



Contribution ID: 53

Type: Oral

Electroweak Symmetry Breaking in Scale Invariant Models with Multiple Scalars

Scale invariance provides an interesting framework for understanding the origin of the electroweak scale without introducing explicit dimensionful parameters. In this talk, I will study electroweak symmetry breaking (EWSB) in two scale-invariant extensions of the Standard Model with multiple scalar fields. First, I consider the SM extended by two scalar singlets, both acquiring nonzero vacuum expectation values. Second, I study a model with two scalar doublets and one scalar singlet, leading to a richer scalar sector and mixing structure. For both scenarios, I investigate the conditions for a viable electroweak vacuum and analyze the resulting scalar mass spectrum and couplings. I will also discuss the role of tree-level flat directions and radiative symmetry breaking, together with theoretical constraints such as vacuum stability, perturbativity, and unitarity, as well as relevant phenomenological constraints from collider and precision measurements. The results highlight how different scalar representations and multiplicities affect the mechanism of electroweak symmetry breaking and the phenomenology of scale-invariant models.

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Session Classification: Parallel - H, EW, top

Track Classification: Higgs, Electroweak, Top