UNIVERSE IS THE BLACK HOLE

Miroslav Súkeník, Jozef Šima
Slovak University of Technology, FCHPT, Radlinského 9, 812 37 Bratislava, Slovakia
sukenik@nextra.sk; jozef.sima@stuba.sk

ABSTRACT: Physico-mathematical parallels between the Expansive Nondecelerative Universe model and black holes justify us to be convicted that each universe can be considered as a black hole. This is why there must exist a fractal arrangement of the Multiuniverse that is boundless both in time and space.

1. Introduction

As for coupling the Universe and black holes there are two ideas appearing in the literature. First one is focused on the Universe creation and can be represented by a hypothesis stating that the Universe was created through the Big Bang from a black hole. The essence of this hypothesis was published by Afshordi et al. [1,2]. They elaborated the idea suggesting that our Universe emerged as a consequence of the formation of a black hole in a higher-dimensional universe. Another approach, authored by Poplavski [3-6] deals with the Universe existence. It is based on the theory that each black hole is a doorway to a further universe and that the Universe was formed within a black hole which exists itself in a larger universe. Poplavski claimed that our Universe may exist inside a black hole. His ideas, connecting general relativity and quantum theory, eliminate the notion of physically impossible singularities in our Universe.
Stemming from the fundamental principles of the Expansive Nondecelerative Universe model [7-12] we formulate the hypothesis that our Universe itself can be understood as a black hole.

2. Spherically symmetric solution of gravitational field

One of the fundamental postulate of our Expansive Nondecelerative Universe (ENU) model declares that our Universe has been expanding by a constant velocity being equal to the velocity of light c [7-12]. The Universe matter and gravitational energy are gradually increasing. The Universe gravitational energy is negative and the total Universe energy is thus equal to zero and the conservation laws are obeyed. Gravitational field is nonstationary.
Introducing the transformations $m \to m_t$ leads to:

$$\frac{dm_t}{cdt} = \frac{m_t}{a} \tag{1}$$

where $a \cong 1.3 \times 10^{26}$ m (a is the gauge factor of the Universe)

In regard to eq. (1) when applying Schwarzschild metric, the components of momentum-energy tensor are obtained from Einstein field equations:

$$T_0^0 = T_1^1 = 0 \tag{2}$$

$$T_2^2 = T_3^3 = \frac{c^4 r_{(g)}^2 r}{8\pi G a^2 (r - r_{(g)})^3} \tag{3}$$

$$T_0^1 = -\frac{c^4 r_{(g)}}{8\pi G a r^2} \tag{4}$$

The component T_0^1 expresses the energy density of localized gravitational field. In the vicinity of black hole, if $r > r_g$, it holds

$$T_2^2 = T_3^3 = \frac{c^4 r_{(g)}^2}{8\pi G a^2 r^2} \tag{5}$$

3. Absence of singularity in black hole

The observer in the black hole surroundings will take notice Lorentz contraction r_g in the direction connecting the observer with the black hole centre. It holds

$$r_g = r_{g(0)}\left(1 - \frac{v_{(r)}^2}{c^2}\right)^{1/2} \tag{6}$$

where $v_{(r)}$ is the escape velocity in the distance r from the black hole. Gravitational radius r_g (in direction connecting the observer with the black hole centre) on the horizon will be of zero value. It means that there will remain only a horizon surface and the metric of horizon will be changed to the flat surface metric. The energy density of gravitational field will be expressed according to (4) as

$$\varepsilon_g = -\frac{c^4 r_{g(0)}\left(1 - \frac{r_{g(0)}}{r}\right)^{1/2}}{8\pi G a r^2} = K\left(\frac{r-1}{r^5}\right)^{1/2} \tag{7}$$

where $r_{g(0)} = 1$ and subsequently $K = -\frac{c^4}{8\pi G a}$.

Given the above relations it is obvious that the gravitational force will increase with decreasing r up to $r_x = \frac{5}{4} r_{g(0)}$ (this point represents the local minimum of the lastly mentioned function), and after that r will decrease reaching zero at $r = r_{g(0)}$. The point r_x is localized under photosphere (its radius is $r_f = \frac{3}{2} r_{g(0)}$) and any stable circular orbits cannot exist in the region r_x.

It can be proved using an analogous procedure that the components T_2^2, T_3^3 have their local maximum on the photosphere and on the horizon they will reach zero value. It thus follows that the singularity cannot exist in black hole. When taking nonstationary solutions into account, Kretschman invariant is finite everywhere, and on the black hole horizon it will reach zero value.

4. Realistic model of the Universe

Kerr black hole satisfies the requirements of the realistic model of the Universe. On March 3, 2013 the results of CBS radiation measurement (Planck satellite) were published [13]. Planck found a region of a higher anisotropy (axis of evil) and its adjacent cool region. Their interface lies approximately in the equatorial plane and is indicated by the S-shape curved line (see Fig. 1).

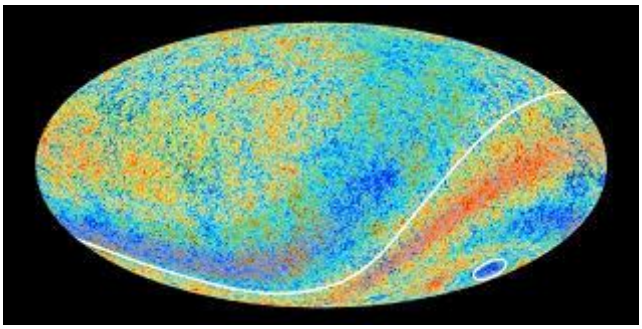

Fig. 1 Asymmetry in the average temperatures on opposite hemispheres of the sky (indicated by the curved line), with slightly higher average temperatures in the southern ecliptic hemisphere and slightly lower average temperatures in the northern ecliptic hemisphere (extracted from [14]).

The most probable explanation of the observed facts is that the Universe rotates. In the system of polar coordinates the metric of such Universe is as follows

$$ds^2 = (1 - r^2\Omega^2)dt^2 - dr^2 - r^2 d\theta^2 - dz^2 \tag{8}$$

where Ω is the angular velocity of rotation.

Accepting the idea of the Universe as a rotational black hole leads to another issue. On April 3, 2013 NASA published the results of Alpha Magnetic Spectrometer intended to look for dark matter and antimatter [15]. Within the investigation a higher abundance of high-energy positrons was observed. The positrons may originate from dark matter (undirect evidence), however, supernovae may be their source as well.

Possible explanation:

According to our theory, if each Universe is a black hole, a fall of surrounding matter into it causes a change in the matter phase. The reverse phase under horizon means that the matter is changed to antimatter. It exactly corresponds to Feynman diagrams characterizing an antiparticle as a particle returning in time. This amount is negligible, it does not endanger the absolute dominance of the matter over the antimatter in a given Universe, it results, however, in the small excess of antimatter in cosmic radiation. Such an excess will be everywhere irrespective of the position of galactic plane. In addition, a dominance of antiprotons should exist. It will be, however, a task for future measurements to prove (rebut) this hypothesis.

5. Conclusions

Instead of traditional-type conclusions, a few claims are formulated and offerred.

1: When elaborating a diagram of the Universe evolution [9], we find that in a distinct time the Universe must have a zero volume and energy. Only introducing time and inspecting the past, it is possible to speak on volume, mass and energy. For the given moment is essential only a horizon surface. It is our present.

2: This surface (expressed dimensionlessly) exactly equals the Universe entropy, which is in accordance with the holographic principle. Looking at the past of our Universe is, in reality, looking at inward black hole. The horizon surroundings – *i.e.* the future - is not accessible for us.

3: Navier – Stokes equations have solutions only in two dimensions.
4: The best expression of quantum theory is in two dimensions. It is so called CFT ADS correlation where two-dimensional quantum theory is equivalent to classic anti de Sitter universe.
5: From our viewpoint, the Universe expansion, matter creation and time evolution are just a demostration of some physical constants gradual changes.
6: Black hole - Universe is gradually expanding. The total evaporation of black hole cannot happen and, therefore, the paradox of information loss cannot exist.
7: Due to the hypothesis that each black hole is a local Universe, the Miltiuniverse must have fractal structure infinite in time and space.
8: B-modes of CMB radiation polarization either do not exist or are negligible (when not taking interstellar dust, gravitational lens and influence of electromagnetic field into account).

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