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Quantum Gravity Meets DESI Dynamical Dark Energy in Light of Swampland Trans-Planckian Censorship Conjecture

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As an implication from Quantum Gravity, the swamplandish Transâ□□Planckian Censorship Conjecture (TCC) prohibits eternal cosmological acceleration, a prediction that aligns naturally with the quintom-B behavior from the latest DESI DR2 data. Primarily, we implement TCC bounds within the framework of dynamical dark energy, especially in the w0waCDM parametrization and f(T), f(Q) modified gravities, demonstrating that TCC is very powerful to constrain or exclude them. Our findings imply that viable dynamical dark energy scenarios must asymptotically transit to deceleration, shedding light on new physics consistent with both cosmological observations and fundamental Quantum Gravity principles.

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