



Status Of The LCG Generator Services Subproject

Alexandre Sherstnev
(Moscow State University)

LCG Generator:



Work Packages and Resources

Subproject of LCG Simulation, activities steered by MC4LHC

- ◆ WP1: GENERATOR LIBRARY
- ◆ WP2: STORAGE, EVENT INTERFACES AND PARTICLE SERVICES (INTERPLAYS)
- ◆ WP3: COMMON EVENT FILES, EVENT DATA BASE
- ◆ WP4: TUNING AND VALIDATION OF EVENT GENERATORS

- Resources for the overall coordination (0.3 FTE) allocated by CMS: P.Bartalini
- Resources for WP1 and WP3 (1.25 FTE) allocated by Russian LCG Team: A.Sherstnev (MSU) and S. Makarychev (ITEP) spent 3 months at CERN, V.Oujinski (JINR) and I.Seluzhenkov (ITEP) are now joining.
- Existing UK-GRID activities in the WP4 domain might be exported in LCG Generator.
- ATLAS traditionally does contribute to WP2.
- Italian participation is anticipated: LCG inclusion of some 2nd priority packages (WP1, WP3) .
- Spanish groups has expressed interest to contribute to the subprojects (F. Matorras)

LCG Generator Services

Milestones



- ◆ **WP1: GENSER Beta (released on schedule: end of September 2003)**
 - ◆ Currently being tested by experiments (CMS, ATALS, ALICE)
 - ◆ New librarian I.Seluzhenkov (now at CERN), S. Makarychev still active from remote
- ◆ **WP1: First C++ Generator in GENSER (12/2003)**
 - ◆ Feasibility study for Sherpa inclusion (F.Krauss)
- ◆ **WP2: Agreement on formats for common samples (12/2003)**
 - ◆ October and November LCG Generator meetings dedicated to this topic
- ◆ **WP1: COMPHEP, ALPGEN, EVTGEN and LHAPDF in GENSER (12/2003)**
- ◆ **WP3: MCDB in production in the LCG environment (1-2/2004)**
 - ◆ LCG Contact person: A. Sherstnev
- ◆ **WP3: Proposal for event production environment (3/2004)**
- ◆ **WP4: Proposal for validation framework (6/2004)**
 - ◆ V.Oujinski already active in this area

WP1:Generator Library Requirements



Quick releases decoupled from large library releases

- Most of the versions released by the authors have to be installed, old versions have to be maintained as long as they are required by the end users
- Maintenance for all LCG supported platforms
- Top priority: HERWIG, HIJING, ISAJET and PYTHIA.
- 2nd priority: ALPGEN, COMPHEP, DPMJET, EVTGEN, GRACE, LHAPDF, MADGRAPH, MCDB, NEXUS, PHOJET, PHOTOS, SFM & TAUOLA
- New large C++ generators: Herwig++, Pythia 7, Sherpa, ThePeg etc.

The Generator Repository (GENSER)

- ◆ CVS repository, AFS public distribution.
- ◆ SCRAM - release, configuration, and building tool for librarians and end users.
 - ◆ Binary distribution is also provided.
- ◆ Automatically generated directory structure (from original MC code).
 - ◆ Some complex packages maintained externally
- ◆ Test/Validation software (provided by the authors and by the users).
 - ◆ Installed in the «Example» and «Test» modules.
- ◆ Code development for WP3, WP4 → **New Modules**



Subpackage versions currently installed in the LCG environment

Package versions pursued for inclusion have been indicated by the contact persons in MC projects and/or by the volunteered beta testers. Further versions and test code can be installed easily.

- 1) **HERWIG** (contact person: P. Richardson): 6.500, 6.503, 6.504
 - Examples from <http://epwww.rl.ac.uk/theory/seymour/herwig/herwig65.html>
- 2) **PYTHIA** (contact person: T. Sjöstrand): 6.205, 6.217, 6.220
 - Examples from <http://www.thep.lu.se/~torbjorn/Pythia.html>
- 3) **HIJING** (contact person: X.-N. Wang): 1.36, 1.37, 1.383
 - No examples available for the time being
- 4) **ISAJET** (contact person still to be suggested by the authors): 7.67, (7.69)
 - Examples available in the ISAJET distribution
- 5) **Sherpa** (contact person: F. Krauss): 1.0
 - Examples from <http://www.physik.tu-dresden.de/~krauss/hep/index.html>
- 6) **MCDB** (contact person: A.Sherstnev): software of the CMS release
 - Examples for authors available in CMS MCDB

GENSER: Progress Report



- ◆ **GENSER was the first repository in the Simulation project**
- ◆ **Inclusion of the Top priority packages has been achieved**
 - ◆ **Convenient «compact» distribution.**
 - ◆ **Installed software are available for the Red Hat 7.3 platform.**
 - ◆ **MC structure just reorganised using macros, end users can patch the code.**
 - ◆ **Safe Double Versioning are applied (FullPackage/Subpackage)**
- ◆ **GENSER BETA release are available from the end of september 2003**
 - ◆ **Documentation:** <http://lcgapp.cern.ch/project/simu/generator>
 - ◆ **GENSER is distributed publicly in** [/afs.cern.ch/sw/lcg/app/releases/GENSER](http://afs.cern.ch/sw/lcg/app/releases/GENSER)
 - ◆ **Currently tested by ATLAS, ALICE, and CMS**
 - ◆ first user feedbacks (from G. Stavropolous, F. Moortgat, A.Moersch).
 - ◆ **Package versions agreed by contact persons in MC projects and/or by the volunteered beta testers.**
 - ◆ Simple procedure to include additional versions and bug fixes.

GENSER structure: Double versioning system



GEN\$EX_X_X/

Config/
\$platform/ Bin/
lib/
tests/

LCG policy on
project code
structure

Src/
Herwig/
Y1_Y1_Y2/
Include/
Src/
Tests/
Examples/
Hijing/ Y2_Y2_Y2/
...
Pythia/



WP2: Storage, Event Interfaces And Particle Services

- ◆ The MC truth Interface
 - ◆ Partonic event files: XMLHEP proposal (LHA I compliant)
 - ◆ HepMC
 - ◆ Problems with duplication of versions.
 - ◆ Evaluate CLHEP 1.9
- ◆ Persistency
 - ◆ Candidates: XMLHEP (parton level), POOL(HepMC) (particle level)
- ◆ The modularisation
 - ◆ Basic idea in ThePEG, Pythia 7, Herwig++, Sherpa.
What are the dependencies ? Inner interfaces?
 - ◆ EvtGen: how to reuse the Fermilab experience ?
How to avoid duplication of versions ?

WP3: Common Event Files, Monte-Carlo Events 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 time/CPU resources
- ◆ There is a product fulfilling such requirements: MCDB (developed for CMS by Lev Dudko (MSU))
 - ◆ <http://cmsdoc.cern.ch/cms/generators/mcdb>
- ◆ MCDB has interfaces of 2 different types
 - ◆ Web interface: a web site with simple access to the available event samples with relative bookkeeping (users can download the files, authors/experts can upload new files).
 - ◆ handy programming interface: automatic finding/interfacing required event samples by user to software at a 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: **storage of particle files**



WP4: Tuning And Validation Of Event Generators

MC-Tester: New Validation Tool (Piotr Golonka et al.)

- Useful librarian tool: comparison of releases of MC generators
- Debugging tool for MC generators and event record formats.

JetWeb: New Fitting/Tuning Tool

- Based on HERA HZTOOL package – updated to include Minimum Bias data, Tevatron Jets, etc. (J.M.Butterworth and S.Butterworth, *Comp. Phys. Comm.* Vol 153/2 164-178 (2003), hep-ph/0210404)
- 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: JetWeb authors are interested to use **GENSER** in
JetWeb

MC4LHC Recommendations



- ◆ The goals of LCG generator (WP1, WP2, WP3, WP4), the defined milestones, the current GENSER structure and the future plans have been approved.
- ◆ **The LCG participation in the MC4LHC workshop has been appreciated. LCG Generator is contributing to advertise the new MC projects and is providing a constant forum for discussions on the generator related software.**
- ◆ It is recommended to improve the collaboration with the MC authors, identifying the contact persons to monitor the inclusion of the existing packages in the LCG environment.
- ◆ **The turn over and the possible loss of well trained people (for instance the librarian) can represent a big problem as all the experiments will soon rely on GENSER. Long term support to LCG Generator members has to be guaranteed by LCG.**
- ◆ **LCG Generator: a new multidisciplinary field ?**
 - ◆ **Working on the border between TH/EP/IT**



Organisational Issues

Web page:

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

-- links to relevant documents and to CVS repository

CDS Agenda Home > Project > LCH Computing Project > Physics Generators

-- minutes of meetings, slides of presentations

Applications area mailing list:

project-lcg-simu@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 or in Island room)

-- September meeting → The GENSER beta release;

-- October meeting → XMLHEP standard for MCDB;



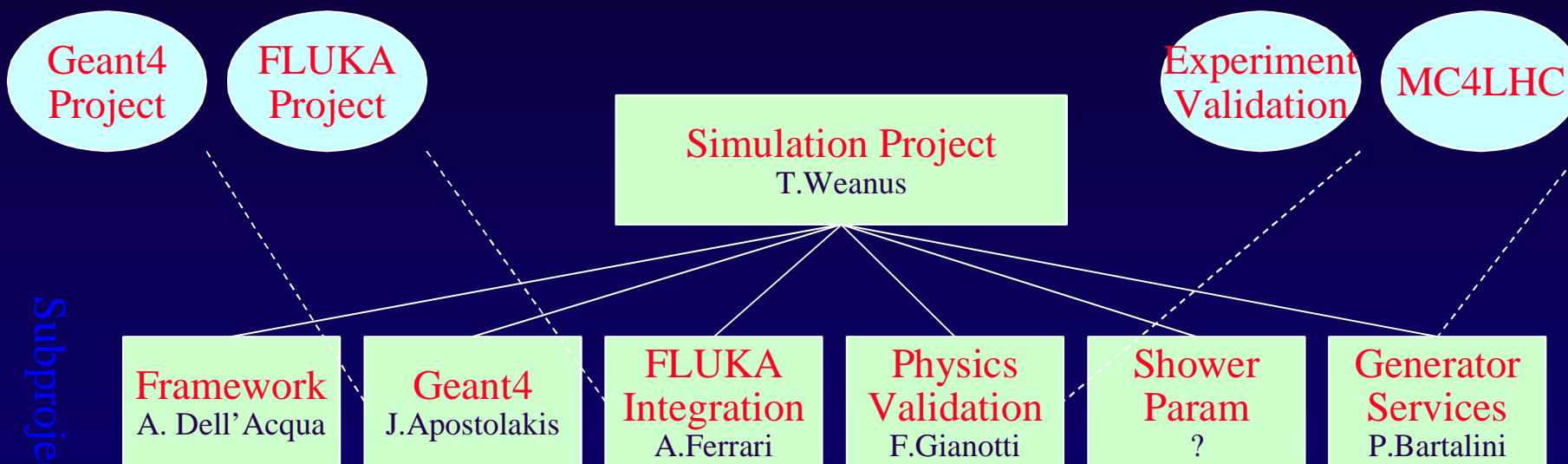
Next Meetings

- ◆ **Persistency for the common event files → 11/27/2003.**
 - ◆ **Get the requirements from the LHC experiments!**
 - ◆ **Evaluate impact on existing projects (MCDB).**
- ◆ **Inclusion of 2nd priority packages in LCG.**
- ◆ **Creation of MC user data base.**



Backup

Simulation project in LCG-APP



Subprojects

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

Work packages

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

Kik-off Meeting of LCG Generator (MiniWorkshop)



(20 June 2003)

- 17:00 Introduction ([Paolo Bartalini](#))
- 17:10 GENSER, the generator repository in LCG ([Alexandre 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 ([Alexandre 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](#))



3rd LCG Generator Meeting

(25 September 2003)

- 17:00 Status of the LCG generator project and feedbacks from the MC4LHC steering group ([Paolo Bartalini](#))
- 17:20 The beta release of the LCG generator repository (GENSER) ([Sergey Makarychev](#))
- 17:55 ATLAS user feedbacks on the GENSER beta pre-release ([Georgios Stavropoulos](#))



4th LCG Generator Meeting

(16 October 2003)

- 17:00 Introduction ([Paolo Bartalini](#))
- 17:10 MC-TESTER ([Piotr Golonka](#))
- 17:45 Using XML in the High Energy Physics ([Alexander Kruekov](#))
- 18:20 XMLHEP: proposal for a structure of partonic events files
([Alexandre Sherstnev](#))



Are the MC packages inside or outside the LCG generator repository ?

- ◆ There are two possibilities for the MC generator packages.
 - 1) To fully store the MC generator code in GENSER defining the corresponding sub-package.
 - 2) 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.).

Just a technical issue!

For each MC package an ad-hoc solution should be found taking into account the user requirements

GENSER as a development environment



If agreed, MC authors could use the GENSER CVS repository for the development of the MC generators code.

- ◆ **Solution rejected for most of the well assessed Fortran packages.**
- ◆ **It should apply in particular to new projects.**
- ◆ **MCDB already migrated in GENSER**
- ◆ **Feasibility study for the inclusion of Sherpa will start soon.**

Advantages:

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

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



Between Two Worlds

- ◆ Small TH groups
- ◆ Old/Huge Fortran packages still in development
- ◆ Cannot spend all the time to give user support

LCG Generator

- ◆ Large Experiments
- ◆ C++ Frameworks
- ◆ Challenging requirements