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Top, Higgs, Diboson and Electroweak Fit to the Standard Model Effective Field Theory

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The search for effective field theory deformations of the Standard Model (SM) is a major goal of particle physics that can benefit from a global approach in the framework of the Standard Model Effective Field Theory (SMEFT). For the first time, we include LHC data on top production and differential distributions together with Higgs production and decay rates and Simplified Template Cross-Section (STXS) measurements in a global fit, as well as precision electroweak and diboson measurements from LEP and the LHC, in a global analysis with SMEFT operators of dimension 6 included linearly. We present the constraints on the coefficients of these operators, both individually and when marginalised, in flavour-universal and top-specific scenarios, studying the interplay of these datasets and the correlations they induce in the SMEFT. We then explore the constraints that our linear SMEFT analysis imposes on specific ultra-violet completions of the Standard Model, including those with single additional fields and low-mass stop squarks. We also present a model-independent search for deformations of the SM that contribute to between two and five SMEFT operator coefficients. In no case do we find any significant evidence for physics beyond the SM. Our underlying Fitmaker public code provides a framework for future generalisations of our analysis, including a quadratic treatment of dimension-6 operators.

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