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A minimally tuned composite Higgs from an extra dimension

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Summary

In this talk I will present the 5D implementation of a specific class of composite Higgs models with a (pseudo-)Goldstone boson Higgs from the SO(5)/SO(4) coset. My starting point is the observation, recently pointed out in the context of 4D deconstructed models, that in order for the ratio v/f to be a good measure of the fine tuning and to not underestimate it, the Higgs potential must be the sum of at least two independent periodic functions of the Higgs field h, generated at the same order in the elementary-composite mixing expansion. This fact constrains the fermionic content of the model. The simplest way to satisfy this requirement is to couple the left-handed top quark to a symmetric representation of SO(5), a 14, and the right-handed top quark to an SO(5) singlet. I will show how this model predicts the existence of light fermionic resonances and I will discuss the spectrum, the constraints coming from electroweak precision tests and the implications on the Higgs mass. I will also show how the tuning in the explicit 5D realization is found to be less severe than expected from simple NDA arguments. Finally I will briefly mention the phenomenological implications of the model, which predicts a light exotic state of charge 8/3 giving rise to striking cascade decays into three Ws and a b quark.

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