Black Hole Universe and Golden Ratio

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Abstract

Within the framework of the black hole model of the Universe, I introduced the concept of Cherenkov radius, i.e. the distance from the center of the Universe, at which the speed of the orbiting test particle and the speed of light are the same. I showed that the radius of the Universe and the Cherenkov radius are in the golden ratio.

Keywords: general relativity, Einstein space, black holes, universe, golden ratio, Cherenkov radiation

1. Introduction

In the e-book *Anti-gravity* [1] I proposed a black hole model of the Universe. In this model, our Universe is a gigantic homogeneous black hole with a constant density (ρ). The spacetime of the Black Hole Universe is Einstein Space, the properties of which are described by solutions of the field equations

$$R_{\alpha\alpha} = -\tfrac{1}{2}\rho c^2 \kappa g_{\alpha\alpha}, \quad R_{\mu\nu} = 0, \quad (\alpha,\mu,\nu = 1,2,3,4; \quad \mu \neq \nu), \quad \kappa = \frac{8\pi G}{c^4}$$

One of these properties is presented in further part of this work.

2. Cherenkov radius and golden ratio

We will determine the distance (r_*) from the center of the Black Hole Universe, which we will call the Cherenkov radius at which the speed of the orbiting test particle ($v_{particle}$) and the speed of light (v_{light}) are the same. Expressions for ($v_{particle}$) and (v_{light}) come from work [1].

$$v_{particle} = c\frac{r_*}{R} = v_{light} = c\left(1 - \frac{r_*^2}{R^2}\right)$$

This relationship shows that

$$r_*^2 + Rr_* - R^2 = 0$$

The above quadratic equation has two solutions, including one positive:

$$r_* = \frac{\sqrt{5}-1}{2}R$$

Note that the quotient of the radius of the Black Hole Universe (R) and the Cherenkov radius (r_*)

$$\frac{R}{r_*} = \frac{\sqrt{5}+1}{2}$$

is the golden ratio.
In the work [1] I showed that

$$R = \sqrt{\frac{3c^2}{4\pi G}} \cdot \sqrt{\frac{1}{\rho}}$$

Thus

$$r_* \sim \frac{1}{\sqrt{\rho}}$$

3. Cherenkov radiation
At a distance from the center of the Black Hole Universe, larger than the Cherenkov radius, the speed of the orbital test particle is greater than the speed of light.

$$r > r_* \Rightarrow v_{particle} > v_{light}$$

Orbiting charged particles can cause emission of Cherenkov radiation.

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