Alternative to the Standard Model and the Higgs Boson
Open letter to Mr. Bill Gates

By

Javier de Juan Díaz

Dear Mr. Gates:

I'm taking the liberty of writing to you for two reasons that I consider sufficient to justify my doing so: First, the subject I bring you is of great importance, both from a scientific point of view and from a practical and economic standpoint. Secondly, the issue will remain in the dark until someone arises, someone with authority, prestige and sufficient means for bringing the subject to light and its consequent public discussion. There are many and very powerful vested interests against the proposal presented in this paper. And I can assure you that if the content of this writing is duly analyzed and discussed there will be an intellectual giant earthquake that will change many things in our world. I'm asking you to be that someone, given your authority, prestige, gained respect and means. And I think that you can be that someone with no problem as your mission would not be pass judgment on a scientific theory on the mass and the material particles. Your mission would be limited to a verdict of purely mathematical character of the various demonstrations presented in this paper. These demonstrations are simple and it is only required basic knowledge of physics and mathematics. Perhaps the highest level of mathematics is limited to solving integrals as easy as these, and you can check in any manual of mathematical formulas that the first integral is equal to $c^4/4$ and the second $c^2/2$.

$$\int_0^c x\,(c^2 - x^2)\,dx \quad \text{and} \quad \int_0^c x\,dx$$

Also some basic knowledge about physics, such as the concepts of spin, magnetic moment, Bohr atom, gravitational and electromagnetic forces. No doubt within the vast Microsoft Empire there are many people who know these subjects. If you, supported by that impressive intellectual Empire you have created, confirm that the calculations of this paper are correct, you will have contributed to one of the most important advances in science and will have prevented modern physicists delve further and further a marshland that leads nowhere, except the loss of time, money and valuable human capital. All this can be done despite the fact that your activity may seem quite apart from the specific issue I am proposing. But the big advantage is that you are out of the scientific community.

The issue at hand is one of the most arduous that human beings face: What is mass, the last component, together with the electromagnetic energy, of our Universe? All the energy of the Universe is mass and radiation. What's that mass in the universal formula of Einstein: $E = m\ c^2$, whose meaning is "if there is an amount of mass there will be a determined amount of energy"? That mass forms the particles of the Universe, stable and unstable. It is clear that to know what is the mass that makes up the universe is crucial in scientific knowledge. Concerning this subject, this is what Fermilab physicist Chris Hill says: "Understanding the origin of mass would be an achievement on a par with the greatest scientific strides in history, like Newton's establishing the universal law of gravitation or Einstein's connection of energy to mass and the speed of light".

It is well known the way that the Scientific Community is taking to respond to the origin and definition of mass. The Standard Model and its inseparable Higgs boson, properly installed in the CERN experiments, are today the most famous achievements of modern physicists, including the last Nobel Prize in Physics. To say that the Higgs Boson is the particle that gives rise to matter in the Universe is a much unsubstantiated statement that counts with repulsion from much of the academic world. It is pathetic that all the major countries of our planet are involved in the great project that has led to these results.

But there are many dark spots that have brought many detractors, although outside the Scientific Community, which allows no organized dissent. The key point is the acceptance of a Theory based on an adaptable formula wherein are inserted, along with a good number of arbitrary parameters, the material particles, which happen to be virtual, as well as the necessary characteristics for their identities, namely: spin, colour, charm and flavour. It seems that the new physicists are obsessed with sorting out, within a huge number of parameters, all discovered and undiscovered unstable particles. All their imagination is lost in the feverish placement of unstable particles, while they have abandoned a few stable particles, which are what really make up the Universe.

I include below some of the most critical comments after the announcement of the discovery of the Higgs Boson:

"There are better models out there than the Standard Model, but the prestigious members of the physics community have tied their reputations to this model. They don't want to lose their grants, the respect of their peers, or to go down in history as misinformed idiots. Some of them have looked over the wall they've built and are beginning to sweat. Real changes will not come from the academics. They will come from technologists and inventors". By Keith Foote.

"The physicists were left with no choice but to blag the Higgs bogus into existence or their jobs, credibility and Gov't funding would have ceased forthwith. The standard model still does NOT work on many fronts and is now confounding scientific issues."

"I've studied the books and articles describing the standard model, quantum electrodynamics, and the entire corpus of modern high energy physics, particle, and superstrings, and I left them out because they do not give me even a shred of knowledge about nature. We have reached a point in the development of physics in which the explanations of the phenomena are only for initiated people. Laws at atomic level are not intelligible to humans. While these things may be supported, I say that physics is not science, but mystery, religion and dogma." (Prof. Antonio Ruiz de Elvira)

"And with the hype there always comes nonsense, nonsense like that the masses of particles are due to the Higgs (No they are not!), nonsense like that the Higgs is some sort of ether while however Einstein disproved all ethers, nonsense. Criticism is taboo in today's business. You have to be a science cheerleader, or else … nothing. Critical positions are simply ignored and silenced so that you cannot get into any journal that anybody reads outside of India."

But one thing is to disagree and another is to propose an alternative. As far as I know there is no alternative to the Standard Model, other than what is presented in this paper. This alternative comes from a Theory of matter and energy that defines quite clearly what mass is and what the origin of mass is. The material particles are not virtual, they are real. The spin is not virtual; it becomes again a physical concept as the product of a mass by a linear speed and by a turning radius. The magnetic moments are as real as they are for everyday life. Nothing to hide under the cloak of a virtual world that can cover everything. The definition of mass is so simple and easy to understand that, in the moment of being announced, the Theory is left uncovered to deal with the huge amount of well known experimental data. Any dissent from the conclusions of the Theory with the experimental facts would force immediately to discard such Theory. This is why there are no alternatives to the virtual model, because everybody knows there are too many things well known as certain that must be confronted with the conclusions of the Theory, making success impossible, unless the Theory is true.

Modern physicists know nothing about the atom, and the atomic nucleus, and the nuclear framework and the nuclear forces that are strong enough to overcome by far the repulsive electric forces between protons at short distances and they disappear at the distance of a fermi (length unit in the nucleus, 10^{-13} cm.). The fact is that the behaviour of the nuclear forces of the new Theory coincides exactly with the experimental reality. This is the qualitative coincidence as this Theory says that the nuclear forces are strong enough to overcome by far the repulsive electric forces between protons at short distances and they disappear at the distance of a fermi. The quantitatively coincidence consists in measuring the binding energy of the deuteron, the nucleus composed of two nucleons, a neutron and a proton. This data is known experimentally and is equal to 2.21 MeV. Both coincidences between conclusions of this Theory and experimental facts occur. This test of the nuclear force, qualitatively and quantitatively, would be sufficient to any objective critic to certify the accuracy of the Theory. Even without yet

considering the series of unlikely coincidences that occur, the most compelling of which being the spin of elementary particles equal to h/4π.

I know very well what I'm facing and that the first reaction will be that my proposal is not possible, that it's crazy, that the Standard Model is the best thing that ever happened to Physics in the last 60 years, that a new Theory, therefore unknown, can never compete with the Theory that has been accepted by the Scientific Community and dozens of Nobel Laureates in Physics, that there are 7,000 physicists at CERN to reaffirm their ideas and a good number of governments who are paying the immense bill that requires the maintenance of those huge facilities to smash the matter in search of extreme consequences that may suggest the existence of some sub products which could be consistent with the existence of a particle within a certain energy range, which is supposed to be the missing link needed to the survival of a theory based on an adaptable formula wherein are inserted, along with a good number of arbitrary parameters, the material particles, which happen to be virtual, as well as the necessary characteristics for their identities, namely: spin, colour, charm and flavour.

All this I know, but even I know better my proposal with full conviction that this proposal is correct. I've gotten this conviction not by faith or by desire but by the numbers and mathematical demonstrations, which led me to the unequivocal conclusion that mass is something real, which constitutes material particles. The two options of the alternative are well defined. First option: elementary particles are virtual and dimensionless and their behaviours and characteristics are given by some adaptable and complicated formulas impossible to digest for ordinary people, leaving unsolved problems in the way, such as gravity forces, with great effort to classify an endless number of unstable particles of very low participation in our Universe. Second option: the mass has a real component and material particles have dimensions, move, rotate, are grouped together and have a common element: they are all the same thing and differ only in their energy and their electrical component. It is imperative that objective critics should compare these two options to get to the only rational solution: the virtual world is beyond physics. Only one possible option remains. The alternative is gone.

As I have said in a previous Article, I am aware that for any superficial reader my ideas will have reached the level of "ridiculous." Who am I to face the world of Science in such a crucial and complicated topic embarking myself on this absurd and ridiculous adventure? But the answer is clear: I am somebody who brings a simple alternative to the current absurd proposition that material particles are punctual and virtual entities. I am well aware of the difficulty involved in publicizing new ideas that challenge the orthodoxy of the Scientific Community. It is very hard to accept what I say, unless one has red and checked all the figures and demonstrations that have become necessary for this New Theory to be enunciated. My ideas are radical and they are bound to be controversial. Yet they have a coherency of their own. This new concept of matter points to the need for a radical rethink about Physics. My performance against ridicule

is limited to ask the reader to verify some numbers and mathematical proofs that once contrasted show that I'm right and therefore my opponent is wrong. These numbers and demonstrations are more than sufficiently contrasted in many different ways. Later on I shall mention them, but I want to highlight a few: The spin, the nuclear forces and Einstein's formula of mass increase with speed, considered relativistic.

As I say I have the certainty that the Theory is correct. This certainty is based on a series of mathematical proofs that lead inevitably to the conclusion that I'm on the right track. Ah! A warning to potential critics: A negative from someone who has not properly studied each and every one of the mathematical proofs and has not verified their correctness or incorrectness cannot be accepted. The question for a dissident is not to give an opinion against the Theory. I have known many who thought so without even reading a letter of the content of mathematical proofs, proving a great desire to eliminate any idea that goes against the Standard Model and its Higgs Boson. The question is to analyze each and every one of those math tests and answer whether the execution is correct. If all tests are accepted as mathematically correct (they are sufficiently contrasted), the critic should go on to rigorously analyze **why** this is so. The dissident can estimate the probability that an erroneous Theory should accumulate so many hits when its consequences are compared with hard experimental reality. If the dissident has accepted that all the mathematical argument is correct, he must accept without question that the Theory is correct and that the Standard Model and its Higgs Boson has been the biggest obstacle physics has found in the last 60 years. What a dissident can not do is to reject the Theory without having checked my calculations leading to the conclusion that all simple elementary particles have a spin equal to $h/4\pi$.

Perhaps the most difficult issue would be the checking of nuclear forces. I can add that nuclear forces have a purely electromagnetic character. This can lead to the fans of Modern Physics to tear their clothes and continue to deny any subsequent verification. Sorry, but that's the truth. I trust that you will not be a follower of Modern Physics and will make the checks. As regards numbers, the detection of the deuteron binding energy of 2.21 MeV, I can say that I made it at different times, using different methods, including a Hewlett Packard computer HP-65 with magnetic cards, obtaining always the figure of 2.21 MeV. These calculations have a feature that prevents making mistakes, since they are successively calculating the forces acting on the proton and neutron varying the distance between them. At each position we have acting electrical and magnetic, huge attractive and repulsive forces between the two particles that determine a final force for each position. By varying the positions we have huge attractive forces below the distance of a fermi at very short distances and forces obtained when the distance reaches a fermi practically vanish. You can imagine that this can only be achieved if the Theory is true. And finally a downward curve of forces is obtained. This curve is uniform and detects any errors in calculations. Once we know the curve the binding energy equal to 2.21 MeV is easily obtained. These two facts concerning nuclear forces would provide sufficient evidence to demonstrate that the Theory is

correct. But there are many more tests, some so convincing themselves like these nuclear forces. I refer to the spin of all simple, stable and unstable, elementary particles equal to h/4π. Proton, neutron, electron and neutrino are stable simple particles with spin equal to h/4π.

Along with nuclear forces and the spin of simple elementary particles I would like to mention as one of the great achievements of my Theory obtaining Einstein's formula of mass increase with speed. This is one of the great pillars of physics. The definition of material particles and mass that my Theory proposes leads to a clear conclusion: mass increases with speed. If the expression of the increase does not match the formula of Einstein, the Theory is incorrect, since Einstein's formula is beyond doubt as it has been thoroughly verified by experimentation. The fact is that my Theory, by simple reasoning that a child can understand, reaches the same formula of Einstein, proving besides that mass increase with velocity has nothing to do with the Theory of Relativity. Another issue that follows easily from my Theory is that mass can never reach the speed of light. When CERN announced they have made neutrinos flying faster than light I knew there was a mistake somewhere.

The Theory

This Theory says that mass is something tangible. In 1934 the Japanese Physicist Yukawa thought of particles as small blobs of sub nuclear matter, that he called urmaterie and others called goo. I have taken the term "goo". So this new Theory starts with a physical concept, easy to understand, for material particles. This reasoning is not a simple improvisation. It is a very elaborate Theory entitled "A New Physics for a New Millennium". It consists of a 286-page book that describes the reasoned steps that have allowed establishing the essential elements that govern the material world. This Work has a Certificate of Registration issued under the Seal of the United States Copyright Office – The Library of Congress in accordance with title 17, United States Code.

Turning to material particles, I can say that these bubbles or whirls of "goo" constitute all matter in the Universe. So, matter consists of some kind of whirl or swirl made out of "something" which exists in the Universe as a sole material component and is part of everything. As Rolf Schaffranke says, "something which exists in interstellar space but remains unrecognizable until it begins to coagulate or gets into a vortex pattern". This whirl turns around its own axis and is subject to a universal law which I shall call the main formula of the Theory. The formula is enunciated in this way: The absolute energy of the particle E multiplied by the length of the whirl equator $2 \pi R$, R being the equator radius, which I have called the equator-ring, is equal to Planck's constant h multiplied by the speed of light c. Thus we see that the main formula is $E \, 2 \pi R = h \, c$. Note that the shape of the whirl has not been mentioned, but I can say in advance that it need not be spherical. The circular shape of the equator-ring will be justified later on. This

formula is valid for any particle either at rest or moving with respect to any referential system.

The whirl also obeys the two following concepts:
1. The maximum speed of the goo forming the particle, that is to say its equatorial speed, is always equal to the speed of light. In other words the speed of every differential element of the equator-ring is always equal to the speed of light. This equatorial-ring acts as a rigid girdle and it doesn't change as long as the energy of the particle remains unaltered.
2. Material whirls are surrounded by rings of electric character which constitute the electric component of matter and turn with the whirls to which they belong, following their own frequencies.

In the case of particles at rest the first concept may be expressed $2 \pi R \nu = c$; ν being the turning frequency of the whirl. And the main formula $E \, 2 \pi R = h \, c$ may be expressed in this way: $m \, c^2 \, c/\nu = h \, c$. Which is $m \, c^2 = h \, \nu$. The first conclusion from the two simple equations that give rise to this Theory is that the energy of all the elementary material particles (non-composite) is $E = h \, \nu$, where ν is the turning frequency of the particle. That is, the energy value of the material particles is equal to that of the electromagnetic radiation, with the exception that, in the case of radiation, "ν" is the radiation frequency, and in the case of the matter, "ν" is a rotational frequency. This is a remarkable analogy between the only two forms of energy that exist in the Universe, as well as a sign of elegance and simplicity of the Theory. Furthermore it should be noted that the product of Planck's constant and the speed of light "hc" appears as isolated limb in the fundamental equation of the Theory. This means that there is a close relationship between the two universal constants: the speed of light "c", which we could call the einstenian constant with Planck's constant "h", which we could call the quantum constant. These constants have totally dissimilar values: $c = 3 \times 10^{10}$; $h = 6,6 \times 10^{-27}$. It does not seem natural that the product of these constants (h c) may appear as the isolated member of an equation. What is the meaning of the product of two so dissimilar constants which, on the other hand, have never been seen together? The result is an intermediate figure in the order of 10^{-16}. It seems strange. But we must bear in mind that the values mentioned of c and h correspond to the CGS system of units. If we adopt another system of units more in accord with the subatomic world, the two constants can become of the same order of magnitude or even, if we identify ourselves with a hypothetical observer located on an elementary particle and leave him to choose his natural system of units, h and c will take up the new values: $c = 1$; $h = 1$. Perhaps Quantum Mechanics is not so far removed from Einstein's ideas about mass and energy.

According to this Theory, all single particles, both stable and unstable, including among the former the electron, the proton, the neutron and the neutrino and their antiparticles, are the same thing, except for its mass, which depends on its frequency of rotation, and their electrical charge. They are just rotating goo. Matter is just movement, when

movement ceases mass disappear. The two simple equations determine that: 1- turning frequency is proportional to mass, greater turning frequency means more mass and more energy; 2- size is inversely proportional to mass, smaller size means more mass and more energy.

Tests to check

And we go on to the rigor of the tests. Once the definition of material particles has been established a large number of effects appear that must inevitably be in accordance with the experimental fact. Can anyone think of an erroneous Theory that could give such a degree of agreement with experimental data? To issue a judgment here one must thoroughly analyze each and every one of the evidence presented.

The spin = h/4π: All elementary particles have a spin, which is an angular momentum or mechanical moment with value equal to "mrv", where m is a mass, r is a turning radius and v is a linear speed. This implies that the spin is something that can be measured in the known particles and the value must always be equal to h/4π irrespective of the value of mass, energy, frequency and size of the particle. If the value of the spin is not always that the Theory is wrong.

Returning to the evidence that shows definitively the veracity of the Theory, which says, following Yukawa, that material particles are as small blobs of sub nuclear matter, that I have called goo. In principle, let us imagine particles as small spheres, although we will see that this requirement is not necessary. The main formulas of the theory are:

$$E \, 2 \, \pi \, R = h \, c$$
$$2 \, \pi \, R \, \nu = c$$
$$E = m \, c^2 = h \, \nu$$

Where E is the energy of the particle, R its radius, ν its rotating frequency and m its mass. The particles are surrounded by rings of electric character which constitute the electric component of matter and turn with the particles to which they belong, following their own frequencies.

The spin or angular momentum of all simple particles is h/4π. This is an insurmountable obstacle to any Theory that does not escape into the virtual. Is it possible to imagine that the simple formulas I have presented above may lead to the conclusion that all particles have the same spin? And besides that this spin is h/4π? It is necessary that modern physicists do this check and then answer the following question: Why the premises of this Theory lead to such a whimsical solution of the spin? Is it by chance? Can anyone imagine that the Theory is wrong, but capable of succeeding in such a complex element? The response should take into account the other matches that follow below.

But let us go into the mathematical proof of the spin. If you are conversant with

differential and integral calculus, one can say that the demonstration is simple. The spin conservation law is no doubt one of the greatest Principles of Nature, as well as energy, momentum and electric charge. The spin conservation law has never been violated in any natural or artificial phenomenon. It is applicable to all material particles, stable or unstable, simple or compound, such as atomic nuclei.

As this Theory maintains that all manifestation of matter consists in whirls turning with a certain frequency ν, it is precisely that turning which determines the existence of the spin or angular momentum, whatever we may call it. The problem is to demonstrate that all manifestation of matter, that is to say, any whirl subject to but two simple established laws, expressed by the formulas $E = m\,c^2 = h\,\nu$; $2\,\pi\,R\,\nu = c$, has a spin permanently equal to $h/4\pi$, whatever the conditions may be. I think that this is one of the greatest steps forward of this Theory.

We must now broach a point which it may be convenient to discuss. What is the shape of the material whirl? In order to tackle this problem I'm going to imagine that the whirl takes on a spherical shape. We shall see later on that this characteristic is not necessary. Thus, and with the sole aim of making the calculations clearer, let us imagine a particle which is in the shape of a sphere.

We start therefore from the fact that all manifestation of matter consists in a whirl of spherical shape made out of "something", which I shall call "goo" in order to avoid new words, which turns with a frequency ν, so that its energy is $E = m\,c^2 = h\,\nu$ and, on the other hand, the speed of its equatorial line, that I have called equator-ring, is always equal to the speed of light.

We shall see how, from those two simple laws, a surprising conclusion is reached, that all manifestation of matter as an elementary particle has a spin equal to $h/4\pi$. It is obvious that we will have, within the very small space occupied by the particle, differential elements of mass dm, the speeds of which vary from zero to the speed of light.

A question immediately arises. How do those differential elements of mass react when they reach speeds close to the speed of light? We know there is a law, sufficiently proved to be considered as universal, which says that a mass submitted to a speed v increases, so that, if we call m_v the mass m at speed v, there is the expression

$$m_v = \frac{m}{\sqrt{1 - \dfrac{v^2}{c^2}}}$$

It is logical to believe that the differential elements of mass which form the whirl are affected by this circumstance, but in a very different way, as their speeds vary from zero to the speed of light.

We know that mass is equal to a volume V multiplied by a density (mass per unit volume) which I shall call δ, so that m = V δ; if we consider a differential element of mass dm = dV δ ; δ now being the density of the corresponding differential element of volume. If we submit this differential element of volume dV, with mass dm, to a speed v, the mass will increase and will take on a new value dm$_v$, so that

$$dm_v = \frac{dm}{\sqrt{1 - \frac{v^2}{c^2}}} \quad ; \quad dm = dV\,\delta \quad ; \quad dm_v = \frac{\delta\,dV}{\sqrt{1 - \frac{v^2}{c^2}}}$$

This means that the differential element considered, when submitted to speed v, takes on a mass dm$_v$ and a density equal to

$$\frac{\delta}{\sqrt{1 - \frac{v^2}{c^2}}}$$

Let us point out that δ is the density of the differential element dm at rest. We shall calculate first of all dV as a function of the variable turning radius r. Let us imagine, as shown in the next figure, a sphere and a differential element of volume, such that the whole differential element is at a distance r from the turning axis.
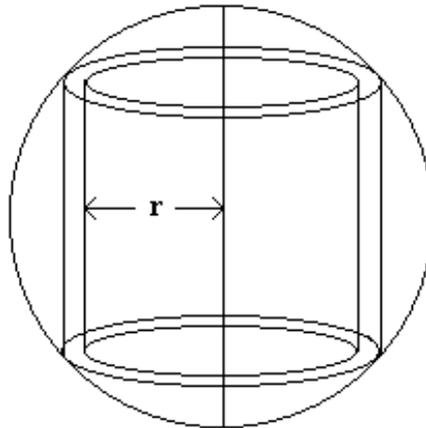
This differential element is the space between two cylinders with radius r and r + dr and

heigt $2\sqrt{R^2 - r^2}$; Where R is the radius of the sphere. We have:

$$dV = 4\,\pi\,r\,\sqrt{R^2 - r^2}\,dr$$

As the differential elements of the particle reach speeds comparable to the speed of light, the value we must take for dm, according to what we have seen before, is

$$dm = \frac{\delta}{\sqrt{1 - \dfrac{v^2}{c^2}}} \, dV \quad ; \quad dm = \frac{4 \, \pi \, \delta \, r \, \sqrt{R^2 - r^2} \; dr}{\sqrt{1 - \dfrac{v^2}{c^2}}}$$

If we call v the turning frequency of the particle, $v = 2 \, \pi \, r \, \nu$; and from that

$$dm = \frac{4 \, \pi \, \delta \, c \, r \, \sqrt{R^2 - r^2} \; dr}{\sqrt{c^2 - 4 \, \pi^2 \, r^2 \, \nu^2}}$$

We can then express the spin value:

$$q = \int r \, v \, dm \; = \; 2 \, \pi \, \nu \int r^2 \, dm \; = \; 8 \, \pi^2 \, \delta \, \nu \, c \int_0^R \frac{r^3 \, \sqrt{R^2 - r^2} \; dr}{\sqrt{c^2 - 4 \, \pi^2 \, r^2 \, \nu^2}} \quad .$$

Let us make a variable change, so that $x^2 = c^2 - 4 \, \pi^2 r^2 \, \nu^2$; and let us remember that $2 \, \pi \, R \, \nu = c$. We are going to get a first equation referred to the spin q:

$$r \, dr = \frac{-x \, dx}{4 \, \pi^2 \, \nu^2} \quad ; \quad q = \frac{\delta \, c}{4 \, \pi^3 \, \nu^4} \int_0^c x \left(c^2 - x^2 \right) dx$$

First equation: $q = \dfrac{\delta \, c^5}{16 \, \pi^3 \, \nu^4}$

It is clear on the other hand that, m being the mass of the particle, the sum of all differential elements of mass which form the whirl should be equal to m. As we have seen before

$$dm = \frac{4 \, \pi \, \delta \, c \, r \, \sqrt{R^2 - r^2} \; dr}{\sqrt{c^2 - 4 \, \pi^2 \, r^2 \, \nu^2}} \quad ; \quad m = 4 \, \pi \, \delta \, c \int_0^R \frac{r \, \sqrt{R^2 - r^2} \; dr}{\sqrt{c^2 - 4 \, \pi^2 \, r^2 \, \nu^2}}$$

Using the same variable change as before we have:

$$m = \frac{\delta \, c}{2 \, \pi^2 \, \nu^3} \int_0^c x \, dx$$

And then we have a second equation referred to the mass of the particle:

Second equation: $m = \dfrac{\delta \, c^3}{4 \, \pi^2 \, \nu^3}$

From the two expressions we have obtained, one for q and the other for m, we have by eliminating δ that $4 \, \pi \, q \, \nu = m \, c^2$. But one of the fundamental Principles of this Theory is $E = m \, c^2 = h \, \nu$.

Third equation: $m\,c^2 = h\,\nu$

And introducing this expression, we finally have:

$$q = \frac{h}{4\,\pi}$$

No doubt the calculation has been a little bit complicated. High powers of c, π and ν have intervened, but in the end there is an incredible simplification. The reasoning leads to two rather complex equations. These two equations and one of the Principles of this Theory form a system of three equations with four variables: m, q, δ and ν. The extraordinary thing is that one of the variables, precisely q, is constant, and its value is precisely h/4π**.**

It must be noted that the calculated value of the spin h/4π is valid for any whirl which responds to the two Principles of this Theory:
$E = m\,c^2 = h\,\nu$; $2\,\pi\,R\,\nu = c$

We have seen how any spherical whirl subject to the two simple Principles proposed by this Theory has a spin permanently equal to h/4π, whatever its energy may be.

The nuclear forces: The next fact to consider is the nuclear forces. I am not going into details in this short Work and refer the reader to the book "A New Physics for a New Millennium". In Chapter 9, page 36 the subject of nuclear forces is discussed in detail, leading to a definition of a purely electromagnetic character. This definition is perfectly understandable and it leads to a number of results in reference to the behaviour of those forces that are fully consistent with the experimental results. They are strong enough to overcome by far the repulsive electric forces between protons at short distances and they disappear at the distance of a fermi. This is the qualitative coincidence. The quantitatively coincidence consists in measuring the binding energy of the deuteron, the nucleus composed of two nucleons, a neutron and a proton. This data is known experimentally and is equal to 2.21 MeV.

Can anyone understand that an erroneous Theory can reach these accurate results according to experimental reality? But this is added to all that has been stated above concerning the spin. These two checks should seriously raise the scientific community a reasonable doubt about where the truth is: In the virtual particles without physical sense or in natural particles made of a material thing. The first case, the virtual particles, will lead to necessarily continue with an extremely expensive system of high energy experiments that is bound to come up with new complications increasingly intractable. In the second case, the verification is easy.
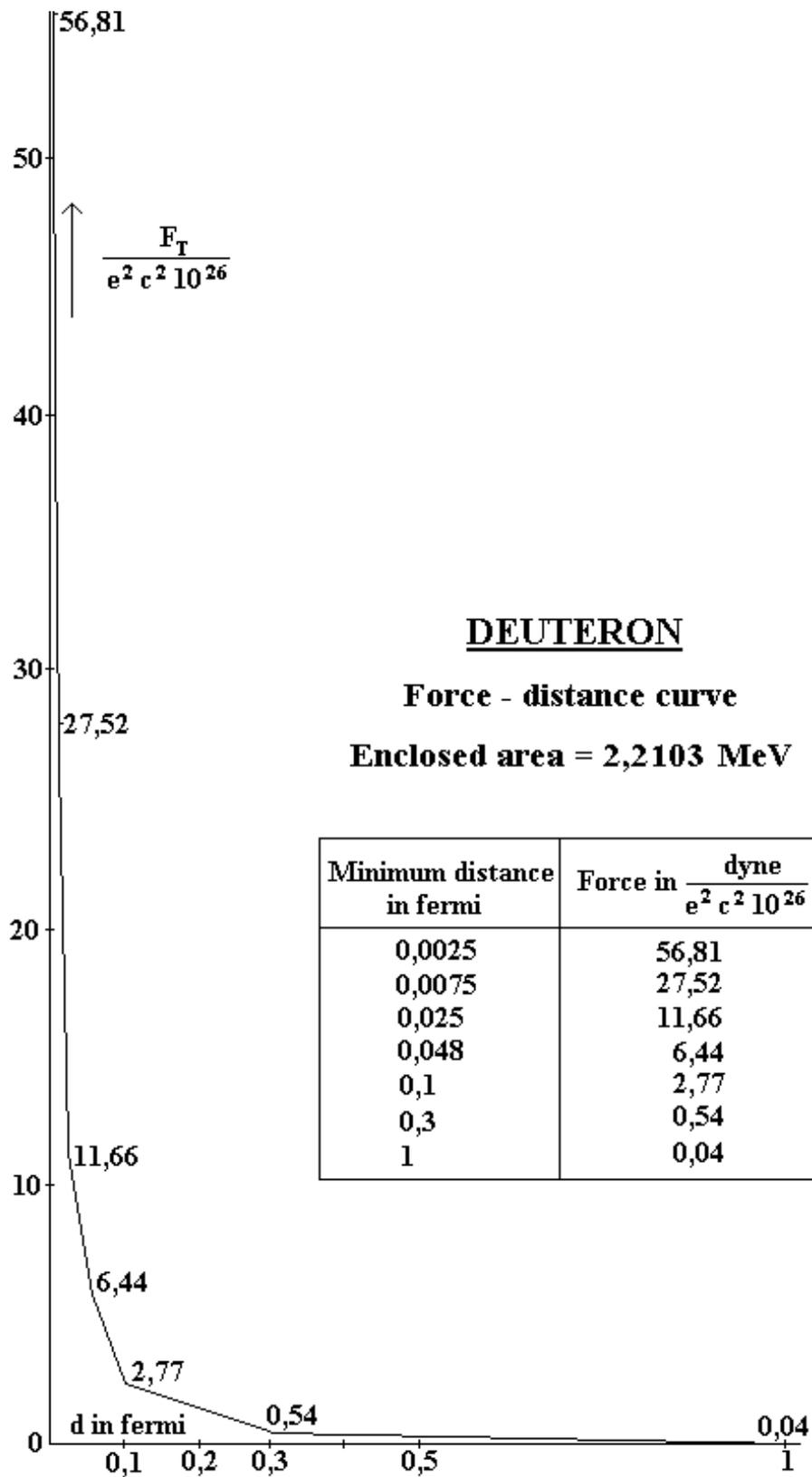
On the next figure the force-distance curve for the deuteron is shown and in it is seen that the force practically disappears at the distance of a fermi and at short distances it can overcome the electrical repulsion forces.

I can add that nuclear forces have a purely electromagnetic character. This can lead to the fans of Modern Physics to tear their clothes and continue to deny any subsequent verification. Sorry, but that's the truth. I trust that you will not be a follower of Modern Physics and will make the checks.

As regards numbers, the detection of the deuteron binding energy of 2.21 MeV, I have already said that I made it at different times, using different methods, including a Hewlett Packard computer HP-65 with magnetic cards, obtaining always the figure of 2.21 MeV. These calculations must necessarily include large and infinitesimal numbers, as shown in the final formula:

$$\frac{3{,}0705 \times 1{,}6019^2 \times 8{,}9874 \times 10^{20} \times 10^{26} \times 10^{6}}{2 \times 10^{40} \times 10^{13} \times 1{,}6019} = 2{,}2103 \text{ MeV}$$

These two facts concerning nuclear forces would provide sufficient evidence to demonstrate that the Theory is correct.

56,81

50

$$\frac{F_T}{e^2\,c^2\,10^{26}}$$

40

30

27,52

20

DEUTERON

Force - distance curve

Enclosed area = 2,2103 MeV

Minimum distance in fermi	Force in $\dfrac{dyne}{e^2\,c^2\,10^{26}}$
0,0025	56,81
0,0075	27,52
0,025	11,66
0,048	6,44
0,1	2,77
0,3	0,54
1	0,04

11,66

10

6,44

2,77

d in fermi

0,54

0,04

0

0,1 0,2 0,3 0,5 1

**Mass increases with speed according to the famous and sophisticated Einstein equation**: This is a simple consequence of the equations of this Theory. On some occasions, when a particle is submitted to a speed v, its turning axis is located in the direction of movement. When dealing with the polarization of elementary particles, we shall see this subject in detail. I have selected this type of movement as it gives a clear explanation of mass increase with speed according to Einstein's formula. There are of course other types of movements and the formula is valid in any case.

The fact is that, considering this type of movement and just applying the principles of this Theory, one reaches the conclusion that mass increases with speed according to the expression

$$m_v = \frac{m}{\sqrt{1 - \dfrac{v^2}{c^2}}}$$

Let us imagine the whirl which forms the particle, as it is depicted in the next figure, with its equator perpendicular to the movement, which coincides with the turning axis. And Let us call O any point of the equator. The movement of point O must be the resultant or composition of two partial movements: one is the movement caused by the turning of the particle around its own axis; as this point belongs to the equator of the particle, the corresponding speed to this movement is c, the speed of light. The other movement is the displacement of the particle. It has a direction perpendicular to the other one and its value is v. We have depicted the speed composition and the resultant is OA. It is clear that point O follows an absolute helical movement and the absolute value of its speed is OA. But Matter Mechanics proposed by this Theory says that the absolute speed of any differential element of equator-ring is always the speed of light. So the resulting speed OA must necessarily be the speed of light.

In order to make the figure clearer I am going to represent on another figure the speed composition, taking a scale such that a vector with length equal to the radius of the particle at rest corresponds to the speed of light.

Paticle at rest　　　　Particle at speed v
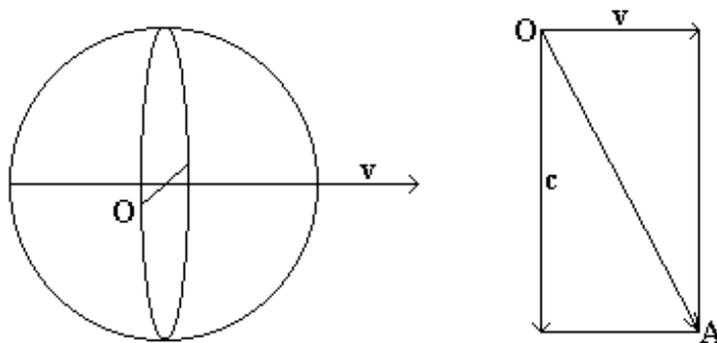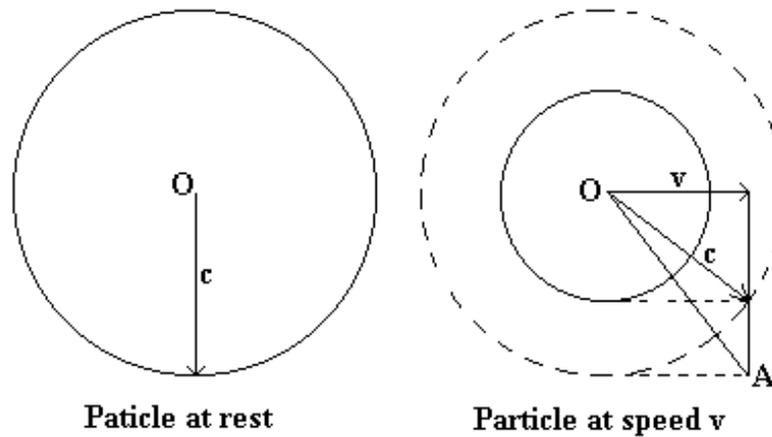
The particle at rest has been depicted on the left hand side of the figure, so that in this scale the speed of light is equal to the length of the radius, which is called R_0 . It has been said that the absolute speed of point O is OA and that this speed must necessarily be c. If the particle maintains its size, the component OA will always be greater than c. As it can be seen on the right hand side of the figure, the only possibility for the resultant OA to be equal to c is that the vertical component, which is equal to the radius of the particle, decreases. That is to say, that this speed which has been vertically represented and that was c for the particle at rest must decrease with the radius of the particle when this is submitted to speed v. In other words, the whirl which forms the particle, when submitted to speed v, has no other possibility than to reduce its size exactly as the vertical component of speed is reduced, so that the absolute speed, which is vector OA in the figure, does not exceed the speed of light. It is easy to see in the figure that the new vertical component is $\sqrt{c^2 - v^2}$.

If R_0 is the radius of the particle at rest, R_1 the radius of the particle at speed v, and by applying one of the fundamental Principles of this Theory, we have:

$$\frac{R_1}{R_0} = \frac{\sqrt{c^2 - v^2}}{c} = \sqrt{1 - \frac{v^2}{c^2}} \quad ; \quad \frac{m_0}{m_1} = \frac{R_1}{R_0} \quad ; \quad m_1 = m_0 \frac{R_0}{R_1} = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}}$$

Which is the well known relativistic expression, giving the increase of mass with speed. Note that the frequency has not changed. Thus the particle moving with speed v becomes smaller inversely to its energy but its frequency does not change.

We have seen how, starting from the conclusions of this Theory about the mechanics of fundamental particles, the relativistic law which rules mass increase with speed can be checked. It is also easy to check that the speed of light is the limit speed of matter. When the speed of the particle gets close to the speed of light, the turning radius tends to zero. This is why a particle is able to receive all the energy we may supply it with without ever reaching the speed of light. Note that this called "relativistic" expression

has nothing to do with Relativity.

The Bohr Atom: It is necessary to analyze rigorously the atom. In Chapter 1 of the book "A New Physics for a New Millennium" the structure of the Bohr Atom is duly studied. We clearly see that if the electrons were simple point charges, the Bohr atom would collapse, since they would constantly emit energy as subject to accelerating forces. But electrons are not point charges.

However there is an irrefutable proof that the Bohr atom is the correct model for the atom. This proof seems to have gone unnoticed by modern physicists who have condemned from the beginning the idea that the atom behaves just like a planetary system. But this is the reality. In other words, the atom consist in a positively charged nucleus representing the mass of matter, surrounded by orbiting electrons carrying its equal and opposite charge and that the forces between these constituents are of the Coulomb type. This means that the force varies as $1/r^2$, where r is the distance between the charged particles. Another force law that has a $1/r^2$ dependence is the force of gravitation. The inverse square law of gravitation has successfully explained the motion of planets around the sun, in circular and elliptical orbits and it explains the atom in exactly the same way. The demonstration that the Bohr atom is stable is so compelling that it leads to think that the electron is not a point charge. That's exactly what the new Theory has done and comes to the strange conclusion that the electrons have a structure that allows them to keep their atomic orbits without emitting radiation. This is shown in the book "A New Physics for a New Millennium".

But regardless of that demonstration we can clearly see that the Bohr atom is correct and that the atom works like a planetary system. I invite modern physicists to present an explanation but in the mean time offer mine that as I say is in the book.

We are now going to see in detail the Hydrogen atom as depicted by Bohr. Let us imagine an atom of Hydrogen formed by a proton and an electron orbiting around the proton. We shall only consider circular orbits**.** The next figure shows two circular orbits corresponding to radii r_1 and r_2 . The electron has a speed v_1 and v_2 in each orbit. Let us consider first the change of potential energy when there is a jump between the two orbits.

If we call $|Pot\ En|_1^2 = \int F\ dr$; where $F = \dfrac{e^2}{4\ \pi\ K_e\ r^2}$
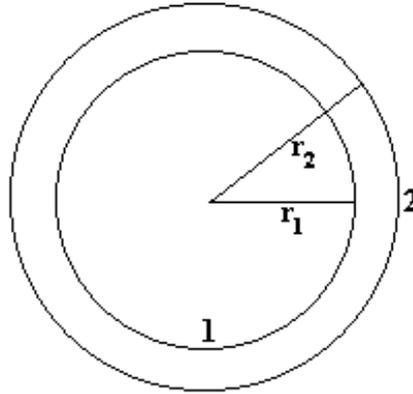
K_e is the fundamental electrostatic constant; e is the elementary electric charge and r is the orbital radius. Then:

$$\left|\text{Pot En}\right|_1^2 = \int_{r_1}^{r_2} \frac{e^2}{4\pi K_e\, r^2}\, dr = \frac{e^2}{4\pi K_e}\left[\frac{1}{r_1} - \frac{1}{r_2}\right]$$

The centripetal force of a body with mass m that follows a circular movement with radius r and angular speed u is $m\, r\, u^2$. This force must be equal to the electrical force F. But we know that $v = u\, r$; then we have:

$$m\, r\, u^2 = \frac{m\, v^2}{r} = \frac{e^2}{4\pi K_e\, r^2} \quad;\quad \text{Then}\quad \frac{m\, v^2}{2} = \frac{e^2}{8\pi K_e\, r}$$

The change of kinetic energy $\left|\text{Kin En}\right|_1^2$ will be $\dfrac{e^2}{8\pi K_e}\left[\dfrac{1}{r_1} - \dfrac{1}{r_2}\right]$

Which is the value of the change of potential energy divided by 2. In other words the total change of energy is equal to the change of kinetic energy. If the electron goes up further from the atom centre, its energy increases and, if it goes down nearer the centre, its energy decreases.

On the other hand we know that the spin or angular momentum or mechanical moment "m r v" of the electron along its orbit is an integer of $h/2\pi$, exactly $n\, h/2\pi$ where n is the principal quantum number. This is only valid for circular orbits. Then we have:

$$m\, r\, v = n\, \frac{h}{2\pi} \quad;\quad v = \frac{n\, h}{2\pi\, r\, m}$$

Having in mind the value of v^2 we have obtained before:

$$v^2 = \frac{e^2}{4\pi K_e\, r\, m} = \frac{n^2\, h^2}{4\pi^2\, r^2\, m^2} \quad;\quad \text{Then}\quad r = \frac{n^2\, h^2\, K_e}{\pi\, m\, e^2}$$

We know that the energy of the light emitted in an orbital jump is equal to $h\, v$, where v is the frequency of the light and h is Plank's constant. And the energy change in the

orbital jump is equal to the change of kinetic energy. Then:

$$|\text{Kin En}|_1^2 = \frac{e^2}{8\pi K_e}\left[\frac{1}{r_1} - \frac{1}{r_2}\right] = h\nu \quad ; \quad \nu = \frac{e^2}{8\pi K_e h}\left[\frac{1}{r_1} - \frac{1}{r_2}\right]$$

Considering the above value of r for each orbit:

$$r_1 = \frac{n_1^2 h^2 K_e}{\pi m e^2} \quad ; \quad r_2 = \frac{n_2^2 h^2 K_e}{\pi m e^2} \quad ; \quad \text{Then} \quad \nu = \frac{m}{8 h^3}\left[\frac{e^2}{K_e}\right]^2\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$$

Having in mind the values of the constants:

m = 0.9108 x 10^{-27} gr.: e = 1.602 x 10^{-20} cr.: h = 6,626 x 10^{-27}

$$K_e = \frac{1}{4\pi c^2}$$

c^2 = 8,987 x 10^{20}

Then we have:

$$\nu = 3{,}296 \times 10^{15}\left[\frac{1}{n_1^2} - \frac{1}{n_2^2}\right]$$

Giving different values to n_1 and n_2, we get the series of the Hydrogen atom. For $n_1 = 1$, we have the Lyman series; for $n_1 = 2$, the Balmer series and for $n_1 = 3$, the Paschen series, with the following values:

Lyman series ; $n_1 = 1$

$$\nu \approx 3{,}3 \times 10^{15}\left[1 - \frac{1}{n_2^2}\right]$$

$n_2 = 2$ $\nu = 2{,}47 \times 10^{15}$ (frequency) $\lambda = 1{,}21 \times 10^{-5}$ cm. (wave-length)

$n_2 = 3$ $\nu = 2{,}93 \times 10^{15}$ $\lambda = 1{,}02 \times 10^{-5}$ cm.

$n_2 = 4$ $\nu = 3{,}09 \times 10^{15}$ $\lambda = 0{,}97 \times 10^{-5}$ cm.

$n_2 = 5$ $\nu = 3{,}16 \times 10^{15}$ $\lambda = 0{,}94 \times 10^{-5}$ cm.

$n_2 = \infty$ $\nu = 3{,}30 \times 10^{15}$ $\lambda = 0{,}90 \times 10^{-5}$ cm.

Balmer series ; $n_1 = 2$

$$\nu \approx 3,3 \text{ x } 10^{15}\left[\frac{1}{4} - \frac{1}{n_2{}^2}\right]$$

$n_2 = 3$ $\nu = 0,45 \text{ x } 10^{15}$ $\lambda = 6,66 \text{ x } 10^{-5}$ cm.

$n_2 = 4$ $\nu = 0,61 \text{ x } 10^{15}$ $\lambda = 4,91 \text{ x } 10^{-5}$ cm.

$n_2 = 5$ $\nu = 0,69 \text{ x } 10^{15}$ $\lambda = 4,34 \text{ x } 10^{-5}$ cm.

$n_2 = 6$ $\nu = 0,73 \text{ x } 10^{15}$ $\lambda = 4,10 \text{ x } 10^{-5}$ cm.

$n_2 = \infty$ $\nu = 0,82 \text{ x } 10^{15}$ $\lambda = 3,63 \text{ x } 10^{-5}$ cm.

Paschen series ; $n_1 = 3$

$$\nu \approx 3,3 \text{ x } 10^{15}\left[\frac{1}{9} - \frac{1}{n_2{}^2}\right]$$

$n_2 = 4$ $\nu = 0,16 \text{ x } 10^{15}$ $\lambda = 18,7 \text{ x } 10^{-5}$ cm.

$n_2 = 5$ $\nu = 0,23 \text{ x } 10^{15}$ $\lambda = 13,0 \text{ x } 10^{-5}$ cm.

$n_2 = 6$ $\nu = 0,27 \text{ x } 10^{15}$ $\lambda = 11,1 \text{ x } 10^{-5}$ cm.

$n_2 = \infty$ $\nu = 0,36 \text{ x } 10^{15}$ $\lambda = 8,3 \text{ x } 10^{-5}$ cm.

We have seen before the value of r:

$$r = \frac{n^2 \, h^2 \, K_e}{\pi \, m \, e^2} = 0,5287 \text{ x } 10^{-8} \, n^2 \; ; \text{ For } n = 1 \, , \, r_1 = 0,5287 \text{ x } 10^{-8} \text{ cm}$$

By substituting this value in the expression $v = \dfrac{n \, h}{2 \, \pi \, r \, m}$ we have the speed along the

interior orbit: $v_1 = 2,2 \text{ x } 10^8$ cm/sec.

We have adopted the following assumptions:

- The Hydrogen atom consists of two well-defined objects.
- The whole movement of the electron is based on the attractive electric force between these two well-defined objects.
- The electron has an orbital spin or angular momentum equal to m r v.

- The electron moving along circular orbits has a specific speed for each quantum number **n**.
- Each of the circular orbits has a specific radius for each quantum number **n**.
- The changes in potential and kinetic energy are measured by applying the rules for a common orbital movement.
- The electron is subject to a centripetal force m r u^2 in the same way as any object turning around a centre.

The results are completely consistent with experimental facts. It seems natural that certain doubts should arise before rejecting the assumptions. Especially if another logical solution to the problem of electrons giving off energy exists.

It must be made clear that electrons from a circular orbit can only jump to another circular orbit when the quantum numbers **n** are consecutive. Otherwise, the electron ends up in an elliptical orbit. But this elliptical orbit belongs to a set of orbits with the same energy covered by the same quantum number **n**. The mathematical reasoning limits itself to comparing the conditions of two circular orbits, which means the radius of the orbit, the electron speed and the energy level. For example, if $n_1 = 1$ and $n_2 = 3$, the jump takes place between orbits ($n_1 = 1$; $l_1 = 0$) and ($n_2 = 3$; $l_2 = 1$), the last being elliptical. And the circular orbits compared are ($n_1 = 1$; $l_1 = 0$) and ($n_2 = 3$; $l_2 = 2$).

The above demonstration should be checked by modern physicists. The calculations are correct and show nothing more and nothing less than the assumption that the atom acts as a true planetary system is certain, since the emissions of the hydrogen atom obtained experimentally coincide with the emissions which result from a situation in which the atom consist in a planetary system. What happens to the hypothesis that the atom would collapse on the nucleus? The explanation is that this does not happen because the electron is not a point charge. On the contrary, it has a structure and that structure is subject to the new law that determines that the particle equator of a material particle always moves so that each of its differential elements uniformly moves at the speed of light. That's the secret. This point is discussed in the book "A New Physics for a New Millennium", Chapter 10, page 43. It should be noted that even without this demonstration that orbital electrons do not emit energy, the previously mentioned demonstration that the experimental emissions of the hydrogen atom can be obtained by assuming the atom a planetary system is sufficient to prove that the assumption is correct. In any case, modern physicists must find a solution. I will offer my solution, which I think is correct. Anyway, it is necessary to abandon the idea that the electron is a point charge. It is not, as in this case, the orbital electrons would emit energy and end up in the nucleus. But sadly the concept of the electron has changed little in over a century since the discovery: This is what one can read concerning the electron: "An electron may not be exactly what we've thought it was since its discovery 100 years ago. The tiny particle may not be a simple negative point charge, as scientists often describe it." (From Purdue News, February 1997). Can anyone be happy when the knowledge of

the electron has progressed so little in a complete century? After 100 years there is nothing about a possible structure of the electron. It is considered a simple negative point charge.

It is necessary to reflect the fact that a simple mathematical proof leads to the conclusion that the Scientific Community has been sailing in error for several decades in such a transcendental issue for Science as knowledge of the atom. That ignorance is parallel to the total ignorance of the atomic nucleus and its network and, after recent events, the new irreparable statement concerning virtual particles and their mass.

Necessity of neutron in the nuclear framework: It is a fact that atomic nuclei need neutrons for their stability and that the number of neutrons increases the higher the atomic number. The proportion of neutrons to protons is 1 to 1 for the deuteron and for the nucleus of helium. As the number of protons increases, the need for neutrons becomes greater. The proportion for $_3Li^7$ is 4 to 3 and for $_{92}U^{238}$ is 146 to 92. Neutrons act as nuclear cement. Without neutrons, protons cannot join together. Atomic nuclei have been formed by successive addition of nucleons. And the fact is that the first level, that of two nucleons, needs a neutron. Without that cement which is the neutron, the first step, the union of two nucleons, would not have taken place. This is a new match of this Theory with experimental facts.

Matter can't go faster than light: As seen in previous paragraphs.

Size of nucleons (proton and neutron) in the range of 10^{-13} cm and measure of time on nuclear scale in the range of 10^{-23} sec.: Easy to check by applying the formulas of the Theory. Note that a failure in any of these two irrelevant data could destroy the whole Theory, but this doesn't happen.

From $E = m c^2 = h \nu$, we have $\nu = m c^2 /h$, being $h = 6,626 \times 10^{-27}$; $c^2 = 8,98657 \times 10^{20}$; From the expression $2 \pi R \nu = c$ we have the radius and frequencies of proton and neutron:
Proton – Radius: $0,2103 \times 10^{-13}$ cm; Frequency: $2,2687 \times 10^{23}$ rps
Neutron - Radius: $0,2100 \times 10^{-13}$ cm; Frequency: $2,2715 \times 10^{23}$ rps

We see that the size of nucleons is in the range of 10^{-13} cm and that the frequencies of proton and neutron are in the range of 10^{23} rps, which means that their time measure or the time it takes them to complete a turning (a day at their time scale) is in the range of 10^{-23} sec, which coincides with experimental data.

I should like to stress the degree of difficulty this Theory is facing when comparing the first datum: the size of nucleons. We have: $R = h/2\pi mc$. This simple formula involves values in the range of 10^{-27} in the nominator and 10^{-24} and 10^{10} in the denominator. In order to be successful in making this datum coincide with reality the combination of

indexes must be in agreement with the experimental result: -13. The combination is: **-27 - (-24 + 10) = -13**. If this simple figure were not -13, this Theory would have failed from the very start.

Nucleus framework.: How it works. Why Deuteron is the only possible stable union of two nucleons? What is the meaning of the different energy levels in atomic nuclei? The Theory gives explanation to these subjects.

Other points:
How nucleons can go through the so called nuclear potential barrier.
What can the explanation of the big-bang Theory be, according to which the whole energy of the Universe was at the very beginning concentrated in an extraordinary small space and the measure of time was so short in comparison with that of our macro physical world that an enormous amount of transformations occurred in the incipient Universe during one second of our time?

What is the significance of the so called black holes? What is the explanation of the unseen matter, without which the behaviour of the Universe cannot be understood?: It simply consists of infinitesimal super-massive particles

Why neutrinos behave in a way so contrary to expectations from theoretical calculus, giving way to the concept of "missing solar neutrinos"? Researchers have reached the conclusion at the beginning of XXI Century that New Physics are needed. Nobody has proposed such New Physics. The only proposal is that neutrinos have mass and, as a consequence of that, the Standard Model is to be rejected. The Theory presented in this work gives the solution to this problem: the sizes of single particles, including neutrinos, diminish with their energies.

What is the real mass of a neutrino? They do not exist at rest.

Matter and antimatter. Their annihilation. Easily explained in the Book "A New Physics for a New Millennium", page. 229. "Goo" disappears and two electromagnetic radiations are created.

What is the explanation of the results of experiments carried out by Professor Krisch at the Zero Gradient Sinchrotron in Michigan, where he discovered that the outcome of a collision between two protons shows a surprising dependence on their directions of spin? This subject is shown in detail in the book "A New Physics for a new Millennium", Chapter 45, page 239. I limit myself here to mentioning some comments from Alan D. Krisch, Professor of Physics at the University of Michigan. Since 1972 he has concentrated on work with polarized proton beams, first in the Zero Gradient Synchrotron at the Argonne National Laboratory and since 1979 in the Alternating Gradient Synchrotron at the Brookhaven National Laboratory. This is what he says: "The outcome of a collision between two protons shows a surprising dependence on

their directions of spin. The results challenge the prevailing Theory that describes the proton's structure and forces. All the building blocks of matter, protons, neutrons and electrons, seem to be spinning like tops. The spinning is a basic quantum-mechanical property; each particle has a definite amount of spin, or spin angular momentum, just as it has a definite mass and a definite electric charge. When two spinning particles collide, the direction of their spins can affect how they scatter, just as the "english" on billiard balls can alter their rebound after a collision. In a series of accelerator experiments my colleagues and I likewise varied the spin and energy of colliding protons. We could not predict the effects of the spin, because many properties of the proton are still mysterious. Indeed, we observed unexpected and often startling behaviour that challenges the current Theory of the proton's structure and forces, Quantum Chromo dynamics (QCD). The results demonstrated that spin plays a significant role in high-energy interactions between protons: violent proton-proton collisions occurred mostly when polarized in the same direction. When the beam and the target protons were spinning in opposite directions, the protons often seemed to pass through each other without interacting. At sufficiently high energies it should make little difference whether two colliding protons are spinning in the same direction or in opposite directions. The fact that the spin directions do make a big difference suggests that our understanding of how protons interact with one another is incomplete. The experiments even call into question the currently accepted model of the proton's internal structure, which holds that a proton consists of three smaller constituents known as quarks, held together by the strong nuclear force (the force described by QCD). Our new results are certainly not the first time that the phenomenon of spin has surprised and confused physicists. The Quark Theory developed by Murray Gell-Mann of the California Institute of Technology has been truly successful in accounting for the masses of the many short-lived particles that are created when protons collide. On the other hand, the Quark Theory of particle scattering, Quantum Chromo dynamics (QCD), has made few predictions that could be verified. QCD is quite a flexible Theory and has been easily able to adjust to most new scattering data after the act; because I am a rather formal scientist, I am impressed less by adaptability than by predictive power. I also confess to some confusion about the notion that quarks can live as particles inside a proton but not outside. The clever and catchy QCD ideas that have been proposed to explain the apparent confinement of quarks may turn out to be correct, and perhaps I shall eventually change my old-fashioned view that particles must be well-defined objects. I believe, however, that a simple concept should not be abandoned in favour of a more complex one until the hard experimental evidence is overwhelming. At energies greater than 8 GeV the cross section falls more rapidly when the protons' spins are antiparallel than when they are parallel. In other words, the protons somehow have a better chance of colliding violently when their spins are parallel. At 13 GeV the probability of collision is four times greater when the spins are parallel than when they are antiparallel. Although we are not sure exactly what is causing this strange and totally unexpected behaviour, it does not appear to be good news for QCD."

"Thus the mystery deepened as we went to still higher energies at the ZGS. Has the QCD prediction that spin effects will disappear at high energies finally come true? Another result, at 28 GeV, makes me think it has not. We calibrated our instruments by observing the elastic scattering of the normal, non-polarized ZGS proton beam from our polarized proton target. According to QCD, the number of protons that scatter to the left should equal the number of protons that scatter to the right. The prediction is borne out at small scattering angles. I remember thinking that even if QCD does not account for our earlier ZGS results, it must surely be correct for the simple left-right scattering of an non-polarized beam from a polarized target.... This was when the new surprises began appearing. In violent large-angle collisions at 28 GeV two-thirds more protons scattered to the left than to the right. Perhaps we should also search for a new and more useful Theory of the interactions of spinning protons and of their spinning constituents. The longer I stare at our data, the more I feel it contains some simple message about the protons' constituents that we have not yet deciphered. I shall not guess at what might happen next, since surprises have materialized whenever spin experiments have probed previously unexplored regions.... Since I am an experimentalist, I can only rely on the ultimate judge of scientific truth, experimental observation. Perhaps measurements made in the near future will yield a clue that will help some clever young theorist to finally understand the proton's constituents and their strong forces."

This is what Professor Krisch has to say about these experiments and I can only say that these surprising results are in full agreement with the conclusions of this new Theory. The spin, that is to say, the rotation of the particles carries with it the rotation of the electric rings. When two particles approach to minimum distances, their electric rings, which are located in the same plane, are exposed to the electric and magnetic forces. It is evident that the result of the collision will depend in great form on the directions of rotation of the particles with their corresponding electric rings, since the magnetic force depends on the direction of rotation. This is what Professor Krisch has observed, but he has not been able to see why. The whole result of the experimentation of Professor Krisch is explained satisfactorily by taking into account the New Theory.

Note some of the statements of Professor Krisch: "each particle has a definite amount of spin, or spin angular momentum, just as it has a definite mass and a definite electric charge" He says "spin angular momentum", something that modern physicists will never say.

"The clever and catchy QCD ideas that have been proposed to explain the apparent confinement of quarks may turn out to be correct, and perhaps I shall eventually change my old-fashioned view that particles must be well-defined objects. I believe, however, that a simple concept should not be abandoned in favour of a more complex one until the hard experimental evidence is overwhelming." Note his expression: "my old-fashioned view that particles must be well-defined objects", something again those modern physicists will never say.

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