9 Gravity in the framework of the axiomatics of the Algebra of Signatures. Interaction of uncharged «particles»

In previous chapters the following results were obtained:

- a metric-dynamic models of all elementary «particles» and «antiparticles» (fermions and bosons) included in the Standard model (with the exception of Higgs bosons) was proposed;

- the chaotic behavior of the cores and the internal nucleoli (particelles) of «particles» and «antiparticles» was considered;

- the foundations of quantum light geometry (stochastic metraphysics) were laid;

- a statics and dynamics of a stable vacuum entities («particles» and «antiparticles») was considered;

- the metric-dynamic models of electrostatic interactions between charged «particles» and «antiparticles» were investigated.

In this chapter the model concepts of gravity (attraction) of non-mobile or slow moving as compared to the speed of light of uncharged «particles» (in particular, «stars» and «planets» or «atoms» and «molecules») are laid.

9.1 Brief analysis of ideas about the nature of gravity

Take an object in your hand, raise it to eye level and release it. Why would an object fall to the ground?

There have been many attempts to explain this phenomenon. Some ancient philosophers were of the opinion that the World is a mixture of whirlwinds of Love and Hatred, and gravity is a natural property of local clots of living matter, due to the universal desire for reunification.

There were also such pragmatic thinkers who believed that when bodies converge, the resistance of the medium between them only decreases. Still others, on the contrary, believed that the environment is closed behind the converging bodies and exerts excessive pressure on them from the outside.

Aristotle somewhat changed the vector of thinking in relation to gravity, stating that the rate of fall of bodies on the earth depends on their magnitude. Indeed, for example, if a pencil and a piece of fluff were simultaneously released from a given height , the pencil would reach the ground much earlier than the piece of fluff.

With the opinion of Aristotle was considered for over two millennia, until Galileo Galilei (1564 – 1642) and his associates began to drop from the top of the leaning tower of Pisa at the same time 100 and 50 pound cores. What was the surprise of Galileo and his disciples when they became convinced that, contrary to the physics of Aristotle, whole cores and half from the same cores fall to the ground at the same time. On the basis of a subsequent series of experiments Galileo found that in the case where air resistance can be neglected, all bodies, regardless of their size fall to the ground by the same law

$$s = 4{,}9\, t^2, \qquad (9.1.1)$$

where s is the path of free fall of the body to the ground during time t.

The next page in the study of the phenomenon of gravitation was turned by Isaac Newton (1642 – 1727). Legend has it that when an apple fell on Newton, it occurred to him that the same force that attracts an apple to the Earth keeps the Moon in orbit around the Earth. Developing this idea, Newton eventually formulated the law of universal gravitation: "the Force with which two bodies are attracted is proportional to the product of their masses and inversely proportional to the square of the distance between them." Newton's followers presented this conclusion in the form of the following compact formula:

$$F = G\frac{mM}{r^2}, \qquad (9.1.2)$$

where M is the mass of the planet;

m is the mass of the body falling on the surface of the planet;

r is the distance between the centers of gravitating bodies;

G is the universal gravitational constant ($G = 6.6720 \cdot 10^{-11}$ N·m^2/kg^2).

However, Newton was forced to admit: –"So far I have explained the celestial phenomena and the tides of our seas on the basis of gravity, but I have not indicated the causes of gravity... The cause of the force of gravity, I still could not withdraw from the phenomena; hypotheses I do not fabricate... Enough of the fact that gravity actually exists and operates according to the laws we set out."

In 1749 George-Louis Le Sage proposed an explanation for the phenomenon of attraction between two material bodies. It is speculated that the space is filled with tiny moving particles (Le Sage called them “ultra-mundane corpuscles”, later these particles were called lesagons). Since the concentration of lesagons outside bodies than between them (Figure 9.1.1), the body as if attracted towards each other by external pressure of lesagons. At the same time, as well as the law of universal gravitation of Newton (9.1.2), the attraction of bodies under the action of lesagons is inversely proportional to the square of the distance between these bodies.

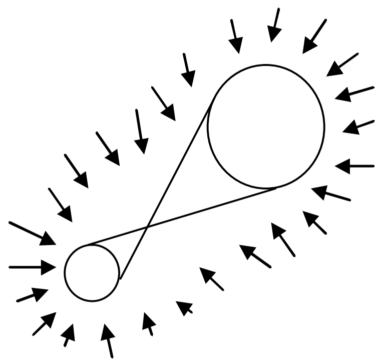


Fig. 9.1.1. According to the hypothesis of Le Sage external pressure of lesagons leads to the convergence of two bodies

The hypothesis of Le Sage was subjected to criticism by Jules Henri Poincare. He argued that if lesagons really existed, you would have observed the following phenomena: 1) a moving body in a Le Sage’s gas due to resistance to movement of the oncoming flow of this gas should slow down at an increasing rate. But such deceleration is not observed, otherwise all the planets would long ago have fallen into the Sun; 2) the kinetic energy of the absorbed lesagons must pass into the bodies which absorbed them. For example, in this case the surface of the Earth would have to be uniformly heated to a very high temperature, whereas in reality neither the crust of our Planet, nor its bowels, are at such a high temperature.

Poincare's criticism significantly reduced the interest of the scientific community to the Le Sage hypothesis. Moreover, by the turn of XIX – XX centuries, particles with the properties of lesagons (e.g., neutrinos) had not yet been discovered.

Modern physics is confident that the entire Universe is permeated with neutrino fluxes, which allowed some scientists to return to the ideas of Le Sage. The hypothesis that neutrinos can play the role of lesagons may be applicable to the explanation of the mutual rapprochement between small bodies. But to explain the gravity of stars and planets it is clearly not appropriate. Neutrinos interact too weakly with matter, so that their fluxes cannot explain the retention of planets in the orbits of the stars.

Mathematical approaches based on the principle of "close interaction", applied by the Italian, French and English schools of science in the XV – XVIII centuries to identify the nature of gravity have not led to the solution of this problem. Therefore, scientists in Germany and Austria-Hungary put forward the idea of "long-range", according to which the gravitation between the bodies is explained as a result of a myriad of specific acts of mutual relations of all points of the Universe with each point of the given region of space. This relational approach explains not only gravity, but all natural phenomena in general. The relational hypothesis continues to be developed by a number of modern scientific centers. However, most physicists are skeptical about this area of research, not only because of the complexity of the mathematical problems behind this hypothesis, but also because the transfer of all interactions known to science (including gravitational) occurs at a finite speed not exceeding the speed of light.

Georg Friedrich Bernhard Riemann (1826 – 1866) in his work "Fragments of philosophical thoughts" [44], published in 1876, (Note: incomplete reference; this was part of “B. Riemann, Gesammelte mathematische Werke und wissenschaftlicher Nachlass”) expressed the following idea: "Existing at each point of space a certain magnitude and direction of the force of acceleration (i.e. gravity), I try to explain the movement of a substance that fills all infinite space, namely, assume that the direction of its movement coincides with the direction of the force of acceleration (free fall), and its speed is proportional to the magnitude of the acceleration force. This substance can be imagined as a physical space, the points of which move in geometric space. On the basis of this assumption, all effects of weighty bodies on weighty bodies are transmitted in the empty space by means of the named substance. ... The further development of this hypothesis is divided into two parts: 1) the study of the laws of motion of the substance, allowing to explain the phenomena; 2) the study of the causes that explain the very occurrence of this movement."

By this statement Riemann drew attention to the fact that massive bodies behave in the gravitational field in the same way as solid objects float in the accelerated flow of water. For example, a large log and a small sliver move in the river with the same acceleration coinciding with the acceleration of the movement of the water itself. Like a stream of water, the invisible substance of Riemann, directed to the center of the Earth, carries everything that occurs in its path, and presses to the solid surface of the Planet.

This hypothesis of Riemann has, however, one significant drawback: "If a certain thin substance (physical space, ether, fluids or vacuum) is constantly in large quantities flowing from space to the core of the planet, where it is placed?”

All our physical experience, brought up on the study of metabolic processes, rebels against the fact that the bowels of the stars and planets can be infinite reservoirs of fine substance. In addition, with the constant flow of a subtle substance into the bowels of gravitational bodies, it should gradually disappear from outer space as a result of such a process, which should inevitably manifest itself in the form of some physical consequences.

Some researchers believe that the vacuum falling into the bowels of the planets flows into an anti-Universe or moves along a wormhole to another place in our Universe.

Other scientists believe that the vacuum flowing from space goes to heating the bowels of stars and planets and the formation of material particles, as a result of which the size of stars and planets must constantly increase. These areas of research have not yet received reliable experimental confirmation, and therefore did not cause significant enthusiasm in the scientific community.

Albert Einstein's ideas have acquired a completely different logical continuation. Einstein conjectured that each arbitrarily small region of the gravitational field can be put in correspondence with the local accelerated frame of reference (equivalence principle). If the inert and gravitational masses of a material body are equivalent, then its behavior in the accelerated frame of reference completely coincides with its behavior in the gravitational field.

The development of ideas based on the principle of equivalence led Einstein to the creation of the theory of General Relativity (GR), in which gravity is explained by the static curvature of the space-time continuum around massive material objects.

Space-time views of Einstein were devoid of the shortcomings of Riemann’s hypothesis. At the same time, within GR it was not necessary to introduce ideas about some experimentally unobservable subtle substance (ether) and explain where this substance eventually disappears after it enters the bowels of stars or planets.

Stationary (i.e. time-independent) solutions of Einstein's vacuum equation for the empty space surrounding a material body with mass M,

$$R_{ij} = 0 \qquad (9.1.3)$$

were found by Karl Schwarzschild in 1916, and has the form

$$ds^2 = \left(1 - \frac{2MG}{r}\right)c^2 dt^2 - \left(1 - \frac{2MG}{r}\right)^{-1} dr^2 - r^2 d\theta^2 - r^2 \sin^2\theta\, d\varphi^2, \qquad (9.1.4)$$

where r is the radial coordinate (more precisely, the length of the equator divided by 2π), at a great distance from the object in question; we can assume that this is the distance measured from the center of the star or planet.

But GR is not devoid of internal contradictions, and it does not explain the nature of gravity, but only offers a more subtle model of its description.

First, the curved "space-time", which is based on General Relativity, is a very fragile mental construct. The fact is that, as Ernst Mach pointed out, "space-time" has never been seen, since neither space nor time is given a direct dimension. They always appear only as a convenient mathematical abstraction, copying the surface properties of extended media and the duration of real processes.

Secondly, Einstein simply declared that a massive body bends the space-time continuum, but did not explain how it happens. In addition, the body mass M is not a geometrized concept. Mass is heuristically introduced into GR , designed to harmonize relativistic theory with Newtonian celestial mechanics.

Third, if the right side of the equation (9.1.3) is not zero, that is, if $M \neq 0$, then the laws of conservation of energy are violated in GR .

Currently, string theorists are attempting to understand the nature of gravity. In the framework of superstring theory, it is possible to describe a quantum object with spin 2, which is considered a mathematical model of the graviton -- the carrier of the gravitational interaction. But the answer to the question: "How does it help in understanding the causes of gravity?" remains hidden behind a veil of mathematical fog of "superstring" ideas.

In this chapter, the Algebra of Signatures (Alsigna), based on the ideas of B. Riemann and A. Einstein, offers a fully geometrized description of the gravitational interactions between stable uncharged and charged vacuum formations, using the example of the study of the interaction between naked «stars» and «planets».

9.2 Naked «star» and naked «planet»

The nature of gravity will be investigated by the example of the interaction of the «star» and «planet», but it is assumed that all the arguments and conclusions made in this chapter relate to any other stable vacuum formations with dimensions: from the microcosm to the world of galaxies and metagalaxies.

«Stars» and «planets» have the typical dimensions of $\sim 10^4 - 10^7$ km = $10^9 - 10^{12}$ cm, so to identify their metric-dynamic structures we use monochromatic electromagnetic waves, according to the method described in §§ 1.3 – 1.7, from the wavelength range $\Delta\lambda = 10 - 100$ km = $10^6 - 10^7$ cm.

Fractal illustrations of possible results of radar sensing of «stars» and «planets» by radio waves with different wavelengths are shown in Figures 9.2.1 through 9.2.6.

Fig. 9.2.1. Fractal illustration of the results of probing the location of the «star» (and /or «planet») with rays of light from the wavelength range $\Delta\lambda = 10^{-14} - 10^{-16}$ cm. In this wavelength range of the «star» and «planet» (more precisely, the landscapes $\lambda_{-14,-16}$-vacuum) look consisting of shells of «atoms», «molecules» and free elementary «particles»

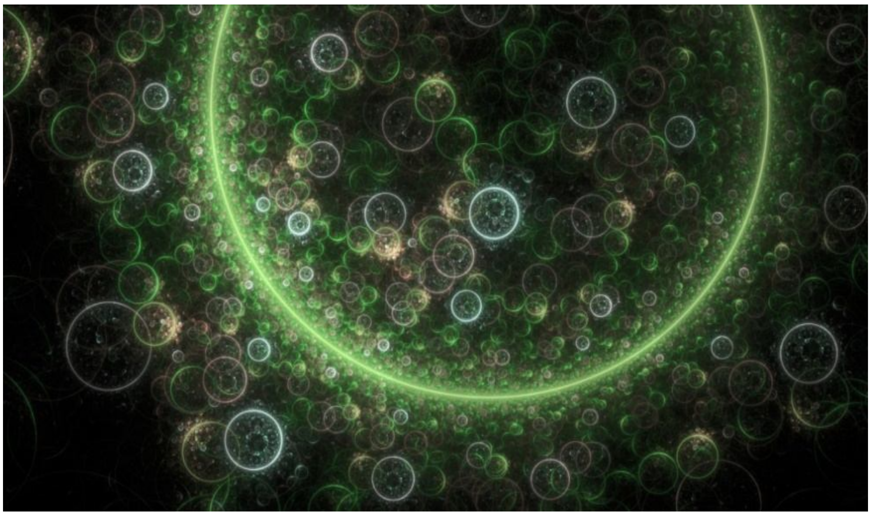
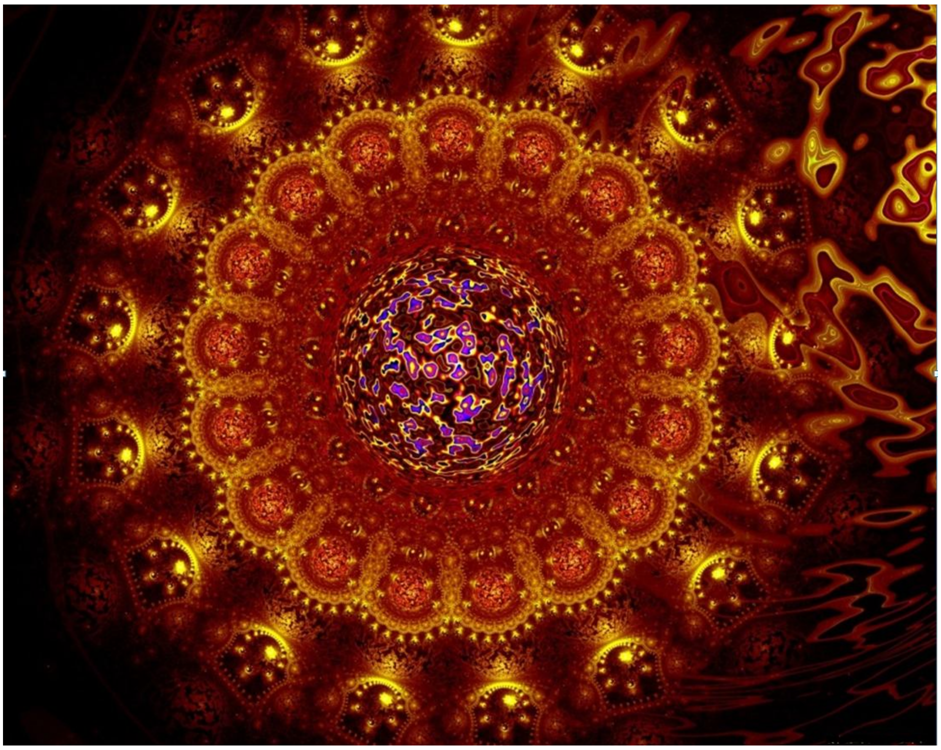


Fig. 9.2.2. Fractal illustration of the results of probing the location of the «star» (and /or «planet») with rays of light from the wavelength range $\Delta\lambda = 10^{-5} - 10^{-6}$ cm. In this wavelength range of the «star» and «planet» (more precisely, the landscapes $\lambda_{-5,-6}$-vacuum) look consisting of of biological «cells», «bacteria», «viruses» and other «microorganisms»



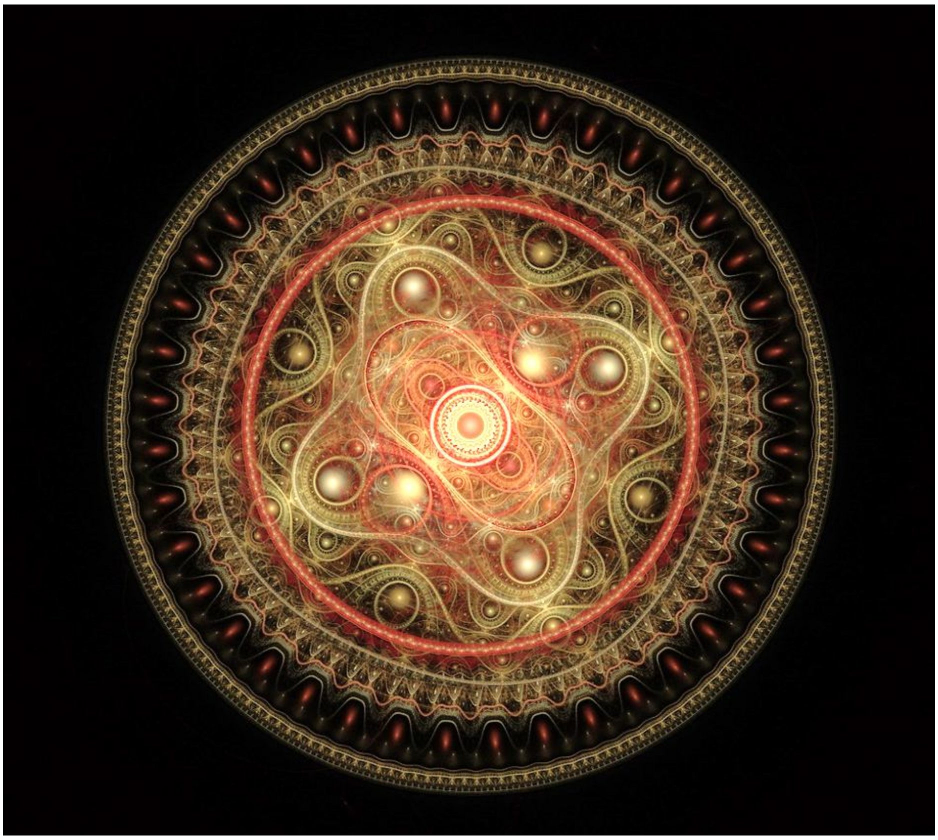


Fig. 9.2.3. Fractal illustration of the results of probing the location of the «star» (and /or «planet») with rays of light from the wavelength range $\Delta\lambda = 10^1 - 10^3$ cm. In this wavelength range of the «star» and «planet» (more precisely, the landscapes $\lambda_{1,3}$-vacuum) look like the fluctuations and turbulence of the continuous medium

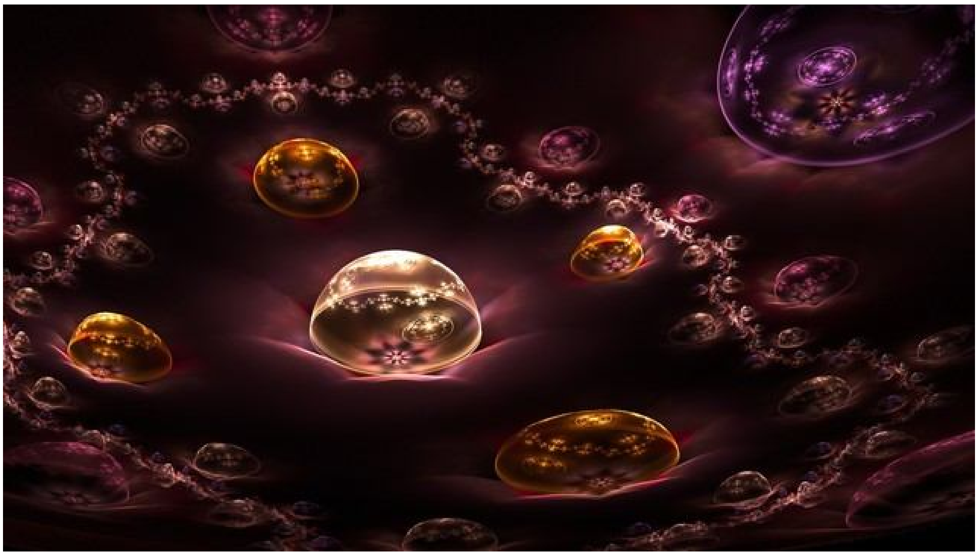


Fig. 9.2.4. Fractal illustration of the results of probing the location of the «star» (and /or «planet») with rays of light from the wavelength range $\Delta\lambda = 10^6 - 10^7$ cm. In this wavelength range of the «star» and «planet» (more precisely, the landscapes $\lambda_{1,3}$-vacuum) look like a star system consisting of single spherical vacuum formations

«Atoms, «molecules», «biological cells», «bacteria» and other small «bodies» do not affect the propagation of radio waves with a wavelength 100 km. Therefore, 4D-landscape of $\lambda_{6,7}$-vacuum does not reflect the fact of their existence, and reveals only the average macroscopic metric-dynamic structure of the «star» and/or the «planet» (Figures 9.2.4 and 9.2.5).

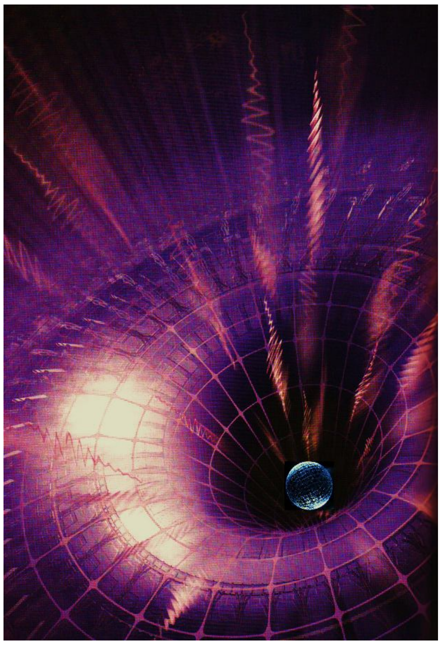


Fig. 9.2.5. Illustration of the length of $\lambda_{6,7}$-vacuum in the vicinity of the naked core «stars» or core «planets»

In other words, the 4D-landscape of $\lambda_{6,7}$-vacuum in the vicinity of the cores of a «star» or «planet» look such as it would be if, from the volume considered of vacuum, it would be possible to remove all elementary «particles», «atoms», «molecules» and other small local vacuum formations.

Such completely cleaned from fine «particles» and bodies 4-curved section of curved landscape area of $\lambda_{6,7}$-vacuum we shall call the metric - dynamic structure naked «stars» or naked «planet».

Definition 9.2.1 A *naked «star» and a naked «planet» are macroscopic electrically neutral «particles», i.e. vacuum formations (Figures 9.2.5 and 9.2.6) with a core radius of order* $r_4 \sim 1{,}4\cdot10^8$ *cm {according to hierarchy (2.6.20)}. The metric-dynamic models of the «star» and «planet» are virtually indistinguishable, but the size of the core of the «star», as a rule, exceeds the size of the core of the «planet».*

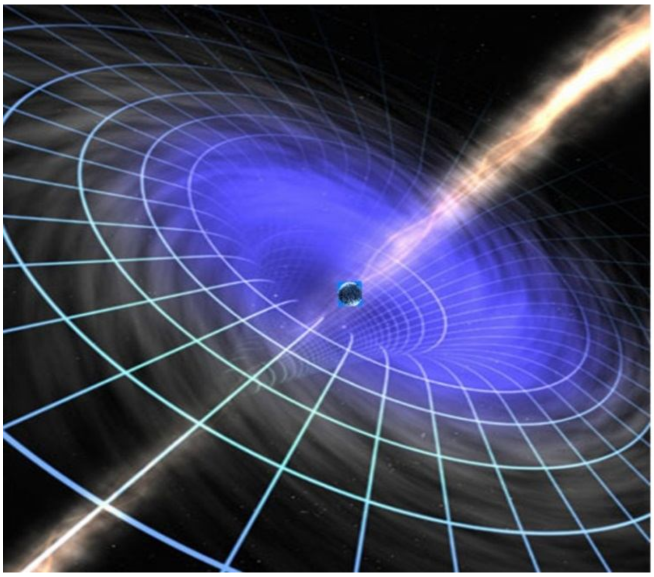


Fig. 9.2.6. The contours of the metric-dynamic structures naked (transparent) «stars» (or naked «planet»), i.e. a curved landscape area of $\lambda_{6,7}$-vacuum in the area of the core of macroscopic vacuum formation, which formally «eliminated» all the small «particle», «electrons», «atoms», «molecules», «bacteria» etc. (by means of sensing long wavelength radio waves)

9.3 Simplified metric-dynamic model of a naked «star»

A naked «star» is an electrically neutral object. Therefore, according to the hierarchy of nested spherical vacuum formations described in *§ 2.6*, we have the following metric-dynamic model:

Naked «STAR»
(in particular naked «Sun») (9.3.1)
with signature
(+ – – –) + (– + + +) = (0 0 0 0)

The outer shell of the naked «star»
in the interval $[r_{s4}, r_2]$

I
$$ds_1^{(+---)2} = \left(1 - \frac{r_{s4.1}}{r} + \frac{r^2}{r_2^2}\right)c^2dt^2 - \frac{dr^2}{\left(1 - \frac{r_{s4.1}}{r} + \frac{r^2}{r_2^2}\right)} - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \quad (9.3.2)$$

H
$$ds_2^{(+---)2} = \left(1 + \frac{r_{s4.2}}{r} - \frac{r^2}{r_2^2}\right)c^2dt^2 - \frac{dr^2}{\left(1 + \frac{r_{s4.2}}{r} - \frac{r^2}{r_2^2}\right)} - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \quad (9.3.3)$$

V
$$ds_3^{(+---)2} = \left(1 - \frac{r_{s4.3}}{r} - \frac{r^2}{r_2^2}\right)c^2dt^2 - \frac{dr^2}{\left(1 - \frac{r_{s4.3}}{r} - \frac{r^2}{r_2^2}\right)} - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \quad (9.3.4)$$

H'
$$ds_4^{(+---)2} = \left(1 + \frac{r_{s4.4}}{r} + \frac{r^2}{r_2^2}\right)c^2dt^2 - \frac{dr^2}{\left(1 + \frac{r_{s4.4}}{r} + \frac{r^2}{r_2^2}\right)} - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \quad (9.3.5)$$

H’ $$ds_1^{(-+++)2} = -\left(1-\frac{r_{s4.1}}{r}+\frac{r^2}{r_2^2}\right)c^2dt^2+\frac{dr^2}{\left(1-\frac{r_{s4.1}}{r}+\frac{r^2}{r_2^2}\right)}+r^2\left(d\theta^2+\sin^2\theta\, d\varphi^2\right), \tag{9.3.6}$$

V $$ds_2^{(-+++)2} = -\left(1+\frac{r_{s4.2}}{r}-\frac{r^2}{r_2^2}\right)c^2dt^2+\frac{dr^2}{\left(1+\frac{r_{s4.2}}{r}-\frac{r^2}{r_2^2}\right)}+r^2\left(d\theta^2+\sin^2\theta\, d\varphi^2\right), \tag{9.3.7}$$

H $$ds_3^{(-+++)2} = -\left(1-\frac{r_{s4.3}}{r}-\frac{r^2}{r_2^2}\right)c^2dt^2+\frac{dr^2}{\left(1-\frac{r_{s4.3}}{r}-\frac{r^2}{r_2^2}\right)}+r^2\left(d\theta^2+\sin^2\theta\, d\varphi^2\right), \tag{9.3.8}$$

I $$ds_4^{(-+++)2} = -\left(1+\frac{r_{s4.4}}{r}+\frac{r^2}{r_2^2}\right)c^2dt^2+\frac{dr^2}{\left(1+\frac{r_{s4.4}}{r}+\frac{r^2}{r_2^2}\right)}+r^2\left(d\theta^2+\sin^2\theta\, d\varphi^2\right). \tag{9.3.9}$$

The core of the naked «stars»

in the interval $[r_{s4}, r_5]$

I $$ds_1^{(+---)2} = \left(1-\frac{r_5}{r}+\frac{r^2}{r_{s4.1}^2}\right)c^2dt^2-\frac{dr^2}{\left(1-\frac{r_5}{r}+\frac{r^2}{r_{s4.1}^2}\right)}-r^2\left(d\theta^2+\sin^2\theta\, d\varphi^2\right), \tag{9.3.10}$$

H $$ds_2^{(+---)2} = \left(1+\frac{r_5}{r}-\frac{r^2}{r_{s4.2}^2}\right)c^2dt^2-\frac{dr^2}{\left(1+\frac{r_5}{r}-\frac{r^2}{r_{s4.2}^2}\right)}-r^2\left(d\theta^2+\sin^2\theta\, d\varphi^2\right), \tag{9.3.11}$$

V $$ds_3^{(+---)2} = \left(1-\frac{r_5}{r}-\frac{r^2}{r_{s4.3}^2}\right)c^2dt^2-\frac{dr^2}{\left(1-\frac{r_5}{r}-\frac{r^2}{r_{s4.3}^2}\right)}-r^2\left(d\theta^2+\sin^2\theta\, d\varphi^2\right), \tag{9.3.12}$$

H’ $$ds_4^{(+---)2} = \left(1+\frac{r_5}{r}+\frac{r^2}{r_{s4.4}^2}\right)c^2dt^2-\frac{dr^2}{\left(1+\frac{r_5^2}{r}+\frac{r^2}{r_{s4.4}^2}\right)}-r^2\left(d\theta^2+\sin^2\theta\, d\varphi^2\right), \tag{9.3.13}$$

H’ $$ds_1^{(-+++)2} = -\left(1-\frac{r_5}{r}+\frac{r^2}{r_{s4.1}^2}\right)c^2dt^2+\frac{dr^2}{\left(1-\frac{r_5}{r}+\frac{r^2}{r_{s4.1}^2}\right)}+r^2\left(d\theta^2+\sin^2\theta\, d\varphi^2\right), \tag{9.3.14}$$

V $$ds_2^{(-+++)2} = -\left(1+\frac{r_5}{r}-\frac{r^2}{r_{s4.2}^2}\right)c^2dt^2+\frac{dr^2}{\left(1+\frac{r_5}{r}-\frac{r^2}{r_{s4.2}^2}\right)}+r^2\left(d\theta^2+\sin^2\theta\, d\varphi^2\right), \tag{9.3.15}$$

H $$ds_3^{(-+++)2} = -\left(1-\frac{r_5}{r}-\frac{r^2}{r_{s4.3}^2}\right)c^2dt^2+\frac{dr^2}{\left(1-\frac{r_5}{r}-\frac{r^2}{r_{s4.3}^2}\right)}+r^2\left(d\theta^2+\sin^2\theta\, d\varphi^2\right), \tag{9.3.16}$$

I $$ds_4^{(-+++)2} = -\left(1+\frac{r_5}{r}+\frac{r^2}{r_{s4.4}^2}\right)c^2dt^2+\frac{dr^2}{\left(1+\frac{r_5}{r}+\frac{r^2}{r_{s4.4}^2}\right)}+r^2\left(d\theta^2+\sin^2\theta\, d\varphi^2\right), \tag{9.3.17}$$

The scope of the «stars»
in the interval [0, ∞]

$$i \qquad ds_5^{(+---)2} = c^2dt^2 - dr^2 - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.3.18}$$

$$i' \qquad ds_5^{(---+)2} = c^2dt^2 - dr^2 - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.3.19}$$

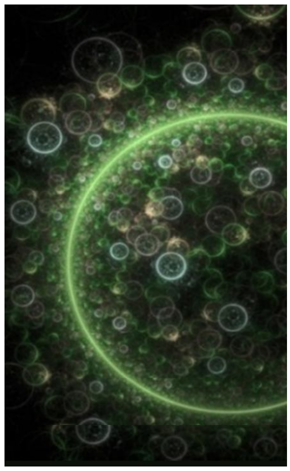
----

where $r_2 \sim 10^{29}$ cm is radius commensurate with the radius of the core of Metagalaxy {see hierarchy *(2.6.20)*};

$r_{s4.1} \approx r_{s4.2} \approx r_{s4.3} \approx r_{s4.4} \approx r_{s4} \sim 10^8$ cm are the radii of the four spherical layers of rakya (closely spaced relative to each other) surrounding the core of the naked «star»;

$r_5 \sim 10^{-3}$ cm is radius commensurate with the radius of the biological cell {see hierarchy *(2.6.20)*}.

In this simplified metric-dynamic model of the naked «star» the following assumptions are made:



1. Instead of r_2 can be substituted with r_1 or r_3 from the hierarchy *(2.6.20)*; it depends on which core of the more global vacuum formation is the core of the naked «star»;

2. Instead r_5 can be substituted with r_6 or r_7 or r_8, etc. from the hierarchy *(2.6.20*], depending on which core of a more global vacuum formation surrounds the core of the naked «star»;

3. Inside the core of a naked «star» there may be many cores of smaller vacuum formations (see Figure 9.2.2). However, for simplicity, the model (9.3.1) takes into account only one inner core with radius r_5.

Within Alsigna possible subject to the availability of many internal nuclei (small cores), but in this case, the metric-dynamic model naked «stars» is more complicated. If inside the core «stars» (more precisely, near its center) are the three inner nucleolus, within the framework of Alsigna, for example, the metric (9.3.10) is split into three similar metrics:

$$ds_{1.1}^{(+---)2} = \left(1 - \frac{r_{5.1}}{r_{(1)}^2} + \frac{r_{(1)}^2}{r_{s4.1}^2}\right)c^2dt^2 - \frac{dr_{(1)}^2}{\left(1 - \frac{r_{5.1}}{r_{(1)}^2} + \frac{r_{(1)}^2}{r_{s4.1}^2}\right)} - r_{(1)}^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.3.20}$$

$$ds_{1.2}^{(+---)2} = \left(1 - \frac{r_{5.2}}{r_{(2)}^2} + \frac{r_{(2)}^2}{r_{s4.1}^2}\right)c^2dt^2 - \frac{dr_{(1)}^2}{\left(1 - \frac{r_{5.2}}{r_{(2)}^2} + \frac{r_{(2)}^2}{r_{s4.1}^2}\right)} - r_{(2)}^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.3.21}$$

$$ds_{1.3}^{(+---)2} = \left(1 - \frac{r_{5.3}}{r_{(3)}^2} + \frac{r_{(3)}^2}{r_{s4.1}^2}\right)c^2dt^2 - \frac{dr_{(3)}^2}{\left(1 - \frac{r_{5.3}}{r_{(3)}^2} + \frac{r_{(3)}^2}{r_{s4.1}^2}\right)} - r_{(3)}^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.3.22}$$

where $r_{5.1}$, $r_{5.2}$, $r_{5.3}$ are the radii of the three inner nucleoli (small cores);

$r_{(1)}$, $r_{(2)}$, $r_{(2)}$ are the distance from the center of the corresponding inner nucleolus, which are near the center of the core of «star».

Similarly, all other metrics (9.3.2) through (9.3.19) are split. In this case, the metric-dynamic model of the «star» becomes much more cumbersome.

The deviation of any of these three nucleoli from the center of the core of «star» leads to the formation of stresses of the corresponding layer of vacuum extent, which tend to return the nucleolus to the initial center (*see Chapter 3*). Therefore, nucleoli constantly randomly move and collide with each other in the vicinity of the center of the core of «star», so that each of the distances $r_{(1)}$, $r_{(2)}$, $r_{(2)}$ on average equal to r – the distance from the center of the core of «star».

4. Each of the metrics (9.3.2) through (9.3.5), (9.3.10) through (9.3.13) and (9.3.18) can be represented as an additive overlay (i.e. superposition) of similar metrics with signatures from left rank *(5.11.33)*, similar to *(5.11.35)*. Similarly, each of the metrics (9.3.6) through (9.3.9), (9.3.14) through (9.3.17) and (9.3.19) can be represented as an additive overlay (i.e. superposition) of similar metrics with signatures from the right rank *(5.11.34)*.

5. Various combinations of metrics with a common signature corresponding to the signature (+ – – –) of the Minkowski space are also possible, for example (see *§ 2.9*):

$$\begin{array}{c}(-\;-\;-\;+)\\(+\;-\;+\;-)\\\underline{(+\;+\;-\;-)}\\(+\;-\;-\;-)_+\end{array}\quad(9.3.23)\qquad\begin{array}{c}(-\;-\;+\;-)\\(+\;+\;-\;-)\\\underline{(+\;-\;-\;+)}\\(+\;-\;-\;-)_+\end{array}\quad(9.3.24)\qquad\begin{array}{c}(-\;+\;-\;-)\\(+\;-\;-\;+)\\\underline{(+\;-\;+\;-)}\\(+\;-\;-\;-)_+\end{array}\quad(9.3.25)$$

or the signature (– + + +) of the Minkowski antispace:

$$\begin{array}{c}(+\;+\;+\;-)\\(-\;+\;-\;+)\\\underline{(-\;-\;+\;+)}\\(-\;+\;+\;+)_+\end{array}\quad(9.3.26)\qquad\begin{array}{c}(+\;+\;-\;+)\\(-\;-\;+\;+)\\\underline{(-\;+\;+\;-)}\\(-\;+\;+\;+)_+\end{array}\quad(9.3.27)\qquad\begin{array}{c}(+\;-\;+\;+)\\(-\;+\;+\;-)\\\underline{(-\;+\;-\;+)}\\(-\;+\;+\;+)_+\end{array}\quad(9.3.28)$$

In this case, for example, when using the rank (9.3.23) metrics (9.3.20) through (9.3.22) form a single set of metrics with a common (average) signature (+ – – –):

$$ds_{1.1}^{(---+)2} = -\left(1-\frac{r_{5.1}}{r_{(1)}^2}+\frac{r_{(1)}^2}{r_{s4.1}^2}\right)c^2dt^2 - \frac{dr_{(1)}^2}{\left(1-\frac{r_{5.1}}{r_{(1)}^2}+\frac{r_{(1)}^2}{r_{s4.1}^2}\right)} - r_{(1)}^2 d\theta^2 + r_{(1)}^2 \sin^2\theta\, d\varphi^2, \qquad (9.3.29)$$

$$ds_{1.2}^{(+-+-)2} = \left(1-\frac{r_{5.2}}{r_{(2)}^2}+\frac{r_{(2)}^2}{r_{s4.1}^2}\right)c^2dt^2 - \frac{dr_{(1)}^2}{\left(1-\frac{r_{5.2}}{r_{(2)}^2}+\frac{r_{(2)}^2}{r_{s4.1}^2}\right)} + r_{(2)}^2 d\theta^2 - r_{(2)}^2 \sin^2\theta\, d\varphi^2, \qquad (9.3.30)$$

$$ds_{1.3}^{(++--)2} = \left(1-\frac{r_{5.3}}{r_{(3)}^2}+\frac{r_{(3)}^2}{r_{s4.1}^2}\right)c^2dt^2 + \frac{dr_{(3)}^2}{\left(1-\frac{r_{5.3}}{r_{(3)}^2}+\frac{r_{(3)}^2}{r_{s4.1}^2}\right)} - r_{(3)}^2 d\theta^2 - \sin^2\theta\, d\varphi^2. \qquad (9.3.31)$$

All other metrics (9.3.2) through (9.3.5), (9.3.10) through (9.3.13) and (9.3.18) with signature (+ – – –) are split similarly.

In this case, all metrics (9.3.6) through (9.3.9), (9.3.14) through (9.3.17) and (9.3.19) with signature (– + + +) are split into three metrics with signatures (9.3.26) or (9.3.27) or (9.3.28). For example, the metric (9.3.14) can be represented in the form of an additive blend (i.e., superposition) of the three metrics with the signature from the rank (9.3.26):

$$ds_{1.1}^{(+++-)2} = \left(1-\frac{r_{5.1}}{r_{(1)}^2}+\frac{r_{(1)}^2}{r_{s4.1}^2}\right)c^2dt^2 + \frac{dr_{(1)}^2}{\left(1-\frac{r_{5.1}}{r_{(1)}^2}+\frac{r_{(1)}^2}{r_{s4.1}^2}\right)} + r_{(1)}^2 d\theta^2 - r_{(1)}^2 \sin^2\theta\, d\varphi^2, \qquad (9.3.32)$$

$$ds_{1.2}^{(-+-+)2} = -\left(1-\frac{r_{5.2}}{r_{(2)}^2}+\frac{r_{(2)}^2}{r_{s4.1}^2}\right)c^2dt^2 + \frac{dr_{(1)}^2}{\left(1-\frac{r_{5.2}}{r_{(2)}^2}+\frac{r_{(2)}^2}{r_{s4.1}^2}\right)} - r_{(2)}^2 d\theta^2 + r_{(2)}^2 \sin^2\theta\, d\varphi^2, \qquad (9.3.33)$$

$$ds_{1.3}^{(--++)2} = -\left(1-\frac{r_{5.3}}{r_{(3)}^2}+\frac{r_{(3)}^2}{r_{s4.1}^2}\right)c^2dt^2 - \frac{dr_{(3)}^2}{\left(1-\frac{r_{5.3}}{r_{(3)}^2}+\frac{r_{(3)}^2}{r_{s4.1}^2}\right)} + r_{(3)}^2 d\theta^2 + \sin^2\theta\, d\varphi^2, \qquad (9.3.34)$$

The above-mentioned complications of the metric-dynamic model of the «star» can reveal the essence of many processes and phenomena of stellar or planetary scale, but they have little effect on the explanation of the nature of gravity, i.e. the mutual attraction of the «star» and its satellites – «planets». Therefore, in this chapter we will use a simplified model (9.3.1) through (9.3.19), keeping in mind the various possibilities of its expansion for solving more complex problems.

9.4 Simplified metric-dynamic model of the naked «planet»

The simplified metric-dynamic model of the naked «planet» completely coincides with the model of the naked «star» (9.3.1) – (9.3.19), except that the radius of the core of naked «planet» r_{p4} is about an order of magnitude smaller than the core of naked «star» r_{s4}:

Naked «planet»
(in particular naked «Earth»)
with signature
(+ – – –) + (– + + +) = (0 0 0 0) (9.4.1)

The outer shell of naked «planet»
in the interval $[r_{p4}, r_2]$

I $$ds_1^{(+---)2} = \left(1 - \frac{r_{p4.1}}{r} + \frac{r^2}{r_2^2}\right)c^2dt^2 - \frac{dr^2}{\left(1 - \frac{r_{p4.1}}{r} + \frac{r^2}{r_2^2}\right)} - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.2}$$

H $$ds_2^{(+---)2} = \left(1 + \frac{r_{p4.2}}{r} - \frac{r^2}{r_2^2}\right)c^2dt^2 - \frac{dr^2}{\left(1 + \frac{r_{p4.2}}{r} - \frac{r^2}{r_2^2}\right)} - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.3}$$

V $$ds_3^{(+---)2} = \left(1 - \frac{r_{p4.3}}{r} - \frac{r^2}{r_2^2}\right)c^2dt^2 - \frac{dr^2}{\left(1 - \frac{r_{p4.3}}{r} - \frac{r^2}{r_2^2}\right)} - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.4}$$

H’ $$ds_4^{(+---)2} = \left(1 + \frac{r_{p4.4}}{r} + \frac{r^2}{r_2^2}\right)c^2dt^2 - \frac{dr^2}{\left(1 + \frac{r_{p4.4}}{r} + \frac{r^2}{r_2^2}\right)} - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.5}$$

H’ $$ds_1^{(-+++)2} = -\left(1 - \frac{r_{p4.1}}{r} + \frac{r^2}{r_2^2}\right)c^2dt^2 + \frac{dr^2}{\left(1 - \frac{r_{p4.1}}{r} + \frac{r^2}{r_2^2}\right)} + r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.6}$$

V $$ds_2^{(-+++)2} = -\left(1 + \frac{r_{p4.2}}{r} - \frac{r^2}{r_2^2}\right)c^2dt^2 + \frac{dr^2}{\left(1 + \frac{r_{p4.2}}{r} - \frac{r^2}{r_2^2}\right)} + r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.7}$$

H $$ds_3^{(-+++)2} = -\left(1 - \frac{r_{p4.3}}{r} - \frac{r^2}{r_2^2}\right)c^2dt^2 + \frac{dr^2}{\left(1 - \frac{r_{p4.3}}{r} - \frac{r^2}{r_2^2}\right)} + r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.8}$$

I $$ds_4^{(-+++)2} = -\left(1 + \frac{r_{p4.4}}{r} + \frac{r^2}{r_2^2}\right)c^2dt^2 + \frac{dr^2}{\left(1 + \frac{r_{p4.4}}{r} + \frac{r^2}{r_2^2}\right)} + r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.9}$$

The core of naked «planet»

in the interval $[r_{s4}, r_5]$

I
$$ds_1^{(+---)2} = \left(1 - \frac{r_5}{r} + \frac{r^2}{r_{p4.1}^2}\right)c^2dt^2 - \frac{dr^2}{\left(1 - \frac{r_5}{r} + \frac{r^2}{r_{p4.1}^2}\right)} - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.10}$$

H
$$ds_2^{(+---)2} = \left(1 + \frac{r_5}{r} - \frac{r^2}{r_{p4.2}^2}\right)c^2dt^2 - \frac{dr^2}{\left(1 + \frac{r_5}{r} - \frac{r^2}{r_{p4.2}^2}\right)} - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.11}$$

V
$$ds_3^{(+---)2} = \left(1 - \frac{r_5}{r} - \frac{r^2}{r_{p4.3}^2}\right)c^2dt^2 - \frac{dr^2}{\left(1 - \frac{r_5}{r} - \frac{r^2}{r_{p4.3}^2}\right)} - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.12}$$

H’
$$ds_4^{(+---)2} = \left(1 + \frac{r_5}{r} + \frac{r^2}{r_{p4.4}^2}\right)c^2dt^2 - \frac{dr^2}{\left(1 + \frac{r_5^2}{r} + \frac{r^2}{r_{p4.4}^2}\right)} - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.13}$$

H’
$$ds_1^{(-+++)2} = -\left(1 - \frac{r_5}{r} + \frac{r^2}{r_{p4.1}^2}\right)c^2dt^2 + \frac{dr^2}{\left(1 - \frac{r_5}{r} + \frac{r^2}{r_{p4.1}^2}\right)} + r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.14}$$

V
$$ds_2^{(-+++)2} = -\left(1 + \frac{r_5}{r} - \frac{r^2}{r_{p4.2}^2}\right)c^2dt^2 + \frac{dr^2}{\left(1 + \frac{r_5}{r} - \frac{r^2}{r_{p4.2}^2}\right)} + r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.15}$$

H
$$ds_3^{(-+++)2} = -\left(1 - \frac{r_5}{r} - \frac{r^2}{r_{p4.3}^2}\right)c^2dt^2 + \frac{dr^2}{\left(1 - \frac{r_5}{r} - \frac{r^2}{r_{p4.3}^2}\right)} + r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.16}$$

I
$$ds_4^{(-+++)2} = -\left(1 + \frac{r_5}{r} + \frac{r^2}{r_{p4.4}^2}\right)c^2dt^2 + \frac{dr^2}{\left(1 + \frac{r_5}{r} + \frac{r^2}{r_{p4.4}^2}\right)} + r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.17}$$

The scope of the «planet»

in the interval $[0, \infty]$

i
$$ds_5^{(+---)2} = c^2dt^2 - dr^2 - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.18}$$

i'
$$ds_5^{(---+)2} = c^2dt^2 - dr^2 - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right), \tag{9.4.19}$$

---

where

$r_2 \sim 10^{29}$ cm is radius commensurate with the radius of the core of Metagalaxy;

$r_{p4.1} \approx r_{p4.2} \approx r_{p4.3} \approx r_{p4.4} \approx r_{p4} \sim 10^7$ cm are the radii of the four spherical layers of rakya (closely spaced relative to each other) surrounding the core of the naked «planet»;

$r_5 \sim 10^{-3}$ cm is a radius commensurate with the radius of the biological cell.

9.5 The metric-dynamic models of the average of the outer shells of naked «stars» and naked «planets»

To study the phenomenon of gravity between the naked «star» and the naked «planet», we simplify the metric-dynamic models of these stable vacuum formations.

First, leave for consideration only the outer shells of the «star» and «planet». Second, given that $r_2 >> r_{s4}$ and $r_2 >> r_{p4}$, in metrics (9.3.2) through (9.3.9) and (9.4.2) through (9.4.9), all terms containing r_2 are negligible. As a result, we obtain even more simplified, averaged metrics to describe the outer shells of the «star» and «planet»:

The outer shell of the naked «star»

in the interval $[r_{s4}, r_2]$

I $$ds_1^{(+--)2} = \left(1 - \frac{r_{s4.1}}{r}\right)c^2dt^2 - \frac{dr^2}{\left(1 - \frac{r_{s4.1}}{r}\right)} - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right) \quad - \ a_s\text{-subcont,} \qquad (9.5.1)$$

H $$ds_2^{(+--)2} = \left(1 + \frac{r_{s4.2}}{r}\right)c^2dt^2 - \frac{dr^2}{\left(1 + \frac{r_{s4.2}}{r}\right)} - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right) \quad - \ b_s\text{- subcont,} \qquad (9.5.2)$$

V $$ds_1^{(-++)2} = -\left(1 - \frac{r_{s4.3}}{r}\right)c^2dt^2 + \frac{dr^2}{\left(1 - \frac{r_{s4.3}}{r}\right)} + r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right) \quad - \ a_s\text{-antisubcont,} \qquad (9.5.3)$$

H' $$ds_2^{(-++)2} = -\left(1 + \frac{r_{s4.4}}{r}\right)c^2dt^2 + \frac{dr^2}{\left(1 + \frac{r_{s4.4}}{r}\right)} + r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right) - \ b_s\text{-antisubcont.} \qquad (9.5.4)$$

The outer shell of the naked «planet»

in the interval $[r_{s4}, r_2]$

I $$ds_1^{(+--)2} = \left(1 - \frac{r_{p4.1}}{r}\right)c^2dt^2 - \frac{dr^2}{\left(1 - \frac{r_{p4.1}}{r}\right)} - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right) \quad - \ a_p\text{-subcont,} \qquad (9.5.5)$$

H $$ds_2^{(+--)2} = \left(1 + \frac{r_{p4.2}}{r}\right)c^2dt^2 - \frac{dr^2}{\left(1 + \frac{r_{p4.2}}{r}\right)} - r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right) \quad - \ b_p\text{-subcont,} \qquad (9.5.6)$$

V $$ds_1^{(-++)2} = -\left(1 - \frac{r_{p4.3}}{r}\right)c^2dt^2 + \frac{dr^2}{\left(1 - \frac{r_{p4.3}}{r}\right)} + r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right) - a_p\text{-antisubcont,} \qquad (9.5.7)$$

H' $$ds_2^{(-++)2} = -\left(1 + \frac{r_{p4.4}}{r}\right)c^2dt^2 + \frac{dr^2}{\left(1 + \frac{r_{p4.4}}{r}\right)} + r^2\left(d\theta^2 + \sin^2\theta\, d\varphi^2\right) - b_p\text{-antisubcont.} \qquad (9.5.8)$$

9.6 Subcont-antisubcont currents in the vicinity of the cores of naked «stars» and naked «planets»

As was shown in *§ 5.10*, it follows from metrics (9.5.1) through (9.5.4) that there are four subcont - antisubcont currents in the outer shell of the «star» that move with accelerations:

- components of the acceleration vector of a_s-subcont:

$$a_{sr}^{(-a)} = -\frac{c^2}{\sqrt{1-\frac{r_{s4.1}}{r}}}\frac{\partial \ln\sqrt{1-r_{s4.1}/r}}{\partial r*} = \frac{c^2 r_{s4.1}}{2r^2\sqrt{1-\frac{r_{s4.1}}{r}}},$$
$$a_{s\theta}^{(-a)} = 0, \qquad (9.6.1)$$
$$a_{s\varphi}^{(-a)} = 0,$$

- components of the acceleration vector of b_s-subcont:

$$a_{sr}^{(-b)} = -\frac{c^2}{\sqrt{1+\frac{r_{s4.2}}{r}}}\frac{\partial \ln\sqrt{1+r_{s4.2}/r}}{\partial r*} = -\frac{c^2 r_{s4.2}}{2r^2\sqrt{1+\frac{r_{s4.2}}{r}}},$$
$$a_{s\theta}^{(-b)} = 0, \qquad (9.6.2)$$
$$a_{s\varphi}^{(-b)} = 0,$$

- components of the acceleration vector of a_s-antisubcont:

$$a_{sr}^{(+a)} = -\frac{c^2}{\sqrt{1-\frac{r_{s4.3}}{r}}}\frac{\partial \ln\sqrt{-(1-r_{s4.3}/r)}}{\partial r*} = -\frac{c^2 r_{s4.3}}{2r^2\sqrt{1-\frac{r_{s4.3}}{r}}},$$
$$a_{s\theta}^{(+a)} = 0, \qquad (9.6.3)$$
$$a_{s\varphi}^{(+a)} = 0,$$

- components of the acceleration vector of b_s-antisubcont:

$$a_{sr}^{(+b)} = -\frac{c^2}{\sqrt{1+\frac{r_{s4.4}}{r}}}\frac{\partial \ln\sqrt{-(1+r_{s4.4}/r)}}{\partial r*} = \frac{c^2 r_{s4.4}}{2r^2\sqrt{1+\frac{r_{s4.4}}{r}}},$$
$$a_{s\theta}^{(+b)} = 0, \qquad (9.6.4)$$
$$a_{s\varphi}^{(+b)} = 0,$$

Due to the fact that a subcont and an antisubcont are mutually perpendicular extents, the total acceleration vector of the subcont - antisubcont current in the outer shell of the «stars» is determined by the complex number given in sections 5.7 and 5.10.

Due to the fact that at one point the currents of the subcont and the antisubcont are always mutually perpendicular, the total acceleration vector of the subcont and antisubcont in the outer shell of the «stars» is determined by the complex number {see § 5.7, 5.10}:

$$a_{sr}^{(ab)} = a_{sr}^{(-a)} + a_{sr}^{(-b)} + i(a_{sr}^{(+a)} + a_{sr}^{(+b)}). \qquad (9.6.5)$$

Taking into account (9.6.1) through (9.6.4) we have

$$a_{sr}^{(ab)} = \frac{c^2}{2r^2}\left[\frac{r_{s4.1}}{\sqrt{\left(1+\frac{r_{s4.1}}{r}\right)}} - \frac{r_{s4.2}}{\sqrt{\left(1-\frac{r_{s4.2}}{r}\right)}} + i\left(\frac{r_{s4.4}}{\sqrt{\left(1-\frac{r_{s4.3}}{r}\right)}} - \frac{r_{s4.3}}{\sqrt{\left(1+\frac{r_{s4.4}}{r}\right)}}\right)\right]. \qquad (9.6.6)$$

At large distances from the core of naked «stars» (i.e. $r_{s4.1}$, $r_{s4.2}$, $r_{s4.3}$, $r_{s4.4} << r$) the expression (9.6.6) takes the simplified form

$$a_{sr}^{(ab)} = \frac{c^2\left[r_{s4.1} - r_{s4.2} + i(r_{s4.4} - r_{s4.3})\right]}{2r^2}, \qquad (9.6.7)$$

from this it follows that the average line of accelerated radial vacuum current flowing to the core of the naked «star» consists of two intertwined spirals:

$$a_{sr}^{(a)} = \frac{c^2\left(r_{s4.1} + ir_{s4.4}\right)}{2r^2} = \frac{c^2 r_{s4.1}}{2r^2} + \frac{c^2 i r_{s4.4}}{2r^2}, \qquad (9.6.8)$$

$$a_{sr}^{(b)} = -\frac{c^2\left(r_{s4.2} + ir_{s4.3}\right)}{2r^2} = -\frac{c^2 r_{s4.2}}{2r^2} - \frac{c^2 i r_{s4.3}}{2r^2}. \qquad (9.6.9)$$

The expression (9.6.8) describes the slowing subcont - antisubcont current, flowing in a spiral from the naked core «star»; and the expression (9.6.9) describes the acceleration subcont - antisubcont current flowing in a spiral to the core.

According to Newton's law of universal gravitation, the force of interaction between two gravitating bodies has the form (9.1.2)

$$F = G\frac{mM}{r^2}, \quad \text{or} \quad mg = G\frac{mM}{r^2}, \qquad (9.6.10)$$

therefore, the acceleration of gravity g is described by the equation

$$g = \frac{GM}{r^2}. \qquad (9.6.11)$$

Comparing acceleration (9.6.11) with acceleration (9.6.7), we find the following correspondence

$$|g_s| \equiv \frac{c^2\sqrt{(r_{s4.1} - r_{s4.2})^2 + (r_{s4.4} - r_{s4.3})^2}}{2r^2}. \qquad (9.6.12)$$

The last expression can be represented in the form

$$\sqrt{(r_{s4.1}-r_{s4.2})^2+(r_{s4.4}-r_{s4.3})^2}\equiv\frac{2|g_s|r^2}{c^2}. \qquad (9.6.13)$$

Similarly, from the metric (9.5.5) through (9.5.8) it follows that in the outer shell of «planet» there are four subcont-antisubcont currents, which move with acceleration:

- components of the acceleration vector of a_p-subcont:

$$a_{pr}^{(-a)}=-\frac{c^2}{\sqrt{1-\frac{r_{p4.1}}{r}}}\frac{\partial\ln\sqrt{1-r_{p4.1}/r}}{\partial r^*}=\frac{c^2 r_{p4.1}}{2r^2\sqrt{1-\frac{r_{p4.1}}{r}}},$$

$$a_{p\theta}^{(-a)}=0, \qquad (9.6.14)$$

$$a_{p\varphi}^{(-a)}=0,$$

- components of the acceleration vector of b_p-subcont:

$$a_{pr}^{(-b)}=-\frac{c^2}{\sqrt{1+\frac{r_{p4.2}}{r}}}\frac{\partial\ln\sqrt{1+r_{p4.2}/r}}{\partial r^*}=-\frac{c^2 r_{p4.2}}{2r^2\sqrt{1+\frac{r_{p4.2}}{r}}},$$

$$a_{p\theta}^{(-b)}=0, \qquad (9.6.15)$$

$$a_{p\varphi}^{(-b)}=0,$$

- components of the acceleration vector of a_p-antisubcont:

$$a_{pr}^{(+a)}=-\frac{c^2}{\sqrt{1-\frac{r_{p4.3}}{r}}}\frac{\partial\ln\sqrt{-(1-r_{p4.3}/r)}}{\partial r^*}=-\frac{c^2 r_{p4.3}}{2r^2\sqrt{1-\frac{r_{p4.3}}{r}}},$$

$$a_{p\theta}^{(+a)}=0, \qquad (9.6.16)$$

$$a_{p\varphi}^{(+a)}=0,$$

- components of the acceleration vector of b_p-antisubcont:

$$a_{pr}^{(+b)}=-\frac{c^2}{\sqrt{1+\frac{r_{p4.4}}{r}}}\frac{\partial\ln\sqrt{-(1+r_{p4.4}/r)}}{\partial r^*}=\frac{c^2 r_{p4.4}}{2r^2\sqrt{1+\frac{r_{p4.4}}{r}}},$$

$$a_{p\theta}^{(+b)}=0, \qquad (9.6.17)$$

$$a_{p\varphi}^{(+b)}=0,$$

The total acceleration vector subcont-antisubcont currents in the outer shell of the «planet» as well as (9.6.5) is determined by a complex number:

$$a_{pr}^{(ab)}=a_{pr}^{(-a)}+a_{pr}^{(-b)}+i(a_{pr}^{(+a)}+a_{pr}^{(+b)}). \qquad (9.6.18)$$

Taking into account (9.5.9) through (9.5.12) are

$$a_{pr}^{(ab)} = \frac{c^2}{2r^2}\left[\frac{r_{p4.1}}{\sqrt{\left(1+\frac{r_{p4.1}}{r}\right)}} - \frac{r_{p4.2}}{\sqrt{\left(1-\frac{r_{p4.2}}{r}\right)}} + i\left(\frac{r_{p4.4}}{\sqrt{\left(1-\frac{r_{p4.3}}{r}\right)}} - \frac{r_{p4.3}}{\sqrt{\left(1+\frac{r_{p4.4}}{r}\right)}}\right)\right]. \qquad (9.6.19)$$

At a great distance from the core of the naked «planet» (i.e. at $r_{s4.1}$, $r_{s4.2}$, $r_{s4.3}$, $r_{s4.4} << r$) the expression (9.6.19) takes the simplified form

$$a_{pr}^{(ab)} = \frac{c^2\left[r_{p4.1} - r_{p4.2} + i(r_{p4.4} - r_{p4.3})\right]}{2r^2}, \qquad (9.6.21)$$

from this it follows that the average line of accelerated radial vacuum current flowing to the core of the naked «planet» consists of two intertwined spirals

$$a_{pr}^{(a)} = \frac{c^2\left(r_{p4.1} + ir_{p4.4}\right)}{2r^2} = \frac{c^2 r_{p4.1}}{2r^2} + \frac{c^2 ir_{p4.4}}{2r^2}, \qquad (9.6.22)$$

$$a_{pr}^{(b)} = -\frac{c^2\left(r_{p4.2} + ir_{p4.3}\right)}{2r^2} = -\frac{c^2 r_{p4.2}}{2r^2} - \frac{c^2 ir_{p4.3}}{2r^2}. \qquad (9.6.23)$$

Comparing acceleration (9.6.11) with acceleration (9.6.21), we find the following correspondence

$$|g_p| \equiv \frac{c^2\sqrt{(r_{p4.1} - r_{p4.2})^2 + (r_{p4.4} - r_{p4.3})^2}}{2r^2}. \qquad (9.6.24)$$

The last expression can be represented in the form

$$\sqrt{(r_{p4.1} - r_{p4.2})^2 + (r_{p4.4} - r_{p4.3})^2} \equiv \frac{2|g_p|r^2}{c^2}. \qquad (9.6.25)$$

For example, in the area of our habitat $|g_p| \approx 9.8$ м/c^2, $r \approx 6\,400\,000$ м, $c \approx 3\times10^8$ м/c; substituting these values into the identity (9.6.25), we obtain an estimate

$$\sqrt{(r_{p4.1} - r_{p4.2})^2 + (r_{p4.4} - r_{p4.3})^2} \approx 9\cdot10^{-3}\,м \approx 1\,см. \qquad (9.6.26)$$

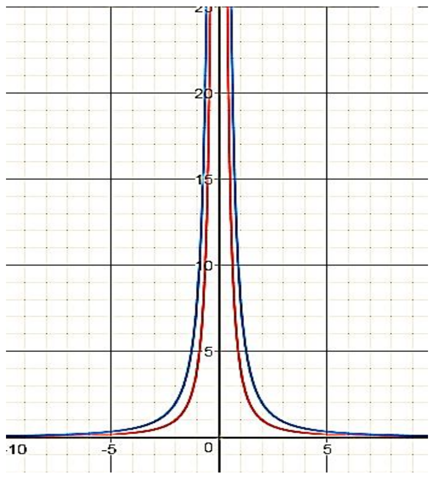


Fig. 9.6.1. The blue (upper) line a_1/r^2 shows the acceleration of the flowing stream, and the red (lower) line a_2/r^2 shows the deceleration of the flowing stream depending on the distance to the cent of the «star» (or «planet»). In this case, $a_1 > a_2$, and the resulting acceleration $(a_1 - a_2)/r^2$ is relatively small and always directed towards the core of the «star» (or «planet»)

So, within the framework of Alsigna's representations, the «star» (or «planet») attracts other bodies because two currents b_s-subcont and a_s-antisubcont flows to core; and two opposing currents: a_s-subcont and b_s-antisubcont flows from core, but the currents flowing to the core everywhere slightly exceed in size the currents flowing from the core. This is due to that the radii of the $r_{s4.1}$ and $r_{s4.4}$ are farther from the core "stars," than the radii $r_{s4.2}$ and $r_{s4.3}$ [see Figures 9.6.1 – 9.6.3 and expression (9.6.12)].

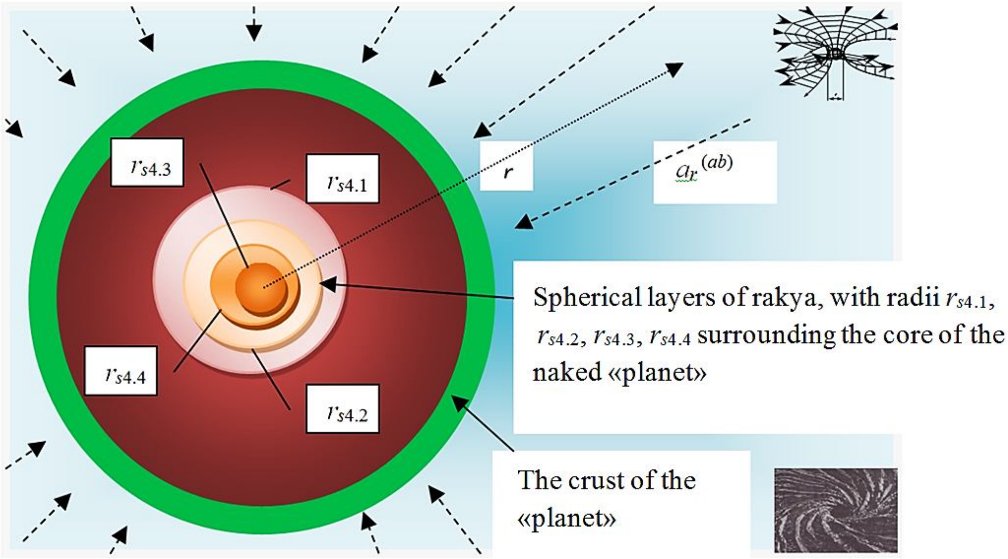


Fig. 9.6.2. Various spherical layers of rakya surrounding the core of a naked «star» (or «planet»), with $r_{s4.1}$, $r_{s4.2}$, $r_{s4.3}$, $r_{s4.4}$

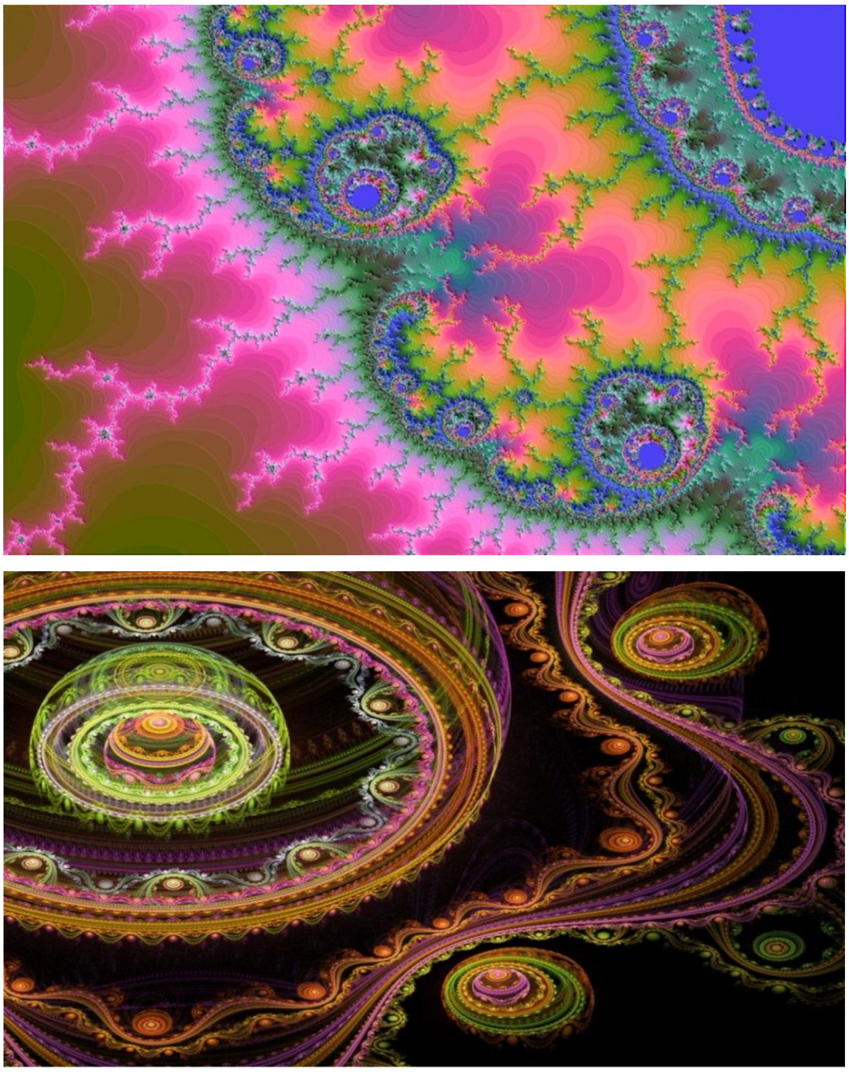


Fig. 9.6.3. Fractal illustration of a *rakya* that consists of several spherical layers on average, for example, with radii $r_{s4.1}$, $r_{s4.2}$, $r_{s4.3}$, $r_{s4.4}$, surrounding the core of the «star» (or «planet»)

In other words, in the framework of the hypothesis presented here and in relation to the planet Earth, we watch the two average subcont-antisubcont flows:

- first average stream flows from space to the core of Earth;
- second average stream flows from the Earth's core into space.

But the acceleration of the inflowing stream at each point of the area surrounding the core of our «planet» is somewhat higher than the deceleration of the outflowing stream due to the shift of the inner-vacuum layers. Therefore, any body (i.e., local vacuum formation), which appeared in this region of vacuum extent, on average, is attracted to the core of the «planet» with uncompensated acceleration (9.6.24) (see Figures 9.6.1 and 9.6.2).

Fig. 9.6.4. Fractal illustration of opposite subcont - antisubcont currents intertwined in spirals and flowing to/from the core of the «star» («planet»). At each point of this vacuum region, the acceleration of the affluent subcont - antisubcont currents is slightly higher than the acceleration of the flowing subcont - antisubcont currents. Therefore, any body that falls into this region of vacuum is, on the average, attracted to the core of a «star» (or «planet») with uncompensated acceleration (9.6.12) [or (9.6.24)]

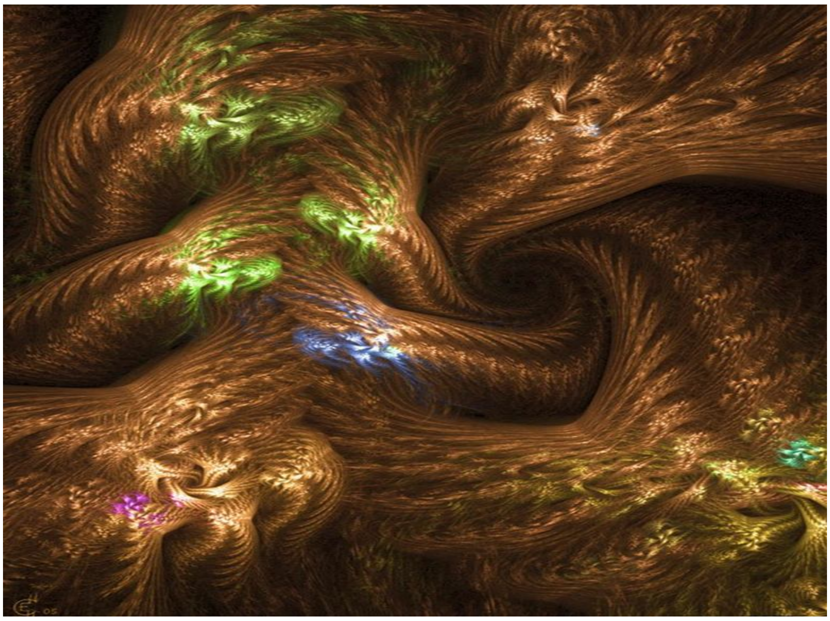


Fig. 9.6.5. Fractal illustration of intertwined subcont - antisubcont currents flowing in double spirals to/from the rotating core of a «star» (or «planet»)

As shown in §§ 5.1, 5.2 and 5.7, counter subcont-antisubcont currents with accelerations (9.6.22) and (9.6.23) are intertwined in a helix (see Figures 9.6.4, 9.6.5 and 9.6.6).

Thus, within the framework of Alsigna, the nature of «star - planetary» gravity turned out to be quite understandable phenomenon associated with counter (flowing to the rakya of the core and flowing from the rakya of the nucleus) flows of various layers of vacuum extent shifted relative to each other, which are described by metrics (9.5.1) through (9.5.4) for the outer shell of the «star», and metrics (9.5.5) through (9.5.8) for the outer shell of the «planet».

These phenomena are inherent in all levels of existence. For example, in the outer shell of the «electron» or «proton» the shifts of the inner vacuum layers relative to each other are also present. But at the picoscopic level of consideration, uncompensated currents associated with shifts in the intra-vacuum layers are so insignificant in comparison with intra-vacuum currents responsible for electromagnetic interactions between charged «particles» and «antiparticles» (see §§ 5.10, 5.11) that they can be neglected.

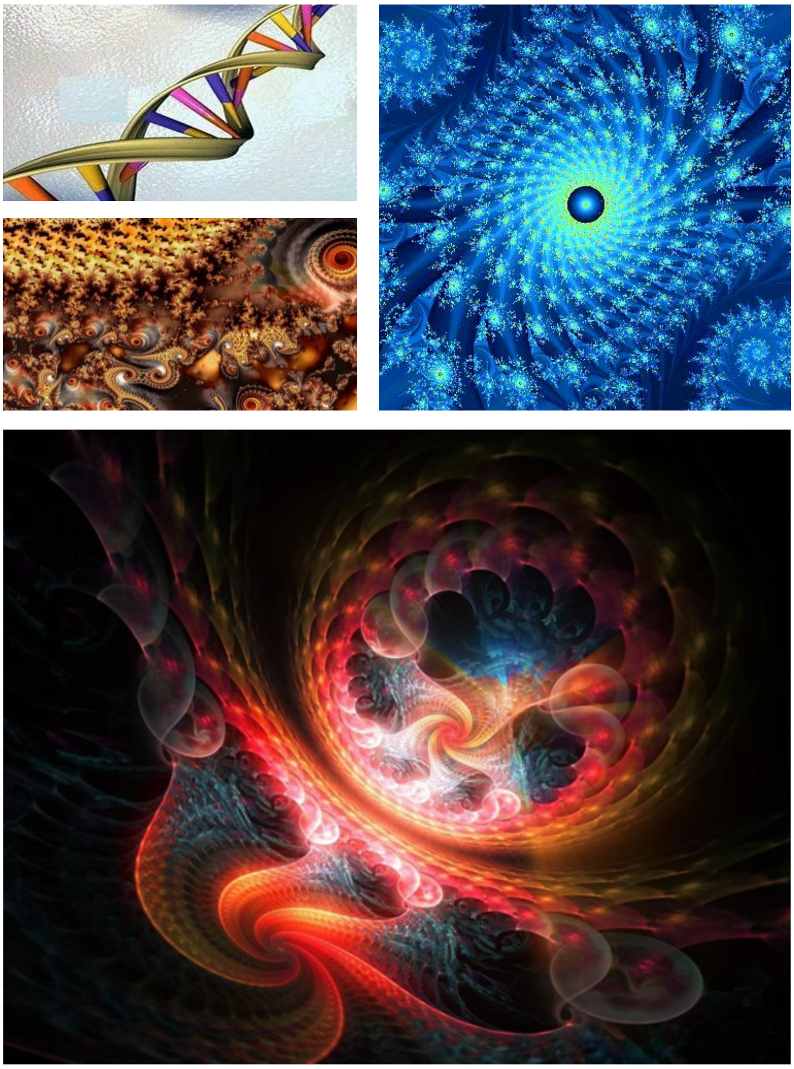


Fig. 9.6.6. Various fractal illustration twisted subcont-antisubcont currents in the vicinity of the core of «stars» (or «planet»)

Such an explanation of the phenomenon of «star» (or «planetary») gravity is devoid of the disadvantages of the hypothesis of Riemann mentioned in § 9.1 of this chapter, because it is due to the shift of counter subcont - antisubcont flows.

But there is another question that requires an explanation: "If the inside-vacuum layers in the outer shell of the «star» (or «planet») are constantly shifted relative to each other, it is contrary to the vacuum condition, which requires that any deviation of the vacuum from the original undistorted state should be accompanied by similar anti-deviations?". The answer to this question will be given in the next section.

9.7 The interaction between naked «stars» and naked of the «planet»

Consider the interaction of the «star» with one of the «planets», which is part of the «star – planetary» system (Figure 9.7.1).

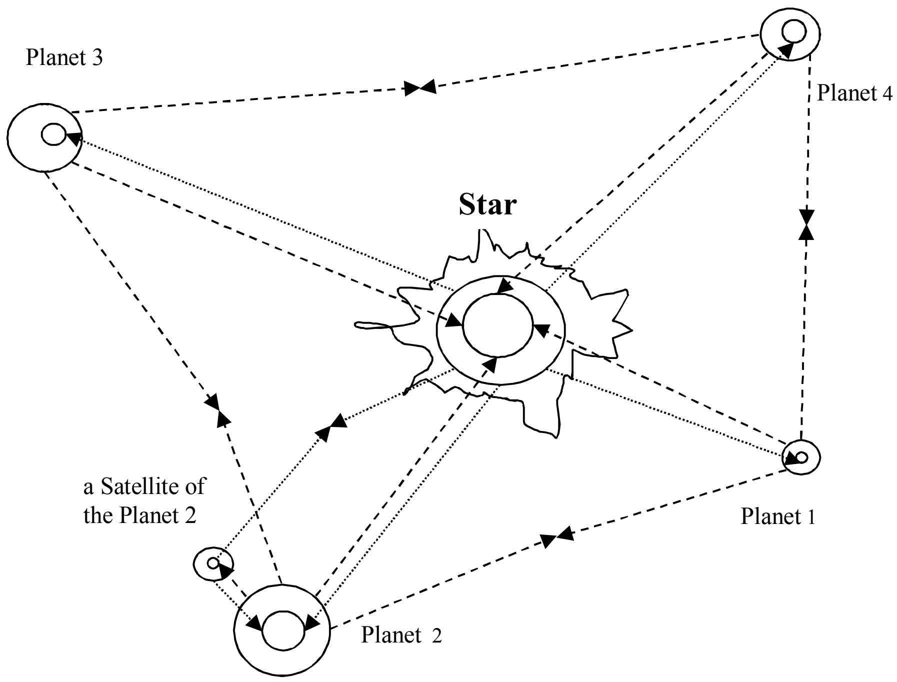


Fig. 9.7.1. "Star-planetary" system, where - counter subcont-antisubcont currents

Subcont-antisubcont that flow from the core of the «star» with slowdowns (9.6.1) and (9.6.4), further accelerated, and flow to the core of the «planet» with accelerations (9.6.15) and (9.6.16), reaching in its *rakya* almost the speed of light.

Complex turbulent processes occur in the *rakya* of the planet (Figure 9.6.3) and the same, but inverted currents flow from the core of the «planet» with decelerations (9.6.14) and (9.6.17). Then they accelerate, and flow to the *rakya* surrounding the core of the «star» with accelerations (9.6.2) and

(9.6.3), where they again participate in complex turbulent processes, inverted and again with a slow-down (9.6.1) and (9.6.4) return to the core of the «planet».

Thus, subcont-antisubcont currents are flowing to the core «stars» or to the core «planets» not out of nowhere, and they don't flow from their core to nowhere, but constantly circulating between *rakyas* of the «stars» and *rakyas* of the «planets» (Figures 9.7.1, 9.7.2 and 9.7.3).

Thus, if at the core of the «stars», the inflowing subcont-antisubcont currents have, on the average, a greater acceleration than the outflowing subcont-antisubcont currents (due to the shell to which they are flow further from the core of «star», Figures 9.6.2 and 9.7.2), then near the core of «planet» inflowing subcont-antisubcont currents have a greater acceleration on the average than the outflowing subcont-antisubcont currents (due to the fact that the shell to which they are flowing is further from the core of the «planet», Figure 9.7.2).

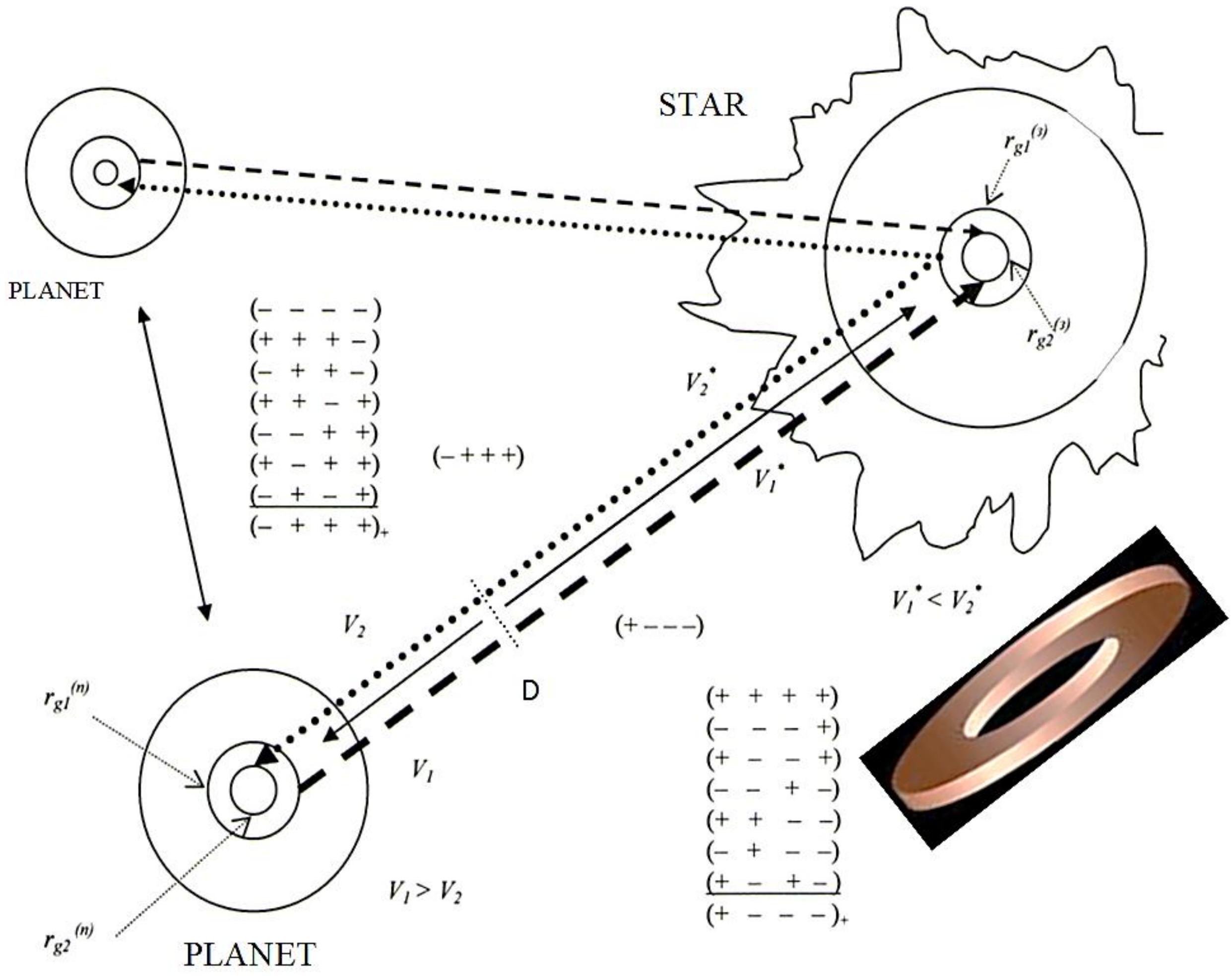


Fig. 9.7.2. Circulation of subcont-antisubcont currents between the rakya of a «star» and the rakyas of «planets». The shift of the inner-vacuum layers near the core of the «star» is compensated by the opposite shift of the same layers near the cores of the «planets»

Fig. 9.7.3. Fractal illustration of "interstellar" and "star-planetary" inside-vacuum currents (i.e. subcont-antisubcont currents)

However, the first and second inflowing and outflowing the subcont-antisubcont currents, twisted into a rope and form an incredible complex patterns (Figures 9.7.4, 9.7.5). That's possible (according to Alsigna) the «stars» and the «planetary» gravity for a long time remained a phenomenon incomprehensible to the human mind.

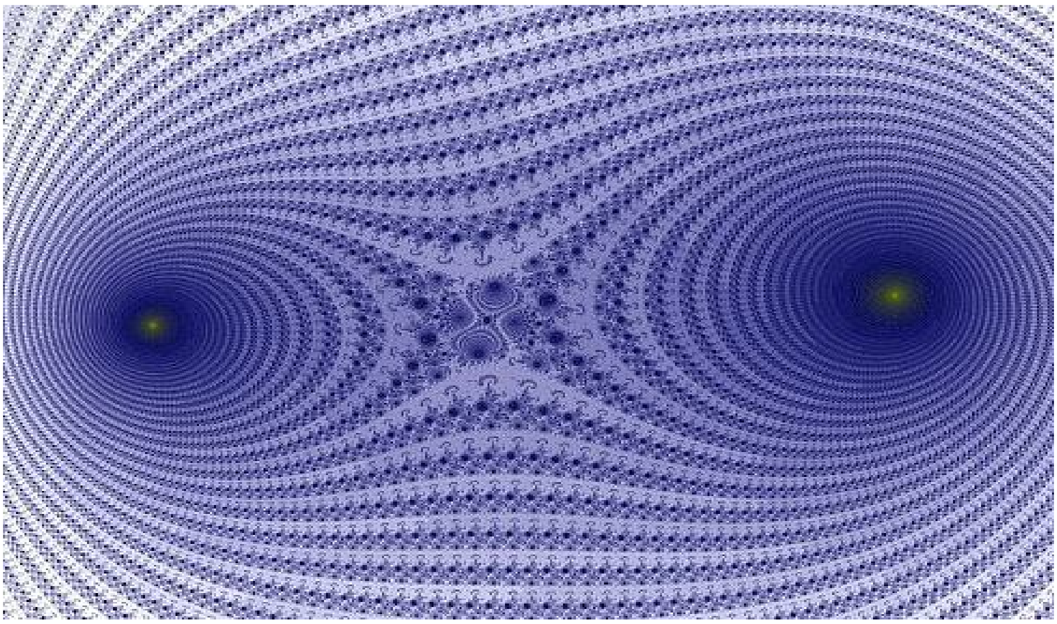


Fig. 9.7.4. Fractal illustration of the complex interweaving of the first and second subcont-antisubcont currents around the cores of the «stars» and core of the «planet»

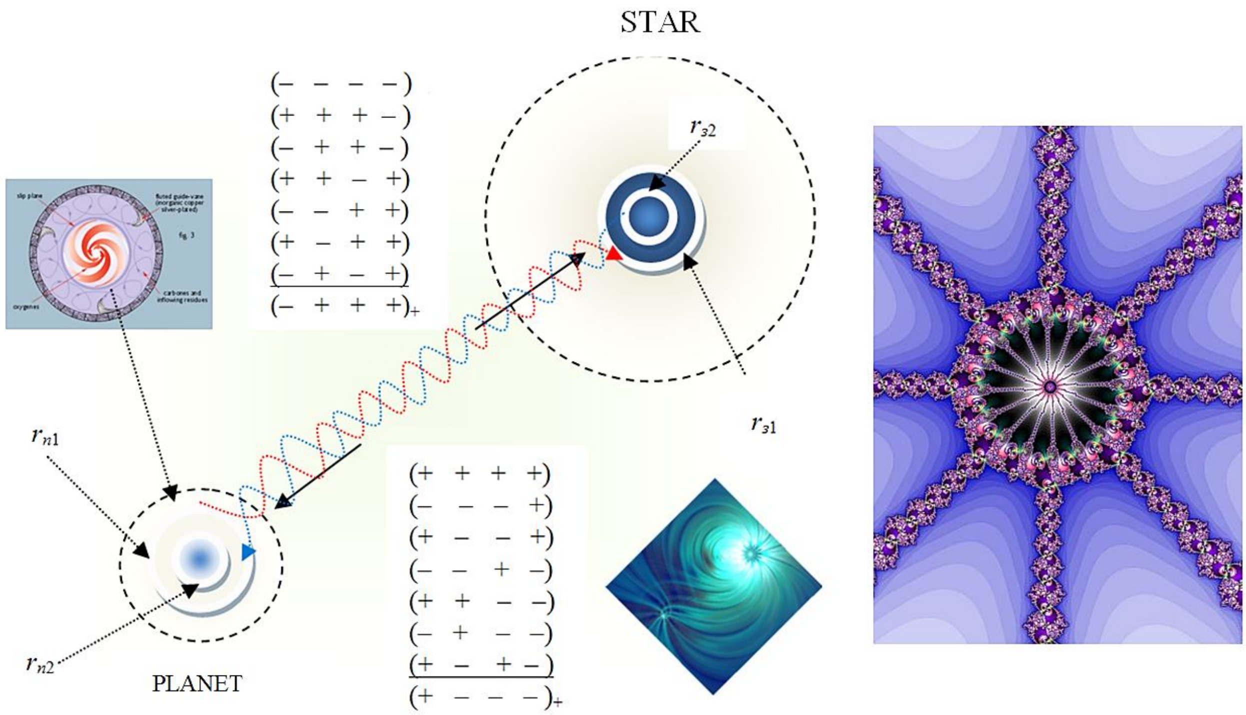


Fig. 9.7.5. Weaving the first and second subcont-antisubcont currents, circulating between the core of the «stars» and core of the «planet»

At the same time, the shift of the inner-vacuum layers near the core of the «star» is compensated by a similar but opposite shift of the inner-vacuum layers near the cores of the «planets» surrounding this «star». Thus, in General (on average) in the «star – planetary» system the vacuum balance is not disturbed.

Within Alsigna, as well as in *(5.11.35)*, each of the metrics (9.5.1) through (9.5.8) with signature {+ – – –} can be represented as the sum of the same seven metrics with signatures from the the rank *(5.11.33)*, and each metric with signature {– + + +} can be represented as the sum of the same seven metrics with signatures from the rank *(5.11.34)*

$$\begin{array}{lcl}
\{+\ +\ +\ +\} & & \{-\ -\ -\ -\} \\
\{-\ -\ -\ +\} & & \{+\ +\ +\ -\} \\
\{+\ -\ -\ +\} & & \{-\ +\ +\ -\} \\
\{-\ -\ +\ -\} & & \{+\ +\ -\ +\} \\
\{+\ +\ -\ -\} & & \{-\ -\ +\ +\} \\
\{-\ +\ -\ -\} & & \{+\ -\ +\ +\} \\
\underline{\{+\ -\ +\ -\}} & & \underline{\{-\ +\ -\ +\}} \\
\{+\ -\ -\ -\}_{\times} & & \{-\ +\ +\ +\}_{\times},
\end{array}$$

Therefore, a more detailed inspection of the braid, made up of 4 twisted subcont-antisubcont currents circulating between *rakyas* of the «stars» and *rakyas* of the «planets», may consist of 4 × 7 = 28 under-currents (Figure 9.7.5). Therefore, the phenomenon of gravity can be considered at a much deeper level.

A superposition of an infinite number of twisted «interstellar» and «stellar-planetary» subcont-antisubcont currents (or under-currents, or under-under-currents) leads to the formation of an unimaginably closely knotted subcont-antisubcont "carpet", which (to mix metaphors) is“boiling” at all points.

In outer space (i.e., at a great distance from the «stars» and «planets»), the speeds of the subcont-antisubcont currents are relatively small, but as they approach the core of the «star» or the core of the «planet» they accelerate almost to the speed of light.

9.8 The interaction of outer space objects without any core

In addition to the exchange-spiral structure of the «star-planetary» interactions, within the framework of Alsigna there is another no less serious difference from modern cosmology, the basis of post-Newtonian celestial mechanics and GRT Einstein. The difference is that in the context of Alsigna not all spatial bodies have a bare core.

If a cosmic body does not have its own bare core, then subcont - antisubcont currents neither flow to or away from it and, therefore, around such a body is not formed any uncompensated accelerated confluence of the $\lambda_{6,7}$-vacuum.

For example, it is reasonable to assume that not all comets and large meteorites have bare cores, and therefore they cannot be centers of gravitational attraction. This explains why the boulders in the asteroid belt do not attract each other over time, and do not form more massive space formations.

Fig. 9.8.1. Asteroids belt. Stones in these belt are practically not attracted to each other for a long period of time

In one of the ground experiments, the researchers tried to measure the gravitational influence of the mountain range. According to the law of universal gravitation massive mountains should attract material objects located near their foot. However, this influence of the mountain, according to the report of this group of scientists, could not be recorded.

If, in fact, it is confirmed that not all material bodies create a gravitational field around them, then how to explain the results of the experiments of G. Cavendish (1798), F. Bessel (1830) and R. Etvesh (1889) the attraction of two balls? In mercury, lead, and other balls, which have been used by experimenters in many laboratories around the world to confirm Newton's law of universal gravitation, there are clearly no own naked nuclei that attract different layers of vacuum. For an explanation of this kind of experiments it is possible to propose three hypotheses:

1. There are still naked core inside the balls-these are the cores of a huge number of atoms or molecules that make up these balls. In this case, the integral effect of the shift of the inner vacuum layers in the outer shells of «particles» and «antiparticles» in the circulation of a huge number of currents $\lambda_{-14,\,-16}$-vacuum is possible (see [8]). In other words, the attraction of macroscopic balls, according to this hypothesis, due to the imposition of huge-number fermiscopic subcont-antisubcont currents shifted relative to each other due to the mismatch of the spherical boundaries of various intra-vacuum layers in *rakya* «atoms» and «molecules».

2. Probably, it is impossible to fully compensate for the difference between the electric charges of the two balls. In this case, their attraction may be due to the forces of electromagnetic nature (see Chapter 8).

3. Finally, we should not completely reject the idea of Le Sage that the attraction of macroscopic balls may be due to the external pressure of by external pressure of lesagons (for example, flows of the neutrino).

Of light geometry of Alsigna also follows that to attract can only cosmic bodies on the opposite shift inner-vacuum layers. In other words, only space objects that complement each other in terms of compensating for shifts in the vacuum layers in order to fulfill the vacuum condition are drawn to each other.

However, it should be expected that Star-Planetary Relations within a single balanced space System (Family) can be not only attractive or repulsive, but much more complex.

9.9 Summary on Chapter 9

In the framework of fully geometrized physics based on the axiomatics of the Algebra of signature (Stochastic metraphysics), the phenomenon of gravitation (attraction) between two stable electrically neutral vacuum formations (whether «stars» and «planets», or «atoms» and «molecules», etc.) is due to the shift of the inner-vacuum layers relative to each other in the region of cancer, surrounding the core of interacting local vacuum formations. This shift of the inner-vacuum layers is very small, so the gravitational attraction of uncharged «particles» is ~ 10^{40} times weaker than the electromagnetic interactions between charged «particles» and «antiparticles» described in Chapter 5 and 8.

The development of this direction of research may lead to the possibility of using the stellar-planetary and interstellar inside-vacuum (subcont-antisubmarine) movements to move in outer space.