Contribution ID: **45** Type: **not specified**

The running of Higgs decays at dimension eight in the SMEFT

Wednesday 12 June 2024 11:40 (15 minutes)

Higgs decays to gg, $\gamma\gamma$ and γZ are important physical processes for Higgs physics with the latter having been recently observed at ATLAS and CMS; all of these decays arise at loop-level in the SM. Under the assumption of weakly coupled, renormalizable UV scenarios, the SMEFT can also only receive matching contributions to these processes at loop-level at dimension-6. Furthermore, study of the renormalization group equations shows that no tree-level generated operators can induce the running of these decays.
However, considering the arguments which explain the renormalization structure and perturbative origin of the operators at dimension-six, the dimension-eight operators responsible for Higgs decays seem to have a richer structure, namely possibly being tree-level generated and receiving renormalization contributions from other tree operators. In this talk we will go over the dimension-eight parameterization of these Higgs decays and verify that the linear combination of Wilson coefficients contributing to these processes does vanish at tree-level as expected. We also verify that, unlike at dimension-six, trees can mix into loops in the running of $h \to \gamma Z$, an effect only captured when considering the dimension-eight SMEFT. This structure points to better basis choice to describe these processes. We will also show that this effect is not only new qualitatively but it can also be observed at future experiments for some scenarios.

Primary author: GUEDES, Guilherme (DESY)

Co-authors: GROJEAN, Christophe; SALLA, Gabriel; NEPVEU, Jasper

Presenter: GUEDES, Guilherme (DESY)

Session Classification: Session