Space, time, and the real relativity

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Abstract

In this brief review, we will show that there is only one cause for relativistic transformation in nature. We will clearly show that there cannot be different causes for relativistic effects because of what we observe in nature. If we suppose that matter and light are made of energy, propagating at the speed of light, there is only a narrow possibility for the accurate description of relativity. And therefore, if matter is made of energy propagating at the speed of light, the conventional concept of "spacetime" is the wrong solution to the relativity which we experience.

Introduction

It has become clear, for many of us, that the particles of matter (fermions) are made of the same "stuff" that light is made of. This is also clearly hinted at, by the famous equation $E=mc^2$.

Martin van der Mark's paper: "On the nature of "stuff" and the hierarchy of forces"[1] gives us further insight into a way this "stuff" which comprises light and matter, can become more clearly understood. And Martin van der Mark's paper "Light is heavy" [2] also gives us some specific insight into the reasons that $E=mc^2$.

In many instances, we can just use the analogy that **matter is made from light**. This analogy does not clearly address the principles of the confinement forces required for the "containment" of the waves of light in fermionic particles, but it gets the basic point across nonetheless.

This situation of "matter being made from light", leads us naturally to some analysis of nature, which is quite enlightening, regarding the nature and cause for relativistic transformation.

Relativistic Effects

The popular view is that relativity is caused by "spacetime", a four dimensional construct which supposedly describes the nature of space itself. This is such a prevailing belief, that those who question this premise are often regarded as some form of extremist, by the established scientific community. *What we are suggesting is a good look at the causes demonstrated in* *nature, to validate or disprove our strongly held beliefs, for this is the stuff that science is made of.*

This is not generally a difficult topic to understand. But it is one that has escaped us somewhat, and which needs to be clarified, for our further understanding and development.

So we will go through a simple, step by step analysis, of the available information, in an attempt to shed some light, so to speak, on this important topic.

Each scientific premise we construct contains some assumptions. Hopefully we can minimize those assumptions, in as many ways as possible, as we construct our theories, so that the theories are built upon a more solid foundation.

Robert Close has done an excellent job of illustrating part of the topic in his paper "The Other Meaning of Special Relativity" [3]. We suggest you read and understand the implications of his suggested premise. Because Robert has done a good job of illustrating this concept mathematically we will not address these formulations in depth again here. For a better understanding you can review his work.

It should be pointed out, that we came to these conclusions completely independently, and many physicists and scientists have come to the same set, or a similar set, of conclusions independently. These include of course Lorentz, and John Stuart Bell. Bell is widely applauded for "proving" the validity of QM with his inequalities. But if you carefully read Bell's work, it becomes clear that he was not of the same opinion. In fact it becomes clear that Bell was pointing out problems in **both** of our fundamental theories, QM **and relativity**. Let us let J. S. Bell speak for himself on these topics.

Regarding relativity Bell wrote, *"I would say that the cheapest resolution is something like going back to relativity as it was before Einstein, when people like Lorentz and Poincar´e thought that there was an aether – a preferred frame of reference – but that our measuring instruments were distorted by motion in such a way that we could not detect motion through the aether. Now, in that way you can imagine that there is a preferred frame of reference, and in this preferred frame of reference things do go faster than light."," Behind the apparent Lorentz invariance of the phenomena, there is a deeper level which is not Lorentz invariant, a pre-Einstein position of Lorentz and Poincar´e, Larmor and Fitzgerald, was perfectly coherent, and is not inconsistent with relativity theory. The idea that there is an aether, and these Fitzgerald contractions and Larmor dilations occur, and that as a result the instruments do not detect motion through the aether – that is a perfectly coherent point of view."*

And regarding QM Bell wrote, *"the orthodox theory [QM] is "unprofessionally vague and ambiguous" in so far as its fundamental dynamics is expressed in terms of words which, however legitimate and necessary in application, have no place in a formulation with any pretension to physical precision … ". And "I think there are professional problems. That is to say, I'm a professional theoretical physicist and I would like to make a clean theory. And when I look at quantum mechanics I see that it's a dirty theory. The formulations of quantum mechanics that you find in the books involve dividing the world into an observer and an observed, and you are not told where that division comes... So you have a theory which is fundamentally ambiguous".*

Now we need to state, that as a generalization, electric charge and magnetism are observed as a result of the dynamics of fermionic particles. Our measurements, are also made by the interactions of fermionic particles with fields or forces. In this way, our visualization of nature is "filtered" by the properties of fermions. In fact, our entire sensory perception of nature, is specifically caused by the way fermions react with and "filter" the fields and forces of nature. If we understand this process of fermions, we can begin to see through this filter and construct a fairly accurate picture of nature. That is a bit beyond the scope of the current writing, so we will, of necessity, address these issues in a later writing.

So let us start with the assumption that we are made of the same "stuff" that light is made of, and that "stuff" obeys a certain set of principles. The "stuff" we refer to is energy. Space has a set of properties which we can decipher, from the way the energy reacts with space. Our starting assumption therefore, is that the basic energy in space, always propagates through space at the speed of light. Then it is *energy in space*, propagating at the speed of light, which makes light. This is a fairly safe assumption. Now we will postulate that the same energy, when "confined" to very small closed paths, is what creates fermionic particles. It is again beyond the scope of this work to provide the details of this creation of fermionic particles from energy propagating in closed paths, but this approach can provide a robust and elegant view of nature. Our work in this area has proved to be very fruitful, and the works of many others including John Williamson[4] , Martin van der Mark [1,2], and Richard Gauthier, is validating this premise, to an extent that it seems that it will become a much clearer definition of nature than we currently have.

But for now, I will ask you to accept this premise *that matter is made from the same stuff that light is made of*, just for the sake of exploring the principles behind relativity.

We have come to understand waves fairly well. This is primarily because we have so many illustrations of how waves behave. Sound waves are a useful analogy as we explore the principle of relativity, and such a comparison for the sake of analogy, is done quite well in the paper by Robert close cited above. But first let us state a result of our earlier premise, the *premise that we are made of the same stuff that light is made of*. If this premise is correct, then it would mean that the length and time, as measured by light propagation, would be exactly the same length and time we would measure using material rulers and clocks.

So another way of viewing this is to state that, if distance is always measured by propagation time, and time is always measured by propagation distance, *then wave velocity is the factor which determines both distance and time.* We know that using material rulers and clocks, yields the same result as measuring distance and time with the propagation of light. It is then reasonable that we might consider particles of matter to be made of energy propagating at the speed of light.

So if distance is always measured by propagation time, and time is always measured by propagation distance, *then wave velocity is the factor which determines both distance and time.*

We can then state that for two points: $d^2 = \Delta x^2 + \Delta y^2 + \Delta z^2 = c^2t^2$ where *d* is spatial distance between two points at a fixed time, *c* is a fixed velocity constant, and *t* is the propagation time between the two points being considered when these two points remain stationary.

Lorentz transformations are required in a system where time is measured by wave velocity, and distance is measured by the same wave velocity. In our universe, it is therefore reasonable to assume that perhaps our rulers and clocks are made of the same energy, in "confined" configurations which make up light when not "confined" in that manner. This configuration allows our rulers to measure distance based on wave velocity, and clocks to measure time based on wave velocity. **The wave velocity of light then becomes for us a conversion factor relating units of distance to units of time**.

Therefore, even apart from the suggestion provided by $E=mc^2$, that light and matter are made of the same stuff, the measurement of length and time being the same when measured by light, as they are when measured my material rulers and clocks, also suggests that we are made of the same stuff that light is made of, and that this energy, that everything is made of, propagates at the speed of light. As Robert Close has also so clearly pointed out, we do not have to resort to any non-Euclidian definition of space to achieve this relativistic result.

Now comes the interesting part. *There can be only one relativity*. Both the "spacetime" relativity popularly accepted, and this relativity based on the observable clues*, specifically require Lorentz types of transformations. So we are stuck with either one or the other being correct. Both cannot be right,* because if both were right, and each requiring Lorentz transformations, then nature would show us that we need to **apply Lorentz transformations twice** to length or time, in order to get the correct answer. But nature has shown us that the correct answer comes from *only one* application of these transformations. So if we are made of the same stuff that light is made of, then there is only this one version of relativity which can be correct.

Now for the "logical" consequences…

So that, if you accept that light and matter are made of the same stuff, propagating through space at the "speed of light" **you have already accepted a condition which causes our rulers and clocks to be transformed by Lorentz transformations in Euclidian space**. So, logically, *there is no room for another interpretation for relativity*.

This is a "painful" situation for some. For this situation has some other interesting consequences. Space is, in this scenario, a 3 dimensional "fixed" medium. Time is created by the velocity of energy through space, and in this scenario, which is likely correct based on all observable evidence, the popular view and interpretation of "spacetime" does not exist.

But now we come to the tricky part.

Without the thing we call *time*, can there be a thing called *motion*? I think the answer must be NO. Simply because motion is perceived by us to be a displacement through time. So that space cannot have *motion* without the *time* component. But let us now consider that we have demonstrated that space is probably Euclidian and most likely fixed. So let us take that observation one step further, to suggest that time is also a fixed unchanging property of our universe. That is not to say explicitly that time is part of space, but rather that time is part of our universe. But this *time* is generally different from the time we measure, it is not the same as the time we are normally able to observe. The distinction will become more obvious as we review the consequences. The reason that this *time* is generally different from, in that it is generally faster than, the time we measure, is clearly illustrated by the mathematics, provided our assumptions to this point are accurate.

So we measure light to be the same speed in our inertial (and gravitational) frames, because we are made of the same energy which light is made of, and this energy propagates through fixed space, at a fixed speed. In this way, this energy is constrained by space, contained, so to speak, by space, because it is controlled and limited in speed, by space.

What does this consideration of time do to the mathematics we use to model fermionic particles? It is clear that we must use Lorentz transformations when dealing with the motion of fermionic particles, because the velocity of the energy within, remains at a speed directly related to the speed of light, in the fixed reference frame of space. We do not yet know our velocity vector in this frame, so we have to calculate from what we know. This has the result of making most things basically appear relative. The reasons we must use Lorentz transformations have been discussed, but they are primarily because the energy in fermionic particles circulates about a point, giving the particle a "rest frame" which is theoretically motionless, even though the energy within is still moving at a speed directly related to the speed of light. For calculations regarding light itself, we do NOT use Lorentz transformation in any form, but we do use time and the speed of light. Or, in the case of analysis of the motion of space as a wave passes, we use wave equations to derive the equations of motion of space, which yield velocities which are higher than, but directly related to, the speed of light, locally, as the wave passes.

A bit more about *time*

It is clear that space can support the propagation of light. The propagation of light is caused by a "displacement" of the fabric of space, (motion). So *time* must be a component of our universe. So if we view things from the fixed frame of this space we can see and understand some details about time. For time, in this space, there are some basic consequences. In this space, there is no past which currently exists, there is only the dynamic remnant of the past.

And there is no future which currently exists in this space, but just the dynamics to create a future. So there is no looking into the past, for all we can see of the past is the dynamic remnant of the past which exists in our present. We can't go into the past, but we can see the results of the past, meaning we can see the energy which was set in motion by the earlier dynamics. We can see the light from long ago and far away, and perceive it to be "looking into our past", but it is not actually looking at the past, it is looking at the present results of the past. We (or anything in our physical universe, for that matter) cannot look into the future, in this space, for all we can see are the dynamic properties which will create a future. So there is no form of time dilation possible which extends our concept of "now" to make it a "now" which encompasses extended time, an extended line instead of a point, into the past or future, no matter how fast we are traveling. As clocks slow in this space, "now" is always still an infinitely short point in time. If time stops for an object, then for that object, there is no NOW, for there is no TIME. For time to exist it must be moving forward. The same is true for light in this space, even though light is traveling at the speed of light. "Now" for light is still an infinitely short point of time. *For it is the action of the propagation of energy through space which defines the rate of time.* No transformation of time (or length) can be accurately applied to light in this fixed space. *Time*, in this fixed frame of space is the reference time of the universe, and no time can move faster than this reference time. But *time* in this frame is not the time we measure, for we measure time in moving and gravitational frames, which is *always slower* than the *time* of space.

If this is the way the universe is made, which appears likely given all the observable information, then there is no form of "retro-causal signaling" going on in space, where time flows into both the past and the future. Time can move in only one direction. Past→Now→Future. It can appear to move more slowly for rapidly moving material objects, but it cannot go faster than the reference time of space, nor can time be reversed.

In light of the information we have, we then must use a component of *time* when calculating the displacement of space for the propagation of light. This is the only way it can work. By considering the motion of space in increments of *time*. Space imposes finite limits on displacement in finite *time*, with a given displacement force.

But how does gravity work in this form of relativity? We will need to delve deeper into the details to gain some understanding, before this becomes obvious.

Let us think about a black hole. If gravity is limited in speed, the same way light is limited, in the massive gravitational field of a black hole, then at the formation of a black hole gravity could not escape, just as light cannot escape. But the evidence indicates that gravity does quite easily escape the massive black hole, which seems to exist at the center of our galaxy. In fact indications are that the gravity which escapes this black hole, apparently helps to hold our galaxy together. So one of the first things we have to recognize is that gravity is FASTER than light. As for how much faster, we will have to look for those clues in nature as we proceed.

So let's take a look at the information in nature to see if we can sort through this puzzle.

The speed of things in space

When we study wave propagation, we can see that for practically any medium, a longitudinal or "compression" wave travels faster than a transverse or "shear" wave. The normal equations are:

For a transverse "shear" wave: $v_t = \sqrt{\frac{\mu}{p}}$

For a longitudinal "compression" wave: $v_l = \sqrt{\frac{K + \frac{4}{3}\mu}{p}}$

Where v_t is the velocity of a transverse wave, v_l is the velocity of a longitudinal wave, μ is the shear modulus, *K* is the bulk, or compression, or longitudinal modulus, and *p* is a density term.

From these simple wave propagation formula, we can see that in a physical medium, with any value of μ, and *p*, and any value for *K* which is greater than zero. A longitudinal wave **will travel faster** than a transverse wave. So far, we have not found any solid "elastic" medium, which supports transverse waves, but which does not support longitudinal waves. In fact, it can be argued that for any such medium, if the medium has a shear modulus*, it must also have a compression modulus*. Which would simply mean that in ANY such medium, longitudinal waves WILL TRAVEL FASTER than transverse waves.

From this we can see that a "compression" disturbance of space will travel faster than a "shear" disturbance. So that, we can also imagine that, if fermionic particles are made of energy propagating in space, in confined "soliton" form, they will cause a tangential "compression" type of displacement of the surrounding space.

Why have we not been able to measure this speed which is faster than light? Actually it appears we have seen that this speed exists, but it is a relatively recent development, so we have not actually measured the speed yet. An experiment conducted in 2012 and repeated with the same results in 2014, "**Measuring Propagation Speed of Coulomb Fields**" by R. de Sangro, G. Finocchiaro, P. Patteri, M. Piccolo, G. Pizzella, at Istituto Nazionale di Fisica Nucleare, Laboratori Nazionali di Frascati, in Italy, showed that the Coulomb field (charge) moves very much faster than the speed of light. But in the small laboratory environment of the experiment it would be very difficult to measure the actual velocity of the Coulomb field if it were significantly faster than light. The distances in the laboratory are just too short so that the measurement for a very fast field propagation would seem almost instantaneous, and therefore the speed would seem almost infinite. This author suggests that we set up an experiment which is capable of measuring speeds for this field *up to* 274.072 c or $\frac{2}{\alpha}c$, or two over the fine structure constant times the speed c.

I suspect we will measure the speed of charge to be $\frac{1}{\alpha}c$ or about 137 times the speed of light, providing for a coupling, between the transverse fields of particles and the Coulomb field, of α, the fine structure constant.

But one reason we are discussing this topic, is to look for a possible cause for gravity, and to see if this possibility can illustrate how gravity can travel faster than light. Now suppose that these longitudinal waves, traveling much faster than light, also add a specific momentum to space, increasing the apparent "density" of space. This would cause light to curve in the vicinity of a large concentration of charged particles, (fermions), particles of mass, like in a sun or planet. And if we are made of the same stuff that light is made of then this would also cause gravity.

Note: *Faster than Light (FTL) tunneling is another phenomenon, where we have clearly measured something traveling faster than light. So we need to realize that, with gravity (faster than light), FTL tunneling (faster than light), and the velocity of the Coulomb field (faster than light), a "relativity theory" where nothing can travel faster than light,* ***is probably in error****.*

References

[1] Martin van der Mark, "On the nature of "stuff" and the hierarchy of forces"

[2] Martin van der Mark, "Light is heavy"

[3] Robert Close, "The Other Meaning of Special Relativity"

[4] John Williamson "On the nature of the photon and the electron"

[5] R. de Sangro, G. Finocchiaro, P. Patteri, M. Piccolo, G. Pizzella, "Measuring Propagation Speed of Coulomb Fields" at Istituto Nazionale di Fisica Nucleare, Laboratori Nazionali di Frascati,