The Lorentz transformation equation applies to objects in a circular motion, its answer being centrifugal accelerations influence on atomic half life.

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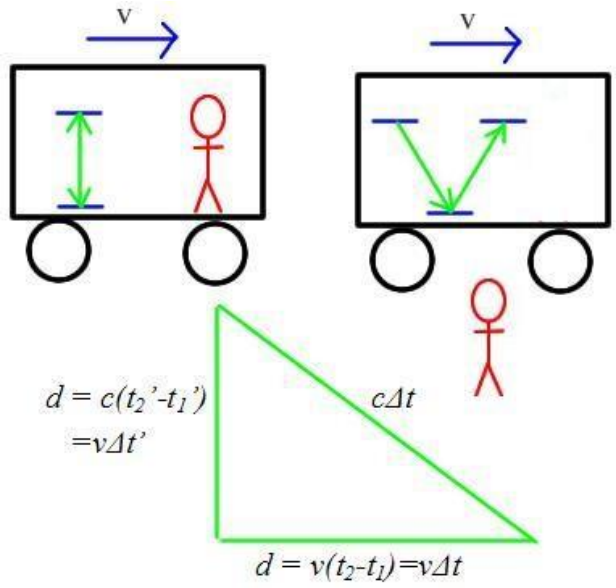
ABSTRACT

When trying to calculate the GR and SR daily adjustment to the USNO's GPS satellites onboard clock frequencies, but only using the gravitational and centrifugal accelerations applying, I noticed that if you start with the general relativity factor = gR/c^2 and substitute g for half the centrifugal acceleration v^2/R you arrive at the SR Lorentz transformation factor - $gR/c^2 = v^2/2R \times R/c^2 = v^2/2c^2$
The Lorentz transformations original derivation is based on linear vector motions and the need for time dilation to reconcile the constancy c across different reference frames. As this $v^2/2c^2$ factor provides a valid and correct adjustment to GPS time keeping, one of these competing derivations is likely to be a representation of reality, but the other one must be a coincidental hoax. This paper argues that the Lorentz derivation is likely to be the hoax.

INTRODUCTION

Original Lorentz transformation motivation and derivation - The speed of light is known to somehow disconnect itself from the relative velocity of its emitting source and speed of light measurements always return an answer of c relative to the observing equipment. The Lorentz transformation equation for time dilation was an apparent resolution to that speed of light paradox. Its resultant derivation is as follows. -
A ray of light travelling vertically at speed c on a train travelling at speed v. To make the resultant vector light speed stay at c relative to an observer watching the train pass by, the rate of time on the train must be slightly slower due to its speed v as follows -



t = normal time according to the stationary observer watching the train.
t' = reduced time experienced by the train due to its speed v

$(ct')^2 + (vt)^2 = (ct)^2$ which rearranges to

$t'/t = \sqrt{(1-v^2/c^2)}$ which when v<<c simplifies to

$t'/t = (1 - v^2/2c^2)$ OR the rate at which time is reduced due to speed v is the factor **$v^2/2c^2$,** the output unit being fraction of a second of time dilation per second of normal time (s/s).

Centrifugal acceleration equivalence to gravity derivation.

The Lorentz transformation factor can be derived from the centrifugal acceleration of the satellites as follows -

G = Gravitational constant, M = Mass of Earth, R = Radius of orbit, v = velocity of satellite, g = gravitational acceleration, c = speed of light in vacuum

Start with general relativity's time dilation factor	GM / Rc^2
Substitute into that $g = GM/R^2$, eg $GM = gR^2$	$gR^2/ Rc^2 = gR/c^2$
Substitute into that 1/2 the centrifugal acceleration v^2/R for gravity	$v^2R/2Rc^2 =$
And you end up with the correct valid working factor	**$v^2/2c^2$**

First attempt at a theoretical explanation for this "must be acceleration" motivated observation driven derivation-

Two competing thoughts for whether the centrifugal acceleration is an additional influence on the atomic half lives of the clocks.

1. NIL influence - The orbital motion is due to the gravitational force, therefore the centrifugal acceleration calculation is simply related to part of that gravitational accelerating influence and does not constitute any additional influence.

2. 100% influence - The orbital motion of the clocks atomic material is assured due to its contact with/containment within the satellites structure. Therefore this centrifugal acceleration is an additional influence being exerted on the atomic material at the same time as that material experiences the full back ground gravitational influence.

The observed simple average of these two competing scenarios as the net result could be due to either, a duplication of work done, or a random oscillation between the two across time.

REALITY OR COINCIDENTAL HOAX?

The US GPS systems on board satellite atomic clocks frequency have been altered for a 45850 ns/day general relativity calculation to deal with reduced gravity and a 7214ns/day special relativity Lorentz transformation calculation. The net daily adjustment being 38640ns/day reduces other GPS time synchronisations that are manually filtered out down to the order of +/- 25ns/day.

As the Lorentz transformation is a working model for motions alteration to atomic half lives, it is likely that one of the above two derivations of it are correct. That in turn means one of them is simply a coincidental hoax. In the event that the hoax is the original Lorentz derivation then the implications are profound, this factor is simply about alterations to atomic half lives and in no way suggests time dilation exists.

The centrifugal acceleration derivation solves some huge problems

1 Centre of orbit reference frame -Everything makes perfect intuitive sense. We know exactly what is relative to what, why and when.

The Hafele Keating plus later more accurate experiments flying clocks around the world can only be made to deliver a valid result by setting the centre of earth as the reference frame. These experiments involve clocks starting by the UTC clock at the USNO in Washington then flying them around the world in an eastward and westward direction and comparing the timing back to that UTC clock. If the time dilation factor $v^2/2c^2$ really is about relative velocity then surely the speeds used should be those relative to the USNO which is in stationary reference frame. Additionally the time dilation result depends on whether the clocks fly around the earth eastwards with the earth rotation or westwards against the earths rotation.

These test results are in perfect harmony with the centrifugal acceleration derivation of the $v^2/2c^2$ factor and in total conflict with the time dilation based derivation.

The Twin Paradox - Motivated by the need to defend time dilation this paradox is crowded out by the claim that the object that experiences the dilated time is

- The one that moved out of the "stationary" objects reference frame.
- But the time dilation is a function of velocity and not related to the acceleration that was required to move the object out of the stationary ones reference frame.

This incoherent wrestle with reference frames and a "well it just is" way to divorce an objects speed from its originating acceleration all goes away under the centrifugal acceleration derivation.

2 We no longer need time dilation.

Resorting to claiming time dilation exists to reconcile the observed constancy of the speed of light could well be an unnecessary act of desperation that is totally invalid. We know light reconfigures its speed/wavelength energy mix as it transmits through different mediums. If back ground EM radiation and/or gravitational waves provide light with the locality against which its speed/wavelength mix propagates then its known independence to the velocity of its emitting source and locally measured constancy is fully explained. The relative speed of the emitter and observer can therefore only be detected in a change to the frequency, in other words red shift.

The appendix to this paper has my analysis of the NASA Lunar Laser Ranging tests. Due to earths daily rotation the emitting laser and receiver had an angular velocity of 200m/s towards the reflector left on the moon by Apollo 15. The average light speed observed in the reference frame of the laser transmitter/receiver on earth and the reflector on the moon was simply c, the speed of light. I suggest that on the outbound part the laser pulses propagated to a speed/wavelength mix relative to the background EM radiation emitted by the sun which it traversed across, thereby eliminating the additional 200m/s of relative speed due to the earths rotation. It also means on the return journey the pulses impacted with earths atmosphere at a relative speed of c + 200m/s before reconfiguring to a speed/wavelength mix relative to the atmosphere.

New issues that arise to be resolved

1 Half life behaviour after the period of acceleration

The various tests demonstrate that gravitational or accelerating influences on atomic half lives is not compounding. The observed acceleration influences are unlikely to be the maximum levels experienced by the atomic material since its creation. It must be concluded then that the atomic half life after a period of acceleration goes into a wind down process. In other words it does not instantly revert back to a level had it not experienced the acceleration influence, but it does not maintain that level either. The apparent correlation between muon half lives and velocity is therefore an observation of this wind down period, the actual source of the half life extension being the greater level of acceleration experienced.

2 Accelerations directional influence on half life behaviour

The Hafele Keating plus later experiments suggest that the acceleration/deceleration of the plane take off and landings did not influence the atomic clock activity. However, if you view the deceleration as simply additional acceleration but in a different direction, then the total acceleration of the take offs and landings is very significant relative to the gravitational+ centrifugal changes that resulted in the measured time differences.

A possible solution is that the takeoff and landing accelerations were at a tangent to the influencing gravitation and centrifugal acceleration and therefore could not exert any influence. If influence is direction dependent, in terms of defining which is the direction, earths gravity is by far the most dominant and probably therefore dictating influence throughout these tests.

3. Modelling straight line acceleration influences.
The observational data dealt with by this paper gives us formula that model the interactions of gravitation and centrifugal acceleration on half life activity. Equations for straight line acceleration and any interaction with gravitational fields are not established within this work.

CONCLUSION

The Lorentz transformation is a valid measure of the alteration to half life activity by centrifugal acceleration and a centrifugal acceleration based derivation of that formula is identified. The traditional time dilation based derivation of the formula is therefore an coincidental hoax and its apparent success at measuring atomic half life activity changes does not constitute proof of time dilation.
We no longer need time dilation, other intuitively correct explanations for various observations are available to us and should be investigated.

APPENDIX next page

APPENDIX

Extracts from the paper -

LUNAR LASER RANGING TEST OF THE INVARIANCE OF c

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"OBSERVATIONS Laser light pulses were launched to the Moon from the Apache Point Lunar Laserranging Operation (APOLLO) facility (Murphy et al. 2004, 2007) installed at the 3.5- meter telescope at Apache Point Observatory (APO) on 11 November 2007. The pulses were returned by the AP15RR retro-reflector deployed on the lunar surface during the Apollo 15 mission.

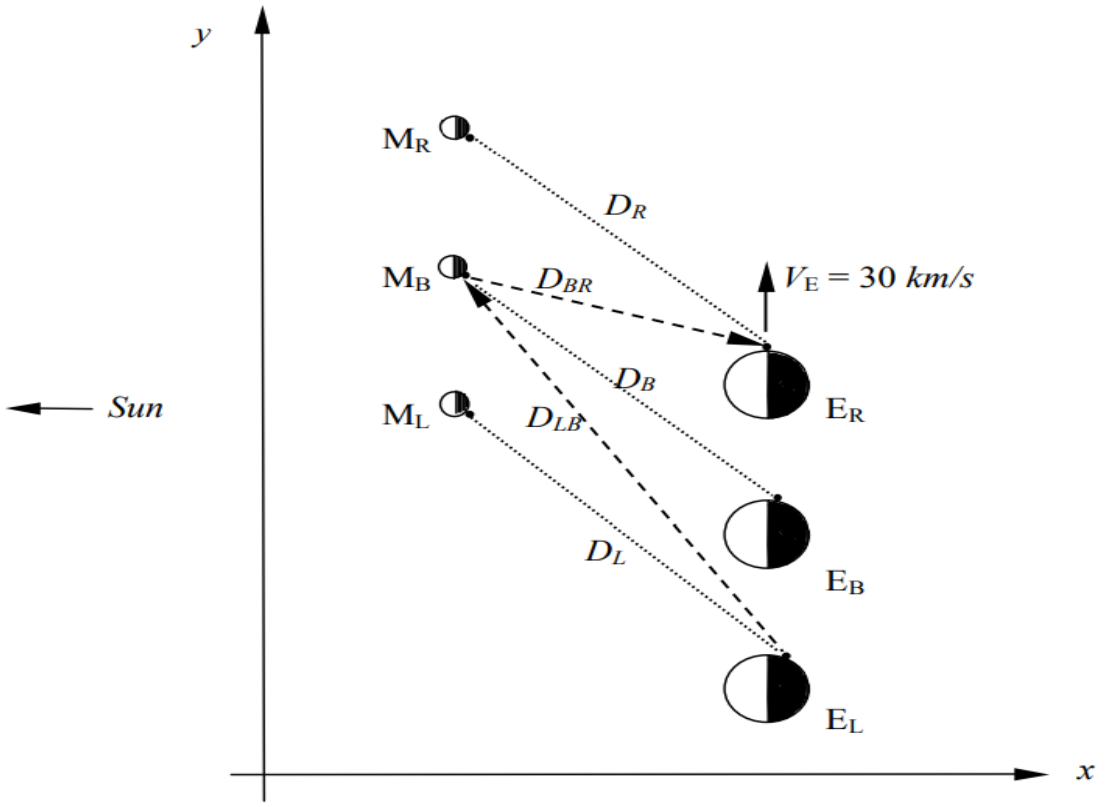

Figure 2: Schematic illustration of the x,y positions of the Earth (E) and Moon (M) in the non-rotating solar system barycentric J2000 inertial frame. The distances DL,, DB and DR are the actual separations of APO and A15RR calculated in the J2000 frame at the moments of launch (L), bounce (B) and receive (R). The distances DLB and DBR are the optical path lengths travelled from launch to bounce (LB) and from bounce to receive (BR), each derived from the position of APO and the position of A15RR at times separated by ~1.3 sec"

In the table below, the data for T, DL, DR, DLB and DBR are extracted from the Gezari paper test results records. Va, Loss and Vo are my calculations based thereon.

Laser pulse reading	**Recorded Time** pulse launch to pulse reception	**Distance at launch** = Pulse emitter to reflector	**Distance at reception** = pulse receiver to reflector	**Average Speed for the total round trip**	**Difference between measured average and c in a vacuum**	**Speed of projector and receiver** due to earths rotation

For distances travelled relative to the earth and moon, the rotation of the earth being the relative motion

Number	**T**	**DL**	**DR**	**Va = (DL+DR)/T**	**Loss = Va - c**	**Vo = (DL-DR)/T**
	Nsec	**km**	**km**	**m/s**	**m/s**	**m/s**
1	2637147909	395298.7883	395298.2404	299792448.53	-9.47	207.78
2	2637147394	395298.7152	395298.1673	299792451.56	-6.44	207.77
3	2637147393	395298.7048	395298.1569	299792443.82	-14.18	207.77
4	2637147055	395298.6630	395298.1151	299792450.53	-7.47	207.77
5	2637145958	395298.4960	395297.9482	299792448.59	-9.41	207.75
2632	2636467152	395196.7306	395196.2106	299792447.88	-10.12	197.24
2633	2636466870	395196.6910	395196.1709	299792449.83	-8.17	197.24
2634	2636466849	395196.6811	395196.1611	299792444.76	-13.24	197.24
2635	2636466755	395196.6711	395196.1511	299792447.86	-10.14	197.24
2636	2636466623	395196.6513	395196.1313	299792447.90	-10.10	197.24

For distances travelled relative to the sun, the rotation of the earth plus its orbit around the sun being relative motions

Number	**T**	**DLB**	**DBR**	**Va = (DLB+DBR)/T**	**Loss = Va - c**
	Nsec	**km**	**km**	**m/s**	**m/s**
1	2637147909	395328.4104	395268.6244	299792450.88	-7.12
2	2637147394	395328.3373	395268.5514	299792453.90	-4.10
3	2637147393	395328.3269	395268.5410	299792446.17	-11.83
4	2637147055	395328.2851	395268.4992	299792452.88	-5.12
5	2637145958	395328.1180	395268.3323	299792450.94	-7.06
2632	2636467152	395226.3238	395166.6236	299792450.23	-7.77
2633	2636466870	395226.2841	395166.5840	299792452.18	-5.82
2634	2636466849	395226.2742	395166.5741	299792447.11	-10.89
2635	2636466755	395226.2643	395166.5642	299792450.21	-7.79
2636	2636466623	395226.2445	395166.5444	299792450.25	-7.75

The Gezari paper concluded -- "(the test) implies that a preferred reference frame exists for the propagation of light. However, the present experiment cannot identify the physical system to which such a reference frame might be tied."

Speculatively applying this papers theory that back ground EM radiation provides an influencing locality or aether to this data -

Taking the first set of time distances between the earth and moon and ignoring their motion relative to the sun, the story is a very simply one of the light pulses travelled across the vacuum of space between the earth and the moon at the speed of light relative to that earth/moon coordinate reference frame. The recorded average speed is slightly less which can be attributed to a loss at the point of reflection plus due to part of the journey going through earth's atmosphere.

Thinking of this journey as having an average speed of c relative to a given medium, this journey can be thought of as having 4 controlling medium stages -

1st Stage From the emitter to the vacuum of space through earths atmosphere -
As we know light does reconfigure itself in actual observational reality for different mediums it is fair to conclude that the laser pulses of this test travelled though the atmosphere at a speed of c relative to that atmosphere. On the outbound path they therefore accelerated as the atmosphere's refractive index reduced with altitude. As the atmosphere was moving towards the reflector on the moon at 200 m/s due to the earths rotation, it follows that the laser pulses would therefore try and accelerate up to=
+ a speed of c in a vacuum relative to the atmosphere, where that atmospheres refractive index reduced to that of a vacuum's due to the atmosphere phasing off into a vacuum.
+ 200 m/s speed of the atmosphere relative to the reflector on the moon
However stage 2 tells us some other influence took over to prevent this being the resultant speed to the moons reflector.

(For the commentary on the next two parts to the round trip the possibility that the outbound trip was at c + 200m/s and the return journey was at c - 200m/s is ignored on the bases that makes no sense at all and there is no reason to even try and look for such a possible explanation)

2nd stage. From the edge of earths atmospheric influence through the vacuum of space to the reflector on the moon-
The observed average speed across the vacuum of space was simply c for in a vacuum relative to the moon and earth frame of reference. As explained in stage 1 of this round trip, the inherent speed from the laser pulse launch through earths atmosphere towards the moons reflector was =
+(c in a vacuum relative to the moon)
+ (200 m/s speed of earth atmospheres towards the moon due to its rotation)
As the actual result was simply c in a vacuum relative to the moon something must have took over influencing the laser pulses speed/wavelength mix after it left the earth's atmospheric influence. (The transition of influence may have been phased). Whatever that influence was, it deleted or prevented the 200m/s earths rotational speed influence and somehow aligned the speed to c in a vacuum relative to the line from the earths surface to the moons surface. This is consistent with established principal/observations that the motion of the emitter does not influence the speed of its EM radiation emissions and distort the resultant signals.
The question is --- what took over being the controlling influence? Looking at the schematic diagram there is only one suspect, it is the back ground radiation of the sun which these test laser pulses have to traverse to get from the earth to the moon. In the vacuum of space between the earth and the moon there is nothing else to suspect.

3rd stage. From the moons reflector to the earths atmosphere -
The reflected pulse travelled at c across the space vacuum relative to the moons reflector, which is also the same as relative to the back ground EM radiation of the sun due to there being no atmosphere on the moon. Therefore the pulses must have impacted with the earth's atmosphere at a relative speed of c + the 200m/s relative motion of the

atmosphere due to earth's rotation. This is in conflict with the mainstream understanding of relativity and the resultant time dilation theory.

4th stage. From the edge of earths atmosphere to the receiver -
Having impacted upon the earths atmosphere at a total relative speed of =
+ c in a vacuum relative to the moons reflector (and the suns back ground radiation)
+ the 200 m/s relative motion of the atmosphere due to the earths rotation,
The earths atmosphere takes over control of the lights speed/wavelength configuration mix reducing it at any time to c for the atmospheres refractive index at that point in time and there by steadily decelerating it as the atmospheres refractive index increases as altitude decreases. At the point of contact with the receiver it will have decelerated down to c relative to the atmosphere and refractive index local to the receiver and its wavelength will have shortened by a corresponding amount to keep the frequency energy the same as earlier higher speed stages in the pulses journey.

To what extent does back ground EM radiation influence EM waves?

The motion of denser mediums such as glass are known to influence the speed and direction of light transmitting though them. If back ground EM radiation also forms such a controlling aether on EM waves then in the scenario of this test the laser pulses could have configured themselves to a speed relative to the sun being the stationary local point to the controlling aether medium. If the speed c was relative to the sun then the path travelled at that speed would have been DLB and DBR and not DL and DR. Unfortunately the total distance of these two round the trip journeys are the same and therefore both deliver the same c average speed. This table of possible relevant data does not therefore tell us which one is the frame of reference and in turn fails to advise us of the true extent of the suns back ground EM radiations influence on the laser pulses.

The test did however detect no "drift" or evidence of an aether despite the sideways velocity of 30km/s of the earth moon coordinates relative to the sun. Additionally if background radiation has an influence on EM waves that is comparable to that of atomic based transmitting mediums then the relative speed of the photons to that back ground radiation could be expected to corrupt the paths and relative speeds travelled by EM waves. This test clearly demonstrates that the laser pulses were not under any such level of influence when traversing across the suns back ground EM emissions. Additionally it is well observed that photons do not interact with each other, incidents where they do is an exceptional high energy contrived event. For example EM wave interference is competing photons delivering opposing signals, it is not photons actually interacting with each other. The general theme of quantum mechanics is one of electromagnetic fields interacting rather than particle interaction.

It is therefore credible and consistent with observational evidence that back ground EM radiation has a sufficient influence to persuade an EM wave to configure its wavelength/speed mix to be relative to the local vicinity in which it is currently travelling, but only in its projected line of travel and the radiation does not influence that projected line of travel. In the case of this test the vicinity relative to which c was set was that of the sun's solar system, however as c only applied in the line of projection the actual path travelled at speed c was the basic earth to moon coordinates DL and DR. The relative vector speeds DLB and DBR if they could be observed by the sun would therefore return speeds higher and lower than c, but as the pulses were not in the suns direction could not be observed by the sun.

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If background EM radiation forms a locality relative to which EM waves propagate their speed/wavelength energy mix then the time dilation theory is not needed. Iain Smith Independent Researcher Rugby, United Kingdom ismith@ianovated.com (Dated 12th January 2020)

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