Unified Principles of Nature: Solution to the "Problem of Time" IV General Relativity Summary

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Abstract

Within "Solution to the Problem of Time I and II + III" [1,2] the author explored the origin of time and suggested the Unified Principles of Nature that must be applied in order to unify Quantum Gravity and General Relativity without contradiction. Within this paper, the author summarize the unification of Electromagnetism and Gravity with introducing applying the definition of 3-dimensional time in 3-dimensional space.

1. Introduction

In Solution to the Problem of Time I,II and III [1,2], the author introduced the Unified Principle of Nature: "Time = Cause".

$$\text{From reasoning} \quad \frac{d}{dc}\left[\frac{d}{dc}\left[c^3\right]\pi c^2\right] = constant = 1$$

[using $(1, \pi, \pi)$ $(1, 1, \pi)$ as model for perception]

it was derived the ToE in physics written (see [1,2]) as:

$$\pi = \frac{1}{12} \cdot \frac{second^3}{metre^3} \; ; \; 12\pi c^3 = 1 \tag{1}$$

as postulate describing a 12-dimensional (3x4) space-time. The idea was advancing on Newton's and Einstein's ideas on "time" to consider "time" to be 3-dimensional as well as space is. Following from the finding of Einstein, Nature knows as natural constant only "c", as relation between length of space and time [meter / second] to be constant. Addressing this finding in its full consequence, time is to be considered to be proportional to length:

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$$c = \text{natural constant} = \text{meter of length} / \text{second of time} \qquad (2)$$

The meaning of this postulate can be written as: length of 1-dim space is proportional to time.

To introduce the findings from Einstein in consistent manner into a Theory of General Relativity in order to unify Gravitation with Electrodynamics it was pointed out the need of change in the definition of Base-SI-Units to accept the findings of Einstein finally not only in "theory" of thinking, but in practice of acting:

The second, symbol s, is the SI unit of time. It is defined by taking the fixed numerical value of the speed of light c when expressed in the unit $s\ m^{-1}\ s$:
One second is the duration "light" needs to travel c meters.

The meter, symbol m, is the SI unit of length. It is defined by taking the fixed numerical value of the speed of light c when expressed in the unit $m\ s^{-1}$:
One meter of length is the distance "light" travels in 1/c seconds.

Although Einstein used the ideal of a theoretical "clock" to address a "time" as "event" to a point in space, he missed to point out that this "time" in a single point of space cannot be measured with 1-dimensional "clocks" and must be excluded from writing physical laws in mathematical denotation. The concept of time used in Special Relativity is always a relation between two points in space (Point A, Point B) that are related with the simultaneity

$$c = \frac{\overline{\text{length\_AB}}}{\overline{\text{time}}_{AB}} \qquad (3)$$

As the "speed" of cause, where "time" is representing "cause". Now we want to summarize the concept of Theory of Special Relativity and General Relativity in light of the ToE-Framework.

2. The physical origin and strength of Gravity

The origin and physical dimension is given with the basic definition of geometrical "time" in 12-dimensional space-time with the gravitational constant:

$$G = \frac{1}{4\,\pi_1\,4\,c_1} \ [\text{s/m}] \qquad (4)$$

The gravitational constant is the relation of second of time per meter of length of space. The reader must consider, that space as well as time as we "perceive" in nature always come in "quantum" - "particle" of Space-time-plasma that is 3-dimensional:
A portion of "space" is always in dimension [meter^3] and a portion of interacting "invisibile space" that is 3 dimensional time always is perceived as [second^3]. A "2"-dimensional space (as a piece of paper) therefore must be considered physically as a discrete number of cubes [meter^3]. A one dimensional space of 4 cubes is a straight line of 4 cubes in a row with

length of 4 cubes, width of 1 cube and height of 1 cube. This "amount" of space in two dimensions might be flat field of 2*2 cubes so that the amount of Energy can be transformed from one dimension into two and into 3 dimension. In 3-dim space 2*2*2 length * width * height would be a representation of 8 "cubes" of space with length of each 1*1*1 Meter. The same idea is transported into the concept of time. There is length, width and height given in time, as well as it is given in space. "Gravity" therefore is representing the general concept of "force", to be the "unified" concept of force as geometry of space-time to be represented as "movement" in one dimension [second / meter] which is the inverse concept of motion [$1/c_1$]. We denote here I.E. as the "general relativity" (origin of gravitational force) the relation between space and time as 1-dimensional "space" (1 second, 1 meter , π)

$$c_1 = \pi_1 = 1 \tag{5}$$

where π is representing the ratio of a timelike to a spacelike perception (angular motion in a circle as space vs. a straight line of time as diameter of the circular motion). (Regarding the concept of foundational mathematics of π, the reader is invited to look up reference [4].)

3. The strength and physical origin of Electromagnetism

The elementary charge (to be positive or negative) was found to be

$$e = (\frac{6}{4\pi_1 4c_1})^2 \ [\text{s}^2/\text{m}^2] \tag{6}$$

Electromagnetism is here representing the "Action-Reaction" principle as origin of "Information" to represent the concept of Energy with a reciprocal "over time" inducing Electrostatic Force and Magnetostatic Force. As the charge can move in two direction (Ampere = Coulomb / Second) it is reciprocal interacting Electromagnetic field between a two-dimensional space [s^2/m^2] and a one-dimensional space [s/m] in a 8 (16-dim) magnetic flux Φ [m^8/s^8] that relates to the squaring of a circle between 3x3 (9) dimensions and 2x4 (8) dimensions. (See Rhind Papyrus Problem No 48 : $(8/9)^2$ [3]).

The relation between Energy in Gravitation (Inertial mass and Gravitational mass) and electromagnetism is given with $E=mc^2$. As the relation [s^2/m^2] resolves to a different [s/m] (1/c) relation then in the one-dimensional c_1 this relation can be denoted as

$$c_2^2 = E / m \quad [\text{Joule} / \text{kg}] \tag{7}$$

In closing the perception of our 3-dim * 4-dim space-time we consider equation (1) to be written as a third relation between space and time in 2*3-dim space-time. All together we get as framework for combined General Relativity and Quantum Theory:

$$c_1 = \pi_1 = 1 \quad [\text{m}^1/\text{s}^1]$$

$$c_2^2 = E / m \quad [\text{m}^2/\text{s}^2]$$

$$c_3^3 = 1 / (12 \ \pi_2) \quad [\text{m}^3/\text{s}^3] \tag{8}$$

4. The nature of Photons

As described in [2], 1/m = h f is the correct interpretation of the relation considering Planck's constant to describe that 1 Cycle / 1 Kilogramm is proportional to 1 Cycle / 1 second. This physical relation reveals that today we use an inverse proportional understanding of the concept of energy between Gravitation and Electromagnetism (Photons). After the mistake in the dimensional setup (definition of time in Base-SI-Units) is corrected, a photon unveils its nature as (hidden) "gravition":

A photon is neither a particle nor a wave. A photon is a local event of action at distance. To give an example: A photon in the sun is emitted and detected some "time" later to "arrive" earth. In fact the photon is emitted and arrived at the same time (simultaniouly) and no "travel" took place, but in our perception there is a duration inbetween (c_1) that is proportional to the gravitation force $(1/r^2)$ (or expressed as inverse square proportional $1/c_1^2$) while a red-shift take place proportional to the "distance" between the emitting source and the detecting of the photon on earth $(1/r)$ (or expressed as linear proportional $1/c_2$).

Following this finding, the universe is not expanding and the red-shift of light from distance galaxies is due to the redshift that is proportional to distance of the source of light. As we deal with "two" dimensions of time as concept of force $(c_1$ and $c_2^2)$ one dimension of time is representing that mass (gravitation) is proportional to time.

5. Experimental Proof of Unified Gravity and Electromagnetism

While the gravitational constant (4) reflects c_1 with the gravitational constant

$$[1 / c_1^1 :=]\quad G = \frac{1}{4\pi_1 4c_1}\ [s/m]$$

the Coulomb-constant with representing c_2

$$[1 / c_2^2 :=]\quad e = (\frac{6}{4\pi_1 4c_1})^2\ [s^2/m^2]$$

is in experimental physics perceived as c_3 as strength of Electromagnetic Interaction given in the same dimension as the gravitational interaction (second / meter as gravitational force in solar system vs. meter / second as electromagnetic force in the atomic scale:

$$[1 / c_3^3 :=]\quad \alpha = 10^{-7} \cdot \frac{6}{5} \cdot c^5 \cdot (6G)^4\ [m/s]\ (1/137,8..\ m/s) \tag{9}$$

(10^{-7} is correcting factor here, because in the Base-SI-Units the Meter is approx. defined as 1 Meter = ¼ 10^{-7} * circumference of planet earth).

To proof the ToE ($12\pi c^3 = 1$) we test the definition of Meter of Length (Solar System : Gravitation) and Second of time (Atomic Electromagnetism) with the experimental finding of the Atomic meter of length (Rydberg-Constant for infinite mass) and the second of time in solar system (speed of light c in CODATA):

$$c_{CODATA} = 299792458 \lfloor m/s \rfloor$$

$$12\pi c_3{}^3 = 1 \implies c_3 = 0,298233409646549... \lfloor m/s \rfloor$$

$$12\pi c_3{}^3 = 1 \implies 12c_3 = \frac{\pi_1}{\pi_2 c_2^2} \implies 12c_3 = \frac{c_1}{\pi_2 c_2^2} \quad ; \quad (\pi_1 = 1 ; \pi_2 = 1)$$

$$(10)$$

$$12c_3 = \frac{\pi_1}{\pi_2 c_2^2} = \frac{R_\infty}{f_{Cs}} \cdot c_{CODATA} \tag{11}$$

$$1\, s/m =$$

$$10^{-7} \cdot 10^2 \cdot \frac{1}{12 c_3} \cdot \frac{10973731,568160\, m^{-1}}{9192631770\, s^{-1}} \cdot c_{CODATA} = 0,999994547.. \quad [s/m] \tag{12}$$

The error in the experimental proof is $5,5 \cdot 10^{-6}$. As the uncertainty given with CODATA on the gravitational constant (here given in dimension 1/c : [s/m]) is $2,2 \cdot 10^{-5}$, the "measurement" based on the Rydberg-constant vs. the speed of light c is within the range of acceptable error and expected uncertainty. As explained above, the 10^{-7} multiplier is due to the definition of the meter as 10^{-7} * ¼ circumference of earth, while 10^2 multiplier is due to the translation of cubes $(10c_3) = (10c_2)^2$.

6. Conclusion

Given the experimental proof for the ToE framework, it is essential that the International Bureau of weights and measures have to change the definition of the second of time internationally in order to allow physics to adopt the necessary further research on solutions for climate change and other pressing problems in the field of renewable energy to a unification of Quantum Theory and Theory of general Relativity.

7. References

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