Improvement of top pair modelling: first blood

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UCL ATLAS group meeting
December 13, 2013

Activities

Generated samples (50'000 events each)

PDF library: CT10 (later also CTEQ6L1, HERA) | Tune: AU2

- PoWHEG + Pythia 6
- PoWHEG + Pythia 8
- PoWHEG + Pythia 8 with `main31` user hook

Rivet analyses

`MC_TTBAR`	Monte Carlo analysis for ttbar studies
`MC_JETS`	Monte Carlo validation observables for jet production
`ATLAS_2012_I1094568`	Measurement of ttbar production with additional central jet activity

Proposed things to do

Easiest things and things with the greatest expected effect first.

Consistency checks

Enable PYTHIA activities one by one and check where versions 6 & 8 start to diverge.

Try to improve description

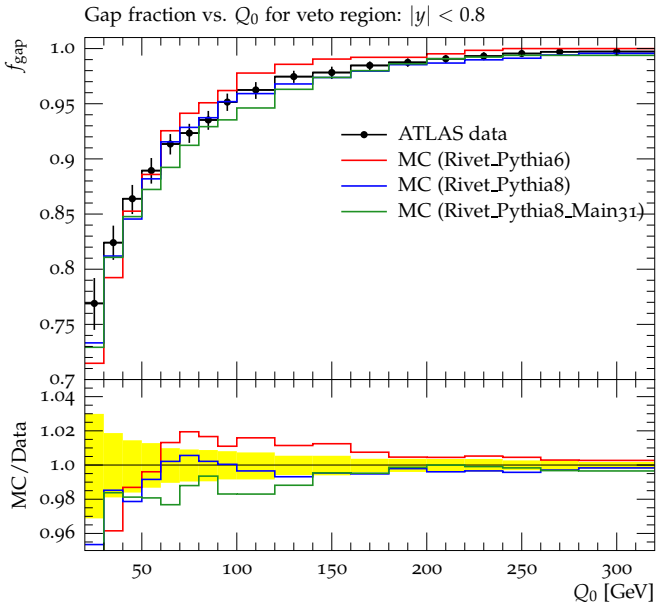
Job option level	Fiddle with built-in scales, in particular $\alpha_s(M_Z)$
Custom code level	Write custom C++ to improve matching between PoWHEG and Pythia (`main31`)

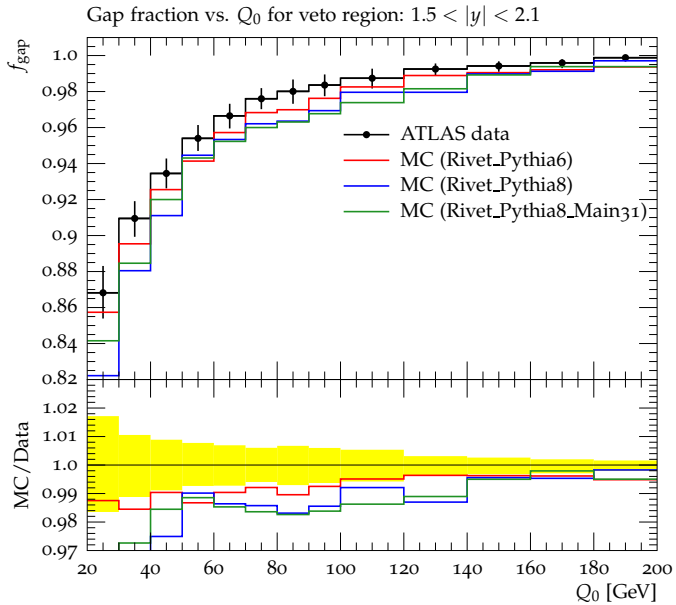
Quantitatively assess agreement between distributions

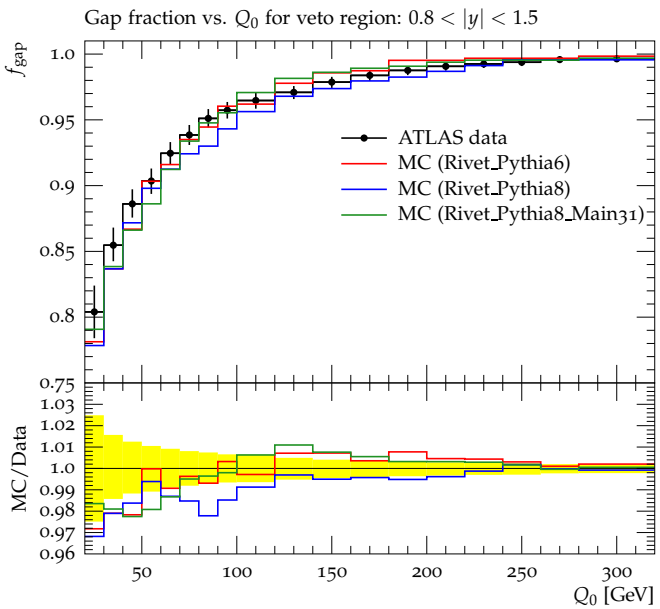
Are there guidelines/common practices? I was thinking of p-values and things like Kolmogorov distances.

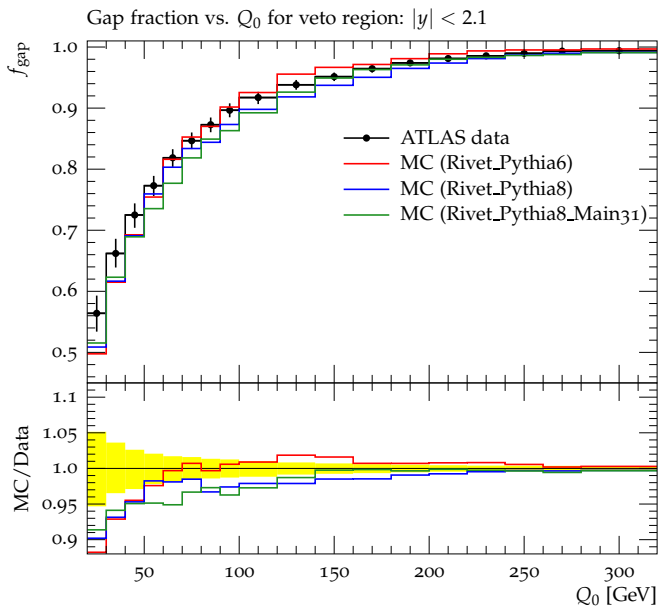
Central jet veto (cut on p_T of hardest jet only)

Shown: fraction of events passing (f_{gap}) vs. p_T cut value (Q_0) in different rapidity regions



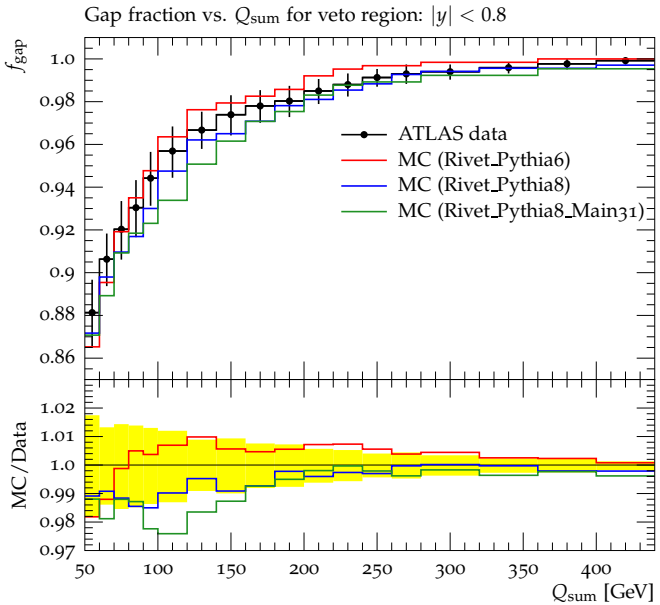


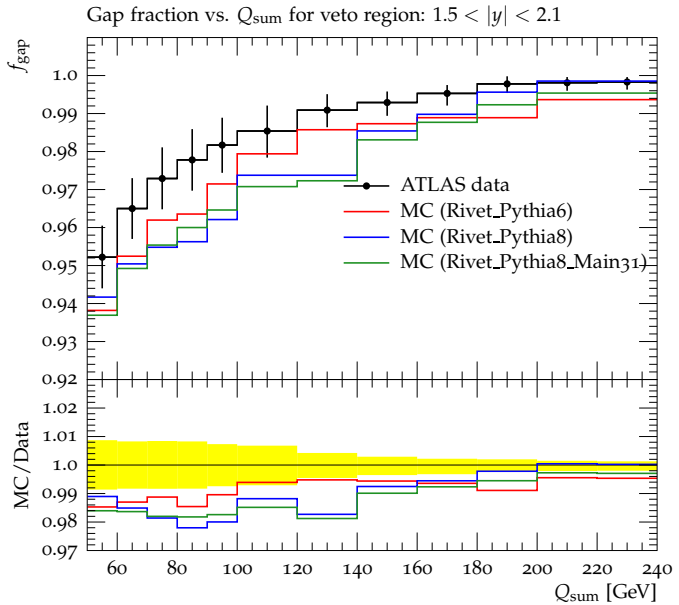


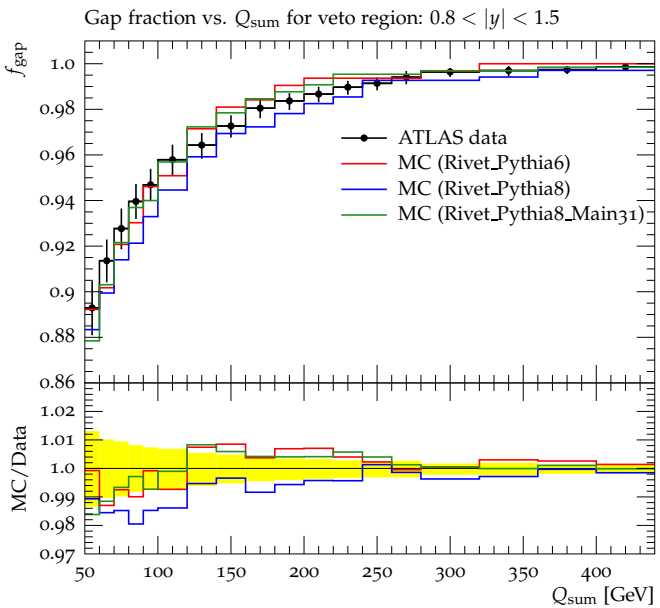


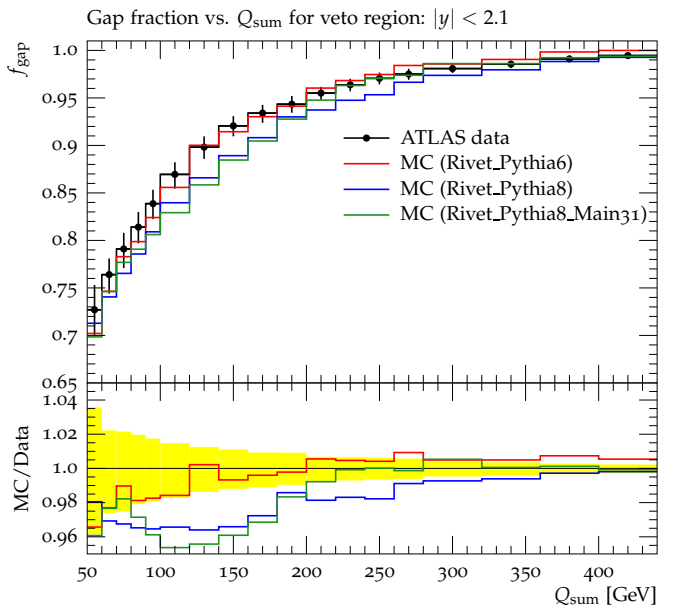
Central jet veto (cut on scalar p_T sum of all central jets)

Shown: fraction of events passing (f_{gap}) vs. p_T cut value (Q_{sum}) in different rapidity regions









Jet multiplicity

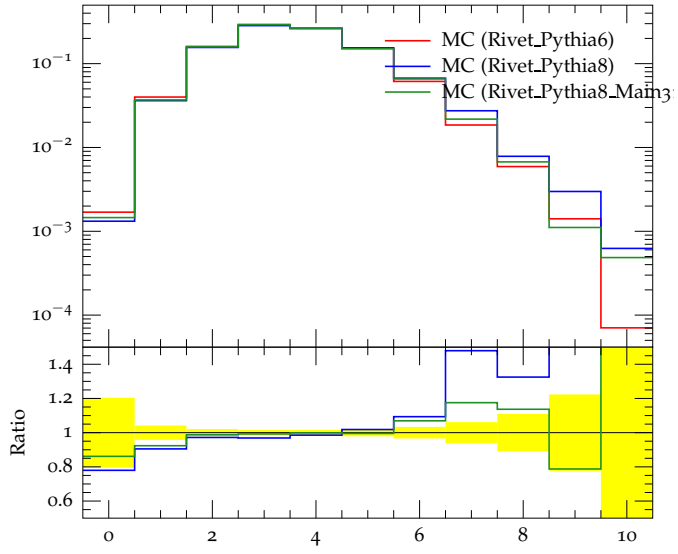
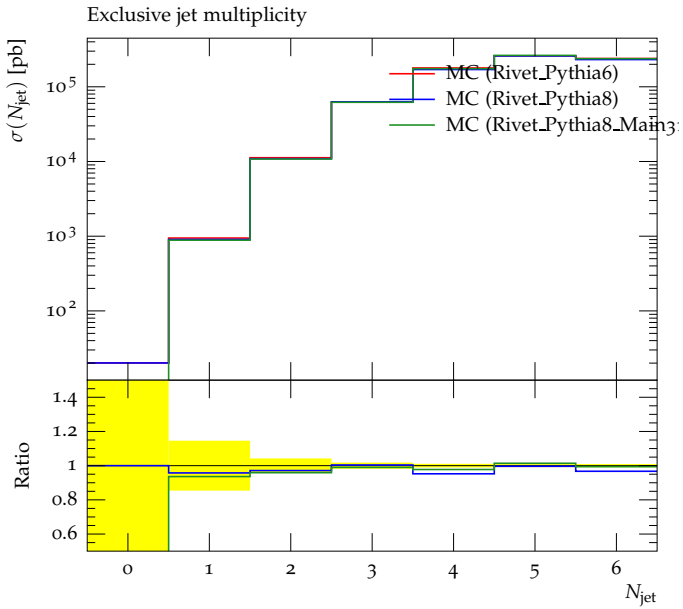


Figure: `MC_TTBAR` exclusive jet multiplicity



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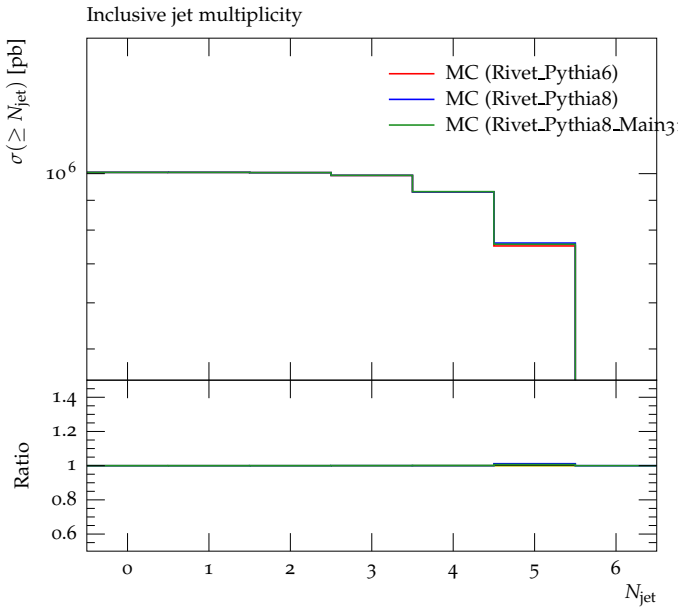

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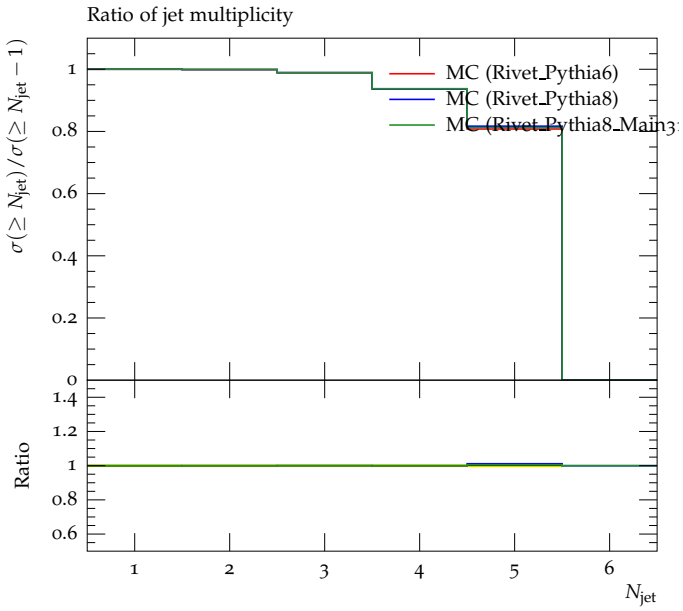

Figure: `MC_JETS` jet multiplicity ratio