Research Article

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Model of Central Mass in Planetology

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Abstract

Offered a model of the formation of all structural elements of the Solar system from a "protostar" by waves of planet formation. It is assumed that the main source of energy in stars is not the thermonuclear reaction of the hydrogen-helium cycle, but the fission of supermassive nuclei and the decay of neutrons on the surface of the dense core of the star. An explanation is given for the presence of heavy chemical elements in the Solar System. A mechanism for the formation of the entire spectrum of stable atomic nuclei by fission chains from massive and supermassive nuclides is proposed.

Keywords: Solar System, Birth of Planets and Planetary Objects, Stellar Energy, Obtaining Chemical Elements from Stellar Matter

1. Introduction

Modern Planetology considers only one option for the formation of the Solar System, as the gravitational collapse of a local part of a giant interstellar molecular dust cloud that occurred about 4.6 billion years ago [1]. As a result of this process, the Sun, planets and all other objects of the system observed today appeared from primary hydrogen and helium, but also from numerous heavy elements formed in the depths of stars of previous generations.

An important assumption is that the collapsing cloud had some initial local angular momentum, which, when compressed by gravitational forces, increased the angular velocity of its rotation, forming a characteristic protoplanetary disk. An increase in the density and intensity of collisions of particles of a substance with each other increased its temperature. In this case, the central regions of the disk heated up most strongly.

When the central part of the disk was heated to the threshold temperature of thermonuclear fusion, the reaction of converting Hydrogen into Helium began, and it began to glow like a protostar. The rotating matter of the disk, removed from the center, also collected into local compactions, from which planets were formed, rotating around the central body in approximately the same plane and in the same direction.

The fact that local rotation should have scattered matter not yet collected by gravity by centrifugal forces is completely ignored.

One of the hypotheses for the further evolution of the Solar system involves the formation of 50 to 100 protoplanets, their collisions and mergers [2,3]. Further collisions of protoplanets formed basically the observed structure of the planetary group [4]. An unsolved problem remains how the circular orbits of the planets were formed if they had to have a high eccentricity for collisions. The presence of an asteroid belt between Mars and Jupiter is explained by the influence of the latter's gravity, which caused large fragments in the belt to collide, break up and leave it.

There is no clear explanation for the position of the two outer "ice" planets, Uranus and Neptune. For this reason, we had to come up with "planetary migration" which also explains the existence and properties of the outer regions of the Solar System, including the Kuiper belt the scattered disk and the Oort Cloud [5-8]. Hypotheses about the further movement of planets and asteroids show, in principle, a logical picture of the causes and mechanism of the observed structure of the Solar system as well as satellites and rings, including tidal interactions but leaving unexplained the reason for the rotation of both the Sun and all other space objects [9-11]. There is no explanation in the nebular model why 99% of the angular momentum belongs to the planets [1]. There is still no complete clarity about what processes occur during the formation of planets and which of them dominate. The planetesimal hypothesis cannot explain the heterogeneity of the distribution of chemical elements along the orbits of the protoplanetary disk, which led to the heterogeneous structure of the planets [12]. There is no unambiguous explanation of how water was formed on Earth important that astrophysicists do not understand the processes of formation of molecules in a vacuum [13]. If the nuclei of chemical elements heavier than Helium were formed in the depths of the star, then there they were in the form of either superdense matter or plasma (without electron shells). Theoretically, after their explosive distribution in space, they could already cool to the state of condensed matter, acquire electron shells, and begin to approach other atoms in the layer of the protoplanetary disk, to form molecules through chemical bonds.But this process almost always leads to the release of energy, which simply scatters the results of the chemical reaction and prevents dust particles from forming. Also, simple adhesion becomes ineffective as dust particles grow, which are also heated by chemical reactions [14]. Therefore, the hypothesis about the formation of planetesimals is initially incorrect.

2. Central Mass Model

The work “Galaxy Formation in a Polysingular Universe” shows the mechanism of formation of galaxy arms from stars emitted from a supermassive rotating “galactic grain”. Recent studies have revealed that the age of our Milky Way Galaxy is about 13.2 billion years [15,16]. In Figure. Figure 1 shows the structure of the Milky Way Galaxy with the region of birth of stars from the “grain of the galaxy”, the current location of the Sun and stars formed 13.2 billion years ago and later.

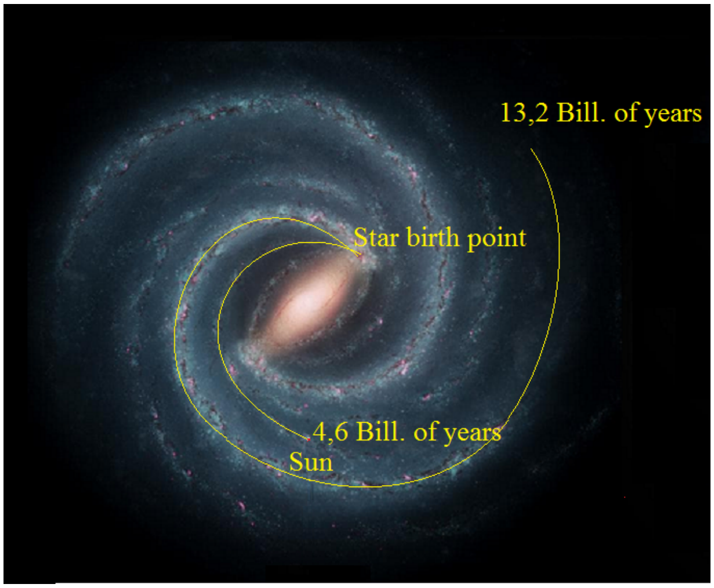


Figure 1: Milky Way Galaxy

In the central mass model, the author puts forward a hypothesis about the mechanism of formation of planets and other structural astronomical components of the Solar System by a mechanism similar to the processes of star formation in spiral galaxies. The only difference is in the size of the resulting objects.

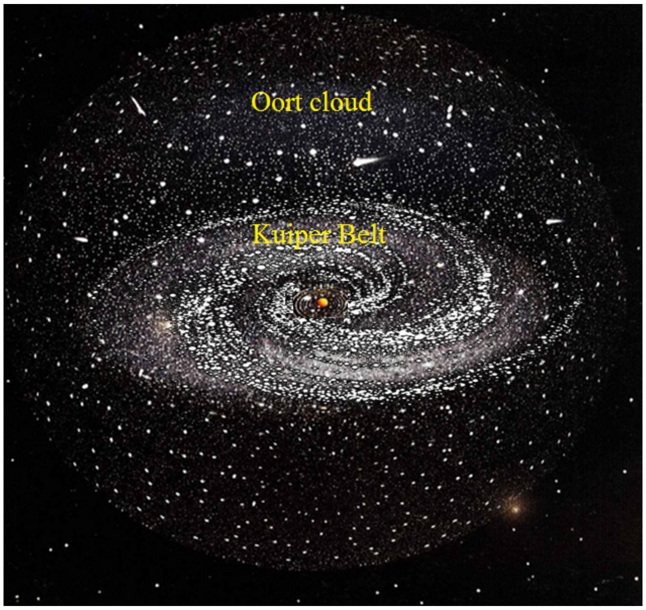


Figure 2: Solar System

The formation of all constituent objects of the solar system in the Central Mass model assumes the following:
After separation from the Galaxy Grain, in the early stages of the massive and ultra-dense protosun, it had a high rotation speed, which allowed small pieces of decaying matter to be separated from the surface, forming the Kuiper arms (belt). Collisions of these small trans-Neptunians objects between themselves led to the formation of many fragments both in the form of long-period comets and the Oort cloud. (Figure.2)

Initially, the high temperature of these pieces brought the decay chains of part of their substance to volatile substances (water, methane, ammonia, etc.), which settled by condensation on denser materials formed from Oxygen, Sulfur, Sodium, Nickel and Iron.

At the same time, inside the rotating protosun, the process of formation of baryonic matter continued, increasing its mass and momentum of rotation, leading the process from an almost continuous separation of matter from the surface to an intermittent process of separation of pairs of planets on both sides of the ellipsoid.

It is proposed to call this process " Planetary Formation Waves" as shown in Figure 3.

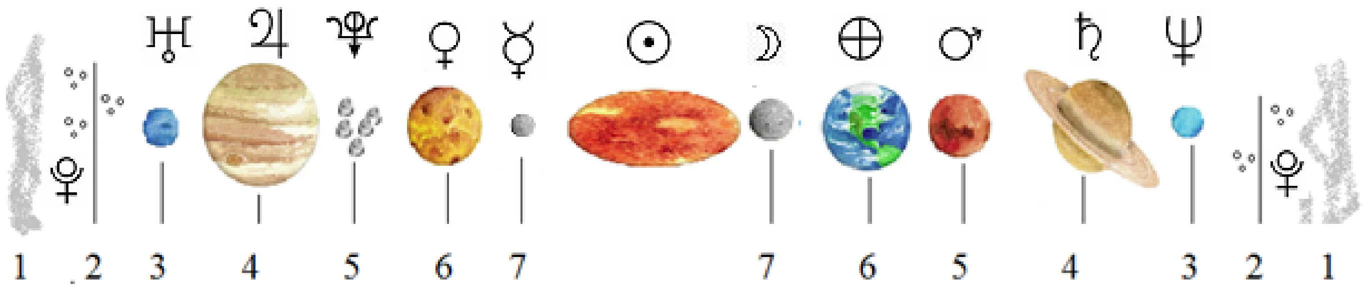


Figure 3: Waves of Planet Formation

First wave in protosun - Formation of the Kuiper Belt ;
(*High rotation speed, large centrifugal forces allow small masses to break away and fly away from the protosun*) .
Second wave - Formation of a group of pseudoplanets ;
(*The masses were already larger; they did not fly so far*).
Third wave - Formation of the Uranus-Neptune pair ;
Fourth wave - Formation of the Jupiter-Saturn pair ;
Fifth wave - Formation of the pair Mar with - " Phaethon ";
Sixth wave - Formation of the Earth-Venus pair ;
Seventh wave – Formation of the Mercury -Icarus pair (planetoid) ;
Probably, a collision of a pair of planets of the fifth wave occurred. As a result, Mars received a serious dent in its surface, and Phaeton crumbled into fragments of the asteroid belt and a large pile of fragments. At first they were in the inner part of the system, intensely colliding with the hot surface of the created planets, increasing their mass. We see traces of these collisions in the form of craters on the Moon and other terrestrial planets.

Also, in the proposed scheme there is no pair for Mercury. This can be explained by the fact that at the last stage the mass of the second planet was so small that it eventually fell into the Sun, or the growing volume of the Sun led to its orbit being inside the star.

A more likely option is that this planet collided with Venus, changing the direction of its rotation, and, being attracted to the Earth, became its satellite, the Moon.

3. Obtaining Energy by the Core of Stars and Planets

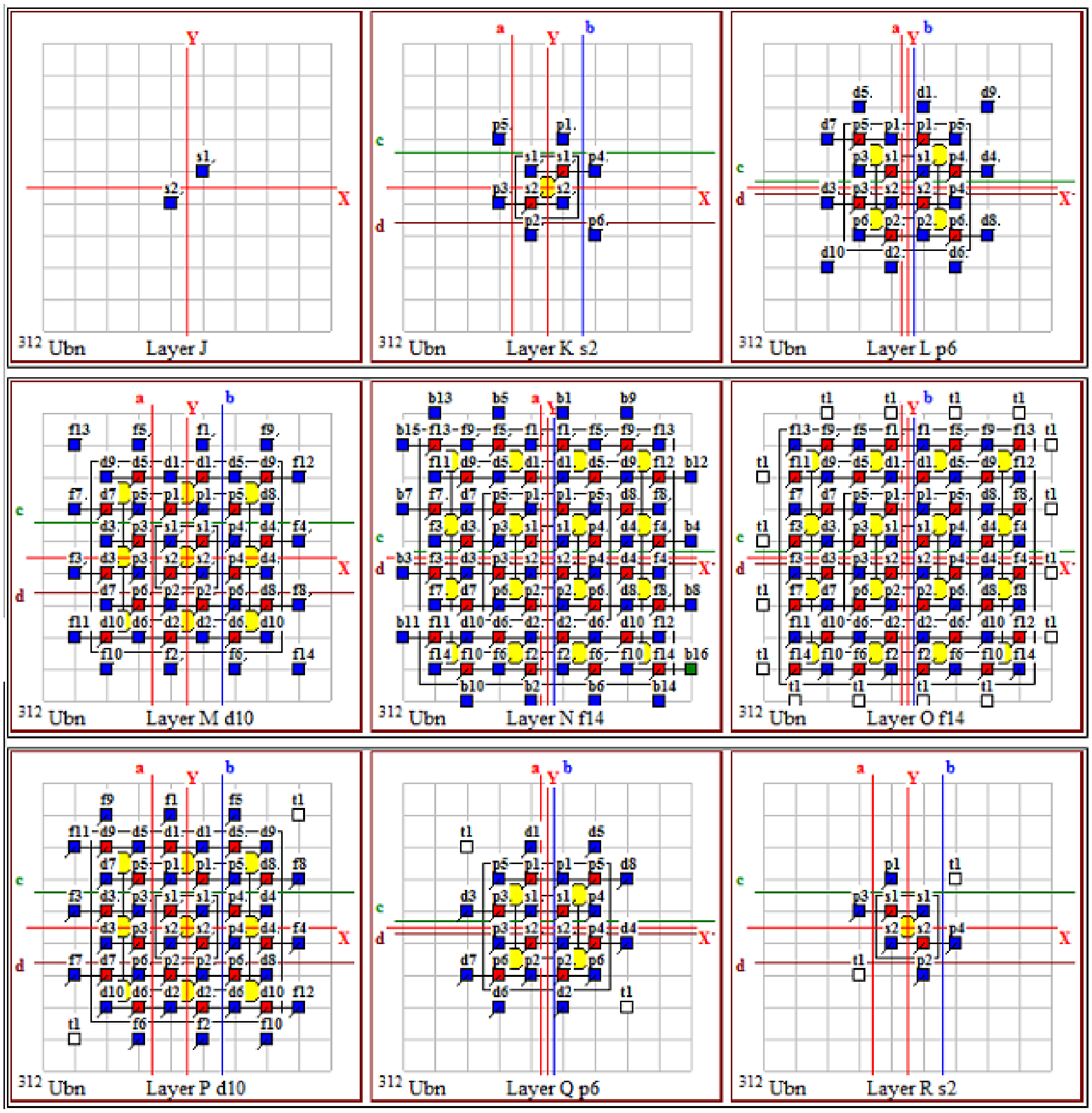
As shown above, at the initial stage of the formation of the Solar system, all its structural elements were formed from superdense fragments of a protostar . In this case, intense reactions of matter fission occurred, both on the surface of the protostar and inside the structural elements, with the release of energy.

Bodies with low mass (asteroids, small planets, comets) decayed to medium and light nuclei (chemical elements) in a short period of time. During the period of liquid and gaseous states, they entered into chemical reactions, forming oxides and other simple substances, of which they are composed today, in frozen form.

Deep in the mantle, in the upper layers of the planetary cores, this process is still happening. The author is not the first to suggest that the main source of the Earth's internal heat is the decay of radioactive elements (U,Th ...) [17], who assumed that the planetary nuclei consist of nuclides of the 364th element (4* ^{92}U nuclei). The model proposed by the author shifts the fission process towards superheavy and supergiant nuclei, equivalent to atomic nuclei of millions and billions of Z , formed in the surface layer of the planet's core. process in more detail, starting with the hypothetical nuclide $^{312}Ubn^{120}$.

Layer-by-layer structure of a possible superheavy nuclide $^{312}Ubn^{120}$ according to the Geometric model of atomic nuclei [18,19], is presented in Fig.12 .

Atomic nuclei are divided not by the appearance of a bridge in a drop, but layer by layer along multi-colored lines a , b , c , d , breaking the communication lines between ^{4} He clusters . Protons are marked in red in the figure , blue - neutrons , yellow - ^{4}He cluster centers .



Rice. 12 Layer structure ^{312} Ubn ^{120}

In the Geometric Model, one of the reasons is the homology (mirrority) of the order of filling the positions of each layer of the nucleus with protons (K,L,M,N,O,P,Q,R), the order in which electrons fill the corresponding shells of the atom (K,L,M,N,O,P,Q,R). Multi-colored lines a,b,c,d in Figure. 12 show the lines of division of the layer along intercluster connections, forming unequal fragments.

This nuclide has four coinciding fission modes of ^{312}Ubn . → ^{176} **Er** + ^{134} **Te** + 2 n ; forming at consists of two fragments plus a couple (and possibly more) of neutrons.

Two fission modes of the first fragment and their further fission are presented in the table. 1. Down arrows indicate different options (modes) for dividing further fragments.

^{176} **Er** → ^{101} **Y** + ^{76} **Cu** + 2n ;

^{101}Y→	^{61}Cr ↓ +	^{38}P ↓ + 2n;	^{101}Y→	^{62}Mn ↓ +	^{37}Si ↓ + 2n;
	^{37}P+^{22}F+2n;	^{25}Ne + ^{11}B + 2n;		^{44}Cl + ^{22}O + 2n;	^{25}Ne + ^{10}Be + 2n
	^{40}Cl+^{19}Ne+2n;	^{25}Ne + ^{10}Be + 2n;		^{45}Ar + ^{21}N + 2n	^{20}O + ^{15}C + 2n
		^{20}O + ^{16}N + 2n;			
		^{22}F + ^{14}C+ 2n;			
76Cu→	^{44}Ar ↓ +	^{30}Na ↓ + 2n;	^{76}Cu→	^{48}K ↓ +	^{26}Ne ↓ + 2n;
	^{25}Ne+^{17}O+2n;	^{19}B + ^{9}Be + 2n;		^{30}Na + ^{16}O + 2n;	^{16}C+ ^{8}Be + 2n;
		^{15}B + ^{15}C + 2n;			

Table 1: ^{134} Te → ^{88} Rb + ^{44}Cl + 2n

$^{88}Rb\rightarrow$	$^{51}Sc\downarrow+$	$^{35}Si\downarrow+{}^{2}n$;	$^{88}Rb\rightarrow$	$^{53}Ti\downarrow+$	$^{33}Al\downarrow+2n$;
	$^{32}Al+{}^{17}O+2n$;	=Ne+ ^{10}Be+ 2 n;		$^{30}Al+{}^{21}F+2n$;	$^{22}F+{}^{9}Be+2n$;
	$^{29}Mg+{}^{20}F$+ 2 n;	$^{20}O+{}^{13}C$+ 2 н;			$^{21}O+{}^{10}B+2n$;
$^{44}Cl\rightarrow$	$^{26}Ne\downarrow+$	$^{16}N\downarrow+2n$;	$^{44}Cl\rightarrow$	$^{24}F\downarrow+$	$^{18}O\downarrow+2n$;
	$^{16}C+{}^{8}Be+{}^{2}$ н;	$^{13}C+{}^{1}H+{}^{2}n$;		$^{14}B+{}^{8}Be+2n$;	$^{15}N+{}^{1}H+2n$;
		$^{13}N+{}^{3}n$;		$^{15}C+{}^{7}Li+2n$;	$^{10}B+{}^{6}Li+2n$;
		$^{9}B+{}^{5}He+2n$;			
		$^{9}Be+{}^{5}Li+2n$;			

Table 2: Two Fission Modes of the Second Fragment and their Further Fission are Presented in Table. 2.3:

^{134}**Te** $\rightarrow{}^{82}As+{}^{50}K+2n$;

$^{82}As\rightarrow$	$^{53}Ti\downarrow+$	$^{27}Na\downarrow+2n$;	$^{50}K\rightarrow$	$^{26}Ne\downarrow+$	$^{22}F\downarrow+2n$;
	^{24}Al+17F+2n;	$^{11}N+{}^{8}Be+2n$;		$^{16}C+{}^{8}B+2n$;	$^{13}B+{}^{7}Be+2n$;
		$^{10}C+{}^{9}B+2n$			$^{13}C+{}^{7}Li+2n$;
$^{82}As\rightarrow$	$^{54}V\downarrow+$	$^{26}Ne\downarrow+2n$;	$^{50}K\rightarrow$	$^{28}Na\downarrow+$	$^{20}O\downarrow+2n$;
	$^{24}Al+{}^{19}Ne+2n$;	$^{16}C+{}^{8}Be+2n$;		$^{17}N+{}^{9}Be+2n$;	$^{16}N+{}^{2}H+2n$;
	$^{26}Si+{}^{17}F+2n$;			^{15}C + 11B + 2n;	$^{12}B+{}^{6}Li+2n$;
$^{82}As\rightarrow$	$^{49}Sc\downarrow+$	$^{31}Mg\downarrow+2n$;	$^{50}K\rightarrow$	$^{30}Na\downarrow+$	$^{18}O\downarrow+2n$;
	$^{30}Al+{}^{17}O+2n$;	$^{20}O+{}^{9}Be+2n$;		$^{19}N+{}^{9}Be+2n$;	$^{14}N+{}^{2}H+2n$;
	$^{28}Mg+{}^{19}F+2n$;			$^{15}C+{}^{13}B+2n$;	$^{10}B+{}^{6}Li+2n$;
$^{82}As\rightarrow$	$^{49}Ca\downarrow+$	$^{31}Al\downarrow+2n$;			
	$^{30}Mg+{}^{17}O+2n$;	$^{21}F+{}^{8}Be+2n$;			
		$^{19}O+{}^{10}B+2n$;			

Table 3: Two Fission Modes of the Second Fragment and their Further Fission are Presented in Table. 2.3:

As we see, as a result of just four successive fission processes, a whole set of nuclei of medium and light nuclides was obtained from the nucleus of the 120th element.

The chains of further divisions of light nuclides A = 2 * Z are presented in Table 4.

$^{26}Al\rightarrow{}^{17}F+{}^{7}Be+2n$;	$^{26}Al\rightarrow{}^{15}O+{}^{9}B+2n$;		
$^{24}Mg\rightarrow{}^{15}O+{}^{7}Be+2n$;			
$^{22}Na\rightarrow{}^{12}N+{}^{8}Be+2n$;	$^{22}Na\rightarrow{}^{11}C+{}^{9}B+2n$;		
$^{20}Ne\rightarrow{}^{11}C+{}^{7}Be+2n$;			
$^{18}F\rightarrow{}^{14}N+{}^{2}He+2n$;	$^{18}F\rightarrow{}^{14}O+{}^{2}H+2n$;	$^{18}F\rightarrow{}^{9}B+{}^{7}Be+2n$;	$^{18}F\rightarrow{}^{11}C+{}^{5}Li+2n$;
$^{16}O\rightarrow{}^{13}N+H+2n$;	$^{16}O\rightarrow{}^{9}B+{}^{5}Li+2n$;		
$^{14}N\rightarrow{}^{11}C+H+2n$;	$^{14}N\rightarrow{}^{13}N+n$;	$^{14}N\rightarrow{}^{8}B+{}^{4}He+2n$;	$^{14}N\rightarrow{}^{8}Be+{}^{4}Li+2n$;
$^{12}C\rightarrow{}^{7}Be+{}^{3}He+2n$;	$^{12}C\rightarrow{}^{11}C+n$;		
$^{10}B\rightarrow{}^{7}Be+H+2n$;	$^{10}B\rightarrow{}^{9}B+n$;		
$^{8}Be\rightarrow{}^{4}He+{}^{4}He$;	$^{8}Be\rightarrow{}^{3}He+{}^{3}He+2n$;		
$^{6}Li\rightarrow{}^{3}He+H+2n$;			
$^{4}He\rightarrow{}^{2}H+{}^{2}H\rightarrow$	**$^{4}He\rightarrow{}^{4}p+2e^{-}+2\tilde{v}e$;**		

Table 4: Fission Chains of Light Nuclei

It takes about 45 fission processes to turn a 1-ton fragment into a set of light nuclei. Note that the resulting set of nuclei includes almost all the chemical elements that make up the most common molecules of not only planets, but also comets, asteroids and satellites. Since the masses of supermassive nuclei can also have a wide range of values, the resulting fragments will fill the entire spectrum of possible nuclei. Unstable nuclei due to beta capture, as well as alpha/beta and neutron decays will turn into stable nuclides.

Thus, it is shown that it is the process of comprehensive division of parts of the surface of the protostar core described above that began from the moment of its separation from the grain of the galaxy and continues to this day.

As a result of the decays of heavy, medium and light nuclei, initiated by ultra-fast neutrons and ultra-energetic gamma rays, only the lightest nuclides remain in the outer layers of the star, and the lighter ones are squeezed out by "photon pressure" to the surface. Thus, the outer layer of the Sun is made up of Hydrogen and Helium. The proposed structure of the Sun is shown in Fig.4

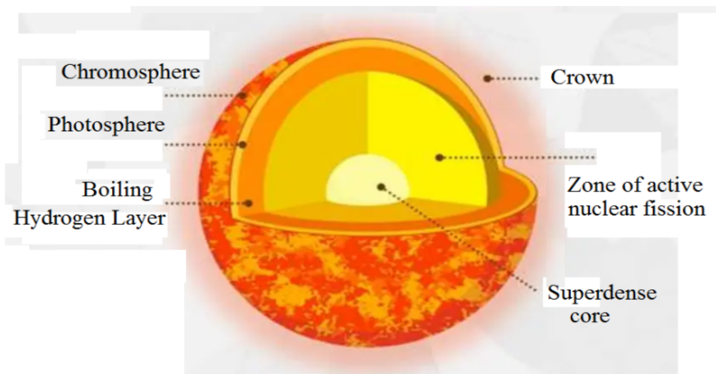


Figure 4: Structure of the Sun in the Central Mass Model

This allows us to make a reasonable conclusion that it is the nuclear fission chains, together with the decay of neutrons, that are the sources of the star's energy. And this same mechanism makes it possible to explain the chemical composition of not only planets and satellites, but also the components of comets, asteroids and other small bodies of the Solar System that arose during the waves of planet formation.

The gradual transformation of the star's core into light elements will lead to a decrease in the mass of the core, an increase in the amount of Hydrogen in its structure, and an increase in size. This process will occur up to a threshold mass of the core and inner layers, at which the energy released by them will not be enough to maintain the outer layers in a heated state. This will lead to a gradual decrease in the temperature of the star, and further evolution, which depends on its mass. One option would be a sharp decrease in the temperature of the star's core, which would lead to the fall of overlying layers onto the core, that is, a "Supernova" explosion.

The presence in the spectra of some stars of lines of heavy elements, which are considered a sign of their "metallicity", taking into account the proposed model, suggests that these are young stars in which the layer of external Hydrogen is too thin. And photons breaking through it carry a spectrum of nuclei heavier than Helium.

For planets, the following pattern is revealed - the greater the mass of the planet, the more its chemical composition is shifted towards decay products - light chemical elements retained by gravity. This explains the presence of Jupiter-like planets in orbits close to the central body in other star systems.

This means that the temperature of the outer layer of the planet depends on the amount of energy received from the inner core and heating by the radiation of the star, minus the energy of its own thermal radiation, and has three threshold values associated with the phase transitions of the substance "melt- to -solid-liquid-gaseous".

The assumption of the similarity of the processes of formation of the mantle of the terrestrial planets gives reason to believe that the local location of hydrocarbon deposits is possible not only on Earth, but also on the Moon and Mars.

4. Conclusions

The article shows the mechanism of formation of all structural elements of the Solar system from a "protostar" by the ejection of pieces from the surface by centrifugal forces and planet formation waves . A process has been proposed for obtaining energy and forming the entire spectrum of stable atomic nuclei in stars by fission of supermassive nuclei on the surface of the dense stellar core.

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