

The Three Physical Factors: Space, Time and Light Velocity

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Abstract: Our conception of light velocity should be changed. Because the units of the space (km) and time (s) are based on calculating a unit of velocity (km/s) and if the light velocity is constant, then there is no equivalence among inertial frames of reference.

The formula $E=m.c^2$ of Einstein is the energy of the mass at rest, and it also denotes a state of the inertia of the mass. Instead of saying formula $E=m.c^2$ is only energy of the mass when fixed, we also have to say that the formula $E=m.c^2$ is energy of the mass when it moves with uniform movement. So, $E_o=m_o.c_o^2$ is the energy of mass when it doesn't move and $E_r=m_r.c_r^2$ is energy of the mass when it moves with uniform motion. The formulas $E_o=m_o.c_o^2$ and $E_r=m_r.c_r^2$ are same in physical rules and are similar but they are not same in the quantity. $E_o=m_o.c_o^2 \sim E_r=m_r.c_r^2$

$E_o=m_o.c_o^2 \neq E_r=m_r.c_r^2$ and $E_r=m_r.c_r^2 \neq E_r=m_r.c_o^2$. Formula $E_r=m_r.c_o^2$ is not similar to $E_r=m_r.c_r^2$ or $E_o=m_o.c_o^2$. It is nothing.

Einstein is confused by the formula $E_r=m_r.c_o^2$ or $E_r=m_o.\gamma.c_o^2$. Because a moving frame only changes the mass and not space and time. In fact, it is $E_r=m_r.c_r^2$ or $E_r=m_o.\gamma.c_o^2.\gamma^2$. (of which γ is shrinkable coefficient of Lorentz).

Everyone assumes light velocity is absolute. On the contrary, I think that physical science and even Einstein have no right to state that light velocity is a universal constant equal to 300,000km/s.

Since in Einstein's theory, the moving frame is deemed the inertial frame where light velocity is 300,000km/s, then from which frame is the measurement taken? Light velocity is constant, and therefore equal to the velocity in the frame at rest. Thus in Einstein's moving frame where space and time are changed, are such physical factors redundant? Taken by itself, it may be considered as "taking the wrong sow by the ear", and is unacceptable. If the calculation is made in the moving frame where space and time are changed and in order that such physical factors are not redundant, then light velocity is not 300,000km/s.

It is easily proven as follows:

From the formula for the shrinkable coefficient of Lorentz: γ

$$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$$

(of which v is velocity of the moving frame; c is light velocity; γ is a shrinkable coefficient)

From: $\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$, we realize that when the velocity: v of the motion frame is small, it

has little effect in changing the physical factors of the frame. In this case we can disregard it. But if it is large, near light velocity, it can change space and time and every physical factor in the moving frame.

The velocity of the moving frame is given as $v=200,000\text{km/s}$, and space is denoted by the dimension: km . The space dimension in the fixed frame is km_0 , ($\text{km}_0 = \text{km}$), the dimension in the moving frame is km_r :

$$\frac{\text{km}_0}{\text{km}_r} = \frac{1}{\gamma}$$

$$\text{km}_r = \gamma \cdot \text{km}_0 = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} \text{km}_0 = \frac{1}{\sqrt{1 - \frac{2^2}{3^2}}} \text{km}_0 = \frac{1}{\sqrt{\frac{5}{9}}} \text{km}_0 = 1.333 \text{km}_0$$

$$\text{km}_r = 1.333 \cdot \text{km}_0$$

This means that the unit of the dimension: km_r in the moving frame is larger than the unit of the dimension: km_0 in the frame at rest by 1.333 times.

Given that the unit of time in the moving frame is second: s_r , the unit of time at the fixed frame is second: s_0 , ($s = s_0$):

$$\frac{s_0}{s_r} = \frac{1}{\gamma}$$

$$s_r = \gamma \cdot s_0 = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} \cdot s_0 = \frac{1}{\sqrt{1 - \frac{2^2}{3^2}}} \cdot s_0 = \frac{1}{\sqrt{\frac{5}{9}}} \cdot s_0 = 1.333 \cdot s_0$$

$$s_r = 1.333 s_0$$

This means that time passes slower in the moving frame than in the fixed frame by 1.333 times.

Giving the light velocity in the moving frame as c_r , light velocity in the fixed frame is c_0 , ($c_0 = c$):

$$\frac{c_0}{c_r} = \frac{1}{\gamma}$$

$$c_r = \gamma.c_0 = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}.c_0 = \frac{1}{\sqrt{1-\frac{2^2}{3^2}}}.c_0 = \frac{1}{\sqrt{\frac{5}{9}}}.c_0 = 1.333.c_0$$

$$c_r = 1.333.c_0$$

This means that light velocity in the moving frame is faster than light velocity in the fixed frame by 1.333 times.

The unit of light velocity in the moving frame is $km_r/s_r=1.333km_0/s_0$ and the unit of light velocity in the fixed frame is km_0/s_0 .

Because the unit of light velocity includes physical space: (km) and time: (s) in the frame, thus in any reference frame, light velocity is measured at $c=300,000km/s$ in the time and the space of the frame. So, in the moving frame, light velocity is $c_r=300,000km_r/s_r$, in fact, in the fixed frame, light velocity is also $c_0=300,000km_0/s_0$.

Comparing physical factors between the moving frame and the fixed frame, we realize that: The dimension: $km_0 \neq km_r$; $km_r=1.333.km_0$, the time: $s_0 \neq s_r$, $s_r=1.333.s_0$, so the velocity: v_r in the moving frame is different from the velocity: v_0 in the fixed frame: $v_r \neq v_0$, $v_r=1.333.v_0 \rightarrow$

$$v_r = \frac{km_r}{s_r} \neq v_0 = \frac{km_0}{s_0}$$

Given the dimension in the fixed frame as $l_0=300,000km_0$, the time is s_0 (second is unit of time). This dimension $300,000km_0$ in the moving frame will be : $km_r=\gamma.km_0$, because $\gamma=1.333 \rightarrow$

$$l_r=1.333 \times 300,000km_0=399,900km_0, \text{ or } l_r=300,000.(1.333km_0)=300,000 km_r$$

The velocity in the moving frame: v_r if calculating by a unit of space, time in the fixed

$$\text{frame is } v_r = \frac{l_r}{t_0} \times \frac{km_0}{s_0} = \frac{399,900}{1} \times \frac{km_0}{s_0} = 399,900 \frac{km_0}{s_0}$$

If calculating by a unit of space, time in the moving frame is

$$v_r = \frac{l_r}{t_r} \times \frac{km_r}{s_r} = \frac{300,000}{1} \times \frac{1.333km_0}{1.333s_0} = 300,000 \frac{km_r}{s_r}$$

$$\text{The velocity in the fixed frame: } v_0, \quad v_0 = \frac{l_0}{t_0} \times \frac{km_0}{s_0} = 300,000 \frac{km_0}{s_0}$$

Comparing: $v_r = 300,000 \frac{km_r}{s_r} \neq 300,000 \frac{km_0}{s_0} = v_0$

$$v_r = 300,000 \frac{km_r}{s_r} \sim v_0 = 300,000 \frac{km_0}{s_0}$$

$$v_r = 399,900 \frac{km_0}{s_0} \neq v_0 = 300,000 \frac{km_0}{s_0}$$

The velocity in the fixed frame is different from the velocity in the moving frame because its units of dimension and time are different, but they are similar: $300,000 km_0/s_0 \sim 300,000 km_r/s_r$.

$V_0 = 300,000 km_0/s_0 = c_0$, $v_r = 300,000 km_r/s_r = c_r$, because $v_0 \neq v_r$, so $c_0 \neq c_r$. Because $c_0 \neq c_r$ and velocity of it can be $399,900 km_0/s_0$, it means that light velocity: c is not constant and can be changed by the formula of shrinkable coefficient of Lorentz as given above.

If light velocity: $c = 300,000 \frac{km_0}{s_0}$ is constant, we can find that at the moving frame it will

$$\text{be measured } c_r = \frac{300,000}{1.333} \times \frac{1.333 km_0}{1.333 s_0} = 225,052 \frac{km_r}{s_r}$$

If we accept that, calculating by units of the space and time of the moving frame, light velocity: c_r can be near zero in the moving frame. This is because when the velocity of the moving frame is near light velocity: c of the fixed frame, the shrinkable coefficient: γ can be near infinity (∞). This is contrary to the correspondence between inertial frames in relativity theory as well as the inertial law of Newton. How does a reference frame with light velocity of $300,000 km_0/s_0$ correspond to one with light velocity of $225,052 km_r/s_r$ or near zero? The reference frame with a light velocity of $300,000 km_0/s_0$ only corresponds to one with light velocity of $300,000 km_r/s_r$. ($300,000 km_0/s_0 \sim 300,000 km_r/s_r$)

I don't think the units of space and time in the moving frame (which are redundant) and the shrinkable coefficient: γ of Lorentz as well as relative theory of Einstein is wrong. But I think there is a problem in our conception about light velocity.

Some think that if light velocity is not constant, the formula $E = m \cdot c^2$ in the Relative theory of Einstein will be wrong. I don't think so, fundamentally the formula $E = m \cdot c^2$ is correct, although it is a bit less than sufficient. This is because Einstein's conception of light velocity is incorrect.

When the frame accelerates to a velocity, it means it has increased energy, equivalent to the energy of the motivating force. This corresponding increase of energy changes all the physical factors of the moving frame. According to the principle of conservation of energy, this corresponding increase of energy is scaled on the difference between the

energy of a frame when it doesn't change and when it changes. It means that this corresponding increase of energy is equal to all the shrinkable coefficients of the physical factors of frame. For example: $m_r = \gamma \cdot m_o$, $l_r = \gamma \cdot l_o$, $t_r = \gamma \cdot t_o$, $c_r = \gamma \cdot c_o$, $v_r = \gamma \cdot v_o \dots$

In the formula $E_r = m_r \cdot c^2$ or $E_r = \gamma \cdot m_o \cdot c^2$ of Einstein, why does the mass of the moving frame have the coefficient: γ , but not the km/s of the light velocity? This means that there is no calculation of physical factors of the dimension (km) and time (s) in the moving frame, so the energy $E_r = \gamma \cdot m_o \cdot c^2$ is not exact and that is why there is no correspondence between the fixed frame and the moving frame so that the light velocity at the moving frame can be 252,052 km/s_r or near zero when it approaches the light velocity of the still frame.

Einstein forgets comparison between the light velocity in the fixed frame and at the frame in uniform motion. He also forgets that the unit of velocity: (km/s) relates to the units of space: (km) and time: (s) and the units of the space: (km) and time: (s) are based on calculation of the unit of velocity: (km/s).

In Einstein's opinion:
$$E_{re} = \gamma \cdot m_o \cdot c^2 = m_o \cdot \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} \cdot c^2.$$

In my opinion:
$$E_r = \gamma \cdot m_o \cdot \gamma^2 \cdot c_o^2 = m_o \cdot \gamma^3 \cdot c_o^2 = m_o \cdot \frac{1}{\left(\sqrt{1 - \frac{v^2}{c^2}}\right)^3} \cdot c_o^2$$

$$E_r = m_o \cdot \frac{1}{\left(1 - \frac{v^2}{c^2}\right)^{\frac{3}{2}}} \cdot c_o^2 = m_o \cdot c_o^2 \cdot \left(1 - \frac{v^2}{c^2}\right)^{-\frac{3}{2}}$$

(of which $c = c_o$)

From:
$$(a + x)^n = a^n + n \cdot a^{n-1} \cdot x + \frac{n(n-1)}{2} a^{n-2} \cdot x^2 + \dots$$

$$\left(1 - \frac{v^2}{c^2}\right)^{\frac{1}{2}} = 1 + \frac{1}{2} \cdot 1^{-\frac{3}{2}} \cdot \frac{v^2}{c^2} + \frac{-1}{2} \cdot \frac{-3}{2} \cdot 1^{-\frac{5}{2}} \cdot \frac{v^4}{c^4} + \dots = 1 + \frac{1 \cdot v^2}{2} + \frac{3 \cdot v^4}{8 \cdot c^4} + \dots$$

$$\left(1 - \frac{v^2}{c^2}\right)^{\frac{3}{2}} = 1 + \frac{3}{2} \cdot 1^{-\frac{5}{2}} \cdot \frac{v^2}{c^2} + \frac{-3}{2} \cdot \frac{-5}{2} \cdot 1^{-\frac{7}{2}} \cdot \frac{v^4}{c^4} + \dots = 1 + \frac{3 \cdot v^2}{2 \cdot c^2} + \frac{15 \cdot v^4}{4 \cdot c^4} + \dots$$

$$E_{re} = m_0 \cdot c^2 \left(1 + \frac{1 \cdot v^2}{2 \cdot c^2} + \frac{3 \cdot v^4}{8 \cdot c^4} + \dots \right) = m_0 \cdot c^2 + \frac{m_0 \cdot v^2}{2} + \frac{3 \cdot v^4}{8 \cdot c^2} + \dots$$

$$E_r = m_0 \cdot c^2 \left(1 + \frac{3 \cdot v^2}{2 \cdot c^2} + \frac{15 \cdot v^4}{8 \cdot c^4} + \dots \right) = m_0 \cdot c^2 + \frac{3 \cdot m_0 \cdot v^2}{2} + \frac{15 \cdot v^4}{8 \cdot c^2} + \dots$$

The energy of the mass when it is motionless, ($v=0$) is $E_0 = m_0 \cdot c^2$. This calculation and Einstein's calculation are same.

It is only different:

Einstein's calculation: $E_{re} = m_0 \cdot c^2 + \frac{m_0 \cdot v^2}{2} + \dots$

This calculation: $E_r = m_0 \cdot c_0^2 + \frac{3 \cdot m_0 \cdot v^2}{2} + \dots$

or
$$E_r = 3 \left(\frac{m_0 \cdot c_0^2}{3} + \frac{m_0 \cdot v^2}{2} \right) + \dots \quad (c = c_0)$$

The energy: E_r in this calculation is different from the energy: E_{re} in Einstein's calculation because it has to change the space (km) and time (s) of the moving frame.

The Einstein formula $E_0 = m_0 \cdot c^2$ (the energy of a frame when motionless) is still valuable, but $E_{re} = \gamma \cdot m_0 \cdot c^2$ is not exact because it lacks the coefficient: γ of physical factors of space (km) and time (s) in the moving frame. In other words, Einstein's formula of energy: $E_r = m_0 \cdot \gamma \cdot c^2$ in the frame moving with extreme velocity only shows a change of mass (m_r) but does not change the space (km_r) and time (s_r) of the frame.

Light velocity which is not constant doesn't depend on Einstein's relativity theory. A question arises in that Einstein's opinion and my opinion differ about the formula of the energy of a frame moving with extreme velocity so that space and time are changed. Which opinion is correct? Genius is sometimes confused and the most terrible thought is that we love genius too much and do not distinguish between confusion and truth.

If this applies to Einstein, he would revise the theory to what we suggested. Revise how? It is best revised by only one method: to affirm light velocity is only constant in each frame of reference and the three physical factors (light velocity: km/s; space: km and time: s) in all frames of reference are directly related to one another. If it is changed, then these three physical factors have to alter to create a physical rule of equivalence among frames of reference. Only such a premise can satisfy the equivalence between the fixed frame and the moving frame when the latter's velocity is as large as light velocity (the Einstein frame). Thus, it is not a choice between Newton and Einstein or the former law being a consequence of the latter law. It can then rightly be said in physical science that

light velocity is constant and equal to 300,000km/s in all inertial frames of reference in the universe and in the space and time of each inertial frame of reference.

It may be deemed that the issue is too big and too complicated. If it is not considered but omitted, it is a black mark in the history of physics, otherwise if revised, all textbooks that specify the immutability of light velocity in the world must be changed absolutely. We must accept it (if we respect truth) for the intellectual development of all.

Hanoi, March 6, 2006