The Daon Theory: Fundamental Electromagnetism

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Abstract

The Daon Theory is a new general theory of physics, it's a completely new way to approach physics. The Daon theory makes it possible to give simple and detailed explanations for all electromagnetic phenomena. We find the Dielectric constant, the Permeability constant and the reason for the signal velocity c, while examining Electricity and Magnetism. We thereafter examine an electron under acceleration with a detailed explanation of the phenomenon of Induction and the Electro-Magnetic wave.

1 Introduction

Our knowledge of physical phenomena is split into four different areas, each of which are associated with a specific force, they are usually called Electro-Magnetic, weak (QED), strong (QCD) and Gravitational forces. Each one of these domains has a corresponding theoretical model which has been fitted to experimental data. These theories give a precise description of the force symmetries, acting within each specific area, but *do not* give any precise idea of the underlying fundamental forces.

The particles are described with the help of their associated wave, which leads to a precise knowledge of the wave phenomenon, but unfortunately, also leads to total ignorance concerning the source of the wave. This is the reason for the need of a new and different approach, able to explain the forces acting at an even smaller distance than the wave-length of the associated wave.

Our knowledge, of the world around us, is in fact very shallow. We are still not able to answer questions like: What is potential-charge? What is mass-energy? What is force-field?

The main reason for the difficulties connected with the type of questions above, is that the field concept is very obscure. The force, connected with a field, has to have some *means of action*. The field must therefore, have some substance. The action of a field indicates that the space should contain something, as also suggested by phenomena like the electro-magnetic wave, the associated wave,...

The relativity as well as the quantum mechanics have lead to dead ends, not reaching the fundamental phenomena of physics. It is therefore necessary to make the development of a new theory as simple and fundamental as possible.

2 Introduction to the Daon theory

It is evident that a better understanding of space is needed! A starting point, to approach this goal, can be obtained by taking a closer look into some weak points in modern physics, which all have a direct connection with what we want to develop.

- We examine the photons supposed to be emitted from an antenna (the antenna is considered to be spherical for reasons of simplicity). Consider the photon as an object having an EM-oscillation, moving with the velocity of light along a straight line.

  The EM-amplitude of the radiation must be proportional to the local density of photons, if the field from such an antenna is constituted by photons. The EM-amplitude must then be reduce with the inverse of the emitted photons density (i.e.$\frac{1}{r^2}$. But, from measurements, it is know that the amplitude of the radiated EM-field is reduced inverse proportional to the distance $\frac{1}{r}$. *The radiated EM-field can therefore not be constituted by photons!*

  Also, a static electric field is **radially** directed, so how can such a field have something to do with a photon, which has its electrical field in the transverse direction?

- Let us suppose that an electron is surrounded by virtual particles. The space neutrality must always be maintained, so the creation and destruction of virtual particles must happen in pairs. The virtual particles can not move very far since their lifetime is very short, whereas the real electron should feel the mean influence from all the virtual charges, distributed symmetrically around it. The charged virtual particles are influenced by the real electron so that the positive charges are attracted towards the electron whereas the negative charges are repelled.

  Let us now examine the interaction between two electrons in collision: The sum of the virtual particles charge must be zero, since, at some

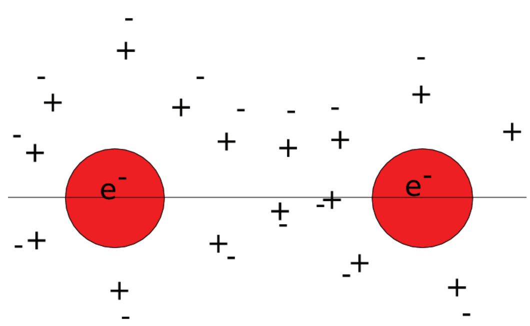

Figure 1: The virtual charged particles distribution, around two electrons

distance away, the electron charge is constant. But, when the distance between the two electrons is shortening, the negatively charged virtual particles must be repelled between the two real electrons, so that they will move away from a line passing through the centres of the two electrons. The positively charged virtual particles will be attracted towards the same line, as schematically demonstrated in Fig. 1. It follows that the force acting between the two real electrons (compared with the coulomb's law) must be *reduced* at shorter distances. But, experiments show an *increase* of the force!?

- Several types of virtual particles such as $\nu, e, \mu, \pi, \ldots$ would mean a radial variation of the effective force between the two electrons. That is a variation of the charge, due to the difference in energy needed for the creation of each specific virtual particle. However experiments show a monotone curve of the charge, as presented schematically in Fig. 2, i.e. there is no structure in the graph. The conclusion must be that *virtual particles do not exist around the electron* or, if you prefer, that some other much stronger phenomenon exists, so that the effect of the virtual particles is invisible!

- If we examine the interaction between two charge particles, having high but different velocity vectors. How can such particles have an interaction? They do not know where their partner is, so how can they interact in the correct direction? This can be done only through a massive creation of virtual photons in all directions, where the virtual photons must "live" long enough to transmit a signal (how?), between the two particles!!?

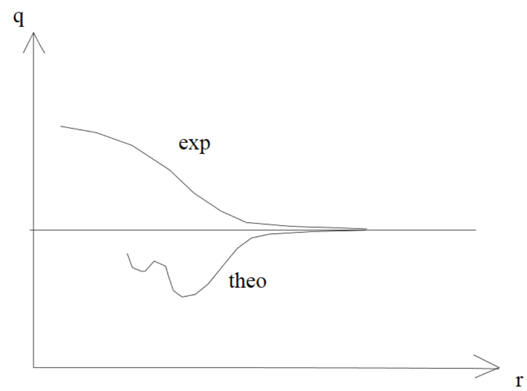

Figure 2: Schematic description of the behaviour of the charge, acting between two electrons, relative to the distance between them.

- How is the EM-field propagating in space and why is the speed of a signal limited to a precise value (c)?
- It has been shown[1] that the electric field around an electron is associated directly with the electron!

What is constituting the electric field around an electron? Virtual particles do *not* exist, around an electron, as demonstrated above. Also theories using fields, constituted by some sort of "liquid", must be excluded since, such models do not explain how, the then necessary "flux" can be maintained between different charges. The photon exchange used as an explanation of the field, was already examined and discarded above.

Let us end by one of the greatest "misunderstandings" in today's physics, *the mass*. According to experimental evidence, the mass grows with velocity according to the famous law $m = \frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}}$. But, according to Einstein's special theory of relativity [2], this mass can not be accepted as a "true" mass, even if all experimental evidence show that this supplementary mass is an absolutely normal one.

The only possible answer to all these problems must be that the space is filled with something, i.e., **there must exist a media**.

It's demonstrated by experiment that an electron is a single spherical particle [3], the electron's associated wave must therefore originate from some oscillatory motion of the electron! This oscillation is modified by the velocity of the electron, as described by the law of Louis De Broglie ($mv\lambda = h$), but, this equation is valid also at velocities much lower then the velocity of light (non relativistic)!

It follows that any observer, with low but different velocities and directions, will see the electron having different velocities [4]! But, the electron will have the same wavelength and frequency of oscillation, for any (non relativistic) observer, which can be measured with high resolution in a Low Energy Electron diffraction measurement.

But then, the velocity of the electron is relative to what? If the space is empty, how can the speed of an electron modify its frequency of oscillation? A force must act on the electron but, from where is such a force coming? There is, in fact, only one possibility, the electron's velocity must be relative to a local reference system, i.e., the laboratory where an experiment is made.

This means that there must exist a media following the earth in its movement through space and that the electron must have some interaction with this surrounding media. It's obvious that in this case all masses must be surrounded by the same sort of media.

We will use this laboratory reference system in the following calculations, if not otherways stated.

3 The electron

The consequences of the equations of Maxwell indicate that the source of the Electro-Magnetic field is the charge. It is therefore necessary to focus our effort on a charged particle, to obtain some basic knowledge of the corresponding physical phenomena. The electron seems to be the most simple construction of nature but contains at the same time most of the basic unknowns in today's physics, such as charge, mass, field, associated wave, ...

The experimental data show that the electron is surrounded by an electric field extending towards infinity. There is no evidence that this field is modified by other fields or forces closer to the electron's center.

This leads us to believe that the electric field, as well as the electron, is constituted by identical real (always existing) objects. We here suggest the existence of an object proposed as the basic constituent of all fields, the name **DAON** [1] is therefore suggested for this specific object.

[1]Dao (Tao) is a fundamental concept in the old chines culture, it is the road through the universal harmony. It's constituted by Yin (darkness, cold, contraction, rest) and its opposite, Yang (light, warmth, expansion, activity)

We introduce here the most basic and simple hypothesis, i.e.; **there is only one unique object as building block for everything within the Universe!**

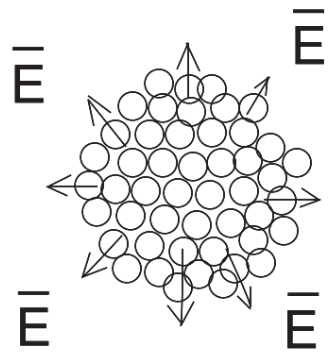

Figure 3: Schematic picture of a cut through the center of an electron

Supposing that daons are the constituents of the electron makes it necessary to believe that the positron, its anti-particle, is constituted by objects in all identical to the daons of the electron but having some characteristic giving it the opposite effect in the radial sense. An anti-daon could here be suggested but the interaction between daons must be such that an anti-daon must be the daon turned around into the opposite direction, the daon must therefore be identical with its anti-daon. The necessary action between daons must then come from a rotation i.e. *the substance of a daon must rotate around an axis, giving a direction to the daon.*

The only possible difference between an electron and a positron must then be that if the positron daons points inwards, the daons of an electron must point outwards from the center; this definition of direction has been defined to give the "correct" behaviour of the magnetic field around the electron.

Now try to imagine the daons constituting a shell around an electron, all pointing in the radial direction, relative to the center of the electron. Around this daon shell is another one, constituted by daons all again pointing in the same radial direction as the daons in the previous shell etc. The result will be something looking similar to the schematic cut of an electron in Fig. 3. The same should then be true for a positron besides the direction of its daons being inverted relative to the electron.

This gives a model of an electron where the constituents of the electric field are also the constituents of the electron itself. All physical characteristics of an electron must then be due to the collective action of the daons constituting it.

3.1 The Daon

Let us imagine a charged sphere of matter, where the daons, constituting the electric field, extend versus infinity. The daons constituting the field can not disappear (as by magic) when the sphere is discharged i.e. the daons must always be there also when the sphere is neutral.

The earth is constituted by an enormous amount of charges, with an identical number of positive and negative ones, this means that there must be a huge amount of daons around the earth, extending versus infinity, according to the suggestion above. There is no privileged direction in space, it's therefore necessary that all possible directions of the daons rotational axis are equally represented. These *disordered* daons will have a growing importance, they therefore deserves a specific name, they will henceforth be called *free daons*. They fill up all space besides the space occupied by *ordered* daons. The space is neutral and isotropic so the free daons must be in equilibrium so that their *medium* value of contraction is equal to their *medium* value of expansion. In the same way their *medium* value of attraction must be equal to their *medium* value of repulsion. This means that the free daons must have the same mean size.

A charge must be a stable and well ordered set of daons, therefore, if a charge is placed within a media of free daons, the daons have to become more and more "ordered", closing in on the charge, until the increased order is matched and a radial equilibrium is established. It follows that an electron, having "perfect" order, doesn't exist. There is always a gradual passage, from disorder to order, going from "far away" versus the center of the electron.

The attraction/repulsion between two daons must depend on the relative direction of motion, of their respective substances, in the zone of interaction. Four specific situations of interaction, between identical daons, is proposed, in Fig. 4:

(a) The substance of the respective daon are, in the zone of interaction, rotating in opposite direction at the same speed. The daons feel an *attraction*, coming from the surface of interaction, leading to a *reduction* of the daon sizes. The daon substances relative velocity is maximal in the zone of interaction, there is here no transverse action!

(b) The substances of the respective daon are, in the zone of interaction, rotating in the same direction at the same speed. The daon substances relative velocity in the zone of interaction is zero. The daons feel a

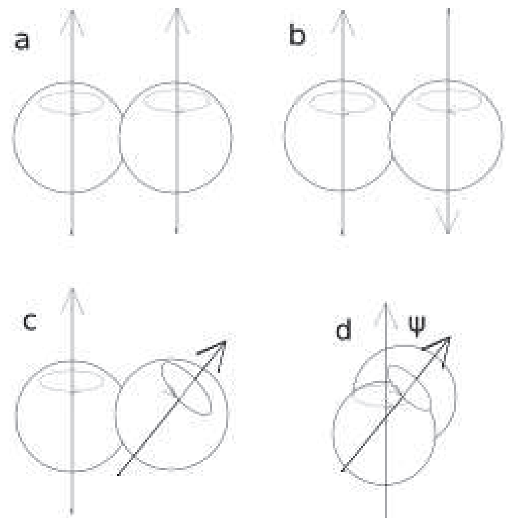

Figure 4: Four representative positions of interaction between two daons.

repulsion, leading to an *increase* of the daon sizes, also here without transverse action.

(c) The substance of the respective daon are, in the zone of interaction, rotating in the same direction. In this situation the daons *angular* velocity vectors have an angle between them, but the respective daon substances have still parallel velocities, in the zone of contact! The attraction between the daons, along a line passing their centres, is identical to the situation in *b)*. There is no transverse action, since the substances velocities are parallel in the zone of interaction.

(d) The substance of the respective daon are, in the zone of interaction, rotating with an angle relative to each other. In this situation the daon substances velocity vectors have an angle ψ between them, as also their angular velocity vectors. The attraction between the daons, along a line passing their centres, is then proportional to $\cos\psi$, whereas the transverse repulsion is proportional to $\sin\psi$, in the zone of contact.

The daon change size under interaction but the medium change of size must be zero in a situation of equilibrium, i.e. *the effective attraction, contracting a daon, must then be equal to the effective repulsion expanding it.*

An interesting thought is the following: If two isolated daons have an interaction, the size of the two daons would rapidly change until the end of interaction. The sizes of such daons would then vary dramatically so that a smooth behaviour of any interaction, like electromagnetic fields and waves, would be difficult to understand, it follows that, *a daon without interaction must expand until inhibited to do so by its neighbours i.e., a daon must always be in contact with other daons*.

Let us examine a daon in equilibrium within an electron shell; imagine a daon, as a sphere of some substance wanting to expand but stopped, by the surrounding neighbours, to do so. A daons surface can then be separated into zones of interaction and zones of non-interaction. Some zones are alternating between compression and expansion, since the daon is rotating. There are also zones having no interaction besides a "will" to expand. This means that a daon is kept together by some sort of elasticity; otherwise the continued expansion of zones of non-interaction would make the daon "explode". The attraction-repulsion between identical daons, in a situation of equilibrium and in the direction of a line connecting the two daon centres, can therefore be written,

$$a_{d_\parallel} = -C\omega_d^2\; r_d \cos\psi \tag{1}$$

ψ is the angle between the directions of the two daon-substances velocities in the zone of contact. ω_d is the angular velocity of the daon substance and r_d is the daon radius. C is an arbitrary constant.

The daons will also obtain a transverse repulsion, perpendicular to the one indicated above, which in the same way, can be written

$$a_{d_\perp} = C\omega_d^2\; r_d \sin\psi \tag{2}$$

The Daon substance velocity of rotation, is then

$$v_d = \omega_d\; r_d \tag{3}$$

The action-reaction between daons must be independent from the position of the zone of interaction. For example, if the attraction was stronger on the daons equator, the size of the daons would be locally reduced i.e., the form of the daons would become elliptical. This would mean a dependence on the order which, would lead to completely different characteristics of the electron and would disagree with Maxwell's equations. It is therefore necessary that *a daon's action-reaction depends only from the relative direction of the daon substance velocities and not on the position of the zones of interaction! It follows that a daon must in medium be spherical*

The daon can not have any mass, since a mass would make it impossible for any particle to move within the media of free daons, the reaction between two daons must therefore be immediate, i.e., without acceleration. This is the reason why we do not call the daon a particle but an *object* and why we us the formulation *action* instead of *force*.

The action becomes a force when several daons are attracted towards each other and interact with an external field, since then the total action must be divided between the participants, leading to a resistance i.e., a mass (as defined by Newton). The daon's mass can be considered to be a system constant.

The interaction between daons is such as to maintain the daon's velocity of rotation at a constant value. This is necessary since otherwise the interaction would reduce the medium velocity of rotation of the daons to zero!

It should be noted that a daon's substance velocity must be faster than the effective velocity of its rotation, since the interaction between two daons must modify their size. It is therefore necessary to include a radial velocity of the daons substance, leading to a reduction of the azimuthal velocity of rotation. It is therefore the *effective* azimuthal velocity of rotation which we use in our calculations.

3.2 An electron takes form

Let us now imagine a concentric shell, filled with daons kept together by an attraction between daons having quasi-parallel rotational axis, all pointing, in medium, in the radial direction. The daons within such a shell must be kept together because of the daons attraction towards each other. The daons must also be attracted to the daons of the upper and under laying shells, since also these must have the same, quasi parallel, direction of their rotational axis. The strongest attraction, between daons from different shells, is found in the middle of a triangle of daons in a shell. The daons belonging to neighbouring shells therefore place themselves preferentially into these positions. The expansion/contraction and attraction/repulsion of each daon must in medium be zero, in any static situation. In case of the electron, each daon is necessarily in equilibrium within its own shell, since the daons are identical and placed symmetrically around it.

The number of daons in a shell is

$$N = \frac{4\pi r^2}{\pi r_d^2} \frac{\pi}{2\sqrt{3}} \tag{4}$$

$\frac{\pi}{2\sqrt{3}}$ is the "filling factor" of circles on a plane surface. The number of daons in a shell is very high, besides in the last couple of shells at the electron's center, so the curvature has been neglected, if not other ways stated.

The daons can move around freely, in a region where the order is very low, meaning that the shells have no "rigidity". The total attraction between neighbouring shells, far from the electron's center, is then almost constant. The radial component of interaction, between daons in the same shell, becomes important closing in on the electron's center, since the size of the daons is continuously decreasing, in neighbouring shells. A daon must adapt its radius so that its attraction is constant in all directions. This can be obtained only by a displacement of the daon's centre in the direction of the electron's centre, i.e. a deformation of the daon. The equilibrium is obtained, when the attraction is equilibrated around each daon.

The radial component of attraction, on an individual daon, from the upper layer must be equal to the radial attraction from the lower layer plus, the radial component of attraction coming from the daons of its own shell. The total radial attraction between two shells can then, with the help of equations (1)-(4), be written

$$f_n = 3Na_d < \cos^2\psi > \cos\phi + 6Na_d \sin\chi \tag{5}$$

ϕ is the angle between the electron radius and a line passing the center of two interacting daons, in different shells ($\cos\phi \simeq \sqrt{\frac{2}{3}}$). The second term is the radial component of interaction between each daon and its 6 neighbours within the same shell, giving the increase of the action (and the number of daons) from a shell to the next. χ is defined as.

$$\sin\chi \simeq \frac{r_d}{r} - \frac{\Delta s}{r_d} \tag{6}$$

Δs is the displacement of the daon's center relative to the daon's geometrical center (see Fig. 5).

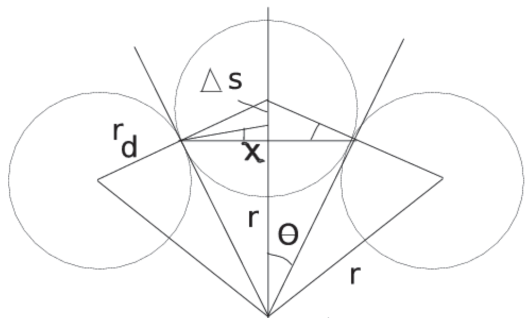

Figure 5: Geometry of a daon in equilibrium, interacting with daons within its own shell.

The attraction between two shells, far from the electron, can now be expressed in the following way:

$$f_n = N3\ C\frac{v_d^2}{r_d} < \cos^2\psi > \cos\phi = C\sqrt{8}\pi\frac{r^2}{r_d^3} < \cos^2\psi > v_d^2 \qquad (7)$$

$< \cos^2\psi >$ is the medium radial coupling in the interaction between daons.

Each daon has 3 interaction zones with the daons of the next neighbouring shell. The examined daon and three daons in the next shell, have the geometry of a regular pyramid.

A daon's radial size has strong variations, due to the contraction and expansion in the interaction between daons. In the electron's centre, where the order is almost perfect, the daons have a geometry similar to a deformed star with 6 points, in the interaction between daons within the same shell, whereas a deformed triangular shape is the geometry between daons from neighbouring shells. This strange geometry of a daon, will of coarse changed when the order is reduced, even if the strong variation of the radius will persist. In the following we will use a medium radius, giving a sphere.

3.3 The Order

The disorder produced by the surrounding free daons must pass through the ordered daons, since the number of surrounding free daons is much bigger than the ordered ones.

The equilibrium around an electron can therefore be written as a number of perfectly ordered daons, placed on a sphere around the electron, subtracting the action from completely disordered free daons placed on the same sphere. We get:

$$\begin{aligned} NC\frac{v_d^2}{r_d} < \cos^2\psi > &= NC\frac{v_d^2}{r_d} - N_{fd}C\frac{v_d^2}{r_{d_{fd}}} \\ \Rightarrow < \cos^2\psi > &= 1 - \frac{r_d^3}{r_{d_{fd}}^3} \end{aligned} \tag{8}$$

$r_{d_{fd}}$ is the radius of the free daons. The index *fd* is hereafter used for free daons.

The daons are attracted to each other due to their order, whereas disorder produce an irregular action in all directions.

The interaction between two parallel daons of different size, for example between two different shells, as presented in Fig. 6, is

$$a_d = C\frac{v_d^2}{\sqrt{r_d^+ r_d^-}} \tag{9}$$

$\sqrt{r_d^+ r_d^-}$ is the effective radius of interaction, being the geometrical mean of their respective radii.

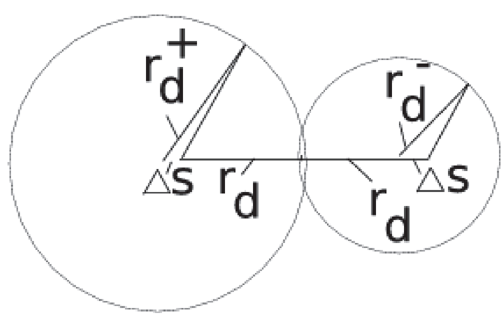

Figure 6: Geometry of the interaction between two daons having different size.

The order must become very low, at a distance sufficiently far from the electron's centre, i.e., a shell has here no "rigidity". The daons within such a shell are constantly replaced by the surrounding ones, but, the shells remain always in position, so that each shell has the same radial action to maintain the equilibrium. The radial action must therefore be constant, "far away" from the electron's center. We get, using equations (7) and (8),

$$\frac{r^2}{r_d^3} < \cos^2\psi >= \frac{r_e^2}{r_{d_{fd}}^3} \qquad \Rightarrow \quad < \cos^2\psi >= \frac{r_e^2}{r_e^2 + r^2} \tag{10}$$

r_e is a radius of reference which is constant when the shells have no rigidity. But, the above equation can be used at any distance, if we allow r_e to vary close to the electron's center, where the action of the radial equilibrium is reduced. This radius will henceforth be called the electron's reference radius and denoted r_{e_∞}.

The radial force, i.e., the action between two shells, far from the electron ($r >> r_{e_\infty}$) can now, by using equations (7), (8) and (10), be expressed as

$$f_\infty = C\sqrt{8}\pi \, \frac{r_{e_\infty}^2}{r_{d_{fd}}^3} \, v_d^2 \tag{11}$$

We will here introduce a fundamental definition, which we will use frequently in the following:

The Order **O**

$$O =< \cos^2\psi >= \frac{r_e^2}{r_e^2 + r^2} \tag{12}$$

which gives

$$\frac{O}{1-O} = \frac{r_e^2}{r^2} \tag{13}$$

Notice that perfect order ($O = 1$) leads to infinity, in the electron's center i.e., perfect order doesn't exist!

4 Fundamental Electricity

Let's imagine two electrons without any movement relative to each other and relative to the surrounding free daons, placed at a distance $a >> r_{e_\infty}$ from each other, as presented in Fig. 7.

The action in the middle between the two electrons, is between two shells associated to different electrons. An interaction between such shells means an action of repulsion ($\cos\psi < 0$) since the rotational axis of their respective daons are opposite in direction i.e. the daons should expand, under such an action. How can then the radial equilibrium be maintained?

A daon deforms without any resistance so an individual daon can adapt itself to any situation. In the above case the size of the daons, between the two electrons, is bigger than for an isolated electron. These bigger daons, must have a bigger angle ($\sin\chi_n$), between the daons within the same shell, to compensate for their increased size and therefore smaller number. A similar situation can be seen on the opposite side of the electron, here the daons reduce there sizes, giving a lower radial component, of the action between the daons within the same shell. The size of the daons will then decrease, adapting them selves until an equilibrium is reached.

4.1 Coulomb's law

We will from now on speak about force instead of action, since the acceleration of an ensemble of daons, due to an external action, must be the action divided by the number of effective ordered daons i.e. the mass.

The force between two electrons, at a distance a, can now be obtained by integrating the radial force ($\frac{f_n}{4\pi r_2^2}$), coming from the source electron (11) over the shells of the target electron. This follows from the fact that each electron must maintain its radial equilibrium, necessary since the surrounding free daons always have a constant disorder, independent from the situation. The resulting force on a shell n, can therefore be obtained, using equation (11), in the following way

$$\begin{aligned} f_s &= \int_0^{\pi}\int_0^{2\pi} m_d \frac{f_n}{4\pi r_2^2}\ \frac{O}{1-O}\cos\theta'\cos\theta\ r_1^2\sin\theta\ d\theta\ d\phi \\ &= m_d\frac{f_n}{3}\frac{r_{e\infty}^2}{a^2} \end{aligned} \qquad (14)$$

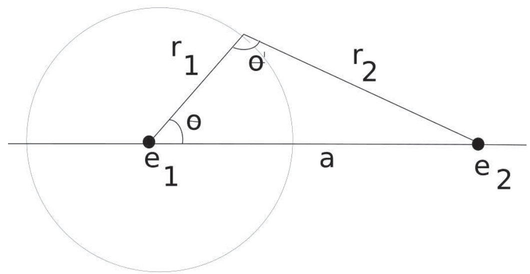

Figure 7: Schematic view of two electrons under interaction.

$$\begin{aligned} \cos\theta' &= \frac{r_1^2 + r_2^2 - a^2}{2r_1r_2} \\ r_2^2 &= a^2 + r_1^2 - 2ar_1\cos\theta \end{aligned}$$

m_d is a system constant corresponding to the daon "mass", whereas θ' is the angle between the medium direction of the rotational axis of the daons in the selected shell and the medium direction of the superimposed daons of the source electron.

The sum of the force between the electron shells gives then the total force. The distanced between shells is very small, compared with the shell radius, so the sum can therefore be replaced by the integral. We obtain the Coulomb force as

$$F_C = \int_0^a \frac{f_{s+1} - f_s}{\Delta r_n}\, dr \tag{15}$$

$\Delta r_n = \sqrt{\frac{8}{3}}\, r_{d_n}$ is the radial distance between two shells.

This means that *the Coulomb force is directly proportional to the density of the radial force, of the daons belonging to source electron, at the position of the target electron*! The result will be identical if we invert the positions of the two electrons.

The shells starts to deform and the reference radius (r_e) is reduced, if the electrons are very close, so we will therefore calculate the equation (15), at a the distance between the two electrons much bigger than r_{e_∞}. We can then make the integral over any shell, since "far away" all the shells have the same constant charge, so if the source electron is at a distance sufficiently far away, the reference radius becomes constant ($r_e = r_{e\infty}$), we get

$$f_s = \int_0^{\pi} \int_0^{2\pi} \frac{f_\infty}{4\pi a^2} \frac{r_\infty^2}{a^2} \cos^2\theta \; r_1^2 \sin\theta \; d\theta \; d\phi$$

and the total force becomes

$$\vec{F}_C = \frac{f_\infty}{3} \; r_{e\infty}^2 \frac{\vec{r}}{r^3} \qquad a >> r_{e\infty} \tag{16}$$

If we compare this equation with the classical electrostatic formula:

$$\vec{F}_C = \frac{e^2}{4\pi\epsilon_0} \frac{\vec{r}}{r^3}$$

we get the definition of the Coulombs constant as

$$\frac{e^2}{4\pi\epsilon_0} = \frac{f_\infty}{3} \; r_{e\infty}^2 \qquad a >> r_{e\infty} \tag{17}$$

i.e., **the Coulombs constant is proportional to the radial force of the electron**.

It's now possible to redefine, within the daon theory, the concepts of field, charge, force, acceleration and mass of an electron.

- The field concept can be understood as the acceleration felt by a positron placed in a given position i.e., directly proportional to the radial force density. An "electric force line" coincides with the medium direction of the daons rotational axis.
- In the daon theory the charge is just an integer number; it is the number of "positive" radial equilibrium minus the "negative" ones, i.e., in the case of the electron it is -1.
- $\vec{F}_C$ is the force acting between the external superimposed order daons and the electron's radial equilibrium.

- The acceleration $\vec{a}$ acting on an electron is the total effective force, acting on the electron, divided by the total number of effective daons N_{tot} (the mass) making up the electron, giving the definition of acceleration as

$$\vec{a} = \frac{\vec{F}_C}{m_d N_{tot}} \tag{18}$$

- *The Daon has no mass* i.e., m_d is just a system constant. The Kilogram can, in fact, be redefined to a specific number of daons $\frac{1}{m_d}$.

$E = 1$ MV/m corresponds to an Order of ($O \simeq \frac{r_e^2}{r^2}$) of around 10^{-15}!

4.2 The electron's mass and potential energy

We can now calculate the electron's mass in the following manner:

$$m_e = m_d \int_0^\infty \frac{4\pi r^2}{\pi r_d^2} \frac{\pi}{2\sqrt{3}} O^2 \frac{dr}{\Delta r} \tag{19}$$

i.e. the number of daons in a shell multiplied by the interaction (the Order or the medium action of interaction $O =< \cos^2\psi >$), giving the number of effective daons (the mass) of the shell, which is again multiplied by **O**, which gives the tendency of the daons to follow the electron in its movement. The electron's reference radius (r_e) varies with the radius close to the electron's center, we have therefore not an exact analytical expression.

But, we can calculate, at a radius $r >> r_{e_\infty}$, the difference in mass due to the added order coming from the interaction between two electrons, i.e. the potential energy. We can then make a precise calculation of the added mass as

$$\begin{aligned} \Delta m &= m_d \int_a^\infty \int_0^\pi \int_0^{2\pi} \frac{r^2}{\pi r_d^2} \frac{\pi}{2\sqrt{3}} \cos\theta' \sin\theta \; O_1 O_2 \; d\phi \; d\theta \frac{dr}{\quad} \Delta r \\ &= m_d \frac{\pi}{\sqrt{2}} \frac{r_{e_\infty}^4}{r_{d_{fd}}^3 a} \qquad a >> r_{e_\infty} \end{aligned} \tag{20}$$

If we now introducing equation (11) into equation (20) and use the classical potential energy, we get

$$C = \frac{3}{2}\,\frac{c^2}{v_d^2} \tag{21}$$

The radial attraction between identical daons Eq. (1), can therefore be written

$$a_d = \frac{3}{2}\,\frac{c^2}{r_d}\cos\psi \tag{22}$$

and the corresponding transverse action is

$$a_d = \frac{3}{2}\,\frac{c^2}{r_d}\sin\psi \tag{23}$$

which gives the radial equilibrium of force, "far" from the electron's center (11), as

$$f_\infty = 3\sqrt{2}\pi\,\frac{r_{e\infty}^2}{r_{d_{fd}}^3} m_d\, c^2 \tag{24}$$

The Coulomb's law within the daon theory, using equation (17), is therefore

$$\vec{F}_C = m_d \frac{q_1 q_2}{e^2}\sqrt{2}\,\pi \frac{r_{e\infty}^4}{r_{d_{fd}}^3}\, c^2\, \frac{\vec{r}}{r^3} \tag{25}$$

$\frac{q}{e}$ is number of effective radial equilibrium, within a particle.

4.3 Internal characteristics of the electron

A better understanding of the electron is necessary, to make us able to complete the analysis. A computer code called EP was therefore developed to examine the electron's internal equilibrium.

The electron is perfectly spherical so, it's enough to optimize the radial position of each shell of constant order (interaction) ($O =< \cos^2\psi >$). We therefore start by choosing some approximate radial position for a number of shells.

The equation of radial equilibrium (5) can then be used to calculate the order in each shell. Starting far from the electron, where the radial equilibrium has an asymptotic constant value, we proceed in iterations step by step closing in on the electron's center, finally obtaining a mesh with a radial equilibrium of force.

It is thereafter necessary to normalize the radii relative to a true electron. This is done in two steps; first we vary the value of r_{e_∞}, until the total mass of the simulated electron agrees with the true value. This is done, using equation (24), within the code EP. We obtain $r_{e_\infty} \simeq 1.1788 \pm 5\ 10^{-15}\ m$.

The free daon size $r_{d_{fd}}$ and the system constant m_d are still missing, but, it is enough to find one to find the other, according to equations (17) and (25). Their values can be obtained examining the shells at the electron's center, since the force in the centre must go to zero. We adapted the free daon size, so that we obtain a minimum number of daons in the first shell.

We get $m_d \simeq 6 \pm 3\ 10^{-41}$ kg and $r_{d_{fd}} \simeq 6 \pm 1\ 10^{-19} m$, at the above mentioned limit. We have then a mesh with a radial equilibrium of force, as well as, an agreement between its mass and the true electron mass. It should be noted that the precision for $\frac{m_d}{r^3_{d_{fd}}}$ is 4 digits whereas its much less for the individual components, due to the unknown 3D-geometry at the center of the electron.

In Fig. 8 is presented a graph showing the radial variation of the simulated electron's main parameters, when the electron has no velocity relative to the free daons.

5 Fundamental Magnetism

Imagine an electron, travelling at a constant velocity **v**, within a media of free daons. It then exists a relative velocity between the electron and the surrounding daons, which modifies their order and velocity, relative to the electron. The shells of daons around the electron still exist but, the daons constituting them are gradually replaced by new ones, depending on the strength of their attraction relative to the electron.

The velocity of a signal, extending from the electron, becomes an important parameter, it will in the following be called the signal velocity. The velocity of a signal, passing through a daon media, must depend on the substance velocity inside the daons them selves, but could also depend on the relative direction of the substance, i.e. the position of the zones of interaction

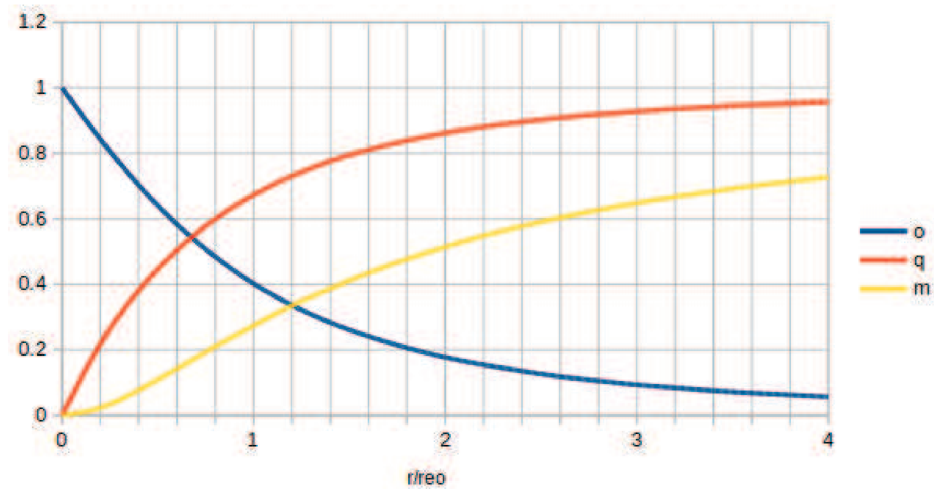

Figure 8: Graph showing the radial variation of the order (O), the normalized radial force ($\frac{r_e^2}{r_{e\infty}^2}$) and the normalized mass ($\frac{m}{m_e}$), relative to the normalized electron radius $\frac{r}{r_{e\infty}}$.

relative to the direction of the signal. But, a dependence on the relative inclination of the daon axis would produce a gradual reduction of the signal's velocity and/or strength, which doesn't agree with experience (Maxwell's equations for example). The signal velocity must therefore be defined, as a constant velocity in all directions, in the following manner

$$c_s = K\omega_d r_d = K v_d \tag{26}$$

r_d is the daon radius and v_d is the daon's effective velocity of rotation at its equator, whereas K is an arbitrary constant.

The shells are attached to the electron through the radial force, which is constant for each individual shell, if $r >> r_{e\infty}$. The velocity of a daon, relative to the free daons, can therefore be written:

$$v_d = vO_n \tag{27}$$

where v is the velocity of the electron and O_n is the order of the selected shell.

A signal from the electron's center reach, at the same time, the surface of a sphere around the electron, having the form presented in Fig. 9,

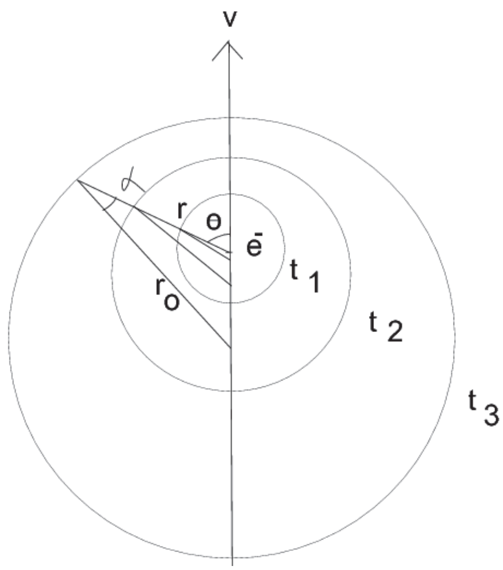

Figure 9: Spheres reached, at the same time, by the "delayed" signal coming from the electron's center

$$r = r_0(\cos\alpha - \beta(1 - O)\cos\theta) \tag{28}$$

$$\cos\alpha = \sqrt{1 - (1 - O)^2\beta^2\sin^2\theta}$$

$$\beta = \frac{v}{c_s}$$

r_0 is the radius of a shell without velocity relative to the free daons.

Looking at the inclination of the daons at a fixed angle (θ), we find a different angle (α) of inclination for daons in different shells. The difference in inclination must then be the source of a rotation, according to equation (23), around the electron's velocity vector $\vec{v}$.

The relative inclination δ between daons from neighbouring shells, due to the delayed potential, can be expressed as:

$$\sin\delta = \frac{v(O^+ - O^-)\sin\theta}{c_s} \tag{29}$$

This difference in angle, of the daons axis of rotation, must therefore produce a rotation of the daons around the electron, giving a relative difference of velocity between neighbouring shells, which can be written:

$$\Delta v_\phi = \omega_d r_d \sin\delta \tag{30}$$

The daons rotational velocity around the electron, as seen from the surrounding free daons, is then

$$v_\phi = \frac{v}{K} O \sin\theta \tag{31}$$

5.1 Inertial movement of the electron

The rotation of the daons around the electron, relative to the electron's velocity $\vec{v}$, is faster at smaller radius so that we obtain a relative inclination of the daons in the transverse sense, perpendicular to the one due to the delayed potential, as presented in Fig. 10. This inclination must again take a value corresponding to the relative velocity i.e.

$$\sin\delta' = \frac{\Delta v_\phi}{c_s} \tag{32}$$

note that the inclination of the daons (in the transverse sense relative to the velocity $\vec{v}$) is always very small, since here only the relative velocity is important. There is no accumulation of the angle (as there is in the case of the delayed potential), because the center of the electron is always in the same relative position.

This relative velocity between the daons gives a sliding movement between the daon shells, due to the propagation, and can therefore be written

$$\omega_d r_d \sin\delta' = \frac{v}{K^2}(O^+ - O^-) \sin\theta \tag{33}$$

We obtain

$$\sin\delta' = \sin\delta \Rightarrow K = 1 \tag{34}$$

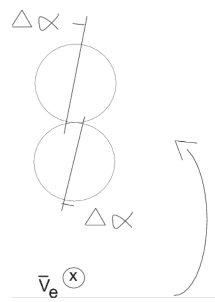

Figure 10: The inclination of the daons, in the sense perpendicular to the electron's velocity $\vec{v}$.

The transverse inclination of the daons is then perfectly matched to the relative velocity, between the shells, so that the velocity of rotation directly corresponds to the velocity of propagation.

$$v_\phi = vO \sin\theta \tag{35}$$

This is the reason for the electron's inertial movement, since then all forces are perfectly compensated.

5.2 Loi de Biot-Savart

The basic equation of magnetism, shows that the force is proportional to the velocity of the electron and to a "magnetic field".

$$\vec{F} = e\vec{v} \times \vec{B}$$

This magnetic field, within the proposed theory, can only be a flux of daons, as presented in Fig. 11(a).

Imagine an electron with a velocity $\vec{v}_1$, at a distance a from another electron, which has a velocity $\vec{v}_2$. The daons circulating around the source electron will pass around the examined electron. The examined electron must therefore start to rotate, this rotation will continue to increase until it reach an equilibrium, which happens when its velocity of rotation, corresponds to the velocity of the daon flux surrounding it. This rotation must bend the

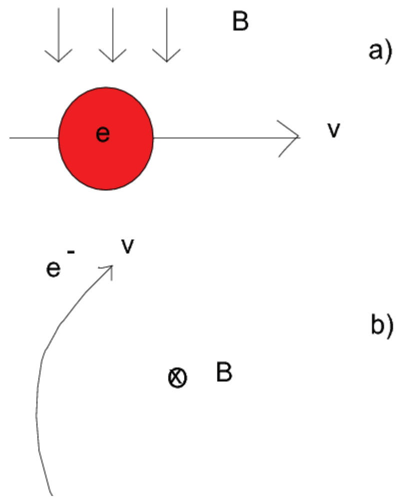

Figure 11: Phenomenon of magnetism.

electron's velocity vector in the direction of rotation, leading to a change of the electrons direction of flight, as presented in Fig. 11(b).

The perpendicular magnetic action do not change the absolute value of energy or momenta of the electron, it only deviates its trajectory!

We now calculate the intrinsic force, corresponding to an electron's velocity, in the direction of flight. This can be calculated imagining that the electron is fixed relative to its surrounding but having a rotation corresponding to its velocity. The inherent force parallel to the velocity vector $\vec{v}$ can then be calculated to

$$\begin{aligned} F_{\parallel} &= m_d \int_0^{\infty} \int_0^{\pi} \int_0^{2\pi} \frac{r^2}{\pi r_d^2} \frac{\pi}{2\sqrt{3}} C \frac{3}{2} \frac{c^2}{r_d} O \sin\delta \sin\theta \sin\theta \; d\phi \; d\theta \frac{dr}{\Delta r} \\ &= \frac{f_\infty}{3} \frac{v}{c_s} \end{aligned} \tag{36}$$

The direction of the force is perpendicular to the electron trajectory. a_d is the action between daons, whereas $\Delta r = \sqrt{\frac{8}{3}}\, r_d$ is the distance between shells. The C comes from the interaction between each daon and the three daons in the neighbouring shell, as indicated in Fig. 12.

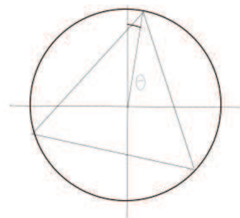

Figure 12: The geometry of the interaction, perpendicular to the electron radius, between each daon and the daons in a neighbouring shell.

$$C = \cos\eta \frac{1}{\pi}\int_0^{\pi}(\cos^2\phi + \cos^2(\phi + \frac{2\pi}{3}) + \cos^2(\phi - \frac{2\pi}{3}))d\phi = \sqrt{\frac{3}{2}}$$

This is the medium action from three zones of contact between a daon and the daons in the next shell. η is the angle between the electron's radius and a line connecting the centres of two daons in interaction, belonging to neighbouring shells ($\cos\eta = \sqrt{\frac{2}{3}}$ since the geometry is a regular pyramid).

The external flux of free daons (v_{ϕ_2}) produce a force rotating the electron (see Fig. 11 b), the electron's velocity vector must therefore deviate in the sense of the rotation. This corresponds to the intrinsic force (36), multiplied with the angle of rotation, we get

$$F_M = \int_{r_e}^{\infty} \frac{f_n}{3}\frac{v_1 v_{\phi_2}(O^- - O^+)}{c_s^2}\frac{dr}{\Delta r} \qquad (37)$$

$+$ indicates the outer shell, whereas the $-$ indicates the inner shell.

Introducing the velocity from the source electron's circulating daons (see equation (35)), into equation (37) we get,

$$F_M = \frac{f_\infty}{3}\frac{v_1 v_2}{c_s^2}\frac{r_{e\infty}^2}{r^2}\sin\theta_2 \qquad r >> r_{e\infty} \qquad (38)$$

θ_2 is the angle between the actual position of the source electron and the position of the target electron, relative to the velocity vector $\vec{v}_2$.

The daons around the electron will change the direction of their rotational axis, with a value corresponding to the relative velocity between the electron and the free daon flux, produced by the source electron. This modified angle will force the electron to rotate, where the rotation of the electron must correspond exactly to the rotation created by the daon flux.

Notice that, according to the definition of the direction of the magnetic field, the daons must be directed away from the electron's s center, respectively towards the center for a positron.

Comparing this with the corresponding classical expression,

$$F_M = e^2 \, \frac{\mu_0}{4\pi} \, \frac{\vec{v}_1 \times \vec{v}_2 \times \vec{r}}{r^3}$$

there is perfect agreement, if the signal velocity is equal to the light speed,

$$c_s = \omega_d r_d = c \tag{39}$$

This means that **the daons effective velocity of rotation is equal to the light speed** (it is of coarse the other way around).

The permeability becomes

$$\mu_0 = \frac{1}{\epsilon_0 \; c^2} \tag{40}$$

It should be noted that the electric force comes from the interaction between daons, expressed in equation (22), whereas the magnetic force originates from the transverse daon interaction, presented in equation (23).

If we aply a magnetic field $\mathbf{B}$, parallel to an electron's velocity $\vec{v}$, we obtain a flux of daons around the electron which corresponds to the vector sum of the electron's velocity and magnetic flux. This added flux will produce an supplementary inclination of the daons rotational axis, in the direction of the magnetic field. This will modify the magnetic field but, this can normally be neglected since $\mathbf{B} = 1$ Tesla corresponds to a flux of daons with a velocity of around 10^{-4} m/s!

6 An accelerating electron

An electron's acceleration produce an inclination of the surrounding daon rotational axis, in the direction of its acceleration. But, they must also obtain an inclination in the transverse sense, as presented in Fig. 13. The two perpendicular inclinations must be identical in value. We then get that the inclination, in the direction of the acceleration, produce an increase of the magnetic flux around the electron, whereas the transverse inclination produce an electric field in a direction opposite to the acceleration of the electron.

The increase in daons velocity of rotation around a direction parallel to its acceleration can be written,

$$v_\phi = -\frac{\vec{a} \times \vec{r}}{c}(1 - O)O \sin\theta \tag{41}$$

a is the electron's acceleration, r is its radius, O is the order around the electron and θ is the angle between the radius and the acceleration.

Note that an increase in time, of a B-field, across the electron simulate an acceleration of the electron relative to the surrounding daon flux. This "acceleration" will produce an added inclination of the daons rotational axis, in the direction of the magnetic field, that is exactly as if an electric field was applied.

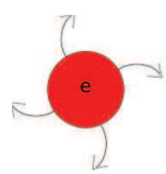

Figure 13: The inclination of the daons, in the sense perpendicular to the electric field.

6.1 Induction

We can now calculate the added EM-field around the electron (in a similar way as was done in equation (36)), we get:

$$\begin{aligned} \vec{E}_I &= \int_0^\infty \frac{v_\phi}{c}[\frac{f_n^-}{3}O^-(1 - O^-) - \frac{f_n^+}{3}O^+(1 - O^+)]\frac{dr}{\Delta r} \\ &= -\vec{E}\ 0.159 \end{aligned} \tag{42}$$

$$\vec{B}_I = -\frac{\vec{E} \times \vec{r}}{rc}\ 0.159 \tag{43}$$

O_E is the Order of the daons, from the imposed external electrical field. The number 0.159 is obtained from the program EP.

Note that the E-field is in the opposite direction relative to $\vec{E}$, i.e. we get a force resisting changes in velocities! This results in a reduction of the efficiency of the acceleration. **This is the basic law for Induction.**

It should be noted that the "electric" part of this action is in fact magnetic, since the interaction between daons corresponds to an action *perpendicular* to the mean direction of the daons rotational axis (see magnetism and equation (37))!

7 The Electro-Magnetic wave

The Electro-Magnetic wave is, in principle, the transmission of an Electro-Magnetic signal through space. The source of sending and receiving, such a signal, is an antenna. A very simple antenna is a perfectly straight conductor, so thin that the transverse dimension can be neglected. An oscillating sinusoidal current is imposed, on such an antenna. The source of the EM-field is then the electrons oscillation, within the conductor.

But, how is it possible that the electrons within a wire can produce a magnetic field? The wire is neutral; there are an equal amount of positive and negative charges. So, why is a magnetic field produced when the daon flux comes from free daons? An electron should just adapt its velocity vector, relative to the free daon flux!

The answer is that a charge must always maintain its radial equilibrium so, if the electric field goes to zero, the radial equilibrium will be maintained by a reduction of **size**. The action of a daon is inverse proportional to its size so, a reduced size, relative to the size of the free daons (9), will create a corresponding order (**O**) to replace the electric field, which will maintain the force equilibrium around each individual charge in the wire. This then leads to a rotation of the daons, around the antenna.

7.1 Creation of the electromagnetic wave

We will here only examine the "far field" i.e., the "radiated" EM-wave. Only the magnetic flux, coming from the acceleration/deceleration of the electron

(41), depends on the distance in such a way that the EM-wave can be explained. Let us therefore start from this equation.

It is the radial **variation of the velocity** of the free daon flux which is the source of the EM-wave. The oscillation of the daon flux, around the antenna, is the magnetic part of the EM-wave. What is missing is therefore the electric part, which can be found examining an individual daon, within the "cylindrical shells" of the daons movement around the antenna.

We should first recall how the daons are interacting between themselves, from equations (22) and (23) and the Fig. 4.

Depending on the orientation of its axis of rotation, a daon can be attracted or repelled or get an impulse in the direction parallel to the relative velocity $\vec{v}$, as demonstrated in Fig. 14. If a daon's axis is parallel to the movement of the daons, around the conductor, it will be pushed in the direction of the daon flux, according to equation (23). If its axis is perpendicular to the direction of the surrounding daons movement, it will be pushed to or from the antenna, depending on the direction of its axis, relative to the direction of the electrons velocity, according to equation (22).

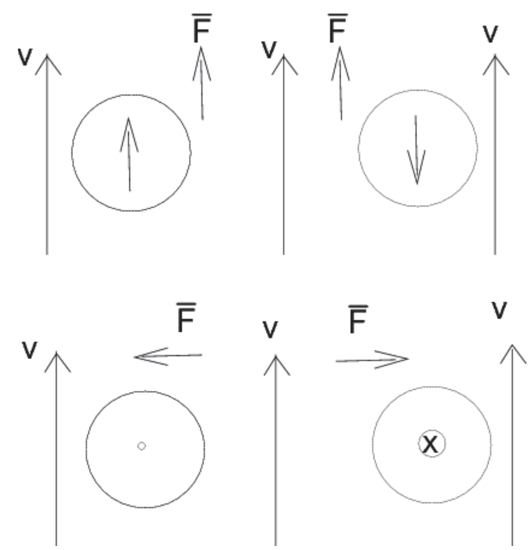

Figure 14: Phenomenon separating the E and B-fields

This phenomenon therefore separates and orders the daons, within the wavelength of the oscillation, which is exactly what we are looking for! The order is separated, within the half period of oscillation, into two regions composed by daons having, in media, opposite directions of their rotational axis. It follows that the daons in between these two ordered regions, in the next half period, will obtain a velocity in a direction parallel to the shells and perpendicular to the electron's velocity vector, as schematically presented in Fig. 15.

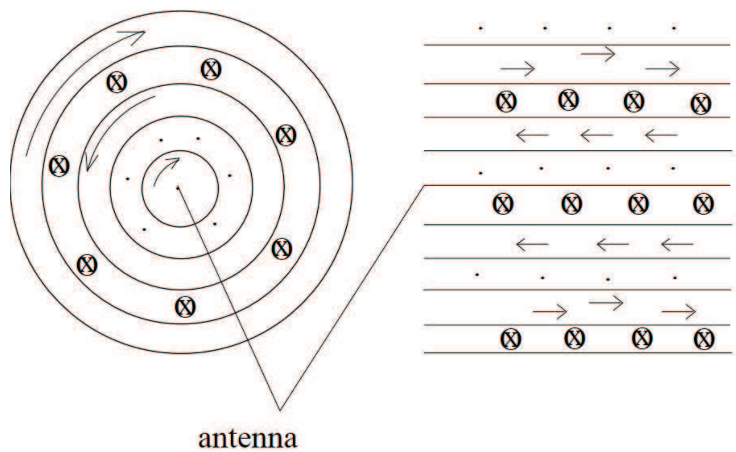

Figure 15: Phenomenon of EM-waves

This phenomena leads therefore to a sinusoidal behaviour, of both the order and the rotational velocity, of the daons but, displaced with $\frac{\pi}{2}$ radians in time and radial position, relative to each other. It means that the magnetic flux create an "electric order" corresponding perfectly to the magnetic one, which is the reason why an oscillation is produced, creating the electromagnetic wave.

If we examine an individual daon, we find that it is moving around the antenna, oscillating forward and backward, it has also a radial oscillation displaced with $\frac{\pi}{2}$ of a peroid. This means that the daon stays in its medium position while making a small circel in a plan with has its vector normal perpendicular to the antenna and antenna radius.

The action-reaction, once produced, can *not* be lost in dissipation since the action-reaction between daons is without dissipation. So the electromagnetic wave must continue to expand away from the antenna in infinity, with the signal velocity c.

The electric and magnetic fields around the antenna can be written in a general manner as

$$B = \frac{f_\infty}{3}\frac{v_a}{c^2}\ \sin\omega t \quad (44)$$
$$E = \frac{f_\infty}{3}O_a\ \cos\omega t \quad (45)$$

v_a is the rotational velocity of the daons, around the antenna, whereas O_a is the Order of the same daons.

We obtain, according to equation (43), the magnetic field around an antenna as,

$$\vec{B} = \vec{v}_1 \times \frac{\mu_0}{4\pi c}\int \frac{\delta I}{\delta t}\vec{ds} \times \frac{\vec{r}}{r^2} \quad (46)$$

The energy of the magnetic field must be equal to the energy of the electric field, we obtain therefore the electric field as

$$\vec{E} = \frac{\mu_0}{4\pi}(\int \frac{\delta I}{\delta t}\vec{ds} \times \vec{r}) \times \frac{\vec{r}}{r^3} \quad (47)$$

Equations (46) and (47) are well known classical laws.

We also obtain, from the above, that the minimum wave length of an EM-wave must be bigger than some free daon radii, i.e. around $10^{-17}m$, while there is no upper limit.

Conclusion

We show, starting from general considerations, that a new theory of physics can be developed. We introduced a new unique object, called the **Daon**, it has specific, but rather simple, characteristics, it has only 3 parameters; its effective velocity of rotation (c), the radius of a free daon ($r_{d_{fd}} = 7\ 10^{-19}m$) and "the associated daon mass" ($m_d = 1.0\ 10^{-40}kg$). There is no freedom to match or adapt these values.

The Daon is proposed as the constituent of the electron and of its surrounding electromagnetic field. We found and expressed the value of the dielectric constant and showed that the electric and the magnetic phenomena, can be explained as the daons collective behaviour. We examined the electron's internal equilibrium, as well as, its mass and Order.

We found that an important parameter is the electron's reference radius $r_{e_\infty} = 1.1788\ 10^{-15}$ which is fixed by the geometrical necessity for a radial equilibrium.

We explain the Induction and the Electro-Magnetic wave.

This simple and effective theory gives a detailed explanation to all electromagnetic phenomena, as far as can be understood by the author.

Acknowledgment

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