Signature of the Celestial Spheres

by Hartmut Warm

The idea that a special order exists in our solar system, a kind of harmony of the spheres, has had a place in cultural history for thousands of years. Pythagoras (c. 580 - 496 BC) discovered the coherence between the simplest relations of small whole numbers and musical intervals, and he was convinced that the same laws were also valid in the cosmos. These ideas were taken from Greek antiquity in different variations up to the end of the Middle Ages. In 1597 William Shakespeare expressed the concept of a music of the spheres in the following wonderful lines and although human beings cannot hear the celestial music, they are nonetheless linked to the cosmic order which embraces all things.

> There's not the smallest orb which thou behold'st
> But in his motion like an angel sings,
> Still quiring to the young-ey'd cherubims:
> Such harmony is in immortal souls;
> But, whilst this muddy vesture of decay
> Doth grossly close it in, we cannot hear it.[1]

Also in 1597, the German astronomer Johannes Kepler (1571-1630) published his first book, *Mysterium Cosmographicum*. And in the subsequent two decades he discovered the fundamental planetary laws. With their aid he managed to raise those ancient concepts onto a new level. Kepler was not endeavouring to discover laws of nature as we understand this notion nowadays; he was seeking for the common bond which connects music, geometry and astronomy: the 'Harmony of the World', as he called his main work, published in 1619. For him these 'secret powers, which hold this world together'[2], were geometric archetypes at work in musical intervals and also in creation. On Earth, he thought, they play a role in weather conditions. These archetypes live also in the inner soul of the human being who, without them, would be incapable of perceiving harmony.

About 15 years ago a deeper exploration of music and its spiritual meaning led me to investigate more profoundly the question as to whether ideas of a harmony of the world and of the spheres can still hold their own against the background of modern astronomical knowledge and calculation methods. Our view of the cosmos is of great importance for our philosophy of life and also for our sense of being connected with, or estranged from, nature. Who can claim that the discoveries of modern astronomy - however fascinating they may be - have given us some spiritual stability and confidence? Those who believe that we are lost and homeless in the cosmos and who think that our blue planet is no more than a dust particle, lacking any relationship with the universe, may well be inclined to approach things on Earth with a similar attitude.

What began with a scrutiny of Johannes Kepler's ideas concerning the harmony of the spheres finally became my own search for order in our solar system. I found that there are indeed very precise correspondences with musical intervals, although of a kind that differs from what Kepler, and also others, had thought. Most notably I discovered geometric figures of a striking beauty which arise when the motions of the different planets are depicted in relation to one another over long periods of time. As in music, where a single note first gains meaning within the coherence of a melody or a harmony, the hidden order in the solar system is first revealed in the interrelationships of the planets. Strangely enough, this co-operation has almost no part to play in current 'official' astronomy. Yet in its clarity it could be eminently suitable as an aid to renewing our

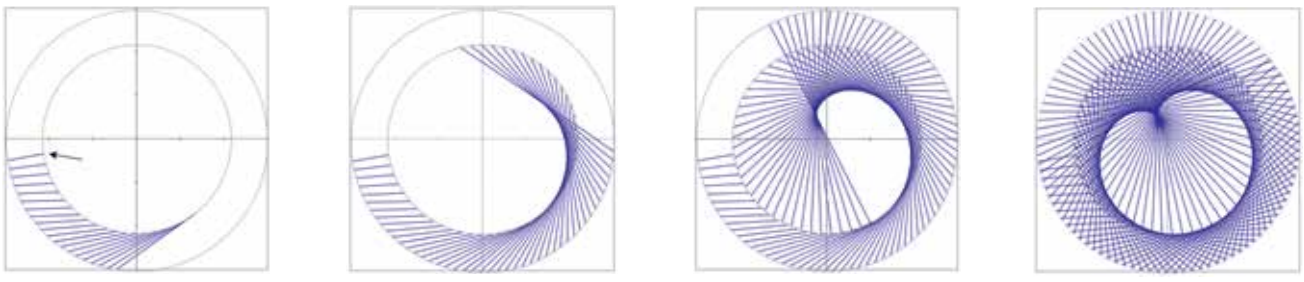


Figure 1.

Venus-Earth linklines, a) continually plotted in the plane of the ecliptic, stepping interval 3.9 days, 20 times, starting at a position of conjunction (arrow); b) 45 times; c) 76 times (opposition); d) 151 times (next conjunction). Inside: Venus orbit, outside: Earth orbit, Sun in the centre.

feeling of being connected with the cosmic order which humanity, for the most part, has lost over the last three or four centuries. We can say that the harmony of the spheres which 'we cannot hear' is made visible in these planetary movement figures. As Shakespeare put it: 'The orbs ... sing ... in motion'.

Movement Structures in the Planetary System

Imagine two planets circling round the Sun at a certain point in time, for example the Earth and its inner neighbour, Venus. Both planets are somewhere on their elliptical orbits that lie in a plane, known as the ecliptic, from which the different orbits deviate only very slightly. We can imagine a connecting line between them, which I have termed the linkline. Some time later, for example three or four days, the planets have covered a part of their orbits. Venus has covered a somewhat greater segment of its journey because it moves faster than the Earth. Again we draw a linkline, which has shifted and turned slightly. If we continue this procedure – in the same stepping interval – for 8 years, the flowerlike form of Fig.2 arises (for intermediate stages see Fig.1).[3] It is ordered according to the number five. This corresponds

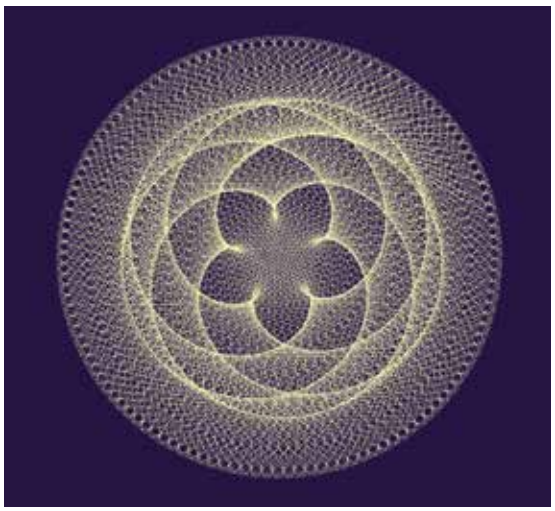


Figure 2. *Venus-Earth linklines, period 8 years*

to a cycle of five conjunctions, occurring in a period of nearly eight years, where the two planets are in line with (and both on the same side of) the Sun (see Fig.3) The order according to the number five also exists in the geocentric (Earth-centred) view; it is thought even the Babylonians knew about it. The number five was often attributed to Venus, in reality however – i.e. in the heliocentric (Sun-centred) view – it is a relationship between two planets which expresses itself in this way.

The reason for the genesis of the figure according to the number five is to be found in the nearly precise ratio of 13:8 of the orbital periods of Earth and Venus. In astronomy, ratios like this (ratios of small whole numbers) are called resonances. They can affect the long-term stability of the orbits of planets and asteroids, exerting either a stabilizing or a destabilizing influence, depending on the ratio involved. The reason for this influence lies in what we at present understand as the

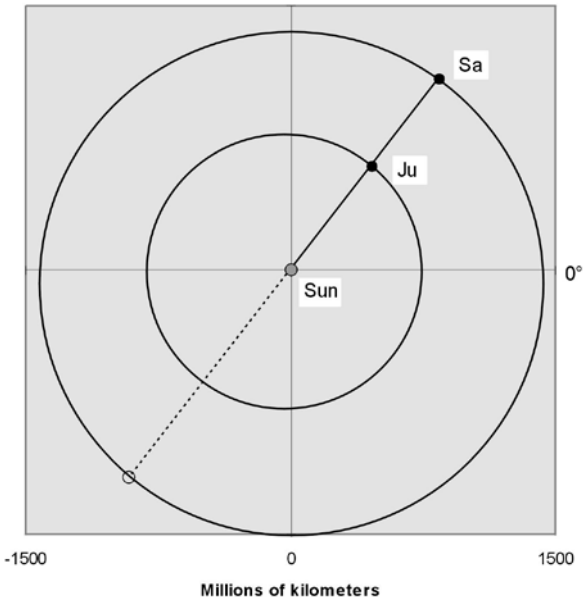


Figure 3. *Example: Jupiter/Saturn conjunction on 22 June 2000 (dotted line: opposition)*

gravitational interactions between the celestial bodies involved being intensified by resonances. The movement figures shown here give an overall impression of these gravitational effects or, in other words, of the co-operation of the planets.

Every conceivable combination of planets can be depicted graphically in this way in corresponding diagrams. There is always a result of some kind, but a precise geometric figure ordered according to a small integer (up to the number 12) emerges only in two cases. The first we have just seen, and the second is shown in Fig. 4. Here the relation between the two giant gas planets, Jupiter and Uranus, manifests geometrically.

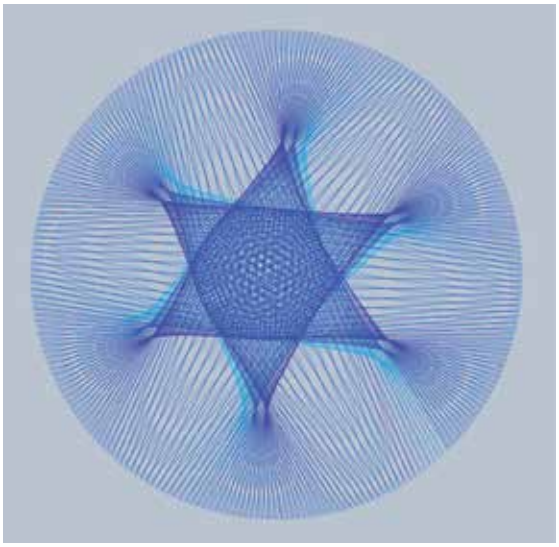


Figure 4. *Jupiter-Uranus linklines, period 248.6 years*

Because they move very much more slowly, we have selected a correspondingly longer stepping interval between the linklines as they follow one another. Incidentally, the figure that arises is independent of the exact chosen interval (it doesn't play any role, if you take e.g. 60 or 71 or 83 days etc), as long as it is not

too long or too short. So far, the inner region of our planetary system is characterized by a five-pointed star, which we see in the centre of the star-flower in Fig.2 and which also arises when the sequential conjunction positions of both planets are connected. And the outer planetary system is represented by the six-pointed star. In all probability these two star-figures have been those most frequently used - in different ages and cultures – to represent certain symbolic contents: the order in the cosmos (hexagram) and the position of the human being within it (pentagram). In a certain way they correspond, therefore, with the archetypes which Johannes Kepler postulated geometrically and which C.G. Jung much later interpreted psychologically. For Jung, archetypes were innate models of behaviour, imagination and experience in the collective subconsciousness of mankind. That some geometric figures are truly archetypes which speak to human beings mostly in an unconscious manner we can all check for ourselves by paying close attention to where and for what purpose these figures – above all the pentagram – are used.

We turn now to some examples of the relationships between the inner and the outer planetary system. Here the representation of the linklines will be expanded so as to make it possible in each case to show how three planets relate with one another. The depiction is based on the conjunction dates of two of the three planets involved. Also, with regard to celestial mechanics, the position of the conjunction between any two planets is the most important one, because at this moment they are nearest to each other and therefore their gravitational interaction is the strongest. At each position of conjunction a linkline can be shown between one of the two planets involved in the conjunction and the third planet. The first example (Fig. 5) shows Venus, Earth and Pluto. At every Venus/Pluto conjunction a linkline is drawn between Venus and Earth (if we take Earth/Pluto conjunctions the result is almost identical). When some centuries have passed, we see that through the participation of Pluto the five-fold star-flower of the Venus/Earth relation has changed to a six-fold one. The reader will no doubt agree that this transformation is rather surprising. And, by the way, this is also a hint that Pluto does indeed belong to the community of the planets, regardless of the current scientific definition of what a planet is supposed to be, a definition which fails to take account of how the members of this community relate with one another.

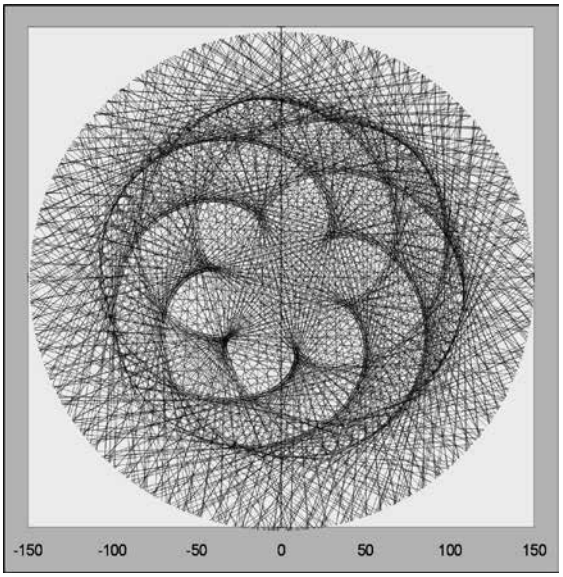


Figure 5. *Venus-Earth linklines at Venus/Pluto conjunctions, period 616.7 years, scale in millions of km*

Our next starting point is the second of the two archetypes we have seen: the hexagram of Jupiter and Uranus, which we now relate to Mars, Earth's nearest outer neighbour. As in the method described above, the Jupiter/Uranus linklines are depicted as Mars/Jupiter conjunctions (and as before, the result would be almost identical if Mars/Uranus conjunctions were taken). After about one-and-a-half millennia, the six-pointed star, which is still faintly recognizable in the outer part of the diagram (Fig. 6), has changed into the now familiar five-petalled flower. In its inner part there is once again a hint of the pentagram. Whereas we earlier saw the number five being changed into the number six, we now see the converse geometrical effect of the six being changed into the five. These reciprocal metamorphoses of the two star-figures, which characterize the inner and the outer planetary system, demonstrate clearly that there are not only certain geometric relations between in each case three planets, but also that the different formations are mysteriously related to one another. These pictures are surely astonishing.

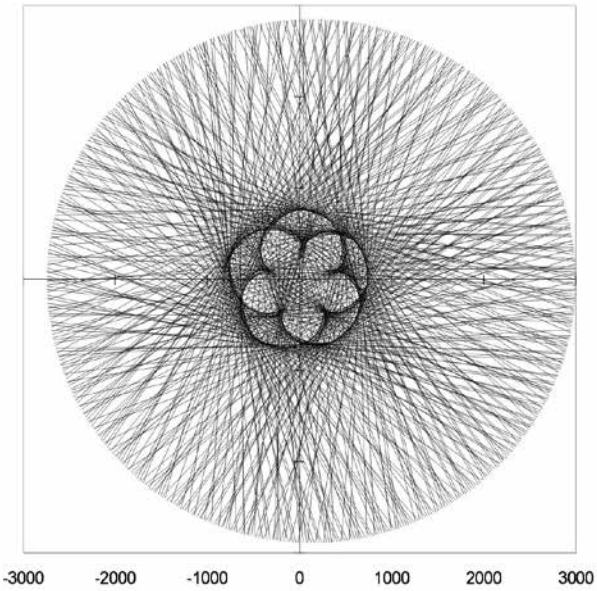


Figure 6. *Jupiter-Uranus linklines at Mars/Jupiter conjunctions, period 1453.9 years, scale in millions of km*

The gravitational force of the Sun keeps the planets in their orbits. But the planets also have some effect on the Sun and indeed on each other as well. Over long periods of time these gravitational interactions cause

the orbits to change – in rhythms of tens of thousands to hundreds of thousands of years. But the planets never leave their spheres and overall the system remains stable. That is by no means self-evident, and up to now nobody knows the reason why they behave in this way.[4] It is also noticeable that apart from the Sun the forces of the giant gas planets in the outer region of the system have the strongest balancing effect on the planetary interplay. In addition we find that the relationship of the three most massive planets, Jupiter, Saturn and Neptune, brings about the best-regulated and most astonishing emergence of different geometric forms. Over periods of some thousands of years, geometric figures involving the number twelve arise between these planets in all possible configurations. (See Fig.7) as an example showing the movement figure of Saturn/Neptune at Jupiter/Neptune conjunctions).

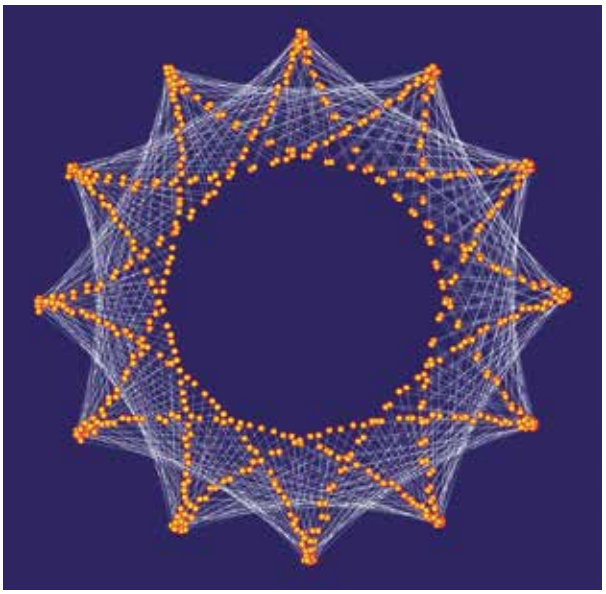


Figure 7. *Neptune as seen from Saturn at Jupiter/Neptune conjunctions, period 8,947.4 years. The points represent the planetary positions, the lines are the successive connections between two positions.*

In this case the positions of Neptune as seen from Saturn are depicted and connected sequentially at the conjunctions mentioned. (A very similar figure arises in the heliocentric view, though on another scale, when the midpoints of the linklines were shown.) The lines linking the chronological planetary positions form two hexagons and the sequence of positions as such appears in three four-cornered star-like formations. In geometry the single figure is termed an astroid (see Fig.8). Three astroids interweave to form a 12-pointed star-figure and, in combination with the figures traced by the lines, the result is a geometrical expression of perfection capable of touching the very core of our being almost as music does. If we now remember that from ancient times the number twelve has been associated with the perfection of the heavens (the 12 signs of the zodiac, the 12 gods in the Greek Pantheon and many others), we may claim that it is scarcely possible to conceive of a more appropriate image. Furthermore it can be shown that the order according to the number twelve also underlies the movement dynamic of the whole solar system which is determined predominantly by the three planets mentioned here together with Uranus.[5] It therefore seems very probable to me that the unexplained stability of the planetary system has to do with the harmonic structure of the movement relations of the four giant planets, although there is (as yet) no scientific proof for this view.

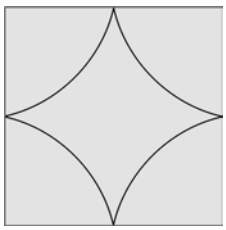


Figure 8. *Astroid*

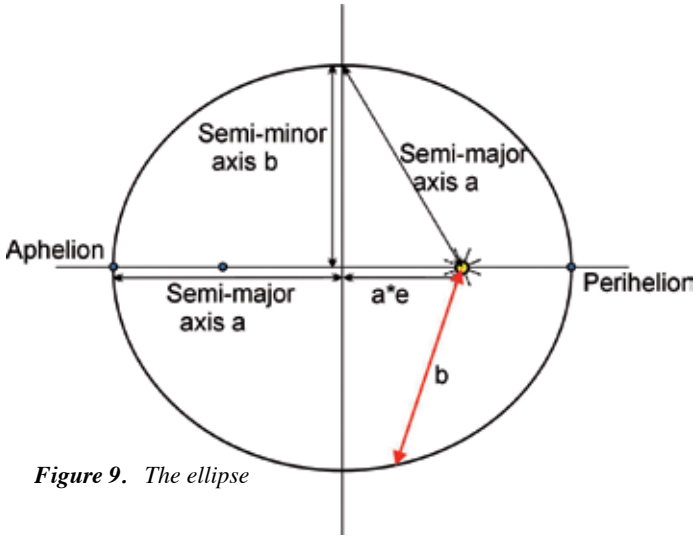


Figure 9. *The ellipse*

The Harmony of the Spheres after Kepler

Finally let us turn to ancient concepts about the harmony of the spheres. From Pythagoras onwards people understood this to be a correspondence between certain planetary relationships and the musical intervals (musical intervals are for instance the octave 2:1, the fifth 3:2, the fourth 4:3 etc.). Pythagoras and his successors, however, were able to specify only very generalised correspondences, which differed in some instances, for there was as yet no way in which they could have determined the parameters of the planetary orbits such as distances, velocities and so on with even a minimum of accuracy. This was not possible until Johannes Kepler discovered the planetary laws. His first law states that the planets move in elliptical orbits. Based on this, and with the aid of his other laws, he was able to calculate the velocities at the points of the elliptical orbit closest to and farthest from the Sun (perihelion and aphelion, see Fig. 9). He believed he had found in their ratios an excellent correspondence with musical intervals. (To be more precise, he actually used the angle velocities, i.e. the angles which the planets cover within the same unit of time – for example one day – as seen from the Sun.)

The decisive question, however, is how to interpret this 'music of the spheres' against the background of modern astronomical and mathematical possibilities. Probability calculation, as yet undiscovered in Kepler's day, is what is needed to find some sort of answer to this

question. If we determine a certain number of ratios, for instance the ratios between the velocities of the different planets, we will always find some which correspond more or less precisely with musical intervals. So even without a detailed knowledge of probability calculation one can imagine that there will be a certain statistical mean (average) or mean probability regarding such correspondences. Only if the investigated relationships show a correspondence that is significantly higher than the statistical mean can one speak of a good correspondence. And in this sense we have to state, for the present, that the probability for a harmony of the spheres in the planetary system, such as Kepler thought he had discovered cannot be stated with any certainty, it is not greater than that of a random distribution.

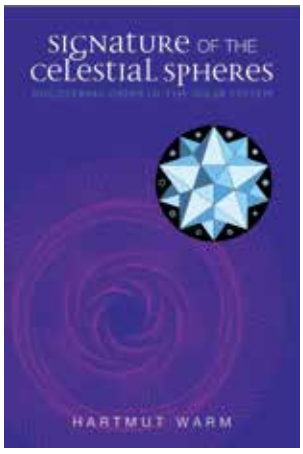
This was the matter-of-fact analysis which stood at the beginning of my search for the order in our solar system. But deep down I was convinced that the basic ideas of Pythagoras and Johannes Kepler were true, even though Kepler's concrete specification had turned out to lack plausibility. As I continued to work I found that there was indeed a statistically highly significant correspondence between the ratios of certain parameters of the planetary orbits and musical intervals. Within the scope of this article I can only outline the main ideas of my, not at all simple, investigations which have led to this result.[6] We have to take not the angle velocities, as Kepler did, but the orbital velocities (e.g. the Earth circles round the Sun at a speed of about 30km/sec!). By calculating these velocities at those points where the planets are at the distance of their semi-minor axis from the Sun (see Fig.7 9) and relating these with the aphelion (when the planet is farthest from the Sun) velocities, we find a very precise correspondence with musical intervals. The probability of this result being purely by chance is only about 1:1600. In other words, there is a certainty of 99.9% that this is proof that the harmony of the spheres, believed to exist by Pythagoras, Kepler and many others, is more than a 'beautiful dream' as it is often called in scientific literature. It can be found in the concrete orbital data.

According to the current scientific theory, planets arise from discs of gas and dust surrounding young suns. Incessant collisions cause the initially diffusely distributed and minute dust particles to clump together more and more until, if all goes well, they reach the size and shape of planets at some point. Even without knowing anything about probability calculation one can assume that in this kind of genesis of planets the final location of their orbits and velocity ratios are indeed purely random. This concept does not allow for a 'harmony of the spheres' or if it came about it would be an utterly gigantic accident. (But of course the current view of the world teems with entirely improbable random incidents which had to happen so that the Sun, the Earth and all the plants, animals and human beings living on it could arise.) In my opinion a genesis by chance and an all-encompassing spiritual sense (which also reveals the significance of how the individual phenomena relate to one another) are mutually exclusive. This is the true dilemma into which the modern concept of the world has thrown us. But there is nothing to stop us asking ourselves whether the scientific view, determined by purely intellectual thinking, can grasp all aspects of existence, and whether we want to grant it this power. For sometimes, if we hear a piece of music which moves us deeply, we know: here, in between the notes, something is at work, something which is more than what the physically transmittable vibrations and the physiologically perceivable sounds can tell us. And it seems that also in the cosmos, at least in our solar system, something is at work which is beyond our purely intellectual grasp, something which is able to help us see in a new light the old ideas of a harmony of the spheres and of a cosmos within which - despite all suffering in this world – we are harmonically integrated.

Hartmut Warm lives in Hamburg, Germany

Endnotes

1. William Shakespeare, The Merchant of Venice, Act V, Sc.1.
2. Quotation from Goethe's *Faust*.
3. This mode of depicting the Venus/Earth relationship appeared independently in: John Martineau, *A little book of coincidence*. A similar drawing had already been published in Neil F. Michelsen, *Tables of Planetary Phenomena*.
4. see: e.g. Ivars Peterson, *Newton's Clock. Chaos in the Solar System*, W. H. Freeman and Company, New York 1993.
5. This cannot be shown in detail here. See: Hartmut Warm, *Signature of the Celestial Spheres*, Sophia Books/Rudolf Steiner Press, Forest Row 2010, Chapter 12.
6. Ibid., Chapter 4.



Descriptions
The Figures are taken from: Hartmut Warm, *Signature of the Celestial Spheres*, Sophia Books. © Keplerstern Verlag, more information: www.keplerstern.com