“Dark matter” may be invisible gravitational ghost images and not the real matter imagined

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Abstract

According to the polar effect in the hyperspherical universe, we realize that “Dark matter” may be invisible gravitational ghost images originating from the matter around the poles and not the real natural matter. The twin pictures of the visible optical (electromagnetic) universe and the invisible gravitational ghost image universe are shown.

Key words: dark matter, dark energy, gravitational lens, large scale structure of the universe, quasars, redshift periodicity, gamma ray burst, galaxies, black hole.

1. Introduction

There are two astronomical or cosmological terms in vogue, one is called “Dark matter” concerned by us in this paper and another “dark energy”. Although many authors might be interested in seeking the relations between the two, we might as well wake to that it is in quite different manner and theoretical principle to perceive the two phenomena indirectly. In allusion to the phenomenon of “Dark matter”, the strong evidences have been obtained by detecting cosmic local gravitational effect in a relatively small area, such as the scale of galaxies or inside Milky Way, and the criterion is well tried local gravitation theory (Newton’s or Einstein’s); As for “dark energy”, circumstances alter cases, as we know that nothing is reliable but redshift for a distant astronomical event, not to mention luminosity distance in the curved cosmic large scale space, and the criterion is the embarrassing cosmology based on General relativity. Respecting these fact, we should ask, whereby do we jump to conclusions that the expansion of the Universe is accelerating and there must be the budgetary energy called as “dark energy”? Imaginably, the statement of “dark energy” may be pure surmise.

We certainly believe in the reality of the phenomena of “Dark matter”. F. Zwicky [1] is the first to take note of the phenomena when he measured the dispersion velocity in Coma galaxies in 1933, and his idea was soon supported by S. Smith [2] studying the Virgo cluster. Since then, many authors, such as: M. S. Roberts et al. [3]; J. Einasto et al. [4]; V. C. Rubin et al. [5]; J. P. Ostriker et al. [6]; G. Jungman et al. [7]; L. Bergstrom [8]; P. Gondolo et al. [9] and G. Bertone et al. [10] etc, confirm that there are the phenomena of “Dark matter” in all manner of ways in succession. It is a pity that the nature of “Dark matter” remains one of the greatest puzzles in modern cosmology for too long.

In order to explain the observed cryptic gravitational effect, it is agreed that the mass of the universe should be much larger than the luminous one, and “Dark matter” should be present in large amount in our universe, and to top it all scientists spare no effort to seek for the new ultraphysical form. Today, the very existence of “Dark matter” is strongest piece of evidence for physics beyond the standard model.

In the present paper, we will attempt to show that the term "Dark matter" may be a kind of misguided concept and propose a new explanation by the polar effect (Deng Xiaoming 2005a, b and 2006a, b)[11]-[14].

2. The estimate of the theory of gravitation on the scale of the universe

We'd better scan what we have learned about gravitation briefly before our work. Superficially, A. Einstein seems to have solved all of the problems about space-time and gravitation. Unfortunately, a lot of modern astronomical observations indicate that there are many holes in the cosmologies based on General Relativity. In fact, both Newton's and Einstein's theory of gravitation originated from solar system, and there must be some strong indelible local genes. As we showed [11]: As for the ratio of the solar system to the universe in size, it is equivalent to "use the physical law got from a very small space, smaller than a seed of gingili, to define the physics of the earth". To extrapolate the cosmic entire mechanism from such a local theory in the original, the elemental and inclement truths were facing us as follows:

(1) It is a general knowledge that the range of application is essential to a theory. And it is obvious that the entire universe is quite different from its local part in boundary conditions. Though Mach's principle hasn't been proved whether it is true or not so far, we may make use of his concept to deal with problems here. In the solar system or the Milky Way (the local area), there must be the entire matter, energy and electromagnetic radiation etc. of the universe as physical environment (might as well called Mach's background). Evidently, if Newton's or Einstein's theory of gravitation was adapted for cosmological use, Mach's background would disappear instantly.

(2) It is called into question continually that the gravitational proportionality G is supposed as a universal constant at all places and all times (C. Brans and R. H. Dicke 1961; D. R. Long 1976 etc.) [15][16], and the verification of this assumption has been done only within the cosmic local region (properly speaking, inside the solar system). In respect that cosmology is a science concerned with the universe as a whole, we have no reason to conclude that G is independent of large-scale space-time.

(3) The cosmological principle not only contains deeper philosophy but also base on a certain observations, and it is unique authentic working hypothesis on the whole of the universe. Its mathematical expression is R-W metric which is a pure mathematical problem, and it is not only independent of but also against General Relativity. We have argued that the entire structure of cosmic space-time described by R-W metric is an absolute system [11][13]. We should pay special attention to the case that there is intrinsic antinomy within the cosmological model based on General Relativity. On Einstein's philosophy, the characteristic of space-time must be determined by matter, however, if we pieced together the cosmological principle and General Relativity, nothing else but the cosmic entire space is regulated beforehand and then the Einstein's matter be encased in triformed "rigid box" homogeneously. This has brought many difficulties, for example, spatial "open" or "close" problem, about which omnipotent matter can't determine the distribution of themselves but the form of cosmic entire space. We may draw the conclusion that the conception of cosmic entire space-time is quite different from Einstein's. In fact, as for the Equivalence principle and the Covariance principle, both come into availability only if the cosmic time is limited within an interval and during that time, the effect of physical evolvement can be ignored, in other words, General Relativity is the offspring of cosmic locale spatio-temporal homogeneity.

According to the above discussion, we may consider that both theories of gravitation of Newton's and Einstein's apply only to cosmic local region same as the scale of galaxies.

For all the world, both theories of gravitation have succeeded in cosmic local area. It is a pity that the nature of gravitation is still a riddle to us. Newton believed in that gravitation is an action-at-a-distance force, and yet Einstein predicted that gravitation is a kind of wave (or gravitational radiation) and the wave propagation velocity is equal to velocity of light. No

experiments or observations prove this assumption to be true or not up to now.

From the viewpoint of cosmology, to say the least, Newton's theory of gravitation may be compatible with cosmology based on cosmological principle as compared with General Relativity. F. J. Tipler (1996) [17] prove that if Newtonian gravity theory is rewritten in geometrical language, Newtonian cosmology is as rigorous as Friedmann cosmology. If the case really like so, this conclusion give us a very strong information, that is to say, the case of mistaken identity make Friedmann model lose the hypostasis of General relativity and to degenerate into Newtonian cosmology.

As a matter of fact, we have only a sketchy knowledge of the commonly seen gravitation. As stated above, it may be naive idea to make sure that the gravitation can rule the universe. We have fully discussed the cosmic spatio-temporal topology, and cannot exclude the possibility that the expansion of the universe may be determined by the intrinsic mechanism of the topology of the cosmic entire space-time [11]-[14]. To explore the universe, we have to chew on gravitation theory over again on the universe as a whole.

3. The qualitative analysis for the phenomenon of "Dark matter"

The "Dark matter" presently known is characterized mainly by (1) gravitational effect (including the gravitational lensing), (2) non-baryonic form and "weakly interacting", (3) cold state, (4) cluster distribution and peculiar motion etc. We find that all of these essential characteristic may check with the following natural deduction by our model [11]-[14]:

Evidently, we have no prerequisites to fabricate "the cosmic entire gravitation theory" at the present time, however satisfaction with the demand of the entire universe compels us to be cautious to mend the current gravitation theory. It is important that we'd better abide by two principles: firstly, the theory must fit in with modern astro observations, and secondly its approximate form must be either of Newton's and Einstein's theories of gravitation when "the cosmic entire gravitation theory" is used for the cosmic local case. In this way, it is feasible to give the qualitative analysis for the phenomenon of "Dark matter".

We have completely proved that there is the polar effect (or at one time called The lens effect of cosmic entire hyperspherical space) in any kind of hyperspherical universe so long as the proper distance of horizon $D_p=R(t)\alpha > R(t)\pi$ [11][12]. According to the polar effect, we have explained many difficult problems in cosmology, and the optical property in hyperspherical universe have been fully discussed [11]-[14].

According to our model, we may explain the phenomenon of "Dark matter" through an entirely new way (by the polar effect) same as the description of the optical universe [11][12][14]. So long as the velocity of the gravitational wave is not equal to velocity of light, the double ghost images of the optical effect and gravitational effect should be staggered. Thuswise, we can get twin pictures of the universe caused by the polar effect. One is the visible optical (or electromagnetic) universe which is familiar to us and have been discussed before, and another is the invisible "Dark matter" universe which puzzle us up to now.

Hereon, we feel a need to go into such two questions first: the terms "gravitational wave or gravitational radiation or graviton", whichsoever is loan concept, and the "wave" may be not on normal meaning. The basic fact is that there is gravitation generated by matter in the universe, and the aim is only for convenience to describe; As for the conjecture about the velocity of the gravitational wave, we have no any reason to exclude the possibility that the velocity of gravitational wave is greater or less than velocity of light because gravitational wave is no electromagnetic wave at all. In addition to scientific proof, we really must take issue with the conclusion that the velocity of gravitational wave is identically equal to the velocity of light by theoretical derivation.

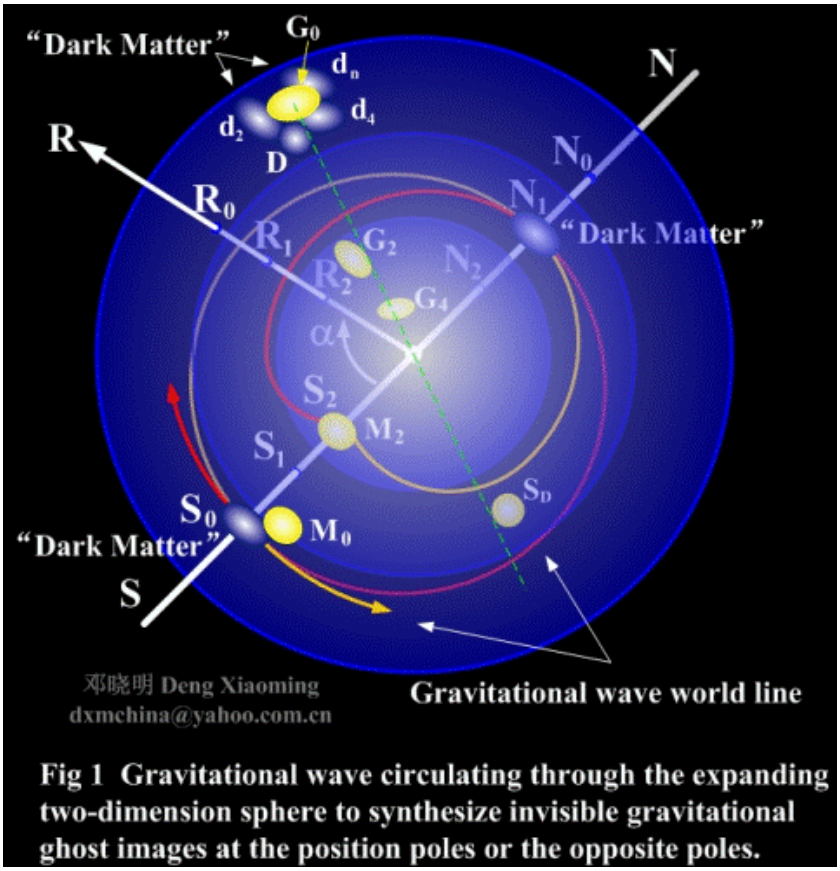

Fig 1 Gravitational wave circulating through the expanding two-dimension sphere to synthesize invisible gravitational ghost images at the position poles or the opposite poles.

See also Fig 1, with the help of two-dimensional sphere, we can partially understand the case happened on three-dimensional hypersphere. Here R_0, R_1 and R_2 express the cosmic radius of the expanding hyperspherical space when the corresponding proper time is t_0, t_1 and t_2 (conventionally t_0 is the time now). We have defined the polar effect [11][12]: $\alpha=0, 2\pi, \ldots 2n\pi, \ldots$ (n=0, 1, 2, …), as the position poles (the places of an observer at different time), and $\alpha=\pi, 3\pi, \ldots (2n+1)\pi, \ldots$(n=0, 1, 2, …) as the opposite poles (relative to the place of the observer at different time).

Supposing that M_0 and M_2 express the locations of our Milky Way at proper time t_0 and t_2, and M_2 is employed as a standard of reference, the axis of the position pole and the opposite pole is S-N. Because there is peculiar motion, our position M_0 now (at t_0) is not just located on the S-N axis but around. Imagining that our Milky Way as a gravitational source emitted gravitational wave (or graviton) at time t_2 (or at position M_2), the wavefront is moving around the universe along geodesic line in all directions, and are focalized to form the first invisible gravitational ghost image at the opposite pole N_1 ($\alpha=\pi$, the proper time is t_1), the same about it, the second invisible gravitational ghost image emerge nearby Milky Way itself (at the position pole S_0 when $\alpha=2\pi$ and time is t_0).

In the normal course of events, by reason that our Milky Way never stops to emit gravitational radiation since coming into being, there must be a lot of invisible gravitational ghost images produced by ourselves in the distant past around us. In order to give clearer definition, see also Fig 1, where G_0, G_2 and G_4 express a galaxy at time t_0, t_2 and t_4 (or $\alpha=0, 2\pi, 4\pi$) if G_0 is employed as a standard of reference (the expression is omitted in the Fig). There are invisible gravitational ghost images d_2, d_4, d_n and D around the galaxy G_0, and thereinto d_2, d_4 and d_n result from the galaxy itself at time t_2, t_4 and t_n, whenas the ghost image D may roots in another galaxy S_D nearby the opposite pole at time t_1 (or $\alpha=\pi$).

Then by inference, we have every reason to think that the invisible gravitational ghost image may be the so-called "Dark matter" in the hyperspherical universe, that is to say, the "Dark matter" is

not the real matter imagined by us before. There are full of such "Dark matter" in the universe. It is clear that every star, galaxy or emission source has several corresponding invisible gravitational ghost images nearby the position poles and the opposite poles.

4. Some inference

If the situation is as stated above, besides the existing observational property of "Dark matter", the inference about the invisible gravitational ghost images ("Dark matter") should be in another nature of:

(1) As it should be, there may be gravitational ghost image distortion and energy degradation after the long journey of gravitational wave;

(2) Ordinary matter can induce the acting force originated in invisible gravitational ghost images ("Dark matter"), but can't make any palpable impact on them;

(3) There is self-positioning effect for any matter (for instance, galaxies or cluster of galaxies) in the hyperspherical universe, that is to say, any matter would be attracted around its position poles by the gravitational effect produced by itself in the distant past ($\alpha=2n\pi$, n=1, 2, 3…);

(4) There should be another kind of black hole caused by the polar effect of gravitation. Same as the description of the optical universe [11][12][14], there may be gravitational "death focus" in the hyperspherical universe too. For example, there is the invisible gravitational ghost image of a star at its opposite pole ($\alpha=\pi$), without regard to physical attenuation, the ghost image is tantamount to its material solid to make gravitational effect on the matter around.

Above paragraphs are the thinkable properties of "Dark matter" according to this model so far, maybe, some idiosyncracy is left out. Anyway, galaxy formation, the distribution of galaxies and the dynamical behavior of celestial bodies would be deeply affected by the invisible gravitational ghost images ("Dark matter").

5. Discussion and general remark

By now, we have gotten twin pictures of the hyperspherical universe: the visible optical (electromagnetic) universe and the invisible gravitational ghost image universe, and both are caused by the polar effect.

As for the polar effect proposed by us first [11][12][14], though it is gotten by a simple mathematical reasoning, we find that it is very important law in any kind of hyperspherical model. According to the polar effect, we may conclude that any kind of physical action on a reference matter come mainly from the matter nearby its position poles and opposite poles (for instance, the circumjacent matter is defined as the matter nearby its position pole at t_0 or $\alpha=0$). With the aid of the polar effect, we have explained many difficult problems in astrophysics or cosmology as follows:

(1) The phenomena of "Dark matter" in the present paper;

(2) The super radiation of quasars and the random variability of a quasar's radiation (Deng Xiaoming 2005a,b and 2006b) [11][12][14];

(3) The redshift periodicity of quasars and Karlsson's peak (Deng Xiaoming 2005a and 2006b) [11][14];

(4) Supernova explosion and gamma ray burst (Deng Xiaoming 2005a,b and 2006b) [11][12][14];

(5) "The great wall" at redshift $Z\approx0.08$ in redshift space (Deng Xiaoming 2006b) [14];

(6) The distribution of galaxies (Deng Xiaoming 2006b) [14] etc…

Of course, a lot of research projects need to lucubrate, such as establishing the equations of gravitational field in this model etc. Undoubtedly, it may be a way that leads us to found "the cosmic entire gravitation theory" by delving into the phenomena of "Dark matter".

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