

# *Journal of Theoretics*

Volume 6-3, June/July 2004

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## **Space and Matter**

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**Abstract** Scientific understanding of cosmic space and its interaction with matter is determinate by the theory of numbers and geometry, that we use for its description.

**Keywords:** space, matter, mathematical infinity, gravitational aether, Einstein.

### **Introduction**

Regarding theory of numbers natural and real numbers are both infinite and at the same time real numbers are more than natural one. Real numbers are composed of algebraic and transcendental one, with natural numbers we can numerate only algebraic one. Logicians confirm that there is no contradiction if we say that the infinity of natural numbers is smaller than the infinity of real numbers and at the same time say that they are equal [1].

By numerating each mile of a straight line with natural numbers we will get infinite distance and by numbering a parallel line with real numbers we will also get infinite distance. If we say that an infinite distance made out of natural numbers is shorter than one made out of real ones there is no contradiction; if we say that they are equal there is also no contradiction. So infinite distance does not mean a real existing and measurable one; infinite distance + 100 miles = infinite distance. That's why the application of infinite distance in cosmology creates difficulties. In the universe we can observe and measure only finite distances between objects. When we imagine that universal space might be infinite as Euclidean space we do not know exactly what does it mean. With applying of Riemann's geometry in cosmology the image of infinite three-dimensional cosmic space changes into the image of finite spherical four-dimensional one. Our imagine of the universal space depends on which geometry we use to describe it, however its real nature remains unknown.

Mathematical infinity is applied also in calculations about pressure, temperature, and density in singularity of big bang and black holes, where all of them have infinite values. Infinite temperature plus 1000 degrees is still an infinite temperature, so terms infinite temperature, pressure, and density do not means temperature, pressure, and density in the common sense.

However the question arises: from where matter appears in the *inflation phase* of big bang and when it disappears the centre of black holes.

According Stephen Hawking in the *inflation phase* energy of the matter that is positive and the gravitational one that is negative are multiplying. Its sum remains always zero:  $E_{\text{matter}} (E_m) + E_{\text{gravitational}} (E_g) = 0$ . In the similar way as  $(-1) + (1) = 0$ ,  $(-2) + (2) = 0$ ,  $(-3) + (3) = 0$  [2].

## Discussion

Describing energy of matter as positive, the energy of gravitation as negative and explaining *inflation phase* with the equations above does not answer the question of the appearance of matter. Equations that function in mathematics do not necessary function in physics. Mathematics only describes reality and can not explain it. Einstein says: "As far as the laws of mathematics refer to reality, they are not certain; and as far as they are certain, they do not refer to reality" [3].

Einstein's idea was that cosmic space can not be imagined without the existence of gravitational aether: "Recapitulating, we may say that according to the general theory of relativity space is endowed with physical qualities; in this sense, therefore, there exists an ether. According to the general theory of relativity space without aether is unthinkable; for in such space there not only would be no propagation of light, but also no possibility of existence for standards of space and time (measuring-rods and clocks), nor therefore any space-time intervals in the physical sense. But this aether may not be thought of as endowed with the quality characteristic of ponderable media, as consisting of parts which may be tracked through time. The idea of motion may not be applied to it "[4].

Interaction between matter and the gravitational aether can be described with the roundness of Riemann four-dimensional geometry; the bigger the star is and the more round is the space around it, the higher is the density of the gravitational aether. In the center of the black hole the density of the gravitational aether is infinite. All atomic and subatomic particles disintegrate, only gravitational force persists. The structured energy of the matter disintegrates into unstructured gravitational energy.

The sum of energy of the matter and gravitational one is always constant:  $E_{\text{matter}} (E_m) + E_{\text{gravitational}} (E_g) = E_{\text{constant}} (E_k)$ . In the first moment after the big bang  $E_m = 0$ ,  $E_g = E_k$ . In the subsequent moments of the inflation phase  $E_g$  is structured into  $E_m$ , and the transformation is over when  $E_g$  and  $E_m$  are balanced:  $E_g = E_m$  ( $E_g = E_k/2$ ,  $E_m = E_k/2$ ). With the formation of black holes, the transformation of  $E_m$  into  $E_g$  starts,  $E_m$  is falling towards zero ( $E_m \rightarrow 0$ ),  $E_g$  is rising towards  $E_k$  ( $E_g \rightarrow E_k$ ). The density of gravitational aether is increasing with disintegration of matter into it. This process increases the gravitational forces between galaxy, the speed of expanding universe is getting slower. At a certain point the expanding stops and universe start to collapse in an enormous black hole that explodes into new big bang where gravitational aether structures in subatomic particles.

The energy of matter and the gravitational one are in a *permanent dynamic equilibrium*. Big bangs are cyclic and the universe is a self-renovated system.

The speed of physical change in a given volume of gravitational aether depends on its density. The higher is density, the lower is speed of change. Time exists only as

stream of this change [5]. An experiment with earthworms show that the weight of a living worm is bigger than the weight of the same dead one [6]. The gravitational aether seems to be more dense around living organisms than around same dead ones.

## Conclusions

In the universe there is only one energy. When structured it appears as matter, when unstructured it appears as gravitational aether that builds up the cosmic space. The physical circumstances of transformation "gravitational aether --> matter" and back are infinite. This presents one of the matters that create difficulties in the unification of General Relativity and Quantum Mechanics.

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Received May 2003

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