

# Is Black Hole the hole?

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## Abstract

Presented evidence, that Black Hole is hole. Namely right behind the black surface (event horizon for non-rotational BH) there are no space nor time. No spacetime. Just as it would be prior to the Big Bang. First composite image of Black Hole from Event Horizon Telescope is another evidence for that, with the resulting correction of the reported mass.

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## I. MY IDEA

What if the Black Hole is actually a hole in space, and right behind the surface (event horizon for non-rotating BH) is there absolute nothing? There is no time nor space, in my calculations. Well, yes, everyone thinks that such strange place is only in the very center of the BH, in one singular point. I argue, that the black surface of the black hole is the edge of our reality and the universe.

Black Hole is surrounded not only by the event horizon, but also by the ergosphere. The ergosphere covers the event horizon because it is larger than event horizon. From the point of view of a stationary observer, the time coordinate turns to zero on the ergosphere surface  $d\tau = 0 dt$ . And this means that there is space, but no time. However this is impossible: space is connected with time. Therefore, there is neither space, nor time.

Because the speed measured by stationary observer reaches speed-limit  $c$  at the ergosphere of the BH, then falling matter vanishes before reaching the ergosphere (otherwise the 4-velocity scalar product  $u^\nu u_\nu$  would change from  $-1$  to  $0$ , which is impossible). The mixture of actual  $A^{\nu\mu}$  and virtual matter  $K^{\nu\mu}$  is conserved:  $G^{\nu\mu} = 8\pi (A^{\nu\mu} + K^{\nu\mu})$ , where  $G^{\nu\mu}$  is the Einstein Tensor. Dark Matter and Dark Energy is the Virtual Matter, take it as the scientific conjecture. The in-falling Actual matter near the Black Hole becomes Virtual, it means “not detectable”, just as the space and time inside the Black Hole became virtual.

### Energy-momentum conservation violation inside the Black Holes

Because there are singularities in General Relativity, the latter can hardly be regarded (in current state of affairs) as a predictable and conservative theory. Indeed, the vanishing of a body sometimes occurs at a finite curvature of spacetime. The velocity component is given by [1]

$$u^r \equiv \frac{dr}{d\tau} = -\frac{1}{r^2} \sqrt{B}, \quad (1)$$

where  $B = E^2 r^4 - (r^2 - 2Mr + Q^2)r^2$ .

In “geometrized” units ( $Q, M, r$  in meters) let us choose  $Q = 1/5$  and  $M = 1/2$ . Zero initial velocity ( $B = 0$  at  $r = r_0 = 20$ ) requires a trajectory with

$$E = \frac{\sqrt{9501}}{100}. \quad (2)$$

Therefore

$$B = -\frac{499}{10000}r^4 + r^3 - \frac{1}{25}r^2, \quad (3)$$

which is negative in  $r < r_m = 20/499$ . This means a termination of the falling body. My detailed study shows that even photons are being terminated (in the Kerr-Newman spacetime; but various terminations are present also in a Kerr spacetime as well as in naked singularity regimes). Such termination was never found yet; e.g., it is not reported in Refs. [1, 2].

## II. THE REPORTS OF MASS OF BLACK HOLE IN THE MIDDLE OF THE GALAXY M87 POINT TO MY THEORY

As shown by Laura, Hawking radiation can stop a star collapse, so there are bodies that are larger than the Schwarzschild sphere but smaller than the neutron star. [3] In this note I give another explanation: the ergosphere is the surface of the Absolute Nothingness (called simply “object” in the following). In that way, we avoid having (hypothetical) negative energy particles in the “Penrose energy extraction process” [1] inside the ergosphere, and we are getting rid of the Hawking information loss paradox at the “bottom” of the ergosphere, i.e., at the event horizon. Is expected then, that such object is the black hole in the middle of the galaxy M87.

Then not the event horizon is being black, but being black the ergosphere. If the surface of the object is the ergosphere, we can notice that the speed of any falling matter is the speed of light just on the surface of the object (measured by a stationary observer [4]). I have calculated this speed using Ref. [1]. Therefore, there is an effective red-shift, and the surface of the object must be black. Indeed, by definition of ergosphere surface there is  $g_{tt} = 0$ , and the metric for stationary observer (he has  $d\phi = d\theta = dr = 0$ ) just at the surface reads  $d\tau^2 = g_{tt} dt^2$ , which looks exactly like the cause for the infinite red-shift turning black hole “black”.

The Event Horizon Telescope Collaboration judges the mass of the black hole by the size of the black spot in the sky (they called it “shadow”). But if it is the ergosphere black, not the event horizon (because latter is absent for the object, which surface is ergosphere); then judging by the size of the black spot, the mass of “extremal” black hole will be twice times smaller than reported by Event Horizon Telescope Collaboration, because ergosphere

surface is twice larger than the event horizon:  $r_E = 2 r_h$ .

As a consequence, the mass value  $m = 6.5 \pm 0.2 \pm 0.7$  billion solar masses, as reported by the event horizon Telescope Collaboration [5], can be divided by a factor of two to produce the correct mass  $M = m/2 = 3.25 \pm 0.1 \pm 0.35$ . Therefore,

$$3.25 - 0.1 - 0.35 = 2.8 < M < 3.7 = 3.25 + 0.1 + 0.35 .$$

This range perfectly agrees with the previous most recent mass determination [6], which was

$$2.8 < M < 4.4 .$$

However, we have noticed that the precision of our instruments has noticeably grown over the years,  $3.7 < 4.4$ . The author offers this solution to solve the discrepancies between the results of Refs. [6] and [5].

So again, the Event Horizon Telescope Collaboration reports the mass  $m$  of the black hole by measuring the PROPER (not the “visible”) size  $\psi$  of the black spot in the middle of the Galaxy M87 by the formula:  $m = \psi$  in meters. However, the author has presented evidence, that the proper size of the black spot relates to true mass  $M$  as  $\psi = 2 M$  for “extremal” black hole. Because The Telescope sees being black not the event-horizon at  $r_h = M$ , but the ergosphere at  $r_E = 2 M$ . Therefore,  $M = m/2$ . So, the author suggests renaming Event Horizon Telescope into “Ergosphere Telescope”.

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