

The MCPLOTS Project

April 20, 2011



The MCPLOTS Project

■ MCPLOTS Project:

- <http://mcplots.cern.ch/>
- combined project of CERN Theory Group, MCnet, GenSer and LPCC,
- **repository of MC plots comparing MC generators predictions to experimental data,**
- data-comparisons part: based on Rivet,
- intended for tuning and reference purpose.

■ Contribution by DESY:

- <http://mcplots-dev.cern.ch/>,
- implementation of the Alpgen generator in the framework.

■ Outline:

- brief introduction of **MCPLOTS**,
- more details on the **Alpgen implementation**.

- **Status:**
- Alpgen running in MCPLOTS,
- but problems with adding Rivet histograms not yet fully resolved.



The MCPLOTS Project - 1

<http://mcplots-dev.cern.ch/>

Menu

- Front Page
- Test4Theory@Home
- Generators and Versions

Beam: **pp/ppbar** ee

Jets

- Transverse Minor
- Transverse Thrust
- Di-jet X
- Di-jet $\Delta\phi$
- Di-jet mass
- Jet Fragmentation
- Differential shape
- Integral shape
- $d\sigma(\text{jet})/dp_T$

Underlying Event

- <pt> vs Nch (AWAY)
- <pt> vs Nch (TRNS)
- <pt> vs Nch (TWID)
- <pt> vs Nch (AWAY)

mcplots.cern.ch

April 2011 - A. Karneyeu, D. Konstantinov, M. Mangano, L. Mijovic, W. Pokorski, S. Prestel, A. Pytel, P. Skands
(BOINC users, see [Test4Theory@Home](#) page)

→ Select beam, process, and observable

Navigate these pages by using the menu to the left. The default for each topic is a comparison of a small number of models to available data, but look for links at the top of each page for comparisons with more tunes/generators. Scroll down each page to see plots at other collider energies. To choose specific generator version(s), use the "[Generators and Versions](#)" link towards the top of the menu (the default is to just display the most recent ones). More plots will be added, as new tunes become available, and as the available data increases.

Note: For a description in layman's terms, or to find out how to participate in the volunteer computing project, [Test4Theory@Home](#), see the [Test4Theory@Home](#) page.

MCPLOTS

MCPLOTS is intended as a simple browsable repository of MC (Monte Carlo) plots comparing High Energy Physics event generators to a wide variety of available experimental data, for tuning and reference purposes. Apart from individual plots contained in papers and presentations, there has so far not been any central database where people can quickly see how tune X of version Y of generator Z looks on distribution D. The idea with mcplots is to provide such a

■ Available Plots:

- pp/ppbar, ee beams,
- Jets, UE, MinBias, DY, W+Jets,
- a large number of Rivet analyzes (ATLAS,CMS),
- a set of generators and a large set of tunes.



The MCPLOTS Project - 2

<http://mcplots-dev.cern.ch/>

Menu

- Front Page
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Beam: **pp/ppbar** ee

Jets

- Transverse Minor
- Transverse Thrust
- Di-jet χ
- Di-jet $\Delta\phi$
- Di-jet mass
- Jet Fragmentation
- Differential shape
- Integral shape**
- osity/dpT

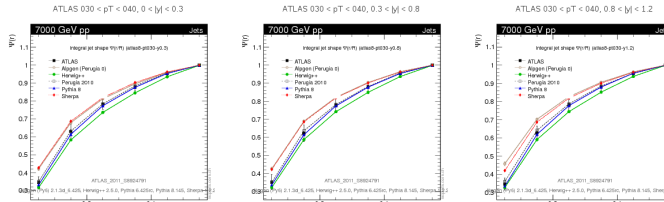
Underlying Event

- $\langle p_T \rangle$ vs Nch (AWAY)
- $\langle p_T \rangle$ vs Nch (TRNS)
- $\langle p_T \rangle$ vs Nch (TWDR)
- $\langle p_T \rangle$ vs p_T (AWAY)

Jets : Integral shape

Generator Group: **Main** Alpgen Herwig++ Pythia 8 Sherpa Pythia 6
Generator Subgroup:

pp @ 7000 GeV



■ Available Generators:

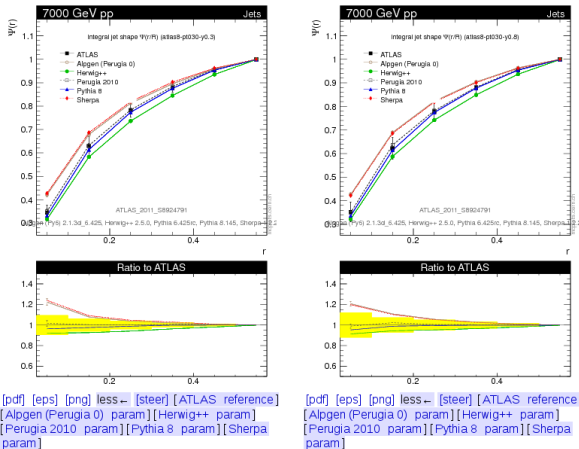
- Pythia 6, 8
- Herwig++,
- Sherpa,
- Alpgen (dev).

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The MCPLOTS Project - 3

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- Detailed setup available for each generator.

LPCC

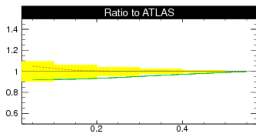
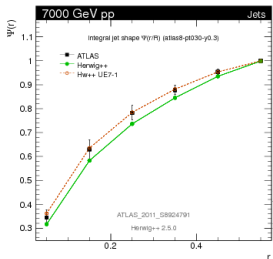


The MCPLOTS Project - 4

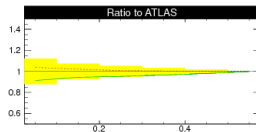
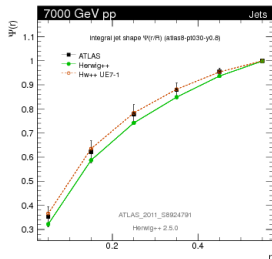
<http://mcplots-dev.cern.ch/>

pp @ 7000 GeV

ATLAS 030 < pT < 040, 0 < |y| < 0.3



ATLAS 030 < pT < 040, 0.3 < |y| < 0.8



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■ Plots available for different tunes.

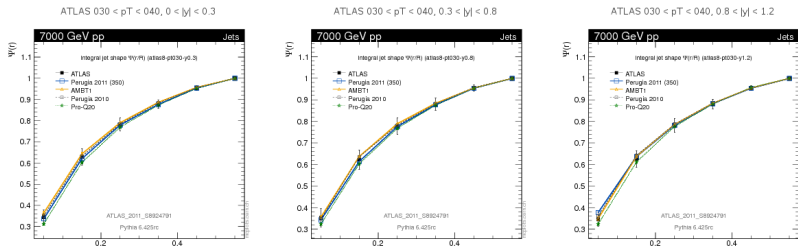
<http://mcplots-dev.cern.ch/>

Jets : Integral shape

Generator Group: [Main](#) [Alpgen](#) [Herwig++](#) [Pythia 8](#) [Sherpa](#) [Pythia 6](#)

Generator Subgroup: [Main](#) [Perugia 2011](#) [Perugia 2011-Variations](#) [Perugia 2010](#) [Tevatron](#) [Q2vsPT2](#) [Py6vsPy8](#)

pp @ 7000 GeV



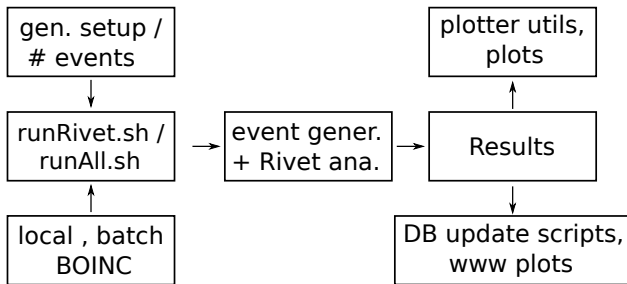
- Plots available for many different tunes.

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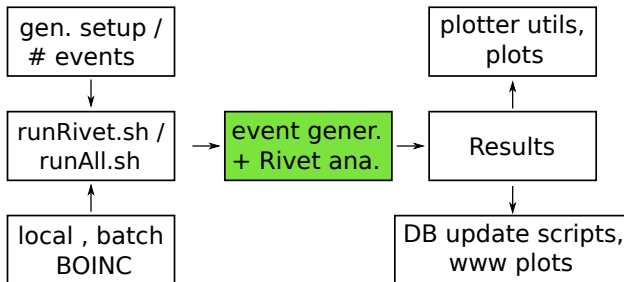
The MCPLOTS Project - 6

- MCPLOTS contains pre-determined set of generator parameters and setups,
- it also contains scripts that control submission, event generation, analysis and final results manipulation.
- A script for a (batch) run of all the setups, intended for the documentation at the MCPLOTS pages is provided.



Alpgen Implementation - 1

- Event generation: need to take care of generating Alpgen weighted / unweighted events,
- using genser installation,
- supported for all Alpgen processes, Pythia, Herwig(Jimmy) + arbitrary param. set,
- special utils like Alpgen event-level filters provided (high-pt jets ...).

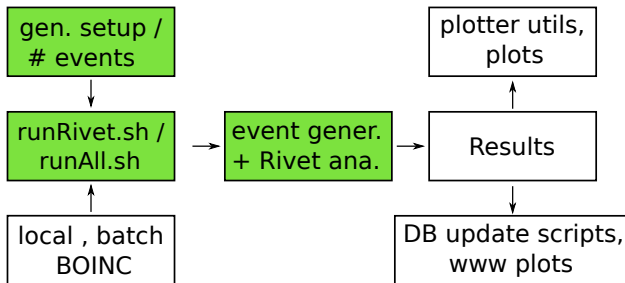


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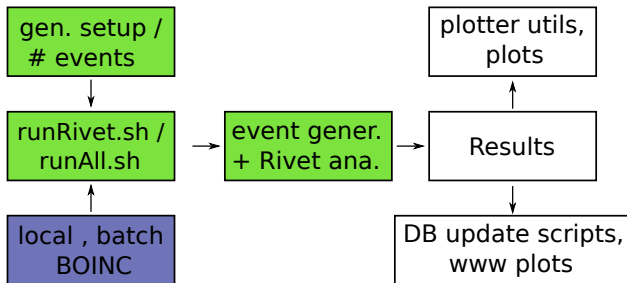
Alpgen Implementation - 2

- Gen. setup and passing # of events more elaborate for Alpgen than for other implemented generators,
- need to take into account more parameters (Njets, Excl./Incl. flag, filter parameters ...).



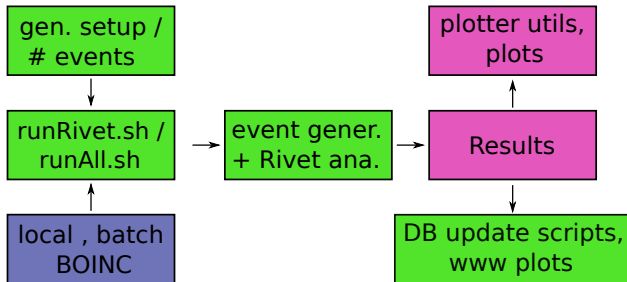
Alpgen Implementation - 3

- Even submission mode requires additional effort ;-)
(Herwig + Jimmy crashing in batch).



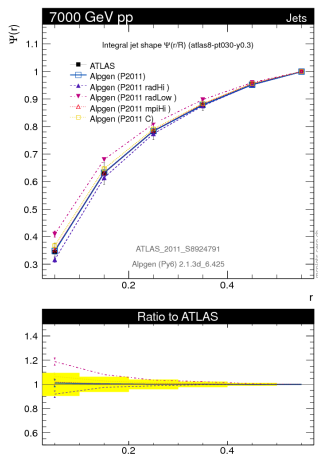
Alpgen Implementation - 4

- Alpgen full chain runs well for any parton multiplicity,
- but histo adding not yet supported in MCPLLOTS;
- we have organized some single-multiplicity plots in the dev. pages.



Alpgen Implementation - 6

- **Alpgen runs in MCPLOTS framew.,**
- no physics/tuning inputs out of the box yet (no histo adding).
- RHS: QCD jets $2 \rightarrow 2$,
Alpgen + Pythia, P2011 tunes family.
- All the plots for the supported processes duly filled,
- features like non-default pdf-s, filters have been tested.
- Room for improvement on the generator-setup side:
- requesting a fixed # of events to be filled in the histo not an optimal strategy for Alpgen,
- MCPLOTS not yet optimized for potential CPU-intensive Alpgen runs.



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Alpgen Implementation - 7

```
#-----
# top weighted events steering file
[genwgt]
1          ! imode
fname      ! label for files
0          ! start with: 0=new grid, 1=previous warmup grid, 2=previous generation grid
1000000 3 ! Nevents/iteration, N(warm-up iterations)
30000000   ! Nevents generated after warm-up
ebeam      3500.
ih2        1
njets      2
ndns       5
ickkw      1.
ptjmin     15
drjmin     0.7
etajmax    4.0
iseed1     271828
iseed2     271828
iseed3     271828
iseed4     271828
#-----
# user-defined filtering at the weighted events level
[filter]
FILTERNAME PTLEAD
#PTLEAD_MIN 20.0
#PTLEAD_MAX 3500.
PTLEAD_MIN 10
PTLEAD_MAX 7000
#-----
# top unweighted events steering file
[genuwgt]
2          ! imode
fname      ! label for files
#-----
[steerPS]
#Pythia steering in Agile-params format
MSTP(5) 320
# Makes particles with c*tau > 10 mm stable:
MSTJ(22) 2
PARJ(71) 10.0
#-----
```

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MCPLOTS Links

■ Project pages:

- <http://mcplots.cern.ch/>
- <http://mcplots-dev.cern.ch/>
- <http://svnweb.cern.ch/world/wsvn/mcplots/>

■ DESY Contribution Docu:

- <https://wiki.terascale.de/index.php/Mcplots>

■ Running MCPLOTS:

- <http://svnweb.cern.ch/world/wsvn/mcplots/trunk/doc/readme.txt>
- `svn co https://svn.cern.ch/repos/mcplots`
- Give it a try in case you are having problems running Alpgen with Agile+Rivet :-).

