Rivet status and direction

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Outline

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Intro

- 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)

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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`**

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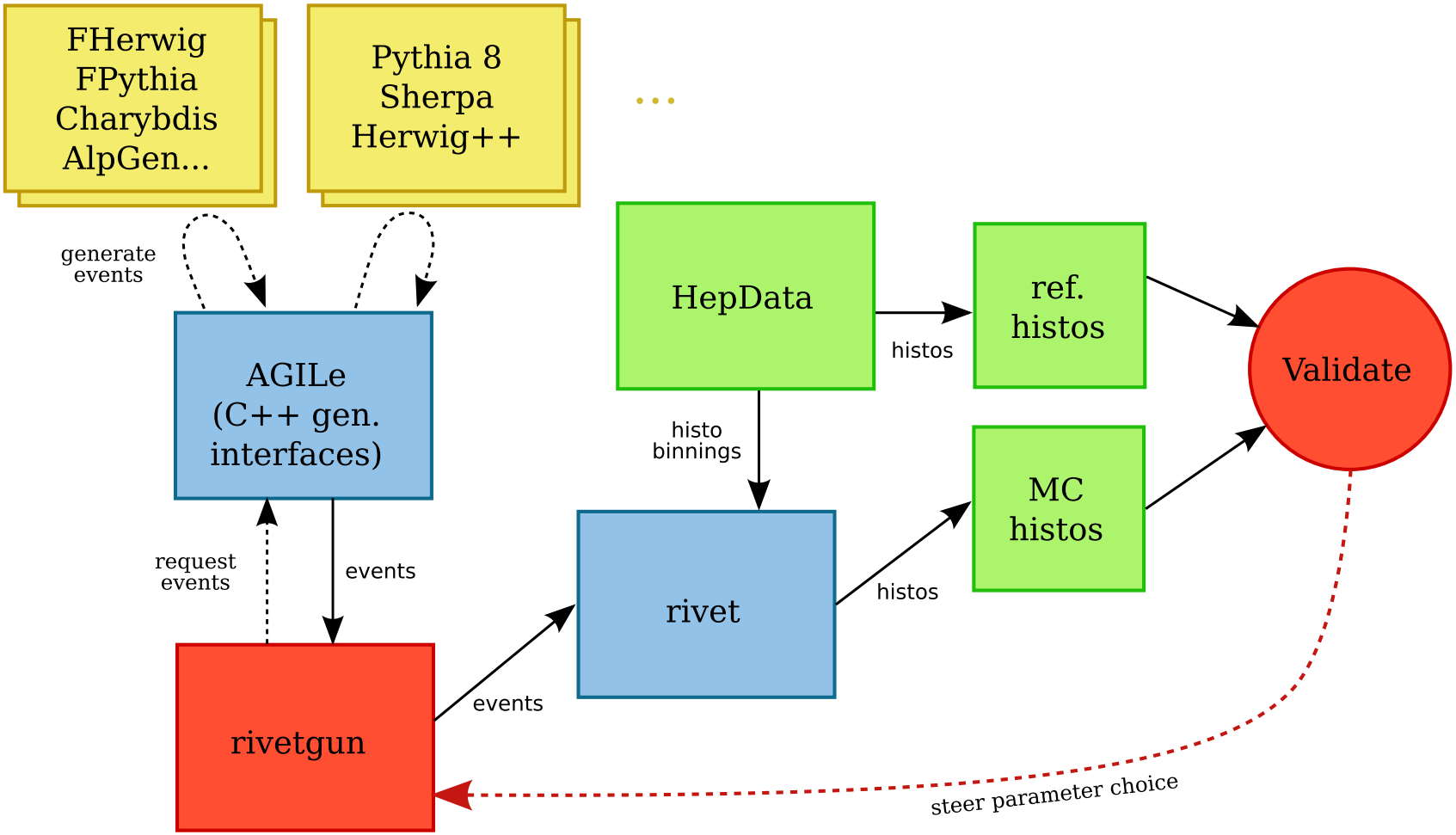
The Rivet system



Rivet details

- Combination of tools, analysis handler and analyses
- Based around auto-cached **`Projection`**s acting on HepMC events
- **`Analysis`** routines use **`Projection`**s 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`**

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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, SISCone, CDF RunII Midpoint *(Durham, JADE needed)*
- **Misc:** jet shapes, primary vertex position, secondary vertices...

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Rivet analyses

- 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

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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

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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

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AGILe

- 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`**

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Supported generators

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

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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)*

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Running Rivet and AGILe

- 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
```

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Demo

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

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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

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