Understanding electromagnetism: a new approach

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Because all electrons, nucleons, and other particles undergo a persistent spin motion without having any source of infinite energy, they should have a unique structure that keeps them persistently spinning and provides all the properties that they display. In addition, there should be some reason or purpose why they show a persistent spin motion, because, in nature, nothing occurs without a reason or purpose. Therefore, the unique structures of electrons, and nucleons, their properties, and purpose why they possess persistent spin motion have been determined. The results of these determinations provide the knowledge of a new force possessing characteristics of nuclear force and both attractive and repulsive components, and very clear and complete explanations of: 1) all the phenomena; 2) all the properties and effects of their systems; and 3) structures of their systems, e.g., deuterons, alpha particles, and nuclei; those are generated due to these particles. Present study is focused on to provide understanding of: 1) how electrons are bound together in their beams against the repulsive Coulomb force, which is generated between them due to similar charges on them; 2) how electromagnetism is generated in electron beams and current carrying substances; 3) which type of magnetism the generated electromagnetism happens to be; 4) how a magnetic field, which possesses direction and occurs in a plane perpendicular to the direction of flow of electrons through them, is generated; 5) how, in electron orbits, and current carrying close loops, magnetic north and south poles are created, and they behave as magnetic dipoles. Present study includes also the speculation of the generations of two possible very important effects in electric current carrying close loops.

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1 Introduction

As we know, in nature, nothing occurs without a reason or purpose. For example, our hearts persistently beat without having a source of infinite energy, which does not happen without a reason because an important reason exists as to why our hearts beat, in addition to why they have a unique structure that keeps them persistently beating and hence provides all the properties that they display. Therefore, because all electrons, nucleons, and other particles possess a persistent spin motion without having any source of infinite energy, some reason or purpose should exist why they show a persistent spin motion. In addition, such particles should have a unique structure that keeps them persistently spinning and provides all the properties that they display.

Further, as we know, all phenomena or activities related to our hearts, e.g., continuous blood circulation in our bodies, are the consequences of the purpose behind the persistent beating of our hearts, their unique structure, and their properties. Similarly, all the phenomena or activities related to electrons, nucleons, and other particles should have been the consequences of the purpose behind their persistent spin motion, their unique structure, and their properties.

Therefore, the unique structure of electrons, Fig. 1, and nucleons (see Section 3, [1]), and purpose why they display a persistent spin motion (see Section 2, [1]) have been determined. The results of these determinations [see bullets 1), and 2), and bullets i), ii), and iii), Section 2] provide the knowledge of a new force which possesses the characteristics of nuclear force and both attractive and repulsive components (see Section 4.2, [1]), and very clear and complete explanations of: 1) all the phenomena (see Section 4.1, [1]); 2) all the properties and effects of their systems, e.g., their beams, substances at their both the normal and superconducting states, deuterons, alpha particles, and nuclei, (see Section 4.2, [1]); and 3) structures of their systems, e.g., deuterons, alpha particles, and nuclei (see Section 4.2, [1]); those are generated due to these particles.

Present study is focussed on to provide the understanding of:

1) How the electrons are bound together in their beams against the repulsive Coulomb force, which is generated between them due to similar charges on them (see Section 3).

2) How magnetism (electromagnetism) is generated in electron beams and electric current carrying substances (rods) (see Sections 3 and 4 respectively).

3) Which type of magnetism the generated electromagnetism happens to be (see Sections 4.2 and 4.3).

4) How a magnetic field, which possesses direction, is generated around them in a plane perpendicular to the direction of flow of electrons through them (see Sections 3 and 4 respectively).

5) How, in electron orbits and electric current carrying close loops, the magnetic north and south poles are created, and they (orbits and close loops) behave like magnetic dipoles (see Section 6.1 and 6.2 respectively).

Present study includes also the speculation of generation of the following two very important possible effects in electric current carrying close loops:

i) Meissner effect (see Section 7.1)

ii) Levitation of a magnet above the surface of the loops (see Section 7.2).

Currently, regarding first, and third properties [bullets 1), and 3)], no explanation or information is found anywhere. Regarding second, and fourth properties [bullets 2), and 4)], it is presumed that, when electrons start flowing through electron beams and electric current carrying rods, due to the flow of charge of electrons through them (electron beams, and electric current carrying rods), electromagnetism in them, and magnetic field around them are generated. It is true that electromagnetism in them and magnetic field around them are generated when the electrons start flowing through them, but the above presumptions cannot be possible, because:

1) Magnetism and magnetic fields cannot be assumed generated due to the flow of charge of electrons, similarly, as charge and electric field cannot be assumed generated due to the flow of magnets, supposing of the size of electrons.

2) As soon as electrons start flowing through their beams, a force of attraction is also simultaneously generated between them (electrons), which keeps them bound together in their beams against the repulsive Coulomb force generated between them due to similar charge on them (see Section 3). The force of attraction between electrons cannot be generated due to charge of electrons.

Further, currently, it is believed that, due to spin motion of the charge of electron, the electron possesses magnetic field, and spin magnetic moment (μ_S) as follows:

$$\mu_S = (-e/2m)\,L_S \tag{1}$$

[where $-e$ and m respectively are the charge and mass of electron, and L_S is its spin angular momentum], and, due to the orbital motion of charge of electron, there are generated a magnetic field around the orbital path of electron and orbital magnetic dipole moment (μ_L) as follows:

$$\mu_L = (-e/2m)\,L_L \tag{2}$$

[where L_L is the orbital angular momentum of electron about the axis of rotation around its orbit, and $= m\mathrm{v}\,\mathrm{r}$, where r is the radius of orbit, and v is the tangential speed of electron].

The Eqns. (1), and (2) may be correct, but the above beliefs that, due to spin motion of the charge of electron, μ_S and magnetic field around the electron, and, due to orbital motion of the charge of electron, μ_L and magnetic field around the orbital path of the electron are generated, cannot be true, because no magnetic field, and μ_S , μ_L , can be generated either due to linear motion, or spin motion, or orbital motion of the charge of electron. Secondly, the above beliefs give rise to numerous very basic and fundamental questions. For example:

1) Currently, it assumed that electron is like a ball of charge, then how and from where does it obtain spin motion, which persists without having any source of infinite energy?

2) The charge of electron, which possesses electric field around it owing to its nature, how can it (charge) possess a magnetic field too, together with its electric field?

3) Can the charge of an electron generate simultaneously μ_S and μ_L , and two magnetic fields: i) around the electron due to its spin motion; and ii) around the orbital path of electron due to its orbital motion; while the electron is travelling along its orbital path ?

4) Suppose, if the two fields (1^{st} and 2^{nd}) are generated simultaneously, then, during the orbital motion of electron, the 1^{st} magnetic field (generated around the electron) should go on passing through the 2^{nd} magnetic field (generated around the orbital path of electron) during its orbital motion. Can it be possible? because, during their passing, there should not occur any intersection between magnetic lines of force of 1^{st} and 2^{nd} magnetic fields.

Moreover, when the classical result of μ_S was compared to the measurement, it was found off by a proportional factor g. Therefore, the Eqns. (1) and (2) were corrected multiplying respectively with correction factors g_S and g_L as follows:

$$\mu_S = g_S(-e/2m)\,L_S \tag{3}$$

and

$$\mu_L = g_L(-e/2m)\,L_L \tag{4}$$

The dimensionless correction factor g is known as g factor. The spin factor g_S (= 2) comes from the Dirac equation, a fundamental equation connecting the electron's spin with its electromagnetic properties, and the orbital factor g_L (= 1) comes by a quantum mechanical argument analogous to the derivation of the classical gyromagnetic ratio.

Further, as in Eqn. (3), μ_S is related to L_S , and in Eqn. (4), μ_L is related to L_L , similarly, the total magnetic dipole moment (μ_J) resulting both from spin and orbital angular momentum of electron is related to its (electron) total angular momentum L_J $(= L_L + L_S)$ as:

$$\mu_J = g_J(-e/2m)\,L_J \tag{5}$$

where g_J is known as the Lande g factor, which can be related to g_L and g_S by quantum mechanics.

For g_S, the most accurate value has experimentally been determined, which is equal to 2.00231930419922 ± (1.5×10^{-12}). It is only two thousand larger than the value from the Dirac equation. The small correction is known as the anomalous magnetic dipole moment of the electron.

However, on the name of spin orbit interaction, to define μ_J, as $\mu_J = \mu_S \pm \mu_L$ (where the g factors of μ_S and μ_L have not been included), is not correct. Because, μ_S occurs in direction opposite to the direction of L_S, where L_S occurs along the perimeter of the orbit tangentially at its every point [because L_S occurs along the direction of velocity v_E of the electron {see bullet 1) of Section 2}, which (v_E) occurs along the perimeter of the orbit tangentially at its every point], and thus μ_S occurs in plane of the orbit, while μ_L occurs along the axis of the orbital motion of the electron, i.e. normal to the plane of the orbit and through its centre. Then how can their (μ_S and μ_L) vector sum be taken? Moreover, to define L_J as L_J = jh /2π [= (s ± l) h/2π = $L_S \pm L_L$] also cannot be set forth to be correct. L_L = lh/2π can be accepted because L_L = lh/2π is according to the postulate of Bohr's theory, but L_S = sh/2π cannot be accepted, because, regarding spin motion of electron, there is no such postulate.

Further, the quantum numbers l (orbital), s (spin) and j (total) are the mathematical tools, to which the values, e.g., 0, 1, 2, 3,.....to l; and 1/2, -1/2 to s are assigned in accordance as the requirements demand in order to arrive at the desired results. These quantum numbers have neither any physical significance nor any physical interpretation. Furthermore, the assignment of two values (1/2 and –1/2) to s is not correct, because electron spins always in one direction, as shown in Fig. 1(b). To s, only one value can be assigned. Therefore, j (= s ± l) can have only one value corresponding to each value of l, not more than one value.

Now, when: i) the definitions μ_J (= $\mu_S \pm \mu_L$), and L_J = jh/2π are not correct; and ii) j (= s ± l) can have only one value corresponding to each value of l, and not more than one value; the current explanations of fine structure of spectra lines, which have been explained taking account of the above factors [bullets i) and ii)], should not be true.

However, the results of the determination of the purpose why electrons possess persistent spin motion, and of the determination of their unique structure (see Section 2) provide very clear and complete explanation of: 1) why and how the fine structure of spectral lines is obtained; 2) deduction of expressions for their numbers, intensity, and frequency (see Sections I, and K, [2])., without taking any account of Eqns. (3), and (5), quantum number s, l, j, selection rules, and g factor etc.

2 Results of the determination of the purpose why electrons and nucleons possess persistent spin motion, and of the determination of their unique structures

Because the purpose (see Section 2, [1]) why electrons, nucleons, and other particles possess the property of persistent spin motion is to generate in them:

1) linear velocities (v) along the directions of their respective L_S, where (v) varies with their frequency of spin motion (ω) (see Section 2.1, [1] for detail information);

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)] (see Section 2.2, [1] for detail information);

all electrons, nucleons, and other particles are always found in a state of linear motion oriented along their respective L_S directions. The energy (E_M), momentum (p_M), and spin angular momentum (L_S) of electrons, nucleons, and other particles are always conserved during their motion, even when the rate of velocity increase in electrons accelerated by a large voltage (see Bertozzi's experiment [3] for example) starts decreasing after they attain their relativistic velocity, or when electrons move along their elliptical orbits (see Section 2.2, [1] for details.

Moreover, because of the unique structure of electrons, and nucleons (see Section 3, [1]):

i) planes of their magnetic rings and magnetic ring's magnetic fields lie always in a plane perpendicular to the directions of their respective v;

ii) directions of their spin magnetic moments (μ_S) lie always opposite to the directions their respective v;

iii) directions of spin motion of their rings of magnetism and magnetic ring's magnetic fields occur always in clockwise direction (if the direction of their v is opposite to the face of clock).

3. Explanations of how electrons are bound together in their beams despite similar charges on them, how a magnetism (electromagnetism) is generated in them, and how a magnetic field, which possesses direction and occurs in a plane perpendicular to the direction of flow of electrons through them, is generated around them

In electron beams, because of the properties of electrons [see bullets 1) and 2), Section 2], the velocity (v) of all electrons of the beams are oriented and aligned along the direction of motion of their beams. The orientation and alignment of v of the electrons occurs by means of electric fields, which is applied in electron guns to concentrate or collimate and increase the velocity of electrons emitted from their source (filament). (For verification that the electric fields orient the direction of v of electrons, see Section 4.4.) When v of electrons of the beams are oriented and aligned: i) due to result [bullet i), Section 2], the planes of electron's magnetic rings and magnetic ring's magnetic fields are subsequently oriented and aligned along number of parallel planes which are perpendicular to the direction of motion of the beam, as shown in Fig, 2, where magnetic rings and magnetic ring's magnetic fields of seven electrons of the beam are arranged along one such plane; ii) due to result [bullet iii), Section 2], the direction of spin motions of magnetic rings and magnetic ring's magnetic field of electrons occurs in anticlockwise direction (if the directions of v of electrons are towards the face of the clock), as shown in Fig. 2; and iii) due to result [bullet ii), Section 2], the directions of μ_S of all the electrons occur in direction opposite to the direction of their (electrons) flow (i.e., v).

As the consequence of alignment of the planes of magnetic rings of the electrons of the beam, magnetism (electromagnetism), which happens to be diamagnetism (see Sections 4.2, and 4.3), is generated in the beam, and as the consequence of alignment of the directions of μ_s of the electrons of the beam, the magnetic moment of magnetism generated in the beam occurs in direction opposite to the direction of motion of the beam (or motion of the electrons of the beam). Further, as the consequence of the alignment of the planes of magnetic field of the electrons of the beam, there is created such situation, Fig. 2, that, due to interaction between their magnetic fields, a force of attraction is generated between all the electrons (how this force is generated, see Section 3.1, [4]), and a magnetic field is generated around them, as shown in Fig. 2, and finally around and along the length of the beam a magnetic field is generated as shown in Fig. 3. This magnetic field obviously occurs in a plane perpendicular to the direction of flow of electrons, and it possesses direction, e.g., anticlockwise, if the electrons of the beam are moving towards the face of clock, similarly, as the magnetic fields of electrons possess anticlockwise

3.1 Explanation of how the strength of magnetic field generated around an electron beam increases as the velocity of electrons flowing through the beam increases

If the velocity (v) of electrons flowing through an electron beam is increased, their (electrons) frequency of spin motion (ω) increases according to expression [2]

$$\mathrm{m}\,\mathrm{v}^2 = h\,\omega \tag{6}$$

(where m is mass of the electron, and h is the Planck's constant), and due to increase in ω of the electrons, the frequency of spin motion of the magnetic field, generated around the beam, also increases accordingly [because the magnetic field generated around the electron beam and its (magnetic field) spin motion are caused due to the magnetic fields of its electrons and due to spin motion of the magnetic fields of its electrons, respectively]. The increase in frequency of spin motion of the magnetic field generated around the beam, determines the strength of its (beam) magnetic field.

4 Explanation of how magnetism (electromagnetism) is generated in current carrying rods, and how a magnetic field, which possesses direction and occurs in a plane perpendicular to the direction of flow of electrons through them, is generated around them

As we know, in all the substances, photons are emitted from their orbiting electrons, which (emission of photons) goes on continuously. Some photons remain always in the substances despite absorption of some of the emitted photons again in the substances, and emission of some of the emitted photons into atmosphere from the surfaces of the substances. The photons remaining in the substances go on travelling here and there inside the substances and collide with free electrons of the substances found in the way of photons, and thus resist their (free electrons) motions along the directions of their respective v. Hence, when no voltage is applied across the ends of the specimen rods, due to collisions of their free electrons with photons remaining in them, the directions of v of their free electrons are found randomly oriented in all the different directions of the rods.

When some voltage is applied across the ends of the specimen rods, the randomly oriented directions of v (or L_s) of their free electrons are oriented and aligned (see Section 4.4 for its confirmation) along the direction from positive to negative pole or end, and the electrons start flowing in that direction. The applied voltage does not let the alignment of the directions of v of electrons to be disturbed due to collisions with photons existing inside the rod. When the directions of v of the electrons are oriented and aligned, the directions of μ_s of the electrons are subsequently oriented and aligned in direction opposite to the direction of alignment of v of electrons, and the planes of their magnetism and magnetic fields are oriented and aligned in a plane perpendicular to the direction of the applied electric field, or perpendicular to the direction of flow of electrons.

When the free electrons of a current carrying specimen rod start flowing through that, they flow through that's different, e.g., number 1, 2, 3, 4,…., inter-lattice passages in the form of number of queues (or rows). Their flow in such a manner can be assumed as, through every inter-lattice passage, the electrons are flowing in the form of a beam, as shown in Fig. 4. The magnetic fields generated around every such inter lattice beam interact as shown in Fig. 4, similarly, as magnetic fields around electrons interact, Fig. 2. Consequently, a force of attraction is generated among all the inter lattice beams and the beams are bound together, and ultimately, all the free electrons of the specimen rods flowing through these inter lattice beams are bound together. Due to interaction between magnetic fields of these inter lattice beams a magnetic field is also generated around and along the length of the rods in a plane perpendicular to the direction of flow of electrons through the rods. Further, as the magnetic fields generated around and along the length of the electron beams possess direction (anticlockwise, if the electrons are moving towards the face of clock, see Section 3), the magnetic field generated around and along the length of the rods also possesses the same (anticlockwise) direction. In electron beams, because electromagnetism (which happens to be diamagnetism) is also generated (see Section 3), due to electromagnetism generated in inter lattice beams, an electromagnetism is generated in the rods also, which (electromagnetism) happens to be diamagnetism (see Sections 4.2 and 4.3). Moreover, due to μ_s of magnetism, generated in inter lattice beams (see Section 3), the magnetism generated in the rods also possesses μ_s, and it (μ_s) occurs in the same direction in which the μ_s of magnetism of the inter lattice beams occur.

4.1 Explanation of how the strength of magnetic field generated around an electric current carrying rod increases as the current flowing through that rod increases

The increase in current flowing through the rod means the increase in velocity of the electrons flowing through the rod. When the velocity (v) of the electrons flowing through the rod is increased, their frequency of spin motion (ω) increases according to Eqn. (6). Due to increase in ω of the electrons, the frequency of spin motion of the magnetic field generated around the rod is increased accordingly, which increases the strength of the generated magnetic field in the rod. Because the increase in frequency of spin motion of the magnetic fields generated around the rod increases the rate of its (magnetic field) interaction with the other magnetic field. For example, if an electric current flowing through two parallel wires is increased, the force of attraction between wires increases. The increase in electric current flowing through the wires means the increase in velocity (v) of the electrons flowing through the wires, due to which the frequency of spin motion (ω) of the electrons, and hence the frequency of spin motion of the magnetic fields generated around the current carrying wires are increased. Due to increase in the frequency of spin motion of the magnetic fields generated around the current carrying wires, the rate of interaction between their magnetic fields is increased, and due to increase in the rate of interaction between their magnetic fields, the force of attraction generated between current carrying wires is increased.

4.2 Explanation of which type of magnetism (electromagnetism) is generated in electron beams and current carrying specimens

It is believed that diamagnetism is a property generated in substances due to their free electrons, and as we see also above in sections 3 and 4 that the electromagnetism generated in electron beams and current carrying rods are caused due to their free electrons, therefore, the generated electromagnetism in them should be diamagnetism.

Secondly, as we know, when some electric current starts flowing through a specimen substance at its normal state, and some persistent current starts flowing through the same specimen substance at its superconducting state, in both the cases, magnetism is generated in the specimen substance. When in both the cases, magnetism is generated in the specimen substance, and the magnetism is generated in them due to the flow of current through them, the generated magnetism in both the cases should be of same type. Since it is believed that when persistent current starts flowing through the specimen at its superconducting state, diamagnetism is generated in the specimen, the generated magnetism in specimen at its normal state when an electric current flows through that, should also be diamagnetism (for its experimental confirmation, see Section 4.3).

4.3 Experimental confirmation that the magnetism (electromagnetism) generated in electron beams and current carrying specimen substances is diamagnetism

Let us consider a specimen rod over which a primary and a secondary coil are wound. The primary is connected to the battery through a key, and the secondary is connected to a ballistic galvanometer. If some electric current is allowed to flow through the rod, a kick in the galvanometer reading is observed, which means, some magnetism has generated in the rod and, due to that, a change of flux has taken place.

If we take the specimen rod in the form of a close loop, and it is brought down to its transition temperature T_c (a temperature below which the resistivity of a metal or alloy becomes zero and a persistent current starts flowing through that metal or alloy), then too, a change of flux takes place (known as the Meissner effect [5]), which means, some magnetism has generated in the specimen. Because the magnetism generated in the specimen at its transition temperature is supposed to be diamagnetism, the magnetism generated in the current carrying specimen at its normal state should also be diamagnetism.

4.4 Confirmation that the directions of linear velocity of electrons in their beams and free electrons in current carrying rods are oriented along the direction of their flow when they start flowing through the beam and rods

If we take an iron bar and place it in the earth's magnetic field parallel to its direction; we find no change in the form/shape of the lines of force of the earth's magnetic field near the iron bar. However, if the iron bar is magnetized (or the iron bar is replaced by an exactly similar bar magnet), the form/shape of the lines of force of the earth's magnetic field near the magnetized iron bar is now being changed. This change occurs because the magnetic lines of force of the earth's magnetic field, which were earlier passing through the iron bar when it was not magnetized, are now expelled out from the iron bar when it is magnetized. The expulsion of the magnetic lines of force of the earth's magnetic field from the magnetized iron bar occurs because when the bar is magnetized, its lines of force are generated, and according to the property of magnetic lines of force, because they neither intersect themselves nor other lines of force, the lines of force of the earth's magnetic field are expelled out from the magnetized iron bar in order to avoid intersection.

Similarly, when the lines of force of the external magnetic field (generated around the steady current carrying primary coil, see Section 4.3) are expelled out from the specimen as a current starts flowing through the specimen, it means, some magnetic field has generated in the specimen of which the lines of force are so oriented and aligned that they block the lines of force of the external magnetic field to pass through the specimen, consequently they are expelled out from the specimen. Since the magnetic field, of which the lines of force block the lines of force of the external magnetic to pass through the specimen, is generated when the current (i.e. free electrons of the specimen) start flowing through the specimen, it means, the magnetic fields which the electrons possess are oriented and aligned such that they block the lines of force of the external magnetic field to pass through the specimen.

It is, therefore, confirmed that when the current starts flowing through the specimen (i.e., when free electrons of the specimen start moving), the directions of their velocity (v) are oriented and aligned such that the planes of their magnetic fields may block the lines of force of the external magnetic field to pass through the specimen.

5 An important conclusion

The magnetic moment of electrons (μ_S), and the magnetic moment of current carrying rods are actually the magnetic moments, and not the magnetic dipole moments. Further, μ_S is defined also always as magnetic moment, and never defined as magnetic dipole moment. By convention, the magnetic dipole means, the magnet has two poles- south and north. South pole is that, through which the magnetic lines of force of the dipole enter the dipole, and north pole is that, through which the magnetic lines of force exit from the dipole. For example, the electronic orbits, Fig. 6(a), and the current carrying close loops, Fig. 6(b), where through their south poles, the lines of force of their magnetic fields enter and through their north poles, the lines of force of their magnetic fields exit. While the magnetic lines of force of electron, Fig. 1, and magnetic lines of force of current carrying rod, Fig. 5(b), both neither enter through them nor exit from them.

6. Explanation of how the electron orbits, and current carrying close loops behave as magnetic dipoles and their magnetic north and south poles are created

6.1 How the electron orbits behave as magnetic dipoles and their magnetic north and south poles are created

Because the electron moves always along the direction of its L_S [see bullet 1) of Section 2], therefore, when it moves with velocity v along its orbit [direction of v has been marked by two long arrows along the path of the orbit in Fig. 6 (a)], the direction of its L_S is happened to be aligned along its orbital path tangentially at every point of the orbital path, and the planes of its magnetic ring and magnetic field, according to its properties [see bullets i), ii), and iii) of Section], are happened to be aligned in a plane perpendicular to the direction of its orbital path at every point of the orbital path, as shown in Fig. 6(a). [In Fig. 6(a), the magnetic ring has not been shown, and each circular vertical ring round the orbital path is in fact consisting of several co-centric circles, as occurs round the magnetic ring of the electron, Fig. 1(b).] The directions of spin motion of magnetic ring and magnetic field of the electron are happened to be anticlockwise (if the direction of motion of electron along its orbital path is towards the face of clock), shown by arrows along the circular vertical rings in Fig. 6(a). Now if we look at Fig. 6(a), we find that the lines of force of the magnetic field generated round the orbital path enter the space A through the upper surface of the orbit, and after their exit from the lower surface of the orbit, they turning round the orbit reach again towards the upper surface of the orbit to enter through it. Therefore, by convention, the space through which the magnetic lines of force of the electron enter, Fig. 6(a), behaves as the south (S) pole, and the space from which the magnetic lines of force of the electron exit, behaves as the north (N) pole. To this dipole, the magnetic dipole moment μ_L is associated.

6.2 How the current carrying close loops behave as magnetic dipoles and their magnetic north and south poles are created

In the manner a magnetic field is generated around the current carrying rod (see Section 4), in the same manner, a magnetic field is generated around the rod if the rod is taken in the form of a close loop, as shown in Fig. 6(b). [In Fig. 6(b) too, each circular vertical ring round the close loop is in fact consisting of several co-centric circles.] If we look at Fig. 6(b), we find that the lines of force of the magnetic field generated round the length (perimeter) of the close loop enter the space A through the lower surface of the close loop, and after their exit from the upper surface of the close loop, they turning round the close loop reach again towards the lower surface of the close loop to enter through it. Therefore, by convention, the upper surface of the close loop behaves as the north (N) pole, and the lower surface behaves as the south (S) pole.

6.3 Discussion

Currently, no explanation is found as to how the electronic orbits and the current carrying close loops behave as magnetic dipoles and how their two magnetic poles are created. Regarding how the electronic orbits behave like magnetic dipoles, currently, it is presumed that, due to flow of charge of the electron along its orbits, a magnetic field is generated around the orbits and they (orbits) behave as magnetic dipoles. Similarly, regarding how the close loops behave as magnetic dipoles, currently, it is presumed that, as due to flow of charge of the electrons through the current carrying rods, a magnetic field is generated around the rods, in the same manner, due to flow of charge of electrons through the current carrying close loops, a magnetic field is generated around the close loops and they behave as magnetic dipoles. However, these presumptions cannot be accepted because, for electronic orbits and current carrying loops to behave as magnetic dipoles, it is necessary that the magnetic fields generated around them should occur in the manners as shown in Figs. 6(a) and 6(b), and the current assumption fails to explain it.

7 Possibility of generation of two very important effects in electric current carrying close loops

7.1 Meissner effect, and explanation how it can be generated

If we take a specimen substance in the form of a close (e.g. circular) loop and place it in an external magnetic field with its plane perpendicular to the direction of the external magnetic field, the lines of force of the external magnetic field pass through the body of the loop, as shown in Fig. 7(a). If an electric current is allowed to flow through the loop, a change in flux can be observed, similarly, as, if the specimen is cooled down to its transition temperature T_c and the persistent current starts flowing through the specimen, a change in flux, i.e. the Meissner effect [5] is observed (see Section 4.4, [6]). Because, as the electric current starts flowing through the specimen, due this current, a magnetic field is generated around the body of the specimen, Fig. 7(b), and the specimen starts behaving like a magnetic dipole (see Section 6.2), consequently, the magnetic lines of force of the external magnetic, which were earlier passing through the body of the specimen when no current was flowing through the specimen, are now expelled out from the body of the specimen and they acquire the form, as shown in Fig. 7(b).

7.2 Levitation of a magnet above the surface of the electric current carrying close loop

As an electric current carrying specimen substance, taken in form of a close (e.g. circular) loop, behaves like a magnetic dipole, and if on its surface, a disc (e.g. circular) type of magnetic dipole is placed, the disc shall experience a force of attraction or repulsion. If the similar poles of the close loop dipole and magnetic disc lie facing to each other, the disc shall experience a force of repulsion, otherwise, the disc shall experience a force of attraction. If their similar poles lie facing to each other and the mass of the disc is such that it may be lifted above due to the force of repulsion on it by the close loop dipole, the disc can be levitated up above the surface of the close loop dipole. It shall be similar to, if above the surface of a persistent current carrying specimen, a magnet is placed and the magnet is levitated up above the surface of the persistent current carrying specimen (see Section 4.5, [6]).

8 Conclusion

As we know, properties of a person depend upon his physical and mental structures, and a work performed by him depends upon his properties, and condition(s) under which the work is performed. In the same manner, properties of electrons, nucleons, and other particles should depend upon their structures, and the phenomena, properties of their systems, and structures of their systems, generated due to them, should depend upon their properties, and conditions under which the phenomena, properties of their systems, and structures of their systems are generated. Therefore, if a theory is developed to explain the phenomena generated due to them, properties and structures of their systems generated due to them, that theory should be developed taking into account their properties [e.g., see bullets 1), and 2), and bullets i), ii), and iii) of Section 2], and condition(s) under which, for example: 1) presence of photons in substances, which colliding with free electrons of the substances produce resistance in their flow, in significant amount at their normal state (see Section 4); 2) presence of photons in substances in insignificant amount at their superconducting state (see Section 1.1, [6]); 3) no presence of photons in electron, proton etc. beams, and nuclei; the phenomena, properties of their systems, and structures of their systems are generated due to them. Otherwise, the developed theory, e.g., electromagnetic theory, quantum wave theory, and current quantum field theories, cannot be true. Consequently, if the rigorous mathematical proofs of the electromagnetic theory, quantum wave theory, and current quantum field theories are examined, in them, numerous logically and practically unbelievable assumptions have been accepted (see Section

1, [7] for quantum wave theory, and Sections 3.1.1, and 3.3.1, [8] for quantum field theories) in order to arrive at the desired results. Further, despite accepting numerous logically and practically unbelievable assumptions, the quantum wave theory fails to explain numerous phenomena, e.g., see Section 1, [7], and electromagnetic theory and current quantum field theories fail to explain, for example: 1) properties (see Sections 3, 4, and 6), and two very important possible effects (see Sections 7.1, and 7.2); 2) several properties of the list of Section 3.3, [8]; 3) all the properties listed in Section 3.4, [8]; and 4) structures of deuterons, alpha particles, and nuclei.

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FIGURE CAPTIONS

Fig. 1 (a) The spherical ball, dark solid-line circle, and concentric broken-line circles represent respectively the charge, magnetism, and magnetic field of an electron. (b) Transverse cross-sectional view of an electron where the ball of charge is indicated by a dark, thick, and solid-line circle, magnetism by a dark, thin, and solid-line circle, and magnetic field by broken-line circles with arrows to show the directions of their spin motion.

Fig. 2 Transverse cross-sectional view of interaction between magnetic fields of electrons those are moving in their beam with velocity v.

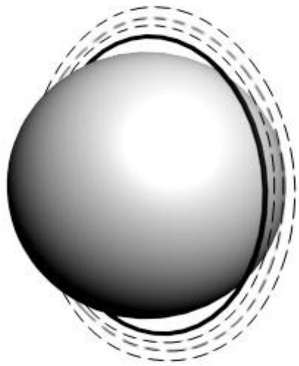
Fig. 3 (a) Transverse cross-sectional view of the magnetic field generated around an electron beam. (b) Longitudinal view of the magnetic field generated around and along the length of an electron beam which is moving with velocity v.

Fig. 4 Transverse cross-sectional view of interaction between magnetic fields generated around the inter-lattice electron beams which are passing through the inter-lattice passages of the specimen, where the lattices have been shown by small solid dark discs.

Fig. 5 (a) Transverse cross-sectional view of the magnetic field generated around the specimen. (b) Longitudinal view of the magnetic field generated around and along the length of the specimen which is carrying current i.

Fig. 6 Longitudinal view of the ejection of magnetic lines of force of the external magnetic field from the specimen, taken in the form of a close loop and carrying current i.

Fig. 7 (a) The magnetic lines of force of the external magnetic field passing through the body of specimen, taken in the form of a close loop and no current are flowing through it. (b) Ejection of the magnetic lines of force of the external magnetic field from the body of specimen when the current i start flowing through it.



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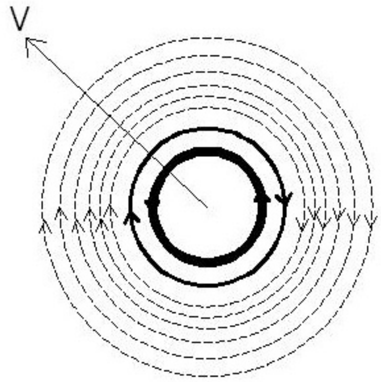
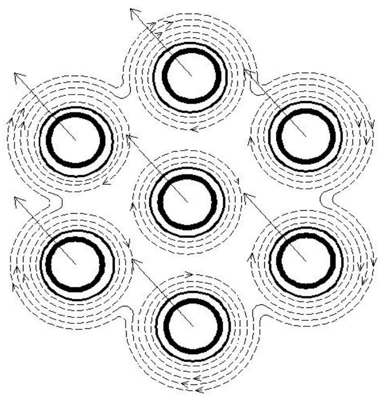


(b)

Fig. 1



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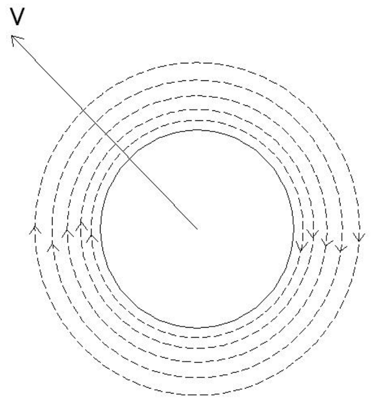

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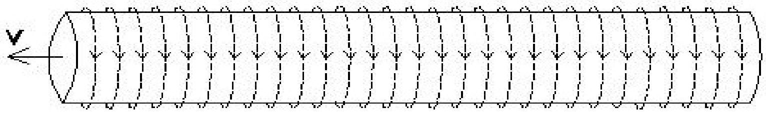

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Fig. 3

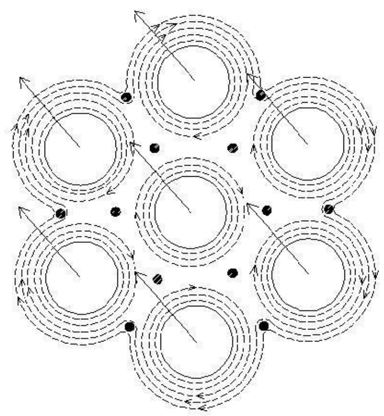
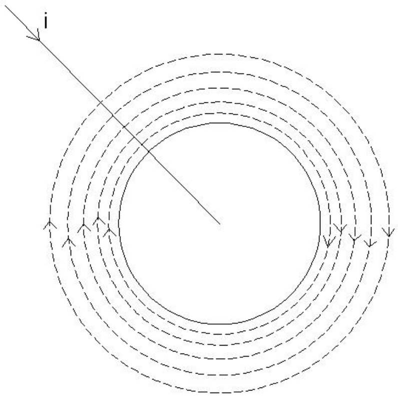


Fig. 4



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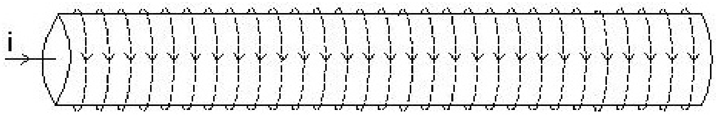

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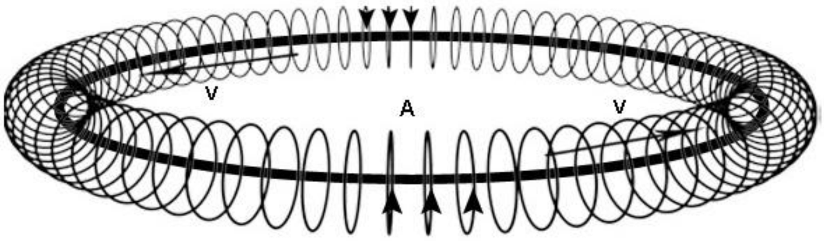
Fig. 5



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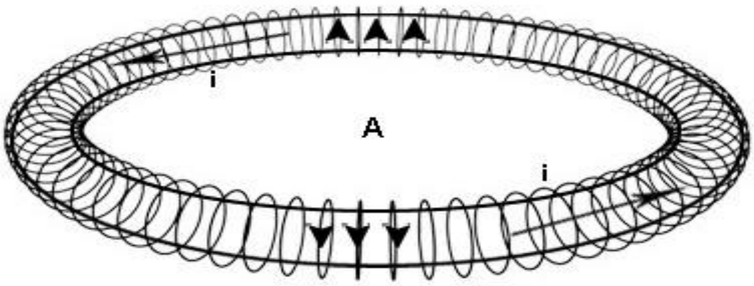

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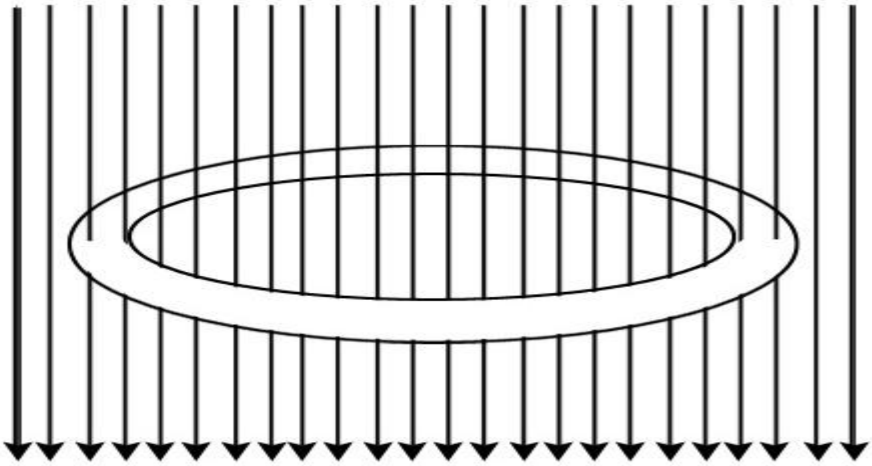
Fig. 6



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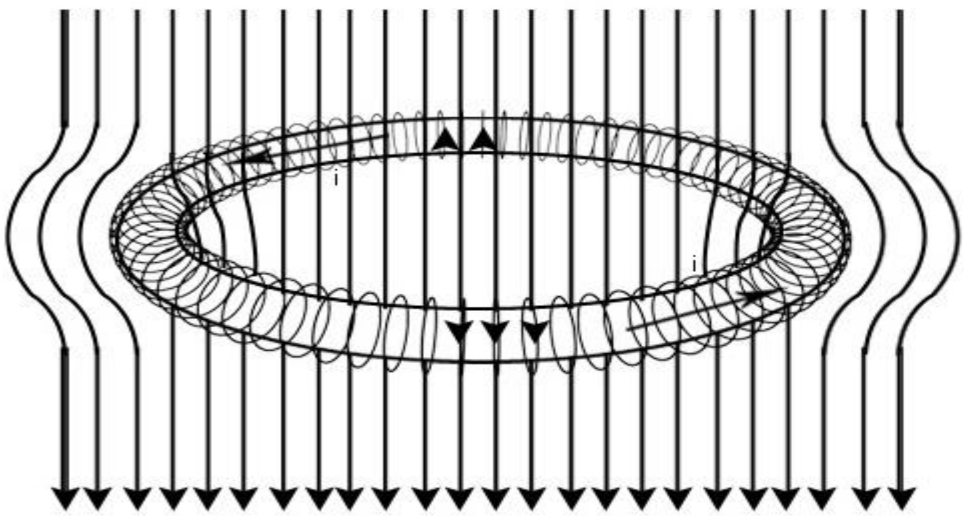

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Fig. 7