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A DISCUSSION ABOUT TIME DILATION BASED ON SPECIAL RELATIVITY

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Abstract:

This article discusses time dilation based on special relativity. An experiment is designed to examine time dilation effects deduced from special relativity. This experiment is similar to but different from the famous "twin paradox" because this experiment doesn't involve any accelerating process, or decelerating process, or change of travelling directions. Impossible results of the experiment are deduced by using special relativity. Thus it can be concluded that the theory of relativity (special relativity) is incorrect.

Key Words: Special Relativity, Theory of Relativity, Albert Einstein, Speed of Light, Frame of Reference, Theoretical Physics, Time Dilation, Space Travel & Time Expansion

Main Text:

In my previous article [A DISCUSSION ABOUT SPECIAL RELATIVITY], an experiment is designed, by using theory of relativity to deduce the experiment results, to prove that the theory of relativity (special relativity) is incorrect. This article aims to further prove it by looking into the time dilation effect based on special relativity.

Special relativity indicates that, for an observer in an inertial frame of reference, a clock that is moving relative to them will be measured to tick slower than a clock that is at rest in their frame of reference. This case is sometimes called special relativistic time dilation. The faster the relative velocity, the greater the time dilation between one another, as described by equation in shown by Figure 1:

$$\Delta t' = \frac{\Delta t}{\sqrt{1 - \frac{v^2}{c^2}}}$$

Figure 1

According to this theory, time dilation would make it possible for passengers in a fast-moving vehicle to advance further into the future in a short period of their own time. For sufficiently high speeds, the effect is dramatic. For example, one year of travel might correspond to ten years on Earth. Indeed, a constant 1 g acceleration would permit humans to travel through the entire known Universe in one human lifetime.

But is it really so?

Now we design an experiment:

At point A, there are 2 spacecrafts (spacecraft 1 and spacecraft 2), both equipped with accurate and synchronized atomic clocks. As shown by Figure 2.

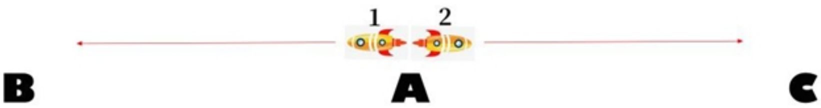

Figure 2

And the two spacecrafts (spacecraft 1 and spacecraft 2) start to travel at the same speeds to point B and point C, whereas point B and point C are several light years apart. The distance between point A and point C is the same as the distance between point A and point B. After they arrive at point B and point C. They stop there, static to each other, as shown by Figure 3. According to theory of relativity, we can know that the clocks on the spacecraft 1 and spacecraft 2 are still synchronized and will always be well synchronized as long as spacecraft 1 and spacecraft 2 stay static to each other.

Figure 3

Then, there is a third spacecraft (spacecraft 3) first passing by spacecraft 2(point C) and then passing by spacecraft 1(point B) at a constant high speed, as shown by Figure 4.

Figure 4

Theory of relativity (special relativity) tells us that, according to the astronaut on spacecraft 3, spacecraft 3 is static while spacecraft 2 and spacecraft 1 are passing by at a constant high speed, as shown by Figure 5. Because we consider that the location of spacecraft 1 is point B and the location of spacecraft 2 is point C, so we can as well say that spacecraft 3 is static while point C and point B are passing by at a constant high speed.

Figure 5

When spacecraft 3 and spacecraft 2 meet at point C, as shown by Figure 6, astronaut on spacecraft 2 sends a signal to astronaut on spacecraft 3 to tell him the exact time. Then the astronaut on spacecraft 3 will use this information to set the atomic clock on spacecraft 3 to be synchronized with atomic clock on spacecraft 2. At the same time, the astronaut on spacecraft 2 will also send a signal to astronaut on spacecraft 1 to tell him when spacecraft 2 and spacecraft 3 meet. During the whole process, the relative speed of the spacecrafts doesn't change, i.e., there is neither accelerating process nor decelerating process. So when spacecrafts meet, they just pass by each other without slowing down.

For spacecraft 3, the time when spacecraft 2 and spacecraft 3 meet at point C, the time is t_{3C}.
For spacecraft 2, the time when spacecraft 2 and spacecraft 3 meet at point C, the time is t_{2C}.
For spacecraft 1, the time when spacecraft 2 and spacecraft 3 meet at point C, the time is t_{1C}.
Apparently, $t_{1C}=t_{2C}=t_{3C}$.

Figure 6

Then, when spacecraft 3 finally meet spacecraft 1 located at point B, as shown by Figure 7:
For spacecraft 3, the time when spacecraft 1 and spacecraft 3 meet, the time is t_{3B}.
For spacecraft 2, the time when spacecraft 1 and spacecraft 3 meet, the time is t_{2B}.
For spacecraft 1, the time when spacecraft 1 and spacecraft 3 meet, the time is t_{1B}.

Figure 7

Theory of relativity (special relativity) tells us:

- According to astronaut on spacecraft 3, spacecraft 3 is static while spacecraft 2 and spacecraft 1 is moving, so the time passes much slower on spacecraft 1 and spacecraft 2 than on spacecraft 3. That is, $t_{1B}-t_{1C}=t_{2B}-t_{2C}<t_{3B}-t_{3C}$.
  Because $t_{1C}=t_{2C}=t_{3C}$, it is deduced that:
  $t_{1B}=t_{2B}<t_{3B}$
- According to astronaut on spacecraft 1 and spacecraft 2, spacecraft 1 and spacecraft 2 are static while spacecraft 3 is moving, so the time passes much slower on spacecraft 3 than on spacecraft 1 and spacecraft 2. That is, $t_{1B}-t_{1C}=t_{2B}-t_{2C}>t_{3B}-t_{3C}$
  Because $t_{1C}=t_{2C}=t_{3C}$, it is deduced that:
  $t_{1B}=t_{2B}>t_{3B}$

Thus, there is now a contradictory result: $t_{3B}<t_{1B}=t_{2B}<t_{3B}$ ($t_{3B}-t_{3C}<t_{1B}-t_{1C}=t_{2B}-t_{2C}<t_{3B}-t_{3C}$)

Because t_{1B}, t_{2B}, and t_{3B} are all time readings. And t_{3B}-t_{3C}, t_{1B}-t_{1C}, and t_{2B}-t_{2C} are each a number(For example, they can be 1000 minutes, or 21 years, etc). So it is apparently impossible that $t_{3B}<t_{1B}=t_{2B}<t_{3B}$ ($t_{3B}-t_{3C}<t_{1B}-t_{1C}=t_{2B}-t_{2C}<t_{3B}-t_{3C}$).

Practically, when spacecraft 3 and spacecraft 1 meet, if the astronaut on spacecraft 3 sends a picture of his own clock reading to the astronaut on the spacecraft 1 and the astronaut on spacecraft 1 sends a picture of his own clock reading to the astronaut on the spacecraft 3, both of the astronaut expect to receive a picture showing time reading smaller than his own time reading. This cannot happen in reality.

To make the experiment more interesting, we can modify the experiment as follows:

Based on the above experiment, when spacecraft 1 and spacecraft 2 are both in location A, they make a schedule. According to this schedule, each year, a new baby will be born in each spacecraft. And the babies born in spacecraft 1 and spacecraft 2 born in the same year will have the same name. When spacecraft 3 meet spacecraft 2, a baby is also born in spacecraft 3. When astronaut on spacecraft 2 tells astronaut on spacecraft 3 the time reading for the setting of clock, the name of the baby is also sent so that the baby born in spacecraft 3 is also named the same name. For example, according to the schedule, the babies born in the year when spacecraft 3 and spacecraft 2 meet is named as Adam. Then there is one person named Adam on each of the 3 spacecrafts.

And as said before, when spacecraft 3 and spacecraft 2 meet, the astronaut on spacecraft 2 will also send a signal to spacecraft 1 to tell him when spacecraft 2 and spacecraft 3 meet. So astronaut on spacecraft 1 knows when did spacecraft 3 and spacecraft 2 meet and that the name of the newborn boy in spacecraft 3 is Adam.

Now we suppose that the relative speed of the spacecrafts is 90% of speed of light in vacuum and the distance between point B and point C is 18 light years. Based on theory of relativity, at the speed of 90% speed of light, the time dilation rate is approximately 2.3. Then:

- According to astronaut on spacecraft 3, spacecraft 3 is static while spacecraft 2 and spacecraft 1, with a distance of 18 light years, is moving at the speed of 90% speed of light towards spacecraft 3.
  so when spacecraft 3 meets spacecraft 1, Adam on spacecraft 3 is 20 years old. Because of time dilation effect, the Adam on spacecraft 1 will be 20/2.3=8.7 years old.
- According to astronaut on spacecraft 1, spacecraft 1 and spacecraft 2 are static while spacecraft 3 is moving at the speed of 90% speed of light towards spacecraft 1. And the distance between spacecraft 1 and spacecraft 2 is 18 light years.
  so when spacecraft 3 meets spacecraft 1, Adam on spacecraft 1 is 20 years old. Because of time dilation effect, the Adam on spacecraft 3 will be 20/2.3=8.7 years old.

When spacecraft 3 and spacecraft 1 meet, if the Adam on spacecraft 3 sends his own picture to the Adam on spacecraft 1, and the Adam on spacecraft 1 also sends his own picture to the Adam on spacecraft 3. What will happen?

According to above analysis based on theory of relativity (special relativity), what will happen is that, on each of the 2 spacecraft, a 20-year-old young man named Adam holds the picture of a 8.7-year-old boy named Adam.

This is apparently impossible.

Or we can also suppose, when spacecraft 3 and spacecraft 1 meet, we let both the Adam on spacecraft 1 and the Adam on spacecraft 3 wave through the window to each other. What will happen?

20-year-old young man named Adam on spacecraft 1 waves to a 8.7-year-old boy named Adam on spacecraft 3?

20-year-old young man named Adam on spacecraft 3 waves to a 8.7-year-old boy named Adam on spacecraft 1?

20-year-old young man named Adam on spacecraft 1 waves to a 20-year-old boy named Adam on spacecraft 3?

8.7-year-old young man named Adam on spacecraft 1 waves to a 8.7-year-old boy named Adam on spacecraft 3?

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Well, at least we can conclude that the theory of relativity(special relativity) is incorrect.

Conclusion:

Because the time dilation effect results in impossible situation, the theory of relativity (special relativity) is incorrect.

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