STRONG INTERACTION AS GRAVITATIONAL EFFECT

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PACS: 21.60-n or 12.60-i

ABSTRACT

This short paper deals with the strong interaction and how it fits qualitatively as the gravitational dipole-dipole bond within the unified field theory of this author as presented on the Internet Site http://jovandjuric.tripod.com and very briefly in the Fifth Award winning Essay in the 1963 competition of the Gravity Research Foundation. The paper introduces the fundamental change of the particle theory. It is stressed that the further research in this direction should lead to the possible efficient fusion control. The experiments, which are suggested by this theory, are not described in this paper.

INTRODUCTION

It has been theorized by Weinberg, Glashow and Salam that electromagnetism and the weak interaction are the facets of the same phenomenon, and they shared the 1979 Nobel Prize for their work But the strong interaction is still considered as a separate phenomenon. It will be shown in this paper that the strong interaction is readily understood and modeled within the unified field theory of this author [1], [2].

STRONG INTERACTION

The strong interaction is the fundamental interaction between the elementary particles protons and neutrons, which binds them together in the atomic nucleus. It is considered in the present physics as one of the four (4) fundamental interactions, namely, strong, weak, electromagnetic and gravitational interaction. Such a view is abandoned completely in the unified field theory of this author, in which theory the symmetrical Maxwell equations classify all interactions in nature, v. [1] and [2].

All particles, and indeed all mass objects regardless of their magnitudes, are defined in the unified field theory of this author by their two distinctly different points, which are the center of mass and the center of self gravitation within the inexorable, external gravitational field in which they exist and interact between each other. The center of mass is correctly defined in all physics textbooks, while the center of gravitation (self is omitted, unless it is very important to be emphasized) is defined by this author as the point at which the self gravitation is zero. This author's paper "PROBLEM OF PHYSICS", which deals with the problem of those two important points , is submitted for publication but not yet published, and is attached here as **APPENDIX.** These two points can never coincide in nature for any real particle or object due to the presence of the inexorable external gravitational field, which must deform to some extent any normally non-rigid particle or object. Absolute rigidity of a real particle or object is impossible physically. The absolute spherical symmetry is possible only for a single particle totally alone in the entire cosmos, so that its mass is subject only to the spherically symmetrical Newton's law of gravity. The characterization of a particle or any object by the two distinctly different points defines that particle or object as a true body with the finite dimensions, not a dimensionless point as the particle is treated so far in the present theoretical physics. The observed mass particle or object is characterized by its total mass and its intrinsic mass moment, which is calculated with respect to its center of self gravitation. The intrinsic mass moment of an object or particle is experimentally shown v. [3] and [4] to be proportional to the magnetic moment of that object, and the factor of proportionality depends on the property of the material of the observed object and the units used. That experimental fact makes the quark hypothesis and the related hypothetical terms gluons, strangeness, color, etc. absolutely unnecessary, cf. [3].

Thus, a proton is defined by its mass, its intrinsic mass moment, i.e., its magnetic moment, its electrical charge and its angular momentum, which may be associated with its electrical charge, while a neutron is defined by its mass and its intrinsic mass moment, i.e., its magnetic moment and possibly its angular momentum. It is experimentally observed that such a pair of particles enters into a very strong interaction between the two intrinsic mass moments, i.e., magnetic moments, beside the obvious, but rather very weak attraction between their small masses, so forming a gravitational dipole-dipole bond.

This is obviously analogous to the observed strong attraction between the opposite poles of the two permanent magnets, or a single permanent magnet strongly attracting the induced magnetic moment within the ferromagnetic object in its close proximity. This is a true qualitative explanation of the strong interaction between the elementary particles, such as protons and neutrons, or any two elementary particles, but the mathematical model of the gravitational dipole-dipole bond remains to be developed, after the models of the constituent elementary particles are developed. This should lead to the full understanding of the fusion and its possible efficient control. The experiments for the possible efficient fusion control, which are obviously suggested by this theory and which this author has in mind, are not described in this paper.

CONCLUSION

It is pointed out that the strong interaction between the elementary particles possessing their intrinsic mass moments, i.e., magnetic moments, and forming the strong gravitational dipole-dipole bond, is fully analogous to the readily observed macroscopic phenomenon of the very strong attraction between the opposite poles of the two permanent magnets, or a single permanent magnet strongly attracting the induced magnetic moment within a ferromagnetic object in its proximity. This very obvious analogy may be helpful for the development of the mathematical model of the gravitational dipole-dipole bond, after the models of the elementary particles are fully developed. This substantially new theoretical and experimental research should lead to the possible efficient fusion control.

It is emphasized once more that all elementary particles in this unified field theory of this author must possess their masses, as well as their intrinsic mass moments, i.e., magnetic moments within the inexorable, always present external gravitational field. The quark hypothesis with all associated hypothetical terms such as gluons, strangeness, color, etc. are experimentally and logically eliminated as absurd and completely unnecessary. As it is well known, some outstanding scientists, Heisenberg, Chew and others, disapproved of the quark hypothesis.

It must be certainly borne in mind that the quarks were somehow "influenced" or perhaps "inspired" by the surrealistic novel *Finnegans Wake* by James Joyce according to the personal letter of June 27, 1978 to the Editor of the *Oxford English Dictionary* of Murray Gell-Mann, the physicist, actually the Nobel Prize laureate who proposed the hypothetical subatomic particle quark, v. *The American Heritage Dictionary*, electronic version 1995, under quark(1). This fact is also mentioned in some advanced physics textbooks, and it is indeed a very strange curiosity that a surrealistic novel is mentioned at all in any physics textbook. The "inspiration" was initially almost perfect, since following the line *"Three quarks for Muster Mark"* from the 13-line scurrilous poem in that Joyce's novel, only three quarks were hypothesized initially, but there "exist" now more than three quarks, and they were even "confirmed" to "exist" by Friedman, Kendall and Taylor, for which they shared the 1990 Nobel Prize! Thus, the absurdity is complete. What a farce in science!

The moral of this very strange example is that the lack of understanding in future of some experimental facts in physics must not be the reason for introducing any surrealistic notions or mysticism in science of physics, which deals only with the real objects, i.e., with the reality, not at all with the surreality. Of course, the problem is shown by this author to be caused by the centuries long misunderstanding of some macroscopic issues, particularly the center of gravitation and the unfortunate choice of the center of mass of the Earth for the coordinate origin of the erroneous but still currently used geophysical coordinate system, and all these macroscopic facts surely prevented the realization that magnetism is a manifestation of gravitation. Evidently, the research of the microscopic region, where hardly anything can be seen properly, began before strictly resolving some very obvious macroscopic problems, especially the origin of the Earth's magnetic field after the experiments of Pierre Curie in 1895.

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APPENDIX

PROBLEM OF PHYSICS

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PACS: 01.50.Zv

ABSTRACT

The center of mass and the center of gravitation of a mass distribution are defined. It is pointed out that, apparently, the center of gravitation has not been defined or used in the published physics literature so far.

The center of mass is defined in all physics textbooks as the point with respect to which the mass moment of the observed mass distribution is zero. On the other hand, the center of gravity is defined in some textbooks, but not mentioned at all in many other textbooks. The center of gravity in the textbooks where it is mentioned and defined is shown to be in fact the center of weight and identical to the center of mass of the observed mass distribution in the uniform external gravitational field. As such, the center of gravity is totally unnecessary and should not be even mentioned at all. It is obvious that *gravity* in the expression *center of gravity* in the textbooks where it is mentioned means nothing else but *weight*, i.e., identically as in the expression *specific gravity*.

However, the language is a living tool, and it changes in time. The word *gravity* has assumed for quite some time also the meaning of the gravitation or the gravitational field as evident, for example, from the name of a scientific journal CLASSICAL AND QUANTUM GRAVITY, where GRAVITY obviously does not refer to WEGHT but certainly to GRAVITATIONAL FIELD. The expressions – words *gravity*, *gravitation* and *gravitational field* are fully interchangeable according to any college edition of the Webster dictionary, including also the American Heritage Dictionary, electronic version. Thus, the expression *center of gravity* may be misleading in some situations. So the textbooks, which omit altogether that expression *center of gravity*, are certainly justified.

Hence, the expression *center of gravity* may be sometimes interpreted erroneously as the center of the gravitational field, or simply, the center of gravitation. However, it is interesting to note that the center of gravitation is not mentioned or defined or used in the published physics literature so far to the best of knowledge of this author. Consequently, the question is raised what is the meaning of the expression the center of gravitation and how that term should be defined?! The only logical definition is that the center of gravitation (or self gravitation for emphasis) is the point at which the gravitation, i.e., the gravitational field of the observed mass distribution is zero.

It is easily concluded from those definitions that the center of mass and the center of self gravitation are the two distinctly different points which coincide only in the case of the absolute symmetry of the observed mass distribution. Those two points are the characteristic invariants of the observed mass distribution, which obviously vary if the observed mass distribution changes.

As an illustrative example, consider the simplest mass distribution consisting of the two point masses m_1 and m_2 at a distance d from each other. Let d_{cm} designate the distance of the center of mass measured from the mass point m_1 along the line connecting these two point masses, then $m_1 d_{cm} = m_2 (d - d_{cm})$, which yields $d_{cm} = dm_2 / (m_1 + m_2)$. On the other hand, let d_{cg} designate the distance of the center of gravitation measured from the same point mass m_1 along the line connecting these two point masses, then applying the Newton's law of gravity we write $Gm_1 / d_{cg}^{\;2} = Gm_2 / (d - d_{cg})^2$, which yields the expression $d_{cg} = d\sqrt{m_1} / (\sqrt{m_1} + \sqrt{m_2})$. G is, of course, the universal gravitational constant. For $m_1 > m_2$, it is easily proved that $d_{cg} > d_{cm}$. It is obvious from the obtained expressions that these two centers coincide, if and only if those two point masses become equal, in which case that simplest mass distribution becomes symmetrical evidently.

It must be mentioned that the calculation of the center of gravitation is not a simple task. In the general case when the mass distribution is defined by the volume mass density ρ_m , the center of gravitation $\vec{r}_{cg}$ is the solution of the integral equation

$$\vec{g}(\vec{r}_{cg}) = G\int \frac{(\vec{r}_{cg} - \vec{r}\,')\rho_m dV'}{\left|\vec{r}_{cg} - \vec{r}\,'\right|^3} = 0 \qquad , \qquad (1)$$

where the notation is customary. It is evident from this equation that the problem of calculating the center of gravitation of a general mass distribution is far from simple, while the calculation of the center of mass is relatively a simple task of the integrations. That may be the explanation of the fact that the center of gravitation was never defined or used so far in the published physics literature to the best of knowledge of this author, to repeat once more. Of course, the center of mass $\vec{r}_{cm}$ is in the general case defined by

$$\int (\vec{r}\,' - \vec{r}_{cm})\rho_m dV' = 0 \quad \text{i.e.} \quad \vec{r}_{cm} = \left(\int \rho_m dV'\right)^{-1} \cdot \int \vec{r}\,'\rho_m dV' \quad . \qquad (2)$$

This obvious deficiency in the physics textbooks - literature should be eliminated.