International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 02 | February - 2024 SJIF Rating: 8.176 ISSN: 2582-3930

THE CONCEPT OF TIME, LENGTH AND MASS

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Abstract

Here I have tried to derive basic units of nature namely, time, distance and mass in terms of Energy and force fields surrounding it. I have made a few changes in the standard definition of Energy in order to arrive at the equations of the three quantities in terms of Energy , force and speed of light 'c'. Energy is the ability to do work , so it is a latent quantity , it also has the ability to manifest itself in the form of electromagnetic radiation and other forms of energy. Force can be stated as the latent ability to cause change in the state of a body, which can manifest itself as the gravitational force of attraction. Considering these two as the basic units and also the speed of light , I have tried to derive the equation of time , distance and mass in relation to energy and force fields and also speed of light C.

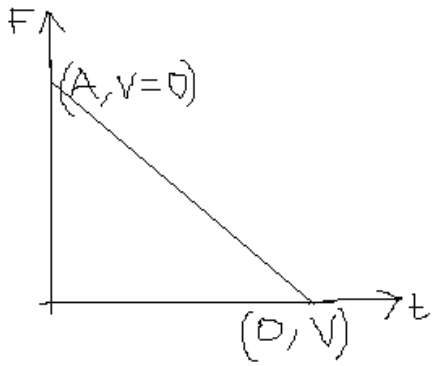
Introduction

For us to arrive at the derivation of time, distance and mass, we have to make a few changes in the equation of energy.

Here is an article on internet which made me question the derivation of energy, (https://physics.stackexchange.com/questions/506489/why-is-work-equal-to-force-times-displacement), Aditya Bharadwaj et all.

Here it is suggested that why Work done should be proportional to v and not v^2, and I also have my clarifications on it .Considering that Energy is force * displacement, then any amount of impulse force would cause an infinite amount of displacement resulting in an infinite amount of energy by Newton's first law of motion.

Consider Energy as the integration of the force over the time. It seems to be quite obvious in the following case. Consider an object being given an initial impulse force of F in space. The object will tend to attain a constant velocity at the end of a time period say T . after which the force will become 0, and the body will keep moving with velocity 'V' thereon . The same can be shown by a simple graph.



Here what if we consider

$E = \int F * dt$

$= \int m.a * dt$

$= m (V - 0)$

$= m V$

So this is the Energy that the body attains as it achieves an inertial frame of reference. So energy comes out as mass times the velocity and not velocity square.

Considering this, and also the theory of relativity, I thought that the fundamental units of nature like time, distances and mass are derived components and not absolute. The light usually originates from a mass. And it is also a form of energy, It also gets affected by the force field. Could it be that these fundamental units be derived in terms of speed of light as well?

I tried my hands at that I got to the following conclusion .

The concept of time

There is a rare story which I heard by word of mouth. He was a colleague of mine. He put forward the following scenario.

Well once upon a time on planet earth , there lived a very notorious king. He used to trouble his subjects a lot. There were rampant rapes and murders carried out by the kings cronies on his own subjects.

Lord Shree Krishna observed this from the heavens , and was greatly disturbed by it. He called Kalyavan to his court to discuss about it. Finally they agreed that Kalyavan would go on Earth and kill the notorious king.

Kalyavan started on his path towards the earth. After traveling much distance , he decided to take a nap, after the nap he set out again for the kingdom. But when he reached earth , he was amazed not to

find any kingdom or king at all. Everything had just disappeared. When he asked a sadhu sitting in a jungle, the sadhu replied, Oh that King whose tales or notoriety are so famous. well he is long time dead , his sons and grandsons used to rule the kingdom, but they are also dead. Now all that remains of the kingdom , is nothing but this jungle. Kalyavan was greatly amazed , went back and narrated the story to Shree Krishna. Shree Krishna deciphered that when he took a nap of 15 minutes in the skies, hundreds of years had passed on earth. Hence the paradox.

I was singularly affected by this story. The concept of time being dependent quantity is preposterous to our common sense. But if we see nature around us the concept of time will be much clearer. We see that there are insects which come during rainy season, and they survive only for 2-3 hours and die out, this can be explained only if their lifetime is stretched . Many of the insects in the natural world have a life span of less than 10 days, as their world grow's in size and become bugs or spiders their life span also increases. Trees have the largest of life span.

This made me in turn think that time could be equated to some of the dependent variables in our physical world, making localized time also dependent. Of all the animals I observed the elephant first since it has a large time span, and also because of its bulk, I also observed the tortoise because of its unique motion and also life span. Could it be that their extra large size and extra slow pace add to the lifetime of the two animals. What if time is directly proportional to energy(bulk) and inversely proportional to force (acceleration) that these animals go on to live for so many years

So, I Equated time to energy and force,

T = Energy / Force

T = E/ F

but , E = integral (F * dt)

T = integral (F *dt / F)

T = integral(dt)

or T = T

or the localized time is the integral or sum total of the of the inertial time.
So we got an equation of time, now lets try to verify it.

Consider the following article Quora (https://www.quora.com/Does-time-in-geostationary-satellites-always-run-slower-and-does-special-relativity-ever-still-influence-time-in-these-satellites) Jay Carlson, Atomic clocks on geosynchronous satellites run faster than the same clocks on the ground.

Now in space the potential Energy is less, hence according to the above formula it will decrease the time period. Since frequency is inversely proportional to Time Period, we can say frequency of vibration of the cesium atoms had increased at an higher altitude showing an advanced value of time.

We can also derive time w.r.t C by considering the following scenario

Consider a frame of reference of a torch moving with a constant velocity ‘v’. Let a photon of light be given out by this frame in the direction of motion at time t1 . This photon of light , after a time duration t2, will accelerate to its final velocity C . so the reference time period will be t2-t1 or to. For this moving frame we can derive the equation of time as .

t = E/F

= m. v / m .a

= c / (c – v)/to

T = to * c/(c- v)

Here the time period of moving frame is derived in terms of speed of light c , and reference frame time period ‘to’. I have assumed that the speed of light attains a maximum speed after a fixed time period hence there is also an acceleration associated with the speed of light.

The concept of space

Since time changes with E and F fields I was trying to figure out distances as I thought space should also change with respect to the E and F fields. I was not able to derive the equation for distances in terms of force or energy completely as I had done in case of time.

Then I remembered one documentary on Discovery channel(it was about time dilation) .

- Ref : - https://www.youtube.com/watch?v=nAxedfo1SE4…… type :- time dilation near massive objects

It showed a bunch of kids playing with a ball around the great pyramids of Egypt. It showed that motion of children and the ball they are playing with goes very dragging-slow in the near vicinity of the pyramid. That gave me the idea that velocity or distances would be inversely proportional to the density. As we know the pyramids are highly dense structure of stones arranged on top of one another.

All it took was matching the units on left and right hand side. And we get distances as

d = forth root (E^2/FD)

Where D = Density of the medium or object

Also FD is a term used in hydrostatic pressure. Can we apply this equation to all of space as they do have Energy and force fields associated with it.

In the Above equation FD can be further Modified as

FD = *F* M

Where *F* in italics is the electromagnetic force density or force per unit volume and M is the mass.

Electromagnetic force density is also given as

$F = gE + J/C * B$

Where,
g= charge density
E = Electric intensity
J = current density
B = Magnetic Intensity
And C is the speed of light.

F M = (gE + J/C * B) M
= gEM + J/C * BM

Now electric field is a surface phenomena and Magnetic field is a bulk phenomena , for these two parts (gEM , J/C * BM) to exist the space should have some sort of enclosure to have an electric field on its surface and some sort of bulk to have a magnetic field associated with it. This could be the reason for the space time curvature near massive objects.

Concept of mass

We know that according to Einstein's famous equation the mass of an object can be given as

E = MC^2
Or
M = E/C^2

We can go for an alternate Derivation of E = MC^2

An alternate Derivation of E = MC ^{2}

Consider a frame - 2 having a body of mass 'M' . Let it be in relative motion w.r.t frame - 1 containing a laser torch, by velocity 'V'. The torch is throwing all its laser light on body M and the body M absorbs all the radiation.

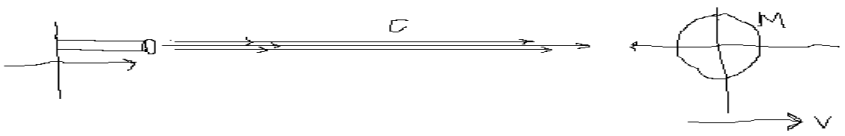


Fig 1

Perspective of the body M

From the receiver M's perspective it is receiving the laser light from a torch which is moving away from it by velocity V.

Total energy = $E\frac{(C)}{(C+V)}$ …….. Doppler energy shift because of moving source, same as frequency shift As E = hF……h = planks Constant

Perspective of the torch

The laser source will see the Body M moving away from it at a velocity of V. So it will feel that the body M is receiving the energy from its laser light as well as due to its own K.E.

It will calculate the total energy of body M to be

Total energy = $MV + E\left(\frac{C-V}{C}\right)$…… doppler shift due to the Observer.

But the total energy received by the body is the same in both the cases, Hence

$$MV + E\left(\frac{C-V}{C}\right) = E\left(\frac{C}{C+V}\right)$$

Rearranging the terms.

$$MV = E\left(\frac{C}{C+V} - \frac{C-V}{C}\right)$$

$$= E\left(\frac{C^2 - C^2 + V^2}{C(C+V)}\right)$$

$$M = E * \frac{V}{C(C+V)}$$

Or mass is the direct function of Velocity with which it is travelling the energy and the speed of light.

For very low velocities V we can write.

M = E * V/C^2

Lower the velocity lower will be the mass and vice-versa. Though this is not the absolute equation of mass, I have derived it in the relativistic sense.

So now we have derived all the fundamental units in terms of E, F and c. Namely

T = E/F = to * c/(c-v)

D = forth root (E^2/*F*M)

Where *F*M = gEM + J/C * BM

And M = E * v/c^2

Conclusion :

In this paper I have tried to derive the equation of time, distance and mass in terms of E , F fields and velocity of light c. I have considered both E and F to be latent quantities able to manifest themselves later. Time, distance and mass also come out as derived units. Speed of light C is a common factor in all the three equations , hence these derived quantities are also dependent on speed of light.