Time Dilation Cosmology 5: Dimensionality and Spatial Expansion and Contraction in the Holographic Spacetime Continuum

Capt. Joseph H. (Cass) Forrington

Email: captcass@captcass.com

Abstract

This paper presents the seventh major development in the Time Dilation Cosmology (TDC) framework, expanding on the holographic structure of spacetime through time dilation gradients. The model proposes that apparent spatial expansion, cosmological redshift, and the structure of the observable universe are illusions resulting from differential time rates rather than actual movement through space. It posits that all observers are at the center of their own perceptual universe, which unfolds outward from a point within. The paper derives and evaluates the cosmological horizon using a time-based integral, explains how dimensionality emerges from the 2.2686×10^{-18} s/s acceleration within life forms, and explores the origin of the Vacuum Zero Point Energy as a fluctuation in temporal continuity. Additionally, it addresses how the One Life hypothesis provides an observer-centered explanation for quantum entanglement and nonlocality. The findings support a model where the universe is not expanding outward but emanating inwardly through perceptual time gradients, yielding a fully observer-dependent holographic cosmology.

Keywords: Time Dilation Cosmology, holographic universe, cosmological horizon, time dilation, spatial expansion, spatial compression, black hole, MECO, redshift, One Life, quantum entanglement, Zero Point Energy, gravity, observer-centered cosmology, relativistic time, spacetime continuum.

1. Introduction

First, much of what is put forth in this paper as fact has been published and proven in my other peer-reviewed papers in the *Journal of Cosmology* and the *Journal of Modern Physics*. They are already proven aspects of the Time Dilation Cosmology, TDC, model. They cover far too much material to reintroduce here, so I strongly advise the reader to refer to those other papers for clarification when needed. This is not a LCDM/Big Bang model so do not try to compare the two side-by-side. This model stands on its own.

This is the seventh in a series of papers[1,2,3,4,5,6] on the holographic TDC model of the universe.

In the TDC model, spacetime is a single thing with two aspects, space and time. The spacetime continuum is the quantum continuum and masses are not separate particles, but simply spatial densities within the continuum. There are two forward directions of time; a Fundamental Direction of Evolution, FDE, in the forward direction of time at a velocity of c, and a Gravitational Direction of Evolution, GDE, down time dilation gradients, **Figure 1**, where the velocity is determined by the slope of the dilation gradient.
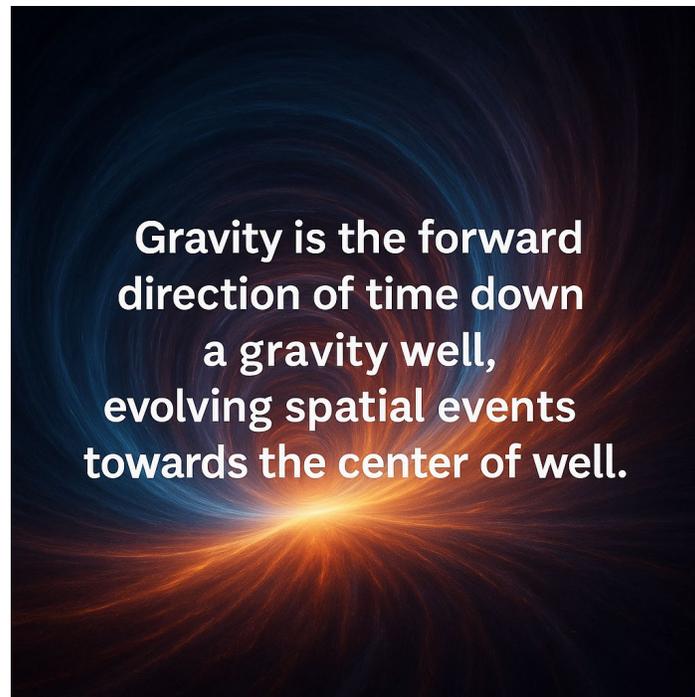

Gravity is the forward
direction of time down
a gravity well,
evolving spatial events
towards the center of well.

Figure 1. The next instant manifests first in faster time frames and gravity is the evolution of events down the time dilation gradient.

The GDE is orthogonal to the FDE and the resultant of the two velocities manifests orbits as the GDE bends the FDE downgradient.

Also, event horizons of any sort are "limits of relativity" as time appears to stop at event horizons. Whatever lies beyond is spacelike and can not be seen by us. This is similar to the worldline light cone, **Figure 2**.
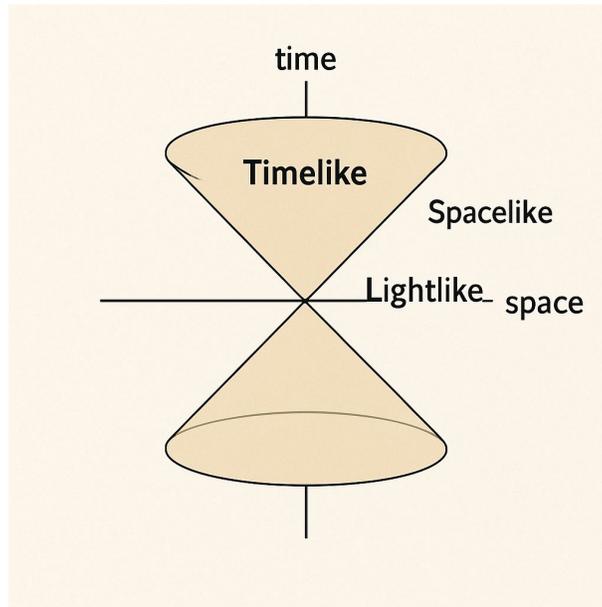

Figure 2. Worldline and Light Cone in Time Dilation Cosmology: This diagram represents the observer's worldline at the origin and the structure of their past and future light cones. In the TDC model, all perceived space and events are projections of time gradients. The past light cone encloses all events whose light is reaching the observer *now*, appearing more distant due to cumulative time dilation (slower past time rates). The future light cone includes all events the observer's present light will eventually influence. Events inside the cone are timelike, evolving forward within the continuum. The light cone surfaces mark lightlike trajectories—apparent horizons of interaction. Events outside are spacelike and perceptually beyond causal influence, though in TDC they may still exist as slower or faster time frames perceived as 'elsewhere in space.

In the first paper[1], it was shown that all gravitationally induced velocities in the FDE were directly related to the difference in the universal invariable 1 s/s rate of time and the rate of time at the coordinate point, the "dRt". Where a Kepler

Zone is the area within a dilation field where the satellites' velocities are determined by the central object's dilation factor:

$$V_{Co} = c\sqrt{(dRt)} \text{ for simple, nearly circular, orbits within a Kepler Zone.} \quad (1)$$

$$V_{Eo} = \sqrt{(2(c^2(dRt) - (c^2(dRt\alpha))} \text{ for elliptical orbits within a Kepler Zone.} \quad (2)$$

$$V_{Go} = (c\sqrt{(dRt)})/\sqrt{3} \text{ for galactic rotation velocities for stars outside a Kepler}$$
Zone, whose own dilation factors are determining their velocities. $\quad (3)$

These formulas prove the gravitationally induced velocities are all merely compensation for the slower rates of time in a continuum evolving forward at the speed of light, c, so the continuum evolves forward uniformly at the same rate, c, everywhere.

In the derivation of these formulas, it was also shown that time has an overall acceleration factor of $\sqrt{3}$, which is proven in the fifth paper[5].

It has also been demonstrated in the first paper[1], that the Hubble shift is not due to the inflation of space, but rather to an intrinsic acceleration of $2.2686*10^{-18}$ s/s within life forms. This acceleration is what enables plants to grow upwards against gravity. Their upward growth is physical evidence of this temporal acceleration.

This value, $2.2686*10^{-18}$ s/s, is derived from the Hubble constant, which in standard cosmology quantifies the apparent rate at which distant galaxies accelerate away from us due to expanding space, producing redshifted light. In the TDC, however, the redshift is caused not by space expanding at an accelerating rate, but by the slowing of coordinate time relative to the observer's accelerating proper time. It is not the galaxies accelerating away, but the observer accelerating into the future, creating *temporal distance*, not spatial distance.

A physicist recently attempted to refute this notion of internal acceleration within life forms by asserting that plant growth is purely a biological process. However, this interpretation just glosses over the process.

To clarify, plant shoots grow upwards against gravity via a process known as gravitropism, which is a biological orientation mechanism, not a source of energy or acceleration. In this process, specialized cells called statocytes, containing starch-filled amyloplasts, sense the gravitational vector when the amyloplasts are displaced by the drag of gravity and settle to the lowest part of the cell, triggering a

redistribution of the hormone auxin. In shoots, higher auxin concentration on the lower side stimulates cell elongation, pushing the shoot upward. In roots, the same auxin distribution inhibits elongation on the lower side, causing the root to curve downward.

While this mechanism determines *direction*, it does not explain the *force* or *energy* required to physically build tissue against gravity. That upward growth, against the Gravitational Direction of Evolution (GDE), still requires acceleration.

Thus, gravitropism provides orientation, but the observed resistance to gravity (and successful upward motion) is made possible by the universal acceleration inherent in life forms. Life, itself, is the building force and the internal acceleration allows it to build upward against gravity, not just a biochemical signal.

For the observer's perception of acceleration effects to accumulate across the ~13.9 billion light-year radius of the observable universe, this acceleration must be continuously carried forward perceptually, passed from life form to life form, generation to generation. This continuity is possible because we are not separate lives, but different points of view of a single, eternal, Life. This concept of the One Life is detailed in "Time Dilation Cosmology 4: Life and the Origin of the Spacetime/Quantum Continuum"[6].

In this framework, the TDC universe is both observer-dependent and observer-centered. Each observer represents a distinct point of view within the One Life. This unified perspective not only supports the cosmological implications of TDC but also naturally accounts for phenomena such as quantum entanglement, non-locality, and distant viewing, each arising from different vantage points within the same underlying consciousness.

For a more in-depth exploration of this concept, readers are encouraged to consult the TDC4 [6] paper.

The second[2] and third[3] papers develop additional formulas and provide solutions proving each. A current list of the TDC formulas is in **Section 6**.

In the fourth paper[4], the unified field is demonstrated, and it is also demonstrated that, in external force-induced velocities, the resultant time dilation is compensation for the velocity so the automobile, rocket, etc., can't get ahead of the continuum, either.

In gravitationally induced velocities, the velocity is compensation for the dRt at the coordinate point, with time dragging space forward, and in external force-induced velocities the dRt is compensation for the velocity, with time putting a drag on space, holding it back. The speed of light is the maximum and minimum velocity of the evolving holographic continuum. It is THE velocity.

It is also demonstrated in the third[3] and fourth[4] papers that, since all masses have a compensatory velocity proportional to their time dilation, super masses like black holes, would have to have extraordinary velocities, i.e., ~175,000 km/s for Sgr A*. Also, as such a mass would nearly stop time, no other masses could ever reach it to build it as their velocities $\rightarrow$ 0 on their approach due to the slowing of time. Therefore such super masses cannot exist as black holes which are, rather spacetime vortexes, Magnetospheric Eternally Collapsing Objects, or MECOs[4].

The force in time in Newtons is also clearly derived in the fourth paper[4].

The fifth paper[5] is a mathematical proof of the $\sqrt{3}$ temporal and $\sqrt{2}$ spatial acceleration factors that showed up in the original velocity formula derivations.

The sixth paper[6] could not be reviewed for a physics journal because in it the author shows how we are all One Life and that One Life is manifesting the universe around us for us as we interact with it with "quantum tales" from the laboratory of life proving it. That paper had to be reviewed by a theologian before being included in the Astro-Theology volume of the *Journal of Cosmology*. It was widely downloaded in the theologian community, as well as the astrophysicist community.

This paper describes how both the apparent expansion outward, and apparent compression inward in the galactic center are manifested through time dilation. Outwardly, the expansion is passive and objects are fading away, while inwardly it is energetic and dynamic as the galactic center spirals into the future in a spacetime vortex, a MECO.

Abhas Mitra, an Indian astrophysicist, is known for first proposing the theory of Magnetospheric Eternally Collapsing Objects (MECOs) as an alternative model for black holes. He theorizes that instead of forming true black holes with event horizons, massive stars collapse into MECOs, which are slowly rotating, incredibly dense and compact objects with strong magnetic fields. However, as

noted above, such super massive objects would have extraordinary velocities, which we do not see.

The spacetime vortex, with relativistic velocities within it, gives us the same effects as Mitra's slowly rotating super massive object and, because the GDE is impinging on itself at the center of all spherical dilation pits, masses can collapse into vortexes, where the previous mass is attenuated in the MECO vortex, which is what happens to the accretion disk as it is drawn into the MECO vortex[3.4].

In the TDC model, when we travel "through" space, we are travelling through time frames with different rates of time. We don't aim our spacecraft at what we see, because what we see is in the past. We aim for a hypothetical point in the future.

Moving with the flow, i.e., "freefall" in gravity, takes no external energy at all. We evolve forward with time as it drags us down the time dilation gradient. When we try to move upwards against the flow, against the Gravitational Direction of Evolution, GDE, of time, we are increasing our rate of time to catch up with the faster time frames upgradient where we see the past. The only way to do this is to accelerate our rate of time through the application of an external force. Once we arrive at our destination, we have sped up our rate of time to that frame's rate of time and experience that frame as the present. However, we are still at the universal rate of time and are faster than what surrounds us.

Down gradient we are merely part of what is evolving forward in time, towards the future. The force in time[4],

$$F = c^2 dRt \qquad (4)$$

is dragging us forward with the rest of the continuum. The energy we must expend moving up, is greater than the force of time evolving us downward. Equal force allows us to hover.

If we can manifest time dilation gradients, we will be able to produce gravity drives where we are evolving through the continuum instead of using external force to force our mass to shift.

It is important to note that when we replace the v element with c√dRt in our formulas, the dRt becomes a separate element and all the formulas in Section X can be solved for the dRt, a few examples being:

$$dRt = 1 - \sqrt{1 - \left(\frac{2GM}{rc^2}\right)} = \left(\frac{E}{mc^2}\right) - 1 = \frac{Fr}{mc^2} = \frac{F}{qc} = \left(\left(\frac{F}{Bc}\right) - \left(\frac{E}{Bc}\right)\right)^2 \quad (5)$$

This should allow us to manipulate the dRt so we can develop gravity drives, though the author believes this will probably be done at the quantum level because using the EMF, for example, would require 10^{27} J of energy to obtain results that would work in a craft. Also, as our UFO/UAP visitors have gravity drives in all their craft, regardless of size, the drives must be relatively small. Again, the reader should consult "The Unified Field"[4] for more comprehensive detail on this.

An explanation of the Vacuum Zero Point Energy, ZPE, is also provided in **Section 4** in this paper.

2. Spatial Expansion

We all experience the same 1 s/s rate of time, which is the same as Einstein's far distant observer. It is the universal constant and the fastest rate of time. But two observers in relative motion will always see the other's time rate as slower than their own and the other's meter length will be shorter than their own.

In a gravity field, the individual that is deeper in the field will appear to have a slower rate of time and a longer meter than the observer farther up the field.

However, despite these perceived differences, everyone experiences the same proper time rate in their own inertial frame, and all meter lengths are locally equal. The apparent observed differences are illusions due to how light travels in time dilation fields and the effects of the spacetime geometry, not actual variations in everyone's intrinsic experience of time or space.

Thus, it is a universe of illusions. We can only experience the present within ourselves because the farther away a distant point, the older it is in time because it takes light longer to reach us. A finger held in front of your nose is viewed in the past, not the present.

When time appears slower, space must appear larger in proportion to maintain the constant speed of light, c. This is because the speed of light is invariant; it must be the same (299,792,458 m/s) for all observers, regardless of their relative motion or gravitational potential. The rate of time and length of a meter appear to change, but the speed of light is a universal constant for all observers, across all frames.

If an observer perceives another's time as dilated (slower), then to preserve

$$c = \text{distance/time} \tag{6}$$

they must also perceive the other's space as expanded. Likewise, if time is appears faster, space must appear compressed to maintain c.

This interplay, where differential time rates cause apparent spatial expansion or compression, is a foundational principle of the TDC model. It allows space to be perceived as expanding or compressing only due to time dilation gradients without invoking motion through space, or the forced expansion of space due to some unknown "dark" energy.

In TDC model, time slows with distance from the observer because of the $2.2686*10^{-18}$ s/s acceleration in the rate of time in life forms. The proof of this acceleration is in the plants that grow upwards against gravity. It is not possible to move up against gravity without acceleration. When we are looking out into space, we are not just looking back in time, but we are also looking at slower time. When time appears to slow, space must also appear to expand to maintain c. Near the cosmological horizon, where time appears to stop, the apparent expansion of space approaches infinity. This is not an active expansion. It is only based on the observer's perception of slower time and if the observer traveled towards the expanded space it would contract as the cosmological horizon shifted ahead away from the observer, bringing more galaxies into view. Behind the traveler, galaxies would slip from view as the cosmological horizon followed the traveler. The observer is always at the center of a universe with a cosmological horizon of ~13.9 Gly.

If we perceive slower time, we are also perceiving expanded space. That keeps c constant. This indicates the holographic distances are illusions based in time dilation and the universe is emanating from a point within each of us.

From what follows, we get dimensionality in space from the acceleration in time within the observer, $2.2686*10^{-18}$ s/s per 13.96 Gy, after which time appears to stop at the cosmological horizon.

2.1 Cosmological Horizon Derivation in Time Dilation Cosmology (TDC)

This derivation models the apparent radius of the observable universe (the cosmological horizon) as a function of a time dilation gradient. In the TDC model, space is not expanding outward in a traditional sense. Rather, it appears to expand due to the observer's increasing time rate differential (dRt) with distance. This time

dilation is what stretches space and redshifts light, resulting in the apparent acceleration and distance observed in cosmology.

Let:

T = Age of the universe $\approx 4.4085*10^{17}$ seconds
c = Speed of light $\approx 2.99792458*10^{8}$ m/s
dRt(t) = Differential time rate function with respect to time t
In the TDC model, the differential time rate is modeled as:

$$dRt(t) \;=\; 1 \;-\; (1 \,/\, (\log(t))^2) \tag{7}$$

Distance Integral:
      The perceived cosmological distance D(T) is then derived by integrating over the time dilation function:

$$D(T) \;=\; \int_{1}^{T} c \,\cdot\, dRt(t)\, dt \tag{8}$$

Substitute dRt(t):

$$D(T) = \int_{1}^{T} c \,\cdot\, \left[1 \;-\; \left(1 - (\log(t))^2\right)\right] dt \tag{9}$$

      Evaluating this integral numerically over the limits from $t = 1$ s to $t = 4.4085*10^{17}$ s yields:

D(T) $\approx 1.3208*10^{26}$ meters $\approx$ 13.96 billion light-years.

      As this radius extends outward in all directions from the observer, it gives us the volume of the universe within the cosmological horizon.

      Thus, in the TDC model, the apparent cosmological horizon arises from cumulative time dilation, not physical expansion. All spatial perception is a projection of evolving time gradients.

Clarifying Notes:

- The use of log(t) in the denominator ensures time dilation increases slowly over cosmic time, producing a cumulative spatial projection.
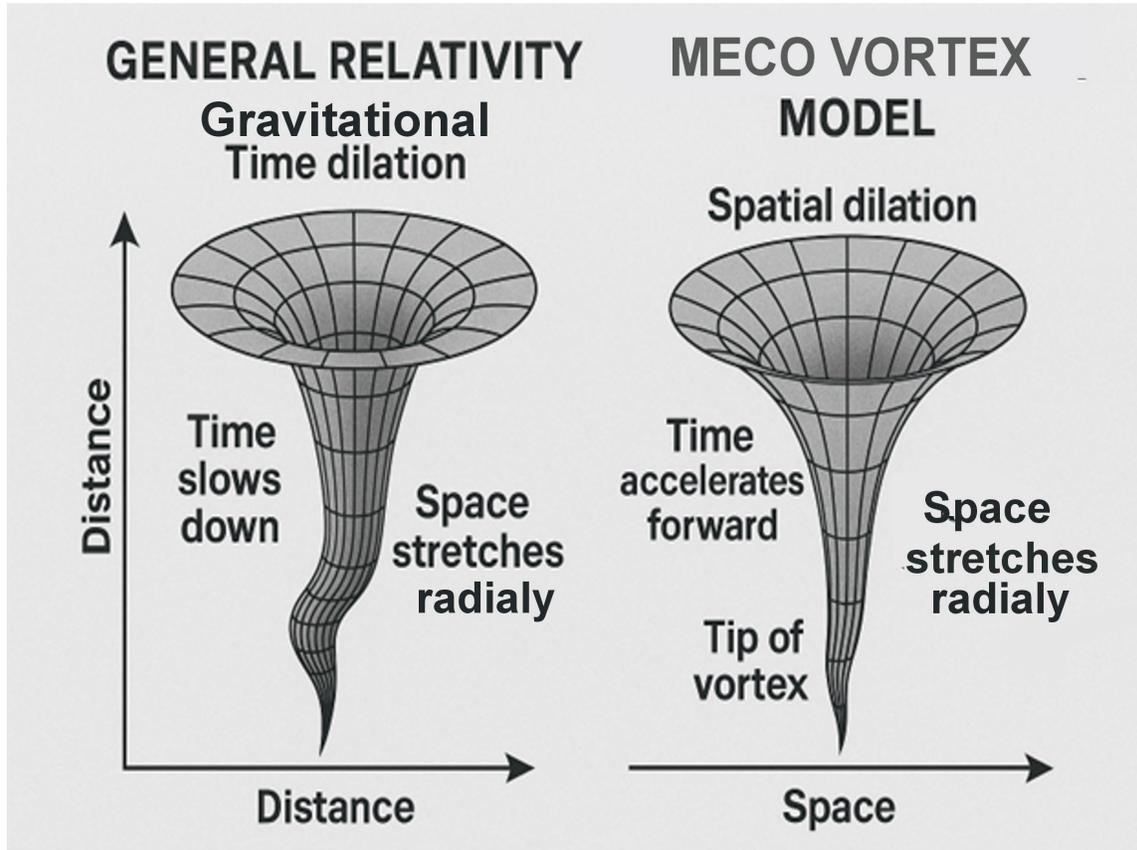
- The **lower bound of t = 1 s** is mathematically convenient and avoids singularities.

- This derivation remains independent of standard cosmological parameters like Ω_m or Λ, reinforcing that in TDC, distance is a time function, not a matter-energy one.

3. MECO Spatial Compression in Time Dilation Cosmology (TDC)

In a spiral galaxy, we see perceptual space expansion as we approach the center of the galaxy from outside the galaxy due to time dilation, but it is a stretching of space radially, similar to what we observe in a solar system. This effect is due to the increasing difference in time rate between the outer galactic regions and points deeper within the gravitational well. Hence, although we see the dRt increasing (i.e., time appearing to slow), we also perceive the length of a meter increasing, i.e., space appears expanded relative to our position.; stretched.

However, as we approach the event horizon of the central MECO, the interpretation of dRt shifts fundamentally. The dilation is no longer relative to the universal invariant time rate of 1 s/s (as experienced by the observer), but instead becomes relative to the acceleration of time at the MECO's core, where time is flowing at its maximum, characterized in the TDC model by a $\sqrt{3}$ acceleration.

At this point, the MECO's intense internal time acceleration reverses the visual effect: instead of space appearing to stretch, it appears to compress and collapse inward, forming the funnel-like vortex geometry. The increasing dRt is now seen as a contraction in radial spatial extent, because we are comparing slower external time frames to the faster, accelerating core, rather than the other way around. This creates the illusion of an infinitely deep gravitational throat, but in TDC, it is simply the time differential compressing space inward toward the accelerating focus of the MECO, **Figure 3**.

GENERAL RELATIVITY
Gravitational Time dilation

Distance

Time slows down

Space stretches radialy

Distance

MECO VORTEX MODEL

Spatial dilation

Time accelerates forward

Space stretches radialy

Tip of vortex

Space

In General Relativity, space stretches radially as it compresses spherically into a mass and time dilates. In a MECO, space stretches radially as the FDE and GDE accelerate in the vortex. Masses can collapse into vortexes.

Figure 3: In General Relativity, space stretches radially as it compresses spherically into a mass and time dilates. In a MECO, space stretches radially as the FDE and GDE accelerate in the vortex. Masses can collapse into vortexes.

3.1. Mathematical Model of Expansion and Compression in TDC

The following outlines how the (TDC) model uses differential time rates (dRt) to explain both spatial expansion and spatial compression in galactic and MECO structures.

3.1.1. Differential Time Rate (dRt)

The differential time rate is the foundational quantity in TDC, and varies with geometry:

In the galactic disk:

$$dRt_{disk(r)} = 1 - 1/(\log(r))^2 \tag{10}$$

Near the MECO:

$$dRt_{MECO(r)} = 1 - A \cdot e^{-k(r - r_s)} \tag{11}$$

Where:

• A is a small constant ensuring dRt < 1
• k is the decay constant determining how quickly dRt approaches 1
• r_s is the Schwarzschild radius
• r ranges from 2.1 r_s (outer MECO surface) to 1.01 r_s (inner core limit)

This is the point of maximum time dilation (i.e., minimum dRt). This is because the observer sees a region of slowed time (0 < dRt < 1) that is accelerating toward proper time (dRt = 1).

As dRt → 1, that region's local frame becomes synchronized with the observer's proper time.

This is equivalent to that region evolving toward the observer's now, catching up to the present as its coordinate point time rate increases.

This is not the MECO physically moving but its temporal frame becoming more current as its dilation relaxes within the vortex.

3.1.2. Effective Spatial Stretch Factor

To preserve c as a constant, the meter length adjusts according to the local time rate:

In low time-rate zones (outer galaxy):

$$L_{eff(r)} = 1/dRt(r) \tag{12}$$

Near a MECO (core time faster than surroundings):

$$L_{eff-MECO(r)} = dRt(r) \tag{13}$$

3.1.3 Force in Time

The gravitational force in time in TDC is given by:

$$F = c^2 \cdot dRt \tag{14}$$

Its gradient determines whether space appears to stretch or compress:

$$\nabla F = c^2 \cdot \nabla dRt \qquad (15)$$

3.1.4. Spatial Perception from Time Rate Derivatives

The second derivative of dRt governs the transition:

If $d^2dRt/dr^2 < 0 \rightarrow$ Expansion

If $d^2dRt/dr^2 > 0 \rightarrow$ Compression

3.1.5. MECO Vortex Depth Derivation

This derivation models the perceived depth into the MECO vortex structure based on the increasing differential time rate (dRt) as one approaches the core. The time rate asymptotically approaches 1 but never reaches it.

The time rate as a function of radius r is modeled as:

$$dRt(r) = 1 - A \cdot e^{-k(r - r_s)} \qquad (16)$$

Where:
• A is a small constant ensuring dRt < 1
• k is the decay constant determining how quickly dRt approaches 1
• r_s is the Schwarzschild radius
• r ranges from 2.1 r_s (outer MECO surface) to 1.01 r_s (inner core limit)

Then the depth is calculated using the integral:

$$D_{core} = \int_{r_{outer}}^{r_{inner}} c \cdot dRt(r) dr \qquad (17)$$

Evaluating this numerically over the defined limits yields the calculated depth into the MECO vortex as approximately:

$$D_{core} \approx -1.79 * 10^{18} m \approx -189 \, light \, years \qquad (18)$$

The negative sign indicates apparent inward contraction relative to external geometric distance.

4. Stochastic Time Fluctuations and Vacuum Energy

Standard quantum field theory (QFT) associates vacuum energy with persistent quantum fluctuations in all fields, leading to an enormous calculated zero-point energy (ZPE) density that exceeds cosmological observations by ~120

orders of magnitude. In contrast, the TDC framework explores ZPE as a macroscopic emergent property rooted in stochastic fluctuations in the rate of time itself.

4.1 Conceptual Reformulation of $\Delta E \cdot \Delta t$

Rather than assigning primary uncertainty to energy (as in particle quantum mechanics), we propose that time evolves as a continuum whose differential segments stochastically fluctuate, constrained only by logical coherence (i.e., causality and conservation).

From the uncertainty relation:

$$\Delta E \cdot \Delta t \geq \hbar \qquad (19)$$

If we assume local ΔE is conserved across all fluctuation sites, then apparent stochasticity in Δt can lead to a spacetime foam-like vacuum texture. Energy remains globally conserved, but time advances in quantized, fluctuating intervals at the submicroscopic scale.

4.2 TDC Perspective on Vacuum Energy

In the TDC model:
- Each observer's local frame experiences a maximum rate of time (1 s/s), with increasing dilation outward.
- Temporal acceleration (e.g., $a_t = 2.2686 \times 10^{-18}$ s/s) results in gradient-driven perception of evolving space.
- Stochastic deviation in this acceleration, at Planck or sub-Planck intervals, leads to residual energy density that manifests as what is perceived as ZPE.

This sidesteps direct reliance on QFT field amplitudes and offers an observer-relative contribution to the vacuum, mitigating the cosmological constant mismatch.

4.3 Clarifying Position vs. Mainstream QFT

We emphasize:
- The TDC-based explanation does not reject QFT but proposes that ZPE arises from time-based stochasticity, not particle field excitations.
- This complements the QFT view by treating energy as constant and letting time fluctuate, rather than vice versa.

- This approach is macroscopic, observer-relative, and consistent with a holographic time-defined spacetime.

This section reframes ZPE as a phenomenological byproduct of perceived stochastic time evolution, and is intended as a conceptual supplement to, not a contradiction of, standard quantum theory.

5. Summary

The Time Dilation Cosmology (TDC) model asserts that the apparent expansion of space, the shape of the observable universe, and its perceived dimensionality are all manifestations of differential time rates (dRt) relative to the observer. Within this framework, space is not expanding physically but emerges perceptually as a projection of how time slows with distance.

The model identifies an intrinsic temporal acceleration of 2.2686×10^{-18} s/s within life forms, a value derived from the Hubble shift. This acceleration enables life to grow upward against gravity and creates a continuous perceptual projection of space via cumulative time dilation. The cosmological horizon arises not from receding galaxies, but from the increasing difference between the observer's proper time and distant coordinate time. This builds the illusion of radial distance in all directions, an expanding universe centered on each observer.

The MECO structure at galactic centers in TDC is interpreted not as a singularity-bound black hole, but as a spacetime vortex driven by a gradient in temporal acceleration. Spatial compression toward the MECO center results from comparing slower outer time frames to the accelerating core. This inversion of the typical GR interpretation leads to a new, dynamic geometry of inward spatial contraction.

The Zero Point Energy (ZPE) of the vacuum is reinterpreted here as emerging from stochastic fluctuations in time itself, not from field amplitudes. This observer-relative approach sidesteps the discrepancy in the predicted versus observed cosmological constant, offering a potentially reconciliatory view.

6. Conclusion

In the Time Dilation Cosmology model:

- **Time defines space**: The geometry of spacetime is a function of time rate gradients, not spatial displacement.

- **Apparent expansion is perceptual**: What we interpret as spatial growth is the result of time slowing with distance, preserving the constancy of the speed of light.

- **All observers are central**: Each observer exists at the center of their perceived universe, with a cosmological horizon defined by cumulative time dilation, not physical boundaries.

- **The universe unfolds from within**: Rather than expanding outward from a singular event, the universe is a holographic emanation of evolving time, organized perceptually into spatial depth.

- **Dimensionality is emergent**: It arises from internal temporal acceleration, with the illusion of spatial volume being a derivative projection of differential time.

This paradigm redefines cosmological interpretation from one of expanding matter-energy distributions to one of evolving temporal perception. It supports a unified, relativistic framework in which time is the fundamental causal variable, and space—along with distance, velocity, and gravitation—is a consequence of how time unfolds differently across the continuum.

7. Time Dilation-based Formulas

$V_{Co} = c\sqrt{(dRt)}$ for simple, nearly circular, orbits within a Kepler Zone. (20)

$V_{Eo} = \sqrt{(2(c^2(dRt) - (c^2(dRt\alpha))}$ for elliptical orbits within a Kepler Zone. (2)

$V_{Go} = (c\sqrt{(dRt)})/\sqrt{3}$ for galactic rotation velocities for stars outside the Kepler Zone. This is the fundamental compensatory velocity formula. (21)

$F_T = (c^2 * dRt)$ for the force of time in Newtons in the FDE (22)

$E = mc^2\sqrt{(1 + dRt)}$ for Einstein's energy formula. (23)

$E = mc^2(1 + dRt)$ for charged elementary particles. (24)

$F = ((mc^2)(dRt))/(r)$ for centripetal force & gravity. (25)

$F = \frac{(Mm)(r_1)(c^2)(dRt)}{M_\odot(r_2)^2}$ for the force in Newton's for 2-body systems. (26)

$F = (Mm)(R_E)(c^2)(dRt_E))/((M_\odot)(RM)^2)$ for a 3-body solution for the force in Newton's for 2-body systems, in this case Earth, Moon and Sun. (27)

$M_\odot = \frac{c^2(R - T_0)}{G}$ for the mass inside a stellar circle. (28)

$G = ((rc^2(dRt))/M$ for the empirical gravitational constant. (29)

$\frac{M}{R} = (c^2\left(1 - \left(\left(1 - \frac{3*(V_{Go})^2}{c^2}\right)^2\right)\right))/2G$ for the Mass/Radius ratio of stars outside the Kepler Zone in spiral galaxies. (30)

$H = \sum_i \frac{(m_i c^2)(dRt)}{2} + \sum_{i<j}((m_i c^2)(dRt))(r_i - r_j)$ for the Hamiltonian. (31)

$u = (c(\sqrt{dRt_v} + \sqrt{dRt_{u'}}))/((1 + (\sqrt{dRt_v} * \sqrt{dRt_{u'}})))$ for summing relativistic velocities. (32)

$\gamma = \frac{1}{\sqrt{1-dRt}} = 1/\sqrt{T_0}$ for the Lorentz Factor. (33)

$u = \|\vec{u}\| = \sqrt{(c^2 dRt_x) + (c^2 dRt_y) + (c^2 dRt_z)}$ for the Euclidean norm of the 3d velocity vector. (34)

$U = \gamma(c, \vec{u})$ for the Four-Velocity. (35)

$\frac{8\pi r(dRt)}{c^2 M}$ for Einstein's Gravitational Constant (36)

$F = q(E + (c\sqrt{dRt} * B)$ For the Lorentz Force. (37)

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