An Expansion Theory Of The Universe With No Dark Matter And No Dark Energy

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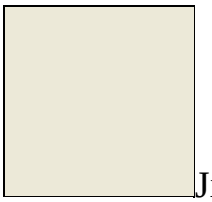 Jiangchunxuan@vip.sohu.com

Abstract

In this paper we find a new gravitational formula: $\overline{F} = -mc^2/R$ and establish an expansion theory of the universe with no dark matter and no dark energy..

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In the Universe there are two kinds of matter: (1) observable subluminal matter called tardyon and (2) unobservable superluminal string matter called tachyons which coexist in motion.
We first define two-dimensional space and time ring [1]

$$z = \begin{pmatrix} ct & x \\ x & ct \end{pmatrix} = ct + jx, \qquad (1)$$

where x and t are the tardyonic space and time coordinates, c is light velocity in vacuum, $j = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$.

(1) can be written as Euler form

$$z = ct_0 e^{j\theta} = ct_0(\mathrm{ch}\,\theta + j\,\mathrm{sh}\,\theta), \qquad (2)$$

where ct_0 is the tardyonic invariance, θ tardyonic hyperbolical angle.
From (1) and (2) we have

$$ct = ct_0\,\mathrm{ch}\,\theta, \quad x = ct_0\,\mathrm{sh}\,\theta \qquad (3)$$

$$ct_0 = \sqrt{(ct)^2 - x^2}. \qquad (4)$$

From (3) we have

$$\theta = \text{th}^{-1}\frac{x}{ct} = \text{th}^{-1}\frac{u}{c}. \qquad (5)$$

where $c \geq u$ is the tardyonic velocity, $\text{ch}\,\theta = \dfrac{1}{\sqrt{1-(u/c)^2}}$ and $\text{sh}\,\theta = \dfrac{u/c}{\sqrt{1-(u/c)^2}}$.

The z denotes mathematics of the tardyonic theory.
Using the morphism $j : z \to jz$, we have

$$jz = \bar{x} + jc\bar{t} = \bar{x}_0 e^{j\bar{\theta}} = \bar{x}_0(\text{ch}\,\bar{\theta} + j\,\text{sh}\,\bar{\theta}), \qquad (6)$$

where $\bar{x}$ and $\bar{t}$ are the tachyonic space and time coordinates, $\bar{x}_0$ is tachyonic invariance, $\bar{\theta}$ tachyonic hyperbolical angle.
From (6) we have

$$\bar{x} = \bar{x}_0\,\text{ch}\,\bar{\theta}, \quad c\bar{t} = \bar{x}_0\,\text{sh}\,\bar{\theta}. \qquad (7)$$

$$\bar{x}_0 = \sqrt{(\bar{x})^2 - (c\bar{t})^2}\,. \qquad (8)$$

From (7) we have

$$\bar{\theta} = \text{th}^{-1}\frac{c\bar{t}}{\bar{x}} = \text{th}^{-1}\frac{c}{\bar{u}}. \qquad (9)$$

where $\bar{u} \geq c$ is the tachyonic velocity, $\text{ch}\,\bar{\theta} = \dfrac{1}{\sqrt{1-(c/\bar{u})^2}}$ and

$$\text{sh}\,\bar{\theta} = \frac{c/\bar{u}}{\sqrt{1-(c/\bar{u})^2}}.$$

The jz denotes mathematics of the tachyonic theory. Both the z and the jz form the entire world but the jz world is unexploited and unstudied.

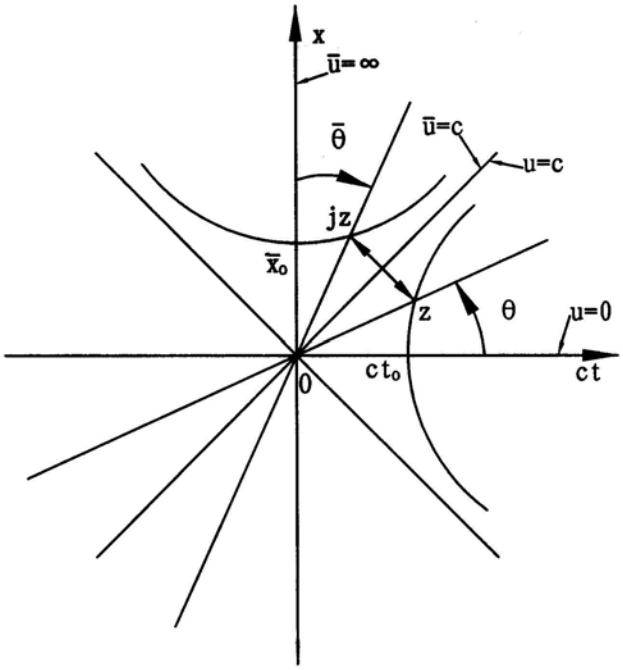

Fig. 1. Minkowskian spacetime diagram

Figure 1 shows the formulas (1)-(9). $j: z \to jz$ is that tardyon can be converted into tachyon, but $j: jz \to z$ is that tachyon can be converted into tardyon. $u = 0 \to u = c$ is the positive acceleration, but $\bar{u} = \infty \to \bar{u} = c$ is the negative acceleration, which coexist. At the $x-$axis we define the tachyonic string length

$$\bar{x}_0 = \lim_{\substack{\bar{u}\to\infty \\ t\to 0}} \bar{u}t = \text{constant}. \qquad (10)$$

where t is the rest time.

Since at rest the tachyonic time $t = 0$ and $\bar{u} = \infty$, we prove that the tachyon is unobservable. In rest system tachyonic motion as an action-at-a distance motion.

Assume $\theta = \bar{\theta}$, from (5) and (9) we get the tardyonic and tachyonic coexistence principle [1-3]

$$u\bar{u} = c^2 \qquad (11)$$

Differentiating (11) by the time, we get

$$\frac{d\bar{u}}{dt} = -\left(\frac{c}{u}\right)^2 \frac{du}{dt}. \qquad (12)$$

$\frac{du}{dt}$ and $\frac{d\bar{u}}{dt}$ can coexist in motion, but their directions are opposite.

We study the tardyonic and tachyonic rotating motions. In 1673 Huygens discovered that the tardyonic rotation produces centripetal acceleration

$$\frac{du}{dt} = \frac{u^2}{R}, \qquad (13)$$

where R is rotating radius.

Substituting (13) into (12) we have the tachyonic rotation produces centrifugal acceleration

$$\frac{d\bar{u}}{dt} = -\frac{c^2}{R}. \qquad (14)$$

It is independent of tachyonic velocity $\bar{u}$ and tardyonic velocity u, only inversely proportional to radius R.

(13) and (14) are dual formulas, which have the same form. It is unique and perfect. From (13) we get the tardyonic centrifugal force

$$F = \frac{Mu^2}{R}, \qquad (15)$$

where M is the inertial mass.

From (14) we get the tachyonic centripetal force, that is gravity

$$\bar{F} = -\frac{mc^2}{R}, \qquad (16)$$

where m is the gravitational mass converted into by tachyonic mass $\bar{m}$ which is unobservable but m is observable.

Whether $u = 0$ or $u \neq 0$, all matter produce the gravity. (15) and (16) are dual formulas, which have the same form. (16) is a new gravitational formula. This simple thought made a deep impression on me. It impelled me toward a theory of gravitation. It is simplicity, elegance and mathematical beauty. It is the foundations of gravitational theory and cosmology. In the universe there are two main forces: the tardyonic centrifugal force (15) and tachyonic centripetal force (16) which make structure formation of the universe.

Now we study the freely falling body. Tachyonic mass $\bar{m}$ can be converted into tardyonic mass m, which acts on the freely falling body and produces the gravitational force

$$\bar{F} = -\frac{mc^2}{R}, \qquad (17)$$

where R is the Earth radius.

We have the equation of motion

$$\frac{mc^2}{R} = Mg, \qquad (18)$$

where g is gravitational acceleration, M is mass of freely falling body.

From (18) we define the gravitational coefficient

$$\eta = \frac{m}{M} = \frac{Rg}{c^2} = 6.9 \times 10^{-10}. \qquad (19)$$

In 1922 Eötvös experiment $\eta \sim 5 \cdot 10^{-9}$ and in 1964 Dicke experiment $\eta \sim 10^{-11}$ [4]. Since the gravitational mass m can be transformed into the rest mass in freely falling body, we define Einstein's gravitational mass $M_g = M_i + m$ and inertial mass $M_i = M$ [5]. We prove

$$M_g > M_i. \qquad (20)$$

Therefore we prove that the principle of equivalence is nonexistent. At the heart of the general theory of relativity is the principle of equivalence[4]. Therefore the general theory of relativity and black holes conjecture could all be wrong.

Using (16) we study the expansion theory of the Universe. Figure 2 shows a expansion model of the Universe. The rotation ω_1 of body A emits tachyonic flow, which forms the tachyonic field. Tachyonic mass $\overline{m}$ acts on body B, which produces its rotation ω_2, revolution u and gravitational force

$$\overline{F_1} = -\frac{mc^2}{R}, \qquad (21)$$

where R denotes the distance between body A and body B, m is gravitational mass converted into by tachyonic mass $\overline{m}$ which is unobservable but m is observable.

The revolution of the body B around body A produces the centrifugal force

$$F_1 = \frac{M_B u^2}{R}, \qquad (22)$$

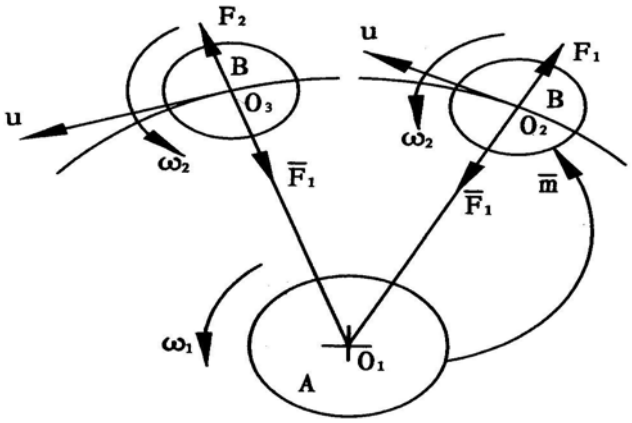

Fig. 2. A expansion model of the Universe

where M_B is the inertial mass of body B, u is the orbital velocity of body B.

At the O_2 point we assume

$$F_1 + \overline{F_1} = 0. \qquad (23)$$

From (21)-(23) we have the gravitational coefficient

$$\eta = \frac{m}{M_B} = \left(\frac{u}{c}\right)^2. \qquad (24)$$

At the O_3 point the tachyonic mass $\overline{m}$ can be converted into the rest mass m in body B, we have

$$F_2 = \frac{M_B u^2}{R} + \frac{mu^2}{R}. \qquad (25)$$

Since $F_2 + \overline{F_1} > 0$, centrifugal force F_2 is greater than gravitational force $\overline{F_1}$, then the body B

expands outwards and its mass increases. This is a expansion mechanism of the Universe. If body A is the Earth, then body B is the Moon; if body A is the Sun, then body B is the Earth; ⋯. It can explain our accelerating universe. In the universe there are no dark matter and no dark energy. This simple thought made a deep impression on me. It impelled me toward an expansion theory of the universe with no dark matter and no dark energy.

If the body A is the Sun and body B is the planet. We calculate the gravitational coefficients η as shown in table 1.

Table 1.

Planet	u (km/sec)	$\eta(10^{-10})$
Mercury	47.89	255.2
Venus	35.03	136.5
Earth	29.79	98.7
Mars	24.13	64.8
Jupiter	13.06	19.0
Saturn	9.64	10.3
Uranus	6.81	5.2
Neptune	5.43	3.3
Pluto	4.74	2.5

Since gravitational mass m can be transformed into the rest mass in body B, we define Einstein's gravitational mass $M_g = M_i + m$ and inertial mass $M_i = M_B$ [5].

We prove

$$M_g > M_i . \qquad (26)$$

Therefore we prove that the principle of equivalence in the Solar system is nonexistent.

The tachyonic mass $\overline{m}$ can be converted into electrons and positrons which are the basic building-blocks of elementary particles [6, 7]. In the universe there are no Higgs particles which are not produces at the Large Hadron Collider and other particle accelerators. This simple thought made a deep impression on me. It impelled me toward a unification of gravitational theory and particle theory[3].

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