

Alpgen 10TeV $t\bar{t}$ +jets

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ATLAS UK Top Meeting
17/09/08



Introduction

- Several MC samples will be available for 10TeV ttbar studies:
- **MC@NLO:**
 - dataset 105200, fullsim and Atfast2, $\sim 2500\text{pb}^{-1}$
- **Alpgen:**
 - datasets 106260 – 106267
(leptonic+semileptonic, different jet multiplicities)
 $\sim 1300\text{pb}^{-1}$ with Atfast2.
- **AcerMC:**
 - $\sim 500\text{pb}^{-1}$ with Atfast2
 - Dataset 105205 (AcerMC through Pythia),
 - Dataset 105206 (AcerMC through Herwig).

Cross Sections (leptonic+semileptonic)

- AcerMC (through Pythia or Herwig): 109 pb
- Alpgen $Q^2 = \Sigma(m^2 + p_T^2)$ (through Herwig):

$$\underbrace{30 + 33 + 22 + 16}_{0j \quad 1j \quad 2j \quad \geq 3j} + \underbrace{7.4 + 8.0 + 5.5 + 4.1}_{0j \quad 1j \quad 2j \quad \geq 3j} = 127 \text{ pb}$$

Inqq Inln
- MC@NLO: ~ 191 pb (old number, with $m_t=175\text{GeV}$)
- Reference cross section :
 419pb for all ttbar
<https://twiki.cern.ch/twiki/bin/view/Atlas/TopReferences10TeV>,
<http://arxiv.org/abs/0807.2794v1> S Moch, P Uwer)
 → 225pb for semileptonic+leptonic
- Following plots are normalised to unity for comparison of shapes...

(Thanks to Joe Foster and Paul Miyagawa for some plotting code)



Alpgen
MC@NLO

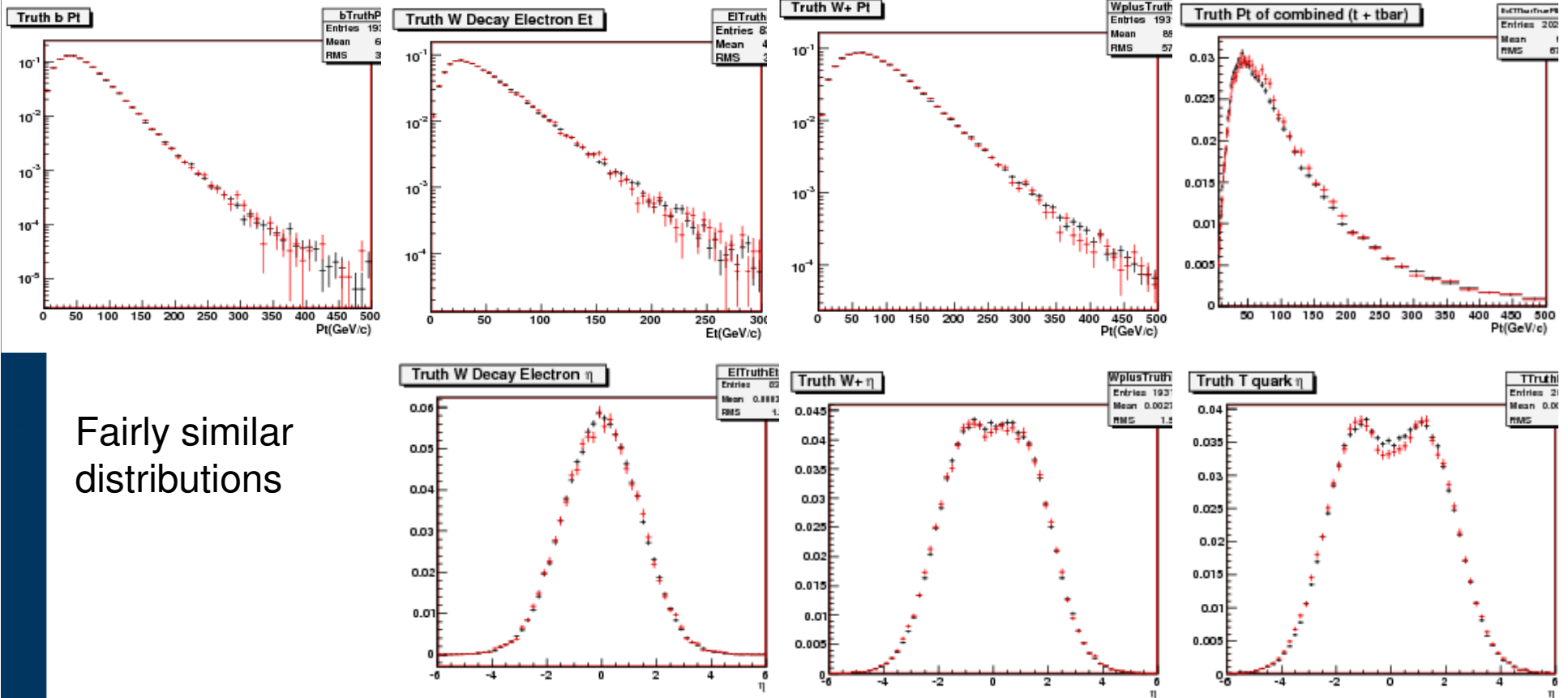
Alpgen versus MC@NLO

b quark

electron

W+

tops



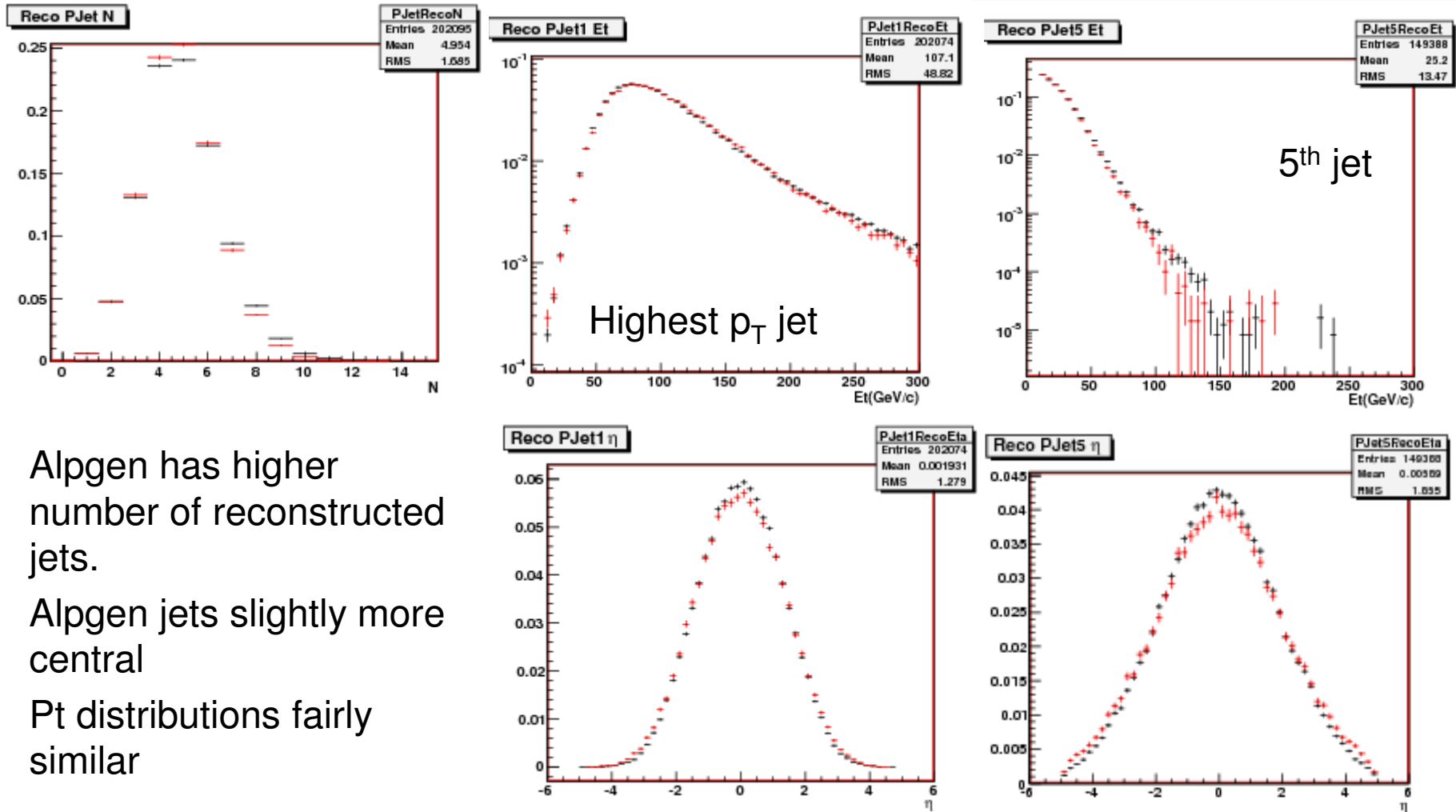
Fairly similar distributions

mc08.105200.T1_McAtNlo_Jimmy.evgen.EVNT.e325
through atfast1

Alpgen input files through evgen and Atfast1 in 14.2.0.1

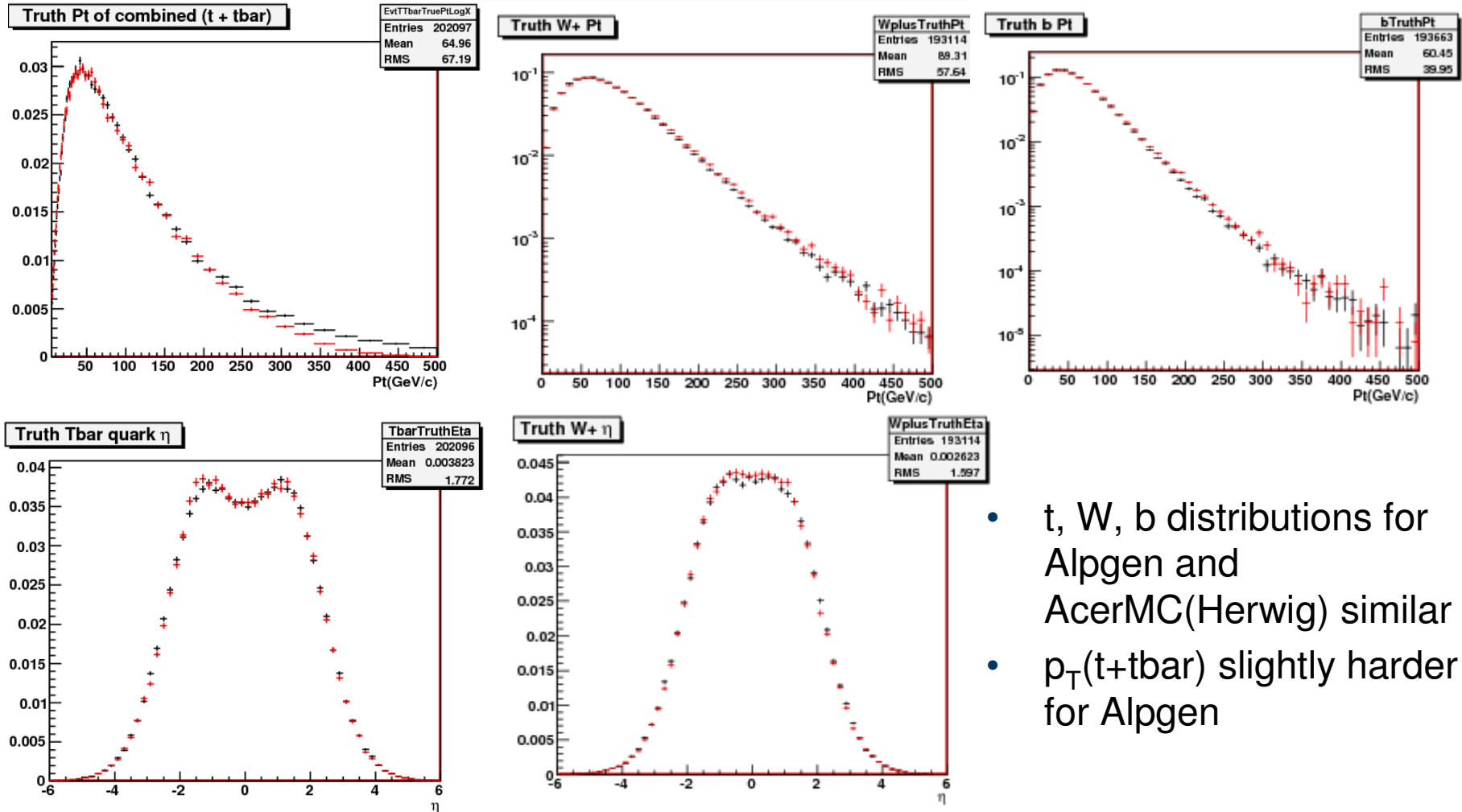
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Alpgen versus MC@NLO, Cone 0.4 Jets



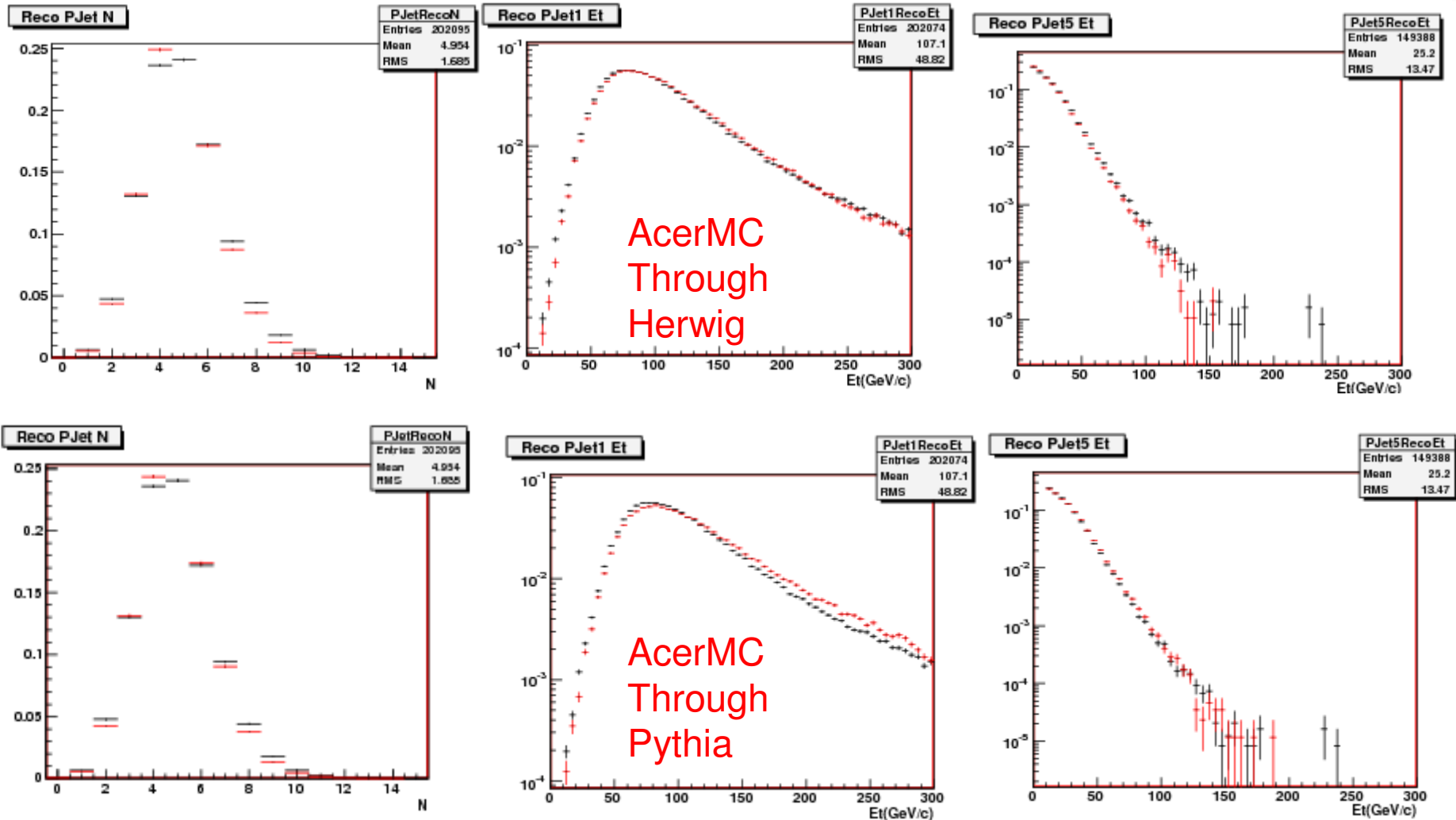
- Alpgen has higher number of reconstructed jets.
- Alpgen jets slightly more central
- Pt distributions fairly similar

Alpgen versus AcerMC (Herwig)



- t, W, b distributions for Alpgen and AcerMC(Herwig) similar
- $p_T(t+tbar)$ slightly harder for Alpgen

Alpgen versus AcerMC, Cone 0.4 Jets



Summary

- Alpgen ttbar MC sample gives distributions for leptons, tops, W, quarks that have similar shapes to AcerMC and MC@NLO.
- Alpgen predicts higher number of jets than MC@NLO and AcerMC.
- Pt distributions for each jet, ordered in pt, are similar for Alpgen and AcerMC (through Herwig)
 - AcerMC with Pythia parton shower gives harder jet pt distribution and this is a greater effect than the difference between underlying generators.