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Extending Global Fits of 4D Composite Higgs Models with Partially Composite Leptons

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Composite Higgs Models offer an attractive solution to the hierarchy problem. We extend previously examined models based on a SO(5) → SO(4) symmetry breaking pattern and 3rd generation quarks, with two representations of the τ and its neutrino. We conduct Bayesian global fits of these models using a wide array of constraints in order to find regions in the parameter volume that best fit experimental measurement. We then study the effects of including lepton parameters and constraints on the fit results for similar scans, as well as analyse the fine-tuning of each model by calculating the Kullback-Lieber divergence between their respective priors and posteriors, and the robustness of each scan. Both models were found to satisfy all constraints at the 3σ level and capable of predicting gluon-fusion produced Higgs signal strengths that are agreeable with the Standard Model order of unity. Additionally, we present the predicted leptons' experimental signatures for valid points in said models and discuss their potential phenomenology at future high-luminosity LHC runs.

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