

Monte Carlo event generation and tuning

We are involved in development, use and maintenance of event generators and related tools in Atlas. In particular...

Rivet MC validation tool

Rivet is a standalone library and command line program for generator-independent validation of simulated events against a large (and growing) number of historically important experimental analyses. Data is primarily supplied via direct export from the HepData database. Rivet is used by Atlas and generator authors for continuous validation of generator physics performance, and as part of the Professor and Atlas generator tuning programmes.

Herwig++ event generator

Herwig++ is the successor to the venerable HERWIG MC simulation program. H++ is a globally improved version of HERWIG, including

- Improved parton shower
- Much-improved hadron decays
- Built-in QED radiation (cf. PHOTOS) and tau decays (cf. TAUOLA)
- Built-in multiple partonic interactions model for underlying event (cf. JIMMY), plus hotspot and non-perturbative extension to allow UE simulation at min bias scales ($< \sim 2$ GeV)
- Generalised new physics modelling (MSSM UED and Randall-Sundrum models as standard)
- POWHEG positive-weight NLO matrix element-parton shower matching for selected processes

We maintain the Athena interface to Herwig++, coordinate the various validation and tuning efforts within Atlas, and act as a contact point for Atlas members with H++ physics or technical questions.

Herwig++ NNLO studies - IanBruce

Herwig++ NNLO studies

Professor tuning framework

Professor is a system for tuning of event generator parameters (and other complex high-dimensional systems) based on deterministic fitting of bin-wise response functions to correlated changes in parameters. Professor tunes of Pythia 6 helped to drive the Atlas MC09 production tune, and are among the best-performing tunes of Pythia 6 for hadron collider processes from min bias to Drell-Yan, based on existing data. The current Pythia 6 default settings are based on Professor results. Professor is in use within Atlas for studies of early data MC retuning, among other uses.

-- Andy Buckley - 2009-09-30

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