

LH'15: Monte-Carlo working group

Vitaliano Ciulli, Rikkert Frederix,
Marek Schönherr

Universität Zürich

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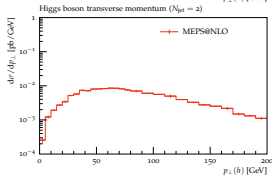
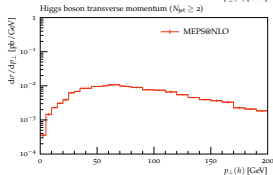
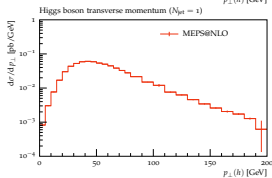
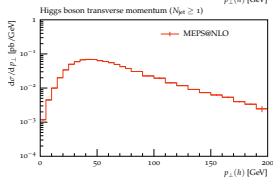
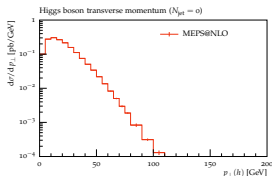
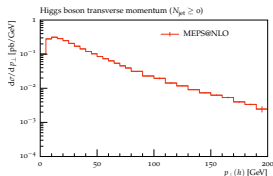
Some topics

- $pp \rightarrow h + \text{jets}$ fixed-order vs. matched/merged calculations
- parton shower systematics
- matching/merging systematic uncertainties
- tuning in the presence of matching/merging
- extrapolation from fiducial region to 4π
- EW corrections
- $pp \rightarrow t\bar{t} + \text{jets}$ comparison
-

$pp \rightarrow h + \text{jets}$

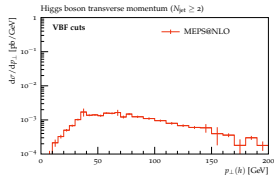
- common project with Loops and Multilegs group
- many observables have intricate phase space dependencies
→ non-trivial to see which ones are described decently by fixed-order calculations
- even when picture seems clear there are surprises
 - xs, leading jet pT in dijet production
 - + leading jet pT in $pp \rightarrow Z + 1\text{jet}$ with veto on 2nd jet
- existing RIVET routine (RIVET-2.2.1) for easy analysis
 - ready for fixed-order, merged and matched calculations
 - HEPMC or LHEF input
 - either stable Higgs or decay to photons→ compare at pQCD level

$pp \rightarrow h + \text{jets}$

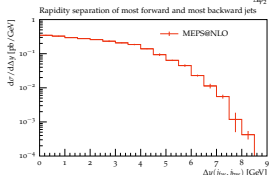
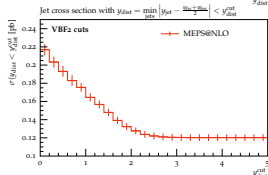
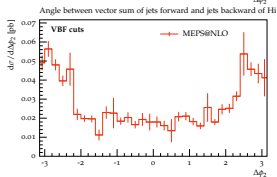
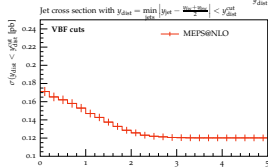
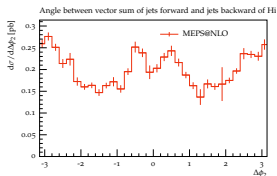
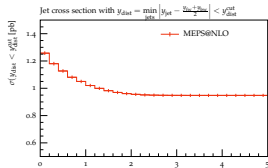


goals:

- study various observables
- some with intricate phase space dependence
- assess description

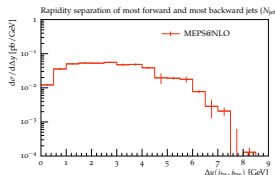


$pp \rightarrow h + \text{jets}$



goals:

- study various observables
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Systematics

Parton showers:

- already discussed in previous incarnations of LH
- some work done by various groups
- none is exhaustive (encompasses not all arbitrary/systematic choices)
- rarely assessed in experiments

Matching/merging systematics:

- already discussed in previous incarnations of LH
- we had a nice table of what to do on the board
- rarely assessed in experiments

Non-perturbative modeling systematics:

- already discussed in previous incarnations of LH
- eigentunes, simplified variations
- rarely assessed in experiments

Extrapolation from fiducial region to 4π

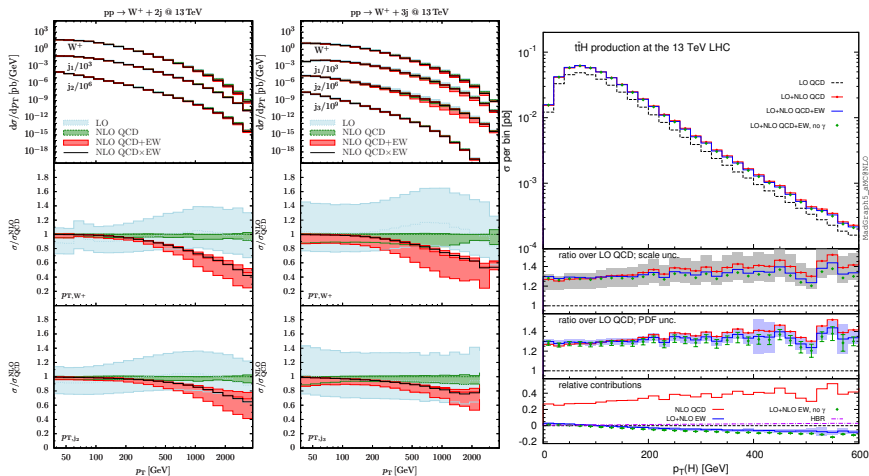
- commonly done to compare to NLO/NNLO/Resummed calculation which does not allow for fiducial cuts
- are the extrapolation uncertainties exhaustive
- when extrapolating include/not-include processes that only contribute outside fiducial region

example: Drell-Yan

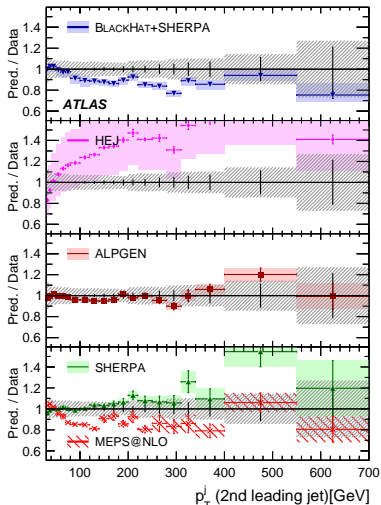
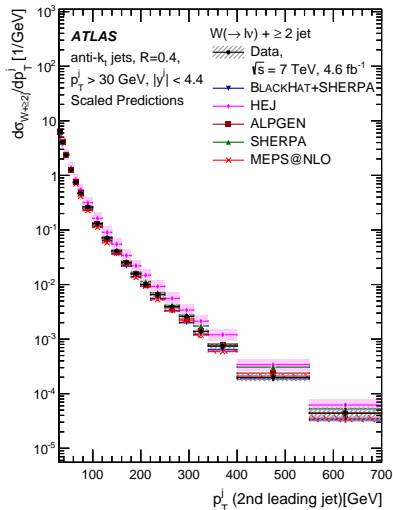
- in fiducial region $q\bar{q} \rightarrow \ell\ell$ and $\gamma\gamma \rightarrow \ell\ell$ (γ PDF)
- suppressed by orders of magnitude in fiducial region but rather large in 4π : $\gamma\gamma \rightarrow \ell\ell$ (EPA – γ -bremsstrahlung)

⇒ **Extrapolation to compare to a calculation or to describe physics process in 4π ?**

EW corrections



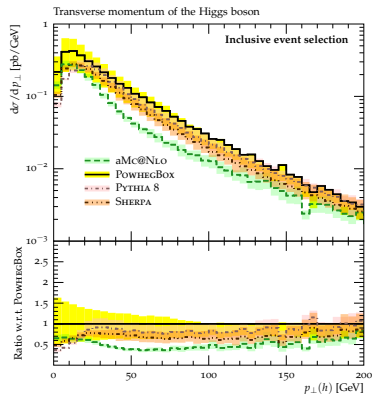
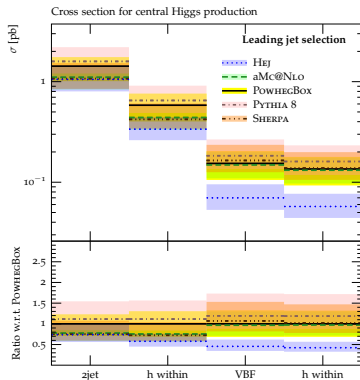
EW corrections



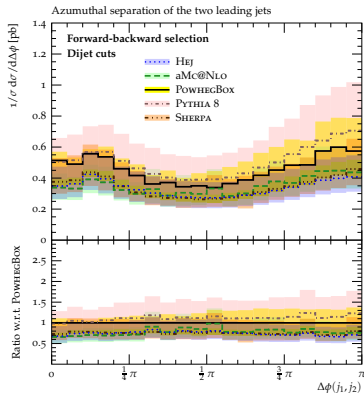
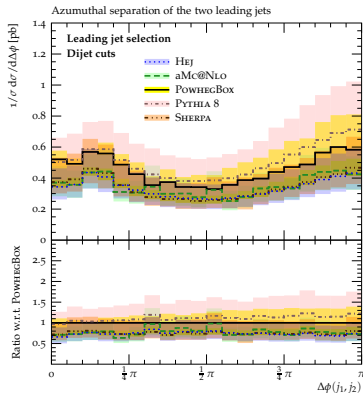
Generator comparison – $pp \rightarrow t\bar{t} + \text{jets}$

- benchmarking predictions and uncertainties of different generator/calculations
 - ideally mix of fixed-order, matched, merged
- $pp \rightarrow W + \text{jets}$ (LH'11), $pp \rightarrow h + \text{jets}$ (LH'13)
- propose **$pp \rightarrow t\bar{t} + \text{jets}$**
 - process of interest in its own right
 - background to tth and BSM
- ideally have all existing methods contributing
- should start discussing soon to fix observables etc.
- identify main objective

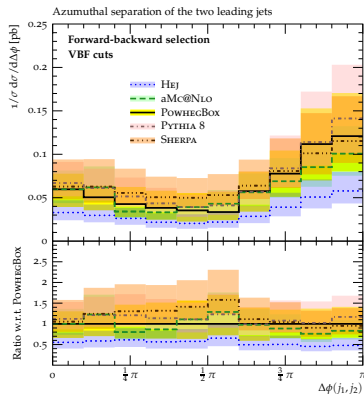
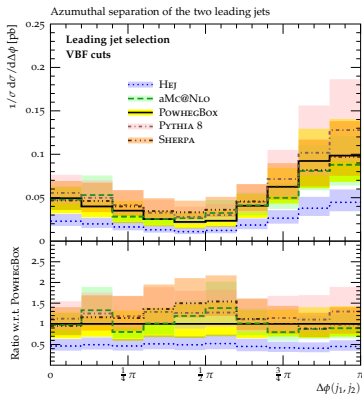
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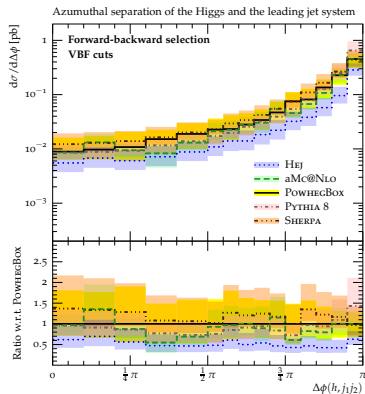
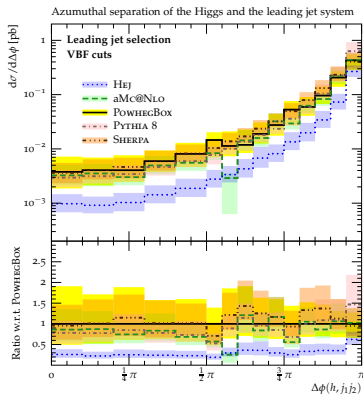
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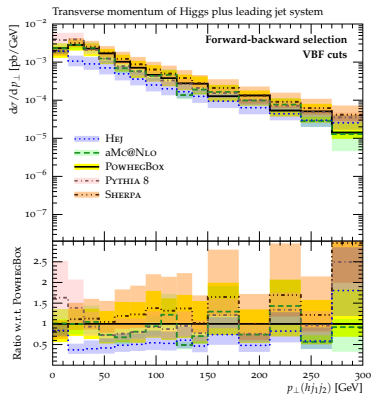
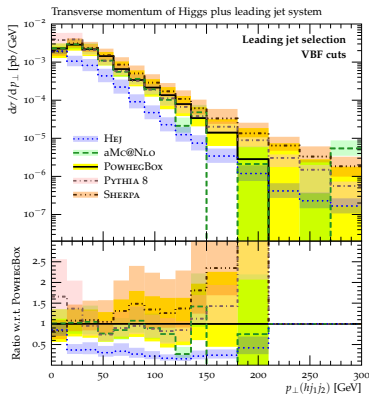
Generator comparison – $pp \rightarrow t\bar{t} + \text{jets}$



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Generator comparison – $pp \rightarrow t\bar{t} + \text{jets}$



First events

Wed 14:00 – hjets discussion via Vidyo

Wed afternoonish – parton shower/matching uncertainties

Thu 10:00 – ttbar (?) setup (focus/scope/observables)

Thank you for your attention!