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Theoretical concepts and measurement prospects for BSM trilinear couplings: a case study for scalar top quarks

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Following the potential discovery of new heavy particles at the LHC or a future collider, it will be crucial to determine their properties and the nature of the underlying Physics. In this context, the possibility of Beyond-the-Standard-Model (BSM) scalar trilinear couplings is of particular interest.
In this talk, I will consider as a specific example the scalar top (stop) trilinear coupling parameter, which controls the stop–stop–Higgs interaction, and I will discuss possible strategies for its experimental determination. I will show that the best prospects for determining the stop trilinear coupling arise from quantum effects entering the prediction for the mass of the SM-like Higgs boson compared to its measured value. Furthermore, the Higgs mass exhibits a high sensitivity to the stop trilinear coupling even for heavy masses of the BSM particles.
Next, I will review different renormalisation prescriptions for the stop trilinear coupling, and their impact in the context of Higgs mass calculations. I will show that a mixed renormalisation scheme is preferred in view of the present level of accuracy of this calculation, and I will clarify the source of potentially large logarithms that cannot be resummed using standard renormalisation group methods.

Summary

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