IOSR Journal of Applied Physics (IOSR-JAP)
e-ISSN: 2278-4861.Volume 7, Issue 6 Ver. II (Nov. - Dec. 2015), PP 01-02
www.iosrjournals

Fate of Relativity When Something Which Travel Faster Than Light Is Discovered

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Relativity is one of the most controversial theories of all time in physics. Here we will talk about the invariance of mass and the highly famous Energy-Mass equivalence and its fate if something which travels faster than light is discovered. Variance of mass in physics is given by:

$$M= \frac{M_o}{\sqrt{1-\frac{v^2}{c^2}}} \quad \text{.............................. (1)}$$

Where v= velocity of a particle and c= velocity of light.
If a common particle like me, you, a ball, etc. crosses speed of light, then

$$M= \frac{M_o}{\sqrt{-ve}}$$

Thus, the mass, in actual, the relative mass will become imaginary, i.e. the relative mass cannot be calculated, just imagined.

But, what if like photons, a new particle say Xtron is discovered whose speed is found to be more than speed of light. Then, what will happen to this equation and relativity.

Actually, we use speed of light here as reference because it is the fastest velocity we can ever calculate. And if something is discovered having speed more than light say C_o , then it will probably be the new reference speed. And the new equation will be:

$$M' = \frac{M_o}{\sqrt{1-\frac{v^2}{c_o{}^2}}} \quad \text{.............................. (2)}$$

Where, M'= new relative mass and C_o = Velocity of particle which travels faster than light.

Now, Do our old formula fail?????
To find out, Let us do some simple calculations:
Firstly simplify eqn. 1, we get

$$M= \frac{M_o}{\sqrt{1-\frac{v^2}{c^2}}} = \frac{M_o\, c}{\sqrt{c^2-v^2}} \quad \text{................(3)}$$

Similarly simplify (2)

$$M' = \frac{M_o}{\sqrt{1-\frac{v^2}{C_o{}^2}}} = \frac{M_o\, C_o}{\sqrt{C_o{}^2-v^2}} \quad \text{................ (4)}$$

Now when we divide (3) and (4) and do some simple maths, we will get

$$\frac{1}{M'} = \frac{1}{M}\frac{C}{C_o}\sqrt{\frac{C_0{}^2-V^2}{C^2-V^2}} \quad \text{................ (5)}$$

Now for general life and general particles V<<<<<C and C_o
Thus, $C^2 - V^2 \approx C^2$ and $C_o{}^2 - V^2 \approx C_o{}^2$
Using these two values in eqn (5) we can get,

$$M' = M$$

TADA!!!!!!! The invariance of mass and thus relativity still holds good……. But But what if speed of particle is approachable to light….

Then we have eqn. (5) where it is clear that

$$M' \propto M$$

So we have got a new equation and you may call it FTL INVARIANCE OF MASS or HD INVARIANCE OF MASS.

And when we talk about the energy-mass equivalence, which is given as:

$$E = MC^2$$

But when something which travels faster than light is discovered, then considering new reference mass, we get:

$$E' = MC_o{}^2$$

Multiplying and dividing by C^2, we get

$$E' = MC_o{}^2 \text{ X } \frac{C^2}{C^2}$$

$$E' = MC^2 \text{X } \frac{C_o{}^2}{C^2}$$

Since the velocities C and C_o are constant. Hence,

$$E' = KE$$

Where $K = \frac{C_o{}^2}{C^2}$ = HD VELOCITY CONSTANT

And this eqn. is called HD-EINSTEIN ENERGY MASS EQUIVALENCE.

This last eqn. also gives

$$E' \propto E$$

HENCE OUR RELATIVITY STILL PREVAILS………………………………………………………….

But what if the speed of new particle can't be used as a new reference, I.e. we can't use it in our prevailing formula as reference. So, I have done another calculation which can prove the above calculations and also the theory of Albert Einstein that speed of light is not relative. Hence, however a particle moves with a speed faster than light, relatively, it will not exceed the speed of light.

So, now, we can't use new velocity as reference but we might use it as v=c+x in the invariance formula, indicating that particle is travelling with velocity faster than light. So, simplified version of eqn. (1) becomes:

$$M = \frac{M_o c}{\sqrt{c^2 - (c+x)^2}}$$

Squaring both sides and cross multiplying, we get

$$M^2 = \frac{M_o{}^2 C^2}{c^2 - (c+x)^2}$$

$$M^2c^2 - M^2(c+x)^2 = M_o{}^2C^2$$

$$M^2c^2 = M_o{}^2C^2 + M^2(c+x)^2$$

$$M^2c^2 = M_o{}^2C^2 + M^2(c^2 + x^2 + 2cx)$$

$$M^2c^2 = M_o{}^2C^2 + M^2c^2 + M^2x^2 + 2M^2cx$$

$$M_o{}^2C^2 + M^2x^2 + 2M^2cx = 0$$

$$M^2\{\frac{Mo^2}{M^2}c^2 + x^2 + 2cx\} = 0$$

$$\frac{Mo^2}{M^2}c^2 + x^2 + 2cx = 0$$

When a particle moves with such a high speed, then M=infinite

Thus, $\frac{M_o{}^2}{M^2} = o$

Therefore, $x^2 + 2cx = 0$

$x(x+2c) = 0$

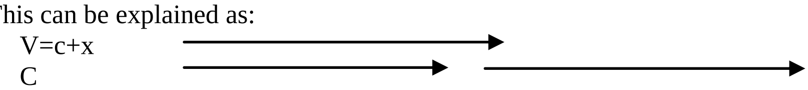
Either, x=0 or x=-2c

But x cant be 0.

Therefore, x=-2c, Hence, v=c-2c=-c

Hence, the particle can't travel with speed more than that of light or if it does it will, relatively tend to move with speed negative as that of light.

This can be explained as:



When the particle will move with speed c+x, since the speed of light is not relative, it will appear to it as light is moving with a velocity c more than its own velocity.

Hence, Theoretical (which should be) speed of light= c+c+x= 2c+x

Therefore, Relative speed of object= c+x-2cx-x= -c

This proves the theory of Albert Einstein that no particle can travel with sped more than that of light.

Hence Proved…………

So, if this velocity is used instead of speed of light as new reference, the relative mass also remains same. Hence, both calculations satisfy each other.