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Bottom quark mass effects in associated WH production with the $H \rightarrow b\bar{b}$ decay through NNLO QCD

We present a computation of next-to-next-to-leading-order (NNLO) QCD corrections to the production of a Higgs boson in association with a W boson at the LHC followed by the decay of the Higgs boson to a $b\bar{b}$ pair. At variance with previous NNLO QCD studies of the same process, we treat b quarks as massive. An important advantage of working with massive b quarks is that it makes the use of flavor jet algorithms unnecessary and allows us to employ conventional jet algorithms to define b jets. We compare NNLO QCD descriptions of the associated $WH(b\bar{b})$ production with massive and massless b quarks and also contrast them with the results provided by parton showers. We find $O(5\%)$ differences in fiducial cross sections computed with massless and massive b quarks. We also observe that much larger differences between massless and massive results, as well as between fixed-order and parton-shower results, can arise in selected kinematic distributions.

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