American Journal of Multidisciplinary Research & Development (AJMRD)
*Volume 06, Issue 04 (**April-2024**), PP 37-46*
ISSN: 2360-821X
www.ajmrd.com

Research Paper **Open Access**

A new theory of space-time

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Abstract: The space-time mathematical theory of the coexistence of sub lights and super lumens is established by using the space-time ring. We can derive the new formula for gravity in two ways. Slow rotational motion produces centrifugal force, but fast rotational motion produces centripetal force, or gravity. The theory of expansion and contraction of the universe is established and a new model of the universe is proposed. The new formula for gravity changes all that. There are two kinds of forces:(1) sub lights (electromagnetic and weak forces) and (2) superluminal forces (gravity and strong forces).

Key words: Sub light, Faster-than-light, New gravitational formula, sub light force (electromagnetic and weak forces), faster-than-light force (gravity and strong force), theory of cosmic expansion.

I. Introduction

1. Mathematical Theory of Space-Time

Throughout history, the notion of space and time has undergone a number of dramatic transformation, thanks to figures ranging from Aristotle, Leibniz and Newton to Gauss, Poincare and Einstein. In the present understanding of nature, space and time form a single entity called space-time. In 1995 I abolished the new ematical theory of space-time. This theory plays a key role for the entire field of physics to unlock the deepest mysteries of the universe.

In the Universe there are two matters: (1) observable subluminal matter called tardyon(locality) and (2) unobservable superluminal matter called tachyon(non-locality) which coexist in motion. Tachyon can be converted into tardyon, and *vice versa*. Tardyonic rotating motion produces the centrifugal force, but tachyonic rotating motion produces the centripetal force, that is gravity. Using tardyonic and tachyonic coexistence principle we deduce the new gravitational formula,

For establishing the mathematical theory of space-time. we first define space-time.

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

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

$$ct = ct_0 \operatorname{ch}\theta, \qquad (3)$$

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

From (3) we have

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

where $c \geq u$ is the tardyonic velocity.

Using the morphism $j : z \to jz$, we have

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

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

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

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

From (7) we have

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

where $\bar{u} \geq c$ is the tachyonic velocity.

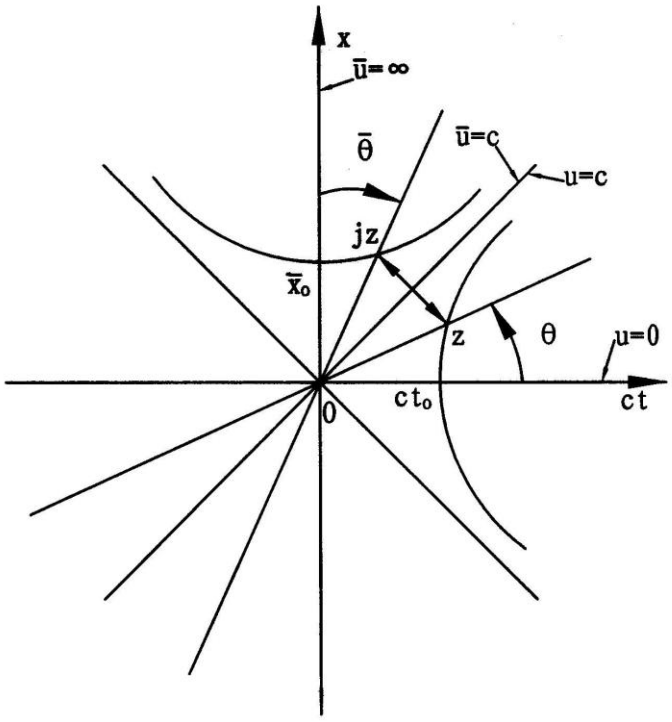

Fig. 1. Mathematical theory of space-time

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 ct-axis u=0 and x=0 we define the tardyonic rest time t. At the $x-$axis we define the tachyonic rest space

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

Since at rest the tachyonic rest time $t = 0$ and $\bar{u} = \infty$, we prove that tachyon is unobservable.
Fig.1 and (10) are mathematical theory of space-time, which are the foundations of physics and cosmology. We can evaluate that physics-cosmology theories and experiments is a standard of right or wrong. From Fig.1 we deduce new gravitational formula.

II. New Gravitational Formula: $\bar{F} = -\dfrac{mc^2}{R}$

Assume $\theta = \bar{\theta}$, from (5) and (9)

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

Using the analytical method we deduce the new gravitational formula. Differentiating (11) by the time, we get

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

$\dfrac{du}{dt}$ and $\dfrac{d\bar{u}}{dt}$ 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 centrifugal acceleration

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

(13) and (14) have the same form. 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

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

where m is the gravitational mass converted into by the tachyonic mass $\overline{m}$, and $\overline{m}$ is the tachyonic mass converted into by the gravitational mass m too. $\overline{m}$ may be the dark matter in the universe, which is converted from the dark energy in the universe. Dark matter and dark energy in the universe are difficult to observe.

(15) and (16) have the same form. (16) is the new gravitational formula.

Using the geometrical method we deduce the new gravitational formula..

Figure 2 shows that the rotation ω of body A emits tachyon mass $\overline{m}$, which forms the tachyon and gravitation field and gives the body B revolutions u and $\overline{u}$.

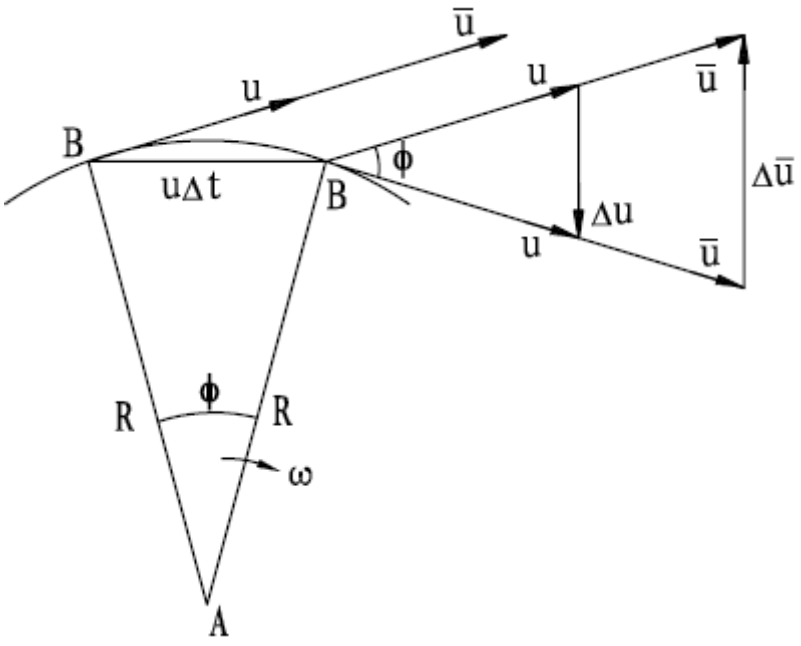

Fig.2. On body B the $\frac{du}{dt}$ and $\frac{d\overline{u}}{dt}$

From Fig. 2 .it follows

$$\frac{u\Delta t}{R} = \frac{\Delta u}{u}. \qquad (17)$$

From (17) it follows the tardyon centripetal acceleration on the body,

$$\frac{du}{dt} = \lim_{\substack{\Delta u \to 0 \\ \Delta t \to 0}} \frac{\Delta u}{\Delta t} = \frac{u^2}{R}. \qquad (18)$$

From Fig. 2. it follows

$$\frac{u\Delta t}{R} = -\frac{\Delta \bar{u}}{\bar{u}}. \qquad (19)$$

From (19) and (11) it follows the tachyon centrifugal acceleration on the body,

$$\frac{d\bar{u}}{dt} = \lim_{\substack{\Delta\bar{u}\to 0 \\ \Delta t\to 0}} \frac{\Delta \bar{u}}{\Delta t} = -\frac{u\bar{u}}{R} = -\frac{c^2}{R}. \qquad (20)$$

On body B the $\frac{du}{dt}$ and $\frac{d\bar{u}}{dt}$ coexistence.

From (18) it follows the tardyon centrifugal force on the body.

$$F = \frac{M_B u^2}{R}, \qquad (21)$$

where M_B is body B inertial mass.

From (20) it follows the tachyon centripetal force on body B, that is gravity,

$$\bar{F} = -\frac{mc^2}{R}, \qquad (22)$$

where m is the gravitation mass converted into by tachyon mass $\bar{m}$ which is unobservable, but m is observable.

(22) is the new gravitational formula. In 1996 this simple thought made a deep impression on me. It impelled me to establish the new gravitational theory. On body B the F and $\bar{F}$ coexistence.

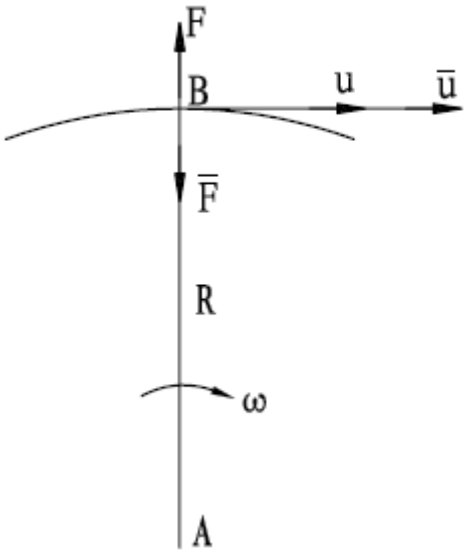

Fig.3. On body B the F and $\bar{F}$ coexistence and the new Universe model

From Fig. 3, it follows

$$F + \bar{F} = 0. \qquad (23)$$

From (21), (22) and (23) it follows

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

Body B increases mass m and centrifugal force is greater than gravitation force, then body B expands outward.

Using Fig.3 we establish the new universe model.

(1) Body A is earth center,body B is the moon;

(2) Body A is the sun center, body B is the Earth;

(3) Body A is Galactic center, body B is stars in the milky way;

(4) .....

(5) Body A is the universe center; body B is the stars in the universe.

In Fig.3 on body B there is tardyonic centrifugal force and tachyonic centripetal force coexistence. It is the universe foundations. All matter has unobservable tachyons to produce gravity. We should establish new cosmological theory and new particle physics theory.

From (22) it follows Newtonian gravitation formula. The m is proportional to body A mass M_A, in (24) m is proportional to M_B, is inversely proportional to the distance R between body A and body B. It follows

$$m=k\frac{M_AM_B}{R}, \qquad (25)$$

where k is constant

Substituting (25) into (22) it follows the Newtonian gravitation formula [2-4,7-8]

$$\overline{F}=-G\frac{M_AM_B}{R^2}, \qquad (26)$$

where $G=kc^2=6.673\times10^{-8}\,\mathrm{cm}^3/\mathrm{g}\cdot\mathrm{sec}^2$ is gravitation constant.

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

$$\overline{F}=-\frac{mc^2}{R}, \qquad (27)$$

where R is the Earth radius.

We have the equation of motion

$$\frac{mc^2}{R}=Mg, \qquad (28)$$

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

From (28) it follows the gravitational coefficient

$$\eta=\frac{m}{M}=\frac{Rg}{c^2}=6.9\times10^{-10}. \qquad (29)$$

Eötvös experiment $\eta \sim 5 \cdot 10^{-9}$ and Dicke experiment $\eta \sim 10^{-11}$. Since the gravitational mass m can be transformed into the rest mass in freely falling body, we prove that the freely falling bodies fall with the same acceleration.

III. The expansion theory of the universe

Using new gravitational formula we study the expansion theory of the Universe. Figure 4 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

$$\overline{F}_1 = -\frac{mc^2}{R}, \qquad (30)$$

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 rotation of the body B around body A produces the centrifugal force

$$F_1 = \frac{M_B u^2}{R}, \qquad (31)$$

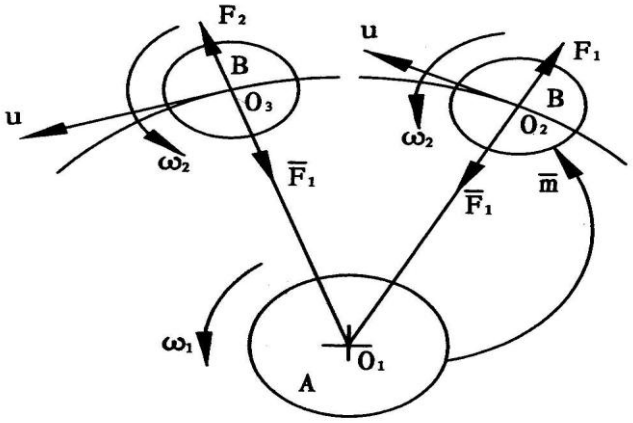

Fig. 4. A expansion model of the Universe

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

$$F_1 + \overline{F}_1 = 0. \qquad (32)$$

From (32) it follows that the coexistence of the gravitational force and centrifugal force.
From (30)-(32) it follows the gravitational coefficient

$$\eta = \frac{m}{M_B} = \left(\frac{u}{c}\right)^2 . \qquad (33)$$

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

$$F_2 = \frac{M_B u^2}{R} + \frac{m u^2}{R} . \qquad (34)$$

Since $F_2 + \overline{F}_1 > 0$, centrifugal force F_2 is greater than gravitational force $\overline{F}_1$, then the object expands outward, gaining mass, at this time, the brightness of the light emitted from object B will increase.This is the local expansion mechanism of the universe.

Conversely at the O_3 point the rest mass of m in body B can be converted to the tachyonic mass $\overline{m}$ also, it follows

$$F_2 + \overline{F}_1 = \frac{mu^2}{R} = M_B g_e \qquad (35)$$

.

From (35) we obtain the expansion acceleration

$$g_e = mu^2 \big/ M_B R . \qquad (36)$$

Substituting (33) in (36) we obtain

$$g_e = \frac{u^4}{c^2 R} \qquad (37)$$

$$F_2 = \frac{M_B u^2}{R} - \frac{m u^2}{R} \qquad (38)$$

Since $F_2 + \overline{F_1} < 0$, centrifugal force F_2 is smaller than gravitational force $\overline{F_1}$, then the object shrinks inward and loses mass, at this time, the brightness of the light emitted from object B will decrease.This is a local contraction mechanism of the universe.

From (31,32,34) we have

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. 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: Values of the gravitational coefficients η

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

The gravitational field of the solar system is the origin of the planet mass.

IV. Conclusion

In summary. We deduce tardyonic and tachyonic coexistence principle. Using it we deduce the centrifugal formula and new gravitational formula We establish the expansion theory of the universe. The centrifugal formula and the new gravitational formula are derived, and the local expansion theory and local contraction theory of the universe are established. The local expansion and local contraction of the universe are generally balanced.Where did we come from? Where are we going? What makes up the universe? These questions have occupied mankind for thousands of years. Over the course of history, our view of the world has been changed. Theologians and philosophers, physicists and astronomers have given us very different answers. Where did we come from? We answer this questions this way $\overline{m} \to m$, tachyons $\to$ tardyons, that is tachyons can be converted into the electrons and positrons which are the basic building-blocks of the elementary particles. The tachyons are the origin of mass. Where are we going? We answer this question this way $m \to \overline{m}$, that is the tardyons produce tachyons, and the tachyons produce tardyons. The tardyons and tachyons make up the Universe.

Note. In 1996 I found a gravitational formula : $\overline{F} = -\overline{m}c^2 / R$, where $\overline{m}$ is the tachyonic mass. In 2004 I studied the Universe expansion and found a new gravitational formula $\overline{F} = -mc^2 / R$, where m is gravitational mass converted into by tachyonic mass.Compatibility of arbitrary speeds for interor dynamical problems implies a new scientific era.Newtonian gravity formula is based on empirical evidence. He did not explain what is gravity? how it works?

V. Thanks

Thank you for reading this paper.

VI. Contribution

The sole author, poses the research question, demonstrates and proves the question.

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