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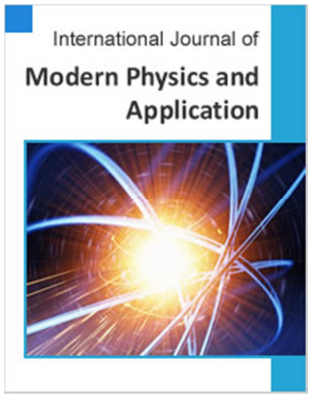

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A Scientific Explanation for the Expansion of the Universe as Well as Dark Matter and Dark Energy

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Abstract
Since American astronomer Hubble first discovered that the recessional velocity of a galaxy increases with its distance from the earth and proposed Hubble's law in 1929, the Big Bang model has become the accepted explanation for the origin of our universe, and the astrophysics community has believed that the universe is in a constant rate of expansion until Saul Permutter, Brian Paul Schmit and Adam Guy Riess discovered the accelerating expansion of the universe through observation of several dozen distant supernovas in 1998, who then won the Nobel Prize in Physics 2011. But human still can't completely explain the phenomenon that the universe is expanding at an ever-accelerating rate, therefore the author of this paper studied the origin and evolution of galaxies again, and revealed the structure of galaxy and the formation and evolution of binary systems, which can be used to explain the expansion of the Universe and the related concepts "dark matter" and "dark energy".

1. The Raising of Questions

In 1929, American astronomer Hubble through a space telescope first discovered the phenomenon that the distance between stars was increasing, and put forward the theory of the expansion of the universe [1, 2]. An incredible discovery of his observation is that almost all galaxies were flying away from the Milky Way, and that the velocity of recession was proportional to the distance from us: the further the galaxy from us, the faster it was receding. A galaxy about 1million light-years from Earth was receding from us at a velocity of 20km/s, while another galaxy about 2 million light-years from Earth was receding from us at a velocity of 50km/s. This discovery led directly to the birth of "The Big Bang Theory", which proposes that the universe was once extremely compact, dense, and hot. Some original event, a cosmic explosion called the big bang, occurred about 13.7 billion years ago, and the universe has since been expanding and cooling. Obviously, it hasn't given out the reasonable cause or result of the cosmic explosion. Since then, the astrophysics community has believed that the universe is in a constant rate of expansion until Saul Permutter, Brian Paul Schmit and Adam Guy Riess discovered the accelerating expansion of the universe through observation of several dozen distant supernovas in 1998, who then won the Nobel Prize in Physics 2011[3, 4, 5]. But they couldn't completely explain the phenomenon that the universe is expanding at an ever-accelerating rate. Fortunately, the author has propounded a new theory of galaxy structure [6, 7], which can be used to explain the formation and evolution of binary star systems and the expansion of the Universe as well as "dark matter" and "dark energy".

2. The Structure of Cosmic Galaxies and the Formation and Evolution of Binary Systems

2.1. The Structure of Galaxies

According to the Solar System's formation law described in some papers of the author [6, 7]: a fix star might have its own parent-star, and can produce several planets around it, and each planet can also produce several satellites around the planet; after a satellite grows into a planet, it can also produce its next generation of satellites. Hence, the basic structure of a galaxy is a hierarchical structure composed of many generations of stars, like a tree, and the entire universe contains many such galaxies, like an endless forest.

Milky Way galaxy is just a complicated hierarchical structure composed of multiple generations of stars, and the Solar system is only a branch of it. Observation also shows that Milky Way galaxy has a huge disk structure, consisting of the center of the Milky Way and at least two spiral arms, which are 4500 light years apart. Our sun is located at the Orion Arm of the Milky Way galaxy, 26,000 light years from the center of the Milky Way. Through a study of the Star cluster disk of the Milky Way, astronomer Maria Geman found that the star cluster in the inner part of Milky way is older, while the star cluster in the outer part is younger. Thus, it can be inferred that the formation of the Milky way started from the inner part, then gradually evolved into a Star cluster disk about 100,000 light years across. In the process of the Milky Way's growth, it has swallowed up a number of small galaxies, the celestial bodies from other galaxies had been merged into the interior of the Milky Way. So the sun is a fixed star generated from multiple generations of stars, Earth is a child-planet of the Sun, and the Moon is a last generation star. Similarly, the external galaxies observed by Hubble are also hierarchical structures, appearing long spiral arms.

2.2. The Formation and Evolution of Binary Star System

In a hierarchical galaxy, any star other than root-star was generated as a satellite of its parent star. These satellites unceasingly incorporated the nebula materials near the orbits to become larger and larger, and gradually moved away from its parent star under the impact of moving objects or the drag of the gravitational force of the parent star whose rotation was speeding up. Especially, when the parent star became a fixed star, these satellites would become planets, which would move away from their parent star under the radiation of the parent star and might also generate new satellites [6, 7]: Except some small planets (like Mercury and Venus of the Solar System) near the parent star, other larger planets have their own thick atmospheres. On the one hand, under the action of the gravitational force of the parent star, these planets unceasingly revolve around the parent star; on the other hand, under the radiation of the parent star, most of these planets rotates from west to east and gradually move away from the parent star. During the planets' revolution around the parent star, they unceasingly incorporate the nebula materials near the orbits to become larger and larger and may also generate new satellites. When a planet grows into a protostar much larger than Jupiter, the pressure and density of hydrogen in its center become great enough for it to begin thermonuclear fusion. When the planet has violent volcanic eruptions or collided with another giant celestial body, it initiates the thermonuclear fusion on the protostar to become an accompanying star aroud the parent star, forming a binary star system. If multiple planets have become accompanying stars around the parent star, they form a multiple star system.

In a binary star system, the parent star and its accompanying star system, including the planets and satellites decended from the accompanying star, share the resource of nearby cosmic space. But since the accompanying star system moves around the parent star, its scope of activity is much larger than that of its parent star; in addition, the planets and satellites orbiting around the accompanying star can absorb gas and dust from deep space and drop part of these gas and dust in the orbit of the accompanying star, so the accompanying star can more easily acquire the resource to burn than its parent star. Moreover, under the radiation of the accompanying star, many planets with dense atmosphere and even large satellites gradually move away from the accompanying star and enter the gravitational attraction range of its parent star, grabing the resources originally belonging to the parent star. Especially, if there are multiple accompanying star systems with many titanic planets moving near the parent star of these accompanying stars, they will grab an essential part of the resources needed by the parent star to maintain its thermonuclear fusion. When the resources needed for the combustion of the parent star is insufficient, the parent star will gradually stop its thermonuclear fusion and finally become a black dwarf, so there are usually only two layers of bright stars in a galaxy, and these bright stars are at bottom layers. The sun in the solar system is a single star at bottom layer. Stars observed from external galaxies are also usually single-stars or binary-stars at bottom layers.

2.3. A General Conclusion About Galaxy Structures

Since a galaxy cluster consists of many member galaxies, and all the spiral arms formed by these galaxies, led by a series of ancestors, move around the center of the super cluster, we can find the following law corresponding to Hubble's law:

Zhong's Law: The basic structure of a galaxy is a hierarchical structure composed of many generations of stars, like a tree, and the entire universe contains many such galaxies, like an endless forest. For the same hierarchy, the deeper the level of a star is, the greater the radius of the star rotating around the center of the galaxy is and the longer its drawing arc at the same time is, therefore the greater its linear speed is. For different hierarchical

structures, the more levels a structure has, the greater the radius of a deep level star rotating around the center of the galaxy is and the longer its drawing arc at the same time is, therefore the greater its linear speed is. Now the sun in the solar system is a single star at bottom layer. Stars observed from external galaxies are also usually single-stars or binary-stars at bottom layers.

3. The Essence of the Expansion of the Universe

Astronomers have discovered a by far the largest supercluster of galaxies —Laniakea supercluster, which consists of thousands of member galaxies including the Milky Way and other galaxies in the local group of galaxies as well as the nearby Virgo Cluster of galaxies, as is shown in Fig. 1, where green area is crowded with many galaxies marked by white points, white lines show how they center around the super-cluster, orange line marked the margin of Laniakea, and the blue point is the location of our earth. Thus we can see that the Milky way and the other galaxies of the local group have a common ancestor.

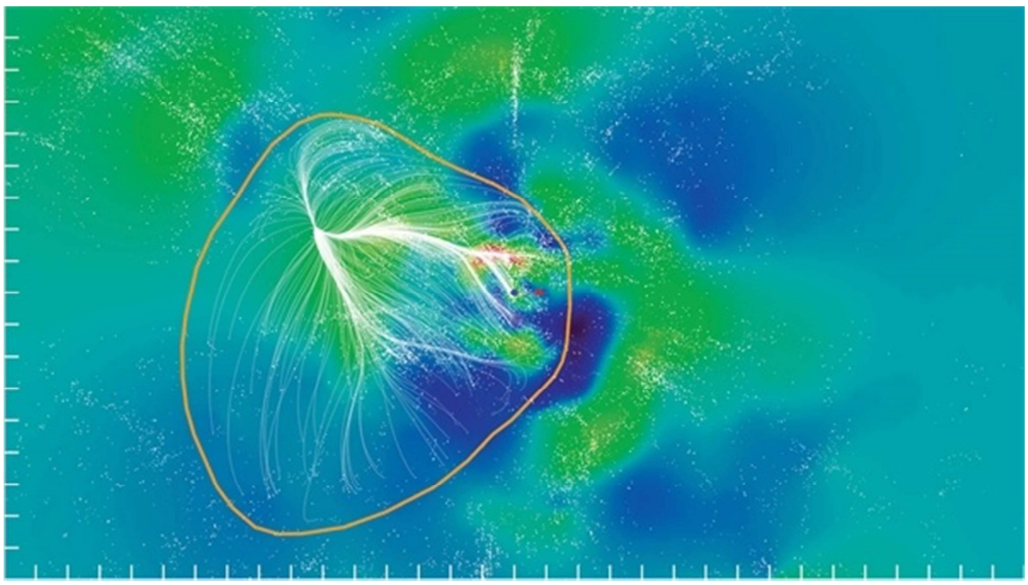

Fig. 1. *Laniakea supercluster including the Milky Way.*

Assuming that the earth is at layer n of the Galactic hierarchy, then an astronomer on the earth must avoid the shield of the Milky Way to observe an external galaxy, so the layer number of the external galaxy should be greater than n, and since the observed star is usually in the bottom layers, the level number of the observed star should also be greater than n. Hence, according to Zhong's law described above, the running velocity of the observed star is greater than Earth's velocity around the center of the Milky Way, so it seems that the observed star was receding from us at a positive velocity. For example, a galaxy about 1 million light-years from Earth was receding from us at a velocity of 20km/s. Furthermore, in order to avoid the shield of the Milky Way and the galaxy about 1 million light-years from Earth to observe an external galaxy 2.5 million light-years from Earth, the layer number of the external galaxy 2.5 million light-years from Earth should be greater than the layer number of the external galaxy 1 million light-years from Earth, so one could see on the earth that the galaxy about 2.5 million light-years from Earth was receding from us at a velocity of 50 (>20) km/s.

4. Dark Matter and Dark Energy

In the study of the movement of galaxies, some people observed that some stars of the inner and outer layers of a galaxy moved at a consistent pace around the center of the galaxy. Thus they image the exterior of the galaxy might be enveloped by a large amount of dark matter, which is the only way to ensure the stability of the galaxy. In addition, since Hubble discovered the expansion of the Universe in 1920s, people have always sought an invisible energy—dark energy, because they think only dark energy can stretch space structure and cause the expansion of the Universe. But scientists have not yet found the so-called dark matter, nor can they understand clearly the essence and function of darkmatter. So the "dark matter" and "dark energy" has become one of the greatest mysteries in the world of astronomy, cosmology and physics [8, 9, 10].

If the theory of galaxy formation and galaxy structure propounded by the author [6] is applied to figure out this mystery, it's easy to explain the expansion of the Universe and the related concepts "dark matter" and "dark energy":

(1) Satellites are generated by planets. The American Appollo spacecraft found that the surface of the moon covered with volcanic ash, but the moon is too small to produce violent volcanic eruption, so it's natural to conclude that the moon was formed by volcanic ash from earth. In fact, it is during some violent volcanic eruptions on the planet that the rudiment of a satellite was erupted into an orbit around the planet, it has

unceasingly incorporated the nebular materials near the orbits to become larger and larger, and gradually move away from the planet under the impact of moving objects or the drag of the gravitational force of the planet whose rotation was gradually speeding up. It is thus clear that the dark matter forming a satellite is volcanic projection from its parent-star or interstellar matter from other planets whose velocity is greater than the second cosmic velocity or the third cosmic velocity.

(2) During the normal rotation of a planet (such as Earth) around the parent-star (such as the Sun), the atmospheric pressure on the trailing hemisphere of the planet is higher than the other hemisphere, effectively increasing the planet's speed, thus making the planet gradually move away from the parent-star along a spiral line. This has been proved in some previous papers of the author. So the difference between the two hemispheres' atmospheric pressures is the dark energy driving the planet away from its parent-star.

(3) In the past, astronomers avoided the shield of the Milky Way to observe an external galaxy, and found some galaxies millions light-years from Earth were receding from us at a positive velocity. Thus, they concluded that dark energy is a form of energy filling space and accelerating the expansion of the Universe. In fact, it's wrong. Because the observers were shielded by the Milky Way, they could only observe some external galaxies having more layers than the sub galaxy which earth belongs to. Since the observed stars are in the bottom layers of these external galaxies, they have velocities greater than Earth's velocity around the center of the Milky Way, therefore they felt that the observed external galaxies were receding from Earth, and the farther the external galaxy was away from Earth, the faster it moved away from Earth. The reason for this phenomenon is that the observed external galaxy has more layers than the sub-galaxy in which our earth is located. It is the multilevel gravitational force existing in galaxy structure that makes the low-level planets in external galaxies have velocities greater than Earth's velocity around the center of the Milky Way. So the dark energy accelerating expansion of the universe is multilevel gravitation existing in galaxy structure.

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