International Journal of Advanced Research in Physical Science (IJARPS)
Volume 4, Issue 8, 2017, PP 4-13
ISSN No. (Online) 2349-7882
www.arcjournals.org

Origin of a Planetary System in the Model of Universe with Minimum Initial Entropy

Petro O. Kondratenko

NationalAviationUniversity, Kyiv, Ukraine

Corresponding Author:** ***Petro O. Kondratenko, *NationalAviationUniversity, Kyiv, Ukraine*

Abstract: *Article is based on the model of birth of the Universe with minimum initial entropy that was developed by the author earlier and describes mechanism of star and planetary system birth. It is taken into account that the Universe that was born during Big Bang had a fractal structure and a limited amount of matter density. Created fractals were rotated with relativistic velocities. The new substance was joined into the Universe at a constant speed in the bineutrons form, which were created directly by Scalar Field. These bineutrons are created in the vicinity of atomic nuclei. Primary matter of the Universe consisted of such nuclei. With the expansion of the Universe localization region of star and planetary system was also expanding. Total angular momentum of the star and planetary system was also increased. Herewith a star has passed the phase when it had disk shape and its periphery was separated from the main mass of the star, forming the future of the planet. With a certain probability the primary star was divided into two or morestars. Resonant interactions between the orbits of the planets have led to natural arrangement of the planets in the equatorial plane of the star. It was shown that in the early stages of evolution of the Universe with high efficiency, it was heavy atoms that were born first. This explains the presence of unstable atomic nuclei in the world with a mass greater than Pb. It was concluded that heavy atoms form the basis of the central regions of stars and planets.*

Keywords: *Model of the Universe birth, fractal structure of the substance, Scalar Field, bineutrons, formation of a planetary system, formation of double stars, formation of heavy atoms.*

1. INTRODUCTION

In Ref. [1] the author had proposed a model of the origin of our Universe with a minimum initial entropy using the Laws of similarity and unity. According to this model, our Universe is the part of a Super-Universe. In its turn, a Super-Universeis presented by a fiber space, and adjacent layers differ by a dimension of space per unit. All layers of a fiber space expand over time with the speed of light. The usual three-dimensional space (four-dimensional (3 + 1) Universe)) is adjacent to the two-dimensional space (World 3) of quarks. Similarly, the two-dimensional space borders with a one-dimensional space (World 2) of diones. Finally, the one-dimensional space borders with a zero-dimensional space (the World-1) of a Scalar Field-time. Between the adjacent spaces there exists an information interaction through a single delocalized point. Filling of the fiber bundle by an energy starts with a World-1. Then the spaces of higher dimensions are filled, each in turn. The initial time of filling of our four-dimensional Universe (World-4) by an energy is $T_{Uo} = 3{\cdot}10^{-5}$ secafter appearance of an energy in the World 1. The energy entered the World-4 has an ability to create bineutrons (charges and magnetic moment are equal to zero) in the vicinity of the atomic nuclei.

It is known that the ground state of bineutron is the triplet state with the bond energy of about 0.5 MeV. The bond energy in the singlet state is reduced to a value of ≈70 keV [3]. However the bineutron instability is connected with the weak interaction processes. It is known that the half-life of a free neutron is 881 sec [4]. The presence of the additional neutron causes the weak interaction activation and results in a significant reduction of the neutron half-life as in the bineutron composition as in a composition of the β-active nucleus [5,6]. However, the half-life of bineutron is significantly higher than the corresponding time for a pion, which is responsible for the strong interaction.

In contrast to the Standard model of origin of Universe [3-7] from singularity with infinitely large density of matter and infinitely high temperature, and therefore infinitely large entropy, the model proposed of origin of the Universe provides the lowest possible value of entropy, the cold initial state and the limited density of a matter.

In the proposed model a zero-dimensional space of Field-time could interact with other spaces and determine a program of evolution of the Universe. According to this program, at creation of a matter in the World-4 it has a fractal structure and the large torque of each fractal element. Starting with these ideas, we will consider the origin of a planetary system from a primary fractal to the state, we are observing at the present moment.

2. THE ORIGIN OF A PLANETARY SYSTEM

Let's suppose that the born neutron matter[1] in the World-4 had a fractal structure and density of the order of 10^{17} kg/m^3, i.e. the density of a nuclear matter. After 1 second, the average value of the density dropped to $8.74 \cdot 10^7$ kg/m^3. The volume of a future star during one second increased from $1.454 \cdot 10^{-9}$m^3 = 1.454 mm^{3}to $5.38 \cdot 10^4$m^3. Note that this volume includes as the volume of the star, and the volume of the space between the stars. This space is formed from the beginning, providing fractal features of a matter in the World-4. A primary nucleus of a future star resembles a microscopic neutron star.

Within the nucleus of a future star the strong interaction forces were initially superior. Then the electromagnetic interaction forces emerged in the process of structuring a matter and running the weak interaction reactions. With further increasing the star's mass and expansion of space the gravitational interaction becomes the dominant one. These forces slowed an expansion of a star and, as an consequence, resulted in the formation of large volumes of space (vacuum) between the stars. There were existed the gaps between the embryos of stars in the initial structure of the Universe that provided a possibility of their rotation around their center of mass, as well as groups of embryos (the future galaxies) around a common centerr of mass[2]. Further one should pay attention at another important point which is in the essential difference between the initial conditions for existence of a dense mass of the Universe and now known neutron stars.

This difference can be characterized by the relative change in size (deformation) of the Universe $\varepsilon = \Delta R_U/R_U = \Delta T_U/T_U$. If you take ΔT_U= 1, then the deformation of the Universe in our time is smaller than in the first seconds of the existence of the World-4 by 18 orders of magnitude. This extension of a matter in the early evolution of the Universe is so powerful that it can not be to slow down by the forces of interaction between the fractal elements. As a result, the individual galaxies and the stars within them had appeared.

An extension of a space leads to the structuring of the volume of the star on the islands of dense matter (embryos of atomic nuclei), that increases the average distance between them. However, the mass of the islands in the early expansion of the Universe may be much greater than the mass of the heaviest stable atomic nucleus and, in addition, it quickly increases as a new matter is created in the field of atomic nuclei.

The processes of a matter transformation run simultaneously with the described structuring and, as a result, protons and electrons appear due to the weak interaction reactions. The islets turn into atomic nuclei of the superheavy mass. In addition, a large excess of neutrons leads to the selection of individual neutrons through the surface of the islets. Such neutrons could call for reactions of fission of atomic nuclei into separate fragments, the value of which is reduced till the creation of nuclei containing from 1 to 92 protons, existed on the Earth. As a consequence, a lot of the heat energy releases and the substance are to be warmed up.

As you can see, the mechanism of evolution of the Universe leads to creation of the heavy atomic nuclei in the first moments after the Big Bang.

Now let us take into account that the fractal structure of the Universe included a large torque of each fractal element and each future star. A rotation of a future star leads to its deformation, and, as a result, it will take a disk-like shape. This shape resembles a miniature galaxy. Over time, the mass of the star grows so that gravity seeks to return it to a spherical shape. This will result in reducing a deformation of a space. However, the peripheral part of a disc-shaped star (in the case of the Solar system the Sun's mass is at 750 times greater than the total weight of all his satellites) will get a high

[1]The total electrical neutrality of matter in the World-4 is provided only by this way.

[2]In Ref. [12] authors make conclusion on an existence of the initial torque at the origin of the Universe, based on the study of the galaxies orientation in a space.

torque and remain outside the star, which provides a creation of future planets. It is obvious that the orbits of these planets must lie in the equatorial plane of the star. Moreover, the star and planet in its orbit must rotate in the same direction. At the same time the axis of rotation of the planets can have an arbitrary direction (chaos), and the angular velocities of their rotation should significantly differ because of the intense processes of the substance islands fission (by the way, it can be observed on the example of planets of the Solar system).

What do we really have? All the planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune) are rotating around the Sun in the same direction (in the direction of axial rotation of the Sun), on nearly circular orbits, whose planes have little inclination to each other (and to the plane of the solar equator).

The planets have the different axial rake angles, that is, their axes are directed at a certain angle to the equatorial plane of the parent star. For this reason, the amount of light received by any planet hemisphere varies during the year; the northern hemisphere of a planet is illuminated longer than the southern hemisphere, and vice versa.As a consequence, a change of seasons occur on the majority of the planets, i.e. climate changing during a year. As usually, a time, when one of the hemispheres faces the Sun, is called the solstice. During one rotation around the star (one turn of the planet in its orbit) two solstices meet; when one hemisphere is in the summer solstice and day is the longest, while when the other hemisphere is in the winter solstice with its extremely short day. Because of their disposition, the hemispheres receive different amounts of light and heat, which causes the annual changes of weather conditions on the planet.

The axial tilt of the Jupiter is extremely small, and seasonal changes there are minimal, while Uranus, on the other hand, has such a large axial tilt, it orbits around the Sun almost "on the side". During its solstices one of its hemispheres is for a long time under sunlight, and the other one is always dark. Between these two states there is a time (spring and autumn), when the days and nights alternate with each rotation of the planet.

If to designate an initial moment of inertia of a future star as J_o, and the initial radius as R_o, then the moment of inertia will increase in $(R/R_o)^2$ times in the process of increasing the radius of the star. Simultaneously the angular velocity of rotation of the fragment (if the non-relativistic approximation is true) decreases by the same time. The additional mass should be added to the ground one with conserving their mechanical characteristics. As a result, the angular momentum L of a star at the arbitrary time will be equal to

$$L = L_o\cdot(m/m_o). \tag{1}$$

One could calculate the approximate value of L for theSun (without taking into account a dependence of the density upon a distance from thecenter of the Sun):

$$L = \frac{2}{5}MR^2\omega = 2{,}8\cdot10^{36}\text{kg}\cdot\text{m}^2/\text{s}. \tag{2}$$

The axialrotation of the Sunis about 2% ofthe angular momentum of the solar system, although the mass of the Sunis more than 99.8% ofthe total weight. This distribution of the angular momentum between the Sun and the planetsis associated with slow rotation of the Sun and the huge size of the planetary system-its diameteris larger than the diameter of the Sun at several thousand times. The angular momentum of the solar systemis $1.4\cdot10^{38}$kg·m^2/s.

One could easily estimate the initial value of the angular momentumof the solar system:

$L_o = L\cdot(m_o/m) = 1.4\cdot10^{38}\cdot(1.454\cdot10^{8}/1.99\cdot10^{30}) = 1.02\cdot10^{16}$kg·m^2/s.

Here the initial mass of a star is determined as the product of the original volume, belonging to a star, on the density of nuclear matter (10^{17} kg/m^3). It is easy to show that such value of the angular momentum is indeed relativistic. Nevertheless, an embryo of a star has a spherical shape as the nuclear forces have a significant value. During expansion of space and increasing the size of a star, when the free spaces between the elements of the stars mass (embryos of atomic nuclei) increase, a shape of the star becomes by disk-like. Over time, the disk-shaped peripheral regions receive independent life as the satellites of astar.

At this stage of creation of the planets it is necessary to find the quantum conditions that provide the known ratio of the radii of orbits of the Solar system planets. Since this is a macroscopic system, it is natural to speak about formation of the resonances between the individual orbits of the planets. This resonance may be of different types. For example, the rotation of the Moon around the Earth and around its own axis is realized with the same frequency, whereby the surface of the Moon is always directed to one side of the Earth.

This type of resonance is possible between the planets. In this case, under each approaching one of these planets will always be to one side of another planet. This case is realized between the Mercury and Earth. However, this case is rather the exception than the rule.

Indeed the resonance between the orbits is very important for all planets. If a neighboring planets at a certain time were on one straight line passing through the Sun, the next same situation in the resonance requires, for example, that the nearest planet made 1.5 turns under half the turnover of the remote planet. One could write the correspondingrelation between the periods:

$$0{,}5 \cdot T_n = 1{,}5 \cdot T_{n-1}, \tag{3}$$

or $T_n = 3 \cdot T_{n-1}$.

This type of response should occur between the neighboring planets. Now one can use the Kepler's third law (a -semi-major axis of the elliptical orbit):

$$\left(\frac{T_n}{T_{n-1}}\right)^2 = \left(\frac{a_n}{a_{n-1}}\right)^3 = 9. \tag{4}$$

or

$$\left(\frac{a_n}{a_{n-1}}\right) = \sqrt[3]{9} = 2{,}080. \tag{5}$$

So, if the radius of the orbit (or major semiaxis) of the next planet is greater than the radius of the previous planet in 2.08 times, then the orbits will be in resonance. All matter which is outside of these orbits, will shrink to a resonant orbit. This results in formation of the planets.There is absent a free matter on the orbits of planets. The reason is that even under minor deflections of orbits of a planet embryo and other substance their meeting is inevitable. Consequently, there will be a capture of substance by a planet from orbit around a star.

In order that a planet has its own satellites, it is necessary that such a structure of matter exists under creation of the planets at the moment of separation from the disk of a future star. Other mechanisms of creating the satellites are not so obvious.

Table1. *Parametersof planetsof the Solar system*

n	Body	Weight, kg	T_n, Earth day	Distance to the Sun, Mln. km.	$a = R_m$
1	Mercury.	$3{,}3022\cdot10^{23}$	87,97	46,0012–69,8169	57,909
2	Venus,	$4{,}8685\cdot10^{24}$	227,70	107,476259-108,942109	108,209
3	Earth,	$5{,}9737\cdot10^{24}$	365,26	147,098290-152,098232	149,598
4	Mars,	$6{,}4185\cdot10^{23}$	686,98	206,669-249,2093	227,939
6	Jupiter,	$1{,}8986\cdot10^{27}$	11y.314d.	740,52 – 816,62	778,57
7	Saturn,	$5{,}683\cdot10^{26}$	29y.167d.	1353,57-1513,33	1433,45
8	Uranus,	$8{,}7\cdot10^{25}$	84y.5d.	2748,9-3004,4	2876,75
9	Neptune,	$1{,}0243\cdot10^{26}$	164y.288d.	4452,9-4553,9	4503,4
10	Pluto	$1{,}19\cdot10^{22}$	247y.255d.	4436,8-7375,9	5906,35

What can be said about the real situation for the Solar system? Some important quantitative data are listed in Table 1.

Since $T_n = 3 \cdot T_{n-1}. = 3^{(n-1)} \cdot T_1$

$$\ln\left(\frac{T_n}{T_1}\right) = (n-1) \cdot \ln \beta, \tag{6}$$

Where the value of β =3 in the idealvariant.

Similarly,

$$\ln\left(\frac{a_n}{a_1}\right) = (n-1)\cdot \ln \gamma, \tag{7}$$

Where $\gamma = \sqrt[3]{9} = 2{,}08$ in the ideal variant, a_n is the average value of the radius of the orbit (major semi-axis of the ellipse) n-th planet. The corresponding curves (6) and (7) are presented in Figure 1.

Extrapolation of the obtained relationships by the straight lines shows that there is relatively good correlation (the correlation coefficient of 0.997 in both cases). However, the determined values of β and γ differ essentially from the ideal values. It was obtained: $\beta = 2.2338$, $\gamma = 1.71$. However, the ratio of $\ln \beta / \ln\gamma = 1{,}5$corresponds to the Kepler's third law. For such values of the coefficients the distant planet arced 291,78^{o} between the two meetings, and the nearest - one turn more.

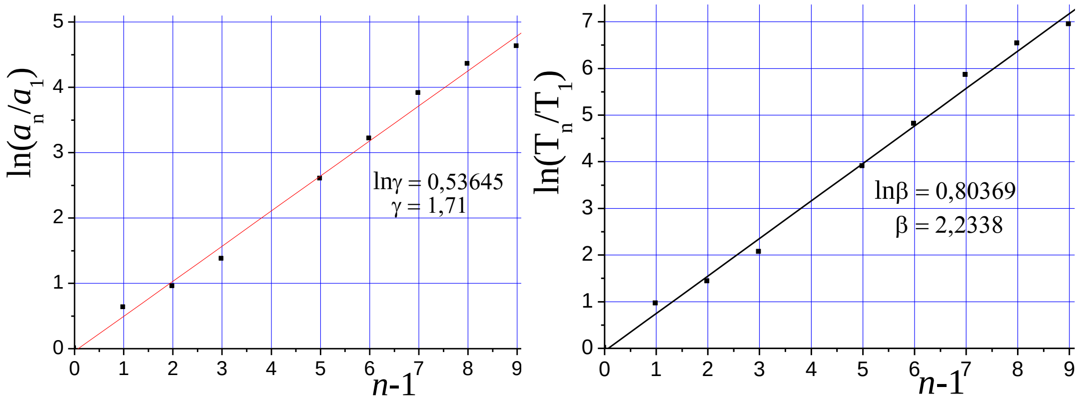

Fig1. *Dependence ofln(a_n/a_1)andln(T_n/T_1)on the number ofplanets in the solarsystem (the data for the asteroid belton the chartsare absent)*

Here wetry tolay physical foundations in explaining features and patterns in the orbitsof the planets of the Solar system. However, in the literature as a rule one could find the empirical relationships that describe parameters of the orbits of the Solar system planets. For example, speech is about the known empirical Titius-Bode law.

According to the Titius-Bode law, the meanorbital radius of the n-thplanet in astronomical units is described by the following formula:

$$R_n = 0{,}4 + 0{,}3\cdot 2^{(n-2)},\ R_M = 0{,}4. \tag{8}$$

Where R_M is the radius of the orbit of Mercury.

This formula can be rewritten as follows: $\dfrac{R_{n+1} - R_M}{R_n - R_M} = 2.$

According to this formula for any planet its distance to the planet of the Mercuryis twice morethan the distance from the previous planets to Mercury. The results of the calculations are listed in Table.2.

As one can see from Table 2, the empirical Titius-Bode law is performed only with great stretch. It is usually supposed that the results for Neptune fall out of this law, but one should take the Pluto data instead of the Neptune.

Table2. *Data on check of the empirical Titius-Bode law*

Planet	***N***	2^{n-2}	The radius ofthe orbit **(a.u.)**		$\dfrac{R_n - R_M}{R_{n-1} - R_M}$
			according to the rule	actual	
Mercury.	1		0,4	0,39	
Venus,	2	1	0,7	0,72	
Earth,	3	2	1,0	1,00	1,825
Mars,	4	4	1,6	1,52	1,855

Asteroid Belt	5	8	2,8	2,2-3,6	2,096 (the orbitof Ceres)
Jupiter,	6	16	5,2	5,20	2,021
Saturn,	7	32	10,0	9,54	1,9
Uranus,	8	64	19,6	19,22	2,053
Neptune,	drops			30,06	1,579
Orc	9	128		39,173	
Pluto	9	128	38,8	39,5	2,078 (with respect to Uranus)
Haumea	9	128		42,985	
Quaoar	9	128		43,405	
Makemake	9	128		45,4365	
$2007JJ_{43}$	9	128		47,910	
Eris	10	256	77,2	67,7	1,721

Let's try to clarify the relationship (8). One could rewrite it as follows:

$R_n = R_M + c{\cdot}d^n$.(distance in astronomical units)

In this case

$$ln\,(R_n - R_M) = ln\,c + n\,lnd \qquad (9)$$

The graphs are corresponding to the dependence, shown in Figure 2.

As follows from Figure 2, the data on Neptune normally lie on a straight line, while the results for Plutoid (Plutoand Eris) deviate significantly. By processing these graphs the corresponding values *ln c* = -1.1283, *ln d* = 0.66198, c = 0.32358;d = 1.9388.The correlation coefficient is 0.99963. So, from Fig. 1 and Fig.2 (although the corresponding dependences are correctly unfounded) it can be concluded that there are resonant dependences between the orbits of the planetsof the solar system.

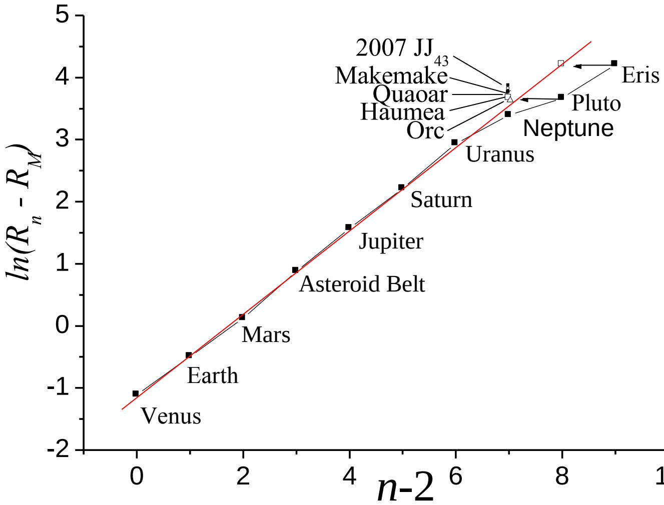

Fig2.*The dependence of ln (R_n - R_M) on the number of planets (figure includes small planets)*

Data on the Figure 2 show that the resonance is really observed in a wide array of planets if minor planets (Pluto and Eris) are assigned the number to one less. Other small planets Plutoid (other than Eris) and Neptune are disposed near. It confirms the fact that **these celestial bodies were created in the complex**, just as together created the Earth and Moon.

However, the certain forces, initially acting during expansion of a space, break the links between the small planets and Neptune, causing Neptune slides from the resonance orbit. The minor planets orbits deviate significantly from the equatorial plane of the Sun.

However, the interaction between these celestial bodies continues to hold them in orbits, dropping out of the resonance series, which are characteristic for all the planets of the Solar system.

Moreover, the orbits of the Pluto and the Neptune turned out to be synchronized: the periods of turnover for the Pluto, Neptune and Uranus around the Sun are as 3: 2: 1 (hence the 3 turnover of the Neptune correspond to 2 ones of the Pluto). Another important feature, which confirms the unity of minor planets and Neptune is as follows: the Neptune's equatorial plane is inclined to the orbital plane of the planets around the Sun (the ecliptic) at 29^o, and the plane of Pluto's orbit is tilted at $17{,}1^o$. It can be assumed that the alien force has led not only to a breakdown in communication between Pluto and Neptune, but also to a shift in the direction of the angular momentum of Neptune.

Finally, the last thing that's important to understand is a distribution of mass and density between the planets of the Solar system.

Using the Law of similarity, one can understand that the laws of quantum mechanics were acted at the initial stage of expansion of the Universe, when motions were relativistic. Let's look at a qualitative picture of the distribution of the electron wave function in 2s, 3p or 4d states (Figure 3.). Based on the dependence of this kind, where the value of the abscissa is chosen so that the function changes sign at $x = \alpha r = 8$, it can be found that the mass of the Mercury should be small, and the mass of the Earth in the Earth's group should be the biggest. Any planet can't appear on the orbit of asteroids ($f(x) = 0$). The Jupiter's mass must be maximized. The mass of the planets located beyond the Jupiter, should naturally decrease.

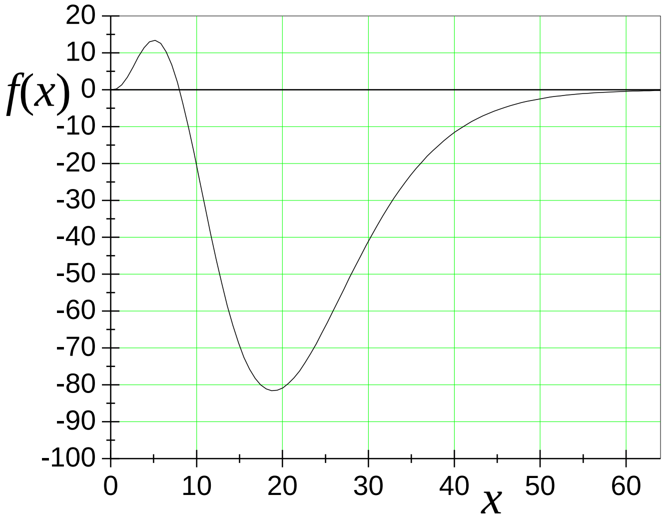

Fig3. *The amplitude of the probability of finding the particle distance from the center of the field (in relative terms, $f(x) = x^2(x-x^2/8)\cdot exp(-x/4)$)*

Figure 3 shows the dependence of the amplitude, not the probability distribution of mass. To obtain a weight distribution, it is necessary to bring the function $f(x)$ to a square. The fact that the probability amplitude outside the asteroid belt has a negative sign, suggesting that the relevant planet must consist of atoms and molecules of a different nature than nearer to the sun planet. In addition, this type of weight distribution on the distance could be formed only in the early stages of evolution of the Universe, when acted quantum effects. In the later stage, only the cleaning of the space created by the planets. The asteroid belt was never planet. It remains the same as it was formed in the early stages of evolution of the Universe.

The fact that the density of large planets is small, can be explained on the basis of the Boltzmann law for the distribution of gas concentration with increasing altitude in the vicinity of the Earth. This distribution is described by the formula:

$$\frac{n}{n_0} = \exp\left(-\frac{mgh}{kT}\right), \qquad (10)$$

Where m – mass of the molecule, n_o - the concentration of the corresponding molecules near the surface of the Earth. This dependence corresponds to the distribution shown in Fig. 4.

As follows from the dependencies shown in Figure 4, a concentration of heavy molecules is substantially reduced with the increase of height above ground level and the atmosphere is represented mainly by the light molecules. So it was at the origin of the solar system: heavy atoms are distributed close to the star, and light ones form the distant planets.

If we consider the distribution on the weight and the distances of the Jupiter's or Saturn moons, we note that in these cases it is correct the quantitative feature, described by the function $f(x)$. The Earth has the single heavy satellite. Yet another small satellite of a little mass is at a distance of 19 million km. But the general rule requires that between the Earth and the Moon there were a few small satellites not seen until now. It is possible to estimate the corresponding distances:$224\cdot10^3$ km, $131\cdot10^3$ km,$77\cdot10^3$ km, $45\cdot10^3$ kmand $26\cdot10^3$ km (similarly, beyond the orbit of the Moon).

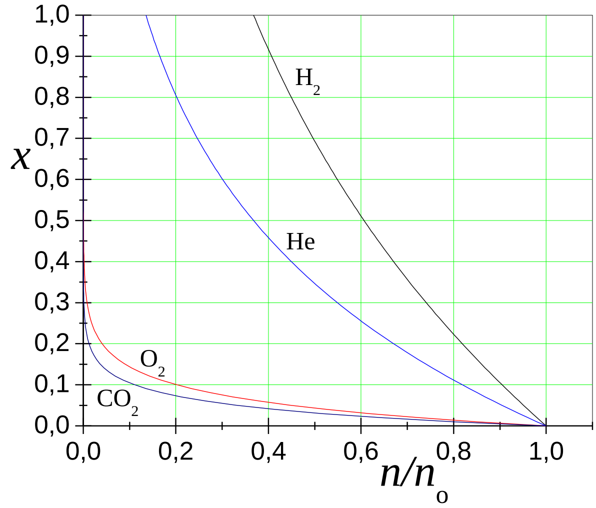

Fig4. *The dependence ofthe relative concentration of gases from the height(* $x = mgh/kT$ *)*

Above we described the mechanism of the origin of a planetary system and showed that the heavy atoms firstly born at the early stages of evolution of the Universe with high efficiency. Thus there appeared free neutrons, electrons and protons, and then atoms of helium as a result of the activity of α-heavy nuclei. Since bineutrons born in the vicinity of atomic nuclei, the mass of the nucleus is constantly increasing. The simultaneous processes of radioactive decay led to the presence of dynamic equilibrium and the Earth and other planets like it has a high content of heavy nuclei beyond the stability (massive lead nuclei). And if there are uranium deposits, then the plutonium additives must be in these deposits. This really takes a place on the Earth (there are discovered ^{239}Pu found with a half-life 24,100 years and ^{244}Pu with a half life of 80 million years).

It follows that not only the planets, but t**he inner regions of the star consist of predominantly of the heavy nuclei of chemical elements**. These regions provide the energy flow and consistency in the emission ability of the stars, not belonging to the class of the the rmonuclear stars. Among these stars are the Sun and other stars, emission characteristics of which are described by the experimentally found "mass-luminosity" law [13]. Thus, the only way to understand the huge emissivity of cool giant stars (Betelgeuse, ε Aurigae).

With the expansion of the Universe the contribution of this mechanism of creation of the atomic nuclei and atoms will be reduced. When the concentration of light nuclei become predominant, then step wise conversion of light nuclei into heavier due ones due to the creation of bineutrons in their neighborhood will be dominant. In the ordinary stars contribution of the the rmonuclear reactions into conversion of light nuclei into heavier one is insignificant. Moreover, it is not determinative in the thermonuclear stars.

Above we have considered an almost perfect case where, despite the occurrence of uncontrolled nuclear transformation reactions in the starembryo, it has the shape of a perfect disk. In reality, this form can be stretched or even chaotic. In any case, there is arisen the possibility star formation of not one, but two or more stars at this step, when the gravitational compression of substance into a star. The turnover periods in the stellar pairs can reach many thousands of years (in the distribution of the maximum). But more interesting is the case where the turnover period is only 11 minutes. In this case, a white dwarf star at a speed of 1200 km/s moves around the 19-kilometer neutron star, which corresponds to the Sun by weight [14]. The distance between stars in this pair is 126,000 km, i.e.at 3 times less than the distance between the Earth and the Moon. This fact raises questions about the mechanism of formation of such a pair of stars.

The generally accepted mechanism of formation of the neutron stars through supernova explosion cannot explain an existence of this close pair of stars, because the radius of the big star before its exposure significantly exceeds 126,000 km. For comparison, the radius of the Sun (the ordinary star) is 696 000 km. In this case, one should assume that a close pair of stars from the outset was the pair. In other words, it is the rare case when the initial neutron matter has not evolved into the structure of a normal star.

The reason is just that a close pair of stars of the future is created from the beginning. It has taken a place a powerful influence of one star to the other, so that one star remains by theneutron, while the second one could only evolve to a state of the white dwarf (intermediate density between a neutron star and a normal star that is at million times greater than the density of the ordinary star). As a consequence, **given the fact clearly speaks in favor of the proposed mechanism of origin of the galaxies, stars, planetary systems**.

The probability of this kind of evolution of a star formation is quite large, as the double stars are often observed in the Milky Way. The triple stars are observed considerably (about 20 times) rarer. They usually consist of a close double star (main pair) and its distant satellite, which rotates around the main pair, both around a single body. As an example of the triple star one could mention our nearest neighbor - Alpha Centauri the distant star Proxima Centauri, which rotates around the binary Alpha Centauri (Alpha Centauri A and Alpha Centauri B). Thesystem of three stars is stable only with this structure.The four-time stars for the stability of the system should be two tight pair of stars, which are at large distances greater than the distance in a pair of stars not less than 5 times. At last, one could mention the five and six-times star systems, in which the third pair of stars rotates around the double star. In Ref. [15] it is noted a number of systems increases in about four times under lowering star multiplicity by one. The double systems are about 75% of all systems, the triple stars are a little less than 20%, the quadruple ones - about 5%, the quinary ones - 1.2%, six-times - 0.3%.

3. Conclusion

We considered the mechanism of origin of a planetary system, based on the model of creation of the Universe with a minimum initial entropy. The development of this model has shown that:

1. The embryo of the future star is the fractal element, rotating with relativistic velocity. As the mass and size of the fractal element increases, it acquires the disc-like shape. Then it is realized a case, when the peripheral regions of a disk detach from the disc, taking a significant part of themomentum of a system. The orbits of all the planets have to be in the equatorial plane of a star. The direction of the rotation axes should vary from planet to planet.
2. Torn away masses form a planetary system. Between the orbits of planets the resonance phenomena occur, resulting in that dependence of a distance from the planet to the star is placed into the geometric progression. An analysis of the resonance phenomena lead to the conclusion that the Plutoids (except Eris) were originally by satellites of the Neptune.
3. If the fractal of a future star evolves in such a way that its shape is elongated, a fractal gap leads to the origin of pair or a great number of the interacting stars.
4. It has been fulfilled an analysis of the motion of electron in an atom and a planet in the Solar system.This comparison showed that ***a***) in the group of planets from the Mercury to the Mars, the Earth must have the maximum mass, ***b***) a planet is absent on the asteroid orbit, ***c***) the Jupiter must have the largest mass in the giant planets group, ***d***) the planets of the Earth group must be characterized by the large value of matter density, while the giant planets – by the low density.

References

[1] Petro O. Kondratenko. The Birth and Evolution of the Universe with Minimal Initial Entropy // International Journal of Physics and Astronomy. December 2015, Vol. 3, No. 2, pp. 1-21. Published by American Research Institute for Policy Development DOI: 10.15640/ijpa.v3n2a1. URL: http://dx.doi.org/10.15640/ijpa.v3n2a1

[2] D. Husemöller. Fibre Bundles. Springer Science & Business Media, 1994. - 353 p.

[3] A. Spyrou, Z. Kohley, T. Baumann, D. Bazin, B. A. Brown, G. Christian, P. A. DeYoung, J. E. Finck, N. Frank, E. Lunderberg, S. Mosby, W. A. Peters, A. Schiller, J. K. Smith, J. Snyder, M. J. Strongman, M. Thoennessen, and A. Volya. First Observation of Ground State Dineutron Decay: ^{16}Be // Phys. Rev. Lett. — 2012. — V. 108. — P. 102501. — DOI:10.1103/PhysRevLett.108.102501.

[4] K. Nakamura, (2010). "Review of Particle Physics". Journal of Physics G: Nuclear and Particle Physics. **37** (7A): 075021.*Bibcode:2010JPhG...37g5021N. doi:10.1088/0954-3899/37/7A/075021*

[5] Petro O. Kondratenko. Quarks and Leptons in the Model of the Universe with a Minimum Initial Entropy // International Journal of Physics and Astronomy. December 2015, Vol. 3, No. 2, pp. 1-21. Published by American Research Institute for Policy Development. DOI: 10.15640/ijpa.v3n2a4 URL: http://dx.doi.org/10.15640/ijpa.v3n2a4

[6] Tables of physical quantities / Directory ed. I.K.Kikoin. – Moscow.: Atomizdat. – 1976. – 1008 pp. (in Russian).

[7] P.J.E. Peebles. The Standard Cosmological Model // in Rencontres de Physique de la Vallee d'Aosta. -ed. M. Greco. – 1998, p. 7

[8] S. W. Hawking. The occurrence of singularities in cosmology, III. Causality and singularities, Proc. Roy. Soc. London, A300, 187–201 (1967).

[9] S.M. Andrievsky, I.A. Klymyshyn. General astronomy course / - Odessa: Astroprint,2010. – 478 p. (Ukrainian).

[10] I.A.Klymyshyn.The relativistic astronomy.-M.:Nauka, 1989.- 208 p.(in Russian).

[11] R.K. Rovinsky. The evolving Universe.- M.:Nauka, 1995. - 354 p. (in Russian).

[12] Longo M.J. Detection of a dipole in the handedness of spiral galaxies with redshifts z~0.04// Physics Letters B. - Volume 699, Issue 4, 16 May 2011. - P. 224–229

[13] N.A. Kozyrev. Sources of stellar energy and the theory of the internal structure of stars. // Proceedings of the Crimean Astrophysical Observatory. 1948, V.2, P.3-43. (in Russian).

[14] Yu. A. Nasimovich.Stars./ http://www.astronet.ru/db/msg/1222187/index.html(in Russian).

[15] V.G.Surdin. Star Birth. M., Editorial URSS, 1999.232 p. (in Russian).

Citation: *P. Kondratenko, "Origin of a Planetary System in the Model of Universe with Minimum Initial Entropy", International Journal of Advanced Research in Physical Science (IJARPS), vol. 4, no. 8, pp. 4-13, 2017.*