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Large Mass Hierarchies in Strongly Coupled Field Theories from Gauge-Gravity Duality

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Strongly coupled theories exhibiting walking dynamics provide a scenario for beyond the Standard Model physics, in which electro-weak symmetry is broken dynamically and the large hierarchy between the electro-weak and Planck energy scales is naturally generated. Due to the spontaneous breaking of approximate scale invariance, a light dilaton can be expected to be present in the spectrum. In this talk, we present an example of a strongly coupled theory with multi-scale dynamics, in which there is a light composite scalar state. Using gauge-gravity duality, we compute the spectrum of scalar and tensor glueballs by studying an 8-scalar sigma-model in five dimensions, the solutions of which include the one-parameter family of backgrounds dual to the baryonic branch of the Klebanov-Strassler field theory. We argue that far out on the moduli space, the ratio of explicit to spontaneous breaking of scale invariance can be made small, leading one of the scalar states, the pseudo-dilaton, to become parametrically light.

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