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ORIGINAL ARTICLE

Statefinder diagnostic of logarithmic entropy corrected holographic dark energy with Granda-Oliveros IR cut-off

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Abstract In this work, we have studied the logarithmic entropy corrected holographic dark energy (LECHDE) model with Granda-Oliveros (G-O) IR cutoff. The evolution of dark energy (DE) density Ω'_D, the deceleration parameter, q, and equation of state parameter (EoS), ω_Λ, are calculated. We show that the phantom divide may be crossed by choosing proper model parameters, even in absence of any interaction between dark energy and dark matter. By studying the statefinder diagnostic and $\omega_\Lambda - \omega'_\Lambda$ analysis, the pair parameters $\{r, s\}$ and $(\omega_\Lambda - \omega'_\Lambda)$ is calculated for flat GO-LECHDE universe. At present time, the pair $\{r, s\}$ can mimic the ΛCDM scenario for a value of $\alpha/\beta \simeq 0.87$, which is lower than the corresponding one for observational data ($\alpha/\beta = 1.76$) and for Ricci scale ($\alpha/\beta = 2$). We find that at present, by taking the various values of (α/β), the different points in $r - s$ and $(\omega_\Lambda - \omega'_\Lambda)$ plans are given. Moreover, in the limiting case for a flat dark dominated universe at infinity ($t \to \infty$), we calculate $\{r, s\}$ at G-O scale. For Ricci scale ($\alpha = 2$, $\beta = 1$) we obtain $\{r = 0, s = 2/3\}$.

Keywords Logarithmic entropy corrected · Holographic dark energy · Granda-Oliveros IR cut-off · Statefinder diagnostic

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1 Introduction

It is widely accepted among cosmologists and astrophysicists that our universe is experiencing an accelerated expansion. The evidences of this accelerated expansion are given by numerous and complementary cosmological observations, like the SNIa (Perlmutter et al. 1999; Astier et al. 2006), the CMB anisotropy, observed mainly by WMAP (Wilkinson Microwave Anisotropy Probe) (Bennett et al. 2003; Spergel et al. 2003), the Large Scale Structure (LSS) (Tegmark et al. 2004; Abazajian et al. 2004, 2005) and X-ray (Allen et al. 2004) experiments.

In the framework of standard Friedmann-Lemaitre-Robertson-Walker (FLRW) cosmology, a missing energy component with negative pressure (known as Dark Energy (DE)) is the source of this expansion. Careful analysis of cosmological observations, in particular of WMAP data (Bennett et al. 2003; Spergel et al. 2003; Peiris et al. 2003) indicates that almost 70 percent of the total energy of the universe is occupied by DE, whereas DM occupies almost the rest (the barionic matter represents only a few percent of the total energy density). The contribution of the radiation is practically negligible.