MAGIC 2025 - 2nd Workshop on Matter, Astrophysics, Gravitation, Ions and Cosmology



Science of the Cosmos

Contribution ID: 29

Type: not specified

Investigating early and late-time epochs in f(Q) gravity

In the following work, a new hybrid model of the form $f(Q) = Q(1+a) + b \frac{Q^2}{Q_0}$ has been proposed and confronted using both early as well as late-time constraints. We first use conditions from the era of Big Bang Nucleosynthesis (BBN) in order to constrain the models which are further used to study the evolution of the Universe through the deceleration parameter. This methodology is employed for the hybrid model as well as a simple model of the form $_1Q + _2Q_0$ which is found to reduce to CDM. The error bar plot for the Cosmic Chronometer (CC) and Pantheon+SH0ES datasets which includes the comparison with CDM, has been studied for the constrained hybrid model. Additionally, we perform a Monte Carlo Markov Chain (MCMC) sampling of the model against three datasets -CC, Pantheon+SH0ES, and Baryon Acoustic Oscillations (BAO) to find the bestfit ranges of the free parameters. It is found that the constraint range of the model parameter (a) from the BBN study has a region of overlap with the ranges obtained from the MCMC analysis. Finally, we perform a statistical comparison between our model and the CDM model using AIC and BIC method.

Author: KOLHATKAR, Ameya (BITS Pilani, Hyderabad Campus)

Co-authors: Prof. SAHOO, Pradyumn Kumar (BITS Pilani, Hyderabad Campus); Mr MISHRA, Sai Swagat (BITS Pilani, Hyderabad Campus)

Presenter: KOLHATKAR, Ameya (BITS Pilani, Hyderabad Campus)