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SMEFT fits for the top quark couplings at the LHC and future colliders

Thursday 24 August 2023 10:40 (20 minutes)

Duration: 15'+5'
As the heaviest particle of the Standard Model, with a mass close to the electroweak scale, the top quark is an interesting candidate to look for hints of new physics. The electroweak couplings of the top quarks are specially relevant in many extensions of the Standard Model. Thanks to the data from the Large Hadron Collider, these couplings are currently being studied with high precision in different processes. In order to analyse if there is still room for new physics in the electro-weak couplings of the top quark, we perform a global fit to these couplings. Following the Standard Model Effective Field Theory formalism we have constrained the Wilson coefficients of the dimension-six operators that affect the top quark electro-weak couplings. In this work we consider, for the first time, the QCD corrections at NLO for most of the processes included. Furthermore, we have included recently measured processes, such as tZq and tγq, and the first differential measurements in $t\bar{t}Z$ and $t\bar{t}\gamma$ production. A special effort is made to understand the uncertainties due to the truncation of the EFT expansion and due to the poorly known correlations among measurements. The results of the fit to LHC run 2 data are compared to prospects for future Higgs/electroweak/top factory lepton colliders. We present bounds on the relevant operator coefficients based on current data and on future prospects. Work based on JHEP02(2022)032, arXiv:2205.02140 and arXiv:2206.08326.

Collaboration / Activity

Collaboration pheno+exp

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