

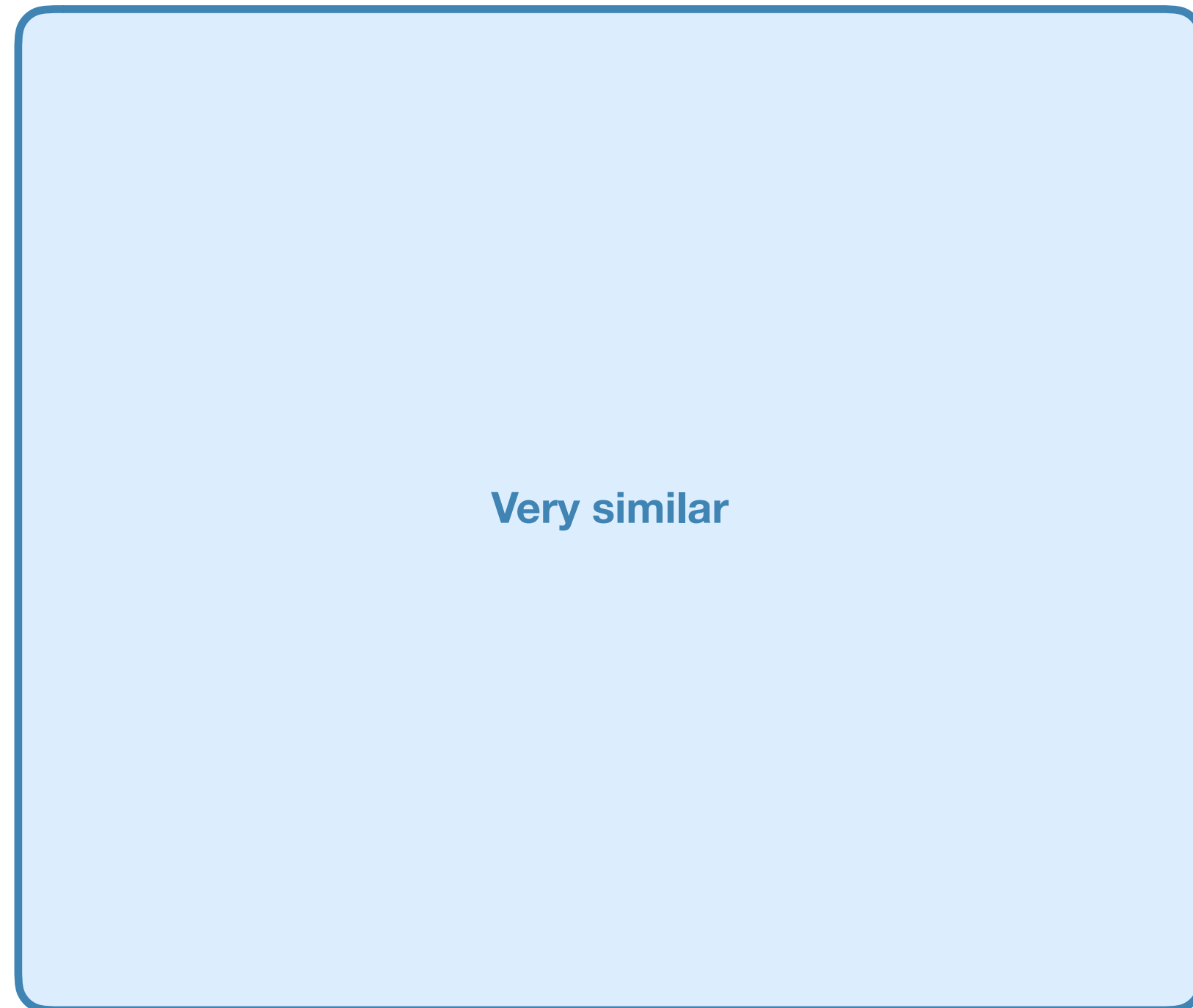
Experimental Status

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Experimental Motivation

same sign WW (ATLAS)



WZ (ATLAS)

Source	Uncertainty [%]
<i>WZjj</i> –EW theory modelling	4.8
<i>WZjj</i> –QCD theory modelling	5.2
<i>WZjj</i> –EW and <i>WZjj</i> –QCD interference	1.9
Jets	6.6
Pile-up	2.2
Electrons	1.4
Muons	0.4
<i>b</i> -tagging	0.1
MC statistics	1.9
Misid. lepton background	0.9
Other backgrounds	0.8
Luminosity	2.1
Total Systematics	10.7

Theory modelling belongs to largest systematic uncertainties!

Experimental Status

Not used in VBS analyses so far, but we did apply this in VBF measurements.

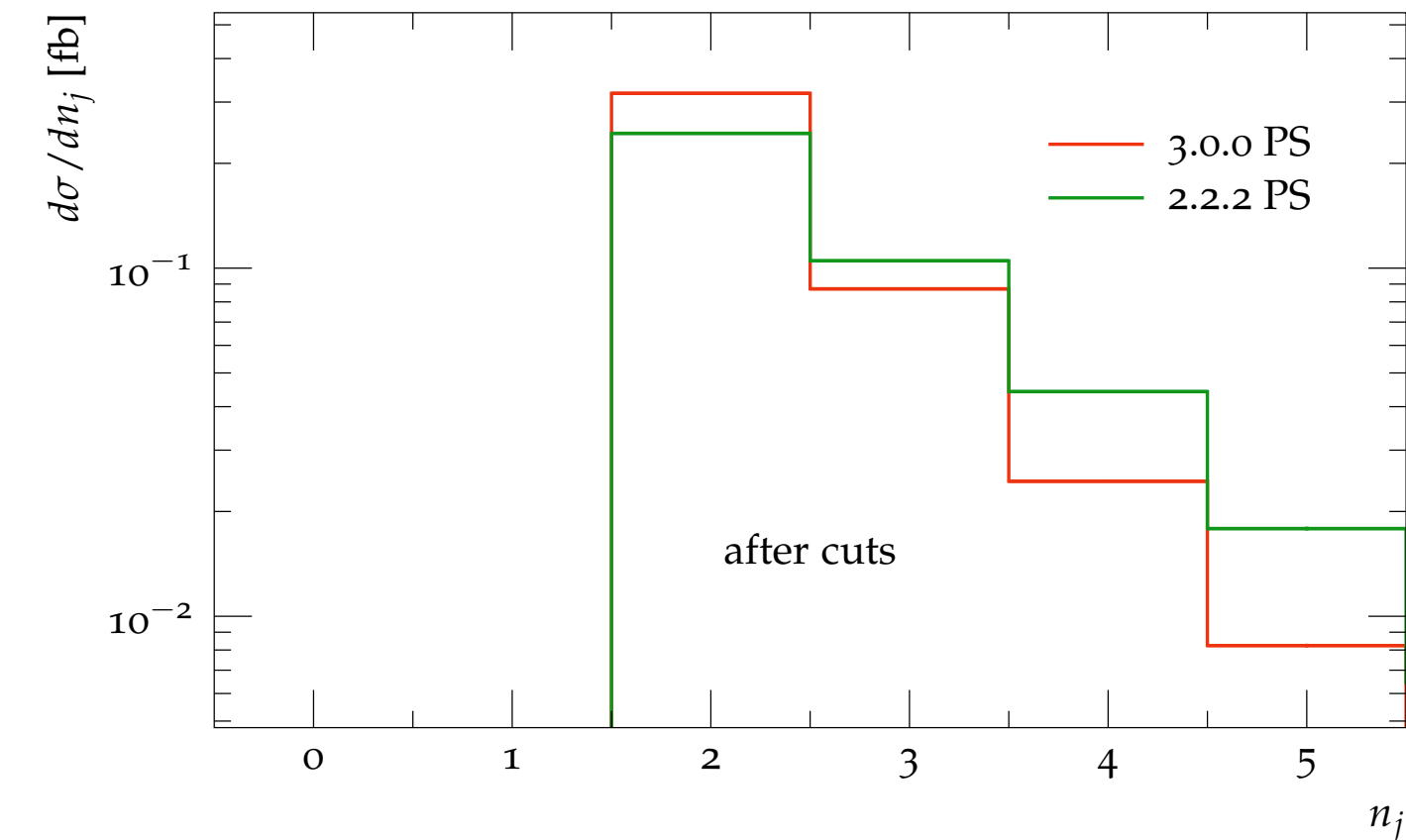
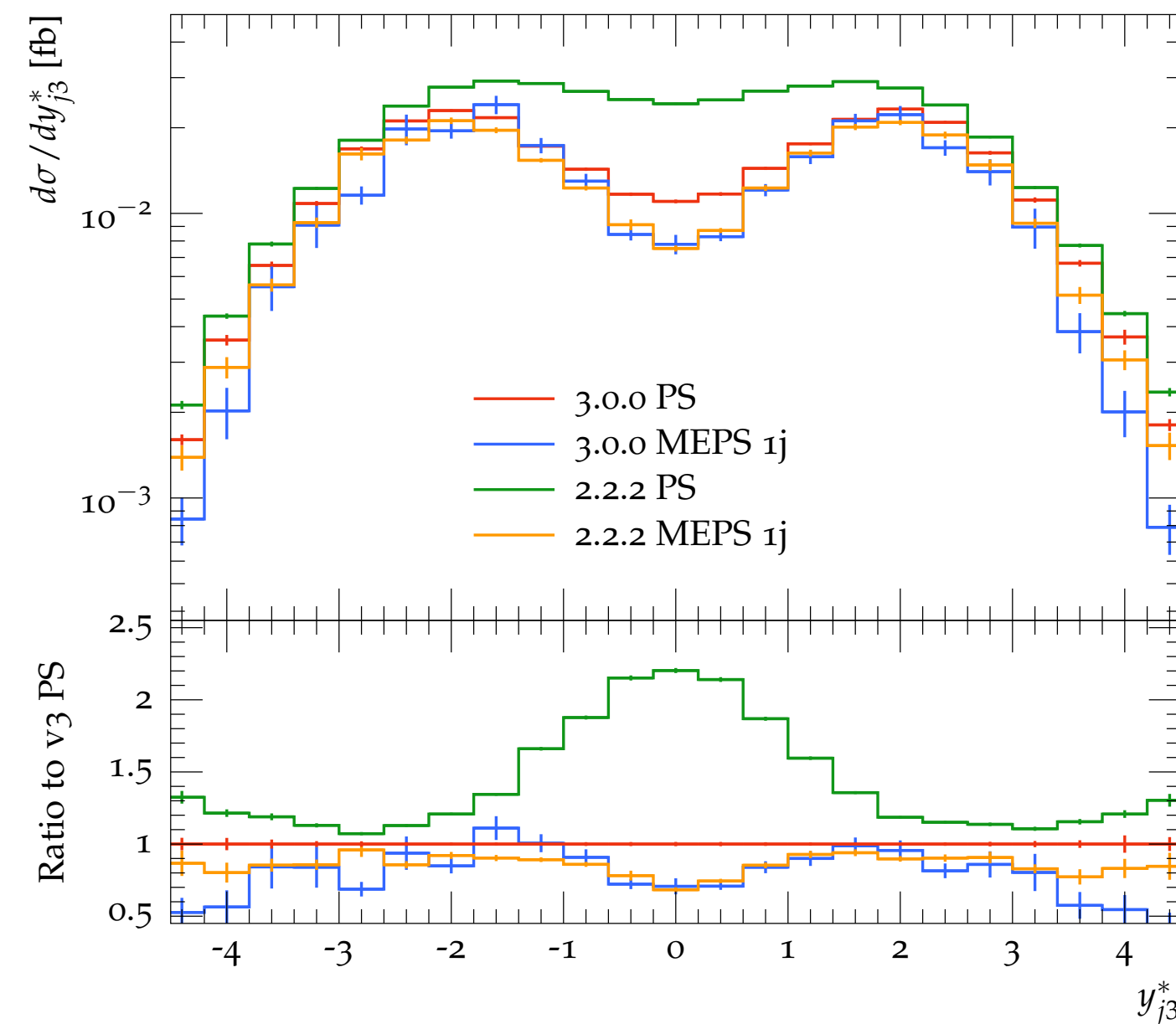
(partially subjective) motivation against this:

- third jet not modelled from matrix element in either signal (EW6) or background (EW4)
- unclear theoretical motivation for jet vetos in general
(see discussion for $WW+0\text{jet}$ @8TeV in ATLAS)

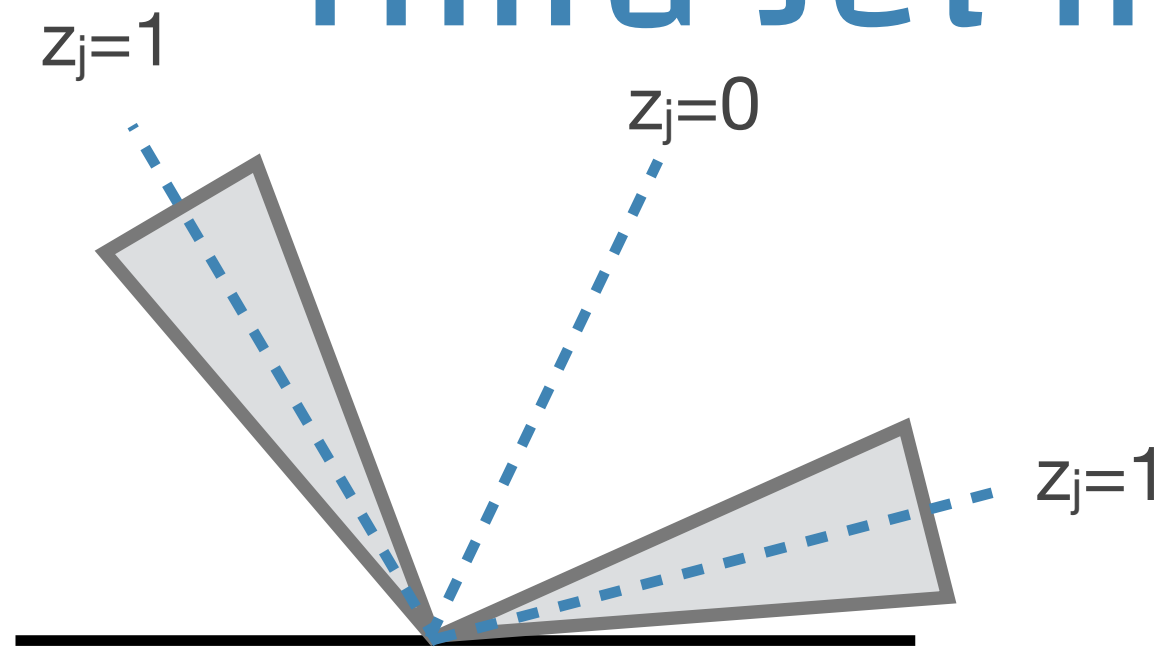
In VBF, we started with veto, but moved to cut on third jet centrality/Zeppenfeld variable

Third Jet in Sherpa

- A problem was found in shower simulation of Sherpa
[talk by S. Höche at MBI 2018]
- third jet is produced more centrally and at higher rate
- merging with this PS decreases overall event rate



Third Jet in Pythia Parton Shower

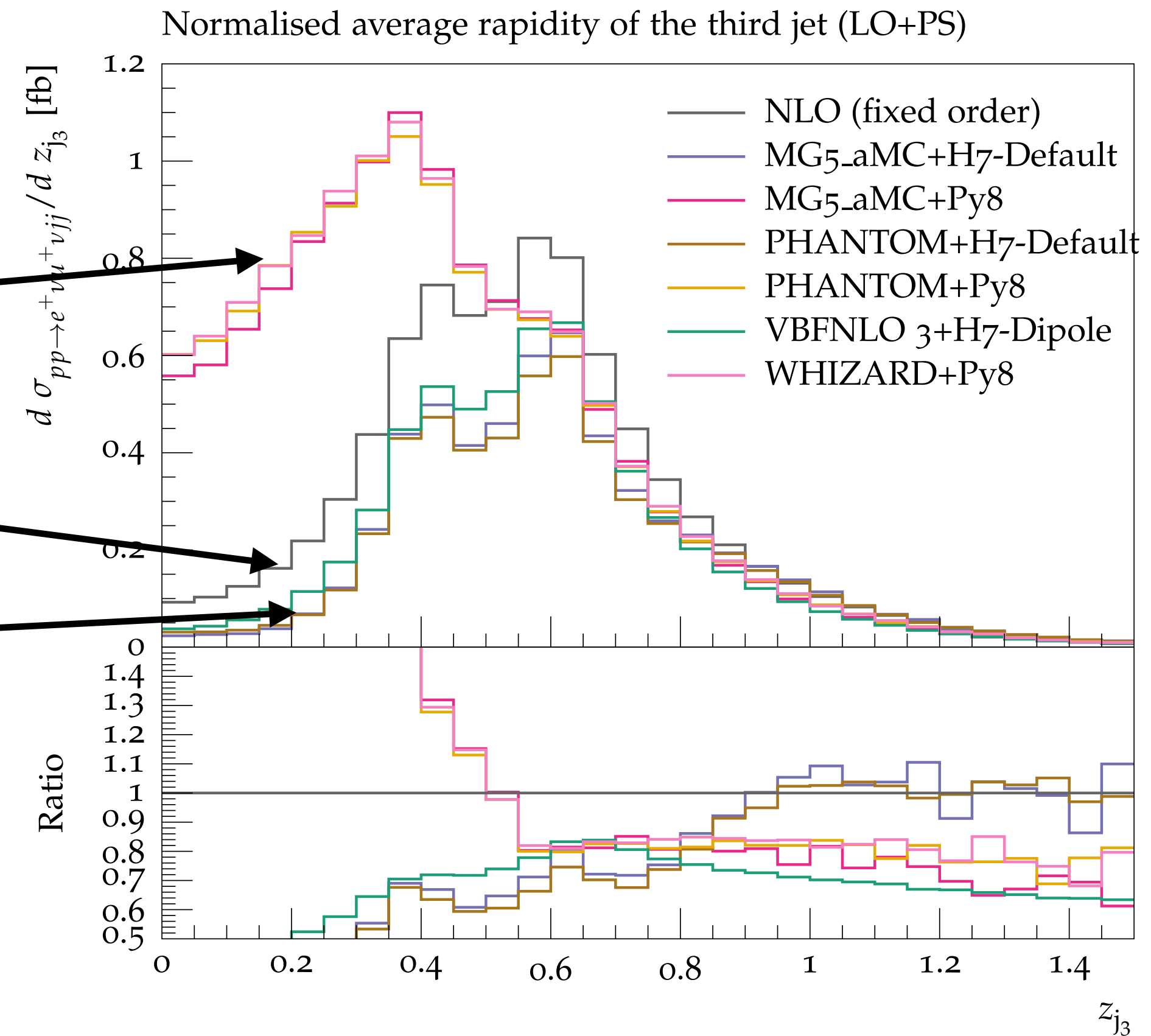


third jet from Pythia PS

third jet from ME

third jet from Herwig PS

Pythia by default shows same behaviour as Sherpa, which isn't compatible with ME calculation!
Possible in new version to adjust recoil scheme, which fixes this



[from arXiv: 1803.07943]

Experimentalists' Wishlist (Subjective!)

hard requirements:

- on-the-fly weights for systematics
- possibility for merging or NLO QCD
- possibility to include s-channel distributions

soft requirements:

- include interferences between s and t, u channels
- reasonable CPU time
- test for other channels than WWss

known setups:

- MG5_aMC@NLO event generation + Pythia8 (not in merged setups) or Herwig for parton shower

waiting for updates:

- Sherpa 3
- Pythia 8 with fix for merging problem
- OTF weights + s-channel contributions in Herwig7 Matchbox interface

⇒ We need two to get uncertainties and for verification!