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SMEFT vs HEFT: multi-Higgs phenomenolog

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Abstract

This article studies the production of multiple Higgs bosons from longitudinal vector boson scattering in the context of effective field theories.
The equivalence theorem is employed for a clearer understanding of the $WWto ntimes h$ dynamics.
In this approximation, the Higgs dynamics is determined at lowest order in the general Higgs Effective Theory (HEFT) by the flare function $mF(h)$, which provides the WWh^n effective vertices.
We find that the amplitudes can be written in a very compact way for the production of two, three and four Higgs bosons.
However, when mapped to the Standard Model Effective Theory (SMEFT), we find a strong suppression in the production of multi-Higgs states.
Non-SMEFT scenarios that allow the flare-function to deviate from the correlations required by SMEFT can avoid this feature and have cross sections orders of magnitude larger.
We provide some phenomenological comparisons between HEFT and SMEFT cross sections and exclusion plots for models assuming the SMEFT scenario. For the computation of these cross sections we provide various specific codes which we have made publicly available to the community.

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