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The effective running Hubble parameter in SNe Ia as a marker for the dark energy nature

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We investigate a theoretical framework for the Universe dynamics, based on the possible creation of dark energy constituents by the time-varying gravitational field of the expanding Universe. The proposed scenario is compared to specific cases of the reduced Chevallier-Polarski-Linder (CPL) parameterization, with the aim of probing the nature of dark energy.
We construct, from our model and the reference models, a theoretical running Hubble constant, i.e. a function of the redshift, which highlights the difference between modified dynamics and the ΛCDM-one. Then, by this function, we provide a fit of the corresponding running Hubble constant as it emerges from the binned analysis of SNe Ia data sample, i.e. the Pantheon and the Master samples, that is a collection of SNe Ia from 4 catalogs: Pantheon, Pantheon+, JLA, and DES without duplicated SNe Ia.
The main result of our study is the identification of a strong sensitivity of the running Hubble constant and the demonstration that the binned supernova data indicates a phantom nature of Dark Energy for $0 < z < 1.5$, clearly in disagreement with the DESI Collaboration results.

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