Scalars 2023

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A Bayesian global analysis of the spectrum of scalars in the A2HDM
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Content :

Two-Higgs-doublet models are among the simplest extensions to the Standard Model (SM). The augmented parameter space that comes with the addition of a second Higgs doublet allows them to possibly solve some of the shortcomings of the SM, and opens the window to a plethora of new phenomena to be discovered. The introduction of scalar-mediated tree-level flavour-changing neutral currents may be tackled with the imposition of extra symmetries on the model or, alternatively, by demanding a strict proportionality between those flavour-changing couplings and fermion mass matrices. The latter is the very idea behind the Aligned-two-Higgs-doublet model (A2HDM). The coefficients that govern such proportionality are, in general, complex and, therefore, possible new sources of CP violation, a calling card of this class of models. We present here a new state-of-the-art global analysis of the A2HDM. To this effect, we simultaneously make use of theoretical constraints, bounds from Higgs searches at the LHC and LEP, electroweak precision observables, and a set of flavour observables, all within the Bayesian Markov Chain Monte Carlo framework of the HEPfit software. In particular, we ascertain whether current data still allows the A2HDM to accommodate an extra scalar lighter than the SM Higgs boson.

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