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Precise predictions for the $t\bar{t}\gamma/t\bar{t}$ cross section ratio at the LHC

Tuesday 26 February 2019 12:00 (30 minutes)

We study the ratio of the cross sections for $t\bar{t}\gamma$ and $t\bar{t}$ production at the LHC. We argue that, due to correlations between the theoretical uncertainties in the numerator and in the denominator, a very precise determination of this observable can be achieved at NLO QCD accuracy, with an uncertainty comparable to that of typical NNLO QCD computations. Thus, the ratio has an interesting potential to shed light on possible new physics that can reveal itself only when sufficiently precise theoretical predictions are available.
Our analysis is based on fully realistic NLO QCD simulations of $t\bar{t}\gamma$ and $t\bar{t}$ production in the dilepton decay channel, including complete off-shell effects and non-resonant contributions. Focusing on the case of the LHC at 13 TeV, we present numerical results for inclusive and differential cross section ratios. We also quantify the impact of the theoretical uncertainties related to renormalization/factorization scales as well as to different choices of parton distribution functions.

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