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Armageddon of Einstein's Principle of Relativity

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ABSTRACT

The variability of Newtonian mechanics with Maxwell's equations of electromagnetism and the inadequacy of practical data for a contemplated luminiferous ether (postulated medium for the propagation of light) led to the outcome of special relativity, which exacts mechanics to handle cases indulging motions approximating the speed of light .Almost everyone has heard of Einstein's Special Theory of Relativity. It was truly a frontline evolution in the field of modern physics. But it doesn't have to be complicated or hard to understand. In fact I bet we could formulate it ourselves. Special Relativity helps us in Einstein's prediction about the presence of gravitational waves, tiny ripples in space-time that streak across the universe at the speed of light. The laws are demonstrated in a entirely new manner keeping the suspense of Einstein's principles at cutting edge.

Keywords: Special Relativity, Gravitational Waves, Einstein's laws

I. INTRODUCTION

The variability of Newtonian mechanics with Maxwell's equations of electromagnetism and the inadequacy of practical data for a contemplated luminiferous ether (postulated medium for the propagation of light) led to the outcome of special relativity, which exacts mechanics to handle cases indulging motions approximating the speed of light.

II. EINSTEIN'S POSTULATES

Einstein's theory proposes two postulates. The first one said simply that the laws of physics are the same in any inertial reference frame. A reference frame is just what a person considers to be at rest. I say "consider" here because you could also consider it to be in motion relative to something else in the universe. It sounds like we're developing a theory of relativity. So I'm fine in saying that the laws of physics are identical in any identical reference frame. It means that one (reference frame here) that isn't speeding up or slowing down. But why does the speed have to be constant all? That's easy to prove. Just sit in a chair and grab a bowl of popcorn. Now, Place the bowl in front of you sit back and watch how the laws of physics behave. (Figure 1)
Nothing is happening right?

Figure 1

Now let's do the same thing in the car with the windows flattened out. Again nothing happened right? Now what if the driver decides to change the speed of the car drastically, by stopping all of it on all of a sudden the laws of physics seem to act a bit differently. The bowl with popcorn and you yourself moves forward suddenly and popcorn spills out. (Figure 1.1)

Figure 1.1

But if the car travels at a nice constant speed, then the exact same thing happens as when I was just sitting on the earth. That is the thing. In both the reference frame of the earth and the car the popcorn bowl doesn't move. Both the earth and car were moving at different speeds but as far as I could tell all the laws of physics acted

exactly the same. Thus we can conclude the same thing would have happened in any frame of reference that was also moving at a constant speed and none of them would have been any less valid than any of the others. So there you have it. We just proved the first postulate.

The second postulate says that light travels at a constant speed in a vacuum regardless of the speed of the source of the light. Now how did Einstein come up with this?

III. INTERFEROMETER

Back in the eighteen hundreds people just realize that light travels as a wave, another kind of wave they were familiar which was sound. Now, Sound waves travels like these. (Fig 2) They require a medium to travel through some kind of matter. So people concluded that light

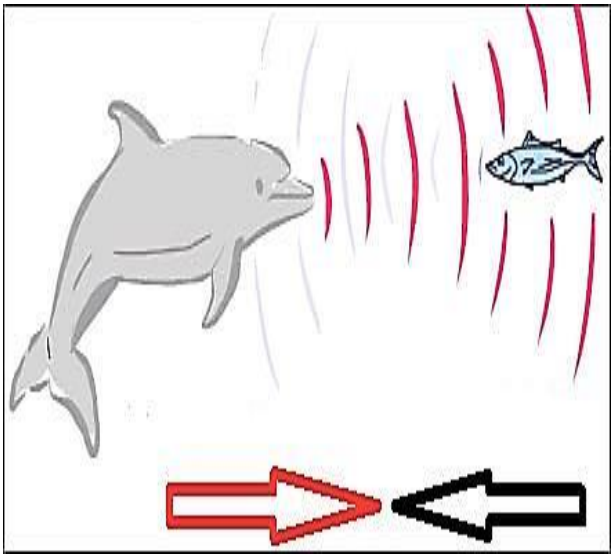


Figure 2

Waves must also need a medium and they called it the ether. Now, how do we prove or disprove the existence of a hypothetical medium. You use an interferometer. (Figure 3)

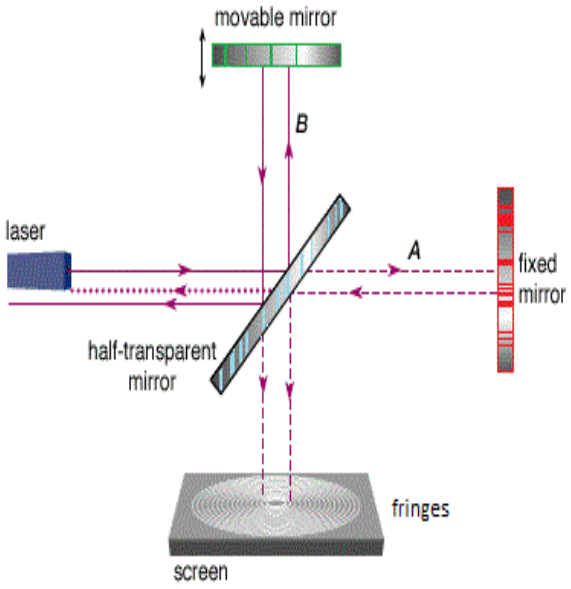


Figure 3

This device measures differences in the speed of light that would occur, if there was such thing as ether. Light was split along to perpendicular arms, reflected back to the center and cause to converge in an eyepiece. And the interference of the waves would create a pattern.

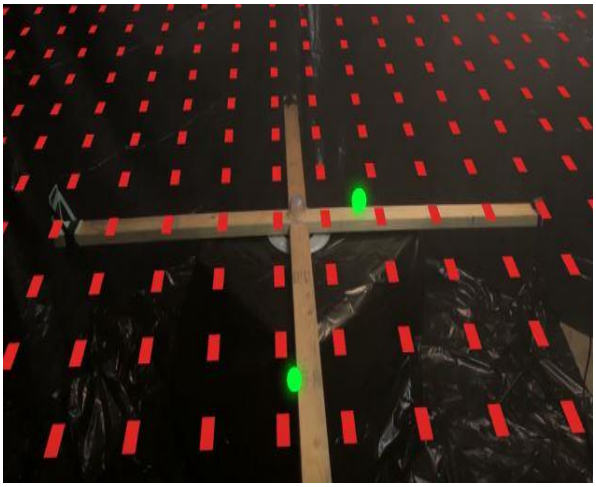


Figure 4

If the light travels at different speeds down each arm (Figure 4), it would reach the eyepiece at different times and create a different interference pattern i.e. one shifted over by. If there was ether, the earth would pass through it on its orbit around the sun on earth. This would make it seem like the ether was moving. If light required the ether to travel, you can see (Image) that the light travelling against the motion of the ether would have a slower speed than light travelling perpendicular to the ether. Thus the interference pattern would be shifted

over. But when this experiment was actually done the interference pattern wasn't shifted over Indicating that nothing was causing the light to move slower. Light, therefore didn't need a medium in any given reference frame. Light wouldn't go slower because the thing was travelling through had its own motion.

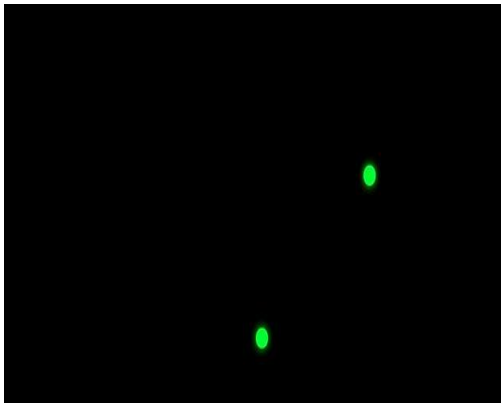


Figure 5

Because the thing it was travelling throughways empty space (Figure 5**)** , Which doesn't have any motion and so as the speed of electro- magnetic waves travelling through empty space. It's also just the same. It is there now, we have it. One of Einstein's greatest achievements and we came up with it ourselves in a few minutes in a wonderful way. It makes it seem kind of simple right. Doesn't it? So what's so revolutionary about this theory?

IV. TIME DILATION

One of the strangest phenomena that Special Relativity predicts is something called **time dilation**. You probably heard this somewhere before. If someone were to leave the reference frame of the earth and enter a reference frame moving very fast relative to Earth. Then that person would return after what on Earth is considered to be thirty years. While the space traveller would only have felt one year go by using special relativity we can answer the question. Why does someone who travels very fast compared to the earth experience time more slowly than people who stay on Earth. It's all based on the equations speed equals distance over time.

Speed = Distance/ Time

When we use this equation to describe like the speed of light is constant. As long as you are measuring it from a reference frame moving at a constant velocity Such as Earth. The distance in this equation has to be the distance travelled by light. But that doesn't mean we can't use it to describe any matter in the universe. All the chemical processes that cause matter to change in the human body to think to breathe, age and end.Usually actions or reactions happen on a cellular level a molecular level an atomic level and ultimately a quantum level where everything is the result of forces carried out by photons gravitons and other fundamental particles which move at the speed of light. So for any bodily activity to occur on Earth, the photons in your body need to travel a certain very tiny distance. And since the speed of light is six hundred seventy million miles per hour, this distances travelled in the activity happens in an extremely short amount of time.

Time = Distance/Speed

Speed of light = 670 million miles/hr

So Let the distance between C-H bond electron pair type be 107 pm equal to one trillionth (i.e., $^{1}/_{1,000,000,000,000}$) of a metre length. Time taken for activity is Time = (107 pm / 670 *1609.34 million metre/hr) = some finite value (very tiny negligible value).This is the time taken for a small activity in the body at quantum level **(**Figure 6).

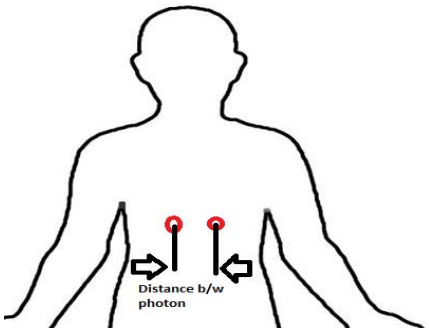


Figure 6

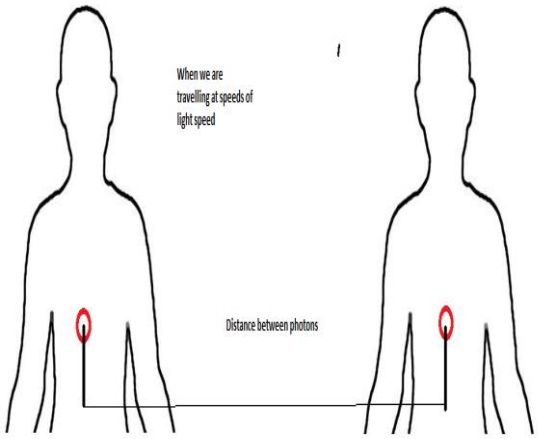


Figure 7

Bond Type	Bond Length (pm)
C-H	107
C–O	143
C=O	121
C–C	154
C=C	133
C≡C	120
C-N	143
C=N	138
C≡N	116
N–O	136
N=O	122
O–H	96

Think of a photon like a car travelling at one hundred twenty mph. Just to get next street going to take a very short amount of time. But when your body moves really really fast compared to Earth, Much closer to the speed of light. Then your photons have to travel. A much larger distance for those same bodily activities to occur (Figure 7). Since the speed of the photons and fundamental particles is constant. But they need to cover a much larger distance. They will have to-do it in a much longer time i.e. your car is still moving one hundred twenty mph. But it's going to take a lot longer to drive from your home to and then is to drive next door. Since the same bodily change that happens on Earth takes much longer to occur when you are moving so fast relative to earth. We say that time slows down for you relative to people on earth.

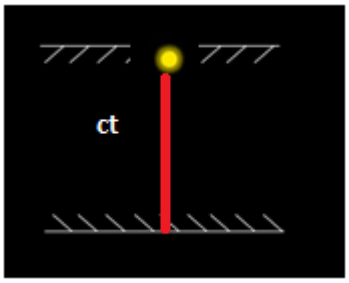


Figure 8

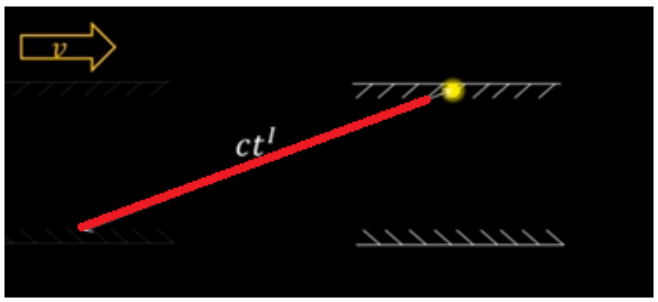


Figure 9

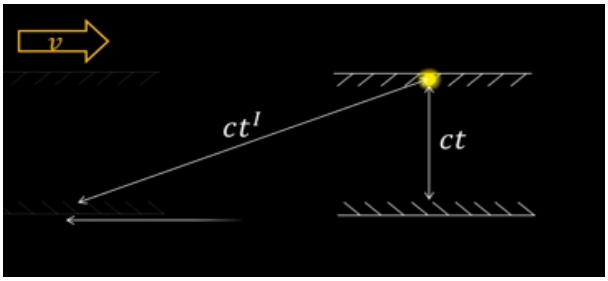


Figure 10

Let us understand this concept by taking a small experiment and later we can apply the same to the photons or fundamental particles in the body. When a observer stationary from outside observes case 1 (system is stationary) the distance yellow dot travels from starting point (bottom) to final point (top) is ct. (Figure 8) But when the system travels with higher speeds the observer stationary notices that the initial point and final point are not in the same line. To go to top from bottom the yellow dot travels a distance at an angle to bottom reference i.e. ct' (Figure 9). From (Figure 10) it is clear that ct' > ct as it occupies the hypotenuse of a triangle. The same is observed in the human body when body travels at higher speed the distance increases between the molecules for interactions and aging takes place very slowly.

Time = Distance/Speed

When Distance increases keeping Speed of light constant, time for bodily activities increase.
This can also explained with the help of gravity where

$$t_0 = t_f \sqrt{1 - \frac{2GM}{rc^2}}$$

- ✓ t0 is the time for the event, (the time measured when observer and event/action are in the same gravitational potential)
- ✓ tf is the time as measured at an infinite distance from any mass.
- ✓ G is Newtonian gravitational potential
- ✓ c is speed of light
- ✓ M is mass of the object you are near
- ✓ r is your distance from object.

But you wouldn't notice a difference. Because your perception and everything travelling with you on the spaceship. Also rely on the behaviour of light speed particles and would have to slow down just as much as

your body think you're so. The relativity of time is a natural conclusion.

V. FOURTH DIMENSION

When scientists flew an atomic clock around the world and they compared it to one on the ground as Einstein predicted. The two clocks no longer agreed. They differed by only a few hundred Billions of a second. But very real proof of motions effect on the passage of time. Einstein's theory has been tested again and again and again and all hangs together. It really forms the basis for the way we understand much of the way nature works. These effects which used to be considered sort of obscure are very in your face with today's technology. With the discovery of this unexpected link between space and time, Einstein realized that the two could no longer be fought of a separate thing. Instead they sometimes are used to gather and what came to be called space. The unified idea space with the idea of time i.e. the four dimensional structure called space time, and this fusion space and time would lead on trying to perhaps the most mind bending realisation of all the sharp difference we see between past present and future may only be an illusion. In our day to day lives we experience time as a continuous flow. But it can also be useful to think of time as a series of moments and everything that happens Can be thought of as the unfolding of moment, after moment and another moment and if we picture all moment or snapshots, they appear lined up like a chocolate wafer layers(Figure 11). So when we stand on the time line, one can see the moments, each chocolate strip representing one life time activity. +

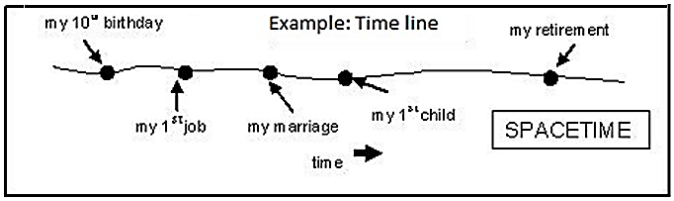
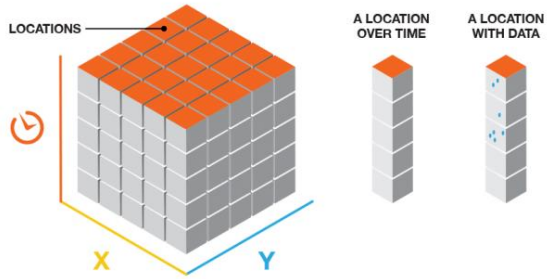
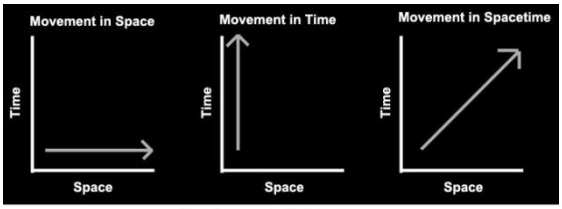


Figure 11



Every unit cube reperesents an location(space x&y)withrespective time



Space time anamoly Illustration

VI. CONCLUSION

Einstein's Theory of relativity bonds with the quantum mechanics. The concept of Gravity bending, space-time, time dilation, light etc are the main constituents of any scientific law developed later and indirectly special relativity leads the picture. Einstein proposed that everything moves relative to one another and he believes that communication can be done through space-time in gravity where time is a fundamental dimension. Gravitational waves are the future scope for the man kind's trailblazing innovations.

VII. REFERENCES

[1] http://www.physicsoftheuniverse.com/topics_relativity_general.html

[2] http://www.space.com/27692-science-of-interstellar-infographic.html

[3] https://www.physics.harvard.edu/uploads/files/thesesPDF/Jones.pdf
[4] A Hypothesis of the Time Dependence of Gravity Fields as Derived from Observations of an Orbiting Grid Sphere by Air Force Avionics Laboratory, Air Force Systems Command, Wright-Patterson Air Force Base, 1968.
[5] A. Einstein, "Relativity: the Special and General Theory by Albert Einstein."Project Gutenberg.<https://www.gutenberg.org/etext/5001
[6] http://www.npr.org/2014/11/03/361069820/new-clock-may-end-time-as-we-know-it
[7] The Analysis of Space-Time Singularities By C. J. S. Clarke
[8] Fundamentals of Geophysics - William Lowrie
[9] Fifth Dimension: The Light to See by Marc King
[10] Einstein's Theory of Relativity By Max Born.
[11] Relativity - The Special and General Theory By Albert Einstein
[12] Einstein's Masterwork: 1915 and the General Theory of Relativity by John Gribbin
[13] The Roots of Special Relativity: Science and Society edited by Peter Galison, Michael Gordin, David Kaiser
[14] Cosmological Special Relativity: The Large-Scale Structure of Space, Time ...By Moshe Carmeli
[15] The Geometry of Space-time: An Introduction to Special and General Relativity By James J. Callahan
[16] Special Relativity and Motions Faster than Light By Moses Fayngold