Generator Group report

Judith Katzy

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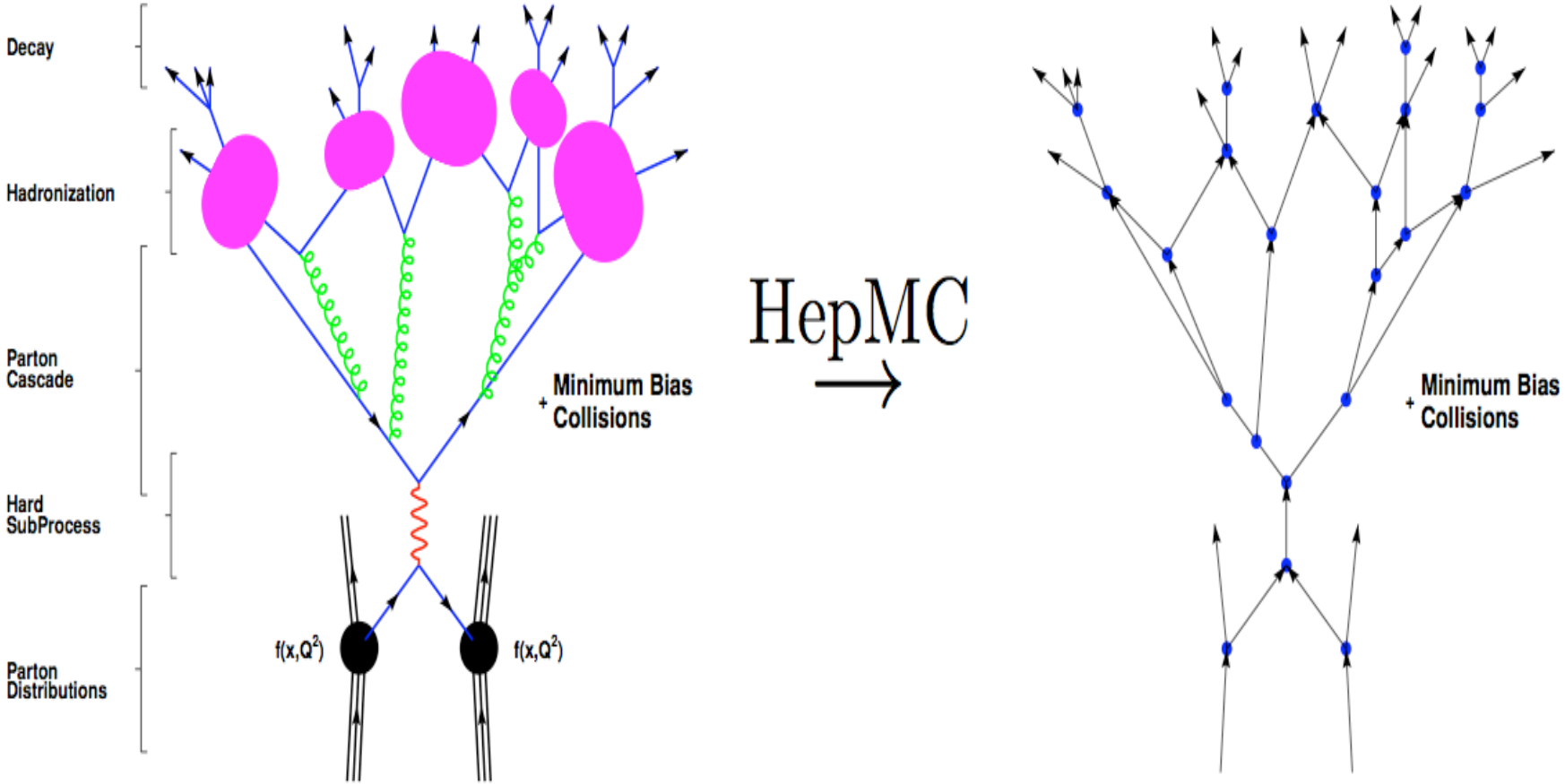
Generator group responsibility

- Code maintenance starting with release 14 (deadline 26/02/08):
  - Bug fixes and version upgrades
  - Help to interface new generators
- New developments - deliverables for release 14:
  - Migration of HepMC
  - Interface to Herwig++ (see ZhongHuas talk)
  - Interface to Pythia8
  - Update of TruthHelper structure (MC truth accessing codes)
  - Documentation of code (doxygen)
  - New generators
  - RTT jobs

HepMC event record - the idea



HepMC I/O

- hepmc format (C++ iostreams) for event storage
- Ascii (similar to pythia 6 output) for human readability
- HEPEVT common block for interfacing to Fortran event generators

HepMC in Atlas

Cano Ay

- Up to release 13 an Atlas specific version of HepMC has been used based on HepMC1
- To profit from GENSER installation and from code updates migration to HepMC2 was highly desired
- Involved some API changes and modification of 125 client packages
  - Implemented in specific development branch in cvs
  - Work completed last week
- Special tests for I/O successfully passed (S.Binet)

Generator Responsibles

- Following a PC suggestions, a responsible persons for each generator has been assigned that will
  - Know about the current status
  - Perform validation
  - Provides user support

- From DESY we have
  - Ewelina, Sergey for Pythia
  - ZhongHua for Herwig++
  - Judith for Cascade

Documentation

Ewelina Lobodzinska, Judith Katzy

- Attempt to document all Atlas software with doxygen and Twiki, special reviews organised for feedback to authors
- Generators software modified for doxygen documentation
- TWiki restructured as part of the MC Group Twiki:
  - One page for each generator:
    - Collect all information on status, validation and code
    - Maintained by generator responsible person
  - Special pages for general generator info:
    - Software framework
    - Truth information on AOD/ESD
    - Event filters
    - Parton densities
- Generator documentation review successfully passed on 21/1/08

Pythia8

James Monk

- New version for future development of pythia
  - Written in C++
- Interfaced to athena to run with release 14
- Ready for testing

Truth Helper update

James Dean, Tom Doherty, Ewelina Lobodzinska

- Set of classes to select particles of certain types, e.g. returns
  - only generator produced (no Geant particles)
  - only stable particles
  - Bremsstrahlung particles
  - …
- Runs against the HepMC events and hides the complex status codes from the user
- Up to release 13 code existed partially in Generator and partially in AtlFast, some of it was dublicated
- For release 14 all code has been cleaned up and moved to Generators package with a specific namespace TruthHelper
- Involved ~25 client packages and a special development branch in the release scheme -> hopefully completed today

New MC: Baur MC

Andrea Bocci

- $W\gamma/Z\gamma$ LO MC
- $|M|^2$ calculated with
  - all ISR+FSR diagram interferences
  - lepton-spin correlations included
  - all anamalous gauge $VV\gamma$ couplings included
- Extensivly used at Tevatron with strong support from author
- Interface for Atlas (hopefully) ready for release 14

MC School

- MC school on MC techniques and physics with talks of the authors of Pythia, Herwig, Cascade and Sherpa
- Part of the “Physics at the Terascale” Helmholtz alliance analysis center at DESY
- Will be at DESY 21.-24.4.08
- Registration required until 15.3.08

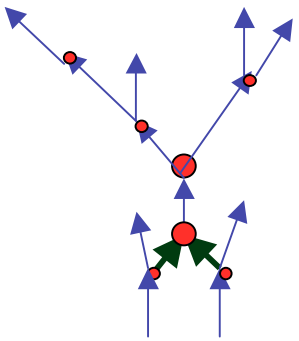
Summary & Outlook

- DESY group for generator support is now active
  - Learning curve for first group on software management level at DESY almost completed
- All of the primary goals for release 14 have been met
- Desy people also involved for Generator validation and Generator main responsibles
- For the future some reorganisation of the code, new generators and validation in special analysis and using RTT are forseen

HepMC event classes

HepMC event

Signal process id
Event number
Event scale
Weight(s)
Random nr state
α_{QCD}
α_{QED}
*pdf information
*beam particle 1
*beam particle 2
*signal process vertex
List of vertices



HepMC Vertex

Position
Vertex id
Spin density matrix
Weight
Barcode

List of incoming particles
List of outgoing particles

HepMC particle

Momentum
Polarization
Id
Status
Barcode
*Production vertex
*Decay vertex