Shape and Dimensions of Space

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Abstract

Contemporary physics states that space is an endless container. Therefore, the question about the shape of space is senseless. This statement is free imagination of the human mind. The other view is disclosed in GR that the shape of space corresponds to the shape of the Universe. This statement is a source of many speculations about the dimensions and shape of space. The article outlines the shape of general 3D space and that of particular 2D and 4D spaces, whitch are wrapped in general space.

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Introduction

The number of space dimensions depends on the forces which form space [1]. If the interaction force does not depend on the distance between bodies, space has only one dimension (1D space). If the force decreases proportionally to the distance, the

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space has two dimensions (2D space). If the force decrease sin the square to the distance, there is 3D space. If the force decreases in the cube to the distance, there is 4D space.

Gravity forces govern in the Universe and they decrease in the square to the distance. Therefore, there is 3D space. Since all the directions in the gravity space of the Universe are equal, it is reasonable to presume that the shape of space is sphere. The space of the Universe is a general space or, in other words, an absolute space because everything is dislocated and all events occur in this space. There is neither physical nor any mathematical evidence for another number of independent dimensions [2]. It is confirmed by investigation of cosmic background radiation [3].

That does not mean that objects with other dimensionality, for example, 2D or 4D, cannot be located in the 3D Universe.

Shape of 2D space

The electric and magnetic spaces have two independent dimensions [4]. These are equipotential surfaces. In the 3D gravity space the 2D space looks like the surface of sphere (Fig. 1.) or that of a more complicated object (ellipsoid, etc.).

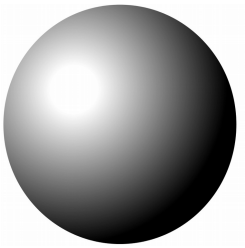

Fig. 1. Surface of s_1 electrons in the hydrogen atom.
The nucleus of an atom is in the centre of sphere.

The interaction [5] between *s* and *p* electrons in the atom leads to a more complicated shape of the electric space (field) as shown in Fig. 2.

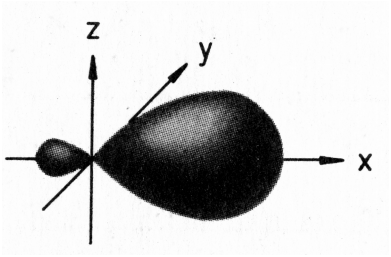

Fig. 2. The shape of 2D space is the result of s_1 and p_x electron interaction.

The interaction of atoms in molecules forms very complex shapes (Fig.3.).

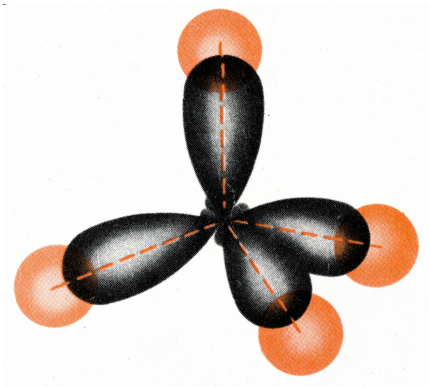

Fig. 3. The shape of electric surfaces in the methane molecule.
Red hydrogen, black carbon.

Shape of 4D space

When the 4D object is examined from the 3D space, only one projection of the 4D object can be seen. It looks like a 3D object [6]. For example, the glome is 4D sphere which looks like a simple sphere. Mathematically the glome can be described by the equation:

$$x^2 + y^2 + z^2 + w^2 = R^2,$$

where: x, y, z, w – spatial coordinates;
R – radius of glome.

In the 3D space the glome can be displayed as 4 projections:

1) if $x = 0$, then $y^2 + z^2 + w^2 = R^2$,
2) if $y = 0$, then $x^2 + z^2 + w^2 = R^2$,
3) if $z = 0$, then $x^2 + y^2 + w^2 = R^2$,
4) if $w = 0$, then $x^2 + y^2 + z^2 = R^2$.

All the 4 projections are 3D spheres, independent and orthogonal. If one looks at the opaque glome he sees only one of the 3D spheres. If the glome is transparent, one can see that the other three spheres are inside the glome.

The example of a 4D object is a nucleus [7]. The nucleus looks like a sphere. The high energy electrons can penetrate the proton. The analysis of electron scattering showed that protons contained several numbers of non-interacting constituent particles [8]. Experimentalists called them quarks. In reality, the quarks are only projections of the 4D nucleus in our 3D space. The quarks cannot be separated from the nucleus like 3D projections of the 4D object from the object itself.

Conclusions

The space of the Universe has three dimensions and the shape of sphere. It is an absolute space in the sense that all objects with different particular spaces are located inside.

Inside each atom the electric space is a surface of two dimensions. The shape of the space can vary from a simple sphere to very complicated forms.

Inside each nucleon the nuclear space has four dimensions and the shape of the glome. The quarks are only 3D projections of the nuclear space.

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