A NEW QUANTUM FIELD THEORY

Kunwar Jagdish Narain[a) b)]

(Retired Professor of Physics)

In nature, nothing is said to occur without reason/purpose. For example, our hearts beat persistently without having a source of infinite energy, which does not happen without reason. The reason is due to their special structure that provides all the properties our hearts possess. In the same way, as electrons, nucleons, and all other particles, or quanta (since quantum mechanics is applied to all particles, these should be known as quanta) possess persistent spin motion without having any source of infinite energy; there should be some purpose. And the purpose should be due to their special structure that provides all the properties they display. Therefore, the purpose as to why quanta possess persistent spin motion, their special structures, and properties have been determined. The account of the effects of the purpose as to why quanta possess persistent spin motion, and of their special structures and properties of electric and magnetic fields, that is, a new quantum field theory, enables us: 1- to determine a new force with characteristics of nuclear force and both attractive and repulsive components; 2- to give very clear and complete explanation of all the phenomena, properties and effects, related to quanta, generated in their systems, for example, in their beams and electric current carrying substances, in persistent current carrying substances at their superconducting state, in deuterons, alpha particles and nuclei; and 3- to give very clear and complete explanation of the structures and properties of their systems, for instance, deuterons, alpha particles and nuclei.

[a)] kjnarain@yahoo.co.in ; kjn.jaiswal@gmail.com

b) Former address: Department of physics, Govt. Bilasa Girls P.G. (Autonomous) College, Bilaspur (C.G.) 495001, INDIA

1. INTRODUCTION

The portion "quantum field" of "quantum field theory" has two interpretations: 1- the field of quanta; 2. the field of that, the quanta [i.e. electrons, nucleons, and all other particles (since quantum mechanics is applied to all particles, these should be known as quanta)] possess themselves, for example, electric and magnetic fields.

The current quantum field theories are all based on the first interpretation of "quantum field". In these theories, it is assumed that a force of attraction is generated between particles of the systems due to continuous exchange of force carrier particles, of which a field is assumed occurring between particles of the systems. For example, in Yukawa's meson field theory[1], it is assumed that a force of attraction is generated between nucleons of nuclei due to continuous exchange of virtual π mesons, of which a field is assumed occurring between nucleons in nuclei. And in BCS (Bardeen–Cooper–Schrieffer) theory[2], it is assumed that a force of attraction is generated between free electrons of the substances at their superconducting states due to continuous exchange of phonons, of which a field is assumed occurring between free electrons of the substances.

The preferred meaning of exchange force is in particle physics, where it denotes a force produced by the exchange of force carrier particles, such as the electromagnetic force produced by the exchange of photons between electrons, and the strong force produced by the exchange of gluons between quarks. But the concepts of force carrier particles and the generation of a force of attraction due to exchange of force carrier particles are very hard to believe or imagine. These concepts give rise to several questions, for example:

Firstly, how can a particle - photon or gluon or virtual π meson or phonon be a force carrier particle? For the time being, if the concepts of force carrier particles and the generation of a force of attraction between particles, due to continuous exchange of force carrier particles between them, are somehow assumed to be true, then the electromagnetic force should be produced in all the substances (possessing free electrons) and always, due to exchange of photons between their free electrons, because, in substances, some photons, which are emitted from their orbiting electrons, occur always inside them between their free electrons (for its verification, see Sec. 5, Ref. 3). Is the electromagnetic force produced always and in all the substances due to continuous exchange of photons between their free electrons? If yes, is there any evidence of it? And if not produced, why?

Secondly, due to continuous exchange of force carrier particles between particles, only a force of attraction is assumed produced, for example, due to continuous exchange of phonons (of which the field is assumed occurring between free electrons of the substances at their superconducting state) between free electrons of the substances, only a force of attraction is assumed produced between free electrons of the substances, whereas, in substances, a magnetism (diamagnetism), and around the substances, magnetic fields are also simultaneously produced (see Sec. 7.4.1, Ref. 3). How are these produced?

Thirdly, the concept of production of a force of attraction between particles, due to continuous exchange of force carrier particles between them, gives rise to the questions: What does happen to force carrier photons, when in substances at their superconducting state, a field of phonons is assumed occurring (BCS theory)? In substances, can/do the exchange of photons and phonons both take place between their (substances) free electrons? If both can/do not take place, then which one does take place, and why?

Fourthly, what does happen to magnetic fields the electrons and nucleons possess? The role of their magnetic fields can neither be ignored nor can be ruled out. Because, we observe that:

1. In electron, proton etcetera beams, the electrons, protons etcetera are held together in their respective beams despite similar charges on them. It means, between electrons, between protons etcetera in their respective beams, a force of attraction, stronger than the Coulomb repulsive force is also generated. This force cannot be generated due to interactions between their electric fields. Then, obviously, it should be generated due to interactions between their magnetic fields (for detail information as to how it is generated, see Sec. 4.1, Ref. 4). In their beams, electromagnetism, and around their beams, a magnetic field, which possesses direction and occurs in a plane perpendicular to the direction of flow of their particles through their beams, are also generated due to interactions between magnetic of their particles (for detail information as to how these are generated, see Sec. 4.1, Ref. 4).

2. In substances carrying electric current and persistent current (which flows at superconducting state) too, a force of attraction is generated between their free electrons, and in them (substances) electromagnetism, and around them, a magnetic field, which possesses direction and occurs in a plane perpendicular to the direction of flow of electrons through them, are generated [for detail information as how these are generated, see Sec. 4.2, Ref. 4 (for electric current) and Sec. 7.4.1, Ref. 3 (for persistent current)]. When no current (neither electric nor persistent) is flowing through the substances, no electromagnetism is generated in them, and around them no magnetic field is generated. It means, when electrons of the substances (carrying electric current or persistent currents) start flowing; their electrons are oriented, and such that the interactions between magnetic fields of their electrons become

possible [for detail information as to why and how the electrons are oriented and the interactions between their magnetic fields become possible, see Sec. 4.2, Ref. 4 (for electric current) and Sec. 7.4.1, Ref. 3 (for persistent current)]. And as a result, a force of attraction is generated between their free electrons, magnetism is generated in them (substances), and magnetic field is generated around them. Due to generation of a force of attraction between free electrons of the substances when their electrons are flowing, the energy of their free electrons is decreased, and consequently, an energy gap is obtained between free electrons of the substances when the substances are at their superconducting state (i.e. when the persistent current is flowing through the substances) and when the substances are at their normal state (i.e. when no current is flowing through the substances). [For detail information, see Sec. 7.9, Ref. 3.] A force of attraction is generated between free electrons of the substances also when an electric current is flowing through them (see Sec. 4.2, Ref. 4), and consequently, the energy of their free electrons is also decreased. But, due to the external voltage, which is applied to make their free electrons flowing, since the energy of their free electrons is increased, the decrease in energy of their free electrons cannot be observed.

3. In deuterons, alpha particles and nuclei too, their nucleons are so arranged and oriented that the interactions between their magnetic fields become possible, and as a result, a force of attraction is generated between their nucleons, and the nucleons are held together in them (for detail information as to how these take place, see Sects. 4. 5, 6, 7 and 8, Ref. 5). In nuclei, a repulsive force is also generated. But this repulsive force is not generated normally. It is generated when, in nuclei, the mass number (A) becomes > 200. Then, due to this force of repulsion, alpha and beta particles are emitted from the nuclei (for detail and complete information, see Sec. 9.2.1, Ref. 5).

Further, if we examine the current quantum field theories, for example, the BCS theory and the Yukawa meson field theory, and their rigorous mathematical proofs, we find that, there, in order to arrive at the desired results, numerous logically and practically unbelievable concepts have been taken (for detail information, see Sec. 3.1.1, and Sec. 3.3.1).

The present quantum field theory is based on the second interpretation of "quantum field". Because:

1. When the electrons and nucleons themselves possess field, how can in presence of their fields, other quanta, for example, virtual π mesons occur as a field between nucleons in nuclei in Yukawa's meson field theory, and phonons occur as a field between free electrons in substances at their superconducting state in BCS theory?

2. As we know, in nature, nothing occurs without reason/purpose. For example, our hearts beat persistently without having a source of infinite energy, which does not happen without reason, as there is an important reason as to why they beat persistently, in addition to why they have a special structure that keeps them beating persistently to provide all the properties our hearts possess. In the same way, as electrons, nucleons, and all other particles, or quanta possess persistent spin motion without having any source of infinite energy; there should be some purpose as to why they possess persistent spin motion. And the purpose should be due to their special structure that provides all the properties they display (e.g. persistent spin motion, electric and magnetic fields). Further, as we know, all the phenomena/activities related to our hearts, for example, the continuous blood circulation taking place in our bodies, are the effects of the purpose behind the persistent beating of our hearts, its special structure and properties. Similarly, all the phenomena/activities related to

electrons, nucleons, and so forth should be the effects of the purpose behind their persistent spin motion, their special structures and properties. Therefore, the purpose as to why quanta possess persistent spin motion (Sec. 2, Ref. 6), the special structures of quanta and their properties (Sec. 3, Ref. 6) have been determined.

The account of the effects of the purpose as to why quanta possess persistent spin motion, and of their special structures and properties of electric and magnetic fields, that is, a new quantum field theory (see Sec. 2) enables us: 1- to determine a new force with characteristics of nuclear force and both attractive and repulsive components (see Sec. 3.1); 2- to give very clear and complete explanation of all the phenomena, properties and effects, related to quanta, generated in their systems, for example, in their beams and electric current carrying substances (see Sec. 3.2), in persistent current carrying substances at their superconducting state (see Sec. 3.3), in deuterons, alpha particles and nuclei (see Sec. 3.4); and 3- to give very clear and complete explanation of the structures and properties of their systems, for instance, deuterons, alpha particles and nuclei (see Sec. 3.4).

2. PRESENT QUANTUM FIELD THEORY

As the purpose (see Sec. 2, Ref. 6), as to why quanta (i.e. electrons, nucleons, and all other particles) possess persistent spin motion, is to generate:

1. Linear velocity v in them along the directions of their respective L_S, which (v) varies as the frequency of their spin motion ω varies (for detail information, see Sec. 2.1, Ref. 6);
2. Motional energy E_M [= kinetic energy (E_K) + spin energy (E_S)] and motional momentum p_M [= linear momentum (p_{LIN}) + spin momentum (p_S)] in them (for detail information, see Sec 2.2, Ref. 6);

the quanta are always found in a state of motion, which is oriented along the directions of their respective L_S (for its verification, see Ref. 3), and during their motion, their energy, momentum, and spin angular momentum always conserve, even, for example, when the rate of increase in velocity of the accelerated electrons by a large voltage (e.g., in Bertozzi's experiment[7]) starts decreasing after attaining relativistic velocity by them, and when the electrons move along their elliptical orbits, because then their velocity varies (for detail information, see Sec. 2.2, Ref. 6).

According to the special structures of electrons and nucleons (see Sec. 3, Ref. 6), they possess magnetism too by virtue of nature, similarly, as they possess charge by virtue of nature. Their magnetism occurs in the form of a ring round their ball of charge, in a similar way to the rings around the planet Saturn, for instance. Around their balls of charge occur their electric fields, and around their rings of magnetism occur their magnetic fields. Their rings of magnetism and balls of charge both spin but in opposite directions.

Due to their special structures, the quanta possess persistent spin motion, linear velocity v along the directions of their respective L_S, and spin magnetic moment (μ_S) in direction opposite to the direction of their respective v (or can say L_S). And when they move along the directions of their respective L_S, the planes of their magnetic rings and magnetic fields lie in planes perpendicular to the directions of their respective v. (For detail information as to how the above properties are generated, see Sec.3, Ref. 6.)

The account of the effect of the purposes as to why the quanta possess persistent spin motion (i.e. of the finding of quanta always in a state of motion, which is oriented along the directions of their respective L_S, and during their motion, conservation of their energy,

momentum etcetera), and of the effect of their special structures (i.e. the occurrence of μ_S of quanta in direction opposite to the direction of their respective v, and the occurrence of the planes of their magnetic rings and magnetic fields in planes perpendicular to the directions of their respective v) enables us to determine a new force with characteristics of nuclear force and both attractive and repulsive components, and to give very clear and complete explanations of all the phenomena, properties and effects (related to quanta) generated in their systems, and of the structures of their systems.

3. APPLICATIONS OF THE PRESENT QUANTUM FIELD THEORY

At present, determination of a new force with characteristics of nuclear force and both attractive and repulsive component (see Sec. 3.1), and some of the important phenomena, as listed below, have been included in this study: 1. Generations of electromagnetism in electron beams and electric current carrying substances, and magnetic field around them, which possesses direction and occurs in a plane perpendicular to the direction of flow of electrons through them (see Sec. 3.2); 2. At transition temperature (T_c) of the substances, generations/occurrences of resistance-less state, superconductivity, properties exhibited by superconductors, Meissner effect, levitation of magnet above the superconductor, and the Josephson's tunnelling (see Sec. 3.3). At present, some of the important and challenging phenomena/events taking place in deuterons, alpha particles, and nuclei have also been included in this study, together with the study of structures and properties of deuterons, alpha particles, and nuclei (see Sec. 3.4).

3.1 Generation of a new force with characteristics of nuclear force and both attractive and repulsive components

1. For the explanation of how and when the force of attraction is generated between two particles, for example, between two electrons, and how that force varies with respect to distance between them, see Sects. 4.1 and 5.1 respectively, Ref. 8.

2. For the explanation of how and when the force of repulsion is generated between, for example, two electrons, and how that force varies with respect to distance between them, see Sects. 4.2 and 5.2 respectively, Ref. 8.

This force enables us to explain all the phenomena taking place in deuterons, alpha particles, and nuclei, including their (deuterons etc.) properties and structures (see Sects. 4, 5, 6, 7, 8 and 9, Ref. 5). This force enables us to explain also all the properties generated in electron, protons etcetera beams (Sec. 4.1, Ref. 4), in electric current carrying substances (Sec. 4.2, Ref. 4) and persistent current carrying substances (Sec. 7.4.1 and 7.9, Ref. 3).

3.1.1 Current force with characteristics of nuclear force, and faults in it

Currently, the force, which possesses the characteristics of nuclear force, is the Yukawa's force. But it has only the attractive component, and no repulsive component. Secondly, it has been assumed generated due to continuous exchange of virtual π mesons between nucleons of nuclei, where the concept of virtual π mesons gives rise to several very basic and fundamental questions. For example: 1. Virtual means which does not exist physically, then how can the exchange of such π mesons take place between nucleons? 2. How can such π mesons possess charge, that too positive or negative? 3. The real π mesons possess charge and mass both, while to virtual π mesons, only the charge has been assigned, and the mass has not been assigned, why is this double standard? 4. As it is believed that, in universe, only matter and energy occur, in which category- matter or energy, do the virtual π mesons lie?

Further, does the field of virtual π mesons occur between protons, between neutrons in their respective beams, and the protons are held together in their beams due to continuous exchange of virtual π mesons between them against the repulsive Coulomb force generated between them due to similar charge on them?

If not, then:

1. Why is this inconsistency? When the field of virtual π mesons can occur in nuclei between nucleons, it should/can occur between protons in proton beams too.

2. How protons and alpha particles are held together in their respective beams against the repulsive Coulomb force?

If yes, then:

1. The field of virtual π mesons should occur in electron beams too, and the electrons should be held together in their beams due to continuous exchange of π mesons between electrons. Can/does it happen so? If not, then how are the electrons held together in their beams against the Coulomb repulsive force?

2. The neutron beams should exist in nature, similarly, as nuclei exist in nature, even with more strong stability. Because, in neutron beams, there occur no protons and hence no repulsive Coulomb force comes into play. While on the contrary, the neutron beams do not survive even as long as the proton beams survive. It happens because neutrons start decaying after their mean life time and consequently the neutron beams are destroyed. But it gives rise to the questions: Then why and how do neutrons not decay in deuterons, alpha particles and nuclei? What does happen or what situation is created in them such that the neutrons become stable in them?

3.2 Explanation of the generations of electromagnetism and the related properties in electron beams and electric current carrying substances

1. For the explanation of how electromagnetism and magnetic moment are generated in electron beams and current carrying substances, see Sects. 4.1 and 4.2 respectively, Ref. 4.

2. For the explanation of which type of magnetism (electromagnetism) is generated in them, see Sects. 4.3. and 4.4, Ref. 4.

3. For the explanation of how a magnetic field is generated around them, which occurs in a plane perpendicular to the direction of flow of electrons through them and possesses direction, see Sects. 4.1 and 4.2 respectively, Ref. 4.

4. For the explanation of how a magnetic field is generated around an electron orbit such that there are generated north and south poles and the orbit behaves like a magnetic dipole, see Sec. 6.1, Ref. 4.

5. For the explanation of how a magnetic field is generated around an electric current carrying close loop such that there are generated north and south poles and the loop behaves like a magnetic dipole, see Sec. 6.2, Ref. 4.

3.2.1 Current explanation, and faults in it

Currently, it has been assumed hypothetically that, due to the flow of charge of electron through the electron beams and the current carrying specimens, electromagnetism is generated in them, and a magnetic field is generated around them. No explanation is found as to how these are generated.. No explanation is found as to how the generated magnetic field occurs in a plane perpendicular to the direction of flow of electrons through them, and how that field possesses direction (for detail information, see Sec. 1, Ref. 4).

Regarding generation of magnetic fields around electron orbits and current carrying close loops such that the north and south poles are created, and the electron orbits and the current carrying close loops start behaving like magnetic dipoles too, currently no explanation is found as to how all these take place (for detail, see Sec. 6.3, Ref. 4).

3.3. Explanation of the generations of resistance-less state, superconductivity, related properties and effects, exhibited by superconductors at transition temperature T_c

1. For the explanation of how the resistance-less state is generated in substances at their transition temperatures (T_c), see Sec. 5, Ref. 3

2. For the explanation of how superconductivity is generated in substances at their transition temperatures (T_c), see Sec. 6, Ref. 3.

3. For the explanation of how entropy of substances decreases at their superconducting state, see Sec. 7.1, Ref. 3.

4. For the explanation of how the transition temperature (T_c) varies from substance to substance, see Sec. 7.2, Ref. 3.

5. For the explanation of how the substances like copper (Cu), gold (Au), and silver (Ag) do not superconduct even down to very low temperatures, see Sec. 7.3, Ref. 3.

6. For the explanations of how: i- Meissner effect takes place, see Sec. 7.4.1, Ref. 3; ii- a magnet is levitated above a superconductor, see Sec. 7.4.2, Ref. 3.

7. For the explanation of how the diamagnetism generated in substances at their superconducting state persists, while generated at their normal state, that does not persist, see Sec. 7.5, Ref. 3.

8. For the explanation of no occurrence of superconducting state in ferromagnetic substances, see Sec. 7.6, Ref. 3.

9. For the explanations of how: i- the normal states of substances are restored applying an external magnetic field H_c across them at their superconducting state, see Sec. 7.7.1, Ref. 3; ii- H_c increases as the temperature of substance decreases beyond its T_c, see Sec. 7.7.2, Ref. 3; iii- H_c varies from substance to substance, see Sec. 7.7.3, Ref. 3.

10. For the explanations of how: i- the thermal conductivity of a substance is discontinuously increased when the superconducting state of the substance is destroyed by the application of an external magnetic field H_c, see Sec. 7.8.1, Ref. 3; ii- thermal conductivity of substance changes continuously between its two phases, and at superconducting phase, thermal conductivity is found to be lower, see Sec. 7.8.2, Ref. 3.

11. For the explanations of how: i- an energy gap is obtained between energy of free electrons of a substance when the substance is at its superconducting and when is at its normal state, see Sec. 7.9.1, Ref. 3; ii- the energy of electrons goes on decreasing as temperature of the substance decreases below T_c, see Sec. 7.9.2, Ref. 3.

12. For the explanation of Josephson's Tunnelling, see Sec. 7.10, Ref. 3.

13. For the explanations of how: i- the substance absorbs heat when the superconductivity of substance is destroyed isothermally by a magnetic field, see Sec. 7.11.1, Ref. 3; ii- the substance's temperature becomes lower for the adiabatic case, see Sec. 7.11.2, Ref. 3.

14. For the explanation of how the specific heat of substance is discontinuously increased when the temperature of substance is brought down to its T_c, see Sec. 7.12, Ref. 3.

3.3.1 Current explanation, and faults in it

To explain as to how superconductivity, properties and effects exhibited by the superconductors, are generated, several theories have so far been proposed. For BCS theory, it is claimed that it provides better quantum explanation of superconductivity and accounts very well for all the properties exhibited by the superconductors. But if we examine the BCS theory and its rigorous mathematical proofs, we find that, in order to arrive at the desired results, there are several logically and practically unbelievable concepts have been taken (for detail information, see bullet- i of Sec. 1, Ref. 3). Consequently, these concepts contradict two well-observed facts (see bullet- ii of Sec. 1, Ref. 3), and give rise to numerous very basic and fundamental questions (for detail information, see bullet- iii of Sec. 1, Ref. 3).

Further, the concept of Cooper pairs, and the flow of persistent current through the substances due to flow of Cooper-pairs through them too gives rise to several very basic and fundamental questions. For example:

1. At temperature T_c (transition temperature, at which the substances becomes superconducting, and the persistent current starts flowing itself through them without any external aid) of the substances, suddenly what does happen or situation is created in them such that the Cooper pairs start forming and flowing, resulting into flow of persistent current through them? Suppose, if something is happened or some situation is created, then what does happen such that the normal state of the substances (i.e. when the persistent current stops flowing) are restored when a critical value of an external magnetic field (H_c) is applied across them? Are the Cooper pairs broken and the electrons are separated from their

respective pairs? If yes, then how does it happen so? And if the Cooper pairs are not broken, then how does the persistent current stop flowing?

2. At temperatures $\leq T_c$ of the substances, if the persistent current is obtained due to flow of Cooper pairs: i- How and from where do the Cooper pairs obtain their initial linear velocity with which they start flowing? ii- How is their linear velocity maintained for indefinitely long time against the gravitational force acting on them during their persistent flow? iii- How are the directions of motion of all the Cooper pairs are oriented and aligned in one direction (i.e. along the direction of flow of the persistent current)?

3.4 Explanation of some of the important phenomena taking place in deuterons, alpha particles and nuclei, and about the structures and properties of deuterons, alpha particles and nuclei

1. For the explanation of how a proton (P) and a neutron (N) combining with each other constitute a deuteron, and neutron in this combination becomes stable, see Sec. 4.1, Ref. 5.

2. For the explanation of how deuteron ($N\ P$) only exists in nature, and not the systems di-proton ($P\ P$) and di-neutron ($N\ N$), see Sects. 4.2 and 4.3, Ref. 5.

3. For the explanation of how, due to addition of one P in system $N\ N$, the resultant system [i.e. the nucleus of tritium (H^3)] becomes stable, while the system $N\ N$ is not stable and hence does not exist in nature, see Sec. 5.1, Ref. 5.

4. For the explanation of how the binding energy per nucleon (E_b) of the nucleus of H^3 [i.e. $(E_b)_{H^3}$] becomes $> 2\times(E_b)_D$, where $(E_b)_D$ is the E_b of deuteron, see Sec.5.2, Ref. 5.

5. For the explanation of how due to addition of one N in system $P\ P$, the resultant system [i.e. the nucleus of helium-3 (He^3)] becomes stable, while the system $P\ P$ is not stable and hence does not exist in nature, see Sec. 5.3, Ref. 5.

6. For the explanation of how the E_b of the nucleus of He^3 [i.e. $(E_b)_{He^3}$] becomes > $2\times(E_b)_D$, see Sec. 5.4, Ref. 5.

7. For the explanation of how the $(E_b)_{H^3}$ happens to be > the $(E_b)_{He^3}$, see Sec. 5.5, Ref.5.

8. For the explanation of how, despite the $(E_b)_{H^3}$ > the $(E_b)_{He^3}$, the H^3 happens to be radioactive and decays into He^3 through beta (β) decay, see Sec. 5.6, Ref. 5.

9. For the explanation of how two-neutrons and two-protons are arranged in an alpha particle (α) such that its nucleons become so strongly bound that it starts behaving like a particle., see Sec. 6.1, Ref. 5.

10. For the explanation of how the E_b of α particle is increased to > $6\times(E_b)_D$, instead of increasing to $2\times(E_b)_D$, see Sec. 6.2, Ref. 5.

11. For the explanation of how nucleons are arranged in nuclei having mass number A = integer multiple of 4 [e.g., the nuclei of helium-4 (He^4), beryllium (Be^8), carbon (C^{12}), oxygen (O^{16}), neon (Ne^{20}), magnesium (Mg^{24})] such that they (nuclei) are most strongly stable, and how their E_b increases as their A increases in multiple of 4, see from Sec. 7.1 to Sec. 7.9, Ref. 5.

12. For the explanation of how the E_b of Be^8 is reduced to < the E_b of He^4, while the A of Be^8 = 2×A of He^4, see. Sec. 7.2.1, Ref. 5.

13. For the explanation of: i- how the nucleons are arranged in nuclei having A ≠ integer multiple of 4 [e.g., lithium-6 (Li^6), lithium-7 (Li^7), boron (B^{11}) and nitrogen (N^{14})] such that these are not strongly stable, how the E_b of Li^6 and Li^7 increases as their A increases, and how the nucleons are arranged in nuclei of Li^6 and Li^7 such that the E_b of Li^6 and Li^7 are happened to be < the E_b of He^4, while the A of Li^6 and Li^7 > the A of He^4, see Sec. 8.1, Ref. 5; ii- how nucleons are arranged in nucleus of B^{11} such that its E_b becomes < the E_b of Be^8 though A of B^{11} > the A of Be^8**,** see Sec. 8.2, Ref. 5; iii- how the E_b of N^{14} becomes < the E_b of C^{12} though A of N^{14} > the A of C^{12}, see Sec. 8.3, Ref. 5.

14. For the explanation of how the E_b of nuclei, after becoming maximum near A = 62, gradually starts decreasing as A of nuclei increases, see Sec. 9.1, Ref. 5.

15. For the explanation of how nuclei become radioactive when A > 200, and α and β particles start emitting from them, see Sec. 9.2.1, Ref. 5.

16. For the explanation of how γ (gamma) and ν (neutrino) are emitted from the nuclei, and how they obtain particle like physical existence, see Sec. 9.2.2, Ref. 5.

17. For the explanations of how γ and ν obtain so high energy and momentum, see Sec. 9.2.3, Ref. 5.

3.4.1 Current explanation, and faults in it

Several nuclear models have so far been proposed but, regarding how the different phenomena/events take place in deuterons, alpha particles and nuclei, and regarding the structures and properties of deuterons, alpha particles and nuclei, very little is known.

ACKNOWLEDGEMENT

The author is grateful to his respected teacher, Prof. Ashok Kumar Gupta, Professor of Physics (Retd.), Allahabad University, Allahabad (U.P.), India, for his valuable continuous moral support, encouragement, timely discussion, sincere advice and help.

REFERENCES

1. H. Yukawa, On the interaction of elementary particles, Proc. Phys.-Math. Soc. Japan **17** (1935) p. 48.

2. J. Bardeen, L.N. Cooper, J.R. Schriefer, Theory of superconductivity, Phys. Rev. 108 (5) (1957) p. 1175.

3. Kunwar Jagdish Narain, Understanding superconductivity: A new approach, vixra: 1111.0097 (Condensed Matter), http://vixra.org

4. Kunwar Jagdish Narain, Understanding electromagnetism: A new approach, vixra: 1111.0072 (Condensed Matter), http://vixra.org.

5. Kunwar Jagdish Narain, Understanding deuterons, alpha particles and nuclei: A new approach, vixra: 1203.0105 (Nuclear and Atomic Physics), http://vixra.org.

6. Kunwar Jagdish Narain, Why electrons and nucleons possess persistent spin motion, vixra: 1512.0331 (Quantum Physics), http://vixra.org.

7. W. Bertozzi, Am. J. Phys. **32**, 551 (1964).

8. Kunwar Jagdish Narain, A new force with characteristics of nuclear force and both attractive and repulsive components, vixra: 1207.0109 (Nuclear and Atomic Physics), http://vixra.org.