

Steps toward an LHC tune

The problem

- comparison with theory predictions is tricky:
 - different tunes: affect multi-jet final states, hadronization, UE
 - α_s - settings, PDF, fragmentation etc
 - different pdfs: affect hard scattering x-section
- conclusion of theory comparison is often not conclusive

The goal:

- develop MC tunes which are
 - general:
 - applicable to all processes (no process specific tune)
 - only one tune per generator
 - provide a reasonable (maybe not the best) description
 - accepted by MC authors and experiments
 - universal
 - applicable to measurements of all (LHC) experiments
 - but also to other measurements at LEP, Tevatron, HERA ?
 - unique
 - make use of the same datasets (benchmark data) to tune relevant parameters
 - additional data might be used for different generators
 - have a comparable goodness-of-fit definition for benchmark data

Next steps:

- create/provide a list of measurements which should be used for tuning:
 - hadronization from LEP
 - what about heavy flavor measurements at LHC etc ?
 - what about colored/uncolored initial state effects ?
 - UE/minibias from LHC and Tevatron at all energies (perhaps except lowest energy at 300 GeV)
 - intrinsic kt distributions: low energy DY or DY at LHC/Tevatron ?
 - parton shower parameters (lower scale cutoff)
 - final state from LEP
 - initial state ?
 - interference/color connections between initial/final state and interleaved MPI ?
 - clarify goodness of fit: delta χ^2

Time scale

- Major effort of MC authors and gen-experts from experiments
- will be the first common general effort to make theory comparisons unified and uniform

- Goal
 - define benchmark measurements until September
 - perform tunes until November
 - validation until end of 2018