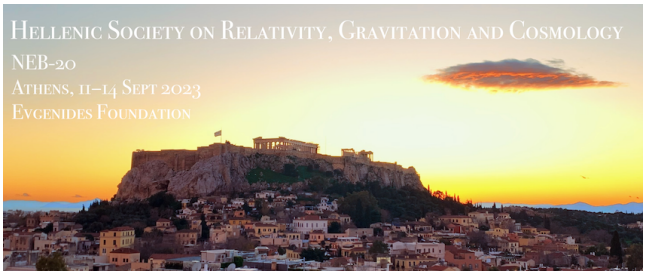

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Fractional Cosmology with conformal and nonminimal couplings: a possible resolution to H0 tension?

Thursday, 14 September 2023 17:00 (20 minutes)

Various studies, such as references 2207.00878 [gr-qc], 2304.14465 [gr-qc], and 2304.14465 [gr-qc], have explored the potential of Fractional Cosmology to address the H0 tension. They have analyzed the Equation of State's value attained from the Supernova H0 and Planck's value for z<1.5 and have reported a trend of H0 that aligns with these values. However, there is still a discrepancy between the 1.5<z<2.5 range values, indicating that the H0 tension has not been entirely resolved. To expand on this theory, we may assume the Einstein-Hilbert action and a scalar field φ to create a nonminimal coupling theory with the coupling ξRφ^2 of gravity and the scalar field. ξ is the coupling constant, and the simplest and most natural case is minimal coupling where ξ=0. Another viable option is ξ=1/6, known as conformal coupling because the action is unchanged under conformal transformations of the metric. Any value of ξ≠0 is nonminimal coupling. A fractional version of the conformal and nonminimal coupling theory employs fractional calculus to modify the standard derivative equations and alter the Friedmann and Klein-Gordon equations. The μ fractional parameter and the age of the Universe t0 affect the evolution of cosmic species densities. This new approach to cosmology modifies the Friedmann equations and allows for late cosmic acceleration without a dark energy component. Fractional cosmology could solve cosmological problems, including the H0 tension.

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