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Novel approach to holographic composite Higgs models

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We revisit the construction of the composite Higgs models in a context of the bottom-up holographic approach. The soft wall framework is under consideration imposing the translation of the $4D$ global symmetry breaking characteristic to the new strongly interacting sector to the $5D$ bulk. The focus stays on the minimal $SO(5) \rightarrow SO(4)$ breaking pattern.

The $5D$ model has a specific form and is inspired by the effective models of QCD, representing a generalized sigma model coupled both to the composite resonances and to the SM gauge bosons. The last are treated as external $4D$ sources and conceptually develop no propagation into the bulk.

The holographic description allows for the consideration of spin one and spin zero resonances. The resulting spectrum leads in a natural way to a variety of new composite resonances, four of which represent the massless Goldstone bosons. Existing experimental constraints implemented, the model is able to accommodate vector and scalar resonances with masses in the range of 1–2 TeV without encountering phenomenological difficulties.

Moreover, for the SM gauge fields holography provides relevant vacuum polarization amplitudes and mixing with composite resonances. Further considering higher order correlation functions we may formulate semi-quantitative predictions for the effective couplings and cross-sections.

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