

The Basics of Special Relativity are the Same: It is A Deliberate Attempt for Conceptual Modifications Only. Space – Time is A Curvature (Complete Closed Loop) for Fermions only And Space – Time is A Curvature (Semi – Elliptical) for Bosons.

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Abstract

A defining year in physics was 1905 when great Einstein first postulated a great theory in physics: the special theory of relativity. Very few understood the theory that time and even fewer believed in this theory. Keeping all the basics of that theory intact, it is just a deliberate attempt to introduce some conceptual modifications in the special theory of relativity. This paper also focuses on space – time as a curvature (Complete Closed Loop) for fermions and space – time is a curvature (Semi – Elliptical) for bosons. The assumptions are made that mass and velocity of a particle or antiparticle cannot go negative. A revision on the mass – energy equivalence equation is proposed in this paper and theoretical relationships of space – time for fermions and bosons are proposed with some conceptual modifications in the special theory of relativity in the light of particle and antiparticle pair production and annihilation. In this paper, conceptual modifications are arranged in such a way to justify conclusion.

Keywords : The special theory of relativity, Space – time, Particle and antiparticle pair, Annihilation, Mass – energy equivalence equation

I. Introduction

According to the theory of Special Relativity, the mass – energy equivalence equation postulated by Einstein in 1905 was [I],[II]–

$$E = mc^2 \quad (1)$$

Where, E is an entity of the Universe in the form of energy m is the rest mass of a body c is speed of light, the universal speed limit of the Universe

If the rest mass m of a body has a velocity V , then, [III],[IV]–

$$E = mC^2 + \frac{1}{2}mV^2 \quad (2)$$

Where, $\frac{1}{2}mV^2$ is the kinetic energy of the rest mass m , with velocity V

$$\text{Or, } E - mC^2 = \frac{1}{2}mV^2 \quad (3)$$

With regard of the theory of Special Relativity, mass and energy are two different facets of the same phenomena. Formation of mass depends on whether an enormous energy is trapped into a small volume or not. The transformation of mass into energy or energy into mass is extremely difficult and there is no known easy way for the transformation. But, continuous production of particle and antiparticle pair and annihilation are going on in the free space. With the help of high energy γ ray photons, energy can be transformed into particle and antiparticle pair with individual mass m and velocity V . With an assumption that mass m cannot go negative and particle – antiparticle have the same mass m . Also velocity V of particle and antiparticle cannot go negative, it means, particle and antiparticle have the same velocity V .

In transformation of energy into particle – antiparticle pair,

Total amount of energy trapped in particle with mass $m = mC^2$

Total amount of energy trapped in antiparticle with mass $m = mC^2$

Total energy trapped in the transformation of energy into mass = $mC^2 + mC^2 = 2mC^2$

Now, pragmatic mass – energy equivalence equation is

$$E = 2mC^2 \quad (4)$$

$$\frac{E}{2} = mC^2 \quad (5)$$

The rest mass never exists. It is a theoretical abstraction only. Nothing is at absolute rest. Suppose, particle and antiparticle both have the same mass m and also have the same velocity V , under normal condition, particle – antiparticle pair have the same mass and velocity.

The total kinetic energy of particle with mass m and velocity $V = \frac{1}{2}mV^2$

The total kinetic energy of antiparticle with mass m and velocity $V = \frac{1}{2}mV^2$

The total kinetic energy of the particle – antiparticle pair produced = $\frac{1}{2}mV^2 + \frac{1}{2}mV^2 = mV^2$

With keeping the basics of Special Relativity the same, the pragmatic mass – energy equivalence equation with particle – antiparticle pair with mass m velocity V

$$E = 2mC^2 + mV^2 \quad (6)$$

The realistic mass is always the relativistic mass. The relativistic mass postulated by the theory of special relativity is[V],[VI],[VII] –

$$mr = \frac{m}{\sqrt{1 - \frac{V^2}{C^2}}} \quad (7)$$

Where, mr is the relativistic mass of a particle or antiparticle

m is rest mass of particle or antiparticle

C is speed of light, the universal speed limit of the Universe

V is speed of the mass of particle or antiparticle

Now, when the relativistic mass is mr

$$E = 2 \times mr \times C^2 \quad (8)$$

$$\frac{E}{2} = mr \times C^2 \quad (9)$$

$$2 \times mr \times C^2 = 2mC^2 + mV^2 \quad (10)$$

$$mr = \frac{2mC^2 + mV^2}{2C^2} \quad (11)$$

$$mr = m + \frac{m}{2} \left(\frac{V}{C} \right)^2 \quad (12)$$

Because in practical case, generally, $V \ll C$, and the equation is also valid for $V \ll C$. This condition is a very realistic condition.

II. The Curved Space – Time

In particle physics, there are mainly two types of particles. These are called fermions and bosons. Both of these have sub-categories of particles. A fermion is a particle with odd half-integer spin, like $\frac{1}{2}, \frac{3}{2}, \dots$. Leptons, Quarks, Protons, Neutrons are examples of fermions[VIII]. Bosons are particles with integer spin like 0, 1, 2, Bosons are, for example, Photons, Gluons, W_+ , W_- , Z_0 bosons, Higgs bosons, Mesons etc.[IX]. All matter particles have significant mass and they are fermions. All force carrying particles are called bosons. All matter particles have their counterpart antiparticles but all force carrying particles do not have their counterpart antiparticles. Fermions show two types of charge – positive charge and negative charge. Because of the charge property, fermions have particles and antiparticles pair. Because, generally, bosons do not show charge property, they do not have particles and antiparticles pair.

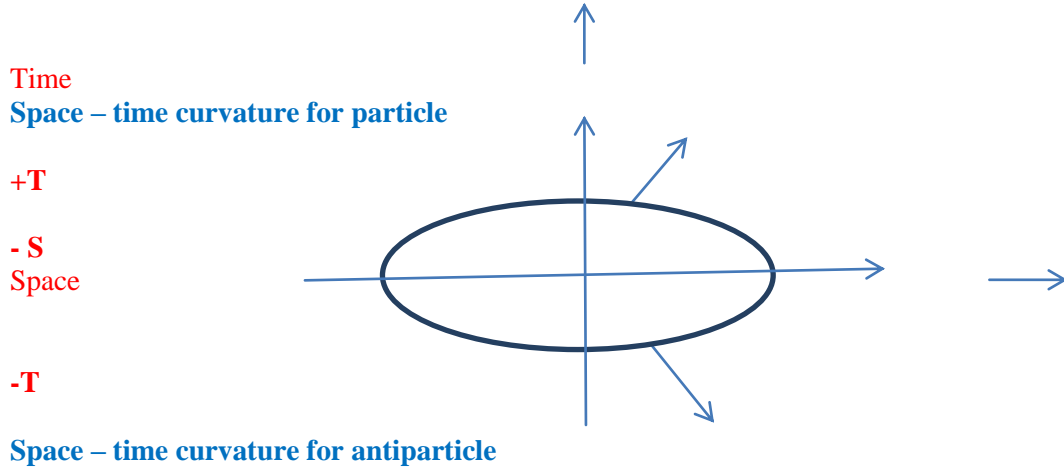


Fig 1. Particle – antiparticle origination and recombination

Formation of particles and antiparticles follow elliptical path to recombine them. At a particular space point s and particular temporal point t in the space – time axis -

$$\frac{s^2}{S^2} + \frac{t^2}{T^2} = 1 \quad (13)$$

Because of the non – linear relationship between space and time, the path looks elliptical. If space and time were equal, transformation constant would be one; the path would look like a circle. If it would be $S = T$, the equation would be –

$$s^2 + t^2 = S^2 \quad (14)$$

$$or, s^2 + t^2 = T^2 \quad (15)$$

In both cases, the path would be a circle. Because fermions show charge property, they originate and recombine as particle and antiparticle pair. Because of the charge property, space – time looks curvature – elliptical shape (complete closed loop). The path is complete closed loop because antiparticle travels in reverse time arrow (opposite to the particle time arrow). Particle and antiparticle pair produces a closed loop from point $-S$ (origination) to point $+S$ (recombination). Because there is never a rest mass, particle and antiparticle originate with a velocity (with some kinetic energy) which propels them away from each other. But the gravity of particle and antiparticle nullify the kinetic energy to come closer to each other in an elliptical path. Because gravity wins over kinetic energy, recombination takes place. But, bosons do not display charge, thus they do not exist as particle and antiparticle pair. Because bosons do not display charge, space –time looks semi – elliptical curvature for bosons.

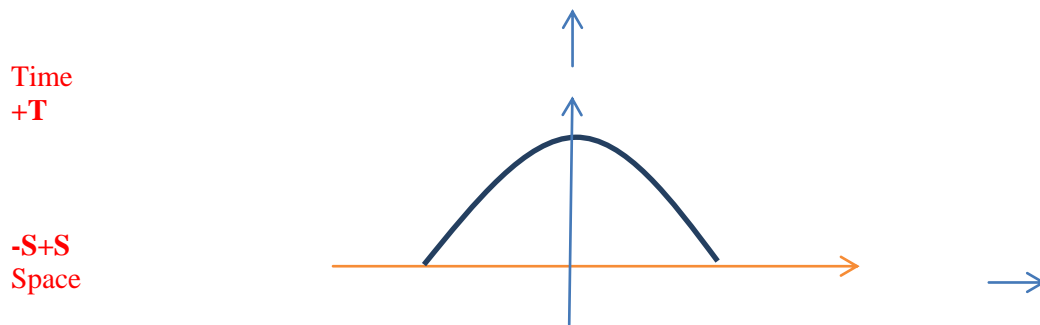
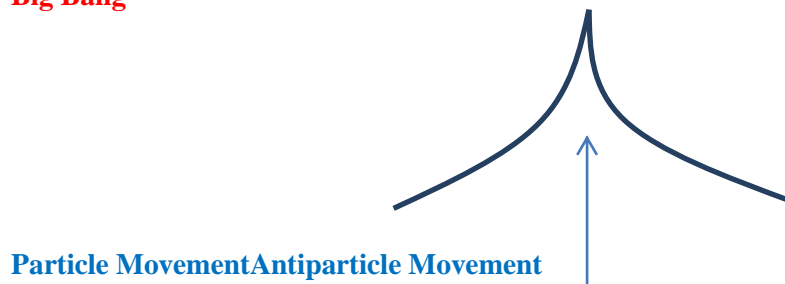


Fig 2. Boson in space – time (without time reversal)

In the time of Big Bang, it was all ultrahigh kinetic energy, this ultrahigh kinetic energy won over gravity which is why all particles together have a Universe where antiparticle is not present. And all antiparticles together have antiparticle Universe where particle does not exist. The kinetic energy was strong enough to move particle and antiparticle pair away from each other permanently. Thus, particle moved in one direction and antiparticle moved in the opposite direction with same curvature. Due to gravity, all particles clumped together to produce our Universe, whereas all antiparticle also clumped together to produce antiparticle Universe. Thus, parallel Universes formed. Thus, fermions developed parallel Universes where bosons remain the same as force carrying particle since the Big Bang.

Big Bang



Enormous Kinetic Energy overcomes Gravity

Fig 3. Formation of parallel Universes

III. Conclusion

The basics of special relativity are exactly the same: It is a deliberate attempt for conceptual modifications of the great theory – the special theory of relativity. Space – time is a curvature (complete closed loop) for fermions only and space – time

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is curvature (only semi – elliptical) for bosons. An enormously high kinetic energy produced particle and antiparticle pair during Big Bang and due to a strong kinetic energy, particle and antiparticle separated permanently to produce parallel Universes. The energy that did not produce particle and antiparticle pair remained as bosons since Big Bang to till date.

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