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Generalizing flavored (flavon-based) scalar potentials and their minima

Tuesday 14 May 2024 15:00 (15 minutes)

Non-abelian symmetries are strong contenders as solutions to the flavour puzzle that seeks to explain the mass and mixing matrices of SM fermions. The Universal Texture Zero (UTZ) model charges all quark and lepton families as triplets under the $\Delta(27)$ symmetry group, while simultaneously exploiting the seesaw mechanism to generate light neutrino masses. Together with BSM triplet scalars, called flavons, the fermions and flavons generate a Yukawa structure that agrees with the current measurements and makes predictions for poorly constrained leptonic CP-violation parameters and other observables like $0\nu\beta\beta$ rates. In this talk, we present the inclusion of non-renormalizable potential in the flavon sector and illustrate how the additional 6-dimensional scalar potential introduce modification to the vacuum alignment. We investigated the possible symmetry contraction of arbitrary dimensional terms using the Hilbert-series-based DECO algorithm and classified terms that could contribute to non-trivial changes to the vacuum alignment and, hence, the flavour measurements. We are also looking into the possibility of classifying a general number of flavons using neural network. The perturbation to the vacuum alignment due to the non-renormalizable scalar potential can affect the effective coupling in the Yukawa sector after family symmetry breaking. We further outlines the possible phenomenological effect in the neutrino sector.

Mini Symposia (Invited Talks Only)

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