Draft version October 17, 2024
Typeset using LaTeX default style in AASTeX631

Evolution of holographic dark energy models in $f(Q,T)$ gravity and cosmic constraint

Xuwei Zhang[1] and Xiaofeng Yang[1]

[1]Xinjiang Astronomical Observatory
1667 K Street NW, Suite 800
Urumqi, Xinjiang, 830046, China

ABSTRACT

We study a holographic dark energy model in $f(Q,T)$ gravity

Keywords: Cosmology

1. INTRODUCTION

2. $F(Q,T)$ GRAVITY THEORY AND HOLOGRAPHIC DARK ENERGY

In weyl geometry, affine connection is not compatible with the metric tensor as

$$Q_{\alpha\mu\nu} = \nabla_\alpha g_{\mu\nu} = -w_\alpha g_{\mu\nu} \tag{1}$$

In gravity, we consider the action is

$$S = \int (\frac{1}{16\pi} f(Q,T) + \mathcal{L}_m)\sqrt{-g} d^4x \tag{2}$$

where T is trace of the matter-energy-momentum tensor.

Vary the action we can get

$$\delta S = \int \left(\frac{1}{16\pi} \delta[f(Q,T)\sqrt{-g}] + \delta(\mathcal{L}_m \sqrt{-g}) \right) d^4x \tag{3}$$

$$= \int \frac{1}{16\pi} \left(-\frac{1}{2} f g_{\mu\nu} \sqrt{-g} \delta g^{\mu\nu} + f_Q \sqrt{-g} \delta Q + f_T \sqrt{-g} \delta T - \frac{1}{2} T_{\mu\nu} \sqrt{-g} \delta g^{\mu\nu} \right) d^4x \tag{4}$$

Field equation is

$$-\frac{2}{\sqrt{-g}} \nabla_\alpha (f_Q \sqrt{-g} P^\alpha{}_{\mu\nu}) - \frac{1}{2} f g_{\mu\nu} + f_T (T_{\mu\nu} + \Theta_{\mu\nu}) - f_Q (P_{\mu\alpha\beta} Q^\nu{}_{\alpha\beta} - 2Q^{\alpha\beta}{}_\mu P_{\alpha\beta\nu}) = 8\pi T_{\mu\nu} \tag{5}$$

In FLRW metric, given by

$$ds^2 = -dt^2 + a^2(t)\delta_{ij} dx^i dx^j \tag{6}$$

then we can get friedmann equations

3. DARK ENERGY MODEL IN DIFFERENT IR CUTOFF

4. TSALIS ENTROPY DARK ENERGY IN DIFFERENT IR CUTOFF

5. AGE OF THE UNIVERSE

6. OBSERVATIONAL DATA AND CONSTRAINT

7. CONCLUSION

APPENDIX

A. APPENDIX INFORMATION

REFERENCES