Sherpa vs pp Data at the LHC

Hendrik Hoeth
(Durham University)

Introduction

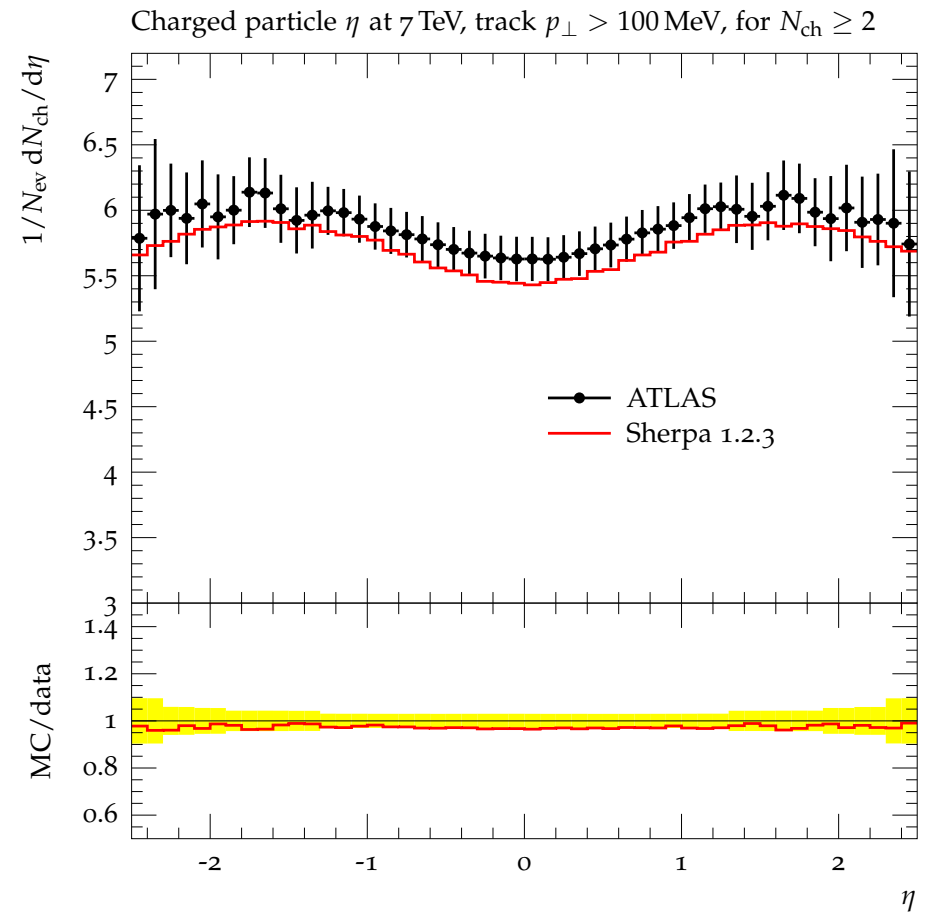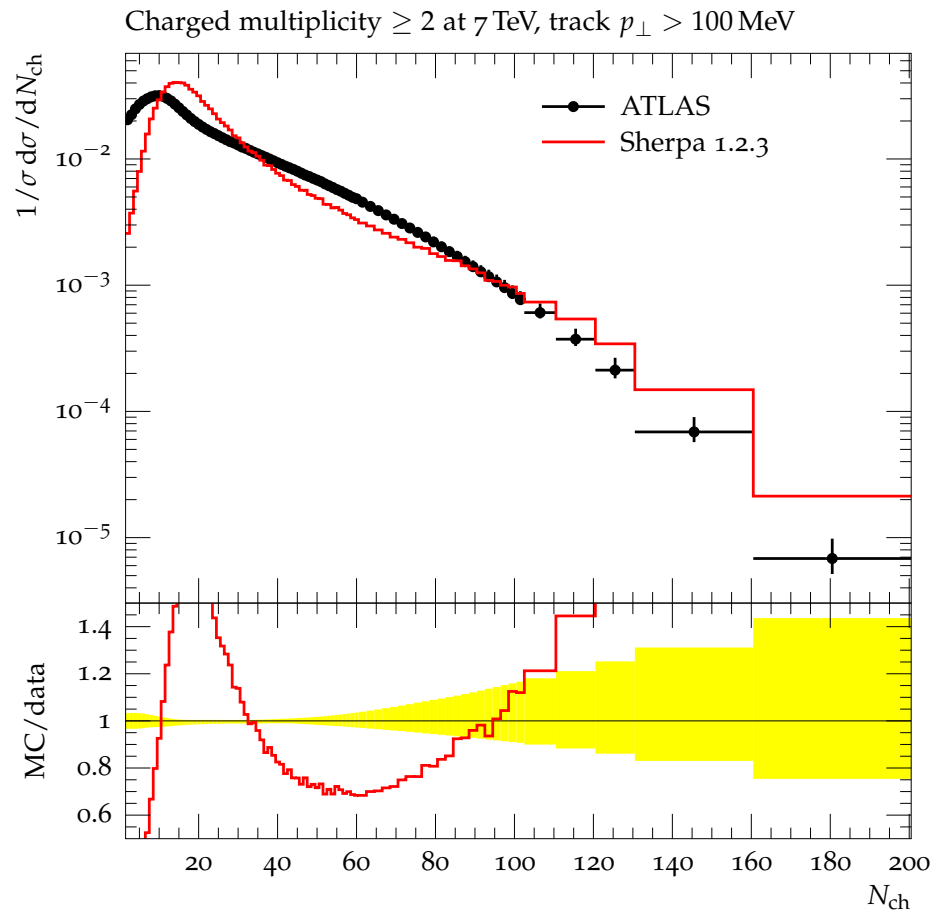Main focus is on hard interactions: Self-consistent ME + PS merging (CKKW).

Sherpa 1.2.3 is the current stable version. Mainly a bugfix release, available since December.

We have tuned Sherpa 1.2.3 to hadron data from Tevatron and LHC, using Rivet and Professor.

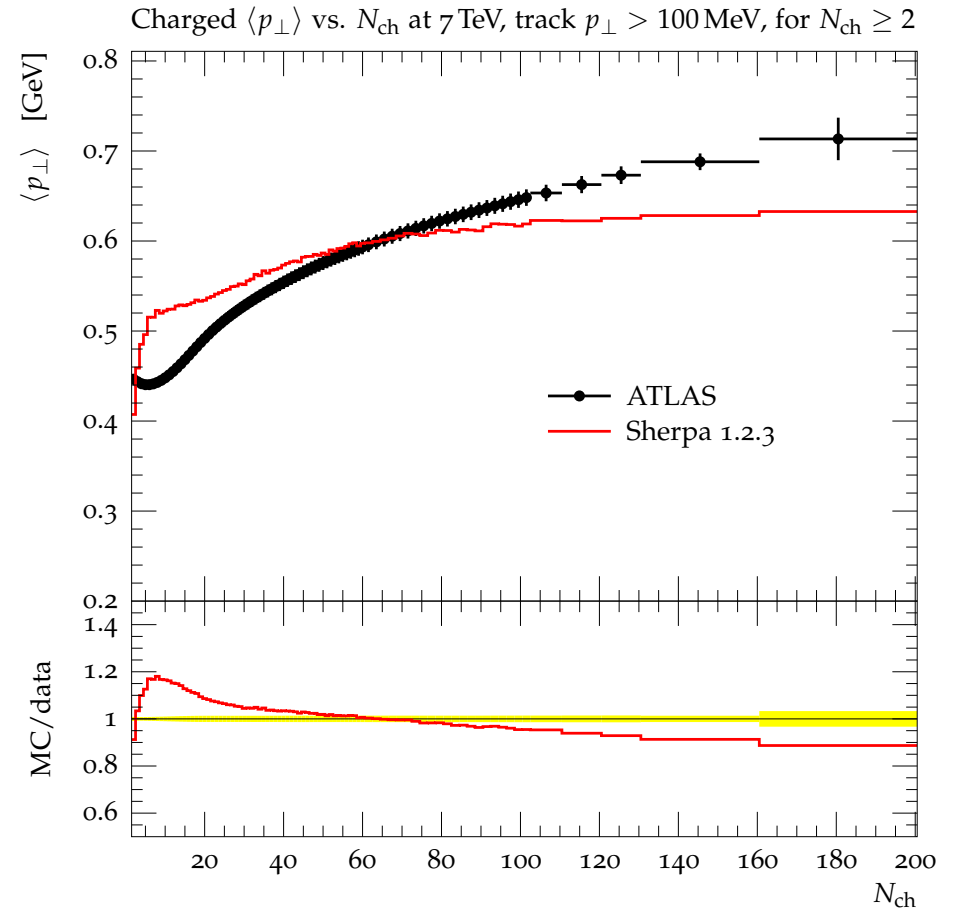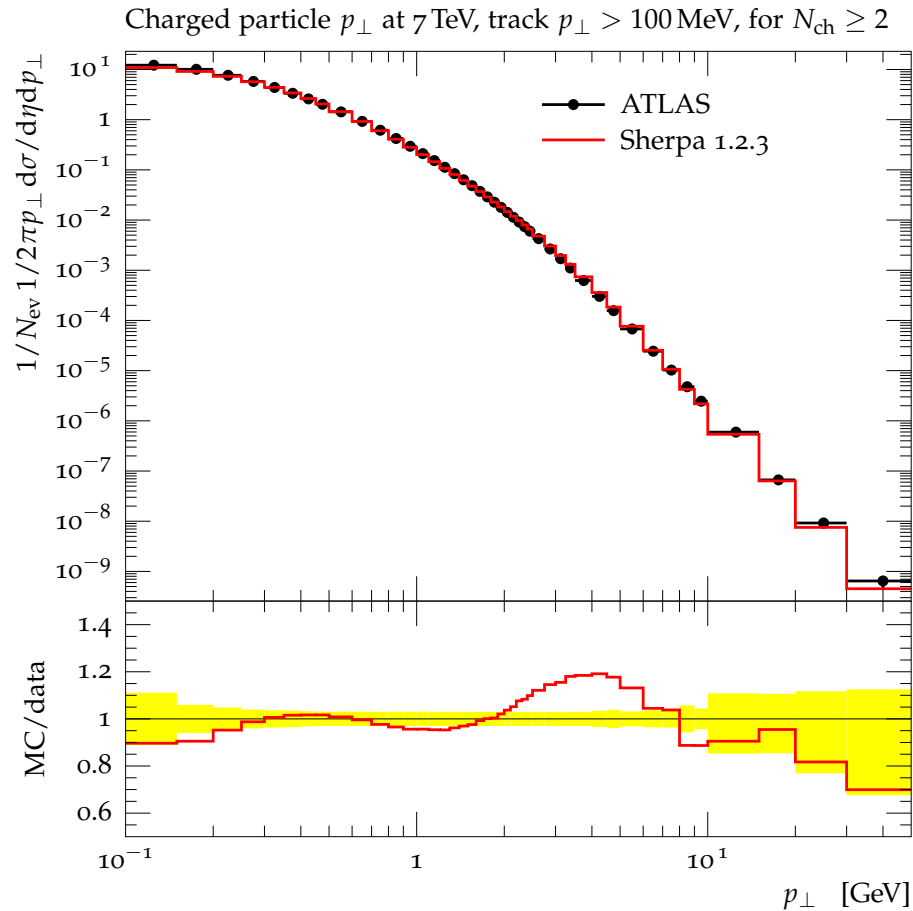Tuning results using CTEQ66 (default) and CTEQ6L1 have been published together with the release.
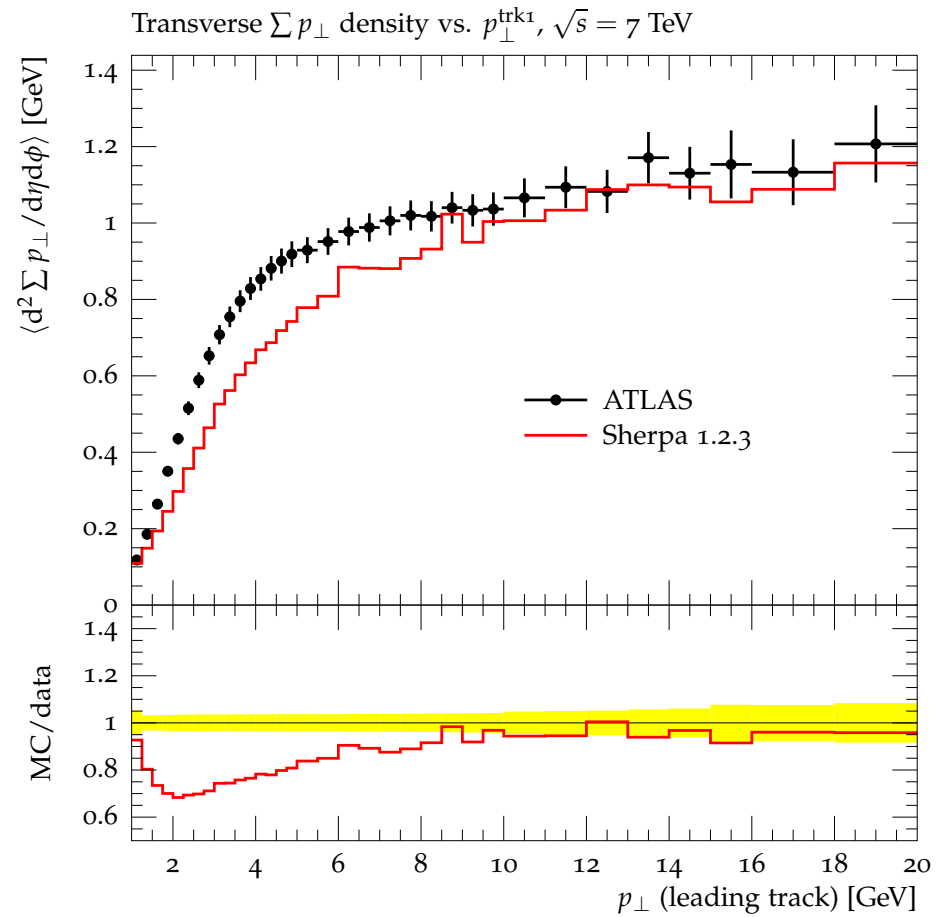
Minimum Bias at 7 TeV

arXiv:1012.5104

Charged multiplicity ≥ 2 at 7 TeV, track $p_\perp > 100\,\text{MeV}$

Charged particle η at 7 TeV, track $p_\perp > 100\,\text{MeV}$, for $N_{\text{ch}} \geq 2$
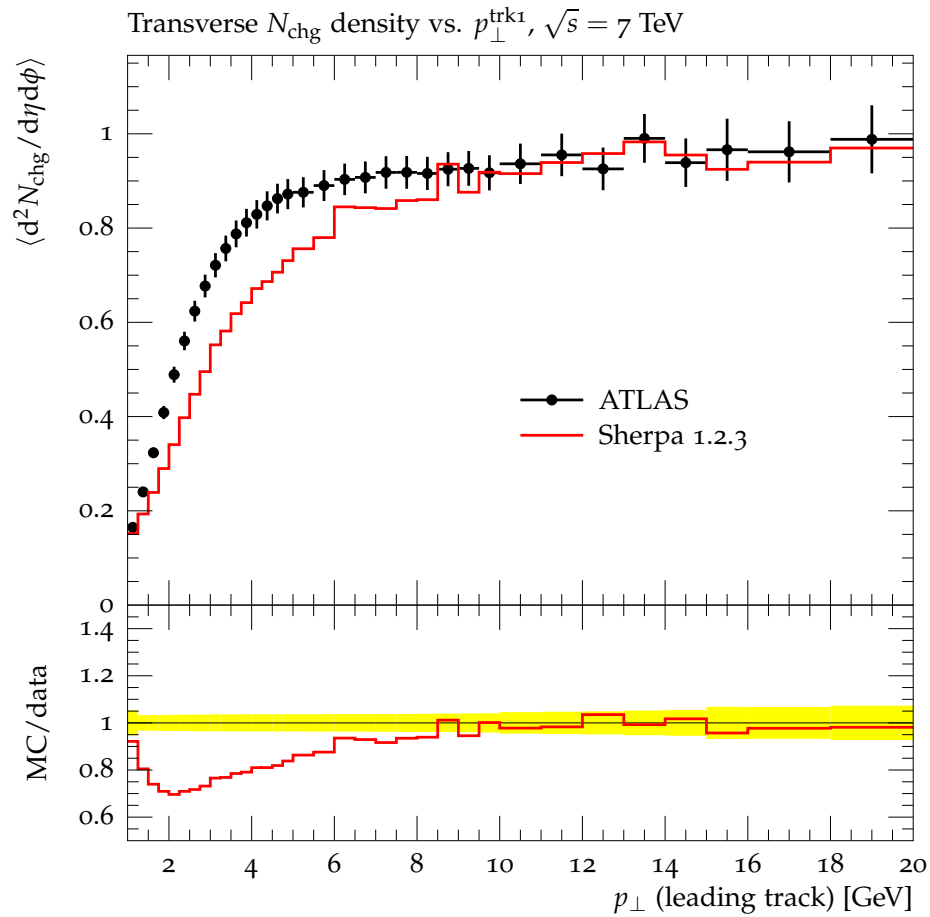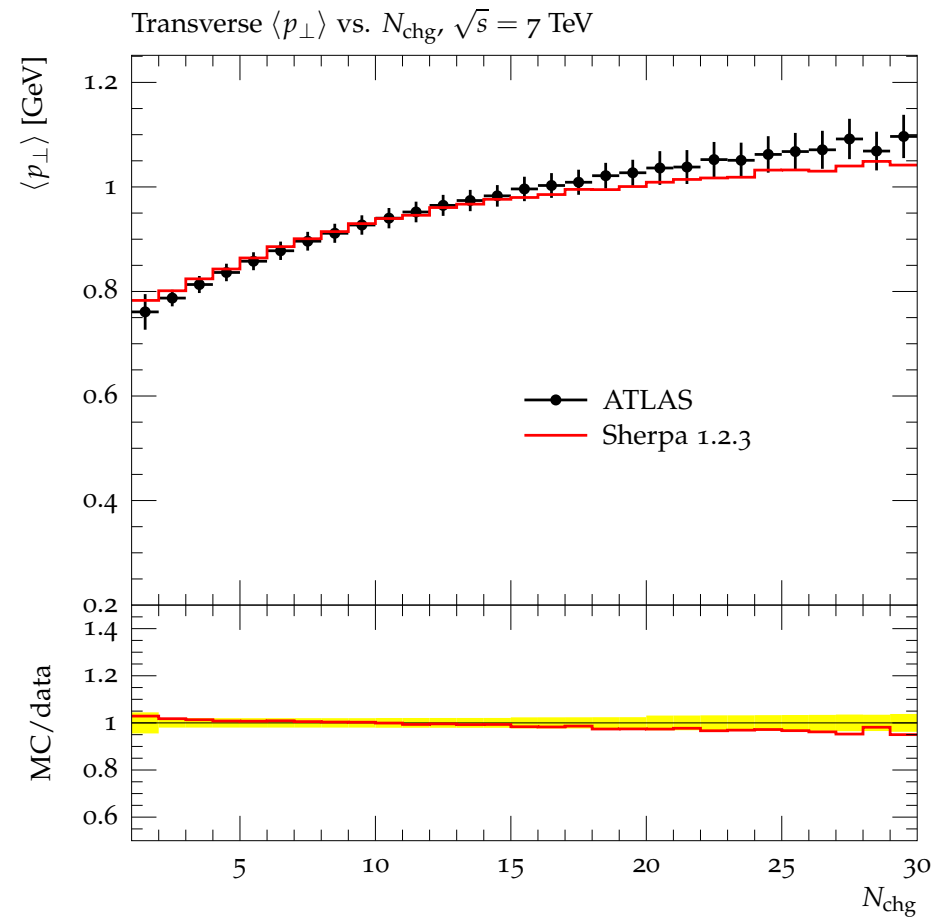
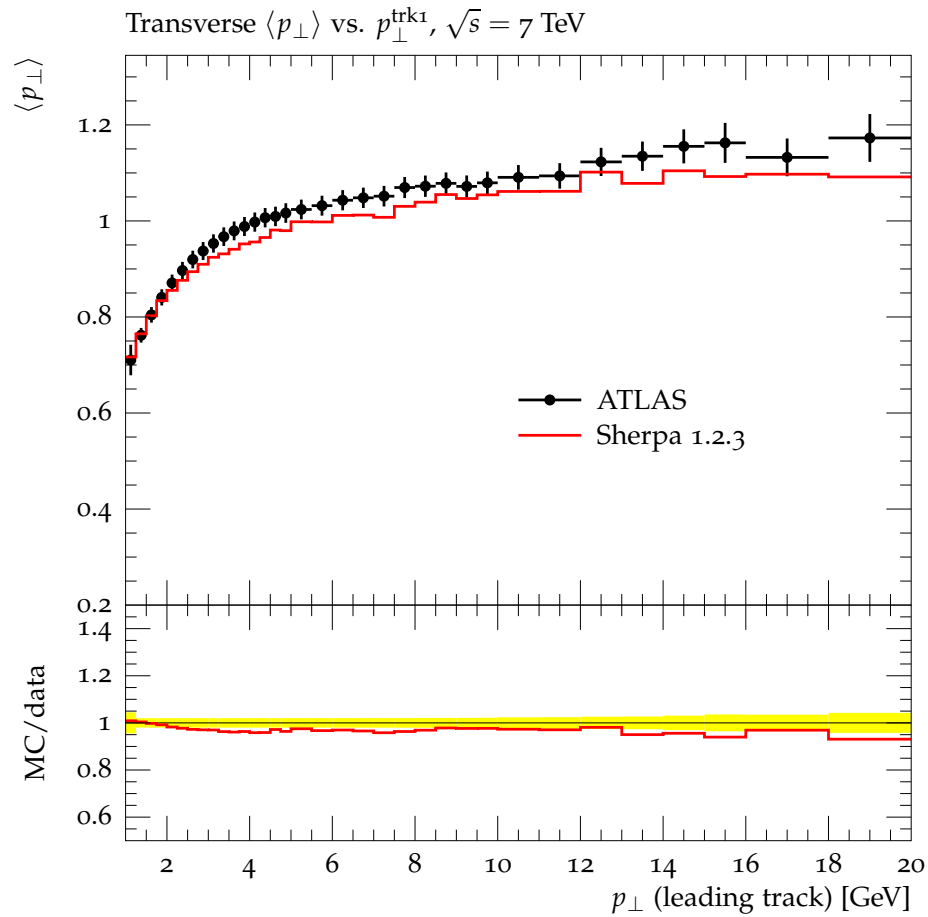# Minimum Bias at 7 TeV

arXiv:1012.5104

Underlying Event at 7 TeV

arXiv:1012.0791

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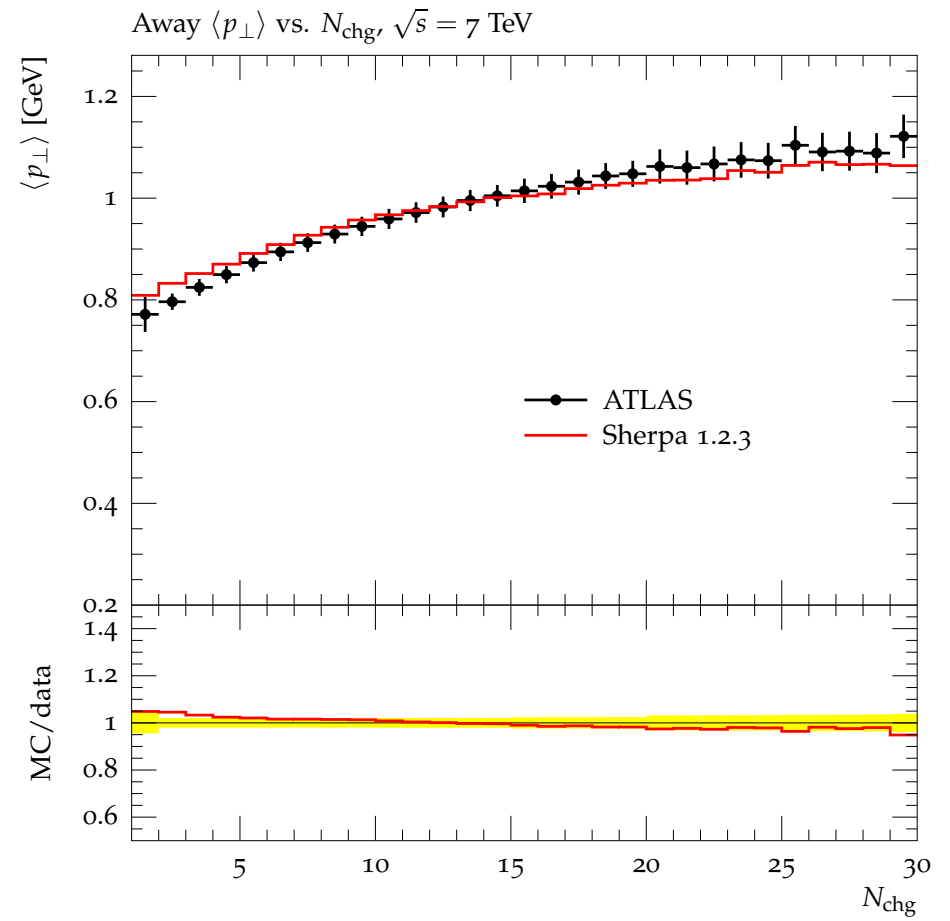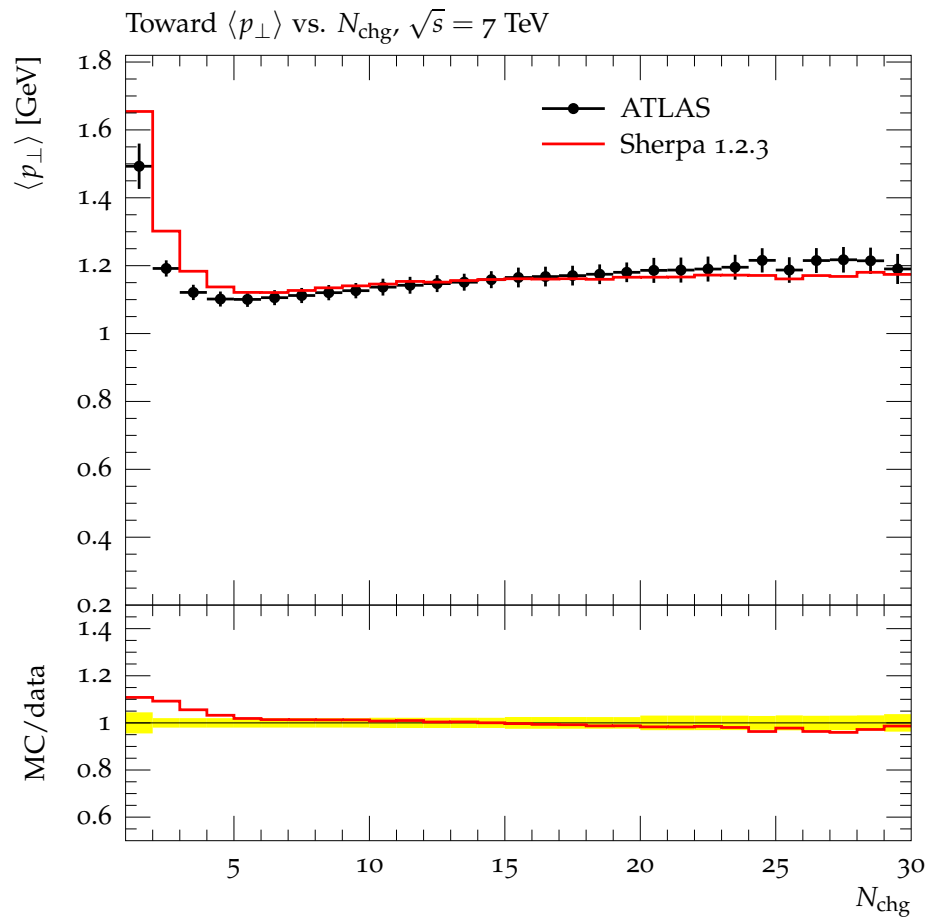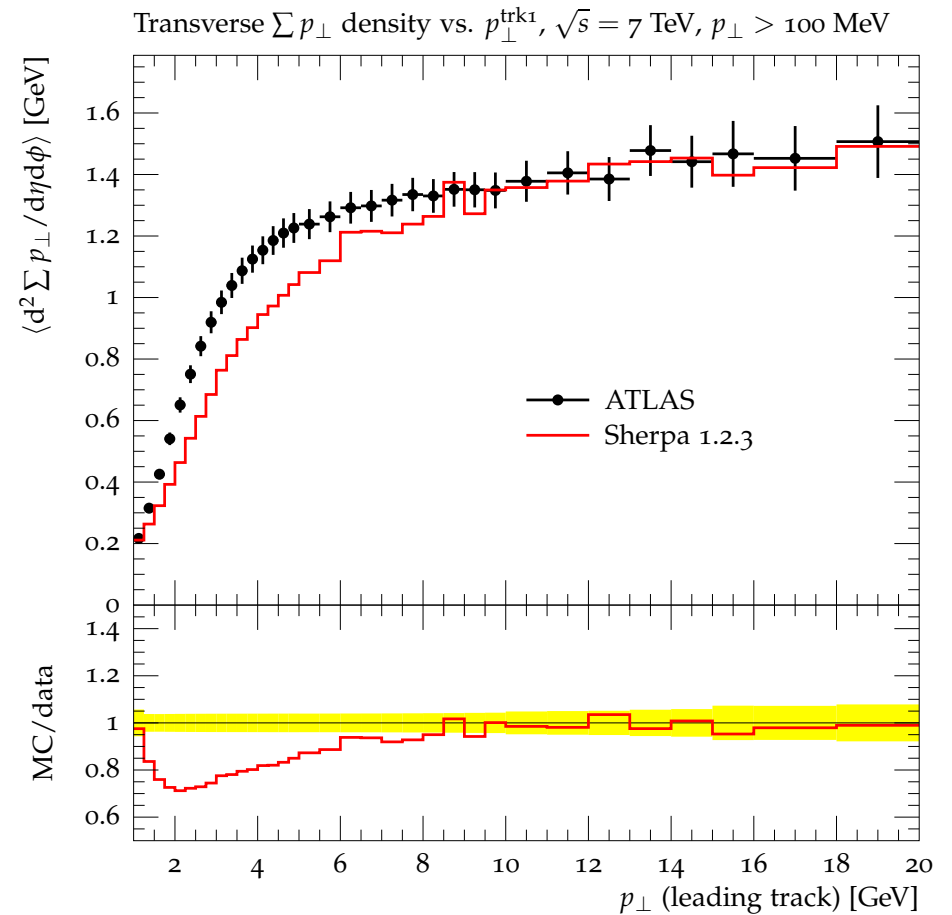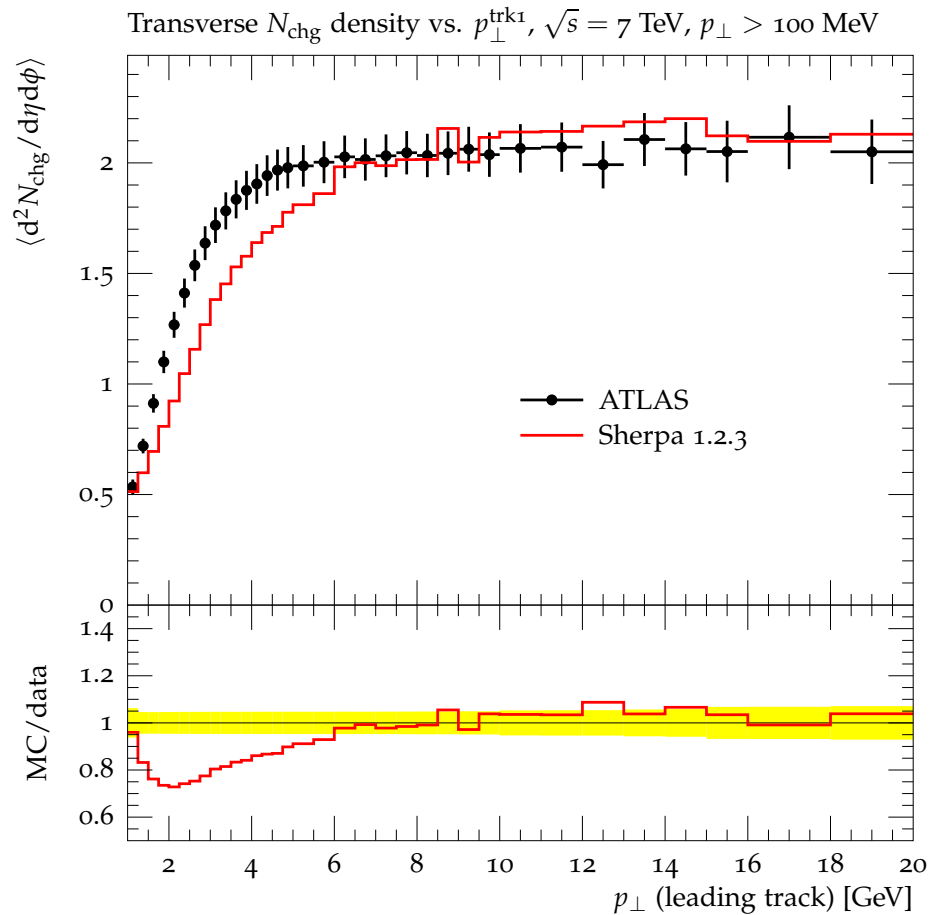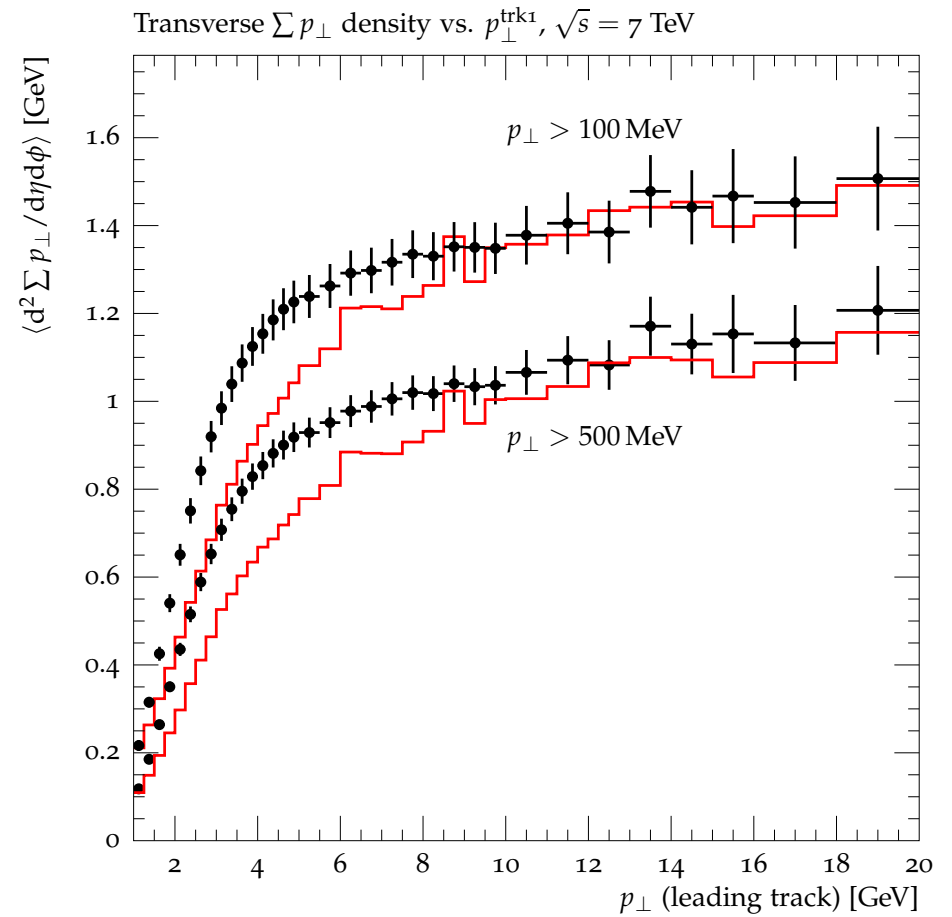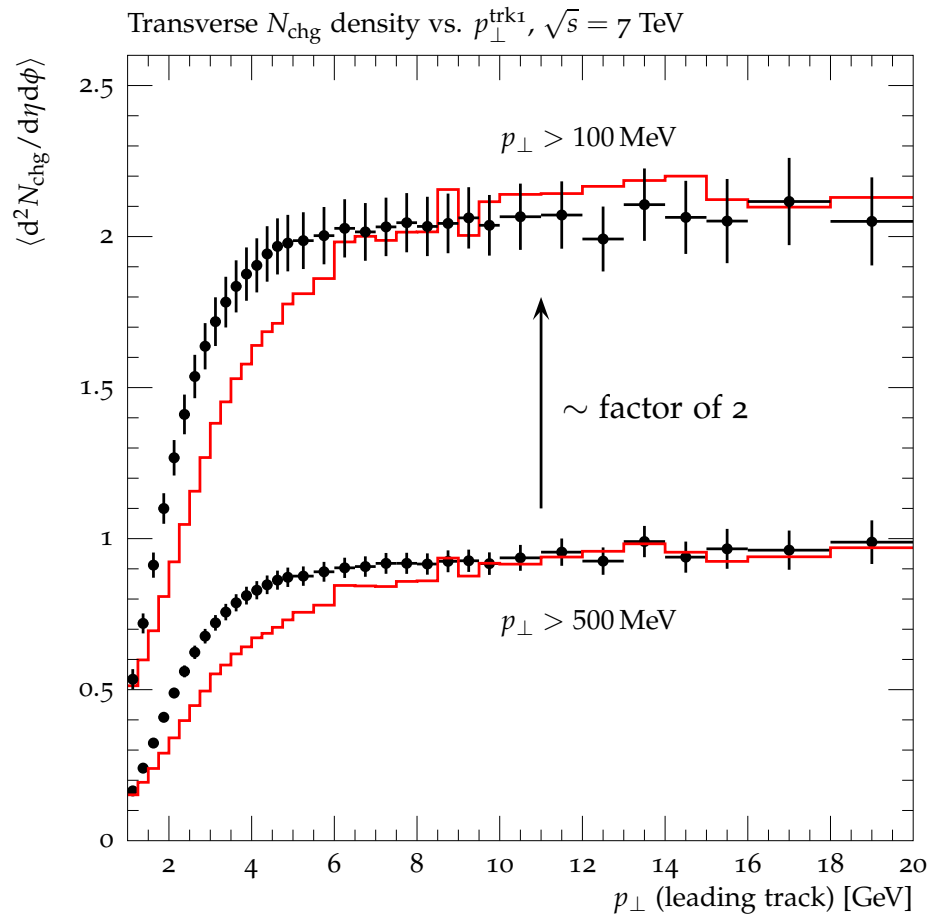# Underlying Event at 7 TeV

arXiv:1012.0791

Underlying Event at 7 TeV

arXiv:1012.0791

Transverse N_{chg} density vs. $p_\perp^{trk1}$, $\sqrt{s} = 7$ TeV

$\langle d^2 N_{chg}/d\eta d\phi \rangle$

$p_\perp > 100$ MeV

$\sim$ factor of 2

$p_\perp > 500$ MeV

$p_\perp$ (leading track) [GeV]

Transverse $\sum p_\perp$ density vs. $p_\perp^{trk1}$, $\sqrt{s} = 7$ TeV

$\langle d^2 \sum p_\perp/d\eta d\phi \rangle$ [GeV]

$p_\perp > 100$ MeV

$p_\perp > 500$ MeV
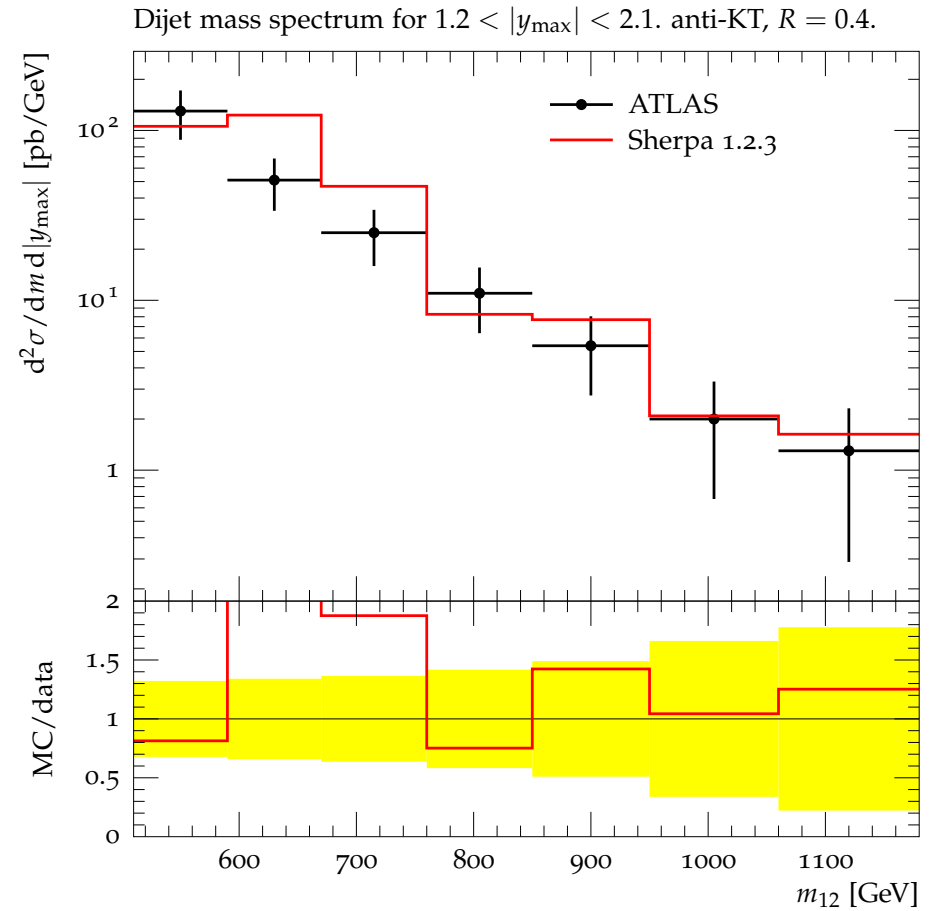
$p_\perp$ (leading track) [GeV]

Inclusive Jet Cross-Section at 7 TeV

arXiv:1009.5908

Inclusive jet p_T spectrum for $|y| < 0.3$. anti-KT, $R = 0.4$.
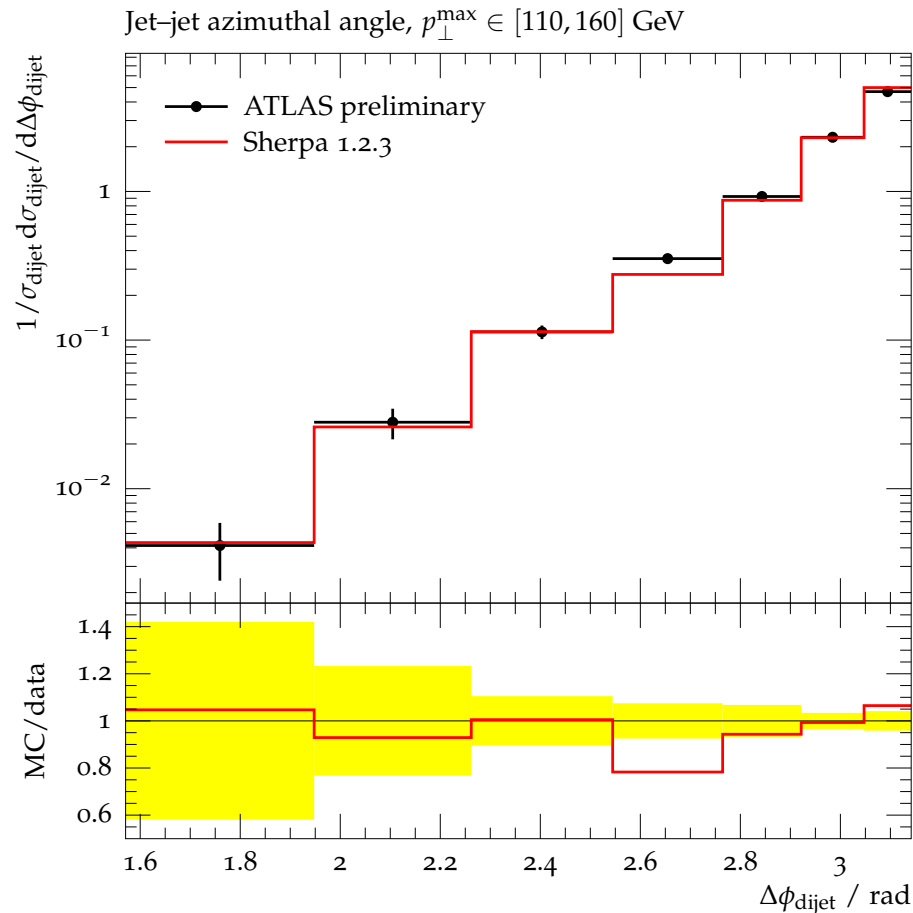
Inclusive jet p_T spectrum for $2.1 < |y| < 2.8$. anti-KT, $R = 0.4$.

Dijet Mass at 7 TeV

arXiv:1009.5908

Dijet mass spectrum for $|y_{max}| < 0.3$. anti-KT, $R = 0.4$.

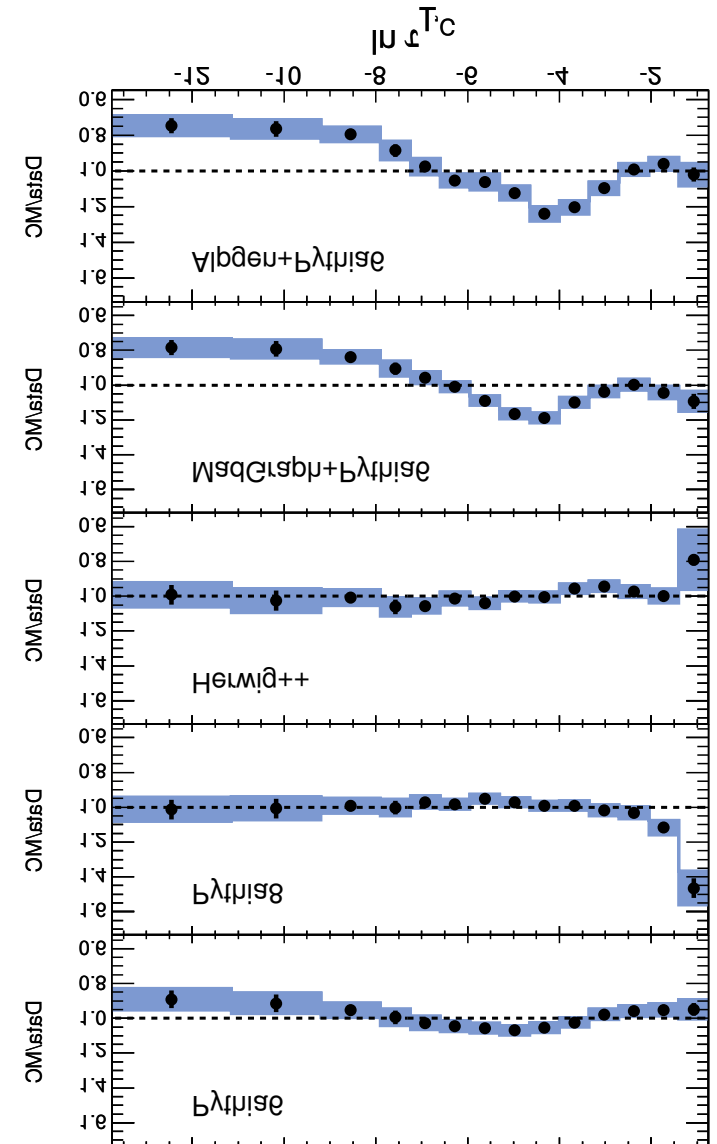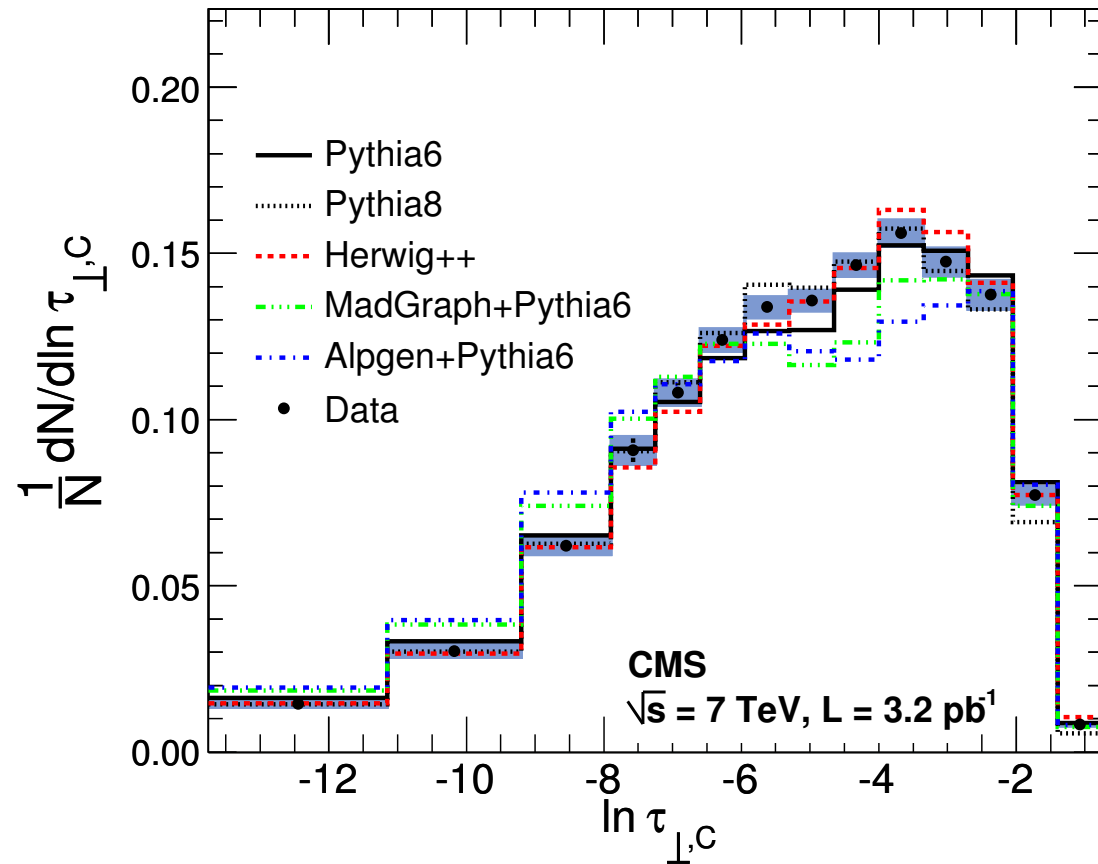Dijet mass spectrum for $1.2 < |y_{max}| < 2.1$. anti-KT, $R = 0.4$.

Dijet Azimuthal Decorr. & *z* in Jets at 7 TeV

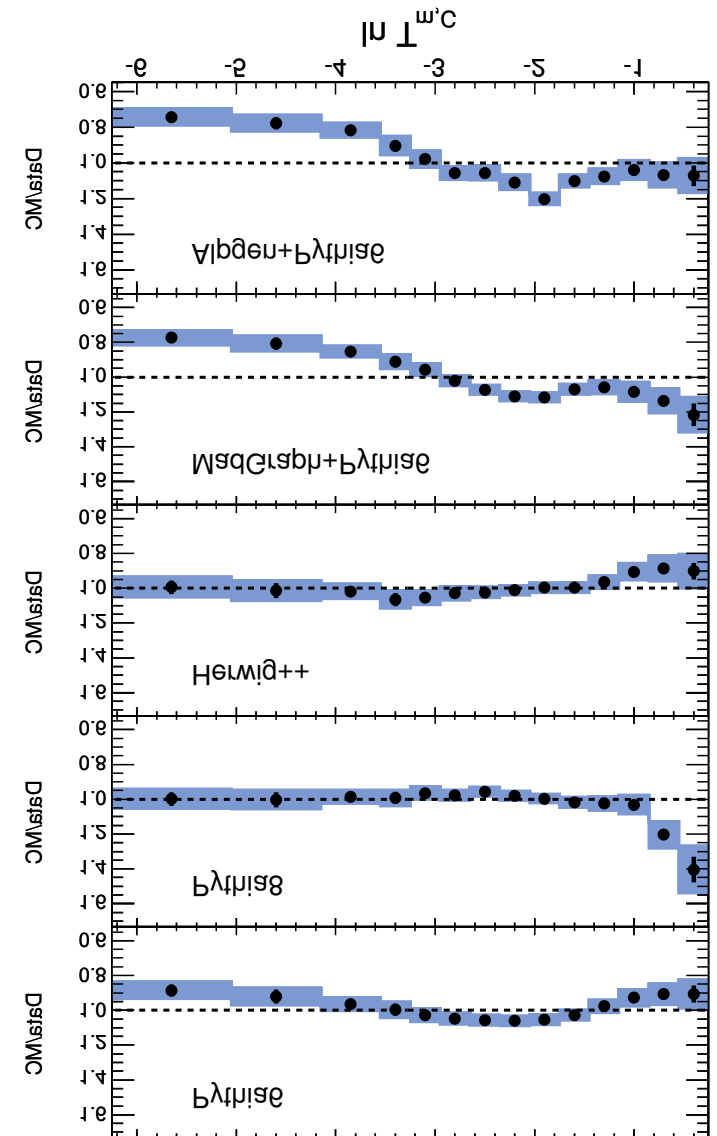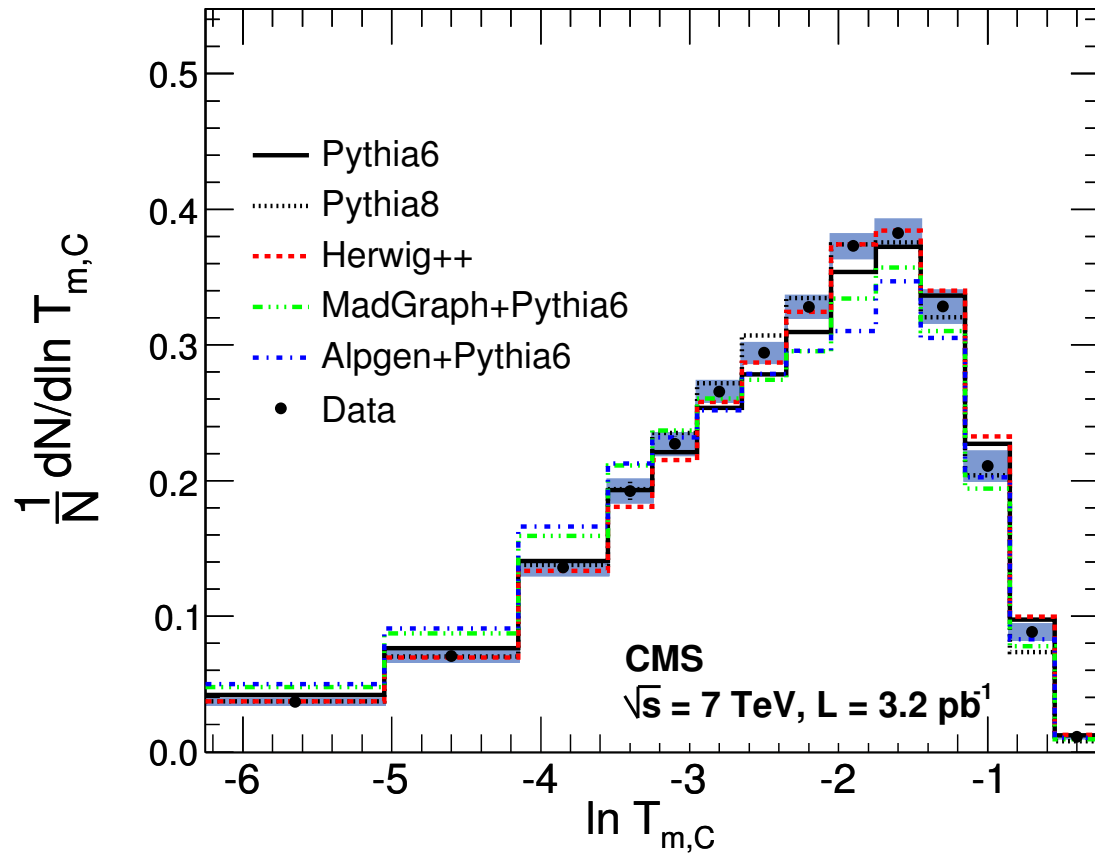ATLAS-CONF-2010-083 and ATLAS-CONF-2010-049, data read off the plots

Event Shapes at 7 TeV

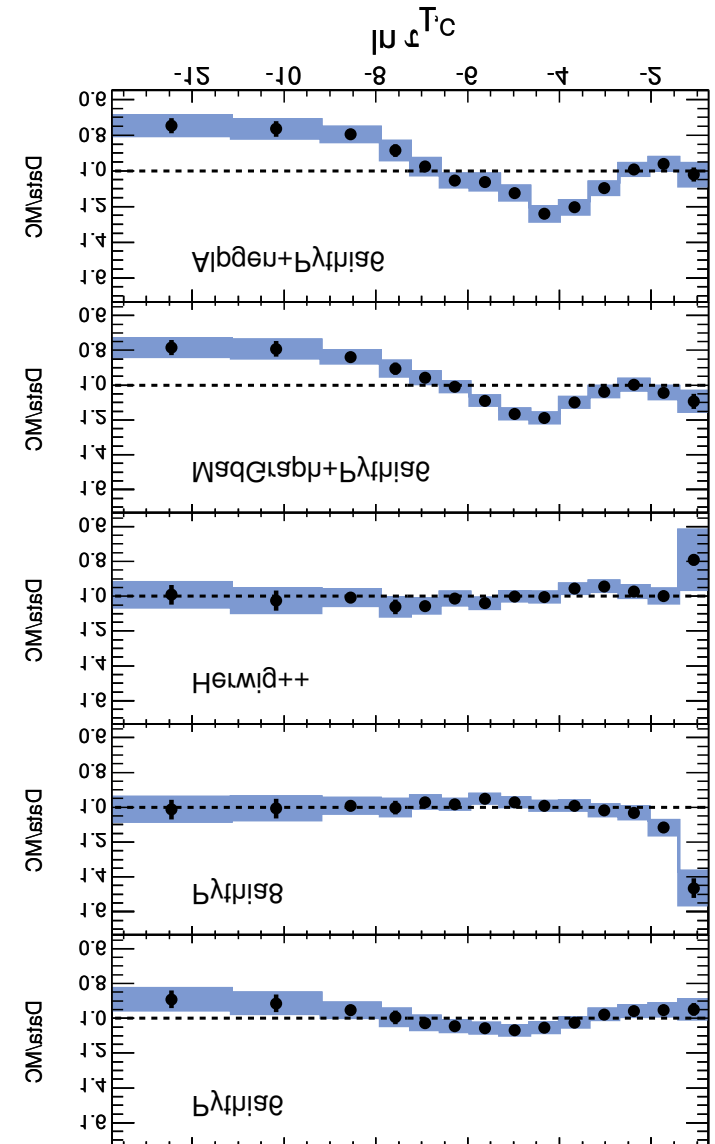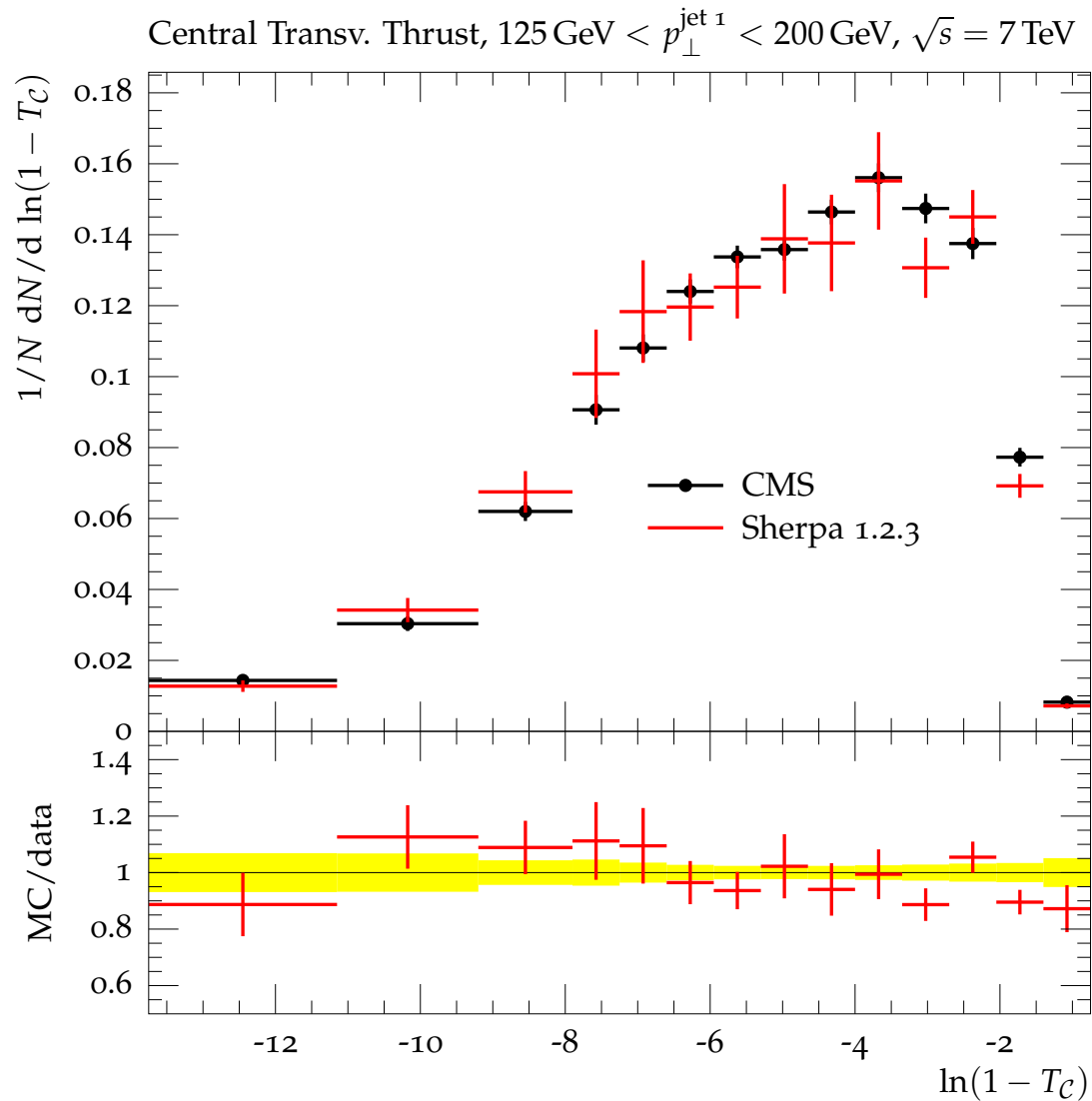arXiv:1102.0068

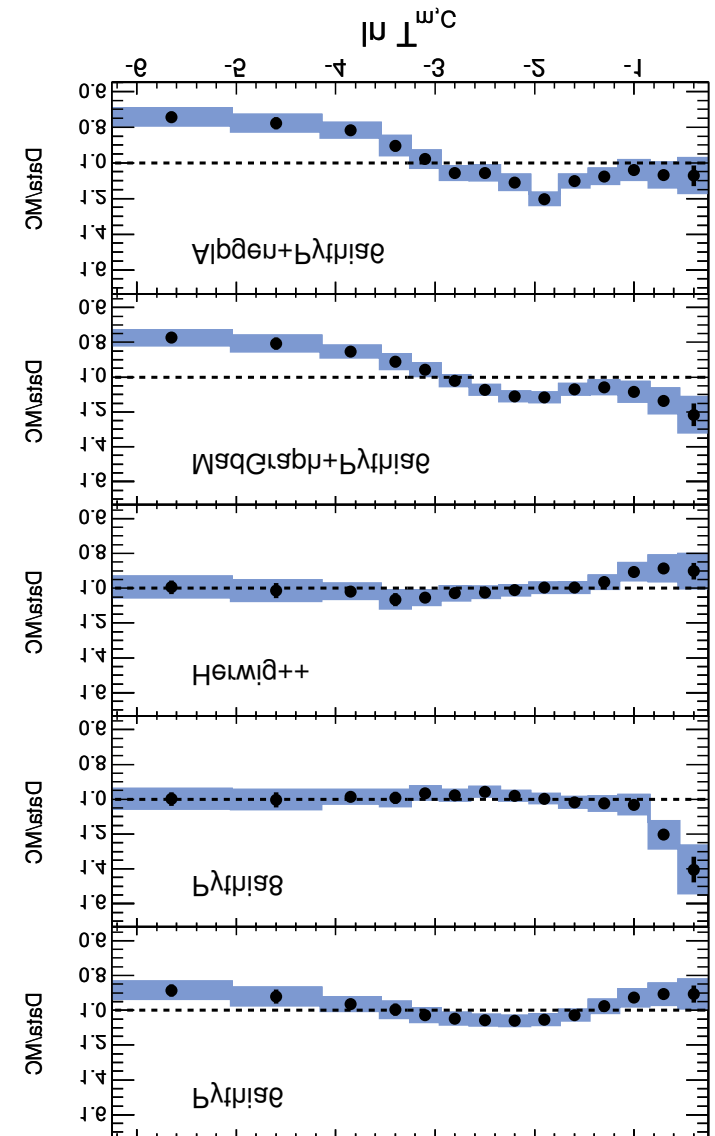# Event Shapes at 7 TeV

arXiv:1102.0068

Event Shapes at 7 TeV

arXiv:1102.0068, data read off the plots

Central Transv. Thrust, $125\,\mathrm{GeV} < p_\perp^{\mathrm{jet}\,1} < 200\,\mathrm{GeV}$, $\sqrt{s} = 7\,\mathrm{TeV}$

Event Shapes at 7 TeV

arXiv:1102.0068, data read off the plots

Central Transv. Minor, $125\,\mathrm{GeV} < p_\perp^{\mathrm{jet\ 1}} < 200\,\mathrm{GeV}$, $\sqrt{s} = 7\,\mathrm{TeV}$

- CMS
- Sherpa 1.2.3

Summary

- Historically Sherpa's emphasis is not on minbias. Nevertheless, it does a reasonable job for the underlying event at LHC.

- Good performance for hard processes.

- We will release a new model for soft physics in Sherpa this year, which will be used for minimum bias and the underlying event.