Black Hole Universe and Speed of Light

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Abstract

I showed that the speed of light in the Black Hole Universe is the smaller the stronger the gravitational field. I gave the formula for time of travel of light from the Earth to a given point of the Black Hole Universe.

Keywords: general relativity, Black Hole Universe, speed of light.

1. Introduction

In the e-book *Anti-gravity* [1] I proposed a black-hole model of the Universe. Our Universe can be treated as a gigantic homogeneous Black Hole with an anti-gravity shell. Our Galaxy, together with the solar system and the Earth, which in the cosmological scale can be considered only as a point, should be located near the center of the Black Hole Universe.

I will show that the speed of light in the Black Hole Universe is the smaller the stronger the gravitational field. I will give a formula for time of travel of light from the Earth to a given point of Black Hole Universe.

2. What is c?

Scalar (c) is a parameter, a universal constant, the value of which is equal to the speed of light in a vacuum in the inertial frame of reference in the absence of a gravitational field. In the special theory of relativity (c) is assumed to be the maximum value of the speed of signals propagation, which is the same in all inertial frames of reference. In the general theory of relativity (c) is assumed to be the maximum value of the speed of signals propagation, which is the same in all frames of reference.

3. The speed of light in the gravitational field

In the theory of relativity, the speed of light is determined by the disappearance of the square of the differential of space-time distance. The general theory of relativity examines the deformations of time-space through the masses. From the general form of the metrices of such time-spaces it follows that the speed of light is the smaller the stronger the gravitational field and the speed of light is only constant in the conformally flat space-times.

4. The speed of light in the Black Hole Universe

The space-time metric for the Black Hole Universe [1] is given by:

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

where

$$0 \le r < R = \frac{GM}{c^2}$$

r – distance from the Black Hole Universe
R – radius of the Black Hole Universe
G – gravitational constant
M – mass of the Black Hole Universe
c – standard value of the speed of light

This metrics, for

$$\theta = \text{const} , \quad d\theta = 0 , \quad \varphi = \text{const} , \quad d\varphi = 0 ,$$

is reduced to the following form

$$(ds)^2 = \left(1 - \frac{r^2}{R^2}\right)^{-1} (dr)^2 - \left(1 - \frac{r^2}{R^2}\right) c^2 (dt)^2 .$$

The speed of light propagation (v_{light}) will be calculated from the condition:

$$(ds)^2 = 0 .$$

Finally, we get:

$$v^2_{light} \equiv \left(\frac{dr}{dt}\right)^2 = c^2 \left(1 - \frac{r^2}{R^2}\right)^2 .$$

Note that the farther away from the center of the Black Hole Universe, the smaller the speed of light.

In [1] I showed that the physical (real) radial component of the gravitational acceleration of a free-falling particle in the Black Hole Universe can be written in the form of:

$$\hat{a}^r = -\frac{c^2}{R^2} r \cdot \frac{1}{\sqrt{1 - \frac{r^2}{R^2}}}$$

From the above relationship it follows that the farther away from the center of the Universe, the stronger the gravitational field. Thus, the speed of light in the Black Hole Universe is the smaller the stronger the gravitational field.

5. Time of travel of light from the Earth to a given point of the Black Hole Universe

$$dt = \frac{dr}{v_{light}} .$$

Substituting for (v_{light})

$$v_{light} = c \cdot \left(1 - \frac{r^2}{R^2}\right),$$

we get

$$\Delta t = \frac{R^2}{c}\int_0^r \frac{dr}{R^2 - r^2} = \frac{R}{c} \cdot \operatorname{artgh}\frac{r}{R} = \frac{R}{c} \cdot \frac{1}{2}\ln\left(\frac{R+r}{R-r}\right), \quad 0 \le r < R .$$

6. Final remarks

Astronomers and astrophysicists, who stubbornly assume the constancy of the speed of light, in my opinion, should use the following relation when determining the distance:

$$r \to R \cdot \operatorname{artgh}\frac{r}{R} = R \cdot \frac{1}{2}\ln\left(\frac{R+r}{R-r}\right)$$

References

[1] Zbigniew Osiak: *Anti-gravity*. viXra:1612.0062 (1916),
http://viXra.org/abs/1612.0062