Contribution ID: **28** Type: **not specified**

A Multi-Benefit Solution of Dark Energy problem based on the IR behavior of asymptotic safe gravity

Wednesday, 12 June 2019 10:30 (25 minutes)

Infrared corrections that arise in some theoretical attempts to
understand Quantum Gravity may be the solution to one tantalizing problem of modern physics. Recently a novel Asymptotically Safe cosmology suggested a simple and attractive mechanism towards resolving naturally the structure
of dark energy and its associated cosmic coincidence problem. The novel idea is that the recent accelerated expansion of the universe happens due to infrared quantum gravity modifications at intermediate astrophysical scales galaxies or galaxy clusters. The reason is that structures of matter are associated with a non zero positive cosmological constant of quantum origin. In this context no extra unproven energy scales or fine-tuning are
used. Furthermore, this model was confronted with the most recent observational data from low-redshift probes. Measurements of the Hubble parameter, standard candles (Pantheon SnIa, Quasi-stellar objects), Baryonic Acoustic Oscillations (BAOs) and high redshift probes (CMB shift
parameters) were used to test the model. The overall likelihood analysis constrained the free parameters of the model. Moreover, it was tested against the concordance model (flat ΛCDM) utilizing a large family of information criteria. This Asymptotically Safe model proved to be statistically equivalent with ΛCDM, suggesting it as a very
interesting and realistic minimal solution to the problem of dark energy.

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