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Higgs mass from compositeness at a multi-TeV scale

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Within composite Higgs models based on the top seesaw mechanism, we show that the Higgs field can arise as the pseudo Nambu-Goldstone boson of some broken larger symmetry group. As a result, the lightest CP-even neutral state of the composite scalar sector is lighter than the top quark, and can be identified as the newly discovered Higgs boson. We present two such models. The first one has a U(3)_L chiral symmetry associated with a vector-like quark and the t-b doublet. Constraints on weak isospin violation push the chiral symmetry breaking scale above a few TeV, implying that other composite scalars are probably too heavy to be probed at the LHC, but may be within reach at a future hadron collider with center-of-mass energy of about 100 TeV. In the second model, we add in a pair of vector-like EW doublets, (X, T), and extend the symmetry group to embed the SU(2) custodial symmetry. As a result, the chiral symmetry breaking scale can be reduced to ˜1TeV.

Summary

based on arXiv:1311.5928 (Hsin-Chia Cheng, Bogdan A. Dobrescu, JG)
and current work (Hsin-Chia Cheng, JG)

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