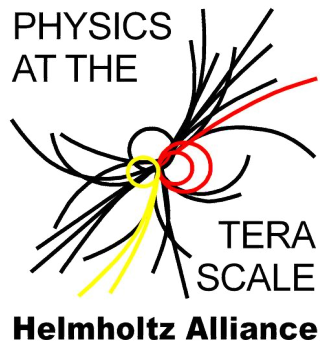


VBF W in Sherpa

Julia Fischer

CJV Working Group Meeting

05.12.2012

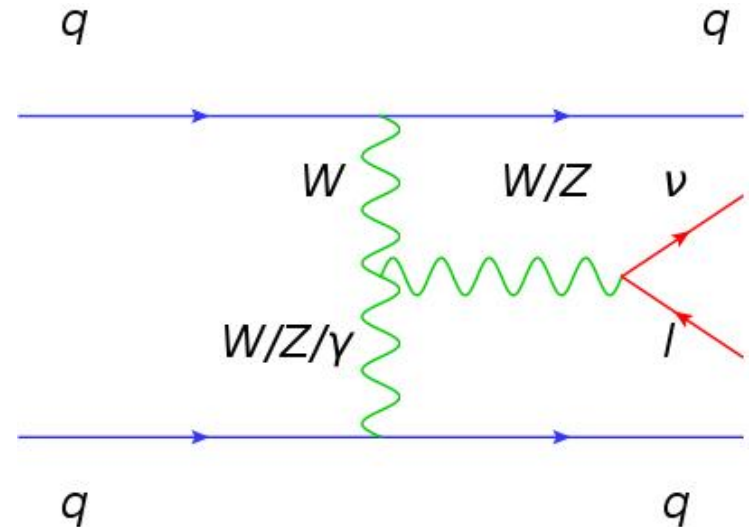


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Introduction VBF-W

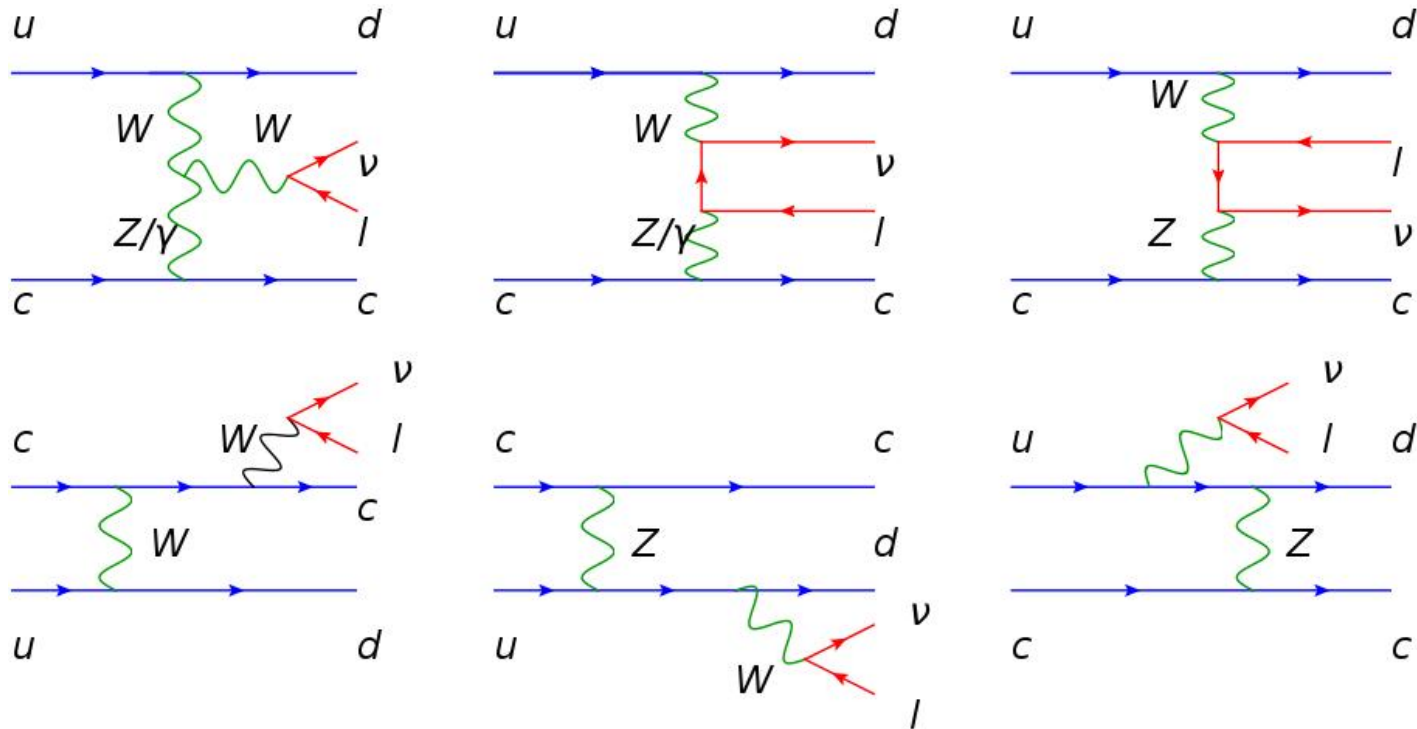
Signature:

- only electroweak interaction
 - no color exchange between the quarks
 - no extra jets in the central region
- Two jets in opposite hemispheres with large angle
 - rapidity gap and large invariant mass $m(j_1 + j_2)$
- charged lepton in the central region
- Large missing transverse Energy



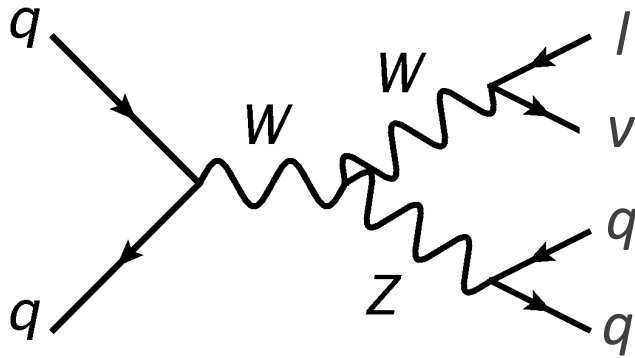
Introduction VBF-W

Generation of VBF diagram not possible, interference with six other diagrams (t channel):



MC production

Problem: s-channel diagrams have the same initial- and final-state and same order of EW vertices:



- VBFNLO gives possibility to generate only t-channel diagrams (interference with s-channel is small)
 - No Shower available for W channel
- Sherpa < 1.4 generates t- and s-channel diagrams

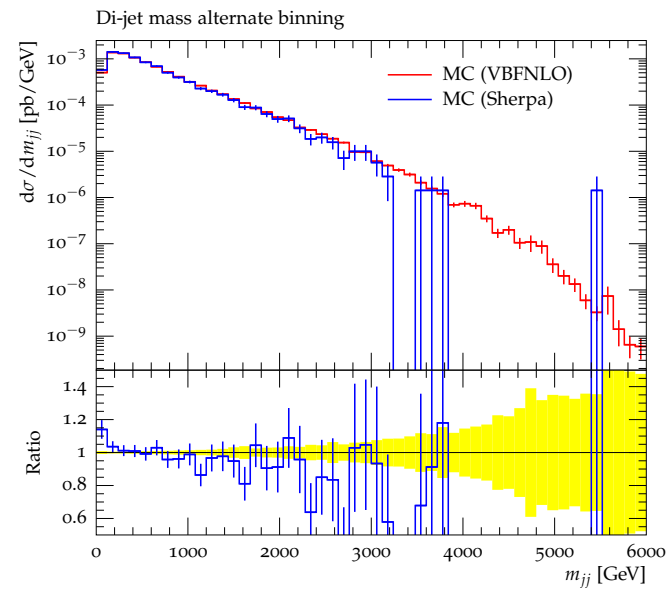
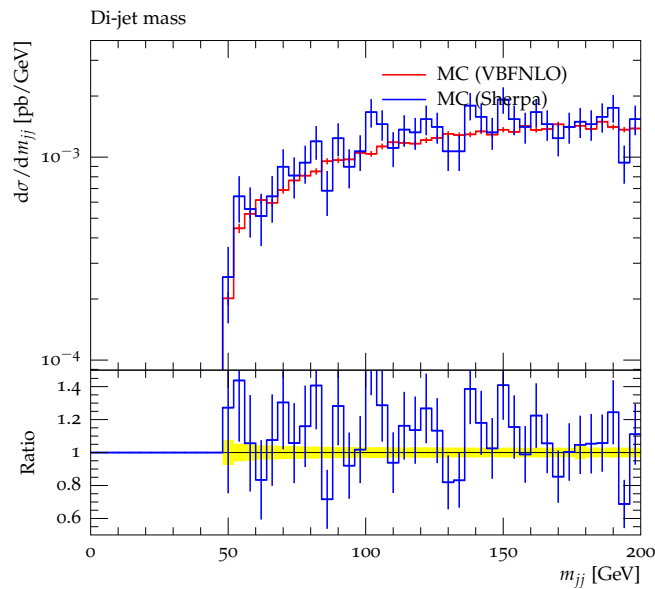
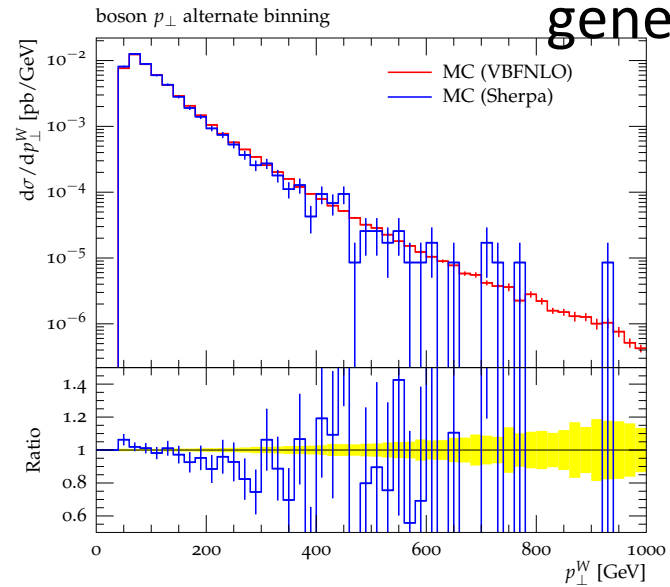
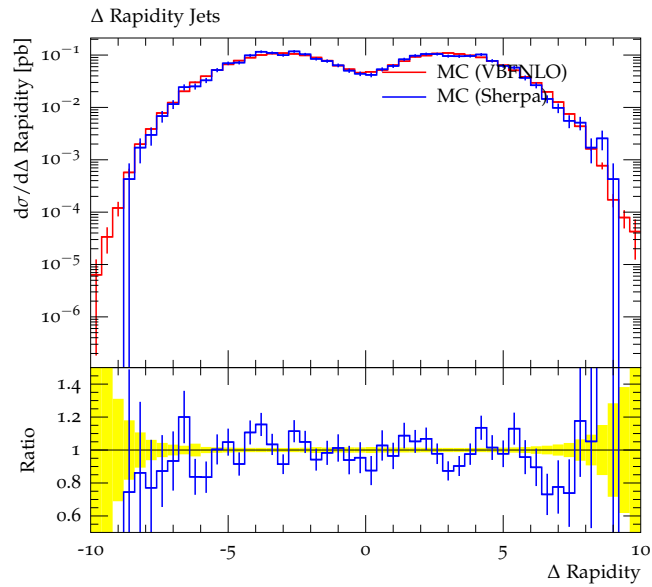
New Sherpa version 1.4 : only t-channel diagrams with parton shower

Generator studies

- First:
 - Compare new Sherpa 1.4 min_t channel option to VBFNLO on Parton Level
 - Both 2 -> 4 process, no extra Jets, no parton shower
- Second:
 - Generate a “real” Signal Sample with Sherpa 1.4 min_t channel
 - Up to one extra Jet and Parton Shower applied
 - Change kinematic distribution slightly
 - Compare this to nominal Sherpa 1.4 and VBFNLO

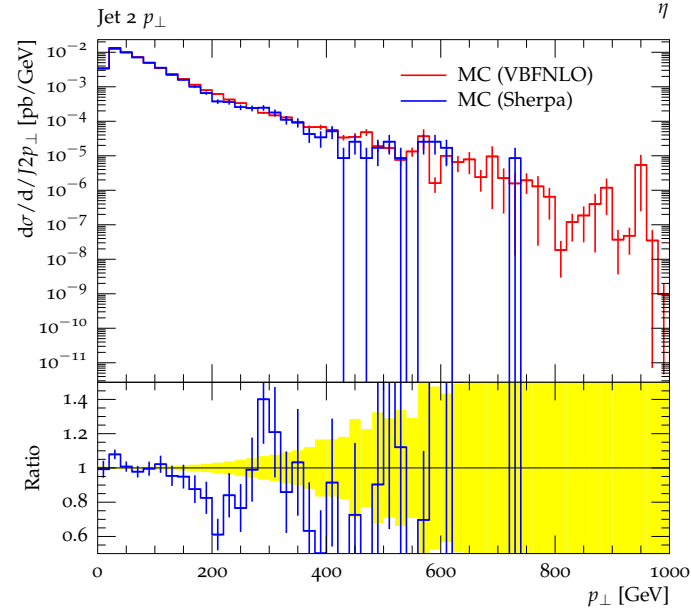
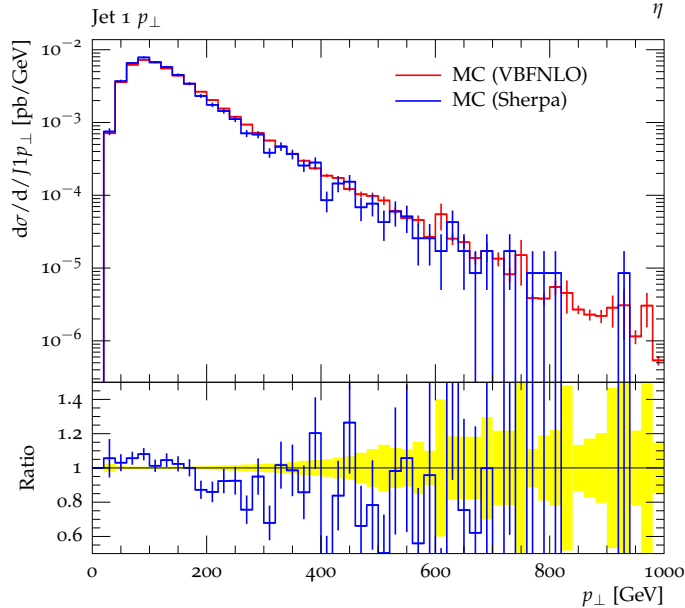
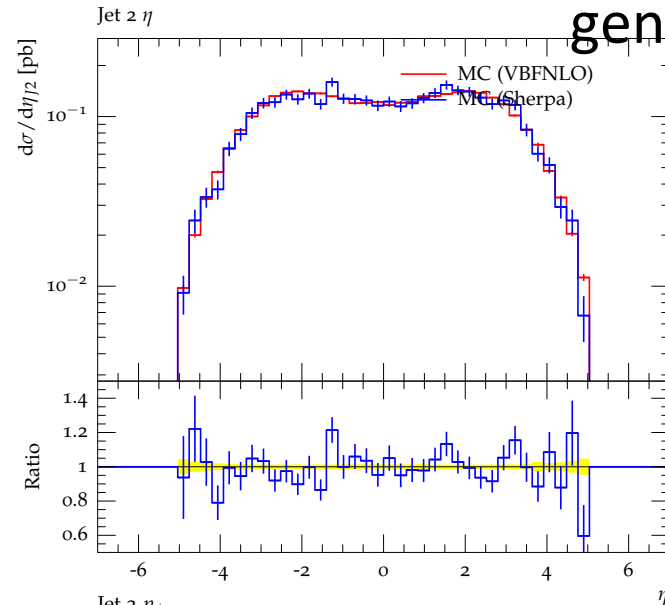
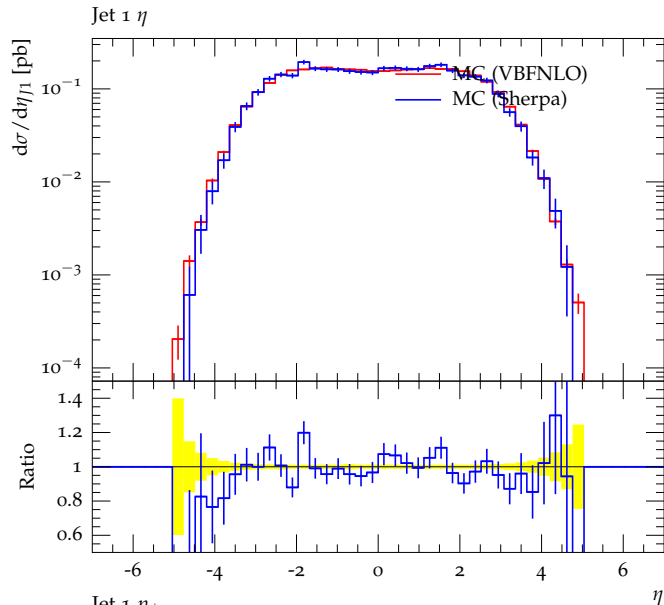
Compare Sherpa 1.4 and VBFNLO on Parton Level

generator study



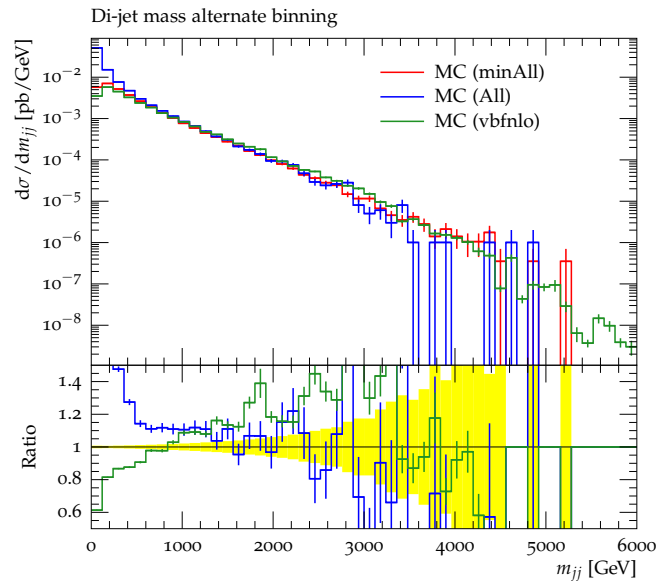
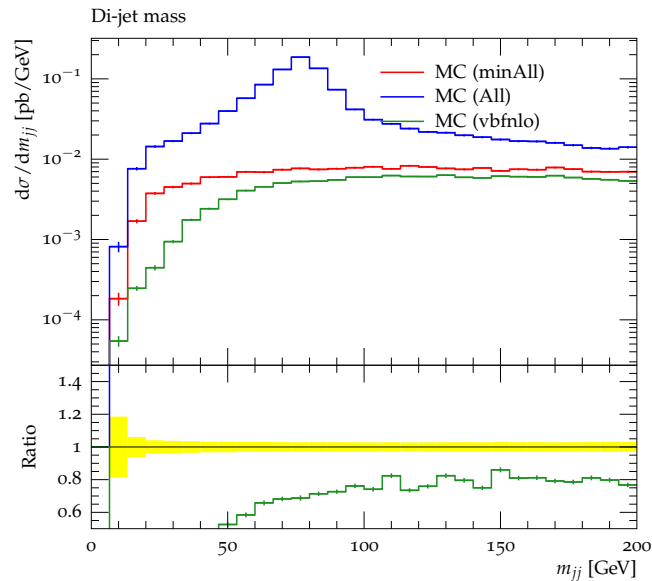
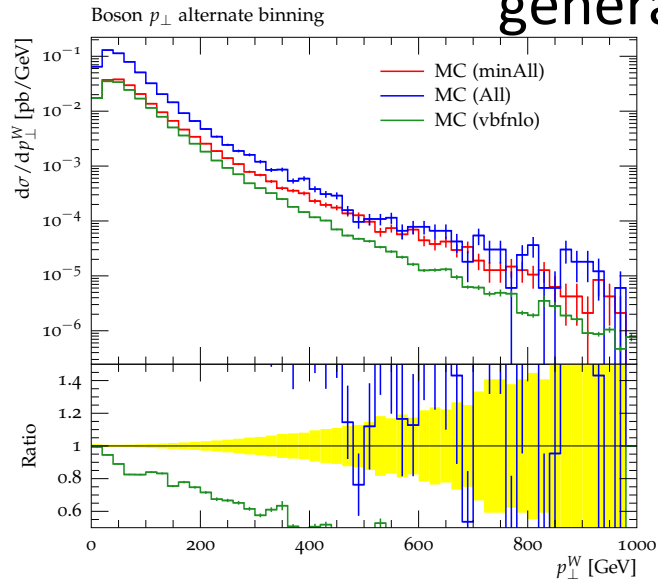
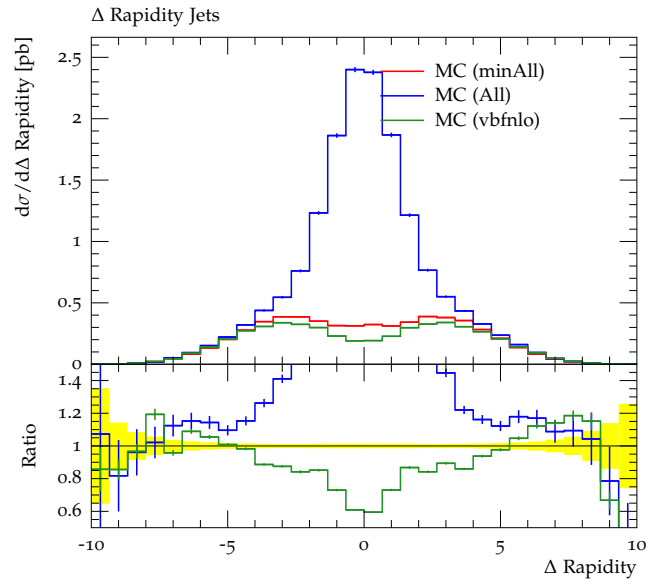
Compare Sherpa 1.4 and VBFNLO on Parton Level

generator study



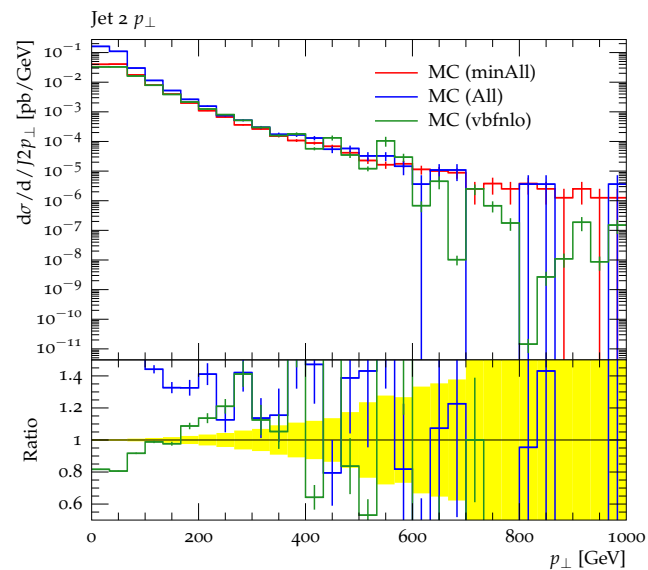
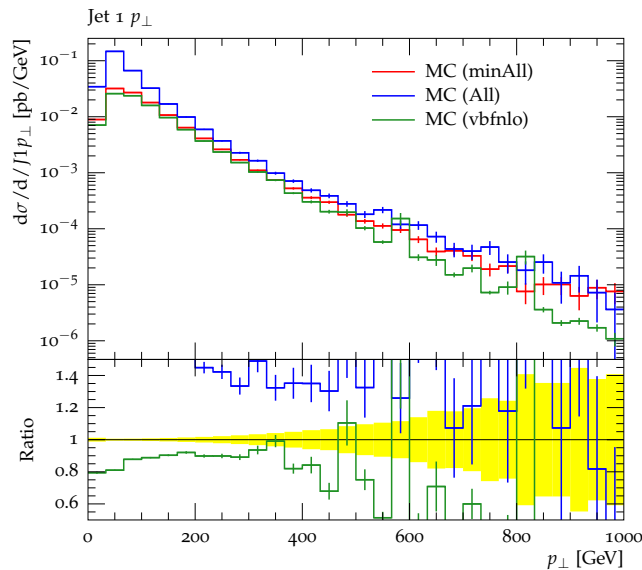
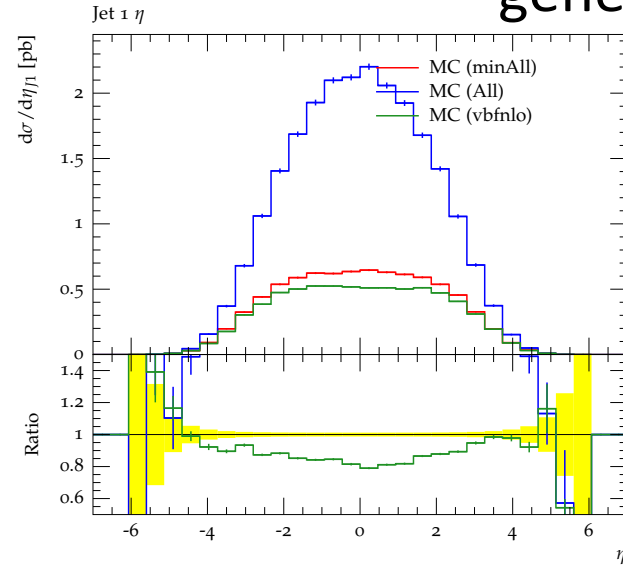
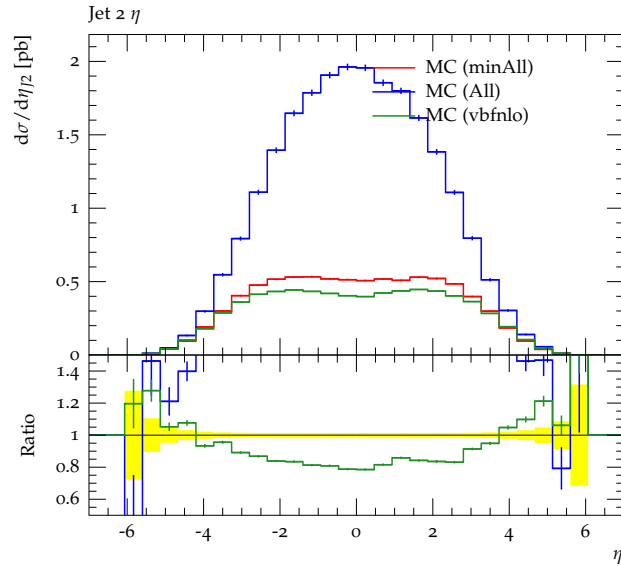
Sherpa 1.4, nominal Sherpa and VBFNLO

generator study



Sherpa 1.4, nominal Sherpa and VBFNLO

generator study



Results

Good Agreement between Sherpa 1.4 distributions and VBFNLO on parton level.

Some differences after showering!

Cross Sections:

Sherpa nominal: 12.08 pb

Sherpa 1.4: 4.22 pb

VBFNLO LO: 3.45 pb

VBFNLO NLO: 4.13 pb

It's not clear why Sherpa 1.4 XS fits better with VBFNLO NLO XS!

Would be good to have VBFNLO also with Parton Shower!