Contribution ID: **48**

Type: **Poster**

Scale Invariance, Renormalization, and the Naturalness/Hierarchy problem

Wednesday, 29 June 2022 15:02 (1 minute)

In the search for physics beyond the Standard Model, in recent years interest has grown towards models with classical scale invariance. When the radiative corrections are calculated within the framework of dimensional regularization, the scale invariance at the quantum level is only logarithmically broken. The (small) values of the particle masses are then generated through a Coleman-Weinberg mechanism, and no naturalness/hierarchy problem seems to be present. Based on novel studies on renormalization, in this talk I will present a thorough analysis of the problem, with particular attention to dimensional regularization. More specifically, I will investigate on the possibility of applying recently proposed peculiar renormalization schemes, that seem to be necessary to implement some popular models.

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Session Classification: Posters