

New Windows on Fundamental Physics: from tabletop devices to large scale detectors



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Effects of Matter Lagrangian in $f(Q,T)$ Gravity: The Accelerating Cosmological Model

We investigate the logarithmic form of $f(Q, T)$ gravity with two different choices of matter Lagrangian such as: $\mathcal{L}_m = p$ and $\mathcal{L}_m = -\rho$. The parameters of the model has been constrained using Cosmic Chronometers (CC) in combination with DES-SN5YR and Pantheon⁺ Type Ia supernova datasets. We have observed that the deceleration parameter shows a smooth transition from deceleration to acceleration phase and the effective equation of state parameter (ω) approaches to -1 at late times. The $Om(z)$ diagnostic exhibits a decreasing profile, confirming quintessence-like behavior, and the statefinder analysis demonstrates trajectories that remain near the Λ CDM fixed point but deviate into the quintessence region. The evolution of the density parameters satisfies the flatness condition, and the predicted age of the Universe lies within $t_0 \sim 13.7 - 14.3$ Gyr, consistent with CMB and stellar estimates. The findings indicate that the logarithmic model successfully reproduces the late-time accelerated expansion for both the choices of the matter Lagrangian.

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