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Time Dilation Cosmology 3: Mathematical Proof of the $\sqrt{3}$ Temporal and $\sqrt{2}$ Spatial Acceleration Factors

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Abstract

This is the fifth paper in a series on Time Dilation Cosmology, TDC. TDC is an eternal holographic model of the universe based on time dilation that ties astrophysics to quantum physics and resolves all the conundrums in astrophysics and serves as a model for the unified field. In the author's previous four TDC papers, it was demonstrated that all gravitationally induced velocities are compensation for the apparent difference in the rates of time, "*dRt*", due to mass/energy densities, and, vice-versa, in all force-induced velocities the *dRt* is compensation for the velocity, so the uniform evolution of the continuum at *c* is maintained at the invariant 1 s/s rate of time of the universe as a whole. These compensations make it impossible for an event to lag behind or get ahead of the evolving continuum. When the author did the first velocity formula derivations in "General Relativity: Effects in Time as Causation" [1], the author felt the explanations for the appearance of the $\sqrt{2}$ spatial and the $\sqrt{3}$ temporal acceleration factors in the formulas were correct, but poorly explained and incomplete. This paper is a proof of the temporal and spatial acceleration factors used in the time dilation-based velocity formula derivations in the Time Dilation Cosmology model.

Keywords

Mathematical Proof, Time Dilation Cosmology, Acceleration Factors

1. Introduction

As of this writing, the author has been advised that most of the PHD students in at least one prominent university are now being introduced to this model of the universe and download patterns indicate multiple universities are now following suit.

This is the fifth paper in a series on Time Dilation Cosmology, TDC. TDC is an eternal holographic model of the universe based on time dilation. The reader should not expect it to be part of the Lamda/CDM/Big Bang, General Relativity, fixed space models. It is a spacetime/quantum continuum evolving forward at the speed of light, *c*, in the forward direction of time. It is a universe of light, not rock. It is strongly suggested the first-time reader refer to the author's previous papers to clarify concepts when necessary.

In the TDC model, there are two forward directions of evolution, the Fundamental Direction of Evolution, FDE, which is in the forward direction of time, and the Gravitational Direction of Evolution, GDE, which is the evolution down time dilation gradients due to differences in the rate of time. Time is the force behind these evolutions and that force is gravity, the irresistible evolutionary force of time.

In the author's previous four TDC papers [1]-[4], it was demonstrated that all gravitationally induced velocities are compensation for the apparent difference in the rates of time, "dRt", due to mass/energy densities, and, vice-versa, in all force-induced velocities the dRt is compensation for the velocity, so the uniform evolution of the continuum at *c* is maintained at the invariant 1 s/s rate of time of the universe as a whole.

When the author did the first formula derivations in "General Relativity: Effects in Time as Causation" [1], the author felt the explanations for the appearance of the $\sqrt{2}$ spatial and the $\sqrt{3}$ temporal acceleration factors in the formulas were correct, but poorly explained and incomplete. This paper is a proof of both acceleration factors.

2. The Lorentz and Schwarzschild-Based Formulas

Since the publication of "The Unified Field"[4], the author has been looking at different aspects arising from that paper that led back to the Lorentz factor and the Lorentz formula for time dilation:

$$t' = T\Big/\sqrt{1-v^2/c^2} \tag{1}$$

Note that the velocity can be derived directly from this equation without the use of the $\sqrt{2}$ or $\sqrt{3}$:

$$v = c\sqrt{1-\left(T/t'\right)^2} \tag{2}$$

Also, note that:

$$\left(\frac{T}{t'}\right)^2 = T_o \tag{3}$$

where T_o is the time dilation factor derived by the Schwarzschild radius-based time dilation formula used in the original derivations in [1] as follows.

In the Schwarzschild metric, since orbital velocity,

$$V_o = \sqrt{\frac{GM}{R}}, \tag{4}$$

the time dilation formulas for orbital velocities are derived from the gravitational time dilation formula,

$$T_o = T\sqrt{1-\left(2GM/Rc^2\right)}, \tag{5}$$

which contains the velocity formula elements within it, by substituting V_o for GM/R, *i.e.*:

$$T_o = T\sqrt{1-\left(2/c^2\right)V_o} \tag{6}$$

resulting in:

$$V_{op} = \sqrt{2} * \sqrt{\left(Tc^2 - T_o c^2\right)/2T} \tag{7}$$

for nearly circular orbital velocities, where $T = 1$ is the distant observer's invariant rate of universal time, T_0 is the rate of time of the coordinate point, and $\sqrt{2}$ is the spatial acceleration factor. Since $T = 1$, this formula reduces to:

$$V_{op} = \sqrt{c^2\left(1-T_o\right)} \tag{8}$$

And, where "*dRt*" = the difference in the rate of time between the invariant 1 s/s rate of the universe as a whole and the coordinate point,

$$1 - T_o = dRt \tag{9}$$

so, we end up with:

$$V_{op} = c\sqrt{dRt} \tag{10}$$

for objects in nearly circular orbits.

So, where did the $\sqrt{2}$ acceleration factor come from? Since the gravitationally induced velocities are compensation for the slower rates of time at the coordinate point, there has to be an acceleration inducing the velocities and the $\sqrt{2}$ is a component of Einstein's Fundamental Metric, wherein *X*, *Y*, *Z* and *T* all equal 1, as in **Figure 1**.

If we look at (6) again, we see that $V_o = GM/R$, but GM/R is not the velocity; $\sqrt{GM/R}$ is. So if we look at (7) again, but without the $\sqrt{2}$, V_{op} should equal v^2:

$$V_{op} = \sqrt{\left(Tc^2 - T_o c^2\right)/2T} \tag{11}$$

But when we solve it for the Earth, when $T = 1$, we get:

$$\begin{aligned} V_{op} &= \sqrt{c^2\left(1-T_o\right)/2} = \sqrt{299792.458^2\left(0.0000000098706030\right)/2} \\ &= 21.06\ \text{km/s} \end{aligned} \tag{12}$$

and taking the square root of this result does not get us the velocity. Only multiplying it by the $\sqrt{2}$ acceleration factor gives us the correct answer.

We can understand the source of $\sqrt{2}$ more plainly in the galactic rotation velocity formula derivation, where it is the denominator in the secant *y*/*x* in **Figure 1**.

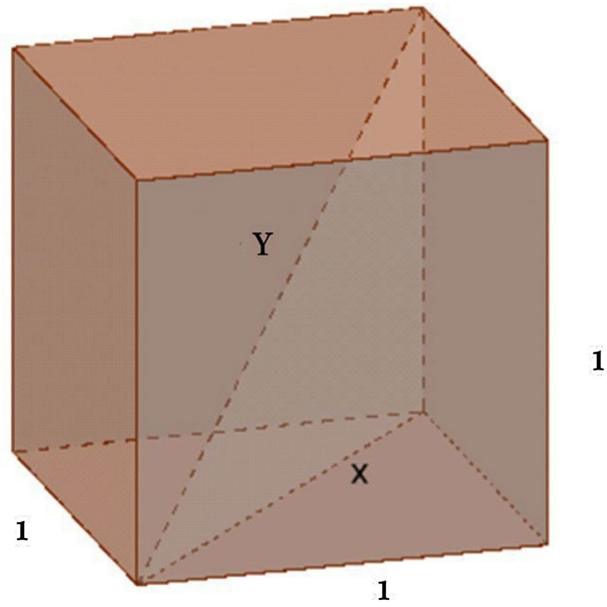

Figure 1. Einstein's fundamental metric.

Assigning 1 unit of length for each side and assuming 1 unit of time, we see that $y = \sqrt{3}$ and $x = \sqrt{2}$, and we find that using

$$V_{og} = \frac{\sqrt{\frac{Tc^2 - T_o c^2}{2T}}}{\frac{\sqrt{3}}{\sqrt{2}}} = \sqrt{2} * \sqrt{\left(Tc^2 - T_o c^2\right)/2T} \Big/ \sqrt{3}, \tag{13}$$

and using the Sun's surface time dilation factor, T_o, gives us the actual rotational velocity of 230.94 Km/s for the Sun. (The 0.9999982197599103142 dilation factor is for a radius of 8.22428833 * 10^8 m, which is 1.27192 * 10^8 m = 0.00018 of the radius above the surface of the Sun. The author believes this is acceptable considering the Sun's dynamic nature and varying densities within its mass.)

Note that it is necessary to divide by the secant, $\sqrt{3}/\sqrt{2}$, of the angle of the fundamental direction of evolution, FDE, along y, to obtain the correct result and that this introduces the $\sqrt{2}$ as the spatial acceleration factor, as in the V_{op} formula derivation.

The reason the acceleration factors are not needed in deriving the velocities using the Lorentz time dilation formula, is that it is based solely on the velocities to begin with and those velocities already include the acceleration factors. As the dRt is unique to each velocity and since both the Lorentz and Schwarzschild formulas derive the same dRt, they must also derive the same velocity. The only way to get the same result is to divide by the secant containing both acceleration factors. This necessary scaling using the secant is proof of the validity of both the temporal $\sqrt{3}$ and spatial $\sqrt{2}$ acceleration factors.

This is also a proof that the cube in Figure 1 is a more complete model of the Fundamental Metric that includes the fundamental direction and acceleration factor of time and the spatial acceleration factor.

The validity is demonstrated by how the $\sqrt{3}$ scales back the velocity in the FDE, which includes the acceleration components, so it is evenly distributed in the 3 spatial dimensions.

The V_{op} formula gives us a result of 400 Km/s for the Sun. When we divide by the $\sqrt{3}$ we get 230.94 Km/s. That is the same as proportioning the velocity in the forward direction of time between the 3 spatial dimensions. The proportion of the length of y to the sides is $\sqrt{3}/1$.

$$\frac{\sqrt{3}}{3}=0.5773502691896257667 \tag{14}$$

$$0.5773502691896257667*400=230.94 \tag{15}$$

The difference between the planets and the Sun is that the planets' velocities are relative to the Sun and the Sun's dilation gradient in the plane of the ecliptic and their velocities are part of a system evolving forward as a whole. As noted in Appendix A, when we also consider the velocity of the system, in this case relative to the Cosmic Microwave Background, CMB, the helical distances travelled by the planets give them velocities equal to the Sun on the grander scale.

The Sun, however, is outside the dominance of the galactic dilation gradient and not a part of the system like the stars inside the Keplar Zone and the planets in stellar systems. The gravitational direction of evolution, GDE, is still acting perpendicular to the FDE, curving the Sun's orbit around the galactic center, **Figure 2**, but its own dilation factor is determining its velocity in the FDE.

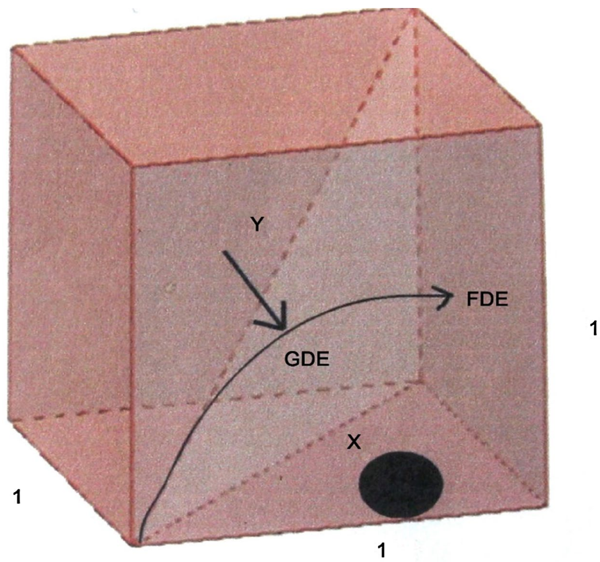

Figure 2. The GDE Bending the FDE.

Again, looking at **Figure 1**, y is the Fundamental Direction of Evolution. The planets appear accelerated in the spatial planes of the ecliptic at $\sqrt{2}$, which is x. The stellar system as a whole, centered on the Sun, is also being accelerated by a factor of $\sqrt{2}$, but it is along y, in the FDE, so the planetary result is divided by $\sqrt{3}$. This keeps the planets in the same plane of evolution as the Sun and is the apparent velocity in the *x*,*y*,*z* dimensions.

Further reducing formula (11), we get;

$$V_{og} = c\sqrt{dRt}/\sqrt{3} \quad (16)$$

for bodies whose own dilation factors are determining their velocities.

3. Time Dilation-Based Formulas

$V_{Co} = c\sqrt{dRt}$ for simple, nearly circular, orbits within a Kepler Zone. (17)

$V_{Eo} = \sqrt{2c^2(dRt) - c^2(dRt\alpha)}$ for elliptical orbits within a Kepler Zone. (18)

$V_{Go} = c\sqrt{dRt}/\sqrt{3}$ for galactic rotation velocities for stars outside the Kepler Zone. This is the fundamental compensatory velocity formula. (19)

$F_T = c^2 * dRt$ for the force of time in Newtons in the FDE. (20)

$E = mc^2\sqrt{1 + dRt}$ for Einstein's energy formula. (21)

$E = mc^2(1 + dRt)$ for charged elementary particles. (22)

$F = (mc^2)(dRt)/r$ for centripetal force & gravity. (23)

$F = \dfrac{(Mm)r_1c^2(dRt)}{M_\odot(r_2)^2}$ for the force in Newton's for 2-body systems. (24)

$F = (Mm)R_Ec^2(dRt_E)/\left(M_\odot(RM)^2\right)$ for a 3-body solution for the force in Newton's for 2-body systems, in this case Earth, Moon and Sun. (25)

$M_\odot = \dfrac{c^2(R - T_0)}{G}$ for the mass inside a stellar circle. (26)

$G = rc^2(dRt)/M$ for the empirical gravitational constant. (27)

$\dfrac{M}{R} = c^2\left(1 - \left(1 - \dfrac{3*(V_{Go})^2}{c^2}\right)^2\right)\Big/2G$ for the Mass/Radius ratio of stars outside the Kepler Zone in spiral galaxies. (28)

$H = \sum_i \dfrac{(m_ic^2)(dRt)}{2} + \sum_{i<j}(m_ic^2)(dRt)(r_i - r_j)$ for the Hamiltonian. (29)

$u = c\left(\sqrt{dRt_v} + \sqrt{dRt_{u'}}\right)\Big/\left(1 + \left(\sqrt{dRt_v} * \sqrt{dRt_{u'}}\right)\right)$ for summing relativistic velocities. (30)

$\gamma = \dfrac{1}{\sqrt{1 - dRt}} = 1/\sqrt{T_0}$ for the Lorentz Factor. (31)

$u = \|\vec{u}\| = \sqrt{c^2dRt_x + c^2dRt_y + c^2dRt_z}$ for the Euclidean norm of the 3d velocity vector. (32)

$U = \gamma(c, \vec{u})$ for the Four-Velocity. (33)

$\dfrac{8\pi r(dRt)}{c^2M}$ for Einstein's Gravitational Constant. (34)

$$F = q\left(E + c\sqrt{dRt} * B\right) \quad \text{For the Lorentz Force.} \tag{35}$$

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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Appendix A. Relative Velocities of the Planets from Different Perspectives

Since relative velocity changes with a change in perspective, the relative rate of time must, too.

Considering relative velocity and rates of evolution within the continuum, in the following computations:

Planetary orbital lengths and periods are as per NASA.

Orbital periods are related to 1 Earth year.

Orbital lengths are as perceived "around the Sun".

Helical orbital lengths are computed using the following formula:

$(\text{Distance travelled by the Sun})^2 + (\text{Orbital length})^2 = (\text{Helical length})^2$

The distance travelled by the Sun is relative to the CMBR.

Sun velocity = 368 km/s = $11.60672 * 10^9$ km/yr.

Considering the perspective of the orbits of Mercury and Venus relative to the plane of the ecliptic, we assign Mercury a velocity of 47.89 km/s and Venus one of 35.03 km/s, a large difference.

But if we consider the velocity of the Sun and its forward evolution in time relative to the CMB, and the helical distances travelled by the planets we get a much different perspective:

Mercury:

Orbital length: $57.909227 * 10^6$ km

Orbital period = .24 yr

Orbits/yr = 4.1666

Total orbital length = $241.249839 * 10^6$ km

Helical length = $11.609226961 * 10^9$ km

Velocity = 368.07948 km/s vs 47.89 km/s

Venus:

Orbital length: $10.8209475 * 10^7$ km

Orbital period = .62 yr

Orbits/yr = 1.6129

Total orbital length = $17.4531062 * 10^7$ km

Helical length = $11.608032143 * 10^9$ km

Velocity = 368.04160 km/s vs 35.03 km/s

Earth:

Orbital length: $14.9598262 * 10^7$ km

Orbital period = 1 yr

Orbits/yr = 1

Total orbital length = $14.9598262 * 10^7$ km

Helical length = $11.607684041 * 10^9$ km

Velocity = 368.03056 km/s vs 29.79

Mars:

Orbital length: $22.7943824 * 10^7$ km

Orbital period = 1.88 yr

Orbits/yr = 0.5319

Total orbital length = 121.2467148 * 10^6 km

Helical length = 11.607353269 * 10^9 km

Velocity = 368.02007 km/s vs 24.13

Jupiter:

Orbital length: 778.340821 * 10^6 km

Orbital period = 11.86 yr

Orbits/yr = 0.0843

Total orbital length = 65.6273879 * 10^6 km

Helical length = 11.606905535 * 10^9 km

Velocity = 368.00588 km/s vs 13.06

Saturn:

Orbital length: 142.6666422 * 10^7 km

Orbital period = 29.46 yr

Orbits/yr = 0.0339

Total orbital length = 484.27237 * 10^5 km

Helical length = 11.606821027 * 10^9 km 12576482920

Velocity = 368.00320 km/s vs 9.64

Uranus:

Orbital length: 287.0658186 * 10^7 km

Orbital period = 84.01 yr

Orbits/yr = .0199

Total orbital length = 341.70434 * 10^5 km

Helical length = 11.606770299 * 10^9 km

Velocity = 368.00159 km/s vs 6.81

Neptune

Orbital length: 449.8396441 * 10^7 km

Orbital period = 164.8 yr

Orbits/yr = 0.0060

Total orbital length = 272.96094 * 10^5 km

Helical length = 11.606752096 * 10^9 km

Velocity = 368.00101 km/s vs 5.43

From this perspective, the velocities, or rate of evolution, of Mercury and Venus are only 0.038 km/s different. There would be no difference if the tilt of the ecliptic and the fact that the orbits are elliptical and not circular were taken into consideration. Note also that as we increase distance from the Sun, the velocities decrease until Neptune has a velocity only 0.001 km/s different from the base velocity of the Sun. Relative velocities equalize with a larger perspective. If we shift out to the local group and its apparent motion relative to the CMB of 627 km/s, the difference between the Sun and Neptune's velocity is only 0.00059 km/s.

In both perspectives, the velocity and acceleration are directly related to the dRt/distance so are higher in steeper gradients, and this higher apparent acceleration of events in slower time frames maintains their relative positions within the overall continuum as it evolves forward as viewed from both perspectives.

This means GR is describing the forward evolution of the continuum and the events occurring within it, rather than the evolution of events through pre-existing "curved spacetime". It is not the masses that determine relative velocities and trajectories, but the dynamics and perspectives in time.