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Global fit of the minimal composite Higgs model using differential evolution

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Composite Higgs models (CHMs), in which the Higgs boson is a bound state of an as-yet undetected strongly interacting sector, offer an attractive solution to the hierarchy problem while featuring rich particle phenomenology at the few-TeV scale. Of particular interest is the minimal CHM (MCHM), based on the $SO(5) \rightarrow SO(4)$ symmetry breaking pattern. However, the complexity of its parameter space has prevented a global fit of the model using simple parameter scans and even nested sampling and MCMC optimisation algorithms. We have instead taken a genetic optimisation approach using the differential evolution software Diver to produce the first convergent global fit of the two-site 4D MCHM with partially composite quarks, employing constraints from the electroweak and flavour sectors along with recent collider measurements. Here we will present preliminary results of the global fit with special attention paid to the fine-tuning of the model and the prospects of probing the MCHM in future collider searches.

Consider for promotion

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