0.0 A brief introduction to The Universal Principle

Andrej Rehak
www.principiauniversi.com

Abstract

Through a link with the speed of light, explained is the nature of ubiquitous but one of the most secretive and controversial phenomenon in nature, gravity. Implicitly, explained is the nature of constantly measured speed of light and the vector of time. From this simple, rigid and tautological relation, without the use of physical constants, derived are universal formulas for motion.
Basic concept of concisely presented Universal Principle is compared with conventional, far more complex model, indicating the crucial Relativistic problem of understanding the indivisible scalar nature of space-time entity.

Introduction

Everything we measure is space-time relation in space-time context. Thus, a fundamental interpretation of physics of the Universe is expressible by the ratio of its space-time variables. "Universal constants of nature" are the result of misinterpretation of the dynamic nature of its propagation, and duration.

Schwarzschild formula for gravitational time dilation t_d is (0.0.1);

$$t_d = \frac{1}{\sqrt{1 - \frac{r_s}{r}}} \qquad 0.0.1$$

Where r is the radius of measured body, and Schwarzschild radius r_s, derived from Newton's equation for escape velocity, is equal to (0.0.2);

$$r_s = \frac{2GM}{c^2} \qquad 0.0.2$$

In equation above, G is the gravitational constant (with the assigned unit $m^3kg^{-2}s^{-1}$ or $N/(m/kg)^2$...), M is the mass of measured celestial body and c is the speed of light included in place of escape velocity. Hidden nature of one of the values given in any equation, leaves the description of all the others without a fundamental explanation.

The Universal Principle

In each unit of time, the speed of light *c* increases for the amount of gravity *g* of a specific gravitational environment. Accordingly applies (0.0.3);

$$t_d = \frac{c+g}{c} \tag{0.0.3}$$

In this statement, gravity *g*, is the geometric equilibrium of speed *c* expansion between acceleration *a* measured at reference radius of the body, in our case Earth, and acceleration a_{ct}, measured at a distance *ct* travelled by light in the reference unit of time *t* of that body (0.0.4). In our case, the a_{ct} is acceleration at one light-second distance from the centre of the Earth;

$$g = \sqrt{a a_{ct}} \tag{0.0.4}$$

The relation (0.0.4) can be written (0.0.5);

$$g = \frac{ar}{c} \tag{0.0.5}$$

Where *r*, is the reference radius at which reference acceleration *a* is measured.
t_d from relations (0.0.1) and (0.0.3) is a value of changed time unit. The amount of that change equals *d* (0.0.6);

$$d = t_d - t \tag{0.0.6}$$

where *t* equals one, i.e. an agreed reference unit of time (1 second). So *d* is equal to gravity *g* by the speed of light *c* (0.0.7);

$$d = \frac{g}{c} \tag{0.0.7}$$

In time *d*, *g* is the propagation of speed *c*. Thus, *g* is the wave length of the speed *c* in time *d*. In other words, gravity is the expansion, i.e. the dilatation of velocity of light (0.0.8);

$$\boldsymbol{g = cd} \tag{0.0.8}$$

From this tautological statement we can read that the space $\vec{g}$ is the vector product of time vector $\vec{d}$ and vector scalar velocity *c* (0.0.9);

$$\vec{g} = c\vec{d} \tag{0.0.9}$$

For events in which motion is described by Newton's mechanics, celestial mechanics, electromagnetism, General and Special Theory of Relativity ... are said to be T-invariant. In other words, despite the fact that time flows from past to future, their scenario will take place under the same laws regardless of the time flow direction. Thus, the popular notion of modern physics is that the direction of time flow in any way does not reflect on the laws of motion of the body.
According to the statement (0.0.9), the idea of T-invariance is not valid because, in the case when the vector-scalar is positive, time vector direction change implies direction change of its cross product space, i.e. gravity.
Each wavelength *g* in its wave-time *d* measures the constant speed of light *c*. It follows that the energies of electromagnetic waves of all lengths in their wave time are equal (0.0.10);

$$c = \frac{g}{d} \quad 0.0.10$$

The implication of alterations in the value of the variable *g* is a scalar change of variable *d* by the same amount. The consequence is constancy of light speed measured from the system. It is the nature of its universally fixed, maximal perceived value.
From this space-time principle, follow some gravitational relations of the world of "big", with the speed of electromagnetic waves, i.e. the speed of light *c*;
Orbital velocity v_o and escape velocity v_{esc} are equal to (0.0.11, 0.0.12, 0.0.13, 0.0.14);

$$v_o = \sqrt{cg} \quad 0.0.11$$

$$v_o = c\sqrt{d} \quad 0.0.12$$

$$v_{esc} = \sqrt{2cg} \quad 0.0.13$$

$$v_{esc} = c\sqrt{2d} \quad 0.0.14$$

From the relation (0.0.11) we can read the nature of the orbital velocity as space-time equilibrium of a system, i.e. the geometric mean between the velocity *c* and its acceleration, i.e. gravitation *g*. Also, due to the known orbital velocity equation (0.0.15);

$$v_o = \sqrt{ra} \quad 0.0.15$$

evident is the analogy (0.0.16), equivalent to the equality (0.0.5);

$$ra = cg \quad 0.0.16$$

Consequently, we have symmetric relations:
The value of gravity *g*, at one light-second away from the centre, equals to the product of the surface dilatation d_a, and the radius *r* (0.0.17);

$$g = rd_a \tag{0.0.17}$$

Acceleration *a* of the surface at the radius *r* of the reference body is equal to the product of light speed *c* and dilatation d_a, measured at the surface of the observed body (0.0.18);

$$a = cd_a \tag{0.0.18}$$

Acceleration a_{ct} at one light second away from the centre, equals to the product of radius *r* and light-second dilation *d* of the observed body (0.0.19);

$$a_{ct} = rd \tag{0.0.19}$$

Last amount is equivalent to the result of Newton's formulation for acceleration (0.0.20), when instead of the radius value the distance travelled by light in one second is included (0.0.21).
Since the values *a* and a_{ct}, from relations (0.0.18, 0.0.19), expressed by Newton's acceleration formula are equivalent to (0.0.20, 0.0.21);

$$a = \frac{MG}{r^2} \tag{0.0.20}$$

$$a_{ct} = \frac{MG}{c^2} \tag{0.0.21}$$

implication of the relation (0.0.4), is the Newtonian formulation for gravity *g* (0.0.22);

$$g = \frac{MG}{rc} \tag{0.0.22}$$

Follows that the GM product, i.e. Standard gravitational parameter *μ*, equals to a product of light speed *c*, celestial body radius *r* and its gravity *g* (0.0.23);

$$\mu = crg \tag{0.0.23}$$

μ is in fact Newton's arbitrary construct of third Kepler's law i.e. $GM = 4\pi^2 k$, where $k = r^3/p^2$, where *r* is any orbital radius of the observed body, and *p* its corresponding orbital period.
Integration of the equation (0.0.22) in relation (0.0.7), explains the nature of Einstein's formula for the spectral shift calculation (0.0.24);

$$d = \frac{MG}{rc^2} \tag{0.0.24}$$

So as Standard gravitational parameter *μ* (0.0.23), the gravitational constant *G* is in fact the terrestrial variable. It is dynamic, constantly measured approximation for ratio value of Earth's gravitational dilatation *d* and acceleration *a* at radius *r*, i.e. at some point of the Earth's surface (0.0.25);

$$G = \frac{d}{a} \quad 0.0.25$$

Further, Schwarzschild radius r_s (0.0.2), equals two acceleration values a_{ct}, measured at reference light time unit (in our case second) from a celestial body centre (0.0.26);

$$r_s = 2a_{ct} \quad 0.0.26$$

Comes forth that the Schwarzschild and celestial radius ratio equals two dilatations of the observed body (0.0.27);

$$\frac{r_s}{r} = 2d \quad 0.0.27$$

Considering equalities (0.0.19, 0.0.26, 0.0.27) we obtain validity (0.0.28);

$$d = d \quad 0.0.28$$

Plugging descriptions (0.0.6) and (0.0.27) in Schwarzschild formula for gravitational time dilation (0.0.1), we end up with contradictory equation (0.0.29) approximately valid only when *d* is much smaller than 0.5 (like for example, when Earth's or Sun's dilatations *d* are calculated);

$$d \ll 0.5 \Longrightarrow 1 + d \approx \frac{1}{\sqrt{1-2d}} \quad 0.0.29$$

From gravitational constant description (0.0.25), follow the equalities for the celestial body masses *M* (0.0.30, 0.0.31);

$$M = c^3 g \quad 0.0.30$$

$$M = c^4 d \quad 0.0.31$$

Unlike Newton's, in which celestial body masses are constant, and whose calculated values will, due to a misunderstood nature of gravitational, in fact, the Earth's constant *G* (0.0.25), approximately coincide only for the planet Earth, given equations calculate masses at all orbital radiuses, which corrects the lack of mass in the visible universe. Accordingly applies (0.0.32);

$$\frac{M_1}{M_2} = \frac{g_1}{g_2} = \frac{d_1}{d_2} = \frac{\sqrt{a_1}}{\sqrt{a_2}} = \frac{v_{o1}^2}{v_{o2}^2} = \frac{v_{esc1}^2}{v_{esc2}^2} = \frac{r_2}{r_1} \quad 0.0.32$$

where all of the listed values are calculated in the orbital radiuses r_1 and r_2, of the unique orbiting system.

In the section of the space *r, c*, and in each unit of time, mean acceleration equals to the amount of gravity *g* measured in that time. According to equality (0.0.16), in the time fraction *c/r* (*a/g*) seconds, acceleration *g* reaches speed equivalent to acceleration of a surface *a*, measured at radius *r*. From this simple law results formula for gravity g_n of any space section *r, n* (0.0.33);

$$g_n = \frac{ar}{n} \qquad 0.0.33$$

It follows that at a distance *r* from the centre, i.e. at the surface of celestial body, gravity and acceleration are equal. The above points to the necessity of equalising the reference radius *r* and speed of light *c*, where the reference time *t*, expressed through a relationship with a second, in which we measure the velocity *c*, equals to its relation with radius *r* (0.0.34):

$$t = \frac{r}{c} s \qquad 0.0.34$$

The implication of described inequality are isolated cases in which the radius of the body and the acceleration of the surface are not sufficient to calculate the gravity of any space section *r, n* at distance *n* from the centre, and is valid for celestial bodies whose radius is larger than the light second (e.g. the Sun). In that case, instead of the value of the surface acceleration, we take gravity g_{ct} of the space fraction between the first light-second from the centre and the surface (mean geometric equilibrium of both accelerations) (0.0.35) or the result of relation (0.0.33), according to the relation (0.0.34), is multiplied by the difference between radius and the light second (0.0.36);

$$g_n = \frac{g_{ct} r}{n} \qquad 0.0.35$$

$$g_n = \frac{ar^2}{nc} \qquad 0.0.36$$

Each second, body at a distance *n* from the celestial body centre, accelerates at the corresponding acceleration amount a_n. After n^2/r^2 seconds, its speed equivalents to surface acceleration *a* of an observed celestial body. This simple principle calculates acceleration a_n at any distance *n* from the centre (0.0.37);

$$a_n = \frac{ar^2}{n^2} \qquad 0.0.37$$

Following from the above are the equations to calculate the orbital and escape velocities v_{no} and v_{nesc} at any orbital distance *n* from the centre of celestial body (0.0.38, 0.0.39);

$$v_{n_o} = \sqrt{na_n} \tag{0.0.38}$$

$$v_{n_{esc}} = \sqrt{2na_n} \tag{0.0.39}$$

which is equivalent to (0.0.40, 0.0.41), while the relation (0.0.40) equivalents to an extraction from the formula for the period of a pendulum of a maximum ideal trajectory *2l/π*, where instead of *l*, hence the length of the pendulum, we write *n*;

$$v_{n_o} = r\sqrt{\frac{a}{n}} \tag{0.0.40}$$

$$v_{n_{esc}} = r\sqrt{2\frac{a}{n}} \tag{0.0.41}$$

While dilatations d_a and d as a result of light speed expansions a and g equal to ratio of corresponding acceleration and the speed of light (0.0.18, 0.0.7), dilatation d_v as a consequence of the transversal velocity v equals to the square of the speed v by two squares of light speed c (0.0.42);

$$d_v = \frac{v^2}{2c^2} \tag{0.0.42}$$

If the value of the velocity v is less than or equal to escape velocity v_{esc}, d_v is equivalent to the dilatation amount of Lorentz's factor γ (0.0.43, 0.0.44);

$$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} \tag{0.0.43}$$

$$v \leq v_{esc} \Rightarrow \gamma = d_v + 1 \tag{0.0.44}$$

Since the relation (0.0.43) calculates dilation added to a second and/or meter, the conversion of Lorentz's factor γ in dilation d_v (0.0.45) is analogue to Schwarzschild dilatation t_d to d conversion (0.0.6);

$$d_v = \gamma - 1 \tag{0.0.45}$$

When in Lorentz formula (0.0.43), in place of velocity v, escape velocity v_{esc} is included, its result γ_{vesc} corresponds to the result of Schwarzschild formula for the gravitational dilation of the body (0.0.1) of a specified escape velocity value (0.0.46);

$$\gamma_{v_{esc}} = t_d \tag{0.0.46}$$

Unlike the Lorentz's formula (0.0.43), in dilatation equation (0.0.42), velocity v can be equal or greater than the speed of light c of the referential system from which we measure. Speed twice the speed of light of measured system will have dilation 1 and will exit the viewer's perceptual range. Stated is equivalent to the black hole *BH* scenario, where gravity g_c, measured from observers point of view, is equal to or greater than the speed of light *c* measured by an observer (0.0.47);

$$d \geq 1 \Longrightarrow g_c \geq c = BH \tag{0.0.47}$$

Accordingly, velocities that we perceive are within the spectrum of our dynamic system of speed, our duration and our propagation.

To remain in orbit of space-time section of celestial entity, the body must reach orbital velocity v_o which will result in dilatation two times less than the gravitational dilation of the orbited entity. Thus we have the equality (0.0.48);

$$\frac{v_o^2}{2c^2} = \frac{g^2}{2v_o^2} = \frac{g^2}{v_{esc}^2} = \frac{g}{2c} = \frac{d}{2} \tag{0.0.48}$$

To leave the space-time section of celestial entity, the body must reach velocity v_{esc}, whose consequence is dilatation equivalent to the gravitational dilation of entity which it abandons. Therefore, we have the equality (0.0.49);

$$\frac{v_{esc}^2}{2c^2} = \frac{g}{c} = d \tag{0.0.49}$$

Since the dilatation as a result of the escape velocity is equal to the gravitational dilation of the observed system, and dilatation as a result of the orbital velocity is half that value, vectors $\vec{d}_g$ and $\vec{d}_{vesc}$ will have a value of 1 while the value of vector $\vec{d}_{vo}$ will be 1/2. Considering space-time balance principle, velocity dilatation vectors reduce the gravity dilatation vector in a way that their sum remains constant (Fig. 0.0.a). Thus, the value of the sum of vectors in the absence of velocity vector that changes the gravitational vector is 1 (0.0.50);

$$1\vec{d}_g + 0\vec{d}_v = 1 \tag{0.0.50}$$

When the body reaches orbital velocity, its dilatation vector, whose value is 1/2, reduces the vector of gravitational dilatation in half and the result of their sum is again 1 (0.0.51). In absence of difference among their values, manifested as acceleration, the described system is in the state of equilibrium.

$$\frac{1}{2}\vec{d}_g + \frac{1}{2}\vec{d}_v = 1 \tag{0.0.51}$$

Escape velocity dilatation vector reduces the gravitational dilatation vector to zero, so in this case too, their sum equals to 1 (0.0.52);

$$0\vec{d}_g + 1\vec{d}_v = 1 \tag{0.0.52}$$

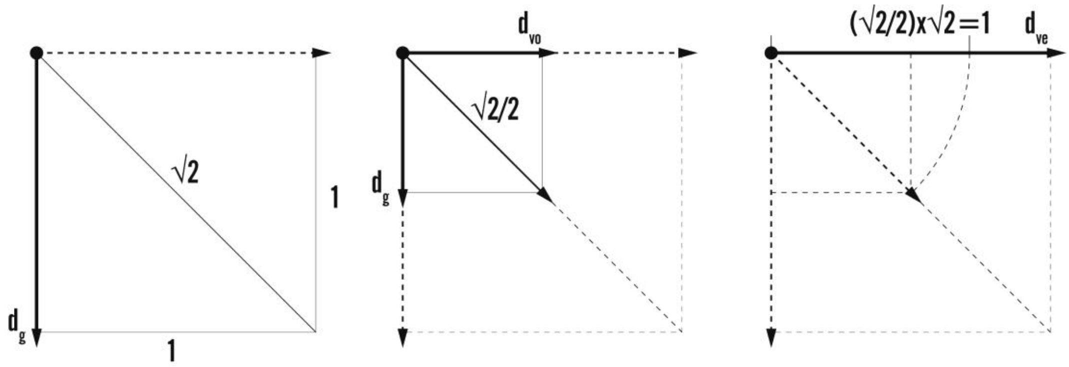

Figure 0.0.a

Figure 0.0.a. *Geometrical representation of the relationship between dilatation vectors of gravity $\vec{d}_g$, the orbital velocity $\vec{d}_{vo}$ and escape velocity $\vec{d}_{vesc}$. In the first display, in the absence of speed that cancels it, the vector of gravitational dilation $\vec{d}_g$ is 1. In another view, the value of the orbital velocity vector $\vec{d}_{vo}$ is 1/2, and the vector of gravitational dilation is consequently reduced by half. Their sum is 1, and their resultant equals to √2/2 (1/√2). In the third screen, the value of the dilatation vector as a result of the escape velocity $\vec{d}_{vesc}$ is 1 and the vector of gravitational dilation is cancelled. As its value is 0, their resultant is equal to the escape velocity dilatation vector and it equals 1. A translation of the resultant between gravitational and orbital velocity dilatation vectors, illustrates the nature of relation between orbital and escape velocity. The factor of their difference is √2, which is equivalent to the difference between the radius of the inscribed and circumscribed circle of a square.*

The implication of the presented principle is correction of units for radius and acceleration. In all of the space-time relations calculated by the universal principle, radius and acceleration are treated as universal physical units of a system, as opposed to customary which count their manifestation inside the system. Acceleration is observed as the expansion of light speed per second *(c+**a**)/c* (0.0.3), where the resulting amount corresponds to dilated meter and second of corresponding accelerating surrounding, in which for the same amount altered space-time units (meter and second) measure a constant speed of light. The above tautology is a crucial correction of contradiction, which due to the universally fixed speed of light, as well as calculated and measured expansion of time, introduces never recorded or measured, contraction of space. Consequently, the unit m has been assigned to acceleration, unlike m/s^2 which due to frequency of speed *c* in space *a* measures velocity growth rate within the system ($c^2/a \Rightarrow m/s^2$). As a result of a valid statement (0.0.16), the dynamic entity which we call radius is treated as a velocity, hence the space s which we measure in time $t_{s/c}$, so $m/s_{m/c}$.

All of the above is a partial and short presentation of the Universal Principle free of constants, necessary for understanding the implicit nature of recorded anomalies.

In the enclosed table (PU_vs_conventional.xlsx) compared are some space-time results of the Universal Principle with the results calculated by conventional physics equations.

Conclusion

Through the tautological relationship between the variables of space and time, we explained the fundamental nature of equalities describing motion and showed that the "physical" appearance of the world is manifestation of its Principle. The above explains the fact that the language of mathematics formulates physical laws. It follows that the attempt to explain the Principle of Nature through the space time spectrum that our dynamic system of speed perceives as matter, i.e. manifestation of the Principle, is necessarily inconsistent and contradictory (complex, ambiguous, counterintuitive, incomplete and in fact an infinite table of “fundamental" particles, which should explain the universe...).

The universe is a dynamic system of propagation and duration, where each of its space-time positions measure unchanged speed of light. The implication of stated is a rigid and universal scalable law, applicable to all of its space-time dimensions. In all of space-time positions of the Universe apply the same laws of physics. All the "anomalies" recorded by the locally fixed contradictory systems, are the implications of the described universal tautological principle manifestation.

Three crucial experiments

Unlike invalid, contradictory systems, valid systems are implicit. Therefore, they do not recognize anomalies and paradoxes usual and commonly accepted in contradictory systems. Valid system is a tautology, true always and everywhere. Anomalies recorded by contradictory systems are the implications of tautology.
Euclid's first axiom says that through any two points in space we can draw a straight line.
Although the line consists of an infinite number of points, the probability that a third arbitrary point lies in the same direction is 1 / ∞.
We chose three seemingly unrelated experiments and show that the nature of their solutions is on the same line. We show that the implementation of unique principle (*g=cd*) predicts their results (fig. tce.1).

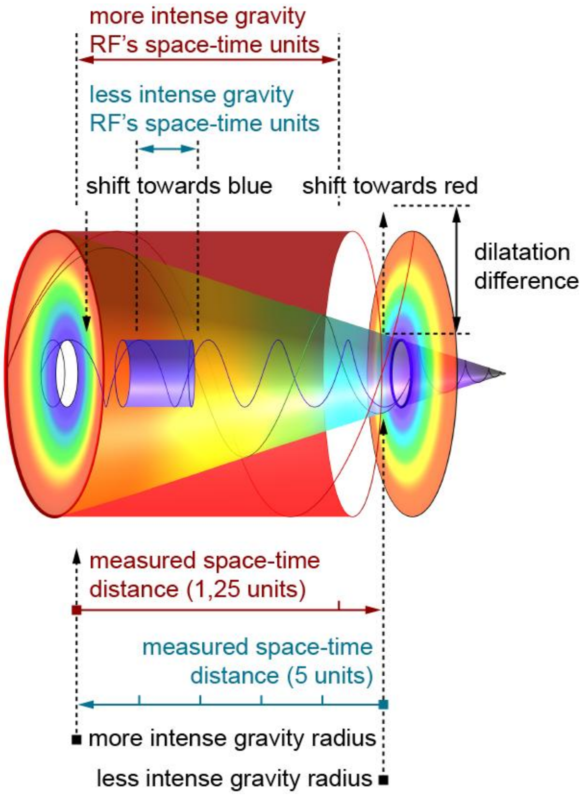

Fig.tce.1 *Tautological space-time relation principle among different frames of reference*

1. **Experiment: Pound-Rebka**

Implementation of tautological space-time principle explains the misunderstood nature of the last of three classic experiments of General Relativity, conducted at Harvard in year 1959, whose wrong interpretation produced a domino effect of invalid, conventionally accepted theories about the truth of the Universe.

2. **Experiment: Pioneer's anomaly**

Despite the many, often exotic efforts, never solved problem, marginalized by media, which for more than three decades indicates the invalidity of existing scientific paradigms. Implementation of tautological space-time principle, by using simple mathematical and logical operations, calculates the result recorded as Pioneer's "anomaly" and explains its implicit nature.

3. **Experiment: OPERA neutrino anomaly**

Contemporary, unplanned scientific sensation, whose possible solution marks the end of the existing scientific paradigm. The anomaly was removed from the media scene by authoritarian accusation of an error in the measurement. The official statement was given by the research institution CERN. The recognition of OPERA results makes its goal of proving the Standard Model of physics unjustified. Implementation of tautological space-time principle calculates the measured result of the OPERA experiment, which explains its implicit nature. Also presented are the results of three possible replicas of the same experiment: Fermilab - Gran Sasso, CERN - Kamiokande, Fermilab - Kamiokande.

Conclusion

Tautological principle, demonstrated by the above three experiments, removes contradictory quantum gravity gap and all of the "universal constants of nature". Four "fundamental forces" reduces to unique space-time relationship. Consequently, it introduces a fundamental, unique and universal, scalar physics of interpretation of the phenomenon, which results in unitization of a measurement system. Cognitive and philosophical implications of tautology *g=cd* mark the end of contradictory plurality of localized scientific and religious paradigms and the beginning of time of universal knowledge.