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Quark mass generation due to scalar fields with zero dimension

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We propose a model of dynamical symmetry breaking, in which a new type of fundamental scalar fields of zero mass-dimension mediate the couplings of fermions to the gravitational field, represented here as a tetrad field in the same manner as Riemann-Cartan gravity. In our model, the tetrad couples to the standard model fermions non-minimally, and the very coupling coefficients are the fundamental scalar fields. There are exactly 36 scalar fields in the model, which are distinguishable by flavor indices on the fields. This is the precise number of zero dimension scalar fields that leads to a vanishing Weyl anomaly and a vanishing vacuum energy. Precisely the same number of these very same scalar fields is required for the coupling of all of the different standard model fermions to the vielbein field. At the same time their interaction with fermions gives rise to fermion mass terms, without the need to introduce a fundamental Higgs field. Within the proposed theory we construct a toy model that deals solely with the top and bottom quarks, and we demonstrate that their observable masses can appear in the action dynamically. Moreover, this mechanism allows for the top and bottom quarks to acquire distinctly different masses, as opposed to our previous, even simpler toy model that contained only the top quark.

Is this abstract from experiment?

No

Name of experiment and experimental site

N/A

Is the speaker for that presentation defined?

Yes

Details

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Internet talk

No

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