Introduction to the Extinction Shift Principle: A Pure Classical Replacement for Relativity

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The Extinction Shift Principle, the most recent emission theory, leads to direct solution to both gravitation and electromagnetism. The formulas of both General and Special Relativity are derivable from a pure classical treatment applying solely Galilean transformations of velocities in Euclidean Space Geometry. A single set of principal axioms applies Galilean transformations to both gravition and electromagnetism on the basis of an extinction of the primary photon and the replacement thereof with a secondary photon, and analogically, with the exchange of primary and secondary gravitons between particles of mass. The transformations are found to applied directly to both, gravitation as well as electromagnetism, of a theoretically ideal vacuum. The solutions require no assumptions of Space-Time or distortions of the space and dilation of the time. The mathematical procedure leads directly to the exact solutions of the problems of General as well as Special Relativity. The mathematical illustrations of this emission theory predict that a direct measurement or observation on a primary wave is not possible and that neither primary wavelength nor the velocity of the primary wave is measurable which is consistent with observational evidence. The extinguished primary wave is replaced by a secondary wave that is re-emitted by its secondary source with an extinction shifted wavelength! The lens, window or mirror of the measuring apparatus becomes the secondary source. For this reason, this effect is coined as the Extinction Shift Principle! As a direct consequence of these emission effects, a resting observer measures a Transverse Relative Time Shift, a mathematical equivalence of the relativistic Time Dilation. A similar mathematical treatment shows that the wave equations are invariant under Galilean Transformations of Velocities in Euclidean Space! Applying the very same rules to gravitation, the problems of General Relativity are solved.

1 Citations

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2 A Brief Introduction to the Emission Theory

Earlier emission theorists such as Sir Isaac Newton (1642 - 1727), Pierre Simon de Laplace (1749 - 1827), Jean-Baptiste Biot (1774 - 1862), Sir David Brewster (1781 - 1868) and Walter Ritz (1878 - 1909) never got to complete the very important fundamentals, the pure classical ideas that were base on the correct principles of optics that seemed to be, in their times, on the correct path! Many emission theories have come and gone in the past century. The *Extinction Shift Principle* that is being presented here is an emission theory. Only this time, unlike earlier emission theories, a clear distinction is made between that which can be **measured** and that which can only be **calculated** [1] The *undisturbed, not measurable nature* is considered. No requirements of a medium or ether were assumed for the formulation of the emission theory. No distortions of the standard coordinate system of space and time were needed for the theoretical explanations of the observed phenomena. This time only the **Galilean transformations of velocities** $c' = c + v$ and the principle of the *rectilinear motion of the photon and of the graviton* were exclusively applied. The theoretical assumption of a distorted space or a dilation of the time is neither required or considered under Galilean transformations in the framework **Euclidean Space geometry**. For the first time a single set of principal axioms are applied to the Galilean transformations to both gravition and electromagnetism on the basis of an extinction of the primary photon and the replacement thereof with a secondary photon. Analogically, the primary gravitons assumed to be emitted directly from a primary mass are exchanged with the secondary gravitons of a secondary mass, under the gravitational influence of the first mass, abiding strictly by the rules of Galilean transformations of velocities, assuming rectilinear motion.

3 Introduction to the Extinction Shift Principle

In this emission theory, there are various combinations of light paths that need to be considered for theoretically interpreting the results pertaining to experiments in electromagnetism and gravitation.

i A *primary wave* or an *undisturbed*, interference free propagating light, is extinguished at every measurement or interaction due to observation. Consequently, a *secondary wave* with *extinction shifted wavelength* is emitted on the same frequency as would be noted in the frame of reference of the interference; that of the measuring apparatus. The observation of a *primary wave* is **not** possible with use of an interfering apparatus. *A primary wave can only be indirectly observed and is never a direct observable.*

ii The principle of the conservation of energy is always adhered to in this emission theory and is never violated. (Energy can be neither created nor destroyed.)

iii The velocity of a primary wave is always c relative to its direct source only. (It is **not** constant in all frames of reference.)

iv Space is **purely** Euclidean and the Galilean transformation of velocity $c' = c + v$ is found to be valid throughout and is consistent with all observations.

v The *undisturbed, freely propagating* electromagnetic wave moves *strictly rectilinearly.*

A purely classical treatment of the transit-time effects of electromagnetism and gravitation, using solely Galilean transformations of velocities $c' = c \pm v$ in Euclidean space, leads directly to exact solutions of the important set of problems responsible for the success and fame of both General and Special Relativity. In this emission theory, the Galilean transformations are applied to the undisturbed 'free' propagating waves of a theoretically ideal vacuum. An **ideal vacuum** may be defined as that space which is void of interference, thus permitting an *undisturbed* motion of a *primary wave*, whose motion is exactly the velocity c relative to its most direct source that is moving with the velocity v relative to the reference frame. The inter-atomic space of a solid or deep interstellar space may approach such an **ideal vacuum**. It is mathematically illustrated that the solutions require absolutely no assumptions of a medium-dependent velocity or a *luminiferous ether.* The theoretical assumptions of distortion of space and dilation of time are unnecessary and are not considered at all in Euclidean space. The mathematical illustration of this emission theory predicts that a direct measurement or observation on a primary wave is impossible with contemporary technical means and methods.

It follows that, as a consequence of Galilean transformations of velocities applied to *undisturbed waves* in Euclidean space, neither the *primary wavelength* nor the *velocity* of the primary wave is measurable! The primary wave will be extinguished by all attempts to measure it and will be replaced by a re-emitted secondary wave. Under the correctly applied Galilean transformations in Euclidean space, it follows also that only the **frequency** of the *secondary wave*, propagating with velocity c in the frame of reference of the interference, is observed. *An extinction or annihilation of the most primary wave emitted from a moving source actually takes place.* The extinguished primary wave is replaced by a secondary wave as a consequence of direct interference by the measuring apparatus. A *secondary wave* is re-emitted from the *secondary source* with an *extinction-shifted wavelength.* The *secondary source* here is a window, a lens or a mirror of the measuring apparatus. For this reason this effect is coined as the *Extinction Shift Principle.*

As a direct consequence of these emission effects, a resting observer measures a transverse relative time shift, mathematically equivalent to the time dilation of Relativity. Similarly, it is easily shown that the wave equations are invariant under the electrodynamics of Galilean transformations in Euclidean space. Applying the very same rules of this emission theory to Galilean transformations of velocities of gravitation, important problems of General Relativity are solved. The very same principal axioms of the *Extinction Shift Principle* used for applying the Galilean transformation of velocities, this time to the emission and re-emission (exchange) of the gravitons in Euclidean space, were used to calculate the perihelion rotation effect of the planet Mercury, the PSR1913+16 binary neutron pulsar star system, the so-called solar light-bending effect and the gravitational redshift effect. The principle leads directly to the derivations of the equations of General Relativity, but for pure classical reasons only. The solutions mathematically illustrate that the motion of both the photon and the graviton describe a rectilinear path, a fundamental principle of optics that has been practically forgotten in modern physics. [3] It is mathematically demonstrated that this very same emission theory is applicable to both gravitation and electromagnetism.

Mathematical illustrations of the correct use of Galilean transformations pertaining to emissions and re-emissions of photons and gravitons in Euclidean space geometry are presented here. Research readily reveals that many emission theories have come and gone in the past century. The *Extinction Shift Principle* presented and illustrated here is also an emission theory. Only this time, the requirements for a velocity dependent media (*ether*) or the distortions of the standard coordinates of space and time are shown to be unnecessary. The Relativistic assumptions are therefore not required.

4 Details on the Extinction Shift Principle

In the *Extinction Shift Principle*, the *undisturbed nature* of a "not-yet-measured" or an "interference-free" primary wave and the obvious consequence of the measurement of a primary wave, are considered. The mathematical illustrations imply that the *undisturbed wavelength* of a primary wave remains unchanged, and is independent of reference frames! Its velocity of motion is exactly c, relative to its most primary source alone. A most significant finding of this emission theory is that neither the **wavelength** nor the **velocity** of a primary undisturbed wave or photon is measurable. As a direct consequence of this principle, any knowledge of the velocity of motion of a single photon is also denied to all ordinary observers in the real material world. Knowledge of the velocity of a photon or a wave would require more than one direct measurement of at least two distinct positions and the corresponding times of detection at those positions. Since the very first detection of a photon requires direct interference with it, the *undisturbed* flight of the most primary photon is interrupted upon measurement. It is *extinction shifted* as depicted in Figure 1:

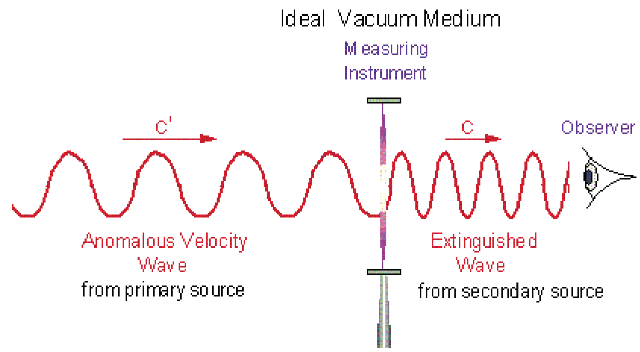

Fig. 1: An interfering observer attempts to measure a previously *undisturbed primary wave* emitted from a **primary** source of a different frame of reference other than that of the observer.

The primary photon or wave is extinguished, as is illustrated, by the measuring apparatus and its **true** wavelength is thereby *extinction shifted*! A naive observer would claim incorrectly that the velocity of the wave is always c. It is for this very reason that the experimental efforts of this past century were incorrectly interpreted as having observed **a constancy in the velocity of light**! The experiments were simply misinterpreted. The successful derivation of the equations of Relativity using assumptions of this *Extinction Shift Principle* is in itself a direct mathematical physics proof that the phenomena taking place in the laboratories of Nature are purely classical ones, describable only in the framework of *Euclidean Space Geometry.*

4.1 On the Constancy of the Velocity of Light

The parameter c is the velocity of light constant, which has been accurately measured to be about $299,792,458$ meters per second in vacuum. There are additionally many issues pertaining to whether this constant has had different values at earlier times and/or in different regions of the universe. But the constant c is **not** the issue here at all! the real issue here is the **constancy** of the velocity of light in all frames of reference! The primary question remains: Does the *true velocity* of electromagnetic waves and gravitation in a given frame of reference depend on the motion of its *primary source* of a different frame of reference? Does the *Galilean transformation of velocities*

$$c' = c \pm v \tag{1}$$

apply to both electromagnetism and gravitation? The question is whether this equation, named after the famous Italian scientist and mathematician, Galileo Galilei (1564-1642), [2] is applicable to the Physics of the photon and the graviton. Galileo, perhaps the most famous in his field of early astronomy, is considered to be one of the founders of modern science; far ahead of his time in many ways. The above questions have been answered in the affirmative by the mathematical proof of this emission theory. The mathematical illustrations and proofs, along with the cited observational evidence, show that the velocity of light is **not** constant in all frames of reference.

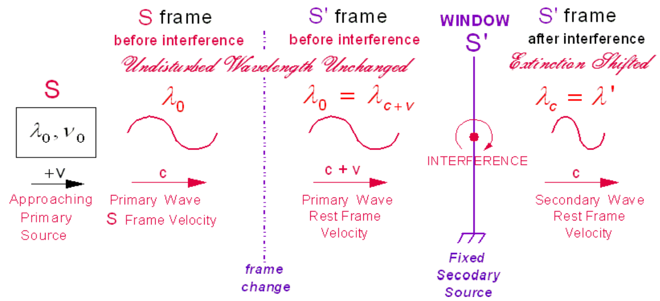

Fig. 2: A Reference Frame Independent *Primary Wave* is re-emitted as a *Secondary Wave* whose wavelength is consequently *extinction shifted*.

4.2 On the Rectilinear Motion of Photons and Gravitons

The rectilinear path of the photons and gravitons [3] is a fundamental basis of this emission theory. As a direct consequence of Galilean transformations in Euclidean Space, the principle of emission and re-emission suggests that any *undisturbed* photon or graviton simply cannot change its path. It cannot deviate as long as its path is *undisturbed*. A *primary photon* moving along an *undisturbed path* will give rise to a *secondary photon* at the point of interference, thereby terminating the *undisturbed path*. The *undisturbed* phenomenon of rectilinear motion is hitherto not treated in modern Physics texts.

As opposed to any light-bending effect or a warped space, as assumed in Relativity, alternatively, altering the path of re-emitted photons is accomplished via electrodynamics of re-emission in Euclidean Space, as a direct consequence of relative phase and conservation of energy. The path of the new photon is characteristic of the interfering medium. [3] The primary photon upon **extinction** or interference no longer exists. In any refracting medium, the photon is subjected to processes of re-emission, i.e., from primary to secondary, from secondary to tertiary, on out to many n-ary re-emissions, each segment denoting infinitesimally short rectilinear (straight-line) paths along which the re-emitted photon or exchanged graviton moves! Regions of interstellar space yield enormous observational evidence for this. An example for such processes is the solar plasma, which is responsible for the light bending effect noted only at the solar rim!

4.3 Definition of Extinction Shift

As opposed to a Doppler shift, a re-emission at the point of interference of a primary *not yet interfered with* wave takes place. In Figure 2, an *undisturbed primary wave* moves independent of reference frames, from **primary** to **secondary** source frame, until which time it is re-emitted (*extinction shifted*) upon interference at the window. As illustrated, from left to right, the primary wave emitted from an approaching source on the left has the *primary undisturbed wavelength* of λ_{c+v} with velocity $c+v$ relative to the depicted fixed interference. The primary wave is extinguished at the point of interference, immediately re-emitting a new secondary wave with an extinction shifted wavelength of λ_c at the velocity c relative to the interfering secondary source (the fixed interference), and with the relative frequency of the primary wave as would be noted in the frame of reference of the interference.

For the case of the **approaching source** as depicted above, the new re-emitted secondary wave will have a shorter wavelength of

$$\lambda_c < \lambda_{c+v} \tag{2}$$

and will move with the velocity c relative to the point of interference, the new secondary source. The primary and secondary waves have exactly the same frequency ν as would be noted in the frame of reference of the interference, i.e., the velocity-to-wavelength ratio of the primary wave equals the velocity-to-wavelength ratio of the secondary wave. For the approaching primary source always:

$$\frac{c+v}{\lambda_{c+v}}\Big|_{\substack{Before \\ Interference}} = \nu = \frac{c}{\lambda_c}\Big|_{\substack{After \\ Interference}} \tag{3}$$

For the case of the **receding source**, the new re-emitted secondary wave will have a longer wavelength of

$$\lambda_c > \lambda_{c-v} \tag{4}$$

and will move with the velocity c relative to the point of interference, the new secondary source. For the receding primary source always

$$\frac{c-v}{\lambda_{c-v}}|_{\substack{Before \\ Interference}} = \nu = \frac{c}{\lambda_c}|_{\substack{After \\ Interference}} \quad (5)$$

The point that has been missed in previous emission theories is that the ordinary real world observer can measure neither the *undisturbed velocity* $c \pm v$ nor the *undisturbed wavelength* $\lambda_{c \pm v}$ of the *primary undisturbed* wave. The measuring instrument can only discern the frequency ν of interference as is perceived in the frame of reference of the interference. Thus, any observer in the frame of reference of the interference would count the same number of waves passing a fixed point per unit time before and after the interference. Hence, the number of primary waves entering the interference equals the number of secondary waves leaving the interference.

As a consequence of the mathematical illustrations presented in the book, [1], it is thereby demonstrated that any wavelength of a primary undisturbed wave cannot be Doppler shifted, but rather re-emitted as an *Extinction Shifted* secondary wave, requiring absolutely no relativistic corrections whatsoever. And there is no direct observation or measurement on the primary wave! Solving equation (3) for λ_c we have, for the above illustrated approaching source

$$\lambda_c = \lambda_{c+v}\left(1 + \frac{v}{c}\right)^{-1} \quad (6)$$

Solving equation (5) for a receding source (if the source were to move in the opposite direction) we have:

$$\lambda_c = \lambda_{c-v}\left(1 - \frac{v}{c}\right)^{-1} \quad (7)$$

Thus, any primary wave along with its previously undisturbed wavelength is extinguished at the interference and replaced with a new secondary wave with a shifted , i.e., Extinction-Shifted wavelength, moving with velocity c in the frame of reference of the interference. It follows that any observation on the primary by the real-world observer is strictly denied. Expanding (6) and (7), one gets second order and higher order terms, the mathematically equivalence of the relativistically corrected Doppler shift. [3] [10] It is also important note that, unlike earlier emission theories, the principal axioms of the Extinction Shift Principle make a clear distinction between the **measurable** and the **calculable**. [1]

5 Mathematical Illustrations

5.1 On the Invariance of the Wave Equation

$$\frac{\partial^2\Phi}{\partial x^2} + \frac{\partial^2\Phi}{\partial y^2} + \frac{\partial^2\Phi}{\partial z^2} - \frac{1}{c^2}\frac{\partial^2\Phi}{\partial t^2} = 0 \quad (8)$$

The invariance of the wave equation is mathematically illustrated under direct application of Galilean transformations of velocities using the Principal Axioms of the *Extinction Shift Principle.* [1] The rules of emissions and re-emissions in Euclidean Space Geometry are strictly adhered to.

Assume:

i All *undisturbed* primary waves, i.e.,

$$\Phi = \Phi_0 \sin 2\pi(\nu t + \frac{1}{\lambda}x)$$

are emitted at velocity c relative to their most *primary* sources and upon any interference are then re-emitted at the same velocity c in the frame of reference of the interference. The *undisturbed* primary wave propagates with velocity c in all frames of reference other than that of the **most** primary source. The re-emitted *secondary wave*

$$\Phi' = \Phi'_0 \sin 2\pi(\nu' t' + \frac{1}{\lambda'}x')$$

noted with relative frequency ν' and an *extinction shifted* wavelength λ', propagates with velocity c relative to its secondary source only.

ii The *undisturbed* (not measurable) wavelength λ, void of interference, remains unchanged in all frames of reference.

iii The laws governing emission and re-emission do **not** change with the frame of reference.

As a consequence of i, ii and iii, the apparent equations of motion, due to measurement or extinction of the primary wave, will be the same for all observers, regardless of the frame of reference, since the velocity of the re-emitted wave is always exactly c in the frame of reference of the interference only; a velocity of $c' \neq c$ in all others frames of reference! Only the *observed frequency* and the *extinction shifted wavelength* will depend on the frame of reference. From the *principal axioms of the Extinction Shift Principle*, (See Appendix IV of **Reference** [1]), all interfering observers will measure a **frequency** and a **wavelength**, the product of which is always c. In the frame of reference of the *primary source*, the velocity of the wave is $\nu\lambda = c$ relative to the *primary source* only!

For any *approaching source*, the observable is always

$$\nu'\lambda' = [\nu(1+\frac{v}{c})][\lambda(1+\frac{v}{c})^{-1}] = \nu\lambda = c. \qquad (9)$$

For any receding source, the observable is always

$$\nu'\lambda' = [\nu(1-\frac{v}{c})][\lambda(1-\frac{v}{c})^{-1}] = \nu\lambda = c. \qquad (10)$$

A *hypothetical*, non-interfering observer, however, would note that the velocity of an *undisturbed* wave moving, say along the x direction, would depend on the reference frame, **strictly** obeying Galilean transformations of velocities and that the *undisturbed* wavelength , **not** measurable by any interfering observer, would remain unchanged!

The hypothetical observer, who abides strictly by the principal axioms of the Extinction Shift Principle, while correctly applying these rules to Galilean transformation in Euclidean Space Geometry, would correctly predict that all interfering observers would always note

$$\nu'\lambda' = \nu\lambda = c.$$

By differentiating the equation

$$\Phi' = \Phi'_0 \sin 2\pi(\nu' t' + \frac{1}{\lambda'}x')$$

twice after t' and x', the interfering observer arrives at

$$\frac{\partial^2\Phi'}{\partial t'^2} = -\Phi'(2\pi)^2\nu'^2 = \nu'^2\lambda'^2\frac{\partial^2\Phi'}{\partial x'^2}. \qquad (11)$$

Thus, the interfering observer, regardless of his frame of reference, derives the very same wave equation

$$\frac{\partial^2\Phi'}{\partial x'^2} + \frac{\partial^2\Phi'}{\partial y'^2} + \frac{\partial^2\Phi'}{\partial z'^2} - \frac{1}{c^2}\frac{\partial^2\Phi'}{\partial t'^2} = 0, \qquad (12)$$

for quantities differing only in ν' and λ', but not in $\nu'\lambda' = \nu\lambda = c$.

Herewith, the wave equation is found to be totally invariant under Galilean transformations of velocities, using the correctly formulated principle axioms of the *Extinction Shift Principle*, applied to emissions and re-emissions in Euclidean Space Geometry.

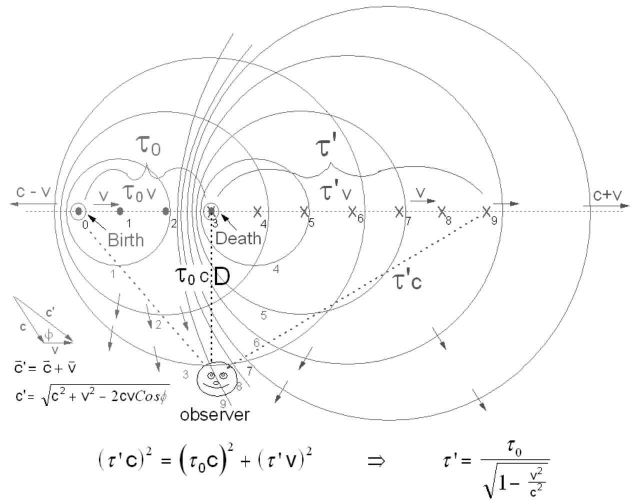

Fig. 3: A *Transverse Relative Time Shift* as opposed to *Time Dilation* assumed by *Relativity.*

5.2 On the Transverse Relative Time Shift

Let a source move with constant velocity v in a direction transversely relative to a stationary observer as indicated in Figure 3. Assume the source has a lifetime of τ_0 seconds and emits two bursts of signals, an initial one at birth ($t = 0$) and a final one at death ($t = 3$). The resting observer is placed at a distance D from the nearest point on the path of the moving source. Let the initial burst serve as time reference and be emitted such that it is received at the observer's measuring apparatus when the source is positioned such that a line extended from the observer to the source is at right angle to the path of the source (*dotted line*). It is herewith mathematically illustrated that the difference in the times of arrival of the initial and final waves is actually $\tau' > \tau_0$; a *transverse relative time shift*, the inverse of a *transverse relative frequency shift.* As a consequence of Galilean transformations and the rectilinear path of all constituent parts of a wave front, *a simultaneous detection by a single observer of both the initial and the final signal busts is not possible!* The initial wave front will arrive at the speed $c' = \sqrt{c^2+v^2}$ for the distance $\sqrt{D^2 + D^2\frac{v^2}{c^2}}$ and have the radius $D = \tau_0 c$. The final wave is emitted at distance $\tau_0 v$ past the point of emission of the initial wave. The final wave front is received at the observer delayed by τ' seconds, during which time the center of the spherical wave front moves the distance $\tau' v$ past the ($t = 3$) point to the ($t = 9$) point, while its radius increases to the length of $\tau' c$. It follows from geometry that $(\tau' c)^2 = (\tau_0 c)^2 + (\tau' v)^2$. Solving for τ' we get

$$\tau' = \frac{\tau_0}{\sqrt{1-\frac{v^2}{c^2}}} \qquad (13)$$

Thus, a particle of lifetime τ_0 and velocity v will appear

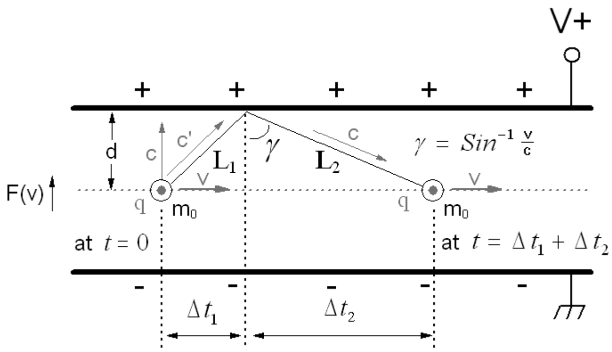

Fig. 4: An *Effective Mass* as opposed to *Relativistic Mass* as a function of velocity v relative to the frame of reference of the accelerating apparatus.

to any fixed observer to move the distance $\tau' v$ in time τ'.

This effect is therefore a *transverse relative time shift*, **not** a time dilation! [1]

5.3 On the Effective Mass

The actual mass m_0 is assumed to be unchanging in Galilean Electrodynamics! In Figure 4 the mass of m_0 with charge q is shown to move between two charged plates, separated by a distance of $2d$. The particle is exposed to the electric field due to the applied potential V as indicated and moves with velocity v relative to the walls of the apparatus and the electric field set up by the charged walls. A velocity dependent force of $F(v)$ is an upward force, assuming that the charge q is negative.

Let us calculate the interaction between the moving particle and the charge walls of the apparatus, assuming rectilinear motion of all fields while obeying Galilean transformations of velocities in Euclidean Space. For the round-trip path effect, the field moves from the particle to the walls and then from the walls back to the particle during which time the particle will have moved to a new location as indicated. In the frame of reference of the walls, the field leaves the moving charged particle with velocity $c' = \sqrt{c^2 + v^2}$ to the walls with transit time $\Delta t_1 = \frac{L_1}{c'} = \frac{d}{c}$. Then from the walls with velocity c back to the charged particle with the transit time of $\Delta t_2 = \frac{L_2}{c} = \frac{d}{c\cos\gamma} = \frac{d}{c}(1 - \frac{v^2}{c^2})^{-\frac{1}{2}}$.

Herewith, an effect increase in transit time of the field results in an effective increase in the path of the field, i.e., from the particle to the wall and then back to the particle, of $L_1 + L_2$. From Geometry in Figure 4

$$L_1 = \frac{c'}{c}d = d(1 + \frac{v^2}{c^2})^{-\frac{1}{2}}$$

and

$$L_2 = d(1 - \frac{v^2}{c^2})^{-\frac{1}{2}}.$$

Comparing this to the static case of a stationery particle of $2d$ the ratio of the path length is

$$\frac{L_1 + L_2}{2d} = (1 + \frac{1}{2}\frac{v^2}{c^2} + \frac{1}{8}\frac{v^4}{c^4} + ...) \approx (1 - \frac{v^2}{c^2})^{-\frac{1}{2}} \quad (14)$$

and the total transit time is

$$t = \Delta t_1 + \Delta t_2 = \frac{d}{c}[1 + (1 - \frac{v^2}{c^2})^{-\frac{1}{2}}] \approx \frac{d}{c}(1 - \frac{v^2}{c^2})^{-\frac{1}{2}}. \quad (15)$$

Thus, the velocity dependent *effective* distance is

$$d_{eff} = d(1 - \frac{v^2}{c^2})^{-\frac{1}{2}}$$

wherefrom a velocity dependent *effective* force of

$$F(v) = Eq = \frac{V}{2d_{eff}}q$$

is gotten, where V is the applied potential in volts. An acceleration of

$$a = \frac{F}{m} = \frac{V}{2d_{eff}}q\frac{1}{m_0} = \frac{V}{2d}q\frac{1}{m_{eff}}$$

results wherefrom an *effective*, m_{eff}

$$m_{eff} = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}} \quad (16)$$

not the actual mass is gotten from the *Extinction Shift Principle.*

An effective mass change may be given as

$$\Delta m = m_{eff} - m_0 = m_0(1 - \frac{v^2}{c^2})^{-\frac{1}{2}} - m_0. \quad (17)$$

Equating energy and *effective* mass, a mass change of $\Delta m = m_0$ may be given by

$$m_0(1 - \frac{v^2}{c^2})^{-\frac{1}{2}} - m_0 = [\frac{1}{2}m_0 v^2]\frac{1}{c^2} = E\frac{1}{c^2}.$$

Thus, the energy required for this *effective* mass change is therefore

$$E = \Delta mc^2 = m_0 c^2. \quad (18)$$

5.4 On the Perihelion Rotation Effect

We shall calculate the planet Mercury perihelion rotation effect using solely Galilean transformations of velocities applied to the transit time effect that is due to the exchange of gravitons between the mass bodies, each moving with a given velocity relative to the gravitational field set up by the other. The Table lists important astrophysical parameters necessary for the calculation illustrated in Figure 5. The indicated velocity c' is that of the gravitons of the field of the solar mass M relative to the mass m of the planet Mercury in the depicted sections of its elliptical orbit. It is to be noted that, for simplicity of the problem solution, the angle ϕ is chosen to separate the velocity vectors for v and c' for the receding portion of the orbit and to separate v and c for the approaching portion of the orbit, taking advantage of the symmetry of the problem.

A one-way transit time effect for a gravitational interaction between mass particles separated by a distance r may be given as $\tau_{rec} = \frac{r}{c_{rec}}$ when they recede from one another. For an approaching case, the transit time may be given by $\tau_{app} = \frac{r}{c_{app}}$. From the Table, the receding mass particles each see a Galilean transformed velocity of the gravitational field set up by the other mass of velocity

$$c'_{rec} = c(1 - \frac{v^2}{c^2} + 2\frac{v}{c}\cos\phi)^{\frac{1}{2}}.$$

This translates to an effective distance of

$$r_{rec} = c\tau_{rec} = r(1 - \frac{v^2}{c^2} + 2\frac{v}{c}\cos\phi)^{-\frac{1}{2}}.$$

The mean orbital velocity of the planet Mercury is

$$v_{Mercury} = 48.96 Km/sec$$

and

$$\frac{v_{Mercury}}{c} = 1.632 \cdot 10^{-4}.$$

From the Table, for the calculation of c' we equate

$$2vc'\cos\phi \approx 2vc\cos\phi$$

and thus

$$2\frac{v}{c'}\cos\phi \approx 2\frac{v}{c}\cos\phi$$

since $\frac{c'}{c} \approx 1$. We will see later on that the terms in $\frac{v}{c}\cos\phi$ will cancel due to sign change and the practical symmetry of the elliptical orbit!

Herewith, for both the receding and approaching cases, the angle ϕ is only slightly greater than $\frac{\pi}{2}$ radians. For the receding case, the effective path for gravitational influence is therefore

Table 1: The table gives the effective path length, the resulting effective force and the velocity transformations from the geometry (Figure 5) for the receding and approaching cases.

Velocity Dependent Parameters (receding, approaching)
r_{rec} = effective length (receding)
r_{app} = effective length (approaching)
$F_{rec} = \frac{GMm}{r^2{}_{rec}}$
$F_{app} = \frac{GMm}{r^2{}_{app}}$
$c'_{rec} = \sqrt{c^2 - v^2 + 2vc'\cos\phi}$
$\approx \sqrt{c^2 - v^2 + 2vc\cos\phi}$
$c'_{rec} = c(1 - \frac{v^2}{c^2} + 2\frac{v}{c}\cos\phi)^{\frac{1}{2}}$
$c'_{app} = \sqrt{c^2 + v^2 - 2vc\cos\phi}$
$c'_{app} = c(1 + \frac{v^2}{c^2} - 2\frac{v}{c}\cos\phi)^{\frac{1}{2}}$
Orbital Parameters for Planet Mercury
$GM = 1.3271544 \cdot 10^{20} m^3/s^2$
$a = 57.9 \cdot 10^9 m$
$e = 0.205633$
$r = a(1-e^2)/(1+e\cos\nu)$
$\omega = \sqrt{\frac{GM}{r^3}}$
$v = \sqrt{\frac{GM}{r}}$
$\frac{v^2}{c^2} = 2.663 \cdot 10^{-8}$

$$r_{rec} \approx r(1 + \frac{1}{2}\frac{v^2}{c^2} + \frac{v}{c}\cos\phi) \quad where \quad r_{rec} > r. \quad (19)$$

Similarly, for the approaching case, the effective path for gravitational influence is

$$r_{app} \approx r(1 - \frac{1}{2}\frac{v^2}{c^2} - \frac{v}{c}\cos\phi) \quad where \quad r_{app} < r. \quad (20)$$

From the Table of orbital parameters, the angular velocity $\omega = \sqrt{\frac{GM}{r^3}}$ can be modified to reflect the receding case, giving

$$\omega_{rec} = \sqrt{\frac{GM}{{r_{rec}}^3}} = \sqrt{\frac{GM}{r^3}}(1 - \frac{v^2}{c^2} + 2\frac{v}{c}\cos\phi)^{\frac{3}{4}}. \quad (21)$$

Similarly, for the approaching case,

$$\omega_{app} = \sqrt{\frac{GM}{{r_{app}}^3}} = \sqrt{\frac{GM}{r^3}}(1 + \frac{v^2}{c^2} - 2\frac{v}{c}\cos\phi)^{\frac{3}{4}}. \quad (22)$$

Since the means orbiting velocity of the planet Mercury is such that $\frac{v}{c} << 1$, then we have

$$\omega_{rec} \approx \sqrt{\frac{GM}{r^3}}[1 - \frac{3}{4}\frac{v^2}{c^2} + \frac{3}{2}\frac{v}{c}\cos\phi]$$

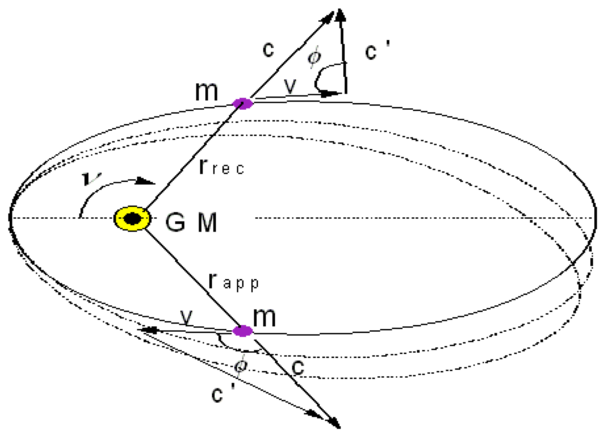

Fig. 5: A direct application of the *Extinction Shift Principle* calculates the perihelion rotation effect due a transit time effect for an exchange of gravitons between orbiting mass bodies according to Galilean transformations in Euclidean Space.

for the receding case.

Expressing the angular velocity ω as a function of velocity v, we have

$$\frac{d}{dv}\omega_{rec} = \sqrt{\frac{GM}{r^3}}[-\frac{3}{2}\frac{v}{c^2} + \frac{3}{2}\frac{1}{c}\cos\phi]. \tag{23}$$

wherefrom $\Delta\omega_{rec} = \omega(-\frac{3}{2}\frac{v}{c^2} + \frac{3}{2}\frac{1}{c}\cos\phi)\Delta v$
where $\omega = \sqrt{\frac{GM}{r^3}}$.

$$\Delta\omega_{rec}|_{\Delta v=+v} = \omega(-\frac{3}{2}\frac{(+v)^2}{c^2} + \frac{3}{2}\frac{(+v)}{c}\cos\phi) \tag{24}$$

Similarly, for the approaching case,

$$\Delta\omega_{app}|_{\Delta v=-v} = \omega(+\frac{3}{2}\frac{(-v)^2}{c^2} - \frac{3}{2}\frac{(-v)}{c}\cos\phi) \tag{25}$$

A net change in angular velocity of the planet Mercury for a complete orbit may be given as $\Delta\omega = \Delta\omega_{rec} - \Delta\omega_{app}$ which results in a function of a second order in $\frac{v}{c}$ only!

$$\Delta\omega = \omega[(-\frac{3v^2}{2c^2}) - (+\frac{3v^2}{2c^2})] \tag{26}$$

We note immediately that, under Galilean transformations of velocities, the first order terms in $\frac{v}{c}\cos\phi$ cancel as a consequence of sign changes during the approach and receding portions of the orbit! From Figure 5 the resultant velocity c' of the gravitational field of gravitons from the solar mass M, as seen from the Mercury mass m, has practically the same angle ϕ history relative to the velocity v of Mercury's orbit, since $\frac{v}{c} << 1$. Hence, practically the same angular history for ϕ is swept for $0 < \nu < \pi$ and $\pi < \nu < 2\pi$. The second order terms in $\frac{v}{c}$ accumulates, as is expected, since a required net energy for the planetary orbit must be zero. Thus, the perihelion must shift! The net change in the angular velocity is calculated using the Table of astrophysical and orbital parameters for the planet Mercury and simply by setting $\nu = \frac{\pi}{2}$ as follows:

$$\Delta\omega = \omega \cdot 3\frac{v^2}{c^2} = \frac{3\omega GM}{a(1-e^2)c^2} \tag{27}$$

where $\Delta\omega = 7.04814 \cdot 10^{-14}\ \ rad/sec.$ Expressing this result in radians per period, we have

$$\Delta\omega\frac{2\pi}{\omega} = \frac{6\pi GM}{a(1-e^2)c^2} = 5.019568 \cdot 10^{-7}\ \ rad/period \tag{28}$$

or

$$\Delta\omega\frac{2\pi}{\omega} = 42.988\ \ arcsec/century$$

.

This result verifies that gravitation as well as light behaves strictly according to Galilean transformation of velocities in Euclidean Space with the very same velocity c, relative to the primary source only, as that of the velocity of light! This principle of the Graviton exchange has a direct analogy to that of the emission and re-emission of the photon, according to the principal axioms of this *Extinction Shift Principle*! The very same principle arrives at the perihelion rotation results of the PSR1913+16 binary neutron pulsar star system, the precise numerical result obtained by Relativity, first published in **Reference** [10], a result claimed by Relativity in 1990 for its fame and validation! [1]

6 Observational Evidence

The past century of experiments in optics along with convincing observational evidence lend support for the above demonstrated emission theory, summarized in detail in **Reference** [1]. The *Principal Axioms*, which are the rules for applying the *Galilean transformations*, were mathematically illustrated on the past century of velocity of light experiments, to include the Beckmann and Mandics Lloyd Mirror experiment [4] of 1965, the Babcock and Bergman rotating mirror experiment [5] of 1964, which was repeated by Beckmann and Mandics [6]in 1964, Rotz [7], and James and Sternberg [8] performed variations of this experiment. One of the most important experiments was performed by Albert A. Michelson [9], who acted alone, where two mirrors rotated about a common center inside of an optical loop. The *principal axioms* serve as the maps to help explain the experimental outcomes, the details of which are given in **Reference** [1] in the **Appendix** pp. **23A - 32A**. Additionally, along with the planet Mercury perihelion rotation effect calculated here, the calculation of the perihelion rotation effect of the PSR1913+16 binary pulsar system, first calculated by Taylor et al (1978) using General Relativity and published in **Reference** [11], is mathematically illustrated with the very same technique of this emission theory and published in detail in **Reference** [1].

7 Summary and Conclusion

In this paper, the obvious consequence of the measurement and the undisturbed nature of the not physically measurable phenomenon is herein considered. A significant finding of this emission theory is:

i The non-measurability of the wavelength or velocity of a *primary* wave or a *primary* photon from a frame of reference other than that of the *most primary* source.

ii The *primary*, not-yet-interfered-with *undisturbed* wavelength remains unchanged and is independent of reference frames.

iii The *Extinction Shift Principle* correctly predicts the outcome of important experiments in the laboratories of Nature for both electromagnetism and gravitation by applying the very same rules of Galilean Transformations of Velocities in Euclidean Space.

vi This pure classical treatment has lead directly to the solutions to those problems responsible for the success and fame of both Special and General Relativity. [1]

8 Appendix: Principal Axioms of the Extinction Shift Principle

There are various combinations of light paths that need to be considered for theoretically interpreting the results pertaining to electromagnetic emissions. The experiment always pertains to a source *primary emitter*, an interference one or more *secondary sources of emission* or re-emitters and an observer or a *detector*. The **principal axioms** pertain to the various combinations of the state of the source, the interference and the observer and the direct application of the *Galilean transformations* to derive the observed frequencies, wavelengths and velocities in Euclidean Space. For instance, one experiment may involve a fixed source, a fixed interfering window and a moving observer. Another experiment may involve a moving source, a fixed interfering window and a moving observer. Still another experiment may involve a fixed source, a moving interfering window and a fixed observer, and so on.

Similarly, for the case of gravitation, a given primary mass particle may be considered as the source of a primary field that perturbs a secondary mass particle that is the direct source of a secondary field. The secondary field set up by this secondary mass conveys indirect information on the primary mass particle via its secondary field to yet a third tertiary mass or some sensor mass under influence of the fields.

The same *Galilean transformation of velocities* applied to gravitation to solve problems in Astrophysics as well as to correctly predict the outcome of *nullified experiments in optics* provides grounds for the correctness of this *Extinction Shift Principle*! See **Appendix IV** of **Reference** [1].

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