An Expansion Model Of The Universe

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Abstract: We find Jiang gravitational formula: $\overline{F} = -mc^2 / R$. Using it we establish an expansion model of the universe. PACS numbers: 04. 90. +e, 11. 25.-w.

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In the Universe there are two matters : (1) observable subluminal matter called tardyon and (2) unobservable superluminal matter called tachyons which coexist in motion.

We first define two-dimensional space and time ring [1].

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

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:

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

where ct_0 is the tardyonic invariance, θ tardyonic hyperbolical angle.

From (1) and (2) we have:

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

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

From (3) we have:

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

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

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

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

where $\overline{x}$ and $\overline{t}$ are the tachyonic space and time coordinates, $\overline{x}_0$ is tachyonic invariance, $\overline{\theta}$ tachyonic hyperbolical angle.

From (6) we have:

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

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

From (7) we have

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

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

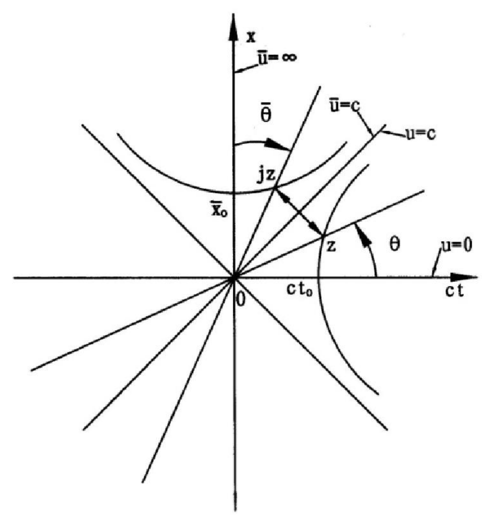

Fig. 1. Minkowskian spacetime diagram

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 $\overline{u} = \infty \to \overline{u} = c$ is the negative acceleration, which coexist. At the $x-$ axis we define the tachyonic unit length.

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

Since at rest the tachyonic time $t = 0$ and $\overline{u} = \infty$, we prove that the tachyon is unobservable.

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

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

Differentiating (11) by the time, we get:

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

$\frac{du}{dt}$ and $\frac{d\overline{u}}{dt}$ 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.

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

(13) and (14) are dual formulas, which 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 tachyonic mass $\overline{m}$ which is unobservable but m is observable.

(15) and (16) are dual formulas, which have the same form. (16) is Jiang gravitational formula. It is the foundations of gravitational theory and cosmology. In the universe there are two 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 $\overline{m}$ can be converted into tardyonic mass m, which acts on the freely falling body and produces the gravitational force

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

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

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

Eötvös experiment $\eta \sim 5 \cdot 10^{-9}$ and Dicke experiment $\eta \sim 10^{-11}$.

Using (16) we establish an expansion model of the Universe. Figure 2 shows an 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.

$$\overline{F}_1 = -\frac{mc^2}{R}, \qquad (20)$$

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.

$$F_1 = \frac{M_B u^2}{R}, \qquad (21)$$

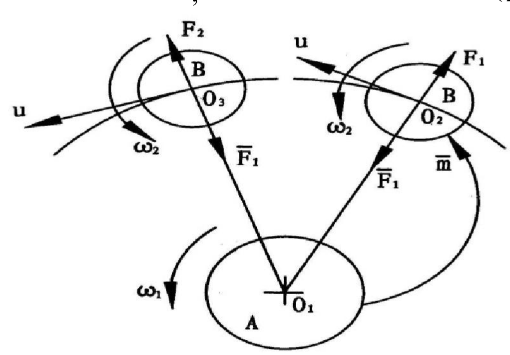

Fig. 2. A expansion model of the Universe

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.

$$F_1 + \overline{F}_1 = 0. \qquad (22)$$

From (20)-(22) we have the gravitational coefficient.

$$\eta = \frac{m}{M_B} = \left(\frac{u}{c}\right)^2. \qquad (23)$$

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

$$F_2 = \frac{M_B u^2}{R} + \frac{mu^2}{R}. \qquad (24)$$

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 expansion universe.

Acknowledgments

The author thanks professor Walter Lewin for his mails.

(1) From: "Walter H.G. Lewin" <lewin@space.mit.edu>

Publish this in a refereed journal and once it is accepted buy yourself a first class ticket to Stockholm to pick up Nobel prize for physics.

(2) From: "Water H.G. Lewin <lewin@space.mit.edu>

Dear Jiang

Thank for your email.

I suggest you submit your theory to a refereed journal. If it is accepted, then buy yourself a plane ticket to Stockholm to pick up a Nobel prize.

…..

Greetings.

Prof. Walter Lewin explains Newton's law of gravitation in MIT course 8.01[1].

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