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NLO corrections to $W^+Z\gamma$ production in SM and tree-level effects of dimension-eight operators in SMEFT at the LHC

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Triple gauge boson production is an important class of processes at the LHC. It allows measurements to test the quartic gauge couplings in the Standard Model and draw the limits of non-standard gauge couplings in the framework of Standard Model effective field theory (SMEFT). We perform the computations of the NLO EW and QCD corrections to $W^+Z\gamma$ production with leptonic decays in SM at the LHC. All the non-resonance and interference contributions are included, namely, $p p \rightarrow e^+ \nu_e \mu^+ \mu^- \gamma$. We study the impact of the corrections on the total and differential cross sections. We also study the tree-level effects of dimension eight operators in SMEFT. The selected operators are turned on individually and the corresponding unitarity bounds are derived based on partial wave expansions. By showing the interplay between the NLO corrections in SM and the effects of dimension-eight operators in SMEFT, we conclude that the NLO EW corrections are indispensable to test the gauge couplings in SM and set the constraints on the dimension-eight operators in SMEFT precisely.

Summary

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