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Time: Multidimensional Time

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Abstract: ***What is time? It's a beautiful and mysterious question of all time in physics. Great scientist Newton told us that time is absolute and it's uniformly ticking throughout whole universe. But Einstein did not agree with Newton at this point and gave us a revolutionary idea in physics, that was "time is relative". He gave us famous theory of relativity which is the basis of modern physics. But there is some paradox which arose with this theory as a result of time dilation and one of them is twin paradox. However, we have many explanations about these paradoxes. But the question is how time appears faster or slower. Well the answer lies in the fact that universe have more than four dimensions and time which we assume to have single dimension is made up of more than two dimensions and that's the true reason why we find sometimes it moves faster while sometimes it moves slower. Just as gravity goes through every possible dimension and appears weak in three or four dimensions and that's exactly the case with time, we can relate its faster and slower speed at different places of universe with time's multidimensional nature.***

Keywords: Time, Time dilation, Time multidimension

1. Introduction

Time is considered as one of the mysterious things in physics all time. At early times, when science got its evolution, scientists considered "time" as absolute, more generally we define time as ticking throughout universe at the same rate. For example, if we say for an event in earth, it takes time of 1 year to take place, then in any other place or planets it was supposed to take same time of one year, as time is absolute and flows at the constant rate throughout universe.

But whole world stunned by the theory of scientist Albert Einstein. He first time revealed to the world that time is not absolute but it's just an illusion. He said that there is no universal ticking clock, but time flows with different rate at the different places. By his theory "special theory of relativity" and "general theory of relativity", he introduced "time dilation".

It made a big revolution in physics world which was thinking that the time is absolute. This time dilation gave rise to "twin paradox" and many other things, which sometime gives contradictory results.

For example, there are two observers; one is at rest while other is moving. Now from the point of view of rest observer, the moving observer's clock is running slow and from the view of second moving observer, the first observer's clock is running slow.

This gave rise to a paradox because both found their clocks running normal but others clock running slow. Here the question arises, is time really getting slow or fast? Or there is something which we can't observe? Here comes the role of multidimensional time.

Just like gravity seems us very weak force in our three dimensions, but it's much stronger because it goes to all possible dimension, as a result it gets divided in all dimensions. It seems weak in three dimensions which is our current limits of observation.

Now the question arises that, could this be the case with time? Till now we assume it as one dimensional but what if time has more than one dimensions?

Yes, from that multidimensional consideration, we can define time dilation without actual time dilation.

1.1 Time

Newton's viewpoint: -From the Newton's viewpoint time is absolute, it cannot be different for different places or simply the rate of flow of time is same everywhere in the universe. For examples if in our planet earth, it takes two hours for any event to take place then this will be supposed to be the same for other planets also or any other place in the universe. Nothing can control the flow of time and that's the view of Newton. He made all his laws based on this absolute time theory.

A view from Albert Einstein's STR and GTR: - Albert Einstein thought differently about time, he didn't agree with Newton's theory on "time" and rejected absoluteness of time.

Later he gave two big revolutionary theories, "special theory of relativity" and "general theory of relativity". On the base of these two theories Einstein revealed that time is not absolute but it's relative.

He proposed that the flow of time is not constant throughout universe but it's different for different places in universe.

He proposed that gravity affects the flow of time and more gravity slows down the time more. For a simple example, we can say that time is slow near the earth's surface compared to time at international space station (ISS).

He also proposed that time gets slower for fast moving bodies. Time dilation as Einstein claimed was proven by many experiments later, as a consequence of time dilation the atomic clocks in satellite, orbiting earth gets faster by very small amount and we must reset it for good functionality of GPS and many other things.

However, many contradictions also arose by time dilation. As twin paradox. In twin paradox, suppose there are two twin brothers, one is at rest while other is moving close to the speed of light. Now twin at rest finds the clock of moving twin running slow, while moving twin also observes the rest twin's clock running slow.

Now here is the problem that both twins find their clock running normal but each other's clocks running slow. We further have many explanations for this paradox.

2. Multidimensional Time

Let's first think about gravitational force. It is supposed to be the weakest force in all known forces till now, but that's only in three or four dimensions.

Now scientists think that there may be more than three or four dimensions, but due to our observation limit we can't observe them directly.

According to present theory, gravitational force is the force which can go through all possible dimensions and that's the reason why it appears weak in our three or four dimensions.

Because we observe it in only three dimensions and not in all dimension, so it appears to be weak, but that is not the truth, it is weak in three dimensions because it flows through all possible dimensions (more than three).

Now let's discuss this analogy with time. Suppose there is not a single dimension of time but multidimensions of time. Then what will happen?

Here we can suppose that time flows in more than one dimension, but we observe only one-dimension component of that time.
Depending upon the relationship (angle theta) between the actual time axis and the component time axis we observe, it may dilate, or it may seem to us go faster.

So, in general we can say that time flows in multidimension and we observe it in one dimension. Which is not the actual time but the single component of that actual time, and that's why we feel sometimes its going /flowing faster and sometimes it's flowing slower. So, in this way by concept of multi dimensions we can explain time dilation.

3. Analogy with Vector Component

Now we can compare it with simple vector analogy. Take a vector, suppose it is force vector (F). Now let's consider here only 2D (dimension) for simplicity, one axis is X and other is Y.

Now if F is fully directed towards X axis then its Y component will be zero. Similarly, if F is fully directed toward Y axis then its X component will be zero.

But now assume a third condition, let F be inclined to X axis at angle 45 degree, then X component will be F/√(2) and Y component will be equal to F/√(2).

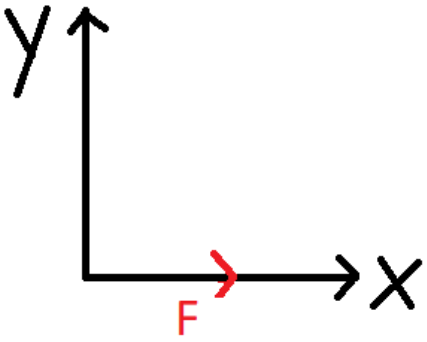

Figure 1
Here total force is directed toward X axis so, F(x)=F and F(y)=0

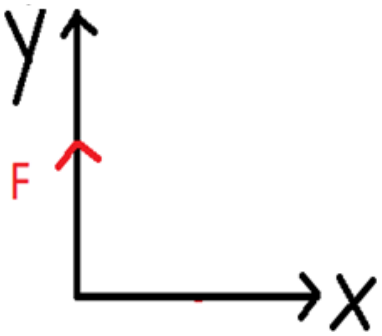

Figure 2
Here total force is directed toward Y axis so, F(x)=0 and F(y)=F

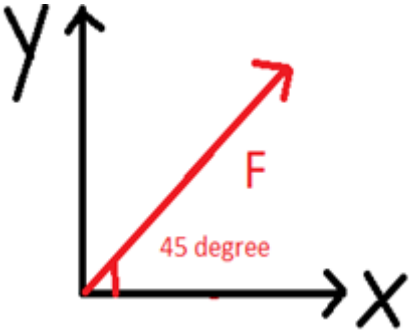

Figure 3
Here total force is inclined with X axis at an angle 45 degree,
So F(x)=F/squareroot (2)
F(y)=F/squareroot (2)
So here by making some angle, F dividend into two components and both are less then F

Here we observe that force components decrease or increase when F inclined at some angle with X axis, and depending upon this angle, both X and Y component will vary. But the combined effect of both will be equal to F.

Now replace F with time "t". Suppose time is two dimensional and we observe its one component at a time. Now depending upon angle of inclination of actual time axis with component time axis, both time components varies and that's why we feel time dilation, while combined effect of both time components will be equal to actual time "t".

For simplicity we only consider here 2D, but time may contain much more dimensions like 3D and again, we will only be able to observe single component by which we feel

time dilation. Actually, there is no time dilation, but it depends upon which component we are observing.

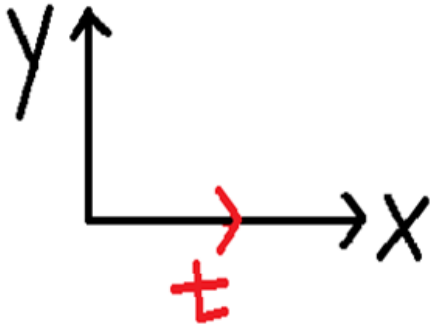

Figure 4:
Whole time is directed toward X axis,
So, t(x)=t and t(y)= 0

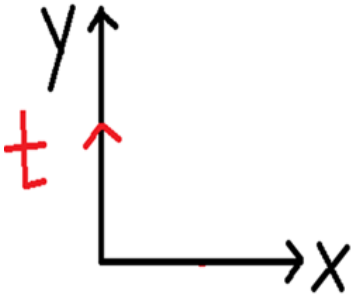

Figure 5:
Whole time is directed toward Y axis,
So, t(x)=0 and t(y)= t

Figure 6:
Whole time is inclined with X axis at some angle theta,
So t(x)=t*cos(theta)
and t(y)= t*sin(theta)
we use theta here just for analogy but in more accurate we can write it as,
t(x)=constant*t
t(y)= constant*t

Factor responsible for Variation of time components: time dilation

Now there are some factors which are responsible for variations of angle between actual time axis and component time axis. These factors are: -(1) gravity and (2) speed. Gravity and speed of object are responsible for variation in angle between the actual time axis and component time axis. As gravity vary, angle between actual time axis and components time axis varies and we feel variation in time (it flows faster or slower). Similar case is with the speed of object, as object speeds up then angle vary and this results in variation in time component axis which we observe.

4. Conclusions

From Newton's point of view time was absolute and uniformly ticking throughout universe. But Einstein's point of view time is relative and its not uniform throughout universe.

In some places it moves faster but, in some places, (like black hole or places of high gravitational field) it moves slower. Also, the clock of moving observer always appears tick slowly in other reference frame, but it ticks normally in its own reference frame.

Now as scientists have predicted more than 4 dimensions, so it is time which has more than one dimension and it's the components of time axis which we observe in our daily life due to our limitations.

Depending upon the angle of inclination of actual time axis with component time axis, the two components vary and that's the reason why we feel time sometime moves faster but sometimes it moves slower. So, the whole mystery of time dilation and change in it's flow rate at different places lies within the time multidimensional theory.

Further variation of angle which actual time axis makes with component time axis depends upon the gravity and speed of object.

As gravity changes, observable time components axis changes, it also changes with changing velocity and that's the whole reason of change in flow rate of time at different places of universe.

5. Acknowledgement

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References

[1] Relativity: the special and general theory (Albert Einstein).

Author Profile

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