Planck constant discovered to be 4-th relativistic attribute

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A never before disclosed discovered relativistic Photon-Atom-Energy paradox led to a solution, according to which the Planck Constant is to be treated relativistic by h' = h γ², whereby a new relativistic effect and a fourth relativistic attribute was discovered. Nevertheless it stays invariant in Lorentz transformations. The same result was derived in another way and motivation while the main was a discovering an energy problem in relativistic dynamics when a relativistically heavier atom is emitting due to time dilation a red shifted low energy photon. A second problem was discovered by analysing Planck mass, length and time relativistically. This does lead to a discovery of 4 more paradoxes of actual version of Special Relativity, which were solved by same relativistic Planck Constant. While the 4 of 5 paradoxes are solved so within the Special Relativity, the Planck length paradox cannot be repaired in SRT and therefore we cite our another work about a new interpretation of length contraction in Lorentz transformations, using stretched length units as it was done with time units to measure contracted distances with them. At the end all now 4 relativistic attributes length, time, mass and Planck constant are asymmetrically between the Inertial Frames then it was the time dilation in Special Relativity alone. All dispute is very vividly and easy for understanding without high mathematics. If we decline the square relativistic Planck constant h then all 4 discovered paradoxes would stay irreparable in Special Relativity.

Photon-Atom-Energy paradox

A relativistic fast moving mass particle is given an energy mass with Lorentz gamma γ growth $m' = m\,\gamma$. But an atom that has become more mass energy as a result emits according to Special Relativity Theory, SRT, a red weakened photon (1) of a lower energy.

The shell electrons have also become relativistic heavier in the atom and one can expect that too the quantum differences between the electron shells are just as relativistic heavier and consequently should emit blue Doppler shifted photons. If one increase the speed, it will even worse. A contradiction that waits for discovery and a solution.

Solution

The solution offers a hypothesis that the Planck constant h', since nothing else is available, by a relativistic transformation must undergo this failure to get corrected. A common rescue solution will help. Some well known formulas we write as anyone can see the way how it works.

According to SRT, "moving clocks are slower", so all frequencies are redder, lower.

$$f' = f / \gamma; \qquad \boldsymbol{f' < f;} \qquad\qquad (1)$$

A *De Broglie* frequency of matter particles is known [1, 4].

$$f = E / h; \text{ from } h \cdot f = E \tag{2}$$

$\rightarrow$ Matter frequency grows linearly with relativistic energy, with Lorentz factor γ.

$$E' = E\gamma = mc^2\gamma = hf\gamma; \qquad E' > E; \tag{3}$$

$$m' = m\gamma; \qquad\qquad m' > m; \tag{4}$$

We assume with h' $\qquad\qquad\qquad E' = h'f';$

$$f' = f / \gamma = E' / h' = E\gamma / h' \tag{5}$$

$$h' = E' / f' = E\gamma\gamma / f = h\ \gamma^2;$$

$$h' = h\gamma^2; \tag{6}$$

Now the relativistic energy of a mass particle according to the Broglie with our assumption of h'.

$$E' = h'f' = h\gamma^2 f / \gamma = hf\gamma \tag{7}$$

and this functions even if *f is red shifted,* the energy will be relativistic growing. So it is explained how a heavier Atom emits a redder photon.

The Planck constant must be corrected square-relativistic "blue" and matter frequencies and wavelengths in same way how photons are made "redder". Corresponding vice versa for inverse transformation.

Besides the time dilation is thus also the Planck constant *h' relativistic asymmetrical* between the compared inertial systems. The asymmetry comes from time dilation and is therefore no question. This must not contradict to SRT but be just an integrated new consequence discovered. But we have to conclude about the mass of mass particles too, which is in SRT a symmetric attribute as the length. According to de Broglie (2) Planck constant and energy are connected and as energy is an equivalent of mass, then mass is connected too. Then the rest mass *m* has to be also an asymmetric attribute and this contradicts to the SRT. But we will get more a reason to be sure of that.

$$m' = m\gamma; \qquad\qquad m = m' / \gamma; \tag{8}$$

Now both the relativistic increasing energy and the red shifted dilated frequency of the matter particle in relativistic effect are working correctly, without contradictions.

$$h\gamma^2 f / \gamma = E\gamma = E'; \tag{9}$$

$$h' = h\gamma^2; \quad h = h' / \gamma^2 \tag{10}$$

Physically now it happens a relativistic correct red shift of the frequency $f' = f / \gamma$ and at the same time a „blue shift" of the Planck constant $h' = h\gamma^2$ with a squared Lorentz gamma, which gives the fixes of the discovered energy paradox. As a result, the energy with blue shift is linear and has a frequency according to time dilation by red shift both correct according to SRT.

Some one will recognise, that de Broglie wave length was always thought to increase with growing speed and that would contradict to SRT, which does expect all periodical processes to time dilate and get lower frequencies. But it can be explained as in low classical speeds the frequency can first grow and when being closer to speed of light it changes the direction and would decrease according to SRT. And only the relativistic Planck constant is repairing that.

Control by Planck time, length and mass constants

We want to make a proof using another way just to find out, how the relativistic mass *m'* and time *t'* are connected with Planck Constant. We think at two Inertial Frames, IFs, to be compared. The logic is that Planck length, time and mass [5] are invariant constants and so they must stay invariant even if this values are relativistically main attributes to be changed.

1. Planck time have to dilate

$$t'_p = \sqrt{\frac{\hbar G}{c^5}} \; ; \qquad\qquad (11)$$

$$\frac{c^5 (t'_P)^2}{G} = \hbar \; ; \qquad\qquad (12)$$

In that formula (11) we see that the time *t*, if changed relativistically to *t'*, would have changed also at last one of the 3 constants inside: *G*, *c* or *h*. So which one we can give free for that? We decide it to be *h*, as we are proving it here and *c* speed of light is in no case free. And above in considering energy of red photons and atoms we see only Planck Constant *h*, no Gravitation Constant G. But we also then have to prove that Planck Constant will stay invariant and always in each IF be measured same known value.

$$\frac{c^5 (\gamma \cdot t_P)^2}{G} = \hbar \cdot \gamma^2 \; ; \qquad\qquad (13)$$

And we get same result for *h* or *h/2π*, without them would be a really problem $\hbar' = \hbar \gamma^2$.

Both Planck Constants *h* and *h'* are only different between the IF's, because in (13) the squared Lorentz factors γ^2 are eliminating each other and so *h* stays invariant in Lorentz transformations.

2. Planck mass also get a relativistic transformation

$$m'_P = \sqrt{\frac{\hbar c}{G}} \; ; \qquad\qquad (14)$$

$$\frac{G \cdot (\gamma \cdot m_P)^2}{c} = \hbar \cdot \gamma^2 \; ; \qquad\qquad \hbar' = \hbar \gamma^2 \qquad\qquad (15)$$

Again, only if we have the Lorentz factor squared being a hidden factor in a relativistic *h'*, we can eliminate the Lorentz factor γ^2 carried by the mass *m* into relativistic mass *m'* and get, that the value of *h* stays invariant, measured in a relativistic IF by its new relativistic units for mass and time. And

again we get the right result only as a consequence of our hypothesis, that *h* is a 4-th relativistic attribute. In any IF's all constants are measured as same values, but only due to correct relativistic transformed units. The units themselves are also not to recognise relativistic changes. And Planck Constant is also getting the rank of an unit.

3. Planck length with relativistic transformation

$$l_p' = \sqrt{\frac{\hbar G}{c^3}} \; ; \tag{16}$$

$$\frac{c^3(\gamma \cdot l_P)^2}{G} = \hbar \cdot \gamma^2 \; ; \qquad \hbar' = \hbar \gamma^2 \, . \tag{17}$$

The same problem and solution, but only if we assume, that the Planck length is going to be relativistically stretched by $(\gamma l)^2$, not contracted. And we know, that due to time dilation the wave length of emitted photons is red stretched and frequency is getting smaller and we just did began this present work with that. We must postulate, that same is true for Planck length being also a consequence of time dilation. The Planck time and length are smallest values and therefore they are measurement units on elementary particle basis, which are stretched and therefore they measure distances and time segments as contracted and dilated, because viewer of stretched units can fit between the same 2 points in space.

In our result on developing a new interpretation of Lorentz transformations [6] we succeed to show, that the length units are to be stretched in order to measure distances contracted and the wave lengths are the *on bord* measurement units of the elementary particles. The Planck length does rather have to do with an elementary particles length unit then with a free in space distance, so this is the reason, why this Planck length is to be stretched. So we get here a strong argument for the true accuracy teaching, as both argumentations do support each other. The length is found to be like time asymmetrically between the IF's.

In our another result on a Gravitation Doppler Theory [7] we did found that mass is like time dilation also asymmetrically between the IF's and that is the Planck Constant too.

So we rolled out the new result on Planck Constant in some important another applications and derived same results in another way and motivation and it worked similar. And by the way we discovered and solved a big problem, being in 4 paradoxes in SRT, which are irreparable.

We conclude therefore that there is a strong evidence of the true teaching of our hypothesis and theories. Also here discovered paradox problems with the Planck constants cannot be left without attention, as they would wait for a solution anyway.

Now we know that there are 4 relativistic attributes, time, length, mass and Planck Constant. And all 4 they have measurement units, which are stretched and are asymmetrically between the IF's.

We can add to the known rule of thumb "moved clocks are slower" in same manner "moved lengths are longer", "moved masses are heavier" and "moved Planck Constants are larger". It is a symmetrical system in all now 4 relativistic attributes to recognise. And Planck Constant is a squared relativistically attribute.

The hidden Lorentz factor in relativistic Planck constant is in same manner to understand as all rest masses also as invariant constants do have this hidden Lorentz factors, which can only be recognized from outside from another IF. So it is nothing unusual to accept so. Within own IF all the Lorentz factors are eliminating each other and stay invariant only thanks to that facts.

4. 5-th paradox on Gravitation constant G

If we ask same according to G, then without our new relativistic Planck constant again it will appear an irreparable paradox. We can take any of the above formulas (13) to express G

$$G = \frac{c \cdot \hbar'}{(\gamma \cdot m_P)^2} \qquad , \qquad (18)$$

and we see, that without the same trick on h' an additional paradox would appear under the SRT making G not invariant. Speed of light c has m/sec two relativistic units, but eliminating each other.

So we have 4 paradoxes against one argument of SRT about contracting the length unit instead of stretching unit as we did. We can surely conclude now, that this is an evidence of the true hypothesis of present interpretation of relativity.

We are able to cite a deeper work on Special Relativity [6] where we discovered that the length measurement was incorrect in SRT and a new interpretation of Lorentz transformations deliver us the result that the length is to be stretched in its unit in order to measure then contracted distances by counting viewer variable number of this longer units. Both results support each other.

Units of Planck constant in view of relativity

If we have a look at the units of the spin s which is the Planck constant h too they are same as a for classical angular momentum with [N m s] or [kg m s^{-1}]. This is telling us that it is a composed unit having length, mass and time in it. All three of them are relativistically attributes, which have to be treated relativistically by Lorentz factor. If we use our hypothesis and results about the length units stretching [6] we have to put for each a Lorentz factor if the Planck constant as attribute of a particle is going to be in a relativistic interchange.

Then we get that Planck constant is in both possible unit forms a function of a squared Lorentz factor γ^2.

$$h = f(\gamma^2) = f[Js] = f[kg \ m^2 \ s / s^2] = f[\gamma kg \ \gamma^2 m^2 \ \gamma^{-1} s^{-1}] = f(\gamma^2) \qquad (19)$$

This is a "shadow" of a hidden Lorentz factors γ in each of the relativistic units. So we have won again one argument more for our hypothesis and results using another way. By the way, if one thinks that the length must be contracted according to SRT then the result would be $h = f(1/\gamma^2)$ so in any way a squared Lorentz factor is unavoidable and h is a fourth relativistic attribute.

Also we can conclude, that some deeper unknown kinematic must be inside of the particle using the three more elementary units of length, mass and time by hidden gammas.

And then we can conclude further more, that in all constants we can assume same tricky hidden Lorentz factors being present there. And now we trust in these model well.

Checking invariant constants for relativistic units as a test

We discovered a method of analysing invariant constants, because the units are relativistically to be treated as a test between SRT and the new asymmetric relativity.

Speed of light c does have relativistic units for length and time *[m/sec]*, so that means in relativistic dynamic moved IF both relativistic attributes are to be treated each with Lorentz factor according to the theory in question. If we use our present new knowledge that both units are to stretch, then we get

$$c[\gamma m/\gamma sec] \tag{20}$$

and eliminating them we get that c is independent of changes by Lorentz factor. That's true.

If we would use the SRT with contracting meter unit m/γ and stretching time unit γsec as done with time dilation, then we would get erroneous [m/γ^2sec] and a variable function of light $c(1/\gamma^2)$ would be none constant.

These effect shows how relativistic units do work in making constants invariant in all IF. They are working hidden eliminating each other. In shadow and invisible we didn't recognise them.

This is a sudden new argument never expected which contradicts the SRT directly and strongly irreparable.

The same will come out by just transforming speed of light [6] to check if it stays invariant and to find out astonishing violation of the 2-d postulate in SRT. The Lorentz transformation of speed of light $c = c' \neq f(\gamma)$ is the fastest test.

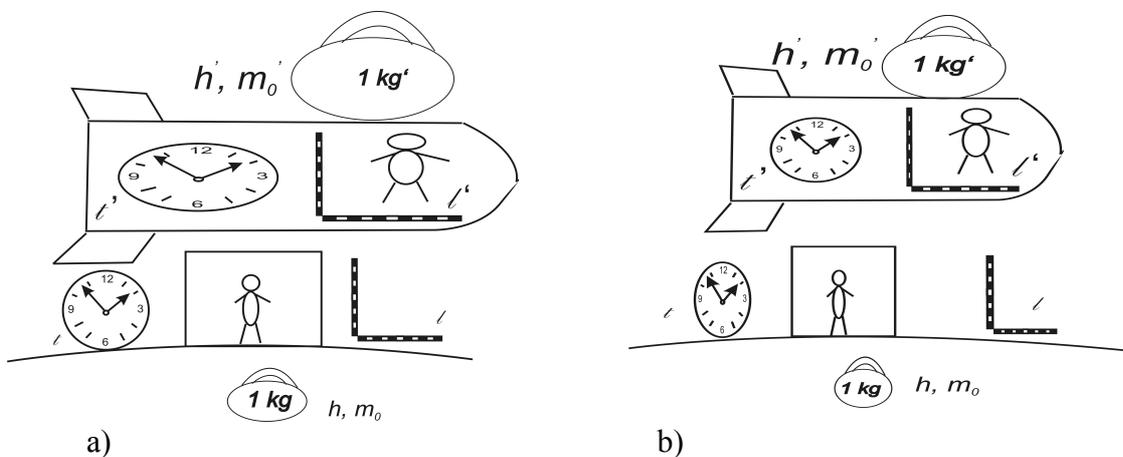## *Different elementary measurement processes for mass and time?*

Fig. 1. A relativistic act a) in Earths IF, and b) the same in the travellers IF.

As we developed a new measurement method [5] using relativistically stretched units to get contracted distances and time segments, we want to widen the same method to the measurement of masses and the Planck constant, this means by stretching units. And indeed, it is same, the corresponding units will be first stretched, are getting larger, but then a difference occurs. In measurement of distances and time durations they are to count how many times the new unit will fit between two space locations, which are same in all IF. But in measurements of masses and Planck constants the number of elementary particles stays invariant and so they must add all the new heavier units together and a measured mass gets more. And Planck constant is inside of each particle as length, mass and time units.

All four relativistic attributes are now asymmetrical and we can show it in a typical SRT figure but with the new knowledge.

Now all four relativistic relevant attributes are at the level of units first all asymmetrically stretched, then using this units a measurement occurs causing contracted distances, time lines and masses.

Easy to see is, that both observers do not need to calculate "synchronized clocks and simultaneity". They are clear and on both sides seeing without any paradox the same facts, events.

In a) the earths observer is measuring with his normal units the length, time and mass of the traveller as stretched. The units time and length are stretched, dilated, but only in compare. The clock is round in Earth and oval in space ship by stretching.

In b) is the opposite constellation. Now the traveller does have normal proportions *on bord*, and with his stretched units he measures as for him normal units everything on the earth contracted.

	Asymmetric Level Relativity		SRT, mixed level		
	stationary IF	moved IF'	*stationary IF*	*moved IF'*	
time unit	$\varDelta t' = \gamma \, \varDelta t$	$\varDelta t = \varDelta t' / \gamma$	$\varDelta t' = \gamma \varDelta t$	$\varDelta t = \varDelta t'/\gamma$	*consensus*
time measured	$t' = t / \gamma$	$t = \gamma \, t'$	$t' = t / \gamma$	$t = \gamma \, t'$	*consensus*
length unit	$\varDelta l' = \gamma \, \varDelta l$	$\varDelta l = \varDelta l' / \gamma$	$\varDelta l' = \varDelta l / \gamma$	$\varDelta l = \varDelta l' / \gamma$	*contradiction*
length measured	$l' = l / \gamma$	$l = \gamma \, l'$	$l' = l / \gamma$	$l = l' / \gamma$	*contradiction*
mass unit	$\varDelta m' = \gamma \, \varDelta m$	$\varDelta m = \varDelta m' / \gamma$	$\varDelta m' = \gamma \, \varDelta m$	$\varDelta m = \gamma \, \varDelta m'$	*contradiction*
mass measured	$m' = \gamma \, m$	$m = m' / \gamma$	$m' = \gamma \, m$	$m = \gamma \, m'$	*contradiction*
Planck h	$h' = \gamma^2 h$	$h = h'/\gamma^2$	$h=h'$	$h'=h$	*can be in SRT*
2-d postulate speed of light c	$c' = \gamma \, \varDelta l / \gamma \, \varDelta t,$	$c=(\varDelta l' / \gamma)/(\varDelta t' / \gamma)$	$c'=(\varDelta l / \gamma)/(\gamma \, \varDelta t)$ $=\varDelta l / \gamma^2 \varDelta t$	$c=\gamma \, \varDelta l' / \gamma \, \varDelta t'$	*Contradiction of 2-d postulate*

Tab. 1. Compare of SRT and present Asymmetric Level Relativity in all four attributes asymmetry and speed of light test discovering a contradiction of 2-d postulate in SRT.

In Tab.1 the compare result of two theories is in compact form for all four relativistic attributes available. The Planck constant is probably an unit with length and time or mass inside and therefore there is a squared relation.

Most interesting is, that also masses do follow this asymmetric principle too which we show with the different size of a kettlebell. The masses are heavier in travellers IF then in the earths IF. This really means the rest mass particles, the invariant constants! And they are nevertheless invariant, as

we discovered above how it happens with the hidden Lorentz factors. In each IF everything is measured with the own relativistic units and the result ends up in the same measure numbers, but with the stretched units. We cannot recognise it being in the IF. The relations are same. More can be found in our other two deeper works on relativity [6, 7].

The result is, that we have to transform asymmetrical, as it is in SRT for time dilation exclusively, now all 4 relativistic attributes including the mass and to stretch all units. This is a fundamental change in the relativity theories, which were thought to be "most exact proven". By the way all proves of time dilation are conform with present new theory.

This compact new relativistic formula for h' can be a symbol of a new coming deeper relativistic theory which contradicts the SRT. In (8) and (10) we can read out and mark the main results:

$$m' = m\,\gamma\,; \quad m = m'/\gamma\,;$$

$$h' = h\,\gamma^2\,; \quad h = h'/\gamma^2$$

References:

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[6]   Schatz, V., New measurement method corrected a failure in special relativity, preprint available at https://vixra.org/abs/2106.0023

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