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W + jet production at NLO QCD and electroweak accuracy matched to Parton Shower

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We consider the process of W-boson hadroproduction in association with jets, including leptonic decays of the W boson. We compute the full set of next-to-leading (NLO) corrections at order $\mathcal{O}(\alpha^2\alpha_s^2)$ and $\mathcal{O}(\alpha^3\alpha_s)$ and given by QCD and electroweak corrections to W plus one jet production and QCD corrections to W production in association with a photon. We also take into account photon-induced processes and mixed interference contributions at order $\mathcal{O}(\alpha^3\alpha_s)$. We match the NLO corrections to a Parton Shower (PS) according to the POWHEG+MiNLO approach and make all the contributions available in the POWHEG-BOX-RES version of the POWHEG generator. The calculation can also be used to obtain predictions for the process of W -boson production associated to a photon at NLO+PS QCD accuracy. We show illustrative phenomenological results of interest for physics studies at the LHC.

Summary

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