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How to Place the Universe at a "Point"

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Abstract

The paper "How to place the Universe at a "point"" puts forward a hypothesis about the nature of singularities in black holes and at the birth of the observable Metagalaxy. This hypothesis is developed in relation to terrestrial black holes.

On the Problem of Singularities

Introductory Statements

One of the difficulties of the general theory of relativity is the problem of singu- larities, which actually arose from the moment Friedman obtained non-stationary cosmological solutions to the equations of the general theory of relativity and became even more acute in connection with the problem of gravitational collapse. Singular- ity denotes a state of infinite density of matter, which indicates the insufficiency of the general theory of relativity. Multidimensionality solves these problems.

How to Place the Universe at a "Point"

The Universe at a "point" is the author's asserted possibility of placing spaces of any extent in a multidimensional "point" with a given size (that is, in a small region of multidimensional space), including the free placement of our entire Universe in a multidimensional "point" with a diameter of 10−33cm. [1, 2].

For a book, as an example of a 3-dimensional object, the amount of information in the form of letters takes up V volume in the book. If the same amount of information is placed in 2-dimensional space, that is, on a plane, then in the form of lines the information will occupy an area S with a square side a(2), and a(2) > a(3), where a(3) is the side of a 3-dimensional cube representing a book.

The same amount of information, placed in a one-dimensional space, in the form of a string will stretch in length by the value a(1), and

$$a(1) > a(2) > a(3) \quad (1.1)$$

Accordingly, as the number of dimensions of space increases, to accommodate the same amount of information (in the form of letters), we will need an n-dimensional cube with an ever-smaller side a(n) of the corresponding n-dimensional cube, that is

$$a(1) > a(2) > \cdots > a(k) > \cdots > a(n) \quad (1.2)$$

It is easy to show that a(n) and a(k) are related by the following relation

$$a(n) = a(k)^{k/n} \quad (1.3)$$

This is the Klimets equation for singularities.

Indeed, (1.3) follows from the equality of volumes of information (or matter) in one or another n-dimensional space

$$V(1) = V(2) = \cdots = V(k) = \cdots = V(n) \quad (1.4)$$

where V (n) are "volumes" of n-dimensional spaces containing the same (equal) number of units of information (or units of matter - atoms), located at the nodes of n-dimensional cubic lattices with a step of d in one or another n-dimensional space. One can imagine that the distance d between particles (atoms) becomes smaller and smaller. Chains of particles in the direction of each coordinate axis transform into what we call continuum. And our rows of atoms turn into solid lines V (1), planes V (2), volumes V (3), etc. to V (n).(Fig.1)

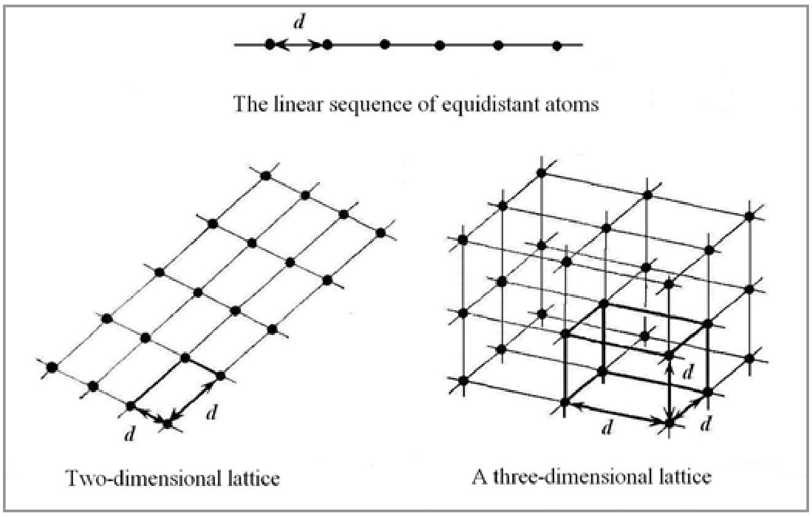

Figure 1: Multi-dimensional lattice And since

$V(1) = a(1)^1; V(2) = a(2)^2; \cdots; V(k) = a(k)^k; \cdots; V(n) = a(n)^n$ (1.5)

then (1.3) follows from here. Here, for example, a(1) = d · t, where t is the number of lattice steps. For a 3-dimensional space from (1.3) we obtain the following relation

$$a(n)=a(3)^{3/n} \quad (1.6)$$

An interesting conclusion follows from the relation (1.6). Suppose we need to place the entire observable Universe together with matter in an elementary n-dimensional "cube" with side a(n) equal to 10 · 10−33cm = 10 · lP (then there are ten units of Planck length), where lP = 10−33cm is one unit of Planck length. How many dimensions of space do we need for this? The size of the observable Universe is 1028 cm or, in Planck length units, 1061lP Planck length units. From the relation (1.6) we have

$$10^1 lP = (10^{61} lP)^{3/n} \quad (1.7)$$

Hence n = 183. From (1.7) it is clear that already with 183 dimensions of space, the entire observable Universe can be placed in a 183-dimensional "cube" with a side 10lP , that is, in fact, in a "point" (183-dimensional).

The density of matter in such a "cube" remains equal to the density of matter located in the 3-dimensional space of the observable Universe. Indeed, the density of matter in n-dimensional space is determined as follows: ρ(n) = M/V (n), where M is the mass of matter of the observable Universe, V (n) is the volume n-dimensional space, ρ(n) is the density of matter in n-dimensional space. And since, by condition, V (3) = V (183), then ρ(3) = ρ(183).

An illustrative example: folding a one-dimensional thread of length r1 into a flat two-dimensional "mat" in the form of a spiral with a diameter of r2 or into a three-dimensional ball with a diameter of r3. It is clear that r1 > r2 > r3, that is, the compactness of the placement of the thread increases with increasing dimension of space, but the density of placement of the substance of the thread remains the same (the atoms of the substance of the thread will still be located at a distance of d from each other in the direction of each nth coordinate axis. (Fig.1)

Based on the above, we claim that any finite-dimensional space can be placed in an infinite-dimensional "point". Note that in Newton's theory of gravitation, the planet Earth and other planets are taken as a" point" in relation to the Sun. Or, for example, in" The Feynman Lectures on Physics" in § 5" Universal Gravitation" it is said" One of the most beautiful celestial spectacles is a globular star cluster. Every point is a star [3]. In physics, a material point is a physical concept (model, abstraction) representing a body or region of space, the dimensions (and shape) of which can be neglected in the conditions of a given problem. Here the word" point" is written in quotation marks and this concept is defined as a small region of space, although this concept is relative and depends on the scale of the problem. In this article, a" point" is an area of ??10 Planck units. In mathematics, a point is zero-dimensional, has no size, and therefore has no relevance to the article.

It can be assumed that the singular "point" (that is, a very small region of space), from which, according to the general theory of relativity, our Universe arose, was multidimensional. It can also be assumed that during the collapse of black holes, when the matter of the black hole reaches a certain (for example, Planck?) density, the collapsing matter in the center of the black hole (in the singularity) is squeezed out into other dimensions of space, which can be folded (compactified) into rings with a diameter on the order of the Planck density length.

Development

Based on the calculations of Klimets A.P. [1-2]. the idea was put forward that terrestrial black holes represent topological features in the structure of near-Earth space-time. [4].

According to Trofimenko A.P. this means the multidimensionality of space and time of earthly objects, the presence of bridges (tunnels) to parallel worlds right on Earth [4].

Taking into account the possibility of compactification using higher dimensions of terrestrial bodies (up to Planck dimensions) while maintaining their usual den- sity, A. P. Trofimenko concludes about the possibility of penetration of man and his technical devices (the density of the substance of objects during multidimen- sional compactification may not change) through multidimensional terrestrial black holes to other worlds (metagalaxies), “launching” directly from Earth. In relation to the problem of space civilizations, this means the possibility of replacing the spatial expansion of civilization in three-dimensional space with the emergence of a supercivilization into the higher dimensions of the Universe.

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