

The Attractive Universe Theory,
A NEW APPROACH TO THE ELECTRICITY AND GRAVITY AMALGAMATION

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**Repulsion-is the attraction to
the Universe.**

**Gravity is the remainder of electrical
forces.**

**The reason of symmetry failure is the
surrounding substance.**

**Gravitational constant probably varies
in different directions.**

The paper gives model considerations permitting to present electric and gravitational forces as the display of a unique fundamental attraction.

One of the main predictions is that a number of physical processes might be anisotropic. It is supposed, in particular, that gravitational constant (G) can depend on how the gravitationally interacting masses are oriented with respect to the system of fixed stars, also it is proposed that degree of CP symmetry could depend on the orientation to the fixed stars.

Another prediction is that the gravitational constant in a given location depends on the state of surrounding matter of the universe, and thus depends on location and time. This in turn should lead to a change in the method of calculating the age of the universe in the context of the Big Bang Theory, as well as to the conclusion that there is no such thing as unstoppable gravitation collapse.

Models give a clew to the cause of symmetry failures in the fundamental interactions.

CONTENTS

1. INTRODUCTION.

2 THE MAIN IDEAS OF AMALGAMATION

3 THE GRAPHICAL MODEL OF INTERACTION.

4 THE OBSERVED ATTRACTION, REPULSION AND GRAVITATION

5 THE MAIN EFFECTS OF THE PROPOSED MODEL: ANISOTROPY, INHOMOGENEITY, SCREENING OF GRAVITATION, AND THE ABSENCE OF GRAVITATIONAL COLLAPSE

6 THE CAUSE THE ABSENCE OF ANTI-MATTER AND THE DISTURBANCE OF CP SYMMETRY - ASYMMETRY OF THE SURROUNDING MATTER

7. PERSPECTIVES FOR DYNAMICS.

8 THE CONJECTURE ON CHARGE DISCREETNESS AND CONTINUITY OF A GRAVITATIONAL MASS

9. CONCLUSIONS

10. ACKNOWLEDGEMENTS

1 INTRODUCTION

The history of the search for the relationship between electricity and gravitation began with the first quantitative studies of electrical forces.

'Electricity is a phenomenon which is governed by the same law as gravitation'- Joseph Priestley wrote as long ago as 1887 in his book "The History and the State-of-the Art of Electricity Illustrated by Original Experiments". Indeed, the law of interaction of electric charges established by Coulomb a little bit later appeared to be similar in form to the law of universal gravitation. The Coulomb force, much like the gravitation force, is inversely proportional to the square of distance and is directly proportional to the product of the charges, i.e. the electric charges play the same role in electrostatics as the gravitational masses do in gravitation. However, in spite of the similarity of these laws, they differ in some essential points:

1. All the known gravitational charges (i.e. gravitational masses) are of the same sign, whereas electric charges exist with opposite signs.
2. Electric charges of the same sign repel while gravitational charges of the same sign attract each other.
3. The intensity of interaction differs dramatically. Thus, the force of Coulomb repulsion of two electrons is $4.15 \cdot 10^{42}$ power times as great as their Gravitational attraction.
4. A charge assumes strictly discrete values, multiples of an electron charge, whereas masses are not discrete.
5. A gravitational mass, in contrast to a electrical charge, changes with the change in the internal energy of a body.
6. A gravitational mass is proportional to the inertia of a body, i.e. to its inertial mass. At the same time there is no direct relation between the electrical charge of a body and its inertia.

However all the enumerated essential distinctions of electricity and gravitation did not prevent Einstein from the search for a unification

theory, which he tried to construct during the last thirty years of his life. He felt these interactions are connected with one link and aimed at obtaining electricity by the modification of his geometrical theory of gravitation, which is also called the general theory of relativity. In this paper we've tried to find another approach, namely, we've made an attempt to modernize the theory of electricity in order to include gravitation. A reader and experiment should judge whether we've managed to untangle the 'clue' to some extent.

The considerations stated in our paper can not lay claim to the complete theory, it is rather a number of suppositions, analogies and visual models in the spirit of Faraday power lines. Many questions still remain unanswered. The goal of the paper is to attract the reader's attention to the possibility of nontraditional treatment of electric and gravitational phenomenon. Another aim is stimulation of experiments on the detection of anisotropy of a number of physical processes, in particular, that of gravitational attraction and CP

asymmetry. Also the proposed view leads to the conclusion that the Gravitational Constant in a given location depends on the density of the surrounding matter of the universe. Thus the gravitational constant depends on location and time, so modern methods of calculation of the age of the universe in the Big Bang Theory should be revised.

2 THE MAIN IDEAS OF AMALGAMATION

A. It is assumed that at the most fundamental level matter consists of particles of two types: positive and negative elementary charges (ECs). Particles of the same type are equivalent to each other; positive and negative particles differ in the sign of the electric charge.

B. It is supposed that the only fundamental interaction is the attraction of opposite elementary charges which has the **feature of saturation**.

C. It is supposed that the interaction with the surrounding universe plays a crucial role for determining any local forces.

On the base of these assumptions we view the repulsion of the similar charges as the consequence of the attraction of each of them to the opposite charges of the surrounding Universe. The mechanism of repulsion is as follows: any elementary isolated charge is attracted to the opposite charges of the surrounding Universe. When the surroundings are symmetric, the forces are compensated in all directions. As two similar charges approach each other, each of them disturbs the symmetry of the attraction to the Universe of the other charge due to saturation. It is as if the approaching charge shaded the charge of the Universe located behind it. As a result the attraction to the region of the Universe located opposite the approaching charge is unbalanced for each of the charges (Fig. 1). The pair of forces of attraction to the Universe (f_{pull}) tends to pull apart similar charges and is perceived as their apparent repulsion.

Attraction and the observed repulsion in this model are not equal in intensity and the difference would depend on the interaction with the surrounding universe.

For example if we manage some how to turn off the interaction with the Universe, it would make the observed repulsion disappear, but the attraction would stay.

In the graphical model constructed in this paper, the attraction of opposite elementary charges is slightly stronger than the apparent repulsion of similar charges. The prevalence of the attraction over the repulsion leads to the fact that fundamental forces between neutral bodies are uncompensated.

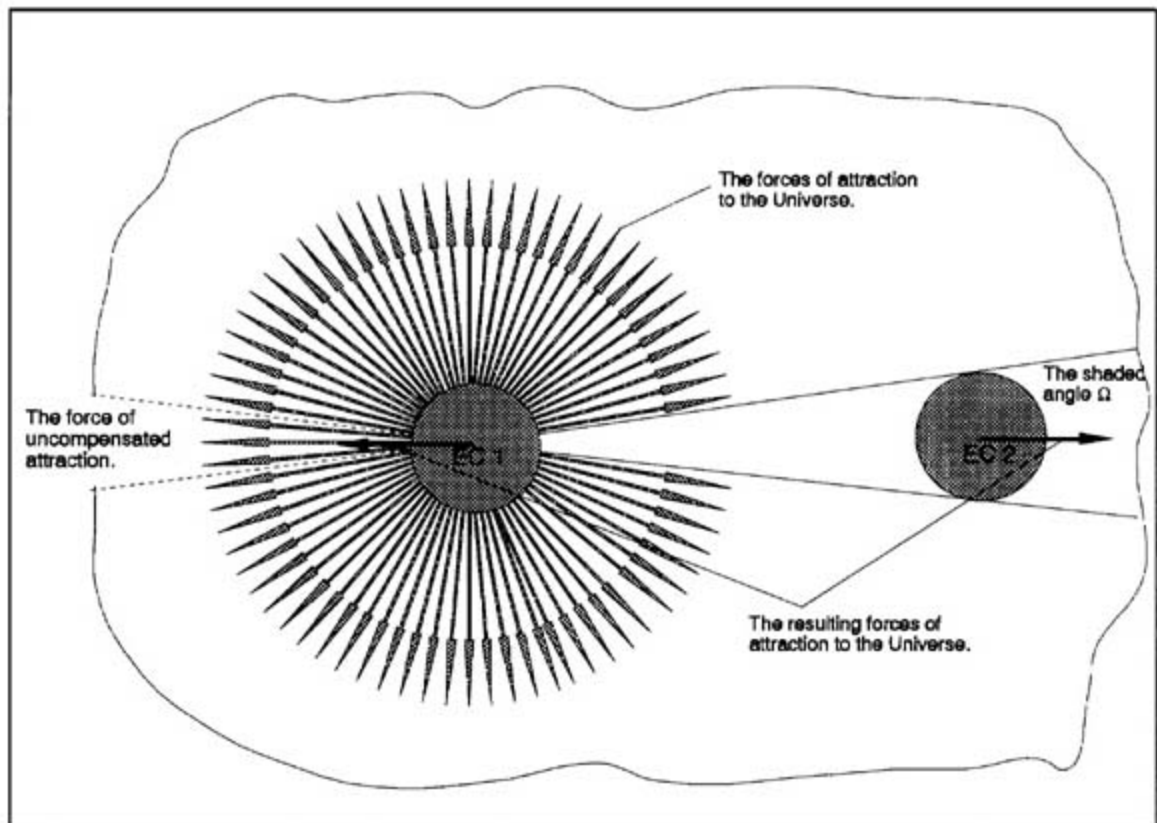


Figure 1 The mechanism repulsion of similar charges. Only the forces affecting the first Elementary Charge (EC 1) are shown; for EC 2 it is analogous.

The uncompensated remainder is the attractive force. Just this attraction has been identified with universal gravitation.

Thus the force of gravity depends on the state of the surrounding matter and thus can be inhomogeneous, time dependent and anisotropic. The inhomogeneity means that the gravitational constant in various regions of the Universe is different. Anisotropy means that it depends on the orientation of the straight line connecting masses in respect to in the system of fixed stars.

3 THE GRAPHICAL MODEL OF INTERACTION

To demonstrate some features of the models based on the main assumptions [A,B,C] we would like to introduce a simple graphical model of the fundamental interaction in the spirit of Faraday power lines. We will suppose that an EC is attracted to EC's of opposite sign by the exchange of the massless particle carriers (C). We also assume that carriers have some surface of interaction with an EC. We would assume also that the *exchange paths* are line segments which connect EC's of different signs.

By analogy with Faraday power lines, *the force which acts on an EC in a particular direction is proportional to the number of paths of exchange which lead from an EC in that direction.*

EC's are represented by spheres with the same radius of interaction.

To determine the number of paths of exchange we will first draw from an EC dotted lines which extend evenly in all directions.

If a dotted line extending from EC1 to EC2 of opposite sign, and is not interrupted by other ECs on the way, it is a *path of exchange* between the two ECs and it would be drawn as a continuous line segment.

This rule actually means that the real interaction occurs when a virtual carrier emitted by EC1 goes to EC2 of opposite sign uninterrupted by ECs of the same polarity as EC2 and at the same time a virtual carrier emitted by EC2 extends to EC1 uninterrupted by ECs of a same polarity as EC1.

4 THE OBSERVED ATTRACTION, REPULSION AND GRAVITATION

4.1 The Attraction of an Elementary Charge to the Matter of the Universe

As it was noted, an isolated EC is attracted to all opposite unshaded ECs of the Universe. If the charges of the Universe surround the considered charge symmetrically, the forces acting on the EC are compensated in all directions.

The force of attraction of the isolated EC to the Universe, affecting it in the direction of a small solid angle Ω , is proportional to a part of this angle Ω^* in which the rays drawn from the given EC encounter the opposite charges. If the environment is absolutely tightly packed and neutral (Fig. 2), exactly half of rays encounter charges with similar signs and the other half encounter charges with opposite signs ($\Omega^* = 1/2 \Omega$). If the environment is not absolutely tightly packed, but has some free space, we account for the missing interactions by defining the angle Ω^* is less than a half of Ω :

$$\Omega^* = (1 - \alpha)(1/2)\Omega \quad (1)$$

The value α is dimensionless, greater than zero, but is much less than one. The value α characterizes a share of free space, i.e. the fraction of the solid angle inside Ω , where the rays extending from the considered EC do not encounter other ECs, within the angle Ω . We call α the coefficient of the incompleteness of the universe at the given location.

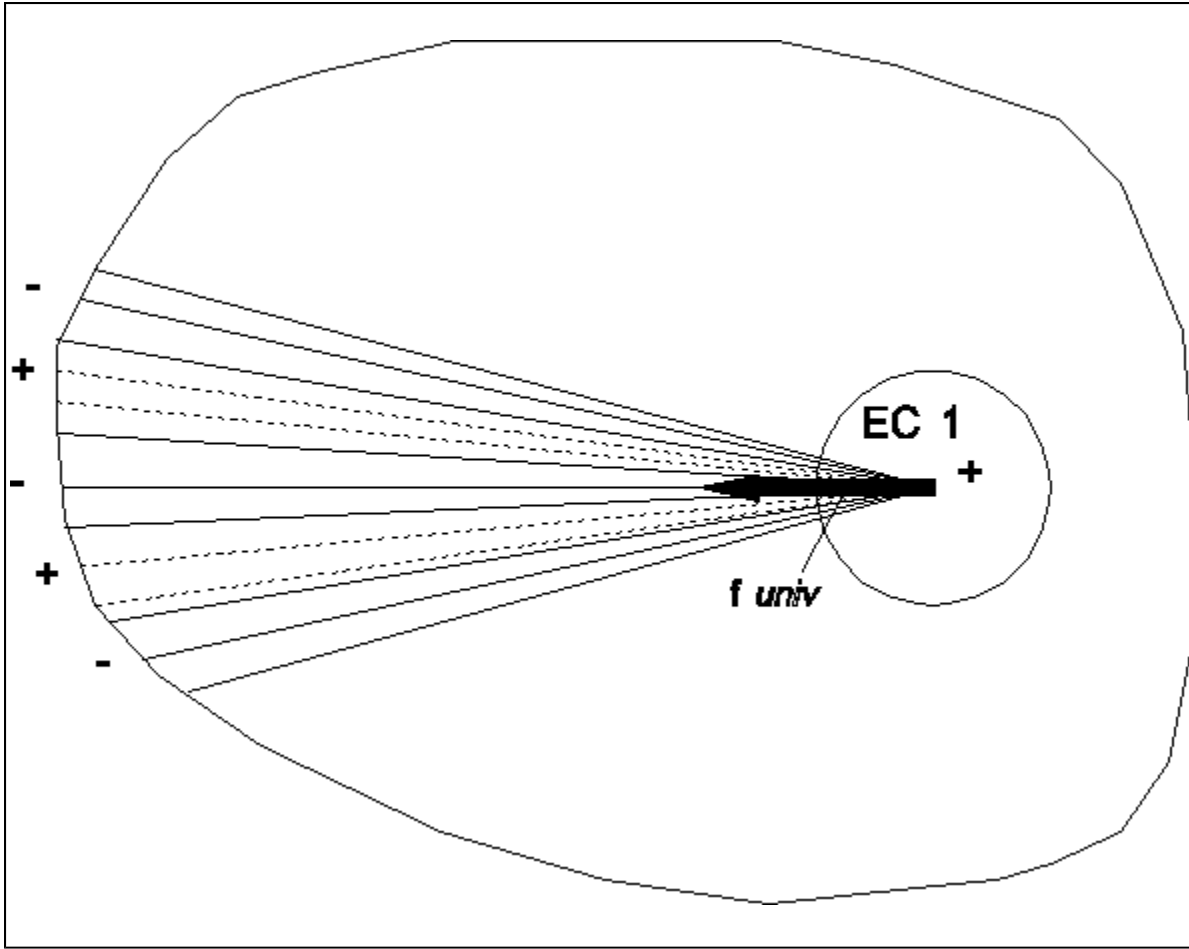


Figure 2 The attraction of EC 1 to the Universe in a solid angle.

One of the possibilities is that the incompleteness of the surrounding universe connected with the expanding of the universe.

Thus the force of attraction of EC1 to the charges of the Universe located in the solid angle Ω ($f_{Univ.}$), is directly proportional to the angle Ω :

$$f_{univ} = k\Omega' = k(1 - \alpha)(1/2)\Omega \quad (2)$$

where k is a constant.

4.2 The Observed Repulsion of Similar Charges

According to the initial assumptions, similar charges do not exchange carriers directly, but they disturb each others symmetry of attraction to the Universe. Each of the adjacent charges intercepts carriers from the matter of the Universe within the solid angle Ω , defined by the diameter of the charge and the point located at the center of the other charge. Due to "shading" the attraction to the universe in the angle Ω is eliminated. Thus the attraction of each of the considered ECs to the matter of the Universe, located in the corresponding angle opposite the shaded angle Ω is uncompensated (Fig. 3).

The pulling force of uncompensated attraction to the Universe, (f_{pull}), equals the force of attraction of isolated ECs to the matter of the Universe in the

angle Ω :

$$f_{pull} = f_{univ} = k\Omega' = k(1 - \alpha)(1/2)\Omega \quad (3)$$

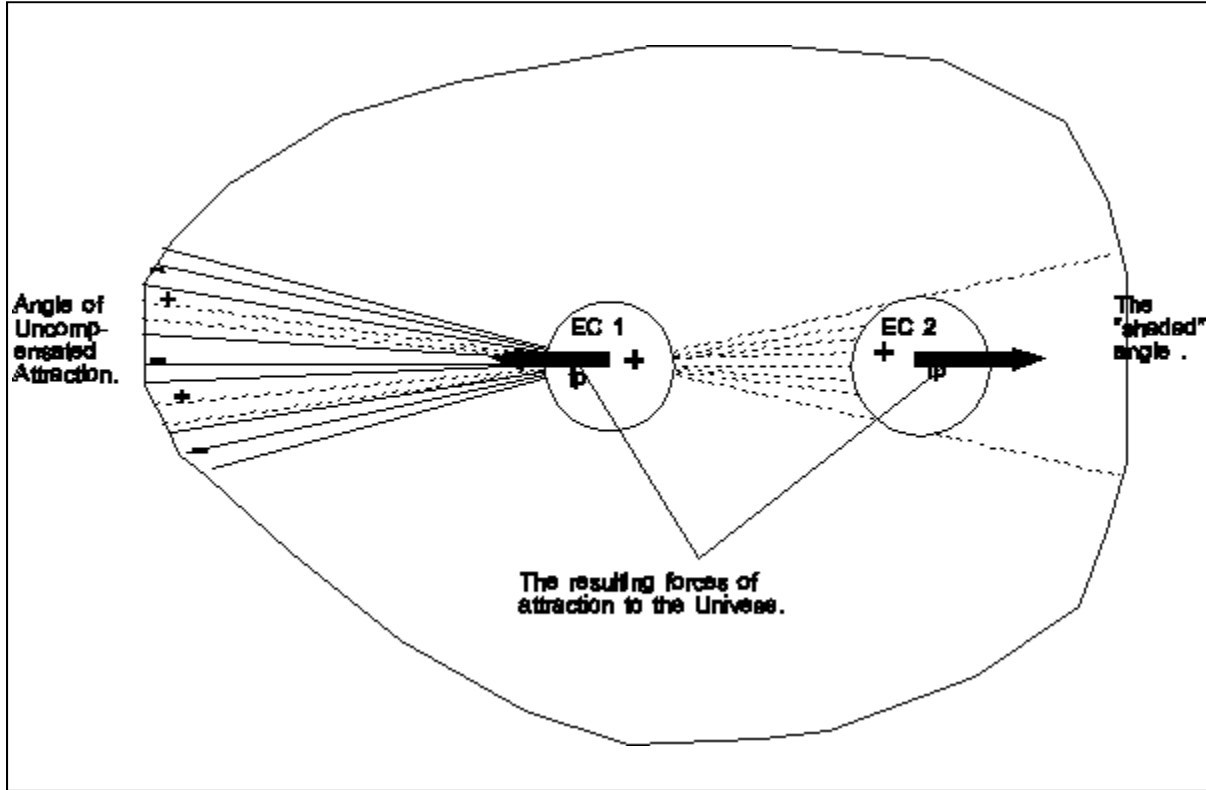


Figure 3 The repulsion of similar charges. Only uncompensated ways of exchange belonging to EC 1 are shown.

4.3 The Observed Attraction of Opposite ECs

The approached opposite EC, similar to the like EC disturb each other's symmetry of the attraction to the Universe by intercepting carriers from each other. The attraction to the Universe in the angle Ω is blocked for each of the opposite ECs. In view of the symmetry disturbance, the opposite approached charges are affected by the same force of pulling asunder the attraction to the Universe (f_{pull}) as the similar charges. The opposite charges are also affected by the forces of fundamental attraction to each other f_f , because they intersect carriers from each other within the solid angle Ω :

$$f_f = k\Omega \quad (4)$$

The forces f_f and f_{pull} have the opposite directions, but the attraction is approximately twice as much as the pulling asunder f_{pull} because the angle $\Omega \approx 1/2 \Omega$. As the result, the attraction of opposite charges is observed with the force f_{opp} which is slightly greater than f_{pull} (Fig. 4):

$$f_{opp} = f_f - f_{pull} = k\Omega - k(1 - \alpha)(1/2)\Omega = k(1 + \alpha)(1/2)\Omega \quad (5)$$

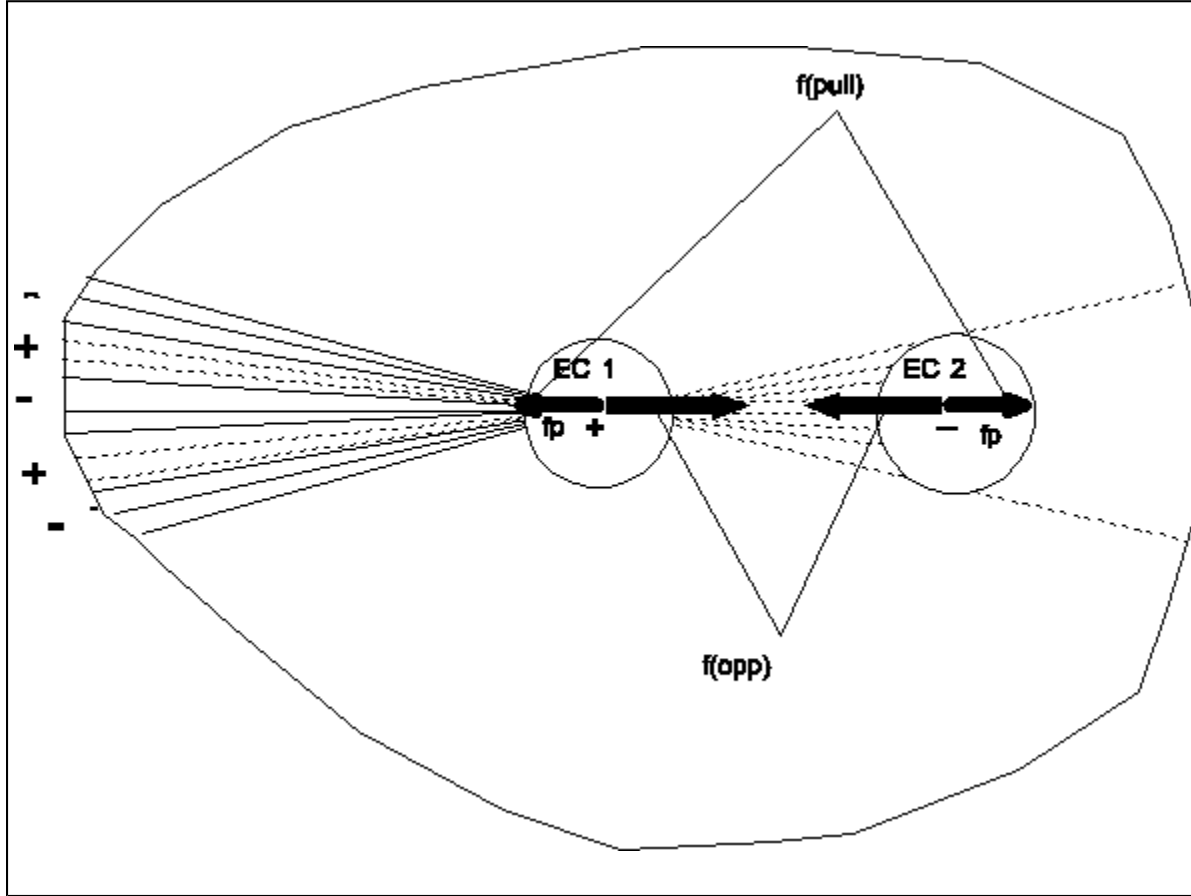


Figure 4 The observed attraction of opposite ECs. Only uncompensated ways of exchange are depicted.

4.4 Gravitational and Purely Electrical Forces

Comparing expressions (3) and (5) that the observed attraction of opposite ECs (f_{opp}) is slightly stronger than the repulsion of similar ECs (f_{pull}). The predominance of the attraction results in the residual attraction acting between neutral bodies. Just this attraction is associated with gravitation in the model we propose. Thus the gravitational force is greater, the less the gravitating bodies are attracted by the matter of the Universe. If the environment is packed absolutely tightly ($\alpha = 0$) there is no gravitation at all. **The observed forces, acting between any two ECs can be presented in the form of a sum of two components: one, which does not depend on the coefficient of incompleteness α and the other directly proportional to it.** We call the first component a electric force (f_{el}) and the second - a Gravitational force (f_{gr}):

$$f_{el} = +_{-}k(1/2)\Omega = +_{-}(1/2)k \pi(r_o^2 / R^2) \quad (6)$$

$$f_{gr} = \alpha(1/2)\Omega(7)$$

The electric part gives an ordinary electrostatic interaction (attraction and repulsion). The gravitational part of the force gives only the attraction between two ECs irrespective of their signs. *Both these forces decreases inversely proportionally to the square of the distance. Both of them are a manifestation of a fundamental attraction.*

5 THE MAIN EFFECTS OF THE PROPOSED MODEL: ANISOTROPY, INHOMOGENEITY, SCREENING OF GRAVITATION, AND THE ABSENCE OF GRAVITATIONAL COLLAPSE

5.1 Anisotropy

The local value of the coefficient of the incompleteness of the Universe α depends on the distribution of the surrounding matter of the Universe. If the distribution of surrounding matter is slightly anisotropic, then the coefficient α can have different values in various directions. Thus, the gravitational attraction of two masses will depend on the fact how the straight line connecting these masses is oriented with respect to the system of fixed stars.

Thus the observation of gravitation anisotropy could open up a new astronomical method.

5.2 Inhomogeneity

In view of the fact that gravitation depends on the environment, the gravitation constant G can be different in various regions of the Universe and varies with time as the distribution of matter or the velocities of matter changes.

When considering cosmological problems it is important to take into account the possible inhomogeneity of G in space and time.

5.3 Screening by surrounding, absence of unstoppable gravitational collapse

It is well known that the screening of purely electric forces is associated with the fact that the external electric field gives rise to charge polarization on a screen and this polarization in turn produces a field that compensates the external one.

The described mechanism of screening does not affect the gravitational part of the force because gravitation influences all the charges equally and thus the screening does not produce any compensating gravitation field. But nevertheless, gravitation is weakened slightly by the screen due to "shading." In this connection the attraction between two masses reduces not only when a screen is placed between them but also when both masses are surrounded by one screen (the density of the surrounding matter increases, i.e. α decreases). The degree of screening of the gravitation by ordinary matter is, perhaps, negligible. This is caused by the fact that the matter, as it is known, "consists, mainly, of free space." In terms of the model proposed it means that the distance between ECs in matter is dramatically greater than the dimensions of an EC.

But when a star is collapsing the density of matter could grow so large that inside the collapsing star the gravitational force would disappear ($\alpha = 0$).

That means there is no such thing as unstoppable gravitational collapse.

6 THE CAUSE THE ABSENCE OF ANTI-MATTER AND THE DISTURBANCE OF CP SYMMETRY - ASYMMETRY OF THE SURROUNDING MATTER

The cause of the absence of antimatter in our universe as well as the disturbance of CP symmetry could be asymmetry in surrounding matter.

We may "shift the blame" for the disturbance of symmetries to the environment, assuming that we are surrounded by elementary charges of one sign in a slightly greater degree than of the other. Thus the total balance in the entire Universe can be absolute, but in any local region the balance can be disturbed due to saturation.

At the base of our assumptions, we suppose that the degree of CP symmetry is different in various directions and also varies with the location in space and time. Then the experiments analogous to those performed by Val Fitch and Jim Cronin will yield different numerical results depending on the orientation of experimental apparatus in the system of fixed stars.

7 PERSPECTIVES FOR DYNAMICS.

In perspective it seems very promising to try to combine the main assumptions of this article (A,B,C) with the ideas of Mach and Feynman-Wheeler [1,2]. It looks naturally in such models to connect inertial mass with the energy of interaction with the universe. One of the requirements, which the theory should meet is the compensation of all forces from the side of the matter of the Universe at a movement without acceleration with respect to the inertial system.

Another requirement is the emergence of uncompensated force from the universe affecting a body accelerated with respect to it, which would be an explanation of Newton's Second Law.

Note that the problem of the effects of the universe on local processes have been considered by a number of authors [3].

8 THE CONJECTURE ON CHARGE DISCREETNESS AND CONTINUITY OF A GRAVITATIONAL MASS

To our mind the discreteness of a charge and the continuity of a gravitational mass can be explained taking into account the mutual shading of charges and assuming that only dynamic structures of a special kind can be stable.

We consider the simplest neutral system consisting of two opposite ECs. Each of them as it approaches the other, intercepts in a greater and greater degree the dotted rays extending from the other. As a result the interaction of each EC with external masses weakens. Averaging over all possible directions we describe a mean weakening of interaction of each of two ECs, with external masses as the decrease of its effective charge (e_{eff}). The effective charge of ECs located in a certain system, for example in a two-charges system, is defined by the total number of dotted rays, extending from EC beyond the system.

In a pair of opposite ECs, each charge intercepts rays extending from the other to the solid angle Ω . Beyond the system of opposite charges the lines extend from each EC to the almost complete solid angle ($4\pi - \Omega$). The lines from a free EC extend to the full solid angle 4π . Putting e_0 for a charge of a free EC, we obtain the following expression for the effective charge of an EC in a system of two opposite charges ($e_{\text{eff}2}$):

$$e_{\text{eff}2} = e_0 \left[(4\pi - \Omega) / 4\pi \right] = e_0 \left[1 - (r_0^2 / 4R^2) \right] \quad (8)$$

where R is the distance between the ECs.

The attraction is defined by a sum of forces of gravitational attraction between all charges of masses irrespective of their sign. Consequently, the gravitational mass of a body is determined by a sum of its effective charges without taking into account the sign. For a mass of a system of two opposite charges ($m_{gr,2}$) we have:

$$m_{gr,2} = e_o [1 + e_o] = 2 e_o [1 - (\Omega/4 \pi)] = 2 e_o [1 - r_o^2/4 R^2] \quad (9)$$

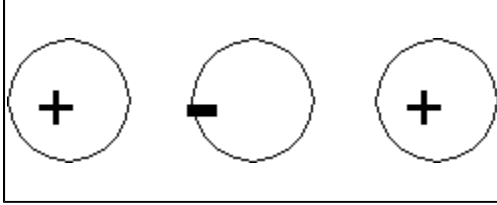


Figure 5 The simplest charged system.

It follows from the expression (12), that the gravitational mass of a two-EC system can smoothly change as the charges approach each other.

At the same time, the electric charge of a system is defined by the difference of the effective positive and negative charges and if a system is neutral it equals zero.

The simplest charged system is a system of three ECs, for example, of two positive charges and one negative. Suppose that all three ECs are on one line, the negative charge locating in the center of it and two positive--on each side of it, equally spaced from the negative charge (Fig. 9). It is easily seen that the electric charge of such a system appears to be total and equal to e_o whatever the distance between ECs. At the same time the gravitational mass of the system changes continuously depending on the distance between ECs.

A positive total effective charge (Q_{eff}^+) is expressed in the form:

$$Q_{eff}^+ = e_o (1 - \Omega/4 \pi) + e_o (1 - \Omega/4 \pi) = 2 e_o (1 - \Omega/4 \pi) \quad (10)$$

Since the negative EC is surrounded from both sides, the total negative effective charge (Q_{eff}^-) is

$$Q_{eff}^- = e_o (1 - 2\Omega/4 \pi) \quad (11)$$

The electric charge of the system (Q) is defined as the difference of Q_{eff}^+ and Q_{eff}^- and the gravitational mass ($m_{\text{gr.}}$) is proportional to the sum Q_{eff}^+ and Q_{eff}^- :

$$Q = Q_{\text{eff}}^+ - Q_{\text{eff}}^- = 2 e_o (1 - \Omega / 4 \pi) - e_o (1 - 2 \Omega / 4 \pi) = e_o \quad (12)$$

$$M_{\text{gr.}} = Q_{\text{eff}}^+ + Q_{\text{eff}}^- = 2 e_o (1 - \Omega / 4 \pi) + e_o (1 - 2 \Omega / 4 \pi) = 3 e_o [1 - (1/3)(r_o^2 / R^2)] \quad (16)$$

Thus, the electric charge of a system can be multiple of e_o and independent of distances between ECs, while the gravitational mass of the same system can depend on these distances and change continuously. The charges of such systems should form in peculiar structures. Suppose that just such structures are dynamically stable. Note that in the considered structure consisting of three ECs (Fig. 5) we really have an attracting center in the form of a negative charge around which the positive "side" ECs can rotate.

9 CONCLUSIONS

"And it will eternally begin." Osip Mandelstam

It is well known that the scattering of values of exact measurements of G is by several times greater than the measurement error [4,5].

Luther and Towler (1982) noted differences in the measured Gravitational Constant consistent with changing orientation of the experimental set up, but probably misinterpreted differences as an artifact connected with the influence of the magnetic field of the Earth [5].

The last measurements of G still differ one from another by several times the experimental errors [Fitzgerald et al.; Meyer et al; Michaelis et al]. We think that these differences are related to the anisotropy of the Gravitational Constant. We hope that this article would motivate experimental measurements of anisotropy of the gravitational constant and also provide the impetus for further development of theoretical models with our main assumptions A,B,C.

Such models suggest the cause of asymmetries, and could change our understanding of gravity, inertia and other fundamental processes as well as the evolution of the universe.

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