The Special Relativity Theory and Energy

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Abstract

In order to think about energy of mass point considering Special Relativity Theory, important point is equality of space and time dimension, which is core of the Theory. Because mass change of a mass point might be possible like nuclear fission, mass change should be included in energy calculation formula if necessary, and the mass change should be pure mass change fixing other elements.

1. Introduction

If mass value of a mass point depends on its velocity and the formula is used for energy calculation, change of mass there means change of velocity.[1]

In this situation, mass of constant velocity mass point, for example static mass point, never change,

When we consider energy of mass, we should think about pure mass change fixing velocity of the mass point to avoid confusion of mass energy and kinetic energy.

Then relativistic energy formula should be reconstructed on pure mass change without velocity change.

2. Energy of mass point

Regarding to the energy of mass point, following kinds of energy make total energy.

- Energy of movement
- Energy of mass

Origin of energy or change of energy is calculated based on following activities

- Work done on the change of movement
- Work done on the change of mass

Then regarding to energy E for a particular mass point (mass m, velocity v), following relation is defined.

$$\frac{\mathrm{dE}}{\mathrm{dt}} = \mathrm{v}\frac{dm}{dt}v + vm\frac{dv}{dt} \qquad (1)$$

The first term on the right side means work done based on increasing mass. To get velocity v for increased mass dm means that mass dm accelerated by $\frac{v}{dt}$. Then dm is mass. $\mathrm{dm}\frac{v}{dt}$ is strength and $\mathrm{v}\frac{dm}{dt}v$ is work done.

The second term on the right side is usual work done based on the change of velocity.

Here the first term represents the energy of mass m as zero level is equal to that of $m = 0$.

The second term represents the energy of space dimension velocity v as zero level is equal to that of space dimension velocity $v = 0$.

Multiplying dt to (1), then integration of each term makes

$$E = mv^2 + \frac{1}{2}mv^2 \tag{2}$$

3. Energy for each cases

For space dimension, (2) is

$$E = mv^2 + \frac{1}{2}mv^2 \tag{3}$$

For time dimension, v is c, then increased mass dm get velocity c and $vm\frac{dv}{dt}$ of (1) is zero because light speed c is constant.[2] On these, (2) is

$$E = mc^2 \tag{4}$$

a) Energy from $m = 0$ level and space dimension velocity $v = 0$ level

$$E = (3) + (4) = mv^2 + mc^2 + \frac{1}{2}mv^2$$

Here comparing to mc^2, other elements' value are very small, then usually these are ignored.

b) Energy from space dimension velocity $v = 0$ level and mass $m = m$ level (current mass level) is

$$E = \frac{1}{2}mv^2$$

This is usual kinetic energy considering only space dimension. Here mass energy is not included.

c) Energy from mass $m = 0$ level and space dimension velocity $v =$ constant zero is

$$E = \frac{1}{2}mc^2$$

This is static mass energy.

4. Conclusion

We get these result only from following assumption.

- Mass is changeable.
- Equality of space and time dimension

Then difference of mass on each frame of reference may have no relation with relativistic energy.

Reference

[1] Peter Gabriel Bergmann,*Introduction to the Theory of Relativity*, (Dover Publication, INC 1976),p85

[2] Tsuneaki Takahashi, viXra:1611.0077,(http://vixra.org/abs/1611.0077)