Contribution ID: **57** Type: **Talk**

Dark Energy and Inflation as effects of torsion and geometry in the Covariant Canonical Gauge theory of Gravity (CCGG)

Tuesday 8 September 2020 09:30 (30 minutes)

CCGG is a mathematically rigorous derivation of the coupling of matter and spacetime geometry from a few basic postulates. The framework, based on the canonical transformation theory in the covariant de Donder-Hamiltonian formulation, yields a classical Palatini field theory extending the Einstein-Hilbert ansatz by an admixture of quadratic gravity. That term, quadratic in the Riemann-Cartan curvature tensor, endows spacetime with inertia and generates geometrical modifications of the stress-energy tensor. Its relative contribution is determined by a dimensionless coupling constant, facilitating a new free parameter for gravity. Applied to the Friedman model of the universe, CCGG gives rise to scale dependence of both, the cosmological constant and the curvature contribution to the Hubble function. Numerical analysis on the basis of the LCDM set of cosmological parameters shows, depending on the choice of the new parameter, three distinct solution types: Non- singular (bouncing), singular Big Bang with following inflationary periods, and a standard Big Bang scenario. All solutions share a graceful exit into the late dark energy era. Our preliminary analysis presented here indicates that the modified Hubble function alleviates the Hubble tension between the SNeIa and the CMB data. Moreover, the cosmological constant problem is resolved as the cosmological term replacing Einstein's cosmological constant is a composite entity.

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Session Classification: MMA, DE, DM, CCGG, X-RAYS, MWA, NSs, SNOVAE, GRAVITY