GRAVITY AS DECREASE OF GRAVUM PRESSURE BY FRACTAL-RING STRUCTURED MATTER

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Abstract: *We tried to explain the basic principle of the gravity without a curved space or virtual gravitons. In our hypothesis gravum is a space without inner kinetic energy of fractal structured matter. We did not use the name vacuum for this space because it has different and disunited definitions. To distinguish our imagination from traditional one we suggest new name for this space: gravum. All objects that have fractal-ring structured matter decrease black energy by their inner kinetic energy. Two objects are attracted due to their decreased gravum pressure around them.*

Keywords: *fractal-ring structured matter, gravity, vacuum, gravum, black energy, black matter, pressure of gravum, fractal lines*

1 Introduction

Gravitation, or gravity, is a natural phenomenon by which physical bodies attract with a force proportional to their masses. Gravitation is most familiar as the agent that gives weight to objects with mass and causes them to fall to the ground when dropped.

Gravitation is one of the four fundamental interactions of nature, along with electromagnetism, and the nuclear strong force and weak force. Modern physics describes gravitation using the general theory of relativity by Einstein, in which it is a consequence of the curvature of spacetime governing the motion of inertial objects. The simpler Newton's law of universal gravitation provides an accurate approximation for most physical situations.

Newton started from Galileo's law of falling objects and applied it to an unlikely object: the Moon. Why, he asked, did the moon not fall to the earth? Other unsupported objects (like rocks, sticks etc.) fall immediately to the ground. The Moon seems to flout the law of gravity. That's the trick, however. The moon only seems to be immune to gravity. Newton realized that the Moon is not immune to gravity. It is continuously falling towards the Earth, but it keeps missing it.

Despite its power in explaining the orbits of the Solar System, Newton (and his critics) was unhappy with the lack of a mechanism by which gravity worked. Until then, all forces were believed to be "contact" forces. That is to say, to push an object one had to be touching it. I push a pen across the table using my hand directly. Even if I blow a piece of paper, I am really moving the air with my lungs which then moves across to the paper and pushes it along. Almost everything in our experience works this way - except for gravity. The Newtonian concept of "action-at-a-distance" was profoundly disturbing to his opponents, who attacked his theory as "occult" and explaining nothing.

In general relativity, the effects of gravitation are ascribed to spacetime curvature instead of a force. The starting point for general relativity is the equivalence principle, which equates free fall with inertial motion, and describes free-falling inertial objects as being accelerated relative to non-inertial observers on the ground. In Newtonian physics, however, no such acceleration can occur unless at least one of the objects is being operated on by a force.

Einstein proposed that spacetime is curved by matter, and that free-falling objects are moving along locally straight paths in curved spacetime.

In the decades after the discovery of general relativity it was realized that general relativity is incompatible with quantum mechanics. It is possible to describe gravity in the framework of quantum field theory like the other fundamental forces, such that the attractive force of gravity arises due to exchange of virtual gravitons, in the same way as the electromagnetic force arises from exchange of virtual photons. This reproduces general relativity in the classical limit. However, this approach fails at short distances of the order of the Planck length, where a more complete theory of quantum gravity (or a new approach to quantum mechanics) is required [1].

General Relativity is perhaps the most beautiful physical theory yet created. It is powerful, pleasing to the aesthetic sense and well-tested. It is one of the crowning glories of modern physics. At about the same time General Relativity was born, another theory was being created. This was Quantum Mechanics (QM). If General Relativity deals with very massive objects, then Quantum Mechanics deals with the interactions of very small objects, such as electrons and protons. Quantum Mechanics has been verified to a stunning degree of accuracy. It is perhaps the most successful

theory in all of physics. So what would happen if one had a very massive, but small, object? Both GR and QM would apply. This seems reasonable until one tries to do the math! It turns out that the two theories are incompatible. We don't mean that they predict different results (that would be straightforward to test), but rather that we don't even know how to express a theory that combines both GR and QM! The usual method for obtaining a quantum theory of a physical process is to take the classical theory and to "quantize" it. But if one does this to General Relativity, the answers to all calculations become infinite! Nothing makes sense anymore. Most physicists believe that a true combination of GR and QM is possible, but it won't be found as merely an extension of GR. The search for a theory that combines GR and QM is called the search for the Theory of Everything (TOE).

Recently a theory known as "string theory" has gained a lot of support as a candidate TOE. What is different about string theory? Normal Quantum Mechanics treats all particles as points of zero size. This leads to a lot of problems when distances get small or energies get large. String theory says that particles are not points after all, but instead small little loops. The sizes of these loops are about 10^{-34} cm - so very, very small indeed. But not zero! Most of the problems reconciling GR and QM go away when one uses this theory. The full consequences of string theory have not been worked out yet (the mathematics is incredibly complex) but so far it seems very promising. But we don't know yet, and the final theory of gravity may be something else entirely. Whatever it is, however, we can be certain that the attempts to understand it will have profound consequences for our understanding of the Universe.

Mainstream quantum gravity work is called string theory and assumes that the particles which masses exchange to produce gravity (gravitons) have spin-2 which is a complex spin assumed to be needed so that two masses will attract when exchanging them. This spin-2 assumption requires 10 dimensions in string theory, and because 6 dimensions are too small to be seen (yet crucially affect the predictions of the theory), string theory can't be checked. It has maybe a hundred unknown parameters concerning 6 invisible compactified dimensions, which leads to 10500 different possibilities which can never be investigated even by a fast computer running for the age of the universe. The spin-2 graviton argument on which string theory is built simply ignores almost all of the mass involved, which is in the immense masses of galaxies in the surrounding universe!

2 Main idea

Vacuum in general imagination is space that is empty of matter. The word stems from the Latin adjective vacuus for "empty". An approximation to such vacuum is a region with a gaseous pressure much less than atmospheric pressure. Physicists often discuss ideal test results that would occur in a perfect vacuum, which they sometimes simply call "vacuum" or free space, and use the term partial vacuum to refer to an actual imperfect vacuum as one might have in a laboratory or in space. It is generally accepted knowledge of the whole word.

In our imagination gravum („vacuum") is space where all kinetic closed ring-fractal structures (torus-fractal structures) are removed as basic particles, atoms, molecules, magnetic and electric lines etc. (there is only black energy E_0) [1-5]. To distinguish our imagination from traditional one we suggest new name for this space: gravum. Every fractal structure that has inner kinetic energy E_k decreases "potential" energy E_p of the space. It can be described as:

$$E_k + E_p = E_0 = const \tag{1}$$

where E_0 is "black energy" of gravum.

If we think about it in small area with volume ΔV in position defined by coordinates x, y, z and p_o is the pressure of gravum:

$$p_0 \Delta V = p_0 \Delta x \Delta y \Delta z = E_k(x, y, z) + p(x, y, z)\Delta V \tag{2}$$

Inner kinetic energy E_k of fractal matter with mass m_1 in our speculative theory is:

$$E_k = m_1 c^2 = E_{k\_in} + E_{k\_out} = (1-k)m_1 c^2 + k m_1 c^2 \tag{3}$$

where $E_{k\text{-}in}$ is part $(1\text{-}k)$ of this kinetic inside of visible part of matter, other part k with energy $E_{k\text{-}out}$ is around the matter and is for us invisible. If something is invisible for us it does not mean that it does not exist (e.i. black matter in our speculative theory is created from very small fractal ring structures). Sometimes all kinetic $E_{k\text{-}in}$ is invisible for us too. Constant k describes ratio of this two parts. Part of $E_{k\text{-}in}$ can be visible for us. Other parts are invisible for us. This principle is valid not only for two objects but for more objects because this decrease of the gravum pressure is omnidirectional.

3 Gravitational law

To simplify the calculation we place both objects with masses m_1 and m_2 on the coordinate x. Outer kinetic energy $E_{k\text{-}out}$ that is around the matter is almost inside magnetic and electric lines. Because magnetic lines of the electron and the proton are very close to them [1] we will use only kinetic fractal electrical lines that are spread in radial way (see Fig.2a). Gravity kinetic lines are created in axes of ring structures. This imagination was inspired by the vortex-fractal structure of the electron [1]. Number $N_{\Delta S}$ of kinetic lines going through area ΔS in distance x:

$$\frac{N_{\Delta S}}{N} = \frac{\Delta S}{4\pi x^2} = \frac{\Delta y \Delta z}{4\pi x^2} \tag{4}$$

$$N_{\Delta S} = N\frac{\Delta y \Delta z}{4\pi x^2} \tag{5}$$

where N are all kinetic lines around object O_1 with mass m_1 in the radius $r = x$. Kinetic energy $E_{0\text{-}line}$ in one kinetic line of the object O_1 that is alone:

$$E_{O-line} \approx k\frac{m_1 c^2}{N} \tag{6}$$

where constant k is defined in (3).

Kinetic energy of a fractal line with the length Δx (see Fig.2b):

$$E_{\Delta x} = E_{O-line}\frac{\Delta x}{l} \approx k\frac{m_1 c^2}{N}\Delta x \tag{7}$$

where l is the length of the line.
Kinetic energy $E_{k\text{-}m2}(x)$ of lines going through $\Delta S = \Delta y \Delta z$ and have the length Δx and are in the distance x (inside of the object O_2) is increased due to influence of anti-parallel lines of the object O_2 with its density ρ_2 (see Fig.1 and Fig.3):

$$E_{k-m2}(x) \approx E_{\Delta x} N_{\Delta S} x\rho_2 \approx k\frac{m_1 c^2}{N} N\frac{\Delta y \Delta z \Delta x}{4\pi x^2} x\rho_2 \tag{8}$$

On the surface of the globe G (see Fig.3) there are lines of objects O_1, O_2 perpendicular to each other. There is no influence between lines of O_1, and O_2. Outside of the globe G lines have the same direction and repel each other. Lines of objects O_1, O_2 inside of the globe G have the opposite direction and attract each other. If we increase the distance d in Fig. 3 for example two times, then all lines inside G will be two times longer. This increase of distance d does not influence the angles between lines. This increase has two times higher influence on the bend of lines O_1 *to*ward ΔS. This influence of $x\rho_2$ in (8) is expected to receive the right law of gravity and has to be derived in future.
Kinetic energy of fractal lines in volume ΔV inside object O_2 with mass m_2 and density ρ_2 is as follows:

$$E_{k-m2}(x) \approx k\frac{m_1 c^2}{N} N\frac{\Delta y \Delta z \Delta x}{4\pi x^2} x\rho_2 = k_2 m_1 \frac{\Delta V}{x}\rho_2 \tag{9}$$

The change of potential energy in the space inside ΔV:

$$\Delta E_p = E_0 - E_{k-m2}(x) = E_0 - k_2 m_1 \frac{\rho_2}{x}\Delta V = p_0 \Delta V - k_2 m_1 \frac{\rho_2}{x}\Delta V \tag{10}$$

The change of potential energy inside the object O_2 with volume V_2:

$$E_p(x) = \int_0^{V_2}(p_0 - k_2 m_1 \frac{\rho_2}{x})\Delta V = p_0 V_2 - k_2 m_1 \frac{\rho_2}{x} V_2 = p_0 V_2 - k_2 m_1 m_2 \frac{1}{x} \tag{11}$$

$$F = \frac{dE_p(x)}{dx} = -k_2 m_1 m_2 \frac{1}{x^2} \tag{12}$$

The force F between objects O_1 and O_2 in the distance $d=x$ and common name for $k_2 = \chi$ and the positive sign for the attraction between objects is:

$$F = \chi\frac{m_1 m_2}{d^2} \tag{13}$$

We receive Newton's law of universal gravitation. All bodies attract all other bodies, and the strength of the attraction is proportional to the masses of the two bodies and inversely proportional to the square of the distance between the bodies. If the object O_2 change its position with difference h it is necessary to add energy E:

$$E = \Delta E_p = E_p(d+h) - E_p(d) = -\chi m_1 m_2 (\frac{1}{d+h} - \frac{1}{d}) = -\chi m_1 m_2 \frac{d-(d+h)}{d(d+h)} \tag{14}$$

For $d>>h$:

$$E \approx \chi m_1 m_2 \frac{h}{d^2} = Fh \tag{15}$$

Einstein's theory of relativity overturned the concept of motion from Newton's day, by positing that all motion is relative. Time was no longer uniform and absolute. Instead, an added dimension had to be taken into account with curved space-time. Time now depended on velocity, and contraction became a fundamental consequence at appropriate speeds. Following formula can be explained by another way.

$$m = \frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}} \tag{16}$$

Increase of velocity v of the object with mass m increases inner kinetic energy of matter in both parts in (3). This way matter accumulated kinetic energy that is in its outer kinetic fractal lines too (see Fig.1). Inertia is the resistance of any physical object to a change in its state of motion or rest, or the tendency of an object to resist any change in its motion. It is due to resistence of kinetic lines change their accumulated kinetic energy. This influence is very big if the velocity v is very close to velocity c of light.

$$F_a \Delta t = m\Delta v = \frac{m_0 \Delta v}{\sqrt{1-\frac{(v+\Delta v)^2}{c^2}}} \tag{17}$$

In formula (17), the greater is mass with its inner kinetic energy, the less a body accelerates under given force F_a and time interval Δt. Because all objects consist from atoms, where their electrons and protons levitate in pairs, there is a frequency change of levitation. Due to formula (16) protons end electrons decrease its levitating distances in the direction, where is higher velocity v of the movement. Object decreases its length in one direction following way:

$$l = l_0 \sqrt{1-\frac{v^2}{c^2}} \tag{19}$$

Because all clocks are oscillating systems where frequency is dependent on the length or mass, we are not able to measure the absolute time t_0 and it seems that the clock in the system that is moving with velocity v goes slowly. Perhaps clocks only oscillate (tick) at lower frequency:

$$t = \frac{t_0}{\sqrt{1-\frac{v^2}{c^2}}} \tag{20}$$

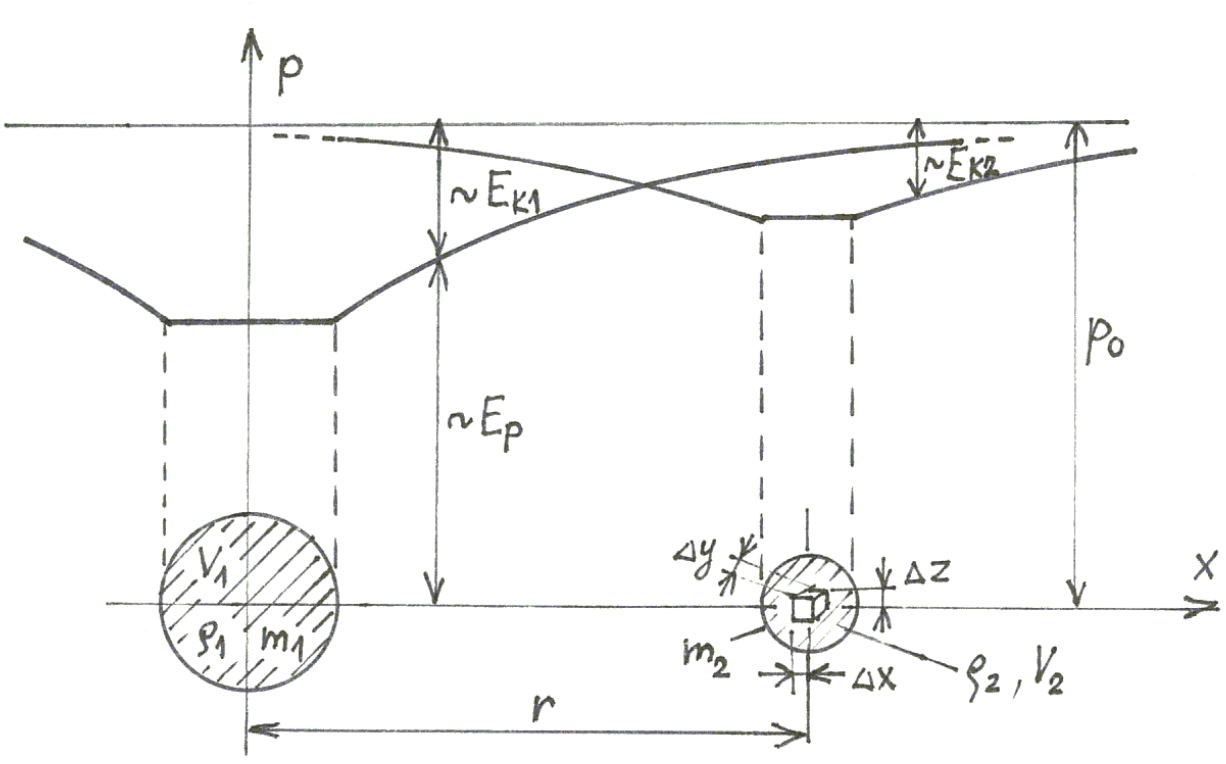

Fig. 1 Kinetic energy of two objects with masses m_1 and m_2 (without a bilateral influence).

4 Conclusion

Our science makes terrific demands on the imagination. To understand gravity requires a high degree of fractal imagination and new ideas about ring structures. The degree of imagination that is required is much more extreme than that required for some of the ancient ideas. The modern ideas are much harder to imagine. We can't allow ourselves to

seriously imagine things, which are obviously in contradiction to the known laws of nature. And so our kind of fractal imagination is quite a difficult game (or a puzzle). One has to have the imagination to think of something that has never seen before, never been heard before. At the same time the thoughts are restricted or limited by the conditions that come from our knowledge of the way nature really is. The problem of creating something which is new, but which is consistent with everything, which has been seen before, is one of extreme difficulty. This paper is a new attempt to explain gravity by another and nontraditional fractal-ring way. It is very speculative imagination without a support of experiments. Black energy reveals by gravity of objects. We don't know how to measure it directly.

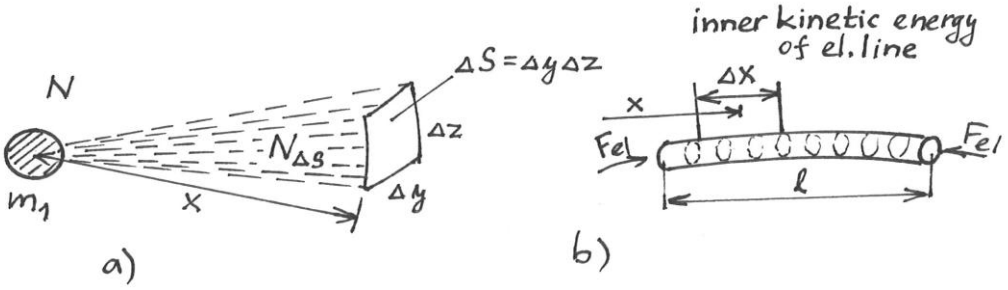

Fig. 2 Two phenomenon that have influence with the gravitational law
a) number of kinetic lines going through the area ΔS
b) kinetic energy inside a kinetic line with the length Δx

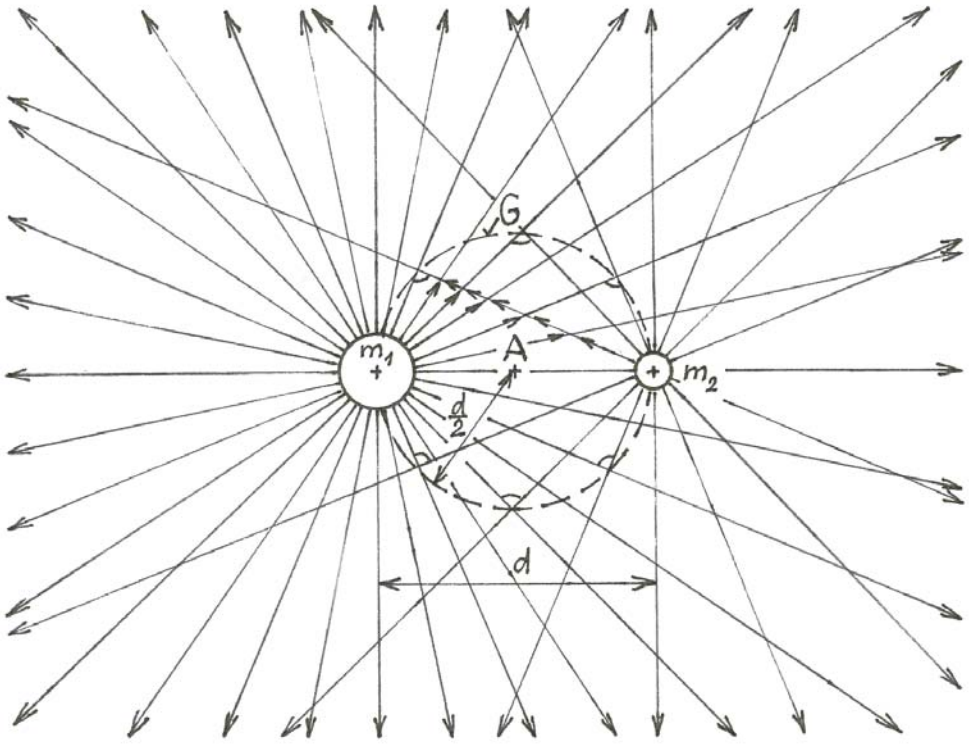

Fig. 3 Influence of anti-parallel lines inside the globe *G* with the center *A*

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