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The Formation of the Planets in the Solar System-A new Theory derived from the Titius-Bode Law

Hans Merkl
flacherhans@gmx.de

ABSTRACT

According to current teaching, the planets in our solar system originated from the dust in the protoplanetary disk clumping together, forming ever larger particles until gravitational pull took effect and formed the planets. The planets were thus produced by accretion.

This seems logical at first, but it takes a very long time and also raises the question of where the planets actually got their angular momentum. It is thus more likely that the planets were formed from the vortexes of matter in the dust disk. These, in turn, were created by repeated eruptions of the unfinished sun, which was still in the throes of labour at that point. Magnetic force fields and gravitation then quickly turned the plasma and vortexes of matter into quickly rotating planets.

The Titius-Bode law allows the distance between the planets and the sun to be easily calculated. If one then assumes that an emerging star like our sun did not gradually start fusing the gas masses that gravity pushed to the centre, but instead ignited repeatedly like a hydrogen bomb, this law is easy to understand. This is not a coincidence – the Titius-Bode law describes the temporal progression of the explosions of the sun from which the planets arose.

Keywords: Plasma; Sun-Explosions; T-Tauri-Stars; Planets; Moon

1 Introduction

Among the riddles of astrophysics that have not yet been solved with absolute certainty is the origin of the stars and the corresponding planetary systems.

Information on how stars are created can indeed be found in a variety of textbooks – a clear cut matter. A giant cloud of gas and dust out in space cools off and, in doing so, consolidates. That creates dense nuclei in the cloud, which collapse under the effect of gravitation, meaning their own weight. The pressure and temperature inside those nuclei finally become so great that a process of fusion begins. Then, when the pressure of the gas masses on the outside is in equilibrium with the internal pressure of the fusion, a new star is born. A whole group of stars in the case described above – at least according to the official theory.

2 Formation of the Stars

2.1 A Peek Inside the Star Nursery

However, let us take a quick look at the region where the stars are created. The Hubble Space Telescope has provided wonderful imagery.

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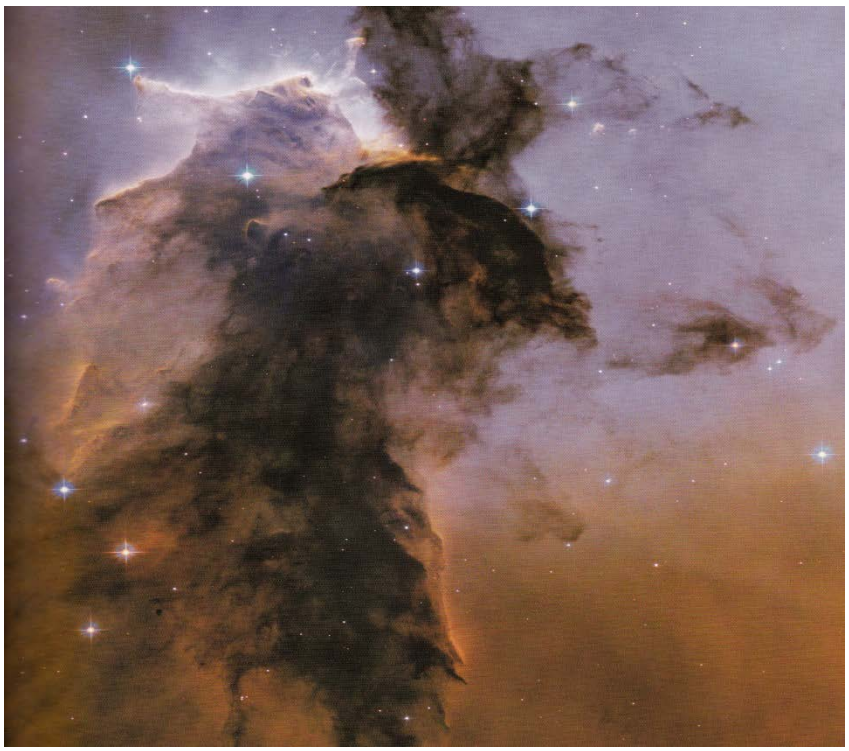
One of the most popular Hubble creations is the picture of the Eagle Nebula. A cosmic nursery. It is 7,000 light years away from Earth, and its massive black clouds of gas and dust are also referred to as the "Pillars of Creation". At the tips of those pillars are very young stars, some only 50,000 years old.

Looking at these 4 to 5 light-year size pillars, it is hard to imagine gravitation is at work here. Instead, it rather gives the impression that a powerful explosion took place, and is perhaps still happening, that drives the dust clouds apart. That, however, would require a parent population of giant stars to have thrown the heavy elements they bred through supernova and into space. Those explosions then also produce the super-heavy elements that are heavier than iron. That would further explain the question of where those giant cosmic dust clouds that are needed to create the metal-rich stars of the 2nd and 3rd generation actually come from.



The Eagle Nebula. A cosmic nursery

2.2 The Significance of Plasma

These elongated forms of gas pillars in the Eagle Nebula can really only be created by strong magnetic fields that are produced by the movement of gas and dust masses. That, however, is only possible if the gas is ionized, meaning it exists in plasma form.

In this regard, it would thus be worthwhile to take a closer look at plasma and how it interacts with normal matter, since it is not only important for the creation of stars, but for the creation of planets, as well. Although plasma is nothing other than an ionized gas, the interactions in plasmas and gasses differ so significantly that researchers consider plasma to be a fourth state of matter in addition to solid, liquid and gas forms. Plasma is everywhere. The sun is one giant ball of plasma. Plasma is something completely normal in space. – By contrast to neutral gasses, where atomic and molecular interactions predominate, the electrical forces of the particles of plasma cause them to interact with microparticles and form a so-called **"complex plasma"**. For example, this happens in space when normal plasma mixes with dust. Even though the dust particles measure a mere 10,000th of a

millimetre, they are many billion times heavier than atoms and have an electric charge (Gregor Morfill/Hubertus Thomas).

The dust towers of the Eagle Nebula are a beautiful example of a “complex plasma”. The dust masses produced by the explosions of large, short-lived parent stars are shot through space at high speed. The dust at the tips collides with the gas that is present everywhere in space. The speed is so great that it causes a shock wave to form, similar to a supersonic jet. This heats the gas, and the moving electrical charges of the complex plasma that is also generated in turn generates strong magnetic fields. This presses the complex plasma of dust and gas together and mixes and consolidates it until gravitation takes over and forms a protoplanetary, quickly-rotating disc in whose centre the future star arises. The complex plasma emerging from the pillar, made up of gas and dust, provide a fresh supply of matter for the star embryo. That is why new stars tend to emerge from the tips of these gas pillars.

2.3 The Riddle of the High Mass Star

At this point, one could naturally ask where the earlier, extremely high-mass stars came from, which exploded at the end of their short life cycle and created the heavy elements for the next generations of stars. Although the standard theory works just fine for objects up to 20 times the mass of the sun, it fails when it comes to structures any larger than that. Technically, the pressure of the radiation should overpower the gravitation and prevent the star from growing any larger.

Many astronomers thus currently assume that the dark matter from the hydrogen clouds produced by the big bang turned into giant stars. – However, they have not yet managed to prove it. However, it is also difficult to provide something that supposedly does not exist! At least not in our immediate solar environment. That is what the astronomers working with Moni Bidin at the Universidad de Conception in Chile found. They examined stars within a radius of 13,000 light years around the sun. However, the pattern of movement in the visible celestial bodies was consistent with gravitation.

This riddle as to how the first generation of giant stars came about is something astronomy has still not been able to conclusively solve even today. However, it can be assumed that another law of physics beyond the one that applies to the creation of normal size star was involved here, since “complex plasma” did not yet exist at that time, as only gas from hydrogen, helium and a bit of lithium existed. The only thing that was probably required to ignite a pure hydrogen compound was a higher temperature than when the gas is contaminated by a heavy element. As a result, much more hydrogen gas had to come together for the fusion to start, meaning a giant star would have been required. That would solve the riddle as to the origins of the first generation of mass-rich stars. That brings a second riddle to light. How did our galaxies form at such an early stage of the beginning of the universe? Presumably, the first giant stars exploded fairly quickly and became black holes. Those then attracted further gas masses, from which the galaxies originated. However, it is also imaginable that with such a giant accumulation of gas, that interim step involving a star would not even be necessary. When large gas masses collide, could that itself not cause a black hole to form?

Now, however, the latest research from the APOGEE observation program, which has been used to create an age map of the large-scale distribution of the “red giants” in the Milky Way, has shown that the “red giants” get younger the further away they are from the galactic centre and the disk plane. Based on that, astronomers conclude that the star components in disk galaxies, such as in our Milky Way, developed from the inside out. However, it is not clear where the gas for it comes from.

3 Formation of the Planets in the Solar System

3.1 Standard Theory

Like the origin of the stars, there are also different theories about the origin of the planets. The currently recognized theory assumes that the dust particles of the protoplanetary disk with the sun in the centre bonded together to form increasingly large particles. Once the bodies were large enough, gravity ensured their continued growth, so that minor planets, so-called planetesimals, formed in the end. These then continued to grow through further collisions, forming the large planets we see today. This is the so-called "theory of accretion" – however, there are two objections to that, in my opinion:

1. Extensive trials at the University of Braunschweig, in which zero gravity was generated through drop tests in order to simulate the conditions in space, were not particularly successful. Although the dust particles did adhere to one another through electrostatic forces, they then bounced off one another upon collision once they reached a certain size!

2. This process of planet formation from the collision of dust particles and subsequent minor planet formation would also take much too long.

From the time the sun began to shine due to nuclear fusion, solar wind would blow all of the dust in the disk out to the edge of the disk. The planet formation from dust in the disk would thus already have to be completed by that time. This also raises the question of where during this process the planets would have gotten their angular momentum.

3.2 The Protoplanetary Disk

For star formation of the $2^{nd}/3^{rd}$ generation, other forces would thus have to have been at work – namely, a "complex plasma" and a strong magnetic field. Plasma accelerated by an explosion generates a strong magnetic field (moving charge!). The magnetic field, in turn, constricts the plasma, which causes it to accelerate even further. This self-strengthening process finally causes the plasma dust compound to become so consolidated in the centre that gravitation takes hold. The masses that flow toward the centre as a result begin to turn and form a disk, and the more gas that flows to the centre, the faster it turns. During this process, the temperature and pressure in the centre become so great that nuclear fusion begins. A star is born. But where are the planets? Before this riddle can be solved, a brief foray into an interesting historic discovery

3.3 The Mysterious Titius-Bode Series

Every astronomer is familiar with the Titius-Bode series. It was mentioned as early as 1766 by German astronomer Johann Daniel Titius. It is a simple guideline for determining the distance of a planet from the sun. Since there is no proven explanation for the rule, most astronomers assume the series is a coincidence.

The rule:

Each of the following numbers represents a planet

0	3	6	12	24	48	96	192	384
Mercury	**Venus**	**Earth**	**Mars**	**Asteroids**	**Jupiter**	**Saturn**	**Uranus**	**Neptune**

As can be seen, every number after the 3 is double the number that preceded it. Now add a 4 to each number in the series. Divide the resulting value by 10, and that is the distance from the respective planet to the sun in astronomical units (abbreviation: AE ≙ semi-major axis Earth - Sun) 1AE ≙ 150 million kilometres.

The distance of the planets in AE is ascertainable using that method:

0.4	o.7	1.0	1.6	2.8	5.2	10	19.6	38.8

Actual distance

0.387	0.723	1.0	1.524	2.9	5.203	9.537	19.189	**30.07 !**

As can be seen from the original top row of numbers, the numbers double from planet to planet. **That cannot be a coincidence.** On the contrary, it is a function of the natural logarithm. It is found in many natural processes. However, there is no planet at the number 24. It is the asteroid belt between Mars and Jupiter. Why is no planet revolving there? There are two different theories about that. One states that a planet used to have its orbit there. However, it burst after colliding with another celestial body. Part of the resulting shower of debris could be the cause of the "great bombardment" of 3.9 billion years ago, the traces of which can still be seen on the moon.


Johann Daniel Titius (1729–1796)


Johann Elert Bode (1747–1826)

Others assume that the strong gravitational influence of Jupiter prevented another planet from forming.

In the case of the last planet, Neptune, however, the actual distance is no longer correct! Obviously an outlier in the series. Oddly, the minor planet of Pluto is found at a distance of 39.482 AE.

When astronomers working with Tim Bovaird at the Australian National University in Canberra analysed 27 extrasolar planetary systems, they noticed that they mostly followed the Titius-Bode formula more closely than the celestial bodies in our planetary system. Of the 27 systems examined, 22 of the planets lined up according to the Titius-Bode rule. The solar system is quite vast. The 27 systems, on the other hand, are much more compact. Within them, sometimes 4 or 5 planets circle the central star in Mercury's orbit.

The discovery that the same rule prevails for extrasolar planetary systems, as well, excludes the idea of coincidence. There is probably a physical reason behind this that is related to how a planetary system develops.

According to Titius-Bode, the simplest explanation for the formation of the distance between planets would be a pulsating sun during the initial stage of their formation. Its eruptions threw large quantities of matter into the planetary gas and dust disk. The turbulence of those gas and dust masses, which were probably in a state of "complex plasma", likely allowed quickly rotating planets to develop in a rather short amount of time as a result of gravitational, and especially magnetic, forces.

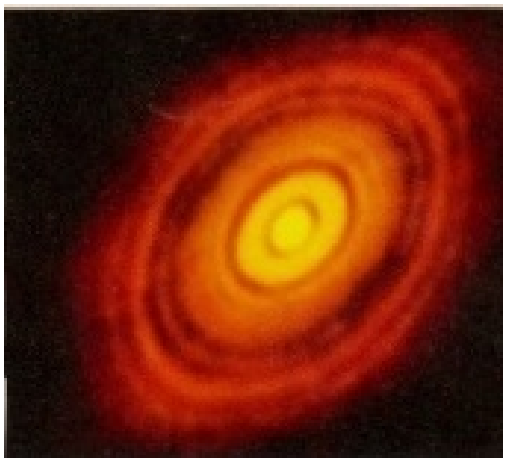
3.4 The Pulsating Sun

The gas- and dust-based matter that collided with a common centre produced, as a result of the pirouette effect, a rotating, protoplanetary disk. At the centre of the spherical accumulation of matter, the location of the future sun, nuclear fusion began when the pressure and temperature were great enough. However, it cannot be assumed that the fusion in the centre gradually covered larger and larger areas of the surrounding area. Meaning the fusion zone grew slowly, causing the sun to shine.

On the contrary, the first combustion of the hydrogen bomb in the centre explosively drove the gas and dust mass that had been push toward the centre by gravitation apart again. That, in turn, stopped the fusion again, as the internal pressure and temperature were then too low. However, gravitation continued to constantly pull gas and dust in. The more matter that pushed its way to the centre, the faster the protoplanetary disk turned. As a result, the outer edge of the disk moved inward. Even the time between explosions became shorter as the mass and pressure at the centre that was necessary for another fusion were reached more and more quickly. Just like many processes in nature, this temporal reduction in the succession of explosions followed a function of the natural logarithm. This is reflected in the Titius-Bode rule and thus clearly explains the reason why this rule describes the distances of the planets. The planets formed, as described in the next section, from the residue of those explosions. This game continued until the pressure from the emerging gas masses on the centre became as great as the internal explosion pressure. The balance of forces was then established and our sun was born.

3.5 Our Planets – Children of the Sun

During this formation phase, each pressure wave from an explosion in the centre, the location of the emerging sun, continued in the disk. That compromised the "complex plasma". Concentric rings formed that forced their way to the edge of the disk. Since the matter on the outer edge of the protoplanetary disk rotates more slowly that at the centre of the disk, the matter being pushed outward by the explosions was slowed down, causing it to swirl. That swirling "complex plasma" produced strong magnetic forces that constricted the plasmoidal matter until the gravitation from it formed a planetary embryo. This attracted further matter on its orbit in the protoplanetary disk. It collected the surrounding dust masses during the process, causing it to grow into the final planet relatively quickly. This also explains why there is only one body in a planetary orbit path, namely that of a large vortex that was able to bind the most matter to itself. The remaining dust and gaseous residue was driven out of the disk by the solar wind. – That means the planets formed from the outside as a result of the turbulence, as where else could they have gotten their angular momentum?



This formation of a planetary system from a pulsating star, one like our sun, can actually be observed in T Tauri stars in our Milky Way. They can reach up to 3 solar mass in size. They are young stars that are less than a million years old. They are surrounded by a circumstellar disk of gas and dusk and are in a phase where they are still contracting and have not yet reached static equilibrium. Thus, they tend toward more or less severe, irregular eruptions.

Our sun probably went through that stage of a T Tauri star itself!

4 Discussion

4.1 At the End of Development

During the phase when the young sun began to shine, the strong solar wind blew the planetary disk free of dust and gas. The planets must have already existed then, because the solar wind dissolved the disk from that point forward. Astronomers have observed that young, sun-like stars in our cosmic

vicinity have a stellar wind that is up to a thousand times stronger than our sun currently does. Thus, no matter is left over for a planet to form. Observations of extrasolar systems have shown that this only takes 2 to 3 years. The new star and its planets are then optically visibly at that time. There is no matter left for the formation of further planets. That would also explain why there is only ever one planet in a planetary orbit path. Namely the one whose vortex attracted all the matter. The solar wind blew the remaining matter in the disk to the edge of the planetary system, to the Kuiper belt on the other side of Pluto. Icy minor planets and comets formed from that residual matter. Matter samples taken from comets originating from even further out on the edge of the solar system, in the realm of the Oort cloud, showed that the residual matter of the protoplanetary disk had already mixed with star dust.

However, it cannot be assumed that this principle of planet formation always applies. In the case of extrasolar planetary systems, huge gas giants were discovered that orbited their parent star very closely and in just a few days. – It is conceivable that, in this case, the rotational speed of the emerging star grew so great from the influx of matter from the disk and surrounding area that the star shed part of its outer mass as a result of the high centripetal-inertial forces and supported by a star eruption. A large gas giant formed as a result, which orbits close to the star. The mass of the planet is irrelevant for the speed of orbit. The only decisive factors are the distance from the star and its mass. It thus seems that how a planetary system forms depends on the overall amount of involved matter that is available and also from the composition and the state of that matter.

4.2 The Formation of the Moon

Formation of the moon from a collision with the imaginary planet of Theia is likely a modern fairytale!

The vortex theory for the origin of the planets would lead to the conclusion that the Earth-Moon system did not arise from a collision of primordial Earth with the theoretical planet of Theia. This

theory, developed by astronomer Dr Hartmann, is still very popular at the moment. It is supported, first and foremost, by rock samples brought back by moon astronauts. However, the latest research, published in technical journal “Nature Geoscience” by researches Junjun Zhang, comes to the conclusion that the moon is the Earth’s geochemical twin. They examined the frequency of two isotopes of the metal titanium in samples of moon rock. The results showed that the ratio of titanium 50 to titanium 47 in moon rock did not differ from the distribution in the Earth’s crust by more than 0.0004%. That is surprising, since the isotope frequencies in the solar system otherwise fluctuate by up to one hundred times the strength. The isotope ratios of oxygen, silicon, chromium and tungsten are also comparable, as Mathias Meier of the Swedish University of Lund emphasizes in a supporting article in “Nature Geoscience”.

These results create some difficulties for the current model of moon formation. That is because in the case of a collision with Theia, moon matter would differ from Earthly matter. Based on these results, the Earth and the moon could certainly be considered twins. They were probably formed by a double vortex. – In the beginning, during the phase when the two celestial bodies of Earth and moon were still close together, the tidal wave of burning rock mass that surged ahead of the Earth accelerated

the moon. That acceleration allowed the moon to shift away from the Earth. However, that also slowed down Earth's rotation. After all, nothing is free in nature. After the surface of Earth had cooled, large quantities of water soon fortunately formed on Earth. Earth was, of course, a water planet in its early stages. The origins of the early wealth of water on Earth was described in detail by Merkl in the Canadian "Journal of Geography and Geology" and in the German "Zeitschrift der Deutschen Gesellschaft für Geowissenschaften" (German Journal of Geology). – The moon continued moving away from Earth because the gravitation between Earth and the moon continued to generate a surging tidal wave in the early oceans, which the moon accelerated even further. That caused the moon to continuously move further away from Earth. Even today this effect still causes our moon to accelerate. As a result, the moon moves another 4 cm away from Earth every year. A remarkable aspect of the moon is the giant indented basins on the front side. It was hit by large meteorites 4.1 to 3.8 billion years ago during the age of the great bombardment. The craters filled with magma from inside the moon and formed the "seas" that are still visible today. But why did these large indents only form on the front? Well, interestingly enough, a method commonly used in space technology to accelerate space probes was able to provide an answer. The close proximity at which probes fly by planets causes them to be accelerated by gravity, and they continue their flight at even greater speed. The same effect accelerated the asteroids and comets that flew very closely by Earth 3.9 billion years ago during the great bombardment. If the moon, in its orbit around Earth, just happened to be in the line of fire, those accelerated celestial bodies would have hit the front side of the moon at great speed, since this side always faces Earth as a result of tidal locking. The high speed generated by the "swing by" caused the giant craters. – This effect was missing on the back side. There is only one large impact crater there.

5 Conclusions

According to this theory of the formation of our planetary system from a pulsating solar embryo, the outer planets, meaning the major gas giants, were created first, one after the other starting with Neptune, Uranus, Saturn and Jupiter, from the outside in. It is probable that the protoplanetary disks were still being formed at that time, and that is why they were surrounded by large masses of gas. That is also what allowed the gas giants to grow so large. At the border to the terrestrial planets, the asteroid belt formed instead of a planet.

This was followed by the planets Mars, Earth, Venus and Mercury in intervals that reflect the solar eruptions. Since the asteroid belt lies on the border between the major gas giants and the minor gas giants, it is fully possible that there is a natural phenomenon here that is not yet understood and which is related to the formation of the planetary system in general. In that case, however, extrasolar planetary systems would also have to have this same kind of asteroid belt.

Another secret is Venus, with its very slow orbit. Not to mention in the opposite direction from the other planets in our solar system, as well.

Some astronomers presume that a large celestial body collided with Venus and created this anomaly. – However, since planets supposedly came from vortexes of matter, it is fully plausible that Venus was formed by a double vortex. However, by contrast to the Earth-Moon system, the two approximately equally sized vortexes collided and, in doing so, destroyed their original angular momentum.

Even Mercury, with its large iron nucleus, gives cause for speculation. Through its proximity to the sun, the strong solar wind probably simply blew away the light components of the vortex of matter that formed Mercury. – Or perhaps the young sun was turning so quickly at the end of its creation that,

like a giant centrifuge, it drove the heavy elements to the edge of the solar disk, where the inner terrestrial planets formed from the final explosions. That could probably explain why the planet Mercury has such a large iron nucleus.

The sun naturally lost part of its angular momentum with each of the explosions that brought about our planets.

Our earth, with its large moon, all the water and the right distance from the sun, appears to be a singular stroke of luck for the creation of life. However, because it can be assumed that planets are also formed in extrasolar systems by vortexes, gas and dust masses that surround the star, there should certainly be more Earth-like planets, perhaps even with a large moon, in our galaxy.

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