Universal Specificity Investigation 7: The Theory of Everything That is Light

Daniel Harris
Northrop Grumman
Morrisville, USA
daniel.harris2@ngc.com

Prior investigations into the theory of universal specificity (or specificity for short) found a proper conception of time missed in common practice; which lead to discovering the cause of kinetic time dilation; which lead to revisiting the relativistic kinetic energy, mass and total energy model; which allowed for the integration between potential and kinetic time dilation and an updated total energy model comprised of internal potential, external potential and kinetic energy; which culminated into a theoretical experiment capable of detecting the universal inertial frame (UIF).

Specificity accepts all observations predicted by relativity, and the appearance of the validity of the conclusions drawn from relativity, but not their actual validity. Specificity asserts that all existents exist at any given instant in some specific state, to include some specific place—nothing exists outside of that. The last remaining question about this theory to be invested is: if spacetime is not a real thing, and therefore, cannot be responsible for kinetic or gravitational time dilation, as an environmental affect on objects, then what causes everything in the same reference frame to be effected by time dilation in the same way? Addressing that question is the focus of this paper.

1. EVERYTHING IS LIGHT

What if light were the atom, the fundamental building block of matter, predicted over a millennia ago by Democritus [1]? What if matter as we know it, are simply entangled photons in differing structures and arrangements? That is the theory of everything that is light.

If everything were made of light, then it would explain why everything is effected by kinetic time dilation in the same way. In the case of kinetic time dilation, if everything is entangled light, and the speed of light is constant relative to the UIF, than any transnational movement of the entangled light would limit the lights internal movement of the objects comprised of light. Indeed, that is what happens when studying the total energy equation, as shown in Equation (6). Assuming no gravity potential (ΔE_P), as the kinetic energy (ΔE_K) increases, the internal energy (ΔE_I) decreases.

$$E_T = E_I + \Delta E_K + \Delta E_P \tag{1a}$$

$$\frac{1}{2}mc^2 = \frac{1}{2}m_0c^2 + \frac{1}{2}mv^2 + m\int g(r)dr \tag{1b}$$

By implication of light being affected by kinetic time dilation, it would be affected by any time dilation, since previous investigations integrated potential and kinetic time dilation as being the same phenomenon. Time dilation would fundamentally be something that affects light, *quite possibly the only thing that effects light*, which then means it affects everything.

It also would explain why *specific* work done, as opposed to simply work done, is the cause of total time dilation because each particle of light needs the same amount of work done to it to have the same effect, thus, work is required to scale with the quantity of entangled photons.

Obstacles to the Theory of Everything That is Light

The theory that everything is light is not conclusive. It lacks a method of agreement and method of difference experiment that makes inductive proof of this grand generalizations possible [3]. Only certain evidences are available to suggest that it might be true, not that it is true; however, the evidence is compelling enough to warrant the creation of a theory.

Certain obstacles stand in the way of this theory seeming plausible. Light, we are told from relativity, only travels at a constant speed, c, for any reference frame. This is a problem because massed objects, normally not considered to be entangled photons, are clearly not at c; therefore, it presents a paradox of how could this be a case where light is not moving at a constant c simply because of its structure.

Another obstacle is light, we are told from relativity, has no mass. This is a problem because what is implied by the theory of everything that entangled light has mass; therefore, it presents a paradox of how could entangled light achieve mass when unstructured light has no mass.

Given these obstacles, this theory seems ridiculous from the perspective of relativity, but let us see what specificity has to say. For the first obstacle, specificity gains access to two key pieces of evidences, which relativity is blocked from, that shows light does not always travel at c for every reference frame. For the second obstacle, specificity gains access to a total energy model that explains why light actually does have mass. Not to mention there are other observations that support the notion that everything is light.

Light Slower Than c

The two key pieces of evidence that light can travel slower than c are in the case where it is moving through a gravitational potential, and moving through a medium, which amounts to the same thing.

Relativity explains gravity with the bending of spacetime which allows the light to travel a further distance to counteract the fact that it takes more time for light to travel through it, thus, keeping c constant. Specificity does not accept spacetime as a thing that actually exists; it is only a useful model to explain predictions, like assuming a flat earth to predict trajectories, or Ptolemy's model to predict celestial motion. According to specificity, therefore, nothing is actually bending since only units being measured are changing

giving the appearance of a bend. This means light is actually traveling slower than c inside a gravity potential. A prior investigation integrated the total energy equation with changes in gravitational potential energy, and it was discovered that the velocity of objects (including light) slow down in the gravity potential by a factor of $\sqrt{1-\frac{\Delta e_P}{e_T}}$—this is the reason why light takes longer to travel through a gravity potential.

Light traveling slower in a gravity potential is not too different from what happens during kinetic time dilation—keep in mind that they are the same phenomenon. Specificity holds that unit changes give the appearance that the speed of light rains constant when specific work is done. If the units were properly calibrated, then one would discover that the relative velocity between traveling objects and light is equivalent to that measured in the UIF. It means the relative velocity of light is actually slower than the speed of light in one direction, and faster in the other. Gravitational time dilation, like its counterpart, makes light appear as though its speed were constant, but in reality it slows down.

As far as light's behavior inside a medium, I believe relativity has nothing new to say about refraction; they are treated as separate branches of physics. A common explanation for why light slows down inside of a medium is because it bounces back and forth between atoms, essentially taking the scenic route, which is just wrong [4]. Another common, and more plausible, explanation is the effective wave, due to electromagnetic (EM) interference to the original wave from the wave generated by moving electrons (moved by the original wave), makes the effective wave appear slower [4]. This last explanation relies on the EM waves produced by the moving electrons to move slower than light, to create the desired slower wave, which just sweeps the problem under the rug.

Specificity, however, addresses light speed inside a medium by integrating the effect of a time dilation gradient with the bending of light in refraction. The index of refraction, n, relates to gravitational time dilation as follows:

$$\text{Recall}: \ v'\sqrt{1-\frac{\Delta e_P}{e_T}} = v \tag{2a}$$

$$n = \frac{c}{v} = \frac{v'}{v} \tag{2b}$$

$$\therefore n = \frac{dt'}{dt} \tag{2c}$$

$$g(r') = \lim_{dr'\to 0} -e_T \nabla \tau^2 \tag{2d}$$

$$\text{Where}: \ e_T = \frac{1}{2}c^2 \tag{2e}$$

$$\nabla \tau^2 = \frac{\tau^2}{dr'} \tag{2f}$$

$$\tau^2 = \left(1-\left(\frac{dt}{dt'}\right)^2\right) \tag{2g}$$

$$\therefore \tau^2 = 1-\frac{1}{n^2} \ \blacksquare \tag{2h}$$

What this tells us is that at the threshold, from one medium to another, there is a time differential gradient which causes the light to refract and slow down, as it does within a gravity potential—because light's close proximity to molecules inside a medium means its inside a gravity potential. This would explain why material density is correlated to refraction index, because denser objects have more gravitational time dilation between its molecules.

Now, the values of τ in the gravitation examples from previous investigations were extremely small. For example, in the studied case on earth's surface $\tau = 4.67 \times 10^{-5}$, which means $n \approx 1$. In contrast, consider the material with highest discovered index of refraction, which is $n = 38.6$ [5], which would mean $\tau = 0.9997$, or five orders of magnitude higher than the earth's gravity case.

Not to mention in our gravitation examples the distance measuring the time dilation gradient were on the order of kilometers, meaning the grade of the gradient was quite shallow. Whereas the time dilation gradient at the threshold of two mediums is practically a step function, implying the gradient is close to a step function. This would explain the kink (apparent infinite acceleration) in the light path during refraction, and the arc of the light path for gravitation. This would also explain why light only bends at the threshold (i.e., Snell's Law)—there is no time dilation gradient anywhere else.

The similarities between refracted light and light in gravity continue. The wavelength decreases (blue shift) as light passes into a gravity potential, just as it does when it passes into a medium. In fact, it is the same shift. The relationship between the wavelength in a medium, λ, the wavelength in space, λ', and the index of refraction is given by Equation (3).

$$\frac{\lambda'}{\lambda} = n \tag{3}$$

Which means the relationship between the wavelength in a medium, λ, the wavelength in space, λ', and changes in potential energy is given by Equation (4).

$$\frac{\lambda'}{\lambda} = \sqrt{1-\frac{\Delta e_P}{e_T}} \tag{4}$$

More generally, the relationship between the wavelength in a medium, λ, the wavelength in space, λ', and specific work done (kinetic or gravitational) is given by Equation (5).

$$\frac{\lambda'}{\lambda} = \sqrt{1-\frac{w}{e_T}} \tag{5}$$

Thus, color shifting of light (in terms of wavelength) under kinetic, gravitational, and refraction are united under a common phenomenon—specific work done. Everything being light would then explain the appearance of space contraction. That is the distance between amplitudes of light shrinks in the UIF as specific work is done; therefore, all the formations of entangled light shrinks along with it.

Much would be explained about refraction if everything were light. What remains unexplained, however, is why different

frequencies of light bend differently during refraction, while they appear to bend the same way with gravity. It actually may mean that light of differing frequencies do bend differently for gravity too, but the effect is so small that it goes unnoticed. But as to why light bends differently depending on its frequency for refraction, I do not know. The best guess I have is that the wavelength of light affects how long the boundary influences the light wave—the shorter the wavelength, the more sinusoidal cycles it has at the boundary layer compared to longer wavelengths. Each cycle might cause the same am mount of bending; thus, more cycles means more bending. This is just a guess.

Given the observations of light's speed change in a gravity potential and in cases of refraction we know that light can, and does, travel at slower speeds than c in any given reference frame; therefore, specificity hurtles over the first obstacle. Things made of light travel slower than c because light travels slower than c.

Light Has Mass

From studying the total energy model produced by specificity, shown in Equation (6), one is able to see that the rest mass of objects approaches zero as they approach the speed of light, but the mass of the object (measured in the UIF) remains invariant.

$$m = \frac{m_0}{1 - \frac{v^2}{c^2}} = \text{Invariant} \tag{6a}$$

$$\frac{1}{2}mc^2 = \frac{1}{2}m_0c^2 + \frac{1}{2}mv^2 + m\int g(r)dr \tag{6b}$$

Recall that rest mass, according to specificity, is NOT the same concept as in relativity. Rest mass in specificity is the mass measured in the rest frame, just like relativity; however, specificity recognizes a change of units of all measuring instruments, caused by work done, while relativity does not. This means for specificity, if light were to slow to a stop its rest mass would not be zero any longer because light is not massless under specificity.

Relativity has another unchallenged issue with regard to light being massless. That is it lacks an explanation for why light has momentum, which prior to relativity was considered a property of things with mass—relativity's solution is to equate mass with energy so momentum now relates to energy as well as mass. Specificity does not cross into this issue because light has mass—mass and energy remain two properties of an object, which have a physical relationship. The mass of light is its total energy divided by specific total energy, and its momentum is its mass times velocity, as shown in Equation (7).

$$m = \frac{E_T}{e_T} = \frac{hf}{\frac{1}{2}c^2} = \frac{h\frac{v}{\lambda}}{\frac{1}{2}c^2} \tag{7a}$$

$$p = mv = \frac{hfv}{\frac{1}{2}c^2} = \frac{h\frac{v^2}{\lambda}}{\frac{1}{2}c^2} \tag{7b}$$

$$\text{if}: \ v = c \tag{7c}$$

$$\text{then}: \ p = \frac{2h}{\lambda} \tag{7d}$$

Other Observations

Other observations, serving as evidence supporting the notion that everything is light, will be quickly listed and described.

- All objects emit and absorb light constantly
- The food chain begins with light emitted from a process of fusion (turning matter into light)
- Objects become more like light the closer they get to c
- light is eternal

It seems reasonable that when dissecting an object to determine what its made of, that the conclusion ought to be based on the makeup of the components you find. For all objects in the universe they absorb and emit light in accordions with Planck's Law and the spectral emissivity of its material. Does it not seem reasonable that this means all things are made up of light? To take it another step, all living organisms requires food for energy, which fundamentally can be traced back to the sun as its source via plants and photosynthesis. It has been said that living organisms are made up of star stuff and star food because of this observation, well the middle man is light—it is what transfers the energy from the sun to our food.

When objects approach the speed of light their rest mass approaches zero, as is the case for light. Light is said to not be charged, what if increased mass being measured by cyclotrons [], which uses the amount of magnetic force to move the object to estimate its mass, it the weakening of the object's charge as it was becoming more like light.

2. Transforming Light Into Matter

The only way for light to transform into matter, if the total energy model is complete, is for light be within sufficiently close proximity to other light. That way both become entrapped by each others gravity potential, which is governed by the third set of terms in the right side of Equation (6). This occurs on a galactic scale all the time, when light is absorbed by objects, and during stray opportunities where light meets in the vastness of space.

3. Conclusion

In conclusion, it was shown that it is possible to detect the UIF if measurements are taken that do not nullify the effects of changes of units caused by work done. The designed experiment involving sending gravimeters hurtling towards the center of mass of a massive object is capable of such a detection.

The last question to be investigated by this universal specificity series is: if the bending of spacetime does not cause gravity, and it is not responsible for kinetic time dilation as an environmental affect on objects, what then causes everything in the same reference frame to be effected by time dilation in the same way? Addressing that question is the focus of the next and last investigation.

References

[1] S. Berryman, *Democritus*, Stanford Encyclopedia of Philosophy, 07-Jan-2023. [Online]. Available: https://plato.stanford.edu/entries/democritus/. [Accessed: 22-Feb-2023].

[2] R. F. Evans and J. Dunning-Davies, *The gravitational*

red-shift, [gr-qc/0403082] The Gravitational Red-Shift, 18-Mar-2004. [Online]. Available: http://export.arxiv.org/abs/gr-qc/0403082. [Accessed: 22-Feb-2023].

[3] D. Harriman, *The Logical Leap: Induction in Physics*, NYC: Berkley, 2010.

[4] fermilab, *Why does light slow down in water?*, YouTube, 20-Feb-2019. [Online]. Available: https://www.youtube.com/watch?v=CUjt36SD3h8. [Accessed: 16-Feb-2023].

[5] *Metamaterial breaks refraction record*, Physics World, 29-Aug-2017. [Online]. Available: https://physicsworld.com/a/metamaterial-breaks-refraction-record/. [Accessed: 16-Feb-2023].