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Does dark energy really revive using DESI 2024 data?

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In this work, we investigate the impact of the Dark Energy Spectroscopic Instrument (DESI) 2024 data on dark energy scenarios. Specifically, we analyze three typologies of models, the first in which the cosmic speed up is related to thermodynamics, the second associated with Taylor expansions of the barotropic factor, whereas the third based on ad hoc dark energy parameterizations. In this respect, we perform Monte Carlo Markov chain analyses, adopting the Metropolis-Hastings algorithm, of 12 models. To do so, we first work at the background, inferring a posteriori kinematic quantities associated with each model. Afterwards, we obtain early time predictions, computing departures on the growth evolution with respect to the model that better fits DESI data. We find that the best model to fit data \emph{is not} the Chevallier-Polarski-Linder (CPL) parametrization, but rather a more complicated log-corrected dark energy contribution. To check the goodness of our findings, we further directly fit the product, $r_d h_0$, concluding that $r_d h_0$ is anticorrelated with the mass. This treatment is worked out by removing a precise data point placed at $z = 0.51$. Surprisingly, in this case the results again align with the ΛCDM model, indicating that the possible tension between the concordance paradigm and the CPL model can be severely alleviated. We conclude that future data points will be essential to clarify whether dynamical dark energy is really in tension with the ΛCDM model.

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