Discussion on the possibility and the effect of existence of net residual electric charges in universe

--Preliminary application of the relativity of electromotive space-time

Yingtao Yang

(Toronto, Canada, former employing institution: Xi'an Institute of China Coal Technology and Engineering Group Corp)

yangyingtao2012@hotmail.com

Abstract： The relativity of electromotive space-time[1] expanded the space-time conception of the special relativity, and go some important result, of them, there are net residual electric charges—a form of existence of energy, lenticular effect of electric potential, redshift effect of electric potential, etc. They are all closely related to astrophysics. Therefore, according to these new physical effects, the author put forward the assumption that there exist possibly great number of net residual electric charges in our universe, which is shorten as assumption of electric universe. On the basis of the assumption, new explanation has been given for important astrophysical phenomena in universe such as redshift, radiation of microwave background, redshift of quasar, dark matter and dark energy, etc. Some new astrophysical phenomena such as evaporation effect of mass—electric charges have been predicted. Experimental methods to verify the assumption have been also given. The paper deals with the preliminary application of the relativity of electromotive space-time in cosmology.

Keywords: electric cosmos; assumption of electric universe； relativity of electromotive space-time; energy of net residual electric charges; redshift effect of electric potential； electric potential-cosmos redshift effect； lenticular effect of electric potential； evaporation effect of mass and electric charges； star of electric potential； dark matter； dark energy; telescope of electric potential

The modern Big Bang Theory based on Hubble's law and other observation experiments can really explain many astrological phenomena and has been widely accepted at present. However, it cannot explain well some important astrological phenomena such as redshift of quasar, accelerated expansion of universe, dark matter, dark energy etc. Therefore that means that the Big Bang Theory is not perfect at present, and needs to develop.

According to the relativity of electromotive space-time and results of related research, it is found that there possibly exist some important physical effects, for example, redshift effect of electric potential, net residual electric charges—one form of energy, lenticular effect of electric potential etc. They are all related to physical problems in cosmology. We can observe the universe from a completely new view， try to explain phenomena and problems in cosmology from the view of the relativity of electromotive space-time, at the same time to verify the relativity of electromotive space-time.

1. Relation between energy and mass of net residual electric charges

According to the relativity of electromotive space-time, we can derive that net residual electric charges are one form of existence of energy [2]. Its energy E is：

$$E_e = k|q|\phi_0 \quad (1)$$

K is the coefficient of energy of electric charges, its current theoretically calculated value is $\frac{\pi}{4}$， q is net basic electric charges.

At the same time, according to the formula for energy—mass conversion of the special relativity, its energy E_m is：

$E_m = mc^2$ (2)

Where, m is mass, c is speed of light.

According to the law of conservation of energy, different forms of energy are convertible each other. Suppose during formation and evolution of universe and under condition of extra high density of mass, some mechanism has transformed the mass into energy of net residual electric charges, and during that process, energy is conservative. That is：

$c^2 \sum m_i = k\phi_0 \sum |q|$ (3)

Because of a lot of net residual electric charges $\sum |q|$ in universe, and because of Coulomb's repulsive force of like charges, net residual electric charges are uniformly distributed in universal space. Therefore, our present universe is possibly one whose density of net residual electric charges is not equal to zero, shorten as electric universe. Suppose the density of electric charges in universe is ρ_0. The occurrence and the variation of the net residual electric charges will play decisive role in the evolution of universe.

There exist the field of electric potential in universal space whose net residual electric charges are not zero, we call it basic field of electric potential of universe. Its distribution is closely related to the physical status of the observing reference system. That is, there is no absolute universal basic electric potential field. The universal basic electric potential field discussed in the paper takes the Earth as the reference system.

2. Possible mechanism of the formation of net residual electric charges in universe

Now we will discuss in detail this problem. Evidently our experimental observation data and the depth of theoretic research have not reached the sufficient level. But we can conduct some guess：

(1)If the Big Bang Theory is tenable, it can be guessed that at the initial period the net electric charges are zero, but during the Big Bang for matter under extreme physical conditions and action of some mechanism, the mass has been transformed into positive net residual electric charges or negative net electric charges, and this transform is asymmetric, because there is energy of net residual electric charges only when there exist net residual electric charges.

(2)In the interior of astronomical objects with high mass density, for example black hole, possibly under some mechanism, great amount of net residual electric charges may be generated, and the sign of these electric charges is identical to that of net electric charges generated during the Big Bang. Otherwise, it will be contrary to the law of energy conservation.

(3) Under action of universal formation mechanism unknown so far, great amount of net residual electric charges have been generated in universe.

The assumption that great amount of net residual electric charges exist in universe and play an important role in the formation the evolution of universe is called hypothesis of electric universe. If tenable, the hypothesis will certainly generate some new astrophysical effect, and can explain probably more cosmological problems.

3. Explanation of astronomical observation results by the hypothesis of electric universe

Currently the Big Bang Theory of universe has been widely accepted, because it can explain astronomical observation facts such radiation of universal microwave background, spectral redshift of galaxy, abundance of helium atoms etc. the hypothesis of electric universe has been developed on the basis of the Big Bang Theory of universe and in combination with the relativity of electromotive space-time. It should explain better these astronomical facts than the Big Bang Theory.

(1）Electric potential—universe redshift

According to the relativity of electric potential, we can derive that there is a redshift mechanism induced by electric potential [3]. Its equation is 为：

$$z_e = \frac{1}{\sqrt{1-\frac{\phi^2}{{\phi_0}^2}}} - 1 \quad (4)$$

（a）

Where ： ϕ is relative difference of electric potential

Φ_0 is limit electric potential

Z_e is redshift of electric potential

Assume that the universal redshift related to Hubble's law is z_h， the total astronomically observed redshift is Z，that is：

$$Z = z_h + \frac{1}{\sqrt{1-\frac{\phi^2}{{\phi_0}^2}}} - 1 \quad (5)$$

According to the hypothesis of electric universe, our universe would carry great amount of net residual electric charges (suppose it is positive electric charge). Therefore, the density of net residual electric charges in universe is ρ_0. Suppose the Earth is the center of circle of coordinate, the observing distance is the radius, we can get a sphere.

According to the relativity of electric potential, the modified Gauss law of electric field is [4]：

$$\oiint E'ds = \frac{Q_0}{\varepsilon_0}(1-\frac{\phi^2}{{\Phi_0}^2}) \quad (6)$$

Φ is the relative electric potential relative to Gauss surface

Φ_0 is the limit electric potential

E' is the electric field of Gauss surface

Q_0 is electric charges in Gauss surface

$$Q_0 = \rho_0 \frac{4}{3}\pi r^3 \quad (7)$$

$$\frac{d\phi}{dr} = \frac{\rho_0 r}{3\varepsilon_0}(1-\frac{\phi^2}{{\Phi_0}^2}) \quad (8)$$

And r = 0, there is $\phi = 0$，By solving the above differential equation, we can get the relation between electric potential and distance：

$$\phi = \Phi_0 \tanh(\frac{\rho_0 r^2}{6\Phi_0\varepsilon_0}) \quad (9)$$

Astronomically observed redshift is the sum of universal redshift and electric potential redshift：

$$Z = z_h + \frac{1}{\sqrt{1-(\tanh\left(\frac{\rho_0 r^2}{6\Phi_0\varepsilon_0}\right))^2}} - 1 \quad (10)$$

This redshift is called electric potential—universe redshift.

（2）Radiation of universal background

According to the hypothesis of electric universe, great amount of net residual electric charges are uniformly distributed in the whole universe, under conditions of no disturbance, these net residual electric charges are arranged stably and steadily in dot matrix structure, we call it as field of net residual electric charges. Each dot carries a net residual electric charge. The net residual electric charges are interactive to each other by Coulomb's repulsive force.

When a dot moves suddenly due to some reason, vibrates even is annihilated, corresponding vibration will occurs at surrounding net residual electric charge under action of Coulomb's force, the vibration will be propagated far away in form of wave motion. From electromagnetic theory, it can be known that the net residual electric charges will emit electromagnetic waves.

Our universe is full of different light and electromagnetic radiation, cosmic rays, astronomical objects, movement of galaxy, explosion of superstar, all these will disturb seriously even destroy temporarily the background field of net residual electric charges in universe. Because the existence of action of repulsive force of action of like charge, the energy of any disturbing event in universe will be transmitted rapidly through electromagnetic force and is uniformly distributed, and transformed into the acceleration movement or vibration energy of net residual electric charges in more domains, at the same time, the vibration of electric charges will certainly radiate electromagnetic waves.

During evolution of universe, the movement of matter and energy will not stop, neither its disturbance to the background field of the universal net residual electric charges will stop. Therefore, the background field of universal net residual electric charges will be remaining at the status of disturbance, at the same time it will emit uniform electromagnetic radiation in the whole universal space, it is the radiation of microwave background observed today.

The average radiation energy of microwave background depends on the motion intensity of matter and energy of the whole universe and the density of net electric charges etc. In comparison of the explanation of the radiation of universal microwave background through the Big Bang, we can know their differences:

a. The big Bang Theory considers that the radiation of universal microwave background is "residual heat after the Big Ban, and the radiation source is emitted by electrically neutral matter. With the increase of time, it will become weaker and weaker. While the electric universe theory thins that the radiation of universal microwave background origins mainly from the disturbance of the background of universal net residual electric charges. If the average intensity of movement of universal matter or the density of universal net residual electric charges increases, the intensity of radiation of universal microwave background may fluctuate with increase of time, rather than decreases continuously, even is enhanced.

b. The Big Bang Theory thinks that the radiation of universal microwave background is induced by the uniform distribution of matter after the Big Bang. However because of the action of gravitational attraction, matter will concentrate and evaluate to form heterogeneous structures, nebula, galaxy and astronomical objects etc. The uniform distribution of these radiation sources is finite. While the theory of electric universe thinks that the radiation sources are mainly the net residual electric charges in universe, under action of Coulomb's repulsive force, they are very uniformly distributed, even they can be distributed in astronomical objects such as galaxy, nebula etc. Therefore, the radiation of microwave background is uniform.

c. Because the net residual electric charges are interactive by electromagnetic force, even if a non electrified object passes nearby them, because of action static electric induction, it will transmit the energy to net residual electric charges. Therefore，the field of universal net residual electric charges is more sensitive to the event occurring in the universe than other electrically neutral matter. That is, if a event of Gig Gang occurs in universe，the field of the universal net residual electric charges will be influenced. Therefore, the uniformity of the radiation of universal microwave background will vary with it, even forms a structure related to this event.

Strictly speaking, the radiation of the universal microwave background is the conjoint consequence of the action of various radiation resources and physical effects, their contribution to the background radiation needs more observations and theoretic discussions,

however, microwave background radiation emitted by net residual electric charges will account for important place.

（3）Abundance of helium atom

During the initial period of the Big bang, the relative density of basic particles such as electrons, quark, photon etc., is very high, they are combined to form proton and neutron，the probability of hydrogen atomic nucleus, helium atomic nucleus and other lighter atomic nucleus is also high. They have formed the basic universal matter. This process is the same as the formation mechanism of helium abundance of the Big bang. Its core is that not only the helium atoms in universe have been generated by thermal fusion in stars, but also rather great proportion of helium nucleus are generated during the formation of universal basic particles.

（4）Interpretation of quasar redshift

There is very big redshift in quasars. It is very difficult to explain universal redshift by using the Big Bang theory, because such big redshift is certainly far away, while for such far away astronomical object to reach the lightness that we have observed, it would required that the energy it emits is many times higher than the energy of galaxy. Still there are phenomena such as multiple redshift of quasar, which is more difficult to explain. But using the mechanism of redshift of electric potential of the hypothesis of electric universe, a series of phenomena such as big redshift and multiple redshift of quasar can be explained.

Suppose the core of quasar is a black hole or an astronomical object of extreme high density, it is possibly a astronomical object of electric object. Positive electric charges are generated in great amount and are distributed on the surface of the core. Through mass—electric potential evaporation effect, they diffuse surrounding a quasar. Therefore, under action of Coulomb's force and universal gravitation, these net residual electric charges reach a relatively stable distribution status. They will generate a relatively high electric potential distribution field called as electric potential field of universal domain. This high electric potential field is superposed on the basic field of universal electric potential and will induce anomaly of electric potential around quasars.

Therefore, the redshift of quasar is composed of two superposed parts. One part is universal redshift of electric potential and is related to the distance between quasar and the observer, another part is the redshift of electric potential of local high electric potential anomaly of astronomical objects and is related to mass—electric charge evaporation effect，we call it local electric potential redshift, it is not related to the distance from us to a quasar and is only related to the amount and the distribution of net residual electric charges of the quasar.

So, the huge redshift of quasar consists of the redshift of universal electric potential, the local redshift of electric potential and Dopller moving redshift. It is can be seen that the quasars are not always far away from us, some of them may be even close to us. Therefore, the problem for interpretation of the energy of quasars is resolved.

Now we can understand the phenomena of multiple redshift in quasars, the phenomena of inconsistence of the redshift of adsorbing rays and emitting rays. These phenomena are related to the electric potential of the actual position of the lighting point. Light adsorbing layer is distributed at the outer of the light emitting layer and its electric potential is relatively low. Therefore, generally the redshift of the adsorbing rays is smaller than that of the emitting rays. Of course, because the actual quasars are different in structure and type, which may induce relatively big difference in the form of distribution of electric potential. Its redshift will have different variations. That is why the redshift of quasars is various.

（5）Dark energy and dark matter

Through astronomical observation facts, now we are aware that there exist dark matter and dark energy. However, at present we don't know what dark matter and dark energy are really.

According to the hypothesis of electric universe, it can be preliminarily defined as follows:

a. Dark matter is the name of net residual electric charges in universe and the carrier of the matter.

b. Dark energy is the energy of net residual electric charges in universe.

Dark matter may not be some particular particles but common basic particles with identical electric charges. Furthermore, it is not certainly fixed. Whether a basic particle is of dark matter depends on the electric charges it carries, in universe at some moment the electric charge is net residual electric charge or not. Their interaction is Coulomb repulsive force. It is homogeneously distributed in the whole universe, has plaid important role from the universal formation and evolution to up date. Only it is too dispersed, and the matter's carrier of net residual electric charges is not invariable. Therefore it is very difficult to find it.

Preliminary explanation for observation facts related to dark matter and dark energy:

1) The rotary linear velocity of matter and astronomical objects in galaxy is almost identical

This motion law of galaxy is completely different to that of the planets of solar system. Therefore, astronomers guess that there exist particular particles of dark matter in galaxy space. They don't react to the light, but is relatively big in mass, distributed in the whole galaxy space, and influences the motion of galaxy. Its mass is much bigger than that of the common matter of galaxy. However, according to the definition of the dark matter of the hypothesis of electric universe, we can explain the problem of the distribution of the rotary velocity of galaxy from a completely new view.

The prerequisite for the deduction of the existence of dark matter is only the above astronomical phenomena explained by universal gravitation. If the existence of net residual electric charges in universe is considered, electromagnetic acting force and universal gravitation apply jointly action on the matter in galaxy, and the relative intensity of electromagnetic acting force is much higher than that of universal gravitation. The following possible factors may influence of matter motion of galaxy:

a. What influence the field of net residual electric charges has on universal gravitation? It may induce gravitation higher than that in vacuum condition.

b. Is there basic force unknown so far between the mass and the electric charges? We call it gravitation of mass and electric charges.

Suppose the gravitation of mass and electric charges is f, it is directly proportional to the product of electric charge q and mass m, and inversely proportional to the square of the distance r, that is:

$$f = k_1 \frac{mq}{r^2} \tag{11}$$

k_1 is the coefficient of the gravitation of mass and electric charges.

The density of universal net residual electric charges ρ_0 is known, so, suppose electric charges are not related to electric potential, electric charges in Gauss plane are:

$$q = \frac{4}{3}\pi r^3 \rho_0$$

$$f = k_1 \frac{4}{3}\pi \rho_0 mr \tag{12}$$

It is can be seen that the force borne by astronomical objects in galaxy is directly proportional to r, it will make the far astronomical objects get higher linear velocity. Does this force exist actually? If it exists, what is the functional relation between it and r? Further discussion is needed.

c. When moving with galaxy, what influence the net residual electric charges have on the motion of matter in galaxy

Because the interior of galaxy is full of net residual electric charges, when they move relatively，according to electromagnetic induction law, induced magnetic field and electric field will be generated, at the same time, and produce mutual acting force to the net residual electric charges. This force arrests always the relative motion of dark matter. Therefore it makes the fast moving matter move slowly, the slowly moving matter move faster. We call this force electromagnetic induction friction force of dark matter. The faster the relative motion velocity of dark matter is, the bigger the resistance. When the relative velocity is zero, the resistance is also zero. It is because of its existence that the motion velocity of the matter around the galaxy tends to be consistent and this status remains stable.

1) When two galaxies are collided，due to the collision, the motion velocity of common matter slowdowns even the motion stops, at the same time when the dark matters are collided, the dark matters may be penetrated each other.

That is because that the dark matters carry identical electric charges, and their volume density is much lower than that of the common matter, there is large space among particles of the matter, when they are collided, their velocity will slowdown under action of Coulomb repulsive force, however they will avoid frontal mutual collision, and penetrate trough the void between them. There is not sufficient void due to high volumetric density of common matter, under action of universal gravitation, frontal collision will occur. Therefore its momentum will be transferred to the counterpart. While the motion of the common matter stops almost.

2） Accelerated expansion of universe

Hubble's law is used in our present calculation of redshift. The linear relation of universal redshift reflected by it is an approximate relation. The formula (10) for electric potential—universe redshift is more accurate relation. Particularly at the position relatively far away from us, the redshift of astronomical objects would deviates the calculation by Hubble's law and moves toward larger direction of redshift. Therefore, it makes us fell that it is being expanded in acceleration. While in fact it does not accelerate, and is only the response of the existence of redshift effect. Therefore, the energy of net residual electric charges in universe is possibly the dark energy we are searching for.

From what we have discussed, the dark matter and the dark energy we are looking for may be possibly the net residual electric charges and the energy of net residual electric charges. Particular basic particles and mysterious energy are not needed. They are through over the whole universe, even nearby us.

4. New prediction of the hypothesis of electric universe

（1）Mass－electric charge evaporation effect

It is well known that the black hole is an astronomical object that even light can no escape. Therefore, the infinitely large mass density of the black hole may occur and diverge. People have searched for different approaches to resolve theoretically the problem of the divergence. Hawking's theory of black hole evaporation is the result of the efforts in this aspect. According to the relativity of electric potential, we can propose a new mechanism of black hole evaporation, the mechanism of mass—electric charge evaporation.

Suppose there is a black hole with mass M，and great amount of matter around it continue to enter it under action of universal gravitation, the mass density increases continuously at its central area, when it tends to be big enough(for example reach the magnitude of Planck's mass density)，mass—electric charge transform reaction may possibly occur, suppose the final consequence is that the black hole generates net residual electric

charge$+Q$, it may be net residual negative electric charges, however, whether the electric charges are positive or negative, their energy of electric field is always positive[2], their energy of net residual electric charges is $k|Q|\Phi_0$. According to law of energy conservation, the mass of the black hole will be reduced by M, so there is:

$$k\Phi_0|Q| = c^2M$$

With the generation of this reaction, great amount of positive electric charges will be generated, accumulated and distributed on the surface of the black hole, under action of strong gravity, it is difficult for them to escape. Therefore, black hole and other astronomical objects of high mass density may be electrified astronomical objects. The strong electric field induced by particles of net residual electric charges will attract particles of negative electric charges outside the black hole and make particles of negative electric charges fall into the black hole. Suppose at a moment the basic particles of negative electric charges with electric volume $-Q_1$ enter in the black hole, their sum of static mass is M_0, they neutralizes net residual electric charges Q_1 in the black hole. At the same time, the negative electric charges outside the black hole decrease, that is, the net residual positive electric charges outside the black hole increase by Q_1, and are diverged rapidly to the universe. This process is equivalent to that the positive net electric charges Q_1 in the black hole move to the outside of the black hole. The energy of the net residual positive electric charges is transformed into mass M_1. According to the law of energy conservation, we get:

$$M_1 = \frac{k\Phi_0}{c^2}|Q_1|$$

Therefore, that is equivalent to that the positive mass of $M_1 - M_0$ moves outside the black hole. So, great amount of mass in the black hole is evaporated through transform of electric charge, we call it mass—electric charge evaporation effect. Suppose the mass of this evaporation process is M_2, there is:

$$M_2 = \frac{k\Phi_0}{c^2}|Q_1| - M_0 \tag{13}$$

This is a very marvelous effect, it meets the condition where the matter in the black hole can enter but can not go out, at the same time, reaches the action of reduction of mass in the black hole. Therefore, the mass density in the interior of the black hole would not be infinitely large and diverge.

From what is discussed above, we can predict that there are electrified astronomical objects in universe, these astronomical objects are accompanied by mass—electric charge evaporation of different intensity, they may be black holes or other particular astronomical objects of high mass density. We call these astronomical objects which can generate electric charges star of electric charges. They are also one of the important sources to generate net residual electric charges in universe.

（2）Lenticular effect of electric potential

According to new Maxwell equations[3] it can be known that the light velocity of high electric potential space is smaller than that in vacuum, that is:

$$C_0' = C_0\sqrt{(1 - \frac{\phi^2}{{\Phi_0}^2})}$$

Where, ϕ is electric potential at any point around an astronomical object, C_0' is the light velocity of the point, Φ_0 is limit electric potential, C_0 is the light velocity in vacuum.

Therefore, we can get the refractivity n of light in the space of electric potential:

$$n = \frac{C_0}{C_0'} = \frac{1}{\sqrt{(1-\frac{\phi^2}{{\Phi_0}^2})}} \tag{14}$$

It can be seen that if black hole and quasar are astronomical objects of electric charges, there is lenticular effect of electric potential in the space around them.

a) Verification of the hypothesis of electric universe

Whether the hypothesis of electric universe is correct will be finally verified by experiments. The tentative ideas for preliminary experiments of verification are put forward as follow：

（1） Observation of electric potential redshift

We can invent a special telescope of electric potential. It consists of following basic parts：

a. Optic telescope and spectral imaging system；

b. Equipotential observation room；

c. Ultra high electric potential generator；

d. Isolating foundation.

The equipotential room is a completely confined space composed of electrically conductive materials, and their observation windows are made up by conductive materials. A set of conventional optic telescope is installed in the room and connected to the conductive materials. The whole room is situated on the isolating foundation sufficiently high from the ground surface. Inside a ultra high electric potential generator is set up, one end of the generator is connected to the ground and other end connected to the room. Such system composes a telescope of electric potential.

When the telescope aims at a quasar in the space through observation window, we make the equipotential room and the telescope carry the equal very high electric potential by using ultra high electric potential generator. The magnitude and polarity can be adjusted by the generator. In this way, the telescope of electric potential can take spectral photos of the same astronomical object under different electric potential. According to classic physics, no change will occur in their spectrum.

But according to the relativity of electromotive space-time, we will find spectral redshift. And the magnitude of redshift of the astronomical object depends on the magnitude of electric potential difference of the astronomical object and the observation point. The variation of electric potential in equipotential room will change this relative electric potential difference. So we can adjust artificially this electric potential difference，make the magnitude of the observed redshift of the astronomical object change with the relative electric potential difference. By adjusting the electric potential of the equipotential room, we can increase or decrease the redshift of the astronomical object.

Provided our telescope of electric potential can generate sufficiently high electric potential or there is equipment with very high resolution for analysis of redshift, we will verify the existence of redshift of electric potential.

（2） The influence of electric potential on time

According to the relativity of electric potential, the electric potential has influence on time, its formula is as follows：

$$t' = \frac{t_0}{\sqrt{1-\frac{\phi^2}{\Phi_0{}^2}}} \tag{15}$$

Where：ϕ is the relative difference of electric potential；

Φ_0 is the limit electric potential；

t' is the time of the reference system with electric potential ϕ;

t_0 is the time of the reference system with zero electric potential.

We need only two clocks T1 and T2 with constant error. The clocks are put in two ideal anti-disturbance metal confined rooms R1 and R2 of identical condition, make the electric

potential in room R1 equal to zero, and make R2 have very high positive electric potential. According to the relativity of electric potential, the clock T2 in R2 would be slower than T1 in R1. In order to overcome the influence of systematic error, it is only to change clocks under the testing conditions. The testing will be conducted for multiple times, and the testing results will be analyzed statistically. Provided the electric potential is high enough and the testing time is long enough, we can get observable results. The biggest advantage of this method is that it has effect of accumulated time. That is, when electric potential can not reach sufficiently high level, prolonged observation time can give observable results.

If the experiment verifies that the influence of electric potential on time is tenable, it also verifies indirectly that redshift of redshift is tenable.

（3） Detection of net residual electric charges

We can design aerospace vehicle and equipment to detect whether there are net residual positive electric charges in the space, electric potential difference and electric field induced by these charges. In the view of modern technology, such detection can be realized completely.

（4） Detection of lenticular phenomena of electric potential

From the lenticular effect of electric potential it can be known that the higher the electric potential is, the lower the light velocity is. Therefore, when light rays pass nearby an astronomical object（quasar etc.）with abnormal electric potential, the light rays will be refracted and bend. It is similar to lenticular effect of glass. However, we can infer that the bigger the redshift of electric potential of a quasar is, the more evident its lenticular effect of electric potential. We can establish the relational formula for redshift and lenticular effect of electric potential, so, it is possible to find out the difference of the lenticular effect of electric potential and the lenticular effect of gravity. The observation of these effects may further verify the hypothesis.

references：

[1] Yingtao Yang, The relativity of electromotive space-time, National Library of Science, www.nstl.gov.cn/preprint

[2] Yingtao Yang, Discussion on the distribution regularities of electric field and energy of electric charges, National Library of Science, www.nstl.gov.cn/preprint

[3] Yingtao Yang, Effect of frequency shift of the relativity of complex electromotive space-time, National Library of Science, www.nstl.gov.cn/preprint

[4] Yingtao Yang, Discussion on the covariant relation between the relativity of electric potential and Maxwell equations, National Library of Science, www.nstl.gov.cn/preprint