

# Active Galactic Nucleus As a Renewing Systems Of the Universe

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**Abstract:** Astronomical observations shows that the AGN of Milky Way galaxy is "eating" the galaxy of Sagittarius. On the other hand observed that AGN continuously emits fresh gas. In AGN matter is transforming in the energy of the physical space and that at the same time energy of the physical space is transforming back into fresh gas. In this way AGN is the renewing the "old matter" with the high entropy into "new matter" with the low entropy. Universe is a self-renewing system where energy of the matter and energy of the physical space are in a into a permanent dynamical equilibrium, there was no beginning of the universe and there will be no end.

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## 1. Introduction

Thousands of stars stripped from the nearby Sagittarius dwarf galaxy are streaming through our vicinity of the Milky Way galaxy, according to a new view of the local universe constructed by a team of astronomers from the University of Virginia and the University of Massachusetts. Using volumes of data from the Two-Micron All Sky Survey (2MASS), a major project to survey the sky in infrared light led by the University of Massachusetts, the astronomers are answering questions that have baffled scientists for decades and proving that our own Milky Way is consuming one of its neighbours in a dramatic display of ongoing galactic cannibalism. The study, to be published in the Dec. 20 issue of the *Astrophysical Journal*, is the first to map the full extent of the Sagittarius galaxy and show in visually vivid detail how its debris wraps around and passes through

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our Milky Way. Sagittarius is 10,000 times smaller in mass than the Milky Way, so it is getting stretched out, torn apart and gobbled up by the bigger Milky Way (1).

## 2. Granular Structure of A-Temporal Physical Space

According to the "Loop Quantum Gravity" physical space has a granular structure: "The most appealing aspect of loop quantum gravity is that it predicts that space is not infinitely divisible, but that it has a granular structure. The size of these elementary "quanta of space" can be computed explicitly within the theory, in an analogous way to the energy levels of the hydrogen atom" (2).

Gravitational force is carried directly by the density of physical space. It is not that a particle or a wave is carrying gravitational force as is the case with light. Gravitational force is A-Temporal (has no physical time) in the sense that no material change (travelling of hypothetical gravitational wave or of hypothetical graviton) is needed for its acting. One could imagine A-Temporal physical space as an elastic medium that has a tendency to shrink. More medium is dense, stronger is the force of shrinking. The "shrinking force" is the gravitational force (3).

Density  $D$  of "quanta of space" in a given volume of physical space depends of amount of matter into it. In the center of AGN density  $D$  can be calculated according to the formula  $D = m * G$ , where  $m$  is the mass of the AGN and  $G$  is the gravitational constant.

$$D = m * G \text{ (} m^3 s^{-2} \text{)} \quad (1)$$

where  $D$  is the density of physical space in the center of the object,  $(m^3 s^{-2})$ ,  $m$  is the mass of the object  $(kg)$ , and  $G$  is the gravitational constant  $(m^3 kg^{-1} s^{-2})$

The gravitational force between two objects can be written as:

$$F = \frac{D_1 D_2}{r^2 G} \quad (2)$$

where  $D_1$  is the density of physical space in the center of the first object,  $D_2$  is the density of physical space in the center of the second object,  $G$  is the gravitational constant, and  $r$  is the distance between the center of the first and the center of the second object.

### 3. Gravitational Time Shift in A-Temporal Physical Space

The speed of physical time diminishes with increasing of the density of physical space. Let's have stone 1 on the surface of the earth and stone 2 on the bottom of 4100 meters deep shaft. Mass of the both stones is the same. Gravitational force between the earth and stone 1 and the earth and the stone 2 is following:

$$F_1 = \frac{DD_s}{r_1^2 G} \quad (3)$$

$$F_2 = \frac{DD_s}{r_2^2 G} \quad (4)$$

where  $D$  is the density of physical space of the earth  $D_s$  is the density of physical space of the stone  $G$  is the gravitational constant,  $r_1$  is the distance between center of the earth and stone 1, and  $r_2$  is the distance between center of the earth and stone 2.

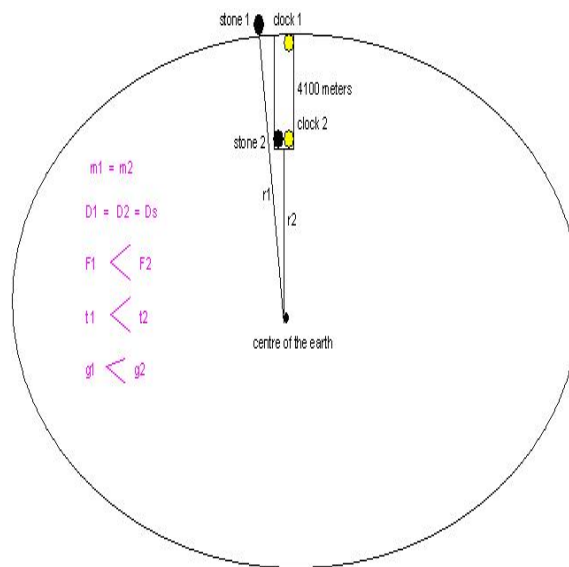


Fig. 1

Gravitational acceleration  $g$  depends on the density of the physical space, it increases toward the center of the earth by the formula:

$$g = \frac{D}{r^2} \quad (5)$$

where  $D$  is the density of physical space at the center of the earth,  $g$  is the gravitational acceleration, and  $r$  is the distance from the center of the earth to the point of which one calculate gravitational acceleration.

The speed of precise clocks should be slower at the stone 2 than at the stone 1. Following experiment could verify expected "gravitational time shift": one put clock 2 4100 meters deep into shaft and the clock 1 on the surface. After a month one pick them up and see eventual difference. The clock 1 should be faster than the clock 2 according to the formula below:

$$T = T_o \left( 1 - \frac{gR}{c^2} \right) \quad (6)$$

$$T - T_E = \frac{gh}{c^2} T_E \quad (7)$$

where  $T_E$  is time on the surface and  $T$  is the time on the point above the earth at the distance  $h$ .

One can first calculate gravitational acceleration  $g_2$  at the clock 2 as that clock 2 is on the surface and later on "Gravitational Time Shift" at the clock 1 as it would be 4100 above the surface.

According to the formula (5)  $g_2$  is  $10,2 \text{ ms}^{-2}$ , according to the formulas (6 and 7) "gravitational time shift" between clock 1 and clock 2 should be around **0,0000012** second per month.

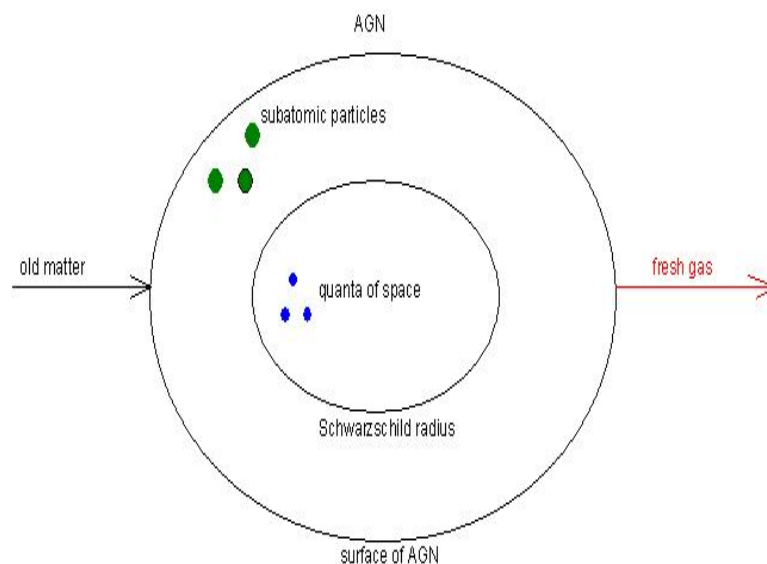
Good place to carry out this experiment would be in "Western Deep mine" (4100 m under the surface of the earth) located in Westonaria, Gauteng Province, South Africa owned by "Gold Mining Company" from Johannesburg.

#### 4. Density of Physical Space in The Centre of Sagittarius $A^*$

Sagittarius  $A^*$  the AGN of Milky Way should have a mass around 2,6 million masses of the sun (4).

In the center of Sagittarius  $A^*$  density of quanta of space should be:  $D = 33,18 * 10^{25} \text{ m}^3 \text{ s}^{-2}$ . Density of quanta of space in AGN is so strong that beyond the Schwarzschild radius gravitational force prevails other three forces: electromagnetic, weak and strong nuclear force. All atomic and subatomic particles transform into quanta of space. By "eating" matter increases the density  $D$  of physical space in the area inside the Schwarzschild radius and at the certain point the reversible process starts: quanta of space transform back into matter (fresh gas). With transformation of quanta of space into matter the density  $D$  inside the Schwarzschild radius diminishes. The process of transformation stops when amount of matter and density  $D$  of physical space in AGN are back into equilibrium.

Observations of Sagittarius  $A^*$  in a last three decades show that it is at rest: "The faintness of Sgr  $A^*$  at all wavelengths requires that the supermassive black hole be in an extremely quiet phase, either because the accretion rate is very low, or because the accretion flow is radioactively inefficient" (5). With "eating" some matter  $A^*$  will become active again.



**Fig. 2**

"Quanta of space" are basic elements out of which all atomic and subatomic particles are made of. According to the first law of thermodynamics quanta of space were not created and can not be destroyed. Quanta of space have no entropy.

Quanta of space build up a-temporal universal physical space for which one can not know how big it is. Scientific model of universal physical space depends on the geometries which describing it. When geometries are finite universal physical space will be finite, when geometries are infinite universal physical space will be infinite. Geometrical properties of universal space does not depends on the geometry with which one describe it. About geometry and vastness of the universal physical space one can not know exactly (6). One can study stars and galaxies in a observable physical space and predict that in the unobservable physical space universe functions in the same way.

For the rational scientific mind understanding of the universal physical space has its limits. For its deeper understanding consciousness as a research tool can be on an immense help (7).

## 5. Conclusions

AGN-s keep universe young. Increasing of the entropy of matter is only temporary. In AGN matter is rejuvenated. In the universe matter and physical space are in a permanent

dynamic equilibrium. Universe has no beginning and no end, it is A-Temporal.

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