ISSN No:-2456-2165

Correct Nucleus Model Proved by Transmutation Experiment by Cold Fusion (Neutron to be Tightly Bound Proton-Electron Pair and Nucleus to be Constituted by Protons and Internal Electrons and no Neutrinos Exist)

Noriyuki Kodama
JAPAN
Independent Researcher

Abstract:- The previous nucleus model in the 1920s was called internal electron theory that the atomic nucleus is composed by only of protons and electrons in the nucleus. Rutherford had already claimed that an electron-proton pair could be bound in a tight state, which is in electron deep orbit. These histories have been forgotten since the introduction of neutrons as fundamental particles by Heisenberg in 1932 because neither experimental nor theoretical study to prove such orbits had been available until recently. Now we have the experimental data of cold fusion which is caused by this electron deep orbit. The deep electron orbit was theoretically proved by J. Maly, J. Vávra, Jean-Luc Paillet, and A. Meulenberg. They showed that this electron deep orbit exists at a distance of a few femto-metres from the nucleus. Thus, the electrons in the electron deep orbit can shield the coulomb repulsive force between nuclei and can cause Cold Fusion. The mechanism of Cold Fusion can be explained by this electron deep orbit theory and we have already had the several experimental results related to this theory by the researchers by showing the highly compressive hydrogen atoms for the study of battery. Based on the mechanism of electron deep orbit we have the experimental evidence of the transmutation by cold fusion as was done by Iwamura et al. They used D_2 gas and target metal element on the Pd which has small D_2 inside Pd lattice on the surface space site, and small D_2(d2 and electron in deep orbit) can be created at Tetrahedral site of Pd, and d2 can fuse to the target metal element and cause transmutation. They showed that atomic number increase is 4, therefore d is 2, which clearly showed that d is constituted only by 2 protons not by a proton and a neutron. Therefore, neutrons do not exist as a fundamental particle but neutron is a pair of proton and electron in deep orbit. And lately proton shape study showed that proton is NOT spherical but has 3 protrusions due to three quarks. Therefore, neutron beta decay must have very large energy distribution of emitted electron based on the correct neutron model, which was proved by soft x-ray emission spectra during cold fusion of small D_2. Thus, we do not need the neutrino hypo by Pauli and Fermi, and no neutrinos exist in this sense that neutrino hypo is incorrect. Because the latest experiment by Collider to produce neutrinos is well-designed, this kind of experiments shows that some new fundamental particles are generated but they are not neutrinos. Thus, I would like to make a suggestion that the researchers must understand the correct neutron model and nucleus model and incorrect neutrino hypo, and they must change the name of "neutrino" to the correct name, and modify the particle physics based on the correct nuclear physics. Experiments to prove the correct neutron model must be done.

Keywords:- *internal electron theory, neutron, beta-decay, neutrino, electron deep orbit, transmutation.*

I. INTRODUCTION

I would like to summarize my previous papers [1]-[4] on the nucleus and neutron model and include the evidence of the correct nucleus model by the transmutation experiments.[5] Because the [5] is the important paper related to [1], I put them together to show that the current nucleus model is incorrect based on the experiment evidence of transmutation [5]. The mechanism of Cold Fusion based on small D_2 molecules was also proved by transmutation experiment [5].

A. Historical Background

a) The nucleus model and neutral particle

I based on the summary of the history nucleus model and neutron model based on the good summary in the introductory section in ref [6] by J. Va'vra.

In the 1920s, there was an internal electron theory that the atomic nucleus is constituted by protons and electrons. In 1992, Rutherford thought that an electron and a proton could be bound in a tight state [7]. Rutherford experimentally confirmed the existence of atomic nuclei in 1911 and attracted attention [8]. In a lecture given at the Royal Society of London in 1920 [9], Rutherford predicted that the particles that constitute the nucleus include neutral particles, with almost the same mass as protons in addition to protons. He asked his team, including Chadwick, to search for this atom, and 12 years later, Chadwick discovered neutrons [10],[11], as Rutherford expected. In response to their discovery, Dmitri Ivanenko changed his conventional view of the structure of the nucleus, saying, "Only neutrons and protons are in the nucleus and there are no internal electrons" [12]. Heisenberg also supported this, and his

ISSN No:-2456-2165

trilogy papers “Über den Bau der Atomkerne I-III (About the Structure of the Nucleus 1-3)” [13,14,15], which decided to adopt the current nucleus theory that proton and neutron constitute the nucleus as the basic assumption of the current nucleus model. However, Dr. Yukawa wrote critically in a memo [16] about Heisenberg’s abovementioned papers. He told that “these papers have not denied the internal electron theory but just mentioned that the possibility of protons and neutrons can stabilize the nucleus quantitatively. Therefore, we will have not reached the conclusion until the interaction between the unit particles that constitute the nucleus is revealed.”

Although it must have been obvious to Schrödinger, Dirac and Heisenberg, that there is a peculiar solution to their equations, which corresponds to the small hydrogen, was in the end rejected [17], because the wave function is infinite at r = 0. The infinity comes from the Coulomb potential shape, which has the infinity at r = 0; it was a consequence of the assumption that the nucleus is point-like. In addition, nobody has observed a small hydrogen. At that point, the idea of a small hydrogen died. However, its idea was revived again ~70 years later [18,19], where Maly and Va'vra argued that the proton has a finite size, being formed from quarks and gluons and that the electron experiences a different non-Coulomb potential at a very small radius. In fact, such non-Coulomb potentials are used in relativistic Hartree–Fock calculations for very heavy atoms, where inner-shell electrons are close to the nucleus. Maly and Va'vra simply applied a similar idea to the problem of small hydrogen, i.e., they used the Coulomb potential in the Schrödinger and Dirac equations to solve the problem outside the nucleus first, then, they used the above mentioned non-Coulomb potentials in a separate solution for small radius, and then matched the two solutions at a certain radius. Using this method, they retained solutions for small hydrogen, which were previously rejected. They called these new solutions “deep Dirac levels” (or electron deep orbits (EDOs)).

b) Latest situation concerning the electron deep orbit and nuclear physics studies

There are two reasons why the idea of small hydrogen was not theoretically investigated further:

- experimentally, nobody had found it by the introduction of neutron, and
- the theory at a small distance from a proton is too complicated.

In the theoretical studies conducted by Va’vra, Meulenberg, Sinha, Paillet, Maly et al. in [18]-[19], the issue at r = 0 was fixed by using a modified Coulomb potential, assuming the positive charge to be distributed uniformly inside the nucleus.

Experimentally EDO was proved in the experiment that Electron transition to EDO was found in the experiment as is discussed in the next section II, and regarding the complicated theory at a small distance from a proton, Research on the quark property and proton shape is progressing, and this can help to understand the correct nucleus mode as in III.

II. EXPERIMENTAL EVIDENCE TO PROVE EXISTENCE OF ELECTRON DEEP ORBITS

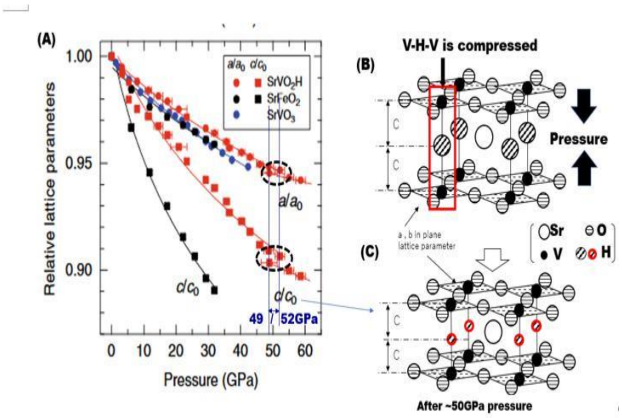


Fig. 1: High-pressure behavior of strontium vanadium oxyhydride ($SrVO_2H$) and strontium iron oxide ($SrFeO_2$), in ref [20].

- Pressure dependence of lattice parameters for the experimental (red) and density functional theory computed (sky blue) values of $SrVO_2H$—note that some error bars are smaller than the width of the symbols. The decrease in pressure from 49 to 52 GPa as the cell volume decreases suggests a phase transition to a denser phase.
- Relative lattice parameters, a/a0 and c/c0, of $SrVO_2H$ (red), $SrFeO_2$ (black), and $SrVO_3$ (dark blue) as a function of pressure. The circles and squares correspond to the a and c axes, respectively. The solid lines in b and c represent linearized Birch–Murnaghan fits to the data.
- Crystal structures of the perovskite-related materials of $SrVO_2H$ and the mechanical stress direction.
- Crystal structures of perovskite-related materials of $SrVO_2H$ after the mechanical stress at 50 GPa, showing the hydrogen to be smaller.

Figure 1 is the engineering research on the property of separator, which is layered $SrVO_2H$ (Strontium Oxyhydride Oxyhydride) by applying pressure to $SrVO_2H$ and the authors have discovered two new properties that are unique to hydroid and found that it plays a role of the thinnest "metal atom separator" in the world. Figure 1(A) shows the pressure dependence of lattice parameters for the experimental (red) and the density functional theory-computed (sky blue) values of $SrVO_2H$.

Note that some error bars are smaller than the width of the symbols. **The decrease in pressure from 52 to 49 GPa as the cell volume decreases suggests a phase transition to a denser phase**. **In Figure 1(A), a small but distinct anomaly is observed in the plot of lattice parameters vs. pressure just below 50 GPa, the discontinuity in the plot arises because at**

this point a reduction in the volume of the sample space causes a decrease in the measured pressure, which observation is consistent with a phase transition to a denser state. As shown above, the authors showed via a high-pressure study of anion-ordered strontium vanadium oxyhydride $SrVO_2H$ that **H^- is extraordinarily compressible,** and that pressure drives a transition from a Mott insulator to a metal at ~50 GPa. Figure 1(A) shows that C/C0 became smaller at 50 GPa; hence, the connected hydrogen with the upper and lower layer of SrV_2 became smaller, as is shown in Fig.1(C)-(D). In other words, electron transitions from H (n = 1) to H (n =0) by the mechanical pressure from above and below results in a hydrogen with the smaller size. **I presume that this experiment is the direct evidence to prove the existence of the EDO.** In other words, the mechanical stress on the V–H–V bond caused the electron transition from n = 1 to n = 0 (EDO), causing the size of the hydrogen to be smaller. This mechanism of the compression of the bond is common in cold fusion experiments as is explained in Section 2.2.

A. Low-energy nuclear reaction

a) Low-energy nuclear reaction mechanism

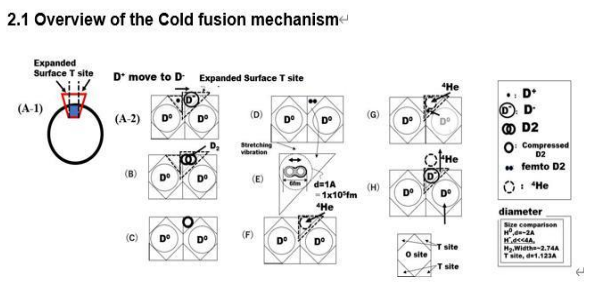


Fig. 2: Proposed cold fusion mechanism [2]

- (A-1) nano-roughness cause the imperfect unit cell which has no atoms adjacent to the unit-cell which is expandable
- (A-2) A negatively charged deuteron (D^-) in a surface T-site and D^+ in the adjacent surface site. D^+ at a surface T-site tends to move toward D− at a surface T-site.
- (B) T-site occupied by D^-, with subsequent formation of D_2 molecule when the D^+ hops to T-site occupied by D^-.
- (C) The D_2 is compressed.
- (D)-(E) The D_2 transforms into a small D_2 in EDOs based on EDO theory.
- (F) 4He forms due to cold fusion.
- (G) The ^{4}He is ejected from the metal and another D^- occupies the surface T-site.
- (H) D^+ moves into a T-site with ^{4}He and D^- enters there by ejecting the ^{4}He.
- T(Tetrahedral)-site of fcc metal. O(Octahedral) site of fcc metal. (K) 2-D schematics of the corresponding T, O site.

As shown in Fig. 2, LENR occurs at the surface spaces of a metallic lattice, which is the T-site. Figure 2(A) shows a negative deuterium (D^-) ion at T-site, which is the narrowest space available for hydrogen storage in the metal. Figure 2(B) shows the creation of a D_2 molecule when a D^+ ion hops to join the D^- ion at the surface T-site. Figure 2(B)-(C) show D_2 being compressed by the mechanical stress exerted by the metal atoms around the T-site, which is the same compression mechanism of the D–D covalent bond as is the compression of V–H–V bond in case of fig.1. Figure 2(C)-(E) show that the compression of D_2 molecule at the surface T-site causes a transition from normal D (n = 1) atoms to small D atoms with EDO (n = 0) electrons, which can shield the repulsive Coulomb force completely because the EDO is located closer than a few femtometers from the center of d nucleus as shown in Fig. 3 and Fig. 4 in the next section (2.2.2). This final compression step (Fig.2(B)-(F)) is the most important one, and it occurs during cold fusion in the electron transition in Fig. 2(B)-(F), producing the soft x-ray spectrum in sec. 2.3.

b) Electron deep orbit shields deuteron–deuteron **repulsive Coulomb force**

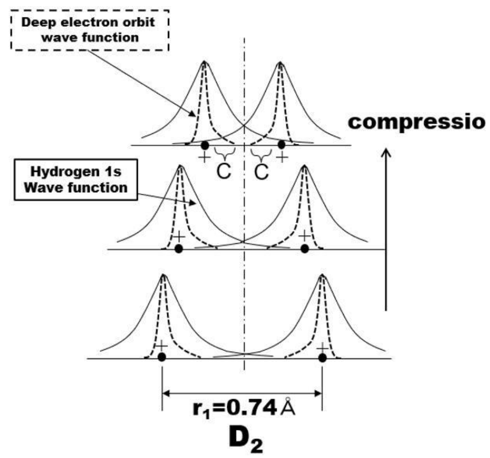


Fig. 3: Mechanism of small atom (molecule) generation by the compression of the deuterium–deuterium bond to enable transition of electron from n = 1 to n = 0.

Figure 3 shows the mechanism of electron transition from n=1 to n=0(EDO) by the compression of D_2 covalent bond. I briefly explain my LENR mechanism based on small hydrogen model based on Fig. 3. I presume that due to compression stress at the surface T-site, a normal D_2 molecule turns into a small D_2 molecule with an EDO by the same mechanism shown in Fig. 1 in Section II. The hypothetical structure of a small D_2 molecule is shown in Fig.2(D), (E). Maly and Va'vra explained that the existence of EDOs was predicted many decades ago from the relativistic Klein–Gordon and Dirac equations [18,19]. The size of a D_2 molecule at a surface T-site is determined by the balance between the compressive stress produced by the lattice of metal atoms and the elastic rebound force of the covalent bond. Due to the nature of the covalent bond, compression can cause the deuteron–deuteron (d–d) distance to decrease along the d–d vibration direction or the covalent bond direction, and compression brings the two ds closer together than the transition distance from n = 1 to n = 0 (EDO) due to less Coulomb repulsive force shielded by electron in EDO, as is shown in Fig. 3, and Fig. 4.

Figure 3 shows the mechanism of LENR based on small D_2 generation by the compression of the d–d bond. When a D_2 molecule is compressed by external pressure, the d–d distance can decrease, and the tail of the D_{1s} wave function can extend sufficiently far inward to overlap with the EDO wave function, which is localized at a distance of a few femtometers from the nucleus. Because the d–d distance is so small, the overlap (region C in Fig. 3) of the wave functions can be large enough to achieve a high tunneling probability of electrons from the D1s state to the EDO (the D0s state). The EDO radius is calculated to be a few femtometers [18,19], which is far smaller than the 0.53 pm Bohr radius of the D_{1s} state.

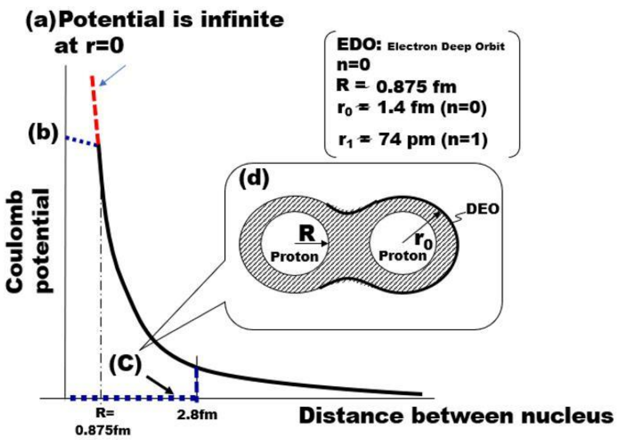


Fig. 4: Mechanism of Coulomb repulsive force shielding to generate small atom (molecule) by compressing the deuterium–deuterium covalent bond

- Coulomb potential at r=0 is infinite due to the point charge assumption
- Modified coulomb potential to have uniform distribution of charge inside the nucleus.
- Complete Coulomb potential shielding due to the small
- H2/D2 molecules
- Schematic small H2 molecules with covalent bonding to shield coulomb repulsive force; Note that in case of d, the nucleus is 2 protons and internal electron.

Figure 4 shows the mechanism of complete coulomb potential shielding with small molecule. A small D_2 molecule can be created by the simultaneous transition of both D atoms into small D atoms so that the D_2 molecule can transform into a small D_2 molecule with the covalent electron in the EDO, as shown in Fig. 4(d).

Because the electron in EDO is the relativistic electron and electron n>=1 is the non-relativistic electron, thus, the electron transition probability is very low due to the electron speed difference. For this reason, the nuclear physics study has not found this orbit. However, the compression of the bond can transition electrons to n=0 due to the longer time to keep the distance closer for a long time.

B. Soft x-ray spectra from low-energy nuclear reaction

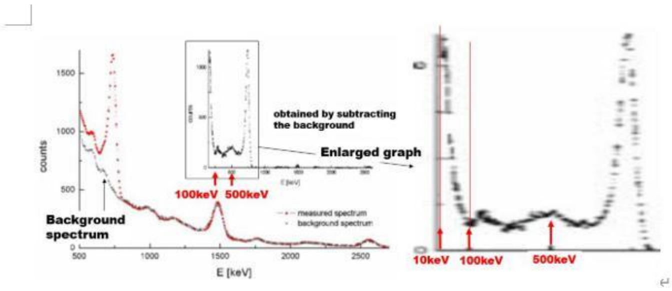


Fig. 5: γ-ray spectrum measured using a sodium iodide scintillator, showing a peak superimposed on the background, in ref [21]

Figure 5 is the soft x-ray spectra from LENR experiment [21] which also prove existence of the EDO. The inserted graph in Fig. 5, obtained by subtracting the background, shows the typical γ-ray structure, which consists of a photoelectric, Compton, and backscattering peak. Many x-ray measurements have been performed to study LENR, and among them, the authors provide clearest information about the energy of the electron orbit; the existence of EDO was proved by the EDO theoretical study by the comparison with the theoretical study of the orbit energy based on EDO theory [18,19] as follows.

The position of the spectral peak can be calculated from the EDO theory, with the following results. The theoretical calculation is currently under study by Va'vra et al., and preliminary results (from private communications) show that the photon energies obtained from the relativistic Schrödinger equation are ~507.27, ~2.486, ~0.497, or 0.213 keV, depending on which transition is involved. From the Dirac equation, the corresponding energies are 509.13, 0.932, 0.311, 0.115, or 0.093 keV, again, depending on which transition is involved.

The study [21] contains an overview of the experimental activity during the last 12 years. The authors have been studying the nickel–hydrogen system of LENR Reactor at temperatures of approximately 700 K. The experiments have been performed in several laboratories. As shown in Fig. 5, the soft x-ray spectra have a broad peak at 500 keV and a single sharp peak at around 10keV.

These roughly match the theoretical calculations, except that the 500 keV peak is broader than the peak at around 10keV. This indicates that the energy distribution in the deepest orbit is larger than in other orbits. I noticed that this can be related to the proton shape and Coulomb force can be different from the conventional orbit (n = 1), as is mentioned by Vavra [6] and Yukawa [16].

III. SHAPE OF THE PROTON

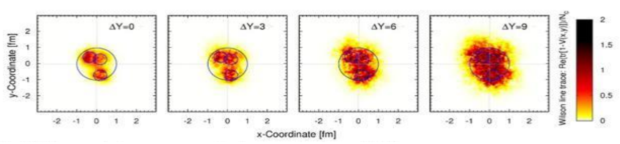


Fig. 6: Shape of the proton at high energies in ref [22]

Figure 6 is the shape of proton study in ref [22]. The different panels (dY = 0 to dY = 9) in Fig. 6 show a contour plot of the real part of the trace of the Wilson line as a function of the transverse coordinates x and y. The small (large) circles show the position and size of the three constituent quarks (the proton). The different panels show a contour plot of the real part of the trace of the Wilson line as a function of the transverse coordinates x and y. The small (large) circles show the position and size of the three constituent quarks (the proton).

IV. SHAPE OF THE PROTON

We have evidence for the existence of the EDO obtained from matching the soft x-ray peak to the theoretical calculations. More importantly, the spectra at the deepest energies have broader peaks in the deepest orbits. Thus, I will interpret this experiment and soft-x-ray experiment based on the original nucleus model in sec 4.1.

A. Electron energy in the deepest electron orbit based on the shape of the proton

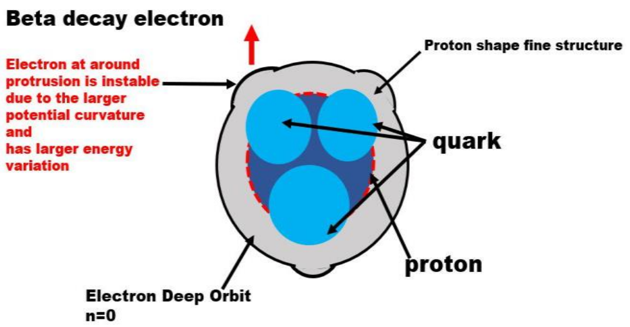


Fig. 7: Schematic illustration of the tightly bound electron–proton pair, which has a fine structure owing to three quarks causing deviations in the electron deep orbit and the energy distribution of beta decay

Figure 7 shows a schematic illustration of a tightly bounded proton–electron pair, with an electron in the EDO, which is now believed to be a neutron. From this illustration, the electron appears to be unstable at the protrusions of the proton, and the energy deviations due to these protrusions must be very large, so an isolated particle can easily undergo beta decay.

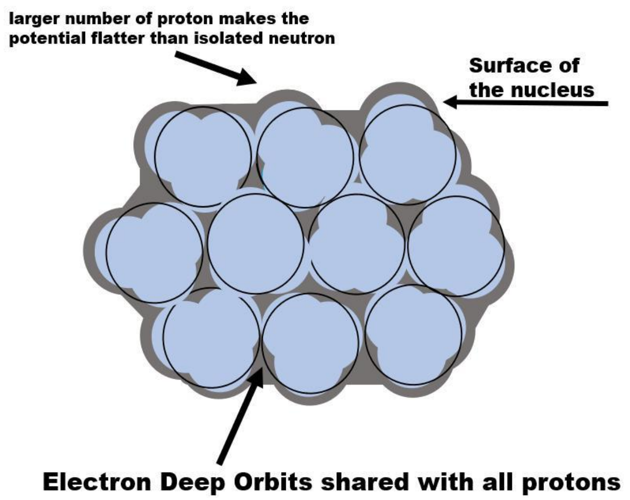
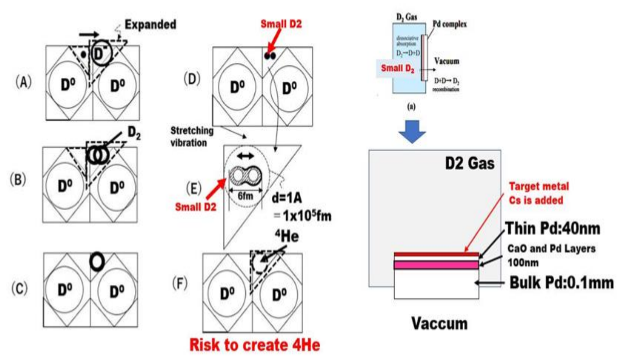


Fig. 8: Model of a nucleus composed of protons with electron deep orbits

Figure 8 is the correct nucleus model that the proton and internal electron constitutes the nucleus and internal electrons are in the shared Electron deep orbit. Because the new nucleus model is too complicated to be proven theoretically, so, I have just discussed it quantitatively. In this model, a nucleus is composed solely of protons accompanied by EDOs, together with some electrons occupying the EDOs. The total charge is, thus, equal to the total number of protons minus the total number of electrons. The EDOs are shared with adjacent protons via the contact region between protons.

Inside the nucleus, the protrusions of the protons are covered by the EDOs of protons and the surface potential around the nucleus is smoother and flatter than an isolated proton with an EDO. Thus, I presume that an isolated proton with an EDO has a much larger possibility of beta decay because, at a protrusion, an electron can be unstable as is shown in Fig. 8. In summary, I presume that the very wide electron energy distribution during beta decay is caused by a proton for which an EDO electron encounters a protrusion on the surface of the proton. This leads to large energy deviations, as observed in the 500 keV soft x-ray peak during cold fusion experiments in Fig. 5. Figure 9 shows the nucleus model based on the previous model at the time of Rutherford, after considering the studies of the EDO and proton shape. From the schematic illustrations, a larger nucleus can experience less impact from the proton protrusions on the Coulomb potential because of the flatter surface of the nucleus. Thus, the smaller isolated proton with an electron in an EDO at the location of protrusion can have a larger impact on the Coulomb potential as is shown in Fig. 8 and Fig. 9. If so, the beta decay electron has very large energy distribution from the location at the protrusion, and it can be instable for the isolated proton with an electron in the EDO.

V. TRANSMUTATION BASED ON COLD FUSION PROVES THAT D IS CONSTITUTED BY TWO PROTONS



ISSN No:-2456-2165

Fig. 9: Transmutation Reactor based on Cold Fusion by Iwamura [5] based on the cold fusion

A. Mechanism of Transmutation

In Fig.9, From(A) to (E) is the same as Cold Fusion however Transmutation needs the lower temperature to prevent the fusion of d + d, The created small D_2 can be diffuse to the target element, thus I corrected the schematics based on this mechanism. Because small D_2 has electron in Electron Deep Orbit, it can shield the coulomb repulsive force between small D_2 and nucleus of the target element to be fused.

B. Experimental Results

Transmutation based on Cold Fusion Reactor Authors in ref [5] reported the transmutation of the following ways. They have the two transmutations

$^{38}Sr+2d=^{42}Mo$
$^{55}Cs+2d=^{59}Pr$

Because they use D_2 gas, Cold Fusion Reactor create small D_2 so 2d is added to the ^{55}Cs and ^{38}Sr. The above transmutation can be explained if d is 2 protons because the atomic number increases by 4. Thus, d has no not neutron. The results of this experiment proved that small D_2 cause fusion, and correct nucleus model that nucleus is constituted by proton and internal electron and no neutron as a fundamental particle [1].

VI. QUARK MODEL OF NEUTRON AND PROTON

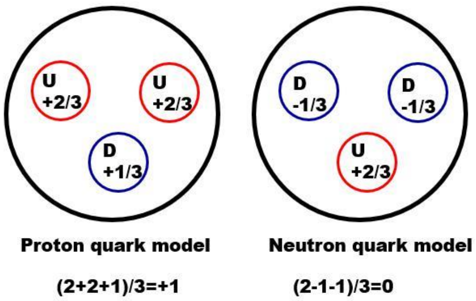


Fig.10: Current standard model of quark of Proton (Left) and neutron (Right)

Quarks are widely recognized today as being among the elementary particles of which matter is composed. The key evidence for their existence came from a series of inelastic electron-nucleon scattering experiments conducted between 1967 and 1973 at the SLAC National Accelerator Laboratory. Other theoretical and experimental advances of the 1970s confirmed this discovery, leading to the present standard model of elementary particle physics.[23]

Because free neutrons do not exist naturally (they decay within minutes), high-energy electron beams were passed through targets of liquid deuterium, which has a nucleus composed of a proton and a neutron. Measurements made at the same E, E' and 8 with liquid hydrogen targets allowed subtraction of the proton contribution and extraction of cross sections for electron-neutron scattering.

The up quark was first observed by experiments at Stamford Linear Accelerator Center in 1968. First proposed in 1964 by Gell-Mann and Zweig, these particles had to have electrical charges equal to l/3 or 2/3 that of an electron or proton. This study was performed from 1967 through 1973 by a collaboration of scientists from the Massachusetts Institute of Technology (MIT)-and the Stanford Linear Accelerator Center (SLAC), began to give direct evidence for the existence of quarks as real, physical entities. For their crucial contributions as leaders of these experiments, which fundamentally altered physicists' conception of matter, Jerome Friedman and Henry Kendall of MIT and Richard Taylor of SLAC were awarded the 1990 Nobel prize in physics.

However, this neutron quark model must be inconsistent to the correct nucleus model and experimental evidence that d is two protons.

These particle studies have been performed under the incorrect nucleus model and can have include incorrect interpretation of experiments. In order to run experiment to have ratio of up-down quark of "neutron", d(deuteron) is used as a target of "neutron" because the isolated neutron has very short lifetime and because it was believed to be constituted by proton and neutron. Thus, I believe that this experiment is incorrect.

VII. HISTORY OF NEUTRINOS

A. Neutrino was dreamed up in 1930 by Pauli

Austrian physicist Pauli was studying radioactive elements. When he was studying the energy distribution of radiation (beta rays) emitted by atomic nuclei, Pauli wondered how to explain that energy disappears somewhere, and he came up with the idea, "It makes sense to think of a ghostly particle that isn't charged and pops out somewhere unknowingly." At that time, Pauli called this particle a "neutron", which was today's neutrino. Neutrinos were born in the minds of scientists before the real thing was discovered.

B. Pauli's strange neutral particle was named neutrino by Fermi.

Italian physicist Femtometre studied Pauli's idea of particles and built the theory of beta decay. Since the current neutron was discovered in 1932, the ghost particle was renamed to "neutrino". "Neutral" means neutral, that is, not charged, and "rino" means small in Italian.

C. Neutrinos were discovered for the first time in 1956[]

American physicists Reines and others have succeeded in capturing neutrinos born from nuclear reactors. More than 20 years after his name, neutrinos were finally discovered.

D. neutrinos observed from the sun in 1970s

In 1969, American physicist Davis began observing solar neutrinos. After many years of experimentation, neutrinos were found only about one-third of what was expected from theory. This was called the "solar neutrino problem" and became a major physics problem for the next 30 years.

ISSN No:-2456-2165

E. Neutrinos observed from the supernova explosion in 1987

In January 1987, the Kamiokande Group began observing solar neutrinos. Only a month later, I caught a neutrino from the supernova 1987A, 160,000 light-years away. From here, a new discipline called "neutrino astronomy" began.

F. Not enough neutrinos from the sun in 1989

The Kamiokande Group has been observing solar neutrinos for two years and announced that the number is less than the theory. The same results were obtained from the two observations of Davis and Kamiokande, which led to more active research on solar neutrinos.

The Kamiokande group also examined the data of atmospheric neutrinos that it had been observing, and found that the composition ratio of electron neutrinos and muon neutrinos was different from the theoretical expectation. This was an important result that led to the later discovery of the weight of neutrinos.

G. Found that neutrinos have the weight.

Super-Kamiokande started operation in 1996.

For the first time in the world, the Super-Kamiokande Group discovered that neutrinos are heavy. It was a very important discovery that urged a review of the basic theory of particle physics.

H. Collider to produce neutrinos

A proton beam generated from a 12 billion electron volt proton accelerator collides target to produce pion which collapses and finally neutrinos are generated. I presume that the experiments by this beam line must be correct but the interpretation of the result is incorrect because it is based on the incorrect neutron model and mistake by Pauli and Fermi. They explained that

the π-mesons then decay into pairs, each comprising a muon and muon neutrino, during the flight in a 100-m-long tunnel (decay volume).in ref [24].

However, the above explanation is incorrect based on the correct model of neutron, and the generated particles must NOT be neutrinos but completely new particles as is explained in sec VIII. I think that this is very important because it was produced by the well-designed collider artificially, there are few ambiguities compared to the observation of natural phenomena with very high uncertainty.

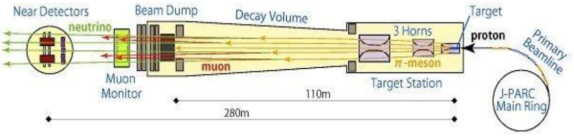


Fig.11: J-PARC Neutrino beam line [24]

VIII. DISCUSSION ON THE EXISTENCE OF NEUTRINOS

A. Beta decay of the neutron

In nuclear physics, beta decay (β-decay) is a type of radioactive decay in which a beta particle (fast, energetic electron or positron) is emitted from an atomic nucleus, transforming the original nuclide to an isobar of that nuclide. Beta decay is a consequence of the weak force, which is characterized by relatively lengthy decay times.

The study of beta decay provided the first physical evidence for the existence of the neutrino. In both alpha and gamma decay, the resulting alpha or gamma particle has a narrow energy distribution since the particle carries the energy from the difference between the initial and final nuclear states.

In 1914, James Chadwick’s measurements showed that the spectrum was continuous. The distribution of beta particle energies was in apparent contradiction to the law of conservation of energy. If beta decay were simply electron emission, as assumed at the time, then the energy of the emitted electron should have a particular, well-defined value. For beta decay, however, the observed broad distribution of energies suggested that energy is lost in the beta decay process. This spectrum was puzzling for many years.

A second problem is related to the conservation of angular momentum. Molecular band spectra showed that the nuclear spin of nitrogen-14 is 1 (i.e., equal to the reduced Planck constant); and more generally, that the spin is integral for nuclei of even mass number and half-integral for nuclei of odd mass number. Beta decay leaves the mass number unchanged, so the change of nuclear spin must be an integer. However, the electron spin is 1/2; hence, the angular.

All of these conundrums are caused by the incorrect neutron model as is explained in 4.1.

Therefore, Pauli’s theory of beta as is shown below is incorrect

$$\mathbf{n^0 \rightarrow p^+ + e^- + \nu_e}$$

We do not need neutrino and beta decay is simple under the correct neutron model as is below mechanism, no neutrinos

$$\mathbf{n^0 \rightarrow p^+ + e^-}$$

B. Discovered “Neutrinos” are NOT the particles by Pauli and Fermi but are completely new particles

As I explained previously, no neutrino hypo is needed and so no neutrino exists in a sense that neutrino hypo is incorrect.

However, we have a lot of experiment to prove the existence of neutrino by creation of neutrino beam and the experimentally found, thus I presume that the particles they found is completely new particles and the name of neutrinos must be changed by the researchers who found the neutrino mass by Kamiokande to the correct name based on the correct mechanism.

IX. OTHER DISCUSSIONS ON THE EXISTENCE OF NEUTRINOS

Because “neutrinos” are very difficult to be detected by the conventional experiments, we had a lot of discussions weather the experiment is correct. Thus, I listed their report below to inform that their concerns are correct; no neutrinos exist.

I found the several related information; some are net articles and some are papers. I believe some researchers presume that neutrino study is incorrect listed and their summary.

I think that all researchers studying neutrinos and nuclear physics must study these papers and communications again.

I think the researchers are really concerned about the very low accuracy of observations because initially all evidences were based on the observation of natural phenomena and not on the well-designed experiment.

A. No neutrinos: Exotic Subatomic Particle May Not Exist at All [25]

University of Cincinnati physicists, as part of an international research team, are raising doubts about the existence of an exotic subatomic particle that failed to show up in twin experiments.

B. Neutrino search finds no evidence of "hidden" particle [26]

An exhaustive search for a ghostly subatomic particle called the sterile neutrino has come up empty, weakening the case for its existence.

Scientists from MIT and the University of Wisconsin at Madison, along with 40 other institutions, report today in Physical Review Letters that after analysing 20,000 neutrinos detected over the span of a year at the IceCube Neutrino Observatory at the South Pole, they were unable to observe any sign of sterile, or "hidden," neutrinos.

C. Neutrinos Do Not Exist [27]

Nuclear Spin is a Vector Quantity and not a Scalar. Pauli's logic about the (alleged) Nuclear Spin of Neutrinos is not credible. The Brilliant Wolfgang Pauli's Logical Blunder of 1930 As of yet, 2020, no experiment has ever been done which has confirmed that Neutrinos actually exist. It took 25 years after Wolfgang Pauli (incorrectly) speculated that Neutrinos must exist, before the first claim of an experimental confirmation was made. In 1956, some creative assumptions were made by Reines and Cowan. They devised their own unique detector, which involved needing protons, neutrons, positrons and electrons (in order to try to prove the existence of a Neutrino). A Nuclear Reactor was found to have produced a handful of unexpected responses in their detector and they announced it as proving the Neutrino. NO ACTUAL NEUTRINOS were ever found but instead only a microscopic number of creative sequences of nuclear processes. One of those processes also resulted in a burst of gamma radiation. A later process resulted in a second burst of gamma radiation. Based on a lot of speculative assumptions, Reines and Cowan calculated the time delay they expected between the two gamma radiation bursts. Based on this, an assumed sequence of nuclear events which resulted in two unique gamma radiation bursts, Reines and Cowan announced that they had proven the existence of a Neutrino. All their experiment had actually proved was that some (unknown) processes took place where two gamma bursts occurred, where no reference to any Neutrino at all was ever involved. But this specific experiment, inside a nuclear reactor, is still considered the "absolute proof of Neutrinos". NO ACTUAL EXPERIMENT, during the following 60 years has ever (yet) even detected a single Neutrino. One of the smartest people ever, Wolfgang Pauli, saw that there seemed to be a serious error in nuclear physics, but then he made an even bigger logical blunder in thinking that he solved it. During the 1920s, Physicists had found that nuclear particles, Protons, Electrons and Neutrons each had "Spin", which meant that they had to comply with a "Conservation of Angular Momentum Law." There appeared to be a serious problem. Every 15 minutes, every Neutron did a "decay" (which later came to be known as a "Beta Decay"), where the Neutron "came apart" into a Proton and an Electron.

X. OTHER NEUTRON FEATURES BASED ON CORRECT NEUTRON MODEL

A. Neutron's magnetic momentum

This correct model of neutron that is the pair of proton and electron can explain the neutron magnetic moment because electron is orbiting around proton which cause this magnetic moment.

B. Mass difference between neutron and proton.

Neutron's electron is the relativistic electron and it is heavier than static electron and mass is larger and this relativistic electron can explain the mass difference between neutron and proton.

C. The cause of that neutron's quark is different from proton' quark.

Based on the correct neutron model, the quark must be the same as proton. The experiment to measure the ratio of up-quark and down quark use deuteron (proton and neutron) as the target of neutron because isolated neutron has very short lifetime. But d is not the pair of proton and neutron but is two proton which is proved by the transmutation experiment by Iwamura.

AS is explained in sec VI, the neutron quark model is meaningless Conversely, this experiment can prove the correct nucleus model. I propose the particle physics society to re-run this experiment to verify correct nucleus model.

Standard theory of particle physics needs to be re evaluated based on the correct neutron and nucleus model.

XI. LENR SOCIETY TO DECIDE ON THE SMALL D2 MODES AS THE MECHANISM OF COLD FUSION

LENR society has a lot of reactors of Cold Fusion and many interpretations of the mechanism. However small D_2 with electron deep orbit was proven in experiments and it is consistent with the correct nucleus model and neutron model. In order to request nuclear physics society and particle physics society to re-run experiment to correct the nucleus model and neutron model, LENR society firstly must decide on the mechanism of cold fusion of small D_2 theory with electron deep orbit.

XII. PARTICLE PHYSICS SOCIETY TO RE-RUN EXPERIMENT TO STUDY D QUARK STRUCTURE TO PROVE THE CORRECT MODEL OF NUCLEUS

ISSN No:-2456-2165

As explained, current quark ratio experiment for neutron can probe the correct nucleus model if the interpretation of the experiment is based on the correct nucleus model that d is two protons.

XIII. SUMMARY

Nucleus is constituted by proton and internal electron, which was proven in experiments of transmutation with cold fusion, showing that d is two protons. Therefore, no neutron exists in d. Now we have the experimental evidence of deep electron orbit and Cold Fusion is caused by the small molecules of D_2 with electron deep orbit, thus, we must move back to the discussion on the neutron model and nucleus model based on the quark structure of d (two protons) which must be re-run by particle physics society, and neutrinos do not exist in a sense that neutrino hypo is needed therefore they are completely new particles.

ACKNOWLEDGMENT

I would like to thank Vavra Jerry and Jean-Luc Paillet for useful discussions on EDO.

REFERENCES

[1] Noriyuki Kodama, Neutron to be Tightly Bound Proton-Electron Pair and Nucleus to be Constituted by Protons and Internal Electrons, International Journal of Innovative Science and Research Technology, Volume 6, Issue 5, May – 2021, https://www.ijisrt.com/assets/upload/files/IJISRT21MAY822.pdf

[2] Noriyuki Kodama, Cold Fusion Mechanism of Bond Compression, International Journal of Innovative Science and Research Technology, Volume 6, Issue 8, August – 2021 https://ijisrt.com/assets/upload/files/IJISRT21AUG112.pdf

[3] Noriyuki Kodama, Novel Cold Fusion Reactor with Deuterium Supply from and Metal Surface Potential Control, International Journal of Innovative Science and Research Technology, Volume 6, Issue 6, June – 2021 https://www.researchgate.net/publication/352694771_Novel_Cold_Fusion_Reactor_with_Deuterium_Supply_from_Backside_and_Metal_Surface_Potential_Control

[4] Noriyuki Kodama, Conceptualized Transmutation Reactor based on Cold Fusion Mechanism, International Journal of Innovative Science and Research Technology, Volume 7, Issue 1, January – 2022 https://www.researchgate.net/publication/358137673_Conceptualized_Transmutation_Reactor_based_on_Cold_Fusion_Mechanism_Possibility_of_Transmutation_to_Superheavy_Element_by_Cold_Fusion_Mechanism?utm_source=twitter&rgutm_meta1=eHNsLXVtM1R3dmhpRHdZd0V5RTVDU3hYRGgvKzdldjBGeXcvWndnK3dzRWUxUHp1cDAvWThXNjZHdUF1dU9GZU92QmJzbjlCdWMvc3o2VThDc3diUkppVUtJOD0%3D

[5] Y. IWAMURA, T. ITOH, M. SAKANO, S. SAKAI, S. KURIBAYASHI, Low Energy Nuclear Transmutation in Condensed Matter Induced by D_2 Gas Permeation Through Pd Complexes: Correlation Between Deuterium Flux and Nuclear Products, in Tenth International Conference on Cold Fusion. 2003 https://www.lenrcanr.org/acrobat/IwamuraYlowenergyn.pdf

[6]. J. Va'vra, A new way to explain the 511 keV signal from the center of the Galaxy and its possible consequences, arXiv, v12, 2018. http://arxiv.org/abs/1304.0833

[7]. R. Reeves, A force of nature the frontier genius of Ernest Rutherford, (New York: Atlas Press Books), p. 114, 2008. Isbn 9780393057508

[8]. E. Rutherford, The scattering of α and β particles by matter and the structure of the atom. Philosophical Magazine. Series 6, v 21 (125), 669–688, 1911. ISSN 1478-6435. https://doi:10.1080/14786440508637080.

[9]. E. Rutherford, Bakerian lecture: nuclear constitution of atoms. Proc. Roy. Soc. A, v97 (686), 374–400, 1920. https://doi:10.1098/rspa.1920.0040.

[10]. J. Chadwick, Possible existence of a neutron. Nature, v129 (3252), 312, 1932, https://doi.org/10.1038/129312a0

[11]. J. Chadwick, The existence of a neutron. Proc. Roy. Soc., A (F.R.S.), v136 (830), 692-708, 1932 https://doi:10.1098/rspa.1932.0112

[12]. D. Ivanenko, The neutron hypothesis. Nature, v129 (3265), 798, 1932. https:///doi.org/10.1038/129798d0

[13]. W. Heisenberg, Über den Bau der Atomkerne. I, About the construction of the atomic nucleus 1 , Zeitschrift für Physik, 1932. https://doi.org/10.1007/BF01342433

[14]. W. Heisenberg, Über den Bau der Atomkerne. II, About the construction of the atomic nucleus 2, Zeitschrift für Physik, 1932. https://doi.org/10.1007/BF01337585

[15]. E.Campari, S.Focaridi, V.Gabbani, V.Montalbano,F.Piantelli, S.Veronesi, Overview of H-Ni systems: old experiments and new setup,8th International Workshop on Anomalies in Hydrogen / Deuterium Loaded Metals 13-18 October 2007, http://newenergytimes.com/v2/library/2004/2004CampariEGoverviewOfH-NiSystems.pdf

[15]. W. Heisenberg, Über den Bau der Atomkerne. III, About the construction of the atomic nucleus 3, Zeitschrift für Physik, 1933. Available from https://doi.org/10.1007/BF01335696

[16]. Hideki Yukawa, Mitiji Konuma, A detailed introduction of Heisenberg's nuclear structure theory to the journal of the Japanese Society of Mathematical Physics and the 1933 conference. Lecture "A Study on the Problem of Nuclear Electrons" https://www2.yukawa.kyoto-u.ac.jp/~yhal.oj/index_files/HeisenbergNuclearStructure.pdf

[17]. L. Schiff, Quantum mechanics (New York: McGrawHill Publishing Company), p. 470, 1968.

[18]. J. Maly, J. Vávra, Electron transitions on deep Dirac levels I, Fusion Technol. v24, 307–18, 1993. Available from https://doi.org/10.13182/FST93-A30206

ISSN No:-2456-2165

[19]. J. Maly, J. Vávra, Electron transitions on deep Dirac levels II, Fusion Sci. Technol. v27, 59–70, 1995. available from https://doi.org/10.13182/FST95-A30350

[20]. T. Yamamoto, D. Zeng, T. Kawakami, V. Arcisauskaite, K. Yata, M. Patino, N. Izumo, J. McGrady, H. Kageyama, M. Hayward, "The role of π-blocking hydride ligands in a pressure-induced insulator-to-metal phase transition in $SrVO_2H$", Nat. Commun. v8, 1217, 2017. Available from https://doi.org/10.1038/s41467-017-01301-0

[21]. E.Campari, S.Focaridi, V.Gabbani, V.Montalbano, F.Piantelli, S.Veronesi, Overview of H-Ni systems http://newenergytimes.com/v2/library/2004/2004CampariEGoverviewOfH-NiSystems.pdf http://newenergytimes.com/v2/conferences/2007/Catania/CataniaAbstractsOct28.pdf

[22]. S. Schlichting, B. Schenke, The Shape of the Proton at High Energies, Phys. Lett. B, v739, 313–09, 2014. https://doi.org/10.1016/j.physletb.2014.10.068

[23] Michael Riordan, The Discovery of Quarks, Science, New Series, Vol. 256, No. 5061 (May 29, 1992), pp. 1287-1293, Also available from http://physics.wm.edu/~inovikova/phys314/notes/quarkdiscovery.pdf

[24] J-PARC Web Site https://j-parc.jp/c/en/facilities/nuclear-and-particle-physics/neutrino.html

[25] University of Cincinnati physicists, Physics News, Physicists Cast Doubt on Neutrino Theory – Exotic Subatomic Particle May Not Exist at All, AUGUST 13, 2020 https://scitechdaily.com/physicists-cast-doubt-on-neutrino-theory-exotic-subatomic-particle-may-not-exist-at-all/

[26] Jennifer Chu, Neutrino search finds no evidence of "hidden" particle, MIT NEWS, August 8, 2016, Available from https://news.mit.edu/2016/neutrino-hidden-particle-dark-matter-0808

[27] Carl W Johnson, Neutrinos Do Not Exist https://www.academia.edu/7934543/Neutrinos_Do_Not_Exist