

Signal Time Travel Dilation TEM Mode Time Machine Creation Theory 10/04/2018

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I. INTRODUCTION

Abstract—Use of coaxial cable and rectangular waveguide as Signal Time Travel Machines. Use of Time Dilation formulas is demonstrated.

Paper provides method to construct, low cost signal time machines, along with additional proof of Einstein. Lorentz etc. constant fixed light speed and how, when white light is split into frequency time lengths, (composed frequencies with different delays) via waveguides, visible rainbow colors from sky, water, glass, etc., are produced. Different frequency time lengths, not changes in light speed or light bending, actually create this visible rainbow light split effect. See Fig. (14) Time delay nm (nanometer) frequency reflective dispersion using rectangular waveguide surface slits is a real causality shown by this article.

The electron microscope contained photo of, mother of pearl, Fig. (8) Shows it to be composed of miniature waveguide slit layers, hence light time cavity reflectors. Open facing end nm cavity resonators. This type of slit layering is found in many forms even butterfly wings to effect color.

Research additionally demonstrates photon (EMR Electromagnetic Radiation) travels in 2 dimensions, not 3 dimensions, as currently thought. Time is still considered the 4th dimension and also nonexistent for a photon.

Time Travel Machine, rarely considered creation realities, is lightly discussed in section IX.

Index Terms—Coax Cable Time Travel, Einstein / Wenner Formulas, Einstein Time Dilation Formula, Frequency Time Length Dispersion, Lorentz Length Contraction Formula, Planck Constant, Practical Time Travel, Prism Time Delay, Rectangular Waveguide Time Dilation, Signal Time Length, Slotted Rectangular Waveguide Antennas, Time Change Formula Plots.

THE common coax cable, used to transmit all types of RF signals thru, when compared to air or a vacuum, actually sends the signals into the future. Figure 1 demonstrates the wavelength, time length shortening, to future.

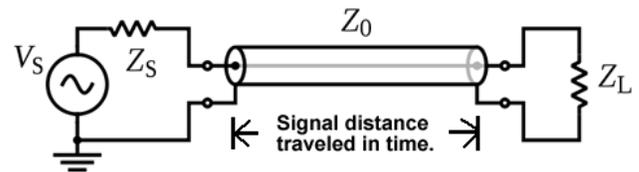


Fig.1. Rather than with a vacuum or air dielectric, a signal takes less time traveling the same distance in coax cable, using a dielectric like Teflon. It thus sends RF signals traveling thru it into the future, at a different time of propagation than air or vacuum time, in standard TEM mode.

I. TIME LENGTH CHANGE VS., LIGHT SPEED CHANGE IN COAX

Contrary to Einstein [1] or Lorentz [5], some believe, light speed or wavelength changes at the coax input then changes back, at the output signal end of coax cable. They claim this reason why coax wavelength is shorter than in air or vacuum.

This cannot be so, since increasing the speed of light, even if you could, would require additional energy (from where?) to accomplish this. At the output end, this free energy, would also have to completely disperse to somewhere? This has never been demonstrated in any lab. Additional photon energy from nowhere followed by its undetected dispersion truly lacks credibility.

Coax signal energy quantity input change then change back, at the output has no conformity to the Planck [2] equation (1) The quantity of energy per photon remains constant unless frequency changes. Therefore higher frequency (shorter wavelength) requires more energy from somewhere?

$$E = hf \text{ Or, } \frac{E}{h} = f \quad (1)$$

Planck [2] Equation

E = Total energy of one photon in joules per second

h = Plancks constant 6.63×10^{-34}

f = Frequency of photon wave in cycles per second

A wavelength change requires a frequency change which also requires an energy change. Again, where does the energy come from, to raise the frequency (Shorten the Wavelength) at coax input, then loose energy, by lowering the frequency, back to its original longer wavelength, at the output?

Figure (1) Neither of these hypothesis offer any current math equation (1) or (2) conforming solutions.

$$\lambda = \frac{c}{f} \quad (2)$$

λ = Wavelength
 c = Fixed speed of light
 f = Frequency of wave

Time length change offers by far, the best current solution. Consider one second length in the coax is not the same amount, as one second length, of Earth time. A coax time second is thus shorter for a signal passing thru it. This is always why, the same frequency and wavelength come out, that went in, along with zero power changes observed and light speed remaining constant. Exactly like all real world observations by reducing the inside time length, while maintaining the same wavelength that went in. Hence wave arrives in the future, compared to air or vacuum time.

E_r is the dielectric constant of the insulating and spacing material supporting the center conductor inside of coax cable.

Example: Teflon E_r is about 2.1 hence signal only takes about 70% of the time to travel thru it, when compared to air or a vacuum per equations (3), (6).

$$\% \text{ of light } c \text{ vacuum time in coax} = 100\left(\frac{1}{\sqrt{E_r}}\right) \quad (3)$$

$$j\lambda = \frac{c}{f\sqrt{E_r}} \quad (4)$$

$$\lambda = \frac{c}{f} \text{ The vacuum dielectric 1 wavelength} \quad (5)$$

$$100\left(\frac{j\lambda}{\lambda}\right) = \% \text{ Of light vacuum time in coax cable} \quad (6)$$

$j\lambda$ = Since it is time length changing, not the actual wavelength, an imaginary j operator wavelength is used.

c = Constant speed of light

f = Frequency of wave

E_r = Dielectric constant, of inside coax insulating material, is always greater than 1 (vacuum dielectric is 1) hence, future time dilation is always produced by standard TEM mode use via coax signal propagation with $E_r > 1$.

An interesting fact is that photons are traveling through coax as a transmitted two dimensional mass-less wave as in rectangular waveguide or other forms of electromagnetic radiation EMR. This provides real time change regardless of the observer effects framed in Einstein [1] special relativity method analysis equation (9).

Equations (3, 6) verify the most significant amount of this future time dilation is the E_r dielectric constant of the coax

center conductor's insulator for any type coax cable, Microstrip or Stripline including Microstrip patch type antennas.

II. TIME LENGTH CHANGE VS. LIGHT SPEED CHANGE IN Rectangular Waveguide

Equation (7)

$$j\lambda g = \frac{\lambda}{\sqrt{1 - \left(\frac{\lambda}{2a}\right)^2}}$$

$$\lambda g t = \frac{\lambda}{c\sqrt{1 - \left(\frac{\lambda}{2a}\right)^2}}$$

$$\frac{\lambda}{c} = \lambda t$$

Equation (7) source see [3] Ridenour, I. (1947). "Radar System Engineering-MIT Radiation Lab."

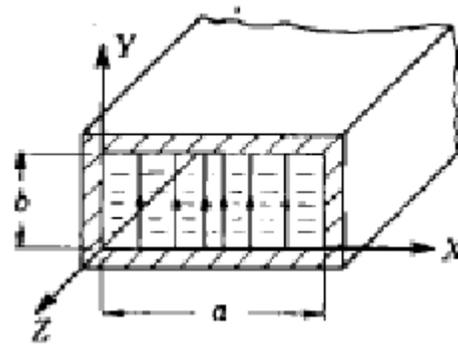


Fig. 3

In a waveguide the equation (7) of imaginary guide wavelength, the denominator is always less than 1 hence, past signal time dilation is always produced. Time length, inside a waveguide, slows down becoming longer than in air or a vacuum. In equation (7) the wavelength can never be larger than waveguide dimension $2a$ (Fig. 3) due to negative number creation. This is the cut off frequency of rectangular guide. Anything lower will not propagate thru rectangular waveguide. This equation (7) 71 years MIT lab reconfirmed thousands of times since.

Demonstrating for either of these closed electron or photon EM signal travel environments (coax or waveguide) Einstein [1] equation (9) says light speed is constant if, velocity changes, also time length, not light speed. Yet the energy output remains the same therefore, they agree with Planck [2] equation (1) and the conservation of energy law of Newton [4]. Millions of watts can be sent easily thru coax or waveguide today, at minimal lose thus, for this analysis zero lose is therefore always assumed, along with the common

TEM mode method of propagation use thru them.

Conclusion: Einstein [1] special relativity time dilation formula (9) is only valid in an open EM propagation medium (unshielded) and at less than light speed. The equation of course is no longer valid at the constant speed of light as the velocity is where time stops for the observer. Light speed is therefore not affected by this equation (9). Signals travel thru coax or waveguide at constant light speed as time changes distance.

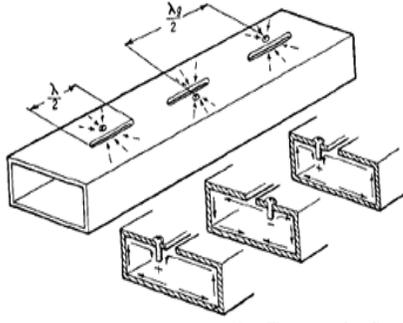


FIG. 4 Probe-fed slots on rectangular waveguide. The arrows show lines of current flow.

To add signals in phase, with slotted antennas in a waveguide, note in Fig 4 that the distance between the slots is longer, than the slot lengths due to the time delay effect.

$$\left(\frac{j\lambda g}{\lambda}\right)100 = \%$$

Of time change longer in rectangular waveguide (8)

Equation (8) gives the percentage of time length change in waveguide using the imaginary guide wavelength equation (7) compared with the free space antenna equation (2).

Coax carries signals to the future, while waveguide delays signals, therefore from the past. In the case of waveguide, it has air dielectric yet it delays signals, when compared to free space air or a vacuum antenna. With air dielectric, how can it change the speed of light or change the wavelength, of signals traveling inside it? This further negates this previous hypothesis but again supports internal time length change.

Some have stated a waveguide causes this delay via side lobes. This is why a slotted waveguide with multiple antennas was chosen for Fig 4 since only 1/2 the imaginary guide wavelength separates each, there can be no side lobes of multi waves, therefore negating that theory, as the causality of the time delaying signals effect in waveguide.

III. TIME LENGTH CHANGE EQUATION PLOT COMPARISONS

Equation (9) is the multi-proven Einstein [1] special relativity formula for time dilation using Lorentz [5] invariance along with a plot Fig (5) of this function.

$$t_o = \frac{t_n}{\sqrt{1 - \left(\frac{v}{c}\right)^2}} \quad (9)$$

t_o = Time observed

t_n = Time normal

v = Velocity

c = Speed of light in same Units as Velocity

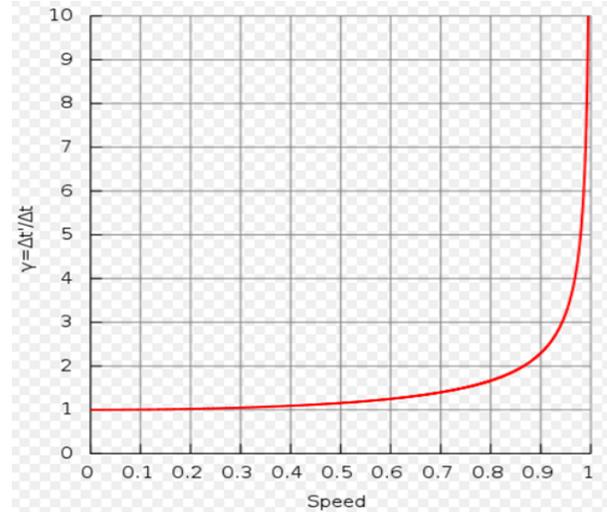


Fig.(5) Plot of equation (9) Einstein [1] time dilation relativity formula, represents time length extending for an object at the approach of light speed. Time slows down considerably more near light speed compared to time normal at lower velocities.

Note: This shape of curve indicates time dilation.

Lorentz [5] was an instructor of Einstein [1] hence Einstein's modification of the Lorentz Factor formulas (10) (11) is the obvious base source of Einstein's time dilation equation (9) for special relativity.

Lorentz [5] length contraction formula (10) below:

$$L' = L\sqrt{1 - \left(\frac{v}{c}\right)^2} \quad (10)$$

Or:
$$L' = \frac{L}{\chi}$$

Where:

L = The length of the object at rest

L' = The length of the object moving at speed v

χ = Is the Lorentz Factor:
$$\chi = \frac{1}{\sqrt{1 - \left(\frac{v}{c}\right)^2}} \quad (11)$$

Equation (10) states that since photons travel at light ($v=c$) speed and are mass-less, they have a constant zero length thereby, always losing one dimension.

This means a photon travels in only two dimensions, width

and depth, x and z with zero y dimension. This also indicates electromagnetic photon waves are two not three dimensional as is any particle(s) with mass. Possibly this 2nd dimension travel of near or mass-less particles is why some appear out of what seems to be empty space or nowhere etc. unknown.

For Einstein [1] equation (9) to be correct then equations (10) and (11) must also be correct since they were used to derive equation (9) regardless of the Einstein [1] method of measuring this contraction by an observer. At light speed particles like photons always remain two dimensions for any observer. 3rd and 4th dimensions do not exist at light speed.

It also provides reasoning why antennas have horizontal or vertical polarization and two dimensional electromagnetic waves. Some Quantum Physics effects are the result of this same two dimensional mass-less photon wave travel. When detected in the dual slit experiment, a detector converts the photon wave energy, by raising the detectors energy level, of an outer electron shell, hence then detected as a particle. With no detection (turned off) it maintains energy as a 2nd dimensional wave hence shows the common interference pattern between slits. There is no 3rd dimension separation in 2 dimensions so a photon wave appears (detected) to be in several places at once. Taking energy to detect from a wave changes its frequency Planck [2] hence can no longer interfere with original wave instead seen as particle detection.

When an electron reaches a high enough frequency it jumps to a higher energy level shell then transmits (creates and releases) a pure energy photon thru the 2nd dimension as it drops down to a lower energy shell level. This provides the means of electromagnetic radiation. The wave travels thru the 2nd dimension, hence the 60 Hz of power lines are not audio sound waves, yet detectable as leakage electromagnetic waves for example traveling at light speed.

Many scientists, in past years, stated that a wave can only be produced thru some type of medium, like air or water waves. Electromagnetic waves they said must travel thru some sort of Aether to travel as a wave. This paper provides a method, via formula (10) that this Aether is in fact the 2nd dimension. Waves can penetrate many objects via the 2nd dimension and act strangely in our visible 3 dimensions etc.

The 2nd dimension has been overlooked by many scientists as a possible true wave mass-less particle medium and should now be reconsidered. The 2nd dimension also is subject to same frequency interference between waves; hence wave location in our time length is unpredictable. Wave travel in the 2nd dimension provides a possible means of some quantum effects and others well.

$$e = mc^2 \quad (12)$$

The Einstein [1] formula (12) does not include v momentum mass or Planck [2] Photon energy p via formula (1) hence (for total energy) should be at least modified to:

$$e_{Total} = (m_{1,2,3}c^2 \Rightarrow \infty) + \left(\frac{m_{1,2,3}c^2}{\sqrt{1 - \frac{v_{1,2,3}^2}{c^2}}} \Rightarrow \infty \right) + (Npf_{1,2,3} \Rightarrow \infty) \quad (13)$$

Formula (13) states: e_{Total} (energy) sums each separate, rest mass $m_{1,2,3}$, plus mass $m_{1,2,3}$, with velocity less than light speed $v_{1,2,3}$, plus mass-less Planck [2] energy N number p of Photons at frequencies. Most known energy sources can be summed thereby giving a near total energy available amount. Other (mass-less) particle energy sources (2nd dimensional particle waves) can be also added in a similar fashion to the Einstein / Planck/ Wenner supplement (EPW) formula (13).

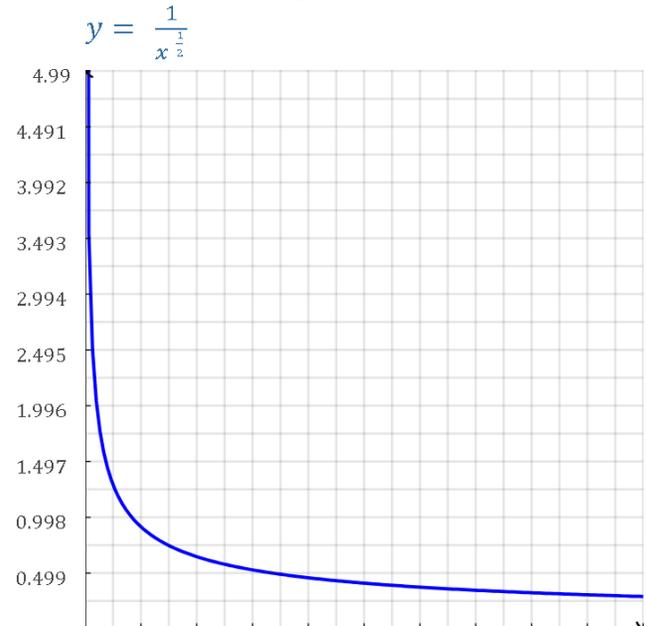


Fig.(6) This is a plot of coax equation (3) Note: It is exactly the same type curve as the proven Einstein [1] time dilation Fig.5, equation (9) which further indicates time length dilation, as the actual cause, in any dielectric $\epsilon_r > 1$ coax cable, again not frequency or light speed somehow magically change, then change back.

It now seems possible the Higgs [6] boson actually produces third dimension particles (mass) when joined with other 2nd dimension mass-less particles. The third dimension therefore becomes mass energy with time dilation (3rd and 4th dimensions).

2nd Dimension particle combinations traveling at light speed could possibly merge with a Higgs boson, which add the 3rd dimension (mass), then be detected as a nearby Cosmic Ray seemingly, coming from nowhere (random). This assumes the 2nd dimension is a plasma soup of particle waves constantly mixing with others, traveling at least at Relativistic vacuum light speed, since they must reach at least that speed to enter the 2nd dimension per equation (10) and have at least Planck energy level to remain there. Reasonable since the 3rd

dimension is a soup of mass particles not traveling at light speed (captured photons still traveling around atomic particles at light speed).

Even captured photons must still travel at light speed in the atom. Light speed is always constant. The 2nd dimension also could be another source of cosmic background noise etc. Magnetic fields are also two dimensional not three.

EM waves, including light, travel in two dimensions. Both electrical and magnetic waves travel together in depth only.

If the electrical wave is vertical (depends on polarization) with depth, then the magnetic wave is 90 degrees horizontal with depth, (always each a separate two dimensional wave combined in the depth dimension only).

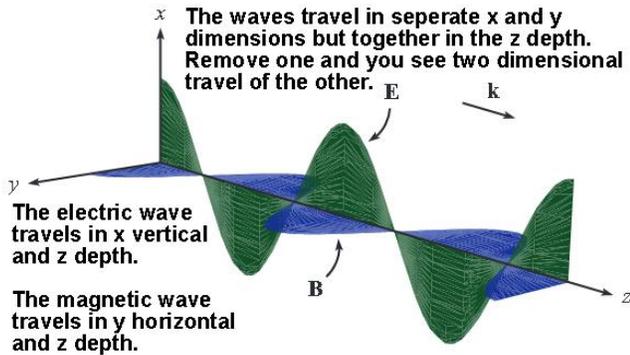


Fig (7) Electromagnetic Wave Propagation.

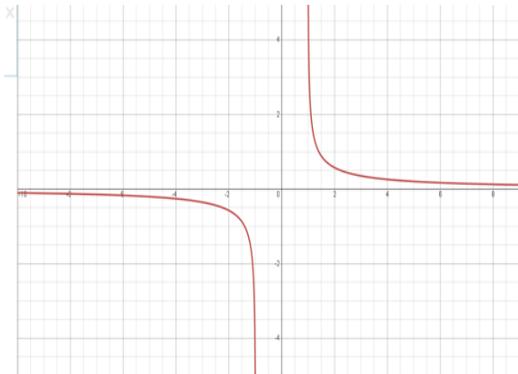


Fig. (8) This is a plot of the imaginary waveguide equation (7) after transforming it to time delay (7b) rather than wavelength via equation (14). Note: The same type time length dilation curves are again produced. Plotting it in the imaginary wavelength equation (7) also produces same type curves.

This again demonstrates the rectangular waveguide effect as also time length dilation similar to equation (9), Fig.5 plot into the past as well.

$$y = \frac{1}{x \sqrt{\frac{1-11.803^2}{x12^2}}} \quad (14)$$

Equation (14) above a = waveguide width 6 inches so (2a = 12 inches). x = Ghz on plot and 11.803 is for wavelength in inches. Fig. (8) Demonstrates how in a real world waveguide of 6 inches width, that (y) varies with (x) frequencies in Ghz input change along the same type curve as Fig. (5) Equation (9). This again indicates a time dilation curve as the real time delay effect causality.

IV. TIME LENGTH DISPERSION CREATES RAINBOW EFFECT

Due to same Er for all frequencies, future time length dilation is the same amount for all frequencies, traveling in coax cable. This is not true of some newer meta-materials that Er effectively changes with frequency. Currently (2017) this time dilation amount separation by frequency has only been produced at lower frequencies with new meta-materials.

In rectangular waveguide, different delay time dilation amounts occur at all frequencies above its cutoff frequency. This splitting of frequencies matches perfectly with the rainbow split from low to high frequency seen in many forms i.e. sky ice rainbows, prisms, mother of pearl, opals etc. After smoothing (heating of glass etc. on its surface) it forms nanometer waveguide shape allowing photons to pass thru as a waveguide signal. This creates varying time delay shift, by light frequency that disperses white light, into its different fundamental color frequencies, hence producing the common rainbow color time delay separation prior to reflection.

See Fig. (14).

This exact same frequency time separation occurs in horizontal waveguides output signals. The same low to high frequency signal separation provides exact correlation to white light frequency separation as well. This method demonstrates how a rainbow pattern is created. Reflection angle is different for each after the frequencies have been time separated by this proven waveguide effect of equation (7).

Snell's law can be expressed in terms of a ratio of wavelengths in the two media. Say λ_1 is the standard vacuum wavelength and $j\lambda_2$ (equation 7) is the guide wavelength which is imaginary as is any light speed velocity change as proven false. This means Snell's law is imaginary, but a method of obtaining waveguide time dilation angle results, not light dispersions actual cause, instead again incorrectly saying light speed and wavelength change, both now proven false and imaginary to compute with j operators except to obtain angle comparisons only (refraction index of material).

$$\frac{\sin \theta_1}{\sin \theta_2} = \frac{v_1}{jv_2} = \frac{\lambda_1}{j\lambda_2} = \text{This papers equation (8) inverted} \quad (15)$$

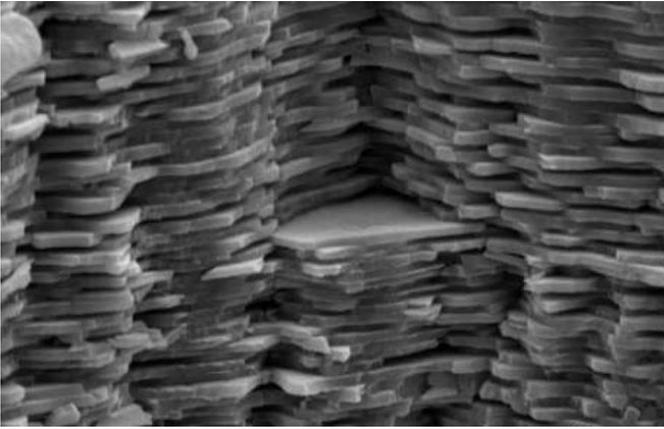


Fig. (9) A photo of Mother of Pearl surface from an electron microscope. Note it is composed of rectangular waveguide slits (dark portions) that are in effect, tuned depth, top open end, resonant nm (nanometer) cavities that reflect different frequency bands of light hence producing the visible colors due to the high Q of resonant cavities.

Fig. (9) Visibly demonstrates the real difference in many isotropic and anisotropic materials is the surface waveguide structure or non-structure. Only the resonant frequencies bandwidth (Q), of the one end open slit cavity waveguide resonator, reflects while all other light frequencies are reflected or absorbed as heat energy etc. per formula (1) by added energy described earlier as raising the surface outer electrons shell (captured photon), then travel inward toward additional electron shells, as photon energy keeps absorbing into a material or reflected as visible or non visible EM waves.

Therefore nm (nanometer) waveguide tuned cavities or lack thereof, produce the visible colors by white light separation via time delay, not changes in light speed (against Einstein [1]) or wavelength since, as with mother of pearl, it reflects back to the observer the tuned frequency bands only. Mixing of paints creates a mixture of these surface tuned slit cavities, hence mixed shaded colors etc. Many colors are therefore likely created by these, tuned cavities, on their surface. This is the reason for color separation in many materials. Again by time dilation (in this case time delay), not wavelength change or light speed reduction, then change back, with no source of energy and then loss of energy, to provide this color difference change.

V. DOPPLER EFFECT CONFIRMS CONSTANT LIGHT SPEED

Radar signals travel at the constant speed of light. The reading, when bounced off a moving object, is the Radar signals return energy frequency difference, from the Radars source energy frequency. An object moving away, takes more time to send same energy level back (drops in frequency, pulling signal effect) and an object moving toward adds energy to the return signal (takes less time to send same

energy level back) (raises the frequency, pushing signal effect) both, conforming to Planck [2] equation (1). The frequency of the wave must change and force a Doppler frequency change effect, no light speed change exists, conforming to Lorentz [5] and Einstein [1]. Measuring this bounce off object frequency return back change easily calculates speed and to or from objects travel towards the radar source. Since light speed is constant, the objects distance from the radar source can also easily be calculated, by comparing the time sent, to time of the return signal arrival back and of course divide by $\frac{1}{2}$ to obtain the actual distance, again using the constant speed of light as the reference speed. This assumes object reflects source Radar signal with enough amplitude directly back to measure the return energy frequency and distance timing. Other factors also affect radar distance measurements see Gürlebeck, Norman and Pfeifer, Christian [7].

VI. GRAVITY TIME LENGTH WELL

Gravity effects may hypothetically be a Time Length Well (Gravity Time) which attempts to trap smaller mass into the larger mass current gravity well velocity time length. This is why, objects fall at the same time rate, regardless of mass, on Earth in a vacuum for example. Larger mass objects attempt to open others into their Gravity Time Length Well. Velocity overcomes this by varying the time length enough via equation (9) to escape the larger mass time length dilation (requires energy). Objects fall at a slower same time rate on the moons gravity well time (less mass of the moon therefore less time dilation than Earth gravity time length).

Light (electromagnetic wave time path bending) while passing near a large mass like a Planet is also a time dilation effect rather than light speed change, which is again against Einstein [1], or some other invisible unknown lensing medium in the vacuum of space. A mass warps the time length of its surrounding space an amount progressively more the larger the mass within limits per Einstein GR [1].

Tensor Calculus of momentum pressure in GR general relativity of the Einstein [1] dual (4x4) matrix equation includes the fourth dimension time energy. This demonstrates all curved path space-time gravity (all earth size gravity for example) is mostly time length well change effect (time dilation). Increasing the mass increases the stress-energy tensors, hence bending its space-time curve path more (other mass taking less time length to arrive) thereby, due to the smaller time arc at same distance, reducing geodesic path length of other mass heading somewhat toward it (not attraction but falling more toward larger mass in less time).

A time length well Theory for Earth gravity does therefore not violate general relativity but agrees with and its effective limits of, very large mass bending actual 3d space, more than 4d time, once becoming a very large size like a neutron star.

Since taking less time, mass or light (EMW) uses less energy following a space-time curved path (takes more energy

to turn away), therein not violating the conservation of energy Newton [4] law either.

Velocity time length special relativity (SR) change is a different time dilation mode, from general relativity (GR) gravity time length change. (SR) Increased velocity dilates time longer, (GR) increased mass dilates objects heading toward it time shorter, both within the limits of Minkowski [8] 4 dimensional space-time for SR and GR.

VII. TIME MACHINE CONSIDERATIONS

Due to their closed environment, these signal time machines discussed are readily demonstrated. Occupying always the same internal dimensions of space, inside coax or waveguides currently, only function at or extremely near the speed of light.

Many time machine theorists demonstrate a time machine that occupies the same place on Earth as where it started only in a different time. If you only change time then the space the machine occupies is the same. Problem is this space is no longer on Earth after say (for example) 10 seconds you would be in outer-space (most likely) whether in the past or the future 10 seconds.

The Earth is spinning and circling the Sun plus the Galaxy is moving at about 1,332,000 miles an hour etc. Since every gravity time well from all objects effects the travel of Earth thru Space, Earths movement is chaotic. We do not know where we are exactly, but to triangulate, via also moving distant stars. Therefore not really knowing where a spot on the Earth's surface was years ago or exactly where it will be years in the future. Finding an exact spot is quite demanding.

The inability to calculate the time machines exact present, past or future position is a fundamental problem. It becomes a difficult computation for celestial mechanics.

A time dilation machine would much better be used, to get into Space without propulsion, than actual time travel. In fact a time dilation machine might be the only way to overcome Earth gravity time well and quickly travel great distances of space in short Earth time comparison?

Wormholes and Space folding will require enormous amounts of energy hence not even remotely practical and provide no method of knowing where an object will end up. We at least now know time dilation is present all over the Universe including coax and waveguide. Additional research, of time travel methods, becomes easily justified, when considering the space travel of great distance benefits it could achieve.

VIII. DEFINE TIME

Relative to the observer time is the past, present or future movement between particles or waves in any or all of three dimensions compared to the fixed speed of light thereby creating a "fourth" dimension.

There is no known reason dimensions were created, at the same time, time length or order.

Comparing the proven Einstein time dilation to the Wenner time dilation Theory it is obvious that when plot, they both have the same type exponential time dilation curves.

Time length dilation, with either Einstein or Wenner equations, both deviate with same curve type, from Earth time. Both have variable limits set by c. again in this area alike.

In either case, it is time that changes, not the velocity of light, being fixed at 11802.85905×10^6 inches per second.

Theory calculations of real time dilation; Delaying the TE10 mode (TEM) electromagnetic waves, via rectangular waveguide method propagation manuscript is demonstrated.

The second dimension appears an ideal candidate for New Relativity Calculation since it begins at the speed of light with 2nd dimension particles or waves that have at least Planck level energies in order to remain there. See Section 10.2 of S. Liberati [9] on Lorentz Invariance.

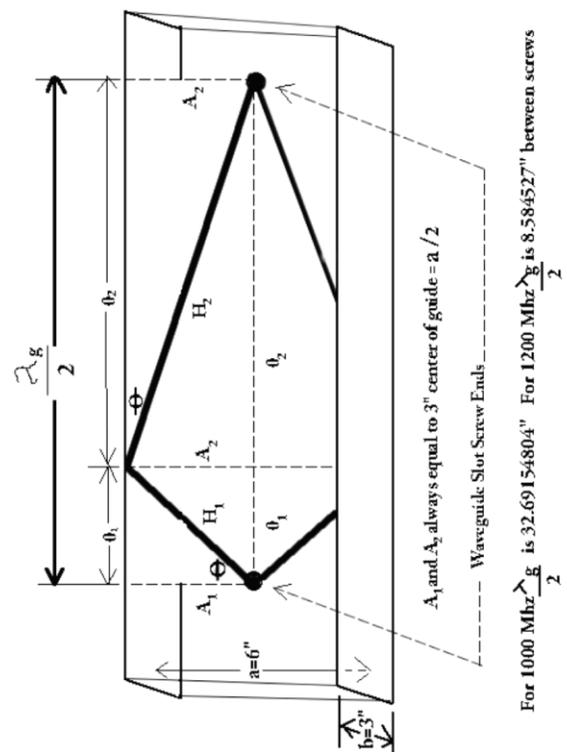


Fig.(10)above shows how time distance wave actually travels using Θ and A_1, A_2 to calculate both H_1, H_2 distance to see if in phase per normal vacuum wavelengths. Calculated at 1.0 GHz and 1.2 GHz using normal $\frac{1}{4}$ wavelength vacuum frequencies.

The 1.0 GHz appears close to in phase but at 1.2 GHz not even near to in phase. It is not in phase at most frequencies, hence this does not correlate, with existing theory of phasing by wavelength change or light speed, for return to in phase. This is not as free space, but waveguide time dilation to past,

providing proper phase. Wavelength and frequency in guide and free air remain constant. It is time that is changing in a waveguide as theory proof calculated that follows further demonstrate.

$$\lambda = \frac{11802.85905}{(1200 \text{ mhz})} = 9.835715875 \text{ inches}$$

$$\cos\theta = \frac{\lambda}{(2a)} = \frac{9.835715875}{12} = .8196429896$$

$$\cos\theta = \frac{\text{Adjacent}}{\text{Hypotenuse}} = \frac{A_1}{H_1}$$

$$A_1 = \frac{a}{2}$$

$$H_1 = \frac{A_1}{(\cos\theta)} = \frac{3}{.8196429896} = 3.660130127 \text{ inches}$$

$$\sin\theta = \frac{O_1}{H_1}$$

$$\sin\theta = \sqrt{(1 - \cos^2\theta)}$$

$$\sin\theta = \sqrt{(1 - (.8196429896)^2)} = .5728746544$$

$$(H_1)(\sin\theta) = O_1$$

$$O_1 = .5728746544 \times 3.660130127 = 2.096795781 \text{ inches}$$

$$\lambda g = \frac{\lambda}{(\sin\theta)} = \frac{9.835715875}{.5728746544} = 17.169054 \text{ inches}$$

$$\frac{(\lambda g)}{2} - O_1 = O_2$$

$$\frac{(\lambda g)}{2} = 8.584527 \text{ inches}$$

$$O_2 = 8.584527 - 2.096795781 = 6.487731218 \text{ inches}$$

$$A_2 = \frac{a}{2}$$

$$H_2 = \sqrt{((A_2)^2 + (O_2)^2)}$$

$$H_2 = \sqrt{(3)^2 + (6.487731218)^2} = 7.147772824 \text{ inches}$$

$$H_2 + H_1 = \text{Total wave travel ?} = 10.80790295 \text{ inches}$$

$$\frac{(\lambda g)}{\lambda} = \frac{17.169054}{9.835715875} = 1.74558255 \neq 2\lambda \text{ Not in Phase}$$

$$\frac{(H_1 + H_2)}{\lambda} = \frac{10.80790295}{9.835715875} = 1.098842533 \neq 1\lambda \text{ Not in Phase}$$

Fig. (11) Signal bounce cannot phase to proper vacuum fixed time lengths at any angle bouncing off the insides for 1st and 2nd signal 1/4 wavelength comparison. Real time slowing with time dilation is indicated as only propagation method to phase the antennas together exactly. This has been lab and field tested with thousands of slotted monitor antennas now in use.

$$\sin\theta = \sqrt{(1 - (.9835715875)^2)} = .1805185096$$

$$\sin\theta = \sqrt{1 - \cos^2\theta}$$

$$\cos\theta = \lambda/2a$$

$$\cos\theta = \frac{11.80285905}{12} = .983571575$$

$$A_1 = \frac{a}{2}$$

$$\cos\theta = \frac{\text{Adjacent}}{\text{Hypotenuse}} = \frac{A_1}{H_1}$$

$$H_1 = \frac{A_1}{(\cos\theta)}$$

$$H_1 = \frac{3}{.9835715875} = 3.05010844 \text{ inches}$$

$$\sin\theta = \frac{O_1}{H_1}$$

$$(H_1)(\sin\theta) = O_1$$

$$O_1 = 3.05010844 \times .1805185096 = .5506010296 \text{ inches}$$

$$\frac{(\lambda g)}{2} = \frac{65.38309608}{2} = 32.69154804 \text{ inches}$$

$$\frac{(\lambda g)}{2} - O_1 = O_2$$

$$O_2 = 32.69154804 - .5506010296 = 32.14094701 \text{ inches}$$

$$A_2 = \frac{a}{2}$$

$$H_2 = \sqrt{((A_2)^2 + (O_2)^2)}$$

$$H_2 = \sqrt{(3)^2 + (32.14094701)^2} = 32.28065171 \text{ inches}$$

$$H_2 + H_1 = \text{Total wave travel ?} = 35.33076015 \text{ inches}$$

$$\frac{(\lambda g)}{\lambda} = \frac{32.69154804}{11.80285905} = 2.769799072 \neq 3\lambda \text{ Not in Phase}$$

$$\frac{(H_1 + H_2)}{\lambda} = \frac{35.33076015}{11.80285905} = 2.993406937 \approx 3\lambda \text{ Close to in Phase}$$

Fig. (12) Signal bounce cannot phase to proper vacuum fixed time lengths at any angle bouncing off the insides for 3rd and 4th signal 1/4 wavelength comparison.

Note above correlates effect at 1.2 GHz frequency confirming phase, does not match at all frequencies, to multiples of 1/4 Wavelength per current SR in a vacuum.

Correct impedance match points seldom match vacuum 1/4 wavelengths. This negates SR Special Relativity formula (9) as invalid for inside rectangular waveguide architecture.

$$\begin{aligned}
 Fc &= 2a \\
 a &= 2b \\
 a &= \frac{\lambda}{2} \\
 b &= \frac{\lambda}{4} \\
 b &= \frac{a}{2} \\
 \lambda g &= \frac{\lambda}{\sqrt{\left(1 - \left(\frac{\lambda}{2a}\right)^2\right)}} \\
 (299,792,458 \text{ MetersPerSecond}) \times (39.3701 \text{ InchesPerMeter}) &= 11802.85905^6 \text{ InchesPerSecond} \\
 \lambda \text{ (inches)} &= \frac{11802.85905}{(Fmz)} \\
 \text{So } \frac{11802.85905}{(983.5715875mz)} &= \lambda = 12 \text{ Inches full wavelength} \\
 \text{So waveguide } b = 3 \text{ Inches} \ \& \ a = 6 \text{ Inches } Fc = \text{Same } 983.5715875mz \\
 \text{Example Test } \lambda &= \frac{11802.85905}{1000} \text{mz} = 11.80285905 \text{ Inches} \\
 \text{Now } \lambda g &= \frac{11.80285905}{\sqrt{\left(1 - \left(\frac{11.80285905}{12}\right)^2\right)}} = 65.38309608 \text{ Inches} \\
 \text{So } \frac{(\lambda g)}{2} &= \frac{65.38309608}{2} = \text{Now } 32.69154804 \text{ Inches} \\
 \text{But } \frac{\lambda}{2} &= \frac{11.80285905}{2} = \text{Only } 5.901429525 \text{ Inches Hence } T_{E_{10}} \text{ Time Dilation To Past} \\
 \text{So in a vacuum at } 1\text{Ghz} \ \lambda \left(\frac{\lambda g}{\lambda}\right) &= 1 \times 10^{-9} \left(\frac{65.38309608}{11.80285905}\right) = 5.53959814ns \\
 \text{Therefore in a vacuum it Takes } 1\text{Ghz } 1ns \ \text{To Travel } 65.38309608 \ \text{Inches} \\
 \text{Therefore in Guide It Takes } 1\text{Ghz } 5.53959814ns \ \text{To Travel } 65.38309608 \ \text{Inches} \\
 \text{Hence } 1\text{Ghz} \ \text{In Vacuum Only Takes } 18.051850\% \ \text{Of The Time As This Guide}
 \end{aligned}$$

Fig. (13) Waveguide delay time formula vs. Einstein SR vacuum Earth lengths compared indicating similar time curve relations. Confirms time delay per frequency exists in a rectangular waveguide.

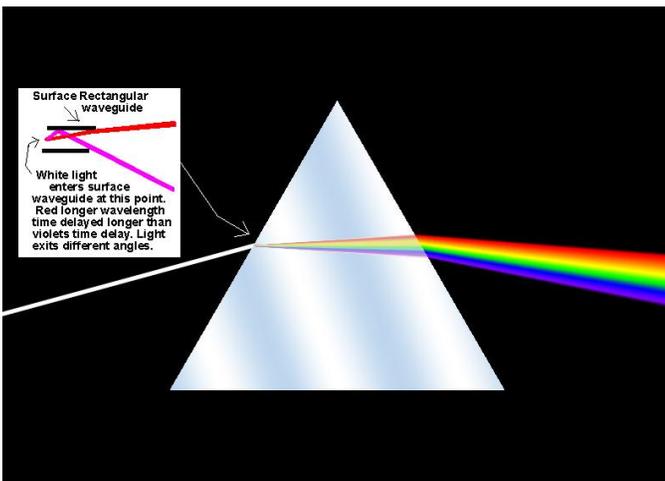


Fig. (14) Demonstrates the surface thickness (to reflect off) and this waveguide effect to delay wavelengths at different time intervals which in fact splits the light into different frequencies (wavelengths). The surface material determines the waveguides depth and angle of reflection required to obtain a full color light spectrum. The reason for variation in material changes of the optimum angle “now called refraction index” is the surface waveguide depth changes with different materials hence optimum angle, cutoff, etc. also changes. This waveguide opening is currently called the bandgap of electrons [10] about 200 nm in glass Fig 3 (b dimension) or 6.2 ev which is ¼ wavelength of lower infa-red 800 nm which matches, out of billions of frequencies, exactly the Fig.3 (b) dimension of the cut off frequency, as being infa-red for waveguide also this size. Diamond is 5.5 ev[11] therefore also in the infa-red waveguide bandgap cutoff

frequency spectrum. Both clear glass and diamond electron bandgaps match this papers surface waveguide time delay reflection theory perfectly and the real world light spectrum they produce. Inside glass also time delays light. In an equilateral triangle the shape distance keeps all the different output light frequencies arriving at the same time called in phase (This is prism output with all colors arriving at the same time in phase). In other shapes, glass time delays light, rather than falsely bending or changing light speed etc again as previously discussed. Most likely water etc. also has a similar bandgap electron infa-red waveguide cutoff frequency distance which would produce rainbows but have no data on this yet. Currently leans toward clear insulator type materials.

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