FQXi Essay Contest 2016: Wandering Towards a Goal
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The Theory of Unity between the Whole and its Parts

Abstract

The theory is a mathematical interpretation of nature, bringing us to numerous predictions and accurate relations. It defines relations among several key physical constants. The proton shift, defined in my article written for the 2015 FQXi contest, is again defined and described here, with the use of different physical constants.

Keywords: Universe, Cycle, proton shift, physical constants

"In science, always talk affirmatively.
Never say: 'It is not rainy', rather, 'it is sunny'."
Prof. Marian Čadež, PhD

1. Introduction

This theory arises from the following statements:

- ***Parts are dependent on the whole (Universe) and are also an integral part of the whole, therefore, the whole is also dependent on the parts!***

  That statement falls under one of the interpretations of Mach's principle [1].

- ***The quantum character of phenomena is connected to the relations between the whole and its parts.***
- ***Mass is piece of physical space which rotates has conserved energy of rotation.*** **[2]**
- ***The matter is in constant motion, which can be described by cycles of different magnitudes.***

The above statements are implemented through the introduction of mathematical constants:

$$2\pi = 6.28318530718 \tag{1}$$

Cycle (2a).

$$cy = e^{2\pi} = 535.491655524765 \tag{2a}$$

We will also use a Half Cycle, (2b)

$$z = cy/2 = e^{2\pi}/2 = 267.745827762382 \tag{2b}$$

The CODATA [3] values of physical constants shall be used, see Appendix.

The methodology used for obtaining relations among physical constants can be found in my two essays previously published at FQXi contests [4] and [6]. In this article I am absolutely complying with that methodology and the results obtained through its use, and I am expanding it with new relations.

The objective of this article is to obtain and explain the value of the proton shift, defined as the difference **Δp**=p-z, where $p=\log_2(M_u/m_p)$, m_p – proton mass. Note that in this article we will not have the mass of the Universe, M_u, since we will only deal with relations and only the well-known values of masses will be used.

The groundbreaking novelty in this article is an addition of a crucial new formula which connects mathematical and physical constants, and which has its physical explanation. The same results were obtained in [6, formula (7)] through a formula which gave good results. Scepticism of certain fellow contest participants regarding that formula and numerous correct relations arising from it should be cleared up here with formula (3), featured in the upcoming Chapter 2.

2. Towards a Mathematical Interpretation of Nature

The following dimensionless relation for the proton shift **Δp** is true:

$$\Delta p = z/3 - \left(\log_2 \frac{2\pi c^4 \lambda_p^2}{G^2 m_p^2} \right) / 3 = 1.9350609435 \qquad (3)$$

See Appendix for the meaning of key physical constants, G, c, h, m_p and λ_p.

Or, if we include: $$\lambda_p = h / m_p c$$

The following is also true:

$$\Delta p = \left(z - \log_2 \frac{2\pi c^2 h^2}{G^2 m_p^4} \right) / 3 = 1.9350609435 \qquad (4)$$

Also, if we include the known formula for Planck's mass:

$$m_{pl} = \sqrt{hc / 2\pi G} \qquad (5)$$

We get:

$$\Delta p = z/3 - 4 * \log_2(m_{pl}/m_p)/3 - \log_2(2\pi) = 1.9350609435 \qquad (6)$$

Which is the exact same result obtained in [6, (7)] or [7, formulas (12) and (13)], here (7), i.e. (8) and (9).

$$\Delta p = 2 - \frac{1}{\mu / \alpha' + 2} = 1.9350609435 \qquad (7)$$

Where: ***á*** - inverse fine-structure constant, ***μ*** - proton-to-electron mass ratio, see Appendix

or if we define: $$2\pi \frac{r_{er}}{\lambda_p} = \frac{\mu}{\alpha'} = \theta \qquad (8)$$

where: r_{er} - classical electron radius, λ_p - proton Compton wavelength, see Appendix

$$\Delta p = 1 + \frac{\theta + 1}{\theta + 2} = 2 - \frac{1}{\theta + 2} = 1.9350609435 \qquad (9)$$

The quantity **Δp** is called the proton shift in all my previous publications. The significance of formula (7) is explained in [6] and [7].

The significance of formula (3) and formulas (4) and (6) arising from it is explained below:

According to Ruđer Bošković, [8 part I 7.]:

"Prima elementa materiae mihi sunt puncta prorsus indivisibilia, & inextensa, ... "

"The primary elements of matter are in my opinion perfectly indivisible & ***non-extended points, ... "***

For the purpose of this article, let's present one such point through a geometric mean of masses, i.e. through an arithmetic mean of a logarithm for the base 2 of the whole mass of the Universe M_u and a part presented by a Cycle, $m_{cy}=M_u*2^{-cy}$, i.e.

$$m_z = \sqrt{M_u * (M_u * 2^{-cy})} = M_u * 2^{(0-cy)/2} = M_u * 2^{-z} \qquad (10)$$

Let's define that masses bigger than this (10), represent "***matter dominant Universe***", while smaller masses are "***radiation dominant Universe***". So how come that non-extended mass m_z has a final mass? The explanation is just like in the case of the barycenter in cosmology, where the collective mass of stars and planets moves as if the entire mass is in the barycenter, even though there does not have to be any real mass there.

The relation of the whole towards this mass is exact, based on (10) and (2b):

$$K_z = M_u / m_z = 2^z = 3.97672326784 * 10^{80} \qquad (11)$$

Of course, real mass or a particle which would be exactly that big part of the mass of the whole cannot be expected to exist because of the very fact that it is non-extended. But, there are so many particles whose masses are very close to this mass. Our task is to show how we have come from non-extended to real extended mass, for which proton is essential in formation of the material world and consequently of the relations represented by physical constants in that world.

Just as formula (1) for the mass m_z, any other mass can be defined as a part of the mass of the whole, i.e.

$$m_n = M_u * 2^{-n} \qquad (12a)$$

where with **n** we marked the level that the mass has in the distribution of masses in the Universe.

For example, for a proton it is:

$$m_p = M_u * 2^{-p} \qquad (12b)$$

It is no surprise that a proton as an elementary constitutive component of matter has the mass $\mathbf{m_p > m_z}$, therefore it belongs to the *"matter dominant Universe"*, i.e. from (12b) $\mathbf{\log_2(m_p/m_z) > 0}$, hence the proton is at the level below **z**. In [6], I claimed that that is the following level:

$$p = z - \Delta p = 265.810766819 \qquad (12c)$$

where **Δp** is defined in relation (7). Let's focus here on the explanation that **Δp** can also be determined by the relation (3), i.e. the proton mass is in immanent relation to the geometric mean m_z, through fundamental physical constants.

Let's define dimensionless proton coefficient, K_p.

$$K_p = \frac{2\pi c^4 \lambda_p^2}{G^2 m_p^2} = 7.11199115839 * 10^{78} \qquad (13)$$

Let's consider that the transition from (11) to (13) is a transition from a non-expanding point over area into the real volume, during the first cyclical movement (hence 2π). Therefore:

$$\sqrt[3]{K_z / K_p} = \sqrt[3]{3.97672327 * 10^{80} / 7.11199116 * 10^{78}} = 3.8239428011 \qquad 14)$$

Or if we logarithmize for the base 2

$$\log_2(3.823942801) = 1.9350609435 = \Delta p \qquad (15)$$

which is the exact same value as in (3), (7) and (9) for **Δp**. Let's just also notice that the obtained value in (14) is the ratio between the proton mass and the mass at the defined level z, m_p/m_z.

We can also write from (11), (13) and (14):

$$\sqrt[3]{K_z / K_p} = \sqrt[3]{2^z / \left(\frac{2\pi c^4 \lambda_p^2}{G^2 m_p^2} \right)} = \sqrt[3]{2^z * G^2 m_p^2 / 2\pi c^4 \lambda_p^2} \qquad (16)$$

Or if we logarithmize (16) for the base 2 we get the formula (3). To sum up: the above analysis shows how a non-extended mass $\mathbf{m_z}$ leads to an extended proton, which explains the meaning of formula (3). It can easily be shown that (3) is identity, Δp=z-p, if we replace the physical constants using (12b), [7 f (18), (25), (30)]. Also, we can say that the parameters of the Whole, G, c, h, and the parameters of the proton are interconnected by formulas (3) or (4). Furthermore, we can determine other non-extended masses and important real parameters, as in [6, Table 2]. From there we can for example determine the connection between the classical eletron radius and the fundamental mass m_f [6, Table 2], or [5, Table] and get that (7) and (9) are true.

3. Relations between Fundamental Physical Constants

In [6] we saw that the significance of the formula (7) is confirmed by a large number of its applications and correct results which have even surpassed the accuracy of CODATA reports. Here we got the formula (3) from the relation between fundamental physical constants, which gives the same result as (7) or (9). So, if we equalize (3) and (9) and include (8), we get:

$$e^{2\pi}/6-\left(\log_2\frac{2\pi c^4\lambda_p^2}{G^2m_p^2}\right)/3-2+\frac{1}{2\pi\frac{r_{er}}{\lambda_p}+2}=0 \qquad (17)$$

If we apply the values from the Appendix, the result differs from zero by 10^{-14}, which is less than an error in the input data. The formula (17) added the classical electron radius r_{er} to physical quantities c, G, λ_p, m_p, while (4) provided Planck's constant h, which are in mutual relation, with mathematical constants ***e*** and ***2π***.

Notice that in (17):

physical constants are equal to mathematical constants, hence it cannot be said that they are derived from mathematical constants, rather, they are in the immanent relation of a whole and its parts.

In other words, they are of the magnitude that they are, they were of that magnitude and always will be. This claim is pictured in Figure 1.

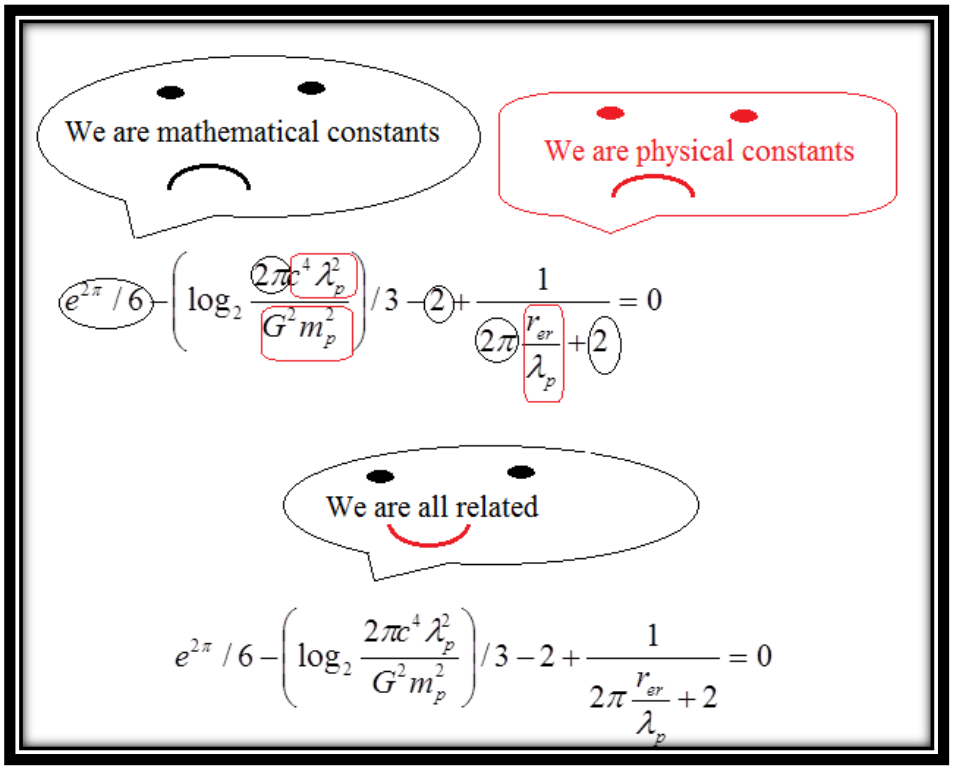

Figure 1. We are all related

Then, where do all these relations originate from? The answer: from irrational mathematical constants, quote: *"In mathematics, an irrational number is any real number which cannot be expressed as a fraction p/q, where p and q are integers, with q non-zero. It is therefore not a rational number. …*
Thus, space-matter consists of irrational points, so it is necessary to speak of the form and distribution of these points to produce both continuous and discrete space-matter" [9, p2].

According to the Theory of Unity between the Whole and its Parts, formula (3) can easily be expressed in the funcion of the relation between the mass of the Universe as a whole and the proton mass, which is evidenced through the introduction of formulas from [7, f (18), (25) and (30)] into (3). However, I decided to use only physical constants in (3), because readers are familiar with them.

4. Conclusion

The nature does not recognize our division into mathematics and physics. For the nature those two are the same, everything is the same. That is why what we today call "science" thinkers once called the "phylosophy of nature", as for example in the title [8]. The formula (17) is part of such understanding and confirms it.

In the **Theory of the Unity between the Whole and its Parts,** the so called

"matter dominant Universe" and "radiation dominant Universe" coexist in every point in time,

so there is no room for weird understanding of their change during the history of the Universe. Here, these two integral parts of the Universe are divided in the framework of the Cycle: ***matter dominant*** in the domain *n* (*0, z)* and ***radiation dominant*** in the domain *n* (*z, cy*), hence that is the only way for dominance of one over the other.

The article defines two formulas for proton shift (3) and (7), which are absolutely correct as such. Here I only partially fulfilled the goal of explaining them. It is also a possible attitude that this dimensionless quantity is insignificant and that as such it does not deserve attention. Here, however, I have shown just how worthy of attention it is and that it opens the door for the determine of other important relations.

From the level **z** to zero there is buildup of matter, first protons at level **p**, then molecules, then more complex structures, all the way to the Universe as a whole at level **0**.

The article shows that gravitational constant G is the product of a relation between the whole and its part. We can say that G in Newton's gravitational formula represents a whole. Even simple replacements in that formula can mathematically prove that.

In my previous participation in the FQXi contest, I was criticized for not having enough theory which would support my calculations. I can only repeat what I said in [6]: ***All I would say has***

already been told countless times and all my attempts at philosophy would thus be a repetition of what had already been stated. Here I also emphasized my accordance with D. B. Semyonowich, articles [2] and [9]. It is especially interesting that in [2] we can see a connection between the Lorentz transformation, i.e. the Theory of Relativity, with the results obtained through entirely different methods in this article.

The applied methodology leads to simple relations of the whole and its parts, therefore, I still consider that all the relations and statements featured in [6] are true.

And one more thing, rather a question than a conclusion. How come that one unique function, $\mathbf{e^x}$, stands behind the entire concept presented here, with a characteristic reserved only for it?

$$(e^x)' = e^x \qquad (18)$$

However, this is also in the domain:

Wandering Towards a Goal – *How can mindless mathematical laws give rise to aims and intentions?*

Novi Sad, January 2017.

Appendix

CODATA 2010 internationally recommended values of the Fundamental Physical Constants:

h	Planck constant	6.626 069 57 e-34	0.000 000 29 e-34	J s
l_{pl}	Planck length	1.616 199 e-35	0.000 097 e-35	m
m_{pl}	Planck mass	2.176 51 e-8	0.000 13 e-8	kg
ά	inverse fine-structure constant	137.035 999 074	0.000 000 044	
c	speed of light in vacuum	299 792 458	(exact)	$m\ s^{-1}$
G	constant of gravitation	6.673 84 e-11	0.000 80 e-11	$m^3 kg^{-1}\ s^{-2}$
λ_p	proton Compton wavelength	1.321 409 856 23 e-15	0.000 000 000 94 e-15	m
r_{er}	classical electron radius	2.817 940 3267 e-15	0.000 000 0027 e-15	m
m_p	proton mass	1.672 621 777 e-27	0.000 000 074 e-27	kg
μ	Proton-electron mass ratio	1836.152 672 45	0.000 000 75	

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