HADRONIC JOURNAL, Vol. 33, issue no. 6, 2010, in press

INCONSISTENCY OF L. B. BOLDYREVA'S CRITICISMS OF THE RUTHERFORD-SANTILLI NEUTRON

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Abstract

In the preceding paper in the present issue of the *Hadronic Journal,* L. B. Boldyreva criticizes the quantitative representation of the synthesis of the neutron from proton and electron inside a star achieved by R. M. Santilli following decades of preparatory works on the covering hadronic mechanics requested by known incompatibility of said synthesis with quantum mechanics. In this note we show that the criticisms are based on: a repulsive Coulomb potential that, as such, has no connection with any bound state, let alone the Rutherford-Santilli neutron. We also show that the criticisms are additionally based on the paradoxical claim that an essentially free electrons in the neutron structure is in conflict with nuclear scattering data, something also completely disconnected with the Rutherford-Santilli neutron where the electron is totally immersed, thus constrained within the hyperdense medium inside the proton, thus being far from free. In view of these and other theological abstractions , in this note we show that Boldyreva criticisms have no physical value and were released in a formal paper distributed to the physics community perhaps under pressures to oppose undesired advances,

1. L. B. Boldyreva's Criticisms of the Rutherford-Santilli neutron.

The author has been the referee of the preceding paper in this issue of the *Hadronic Journal*

> *Disagreement of the Rutherford-Santilli Neutron with nuclear scattering experiments*
> by Liudmila B. Boldyreva

and recommended its publication because its content is typical for criticism against basically *new* advances over pre-established doctrines, thus deserving open comments.

As one can see, Boldyreva criticisms are essentially based on a claimed incompatibility of the Rutherford-Santilli neutron with quantum mechanics at large and quantum experimental data on nuclear scattering. This view is essentially similar to the old criticisms moved against the quantum structure of the hydrogen atom because incompatible,.e with Newtonian mechanics, since the structure model of the neutron according to the covering hadronic mechanics is incompatible, by central assumption, with quantum doctrines.

In this note we outline the historical references in the field and show that Boldyreva's criticisms have no scientific value because based on excessive theological assumptions, extreme approximations and other extremely implausible scientific manipulations that can solely be interpreted as being intended to support a pre-existing doctrine and to oppose the laborious process of basic advances in scientific knowledge.

2. Review of Historical Contributions

Let us recall that the neutron was conceived in 1920 by H. Rutherford [1] as a "compressed hydrogen atom" in the core of a star, that is, as an electron totally compressed inside a proton since stars initiate their lives as being solely composed of hydrogen, as well known.

The existence of the neutron was confirmed twelve years later by J. Chadwick [2]. W. Pauli [3] pointed out that quantum mechanics does not allow the representation of the spin 1/2 of the neutron via a bound state of two particles, the proton and the electron, each having spin 1/2.

E. Fermi [4] then submitted in the early 1040s the hypothesis that a massless particle he called "neutrino" (meaning "little neutron" in Italian)

is emitted at the time of the synthesis of the neutron according to the now historical particle reaction

$$p^+ + e^- \ \rightarrow \ n + \nu, \tag{1}$$

R. M. Santilli [5,6] pointed out in 1978 that the rest energy of the neutron is 0.782 MeV *bigger* than the sum of the rest energies of the proton and the electron,

$$E_p = 938.272 \ MeV, \quad E_e = 0.511 \ MeV, \quad E_n = 939.565 \ MeV, \quad E_v =?, \tag{2a}$$

$$E_n - (E_p + E_e) = 0.782 \ MeV. \tag{2b}$$

and provided vast arguments establishing that quantum mechanic is *inapplicable* (rather than being "violated") for the synthesis of the neutrons because, under the indicated conditions requiring a *positive binding energy,* the Schrödinger equation no longer admits physically meaningful solutions. In fact, the only consistent bound states described by quantum mechanics in nuclear, atomic, molecular and other sciences are those in which the rest energy of the resulting state is *smaller* then the sum of the rest energies of the constituents, that is, occurring under a *negative potential energy,* as it is the case for all quantum mechanical attractive forces.

In view of the above insufficiency of quantum mechanics for the problem considered, Santilli [5.6] suggested the construction of a covering theory under the name of *hadronic mechanics.* Santilli's main argument is that quantum mechanics is exactly valid for the conditions of its originators, i.e.,point-like particles moving in vacuum under action-at-a-distance potential interactions. as occurring in the structure of the hydrogen atoms, particles in accelerators, and many other systems.

However, when particles enter into conditions of deep mutual penetration of their wave packets, as it is the case for Rutherford's compression of the electron inside the proton, there is the emergence of nonlinear, nonlocal and nonpotential interactions beyond any dream of representation with quantum mechanics. In particular, the latter interactions require necessarily a *nonunitary* covering of quantum mechanics.

Santilli's proposal [5,6] to build hadronic mechanics was adopted by hundreds of mathematicians, theoreticians and experimentalists, resulting during the following decades in vast mathematical and theoretical developments as well as numerous experimental verifications in various fields summarized in the five volumes [7] as well as in the forthcoming review [8].

In the original proposal [5,6] Santilli proved that his nonunitary covering's the Schrödinger equation permitted, for the first time, a numerically exact and invariant representation of the synthesis of the π^o meson from an electron and a positron in which we also have the indicated departure from quantum mechanics, because the rest energy of the π^o meson about 135 times bigger than the sum of the rest energies of the electron and the positron.

The solution of the corresponding problem of the neutron synthesis resulted as being much more complex and required the prior structural lifting of the linear, local and Hamiltonian *Lie theory* into its covering nonlinear, nonlocal and non-Hamiltonian *Lie-Santilli isotheory.* including most importantly the isotopic lifting of the $SU(2)$-spin symmetry [5.6,9,10,11].

Following decades of research along these lines by numerous scientists, Santilli was finally able to achieve in 1990 [12] *the first and only known, numerically exact and invariant, non relativistic representation of all characteristics of the neutron in its synthesis inside stars from a proton and an electron, including a numerically exact and time invariant representation of the neutron rest energy, charge radius, mean life, spin, charge, parity, anomalous magnetic moment and spontaneous decay. Subsequently, in 1993 Santilli [13] achieved the exact and invariant relativistic representation of all characteristics of the neutron in its synthesis inside stars.*

It should be noted that *Santilli achieved the nonrelativistic numerical representation of all characteristics of the neutron via the use of one single dynamical equation given by a nonunitary image of the Schrödinger equation for the hydrogen atom* [12]

$$U[-\frac{\hbar^2}{2\mu}\nabla^2 - V(r)]\psi U^\dagger = UE\psi U^\dagger \tag{3a}$$

$$UU^\dagger = e^{\psi/\hat{\psi}\int \psi_p^\dagger \psi_e d^3r} \tag{3b}$$

where ψ is the wavefunction of the hydrogen atom, $\hat{\psi} = U\psi U^\dagger$ is that of the neutron, μ is the reduced mass for the hydrogen atom, and $-V(r)$ is the well known Coulomb *attractive* potential between a proton and an electron.

Similarly, *Santilli achieved the relativistic representation of all characteristics of the neutron via the use of a nonunitary transformation of the Dirac equation for the hydrogen atom* (see Ref. [13] for details)

$$(\hat{\gamma}^\mu \hat{\partial}_\mu - i\hat{m})\hat{\psi} = 0. \tag{4}$$

Due to these historical advances, numerous authors suggested the name of *Rutherford-Santilli neutron* that was adopted by this author in his general review [14].

3. Lack of Scientific Value of Boldyreva's Criticism.

Boldyreva's criticisms are typically those moved against basically new advances via arguments entirely based on preferred pre-existing doctrines, thus having no scientific value, and raising instead problems of scientific ethics. More specifically, Boldyreva's criticisms are essentially the same as those moved against Schrödinger in the early 20th century on grounds that his equation contradicts Newtonian mechanics.

In Section 1 of her preceding paper, Boldyreva claims that a fully consistent, quantum mechanical equation for the neutron synthesis with positive binding energy exists and it is given by her first equation, i.e.,

$$[-\frac{\hbar^2}{2M}\nabla^2 + V(r)]\psi = \frac{\hbar^2 K^2}{2M}\psi \tag{5}$$

However, Boldyreva is not aware of the fact that *the potential $+V(r)$ is repulsive, rather than attractive as it should be per correct Eq. (3). Therefore, Boldyreva Eq. (5) cannot possibly represent a bound state of any type.* In effect, it is well known that equations of type (5) represent *Coulomb scattering between particles with the same sign of the charge,* something that has no connection whatsoever with the synthesis of the neutron from proton and electron. This establishes that Boldyreva's "criticism" of Santilli's achievements have no scientific value whatsoever.

In Section 2 of the preceding paper Boldyreva's manipulations become paradoxical because she enters into all sort of "arguments" that the Rutherford-Santilli neutron is incompatible with scattering data on polarized nuclei. However, all these arguments are based on the assumption of "her" electron that has no bond at all with the proton, thus having no connection whatsoever with the Rutherford-Santilli neutron.

In Santilli's serious discoveries the electron is totally immersed within the hyperdense medium inside the proton. Consequently, the idea that such an electron operates independently form the proton (essentially as it is the case for the hydrogen structure), is dramatically outside scientific realities, thus having no scientific value per se, let alone as a criticism of Santilli's discoveries.

The very assumption of the quantum scattering theory as being exactly valid for neutron-nuclei scattering (a condition needed to use such a theory for criticism against a covering theory) denotes profound anti-scientific posturing because the crude character of quantum scattering theories is today known to all qualified physicists. e.g., because the quantum scattering theory must assume large nuclei to be dimensionless points as a necessary condition for its very applicability [15] and numerous otehr reasons (see Ref. for technical details).

n any case, readers should compare the immense difference between the hyperbolic theologies of Boldyreva with Santilli's mathematically rigorous and time invariant representation of *all* characteristics of the n neutron as a generalized bound state of a proton and an electron verifying the covering *hadronic mechanics.*

In summary, Boldyreva heard about the incompatibility of the neutron synthesis with quantum mechanics, somehow heard about the construction of a covering mechanics specifically conceived for such a scope and, without any study whatsoever of these historical advances achieved by hundreds of scientists the world over, concocted her own "model" of the neutron synthesis based on repulsive Coulomb forces and used such a concoctions to criticize very professional advances.

The most astonishing aspect is the clear evidence that Boldyreva, perhaps following pressures from unknown interests, went to the extreme of writing a formal paper and releasing it in the physics community, thus mandating its publication with due rebuttal, all this without any knowledge whatsoever of the discoveries to be criticized. This posturing is rather widespread in the contemporary physics community, for which reason this author recommended the publication of Boldyreva's paper, because it shows an uncontrollable urge to oppose undesired basic advances at whatever cost, including personal damage. Such a widespread posturing must be denounced if we care about human knowledge because it is the negation of any and all scientific values.

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