

A Non Singular Cyclic Universe from Modified Gravity

Monday, 9 November 2026 11:30 (30)

The Big Bang singularity marks a fundamental breakdown of General Relativity, yet all proposed quantum gravitational remedies invoke microphysical assumptions beyond the observational reach. We show that a minimal, purely classical modification of the gravitational potential — preserving the inverse-square law where tested, but free to depart at unmeasured scales — is sufficient to produce a non-singular, cyclic universe. The resulting modified gravitational formulation leads to a cosmic evolution exhibiting a bounce at a finite minimum size, followed by a regime closely akin to the concordant Λ CDM model, and an eventual collapse to another bounce. Cosmic Chronometer, Supernovae type Ia, Baryon Acoustic Oscillation, Cosmic Microwave Background and Nucleosynthesis data constrain both the new length scales, implying a cycle period of $\simeq 89$ Gyr, and this framework — subsuming a broad class of bounce scenarios within a single testable model — opens a direct route for distinguishing cyclic cosmologies from Λ CDM.

Primary author(s) : Prof. DAS, Saurya (Theoretical Physics Group, Department of Physics and Astronomy \& Quantum Horizon Alberta, University of Lethbridge, 4401 University Drive, Lethbridge, Alberta T1K 3M4, Canada); KUNIYAL, Dhiraj (Department of Physics and Astrophysics, University of Delhi, Delhi 110007, India); Prof. SUR, Sourav (Department of Physics and Astrophysics, University of Delhi, Delhi 110007, India); Dr FRIDMAN, Mitja (Department of Physics, Faculty of Nuclear Sciences and Physical Engineering, Czech Technical University in Prague, Břichová 7, 115 19 Praha 1, Czech Republic)

Presenter(s) : KUNIYAL, Dhiraj (Department of Physics and Astrophysics, University of Delhi, Delhi 110007, India)

Session Classification : Parallel-Cosmology