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Infrared properties of a prototype pNGB model for beyond-SM physics

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We construct a prototype BSM model where the Higgs boson is a pseudo Nambu-Goldstone boson by combining 4 light (massless) flavors and 8 heavy flavors. In the infrared, the $SU(4)$ chiral symmetry is spontaneously broken, while in the ultraviolet it exhibits the properties of the $N_f = 12$ conformal fixed point. The running coupling of this system “walks” and the energy range of walking can be tuned by the mass of the heavy flavors. At the same time, renormalization group considerations predict the spectrum of such a system to show hyperscaling i.e. hadron masses in units of F_π are independent of the heavy mass. Hyperscaling is present for bound states made-up of light, heavy, or heavy and light flavors. This observation is supported by numerical observations and makes the model strongly predictive.

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