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INCONSISTENCIES OF NEUTRINO AND QUARK CONJECTURES AND THEIR NEGATIVE ENVIRONMENTAL IMPLICATIONS

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Abstract

By using a language as accessible to a broad audience as possible, in this note we present evidence suggesting scientific caution prior to final claims that neutrinos and quarks are actual physical particles existing in our spacetime. We review historical and recent evidence dismissing the existence of neutrinos and quarks as physical particles, and outline recent theories representing experimental data without their existence. We also identify the negative implications for environmental issues of the neutrino and quark conjectures since they imply the suppression of due scientific process on new clean energies predicted by new structure models of hadrons with massive physical constituents produced free in spontaneous or stimulated decays. The note ends with the need of continuing theoretical and experimental research on neutrino and quark conjectures, but complemented, for evident scientific democracy, accountability and societal needs, with theoretical and experimental studies on alternative theories without the neutrino and quark conjectures and their prediction of new clean energies.

1. The litany of directly unverifiable neutrino and quark conjectures.

As it is well known, Rutherford [1] submitted in 1920 the conjecture that hydrogen atoms in the core of stars are compressed into a new particle he called the *neutron* according to the synthesis

$$(p^+, e^-) \rightarrow n. \quad (1.1)$$

The existence of the neutron was subsequently confirm experimentally in 1932 by Chadwick [2]. However, numerous objections were raised by the leading physicists of the time against Rutherford's conception of the neutron as a bound state of one proton p^+ and one electron e^- .

Pauli [3] first noted that synthesis (1.1) violates the angular momentum conservation law because, according to quantum mechanics, a bound state of two particles with spin 1/2 (the

proton and the electron) must yield a particle with integer spin and cannot yield a particle with spin 1/2 such as the neutron. Consequently, Pauli conjectured the existence of a new neutral particle with spin 1/2, charge zero and no mass that is emitted in synthesis (1.1) or in similar radioactive processes so as to verify the angular momentum conservation laws.

Fermi [4] adopted Pauli's conjecture, coined the name *neutrino* (meaning in Italian a "little neutron") and presented the first comprehensive theory of the underlying interactions (called "weak"), according to which synthesis (1.1) should be replaced with the expression

$$(p^+, e^-) \rightarrow n + \nu, \quad (1.2)$$

where ν is the neutrino, in which case the inverse reaction (the spontaneous decay of the neutron) reads

$$n \rightarrow p^+ + e^- + \bar{\nu}, \quad (1.3)$$

where $\bar{\nu}$ is the *antineutrino*.

Despite the scientific authority of historical figures such as Pauli and Fermi, the conjecture on the existence of the neutrinos as physical particles was never accepted by the entire scientific community because of: the impossibility for the neutrino to be directly detected in laboratory; the neutrino inability to interact with matter in any appreciable way; and the existence of alternative theories that do not need the neutrino conjecture (see Refs. [5,6,7] and literature quoted therein for earlier alternative theories).

By the middle of the 20-th century there was no clear experimental evidence acceptable by the scientific community at large confirming the neutrino conjecture beyond doubt, except for experimental claims in 1959 that are known today to be basically flawed on various grounds, as we shall see in the next sections.

In the last part of the 20-th century, there was the advent of the so-called *unitary SU(3) theories* that attempted the Mendeleev-type classification of all strongly interacting particles (known as *hadrons*) into families. Jointly said theories intended to characterize the structure of any member of a given hadronic family as a quantum bound state of hypothetical particles known as *quarks*. These studies were subsequently extended to the so-called SU(3) color and flavor theories and are more recently known as the *standard model* of all elementary particles (see, e.g., Ref. [8] and vast literature therein).

The validity of the classification of hadrons into families via unitary symmetries was established by clear experimental confirmation of numerous predictions of new physical particles existing in our spacetime along lines much similar to the historical predictions of new atoms achieved by the Mendeleev classification, which prediction were all experimentally verified.

Nevertheless, the conjecture that quarks are physical particles in our spacetime has never been widely accepted by the scientific community due to a plethora of conceptual and technical inconsistencies (see refs.s [9,10]) some of which are outlined in the next section.

More recently, the controversies have been multiplied by the joining of neutrino and quark conjectures because such a joining has required additional unverified conjectures. The standard model does not predict the main features of the hypothetical neutrinos. This occurrence is considered positive by scientists accepting only the final classification character of the standard model, while the same occurrence is considered a major drawback of the standard model by scientists accepting the conjecture that neutrinos and quarks are physical particles.

The marriage of neutrino and quark conjectures within the standard model has requested the multiplication of neutrinos, from the neutrino and antineutrino conjectures of the early studies, into six different hypothetical particles, the so called *electron, muon and tau neutrinos and their antiparticles*. In the absence of these particles the standard model would lose the capability of providing both the classification and structure of particles.

In turn, the multiplication of the neutrino conjectures has requested the additional conjecture that the electron, muon and tau neutrinos have masses, plus the additional conjecture that they have different masses, as necessary to salvage the structural features of the standard model. Still in turn, the lack of resolution of the preceding conjectures has requested the additional conjecture that *neutrinos oscillate*, namely, that "they change flavor" (transform among themselves back and forth).

In addition to this rather incredible litany of sequential conjectures, each conjecture being voiced in support of a preceding unverified conjecture, by far the biggest controversies have occurred in regard to experimental claims of neutrino detection voiced by large collaborations.

To begin, both neutrinos and quarks cannot be directly detected as physical particles in our spacetime. Consequently, all claims on their existence are indirect, that is, based on the detection of actual physical particles predicted by the indicated theories. This occurrence is, per se, controversial. For instance, controversies are still raging following announcements by various laboratories to have "discovered" one or another quark, while in reality the laboratories discovered physical particles predicted by a Mendeleev-type classification of particles, the same classification being admitted by theories that require no quarks at all, as well shall indicate later on.

In the 1980s, a large laboratory was built deep into the Gran Sasso mountain in Italy to detect neutrinos coming from the opposite side of Earth since the mountain was used as a shield against cosmic rays. Following the investment of large public funds, the Gran Sasso Laboratory released no evidence of clear detection of neutrino originated events following five years of continuous tests.

Rather than passing to scientific caution in the use of public funds, the failure of the Gran Sasso experiments to produce any neutrino evidence stimulated new massive efforts by large collaborations involving hundred of experimentalists from various countries. The increase in experimental research was evidently due to the scientific stakes, because, as well known by experts, the lack of verification of the neutrino conjectures would imply the identification of clear limits of validity of quantum mechanics and special relativity.

These more recent experiments resulted in claims that, on strict scientific grounds, should be considered "experimental beliefs" by serious scholars for numerous reasons, such as:

- 1) The predictions are based on a litany of sequential conjectures none of which is experimentally established on clear ground;

- 2) The theory contains a plethora of unrestricted parameters that can essentially fit any pre-set data;

- 3) The "experimental results" are based on extremely few events out of hundreds of millions of events over years of tests, thus being basically insufficient in number for any serious scientific claim;

- 4) In various cases the "neutrino detectors" include radioactive isotopes that can themselves account for the selected events;

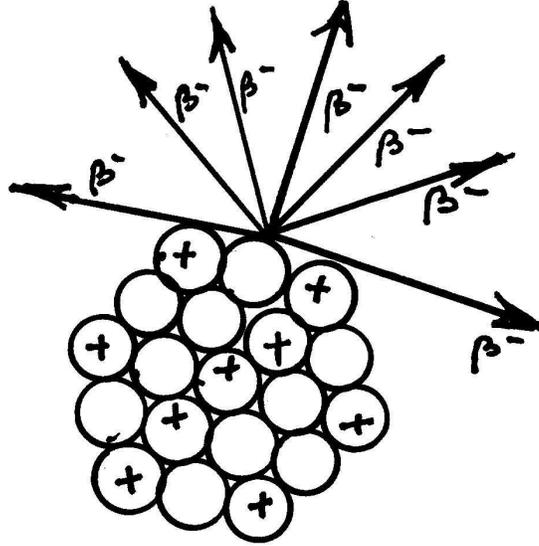


Figure 1: *DISMISSAL OF THE NEUTRINO CONJECTURE DUE TO LACK OF ENERGY.* Measurements done in the first half of the 20-th century have established that the energy of the electron in nuclear beta decays has a bell-shaped curve with the maximal value of 0.782MeV. the "missing energy" has been historically attributed to be carried out by the hypothetical neutrino. However, as indicated in Section 2 (and treated technically in the quoted literature), when the energy in the beta decay is computed with the inclusion of the Coulomb interactions between the expelled (negatively charged) electron and the (positively charged) nucleus at different directions of the expulsion, the nucleus acquires the "missing energy," without any energy left for the hypothetical neutrino.

5) The interpretation of the experimental data via neutrino and quark conjectures is not unique, since there exist nowadays other theories representing exactly the same events without neutrino and quark conjectures (including a basically new scattering theory of nonlocal type indicated later on).

Neutrino and quark conjectures have requested to date the expenditure of over one billion dollars of public funds in theoretical and experimental research with the result of increasing the controversies rather than resolving any of them.

Therefore, it is time for a moment of reflection: scientific ethics and accountability require that serious scholars in the field exercise caution prior to venturing claims of actual physical existence of so controversial and directly unverifiable conjectures.

In a language as accessible to a broad audience as possible, and by delegating technical issues to quoted references, in this note we collect, apparently for the first time, the main arguments against the existence of neutrinos and quarks as physical particles, outline alternative theories without neutrino and quark conjectures, and point out their negative environmental implication.

The predictable conclusion of this study is that theoretical and experimental research on neutrino and quark conjectures should indeed continued. However, theoretical and ex-

perimental research on theories without neutrino and quark conjectures and their new clean energies should be equally supported to prevent a clear suppression of scientific democracy on fundamental issues, evident problems of scientific accountability, and a potentially severe judgment by posterity.

2. Catastrophic inconsistencies of neutrino and quarks conjectures.

In regard to the neutrino conjecture, it is important to disprove it first as originally conceived, and then disprove the flavored extension of the conjecture as requested by quark conjectures. The disproof of the original conjecture of the neutrino can be done with the argument below and those of the following sections. The disproof of the conjecture of flavored neutrinos is an inevitable consequence of the catastrophic inconsistencies of the conjecture that quarks are physical particles.

As reported in nuclear physics textbooks, the energy experimentally measured as being carried by the electron in beta decays is a bell-shaped curve with a maximum value of 0.782MeV , that is the difference in value between the mass of the neutron and that of the resulting proton in decay (1.3). The "missing energy" has been attributed throughout the 20-th century to be carried out by the hypothetical neutrino.

It is easy to see that these calculations were initially done to adapt reality to the neutrino conjecture and then adopted by others without their critical examination. The electron in beta decays is negatively charged, while the nucleus is positively charged. Consequently, *the electron in beta decays experiences a Coulomb attraction from the original nucleus.*

Moreover, such an attraction is clearly dependent on the angle of emission of the electron by a decaying peripheral neutron. The maximal value of the energy occurs for radial emissions of the electron, the minimal value occurs for tangential emissions, and the intermediate value occur for intermediate directions of emissions, resulting in the experimentally detected bell-shaped curve.

When the calculations are done without prejudicial interests in existing doctrines, it is easy to see that the "missing energy" in beta decays is entirely absorbed by the nucleus via its Coulomb interaction with the emitted electron. Consequently, in beta decays there is no energy at all available for the neutrino conjecture, by reaching in this way a final disproof of the conjecture itself.

Supporters of the neutrino conjecture are expected to voice various counter-arguments on the lack of experimental evidence for the nucleus to absorb said "missing energy." These supporters are suggested to exercise scientific caution and first study the new structure models of the neutron without the neutrino conjecture, as well as the resulting new structure models of nuclei before venturing politically motivated views.

In regard to quark conjectures, the author has repeatedly stated in his writing that *the unitary, Mendeleev-type, $SU(3)$ -color classification of hadron into families has a final character.* All doubts herein considered solely refer to the joint use of the same classification models as providing the structure of each individual element of a given hadronic family.

Consequently, all structure models considered, including those without neutrino and quark conjectures, must achieve full compatibility with said unitary models of classification, in essentially the same way according to which quantum structures of atoms achieved full compatibility with their Mendeleev classification.

Far from being alone, this author has repeatedly expressed the view that *quarks cannot be*

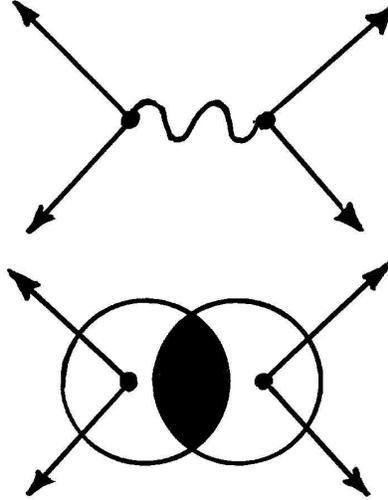


Figure 2: *DISMISSAL OF THE NEUTRINO CONJECTURE DUE TO THE INAPPLICABILITY OF THE QUANTUM SCATTERING THEORY.* As indicated in Section 3 (and treated technically in the quoted literature), the scattering theory used in all experimental claims on neutrino conjectures is structurally insufficient for final scientific claims because it is based on the abstraction of particles as massive points (top view) that, as such, cannot have collisions. In reality, all hadrons are extended hyperdense spheroids of radius $1F = 10^{-13}cm$, and even though electrons have a point-like charge, they do not have a "point-like wavepacket" as necessary for a serious validity of the quantum scattering theory. When extended particles collide as in the physical reality, we have a volume of mutual penetration of their charge distributions and/or wavepackets (lower view) that causes interactions of nonlinear, nonlocal, nonpotential and nonunitary type, namely, interactions dramatically beyond any dream of treatment via quantum mechanics. A covering nonlocal scattering theory has been built as part of the new hadronic mechanics outlined in Section 4. It is easy to see that the elaboration of experimental data via a more realistic nonlocal scattering theory produces results different than those claimed for neutrino conjectures, thus confirming the need for scientific caution prior to final claims that they are physical particles.

physical constituents of hadrons existing in our spacetime for numerous independent reasons [9,10].

On historical grounds, the classification of nuclei, atoms and molecules required *two different models*, one for the classification and a separate one for the structure of the individual elements of a given family. Quark theories depart from this historical teaching because their conception of representing with one single theory both the classification and the structure of hadrons.

As an example, the idea that the Mendeleev classification of atoms could jointly provide the structure of each individual atom of a given valence family is outside the boundary of science. The Mendeleev classification was achieved via *classical theories*, while the understanding of the atomic structure required the construction of *a new theory*, quantum mechanics.

Independently from the above dichotomy classification vs structure, it is well known by

technicians, but rarely admitted, that *quarks are purely mathematical quantities, being purely mathematical representations of a purely mathematical unitary symmetry defined on a purely mathematical complex-valued unitary space without any possibility, whether direct or implied, of being defined in our spacetime (technically prohibited by the O’Rafearthaigh theorem).*

It follows that the conjecture that quarks are physical particles is afflicted by a plethora of major problematic aspects today known to experts as *catastrophic inconsistencies of quark conjectures*, such as:

1) No particle possessing the peculiar features of quark conjectures (fraction charge, etc.) has ever been detected throughout the 20-th centuries in any high energy physical laboratory around the world. Consequently, a main consistency requirement of quark conjectures is that quarks cannot be produced free even under the extremely high energies achieved by current particle laboratories and, consequently, they must be "permanently confined" in the interior of hadrons even. However, it is well known to experts that, despite half a century of attempts, *no truly convincing "confinement of quarks" inside protons and neutrons has been achieved to date*, nor it can be expected on serious scientific grounds by assuming (as it is the case of quark theories) that quantum mechanics is identically valid inside and outside hadrons. This is due to a pillar of quantum mechanics, Heisenberg’s uncertainty principle, according to which, given any manipulated theory appearing to show confinement for a given quark, a graduate student in physics can prove the existence of a finite probability for the same quark to be outside the hadron *at low energies*, thus being free, while the probability for the production of free quarks at very high energy can only be defined as being embarrassing. These facts establish beyond "credible" doubt that quark conjectures are in catastrophic disagreement with physical reality. Consequently, the conjecture that quarks are physical particles is afflicted by catastrophic inconsistencies in its very conception since all quark theories predict the production of free quarks under sufficiently energetic collisions, while no quark has ever been detected free and no true confinement is possible on serious scientific grounds accepted by the scientific community at large [9].

2) It is equally well known by experts that *quarks cannot experience gravity* because quarks cannot be defined in our spacetime, while gravity can only be formulated in our spacetime and does not exist in mathematical complex-unitary spaces. Consequently, if protons and neutrons were indeed formed of quarks, we would have the catastrophic inconsistency that all quark believers should float in space due to the absence of gravity [10].

3) It is also well known by experts that *"quark masses" cannot possess any inertia* since they are purely mathematical parameters that cannot be defined in our spacetime. A condition for any mass to be physical, that is, to have inertia, is that it has to be the eigenvalue of a Casimir invariant of the Poincaré symmetry, while quarks cannot be defined via said symmetry because of their hypothetical fractional charges and other esoteric assumptions. This aspect alone implies numerous catastrophic inconsistencies, such as the impossibility to have the energy equivalence $E = mc^2$ for any particle composed of quarks, against vast experimental evidence to the contrary [10].

4) Even assuming that, because of some twist of scientific manipulation, the above inconsistencies are resolved, it is known by experts that quark theories have failed to achieve a representation of all characteristics of protons and neutrons, with catastrophic inconsistencies in the representation of spin, magnetic moment, mean lives, charge radii and other basic features.

5) It is also known by experts that the application of quark conjectures to the structure of nuclei has multiplied the controversies, while resolving none of them. As an example, the assumption that quarks are the constituents of the protons and the neutrons composing nuclei has failed to achieved a representation of the main characteristics of the simplest possible nucleus, the deuteron. In fact, quark conjectures are afflicted by the catastrophic inconsistencies of being unable to represent the spin 1 of the deuteron (since they predict spin zero in the ground state), they are unable to represent the anomalous magnetic moment of the deuteron, they are unable to represent the deuteron stability, they are unable to represent the charge radius of the deuteron, and when passing to larger nuclei, such as the zirconium, the catastrophic inconsistencies of quark conjectures can only be defined as being embarrassing.

In summary, while the final character of the SU(3)-color classification of hadrons into families has reached a value beyond scientific doubt, the conjecture that quarks are the actual physical constituents of hadrons existing in our spacetime is afflicted by so many and so problematic aspects to raise serious issues of scientific ethics and accountability, particularly in view of the ongoing large expenditures of public funds in the field.

It then follows that any additional conjecture based on the quark conjecture, such as that of the electron, muon and tau neutrinos and related additional conjecture of their oscillations, are so clearly flawed not to warrant detailed dismissals because unresolved conjectures cannot be credibly bypassed with additional conjectures, while the rather frequent use of academic power and credibility to support unverifiable conjectures can only multiply the controversies.

Above all, the most serious problems of scientific ethics and accountability emerge when the belief of neutrino and quark conjecture emerge as having serious negative impact on major environmental issues, as illustrated in Section 6. In fact,

3. The inapplicability of quantum mechanics inside hadrons.

The proton and the electron are the only massive stable particles clearly identified until now. Consequently, the idea that, as necessary for the standard model, the proton and the electron must "disappear" in synthesis (1.1) and be transformed into hypothetical undetectable quarks is repugnant to reason.

The most logical expectation is that, being stable particles, the proton and the electron persist in synthesis (1.1) according to Rutherford's original conception [1]. This is why, despite the successes of weak interactions, studies along Rutherford's original conception have continued since the times of Ref. [1].

The main obstacle against Rutherford's conception of the neutron is that it is prohibited by quantum mechanics, as pointed out by Pauli, Fermi, Schroedinger and other founders of quantum mechanics, who voiced the following serious objections:

1) Quantum mechanics cannot represent the spin of the neutron under Rutherford's conception because the total angular momentum of the ground state of a two particles with spin 1/2, such as the proton and the electron, must be 0, while the neutron has spin 1/2.

2) The representation of synthesis (1.1) via quantum mechanics is impossible because it would require a "positive binding energy," in violation of basic quantum laws requiring that all binding energies must be negative, as proved in nuclear physics. This is due to the fact

that the sum of the mass of the proton and of the electron,

$$m_p + m_e = 938.272\text{MeV} + 0.511\text{MeV} = 938.783\text{MeV}, \quad (3.1)$$

is *smaller* than the mass of the neutron, $m_n = 939.565\text{MeV}$, with "positive mass defect"

$$m_n - (m_p + m_e) = 939.565 - (938.272 + 0.511)\text{MeV} = 0.782\text{MeV}. \quad (3.2)$$

Consequently, quantum mechanics would require a positive binding energy bigger than 0.782MeV , under which all quantum equations become inconsistent (technically, the indicial equations of Schroedinger's equation becomes inconsistent and prevents the representation of the total energy with real numbers).

3) Via the use of the magnetic moment of the proton $\mu_p = 2.792\mu_N$ and of the electron $\mu_e = 1.001\mu_B$, it is impossible to reach the magnetic moment of the neutron $\mu_n = -1.913\mu_N$.

4) When the neutron is interpreted as a bound state of one proton and one electron, it is impossible to reach the neutron meanlife $\tau_n = 918 \text{ sec}$ that is quite large for particle standards, since quantum mechanics would predict the expulsion of the electron in nanoseconds.

5) There is no possibility for quantum mechanics to represent the neutron radius of about $1F = 10^{-13}\text{cm}$ since the smallest predicted radius is that of the hydrogen atom of 10^{-8}cm , namely 5,000 times *bigger* than the neutron radius.

The above objections were indeed valid at the time of their formulations in the 1940s. However, due to the knowledge gained on the structure of the proton and neutron since that time, the above objections are nowadays no longer valid for numerous reasons.

Quantum mechanics was conceived and constructed for the representation of the trajectories of electrons moving in vacuum in atomic orbits, in which field the theory received historical verifications. The same mechanics cannot possibly be exact for the description of the dramatically different physical conditions of the same electron moving within the hyperdense medium inside a proton. Such an assumption literally implies the belief in the perpetual motion within a physical medium since it implies that an electron must orbit in the core of a star with a conserved angular momentum, as requested by the quantum axiom of the rotational symmetry and angular momentum conservation law.

In addition, there exist today a rather large body of evidence according to which quantum mechanics, while being exactly valid under the conditions of its conception (point-like particles moving in vacuum), is *inapplicable* within hadrons, with the understanding that claims of "violation of quantum mechanics inside hadrons" would not be scientific, first of all, because the theory was not constructed for the field considered and, second, because all theories can at best approximate nature.

For comprehensive studies of this issue we refer the reader to monographs [16] and vast literature quoted therein. In this note it is sufficient to recall that quantum mechanics cannot be exact inside hadrons because its fundamental Galileo and Poincaré symmetries are broken since they were conceived for motion in vacuum and certainly not within hyperdense media.

As it is well known, the validity of said basic symmetries requires the validity of the *celebrated ten conservation laws of the total energy, linear momentum, angular momentum and uniform motion of the center of mass* that can be classically expressed with the unified law

$$\frac{dX_i(t, r, p)}{dt} = \frac{\partial X_i}{\partial b^\mu} \times \frac{db^\mu}{dt} + \frac{\partial X_i}{\partial t} = 0, \quad (3.3)$$

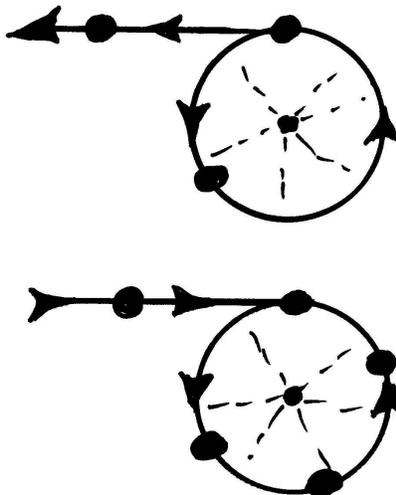


Figure 3: *DISMISSAL OF THE NEUTRINO CONJECTURE DUE TO THE LACK OF ANGULAR MOMENTUM CONSERVATION IN SCATTERINGS OF EXTENDED PARTICLES.* As it is well known, the neutrino conjecture was formulated on the basis of the quantum mechanical conservation of angular momentum. All experimental claims on neutrino conjectures are based on the Poincaré invariant scattering theory that, in turn, is based on the angular momentum conservation law. However, it is equally well known that said conservation only occurs for planetary-atomic systems, namely for Keplerian systems of point particles in stable orbits without collisions. In the scattering of extended particles only the total energy is conserved since the angular momentum can transform itself in linear momentum and vice versa, as illustrated in this picture with the sling-shot, or as anybody has eyewitnessed in the scattering of billiard balls. The lack of conservation of angular momentum eliminates the very foundations for the original proposal of the neutrino conjecture.

where

$$X_1 = E_{tot} = H = T + V, \quad (3.4a)$$

$$(X_2, X_3, X_4) = \mathbf{P}_{Tot} = \Sigma_a \mathbf{p}_a, \quad (3.4b)$$

$$(X_5, X_6, X_7) = \mathbf{J}_{tot} = \Sigma_a \mathbf{r}_a \wedge \mathbf{p}_a, \quad (3.4c)$$

$$(X_8, X_9, X_{10}) = \mathbf{G}_{Tot} = \Sigma_a (m_a \times \mathbf{r}_a - t \times \mathbf{p}_a), \quad (3.4d)$$

$$i = 1, 2, 3, \dots, 10; \quad k = 1, 2, 3; \quad a = 1, 2, 3, \dots, N,$$

with corresponding quantum expressions here ignored for simplicity.

It bis easy to see that, while all the above conservation laws are indeed verified for planetary-atomis structures, *the sole conservation law valid for physical systems in general is the conservation of the energy, due to the known lack of conservation of the linear and angular momentum in actual collisions.*

There is no need for high energy laboratories to see this occurrence since it is sufficient to drop a mass on a table. As anyone can observe, in this collision the linear momentum *cannot* be conserved. The only conserved quantity is the kinetic energy that, in this case, is transformed into heat energy.

Similarly, Figure 3 illustrates the exchange of linear and angular momenta, but always under the conservation of the energy, since we merely have in this case the transformation of kinetic energy into rotational energy and vice versa.

Note that *the above physical collisions among extended objects are sufficient to invalidate the experimental claims that neutrinos and quarks are physical particles since said claims all result from collision of extended particles.* Alternatively, the approximate character of quantum mechanics in hadron physics can be seen from the fact that *the quantum scattering theory cannot be exactly valid for particle collisions since it must represent the particles as massive points, and points cannot collide because they are dimensionless.* Under these extreme abstractions, how can "experimental beliefs" be turned into physical reality?

Unreassuringly, the above arguments are only the beginning of the litany of strong evidence preventing quantum mechanics from being exact for the hadronic structure. It is equally well known by expert, but not sufficiently spoken, that the Galileo and Poincaré symmetries can be exactly valid only under the conditions that:

I) All constituents can be effectively approximated as massive points (a condition necessary from the very mathematical structure of the symmetries, beginning from the underlying topology);

II) The constituents move in stable and quantized orbits without collisions (otherwise the structural axioms would not apply); and

III) The system considered must exhibit a *Keplerian center*, namely, the heaviest element is located in one of the two foci (otherwise the Keplerian structure cannot occur).

It is easy to see that *none of the above central conditions for the validity of the Galileo and Poincaré symmetries are valid inside hadrons, with resulting lack of exact validity of the Galileo and Poincaré symmetries and the consequential lack of exact character of quantum mechanics.* In fact:

I*) The constituents of hadrons cannot be effectively approximated as being point-like because that would require *hadronic constituents to have "pointlike wavepackets,"* something without any scientific sense. All particles, beginning with the electrons have non-null wavepackets that are rather large for particle standards because of approximately the size of all hadrons (1 F). Consequently, hadronic constituents are in a state of total mutual penetration of their wavepackets, resulting in *nonlocal interactions* (that is, interactions extended over a volume) that are beyond any possibility of quantum description since quantum theories can only represent events occurring among isolated points.

II*) The orbits of hadronic constituents are indeed stable but they cannot be quantized as for the orbit of atomic electrons, again, because motion occurs within a hyperdense medium. This is established by the fact that any quantum jump from one orbit to another would mandate the constituent to exit the hadron, since the minimal spacing in quantum orbits is greater than the size of hadrons. In different terms, the admission of quantized orbits for quark constituents of the proton mandates that the proton is unstable and the work is free because, when excited, said quark must jump to a new orbit necessarily outside the proton itself, in catastrophic disagreement with experimental reality.

III*) The Galileo and Poincaré symmetries *cannot* be exactly valid for the hadronic structure because *hadrons do not possess a Keplerian centers* as it is the case for atoms. Consequently, hadrons cannot constitute Keplerian systems, and quantum mechanics cannot be exact. According to incontrovertible data from deep inelastic scattering, hadrons are

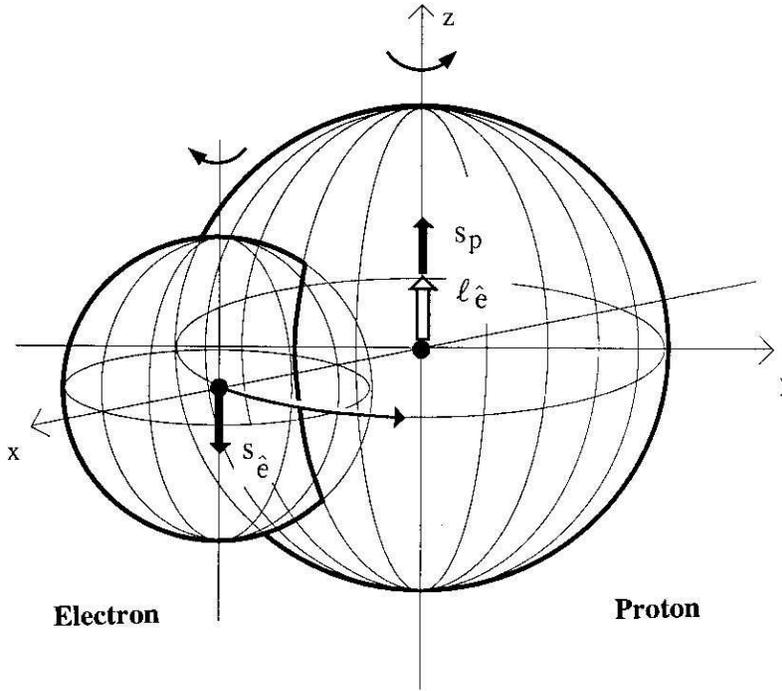


Figure 4: *ABSENCE OF THE NEUTRINO CONJECTURE IN RUTHERFORD'S SYNTHESIS OF THE NEUTRON ACCORDING TO HADRONIC MECHANICS.* At the initiation of Rutherford's compression of the hydrogen atom in the core of a star, when the electron penetrates within the hyperdense medium inside the proton it is constrained for stability to couple with antiparallel spins, while it is equally constrained to have an angular momentum that coincides with the spin of the proton, as illustrated in the figure. In this process the electron is mutated into the isoelectron, that is, a particle characterized by the covering Poincaré-Santilli isosymmetry. Consequently, at the completion of the compression, the isoelectron has null total angular momentum and the spin of the neutron coincides with that of the proton without any need for the neutrino conjecture. It should be indicated that fractional values of angular momenta are anathema for quantum mechanics because they break its unitary structure. However, the same values are normal for the covering hadronic mechanics since the latter theory has been build for the invariant treatment of nonunitary structures.

composed of a somewhat homogeneous and isotropic hyperdense medium in which the search for the remnants of an atomic structure has no scientific sense.

Note that the absence of an atomic structure inside the proton is sufficient, per se, to invalidate all arguments against Rutherford's conception of the neutron, since all these arguments are based on said atomic structure.

In the final analysis it has been established by scientific history that the validity of any given theory within given conditions is set by the results. Quantum mechanics has represented *all* features of the hydrogen atom in a majestic way and, therefore, the theory is exactly valid within the indicated conditions. By contrast, when extended to the structure of particles, quantum mechanics has only produced an interlocked chain of individually unverifiable conjectures on neutrinos and quarks, besides failing to achieve final results in various other branches of sciences, such as in nuclear physics, chemistry and astrophysics [16].

Rather than continuing with additional unverifiable conjecture, it is time to re-examine the validity of quantum mechanics for the structure of hadrons. After all these dramatic controversies protracted for such a long period of time, there comes a point in time in which the serious conduction of serious science requires a re-examination of the foundations.

4. The structure model of hadrons with massive physical constituents.

The view advocated by the author is that a deeper understanding of the structure of hadrons requires a generalization of the quantum theory valid for their classification, because a theory constructed for the description of electrons orbiting in vacuum in atomic structures, cannot be credibly claimed to be necessarily valid for the description of the same electrons when moving within the hyperdense media inside hadrons.

In view of all the insufficiencies and controversies in various branches of sciences, R. M. Santilli [20] proposed in 1978 the construction of a generalization/covering of quantum mechanics under the name of *hadronic mechanics* precisely to represent the dynamics within hyperdense media inside hadrons, under the conditions of achieving full compatibility with quantum theories of classification, as well as admitting quantum mechanics uniquely and unambiguously at the limit when all resistive forces caused by motion within hyperdense media cease to exist and motion returns to be in vacuum.

Following proposal [20], hadronic mechanics was studied by numerous mathematicians, theoretician and experimentalists (see monographs [11-19,33-39] and vast literature quoted therein). After decades of studies, mathematical maturity in the formulation of hadronic mechanics was reached only in 1996 [21], after which it was easy to achieve physical maturity [22,23].

As we shall see, hadronic mechanics has permitted the exact, numerical and invariant representation of *all* characteristics of hadrons without any neutrino and quark conjecture and via the use of ordinary massive particles as physical constituents in our spacetime, generally those produced free in the spontaneous decays with the lowest mode.

In particular, as clearly stated in the original proposal [20], hadronic mechanics was proposed for the specific intent of achieving a consistent quantitative representation of Rutherford's synthesis (1.1) by resolving all the objections outlined in Section 3. This objective was set in view of the important environmental implications outlined in the next section.

The main idea of proposal [20] is essentially the following. One of the axioms of quantum

mechanics is that its time evolution must characterize a *unitary transform* in a Hilbert space \mathcal{H} over the field of complex numbers \mathcal{C} ,

$$U \times U^\dagger = U^\dagger \times U = I. \quad (4.1)$$

A necessary condition to achieve a true generalization of quantum mechanics is then that of exiting from its class of all possible equivalent formulations. Consequently, a central axiom of hadronic mechanics is that its time evolution must characterize a *nonunitary transform* when expressed on \mathcal{H} over \mathcal{C} ,

$$U \times U^\dagger \neq I. \quad (4.2)$$

However, it was known in 1978 that nonunitary theories do not have consistent physical predictions when treated via the mathematics of quantum mechanics, such as Hilbert spaces \mathcal{H} and fields \mathcal{C} . This mandated the construction of a *basically new mathematics* specifically conceived for physically consistent treatment of nonunitary theories.

The solution proposed in the original memoirs [20] is the generalization (called *lifting*) of the trivial unit $I = +1$ of quantum mechanics into a positive-definite, but most general possible integro-differential operator $\hat{I}(t, r, p, \psi, \dots)$, today called *Santilli's isounit*, that is assumed to coincide with nonunitary transform (4.2),

$$U \times U^\dagger = \hat{I}(t, r, p, \psi, \dots) = 1/T(t, r, p, \psi, \dots) > 0 \quad (4.3)$$

In turn, the lifting $I \rightarrow \hat{I}$ required a generalization of the conventional associative product $A \times B$ between generic quantities A, B (numbers, matrices, etc.) into the form

$$A \hat{\times} B = A \times \hat{T} \times B, \quad (4.4)$$

under which \hat{I} is indeed the correct left and right unit

$$\hat{I} \hat{\times} \hat{A} = \hat{I} \times \hat{T} \times \hat{A} = \hat{A} \hat{\times} \hat{I} = \hat{A}, \quad (4.5)$$

for all elements A of the set considered.

As a pre-requisite for practical applications of hadronic mechanics, the lifting of the unit and of the product required the construction of a compatible generalization of the totality of the mathematics of quantum mechanics into a covering formulation today known as *Santilli's isomathematice*, that includes generalized numbers, fields, metric spaces, topologies, functional analysis, algebras, geometries, symmetries, etc. This explains the decades of work that were necessary to achieve maturity of applications of hadronic mechanicsd.,

On physical grounds, the generalized unit $\hat{I}(t, r, p, \psi, \dots)$ is used for the invariant representation of *contact forces among extended constituents* that are completely absent in quantum mechanics.

Santilli [20] selected the unit for the representation of contact interactions among extended particles because, on one side, the latter are not potential, thus being outside the quantum Hamiltonian, and, on the other side, because the unit is the *only* alternative permitting an invariant representation. In fact, whether conventional or generalized, the unit is the basic invariant of any theory.

Via the use of hadronic mechanics, the original proposal [20] achieved already in 1978 a new structure model of mesons with actual massive physical constituents according to the models

$$\pi^0 = (\hat{e}^+, \hat{e}^-)_{HM}, \quad (4.6a)$$

$$\pi^\pm = (\hat{e}^+ \hat{e}^\pm, \hat{e}^-)_{HM}, \quad (4.6b)$$

$$K^0 = (\hat{\pi}^+, \hat{\pi}^-)_{HM}, \text{ etc.}, \quad (4.6c)$$

where $e, \pi, K, \text{ etc.}$ represent conventional particles as detected in laboratory and $\hat{e}, \hat{\pi}, \hat{K}, \text{ etc.}$ represent their *mutation*, that is, the alternation of their characteristics when in deep mutual penetration of their wavepackets and charge distributions (a feature technically treated via representations of the Galileo-Santilli [13] and Poincaré-Santilli [14] isosymmetries).

Hadronic structure models (4.6) achieved an exact, numerical and invariant representation of *all* characteristics of mesons, including characteristics whose representation has been impossible for quark conjectures after some three decades of failures, such as the representation of: 1) the charge radius of the particles; 2) Their meanlife, and 3) the reason the massive constituents are emitted in the spontaneous decays with the lowest mode.

Hadronic mechanics can now be constructed quite simply by applying a nonunitary transform to *all* quantities and their operations of quantum mechanics, including number, metric spaces, algebras, geometries, topologies, etc. Recall that the quantum model underlying the hadronic structure of the π^0 , Eq. (4.6.a), is the positronium (a bound state at large mutual distances of an electron and a positron). Therefore, model (4.6a) can be easily achieved via the lifting of the quantum Schroedinger's and Heisenberg's equations

$$U \times U^\dagger = \hat{I} = 1/\hat{T} \neq 1, \quad (4.7a)$$

$$\begin{aligned} i \times U \times \frac{dA}{dt} \times U^\dagger &= i \times \frac{\hat{d}\hat{A}}{\hat{d}\hat{t}} = U \times [A, H] \times U^\dagger = \\ &= \hat{A} \times \hat{T} \times \hat{H} - \hat{H} \times \hat{T} \times \hat{A} = \hat{A} \hat{\times} \hat{H} - \hat{H} \hat{\times} \hat{A} = [\hat{A}, \hat{H}], \end{aligned} \quad (4.7b)$$

$$\begin{aligned} U \times (H \times |\psi \rangle) &= (U \times H \times U^\dagger) \times (U \times U^\dagger)^{-1} \times (U \times |\psi \rangle) = \\ &= \hat{H} \times \hat{T} \times |\hat{\psi} \rangle = \hat{H} \hat{\times} |\hat{\psi} \rangle = U \times (E \times |\psi \rangle) = \hat{E}' \hat{\times} |\hat{\psi} \rangle = E' \times |\hat{\psi} \rangle, \end{aligned} \quad (4.7c)$$

$$\hat{H} = U \times H \times U^\dagger, \hat{A} = U \times A \times U^\dagger, |\hat{\psi} \rangle = U \times |\psi \rangle, \quad (4.8b)$$

where: the isotopic generalization (4.7b) of Heisenberg's equation is the fundamental equation of hadronic mechanics proposed in the original memoirs [20] of 1978; Eq. (4.7b) is the isotopic generalization of Schroedinger's equations achieved subsequently; H and $|\psi \rangle$ are the Hamiltonian and wavefunction, respectively, of the positronium; their nonunitary images \hat{H} and $|\hat{\psi} \rangle$ are the corresponding expressions for the π^0 ; d/dt is the conventional differential; and $\hat{d}/\hat{d}\hat{t}$ is the isodifferential [21].

Rather remarkably, the representation was reached via the following simple isounit

$$U \times U^\dagger = \hat{I} = e^{k \times (\psi/\hat{\psi}) \times \int dr^3 \times \psi^\dagger(r)_\uparrow \times \psi(r)_\downarrow}, \quad (4.8)$$

where k is a normalization constant and $\int dr^3 \times \psi^\dagger(r)_\uparrow \times \psi(r)_\downarrow$, represent the *nonlocal interactions* caused by the deep overlapping of the wavepackets of the electron and positron one inside the other, a feature that is outside any possible representation via quantum mechanics.

At the limit

$$\int dr^3 \times \psi^\dagger(r)_\uparrow \times \psi(r)_\downarrow, \rightarrow 0, \quad (4.9)$$

namely, at the limit of large (atomic) distances and ignorable waveoverlapping, hadronic model (4.6a) recovers the quantum model of the positronium exactly, uniquely and unambiguously.

The use of quantum mechanics for models (4.6) yield the inconsistencies 2) to 5) of Section 3 but inconsistency 1) required no treatment for mesons because in this case there is no violation of the quantum conservation of angular momentum, since the spin of the mesons can be achieved via the spin of their massive constituents. Consequently, it was relatively easy to reach models (4.6) in the original proposal [20] to build hadronic mechanics.

The representation of Rutherford's synthesis of the neutron, Eq. (1.1), required considerable additional studies on the isotopies of angular momentum and spin (see papers [24,25]). After decades from the original proposal [20], *a nonrelativistic, exact, numerical and invariant representation of all characteristics of the neutron as a bound state of a proton and an electron was finally achieved in papers [26] of 1990, with the relativistic extension achieved in paper [27] of 11993 (see also Ref. [28])*, according to the expression

$$n = (\hat{p}^+, \hat{e}^-)_{HM}, \quad (4.10)$$

where \hat{p}^+ and \hat{e}^- are the conventional proton and electron in a deformed (mutated) form caused by their deep mutual penetration called *isoprotons and isoelectrons* (technically represented via irreducible representation of the Poincaré-Santilli isosymmetry).

It should be noted that, since the proton is about 2,000 times heavier than the electron, all calculations can be done with the simpler model

$$n = (p^+, \hat{e}^-)_{HM}, \quad (4.11)$$

namely, the sole deformation of the electron caused by its Rutherford's compression inside the hyperdense proton is sufficient to represent *all* features of the neutron.

The exact, numerical and invariant representation of the rest energy, meanlife, charge radius, anomalous magnetic moments and parities were achieved as for models (4.6). The representation of the spin 1/2 of the neutron turned out to be much simpler than expected, as outlined in Figure 4.

In particular, *the hadronic representation of the synthesis of the neutron does not require any neutrino conjecture at all, exactly as originally conceived by Rutherford*. Once compressed inside the proton, the electron is constrained for stability to have its spin antiparallel to that of the proton and its orbital angular momentum to coincide with the spin 1/2 of the proton, resulting in the following exact representation (where the proton and the resulting electrons are assumed to be at rest for simplicity)

$$s_n^{spin} = s_p^{spin} + s_{\hat{e}}^{spin} + s_{\hat{e}}^{orb} = \frac{1}{2} - \frac{1}{2} + \frac{1}{2} = \frac{1}{2}, \quad (4.12)$$

namely, *the total angular momentum of the isoelectron is null*,

$$s_{\hat{e}}^{tot} = s_{\hat{e}}^{spin} + s_{\hat{e}}^{orb} = 0, \quad (4.13)$$

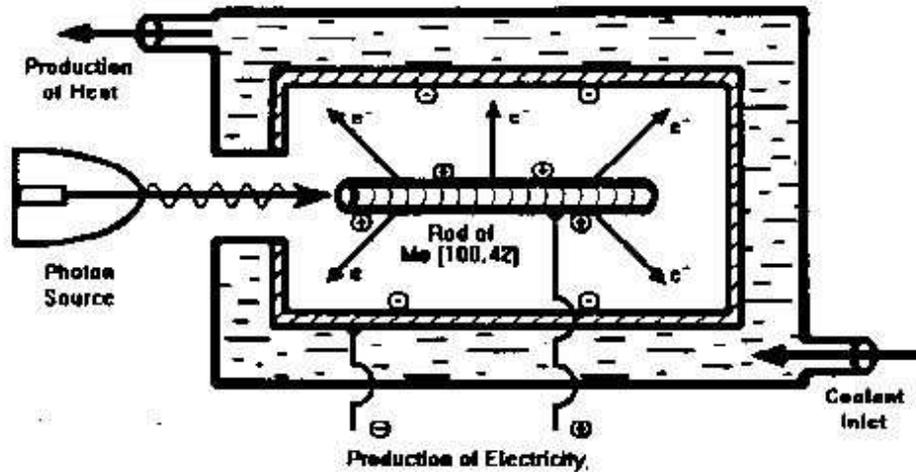


Figure 5: *THE PREDICTED CLEAN AND INEXHAUSTIBLE ENERGY FROM THE STIMULATED DECAY OF RUTHERFORD'S NEUTRON.* The neutron is, by far, the largest and inextinguishable source of clean energy available to mankind because it releases a high energetic electron with up to 0.782MeV that can be easily trapped with a thin metal shield, while the hypothetical neutrino, assuming that it exists, is harmless to humans and the environment. If the neutron is composed of hypothetical quarks, there is no possibility whatever to tap this clean energy, trivially, because the conjectural quarks cannot be produced free. The same holds if the neutrino exist because the neutrino hypothesis was developed precisely to prevent that the electron is a physical constituent of the neutron. On the contrary, if the neutron has Rutherford's structure, its energy can be utilized, e.g., via its stimulated decay originating from the excitation of the electron. The above picture is a reproduction of the original figure of Ref. [29] to illustrate that the produced energy is twofold, electric energy in the form of a continuous current (called hadronic battery) caused by the difference of potential between the electron shield and the original metallic fuel, as well as heat acquired by said shield. Hadronic mechanics has predicted the exact value of the resonating frequency for the stimulated decay of the neutron, the restricted class of nuclear isotopes admitting such a stimulated decay (hadronic fuel) and other aspects needed for industrial; development [29]. The energy produced is predicted to be a large multiple of the energy used since a high efficiency can be achieved with a small submultiple of the resonating frequency. This energy, the first predicted to originate from industrial hadrons, rather than nuclei, is clean because it releases no harmful radiations and leaves no harmful waste, as illustrated in the text [see Refs. [16,26] for details).

and *the spin of the neutron coincides with that of the proton.*

Remarkably, after taking into account all contributions, configurations (4.12) resulted to yield an exact, numerical and invariant representation of the anomalous magnetic moment of the neutron, thus providing final confirmation [26,27,28].

It should be noted that a fractional angular momentum is pure anathema for quantum mechanics (because it implies a departure from the nonunitary structure of the theory with a host of problems), while the same value is perfectly normal for hadronic mechanics defined on an iso-Hilbert space $\hat{\mathcal{H}}$ over an isofield $\hat{\mathcal{C}}$ (see Refs. [26-28] for technical aspects)

As a matter of fact, the nonunitary character of fractional values of orbital angular momenta is a direct confirmation of the need for a nonunitary theory. Hadronic mechanics is the *only* known nonunitary theory that has reached invariance and axiomatic consistency, besides a large number of experimental verifications in various fields [11-39].

As one can see, the spontaneous decay of the neutron into physical, actually observed particles

$$n = (p^+, \hat{e}^-)_{HM} \rightarrow p^+ + e^-, \quad (4.14)$$

is a mere tunnel effect of the massive constituents. Assuming that the neutron and the proton are *isolated* and at rest in the spontaneous decay, the electron is emitted with $0.782MeV$ energy. When the decaying neutron is a member of a nuclear structure, the energy possessed by the electron is generally less than $0.782MeV$ and varies depending on the angle of emission, as indicated in Figure 1 and Section 2.

Again, hadronic mechanics permitted the exact, numerical and invariant representation of features whose treatment with quark conjectures is impossible, such as the representation of: 1) The charge radius $10^{-13}cm$ of the neutron, 2) Its mean life $\tau_n = 918sec$, and the reason the massive constituents are emitted in the spontaneous decay.

The extension of the model to all remaining unstable particles resulted to be elementary. Finally, full compatibility of the above hadronic structure models with the SU(3)-color Mendeleev-type classification of hadrons resulted to be possible in a variety of ways, such as, via a multivalued isounit, as expressed below for the meson octet

$$\hat{I} = \text{Diag.}(\hat{I}_{\pi^0}, \hat{I}_{\pi^+}, \hat{I}_{\pi^-}, \hat{I}_{K^0}, \dots). \quad (4.15)$$

(see Ref. [14,16,22] for brevity).

The conclusion beyond scientific or otherwise credible doubts is that *all features of all unstable (thus composite) particles can be uniquely and unambiguously represented in an exact, numerical and invariant way as hadronic bound states of massive constituents generally produced free in the spontaneous decays with the lowest mode, including the representation of various features that are impossible with quark conjectures, said hadronic structure models being fully compatible with the unitary Mendeleev-type classification of hadrons.*

5. The negative environmental impact of neutrino and quark conjectures.

Molecular, atomic and nuclear structures have provided immense benefits to mankind because their constituents can be produced free. Quark conjectures on the structure of hadrons have no practical value whatever, not even remote, because, by comparison, quarks cannot be produced free.

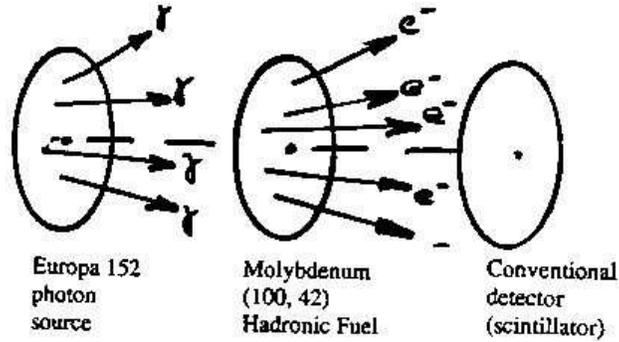


Figure 6: A SCHEMATIC VIEW OF TSAGAS EXPERIMENT ON THE STIMULATED DECAY OF THE NEUTRON. The selected "hadronic fuel" is the $MO(100,42)$ that, when hit by photons with the resonating frequency (5.1b) is predicted to experience a stimulated decay into an unstable isotope that, in turn, decays spontaneous into a final stable isotope with the total emission of two highly energetic electron, Eqs. (5.3), thus realizing the conditions of Figure 5 with a large gain of energy (see Ref.s [16,26] for details).

On the contrary, the structure model of hadrons based on physical constituents that can be produced free have predicted new clean energies originating in the structure of individual hadrons, today known as *hadronic energies*.

As an illustration, *the neutron is the biggest reservoir of clean energy available to mankind* because: 1) The neutron is naturally unstable; 2) When decaying, it releases a large amount of energy ($0.782MeV$) carried out by the emitted electron; and, most importantly, 3) Such energy is clean because the electron can be trapped with a thin metal shield, the energy thus being without dangerous radiations and without dangerous waste as occurring for the nuclear energy.

Moreover, the latter type of hadronic energy is two-fold because, when the decay of the neutron occurs in a conductor, the latter acquires a positive charge while the shield trapping the electron acquires a negative charge, resulting in a new clean production of continuous current first proposed in Ref. [29] and today known as *Santilli's hadronic battery*. The second source of energy is thermal and it is given by the heat acquired by the shield trapping the emitted electrons.

The main motivation of this paper is the indication that *the current widespread belief on neutrino and quark conjectures prevents the orderly scientific study on how to utilize the inextinguishable clean energy inside the neutron, thus raising serious problems of scientific ethics and accountability in view of the alarming increase of environmental problems*.

If quarks are the actual physical constituents of the neutron, there is no possibility whatever to utilize the trapped energy, trivially, because the hypothetical quarks are assumed (but not proved) to be perennially confined inside the neutron.

The neutrino conjecture is even more insidious for environmental issues because it was conceived to deny Rutherford's conception of the neutron, that is, to deny that the electron is an actual physical constituent of the neutron. Consequently, there is no known mechanism for tapping the large clean energy inside the neutron if the neutrino is admitted to be a physical particle.

On the contrary, if neutrino and quark conjectures are abandoned in favor of the more realistic view that, being permanently stable, the electron cannot "disappear" at the time of the synthesis of the neutron and it is indeed a physical constituent of the neutron, then there exist various ways for the industrial utilization of the large energy inside the neutron.

Recall that, unlike the proton, the neutron is *naturally unstable*. Consequently, it must admit a *stimulated decay*. That predicted by hadronic mechanics was first proposed by Santilli [29] in 1994 and it is given by hitting a selected number of nuclear isotopes, called *hadronic fuels*, with hard photons having a frequency given by a submultiple of the difference of energy between the neutron and the proton

$$m_n - m_p = 1.293MeV = h \times \nu_{reson}, \tag{5.1a}$$

$$\nu_{reson} = (3.288 \times 10^{20} Hz) / 1, (3.288 \times 10^{20} Hz) / 2, (3.288 \times 10^{20} Hz) / 3, \dots \tag{5.1b}$$

under which the isoelectron is expelled by the neutron, resulting in decay

$$\gamma_{reson} + n \rightarrow p^+ + e^-. \tag{5.2}$$

The energy gain is beyond scientific doubt, because the use of 1/10-th of the exact resonating frequency (5.1b) would guaranteed the production of a ten-fold clean energy gain. Note that the energy of the photons not causing stimulated decay is not lost, because absorbed by the hadronic fuel, thus being part of the heat balance (see Figure 5).

The synthesis of the neutron from protons and electrons was tested experimentally by the Italian priest-physicist Don Borghi and his associates [31] with positive, yet preliminary results in need of independent verification. The test can today be confirmed or denied in a variety of way, such as by hitting a mass of palladium saturated with hydrogen with an electron beam having the threshold energy of 0.782MeV under certain polarizations to assure that the coupling of the electrons and the protons is in singlet as requested by Figure 4. The detection of neutrons emitted by the mass would confirm synthesis (1.1) at low energy, thus establishing the validity of hadronic over quantum mechanics beyond credible or otherwise scientific doubt.

Stimulated decay (5.2) has also been subjected to experimental verifications by Tsagas and his collaborators [32] with encouraging results also in need of independent verifications. The test was done via the use of resonating photons originating from a radioactive source hitting a particular isotope of the molybdenum (an admitted hadronic fuel), according to the reactions

$$\gamma_{reson} + Mo(100, 42) \rightarrow Tc(100, 43) + \beta^-, \tag{5.3a}$$

$$Tc(100, 43) \rightarrow Ru(100, 44) + \beta^-, \tag{5.3b}$$

where the first beta decay is stimulated while the second is natural and occurs in 18 sec.

Note that nuclear energy is based on the disintegration of heavy nuclei, thus implying dangerous radiations and dangerous waste. By comparison, the hadronic energy is based on the use of *light, natural and stable nuclei* as in case (5.3), thus implying no harmful radiation and no harmful waste because both the original nucleus Mo(100, 42) and the final one Ru(100,44) are light, natural and stable elements. For additional detailed studies of the topic, interested readers should consult Refs. [16,29].

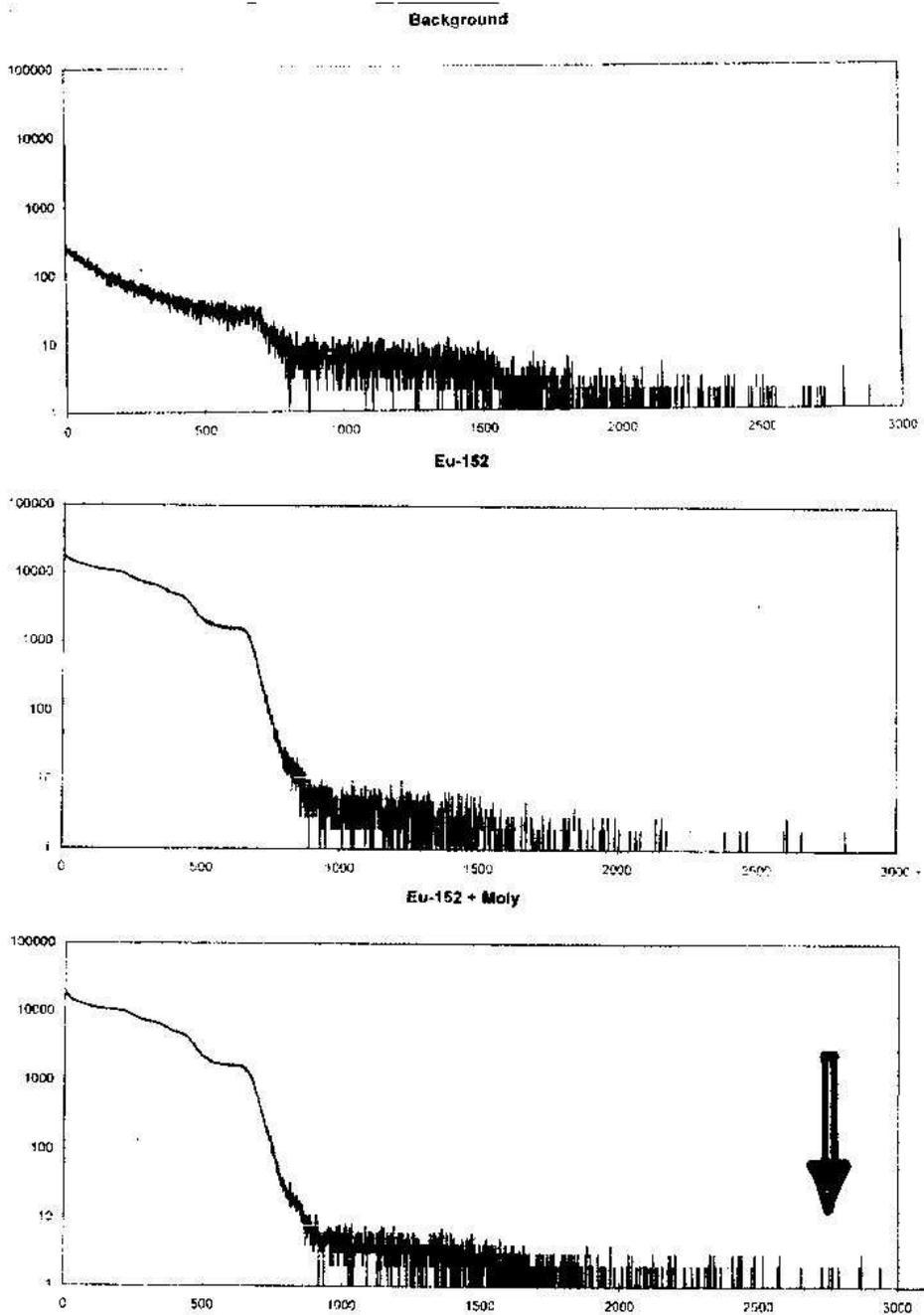


Figure 7: *PRINTOUTS FROM TSAGAS TEST [32]. The top view is a printout of the background; the middle view is a printout with only the source of photons with a resonating frequency (a disk of Eu^{156} ; and the bottom view is a printout of the pairing of the Europa source with a disk of $Mo(100, 42)$ showing new energy lines precisely as predicted by hadronic mechanics for the stimulated decay of the neutron. Unfortunately, it has not been possible to repeat Tsagas experiment since its original run of 1996 despite numerous proposals to laboratories around the world because of academic obstructions dismissing the test on grounds that the stimulated decay of the neutron is not admitted by neutrino and quark conjectures with evident damage to environmental research and to society.*

To conclude, the condition of contemporary research can be best illustrated by the fact that, following the expenditure of over one billion dollars resulted in the multiplication of the controversies rather than the resolution of any of them, hundred of millions of dollars continue to be spent by various governments around the world for additional experiments on neutrino and quark conjectures despite their known catastrophic inconsistencies.

By contrast, manifestly more important and dramatically less expensive experiments, such as Don Borghi's synthesis of the neutron [31], Tsagas tests on its stimulated decay [32] and numerous others [14,16], continue to be discredited, let alone funded and conducted, via the use of neutrino and quark conjectures. In any case, the investments of various governments on serious environmental research continue to be insignificant, thus identifying serious problems in our contemporary societies.

The predictable conclusion is that theoretical and experimental research on neutrino and quark conjectures should indeed continued to be funded, but complemented with the funding of theoretical and experimental studies on alternative theories without the neutrino and quark conjectures predicting new clean energies, the latter funding being recommendable not only on grounds of scientific ethics and accountability, but also to prevent a predictable severe condemnation by posterity, particularly vis-a-vis the alarming increase of cataclismic climactic events no responsible person can any more deny.

References

- [1] H. Rutherford Proc. Roy. Soc. A **97**, 374 (1920).
- [2] J. Chadwick Proc. Roy. Soc. A **136**, 692 (1932).
- [3] W. Pauli, *Handbruch der Physik* Vol. 24, Springer-Verlag, Berlin (1933).
- [4] E. Fermim *Nuclear Physics*, University of Chicago Press (1949).
- [5] E. R. Bagge, *World and Antiworlds as Physical Reality*, Haag Herchen, Frankfurt (1994)
- [6] A. Franklin, *Are There really neutrinos?* Westview Press, Boulder, CO (2000).
- [7] H. E. Wilhelm, *Hadronic Journal* **27**, 349 (2004)
- [8] M. Kaku, *Quantum Field Theory*, Oxford University Press, New York (1993).
- [9] R. M. Santilli, An intriguing legacy of Einstein, Fermi, Jordan and others: the possible invalidation of quark conjectures (as elementary constituents), *Found. Phys.* Vol. 11, 383-472 (1981).
- [10] R. M. Santilli, *Hyperfine Interactions*, **109**, 63 (1997).
- [11] R. M. Santilli, *Foundations of Theoretical Mechanics*, Vol. I (1978), VOL. II (1983), Springer-Verlag, Heidelberg-New York.

- [12] R. M. Santilli, *Lie-admissible Approach to the Hadronic Structure*, Vol.I (1978), Vol. II (1981), Hadronic Press, Palm Harbor, Florida .
- [13] R. M. Santilli, *Isotopic Generalizations of Galilei and Einstein Relativities*, Vols. I AND II (1991), Hadronic Press, Palm Harbor, Florida.
- [14] R. M. Santilli, *Elements of Hadronic Mechanics*, Vol I (1995), Vol. II (1995) and Vol. III (in preparation), Ukrainian Academy of Sciences, Kiev.
- [15] R. M. Santilli *Isotopic, Genotopic and Hyperstructural Methods in Theoretical Biology*, Ukraine Academy of Sciences, Kiev (1996).
- [16] R. M. Santilli, *The Physics of New Clean Energies and Fuels According to Hadronic Mechanics*, Special issue of the Journal of New Energy, 318 pages (1998).
- [17] R. M. Santilli, *Foundations of Hadronic Chemistry with Applications to New Clean Energies and Fuels*, Kluwer Academic Publishers, Boston-Dordrecht-London (2001).
- [18] R. M. Santilli, *Isodual Theory of Antimatter with Applications to Antigravity, Grand Unification and Cosmology*, Springer (in press).
- [19] R. M. Santilli, The structure of the neutron and the nuclei according to hadronic mechanics, <http://www.neutronstructure.org>
- [20] R. M. Santilli: Hadronic J. **1**, 224, 574 and 1267 (1978).
- [21] R. M. Santilli, Rendiconti Circolo Matematico di Palermo, Supplemento **42**, 7 (1996)
- [22] R. M. Santilli, Found. Phys. **27**, 635 (1997).
- [23] R. M. Santilli, Found. Phys. Letters **10**, 307 (1997).
- [24] R. M. Santilli, JINR Rapid. Comm. 6, 24 (1993)
- [25] R. M. Santilli, Acta Appl. Math. 50, 177 (1998).
- [26] R. M. Santilli, Hadronic J. 13, 513 [1990].
- [27] R. M. Santilli, JJINR Comm. E4-93-352 (1993).
- [28] R. M. Santilli, Chinese J. Syst. Eng. and Electr. 6, 177 (1995)
- [29] 26. R. M. Santilli, Hadronic J. 17, 311 (1994).
- [30] S. Smith in *Proceedings of the International Symposium on New Energies*, M. Shawe et al., Editors, Association of New Energy, Denver, Colorado (1996).
- [31] C. Borghi, C. Giori and A. Dall'Olio [Russian] J. Nucl. Phys. 56, 147 (1993).
- [32] N. F. Tsagas, A. Mystakidis, G. Bakos, and L. Seftelis, Hadronic J. 19, 87 (1996).
- [33] H. C. Myung, *Lie Algebras and Flexible Lie-Admissible Algebras*, Hadronic Press (1982).

- [34] A.K. Aringazin, A. Jannussis, D.F. Lopez, M. Nishioka, and B. Veljanoski, *Santilli's Lie-isotopic Generalization of Galilei's and Einstein's Relativities*, Kostarakis Publishers, Athens (1991).
- [35] D. S. Sourlas and G. T. Tsagas, *Mathematical Foundations of the Lie-Santilli Theory*, Ukraine Academy of Sciences, Kiev (1993).
- [36] J. Lõhmus, E. Paal and L. Sorgsepp, *Nonassociative Algebras in Physics*, Hadronic Press, Palm Harbor, FL, USA (1994).
- [37] J. V. Kadeisvili, *Santilli's Isotopies of Contemporary Algebras, Geometries and Relativities*, Second Edition, Ukraine Academy of Sciences, Kiev, Second Edition (1997).
- [38] R. M. Falcon Ganfornina and J. Nunez Valdes, *Fundamentos de la Isoteoria de Lie-Santilli*, (in Spanish) International Academic Press, America-Europe-Asia, (2001), also available in the pdf file <http://www.i-b-r.org/docs/spanish.pdf>
- [39] Chun-Xuan Jiang, *Foundations of Santilli's Isonumber Theory*, with Applications to New Cryptograms, Fermat's Theorem and Goldbach's Conjecture, International Academic Press, America-Europe-Asia (2002) also available in the pdf file <http://www.i-b-r.org/docs/jiang.pdf>