

Comparitive study of H+jets production

Jeppe Andersen, Marek Schönherr

Institute for Particle Physics Phenomenology

Les Houches, 05/06/2013



LHCphenOnet



Cuts and Observables

Cuts:

- $p_{\perp}(j_1), p_{\perp}(j_2) > 25 \text{ GeV}$ (anti-kt, $R = 0.4$, $\eta < 5$)
- $m_{jj} > 400 \text{ GeV}$, $\Delta_y > 2.8$
- $p_{\perp}(j_3) > 20 \text{ GeV}$

Observables/Binnings:

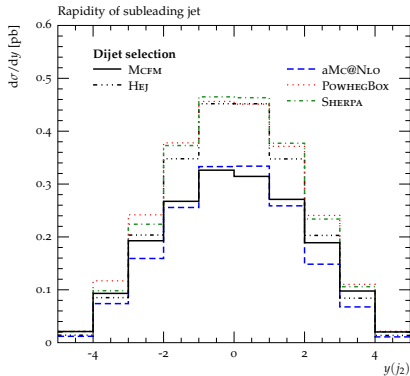
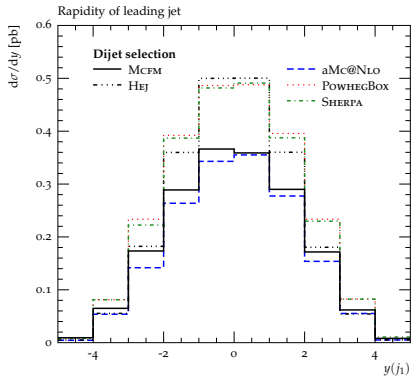
- $p_{\perp}(j_1)$ [25, 200] 7 bins
- $p_{\perp}(j_2)$ [25, 150] 5 bins
- $y(j_1), y(j_2)$ [-5, 5] 10 bins
- m_{jj} [0, 800] 20 bins
- Δy_{jj} [0, 8] 8 bins
- $\Delta\phi_{jj}$ [0, π] 10 bins
- $p_{\perp}(j_3)$ [20, 100] 8 bins
- $y(j_3), y^*$ [-5, 5] 10 bins

First/Preliminary results (partially in YR3)

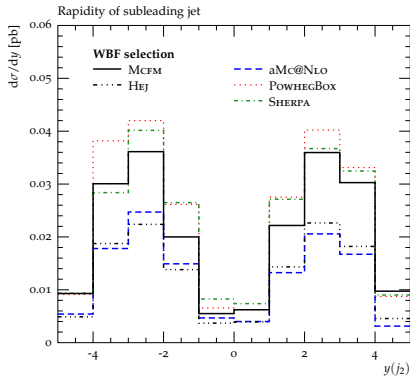
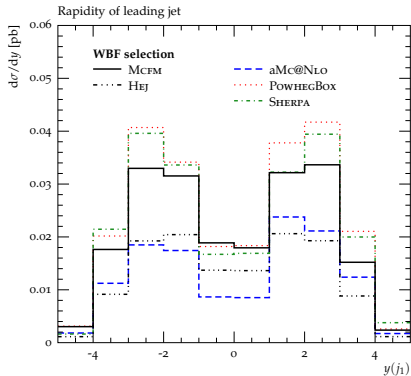
- First comparisons started with

HEJ	$pp \rightarrow h + 2j$ @ LO BFKL-type resummation	$\mu_{\text{core}} = m_h$ $\mu_{\text{em}} = p_{\perp}^{\text{max}}$
aMC@NLO	FxFx merging $pp \rightarrow h + 0, 1, 2j$ @ NLO	CKKW-like scales $\mu_{\text{core}} = m_{\perp}^h$
POWHEG-BOX	$pp \rightarrow h + 2j$ @ NLO	MiNLO scales $\mu_{\text{core}} = m_h$
SHERPA	MEPS@NLO $pp \rightarrow h + 0, 1j$ @ NLO $pp \rightarrow h + 2, 3j$ @ LO	CKKW scales $\mu_{\text{core}} = m_h$
MCFM	$pp \rightarrow h + 2j$ @ NLO	$\mu_{R F} = m_{\perp}^h$

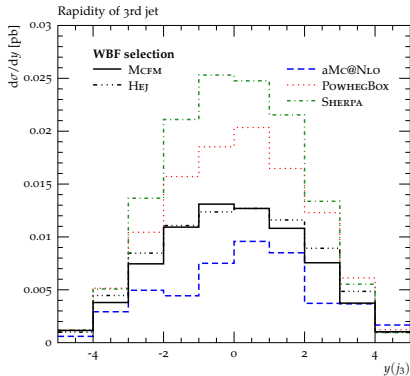
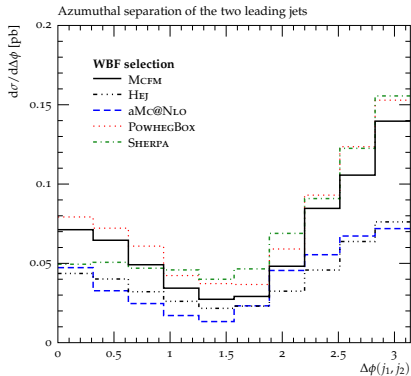
First/Preliminary results (partially in YR3)



First/Preliminary results (partially in YR3)



First/Preliminary results (partially in YR3)



Action items

- adapt cuts and observable definitions/binning to current experimental needs
- include few additional observables which provide insights into what's going on
- include more of the modern tools on the market:
 - UMEPS, UNLOPS (PYTHIA8, S. Prestel)
 - ...
- evaluate uncertainties (μ_R , μ_F , μ_Q , Q_{cut} , etc where possible/applicable)
- comprehensive write-up