

WW production using MEPS@NLO

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LHC EW MB WG

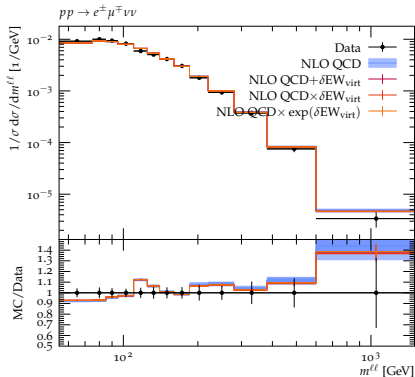
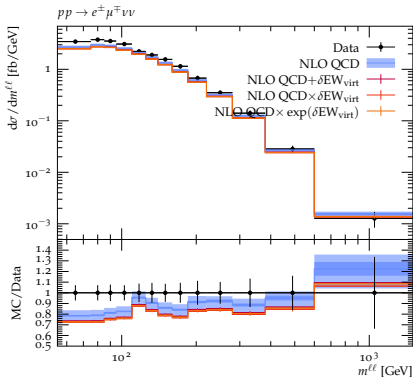
28 May 2021



Overview

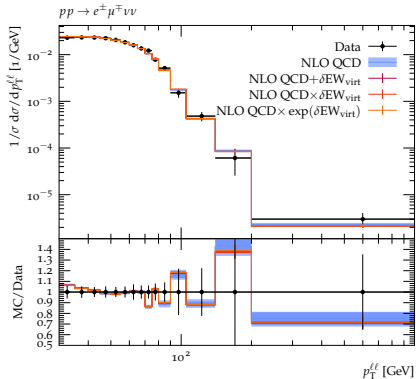
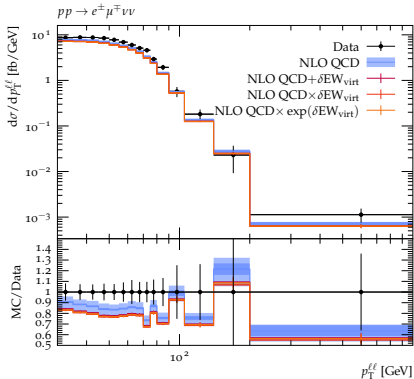
- generated $pp \rightarrow \ell^+ \ell^- \nu \nu + 0, 1j @ \text{NLO QCD} + \text{EW}_{\text{virt}} + 2, 3j @ \text{LO}$ using Sherpa 2.2.11 and OpenLoops 2.1.2
- predictions shown with just NLO QCD accuracy as well as variations of the nominal with electroweak virtual corrections combined using additive, multiplicative, and exponentiated schemes
- in all plots – dark blue: statistical uncertainty only, light blue: statistical and 7-point scale variations in matrix element and parton shower, PDF uncertainties from the NNPDF3.0nnlo replicas, α_s variations of ± 0.01
- currently no loop-induced production being considered

inclusive WW production



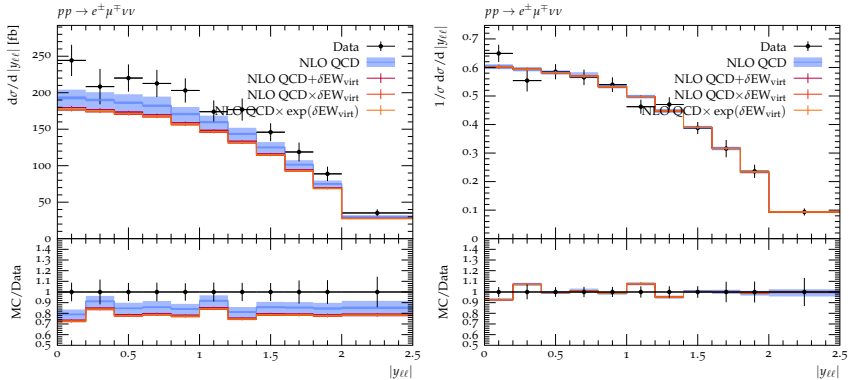
→ absolute (left) and normalised (right) $m_{e\mu}$ distribution from ATLAS_2019_I1734263

inclusive WW production



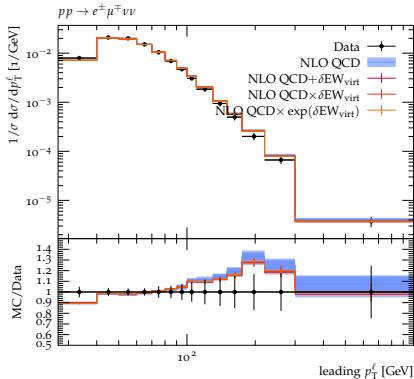
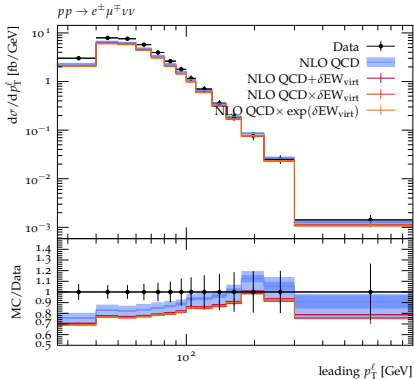
➔ absolute (left) and normalised (right) $p_T^{\ell\ell}$ distribution from ATLAS_2019_I1734263

inclusive WW production



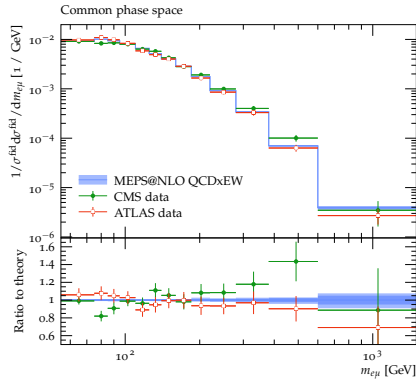
→ absolute (left) and normalised (right) $|y_{\ell\ell}|$ distribution from ATLAS_2019_I1734263

inclusive WW production



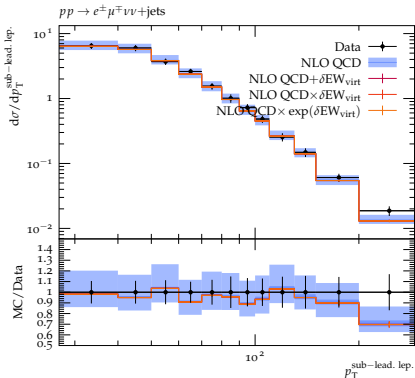
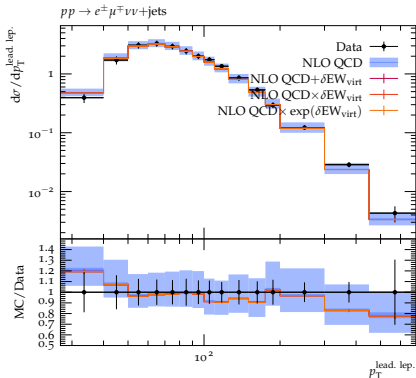
→ absolute (left) and normalised (right) $p_T^{\ell 1}$ distribution from ATLAS_2019_I1734263

inclusive WW production: combined phase space



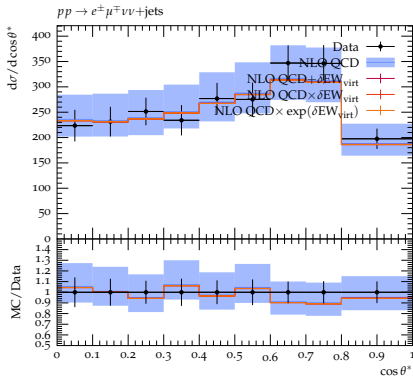
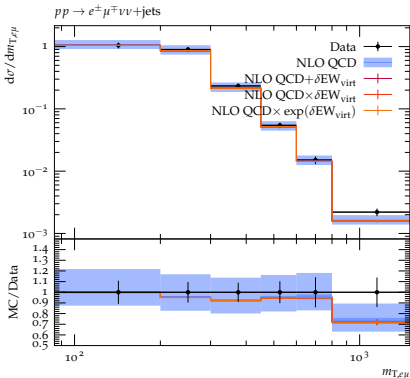
→ normalised $m_{e\mu}$ distribution with data from ATLAS ([v37 ARXIV:1905.04242](https://arxiv.org/abs/1905.04242)) and CMS ([v37 ARXIV:2009.00119](https://arxiv.org/abs/2009.00119))

WW ≥ 1jet production



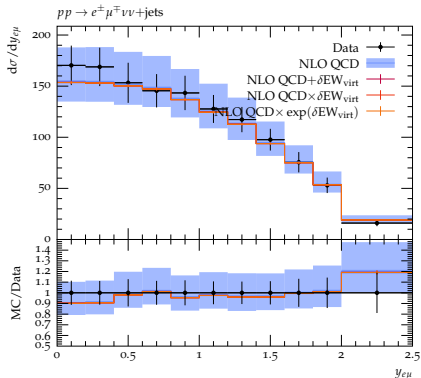
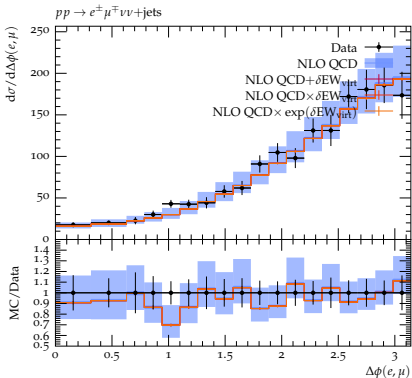
➔ leading (left) and subleading (right) lepton p_T distributions from ATLAS_2021_I1852328

WW ≥ 1jet production



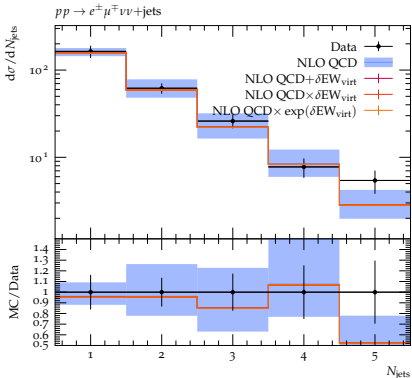
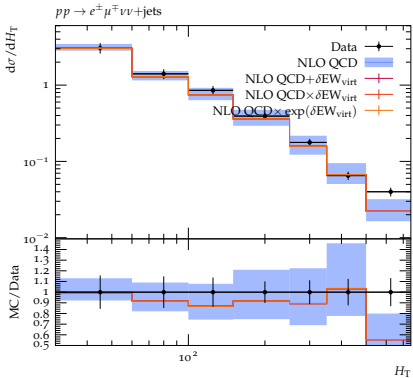
→ transverse $m_{T,E\mu}$ (left) and $\cos\theta^*$ (right) distributions from ATLAS_2021_I1852328

WW ≥ 1jet production



→ $\Delta\phi(e, \mu)$ (left) and $y_{e\mu}$ (right) distributions from ATLAS_2021_I1852328

WW ≥ 1jet production



→ H_T (left) and N_{jets} (right) distributions from ATLAS_2021_I1852328

Summary

- comparisons of MEPS@NLO QCDxEW to ATLAS data for inclusive WW and $WW + 1\text{jet}$ analyses
- modelling quite nice across the board
- data not too sensitive to electroweak corrections just yet
- latest measurements of WW production super useful for phenomenology studies
- please **provide Rivet routines and HepData entries** for all these nice measurements!