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Assessing uncertainties arising in the interpretation of single-Higgs-production observables as a measurement of the triple Higgs coupling

e+e- colliders operating at energies below the di-Higgs production threshold can provide information on the trilinear Higgs self-coupling lambda via its loop contributions to single Higgs production processes and electroweak precision observables. We investigate how well a non-SM value of lambda can be determined indirectly via its loop contributions to a global EFT fit. Using a doublet extension of the SM Higgs sector as an example for a scenario of physics beyond the SM that could be realised in nature, we find that the results for lambda obtained from the global EFT fit differ significantly from the actual value of lambda in the considered scenarios unless additional systematic uncertainties are considered. We find that theoretical uncertainties that are connected to the treatment of loop contributions and the truncation of the EFT expansion play an important role in this mismatch. The results obtained from such an indirect determination of lambda via its loop contributions in an EFT fit, without taking additional uncertainties into account, could therefore be misleading in the quest to precisely identify the underlying physics of electroweak symmetry breaking. We furthermore discuss the role of di-Higgs production in the determination of the trilinear Higgs self-coupling.

Secondary track

T06 - Top and Electroweak Physics

Authors: WEIGLEIN, Georg (DESY); BAHL, Henning (Universität Heidelberg); LIST, Jenny (DESY); BRAATHEN, Johannes (Deutsches Elektronen-Synchrotron DESY); REBUZZI ARDIÓNS VELLASCO, Murillo (Physikalisches Institut, Universität Bonn); BECHTLE, Philip (DESY); HEINEMEYER, Sven (IFCA (CSIC-UC, Santander))

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