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## Rivet: a system for event generator validation and development

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The Rivet system is a framework for validation of Monte Carlo event generators against archived experimental data, and together with JetWeb and HepData forms a core element of the CEDAR event generator tuning programme. It is also an essential tool in the development of next generation event generators by members of the MCnet network. Written primarily in C++, Rivet provides a uniform interface for event generators and an analysis system to replicate experimental analyses.

The generator interface produces events via the HepMC event record and currently supports both Fortran and C++ versions of the Herwig and Pythia generators, as well as the C++ Sherpa generator and the Alpgen and Jimmy subprocess generators. More generators will be added to the package according to demand.

The Rivet analysis system is based on a concept of “event projections”, which project a simulated event into a lower-dimensional quantity such as scalar or tensor event shape variables. Projections can be nested and their results are automatically cached to eliminate duplicate computations. A set of standard projections and analyses which use them are included with the Rivet package, and this collection will grow with subsequent releases. Analysis data is accumulated using the AIDA interfaces, and exported primarily in the AIDA XML histogram format. To complement this, HepData-generated AIDA records for each bundled analysis are included in the Rivet package and can be used to define the binnings of generated data observables: this improves the robustness of analysis implementations and allows easy data-theory comparisons without requiring network access to HepData.

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