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E₆-extended SUSY trinification

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I will review recent work on a supersymmetric trinification model, where the standard trinification gauge group $[SU(3)_L \times SU(3)_R \times SU(3)_C] \times \mathbb{Z}_3 \subset E_6$ is supplemented by a global $SU(3)_F$ family symmetry. The chiral super field content of the model is taken from the **248** branching under $E_8 \supset E_6 \times SU(3)_F$, and includes novel gauge adjoint fields in addition to the conventional gauge bi-fundamental fields. Even though this leads to a highly constrained theory with an extraordinarily low number of free parameters (including both a single unified gauge coupling and one Yukawa coupling in the fundamental sector), the scalar potential allows for SUSY conserving vacuum expectation values (VEVs) in the gauge adjoint chiral superfields that can consistently break the trinification gauge symmetry. In addition, these VEVs break the Colour-Left and Colour-Right parity symmetries of the high-scale theory while preserving \mathbb{Z}_2 symmetry that can be identified with conventional Left-Right parity. Upon integrating out all fields that receive masses on the order of the GUT scale, we obtain a SUSY Left-Right symmetric theory that in principle allows for Fayet-Iliopoulos SUSY breaking. When allowing for a softly broken SUSY in the high-scale theory, we observe that all subsequent symmetry breaking scales (including both the scale of spontaneous parity breaking and the electro-weak scale) are controlled by the soft SUSY breaking terms such that these scales are protected from large radiative corrections and are thus naturally small compared to the GUT scale.

Presentation type

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Author: WESSÉN, Jonas (Lund University)**Presenter:** WESSÉN, Jonas (Lund University)**Session Classification:** Parallel V