

Research Article

On the Creation of Multiple Space Objects

Petro Olexiyovych Kondratenko* 

Department of General and Applied Physics, National Aviation University, Kyiv, Ukraine

Abstract

The work considers the processes of the birth of a planetary system, dwarf and neutron stars, as well as multiple stars of various natures, based on the Standard Model of the creation of the Universe, as well as the model of the Universe with minimal initial entropy (UMIE). It is shown that the Standard Model considers exclusively secondary processes of creating a planetary system, not considering the expansion of the Universe. Such an approach can be justified only in the case of the creation of a young planetary system. Considering the expansion of space to describe the Solar System led to the conclusion that the Standard Model cannot be used in this case. On the other hand, the use of the UMIE model made it possible to convincingly show that the nucleus of the Solar System arose shortly (from 0.025 to 17 million years) after the birth of the Universe, and the nucleus of the Sun arose immediately after the birth of the Universe. Its mass increased constantly from the first nucleons to the present state. The embryos of stars were immediately united into galaxies, and galaxies into clusters of galaxies. From the very beginning, the embryo of the future Sun had a relativistic rotation speed, which, as its mass increased, caused a disk-shaped shape. This state of the embryo ensured the creation of a planetary system in which there is a resonance between the orbits of the planets. Similar processes occurred among other stars. Depending on the structure of this embryo, stars with planetary systems or groups of dwarf stars are created. In this case, a dwarf star and a massive planet or a dwarf star and a neutron star may be made. If the embryo of the future star turns out to be asymmetric, then during its decay, two secondary embryos with different masses may be formed first, which at the same time can disintegrate into parts again. This is how multiple stars with various masses or dwarf stars with massive planets are created, as observed in the Galaxy. According to the laws of similarity, similar processes occur in the planets' embryos, which cause their satellites' appearance.

Keywords

UMIE Model, Star Formation, Processes of Planet Formation, Creation of Planetary Satellites, Star Explosions, Multiple Space Objects

1. Introduction

Thanks to the latest astronomical equipment, scientists have found many interesting objects in our galaxy and distant space in recent years. Each time, they compare the results obtained with the predictions of the Standard Model of the creation of the Universe, which requires that the Universe was born during the Big Bang from a singularity. This singularity

is characterized by hot temperature and high entropy, which prevents the grouping of matter into stars and galaxies. However, the Standard Model predicts the creation of galaxies and stars after a time of ~1 billion years after the Big Bang.

On the other hand, astronomical objects whose existence is not consistent with the Standard Model are often discovered.

*Corresponding author: pkondrat@ukr.net (Petro Olexiyovych Kondratenko)

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Such objects include galaxies and massive black holes, which exist only 280-400 million years after the Big Bang [1, 2].

However, the Standard Model is created solely in the fantasies of specialists without proper justification. Initially, the model claimed that only hydrogen atoms were born, and helium atoms were made in the depths of stars billions of years later. However, calculations showed that this approach does not correspond to the available number of helium atoms in the Universe. Then the model was changed to create the required number of helium atoms during the Big Bang.

It is easy to show that in this case, protons did not have the opportunity to combine into a helium nucleus. The reason is the powerful deformation of space ($\Delta R_U/R_U$) immediately after the Big Bang. In particular, this deformation would not allow the processes of creating small black holes or massive stars to occur in the dense plasma. However, such a mechanism is imposed in the scientific literature. Such ideas are expressed to understand the appearance of galaxies and massive black holes after a relatively short period of time after the Big Bang [1, 2].

This article will consider planetary systems and multiple space objects, particularly double dwarf stars, dwarf stars with massive planets or neutron stars, and massive planets in systems with ordinary and dwarf stars.

For example, the authors of the article [3] discovered the star LHS 3154, whose mass is nine times less than the mass of the Sun. At a small distance around it revolves a planet with a mass that exceeds the mass of the Earth by 13.2 times. The exoplanet's period of rotation is only 3.7 Earth days.

With understanding the processes of evolution of the Universe, such a situation cannot adequately explain the processes of creation of planetary systems or multiple stars that occurred shortly after the Big Bang. In this regard, there was a need to replace the model of the creation of the Universe, which would not violate the laws of physics and correspond to the results of astronomical observations.

2. Creating Stars and Planets in the Standard Model

The standard model states that matter remained in a dense plasma state after the Big Bang for 500 million years, from which light could not escape, and the first stars should have formed only after 1-1.5 billion years. In this case, astronomers assume that massive stars and black holes are formed directly in this dense plasma. Moreover, giant stars have time to explode as novae, creating heavy chemical elements.

It is easy to understand that such a process is impossible, since the Standard Model requires that the initial temperature of the Universe be close to $\sim 10^{28}$ K [4], and that the entropy reaches a value of 10^{88} J/K [5] and continues to increase as the Universe expands. In such a situation, the condensation of hot plasma into a star or a black hole is impossible. As a detailed

consideration of the mechanism of star explosions shows, creating heavier atoms than iron atoms are also impossible.

The Standard Model requires that stars and planets around them form due to gravitational compression of a large cloud containing mainly hydrogen and helium atoms. Thus, a star is created in the center of this cloud with a disk of gas rotating around it. Then, massive objects are made on that disk, and the merger initiates the formation of planets. In such a model, it is difficult to understand how giant planets can form around a star with a low mass. The authors of the paper [3] had to assume that the bulk of the protoplanetary disk did not condense into a star but was used to create planets. But in this case, the creation of a protoplanetary disk is unlikely.

The creation of the Solar System according to the Standard Model's requirements also occurred due to the gravitational compression of a large cloud about 6.5 billion years ago. In this case, the expansion of space was not taken into account. Taking into account the expansion of space with the constant mass of the Sun and the Earth, it was shown that in this case, the speed of the Earth's distance from the Sun exceeds the speed of the expansion of space within the Earth's orbit by a factor of 2 [6]. In other words, the Earth separated from the Sun 6.9 billion years ago with an initial orbital velocity of 435 km/s. Such an initial velocity of the Earth is impossible. Therefore, there must be another mechanism for creating a planetary system, especially since there are also planetary systems around other stars in the Galaxy. New astronomical discoveries clearly emphasize that it is necessary to abandon the Standard Model, which, from the very beginning, contradicts the laws of physics. In particular, thanks to the constant mass of the Universe in this model, the Universe must be inside a black hole from the moment of its creation [7, 8]. In addition, as noted above, being hot, such matter cannot condense into stars or galaxies. However, the Standard Model claims that fluctuations in matter after the cooling of the plasma led to the creation of galaxy nuclei, within which the condensation of matter led to the creation of stars and planetary systems. Since supporters of the Standard Model cannot find a convincing mechanism for creating galaxies and stars shortly after the Big Bang, they have focused on secondary processes for making stars and planets from large molecular clouds in the Universe today.

To solve all the problems that have arisen when using the Standard Model, which have accumulated in recent years, let us consider the processes of star and planet formation using the UMIE model [7, 8], which the author of this article is developing.

3. Creating Stars and Planets in the UMIE Model

In the article [8], based on the Law of Similarity and the Law of Unity, the author proposed a model of the UMIE, that is, the process of the emergence of our Universe. According to

this model, our Universe is a component of the Super-Universe. In turn, the Super-Universe is represented by a layered space [9], and the neighboring layers differ in the space dimension by one unit. Each of these spaces is a brane of space with a one-unit larger dimension. The radius of each brane expands over time at the speed of light. The three-dimensional space familiar to us (World-4) borders on the two-dimensional space (World-3) of quarks. Similarly, the two-dimensional space borders on the one-dimensional space (World-2) of dyons (Planck particles). Finally, the one-dimensional space borders on the zero-dimensional space (World-1). In this case, World-1 is represented by a 12-dimensional fundamental sphere, where all dimensions are folded into rings of fundamental radius. These 12 dimensions are the sum of all dimensions of the other three Worlds. The filling of the stratified space with energy begins with World-1. Through it, time and the Scalar Field (SF) enter the Super-Universe, which carries with it energy and the program for the creation of the specified Worlds, that is, it is the carrier of the fundamental code [10]. It fills the spaces of higher dimensions, each in turn. The last one begins to be filled with World-4. The initial filling time with energy of our four-dimensional Universe (World-4) equals $T_{U_0} = 3 \cdot 10^{-5}$ s after the appearance of energy in World-1. At the same time, the SF energy entering World-4 can create bineutrons in a singlet state (all quantum numbers except mass are zero) in the vicinity of nucleons or atomic nuclei.

Unlike the Standard Model of the birth of the Universe [5] from a singularity with a high density of matter and hot temperature, and therefore high entropy, this model of the birth of the Universe provides the minimum possible amount of entropy, a cold initial state, and zero density of matter.

In the proposed model, the SF is able to interact with other spaces and set the program for the evolution of the Universe. According to this program, when matter is born in World-4, it has a fractal structure and a large rotational moment of each element of the fractal. In this case, the embryos of stars are combined into the embryos of galaxies, which in turn are combined into the embryos of galaxy clusters.

Based on this, let us consider the birth of planetary systems and multiple stars from the primary fractal to the state that we observe at present.

Let us assume that the born neutron matter in the volume of each star embryo in World-4 had a density of 10^{17} kg/m³, that is, the density of nuclear matter. After 1 second, the average density value dropped to $8.74 \cdot 10^7$ kg/m³. At the same time, the average volume of one future star will increase from $1.454 \cdot 10^{-9}$ m³ = 1.454 mm³ at the maximum of its density to $5.38 \cdot 10^4$ m³.

Within the embryo of the future star, the forces of strong interaction initially prevailed. Then, electrons and protons were born in structuring matter and the course of weak interaction reactions, and the forces of electromagnetic interaction appeared. In addition, a significant excess of neutrons within individual atomic nuclei will lead to the release of

individual neutrons through their surface or will cause the reaction of splitting atomic nuclei into separate fragments, the size of which will eventually decrease to create nuclei containing from 1 to ≥ 92 protons. As a result, a lot of thermal energy will be released, and the stars will heat up. Gravitational interaction becomes dominant as the star's mass increases, and space expands.

Now, let us consider that the fractal structure of the Universe includes a significant rotational moment for each element of the fractal and each future star. The rotation of the future star with an increase in mass will lead to its deformation, as a result of which it will acquire a disk shape. This shape resembles a miniature galaxy. Over time, the mass of the stars will grow so much that gravity will provide its almost spherical shape. However, the peripheral part of the disk-shaped star in the period from 0.025 to 17 million years will receive a significant rotational moment. It will remain outside the star, ensuring the formation of future planets [6]. At this stage of planet creation, resonance appears between individual orbits of planets. After the Oort and Kuiper belts were created, Neptune was the first planet created. At a certain distance from it to the Sun, a resonant interaction occurs, resulting in a lump of matter appearing on the Sun's surface, the separation of which from the Sun causes the appearance of the planet Uranus. Over time, the mass of the Sun and its radius increase. When resonance occurs between Uranus and the volume of the Sun, the planet Saturn is formed. At the same time, the mass of each new planet increases at its birth until the massive nucleus of Jupiter is born. This massiveness causes the ejection of a large amount of matter from the Sun, which forms the asteroid belt. This belt, having a non-uniform distribution of the mass of matter, enters into resonance with the volume of the Sun, causing the birth of Mars. Then, due to the interaction of Mars with the volume of the Sun, the Earth is formed with an increased initial mass. The process continues until the birth of Mercury, after which the Sun loses the disk-shaped component of its shape, and the birth of planets stops.

The orbits of these planets must lie in the star's equatorial plane. Moreover, the star and the planets in their orbits must rotate in the same direction. In this case, the axes of rotation of the planets can have an arbitrary direction (chaos), and the angular velocities of their rotation must differ significantly due to the turbulent processes of division of islands of matter, which we observe in the example of the planets of the Solar System.

What do we have? All the large planets—Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune—revolve around the Sun in the same direction (in the direction of the Sun's axial rotation), in almost circular orbits.

Based on the Law of Similarity, it is easy to understand that the hot embryos of planets born at a sufficiently high rotation speed will be able to generate light satellites that will revolve around these planets. Thus, many satellites were born near massive distant planets. Thus, the Moon was born and re-

volves around the Earth [11]. Other terrestrial planets had insufficient conditions for the creation of satellites. In this regard, it is essential to note that the satellites born in this way must differ in the chemical composition of their substance. In addition, if the born satellite had a sufficiently high rotation speed around its axis, its shape must be close to spherical. When the angular velocity of rotation of the satellite around its axis and the planet is the same, the satellite's center of mass must be closer to the Earth due to the action of tidal forces. In this case, the shape of the satellite must be elliptical. This is seen in the example of Saturn's satellites, particularly Mephon. The Moon should have a similar shape. However, in this case, the ellipticity should be small, since the mass of the Earth is 95 times less than the mass of Saturn.

The mechanism of the birth of a planetary system described here showed that heavy atoms were born with excellent efficiency first in the evolution of the Universe. The simultaneous processes of the birth of matter and radioactive decay lead to the presence of a dynamic equilibrium, as a result of which the planet Earth and other planets similar to it have a high content of heavy nuclei beyond the limits of stability (more massive than lead nuclei). And since there are uranium deposits, they must also contain plutonium additives, which take place on Earth (^{239}Pu with a half-life of 24100 years and ^{244}Pu with a half-life of 80 million years have been discovered). Radioactive processes in the volume of the planet heat its substance.

It follows that not only planets, but also *the inner regions of stars consist mainly of heavy nuclei of chemical elements*. These regions provide the energy supply and the constancy of the radiative capacity of stars that do not belong to the class of thermonuclear stars. Such stars include the Sun and other stars whose radiative characteristics are described by the experimentally found "mass-luminosity" law [12]. Only in this way can the enormous radiative capacity of cold giant stars (Be-

telgeuse, ϵ Aurigae, etc.) be understood.

4. Hierarchical Structure of the Universe

Let us pay attention to one crucial fact. The analysis shows that only large systems organized according to the hierarchical principle can be stable. All other systems in the process of evolution must cease to exist due to their instability [13]. Therefore, the result of the evolution of any natural extensive system is the formation of its hierarchical structure [13, 14].

It was further found that each structure corresponds to a separate physical interaction. However, an arbitrary hierarchical system must have 7 levels [13-15]. Such is the hierarchical structure of our Universe (Table 1).

From Table 1, it follows that in addition to the known interactions, there must be other interactions that manifest themselves on large scales [13, 14]. At the same time, in [13, 14], seven principles are described by which hierarchical structures are described. The first principle is the Law of Unity within the elements of the hierarchical level (HL).

The interaction for a separate HL element provides temporal unity, and for all other aspects of the same HL, interaction between them. Temporal unity means that within the time $\Delta t = h/mc^2$ the unity signal will cover the characteristic (smallest) HL element. This fact causes different properties of gravitational fields in different HLs.

Experience shows that the transformation of a star into a black hole does not lead to the disappearance of the gravitational attraction of stars to the black hole. It exists and ensures the capture of matter from a nearby space by the black hole, including stars and other black holes that have come close enough to the black hole.

Table 1. Hierarchical structure of the Universe.

HL	Substance	Interaction	Process
1	Elementary particles	Weak	Particle decay to form leptons and leptons scattering on baryons
2	Atomic nuclei	Strong	Interaction between baryons
3	Atoms, molecules, molecular systems, plasma	Electromagnetic	Interaction between electrically charged particles
4	Planetary systems	Gravitational I	Interaction between gravitating bodies within a planetary system
5	Star systems	Gravitational II	Interaction between stars within a galaxy
6	Galaxy clusters	Gravitational III	Interaction between galaxies in galaxy clusters (cellular structure of the Universe)
7	Metagalaxy	Gravitational IV	Interaction between galaxy clusters
8	God system		

We have already discussed similar phenomena in the article [16], where it was shown that galactic arms could be formed only by the merger of black holes. In this case, a multidimensional SF could only provide the exit of matter beyond the boundaries of black holes [17].

Thus, only the SF and gravitational waves generated by the SF can go beyond the boundaries of a black hole, demonstrating their multidimensionality.

Using its multidimensionality and the presence of information interaction between the layers of stratified space provided by the SF, which occurs through a delocalized point, the SF “knows” the coordinates of all masses in the Universe [17]. Therefore, it can always organize the interaction between massive bodies (planets, stars) or massive systems of bodies (galaxies, clusters of galaxies).

The multidimensionality of the SF and gravitational waves will be responsible for the extremely weak gravitational interaction between bodies. The author of the article considers gravitational interaction, taking into account the hierarchical structure of the Universe [18].

Such a mechanism of the evolution of the Universe will lead to the birth of heavy atomic nuclei in the first moments after its creation, as well as in all subsequent periods. There was no Big Bang in the usual sense. There is an expansion of a closed space. This space is filled with matter that is born in it.

In ordinary stars, the contribution of thermonuclear reactions to the transformation of light nuclei into heavier ones is insignificant. In particular, in the center of the Sun, the temperature reaches $15 \cdot 10^6$ K, which could be sufficient for the thermonuclear fusion of helium nuclei to occur. However, the center of the Sun is filled with heavy atomic nuclei, not protons, which makes it impossible for thermonuclear fusion reactions to occur. Moreover, *in thermonuclear stars, this process is not decisive.*

5. The Birth of Multiple Stars

Above, we considered an almost ideal case where it has a disk-like shape despite the nuclear transformation reactions taking place in the star's nucleus. In an arbitrary case, the shape of the star's nucleus can have any shape. In any case, at this stage, when gravitational compression of substances into the star is turned on, the possibility arises of the decay of the original nucleus with the formation of not one, but two secondary stars, each of which, under certain conditions, can divide into two parts. The created star pairs' rotation periods can range from tens of minutes to thousands of years. However, the most interesting case is when the rotation period is only 11 minutes. In this case, a white dwarf moves around a 19-kilometer neutron star with a mass corresponding to the mass of the Sun at a speed of 1200 km/s [19]. The distance between the stars in this pair is 126,000 km, 3 times less than the distance between the Earth and the Moon. This fact makes us wonder about the formation mechanism of such a pair of stars.

The generally accepted mechanism of neutron star for-

mation by supernova explosions cannot explain the existence of this close pair of stars, since the radius of the large star before its explosion significantly exceeds 126,000 km. For comparison, the radius of the Sun (an ordinary star) is $\approx 696,340$ km.

The UMIE model allows us to describe the processes of creating close pairs of stars. According to this model, the mass of the primary star nucleus is constantly increasing. At the same time, the pressure and temperature in the center of the star increase. Due to the hot temperature, all atoms are ionized, that is, the volume of the star consists of plasma. Since the angular momentum of the nucleus is significant, an increase in its mass and size leads to an increase in the angular momentum. Suppose the shape of the flattened nucleus of the primary star is close to elliptical. In that case, this makes it possible to create two centers within the nucleus, as a result of which the primary star divides into two secondary ones with masses that do not differ much. The mass of each secondary star continues to increase. The mutual influence between the secondary stars ensures an increase in the average density of these stars. This leads to the fact that the distribution of electrons by energy no longer obeys Maxwell's statistics in the center of the secondary stars. The state of the electrons becomes degenerate. This stable state ensures an increase in the density of matter.

So, at this stage, ordinary young stars turn into dwarfs.

Further increase in the mass of a larger star causes such a level of compression of the central regions that the energy of electrons at the Fermi level becomes so great that the energetically favorable reaction is the fusion of electrons and protons into neutrons. This state is characterized by a significant decrease in volume and an increase in density in the star's center. In turn, the reduction in volume will cause the centripetal movement of the surrounding regions of the neutron nucleus of the star and their transformation into neutron matter. This process is violent. In this case, the law of conservation of energy is fulfilled, that is, kinetic and potential energy simultaneously increase in equal amounts.

Now, let us take into account the requirements of the virial theorem. For the case of gravitational interaction, the contribution of kinetic energy is 2 times smaller than the contribution of potential energy in full accordance with the virial theorem. The transition of the plasma volume from the state of free charges to the degenerate state is accompanied by a gradual decrease in the volume of matter. Therefore, this process is not instantaneous, which allows excess kinetic energy to escape beyond the dwarf in the form of intense radiation. When the dwarf is formed, the radiation intensity should decrease. This will continue until its mass increases sufficiently to create conditions in the star's central region for the combination of an electron with a proton into a neutron. This process is accompanied by a significant decrease in the volume, which causes a violent reaction; as a result, the kinetic energy front will move in the radial direction, increasing its magnitude. When this value exceeds the potential energy of the star's near-surface layers, these hot layers are thrown

out of the star in an explosion that we can record as a supernova. This creates a close pair of stars, one of which is a dwarf, and the other is a neutron star. As the mass of the stars increases, in the future, in such a pair, the neutron star will turn into a black hole, and the dwarf star into a neutron star.

Of course, similar processes occur in isolated stars when they reach a sufficiently large mass. However, supernova explosions in the two types of stars under consideration should differ.

If we deal with an asymmetric disk, it can split into two secondary nuclei with different masses at a particular stage of the increase in the star's mass. Thus, a specific type of multiple objects from two elements can be created: two dwarf stars, a dwarf star and a massive planet, a dwarf star and a future neutron star, etc. If the larger fragment can split into two-star nuclei, then a multiple object from three dwarf stars is created, the α -Centauri object.

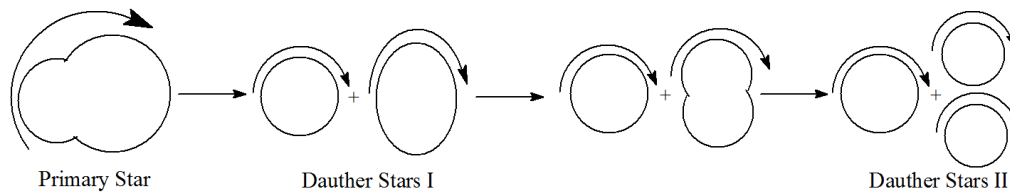


Figure 1. The creation of a triple star from an initial embryo.

To confirm this scheme of creating a triple star system, we present the result of observing a triple system (Figure 2), published in [20].

The probability of this type of development in the evolution of star formation is quite high since binary stars are quite often observed in the Milky Way galaxy. What is very important is that the vast majority of multiple stars are dwarf stars.

Triple stars are found much (approximately 20 times) less often. As a rule, they consist of a close binary star (main pair) and its distant companion, which revolves around the main pair, as around a single body. An example of a triple star is our nearest neighbor - Alpha Centauri: the distant star Proxima Centauri revolves around the two-component Alpha Centauri (Alpha Centauri A and Alpha Centauri B). Only with such a structure is a stable system of three stars.

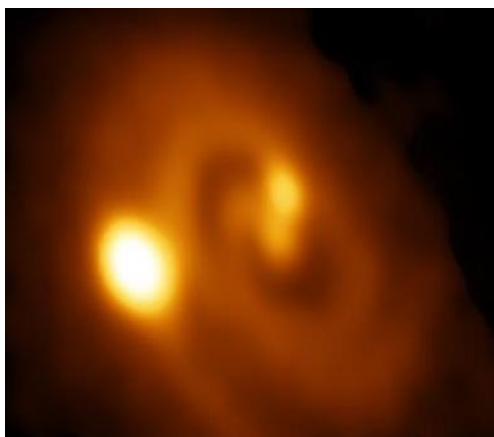


Figure 2. The triple protostar system L1448IRS3B, located 750 light-years from Earth, is in the initial stages of star formation. In addition to the stars, there is a disk of dust and molecular gas with a spiral structure surrounding the system of three protostars [20].

For the system's stability, Quadruple stars should be two

close pairs of stars separated by large distances, which exceed the distance between the pair of stars by at least 5 times. Such stars are created because the initial star embryo can divide into two secondary embryos with almost the same masses, and both secondary embryos can split into two parts. Five- and six-fold stars have also been found, in which the third pair of stars or a separate star revolves around two double stars. Such stars are formed because the three stars created by the mechanism shown in Figure 1 can be divided again into 5 or 6 components. It is noted in the book [21] that when the multiplicity of stars decreases by one, the number of systems increases by approximately 4 times. At the same time, binary systems make up approximately 75% of all multiple systems, triples - slightly less than 20%, four-star systems - approximately 5%, five-star systems - 1.2%, six-star systems - 0.3%.

6. Conclusions

The paper considers the birth of dwarf and neutron stars, planetary systems, pairs of dwarf stars, a dwarf star and a massive planet, a dwarf star and a neutron star, and other multiple stars based on the UMIE model. The following is shown.

The embryo of a future star is an element of a fractal rotating with relativistic speed. It acquires a disk-like shape as the mass and size of this element increase. There comes a moment when the peripheral regions of the disk, which have a chaotic structure, break away from the disk, carrying a significant part of the system's angular momentum. This is how the Oort and Kuiper belts are created.

The heterogeneity in mass distribution in the Kuiper belt forms the future planet Neptune at the edge of the star's disk. As a result of the resonant interaction between the volume of the Sun and the born planet, the embryo of the next planet is created. The embryos of planets torn from the solar disk form a planetary system.

If the shape of the future star turns out to be elongated, its rupture forms dwarf stars with similar masses or masses that

differ significantly. In this case, a dwarf star and a massive planet or a dwarf star and a neutron star can be created. In turn, secondary star embryos can rupture again into two daughter stars. This is how multiple stars are made.

Planetary embryos that have broken away from the solar disk can also create relatively light satellites. This is how the Moon was created around the Earth, as well as satellites around gas planets.

Abbreviations

The UMIE Model	The Model of the Universe Creation with Minimum Initial Entropy
World-1	Zero-Dimensional Space
World-2	One-Dimensional Space
World-3	Two-Dimensional Space
World-4	Three-Dimensional Space
SF	Scalar Field
HL	The Hierarchical Level

Author Contributions

Petro Olexiyovych Kondratenko is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The author declares no conflicts of interest.

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