Improvement of top pair modelling: first distributions

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Activities

Generated samples (50'000 events each)

PoWHEG + PYTHIA 6

PoWHEG + PYTHIA 8

PoWHEG + PYTHIA 8 with main31 user hook
— has to be run on lxplus5, because main31 only exists (?) for SLC 5 :(

Rivet analyses

`MC_TTBAR`	
`MC_JETS`	
`ATLAS_2012_I1094568`	"Measurement of ttbar production with additional central jet activity"

Tried giving PYTHIA custom commands, turning of all parton-level activities except hard process (ISR, MPI, UE, FSR).

Problem	PYTHIA labels such events as failed (always/sometimes?); exits with error after 499 failed events.
Solution	Give more sensible instructions or override PYTHIA's complaints

Proposed things to do

Guiding principle: easiest things and things with the greatest expected effect first.

Consistency and sanity checks

Enable PYTHIA activities one by one and check where versions 6 & 8 start to diverge. Change between *power* and *wimpy* shower—shouldn't make a difference as shower starting scale $>$ PoWHEG hardest emission scale in any case.

Try to improve consistency

Fiddle with built-in scales (modified job options). Write custom C++ to improve matching?

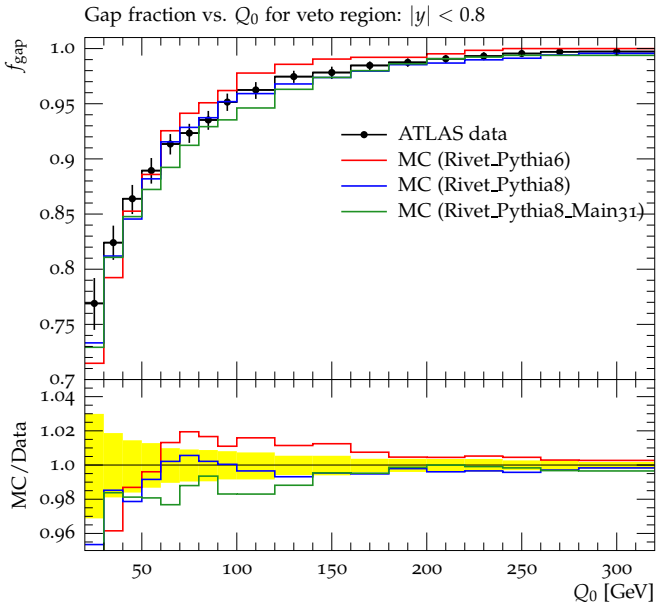
Quantitatively assess agreement between distributions

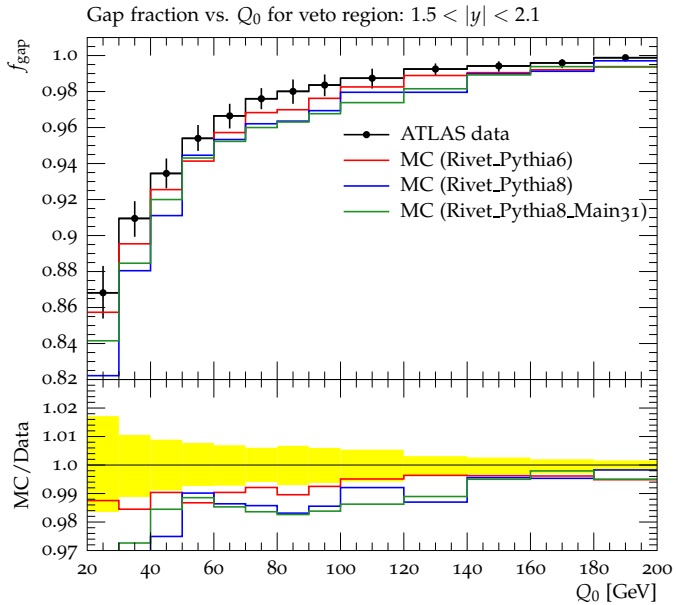
Are there guidelines/common practices? Is there a toolkit? I was thinking of p-values and things like Kolmogorov distances.

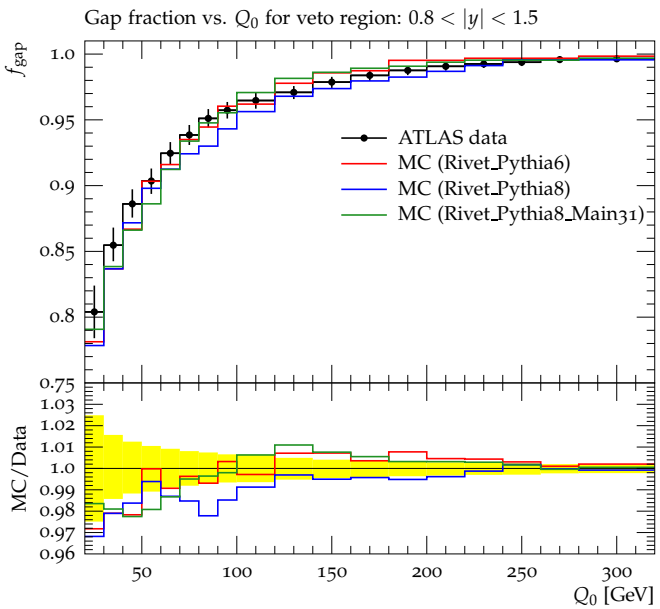
(Credit to Keith Hamilton for advice.)

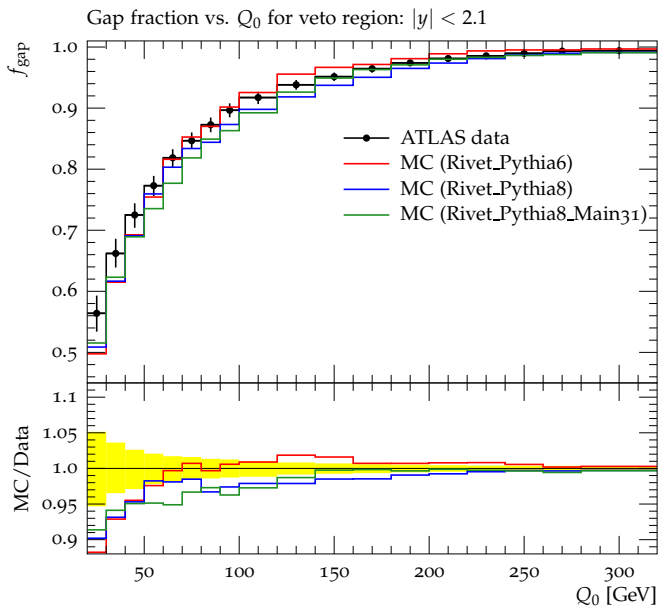
Central jet veto (cut on p_T of hardest jet only)

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



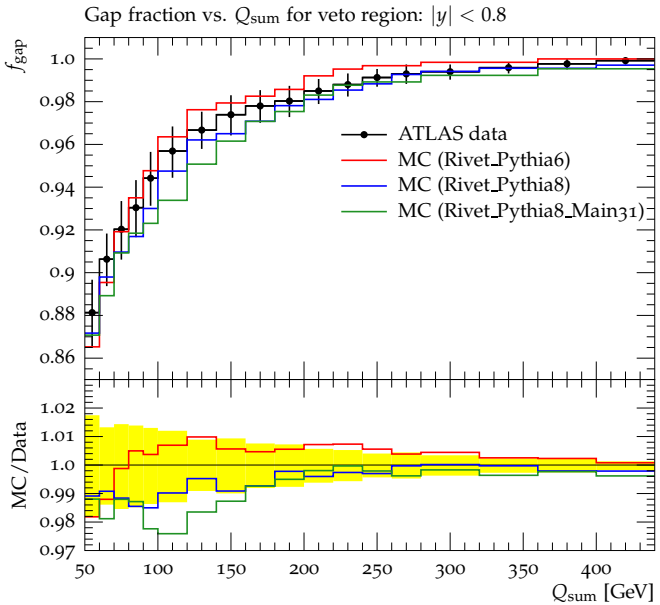


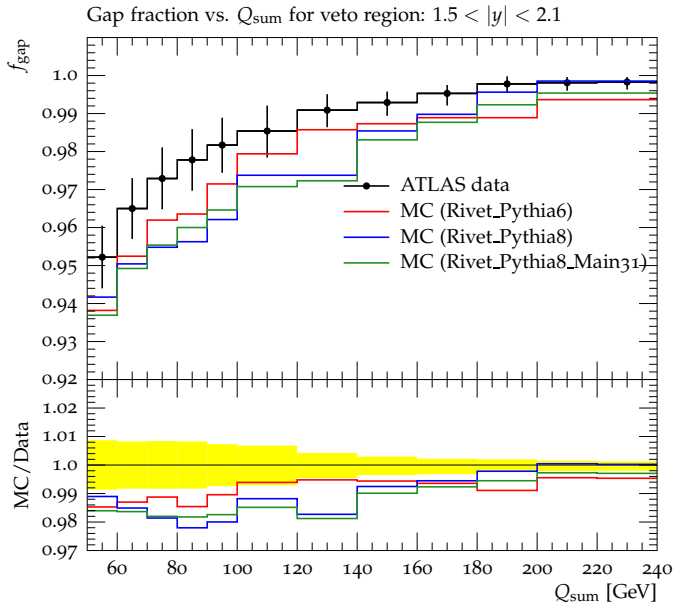


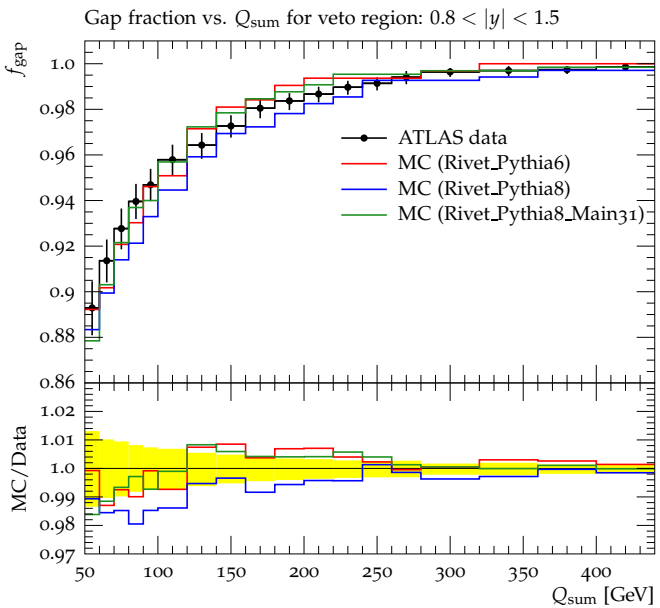


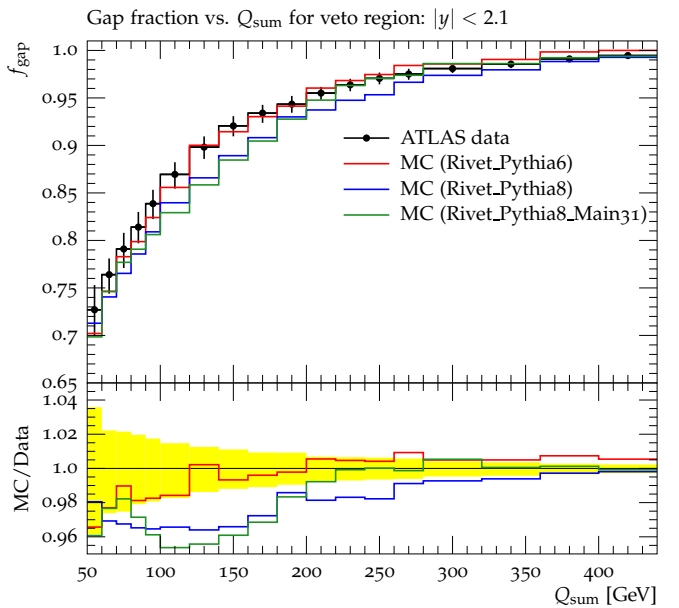
Central jet veto (cut on scalar p_T sum of all central jets)

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









Jet multiplicity

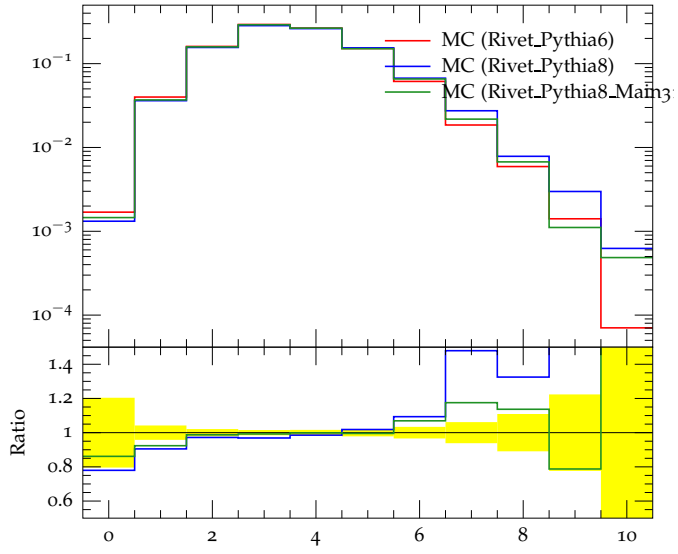


Figure: `MC_TTBAR` exclusive jet multiplicity

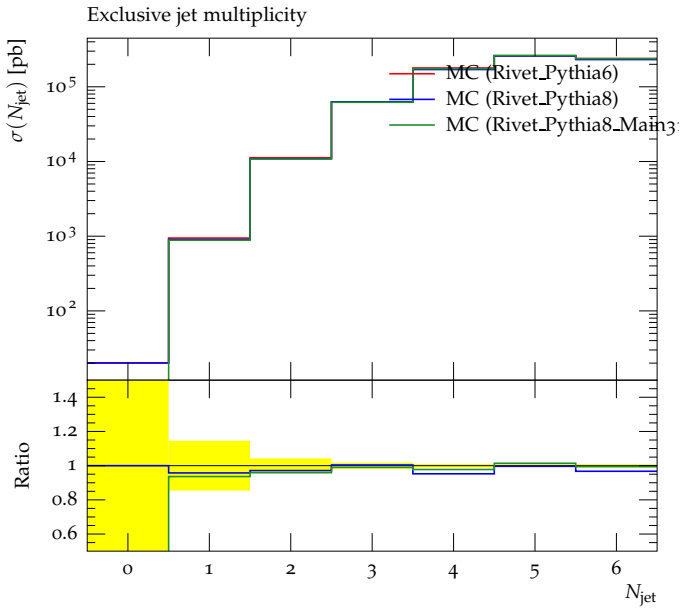


Figure: `MC_JETS` exclusive jet multiplicity

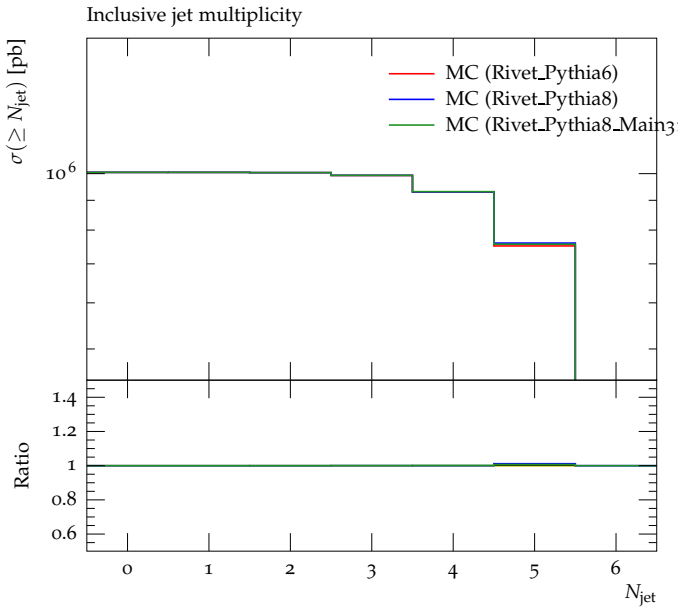


Figure: `MC_JETS` inclusive jet multiplicity

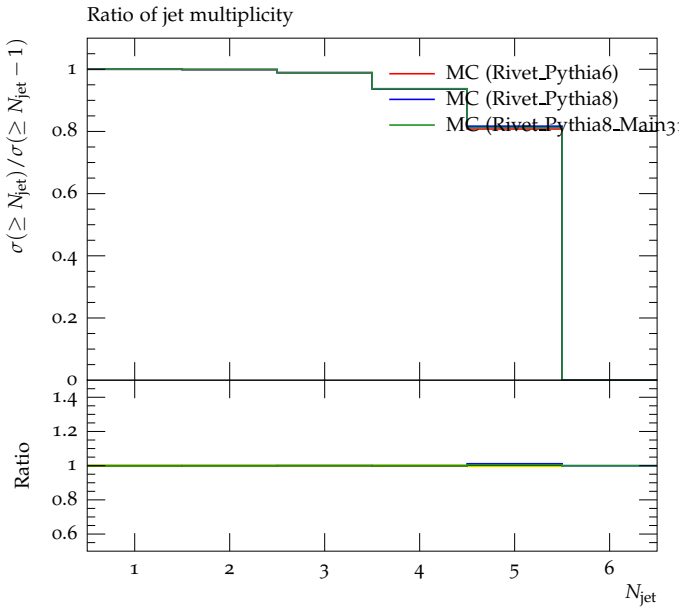


Figure: `MC_JETS` jet multiplicity ratio