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Conjecture on the Origin of the Solar System

Liu Taixiang

System Relativity Work Room, Jinan, China

E-mail：taixiang.l@126.com

Abstract

This paper briefly describes the principle of the formation of the solar system, and explains the cause of the Titius-Bode law, the rotational angular momentum and revolutionary momentum of a celestial body.

Keywords: Origin of the Solar System, primitive nebula, spherical primitive nebula vortices, self-induced motion, nebula sub-vortices, the Titius-Bode law, the cosmic-dust disappearance event.

Origin of the solar system is the famous question of the natural sciences, History of nebular hypothesis, planetesimal hypothesis and other views have been. The Theory of System Relativity[1] supports the idea that the Solar System originated from a nebula, but it offers a different view of the formation mechanism described by the nebula hypothesis. In the following, we discuss this formation mechanism, using the Solar System as an example.

1 Principle of the formation of the solar system

1.1 Formation of primitive nebula vortices from multi-body systems

The micro-particles that constitute a primitive nebula primarily consist of polar particles, such as electrons, protons, and atoms. There is random coherent interaction among these micro-particles, which constitute a multi-body system on the cosmoscopic scale, as shown in Figure 1a. Under the influence of the external gravitational field and the mutual influences among particles, **many spherical primitive nebula vortices** form in a primitive nebula.

Under the action of self-induced motion, the volume of each primitive nebula vortex slowly shrinks, and a clear boundary appears between adjacent primitive nebula vortices. Therefore, the original multi-body nebula system as a whole evolves into a number of isolated primitive nebula vortices, each of which becomes a two-body system interacting with the gravitational field of the ambient environment, as shown in Figure 1b. One such primitive nebula vortex was the earliest prototype of the Solar System.

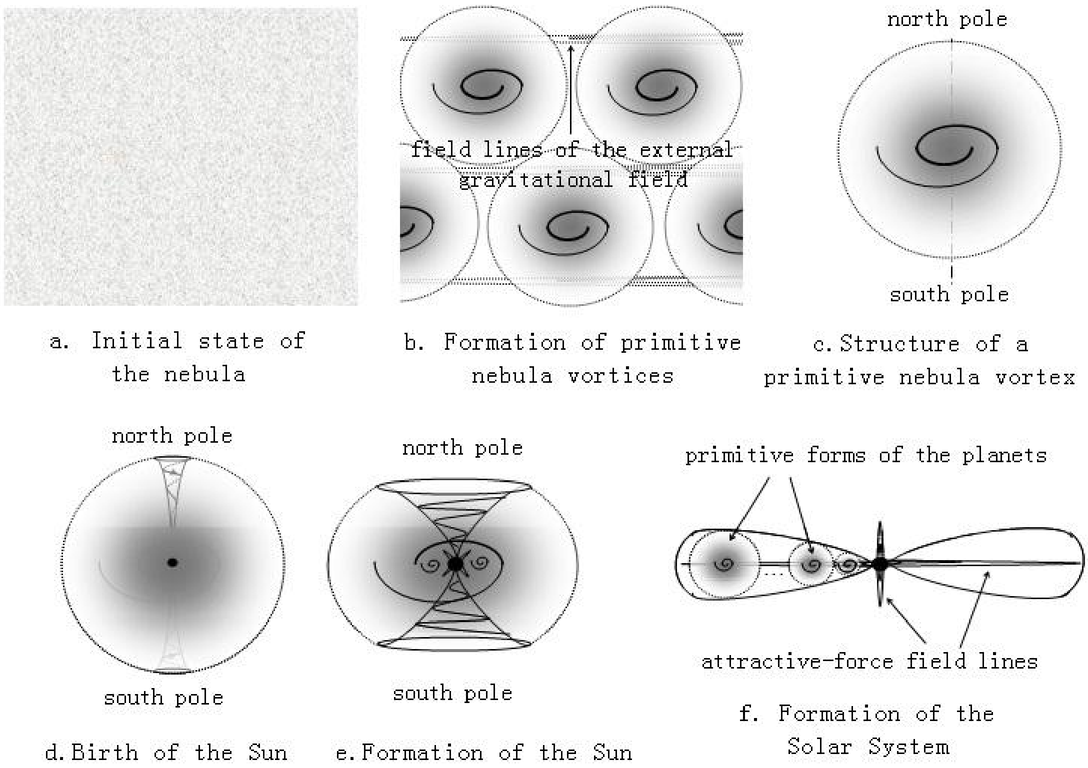

Figure 1 Schematic illustration of the formation principle of the Solar System

1.2 Evolution of the primitive nebula vortex structure and the birth of the Sun

A primitive nebula vortex has a spherical structure. The two intersection points of the axis of the vortex with the spherical surface are called the south pole and north pole of the primitive nebula vortex, as shown in Figure 1c. The vortex motion of the primitive nebula vortex causes the formation of two eddies rotating in the same direction around the axis of the vortex at the two poles. When seen from the outside, the eddies on the south and north poles rotate counterclockwise and clockwise, respectively; when seen from the side, the eddies on the two poles exhibit a ripple structure, just like eddies formed on the surface of a body of water.

Under the action of self-induced motion, the intensity of the eddies at the two poles continuously increases, and the centers of these eddies sink continuously deeper inside the sphere of the primitive nebula vortex. Eventually, the centers of the eddies at the two poles meet at the center of the primitive nebula vortex. The micro-particles near the two poles constantly rotate into the sphere along the vortex surface and eventually aggregate at the center of the sphere with a high speed of rotation. Such an aggregate of micro-particles originating from the two poles and converging at the center of a primitive nebula vortex was the prototype of the Sun, as shown in Figure 1d. Therefore, the angular momentum of a celestial body, such as the Sun, originates from the vorticity of a primitive nebula vortex.

As the micro-particles near the two poles continuously converge toward the center of the sphere, the eddy surfaces on the two poles constantly expand, and the micro-particles in the adjacent regions of the vortex surface are pulled into these eddies. Therefore, more micro-particles inside the sphere join those congregating at the center of the sphere, and eventually, the vast majority of micro-particles inside the primitive nebula vortex enter the center of the sphere to become part of the central star. At the same time, the primitive nebula vortex is converted from a spherical structure into a flat structure with constantly expanding concave surfaces at the two poles, as shown in Figure 1e.

1.3 Generation of planets and formation of the Sun

As the central star continues to enlarge, its gravitational field continuously increases. Under the influence of the gravitational field of the central star, micro-particles traveling with circular motion near the equatorial plane of the central star also continuously gather such that micro-particles in the same orbit slowly come together to gradually form many spherical **nebula sub-vortices** with a certain distribution on the equatorial plane of the central star and at various distances from the central star. On the one hand, the nebula sub-vortices form sequentially from the nearest to the central star to the farthest away; on the other hand, spherical nebula sub-vortices that are farther from the Sun have larger radii and undergo slower evolution. Such spherical nebula sub-vortices were the prototypes of the planets in the Solar System, as shown in Figure 1f.

With the formation of these spherical nebula sub-vortices, the micro-particles being incorporated into the eddies at the two poles become fewer and fewer. The eddies at the two poles of the Sun also gradually weakened until they disappear. At this time, the primitive Sun was fully formed, namely, the first stage of the formation of the Solar System was complete. Subsequently, the formation of the Solar System entered the second stage, namely, the formation of planets.

1.4 Formation of the Solar System and the establishment of a two-body system

With the complete formation of the Sun, the Solar System evolved from a multi-body system of primitive nebular vortices into a two-body system dominated by the gravitational field that interacted with the individual primitive planets. By that time, the Solar System was essentially formed. The planets and satellites eventually formed in their entirety following a mechanism similar to that of the formation of the Sun. This process resulted in the formation of the Solar System that we now see.

From the formation process of the Solar System as described above, we can draw the following conclusions:

1) The accumulation of the primitive nebula began at the higher latitudes (two poles) of a primitive nebula vortex and then gradually extended to lower latitudes, which is why the Solar System is of a nearly planar structure.

2) The vast majority of the micro-particles in the primitive nebular vortex that formed the Solar System accumulated to form the Sun. Therefore, the mass of the Sun plays an absolutely dominant role in the Solar System.

3) The rotational angular momentum and revolutionary momentum of a celestial body both originate from the vorticity of a primitive nebula vortex.

4) The sequence of the formation of the celestial bodies in the Solar System was as follows: the Sun, followed by the planets, and finally, the satellites. The planets were gradually generated and formed according to their distances from the Sun, from the nearest to the farthest away.

2 Cause of the Titius-Bode law

Concerning the origins of the Titius-Bode law, although some explanations have been proposed, no conclusive solution has been found thus far. In the following, we provide the explanation given by the Theory of System Relativity.

According to section 1, the nebula sub-vortices that led to the formation of the planets were generated in the gap between the eddies on the south and north poles of the primitive nebula of the Solar System. Therefore, the radius of each nebula sub-vortex depended on the interval between the eddy planes of the two poles at that position, as shown in Figure 2. As shown in the figure, the distance between adjacent planets is approximately the sum of the vortex radii of their primitive nebula sub-vortices. Using the Titius-Bode law, it is straightforward to derive that the distance between adjacent planets is

$$a_n - a_{n-1} = 0.3 \times 2^{n-3} \quad (1)$$

Let the vortex radius of the primitive nebula sub-vortex for the n^{th} planet be r_n; then, $r_n + r_{n-1} = 0.3 \times 2^{n-3}$. Therefore, we obtain

$$r_n = 2r_{n-1} \quad (2)$$

Using the measured data, we can calculate the vortex radius of the primitive nebula sub-vortex for each planet and then derive the theoretical distances between planets, $(r_n + r_{n-1})$; the results of this calculation are compared to the actual observed distances in the following table.

	Mercury	Venus	Earth	Mars	asteroid belt	Jupiter	Saturn	Uranus	Neptune
radius of nebula sub-vortex r_n	0.05	0.1	0.2	0.4	0.8	1.6	3.2	6.4	12.8
$L_n' = r_n + r_{n-1}$		0.15	0.3	0.6	1.2	2.4	4.8	9.6	19.2
measured distance L_n		0.336	0.277	0.524	1.381	2.297	4.352	9.663	10.892
eccentricity of distance $(L_n' - L_n)/L_n$		-0.55	0.08	0.15	-0.13	0.04	0.1	-0.01	0.76

Note: Each measured distance is calculated according to the semi-radius of the planetary orbit;the orbit radius of the asteroid belt is 2.905.

From this table, we can see that except for Mercury and Neptune, the observed distances of the planets are generally consistent with the theoretical results. For Mercury and Venus, the calculated distances are distinctly smaller than the observed values. For Neptune and Uranus, the calculated distances are distinctly larger than the observed values. In fact, by invoking the concept of the vortex radii of primitive nebula sub-vortices, the problem that Mercury and Neptune are not consistent with the Titius-Bode law has been replaced with the problem that the theoretical radii of the primitive nebula sub-vortices for Mercury and Neptune are smaller and larger, respectively, than would be indicated by observations.

Mercury is the closest planet to the Sun; therefore, the size of the Sun is a factor that cannot be neglected (in other words, the Sun cannot be viewed as a point particle). Moreover, the formation of the nebula sub-vortex for Mercury was the earliest. At that time, the interval between the eddy planes of the two poles at the position of the Mercury nebula sub-vortex was relatively large. Therefore, the nebula sub-vortex radius of Mercury was much larger than the calculated value. From the measured distance and the nebula sub-vortex radius of Venus, we can derive that the nebula sub-vortex radius of Mercury was r_1=0.366-0.1=0.266 (astronomical units). Of course, this calculation does not account for the fact that the formation of the nebula sub-vortex of Venus was also relatively early.

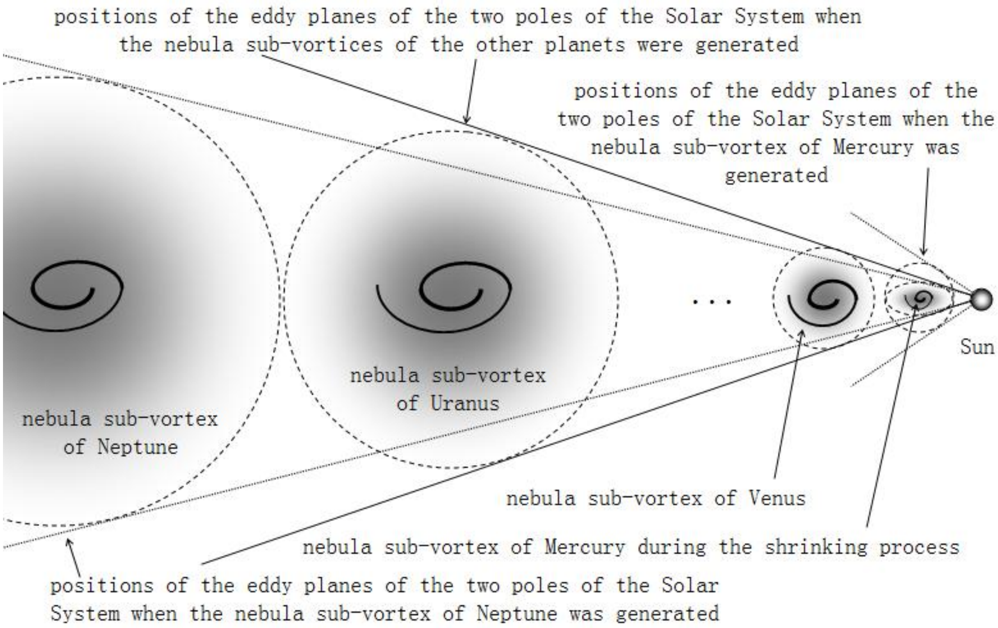

Figure 2 Schematic illustration of the principle underlying the planetary distribution in the Solar System

With regard to Neptune, one the one hand, the formation of its nebula sub-vortex was the latest, meaning that the radius of its nebula sub-vortex was relatively smaller; on the other hand, closer to the outside, the eddy planes of the two poles became flatter, and even the interval between the eddy planes of the two poles became smaller. The result is that the nebula sub-vortex radii of Neptune and Uranus did not obey the magnification relation of equation (2), and indeed, the nebula sub-vortex radius of Neptune was even smaller than that of Uranus. From the measured distance and the nebula sub-vortex radius of Uranus, we can derive that the nebula sub-vortex radius of Neptune was r_9=10.892-6.4=4.492 (astronomical units, AU). Of course, this calculation does not account for the fact that the nebula sub-vortex of Uranus was formed relatively late.

3 Cause of the cosmic-dust disappearance event

On July 5, 2012, Nature magazine (UK) reported that a group of huge cosmic-dust rings that were being tracked by scientists had disappeared. These dust rings, which might have constituted Earth-like celestial bodies, were once located near a certain star at a distance of 450 light-years from the Earth. Astronomers had been detecting this star, named TYC 8241 2652, for as long as 25 years, until these glowing dust rings gradually disappeared over a time span of two and a half years. At present, images from astronomical telescopes confirm that the entire dust cloud has almost completely disappeared.

Astronomers speculate that this star has a history of only 10 million years. According to the above-described principle of the formation of a solar system, this star system is currently in the latter part of the first stage of stellar formation; in other words, the central star should be completely formed, and the nebula sub-vortices of its planets should also be completely formed.

At this time, the original nebula vortex of this stellar system has become compressed into the small space near the equatorial plane of the star. Regarding the micro-particles of the primitive nebula in this narrow space, many have entered the star through the eddies on the two poles of the star; moreover, because the micro-particles in the orbits of the nebula sub-vortices of the planets possess relatively low orbital velocities, these micro-particles are constantly being absorbed by the nebula sub-vortices of the planets. Therefore, the number of primitive nebula micro-particles extant in this small space has continuously decreased, which is why "the glowing dust gradually disappeared over a time span of two and a half years."

4 Closings

It is evident that vortex motion dominates the formation of stars, planets, and other celestial bodies. In the structural formation of a planetary system, the gravitational field of the central star plays a dominant role. Therefore, a complete description of the origin and formation process of a galaxy requires not only vortex theory but also gravitational theory. The gravitational field determines the galactic structure.

References：

[1] Liu Taixiang, *the Theory of System Relativity*, Beijing: SCIENTIFIC AND TECHNICAL DOCUMENTATION PRESS, 2012