

On an Interpretation of Podkletnov's "Shielding Effect Against Gravitational Force"

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Based on the well-known Shadow-Gravity Theory an explanation is given for Podkletnov's «gravitation-shielding» effect. It is assumed that the whole of the matter is composed of basic sub-particles, particles whose level is deeper than that of quarks and leptons and that their shape differs from the spherical one. It is shown that the gravity force magnitude should be dependent on the fundamental particle orientation with respect to gravitation and magnetic fields. In contrast to what was reported in a preview publication we have found more lucid solution for the issues pertinent to the above phenomena.

Keywords: shadow-gravitation, Podkletnov's "gravity shielding" experiments, magnetic field

1. Introduction

In 1992 E. Podkletnov and A. Nieminen reported on the results of experiments in which they could observe a slight, 0.05-0.3 % ,

decrease in gravitational force, which was produced by a superconducting disk rotating in the magnetic field [1].

In the course of the second experiment E. Podkletnov succeeded in having the weight decrease of a sample somewhat more (0.3-2.1%) and he designated this as the “shielding effect against gravitational force” [2].

The unusual results achieved by E. Podkletnov announced a keen interest among the experts of physical science. However, since neither Newton's nor Einstein's theories could provide any deep insight into the results thus obtained [3], the members of physical community appear to be rather cautious about their official standpoints.

Based upon the Shadow-Gravity theory [4, 5] I have recently made an attempt to explain these results in a natural manner [6]. In my view, although there was no gravitation shielding, the experimental work had been carried out most accurately, and in accordance with the description, the effect was undoubtedly observed.

Still, it may have an alternative physical interpretation. To this end, *it is necessary to seek for the cause of the processes in the changes, which take place in a test sample under the action of the magnetic field, rather than in gravitational shielding.* Here we will elaborate upon this idea and make it sound more accurately.

2. Possible mechanism for the sample weight decrease under the action of magnetic field

In [4, 5] a new notion about fundamental sub-particles (FSP), particles of the deeper level of matter as compared to observed elementary particles was introduced. The basic property of FSP is its impenetrability for fations, which, according to Shadow-Gravity theory, fill the Space and cause gravity.

In [5] an exact formula for gravitation force acting between two FSP has been derived. It has the form

$$F_{Gff} = \frac{\pi r_p^2 r_a^2 \varepsilon_G \delta_a}{2L^2} k(L), \quad (1)$$

where r_a and r_p are the radii of active and passive FSPs, respectively (if one considers them as spherical), ε_G is the energy density of the fation gas, δ_a is the asymmetry factor, which is equal to the ratio of fations absorbed by the active FSPs to all fations that bombard these FSPs, L is the distance between interacting FSPs, $k(L)$ is the function of L for its very small values, when gravity becomes strong. For macroscopic conditions (evidently for $L > 10^{-35}$ m) $k(L)$ can be considered to be equal to 1. It is obvious that active and passive cross-sections of FSPs can have not equal values. This issue requires further study.

As seen from (1), the gravitation force depends upon areas of cross-sections of FSPs, more exactly of shadows, which FSPs produce onto each other. The formula (1) was obtained for spherical FSPs, for which shadows are equal to their cross-sections. But the shape of FSPs can be different from the spherical one. For example, they can have form of an ellipsoid of revolution (Fig. 1), because the FSPs are supposed to have the spin. The analog of this statement is the fact that some nuclei have the ellipsoidal shape, see ref. [7].

The cross-sectional area of the ellipsoid, in the circular plane, is πa^2 , and in the perpendicular direction it is equal to πab , where a and b are major and minor semi-axes of the ellipsoid cross-section (Fig. 1). Shadows falling in directions parallel to ellipsoid axes are equal to their corresponding cross-sections. But in other directions this is not the case.

Generally, due to the isotropy of space, the axes of FSPs are bound to be oriented at random in space, if the bodies are arranged far from external magnetic fields. Therefore it is necessary to replace cross-sections areas, πr_a and πr_p by averaged values of active $\overline{\sigma_{Ga}}$ and passive $\overline{\sigma_{Gp}}$ shadows areas respectively in (1). In this case the formula for a test-body placed on Earth's surface has the form

$$F_G = \frac{N_{\text{Earth}} \overline{\sigma_{Ga}} N_p \overline{\sigma_{Gp}} \varepsilon_G \delta_a}{2\pi R_{\text{Earth}}^2}, \quad (2)$$

where N_{Earth} and N_p are numbers of FSPs inside the Earth and in the test-body, respectively, R_{Earth} is Earth's radius.

Now let us find an averaged value of the shadow area produced by the FSP.

As seen from figure 2, the random value of the shadow in the MB plane, perpendicular to the random direction at an angle of β to the plane AO is equal to

$$\sigma_{\text{MB}} = \sigma_{\text{MK}} \sin \gamma = \pi a b' \sin(\alpha + \beta), \quad (3)$$

where the AM line is tangent to the ellipse at the point M, $\sigma_{\text{MK}} = \pi a b'$ is the cross-section in the MK plane, where it has an ellipsoidal shape with semi-axes a and b' ; $\gamma = \alpha + \beta$.

The equation of the ellipse has the form

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, \quad (4)$$

where, for the point M, coordinates are equal to

$$x_M = b' \cos \alpha, \text{ and } y_M = b' \sin \alpha. \quad (5)$$

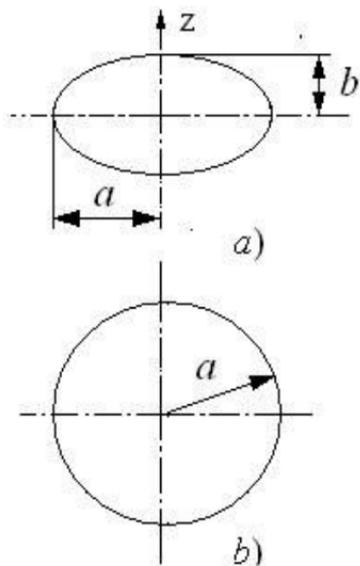


Fig. 1. Minimal a) and maximal b) cross-sections of the FSP in two possible positions relative to the line of the gravitation field action, which is perpendicular to the drawing.

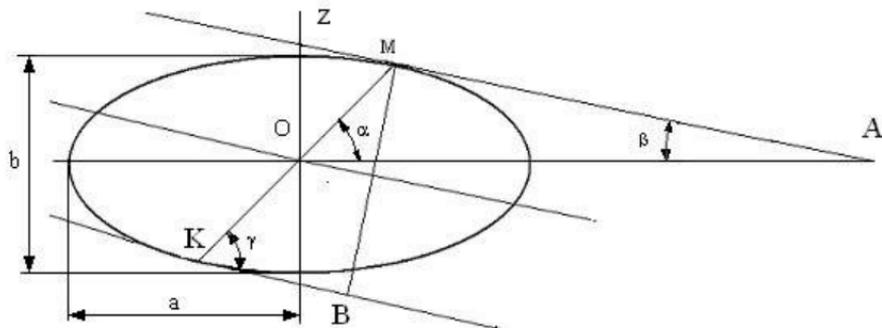


Fig. 2. Diagram for the derivation of the averaged shadow area.

Then, from (4) and (5), we obtain

$$b' = \frac{b}{\sqrt{\sin^2 \alpha + t^2 \cos^2 \alpha}}, \quad (6)$$

where $t=b/a$.

Next, let us express the angle α in terms of β . From Fig. 2 we have:

$$\operatorname{tg} \beta = \frac{y_M}{(x_A - x_M)}. \quad (7)$$

On the other hand, the equation of the MA tangent line is written as

$$\frac{x_M x}{a^2} + \frac{y_M y}{b^2} = 1. \quad (8)$$

For the point A, where $y=0$, in view of (5), we get

$$x_A = \frac{a^2}{x_M} = \frac{a^2}{b' \cos \alpha}. \quad (9)$$

Finally, upon substituting (5) and (9) in (7) we find

$$\operatorname{tg} \beta = t^2 / \operatorname{tg} \alpha. \quad (10)$$

The random ellipse square in the random MK cross-section will then be as

$$\sigma_{MK} = \pi a b' = \frac{\pi a b}{\sqrt{\sin^2 \alpha + t^2 \cos^2 \alpha}}. \quad (11)$$

Thus, by assuming that axes of ellipsoidal FSP take equiprobable directions in space, we find the averaged value of the shadow area from the following expression

$$\bar{\sigma} = \frac{2}{\pi} \int_0^{\pi/2} \sigma_{MK} \sin(\alpha + \beta) d\beta = 2a^2 \int_0^{\pi/2} \frac{t^2 \cos^2 \beta + \sin^2 \beta}{\cos \beta \sqrt{t^2 + tg^2 \beta}} d\beta, \quad (12)$$

where axial symmetry (relative to axis z) was taken into account.

I had calculated the integral (12) with the numerical method (using Simpson formula), and obtained numerical data, from which the following approximate equation was found

$$\bar{\sigma} \cong \pi a^2 \left(0.363t^{1.415} + 0.637 \right), \quad 0 \leq t \leq 1. \quad (13)$$

Fig. 3 shows the diagram of dependence of the averaged relative shadow area $\bar{S} = \bar{\sigma} / \pi a^2$ upon the ratio $t = b/a$, where dots are the data calculated from (12), and the line is the approximation by (13).

Next, assuming that FSPs have magnetic moments, they are to be oriented in the space in such a manner that their minor axes coincide with the direction of the magnetic field the test-body is placed in.

If magnetic field is oriented perpendicularly to the gravitation field of the Earth, then, according to (13), a relative decrease of the test-body weight will be

$$\frac{\Delta F_G}{F_G} = \frac{\left(0.363t^{1.415} + 0.637 \right) - t}{\left(0.363t^{1.415} + 0.637 \right)}. \quad (14)$$

Podkletnov placed the test-body (sample), above the superconductive disk, just where the lines of the magnetic field were perpendicular to the direction of the gravitational field (Fig. 4). As a result he had obtained decrease of the weight force. If the effect of $\Delta F_G / F_G = 0.021$ he had obtained during his second experiment had the maximum possible value, then as evident from (14) the possible ratio between semi-axes of the FSPs ellipsoidal shape is equal to $t = 0.95$.

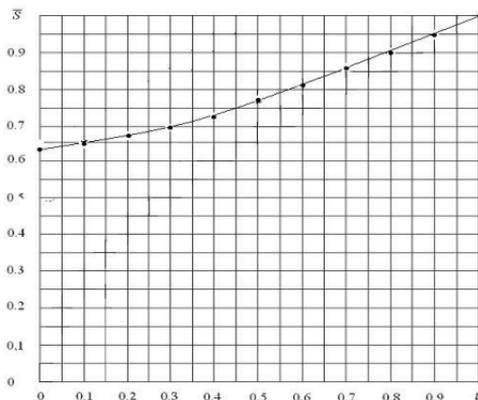


Figure 3. Diagram of dependence of the relative cross-section $\bar{S} = \bar{\sigma} / \pi a^2$ upon the ratio $t = b/a$, where a and b are semi-axes of the ellipsoid: the dots are for the data calculated from (12), the line indicates the approximation by (13).

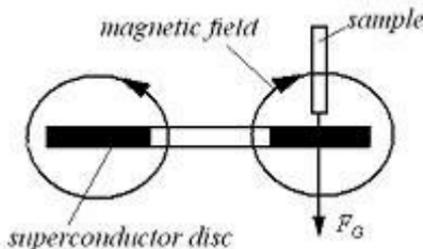


Fig. 4. The sample position relative to the magnetic field in Podkletnov's experiment. The line of gravitation force is perpendicular to that of the gravitation field action.

3. Conclusion

I think that the shielding effect against gravitational force, i.e. antigravity, does not exist in nature. This explicitly stems from the Shadow-Gravity theory.

Effects of the reduction in the force weight, which were observed during Podkletnov's experiments, as it has been exposed here, have a natural and physical interpretation. The described weight change mechanism can be additionally verified in a further experiment. In this experiment a test-mass should be placed in a strong magnetic field in two positions: when the magnetic field is first perpendicular to the line of the gravitation field action and when it is then parallel to this line.

Provided that the expected gravitational effect is confirmed it will be possible to make use of the energy of Earth's gravitational field.

It is evident that we can consider the results of Podkletnov's experiments as the corroboration of the shadow-gravity, if we bear in mind that Newton's and Einstein's gravity theories cannot account for these results.

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