Space motion theory

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Abstract

The special theory of relativity discovered the relation between motion and time, and proposed that motion and time are all relative, determined by reference frames. Herein, the other possibility that motion and time are all absolute, regardless of reference frames, is proposed. It is concluded that space is composed of the sum of the distributions of all particles in the universe and free vacuum energy; $D \propto M/R^2$, where D is the distribution density of a particle at a position, M is the absolute mass of the particle, and R is the distance of the point from the momentum center of the particle. Every point in space has a specific motion, and a large uniform space forms a space motion background. Every elementary quantity, energy, mass, time or length, requires an object of reference to define its size. The absolute quantities of an object vary with the velocity relative to the space motion background, named energy velocity (v), while the relative quantities have invariability, named relative invariance.

Keywords: Space motion background; Energy velocity; Entropic information energy; Relative invariance; Special relativity

1 Introduction

It was the notions from human early practical cognition that motion is relative and time is absolute until relativity theory discovered a strict one-to-one relationship between velocity and time. If this relationship is correct, there are only two possibilities: motion and time are all absolute, or time and motion are all relative. Einstein chose the latter.

2 Absolute and relative quantities

Measurement and observation are two different processes; however, they are often confused in analyses. In this theory, observers are used to measure quantities; a light source can also be called a sender, while the recipient of the photons is called the recipient, but cannot be called the observer.

Absolute quantities: absolute energy (E), absolute mass (M), absolute time (T), absolute length (L), absolute velocity (V) and absolute quantum frequency (N) are the quantities of an observed thing measured by the quantities of standard objects static to and at the observer. The observer's quantities must be invariant within the scope of the analysis.

Relative quantities: relative energy (e), relative mass (m), relative time (t), relative lengths (l), and relative quantum frequency (ν), are the quantities of a system or at a point that are measured by the quantities of the system or at the point themselves or measured by the relevantly local quantities. It should be noted that the energy velocity of an object (v) is measured by the higher system.

Quantity ratios: $E^q=E/e$, $M^q=M/m$, $T^q=T/t$, $L_{x,y \text{ or } z}{}^q=L_{x,y \text{ or } z}/l$, $V_{x,y \text{ or } z}{}^q=V_{x,y \text{ or } z}/v$ and $N^q=N/\nu$ are the ratios of the absolute quantities of an object to the relative quantities of the object. Quantity ratios can also represent systemic changes in quantities.

3 Space motion background

The existence of vacuum fluctuations has been predicted by quantum field theory [1],[2] and has been proven by many experiments. The vacuum energy density is called the cosmological constant and is usually denoted by Λ. However, the theoretical calculations of Λ are 120 orders of magnitude greater than what is observed [3].

According to the present knowledge, three forces, electromagnetic force, strong nuclear force and weak nuclear force, form particle structures, the energy of which is named particulate information energy or internal energy (E_s). The energy of particles that spreads over the universe is named matter information energy or information energy (E_i), including E_s and entropic information energy (E_e).

$$E_i=E_s+E_e \tag{1}$$

Vacuum energy can move, has inertia and is the only source of energy. Matter information of particles will absorb free vacuum energy (E_v) into E_i.

A large uniform vacuum energy (relative to a substance in it), of which the motion state is hardly affected by the substance, is the space motion background or the space background of the substance.

A train is traveling on a planet at a velocity v. v (v_1) is relative to and measured by the time and length of the space motion background mainly provided by the planet (t_2 and l_2), $v_1=l_2/t_2$. The velocity of a particle relative to and measured by the time and length of the space motion background is known as the energy velocity of the particle.

E_i, E_e, absolute mass (M), distribution density (D) and v are hierarchical. For example, the motion of a train on the earth has a v_1 relative to the earth, which has a v_2 relative to the surrounding space, which has a v_3 relative to the galaxy-scale space, and so on, until a v_n relative to the universe. The velocity of an E_i is relative to the space motion background, and the space motion background is moving in a larger space motion background, which corresponds to planets, stellar systems, galaxies and more enormous structures.

$$V_{cm}=V_{c(m+1)}/\gamma_{(m+1)}^2 \qquad (2.1)$$

in the moving axis, which is because V=L/T; T increases by the factor γ and L decreases by the factor γ, where γ is the Lorentz factor and $\gamma=(1-v^2/c^2)^{-1/2}$, while

$$V_{cm}=V_{c(m+1)}/\gamma_{(m+1)} \qquad (2.2)$$

in the other two axes because L does not change in the two axes.

$V_c=V_{max}$; $v_{max}=c$. For example, assuming the earth moves at v_2 in the surrounding space, the absolute velocity of a photon on the earth (V_{max1}) equals the absolute velocity of a photon in the surrounding space (V_{max2}) divided by γ_2^2 in the earth moving axis and divided by γ_2 in other two axes. If a photon leaves the earth to the surrounding space in the moving axis, it will have a red shift or blue shift because of absolute velocity change [4]; if it leaves the earth to the surrounding space in other two axes, it will not change because γ conforms to Pythagoras' theorem. Not only the absolute velocity of the maximum relative velocity V_c but also the absolute velocity of any relative velocity, such as $V_{0.5c}$ and $V_{0.00001c}$, conforms to (2.1) and (2.2).

The density Λ is the density sum of the maximum level of hierarchical E_i (E_{imax}) of all particles in the universe and E_v; Λ can be expressed as:

$$\Lambda=(\Sigma E_{imax}+E_v)/(L_xL_yL_z) \qquad (3)$$

E_v will not be steady in the universe; it will be absorbed by particles, which may induce the inflation of the universe.

If there is not E_v at a point in space, Λ is ΣD_{max} and the absolute velocity of the point (V_s) can be expressed as:

$$\overrightarrow{V_s} = \sum D_{maxn}\overrightarrow{V_n}/\Lambda \qquad (4)$$

where D_{maxn} represent the distribution density of the particle n at the point; V_n denotes the absolute velocity of the particle n. (This formula mainly conveys that every V_s is definite. In this formula, all particles are regarded as being distributed separately in the universe. However, in actual analyses, motion hierarchy may need to be considered. In addition, the motion of E_v is determined by the momentum conservation of the universe. This theory suggests a universe is a black hole, which has a specific entire motion.)

4 The deduction of entropic information energy: $E_e=Mv^2$

If E_i represents all the energies of a particle, E_s represents the internal energy of the particle, which forms the particle structure, and E_e induces the motion for the particle and forms the thermodynamic entropy. E_e cannot be detected by particle-exchange actions but has gravity.

$$E_i=E_s+E_e=E_0+E_k \tag{5}$$

where E_0 is the energy of a particle static in the space motion background and E_k, kinetic energy, is the increased energy when the particle moves at v. Respectively, M_0, T_0, L_0, etc. denote the quantities of a particle static in the space motion background.

The Planck-Einstein equation is E=hN (which is the expression of absolute quantities corresponding to E=hν), where h is Planck's constant; this equation is considered valid for all particles besides photons. $E_s=hN_s$ and $E_e=hN_e$.

E_e forms the motion with de Broglie waves. According to the formula of the de Broglie wavelength $\lambda=h/p$, where p represents momentum and p=Mv, it can be obtained that $\lambda=h/(Mv)$. Consequently, $E_e/h=N_e=v/\lambda=Mv^2/h$, where v is the energy velocity; besides, N_e, λ, p and M are also measured by and relative to the observer static in the space motion background.

Therefore, given that $E_e/h=N_e=v/\lambda=Mv^2/h$, E_e can be expressed as,

$$E_e=Mv^2 \tag{6}$$

The motion of a particle is hierarchical and every level of E_e conforms to $E_{en}=M_n v_n^2$; $E_{in}=E_s+E_{e1}+E_{e2}\ldots+E_{en}$.

In special relativity, $E=mc^2=\gamma m_0c^2$; the corresponding expression of absolute quantities is $E_i=Mc^2=\gamma M_0c^2=\gamma E_0$. Given that $E_i=E_s+E_e=Mc^2$, $E_s=Mc^2-Mv^2=E_i/\gamma^2$.

According to $E_i=\gamma M_0c^2=\gamma E_0$, the kinetic energy E_k can be expressed as,

$$E_k=E_i-E_0=(\gamma-1)M_0c^2=(\gamma^2-1)M_0c^2/(1+\gamma)=M_0v^2\gamma^2/(1+\gamma)=Mv^2\gamma/(1+\gamma) \tag{7}$$

(If the absolute quantities are measured by the observer static in the space motion background, the absolute quantities can be regarded as relative quantities, such as M_0 and M being the same with m_0 and m.)

5 Principle of relative invariance

The change of particles in E_s induces systemic changes in the other inner absolute quantities, such as Lorentz-Fitzgerald contraction (length contraction) and time dilation, whereas the internal relations between the inner quantities of particles are invariant; this invariance effect is called the relative invariance of inner quantities. Therefore, relative quantities are invariable. In contrast to the principle of relativity, the systemic quantity changes induced by energy velocity variations are real and absolute.

5.1 Internal energy is directly proportional to the time rate; $E_s \propto 1/T$

The same change occurs on the earth, at another place, and at an observer, such as an atomic clock passing by 1 s. Measured by the observer, the change on Earth requires time T_e, the change at another place requires time T_x, and the change at the observer requires $T=t$ 1 s; where T_e/t is the time dilation coefficient on Earth ($T^q{}_e$) and T_x/t is the time dilation coefficient at another place ($T^q{}_x$). T represents time amount while 1/T means the time rate.

In a system with relative invariance, $N_s{}^q=1/T^q$. Furthermore, $N_s=E_s/h$, and $\nu=e/h$; thus, $N_s{}^q=N_s/\nu=E_s/e=E_s{}^q$.

Therefore, the following relation can thus be obtained: $E_s{}^q=1/T^q$ or $E_s \propto 1/T$.

5.2 Time dilation with velocity $T/T_0=\gamma$

Because E_{s0} is E_0, given that $E_s \propto 1/T$ and $E_0/E_s=\gamma$, $T/T_0=(1/E_s)/(1/E_{s0})=E_0/E_s=\gamma$.

Therefore, the factor of the time dilation with v is γ.

5.3 Length and internal energy $E_s{}^q=L_x{}^q L_y{}^q L_z{}^q$ or $E_s \propto L_x L_y L_z$

This theory suggests that the systemic changes in length are induced by the change in internal energy, i.e., $E_s{}^q=L_x{}^q L_y{}^q L_z{}^q$ or $E_s \propto L_x L_y L_z$, where $L_x{}^q$, $L_y{}^q$, and $L_z{}^q$ are the quantity ratios of length with respect to x, y, and z, respectively.

Given that $E_s=E_i-E_e=Mc^2-Mv^2$ and $v=c$, the E_s of photons equals 0. Therefore, electromagnetic waves are E_e waves and the entropy of photons reaches the maximum. At the beginning of a universe, all particles are accelerated or destroyed into photons. At that time, matter information has no E_s, internal time (T) or internal length (L), as $E_s \propto 1/T \propto L_x L_y L_z$. And, there is not electromagnetic force, strong nuclear force or weak nuclear force at that time until photons change into massive particles.

5.4 The invariance of energy velocity

As a relative quantity, energy velocity v has relative invariance.

If a person on a great celestial body does not perceive the variance of velocities or the variance of lengths on the celestial body when the motion state of the celestial body change, the change in velocity V^q should be equal to the factor of the length contraction in the direction of the velocity L_v^q divided by the factor of time dilation T^q, i.e., $V^q=L_v^q/T^q$. For example, if a celestial body moves from a state static in the space background to a state with an energy velocity v, the absolute velocities of movements on the celestial body in the direction parallel to the vector of v will increase by the factor V^q: $V^q=L_v^q/T^q=(1/\gamma)/\gamma=1/\gamma^2$; the absolute velocities of movements perpendicular to the vector of v will increase by the factor V^q: $V^q=L_v^q/T^q=1/\gamma$.

The speed of light c is the fastest energy velocity; $v_{max}=c$. The v of c v_{max} is a constant but the V of c V_{max} is variable.

5.5 Relativistic-like mass

The information energy E_i will increase with the energy velocity v by the factor γ while the internal energy E_s will reduce with the increase of v by the factor γ; $m:m_0=m_0:m_s=E_i:E_0=E_0:E_s=\gamma$. From the side of a rest object, m_0 is the rest mass and the mass of a moving object is the relativistic mass m while from the side of the moving object, m_s seems the rest mass and m_0 seems the relativistic mass.

6 Relative energy velocity

v_a is the energy velocity of A, v_b is the energy velocity of B, and v_{ba} represents the relative energy velocity of A to B. The impact energy of A to B can be approximately calculated by v_{ba} when v_a and v_b is unknown.

The relation between v_{ba} and v_a and v_b:

At low-speed, $\overrightarrow{v_{ba}} = \overrightarrow{v_a} - \overrightarrow{v_b}$.

At high speed and in the case in which $\overrightarrow{v_a}$ and $\overrightarrow{v_b}$ are in opposite directions, according to the theorem of the addition of velocities in relativity $W=(v+w)/(1+vw/c^2)$, $v_{ba}=(v_a+v_b)/(1+v_av_b/c^2)$.

7 Position velocity

The position velocity of A relative to B (V_{ba}) is the velocity at which A leaves B (or B') in the direction from B (or B') to A, and is measured by B. If the velocity is measured by C; it is expressed as $V_{ba(c)}$ (A and B' are at the same position and B' is static with respect to B based on absolute lengths).

8 The distribution density and gravity

Besides the motion effect, the distribution density is related to gravity effect.

Because the density Λ is a constant and is limited, $D\propto M/R^2$ is invalid when R is too short. And, when two objects get closer, the total E_i of them will decrease, which is related to the issues of accelerating universe, black holes, and other issues relevant to general relativity.

$D \propto M/R^2$ has mainly two reasons: one is that because Λ is a constant and the visible universe is even regarding celestial bodies, the visible space can be filled up by this distribution of celestial bodies, which forms a fundamental uniformity of density and E_v could be the least; the other is $\propto M/R^2$ is consistent with gravity.

However, this research is mainly corresponding to special relativity; the content relevant to general relativity will be analyzed and discussed later.

(In addition, the terminologies and abbreviations in this research were defined temporarily, which could be improved based on more comprehensive considerations.)

Data availability

All data generated or analyzed in this study are included in the published article (and its supplementary information files).

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Author contributions

Wenjing Qu is the sole authors of this manuscript. The author declares that he is responsible for all aspects of the manuscript.

Declaration of Competing Interest

The author declares no competing interests.

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