Rivet status and direction

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MCnet 3rd Annual Meeting, 2008-01-09
Outline

1. Introduction
2. Rivet
3. AGILe
4. The Rivet system

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Rivet status and direction
In this talk: Rivet+AGILe generator validation system overview and update

Rivet is a means to several ends:
- In Lars’ talk: a closer look at some Rivet analyses
- In Hendrick’s talk: Rivet as a data source for generator tuning
- In James’ talk: JetWeb (which will use Rivet!)

Hopefully I’ll give a quick demo
(if my laptop doesn’t misbehave)
Rivet and AGILE

- Rivet is a C++ generation validation library, which operates on HepMC event objects.
- Generator steering by AGILE — A Generator Interface Library.
- rivetgun executable is an easy way to run generators and Rivet analyses.
- http://projects.hepforge.org/rivet
The Rivet system

FHerwig
FPythonia
Charybdis
AlpGen...

Pythia 8
Sherpa
Herwig++

generate events

AGILe
(C++ gen. interfaces)

request events

HepData

histo binnings

rivet

rivetgun

ref. histos

MC histos

histos

Validate

histos

steer parameter choice

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Rivet status and direction
Rivet details

- Combination of tools, analysis handler and analyses
- Based around auto-cached Projections acting on HepMC events
- Analysis routines use Projections to make distributions
- Analysis plugins: detected at runtime by scanning candidate libraries
- Data analysis via AIDA interfaces (for now): output as AIDA XML, “raw” and ROOT
- Histogram autobooking: use HepData to make reference histos installed with Rivet

http://projects.hepforge.org/rivet
Rivet projections

A quick selection:

- **Final states:** normal, DIS, “vetoed”, charged, hadronic...
- **Event shapes:** thrust, sphericity (regularised), $C$ & $D$, hemispheres
- **Jets:** $k_T$, CDF “track jet”, DØ ILC, SISCones, CDF RunII
  *Midpoint (Durham, JADE needed)*
- **Misc:** jet shapes, primary vertex position, secondary vertices...
Two illustrative examples

**LEP:** ALEPH\_1991\_S2435284, DELPHI\_1996\_S3430090

**Tevatron:** CDF\_1994\_S2952106, CDF\_2001\_S4751469, CDF\_2005\_S6217184, CDF\_2006\_S6653332, CDF\_2007\_S7057202, D0\_2001\_S4674421, D0\_2004\_S5992206

**HERA:** H1\_1995\_S3167097, ZEUS\_2001\_S4815815

Want/need more
Recent Rivet developments

- Improved analysis name scheme
- Highlighted output
- Speed improvement with autobooking
- Removed HepPDT/HepPID dependency
- Replaced CLHEP with own vectors and matrices (+ binary dep on GSL)
- Replaced KtJet with FastJet
- … a lot has happened since HERA-LHC in Nov
Rivet TODOs

For 1.0 release:
- Manual!
- Code review of projections and analyses: lead by example
- Make as compatible as possible with LCG AFS area

Later: more analyses and projections... 

Partial re-designs? Base on feedback & demand
Uniform C++ class interface for generators

- Generators inherit from `Generator` interface class
- Common features: `setInitialState`, `setParam`, `setSeed`, `makeEvent`...

- Each generator builds a plugin library
- Plugin loading infrastructure also part of AGILe
- [http://projects.hepforge.org/agile](http://projects.hepforge.org/agile)
Supported generators

- Fortran Herwig + Jimmy + Charybdis + AlpGen
- Fortran Pythia + Charybdis + AlpGen
- Pythia 8
- *Herwig++ and Sherpa*
AGILe TODOs

- **Herwig++**: problem with HepMC when more than one `GenEvent` alive? Real problem?
- **Sherpa**: “just” needs testing and special treatment because of make-libs phase. Can maybe avoid expected crash later by catching the “normal” exception
- Compatibility with Genser generator distribution and automatically use LCG AFS area
- *Read HepML for JetWeb: GeneratorState I/O development by James Monk*
- A bit of tidying up, e.g. logging (not essential for 1.0)
Both Rivet and AGILe are libraries — we need an executable that uses them

Enter `rivetgun` — makes HepMC events via AGILe and (optionally) runs Rivet

Generators dynamically loaded as “plugins”

Lots of command line control switches! Try `rivetgun --help`

Example: `rivetgun -g CharybdisFPythia:6411 -n 50000 -P lep1.params -p "PARJ(82)=13.258936" -a EXAMPLE -a DELPHI_1996_S3430090`
Time for a quick demo!

- Analysis and projection code
- rivetgun: write HepMC to file
- Autobooking: see it with `-l Rivet=TRACE`
- Run analyses: browse output and XML
Summary

- Rivet and AGILE release 1.0 in next few weeks
- Analyses need to come from somewhere: MCnet is an obvious place
- We will help to get you started: it’s really not that complex
- MCnet demands will steer much of Rivet’s direction: please use it and provide feedback