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The Nambu Sum Rule in the Composite Two Higgs Doublet Model

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The spectrum of spinless modes in a model with the SU(2)_L×SU(2)_R symmetrical four-quark interaction proposed by Miransky, Tanabashi, and Yamawaki is studied. For the sake of simplicity, only four-fermion interactions of top and bottom quarks are considered. The spinless modes result from spontaneous electroweak interaction symmetry breaking and are coupled quark–antiquark states associated with SU(2) two Higgs doublets. Their dynamics is described by the effective Lagrangian obtained by the Schwinger– DeWitt method. The spectrum is represented by excitations of five types, the mass of each being expressed by the parameters of the model. It is shown that the model yields phenomenologically acceptable values of both the mass of quarks m_t=173 GeV and m_b=4.18 GeV and the mass of the standard Higgs state m(χ_1)=125 GeV. The masses of the particles that comprise the second Higgs doublet m_(hˆ∓)=275 GeV, m_(χ_1)=325 GeV and m_(ϕ_0)=125 GeV, have been calculated. The Nambu sum rule and the conditions for satisfying it in the theories with the broken U(1)_A symmetry are discussed.

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