Universe Self Inflation without Dark Energy

Ilgaitis Prūsis[1], Peteris Prūsis[2]

Abstract

The cosmic expansion of our Universe really is accelerating; the mystery is why. The most popular explanation is Hypothesis of Dark Energy, which originates from another supposition – the Big Bang. According to Newton mechanics with corrections of Einstein relativity the velocity of galaxies must slow down or at least remain unchangeable.

This article shows that Newton gravitation law causes two distinct phenomena in the Universe:

1. mutual attraction of the bodies and

2. accelerating expansion of the void.

No Dark Energy is necessary.

Keywords: space---gravitation---Dark Energy---expansion of the Universe---time
PACS Classification codes: 04. General relativity and gravitation;
95.36+x. Dark energy
98.58.Ay. ISM: Physical properties
98.80.Bp. Origin and formation of the Universe

Introduction

The 1998 discovery that the Universe is accelerating [1] set off an enormous amount of activity, both theoretical and observational. The original result, from two groups observing Hubble diagram of Type 1a supernovae, has since been verified by a variety of independent types of observations. It seems clear that our Universe really is accelerating; what remains a mystery is why [2]. The self-repelling property of space was first proposed by Albert Einstein in 1917. He called it the cosmological constant. A dozen years later Einstein dismissed his cosmological constant idea as "the biggest blunder of my life." Now the cosmological constant is being reanimated as Lambda-Cold Dark Matter model, which contains mysterious Dark Energy [3].

[1] Independent researcher;
[2] Independent researcher

Properties of Gravitation

The gravitational acceleration according to Newton gravitation law [4] is equal to second derivative from distance as shown in equation (1):

$$g = \frac{d^2 r}{dt^2} = - \frac{GM}{r^2} \qquad \textbf{(1)}$$

Where: G - gravitational constant

M – mass

r – distance.

Equation (1) can be transformed in differential equation (2):

$$r^2 \frac{d^2 r}{dt^2} + GM = 0 \qquad \textbf{(2)}$$

The differential equation (2) has a solution only if at the initial moment of time t=0, initial distance r=0 and initial velocity $\frac{dr}{dt} = 0$.

The solution of equation (2) is shown in equation (3):

$$\frac{2r^3}{3} = 3GMt^2 \qquad \textbf{(3)}$$

After the Big Bang at the time moment t from mass M emerged Gravitational space. Since all directions of space are equal, the shape of Gravitational space is a sphere with volume as shown in equation (4):

$$V_G = \tfrac{4}{3}\pi r^3 = 6\pi GMt^2 \qquad (4)$$

In this case the term "Gravitational Space" is used because the physical cause of space is the gravitation of mass. The mass of the observable Universe is 10^{53} kg, the time from the Big Bang $t = 10^{18}$ s. The volume of the Universe $V_G = 1.26*10^{80}$ m^3 and the radius of the Universe $r = 3*10^{26}$ m are arrived at from equation (4). This completely agrees with observations [5].

A steady volume acceleration of the Universe according to equation (5) is arrived at from equation (4):

$$a_V = \frac{V_G}{t^2} = 6\pi GM \qquad (5)$$

According to equation (5) the source of the volume acceleration is the mass M. No Dark Energy is necessary. The volume acceleration a_v would slow down only if some part of the mass annihilates.

It is important to understand that it is the void volume of the Universe that accelerates. The volume of matter does not accelerate because it is mainly formed by strong electromagnetic and

nuclear interactions; these are much stronger than the weak gravitational forces. Separate space and time do not exist in the Universe. Only an accelerating gravitational space exists. The gravitational space has three dimensions. These are formed volume, surface and distance. The acceleration of the gravitational space is assumed to be the consequence of events and are called "time".

Conclusions

In ordinary physics space is only a container in which the Universe is displaced and all phenomena transpire. Considering equation (4) space is not a container for gravitation. Space emerges from gravitation. The gravitation field fills all the void of the Universe. In other words, the carrier of gravitation interaction is void. Any local perturbation of a gravitation field or void causes instant response throughout the Universe. The intensity of response decreases with the square of distance but remains instant. This phenomenon may be used for the instant transmission of information or tacking the stock of the actual situation in the Universe. It is important to understand that in this case information does not travel. Information from the moment of origination already exists throughout the Universe.

Regarding electromagnetic waves the situation is different. The gravitational space ability to transmit both an electric and magnetic field corresponds to electric ε_0 and magnetic μ_0 constants accordingly. The speed of light $c^2 = 1/(\varepsilon_0 \mu_0)$ is only the gravitational space ability to transmit electric and magnetic fields. In this case this ability appears as electromagnetic waves. In other words, it shows the interaction between the gravitation field and the electromagnetic field. For this reason, any particle or wave containing an electric or a magnetic field cannot travel in the gravitational space with speed greater than *c*.

The consequential changes of volume can be described as volume velocity and volume acceleration. In the same way the consequential changes of surface area can be described as area velocity and area acceleration. Analogically, the consequential changes of distance are length velocity and length acceleration; in ordinary physics they are simply named "velocity" and "acceleration".

References

1. Perlamutter S. Supernovae, Dark Energy and the Accelerating Universe. *Physics Today*. 53-60 (April 2003).

2. Carroll S. Focus on Dark Energy. *New J. Phys.* **8** (2006). doi:10.1088/1367-2630/8/12/E07

3. Narlikar1 J.V., Vishwakarma1 R.G. and Burbidge G. Interpretations of the Accelerating Universe. arXiv:astro-ph/0205064 v2 (11 Jul 2002).

4. Newton, I. *Principia: Mathematical Principles of Natural Philosophy,* translated by I.B. Cohen & Whitman, University of California Press, 1999.

5. Davies, P. C. W. *The Accidental Universe* Ch. 2 (Cambridge University Press, Cambridge, 1982).

Acknowledgements: We are very grateful to Ieva Mazere and Valda Kalniņa for valuable discussions and assistance.

Correspondence and requests for materials should be addressed to I.P. (ilgaitis@gmail.com).