A relativistic theory based on the invariance of Newton's second law for motion and the constancy of the speed of light in vacuum.

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I) Introduction:

Let me begin by saying that I did not start to develop a new relativistic theory in order to somehow supersede Einstein's Special Theory of Relativity (STR). My intention was to find out, if possible, a relationship between the "Newtonian Time" (NT) and "Einstein Time" (ET) after I discussed the concept of "Time" in my paper, "Further thoughts on, "On a general theory of gravity based on Quantum Interactions", Part Two". After obtaining the said relationship, I noted that I could develop a set of relativistic transformation equations between two non-newtonian inertial reference frames, S and S' with S' moving at a constant speed, T', along the +x-axis of S. These equations turned out to be quite different from the Lorentz-Einstein equations in STR and had consequences that in some cases were qualitatively similar to those of STR and others that were very different both qualitatively and quantitatively.

II) Newton's second law for motion:

I do not have to spell out what the Newton's second law of motion is, as it is quite well known. But I will state it's mathematical formulation, which is given by, $\vec{F_0} = d\vec{P_0}/dt_0$. Here, (a) $\vec{F_0}$ is the newtonian force, (b) $\vec{P_0}$ is the newtonian momentum and (c) t_0 is the NT. Underlying this equation are the assumptions, (1) there exists an absolute newtonian inertial reference frame, which we will designate by S_0 and whose coordinates are (x_0 ,y_0 ,z_0) and which is at absolute rest, and (2) there exists an absolute NT which is designated by t_0 associated with S_0. Now, both S_0 and t_0 are fictional entities and there is nothing in reality that represents them. If we take a non-newtonian inertial reference frame S in which we use the ET which we will represent by the letter t, and whose coordinates we represent by (x,y,z), then the Newton's second law for motion, in this frame of reference, will be given by $\vec{F} = \frac{d\vec{P}}{dt}$.

III) Relationship between t_0 and t:

Let us have S move along $+x_0$-axis of S_0 at a uniform absolute speed 'u' relative to S_0 . Using our assumption of the invariance of the second law of motion we have $\frac{dP_0}{dt_0} = \frac{dP}{dt}$ — equation # 1

From this, and using Occam's razor, we will assume that ~~dt_0 = dt~~ $dt_0 = \lambda dt$ and $dP_0 = \lambda dP$. From these we get, putting the integration constants equal to zero, $t_0 = \lambda t$ and $P_0 = \lambda P$. The relationship between x_0 and x will be given by $x = x_0 - ut_0$. From this we get $\frac{dx}{dt} = \frac{dx_0}{dt} - u\frac{dt_0}{dt}$. Taking $t_0 = \lambda t$, we get $dt_0 = \lambda dt$ and putting it in the above equation we get $\frac{dx}{dt} = \lambda \frac{dx_0}{dt_0} - \lambda u = \lambda\left(\frac{dx_0}{dt_0} - u\right)$

Now, putting v_0 for $\frac{dx_0}{dt_0}$ and v for $\frac{dx}{dt}$, we get after simple manipulation $\lambda = \frac{v}{v_0 - u}$ — equation #2 .

The equation #2 is valid for all v and v_0, including the speed of light. However, for the speed of light we have according to our assumption of it's constancy, $v = v_0 = c$.This leads to $\lambda = \frac{1}{1-u/c}$.

From this we see that the relationship between NT and ET is given by $NT = ET/_{1-u/c}$. Also, the relationship between P_0 and P is given by $P_0 = P/_{1-u/c}$. We know that 'u' is a fictional quantity which we can never determine, which makes determination of NT not possible.

IV) The set of relativistic transformation equations between two non-newtonian inertial reference frames S and S' :

Let us now assume that we have two non-newtonian inertial reference frames, S and S' that are moving at uniform absolute speeds v and v' respectively relative to S_0 along the $+x_0$-axis. We can immediately see

that, $x + vt_0 = x_0 = x' + v't_0$, $y_0 = y' = y$, $z_0 = z' = z$

and $t_0 = \frac{t}{1-v/c} = t'/_{1-v'/c}$.

After some simple manipulation we get the following set of transformation equations from S to S'.

$$x' = x + \left(\frac{v-v'}{c-v}\right)ct, \quad y' = y, \quad z' = z$$

and $t' = \left(\frac{c-v'}{c-v}\right)t.$

Let us now put T' for $\left(\frac{v'-v}{1-v/c}\right)$ into the above equations. This will give us the following set of Relativistic Transformation Equations from

S to S'. $x' = x - T't, \quad y' = y, \quad z' = z$

and $t' = \left(1 - \frac{T'}{c}\right)t$

From the consideration of these equations we can conclude, (1) the absolute and fictional quantities are eliminated, (2) the set of equations relating the coordinates (x',y',z') to (x,y,z) is exactly the same if we consider S' moving along +x-axis of S at a uniform, relative, to S, speed of T', (3) we can from this point on totally ignore the S_0 and t_0 as they have become irrelevant, (4) the speed, T', is a measurable speed and not something fictional, (5) there is no upper limit to the value for T' and (6) one can easily find out that if the speed of light in S is 'c', then it is also 'c' in S'.

V) Conclusions:

1) Using symmetry we get the following transformation equations from S' to S: $x = x' + T't', \quad y = y', \quad z = z'$

and $t = \left(1 + \frac{T'}{c}\right)t'$

2) Taking $x = x' + T't'$ we get $\Delta x = \Delta x' + T'(\Delta t')$.

Now if we are measuring the length, l', of a rod in S', then it's length, l, in S will be $l = l' + T'(\Delta t')$. Since the measurement is being done at a single moment $\Delta t' = 0$. This leads to l = l' . This means there is no length contraction in S' relative to S. This is unlike STR. However, the absence of length contraction protects us from all the length contraction related paradoxes encountered with STR.

3) Taking the equation $t' = (1 - \frac{T'}{c})t$, we get $\Delta t' = (1 - \frac{T'}{c})\Delta t$. This is similar, qualitatively, to the time dilation we encounter in STR. As mentioned before, there is no, a priori, upper limit on the value for T' . Hence, if $T' = c$, then $\Delta t' = 0$. This means the ET in S' (which can be a spaceship with passengers) comes to a halt. If, however, $T' > c$, the $\Delta t' < 0$. This means when S' is moving at supra-luminal speed, the ET in S' moves backwards! This means if S' is a spaceship with people, then the people will get younger!! It should be kept in mind that this retrogression of time is restricted to the spaceship only and the people in it will never be able to go back into the history of the universe in general or the earth in particular. The question as to whether we can build a spaceship that can travel at luminal and supra-luminal speeds is a purely engineering one. Our theory does not prohibit a spaceship from reaching any speed. One possible way to construct such a spaceship and power it was discussed by me in a paper called, "An interesting, but not practically impossible, application of the two proposed theories on gravity by myself". In it I show how we can use anti-gravity to drive a vehicle and be able to achieve any possible speed.

4) The famous mass/energy equation by Einstein, $E=mc^2$, remains unchanged with this theory. This can be easily seen by considering the well known thought experiment, by Einstein himself, in which he had a box in empty space with a photon traveling the length of the box. Einstein derived the mass/energy equation in it without the use of STR or the Lorentz-Einstein transformation equations. Hence, it stands to reason that the mass/energy equation is independent of our set of transformation equations also.

IV) Testing the theory:

I will not give a detailed description of an experiment that can be done to prove/disprove this theory. I will end this paper with the following two suggestions:

1) One can look at astronomical phenomenon and see if there are cosmic events that support this theory.

2) One can devise experiments or observe events at quantum mechanical level and see if there is any support for this theory.

Lastly, I feel that if we do find a quantitative but not qualitative difference between the predicted and measured results, it is most likely due to our assumption that $dt_0 = \lambda dt$. We have used the simplest relationship here and perhaps a less simpler relationship will make the predicted and measured results match each other.

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