THE REAL STRUCTURE OF THE UNIVERSE

(Why General Relativity Is Wrong)

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This research was posted on YouTube, Google Drive, and https://properlightspeed.com/ long before posting it to GitHub. It has been sent to numerous physicists via email, and to science journals such as Nature and AAS with no mathematical objections. I have even offered a monetary reward to anyone that can disprove it, and still not even one mathematical argument against it has been presented to date. I encourage anyone with an education in physics or mathematics to try and disprove this article in any capacity.

Abstract

In this paper, the author shows that time is a property of existence and therefore time is not a dimension. Thus, the spacetime object of general relativity (GR) does not exist. By restructuring the spacetime metric so that time passes at the same rate everywhere, and the speed of light dilates based on energy density, the results of experiments in GR are reproduced including the appearance of gravitational time dilation, and paradoxes are resolved. Maxwell's equations for a gravitational field are then derived, and used to yield the results of gravitational redshifting and gravitational lensing without the need for spacetime. This model shows that the singularity of a black hole does not exist, but rather the forces inside and out push matter and energy towards the event horizon. The big bang model, and other models attempting to explain the beginning of the universe, ultimately assume a framework that allows the principles of quantum mechanics to play out: In this paper, no such assumptions are made. An argument is built from first principles, and the conclusions made are then interpreted in light of quantum mechanics and GR to determine why the universe exists.

Definitions

Existence is the state of being.

Universe (**U**) refers to all of the fundamental components of what is referenced in General Relativity as our spacetime object. If anything exists beyond the universe, that isn't included in the definition. In the case of the CCC model (or similar models) in which a new universe emerges from within the previous, both the old and the new universe are included in the definition.

All Existence (**AE**) refers to all of the fundamental components of all that exists. If anything exists beyond this universe, AE includes the fundamental components of that as well. AE is by definition isolated (as defined below) since P_2 below holds.

Nothing ($\varnothing$) is defined such that if $C_n = \varnothing$, then $\forall\ C_{n,i} \subseteq C_n$, $C_{n,i} = \varnothing$. It therefore has no measurable properties, no dimensionality, quantum fluctuations, time, energy, existence, or anything else. A common definition of nothing in quantum mechanics is the ground state. This is not the case herein.

State refers to a system's complete set of properties, known or otherwise.

System (**A**) refers to an object with a given state A_n. An **isolated system** is one in which a state change cannot be caused by anything outside of the system (or vice versa), and where nothing leaves or enters the system.

Time is not a dimension, it is a property of existence:

> If some property of X can be measured against a clock, then X must first exist. Thus Time $\Rightarrow$ Existence.
>
> If X exists, then some property can be mapped to the ticking of a clock. Thus, Existence $\Rightarrow$ Time.
>
> Time, as used herein, references instantaneous time (Time doesn't need to be measurable to pass.). Time doesn't reference the spacetime object unless otherwise stated.

E is an event $E_n \equiv A_n \rightarrow A_{n+1}$ of system **A** going from one state to the next.

Causality means that cause precedes effect.

Deterministic refers to an event $E_n \equiv A_n \rightarrow (C_{a1}A_{a1} \vee C_{a2}A_{a2} \ldots \vee C_{am}A_{am})$ with fixed probabilities (C_{a1}, C_{a2},... C_{am}) respectively. The fact that there is a fixed weight or probability, tells us that there is an underlying rule that ensures those weights are obeyed. In the classical case am = n+1, $A_n \rightarrow A_{am}$, and C_{am}=1. In the quantum case, A_{a1} through A_{am} represent the possible states, and C_a through C_{am} are the probabilities of those states. Thus quantum mechanics is deterministic.

Free Will refers to an event $E_n \equiv A_n \rightarrow (C_{a1}A_{a1} \vee C_{a2}A_{a2} \ldots \vee C_{am}A_{am})$ where the respective probabilities (C_{a1}, C_{a2},... C_{am}) are not fixed.

Suppose that you have a dart board with different states or sections ($A_{a1} \vee A_{a2} \ldots \vee A_{am}$), each with their respective probability (C_{a1}, C_{a2},... C_{am}) of getting hit. As long as the board is far enough away that one's skill in throwing darts is not valuable, the probabilities of each state can be calculated based entirely on the areas of each state in relation to the others (ignoring misses). This is only true because everything about the dart is deterministic. If the dart had free will, there would be no way to assign such probabilities.

Premises

P_1: Given an infinite period for an isolated system **A** with a finite set of distinct possible states, any event E that is possible will happen, assuming that no free will prevents it. (variation of the Poincare Recurrence Theorem).

Proof: Let B = $\{B_1, \ldots B_m, B_{m+1}\}$ be the set of distinct states of **A** (which is in state B_j), and let $E_j \equiv B_j \rightarrow B_{j+1}$ be an event with a probability $P_1(E_j) = \varepsilon_j$ of occurring, where $0 < \varepsilon_j \leq 1 \ \forall$ j $\in$ [1, m]. It follows that $P_1(\neg E_j) = 1 - \varepsilon_j$, and $P_k(\neg E_j) = (1 - \varepsilon_j)^k$ where k is the number of opportunities. Since $|B| < \infty$, $1 < m < \infty$, and thus we define an infinite period T = $\{T_1, T_2, \ldots T_m\}$ | [$T_j = \frac{T}{m} = \infty$ and $T_i \cap T_j = 0$] $\forall$ i $\in$ [1,m] where i $\neq$ j. We also define some minimal unit of time $\infty > t_{min} > 0$ in which a state change can occur | $k = \lfloor \frac{t}{t_{min}} \rfloor$. Since $\lim_{t \rightarrow T_j} P_{\lfloor \frac{t}{t_{min}} \rfloor}(\neg E_j) = 0 \ \forall$ j, all of the states of **A** have a 0 probability of not occurring in T. Since T is arbitrary, this holds for any infinite period.

Clarification: *Suppose that A and B are 2 mutually exclusive events each with a non-zero probability of occurring | once either A or B occurs, the probability of the other event occurring becomes 0.*

Let t_a and $t_b \in [0, t)$ be the respective time periods in which events A and B remain possible. We let A represent the event that occurs, and since A and B are mutually exclusive, they cannot occur at the same time. Thus, $0 \leq t_b < t_a \leq t$. Thus event B not occurring doesn't violate P_1 even as $t \rightarrow \infty$ since $t_b < t$.

P_2**:** You cannot create something from nothing.

Proof: If $C_n = \varnothing$, then $\forall\ C_{n,i} \subseteq C_n$, $C_{n,i} = \varnothing$. If we then wish to construct $D_n | D_n = C_{n,i} \mp C_{n,j}$, we get $D_n = [C_{n,i} = \varnothing] \mp [C_{n,j} = \varnothing] = \varnothing$. It follows that if $D_n \neq \varnothing$, $C_n \neq \varnothing$.

Proof 1

Let **A** represent an isolated system in the state A_{n+1} where A = $\{A_n, A_{n+1}\}$ is the set of all states of **A** in order of occurrence, with n ∈ Z, and $A_{n+1} \neq \varnothing$, and let $\check{T}(A_i)$ be the length of time in which **A** is in state A_i.

1) Prove that if $A_c \in$ A, then $A_c \neq \varnothing$:

   Since $A_{n+1} \neq \varnothing$, and **A** is isolated, then by P_2, $A_c \neq \varnothing$.

2) Prove that $A_{n-1} \in$ A:

   a) Suppose that $\check{T}(A_n) = \infty$. Since $|\{A_n, A_{n+1}\}| = 2 < \infty$, by P_1, state A_{n+1} isn't possible, contradicting the premise that $A_{n+1} \in$ A. Since **A** is isolated and P_2 holds, by contradiction, $\check{T}(A_n) < \infty$, thus $A_{n-1} \in$ A.

   b) Suppose that $\check{T}(A_n) < \infty$. Since P_2 holds, $\exists\ A_{n-1} \in$ A.

Claims

Let the following claims reference Proof 1, and let **A** = AE (Since AE is by definition isolated, and there are at least 2 known states that are not $\varnothing$, we can make this association):

Claim 1: The |A| = ∞, and each state is finite in duration.

Since $\{A_n, A_{n+1}\}$ was used to prove that $A_{n-1} \in$ A, $\{A_{n-1}, A_n\}$ prove that $A_{n-2} \in$ A. It follows that $\exists\ A_{k-1} \in$ A $\forall$ k ≤ n. Thus |A| = ∞.

By Proof 1-2), $\check{T}(A_k) < \infty\ \forall$ k.

Claim 2: **A** is infinite in distinct states.

Let B = $\{A_i | A_i$ is distinct$\}$:

If |B| < ∞, then by Claim 1, states repeat. Since U ⊂ AE, in order for states of B to repeat, states in U must also repeat violating the laws of entropy. Thus by contradiction, |B| = ∞.

Claim 3: Time has always existed.

Let $t(E_k)$ be the time it takes for E_k to occur. Then, $\forall\ E_k\ \exists\ E_{k-1} \mid \exists\ t(\ E_{k-1}\ )$. It follows that an event E_k cannot be the beginning of time, thus time is infinite (The fact that something exists today, and P_2 holds, gives the same conclusion.).

Claim 4: The existence of **A** doesn't violate causality.

Since $\exists\ A_{k-1}$ (cause) $\forall\ A_k$ (effect), every effect has a cause. Thus AE has always existed without violating causality.

Claim 5: There must exist G = {..., $A_{n-1,\,j}$, $A_{n,\,j}$} ⊊ AE where $A_{n,\,j} \subsetneq A_n$| G has free will, and G organized U.

In this section a case is made for why the author believes that each standard model pertaining to the beginning of the universe isn't possible:

Conformal Cyclic Cosmology:

Let u be a m-dimensional volume in which the laws of quantum mechanics, and general relativity hold, and let u ⊆ U. Since space is expanding $\exists$ some distance D in which 2 events are non-existent to each other due to the finite speed limit c. We thus define a point P in U in which event $E_{n,P\pm\epsilon} \equiv U_{n,P\pm\epsilon} \rightarrow U_{n+1,P\pm\epsilon}$ representing the universe's beginning (or this cycle of it) occurs, and then define u as being the volume enclosed by distance D around P in m-space. Since space expands uniformly, there is nothing unique about point P, thus every point in u has the same probability for a similar event $E_{a,i}$ (a ≥ n) to occur. We thus establish all of the points in u as a grid, where each point is separated by a planck length l_p: We then define t_{min} (from P_1) to be the Planck time | every t_{min} an event $E_{a,i}$ could occur at each point in u (outside of the light radius of P). We now calculate the probability that $E_{n,P\pm\epsilon}$ is the only such event that occurs in u over time D/c, for m = 3.

Let the radius of a sphere be a multiple (k) of l_p. We divide the area of the sphere by the area of an equilateral triangle of side length l_p, to get the ~ number of triangles that grid the sphere. Thus, the approx. number of triangles ▲(k) is:

$$▲(k) \cong \frac{4Pi(k^*l_p)^2}{(\frac{l_p^{\,2}sin(Pi/3)}{2})} = \frac{16Pi(k)^2}{\sqrt{3}}$$

The number of triangles on the surface of the sphere relates to the number of points *(k) by the approx. relation *(k) $\cong \frac{1}{2}$▲(k). Thus:

$$*(k) = \frac{8Pi(k)^2}{\sqrt{3}}$$

It follows, that at the moment of $E_{n,P\pm\epsilon}$, there existed $\frac{8Pi}{\sqrt{3}}\sum_{k=1}^{q}(k)^2$ opportunities for $E_{a,i}$ to occur elsewhere within u, where q = $\lfloor D/l_p \rfloor$. By the time that light from P reached the next planck length to communicate that $E_{n,P\pm\epsilon}$ occurred, another $\frac{8Pi}{\sqrt{3}}\sum_{k=2}^{q}(k)^2$ opportunities passed, followed by $\frac{8Pi}{\sqrt{3}}\sum_{k=3}^{q}(k)^2$ the following t_{min}... Thus, the number of opportunities for $E_{a,i}$ to occur in D is:

$$\frac{8Pi}{\sqrt{3}}\sum_{j=1}^{q}\sum_{k=j}^{q}(k)^2 = \frac{8Pi}{\sqrt{3}}\sum_{j=1}^{q}\left(\frac{q(q+1)(2q+1)}{6} - \frac{(j-1)j(2j-1)}{6}\right)$$
$$= \frac{4Pi}{3\sqrt{3}}\left(q^2(q+1)(2q+1) - \sum_{j=1}^{q} j(2j^2-3j+1) \right)$$
$$= \frac{4Pi}{3\sqrt{3}}\left(q^2(q+1)(2q+1) - \left[2\left(\frac{q(q+1)}{2}\right)^2 - 3\frac{q(q+1)(2q+1)}{6} + \frac{q(q+1)}{2}\right] \right)$$
$$= \frac{2q^2Pi}{\sqrt{3}}(q^2+2q+1)$$

If we now think of each point in u as a die with η distinct states in which only 1 results in $E_{a,i}$, then the probability that $E_{a,i}$ doesn't ever occur in u over time D/c is $\left(\frac{\eta-1}{\eta}\right)^{\frac{2q^2Pi}{\sqrt{3}}(q^2+2q+1)}$. If we set this to greater than or equal to what is typically considered to be "impossible" we get $\left(\frac{\eta-1}{\eta}\right)^{\frac{2q^2Pi}{\sqrt{3}}(q^2+2q+1)} \geq 10^{-50}$, which $\Rightarrow \eta \geq \frac{1}{1-10^{\frac{-25\sqrt{3}}{q^2Pi(q+1)^2}}}$. This means that the vacuum of space must have at least η distinct states (not energy levels) with one being able to cause $E_{n,P\pm\epsilon}$. Using just the values for when D is one light-second we get $\eta >$ 10^{170}. There isn't anything in the vacuum that is known to even remotely come close to this value. Thus $E_{a,i}$ should have occurred many times over, and those events occurring should be apparent in the cosmological data: We should observe galaxies and radiation heading towards us from all directions.

In addition to this, if $E_{a,i}$ and $E_{n,P\pm\epsilon}$ both occur, which according to P_1 this must happen at some point, neither event is aware of the other, so the scale factor in the Conformal Cyclic Cosmology model could not be coordinated leading to inconsistencies.

It follows that the CCC model of cosmology, or any theory attempting to "smoothly" cycle through universes, suffers from these issues.

Other Cyclic Models:

These models are either known to violate the laws of entropy, or they are known to require a beginning a finite number of cycles into the past.

Big Bang Model:

From claim 1, the universe cannot exist in a singularity state for an infinite period. So, the BB could occur, but a non-singularity state had to precede the singularity in which our universe emerged: This can't happen without violating the laws of entropy unless an outside force caused it ([non-singularity state → singularity state (for all of U)] is a decrease in total entropy.).

Multiverse:

This model has the same issues as the CCC in that we should observe interactions of other universes with our own, and those interactions should be apparent through the CMB which they aren't. Additionally, unless the universes get recycled, they must be made from nothing (even if AE is infinite) violating P_2.

Conclusion: The universe can't be cyclic (infinitely), it can only begin with a BB if the BB were started from an outside force, and the multiverse isn't supported by the cosmological data. The only other known option is that the process that organized U is controlled. Therefore there must exist G = {..., $A_{n-1,j}$, $A_{n,j}$, $A_{n+1,j}$,..} ⊊ AE where $A_{n,j} \subsetneq A_n$| G has free will, and G organized U.

Claim 6: U ⊊ AE.

From Claim 5, ∃ G ⊊ AE | G ∩ U = 0. Thus U ⊊ AE.

Claim 7: The proper speed of light in the opposite direction of travel is: $c_0 = \sqrt{g_{\mu\nu}\frac{dx^{\mu}}{dt}\frac{dx^{\nu}}{dt}}$.

Since time is a property of existence it follows that time can't go to 0, thus the speed of light is what changes: Since our ability to measure time is dependent on the speed of light, when light slows down, to a distant observer it appears as if it is time that is slowing down. It follows that as what is referred to as the proper time $\boldsymbol{\tau}$ decreases, the speed of light is what actually decreases ⇒ $c_0 dt$ = c$d\boldsymbol{\tau}$. Since c$d\boldsymbol{\tau}$ = $\sqrt{g_{\mu\nu}dx^{\mu}dx^{\nu}}$, it therefore follows that $c_0 = \sqrt{g_{\mu\nu}\frac{dx^{\mu}}{dt}\frac{dx^{\nu}}{dt}}$ where $g_{\mu\nu}$is the metric tensor.

The Proper Light Speed Theory

By claim 3, time has always existed, and by claim 1, AE cannot exist in the same state for an infinite period. By claim 6, the universe is a subset of AE. Claim 7 tells us that the proper speed of light is what changes, not time. Putting all of this together we get The Proper Light Speed Theory. It is important to note that the above information, excluding claim 7, is not dependent on the following as it stands on its own.

Postulate 1: Time runs at a constant rate throughout AE, but our ability to measure time is tied to the local speed of light.

Postulate 2: To someone observing the effects of what we call time dilation, one cannot tell if it is the speed of light, or time that is changing.

In this model, time is not a dimension, it is a property of existence. The equations of general relativity are used without time dilation to show that it is the speed of light that changes, and this change in the speed of light results in what is observed as time dilation, length contraction, etc.. Starting with the Schwartchild metric having only radial components, claim 7 tells us that the proper speed of light in the opposite direction of travel is $c_0 = \sqrt{\frac{r-r_s}{r}c^2 - \frac{r}{r-r_s}v^2}$, where the Schwartzchild radius $r_s = \frac{2GM}{c^2}$. Plotting this as in Figure 1, we see that c_0 changes as a function of r, r_s, and v. Therefore:

$$c_0(r,\ r_s,\ v) = \sqrt{g_{\mu\nu}\frac{dx^{\mu}}{dt}\frac{dx^{\nu}}{dt}} \quad (1)$$

Thus, the proper speed of light is tied to velocity (directionally). Setting $r_s = 0$, and v = c, we see that $c_0 =$ 0 meaning that light doesn't observe other light catching up to it: This holds true for light regardless of what the local speed of light C is. From Figure 1, we see that the magnitude of the local speed of light is the first term in the metric which for the Schwartzchild metric yields:

$$C = \sqrt{\frac{r-r_s}{r}}\, c \quad (2)$$

It follows that since c was measured on earth, the actual speed of light in zero-g would need to be modified by the inverse of equation (2).

Since $|c_0| \le \sqrt{\frac{r-r_s}{r}}c$, and $\lim_{r^+ \to r_s} \sqrt{\frac{r-r_s}{r}} = 0$, it follows that $c_0(r_s, r_s, v) = 0$ which $\Rightarrow$ v = 0 for both light and mass at the event horizon of a black hole, and that the event horizon is never actually reached.

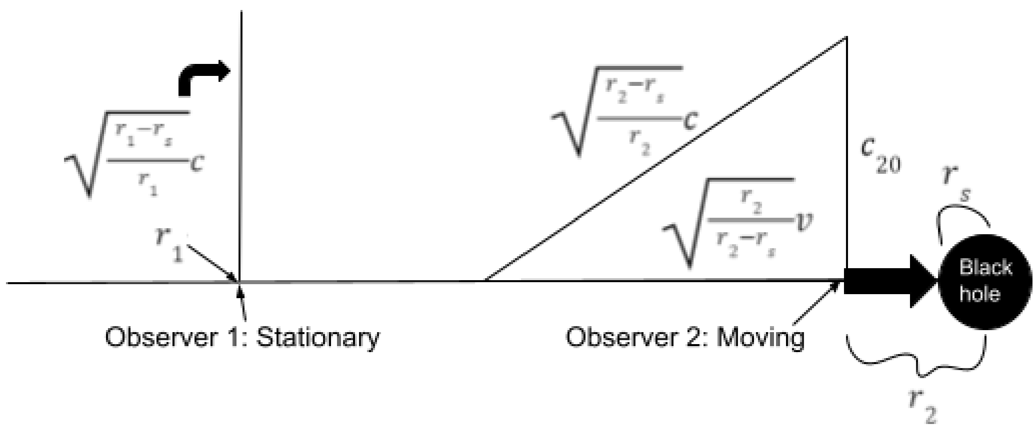


Figure 1: Shows the relationship between the components of the Schwartzchild metric.

From Figure 1, suppose that observer 2 starts at $r_2 = \infty$ (far left), and moves towards Observer 1. The proper velocity is:

$$v_0 = \sqrt{\frac{r_2}{r_2-r_s}}\, v_2 \quad (3)$$

So initially, the proper velocity is $v_0 = \sqrt{\frac{\infty}{\infty - r_s}}\, v$ = v. This means that when Observer 2 passes Observer 1,

$v_0 = \sqrt{\frac{r_1}{r_1-r_s}}\, v_1 = \sqrt{\frac{r_2}{r_2-r_s}}\, v_2$, where v_1 is the velocity of Observer 2 according to Observer 1. Since v_2 is the velocity of Observer 2 as viewed from a stationary reference frame at r_2, for Observer 1,

$$v_1 = \sqrt{\frac{r_2(r_1 - r_s)}{r_1(r_2 - r_s)}}\ v_2 \quad (4)$$

Since this is also constant, as $r_2 \to r_s$, $v_2 \to 0$. It follows that Observer 1 sees Observer 2's velocity go to 0, and Observer 2 sees their velocity remaining the same. This is only possible because all velocities are measured against their local speeds of light: If you don't believe me, consider the workings of a clock where all components interact at their local light speeds so a clock always runs at the same rate relative to its proper speed of light. This tells us that:

$$v_0 = \frac{c}{c_0}\frac{dr}{dt} \quad (5)$$

where c_0 is the proper speed of light at r, and $\frac{dr}{dt}$ is how quickly r changes with time (not relative to light) as viewed from r = ∞. For example, $v_0 = \frac{c}{c}\frac{dr}{dt}$ at r = ∞; and since $c_0(r_s, r_s, v) = 0$, $\frac{dr}{dt} = 0$ at the event horizon. For light, $c_0 =$ 0, so $\frac{dr}{dt} = 0$ as perceived at r = ∞ (you can't see light once it is gone). It's important to note that length contraction doesn't physically occur. If we wanted to say that there is some clock time $\boldsymbol{\tau}$ in the universe relating velocity to the local speed of light such that $v_0 = \frac{dr}{d\boldsymbol{\tau}}$, then $\frac{dr}{d\boldsymbol{\tau}} = \frac{c}{c_0}\frac{dr}{dt} \Rightarrow c_0 dt = c d\boldsymbol{\tau}$ which is what we concluded in Claim 7. In fact, all we really care about is the relationships between clock speeds so it is easiest to use $\boldsymbol{\tau}$ in calculations, but in reality it is the speed of light that dilates, not time. This leads us to:

Postulate 3: The proper time $\boldsymbol{\tau}$ ties velocity to the local speed of light (not to time). Therefore, we replace t with $\boldsymbol{\tau}$ in all of our non-relativistic equations, and we replace c with C. To observe what the function looks like locally we leave it in terms of $\boldsymbol{\tau}$, and to see what it would look like from far away we convert $\boldsymbol{\tau}$ into t using the metric. To a distant observer $\boldsymbol{\tau}$ goes to 0 at the event horizon so all motion stops: To an observer headed towards a black hole, nothing changes. The laws of physics are the same everywhere but they play out according to the local speed of light. Thus, if there are any inconsistencies, this needs to be addressed in the equations of our local laws, not in the metric.

Example (Free Particle over a small distance): The time solution is of the form $\Psi(\boldsymbol{\tau}) = Ae^{-i\omega\boldsymbol{\tau}}$. Thus $\Psi(t) = Ae^{-i\omega\sqrt{\frac{r-r_s}{r}}*t}$, which means that to an observer in zero-g, the time component of the particle's wave is stretched out due to the slower speed of light in the field compared to out of the field.

These differences might seem minute, but this is important because time is not actually a dimension: Time is a property of existence, and therefore the structure of this "lightspace" doesn't include time. This means that wormholes do not exist, time travel into the past is impossible, length contraction doesn't physically occur, causality always holds in relation to t, yet black holes still exist.

Deriving Maxwell's Equations of light in a gravitational field: From equation (1), for a photon traveling in a plane containing the COM of some object of mass M we get ($c_0 = 0$ for light):

$$\frac{r-r_s}{r}c^2 - \frac{r}{r-r_s}\left(\frac{dr}{dt}\right)^2 - r^2\left(\frac{d\theta}{dt}\right)^2 = 0 \quad (6)$$

From Figure 2, we see that the components of equation (6) require a velocity vector of:

$$\overline{v} = \left\langle \frac{dx}{d\boldsymbol{\tau}} = \sqrt{\frac{r}{r-r_s}}\frac{dr}{dt}cos(\theta) - r\frac{d\theta}{dt}sin(\theta), \frac{dy}{d\boldsymbol{\tau}} = \sqrt{\frac{r}{r-r_s}}\frac{dr}{dt}sin(\theta) + r\frac{d\theta}{dt}cos(\theta) \right\rangle \quad (7)$$

Where x = rcos(θ), and y = rsin(θ). Thus:

$$\frac{dy}{dx} = \frac{\sqrt{\frac{r}{r-r_s}}\, sin(\theta) + r\frac{d\theta}{dr}cos(\theta)}{\sqrt{\frac{r}{r-r_s}}\, cos(\theta) - r\frac{d\theta}{dr}sin(\theta)} \quad (8)$$

Notice that $\boldsymbol{\tau}$ is used instead of t as required by postulate 3. Dividing the x-component in equation (7) by dx, squaring both sides, and multiplying by $\partial^2 E_x$ yields:

$$[\sqrt{\frac{r}{r-r_s}}\frac{dr}{dt}cos(\theta) \; - \; r\frac{d\theta}{dt}sin(\theta)]^2 \frac{\partial^2 E_x}{\partial x^2} = \frac{\partial^2 E_x}{\partial \boldsymbol{\tau}^2} \quad (9)$$

Repeating the same process for the y-component we get:

$$[\sqrt{\frac{r}{r-r_s}}\frac{dr}{dt}sin(\theta) \; + \; r\frac{d\theta}{dt}cos(\theta)]^2 \frac{\partial^2 E_y}{\partial y^2} = \frac{\partial^2 E_y}{\partial \boldsymbol{\tau}^2} \quad (10)$$

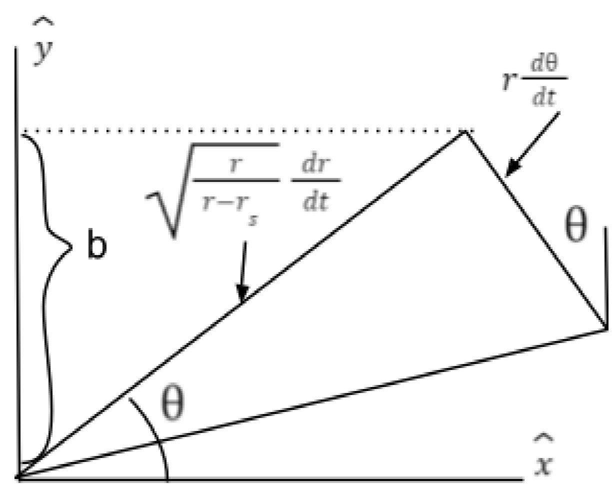
Equations (9) and (10) are Maxwell's Equations for light in a gravitational field where the light is traveling through some plane going through the COM. Notice that when $r_s = \theta = 0$ equation (9) yields:

$$[\frac{dr}{dt} = c]^2 \frac{\partial^2 E_x}{\partial x^2} = \frac{\partial^2 E_x}{\partial \boldsymbol{\tau}^2} \quad \text{(Maxwell's Eq for light in zero-g)}$$

Likewise, when $r_s = 0$, and $\theta = \frac{\pi}{2}$, equation (10) yields:

$$[\frac{dr}{dt} = c]^2 \frac{\partial^2 E_y}{\partial y^2} = \frac{\partial^2 E_y}{\partial \boldsymbol{\tau}^2} \quad \text{(Maxwell's Eq for light in zero-g)}$$

Figure 2: This figure shows how the components of equation (6) fit geometrically. For a mass positioned at (0,0), a photon released in the x-direction from (x=0, y=b) will curve downwards.



Experimental Results

Appearance of Time Dilation: From equation (3), $v_0 = \sqrt{\frac{r}{r-r_s}}\, v$. Thus $\frac{dr}{d\tau}\sqrt{1 - \frac{r_s}{r}} = \frac{dr}{dt}$, and therefore $d\boldsymbol{\tau} = \sqrt{1 - \frac{r_s}{r}}dt$ which is the exact Schwartzchild solution for the time dilation of a non-rotating object in space.

Black holes: Since $c_0(r,\ r_s,\ v) = 0$ for light, equation (1) yields $\frac{dr}{dt} = \pm\frac{r-r_s}{r}c$ (assuming no radial components). $\frac{dr}{dt} = -\frac{r-2}{r}c$ is plotted in Figure 3, where we see that inside the event horizon the velocity is positive, and outside the event horizon the velocity is negative. Therefore, all of the light of a black hole moves to the event horizon, and mass follows. Thus, there isn't a singularity inside of a black hole. If you consider the acceleration $\frac{d^2r}{dt^2} = \frac{r-r_s}{r^3}c^2s$, you see that inside the event horizon, the acceleration changes direction. These results are consistent with the amount of information inside of a black hole being proportional to the surface area of the event horizon as all of the information is on the event horizon separated by what is assumed to be the minimal distance allowed by quantum mechanics. Notice that the acceleration is 0, not ∞, at the event horizon.

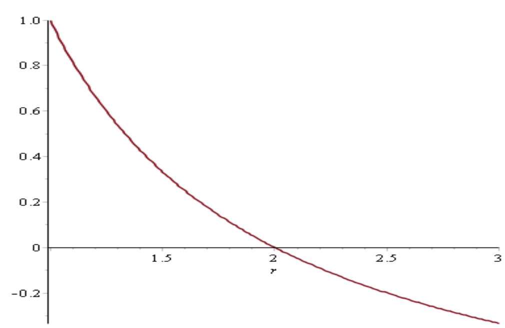


Figure 3: This is a plot of the velocity of light which shows that light always moves towards the event horizon (shown as r = 2), not a singularity.

Gravitational Redshift: Using equation (9) evaluated at θ = 0, and x = r yields:

$$\left[\sqrt{\frac{r}{r-r_s}}\frac{dr}{dt}\right]^2 \frac{\partial^2 E}{\partial r^2} = \frac{\partial^2 E}{\partial \boldsymbol{\tau}^2} \quad (11)$$

Since there aren't any rotational velocities, equation (6) tells us that $\frac{r-r_s}{r}c^2 = \frac{r}{r-r_s}\left(\frac{dr}{dt}\right)^2$. Thus, equation (11) becomes:

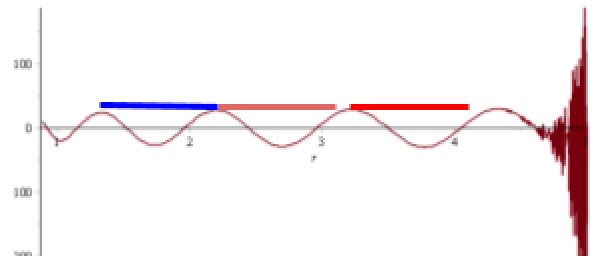
$$\frac{r-r_s}{r}c^2\ \frac{\partial^2 E}{\partial r^2} = \frac{\partial^2 E}{\partial \boldsymbol{\tau}^2} \quad (12)$$

Setting E = R(r)**T**($\boldsymbol{\tau}$) we get:

$$\frac{d^2R(r)}{dr^2} = -\left[k^2\frac{r}{r-r_s}\right]R(r) \quad (13)$$

The solutions for equation (13) are Whittaker functions shown in figure 4 for arbitrary values simply to show the shape. As you can see from the red and blue stripes, gravitational redshifting occurs as the photon gets further and further from the event horizon.

Figure 4: The blue and red stripes are the same length, thus, this figure shows a gravitational redshift as the light gets further from the event horizon on the left.



From equation (13):

$$k\sqrt{\frac{r}{r-r_s}} = \frac{2\pi}{\lambda} \quad (14)$$

Thus:

$$\lambda = \frac{2\pi}{k}\sqrt{\frac{r-r_s}{r}} = \lambda_\infty\sqrt{\frac{r-r_s}{r}} \quad (15)$$

Where equation (15) is the exact relationship between λ and λ_∞ as predicted by GR.

Gravitational Lensing: From equation (11), C = $\sqrt{\frac{r-r_s}{r}}\,c = \sqrt{\frac{r}{r-r_s}}\frac{dr}{dt}$. This suggests that the index of refraction is either $n_1 = \frac{r}{r-r_s}$, or $n_2 = \sqrt{\frac{r}{r-r_s}}$, depending on the frame of reference. When deriving the gravitational lens equation for GR using a Fermat Surface, n = $\sqrt{(\frac{r+r_s}{r-r_s})}$ (Bacon). Setting n_1 equal to n we get: $\sqrt{(\frac{r+r_s}{r-r_s})} = \boldsymbol{\alpha}_1\frac{r}{r-r_s} \Rightarrow \boldsymbol{\alpha}_1 = \frac{\sqrt{r^2-r_s^2}}{r}$ which is ~1 for the exterior of anything that isn't a black hole. Setting n_2 equal to n we get $\sqrt{(\frac{r+r_s}{r-r_s})} = \boldsymbol{\alpha}_2\sqrt{\frac{r}{r-r_s}} \Rightarrow \boldsymbol{\alpha}_2 = \sqrt{\frac{r+r_s}{r}}$ which is also ~ 1 for the same. Using the calculus of variations to minimize the functional $\int_b^R N\sqrt{1 + r^2(\frac{d\theta}{dr})^2}\,dr$, where N ∈ {n, n_1, n_2} and θ is as shown in Figure 2, we can derive θ(r). However, the solutions are integrals, so it is easiest to compare $\frac{d\theta}{dr}$ as shown in Figure 5 where we use the mass of the sun. It is important to note that the left side doesn't matter since those points are inside of the sun. In fact, $r_{sun} \cong 6.96 * 10^8$ meters, so the entire plot shown in Figure 5 is still inside of the sun. This means that the predictions of this theory and those of GR are identical in any region that can be tested.

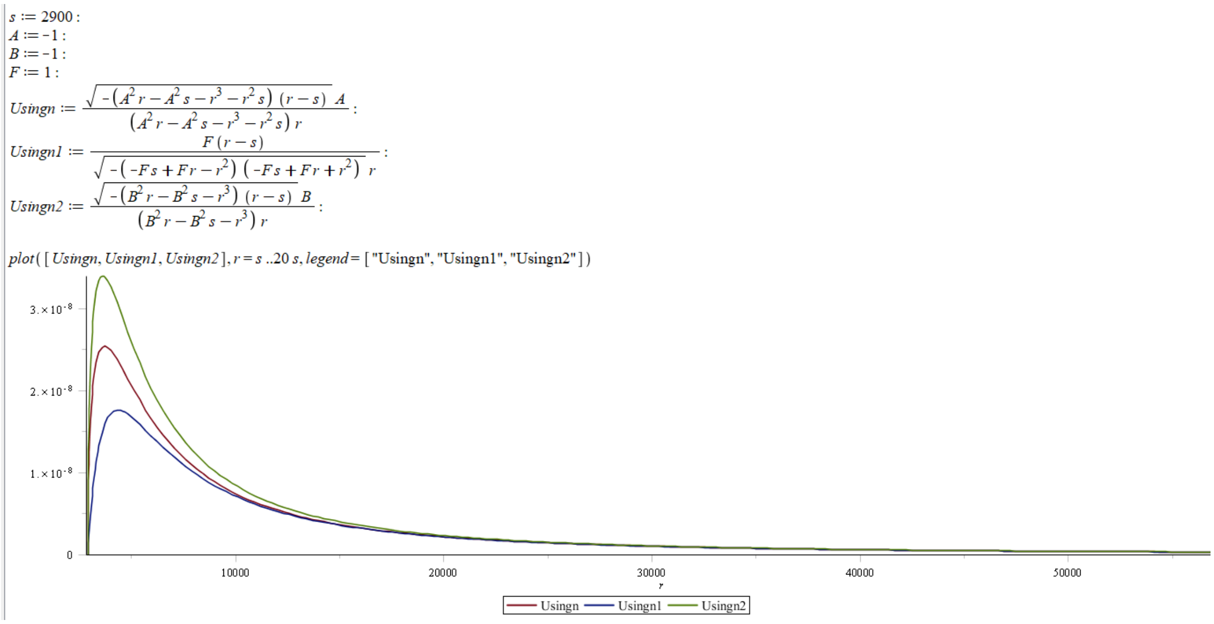


Figure 5: (Units in meters) These are plots of $\frac{d\theta(r)}{dr}$ where $s = r_s = r_{sun}$. They are only meant to show the relationship between the solutions as the constants were arbitrarily selected. Note that every point on this plot is still inside of the sun, so in the region where this is testable, the solutions are identical.

Gravitational Waves: It appears that there exists some fabric of lightspace that expands and contracts based on energy density, and this expanding and contracting changes its local index of refraction in the same capacity as time was thought to do so. It thus makes sense that such expanding and contracting would propagate through space as a wave.

The Universe's Expansion: Has not been looked into.

Muon Decay: From Figure 1, $c_0^2 = \frac{r-r_s}{r}c^2 - \frac{r}{r-r_s}\left(\frac{dr}{dt}\right)^2$. In zero-g this yields: $c_0^2 = c^2 - v^2$, and restructuring this gives us: $\frac{c_0}{c} = \sqrt{1 - \left(\frac{v}{c}\right)^2}$, so any perceived effects of special relativity are immediately recovered without time and length contraction, and gravity is already built-in. I would interpret this further as meaning that the half life of a particle is a function of how the particle perceives light. That is:

$$\boldsymbol{T}_{1/2}(c_0) = \boldsymbol{\tau}_{1/2}\frac{c}{c_0} \quad (21) \quad \text{(Approximation)}$$

Length Contraction: Imagine that Muons are produced at a height H above the surface of the earth, and that the percentage of Muons to hit the surface before decaying is consistent with the predictions of special relativity (which it is). It should be abundantly clear that H didn't physically shrink. Thus, while special relativity does yield the correct answer, how it got to the correct answer is not valid. The only logical conclusion here is that H stays the same, and the particle's decay rate depends on how the particle perceives light as shown in equation (21). This makes sense because everything communicates with light. Thus, special relativity is wrong.

Conclusion

In this paper we proved that time is a property of existence. It was then shown that the same experimental results of GR can be achieved by allowing time to pass at the same rate while allowing the local speed of light to vary. This approach shows that what we perceive as time, is tied to our local speed of light, and thus the appearance of time dilation occurs when measuring time where the local speed of light is different than our own. This approach yields the same results as predicted by GR for gravitational lensing (approx.) and redshifting, and it removes all paradoxes known to the author at the time of writing: time travel into the past is impossible; there are no singularities of a black hole; all laws of physics hold everywhere when they are written in terms of C and $\boldsymbol{\tau}$; time exists before the big bang thus allowing it to make sense for the BB to occur; and you never have to create something from nothing.

I welcome all constructive feedback on this. Thank you for reading.

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Above all else, the KJV was used.

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