

***Curiosum* : The Titius-Bode law shows a modified proto- gas-planets' sequence.**

by using the Solar Protuberance Hypothesis and the Maxwell Analogy for Gravitation.

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Summary

During my research on a better comprehension of the formation of our planetary system, which started with my paper "*Are Venus' and Uranus' Tilt of Natural Origin?*", it appeared to me that the protuberance-model needs an addition. As know from my former paper, Neptune is the "lonely planet". But I found more.

In this paper, I come to the *curiosum*, that the sequence order of the gas-planets, at the very beginning of its existence as proto-planets, should have been as follows: proto-Jupiter, -Neptune (!) , -Saturn, and -Uranus.

The basis for this research lays in the existence of the remarkable Titius-Bode law, and the unexpected successive matter composition of our gas-planets.

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1. The solar protuberance.

The Titius-Bode law – The orbits of the planets are spread according a simple law.

In the paper “*Are Venus' and Uranus' Tilt of Natural Origin?*”, it appeared that the planets were probably born out of the sun due to a huge protuberance. A part of it, containing screwing gasses, has been following an electromagnetic force line coming out of the sun, and was mainly composed of hydrogen and helium, supposed to be electrically charged (ions). Thus, a spirally wound ring-segment arose from the sun, was then fractioned into proto-planets and finally became a set of planets.

One of the reasons to suppose the existence of a protuberance instead of a interstellar cloud (like another theory proposes) is the fact that there exists only one planet per orbit, and that these orbits lie on certain distances of each other, as follows from the empiric Titius' law (also known as Titius-Bode law): $a = 0,4 + 0,3 \cdot 2^n$, wherein a is the semi major axis in (AU) and the exponent n , takes the values 1, 2, 3, ... This law was found in 1766, when Uranus was not discovered yet. Nevertheless, it is also valid for the distances of Uranus and Neptune to the sun.

The gas-part and the core-part – Basic concept

As explained in my former paper, the protuberance was a solar eruption in which all types of the planet's atoms were already present. It caused the ejection of matter, about 0,15 % of the sun's total mass, at a speed of about 10^5 m/s .

The hypothesis of a solar protuberance implies that the planets were created from one eruption only, but consisted of two (successive or simultaneous) eruption shocks: a first eruption shock of mainly hydrogen and some helium at one side of the protuberance (proto-Uranus, -Neptune, -Saturn, -Jupiter), followed by an implosion-explosion shock due to the hydrogen shock wave hitting a solar spot at the other side of the electromagnetic force line of that protuberance (proto-Mercury, -Venus, -Earth, -Mars).

2. The initial expansion speed of the proto-gas-planets.

The electromagnetic properties of a solar protuberance – A screwing hot cloud

When the protuberance or eruption is formed, and taking in account the second shock, hitting the solar spot, the series of proto-planets has the following shape. When mass ejections occur, at very high temperature, the ionised hydrogen and the electrons follow a magnetic path which quit one sunspot pole and go to the other pole, creating so a magnetic buckle outside the sun's surface (fig.2.1).

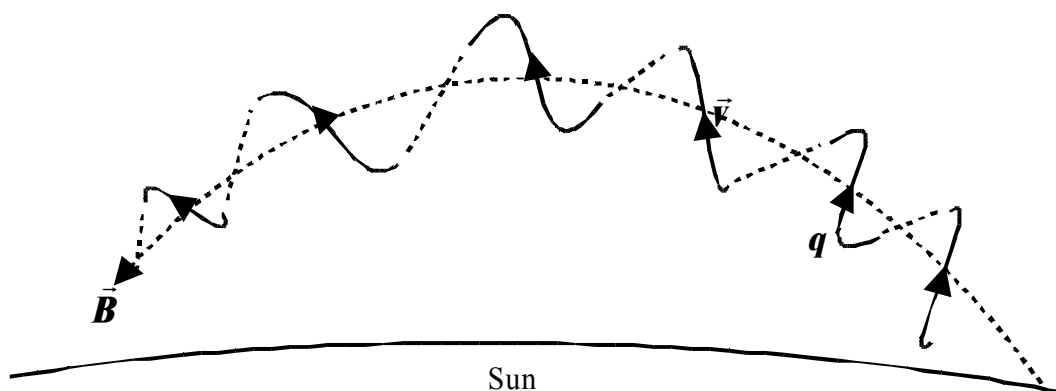


Fig.2.1

In fig.2.1 , \vec{B} is the magnetic field, q the electric charge and \vec{v} the screwing speed of the hot cloud. Remark that the dynamics of the cloud are essentially defined by the positive hydrogen ions. The mass of electrons is too insignificant to influence these dynamics. The electrons will screw very tightly about the electromagnetic force line, in the inverted screwing direction of the hydrogen- and helium ions.

The rotation speed of the proto-gas-planets has been found in former paper out of some thermodynamic considerations of the sun, and this speed complies perfectly with the actual rotation speed of Jupiter.

Disruption into proto-planets – Basic equations

How did the protuberance exactly split-up into proto-planets? Therefore we have to look at fig.2.2.

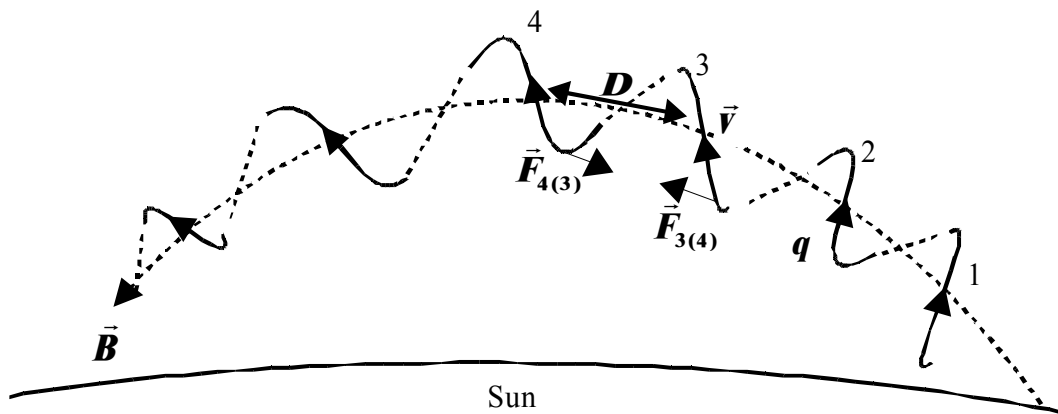


Fig.2.2

Since there are four gas planets known, I will restrict the number of parts to four, assuming that the other parts are insignificant for next calculation. The solid planets are much smaller than the gas-planets and their electromagnetic charge is not easy to estimate. Was a ionised cloud surrounding them? According to which distribution? Therefore, I will not consider too much the solid-core planets further for this paper.

Each part of the screwing hot cloud will undergo a force from the other parts. So, it follows that the cloud will expand in length, allowing the final separation of the parts into proto-planets. The distance D between the parts is assumed to be the same for the whole protuberance.

In the drawing, I have shown two examples of forces: $F_{4(3)}$ and $F_{3(4)}$ which mean respectively the force on part 4 due to part 3, and the force on part 3 by the part 4.

For simplicity, I consider the X-axis positive to the right side, and I disregard the bending of the magnetic force line. This is allowed because, at the end, all the planets move in elliptic orbits, and the starting direction of the proto-planets at this stage of the study is then of little importance.

The forces can then be written as follows.

For part 1 (the first proto-gas-planet):

$$F_{1(2)} = \frac{q_1 q_2}{4\pi \epsilon_0 D^2} \quad F_{1(3)} = \frac{q_1 q_3}{4\pi \epsilon_0 (2D)^2} \quad F_{1(4)} = \frac{q_1 q_4}{4\pi \epsilon_0 (3D)^2}$$

Hence :

$$F_1 = \sum_{i=2}^4 F_{1(i)} = \frac{q_1 (36q_2 + 9q_3 + 4q_4)}{144\pi \epsilon_0 D^2} \quad (2.1)$$

and the acceleration a_1 of the part 1 with mass m_1 is :
$$\mathbf{a}_1 = \frac{\mathbf{F}_1}{m_1} \quad (2.2)$$

For the acceleration of the other parts of course, a similar equation as (2.2) exists.

For part 2 :

$$\mathbf{F}_{2(1)} = \frac{-\mathbf{q}_2 \mathbf{q}_1}{4\pi \varepsilon_0 \mathbf{D}^2} \quad \mathbf{F}_{2(3)} = \frac{\mathbf{q}_2 \mathbf{q}_3}{4\pi \varepsilon_0 \mathbf{D}^2} \quad \mathbf{F}_{2(4)} = \frac{\mathbf{q}_2 \mathbf{q}_4}{4\pi \varepsilon_0 (2\mathbf{D})^2}$$

Hence :

$$\mathbf{F}_2 = \sum_{i=1,3,4} \mathbf{F}_{2(i)} = \frac{\mathbf{q}_2(-4\mathbf{q}_1 + 4\mathbf{q}_3 + \mathbf{q}_4)}{16\pi \varepsilon_0 \mathbf{D}^2} \quad (2.3)$$

For part 3 :

$$\mathbf{F}_{3(1)} = \frac{-\mathbf{q}_3 \mathbf{q}_1}{4\pi \varepsilon_0 (2\mathbf{D})^2} \quad \mathbf{F}_{3(2)} = \frac{-\mathbf{q}_3 \mathbf{q}_2}{4\pi \varepsilon_0 \mathbf{D}^2} \quad \mathbf{F}_{3(4)} = \frac{\mathbf{q}_3 \mathbf{q}_4}{4\pi \varepsilon_0 \mathbf{D}^2}$$

Hence :

$$\mathbf{F}_3 = \sum_{i=1,2,4} \mathbf{F}_{3(i)} = \frac{\mathbf{q}_3(-\mathbf{q}_1 - 4\mathbf{q}_2 + 4\mathbf{q}_4)}{16\pi \varepsilon_0 \mathbf{D}^2} \quad (2.4)$$

For part 4 :

$$\mathbf{F}_{4(1)} = \frac{-\mathbf{q}_4 \mathbf{q}_1}{4\pi \varepsilon_0 (3\mathbf{D})^2} \quad \mathbf{F}_{4(2)} = \frac{-\mathbf{q}_4 \mathbf{q}_2}{4\pi \varepsilon_0 (2\mathbf{D})^2} \quad \mathbf{F}_{4(3)} = \frac{-\mathbf{q}_4 \mathbf{q}_3}{4\pi \varepsilon_0 \mathbf{D}^2}$$

Hence :

$$\mathbf{F}_4 = \sum_{i=1}^3 \mathbf{F}_{4(i)} = \frac{-\mathbf{q}_4(4\mathbf{q}_1 + 9\mathbf{q}_2 + 36\mathbf{q}_3)}{144\pi \varepsilon_0 \mathbf{D}^2} \quad (2.5)$$

The order of the proto-planets however is not known, and we have to find this out by reasoning or by trying out all the possibilities.

3. Evaluating the gas planets' order.

The gas planets' order, based on the actual physical data – The sequence order changed.

There are several reasons to doubt that the actual order of the planets is the same as that of the conception of the proto-planets. In my former paper, I found a few ones. One of the conclusions was that Neptune, the 'lonely planet', was perhaps inversed with Uranus due to the shape of the protuberance. This inversion fit quite well with the strange tilt of Uranus.

Here, I will find another point of view. But amazingly, it is not exactly what I expected. Neptune originated from a totally different region of the protuberance! Although the formal evidence is missing, interesting indications will be found here.

With (2.2), the acceleration of the parts of the protuberance can be calculated, taking in account the electrical charges, which are directly proportional with the known planetary masses.

		SUN	MERCURY	VENUS	EARTH	MARS	JUPITER	SATURN	URANUS	NEPTUNE	PLUTO
Mass	(10^{24} kg)	1989000	0,33	4,87	5,97	0,642	1899	568	86,8	102	0,0125
Diameter	(10^3 m)	1390000	4879	12104	12756	6794	142984	120536	51118	49528	2390
Density	(kg/m ³)		5427	5243	5515	3933	1326	687	1270	1638	1750
Rotation Period	(hours)		1407,6	-5832,5	23,9	24,6	9,9	10,7	-17,2	16,1	-153,3
Distance from Sun	(10^9 m)		57,9	108,2	149,6	227,9	778,6	1433,5	2872,5	4495,1	5870
Orbital Period	(days)		88	224,7	365,2	687	4331	10747	30589	59800	90588
Orbital Inclination	(degrees)		7	3,4	0	1,9	1,3	2,5	0,8	1,8	17,2
Orbital Eccentricity			0,205	0,007	0,017	0,094	0,049	0,057	0,046	0,011	0,244
Axial Tilt	(degrees)		0,01	177,4	23,5	25,2	3,1	26,7	97,8	28,3	122,5

table 3.1^[16]

In table 3.1 , the strange axial tilt of Uranus and its unexpected negative rotation period brought me, in the former paper, to the investigation of the protuberance's shape. Neptune did not play any significant role in this investigation.

As shown in the table 3.2, Uranus has a remarkable matter composition, compared with the other gas planets.

Element (wt%)	Atomic Mass	Jupiter	Saturn	Uranus	Neptune	Pluto
H	1	90,00	93,00	59,00	74,00	
He	2	10,00	3,00	10,00	22,00	
Rocky core (estimate)	25		3,00	30,00	3,00	70,00
Water	10					30,00
Total (wt%)		100,00	99,00	99,00	99,00	100,00
Total mass (10^{24} kg)		1899	568	86,8	102	0,0125

table 3.2^[13]

Thus, the order-sequence of the gas-planets' orbits, compared with the sequence of their tilts and their composition, did me think of some inversion between the planets, compared with the original combination of proto-planets.

Is the switching of Uranus and Neptune confirmed here ? – The wrong hypothesis

My former paper, “*Are Venus' and Uranus' Tilt of Natural Origin?*”, suggests that Uranus' and Neptune's orbit became inverted during their conception, due to the supposed high curvature of the protuberance's ends. Since Uranus is very different of the other gas-planets, the inversion hypothesis seemed to be the logical solution.

	Proto planets	M [kg] (xE24)	q [C] . k	a [m/s ²] . p
1	Jupiter	1899	1899	150,79
2	Saturn	568	568	-443,83
3	Neptune	102	102	-238,99
4	Uranus	86,8	86,8	-113,75

Table 3.3 : *The wrong hypothesis.*

In the table 3.3 , the equations (2.1) to (2.5) are applied on the supposition that Uranus' and Neptune's positions in the large sun's protuberance were originally inverted, compared with the orbits of today.

I connect the condition for the direct proportionality of the accelerations with the orbit radii to the following: the physical law (for low velocities)

$$v^2 = GM / r \quad (3.1)$$

must have been able to catch the planets into orbits, while they decelerated due to the increasing distance to the sun, and thanks to the bending path of the ejected proto-planets, caused by the sun's gravitation.

For the easy use of the calculations, I have put the figures of the electric charges of the proto-planets equal to the actual masses' data of the planets, multiplied with a unknown constant factor k . The reasons are firstly that it is probable that the hot cloud was almost totally ionised and secondly that the value of the distances D between the protuberances' parts are not known.

The results for the initial acceleration of the proto-planets' are multiplied with an unknown constant factor p as well.

Interpretation of the acceleration's sign – The sign does not matter

Indeed, the sign of the acceleration is of no importance, because the path can initiate an orbit at both sides of the sun. A negative (positive) sign for the acceleration will cause a prograde (retrograde) orbit, -or inversely-.

Even when the orbits initiate in retrograde way, these orbits will turn back into prograde orbits, as explained in “[A coherent dual vector field theory for gravitation](#)”. This collapse is generated by any body, moving in the spinning gravitation field of the sun, and the conclusion was that the prograde-wise spinning sun will automatically generate prograde orbits of the planets. During this *angular collapse*, the orbit's diameter remains unchanged, and the retrograde orbit turns towards a prograde orbit, more or less about a virtual axis, laying in the sun's equator plane.

Table 3.3 however is not inspiring at all. Since the accelerations are -or should be- directly proportional with the distances of the actual orbits of the planets, the final order-sequence would then have become : Uranus, Jupiter, Neptune, Saturn, which is indeed not correct.

Since the hypothesis of table 3.3 did not work, other alternatives should be tested.

The alternate hypothesis for the initial position of Neptune – The helium content as an indicator

One of the other possible positions of Neptune can be found out of the matter composition of the planets. Neptune got only 3% of rocky matter, just as Saturn. At the other hand, the mass-sequence (gradually from very large mass to small mass) of the actual gas planets sequence is surprising. Maybe we should try to put Neptune near Jupiter, in order to get the more another protuberance sequence: proto-Jupiter, -Neptune, -Saturn, -Uranus. This makes sense regarding their absolute (not relative) helium and rocky core content, which are then successively decreasing (see table 3.1). Proto-Uranus, of which its heavy rocky core is then at an extremity of the protuberance.

The result of that hypothesis is given in table 3.4.

	Proto planets	M [kg] (x E24)	q [C] . k	a [m/s²] . p
1	Jupiter	1899	1899	63,41
2	Neptune	102	102	-327,33
3	Saturn	568	568	-122,49
4	Uranus	86,8	86,8	-201,13

Table 3.4 : *The right hypothesis and the best fit.*

Here, when considering only absolute values for the acceleration \mathbf{a} , we find the final sequence *Jupiter, Saturn, Uranus, Neptune*, because the accelerations are directly proportional with the orbit radii.

In (3.1), v is the tangential velocity in relation to the sun, and r the radius of the orbit position at any moment, associated to the mass of each part (proto-planet) of the cloud.

A very interesting discovery in table 3.5 is the compliance of the orbit radii with the Titius-Bode law. Although the values do not fit 100% perfectly, the orders of magnitude follow very well the 2^n -law, because each orbit diameter is about half the next orbit diameter. The result for Jupiter is less significant than the Titius-Bode law requests it, but the other results are very impressive. Remark that the constant value in the Titius-Bode law is insignificant for the larger orbits of the gas-planets.

Original sequence	Final sequence
1 Jupiter	1 Jupiter
2 Neptune	2 Saturn
3 Saturn	3 Uranus
4 Uranus	4 Neptune




Table 3.5

An huge initial acceleration (five times the acceleration of Jupiter !) must have pushed Neptune away at a very high speed. Since the distances D between the successive parts of the screwing protuberance are not known, I am unfortunately unable to define the real initial accelerations.

4. Discussion: Is all the preceding to be taken seriously?

Apparently, the point of view in “*Are Venus' and Uranus' Tilt of Natural Origin?*”, where an inversion of Uranus and Neptune has been suggested, contradicts the actual analysis. But even if it does, this will not affect the general thoughts and the conclusions of that former paper, because mainly the tilt of the planets was concerned in there, and the considerations about Neptune took no preponderant place.

All other combinations for the correspondence of the electro- and gravitodynamics of the protuberance with the Titius-Bode law came out to nothing.

The excellent compliance of the sequence *proto-Jupiter, -Neptune, -Saturn, -Uranus* with the Titius law makes possible to go further on this exciting research.

But is the compliance of these calculations with the Titius-Bode law not merely accidental? Must this study be taken seriously? I really don't know. Maybe, maybe not.

The only thing we can do about it is to find other indications stating or refuting the switching of the (proto-)Neptune's sequence, and to look at the possibilities of an accidental fitting of the figures.

At the first sight, there are some difficulties, such as the less perfect compliance of the Jupiter's orbit. At the other hand, the calculations are made with pure and simple maths, based on the well-known Coulomb force.

The protuberances of the sun, which are regularly observed, vanish indeed after some strange and sudden smear-outs in different directions.

The interpretation of the signs with the Maxwell Analogy for Gravitation is based on well-known properties, which are implicitly validated by the quasi-equivalence between this analogy and the GRT.

By testing all other combinations of order sequences for the proto-gas-planets, none of these sequence orders fits (even very approximately) the Titius-Bode law.

Probably, the actual hypothesis should be taken seriously enough to allow further research on questions such as: What is the reason for Jupiter's less perfect fitting? How about the other, smaller planets: is the present theory applicable as well and did there exist a different sequence order at the conception than the actual one? Do the existence of the asteroid ring comply with the protuberance model of this paper? What was the sequence-order of the eight proto-planets? Etc.

5. Conclusion : curiosum about the formation of the gas-planets of our planetary system.

The hypothesis of the changed gas-planets' sequence, essentially of Neptune, allows maintaining the assumption of a huge solar protuberance, while fitting the Titius-Bode law quite well. The planets were created from one huge eruption, but consisted probably of two successive (or simultaneous) eruption shocks: a first eruption shock of mainly hydrogen at one side of the protuberance : proto-Uranus, -Saturn, -Neptune (!) , -Jupiter (or the other way around), followed by an implosion-explosion shock due to the first shock wave at the other side of the protuberance : proto-Mercury, -Venus, -Earth, -Mars, in a yet unknown sequence order.

Using this protuberance theory, and calculating the initial electromagnetic accelerations due to the ionisation of this hot screwing cloud, the requested position of proto-Neptune is quite a surprise. The sequence of the proto-gas-planets has been validated using the Titius-Bode law, to which the found orbit sequences fit remarkably well.

For the interpretation of the data, the use of the principles of the Maxwell (or better Heaviside-) Analogy for Gravitation is mandatory, making evident the indifference of the initial orbit direction of the proto-gas-planets.

6. References and interesting lecture.

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