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Well-Tempered Cosmology in Teleparallel Horndeski

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The difference between the observational vacuum energy driving the expansion of the universe and the large vacuum energy density arising from zero point quantum field fluctuations has led to the cosmological constant problem. Well-tempering offers a formalism to dynamically cancel the cosmological constant and obtain a late-time, low energy vacuum state. The well-tempered recipe is applied within the teleparallel analogue of Horndeski theory a torsionful second-order scalar-tensor gravitational theory. This framework offers the possibility of reviving Horndeski terms which were once disregarded upon the confirmation of gravitational waves. In this work, well-tempering is applied wherein degeneracy in field equations is able to provide the necessary screening of particle physics scale vacuum energy, while teleparallel analogue of Horndeski offers broader viable cosmological model. Additionally, cosmological dynamics of a well-tempered model are analysed to verify dynamical stability of the vacuum, compatibility with matter era, and the stability of the vacuum through a phase transition in order to correspond with the cosmic history of the universe.

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