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Flash Talk: Observational constraints on Fractional Holographic Dark Energy in $f(T)$ gravity

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We explore the cosmological implications of Fractional Holographic Dark Energy within the context of $f(T) = \beta(-T)^n$ gravity, in which the Hubble parameter is determined implicitly. The model incorporates fractional corrections through a generalized entropy-area relation, allowing for the inclusion of nonlocal effects in the dark energy sector. The model parameters are optimized using Hubble parameter measurements, DES supernova data 5 year, and BAO observations for DESI DR2 via a MCMC analysis. Our results show that the model remains consistent with current observational data and provides a viable cosmological scenario. The dynamical analysis indicates that the model maintains a positive energy density and a negative pressure throughout the cosmic evolution, ensuring physical consistency. The equation of state parameters exhibit a quintessence-like behavior at the present epoch and gradually evolve toward a cosmological constant-like phase at late times. The deceleration parameter confirms a transition from deceleration to acceleration at a redshift $z_t \approx 0.78$. Furthermore, the statefinder diagnostic reveals noticeable deviations from the Λ CDM model at intermediate redshifts, while approaching the standard fixed point $\{r, s\} = \{1, 0\}$ in the asymptotic future. The estimated age of the Universe is also found to be consistent with observational constraints. Overall, the FHDE model within $f(T)$ gravity provides a physically consistent and observationally viable description of late-time cosmic acceleration, and may serve as a promising alternative to the standard Λ CDM paradigm.

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