

## Top Seesaw, Custodial Symmetry and the 126 GeV (Composite) Higgs

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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. I 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 consider an extension to the first model to incorporate the custodial symmetry by adding a vector-like electroweak doublet of quarks with hypercharge  $+7/6$ . Such a setup also protects the  $Zbb$  coupling which is another challenge for many composite Higgs models. With this addition, the chiral symmetry breaking scale can be lowered to around 1 TeV, making the theory much less fine-tuned.

### References

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