

Composite Higgs from Mass-Split Models

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Beyond Standard Model theories describing the electro-weak sector must exhibit a large separation of scales (or “walking”) to account for a light, 125 GeV Higgs boson and the fact that so far no other resonances have been observed. Large separation of scales arises naturally and in a tunable manner in mass-split models that are built on a conformal fixed point in the ultraviolet. Splitting the fermion masses into “light” (massless) and “heavy” flavors, the system shows conformal behavior in the ultraviolet but is chirally broken in the infrared.

Due to the presence of a conformal fixed point, such chirally broken systems show hyperscaling and have a highly constrained resonance spectrum that is significantly different from the QCD spectrum. We highlight most characteristic features presenting numerical data obtained from dynamical simulations of an SU(3) gauge theory with four light and eight heavy flavors. In addition, we give an outlook on ongoing work simulating an SU(3) gauge theory with four light and six heavy flavors using a set-up well suited to explore e.g. mass-generation of Standard Model fermions via four-fermion interactions or partial compositeness.

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