

Dark energy reconstruction and crossing of the phantom divide

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Hints of dynamical dark energy (DE) have strengthened under the combination of data from CMB, SNIa and BAO from DESI. This evidence is typically quantified using the well-known CPL parameterization of the DE equation-of-state, $w_{\text{DE}} = w_0 + w_a(1 - a)$. However, this truncation may bias our interpretation of the data, potentially leading us to mistake spurious features of the best-fit CPL model for genuine physical properties of DE. We keep more terms in the expansion and apply the Weighted Function Regression (WFR) method to eliminate the subjectivity associated with the choice of truncation order. Using this model-agnostic approach we reconstruct cosmological functions and quantify that evidence for a crossing of the phantom divide is statistically significant, with confidence levels ranging from 96.21% to 99.97%, depending on the SNIa dataset. Finally, I will show that the effective DE fluid from a combination of standard and negative quintessence can produce the reconstructed shape of $w_{\text{DE}}(z)$.

Author: GONZÁLEZ FUENTES, Alex

Presenter: GONZÁLEZ FUENTES, Alex

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