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Scholars Research Library
Archives of Physics Research, 2024, 16 (1)
(http://scholarsresearchlibrary.com)

ISSN: 0976-0970

The effect of time dilation on the strong force offers the theory of everything

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***Received:** May 15, 2024, Manuscript no. apr-24-134995 **Editor assigned:** 20 May, 2024, Pre QC no. apr-24-134995 (PQ) **Reviewed:** 23May, 2024, QC no. apr-24-134995 (Q) **Revised:** 30 May, 2024, Manuscript no. apr-24-134995 (R) **Published:** 29 June, 2024*

ABSTRACT

Understanding gravity opens the door to mathematically describing the movement of all mass. With gravity shown to be the strong force affected by gravitational time dilation, this paper proposes the theory of everything. The theory of everything explains why all mass moves from faster time to slower time. The time dilation described by Einstein accounts for a slower time with both energy (mass) and speed. Einstein's time dilation applied to the strong force accounts for gravity, electromagnetism, and the weak force and explains the strong force. All forces of nature are shown to have a base of time dilation multiplied by the strong force.

Keywords: Gravity, Time dilation, Space time, Force

INTRODUCTION

The aim to understand the forces at work in the universe is a quest spanning thousands of years, from ancient Greece and earlier down to the present day. As our understanding of each of the four forces deepens, so does our desire to discover a unifying base equation that, by accounting for all four forces, can explain the movement of everything in the physical universe: the elusive "Theory of Everything."

Early models of the gravitational force included Newton's description of the inverse squared relationship between mass and distance but were verifiable only in classical limits. In 1785, Coulomb created a mathematical model to describe the Electromagnetic (EM) force. Later models of gravitation include Einstein's theories of relativity, which treated gravity as a distortion of the space-time fabric and were recently verified via experiments examining the physical properties of galaxies and black holes. However, Einstein was not satisfied with merely explaining gravity. He spent half of his life searching for what he called a "Unified Field Theory" [1-4]. The grand unified theory developed by Georgi and Glashow, which provides a framework for a singular combination of the weak nuclear force, strong nuclear force, and electromagnetic force, has enabled the work of theorists Kaku and Hawking, who have presented frameworks for combining the grand unified theory with the gravitational force [5,6].

UNDERSTANDING TIME (Section 1)

Einstein theorized that time would slow down (to an outside observer) when an object was in close proximity to a large mass and that time would move faster (to the observer) for an object at a greater distance from the mass [7,8]. Baird explains this as follows:

"The stronger the gravity, the more spacetime curves, and the slower time itself proceeds. We should note here, however, that an observer in the strong gravity experiences his time as running normal. It is only relative to a reference frame with weaker gravity that his time runs slow. A person in strong gravity therefore sees his clock run normal and sees the clock in weak gravity run fast, while the person in weak gravity sees his clock run normal and the other clock run slow. There is nothing wrong with the clocks. Time itself is slowing down and speeding up because of the relativistic way in which mass warps space and time."

Imagine you are standing at sea level, wearing a watch. The second hand ticks by at a steady rate of 60 beats per minute. If you were to climb a hill, you would be farther away from the gravitational pull of the center of the earth, and your watch would tick faster than the watch of an observer at sea level because you would actually be experiencing time moving at a faster pace. This time difference, theorized by Einstein, has been proven in experiments using atomic clocks. The time difference is infinitesimal, corresponding to a difference of only approximately three seconds after one million years for two identical clocks separated by 1 km elevation near the earth's surface [9]. This difference in the passage of time due to gravity is called gravitational time dilation.

Predictably, the effect of gravitational time dilation decreases as the distance between two clocks decreases. At the earth's surface, the difference in the rate of the passage of time is a factor of 1.18×10^{-31} for two locations separated by the length of a nucleon [10]. This time difference is very small, just as a nucleon (a proton or neutron, i.e., part of an atom's nucleus) is very small.

There is a second factor that slows down time: speed. To an outside observer, objects that are moving faster experience time at a slower rate. For example, even though the clock on the International Space Station (ISS) is much farther from the gravitational pull of the earth than a clock on the earth's surface (and would therefore be running faster because of gravitational time dilation), it actually runs slower than a clock on earth because the orbital speed of the ISS is so great. This phenomenon is called speed time dilation. In the case of the ISS, the speed time dilation is much greater than the gravitational time dilation [11].

A third parameter leading to time dilation (related to a change in energy) will be offered later in this paper.

Delta Energy = Energy Time Dilation × Strong Force × Distance (1)

The details of this time dilation will be discussed in Section 7.

PROPOSED GRAVITY EQUATION (Section 2)

Newton theorized that one object falls towards another (e.g., an apple falls towards the earth) because a gravitational force exists between those two objects. He described this force as directly related to the product of the two masses divided by the square of the distance between them. However, there was a problem with that basic equation. Without any additional factor in the calculation, the units of the solution were kg^2/m^2, which does not describe the force between the two objects, either in math or units.

To solve this problem with the units and to ensure that the calculations are correct, Newton calculated the gravitational constant, G, which is equal to $6.674\times10^{-11}\, m^3\times kg^{-1}\times s^{-2}$. When G is multiplied by mass 1 (M1) × mass 2 (M2) and divided by the distance squared, the units become $kg\times m/s^2$, which is representative of mass times acceleration. Now the units and math for the gravitational force provide a fairly accurate description of the mass of the objects and the acceleration between them. This unit $kg\times m/s^2$, the measure of force, is called a Newton (N).

Einstein theorized that the warping of spacetime around a gravitational mass would cause time to pass at different speeds for objects at different distances from the gravitational source. "Einstein's theory recognizes that the source of gravity is not mass, as Newton believed, but energy, one form of which is mass" [12].

Although the two theories have been widely used and proven through experimentation, they are not entirely compatible. Neither theory presents a model of gravity that is valid at every point in the universe.

In 2021, Robert F. Houghton and George F. Houghton published a paper entitled "Gravity as Shown by Gluons: the Proposed Gravity Equation." The paper proposed an equation that calculated quantum gravity as the product of gravitational time dilation and the strong force, modified by the number of nucleons in M2 and then multiplied by 2 to account for the pull of both masses on each other.

THE PROPOSED GRAVITY EQUATION (PGE) IS EXPRESSED AS FOLLOWS: (Section 3)

$$F_g = GTD_{effect} \times F_s \times nucleons \times 2 \quad (2)$$

where GTD_{effect} is the effect of the gravitational time dilation on the strong force, F_s is the strong force inside a nucleon, the term "nucleons" indicates the number of nucleons contained in object 2, and the factor of 2 indicates the total number of unique masses applying a force within the sample.

The PGE was shown to be mathematically equivalent to Newton's gravitational formula and eliminated the need for a gravitational constant. By accounting for both microgravity and macrogravity, the PGE reconciles the theories of Newton and Einstein.

Gravity opens the door to all mass movement. Gravity can be described by gravitational time dilation multiplied by the strong force. The mathematics involved in the PGE explain the "attraction" between two masses and describe the movement of mass from faster time to slower time. Moreover, we find that the speed time dilation multiplied by the strong force describes electromagnetism (see Section 4) and the weak force has the same base (see Section 6). Thus, gravity may provide the theory of everything sought by Einstein, Hawkings, Kaku, and others, consequently answering age-old questions stemming from time dilation applied to mass.

MASS MOVES FROM FASTER TIME TO SLOWER TIME (Section 3.1)

The PGE presented by Houghton and Houghton states that the strong force is formed closer to slower time and that the effect of this formation on the nucleon moves this nucleon (and all other nucleons in M2) toward the source of gravitation (the earth, for example). Therefore, as a mass moves closer to the source of gravitation, it is moving from faster time to slower time.

The nucleon of M2 exists in the time gradient of M1, and the gluons travel farther (with more time) on the "far side" of the nucleon, farther from the center of mass of M1. The effect of traveling farther (into slower time) is to offer more pull from the slower time. (More motion tends towards less motion, as governed by the second law of thermodynamics.) This effect is currently understood for gravitational time dilation, but not for speed time dilation. As currently represented in physics, speed time dilation is not associated with distance.

In the article "Does time go faster at the top of a building compared to the bottom?", Baird showed how the charge of an electron overlaps the proton. Baird described how an electron, in its near-light-speed orbit, actually travels through the nucleus. This behavior is possible because electrons act as both waves and particles; thus, the electrons travel like waves through the nucleus. It is proposed that when the electron passes through the nucleus, the speed time dilation of the electron is transferred to the nucleus. The speed time dilation does not change with distance, but distance is a factor (as the inverse square of the distance) when you consider the transfer of the speed time dilation. Gravitational time dilation is also cumulative, accumulating as mass increases.

This paper proposes that because the electron travels near the speed of light (2200 km/s), existing in slower time than the proton, which exists at ambient time 1, the electron speed accumulates time with the proton during their constant overlap in the nucleus. There is overlap with speed time dilation, and thus, there is a time difference between the proton and electron, with the electron waves influencing the nucleus. As the slower time of the electron slows the ambient time of the proton, there are two effects. First, the proton is attracted to the electron (similar to gravity) by gluons traveling farther (on the "far side" of the proton) in faster time. This corresponds to the EM force. Second, there is now a change in the nucleus time zone, creating gravitational time dilation from speed time dilation. The equations and math for this phenomenon are presented in Section 4.

TIME DILATION: WHY TWO DISSIMILAR CHARGES ATTRACT (Section 4)

Opposite charges attract, and similar charges repel. This effect, known as Coulomb's law, was first described by Coulomb in 1785 [13]. Traditional electromagnetism studies have reached the following conclusion: "It is concluded that a charged particle is a particle that carries an electric charge. In atomic levels, the atom consists of a nucleus around which the electrons turn. The nucleus is formed by protons and neutrons and thus carries a positive charge (the proton charge is 1.602×10^{-19} Coulombs). The electron carries a negative charge (-1.602×10^{-19} Coulombs). An atom charge. This is called neutral if the number of protons equals the number of electrons. Thus, an atom can be positive, negative, or neutral" [14].

However, this statement simply provides an observation of the effect. Stark asserts, "There isn't a good "why" here - as physics hasn't quite explained this part" [15]. If you follow through a Quantum Field Theory description using path integrals, you'll find the force between an electron and a proton is attractive. But all Physics has done is explain "how" or "what" happens, but not "why"."

It is proposed that protons and electrons are attracted to each other as a result of time dilation. The speed time dilation of the electron influences the formation of the proton's strong force closer to slower time, moving the proton towards slower time. The reverse is also true; the speed time dilation of the proton influences the formation of the electron's waves. (From the viewpoint of the electron, the proton is in motion.) Thus, both the electron and proton move towards each other as a result of each other's speed time dilation, from faster time to slower time.

Similar to the calculation of acceleration based on a time ratio of gravitational time dilation, the proton–electron attraction can be calculated via the proposed base equation of time dilation multiplied by the strong force [10].

Using a corresponding base for the EM force for two dissimilar charges, the acceleration for the EM force can be written.

The proposed EM equation for two dissimilar charges is as follows:

$$F_{EM} = 2 \times STD_{effect} \times \frac{SA}{r^2} \times F_S \times n \quad (3)$$

where STD is the speed time dilation effect between two charges, SA is the surface area of object 1, r is the distance between charges 1 and 2, F_S is the strong force between the nucleons, and n is the number of unique strong-forces within object 1 and the factor of 2 indicates the total number of unique effects applying to the particles within the sample.

This new equation illustrates the parallels between the EM force and the gravitational force, as both are affected by time dilation. We explain the proposed equation as follows. This proposed EM equation for dissimilar charges (Eq. (3)) ties to Coulomb's law via time dilation rather than charge. (The gravitational time dilation of mass simply accumulates with more mass. EM time dilation accumulates through overlap.) In the EM force between an electron and proton, the electron represents a slower time zone orbiting at a fraction of the speed of light (approximately 2200 km/s). Through overlap, the speed time dilation of the electron surrounds the proton [16].

If one starts with the speed time dilation of the electron and applies it to the surface area of the nucleus multiplied by the inverse square law (decreasing force strength through distance), one can calculate the time dilation of the electron wave overlap to the nucleus. The equation has a coefficient of 2 to account for the protons and electrons each independently acting upon each other.

For example, a deuterium atom consists of one proton, one neutron, and one electron, resulting in three strong forces within the deuterium atom: the strong force forming the proton, the strong force forming the neutron, and the two nucleons held together (three unique strong-forces). The atom's nucleus will have little or no speed (relative to the electron) and will be surrounded by the faster ambient time of the exterior space.

The proposed EM equation for two dissimilar charges (as previously stated) is as follows:

$$F_{EM} = 2 \times STD_{effect} \times \frac{SA}{r^2} \times F_S \times n \quad (4)$$

The electron as a wave (as it passes through the nucleus) imparts its slower time dilation onto the proton. The proton is in a faster ambient time zone. For deuterium, we have the following parameters:

Electron orbit = 2200 km/s (5)

Speed time dilation (ratio) for 2200 km/s = 2.75×10^{-5} (6)

Radius of deuterium nucleus = $2.1 \times 10^{-15} m$ (7)

Radius of deuterium atom = $5 \times 10^{-11} m$ (8)

Surface area of a sphere = $4\pi \times r^2$ (9)

Strong force = 2.5×10^4 N (10)

Three unique instances of strong force in deuterium (11)

Times two for vice versa (12)

Based on this paper's proposed equation, the calculated electron–proton interaction for deuterium is $9.0\times10^{-8}N$, as shown below.

Speed time dilation (Eq. 6) 2.7×10^{-5}

Multiplied by the surface area of the nucleus (Eqs. 7, 9) $(2.1\times10^{-15}m)^2$

Multiplied by 4π

Divided by the distance to the electron (Eq. 8) $(5\times10^{-11}m)^2$

multiplied by the strong force (Eq. 10) 2.5×10^4N

times the number of unique strong-forces within object (Eq. 11) $\times$ 3

times two for vice versa (Eq. 12) $\times 2 = 9.0\times10^{-8}$N

When the same problem is calculated using Coulomb's law, the resulting solution is nearly identical, as shown below.

$$= k\times q1\times q2 / r^2 \quad (13)$$

$$= (9\times10^9)\times (1.6^{-19}\times C)^2 / (5\times10^{-11})^2 \quad (14)$$

$$= 9.2\times10^{-8}N \quad (15)$$

The surface area of the deuterium nucleus is not precisely known by science at the time of writing. Thus, the difference between calculations for the EM force based on the proposed equation (time dilation multiplied by the strong force) *vs*. Coulomb's law (where the charges are multiplied) is well within the rounding error, giving mathematically identical results. Consequently, time dilation multiplied by the strong force may be viewed as the base for electromagnetism.

It is proposed that the EM force for dissimilar charges operates in much the same way as gravity. Time dilation causes the proton and electron to move toward the other charge based on the faster time on the far side of both the proton and electron. This effect causes the increased travel distance (movement) of gluons (mesons for paired nucleons) and the increased wave pattern of electrons. The proton is attracted to the electron, and the electron is attracted to the proton (from faster time to slower time).

EM FORCE FOR SIMILAR CHARGES (Section 5)

A pair of protons will repel each other, as will a pair of electrons. When two charges approach each other, an electric field is formed. As the electrical field intensifies, more energy is expended, and thus, time is proposed to be moving faster within the field (see Section 7). There are two reasons for protons to repel: 1) It is proposed that matter moves from faster time to slower time, thus causing the two charges to repel. 2) With gravitational and EM forces, the gluon moves farther in faster time and the nucleon follows. (Thus, the strong force is formed slightly away from each of the two protons and the three quarks in each proton follow.) The two similar charges and the electric field offer faster time as energy is expended, and the ambient time elsewhere is slower. This paper proposes, and has explained, that two protons (with gluons) repel each other because of time dilation.

We can also consider two electrons. Similar to two protons, two electrons repel each other with a charge field between them that represents more time. The charge field is a configuration of waves with more energy expended from one electron towards the second electron. More time is proposed to offer more waves. Based on field formation with more waves toward the other electron, it is proposed that time dilation causes the two electrons to repel.

ELECTROMAGNETISM IS SIMILAR TO GRAVITY (Section 5.1)

Coulomb's law, the standard for calculating EM force, calculates the magnitude of the force F between two point charges, q1 and q2, separated by a distance r. Note the similarities between Coulomb's law and Newton's law of gravitation:

Coulomb's law: $F = k\times(q1\times q2) / r^2$

Newton's law of gravitation: $F = G\times(m_1\times m_2) / r^2$

Both equations state that the force (EM or gravitational) is equal to a constant (k or G) multiplied by the two charges or two masses and divided by the square of the distance. In both equations, the constant, k or G, is used to manipulate both the numerical value and the units so that the answer comes out correctly in both regards.

Both this paper and our previous work present equations for EM and for gravity without the need for a constant. Thus, both gravity and EM forces can be explained in terms of time dilation multiplied by strong force, without a need to further change the units or math.

WEAK FORCE (Section 6)

The weak force is responsible for radioactive decay, nuclear fission, and the creation of elements. The weak force can be measured by observing the decay of a neutron into a proton, an electron, and an antineutrino. This process is called beta decay. The weak force is responsible for the change in the flavor of the quarks in the neutron. In beta decay, a down quark in the neutron is converted into an up quark, and an electron and antineutrino are emitted.

The weak force can also be measured by observing the fusion of two protons to form a deuterium nucleus. This process is called proton–proton fusion. The weak force is responsible for the weak interaction between the protons, which allows them to overcome the repulsive force of their positive charges and fuse together.

In 2019, a team of researchers from the University of Washington published a paper entitled "First precision measurement of the parity violating asymmetry in cold neutron capture on 3He". According to this paper, the parity-violating asymmetry is a measure of the weak force interaction between the neutron and the 3He nucleus.

THEORETICAL IDEA FOR THE INTERIOR OF A 3HE ATOM. (Section 6.1)

This paper proposes that the weak force exists because during decay, the electron moves from faster time in the nucleus (at the point of decay) to slower time. When a neutron decays, it is thought that the decay event occurs only inside a small portion (perhaps as small as 1%) of the nucleus. When the decay event happens, it creates a pocket of faster time within the nucleus. This faster time is demonstrated by the antineutrino and electron being expelled from the nucleus of the atom. The time is slower in the area outside the decay event. Thus, at this event area in the nucleus, energy is expended and the change in time would lead to faster time relative to the slower time in the remainder of the nucleus, as discussed in Section 7.

ENERGY TIME DILATION (Section 7)

A change in energy is equal to a force multiplied by a distance. The equation for expended energy can be written as follows:

$\Delta E = \text{Force} \times \text{Distance}$

This paper has demonstrated that force is equal to time dilation multiplied by the strong force and then adjusted for each example. Thus, when the strong force and distance are held constant, the change in energy will vary directly with the time dilation. According to this new adjustment in the equation for energy, the time gradient is larger in areas where more energy is expended. Thus, the change in energy becomes the third time dilation factor. Stated directly, energy time dilation indicates that time decreases with more energy.

(Thus, expended energy increases time, and more energy decreases time.)

Therefore, there are three ways in which to change the rate at which time passes:

Gravitational time dilation (from mass): Time slows with more mass.

Speed time dilation (from higher speed): Time slows with more speed.

Energy time dilation (from more energy): Time slows with more energy.

STRONG FORCE (Section 8)

Physicists view gluons and mesons as the "messenger particles of the strong force", which, through the strong force, hold together sets of quarks and pairs of nucleons. Although physicists can calculate this strong force, they do not know why it exists or how gluons are involved in creating or transferring it [17-19].

This paper proposes that the strong force is created by gluons and mesons because their high speed causes them to exist in a slower time than their surroundings. Gluons travel at light speed because they have no mass. The meson has some mass and thus is thought to travel slightly slower than the speed of light. Because of these high speeds, gluons and mesons exist in slower time than their surroundings. It is proposed that this huge difference in time speeds at the subatomic level creates the strong force. A nucleon (looking outwards into space) experiences faster ambient time, which pushes the same nucleon inwards towards the slower time represented by the near-light speed of gluons and mesons.

It is proposed that the strong force is the foundational force of the universe and that the other three forces are a (time dilation ratio) fraction of the strong force.

CONCLUSION (Section 9)

It is proposed that the four forces of nature can be calculated by using the base of the strong force and time dilation. Thus, all of the forces are interrelated. The strong force is the unifying force of the universe, which is then stretched by time dilation describe the other three forces. This description explains why all mass everywhere moves from faster time to slower time, providing one of the results of the theory of everything.

All four forces have been shown to have a base of time dilation multiplied by the strong force. For the strong force, the time dilation ratio is 100% (unity). The gravitational force arises from gravitational time dilation, the EM force arises from speed time dilation for the proton–electron relationship plus energy time dilation for reactions, and the weak force arises from energy time dilation. Each of these forces is explained by a stretching of the strong force from time dilation. In summary, we can state that the theory of everything is a basic equation of F = Time Dilation × Strong Force, adjusted for each example.

By applying the classical calculations of both Newton and Coulomb to the deuterium atom, we have shown how the gravitational force and EM force can be recalculated by using a variation of the base formula of F = Time Dilation × Strong Force. Similarly, we have also explored the weak force and strong force through the lens of time dilation, providing new insights into their workings.

Time dilation is a time difference ratio. More time offers more distance to a moving gluon. A greater gluon distance corresponds to more motion within faster time and a redistribution towards slower time with increasing entropy (corresponding to the second law of thermodynamics.) The strong force is formed towards slower time, and the three quarks (the nucleon) follow, leading to attraction caused by gravity and EM forces. The charge is shown to be the speed time ratio (speed time dilation) for EM forces.

While this paper has presented intriguing ideas and a strong mathematical basis, it should be noted that this proposal is speculative and requires further evidence and experimental verification. The concept of time dilation as a unifying force has the potential to revolutionize our understanding of the universe and its fundamental interactions, but further research and analysis are essential to fully validate its claims.

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