HepMCAnalysis

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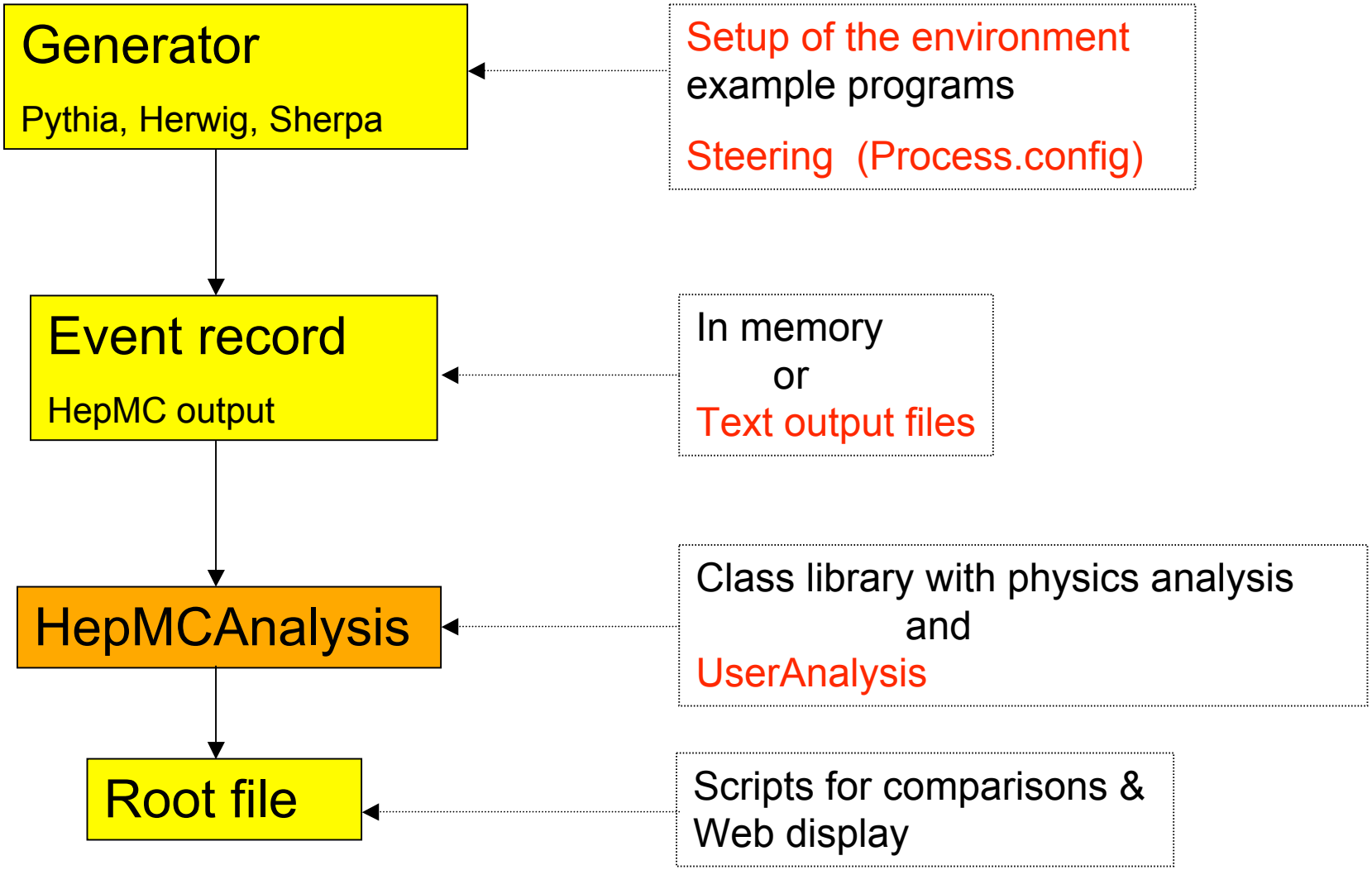
HepMC Analysis Tool

- Framework for MC generator studies including process generation and analysis
- Covers all aspects of mc generation, e.g. hard process, underleying event, parton showers,…
- Covers wide variety of physics processes, e.g. pp->Z, pp->dijets, pp->W+Jets,…
- Used for generator comparisons and validation e.g. regression tests in ATLAS and in LCG Genser group
- See project homepage: hepmcanalysistool.desy.de for releases, publications and doxygen documentation

HepMCAnalysis tool will be used for the exercises

HepMC Analysis Components



Generator

Pythia, Herwig, Sherpa

Generator Services Project

- Part of the LHC Computing Grid Project
- Provides
  - Installation of generators on cern afs and as mirror on desy afs
  - Some validation of generators (partially using HepMCAnalysis Tool)
  - Links to generator web-sites
- Used by all LHC experiments as source of generator codes and libraries for their production

In this school you will use the installed generators from GENSER

List of Generators in GENSER

alpgen	2.1.3d	2.1.3b	2.1.3	2.1.2	2.1.1																		
cascade	2.0.1	1.2.10																					
charybdis	1.003hp	1.003h	1.003																				
evtgenlhc	9.1	8.16	8.15.1	8.15	8.14																		
herwig	6.510	6.510.2	6.510.3																				
herwigpp	2.3.1	2.3.0	2.2.1	2.2.0	2.1.4	2.1.2	2.1.1	2.1.0	2.0.3	2.0.2	2.0.1												
hijing	1.383bs.2																						
hydjet	1.6	1.5	1.4	1.3	1.2	1.1																	
isajet	7.75	7.75.2	7.69	7.69.2																			
jimmy	4.31	4.31.2	4.31.3	4.2																			
lhapdf	5.7.0	5.6.0	5.5.1.a	5.5.1	5.4.1	5.4.0	5.3.1	5.3.0	5.2.3														
mcatnlo	3.31																						
phojet	1.10	1.10.2																					
photos	215	215.2	215.3	215.4	215.5																		
powheg	1.0																						
pyquen	1.5	1.4	1.3	1.2	1.1																		
pythia6	420	420.2	419.ac	419.ac.2	419	419.2	418	418.2	416	416.2	415.2	414.2	413.2	412	412.2	411	411.2	411.3	410	410.2	409	409.2	326
pythia8	120	108	107.1	107	105	100	095.1	095	090	080	070												
sherpa	1.1.3.2p	1.1.3.2	1.1.3	1.1.2.2p	1.1.2.2	1.1.2	1.1.1	1.1.0	1.0.11p	1.0.10	1.0.9	1.0.8											
stagen	1.11																						
tauola	27.121	27.121.2	27.121.3	27.121.5																			
thepeg	1.4.1	1.4.0	1.3.0	1.2.0	1.1.2	1.1.1	1.1.0	1.0.1															
toprex	4.23																						
winhac	1.24	1.23																					

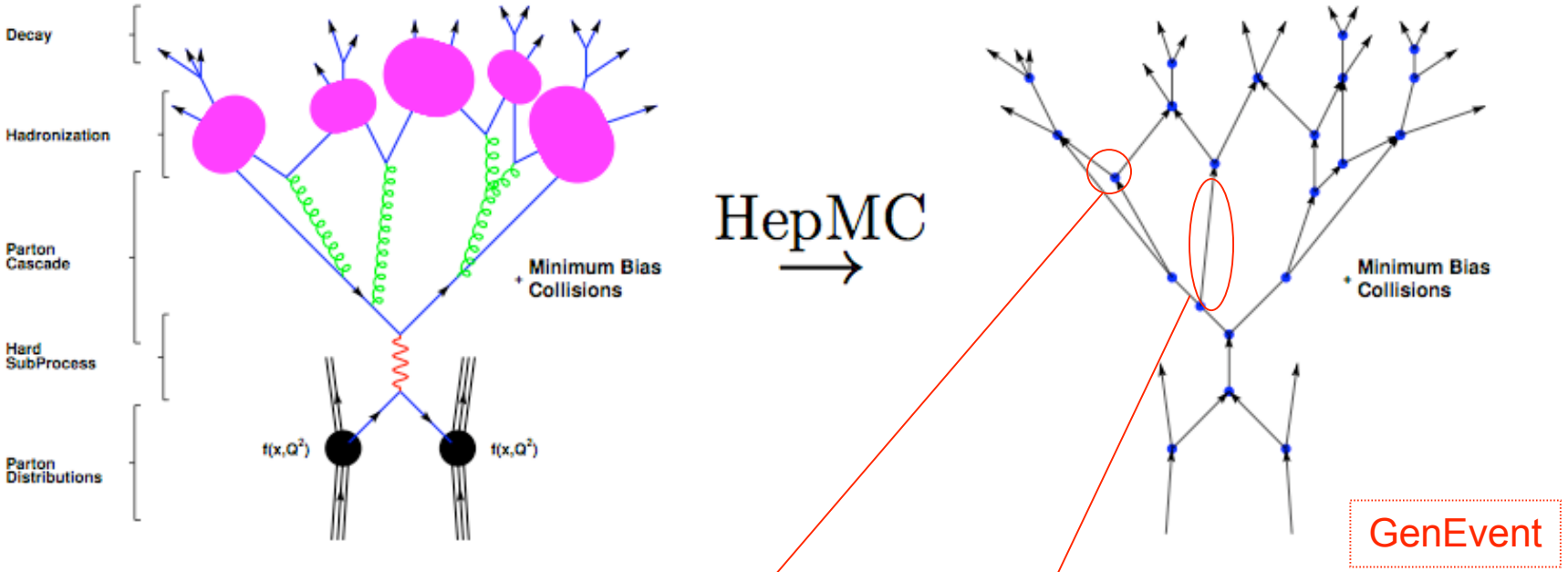
And MCTools & formats: HepMC, LHAPDF, HepMCAnalysis,MCTester, Rivet,…

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

Event record

HepMC output

Particle event record:HepMC



GenVertex
List of ingoing particles
List of outgoing particles

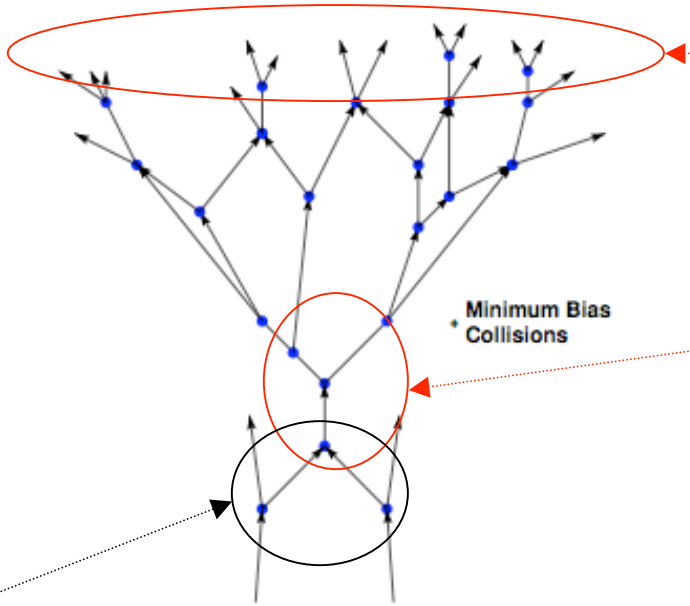
GenParticle
PDG id
Status Code 1,2,3,…
Four momentum

See Spreadsheet HepMC in 5 seconds for more details

Event record

HepMC output

Particle event record: status codes



Undecayed particles:

status code 1

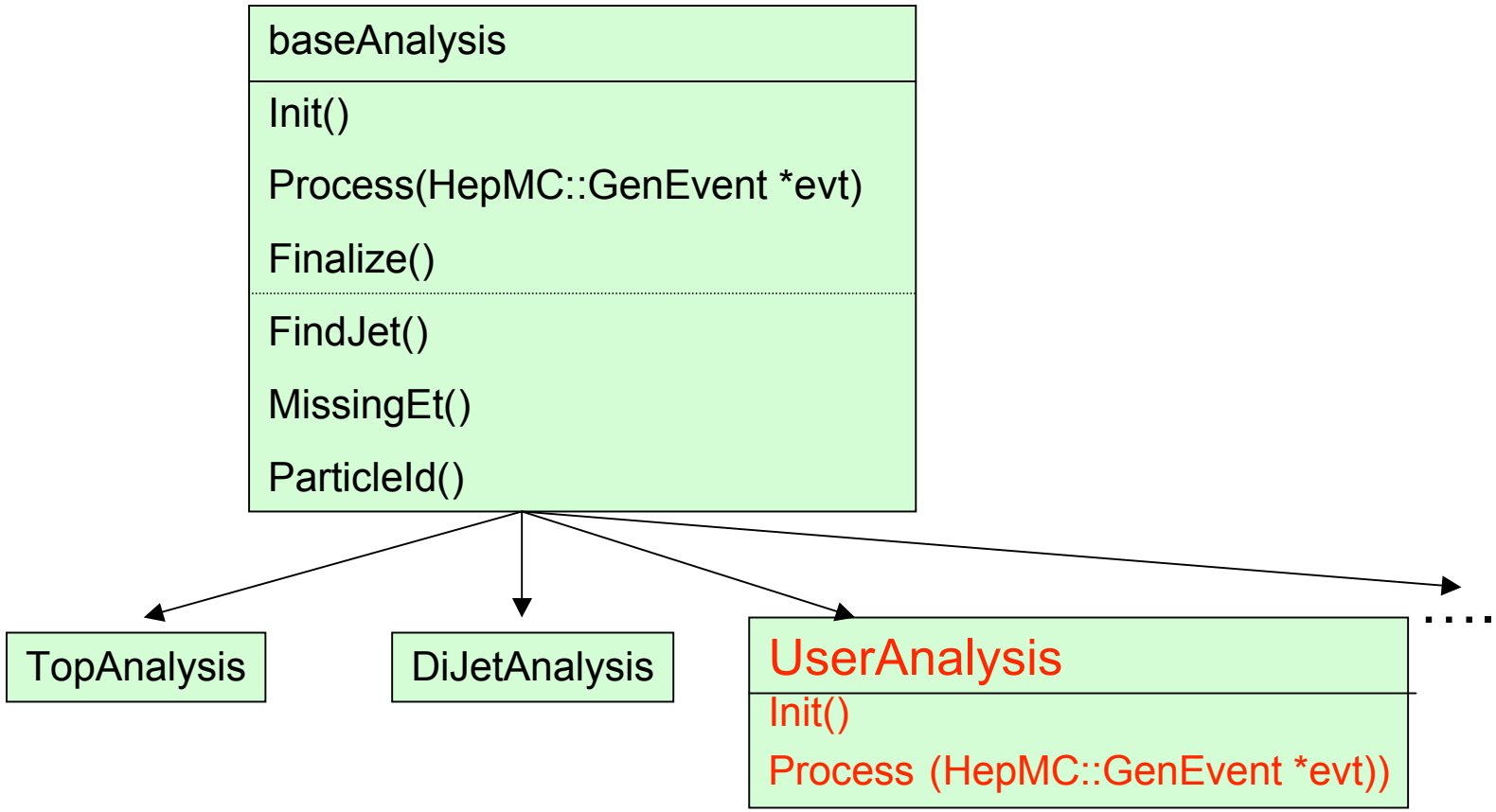
No end vertex

Decayed particle:
Status code 2
End vertex

Incoming particles:
Status code depends on generator,
e.g. 3 for pythia

HepMCAnalysis

HepMC Analysis - class structure



See spreadsheet HepMCAnalysis for more details

Your Analysis

- Generate Gluino Pairs at LHC using different generators
- Generate SM W+jet background using different generators
- Write your own analysis separating signal from background and filling corresponding histogramms
- Compare normalised root histogramms to see whether we could detect SUSY at LHC

One groupe per generator

Use for all exercises