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Visual tool for assessing tension-resolving models in the $H_0 - \sigma_8$ plane

Igor de O. C. Pedreira, Micol Benetti, Elisa G. M. Ferreira, Leila L. Graef, and Laura Herold

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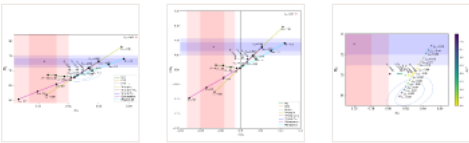Export Citation (/prd/export/10.1103/PhysRevD.109.103525)

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ABSTRACT −

Beyond-ΛCDM models have been proposed to address various shortcomings of the standard cosmological model, such as the "Hubble tension." These models often have an impact on the discrepancy in the amplitude of matter clustering, the "σ_8 tension." To explore the interplay between the two tensions, we suggest a simple method to visualize the relation between the two parameters: H_0 and σ_8. For a given extension of the ΛCDM model and dataset, we plot the relation between H_0 and σ_8 for different amplitudes of the beyond-ΛCDM physics. In this work, we use this visualization method to illustrate the trend of selected cosmological models, including nonminimal Higgs-like inflation, early dark energy, a varying effective electron mass, an extra number of relativistic species and modified dark energy models. Although already studied in the literature, some of these models have not been analyzed in view of the two joint tensions. We stress that the method used here could be a useful diagnostic tool to illustrate the behavior of complex cosmological models with many parameters in the context of the H_0 and σ_8 tensions.

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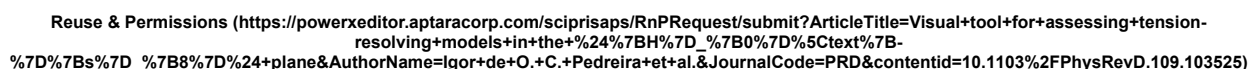[7]Max-Planck-Institut für Astrophysik, Karl-Schwarzschild-Straße 1, 85748 Garching, Germany
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