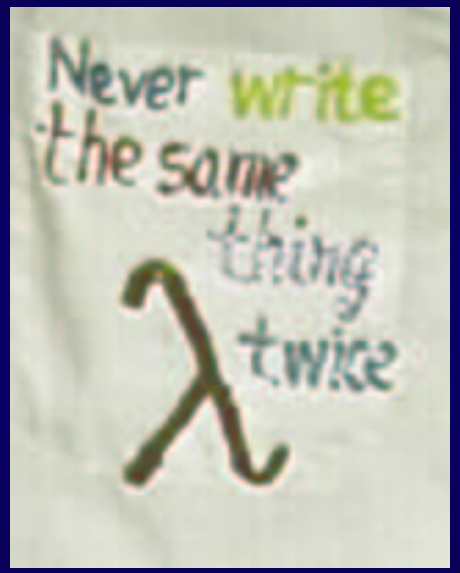
-- A.Sherstnev at CERN since middle may (now leaving)

-- S.Makarichev at CERN since middle july

→Need more resources and collaborations with the LHC experiments to cover other generator work packages

Between Two Worlds

- Small TH groups
- Old/Huge Fortran packages still in development
- Slow response time



LCG Generator

- Large Experiments
- C++ Frameworks
- Challenging requirements

GENSER: The Generator Library

A.Sherstnev, S.Makarychev

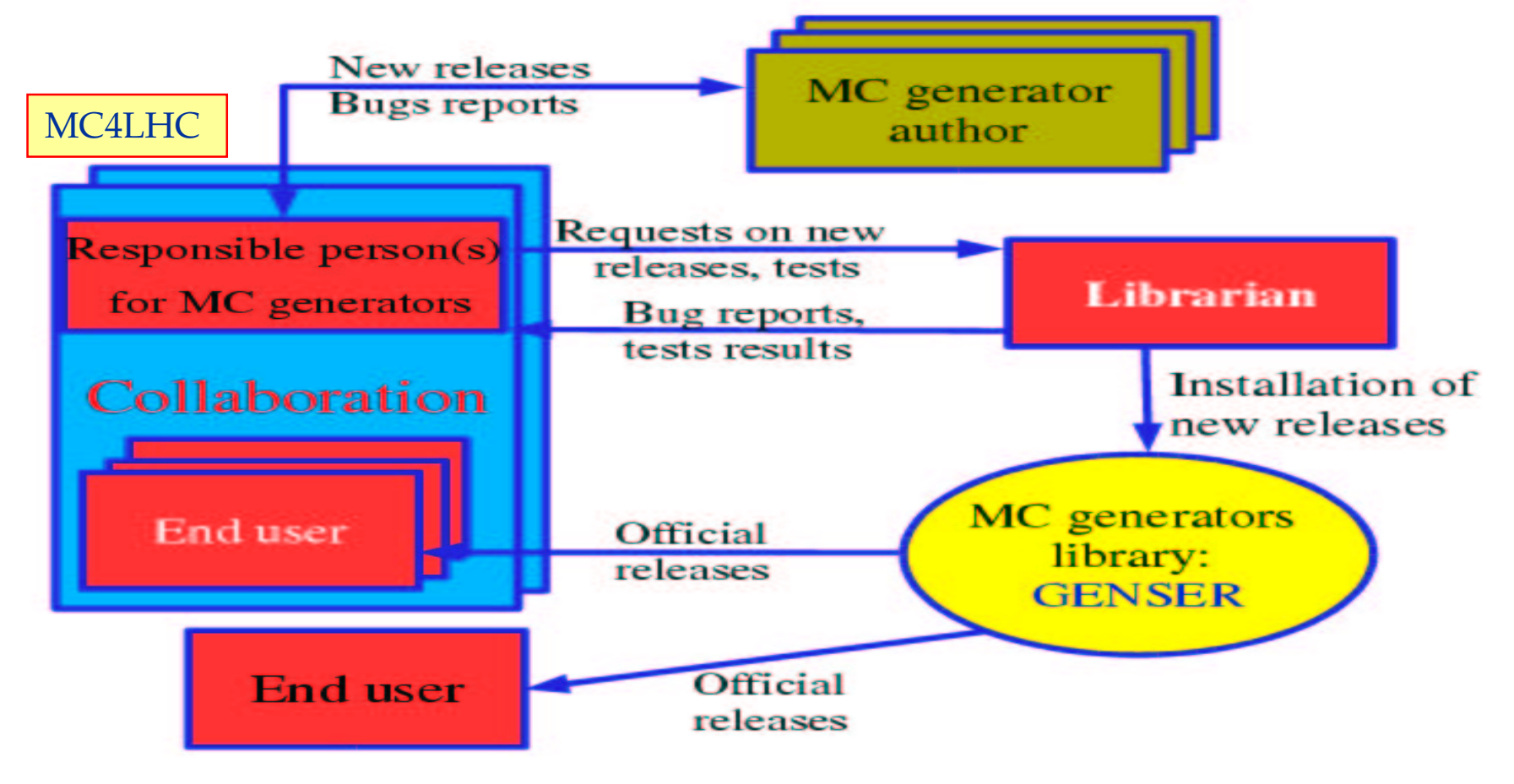
→ Centrally organized code repository for generators and common generator tools
→ Quick releases decoupled from large library releases
→ Maintenance for all LCG supported platforms
→ Top priority: HERWIG, HIJING, ISAJET and PYTHIA.
→ 2nd priority: ALPGEN, COMPHEP, DPMJET, EVTGEN, GRACE, HEPMC, LHAPDF, MADGRAPH, MCDB, NEXUS, PHOJET, PHOTOS, SFM & TAUOLA

Need a second generator librarian from September

GENSER: Sub-package Versions and Validation Scheme

- CVS repository.
- SCRAM release and building tool for librarian and end users.
  - Binary distribution also provided.
- Most of the versions released by the authors will be installed.
- Version control: old versions will be maintained as long as they are required by the end users.
- Test/Validation software for new versions has to be provided by the experiments/theory groups and will be one of the GENSER sub-packages.

Working with GENSER



Internal And External Generator Packages

- **There are two possibilities for the MC generator packages.**
  - **To fully store the MC generator code in GENSER defining the corresponding sub-package.**
    + Flexible maintenance of the code (Experiments need to patch the code!)
    + Convenient distribution and guaranteed installation on all the lcg supported platforms.
    + GENSER can become the development environment.
    - The current structures may not comply with LCG rules.
    - The size of GENSER will increase quickly
  - **To install the MC generator as external software packages in the LCG environment and to store in GENSER just tests suites and other related code (examples etc.).**
    + Less stringent requirements on coding/structure.
    - Procedure for bug report and bug fixes can be unacceptably slow
- **This issue is currently under discussion. A final decision has to be taken by the MC4LHC steering group for each sub-package.**

GENSER as a Development Environment

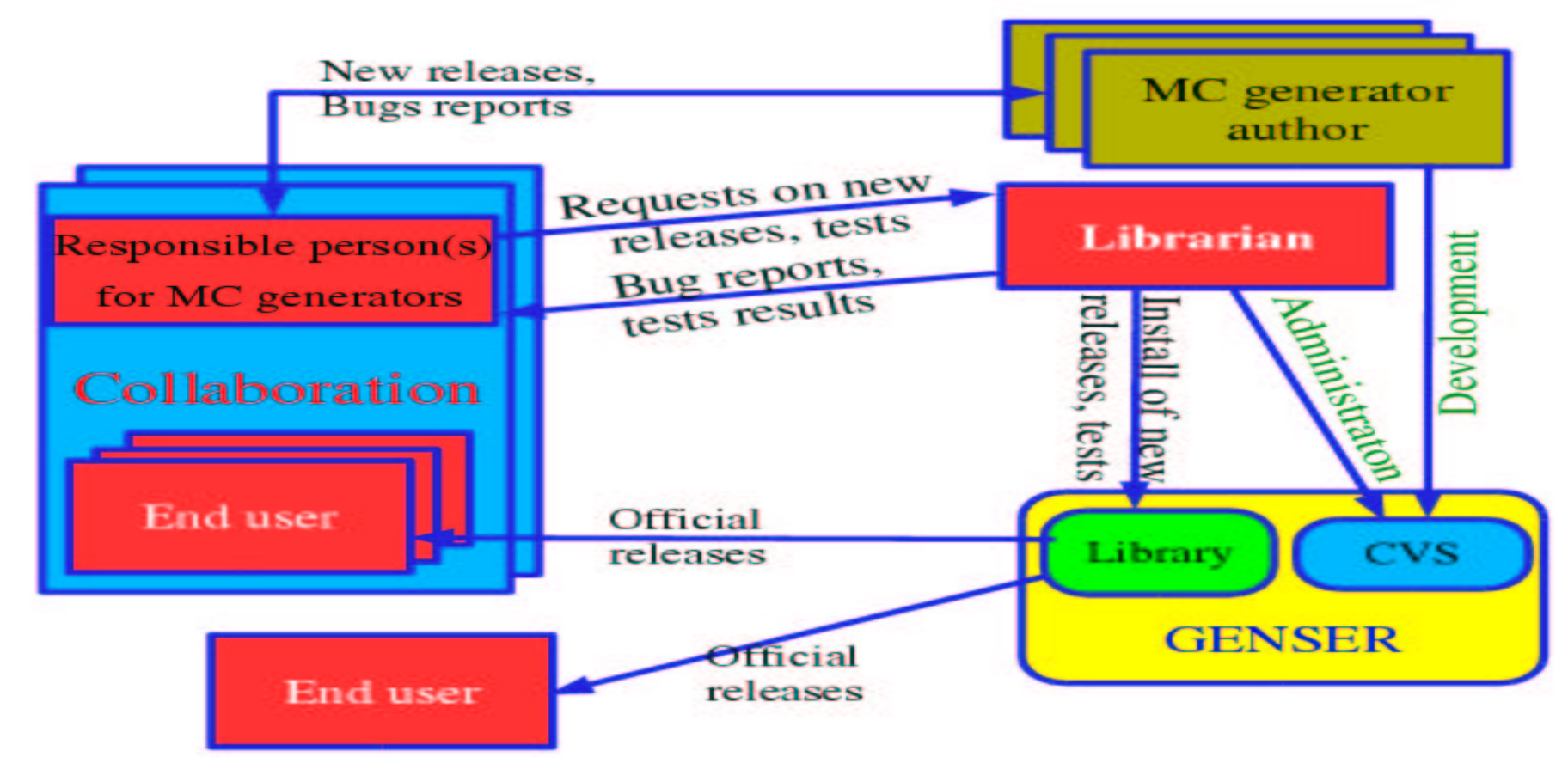
- **GENSER can become a development environment**

  The authors of MC generators can use the GENSER CVS repository for development of the MC generators code.
  - **Solution rejected for most of the well assessed Fortran packages.**
  - **It should apply in particular to new projects.**
  - **A feasability study for Herwigg++, Pythia7, Sherpa and ThePEG will be done October 2003.**

Advantages:

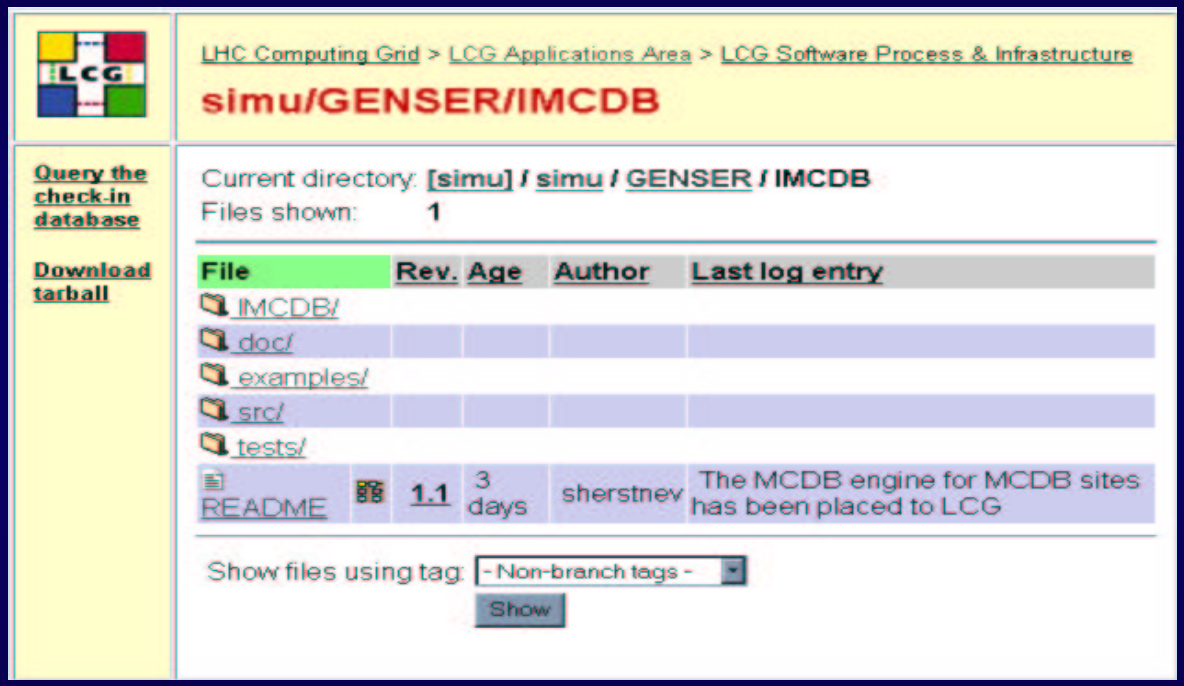
- **MC generators authors would have a convenient environment for development (SPI Tools).**
- **Coding compliance to LCG rules would be guaranteed.**
- **Release, Feedbacks and bug fixes would speed up.**

Working with GENSER as a Development Environment



Progress Report

- **ALPHA version of GENSER ready by 06/30/2003**



LHC Computing Grid > LCG Applications Area > LCG Software Process & Infrastructure

simu/GENSER/IMCDB

Query the check-in database

Download tarball

Current directory: [simu] / simu / GENSER / IMCDB
Files shown: 1

File		Rev.	Age	Author	Last log entry
IMCDB/					
doc/					
examples/					
src/					
tests/					
README		1.1	3 days	sherstnev	The MCDB engine for MCDB sites has been placed to LCG

Show files using tag: - Non-branch tags - Show

First milestone of the project achieved in time!!!

LCG repository for GENSER defined (thanks to A. Aimar).

Begin to fill the repository with the available code
→ First MCDB
→ Now also Herwig, Isajet and Pythia are there.

-- First Feedbacks (W.Pokorski) and Bug Fixes (S.Makarychev):
Getting rid of obsolete stuff. Configuration in Simulation/simu/GENSER/config/
-- Now the product is basically ready to be tested (ATLAS will do it immediatly!)
-- Waiting for blessing from MC4LHC.

Storage, Event Interfaces And Particle Services

- The MC truth
  - HepMC
    - Problems with duplication of versions/missing translators.
    - CLHEP maintenance was not satisfactory → Split (anything else ?)
  - Structure of partonic event files: XMLHEP ?
- The modularisation
  - Basic idea in THEPEG, Pythia 7, Herwig++, Sherpa.
    What are the dependencies ?
  - EvtGen: how to reuse the Fermilab experience ?
    How to avoid duplication of versions ?
- Persistency
  - How to define the common event files ?
- Particle properties in the physics generators and in the simulation/analysis frameworks.
  - Is everybody relying on HepPDT ?

Common Event Files, Event Data Base

- Motivations
  - Some physics processes (the most difficult for generation) should be prepared by experts or MC generators authors.
  - Sharing the same generator events does simplify the comparisons and save CPU time
- There's a product fulfilling such requirements: MCDB, developed for CMS by Lev Dudko et al.
  - http://cmsdoc.cern.ch/cms/generators/mcdb/
- MCDB has interfaces of 2 different types
  - interface based on the Web: a web site with simple access to the available event samples with relative bookkeeping.
  - handy programming interface: automatic generation from local machine once some basic parameters have been set.
- It would be desirable to study how to extend this model to the new ME+PS packages

Tuning And Validation Of Event Generators

New Fitting/Tuning Tool: JetWeb

- Based on HERA HZTOOL package – updated to include Minimum Bias data, Tevatron Jets…[J.M.Butterworth and S.Butterworth hep-ph/0210404] also submitted to Comput. Phys. Commun.
- Web page - http://jetweb.hep.ucl.ac.uk/
- Database of data, MC and comparisons
- Web interface allows access to DB and submission of jobs to generate MC plots
- Good starting point for the LCG-Generator Validation working package

Interactions between authors, librarian and end users

- Now our main task in the lcg generator project is to collect opinions and suggestions of LHC collaborations and theoretical groups about:
  - How we can organize effectively cooperation between MC developers, contact persons in the LHC experiments and our team.
  - Defining time scale and milestones on the transition to the LCG-generator environment for end-users (in particular for the simulation frameworks of the LHC experiments).
- We start to develop the effective ways of this cooperation with the LHC collaborations and with some developer of the generator packages.
  - The LHC collaborations and the developers should nominate a contact person to interact with LCG-Generator (MC4LHC)

Organisational Issues

WEB page:

http://lcgapp.cern.ch/project/simu/generator

-- links to relevant documents and to CVS repository

CDS Agenda Home > Projects > LHC Computing Grid > Physics Generators

-- minutes of meetings, slides of presentations

Applications area mailing list:

project-lcg-peb-apps@cern.ch

Meetings:

-- Kick off meeting in June (mini-workshop)

-- During MC4LHC workshop (in July)

-- Last Thursday of the month at 5 PM in 32-1-A24

(VRVS connection in Desert room)

Kick-off Meeting of LCG-Generator Mini w/s (20 June 2003)

17:00	Introduction (Paolo Bartalini)
17:10	GENSER, the generator repository in LCG (Alexander Sherstnev)
17:25	Parton Shower MC's (Stefan Gieseke)
17:50	Event Simulation Tools in ALICE (Andreas Morsch)
18:15	LHCb event generators status (Witek Pokorski)
18:40	CMS event generators status (Albert De Roeck)
19:05	---long coffe- / short dinner- break---
20:10	Generator support in ATLAS (Ian Hinchliffe)
20:35	HepMC Event Record - Status (Matt Dobbs)
21:00	The requirements from TH (discussion) (tba)
21:25	The MCDB project (Alexander Cherstnev)
21:40	JetWeb (Ben Waugh)
22:05	The LCG Generator subproject - organizational issues (Paolo Bartalini)

2nd LCG Generator Meeting (31 July 2003)

17:00 Introduction (Paolo Bartalini)

17:05 Tutorial on LCG tools (Alberto Aimar)

17:45 Status of GENSER (Sergey Makarychev)

18:00 XMLHEP (Alexander Sherstnev)

18:15 Status of the C++ Event Generator Packages (Alberto Ribon)

18:30 Decay Tables (Peter Z Skands)

18:45 Status of CLHEP split (Mark Fischler)

Workshop on MC's for the LHC (MC4LHC), CERN, 7 july - 2 august 2003

- Web page
  http://mlm.home.cern.ch/mlm/mcwshop03/mcwshop.html
- Seminars from program authors; working groups etc.

1. Matrix element generators (the 4 weeks)
2. N(N)LO tools (7-12 july)
3. Tools for electroweak physics (the 4 weeks)
4. Parton Distribution Functions (weeks 3 and 4)
5. MC's for new physics (9-16 july)
6. Heavy quark and tau decay packages (22-29 july)
7. Minimum bias, Underlying event, and MC tunings (27 july - 2 august)
8. Tools for Heavy Ion Physics (8-11 july)
9. CLHEP and related tools (14-16 july)
10. Herwig++, Pythia++ (21-25 july)