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Heavy quarks within the electroweak multiplet

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Standard-model elds and their associated electroweak Lagrangian are equivalently expressed in a shared spin basis. The scalar-vector terms are written with scalar-operator components acting on quark-doublet elements, and shown to be parametrization-invariant. Such terms, and the t- and b-quark Yukawa terms are linked by the identification of the common mass-generating Higgs operating upon the other fields. Thus, the customary vector masses are related to the fermions', fixing the t-quark mass mt with the relation mtˆ2+mbˆ2= vˆ2/2 either for maximal hierarchy, or given the b-quark mass mb. A sum rule is derived for all quark masses that generalizes this restriction. An interpretation follows that electroweak bosons and heavy quarks belong in a multiplet.

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