

# Status of Herwig++ Atlas Integration

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# Outline

- Introduction
- Herwig++ Atlas Integration
- Current status & TODOs
- Summary



# Introduction

- Herwig:  
written in Fortran, last version is 6.5  
the following versions are just for bug-fix.
- Herwig++:  
Implemented by C++, based on Herwig.  
with many improvements on **shower, hadronization, hardon decay** and **BSM physics**, etc.

see the homepage for more:

<http://projects.hepforge.org/herwig>

# Current status of Herwig++

- Herwig++ 2.0: released at Sep. 2006

First version can be used for **hadron-hadron physics** and includes the full simulation for both initial and final state QCD radiation.

[ArXiv:hep-ph/0609306](https://arxiv.org/abs/hep-ph/0609306)

- Herwig++ 2.1.0: released at Nov. 2007

The version is **fully ready for the simulation of events** in hadron-hadron collisions.

[ArXiv:0711.3137v1](https://arxiv.org/abs/0711.3137v1)

- Herwig++ 2.1.2, released at Jan. 2008

The last version. bug fixed for 2.1.0, 2.1.1

[ArXiv:0711.3137](https://arxiv.org/abs/0711.3137)

# A little to Herwig++ techniques...

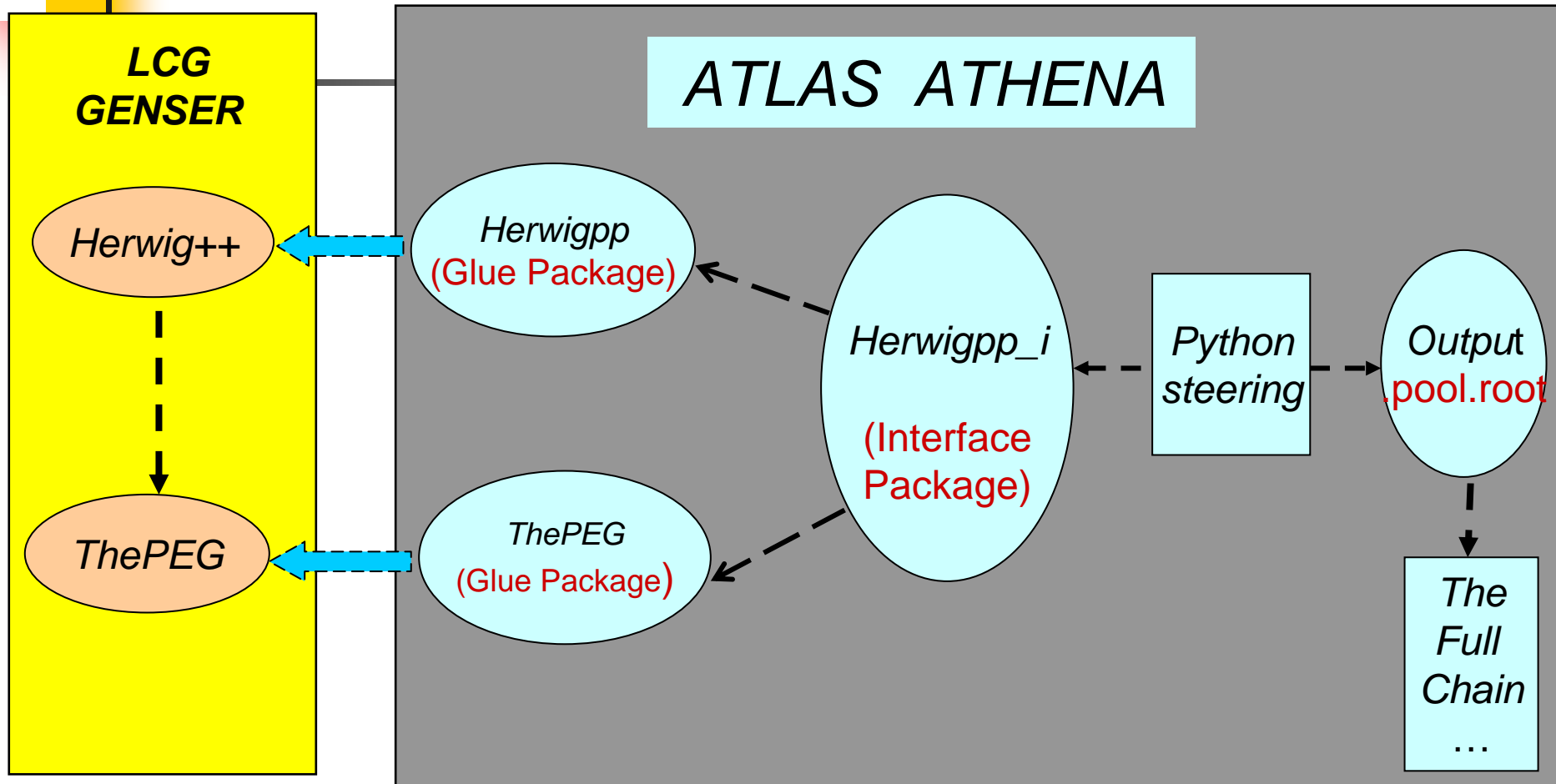
- Herwig++ is based on **ThePEG**, i.e. a **ToolKit** for **High Energy Physics Event Generation**
- The idea is to have a common **framework**, in which event generators would be built, i.e. so called **splitting the infrastructure part of a generator from its physics part**.
- The last version of ThePEG is **1.1.1**, more information please see:

<http://www.thep.lu.se/ThePEG/>

# Herwig++ Integration to Athena

- Herwig++ is maintained on **GENSER** from the version of 2.0, the newest one is 2.1.2.
- ThePEG is maintained on GENSER from version 1.0, the newest one is 1.1.1
- The Atlas integration of Herwig++ is to implement that one can use python joboption to **call and steer Herwig++ within Athena framework.**

# The illustration of the Integration



# Interface package: Herwigpp\_i

Implemented by only one C++ class(named `Herwigpp`):

- Constructor `Herwigpp::Herwigpp(...)`  
define the **command vector** for steering in Joboption  
(the steerable parameters: generator type, specified physics process, seed, number of events, and so on...)
- At initializing phase `StatusCode genInitialize()`  
**read and apply the config parameters from joboption**, and then,  
make a **"run" object** from the config repository
- Run generator `StatusCode Herwigpp::callGenerator()`  
**generating events from here**
- Fill event in HepMC format `StatusCode Herwigpp::fillEvt(...)`  
**convert event to HepMC**
- At finalization phase `StatusCode Herwigpp::genFinalize()`  
tidy up and print out run stats. etc.



# problems and solutions

## ■ Problem appeared on the first compilation of the packages:

this is related to HepMC transition...

- Herwigpp\_i: use the new HepMC (External/AtlasHepMC, migrated from GENSER)
- But GeneratorModules, TruthHelper and GeneratorObjects use old HepMC (Simulation/HepMC, Atlas own)

Patched/fixed all the relative packages

## ■ Failure in Herwigpp\_i module initializing

this is related to a bug in the Herwig++ itself...

- problem eventually isolated in Herwig++ version 2.1.1
- parton shower module balks at new particle “uniqueId”
- Only under certain run conditions (without writing of “run” file), but Herwigpp\_i must use those run conditions.

Fall back to an older version, interface Herwig++2.1.0 to Atlas.

## ■ Other...



# Current status & TODOs

- **The interface works**, can get the output in hepMC or pool.root format. compile and test under release 13.0.30
- **Steered from job option not good**, so far putting many Herwig++ config parameters in Herwigpp\_i.
- **Runtime/build-time determination of LCG platform tag** ( such as slc4\_amd64\_gcc34, slc4\_ia32\_gcc34, ... )  
the interface needs to know this tag at runtime to dynamically load Herwig++ modules and read basic configuration files, so far a hard-coded way was used.



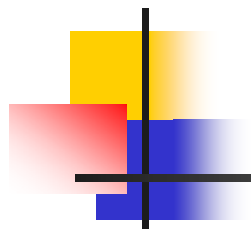
## Current status & TODOs cont'd

- More test needed for **DumpMC**, **AthenaPool**, make sure it works correctly.
- Will include by **release 14.0.X?** , **RTT** test.
- Future, physics validation.



# summary

- Hewig++2.1.0 is interfaced to Atlas currently, next one should be Herwig++2.1.3 (not coming out yet).
- Packages of Herwigpp\_i, Herwigpp and ThePEG have been added in CVS.
- Integration is ongoing and many test need to do.



# Backup Slides



## “Glue” packages : Herwigpp, ThePEG

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- Standard Atlas “configure” Package, no c++ code, just the CMT-known commands in requirements file.
- Providing the exported directories of the shared libraries and header files of and ThePEG and Herwig++, which were installed on non-atlas area.

# Dependencies of the Interface package of Herwigpp\_i in Athena

