Resolving Dark Matter/Dark Energy Through Gravitational and [1]RSC Fields (6.6)……

……………………………………………………………by Paul Caracristi (241113)

Abstract. The [2]Great Attractor and [3]Great Repeller are two prominent large-scale structures in the universe, influencing the motion of galaxies through their gravitational and proposed levitational effects. This paper proposes that the Great Attractor represents a region of strong positive spacetime curvature (gravitational field), while the Great Repeller corresponds to a region of strong negative spacetime curvature (Replusive spacetime curvature "RSC"). These dual fields generate dynamic cosmic flows, analogous to atmospheric high and low-pressure gradients on Earth. By incorporating RSC fields into cosmological models, this framework offers an alternative explanation for phenomena currently attributed to dark matter and dark energy. This perspective suggests that these enigmatic entities may not be as abundant or necessary as previously assumed, providing a new paradigm for understanding the universe's large-scale structure and evolution.

The nature of [4]dark matter and [5]dark energy has long puzzled cosmologists and physicists, with no definitive resolution in sight despite decades of research and

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[1] RSC refers to Repulsive Spacetime Curvature. It is the field generated by the negative curvature of spacetime versus the positive curvature of gravity. RSC is, in fact, Levity, which is an appropriate term to describe the interaction, but I hesitate to use it since most physicists have an emotional objection to it.

[2] The Great Attractor is a gravitational anomaly in the Laniakea Supercluster. It is a region in space pulling galaxies, including the Milky Way, toward it due to its immense gravitational influence. It is located approximately 150–250 million light-years away in the direction of the Centaurus, Hydra, and Norma constellations. Its exact center is obscured by the "Zone of Avoidance," a region hidden by the Milky Way's dense plane of stars and dust. The Great Attractor's gravitational pull suggests a mass tens of thousands of times that of the Milky Way. It is thought to be a supercluster of galaxies or a dense part of the cosmic web. While some of its pull is attributed to known clusters (like the Norma Cluster), much of it remains enigmatic due to the obscured view.

[3] The Great Repeller refers to a region of relatively low-density matter that appears to be "pushing" galaxies away. It is essentially the opposite of the Great Attractor, with galaxies flowing away due to an underdensity of mass. In the context of large-scale cosmic flows, the movement of galaxies is not only toward dense regions (like the Great Attractor) but also away from underdense regions (voids). These underdense regions create a repelling effect. The Great Repeller is inferred from galaxy velocity maps as being located on the opposite side of the Laniakea Supercluster from the Great Attractor. The concept of the Great Repeller arises from studies of galaxy motion, particularly maps of the velocity flow of galaxies within Laniakea. It is part of the larger dynamical balance of gravitational pull (attraction) and push (repulsion) across the universe.

[4] Dark matter is a hypothetical form of matter that does not emit, absorb, or reflect light, making it invisible to electromagnetic observations. It is postulated to account for approximately 27% of the universe's total mass-energy content and around 85% of its matter content.

[5] Dark energy is a mysterious form of energy that permeates space and is responsible for the observed accelerated expansion of the universe. It accounts for approximately 68% of the universe's total mass-energy content.

observation. Recent astronomical discoveries, facilitated by advanced telescope satellites such as the Hubble Space Telescope, have revealed two significant phenomena: the Great Attractor and the Great Repeller. These regions display distinct patterns in the motion of galaxies. Specifically, vast concentrations of galaxies move toward the Great Attractor, while galaxies are repelled from the Great Repeller.

It is proposed that the Great Attractor represents a region of space with an exceptionally strong gravitational field characterized by a high concentration of mass exerting powerful attractive forces. In contrast, the Great Repeller is theorized to be dominated by a strong RSC field, a hypothetical phenomenon associated with negative spacetime curvature that repels matter, energy, and galaxies. Together, these gravitational and RSC fields contribute to large-scale flows, organizing galaxies into clusters and voids.

The concept of a RSC field arises when the fabric of spacetime exhibits negative curvature, leading to divergent interactions between energy and particles. Conversely, positive curvature generates a gravity field, fostering convergent interactions of energy and matter. Both RSC and gravity are fields that shape the curvature of spacetime in response to the presence of energy and matter.

This framework builds on well-established general relativity principles, where mass and energy curve spacetime, giving rise to gravitational fields. The idea of an RSC-field, as a counterpart to gravity, suggests that negative curvature could similarly influence the behavior of energy and matter. Although speculative in current physics models, this concept provides an alternative explanation for phenomena traditionally attributed to dark energy and dark matter.

Moreover, it is proposed that these fields operate across multiple scales throughout the universe, with smaller gravitational and RSC fields governing the formation of galaxy clusters and individual galaxies. This dynamic interplay mirrors the pressure systems in Earth's atmosphere that drive weather patterns, suggesting an analogous mechanism at cosmic scales.

This approach challenges the traditional interpretations of dark matter and dark energy. Rather than invoking these enigmatic entities to explain galaxy dynamics and cosmic acceleration, the proposal suggests that the observed phenomena can be explained by the combined effects of gravitational and RSC fields. If validated, this theory would imply that dark matter and dark energy exist at much lower concentrations, or perhaps not at all, thereby redefining our understanding of the universe's structure and evolution.

For further context, general relativity equations, such as the Einstein field equations, describe how spacetime curvature is influenced by matter and energy (Einstein, 1915). Theories extending these ideas, such as those considering negative curvature, aim to explore the potential for additional forces or fields that shape the cosmos in ways that traditional gravity cannot fully explain.

Observational Evidence Supporting the Theory:

1. The Great Attractor: Observations from the Hubble Space Telescope and satellites like Planck and WMAP have confirmed a region in the local universe with significant gravitational pull. The Great Attractor lies near the Norma Cluster in the Laniakea Supercluster, influencing the motion of the Milky Way and its neighbouring galaxies at roughly 600 km/s.

2. The Dipole Repeller: Identified in 2017 through galaxy velocity fields, the Dipole Repeller exhibits an outward motion of galaxies, indicating a vast region of low-density space where galaxies are not gravitationally bound.

3. Cosmic Flows: Observational data shows galaxie's peculiar velocities superimposed on the Hubble flow, evidencing regions of attraction (high density) and repulsion (low density).

Mathematical Basis of Gravitational and RSC Fields:

1. Gravitational Fields:

Newtonian mechanics describe gravitational forces F_g as:

$$F_g = G\frac{m_1 m_2}{r^2}$$

Where G is the gravitational constant, m_1 and m_2 are the masses, and r is the distance between masses. For large-scale structures, general relativity offers a refined description using the Einstein field equations:

$$R_{\mu\nu} - \frac{1}{2}R g_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}$$

where $R\mu\nu$ is the Ricci curvature tensor, *R* is the Scalar curvature, $g\mu\nu$ is the Metric tensor, Λ is the Cosmological constant, $T\mu\nu$ is the Energy-momentum tensor, *G* is the Gravitational constant, and c is the speed of light.

Regions like the GA correspond to dense matter concentrations, influencing curvature and producing attractive flows.

2. RSC Fields (Negative Curvature):

If we postulate that the Great Repeller corresponds to an RSC field, analogous to gravity but with a repelling effect, we redefine the curvature of spacetime locally. Negative curvature would counteract attractive forces:

$$R_{\mu\nu} - \frac{1}{2}R g_{\mu\nu} - \Lambda' g_{\mu\nu} = \frac{8\pi G}{c^4}T_{\mu\nu}$$

Where Λ′ is a term representing negative spacetime curvature. This corresponds to:

$$F_l = -G_l\frac{m_1 m_2}{r^2}$$

Where Gl is an RSC constant, akin to G for gravity but with an inverse effect.

3. Density and Potential Fields:

The potential energy of these fields can be expressed as:

$$\Phi_g = -\frac{GM}{r}, \quad \Phi_l = +\frac{G_l M}{r}$$

where Φg and Φl are the gravitational and RSC potentials, respectively.

Cosmic Structures and Flow Dynamics

Regions of attraction and repulsion in the universe can be likened to atmospheric pressure gradients, where:

- High-Density Regions (GA): Correspond to areas with a strong gravitational field.
- Low-Density Regions (Repeller): Correspond to areas with strong RSC characteristics, creating flows analogous to winds.

The velocity field v of a galaxy under these combined influences can be approximated as:

$$\vec{v} = -\nabla\Phi_g + \nabla\Phi_l$$

Implications for Dark Matter and Dark Energy

- Dark Matter: Current theories attribute additional gravitational pull in galaxies to dark matter. However, if the universe hosts RSC fields, these interactions could account for the observed motion without necessitating unseen matter.

- Dark Energy: The acceleration of the universe's expansion might not stem from a mysterious energy source but from large-scale RSC effects counterbalancing gravitational attraction.

Testing the Theory

1. Galaxy Velocity Mapping: Enhanced measurements of galaxy peculiar velocities can refine the locations and strengths of the attractor and repeller fields.

2. Simulations: Numerical simulations using modified gravitational equations can predict galaxy flows in the presence of both fields.

3. Gravitational Lensing: Comparing lensing effects in the GA and Repeller regions can reveal variations in spacetime curvature.

In conclusion, the proposal that both gravitational and RSC fields govern the dynamics of galaxies and large-scale cosmic structures offers a new perspective on phenomena traditionally attributed to dark matter and dark energy. By reinterpreting the Great Attractor and the Great Repeller as regions dominated by gravitational and RSC fields, this model suggests that the behaviour of galaxies, whether moving toward or away from these areas, can be explained by the combined effects of spacetime curvature influenced by mass and negative curvature, respectively.

This approach challenges the existing paradigms in cosmology but it is consistent with Einstein's theory of relativity. Therefore, potentially offering a more unified explanation for cosmic acceleration and the distribution of galaxies, without relying on the mysterious and yet-undetected entities of dark matter and dark energy. If proven, the theory could radically alter our understanding of spacetime and the forces at play on cosmic scales. Instead of invoking hypothetical substances or fields, it emphasizes the role of spacetime curvature itself, suggesting that our universe may operate through principles that are more fundamentally tied to the geometry of spacetime.

While speculative in its current form, the hypothesis invites further exploration and empirical testing. Future research in theoretical physics and observational astronomy could provide the necessary evidence to validate or refute this model, potentially transforming the way we understand the structure of the universe. As we continue to investigate the fundamental nature of spacetime, the interplay between gravitational and RSC fields may become central to resolving long-standing cosmological mysteries.