A Cavitational Interpretation of the Great Attractor and Great Repeller……….………

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❖ Abstract

Recent reconstructions of galaxy motion and matter distribution in the observable universe have revealed the presence of two dominant large-scale anomalies: the Great Attractor and the Great Repeller (Tully et al., 2014; Hoffman et al., 2017). Traditionally interpreted through the lens of general relativity and gravitational potentials (Einstein, 1916; Misner, Thorne, & Wheeler, 1973), these phenomena can be recontextualized within a cavitational cosmological model. This model introduces gravity and levity as expressions of positive and negative spacetime curvature, respectively (Caracristi, 2021a; Caracristi, 2024a). In this paper, we present a detailed analysis of how these curvature polarities influence the large-scale dynamics of cosmic structure, treating the universe as a cavitated domain embedded in a curvature gradient field. We interpret the Great Attractor as a region of high positive curvature and the Great Repeller as a region of high negative curvature, and propose that their influence on matter flows results from intrinsic curvature gradients, not simply mass distribution. This perspective yields new insights into the interplay between structure formation and the underlying spacetime topology. [1]

❖ Introduction

The discovery of large-scale coherent motions of galaxy clusters, such as those associated with the Great Attractor and the Great Repeller, has challenged conventional interpretations of gravitational dynamics (Tully et al., 2014; Hoffman et al., 2017). While general relativity remains the prevailing framework, it presumes spacetime curvature only in the context of mass-energy distributions (Einstein, 1916; Padmanabhan, 2010).

However, the cavitational model (TCMC) proposes an alternative foundation: that spacetime itself emerges as a cavitated bubble from a pre-spacetime continuum (Latent realm), and that within this domain, gradients of curvature, both positive and negative,

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[1] This work is a personal reflection, grounded in my own experience, knowledge, and creative reasoning. It does not claim to offer absolute truths or definitive models, but rather represents a process of inquiry, one shaped by my evolving understanding of the world and the cosmos. These writings are part philosophy, part science, and part imagination, offered in the spirit of open exploration. While I draw upon established ideas where relevant, my intent is not to conform, but to question, reinterpret, and reframe. What you will read is the product of years of thought, observation, and a genuine desire to see beyond the surface of things, to engage not just with information, but with meaning.

naturally arise through the interactions between the time and space fields (Caracristi, 2020; Caracristi, 2021a).

This paper applies the cavitational model to large-scale cosmological structures by interpreting gravity and levity as dual curvature phenomena. Gravity is the familiar inward curvature (positive) caused by energy density, while levity is its less-explored counterpart, representing outward curvature (negative) associated with under-dense or dynamically expanding regions (Caracristi, 2024a).

❖ Cavitational Cosmology and Spacetime Curvature

The cavitational model envisions the universe as a bounded yet expanding spacetime domain emerging from a nonlocal, atemporal substrate. This cavitation process gives rise to a structured but dynamic spacetime "membrane"[2] in which curvature gradients form naturally, similar to pressure or tension gradients in a physical membrane.

In this view, gravity arises in regions where the membrane thickens and curves inward (positive curvature), and levity arises where the membrane thins or curves outward (negative curvature). These curvature states modify the local rate of time flow and spatial expansion, guiding the motion of matter and energy (Misner et al., 1973; Padmanabhan, 2010).

Levity, in this model, is not merely the absence or opposite of gravity, but an active manifestation of negative spacetime curvature (Caracristi, 2021a; Caracristi, 2024b). Just as gravity arises from regions of positive curvature that draw matter inward, levity emerges from regions of negative curvature that dynamically disperse matter outward.

❖ The Great Attractor as a Gravity-Dominated Structure

The Great Attractor, located near the Norma Cluster in the Laniakea Supercluster, is inferred from the coherent infall of galaxies toward a common region (Tully et al., 2014). In the cavitational framework, this is a region of steep positive curvature where time flows more slowly relative to surrounding regions; spatial volume contracts, increasing energy density. Matter follows geodesics that converge due to the curvature gradient (Einstein, 1916).

These features are consistent with observations of gravitational wells but reinterpreted here as curvature-induced flow fields rather than purely mass-induced gravity (Caracristi, 2020).

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[2] Membrane (in the cavitational model): In this framework, a *membrane* refers to the structured yet flexible boundary layer of spacetime that emerges during the cavitation of the universe from a nonlocal, atemporal substrate. It is not a physical surface in the conventional sense, but rather a dynamic, multidimensional continuum that both contains and constitutes spacetime. Like a physical membrane, it possesses tension and curvature, enabling gradients to form. These gradients manifest as regions of positive curvature (gravity) and negative curvature (levity), guiding the motion of matter and energy much as stresses and deformations guide flows in a material surface.

❖ The Great Repeller as a Levity-Dominated Structure

The Great Repeller is characterized by an apparent repulsion of galaxies, inferred from a large under-dense region likely corresponding to a super-void (Hoffman et al., 2017). In the cavitational model, time flows more quickly relative to its surroundings; spatial volume expands more rapidly, reducing effective density. Matter is dynamically pushed away by a gradient of negative curvature (Caracristi, 2024a).

Rather than invoking repulsion as a force, this interpretation frames the Repeller as a high point in the curvature field: matter flows away not because it is repelled, but because it is not gravitationally constrained and follows the path of maximal temporal expansion.

❖ Curvature Gradients and Cosmic Structure

The dual presence of positive and negative curvature creates a tensioned curvature field, akin to a fluid dynamics analogy. Matter flows through this field along curvature gradients, toward regions of positive curvature (attractors), away from regions of negative curvature (repellers).

This continuous flow helps explain the filamentary structure of the cosmic web, voids, and clusters, not merely as results of mass clustering, but as the result of an evolving topology in spacetime curvature (Padmanabhan, 2010; Caracristi, 2020; Caracristi, 2021b).

❖ Conclusion

By interpreting gravity and levity as physical manifestations of spacetime curvature polarity, the cavitational model provides a coherent framework for understanding the large-scale dynamics of the universe. The Great Attractor and Great Repeller are not anomalies, but natural consequences of curvature gradients within a cavitated spacetime domain. This model offers a new lens through which cosmic structure and motion can be interpreted—one that treats spacetime not as a passive stage for gravity, but as an active, dynamic field shaped by both contraction and expansion. [3]

[3] "This paper is the sole work of the author. All research, analysis, conceptual developments, philosophical positions, and original insights presented herein are products of the author's own knowledge and experience. Artificial intelligence tools were employed only to assist with matters of clarity, coherence, and linguistic accuracy; they did not contribute to the generation of ideas or arguments."

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