The lens effect of cosmic entire hyperspherical space

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Abstract

There is a sort of new lens effect in hyperspherical universe, and it should result in some periodicity in observation. In addition, the cause of supernova and gamma ray burst may be given; the super radiation of quasars and the random variability of a quasar's radiation are explained. Given the conclusion: All quasars observed by us, some are the early multiple images of stars or the nucleus of the milky way and others are the early multiple images of stars or galaxies nearby the opposite poles that relative to the milky way; the redshift Great Wall may be integrated into "the great redshift spherical shell" covering all of the sky.

Key words: bolometric flux, hypersphere cosmology, large scale structure of universe, quasars, supernova, gamma ray burst, redshift periodicity.

1. Introduction

Deng Xiaoming (2005a) [1] has discussed about the lens effect of cosmic entire hyperspherical space, and given the special case of radiant intensity formula when cosmic radius R(t) is a linear function: R(t)=kt and without considering that photons losing energy aroused by redshift. In the present paper, the general case and some visual effect caused by the lens effect will be given.

2. Bolometric flux formula and explanation in hyperspherical universe

Although Bolometric Flux is a classical formula (reference to J. A. Peacock) [2], in order to show its new purpose, we deduce it again with the help of Fig 1. Suppose that we are at point A, a distant celestial body was at point O, and its absolute Luminosity was:

$$L = \frac{nh\nu}{\Delta t}. \tag{1}$$

The radiant power has changed into

$$L_0 = \frac{nh\nu_0}{\Delta t_0} \tag{2}$$

after long journey from O at time t to A at time t_0. Where n is the number of photons; h is the Planck constant; ν was emission frequency at time t; ν_0 is accepting frequency at time t_0; Δt was unit interval (from t to t +Δt) and Δt_0 is that the unit interval Δt is elongated when we receive the power at time t_0, $\Delta t_0=\Delta t\,(1+Z)$.

As we know the relation given:

$$\frac{R(t_0)}{R(t)} = \frac{\Delta t_0}{\Delta t} = \frac{\nu}{\nu_0} = 1+Z, \text{ then } \nu_0 = \frac{\nu}{1+Z} \text{ and } \Delta t_0=\Delta t\,(1+Z).$$

Substituting them into Eq. (2) and reference Eq. (1), we have

$$L_0 = \frac{nh\nu_0}{\Delta t_0} = \frac{nh\nu}{\Delta t(1+Z)^2} = \frac{L}{(1+Z)^2}. \quad (3)$$

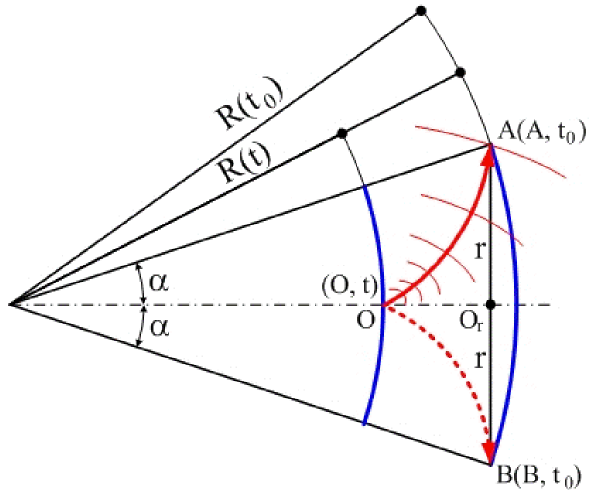

Figure 1 Electromagnetic radiation from point O taking on spherical symmetry relativing to O_r in four-dimensional Euclidian space.

The wave front is given as $4\pi r^2$ in three-dimensional cosmic hyperspherical space. Since $r=R(t_0)\sin\alpha$, we obtain

$$l = \frac{L_0}{4\pi r^2} = \frac{L}{4\pi R^2(t_0)(1+Z)^2\sin^2\alpha}. \quad (4)$$

We also can change its form

$$l = \frac{LR^2(t)}{4\pi R^4(t_0)\sin^2\alpha} \quad \text{or} \quad l = \frac{L}{4\pi R^2(t)(1+Z)^4\sin^2\alpha}. \quad (5)$$

Where l is the brightness observed by us. And the Eq. (4) is called as Bolometric Flux.

It is necessary to discuss about the definition of the distance relating to this subject. Some books or articles define the proper distance as: $D_p=R(t_0)r_0$ and the Luminosity distance as: $D_L=R(t_0)r_0(1+Z)$. Where $r_0=\sin\alpha$ in the case of spherical space. We descry that the proper distance between two points at time t_0 should be defined as: $D_p=R(t_0)\alpha$ in hyperspherical space. Also see Fig 1, $r=R(t_0)r_0=R(t_0)\sin\alpha$ is the radius of the wave front, it is not in cosmic space, so it is ambiguous to be called as "distance".

In fact, there is difficulty to define the distance between a distant celestial body and us for this subject, as we have argued that there are three kinds of distances [1], the proper distance $D_p=R(t_0)\alpha$ at time t_0, $D_p=R(t)\alpha$ at time t and the traveling distance of an electromagnetic wave $D=(t_0-t)c$. We propose that the "distance" may be replaced by both absolute coordinates α or redshift Z. It is unnecessary to limit the value range of α when a free particle in expanding hyperspherical space is studied.

In order to visualize the Eq. (5), for convenience, we might as well use the simplest model with

R(t)=kt, and give the integral periodic parameter of redshift: Ω=2kπ/c [1]; the redshift formula: kα/c=ln(1+Z) [1], manipulating the two formula and substituting them into Eq. (5), we have

$$l=\frac{L}{4\pi R^2(t)e^{2\Omega\alpha/\pi}\sin^2\alpha}. \tag{6}$$

If we consider a wave front emitted at a past time t, and the radiant power L was invariablenes within that short duration, the emitting time t would be fixed and let

$$\mu=\frac{L}{4\pi R^2(t)}, \tag{7}$$

note that μ here is a constant, substituting Eq. (7) into Eq. (6), we obtain

$$l=\frac{\mu}{e^{2\Omega\alpha/\pi}\sin^2\alpha}. \tag{8}$$

It is seen that $\frac{1}{e^{2\Omega\alpha/\pi}}$ is degressive factor and $\frac{1}{\sin^2\alpha}$ is period factor.

We have deduced Karlsson's formula Δln(1+Z)=Ω [1], if let Ω≈0.206 (K. G. Karlsson 1971, 1973, 1977) [1], we can give Fig 2.

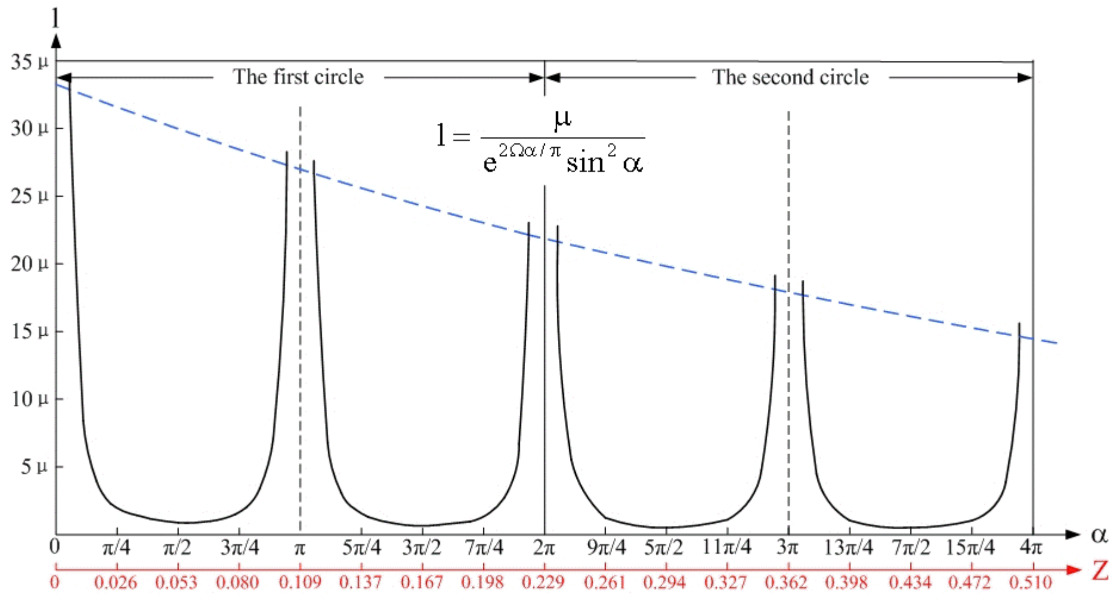

Figure 2 the change of the bolometric flux l with α or redshift Z

It is seen that the bolometric flux l has obvious periodicity, and it will be infinite when α=0, π, 2π, 3π, 4π… nπ…. Of course, it is not verity, it merely is mathematical infinite, because the radiant power L emitted from a celestial body is limited, in nature, it should be the value measured nearby the position poles or opposite poles [1] of a celestial body. We notice that the Fig 2 gotten here almost is as same as we shown before [1], because the attenuation factor $1/(1+Z)^2$ is called into play when redshift must be big enough.

3. Another optical property in hyperspherical universe

From the discussion above, in hyperspherical universe, we have shown the periodicity in brightness in scope of large-scale space-time. We may also illustrate that there is similar periodicity for the size of celestial bodies with α.

Jeff Weeks (2002) [3] has shown us a lot of pictures in curved space, and discuss about the hyperspherical optical properties on the surface of a ordinary sphere. See Fig 3, now, we use the two-dimensional expanding sphere to show the optical properties in hyperspherical universe. First we place ourselves at point A, three celestial bodies with the same size are B_1, B_2 and B_3, and they are located at coordinate α_1, α_2, and α_3 on three continuous expanding spheres S_1 at time t_1, S_2 at time t_2 and S_3 at time t_3 respectively. β_1, β_2 and β_3 are the angles in our field of view.

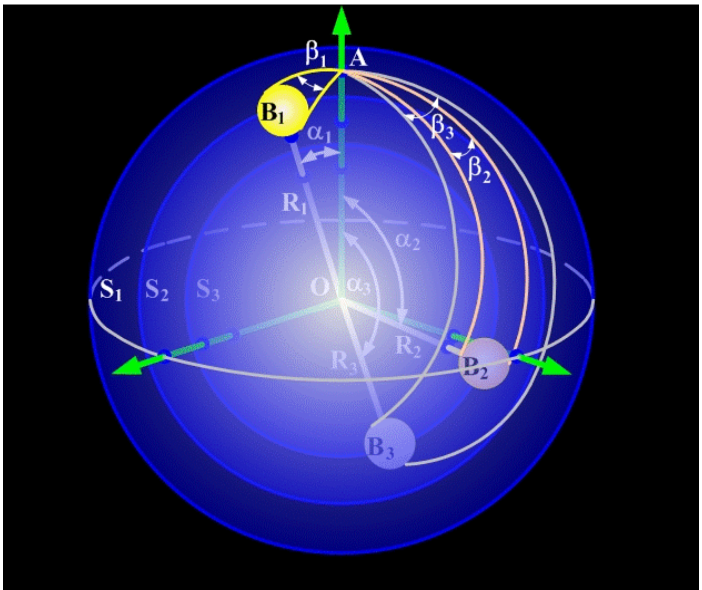

Figure 3 On the surface of two-dimensional spheres, to study optical properties in the expanding hyperspherical universe.

It is seen that the angle β as similar as bolometric flux l show periodicity with α, and it will be maximum when α=0, π, 2π, 3π, 4π… $n\pi$…. By the way, this scene of Fig 3 is on the point of view of a "fundamental" observer. The visual effect taken by us is determined by β the angle in our field of view. We also can see the reversal image of a celestial body when α is in the range (π, 2π), (3π, 4π)….

4. The lens effect of cosmic entire hyperspherical space

Above two effect both are caused by the properties of cosmic entire hyperspherical space, so we might as well imprecisely call it as the lens effect of cosmic entire hyperspherical space. The effect have shown us many amazed phenomena in hyperspherical universe [1]. We may see that there must be this effect in every hyperspherical model without cosmological horizon or (if we soften the terms) with cosmological horizon when the proper distance of horizon $D_p=R(t)\alpha > R(t)\pi$.

We have already given the definition of the position poles and opposite poles [1] for the hyperspherical universe. Every objective celestial body that we want to research, well then its position in hyperspherical universe can be regarded as the position poles. If we regulate its position pole coordinate α=0 at time t_0, the other position poles are $\alpha=2\pi$, 4π,…$2n\pi$…at different times, and correspondingly, its opposite poles are at $\alpha=\pi$, 3π,… $(2n-1)\pi$…, at different times. Where n=1, 2, 3…. It is through the position poles and opposite poles that the lens effect is achieved. Of course, the position poles and opposite poles are not peculiar to us, every observer at any place in the universe possess of theirs. We can transform our position in different point of view to appreciate the optical effect.

With the help of both effect of “brightness” and “size”, we can describe the lens effect of cosmic entire hyperspherical space. Before doing this, we must announce that the “size” effect hasn’t been strictly proved by math (this author will do it later). Anyway, this point can not affect our conclusion because the case illustrated by Fig 3 is a nice approximation. We might as well use the case on static sphere to describe (reference Jeff Weeks 2002) [3].

See Fig 2 and Fig 3, both the bolometric flux l and the angle of view β are decreasing function in the range of α (0, $\pi/2$), (π, $3\pi/2$), (2π, $5\pi/2$)….but increasing function in the range of α ($\pi/2$, π), ($3\pi/2$, 2π), ($5\pi/2$, 3π)….and both values will be minimum at $\alpha=\pi/2, 3\pi/2, 5\pi/2$…, but will be infinite for l and maximum for β at $\alpha=0, \pi, 2\pi, 3\pi$….All of these phenomena have strong physical meaning, and which have been fully discussed before [1].

See also Fig 2, it is seen that an emitting celestial body was at $\alpha=0$, and if our position is located at the range of α (0, $\pi/4$), ($3\pi/4$, $5\pi/4$), ($7\pi/4$, $9\pi/4$)…, we would see the celestial body easily; Whereas if our position is located at the range of α ($\pi/4$, $3\pi/4$), ($5\pi/4$, $7\pi/4$), ($9\pi/4$, $11\pi/4$)…, we couldn’t see the celestial body clearly; If we are around $\alpha=\pi/2, 3\pi/2, 5\pi/2$…, maybe we couldn’t see the celestial body; For special case, if we were at $\alpha=\pi, 2\pi, 3\pi$…, the disaster would happened, we would drop into the “death focuses” of the celestial body (this subject has been described before) [1].

In order to develop this macabre scene, we would give the example. Supposing that this celestial body was our sun ($\alpha=0$), we were not in the solar system but on another planet nearby $\alpha=\pi$, and approached to π, first we would see the sun as same as the real floating before our eyes, and the sun would become not only bigger and bigger but also brighter and brighter (hotter and hotter), when we just arrived at the point of π, if we were still alive yet! We would see that all of the sky is covered by the surface of sun (the surface of sun seem to be turned the inside out), and the height of sky is as same as the radius of sun. Some time later, when the information of sad story of ours arrives to other distant observers, they would see a distinct astronomical phenomenon, that maybe just is mystical gamma ray burst! If that unfortunates were not us but a star, the phenomenon observed by the distant observers would be a supernova.

There are full of such “death focuses” (small area) in the universe. It is clear that every star, galaxy or emission source has several corresponding death focuses nearby the position poles and the opposite poles (for the peculiar motion, the focuses shift about the poles in different directions), because the radiant energy turns round the universe several times. In this case, we may infer that the probability of this kind events is more then the events of bump between galaxies or stars.

5. The cosmic scene presented to our eye

It is seen that, from the point of view of an observer at each place in the universe, it is easier to see the matters that are distributed around the position poles and the opposite poles, Because the electromagnetic wave from both poles are focalized when they pass through the place of the observer’s. In observation, the lens effect of cosmic entire space should result in some periodicity, and the periodicity can be detected by means of statistic.

See fig 4, the same size celestial body with same absolute luminosity show periodicity in size and brightness with α, that is the cosmic scene presented to our eye.

The famous redshift Great Wall has been shown by large-scale redshifts survey, we may believe that it was distributed nearby the opposite pole that relative to us at first phase $\alpha=\pi$. According to the lens effect, we also may predict that the Great Wall must be integrated into "the great redshift spherical shell" covering all of the sky if our eyeshot hasn't been enveloped by Milky Way.

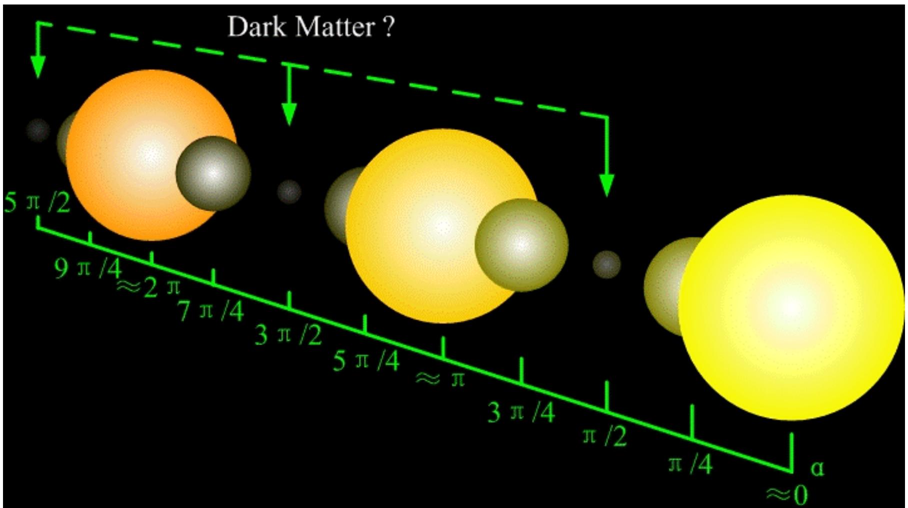

Figure 4 The cosmic scene presented to our eye

6. Conclusions

We may show other conclusions given before [1] briefly here:

The explanation for quasars: (1) All quasars observed by us, some are the early multiple images of stars or the nucleus of milky way galaxy (or local group of galaxies) and others are the early multiple images of stars or galaxies nearby the opposite poles that relative to milky way; (2) The super radiation of quasars is a kind feint and caused by the lens effect of cosmic entire space; (3) The random variability of a quasar's radiation is caused by its peculiar motion nearby the position poles or opposite poles, see Eq. (4), we haven't given the Figure for Eq. (4), but may reference to Fig 2, the bolometric flux l is very sensitive to a small motion nearby $\alpha=0, \pi, 2\pi, 3\pi, 4\pi\ldots n\pi\ldots$;

The Main contribution for microwave background radiation were by the early matter nearby the position poles and the opposite poles that relative to milky way.

Alleged "dark matter" is not darker, same as normal matter, the uniquely difference only is the different position at which they located.

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