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*Corresponding author

Song Guanyi, Hebei Province Seismology Bureau, Shijiazhuang, China

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Review Article

The Cause of the Constant Speed of Light and the Genetic Correlation Between Dark Matter and Dark Energy

Song Guanyi*

Hebei Province Seismology Bureau, Shijiazhuang, China

Abstract

The principle of the constant light speed was proposed by Einstein as a hypothesis in 1905. It is one of the cornerstones of the theory of special relativity. In the next 120 years, physicists have continuously discussed the reasons for the constant light speed, but their understanding of the causes of the constant light speed remains in Einstein's initial hypothesis stage. From 2017 to 2022, Chinese scholar Song Guanyi, according to the analysis of the cosmic microwave background radiation data found by American radio astronomers Arnold Penzias and Robert Wilson in 1964, realized that the cosmic microwave background radiation is that the early strong radiation light quantum during the long distance traveling constantly loses energy (redshift), and evolves into a microwave (wavelength from 0.3 ~ 75cm). The observations prove that the light quantum is not previously understood as an independent, indivisible particle entity, and it should be composed of two parts: matter and energy. Based on the change of the structure of light quantum, this paper interprets the following concepts of physics related to light quantum

a. The light quantum is composed of two parts: ground state matter (ground state photon) and energy (dynamic energy). When the ground state photon is excited by the dynamic energy, it turns into a light quantum. The light quantum is propagated in a continuous collision (elastic collision) manner between the light quantum and the ground state photon. The ground state photon is the medium particle of the light quantum propagation. A light quantum from any light source in the universe is new-born, and its propagation velocity (in a vacuum) has the same value C (whether it is emitted from a stationary or moving object).
b. Interpretation of wave-particle duality.
c. The existence state of ether (essentially the ground state photon) and its action.
d. The difference between light wave and electromagnetic wave.
e. The reason for the deviation when the starlight passes near the sun.
f. The cause of the redshift of the galaxy spectral lines observed from the earth.
g. The existence form and characteristics of dark matter (essentially ether).
h. The existence morphology and characteristics of dark energy (essentially it is the energy carried by the light quantum and formed after the ground state photon (dark matter) is excited by the limited (one share by one share) dynamic energy).

Preface

The theory of light speed invariance was proposed by A. Einstein in 1905. Einstein took this assumption as the cornerstone, and added the principle of relativity to establish the special theory of relativity. But until Einstein's death in 1955, he still had no explanation for the cause of the constant speed of light. At present, the scientific community has assumed that the theory of constant speed of light is a scientific fact proved by experiments, so it can be regarded as an axiom (similar to that in mathematics), and the axiom does not need to be proved.

In 2003, the Wilkinson Microwave Background Anisotropy Prober (WMAP) and Sloan Digital Sky Survey (SDSS) astronomical observations told us that only about 4% in the universe is ordinary matter, while the rest about 23% is dark matter and about 73% is dark energy. However, the basic theory of modern physics cannot explain and observe dark matter and dark energy, which are the biggest challenges facing physics in the 21st century. Physicists have been exploring dark matter and dark energy for 20 years, and opinions vary, but there are many speculation and assumptions, far from a basic explanation accepted by the scientific community.

As we all know, the light quantum is a kind of material with the huge inventory, the fastest propagation speed and the infinite lifetime in the universe. The universe is a universe full of the light quantum, which together with dark matter and dark energy occupies all the space of the universe (except ordinary matter). Based on this coexisting companion relationship, we can imagine that there may be exists a close genetic correlation among dark matter, dark energy and light quantum in the universe. Therefore, through the study of the composition structure and propagation mode of the light quantum, it is possible to provide some clues to the revelation of several important topics in modern physics, such as the existence forms of dark matter and dark energy.

The Process of Understanding the Light Quantum

a) In 1900, the German physicist M. K. E. L. Planck in the study of blackbody radiation found that the radiation energy absorbed or emitted by matter can only be an integer multiple of the fundamental amount h υ, where h is the Planck constant and υ is the frequency. Based on this discovery, he initially established the idea that photons have energy quantization, but he did not explicitly explain that the basic unit of energy $\varepsilon = h\nu$ is an entity.

b) From 1916 to 1917, in Einstein's papers on the quantum theory of radiation, he had further understanding of the light quantum. The previous light quantum, is the energy quantum of the light, $\varepsilon = h\nu$ is an energy unit. Whether it is a particle entity or not is conceptually ambiguous. So, Einstein proposed that the light quantum not only has energy, but also has momentum, that is, $P = h\nu / c$. Therefore, the light quantum is a particle entity with a certain energy and a certain amount of momentum.

c) In 1964, American radio astronomers A. A. Penzias and R. W. Wilson stumbled upon the cosmic microwave background radiation (his observations were published in 1965). Later, most physicists and astronomers agreed that this radiation was the light quantum of intense radiation in the early days of the universe and after constantly losing energy(redshift) during ultra-long distance, the light quantum evolves into a microwave (wavelength from 0.3-75cm). At that time, many astronomy researchers believed that this discovery was a very strong support for the big Bang theory, and it was another major astronomical discovery after E. Hubble discovered the redshift of the galaxy spectral line in 1929. So, Penzias won the Nobel Prize in Physics in 1978. Chinese scholar Song Guanyi believes that the discovery of cosmic background radiation has more important scientific value, namely it reveals that the energy carried by the light quantum during the long-distance transmission is constantly decreasing (galaxy redshift), indicating that a single light quantum is not an independent, indivisible particle entity, it may be composed of some matter and energy.

d) In 2017, in his article "Analysing (Optical pressure) Repulsive Interaction with Special Relativity", Song Guanyi proposed that a single light quantum is composed of two parts of a matter plus energy that we do not know at present, and the unknown matter is called the "ground state photon". The ground state photon is highly elastic material existing in the space and can penetrate into any matter, it is not charged, has a certain momentum, the movement speed is very low (far less than the speed of light), close to zero quality; extremely stable performance, long life; extremely small energy, weak radiation intensity, strong penetration extremely low absorption by matter; a medium particle that transmits energy (static and dynamic energy).The ground state photon can be understood as the body shell of a single light quantum losing almost its energy (with a mass approaching zero), filling all the space of the universe, and burying massive objects (stars and interstellar matter) in the "ocean" of ground state photons [1].

The Establishment Cornerstone of Special Relativity - Putting Forward the Supposition of Constant Speed of Light

In 1905, Einstein, in his paper about special theory of relativity "On the electrodynamics of motion bodies", proposed two basic principles, namely the principle of relativity and the principle of constant speed of light. Einstein stated the principle of relativity: "The laws of physics are the same in all inertial systems; so all inertial systems are equivalent, and there is no special absolute inertial system." The first statement of the principle of constant speed of light was:

"In the 'still' coordinate system any light moves at a certain speed v, regardless of whether the light is radiated by a still or a moving object." In modern textbooks, the principle of light speed is stated as: "In all inertial systems, the propagation rate of light in free space (vacuum) has the same value C."

The principle of constant light speed was proposed by Einstein as a hypothesis and it is the cornerstone of relativity.

As for why the speed of light is constant, during the lifetime after Einstein proposed, although after long-term careful thinking, but he has not explained the reason for its "constant". Modern physics has considered this assumption of the constant speed of light as an axiom, because it is a scientific fact proved by a large number of observational experiments.

Why Does the Propagation Speed of the Light Quantum Remain Constant?

Structural composition of the light quantum

According to the genetic analysis of the light quantum proposed by Song Guanyi [1], a single light quantum is not previously thought to be one of the most basic particles in the physical world, no longer having smaller constituent units. It is composed of two parts: a ground state photon and its energy. When the ground state photon is excited by external energy (the energy converted from any matter), the ground state photon is immediately in a state of high frequency vibration, and the ground state photon in a state of high frequency vibration is transformed into the light quantum. Since all the excitation energy (dynamic energy) received by the ground state photon is one by one, the energy expression of the light quantum can be written as $\varepsilon = h\upsilon$. The vibration frequency of a single light quantum is related to the energy carried by the ground state photon. Because the ground state photon has a certain mass, so the light quantum also has momentum, namely $p = h\nu / c$.

Movement mode of the light quantum

Planck believes that the light is wave. Not only the radiation is electromagnetic wave, but also everything is made up of vibrating waves. Einstein used Planck's wave equation $\varepsilon = h\nu$, but he believed that the light quantum is a kind of light quantum flow, a stream of particles. Wave and particle are two concepts incompatible with each other as water and fire. Using light as particles, it cannot explain its frequency, wavelength, interference and diffraction. In fact, Einstein's photoelectric effect explanation is that between the particle theory and the fluctuation theory, but it is by no means a simple particle theory explanation. Here Einstein used the frequency and wavelength to depict the real particles in his heart. Unfortunately, as is the case for later particle scientists, the superficial particle explanation is, in fact, the fluctuation explanation.

As for the nature of the light, we should not choose between the particle theory and the fluctuation theory, but should regard it as a description of the different aspects of the light quantum nature. Song Guanyi believes that in the material world, when the ground state photon is excited by external energy, that means, it is in the high frequency vibration state. At this time the ground state photon with high frequency vibration has been converted into the light quantum. The light quantum propagation is performed in the form of its collisions with the objectively existing ground state photons and during the process it transmits the energy (momentum) carried by itself to far away place. Based on the totally same basic physical properties of the two, the collision between them belongs to the most ideal elastic collision in the physical world. The ground state photon, collided by the light quantum, almost completely inherits the energy (momentum) carried by the excited ground state photon(light quantum),and at the same time the ground state photon (light quantum) in the high frequency oscillation state stops at a sudden end after completing the collision with the relatively static ground state photon and returns to the relatively static state (the existence condition of the ground state photon in space).

The light quantum transmits energy outward in the form of continuous collision. From the perspective of the whole observation process of a beam of the light quantum (the optical observations are all related to the mean value of the time, not to the instantaneous value),the light quantum of high frequency vibration appears as waves in the process of propagation; however, from any aspect of the propagation path (to the instantaneous value of time), it is manifested as a single particle [1]. This is the analysis of why the light has the nature of wave-particle duality, which the scientific community has been exploring since Einstein's time until the early 21st century.

Why does the propagation speed of the light quantum remain constant

According to the formation mechanism of the single light quantum and the propagation mode of the light quantum proposed by Song Guanyi, it is known that:

a) a single light quantum is the combination of a ground state photon and the energy. Its performance is different from the ground state photon and the energy quantum, but a new-born matter. When the ground state photon is excited by external energy (dynamic energy), the ground state photon is in a high frequency vibration state. At this time, the matter has been transformed into the light quantum, but it still appears in the vibration form of a single particle. So, from any section of the light quantum propagation path (to the instantaneous time), the light quantum are indeed the particles moving independently one by one

b) The light quantum propagation is achieved by its continuous collisions with the surrounding ground state photons. Because the position of light quantum in space are not fixed (vibration in a certain range of amplitude), the propagation trajectory of a bunch of light quantum is observed through the time axis (for the average value of time) as a wave

c) The light quantum initially emitted from any light source is newborn, and the propagation of the light quantum is realized by the continuous collision with the ground state photons; it is like a small newborn light source, and travels according to its inherent physical characteristics (the speed of light (a constant) = the product of wavelength and frequency). Therefore, under any physical conditions, the light quantum travels with the same velocity (in a vacuum) value C (whether it is emitted from a stationary or moving object).

Analysis of the Causes of the Constant Speed of Light and the Revelation of the Existence Form of Dark Matter and Dark Energy

The existence of ether and its role

The theory of light propagation medium has been debated in the development history of physics. According to the view of mechanical waves, wave propagation depends on medium, such as water waves depend on water, and sound waves depend on air and other substances. The sunlight shines on the earth surface and it needs more than 8 minutes of space travel. By what medium does it pass on? In the 17th century, the French philosopher, physicist and mathematician R. Descartes first used ether to represent the light medium. In ancient Greece, the ether was a kind of matter conceived by the ancient Greek philosopher Aristotle. It was a hypothetical matter in the early history of physics and it was a special matter distributed throughout the whole space and could penetrate into any matter. In 1818, when French physicist A. J. Fresnel established his theory of light fluctuations, he also developed the ether theory and proposed the concept of the elastic ether, which is also called the light ether. Because the light is transverse wave, this requires light medium must have good elasticity.

In 1892, Dutch physicist H. A. Lorentz argued that the ether, different from ordinary matter, is only uniformly distributed evenly in all the space of the universe, characterized by immobility; while ordinary matter is moving. The ether in a matter is no different from the ether in a vacuum. Material movement does not drive the ether to move. Matter is made up of molecules; material molecules contain electrons; an electron is very small with a steel ball of a certain mass; the electrons move at a certain inherent frequency under the binding force of the molecule to form the charged harmonic oscillators. The emission of matter is produced by charged harmonic oscillators and emits the electromagnetic wave with optical frequency. All optical phenomena, which can be explained by the ether elasticity theory of light, can also be explained by the electromagnetic theory of light; and some optical phenomena, which cannot be explained by the ether elasticity theory of light, can also be explained by the electromagnetic theory of light. By the beginning of the 20th century, that is 1905, Einstein boldly abandoned the ether theory. He believed that the constant speed of light and the undulatory property of light were the nature of light(He understood the wave granulation quadrilarity of light as follows: The light for its average value of time manifests itself as fluctuation, and for its instantaneous value of time manifests itself as particle property).The quote of the light ether will be considered redundant, and he created the special theory of relativity. Since then, people have accepted the concept that the electromagnetic field itself is a form of the existence of matter, and the field can spread in the vacuum in the form of waves. The narrow view that the fluctuation is only understood as the mechanical vibration of some medium material has been completely broken, and the "ether" has been abandoned by the mainstream physicists.

In 1920, Einstein gave a report on "Ether and Relativity" at Leidon University, trying to reconcile relativity and ether theory. He pointed out: "Although special relativity does not need the concept of the ether, it does not deny the ether. And according to general relativity, the space has physical properties, and in that sense the ether exists." He even said, "According to general relativity, the space without ether is unimaginable". According to the theory of light quantum structure proposed by Song Guanyi, light quanta are formed from ground state photons excited by external energy, that is to say, the energy of any matter in space is carried by the ground state photon (as the medium particle) and expressed in the form of the light quantum. Additionally, the propagation of the light quantum is carrid on in the form of elastic collisions between light quanta and surrounding ground state photons. Therefore, this theory can not only explain the wave of light as the horizontal wave without longitudinal waves (because the propagation of the light quantum is in the form of elastic collisions with the surrounding ground state photons, where every light quantum vibrates in its equilibrium position, and the direction of vibration is always perpendicular to the forward direction), but also it can satisfactorily explain the dispersion of light(Because when the light quantum is generated, it exhibits different vibrational frequencies related to the energy carried by the ground state photons). From this point of view, the fundamental reason, why the concept of elastic ether proposed by Fresnel was denied, is that he did not realize that the ether is the ground state photon, which is a component part forming of the light quantum and participates in the vibration of the light quantum. However,they (including Lorentz) thought that the ether in the vacuum was always stationary, and because there was no absolutely static ether, of course, there would be no earth motion relative to the ether. So, in the Michelson Morley experiment, no matter how the interferometer is rotated, there is no change in the interferometer. Therefore, the ground state photons can be regarded as the medium particles of the light quantum propagation, which can transfer the energy released by any object (celestial body) to all the space in the universe. Obviously, the ground state photon mentioned here is a substance- "ether" conceived by the ancient Greek philosopher Aristotle. Here, the "ether", which was previously denied, is resurrected, but at this time it is no longer the traditional sense of "ether".

The difference between light and electromagnetic wave

In 1886, German physicist H. R. Hertz discovered electromagnetic wave, and through a series of experiments on the electromagnetic wave he proved that the speed of electromagnetic wave is equal to the speed of light, and both the electromagnetic wave and the optical wave have reflection and refraction properties. He also discovered the phenomena of interference, diffraction and polarization of electromagnetic waves. In 1887 and 1888, Hertz published his experimental results, which fully confirmed the existence and the nature of electromagnetic waves, and he concluded that the light wave is a kind of electromagnetic wave.

Modern mainstream physicists admit that light is electromagnetic wave, and make it clear that the optical theory should be built on the basis of the electromagnetic theory. The reason is that all the phenomena, which can be explained by the light fluctuation theory (the theory was founded by Fresnel on the basis of the elastic ether), can also be explained by the later theory of electromagnetic waves. And some phenomena, which cannot be explained by the elastic ether view point, can be well solved by the electromagnetic field theory. Because the elastic ether theory of Fresnel cannot explain why the light wave is the transverse wave without the longitudinal wave; and because the visible light is only a very narrow frequency band of the electromagnetic wave, and according to Fresnel's elastic ether theory, there should be countless different ether densities for the different frequencies of all electromagnetic waves in the same medium, so the elastic ether theory cannot explain the problem of dispersion. The fluctuation theory of light proposed by Song Guanyi [1] can not only explain why the light wave is the horizontal wave without longitudinal waves, but also satisfactorily explain the dispersion of light, that is, all the phenomena, which can be explained by the electromagnetic wave theory, can also be explained by the fluctuation theory of light. Because of following facts: the fluctuation of the light quantum is caused by the high frequency vibration of the ground state photon excited by external energy, and the electromagnetic wave is generated by the high frequency vibration of electrons, and from the physical appearance of waves, the light quantum is similar to the electromagnetic wave, but their origin (cause of formation) is fundamentally different, therefore it is obviously inappropriate for modern physics to interpret the essence of light as electromagnetic waves.

The reason for the deviation of starlight passing by near the sun

Based on the huge amount of ground state photons (matter with nonzero stationary mass) in cosmic space, the distribution of ground state photons determines the gravitational field [2]. In interstellar space, the distribution of the ground state photons (ether) can be considered uniform, and because their average density is small, the gravitational field is weak, so the space is flat at large distances.

However, around a huge celestial body, a concentric layered structure centered on the celestial body can be formed. The closer to the center of the celestial body, the greater the ground state photon density in the concentric layered structure, and the gravitational field divided by the different distribution of the ground state photons according to their density is formed. So, when the light passes by near a big mass center (such as the sun), because the light quantum propagation proceeds by a continuous elastic collision form with the surrounding ground state photons, the propagation path of light quantum must bend at a certain angle to the center of the big mass (gravitational center).

There is a fundamental difference between the above reason analysis for the deviation of the starlight through the edge of the sun and the deviation analysis of Einstein's general theory of relativity. Einstein's general theory of relativity holds that any mass of objects will distort the surrounding space and time, and the bending of space and time is the result of this distortion. This bending is very weak around small mass objects, but it is obvious around massive objects, mainly manifested as the formation of space-time vortex or space-time trap in the surrounding. So, the celestial bodies close to each other will fall into the space-time trap. The phenomenon presented is the gravitation between each other.

The reason for the redshift of galaxy spectral lines observed from the earth

According to the theory of light quantum propagation mode proposed by Song Guanyi [1,2], when the ground state photon is excited by external energy (the moment at which the initial light quantum is formed), it transmits (radiates) energy through continuous collisions with the surrounding ground state photons. Although the collision between a light quantum with finite energy and a ground state photon is the most ideal elastic collision in the physical world, it is not a complete elastic collision. Each collision will lose a certain amount of energy (although the energy lost in each collision is minimal). However, the loss of energy after a long period (cosmic period) and ultra-long-distance (several billion light years) can be observed by spectral analysis. Since this kind of collision is not a complete elastic collision, the limited energy carried by the light quantum continues to decay with the increase of the transmission distance, the vibration frequency drops and the wavelength increases, causing the spectrum to move to the red end.

From this point of view, the redshift (cosmic redshift) of the galaxy spectrum observed in astronomical observation should be attributed to the energy loss caused by the continuous collisions between light quanta and ground state photons in the transmission path of the light quanta. Because the motion of any celestial body (star) in the universe belongs to the category of Newtonian mechanics (its velocity is far lower than the speed of light), the redshift of the galaxy spectrum observed on the earth cannot be explained by the recession velocity of celestial motion, nor can it be used as the basis of the Big Bang theory. The size of a galaxy redshift is not a tool to measure the expansion and movement velocity of celestial bodies, but a ruler to measure the distance between the celestial body and the earth.

The above understanding is fundamentally different from the understanding of the general relativity. According to the theory of general relativity, gravity is no longer an interaction force, but caused by the bending of space-time. In a stronger gravitational field, the clock becomes slower, or the frequency of radiation increases. Because the gravitational field on the earth's surface is weaker than that on the surface of the star, the frequency of the received starlight is reduced, and the corresponding wavelength becomes longer, and the spectrum of the starlight will appear gravitational redshift.

The properties and nature of dark matter

According to the analysis of section 4.1, it is known that the ground state photon is the medium particle of energy (dynamic energy) propagation, which is a kind of material ether) conceived by the ancient Greek philosopher Aristotle. The main properties of the ground state photons (ether) are shown as follows:

a) The ground state photon (ether) is the medium particle of energy (static energy and dynamic energy) propagation. It is a special matter distributed in the whole space and can penetrate into any matter. It is the "dark matter" that physicists and astronomers are looking for [2].

b) The mass of a single ground state photon is very small (close to zero). But, because the ground state photons are distributed in the whole universe space, the space occupied by them has a much larger proportion than the visible matter (according to the standard Model of the universe, the visible matter accounts for about 5% and the dark matter accounts for about 26.5%).

c) The mass of all ground state photons is the same. They do not combine with each other to form a composite structure. They do not collide or exchange energy with each other. And they do not collide or exchange energy with any normal matter particle. However, among them only gravity exists.

d) Gravitational action is expressed by the distribution state of the ground state photon (ether) density (because gravity is the expression of potential energy, which is a state quantity), forming the gravitational field with ground state photons as the medium particles. The distribution of ground state photons (ether) in space is originally uniform, but it is restricted by how much static energy existing inside the heavy object. Under the action of static energy (potential energy), the dark matter forms an orderly stereo concentric layered structure (gravitational field) in the space around the star according to the density [2].

e) The gravitational field is the natural property of mass when it is born, and in the condition where the mass of any object (or celestial body) remains constant, the gravitational field will always exist(For example, the earth's gravitational field was not acquired when it was formed 4.6 billion years ago, but during the "embryo" period, just a change in the strength of the gravitational field). Therefore, as long as there is an object (or celestial body) in the universe, there must be a gravitational field in its surrounding space. The gravitational interaction between two objects (celestial bodies) does not change from the early or late appearance of one of the objects (celestial bodies) in space. (For example, as long as a spacecraft flies into the gravitational field space near any celestial body, it will inevitably immediately accept the gravitational interaction of this celestial body). At the moment, the gravitational action of one object on another object depends only on the distance between two objects and their respective mass at the same time, regardless of time. Therefore, in Newton's theory of gravity, the gravitational interaction between two objects (celestial bodies) cannot be regarded as a so-called "super-distance interaction" between them.

f) The ground state photon (ether) does not have any effect on electromagnetic waves, radio waves, infrared rays, gamma rays and X-rays, that is,100 percent transparent to them. Therefore, the ground state photon (ether) is not known by the observation means held by modern people, so it is called "dark matter". However, when the ground state photon (ether) is excited by energy (dynamic energy), the ground state photon after obtaining the energy is in a state of vibration at high frequency, and at this time the ground state photon is converted into a part of visible matter (the light quantum) [3-9].

Dark energy action and dark energy field

The source and existence magnitude of dark energy in the universe

The source and expression pattern of dark energy

In 2022, Dr. Song Guanyi in his paper (Discussion on hot issues in physics such as gravitation, repulsion, dark matter and dark energy) pointed out that the dark energy existing in the universe mainly comes from the thermonuclear reaction in all stars, which releases energy (dynamic energy, $E=mc^2$. The energy is not directly spread outward, it must spread through some material (medium particles). This material is "dark matter", called "the ground state photon" [1]. The light quantum observed in the universe is the product of the combination of the ground state photon and the dynamic energy, that is, when the dark matter (the ground state photon) is excited by energy (dynamic energy), it is transformed into a new matter i.e the light quantum, that is, into a dominant matter. Therefore, on the surface, the light quantum is a dominant matter, and in the essence it is composed of dark matter and dark energy. The ground state matter part (the ground state photon) of the light quantum is the dark matter, and the energy part of the light quantum (dynamic energy) is the dark energy. When the dark matter (the ground state photon) is excited by the external dynamic energy and converted into the light quantum, the latter spreads outwards in the form of collision with the dark matter (the ground state photon). Based on the ground state photon (ether) existing in all spaces of the universe, this propagation mode can transport the energy generated by the thermonuclear reaction inside the star to every corner of space in the form of the light quantum. On the surface, the universe is a universe full of the light quantum, essentially it is a universe full of dark matter and dark energy.

The magnitude of the existence of dark energy in the universe

Astronomers have had different estimates of the number of stars in the universe. And one of the estimates is proposed by American astronomer Carl. E. Sagan. He suggests that there are 100 billion galaxies, with 100 billion stars each. And some scientists estimate that the total number of stars in the universe may be three times our current estimate, up to 1023 stars. That number is more than the total amount of sand grains in all the beaches and deserts on the earth. The sun is a very insignificant star in the Milky Way. The dynamic energy radiated by the sun into space is 3.75×1026J per second. Therefore, the dynamic energy released by all stars in the universe into space can reach the magnitude of 1.0×1049J per second. If the average life of all stars in the universe has reached 5 billion years, the dynamic energy in the space can accumulate to the order of 1.0×1066J. This kind of energy, whether the magnitude, the speed of transmission, the breadth of radiation range, or its long life, it occupies an absolute dominance in the evolution of space matter, and any other form of energy cannot be compared with it!

Characteristics of dark energy and dark energy field

a) The basic characteristics of dark energy are presented as the repulsion. The repulsion action is achieved in the form of the repulsion field. So the repulsion action can also be called the dark energy action. The repulsive field is a dynamic energy field, and it reflects the dynamic state of conversion of the internal mass of stars into energy (the energy released by the thermonuclear reaction). The dark energy action is to continuously transfer the energy generated by the internal thermonuclear reaction to the space through collisions between the light quantum and the ground state photon.

b) The dark energy (the energy carried by the light quantum) radiated by each star in the universe is like a continuous inflatable balloon, which causes the matter of the star in the space to expand (swell) in all directions, resulting in the expansion of the whole universe. The expansion of the universe is different from what we usually understand. It does not have a clear center, and all objects are moving away from one another, showing the isotropic property (negative pressure property in all directions).

c) There is no unified dark energy field in the universe and each star forms its own dark energy field. In 2015, Chinese scholar Song Guanyi discovered the existence of the independent stellar repulsive field (dark energy field), and he proposed a mathematical expression for the repulsion interaction (dark energy action):

d) $$F = (1+K)\frac{3JS}{4\pi R^3}$$

e) The law of repulsive action (dark energy action) is written as follows: The energy emitted by any star can produce the repulsion effect on any object (celestial object) in its stellar system, The magnitude of the repulsion is proportional to the product of the energy emitted by the star itself per second and the light surface area received by the radiated object, and it is inversely proportional to the cube of the distance between the star and the radiated object. J is the energy emitted by the star itself per second; S is the illumination surface area received by the radiated object; R is the distance between the star and the radiated object K is the average reflectivity of photons on the surface of the radiated object and is the circumference ratio.

f) The discovery of dark energy action and the proposal of its mathematical expression are landmark events in the history of modern physics. The reasons are as follows:

   i. The modern physics believes that all the natural forces in the material world can be attributed to four interactions, namely gravitational interaction; electromagnetic interaction; strong interaction and weak interaction. The repulsive interaction is fundamentally different from the above four interactions. It can be considered as the fifth natural force that exists in nature

   ii. The energy of the dark energy action mainly comes from the energy (dynamic energy) released by all stars into the universe due to thermonuclear reactions. If the average age of the stars in the universe is 5 billion years old, the dark energy stored in the entire universe has accumulated to the order of 1066J. Such an order of energy is absolutely dominant in the evolution of the universe

   iii. In 1998, astronomers captured the spectral lines of the Type 1a supernova when it burst. The analysis of redshift quantities reveals that the universe is expanding faster. The discovery overturns previous Big Bang theory that the universe is slowing down its expansion. And not only does it offer the existence evidence of dark energy action (repulsion action), but it also indicates that Einstein's gravitational field equation (general relativity) has limitations (it does not reflect the properties of the repulsive field).

g) The repulsion field is generated during the evolution of stars. The evolution of stars can be roughly divided into four stages (namely, protostellar stage; main sequence star stage; red giant stage and late extinction stage). During the protostellar stage, in the (macroscopic) fundamental relationship between matter in the inertial system exist only universal gravitation interaction and gravitational field, which is the only macroscopic force source of interstellar matter condensing into a massive, high density protostellar architecture. During the main sequence star stage, the repulsion action and repulsion field emerge due to the thermonuclear reaction of the part mass inside the star. The co-existence of repulsion action(dark energy action) and gravity action is the basic dynamic source feature of the star evolution in the main sequence star stage (which is the basic sign of the star evolution into the mature stage). The contradictory opposition and unity between the two dominate the evolution of matter (stars) in the whole star system during the main sequence star stage and the later red giant stage. During the stellar extinction stage, it is marked by the "flameout" of the thermonuclear reaction inside the star. Thereupon, the dark energy action and the dark energy field also disappear. The (macroscopic) fundamental relationship between matter (stars) in stellar systems retains only the gravitational action and the gravitational field.

Brief Introduction of Author

Song Guanyi, male, born in 1940, a researcher, graduated from the University of Science and Technology of China in 1964, mainly engaged in geodynamics and geophysics research.

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