

# A framework for a spatially infinite, non-time-limited, globally static Cosmology

## Abstract

This document proposes a cosmological model characterized by a globally flat, spatially infinite, and non-time-limited spacetime. It challenges the standard application of the Friedmann-Lemaître-Robertson-Walker (*FLRW*) metric -specifically the assumption of a dynamical scale factor  $a(t)$  - by reinterpreting *general relativity* (*GR*) as a strictly local phenomenon within a non-continuum matter distribution. In this framework, the observed flatness of the universe is a fundamental geometric property rather than a dynamical result of inflation, and cosmological redshift is modeled as a cumulative energy dissipation process rather than metric expansion.

## 1. Geometric foundations: global flatness and spatial infinity

Standard cosmological models require inflationary mechanisms to explain the observed spatial flatness of the universe. In contrast, this conjecture posits that spacetime is globally flat and spatially infinite as a baseline geometric condition.

In an unbounded, open Euclidean manifold, flatness is not a state requiring fine-tuned dynamical balancing but the inherent structural property of the vacuum. While local mass-energy distributions induce curvature according to the Einstein Field Equations, these perturbations do not coalesce into a global curvature. Consequently, the universe is modeled as a manifold where the average curvature  $\langle G_{\mu\nu} \rangle$  remains zero across cosmological scales, consistent with high-precision observations from the Planck and DESI missions.

## 2. The rejection of the continuum approximation

A central premise of this model is the rejection of the 'fluid approximation' used in standard cosmology. By treating the universe as a homogeneous and isotropic fluid, the *FLRW* solutions necessitate a global expansion or contraction.

This framework instead treats the universe as a discrete ensemble of gravitationally bound systems (galaxies, clusters, and superclusters) separated by vast regions of effectively flat spacetime. Because these systems are separated by distances exceeding their respective causal horizons, the universe cannot be treated as a single, coherent dynamical system. The absence of a global center of mass further implies that there is no privileged direction or point toward which a global collapse could occur.

### 3. Local dynamics vs. global stasis

While *GR* remains valid for describing the evolution of local systems, this model distinguishes between local gravitational aggregation and global metric evolution.

- Local aggregation: Gravity drives the formation and eventual collapse of stars and galaxies within their respective causal domains.
- Global stasis: The underlying spacetime metric does not undergo a universal 'stretching' or 'shrinking'.

The 'beginning' of the universe (the *Big Bang*) is reinterpreted as an observational limit imposed by the finite speed of light and the dissipation of information, rather than a temporal singularity.

### 4. Temporal nature: a non-time-limited universe

The universe is described as not time-limited, rejecting the notion of a singular temporal origin. The standard estimate of the 'age of the universe' (~13.8 Gyr) is viewed as the detection horizon of current instrumentation, the point at which signals from distant sources become indistinguishable from background noise.

By removing the temporal constraint of a 13.8 Gyr origin, the existence of highly evolved, 'dead' elliptical galaxies is no longer a chronological paradox. These structures have had an unlimited duration to evolve, exhaust their low-entropy fuel, and reach their end-states within a globally static spacetime. In this view, the universe is always 'in progress', and the fact that certain infinite-scale processes have not 'completed' is a natural consequence of their divergent timescales.

### 5. Redshift as a cumulative energy horizon

Cosmological redshift is decoupled from the velocity of receding galaxies. Instead, it is modeled as a physical loss of energy experienced by photons as they traverse vast cosmic distances.

This energy decay creates a detection horizon: as the wavelength increases due to redshift, it eventually reaches a threshold where the signal-to-noise ratio prevents further measurement. This dissipation provides a self-consistent explanation for the dark night sky (Olbers' paradox) and the observed redshift-distance relationship without requiring a dynamical expansion of the spatial metric.

### 6. Causal disconnection and statistical uniformity

The universe is a mosaic of causally disconnected systems. While these systems are governed by the same fundamental laws of physics and emerge from statistically similar initial conditions, they do not coordinate their evolution.

The finite speed of gravity ( $c$ ) prevents local perturbations from synchronizing into a global

dynamical mode. Therefore, the universe remains a collection of 'isolated thermodynamic engines'. The observed large-scale uniformity is a result of the statistical distribution of these independent systems across an infinite volume, rather than a result of early-universe thermal equilibrium.

## Conclusion

This conjecture offers a parsimonious alternative to the *Big Bang* model by interpreting the universe as a spatially infinite, non-time-limited, and globally static ensemble. It preserves the local predictive power of *GR* while eliminating the need for dark energy, inflation, and a temporal singularity. The cosmos is thus viewed not as a singular evolving entity, but as a vast, non-coherent mosaic of locally evolving islands within a stable, flat, and infinite spacetime.