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Model independent analysis of supernova data, dark energy, trans-Planckian censorship and the swampland.  (English)  [Zbl 07403222]  

Summary: In this Letter, we consider the model-independent reconstruction of the expansion and growth functions from the Pantheon supernova data. The method relies on developing the expansion function in terms of shifted Chebyshev polynomials and determining the coefficients of the polynomials by a maximum-likelihood fit to the data. Having obtained the expansion function in a model-independent way, we can then also determine the growth function without assuming a particular model. We then compare the results with the predictions of two classes of Dark Energy models, firstly a class of quintessence scalar field models consistent with the trans-Planckian censorship and swampland conjectures, and secondly a class of generalized Proca vector field models. We determine constraints on the parameters which appear in these models.

MSC:

85A15 Galactic and stellar structure
83C56 Dark matter and dark energy
83C75 Space-time singularities, cosmic censorship, etc.
83E05 Geometrodynamics and the holographic principle
41A50 Best approximation, Chebyshev systems
83F05 Relativistic cosmology

Full Text: DOI

References:


Agrawal, P.; Obied, G.; Vafa, C., H₀ tension, Swampland conjectures and the epoch of fading dark matter (2019)

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