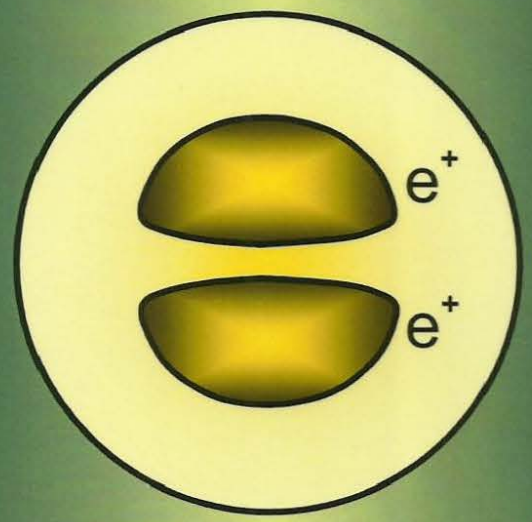
Konstantin Meyl

From Field Vortex to Elementary Particles



Derivation of the standard model of elementary particles, including the calculation of quantum properties, based on recently discovered Potential vortices

Potential Vortex Vol. 3

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From Field Vortex to Elementary Particles

By Prof. Dr. Konstantin Meyl

Potential vortices are a phenomenon of the field that is able to form structures. The most simple spacial structure is the sphere, which is, as we are dealing with an electromagnetic vortex, electrically charged.

In this manner, the electron is derived as the elementary quantum as well as all particles composed of it. For the first time, quantum properties, such as mass, charge, spin and magnetic moment, of the most important elementary particles are calculated.

The base for the calculation of the measurement values listed in the standard model is a theory of objectivity formulated by the author, after the theory of relativity has not been able to accomplish this.

The quantitative proof for the existence of potential vortices is given by the high correlation between the calculated quantum properties and the known measurement values.

Derivation of the standard model of elementary particles, including the calculation of quantum properties, based on recently discovered Potential vortices

3

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from the series **Potential vortex** volume **3**

Professor Dr.-Ing. Konstantin Meyl

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Preface

Template for the third volume on Potential Vortex is the the second volume of 1992, published 20 years ago. Here, based on the newly developed theory of objectivity, so to say as evidence of the usefulness and correctness of the theory and of the Potential Vortex approach, have been calculated for the first time the merely measured quantum properties, which are listed in the standard model.

Then the derivations were taken in the lecture notes (EMUV Part 1 of 1995) and published as a collection of material. Against the backdrop to discuss the revolutionary ideas with students and seminar participants the concept worked. Thus, some interested parties have been inspired by my model.

The most comprehensive statement has been sent to me by a nuclear physicist (2002), after he worked through the MFT (Meyl's field theory), as he calls it. Focus of his interest were a new classification and systematizing of the MFT by appropriate selection criteria and rules.

In his concluding remarks the colleague writes: "*All known elementary particles, with help of the MFT, can be described extremely accurate and consistent!*"

Concerned about his position as a civil servant and fearing the attacks of colleagues, the statement was sent to me under the pseudonym of an "upper established graduate secondary-school teacher Kaiser". The preface to the elaboration on "Nuclear Physics after Meyl's field theory MFT" clarifies his worries [0-1]. He writes:

„This work is pure heresy! Conservative nuclear physicists, I strongly recommend: hands off this work! Everything you've become fond of, I bring to the flea

market or advise you to dispose of it as fast as possible: Shell model, liquid drop model, collective model, the different potential wells, wave functions, strong and weak nuclear forces, quarks and gluons, and the host of postulates, isospins, parities, Senioritäten, spin-orbit couplings; almost none of it remains untouched!

But if there are nuclear physicists, who have kept a little natural curiosity, and are able, at least for the time reading this work to lay their previous worldview aside, I can promise that there is highly volatile knowledge waiting for you . After the MFT everything is so simple! " (Knittlingen, January 2009).

I would like to thank the colleague for the thorough revision of my texts. I am happy to enrich my original text to some of his suggestions and valuable didactic illustrations.
In addition, the extent of the work of 1992 has on the basis of my own, within 20 years accumulated additions, quasi doubled. Thus, from the first edition two booklets emerged as a 2nd Edition, the volume 2 and the present volume 3.

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Villingen-Schwenningen, January 2012 www.meyl.eu

Translated with the help of Ben Jansen (2003)
and Steve Bublies (2014).

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1. Introduction in field physics

1.1 The field-theoretical approach

A new theory only has chances on acknowledgment if it is provable. For that physical phenomena in the sense of the new and extended field-theory are calculated and independently of this experiments are being carried out. If the calculations are confirmed by reproducible measurement results, then with that the correctness of the approach is proven.

In the here presented case we have chosen the field-theoretical approach instead of the usual quantum physical approach (vol. 2). As a consequence of this we had found as a new phenomenon the vortex of the electric field. With regard to the normally used Maxwell theory this resulted in changed field equations in a dual formulation (fig. 1.1).

The description of the magnetic field via the law of magnetic flux in the manner specified by Maxwell corresponds to the present state of knowledge. Electrical charge carriers in a monopolar shape constitute, on the one hand, the volume charge density ρ_{el}, and on the other hand, a current density **j**, as well as eddy currents.

The dual description requires an extension of the law of induction to a potential density **b** [V/m²], dual to the current density [A/m²], with the subsequently occurring and newly discovered Potential Vortexes. The resulting vortex structures are to be regarded as magnetic monopoles, because one quantity has the other quantity necessarily as a consequence, or vice versa would from $\rho_{magn} = 0$ directly follow **b** = 0 (acc. to equation 1.10), as required by the textbooks.

In 2009 the Helmholtz Association announced the discovery of magnetic monopoles [1-1].

the magnetic field	the electric field
Ampère's law: (1.1)	law of induction: (1.2)
$\text{curl}\,\mathbf{H} = \mathbf{j} + \partial\mathbf{D}/\partial t)$	$-\,\text{curl}\,\mathbf{E} = \mathbf{b} + \partial\mathbf{B}/\partial t)$
(1st Maxwell-equation)	(2nd Maxwell-equation)
acc. to the rules of vector analysis:	extended by the *potential-density* **b** [V/m²] (Meyl 1990)
$\text{div curl}\,\mathbf{H} = 0$ (1.3)	$-\,\text{div curl}\,\mathbf{E} = 0$ (1.4)
1st equation of continuity:	2nd equation of continuity:
$0 = \text{div}\,\mathbf{j} + \partial/\partial t(\text{div}\,\mathbf{D})$ (1.5)	$0 = \text{div}\,\mathbf{b} + \partial/\partial t(\text{div}\,\mathbf{B})$ (1.6)
whereas $\text{div}\,\mathbf{D} = \rho_{el}$ (1.7)	whereas $\text{div}\,\mathbf{B} = \rho_{magn}$ (1.8)
(4th Maxwell-equation)	(3rd Maxwell-equation acc. to spezial case: $\text{div}\,\mathbf{B} = 0$)
with the electric charge density ρ_{el}, resp. *electric monopoles* (electrons, ions, ...)	with the magnetic charge density ρ_{magn}, resp. ***magnetic monopoles***
and with the current density **j** [A/m²]:	and with the potential-density **b** [V/m²]:
$\mathbf{j} = -\mathbf{v}\cdot\rho_{el}$ (1.9)	$\mathbf{b} = -\mathbf{v}\cdot\rho_{magn}$ (1.10)
$\mathbf{j} = \mathbf{D}/\tau_1$ (1.11)	$\mathbf{b} = \mathbf{B}/\tau_2$ (1.12)
τ_1 = *time constant of eddy currents (relaxation time)*	τ_2 = *time constant of the **new** developed **potential vortex***

Fig. 1.1: The dual field (new: Potential density **b**)

1.2 Fundamental field equation

If both equations (1.1 and 1.2) are inserted into each other the result is an only in time and space formulated, generally valid and hence fundamental field equation (vol.1 and eq. 1.13).

$$\boxed{\begin{aligned} &\underbrace{-\,c^2\cdot\text{curl curl}\,\mathbf{E}}_{a} = \underbrace{\partial^2\mathbf{E}/\partial t^2}_{b\ \text{(electro magnetic wave)}} + \\ &\underbrace{+\,(1/\tau_1)\cdot\partial\mathbf{E}/\partial t}_{c} + \underbrace{(1/\tau_2)\cdot\partial\mathbf{E}/\partial t}_{d} + \underbrace{\mathbf{E}/\tau_1\tau_2}_{e} \\ &+\ \text{eddy currents} + \text{potential vortex} + I/U \end{aligned}} \quad (1.13)$$

with the speed of light by definition:

$$\boxed{\varepsilon\cdot\mu = 1/c^2} \quad . \quad (1.14)$$

This equation has many special cases; one of them, the Schrödinger equation, could be derived by using an harmonic approach. We renounced to give special solutions of the Schrödinger equation, because these are printed in numerous text books.

On the other hand experiments are known, which are capable to confirm the theoretical solutions and thus to prove the Schrödinger equation. The eigenvalues of the equation describe for instance the shell-shaped structure of the atoms with the by *Niels Bohr* given radii.

Now this already proven equation was derived from the new field-theoretical approach. Thus for the special

case, the area where the Schrödinger equation is valid, the new theory can be said to be proven (vol.1).

We will calculate the quantum properties of the elementary particles in addition. These until now have only been measured. Today is merely sought for symmetries and for models of explanation, like e.g. the quark-hypothesis. From a calculation science is miles and miles away.
We will compare the calculation results with the measurement values. Then everyone can check and compare for him or herself.

The conditions in an elementary particle are completely different. Here it concerns the vortex itself, whereas the model of the atom merely describes vortex properties, so-called actions at a distance. The differences in size and distances for an atom lie more than five powers of ten over those of a particle.

Here a new problem of causality comes to light, at which we now must have a critical look: the question of the by *Einstein* postulated constancy and universality of the speed of light. Seen from a relativistic and subjective point of view of an observer, Einstein by all means may be right. But may such a theory be generalized?
How are the measurements concerning the speed of light and the relativity of space and time to be judged when looking at them objectively?
The current measurements of speeds faster than light speak a clear language and represent a challenge.

2. Electron as an elementary vortex

2.1 Duality of the vortex properties

The rules of duality dictate for the vortex of the electric and of the magnetic field the following characteristics:

1. Whereas currents and eddy currents demand a good conductivity, potentials and potential vortices can only form with bad conductivity, thus in a *dielectric* and best in the *vacuum*.

2. Eddy currents run apart, strive towards infinity and thus show the well-known *"skin effect"* with a spatially limited arrangement of the conductor. According to the rules of duality the potential vortex will strive towards the vortex centre and in this way will show a *"concentration effect"*.

3. Another property of vortices is shown in fig. 2.1.

   On the left side a plane eddy current is indicated. Since the discovery of Ampère's law it is well-known to us that such a circular current (I) forms a *magnetic dipole* standing perpendicular to the vortex plane.

   On the right hand side the dual phenomenon is sketched. Here charges are piled up circularly to a planar potential vortex (U). Thereby an *electric dipole* forms, standing perpendicular to the vortex plane. This relation directly follows from the equations of the field-theoretical approach.

Whereas circular currents and *current eddies* produce *magnetic dipoles*, the *potential vortices* will form *electric dipoles*.

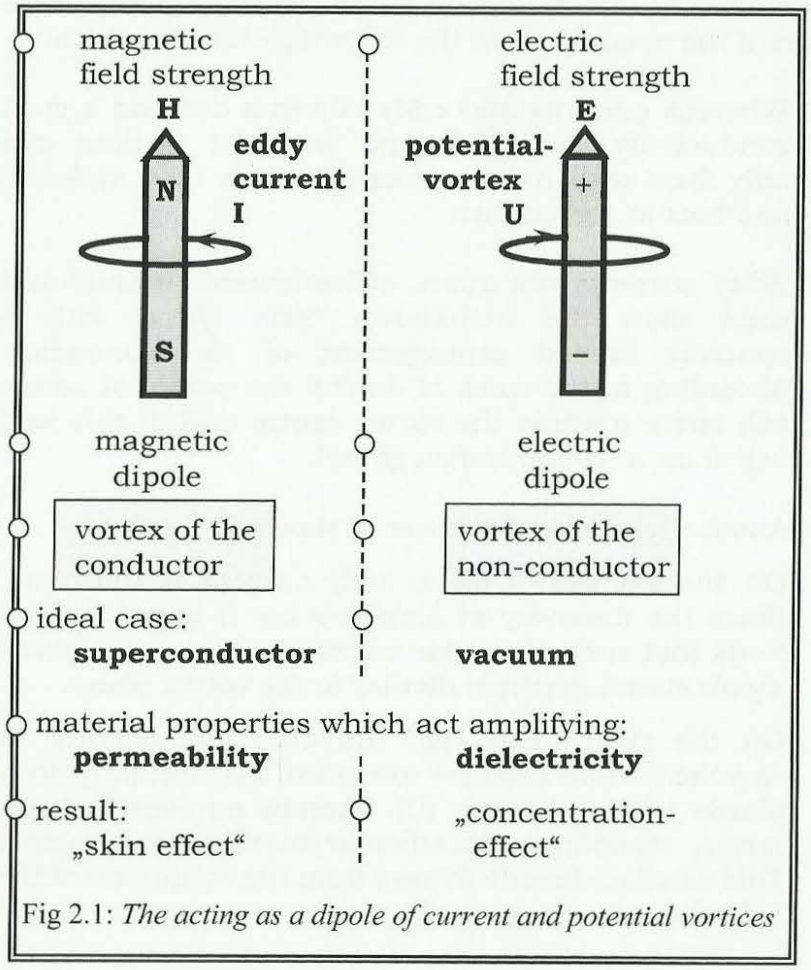


Fig 2.1: *The acting as a dipole of current and potential vortices*

2.2 Quanta duality

With these three interesting properties some key questions of quantum physics, that until now have stayed a mystery to science, can be answered conclusively and without compulsion e.g.:

I. Why no magnetically charged particles want to be recognised?

The better the conductivity of a medium is, the higher as a consequence the number of free charge carriers is, the more strongly eddy currents are formed. The answer to question I is inferred from the opposite case:
In the ideal vacuum no charge carriers at all are present, why no currents, no current eddies and consequently no magnetic poles can exist.
With this well-known fact the first question already is answered. The question why in the microcosm there can not exist magnetically charged elementary particles, why the search for magnetic monopoles doesn't make a lot of sense. Let's ask further:

II. Why only electrically charged particles do exist?

The worse the conductivity of a medium is, the more the potential vortex will be favoured that because of this property also can be understood as the vortex of the dielectric.
In the mentioned extreme case of the ideal vacuum, no electric conductivity is present for reason of the missing charge carriers. But this circumstance favours the potential vortex and that, according to fig. 2.1, forms electric poles and with this also the second question would be answered clearly.

It can be traced back to the boundary conditions of the microcosm that without exception electrically charged particles are entitled to exist; a realization derived from the field-theoretical approach, that covers all experiences.

III. Why do these particles show as monopoles?

More concrete the question has to read: *Where is the positive pole in a negatively charged electron, if it should be an electric dipole?*
The only possible answer is: *In the centre of the particle!*

Thus in the centre of the electron its positive pole is hidden and in the centre of the positron its negative pole is hidden. But we only observe these particles from the outside and for reason of the field conditions of the electron we measure a negative charge and for its antiparticle, the positron, a positive charge. If in each case we wanted to measure the electric fields included in the inside, we had to destroy the particle. Then a proof would not be possible anymore.
In addition the pathway of the charge in figure 2.2 shows that the pole, hidden in each vortex center, corresponds to the condition in infinity, in the sense, therefore, the charge "zero" has and so the zero line marks.

Here also a persistent mistake is eliminated by the for a long time known axiom that monopoles can not exist at all if one considers continuity. By means of technical-physical experiments this axiom is sufficiently secured.

The quantum physical approach is standing on uncertain ground if it is postulated that other laws of nature should apply to particle physics, if a second

approach, the field-theoretical approach, is conceivable that does not know these problems.

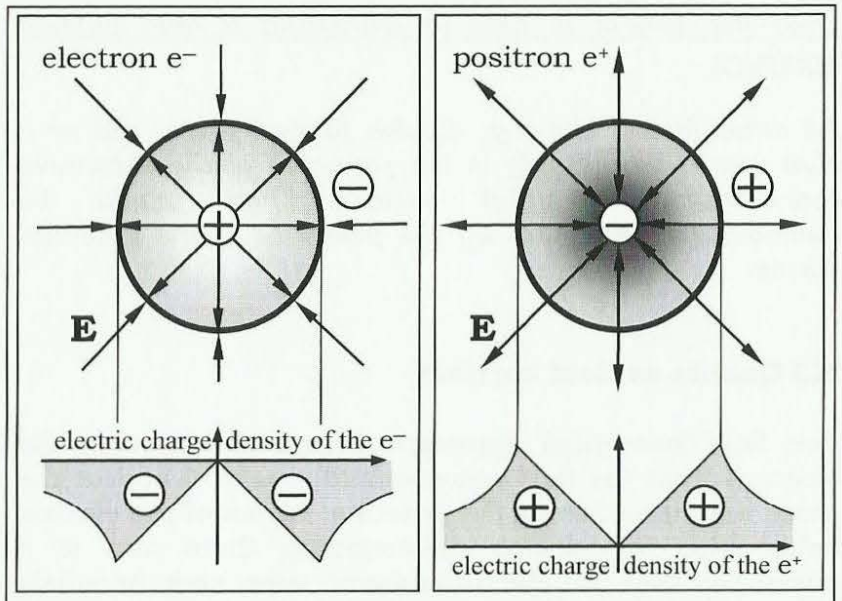


Fig. 2.2: e⁻ *and* e⁺ *as configurations of potential vortives*

The discussed concentration effect gives the potential vortex a structure shaping property. With that also the fourth key question can be answered:

IV. Why do the particles have the form of spheres?

The potential vortex is favoured in the particle-free vacuum of the microcosm because of the missing conductivity. In connection with the concentration effect the following conclusion can be drawn:

The extremely mighty potential vortex exerts a high pressure on the microcosm and on each particle.

With that also the fourth key question, why stable elementary particles are spherical, can be answered by the potential vortex theory:
Only the sphere is able to withstand a high outside pressure.

All other forms, like e.g. dipoles formed like a rod or a club would be instable in the presence of the extremely concentrating potential vortex. They would be immediately destroyed by the pressure of the potential vortex.

2.3 Quanta as field vortices

The field-theoretical approach demands removing the electron from the field equations (div $\rho_{el} = 0$) and at the same time introducing the potential vortex of the electric field. With this vortex phenomenon there now is a possibility that the electromagnetic wave spontaneously rolls up to a vortex in case it is disturbed from the outside. The vortex particle that is formed in such a way owes its *physical reality* on the one hand the concentration effect of the potential vortex, that compresses this particle to the dimension of a tiny *sphere* and on the other hand its *localization* for reason of the oscillation around a fixed point.
The spherical elementary particles are being compressed to inconceivably small dimensions. Therefore they are capable to bind a comparatively high energy in their inside. This is confirmed by the mass-energy relation

$$E = mc^2 . \qquad (2.1)$$

The fact that the energy is dependent on the speed of light can be judged to be a clear indication that quanta

actually are nothing but *oscillating electromagnetic packages*, vortical oscillations of empty space.
The next question reads:

V. Why is the elementary quantum stable?

The worse the conductivity is, the more the potential vortex will be favoured, the more strongly the concentration effect will form, the smaller the spherical phenomena will get - the larger the authoritative *relaxation time* will be, i.e. the slower the decay of vortices and with that the more stable the vortex phenomenon will be.

In the microcosm, that comes the ideal case of a particle-free vacuum very close, the *spherical vortices because of the missing conductivity have an absolute stability.*

VI. Why does for every particle of matter exist an antiparticle?

Since every vortex can also oscillate in the opposite direction, there always exist two *forms of formation* of spherical vortices *with equal rights*, one of them is assigned to the world of matter and the other to the world of anti-matter.

VII. Why are particles and antiparticles incompatible?

For reason of the *contrary vortex direction* they are incompatible to each other. They have the tendency to destroy each other mutually, like two trains that want in the opposite direction on a single-tracked distance.

2.4 The photon

The ability to form structures as a consequence of the concentration effect gives the potential vortex a number of highly interesting properties. To derive these properties we can make work easier when we fall back upon the observations and experiences of *flow dynamics*.

Here the *vortex ring* takes a special place. Its vortex centre is not closed, for which reason it is not stationary and propagates in space with a constant speed. It can be observed that the velocity of propagation increases with the ring diameter becoming smaller. By means of the vortex rings, that skilful smokers can produce with pointed lips, these properties can be made visible.

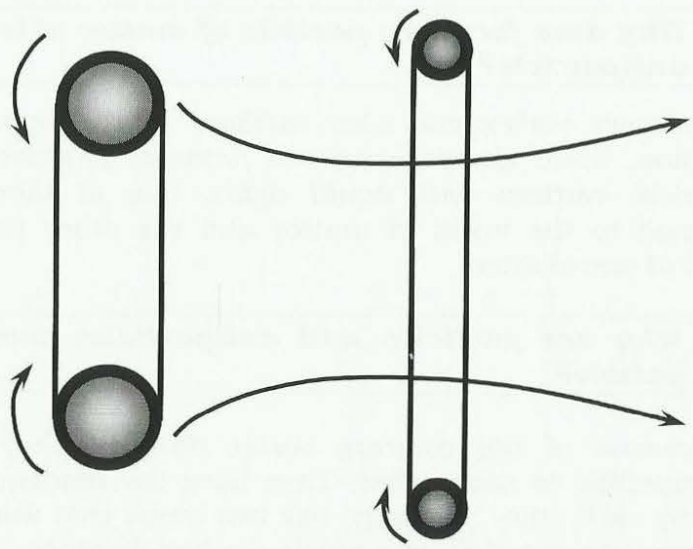


Fig. 2.3: *Two coaxial oscillating vortex rings (acc. to [2-1]).*

Now if two vortex rings run into each other with the same axis and direction of rotation then both oscillate around each other, by one vortex attracting the other vortex, thereby accelerating and thus contracting it. The second vortex then slips through the core opening and gets again slower and larger. Now the first vortex accelerates and plays the same game.

It would be obvious for the vortex of the electric field to have a corresponding property. The electron e^- and with the opposite swirl direction the positron e^+ will form such a potential vortex corresponding to the derivation. Two electrons, as like charged particles, would repel each other and surely will be out of the question for such a configuration.

An electron and a positron however will attract each other and because of their incompatibility they will mutually destroy unless they open their vortex centres to form a vortex ring. Now the e^- shows its positively charged centre that shows the same swirl direction as the e^+ seen from the outside. Therefore the vortices don't hurt each other, when the positron slips through the opened vortex centre of the electron and vice versa.

This oscillating electron-positron pair has strange properties: seen from the outside one moment it is negatively charged and the next moment it is positively charged. Therefore over time on the average *no charge* will be *measurable* and *no electromagnetic interaction* will take place.

One moment the particle is *matter and the next moment it is anti-matter.* Hence *no mass at all* can be attributed to the particle. Interactions primarily takes place between both dual vortices. We can predict, the particle has neither mass nor charge. The environment merely sees a fast oscillating particle that only within every half cycle is capable of an interaction.

The centre of the oscillating particle is open, for which reason *it is not stationary* anymore. Instead it propagates in z-direction with the swirl velocity, which is the speed of light, in this way preventing a rotation around the x- or y- axis (fig. 2.4). In this way a *polarizability* is present.

The only possible and, as we will see, necessarily taking place rotation around the z-axis gives the particle a spin of the magnitude of a quantum of angular momentum. After all the rotation for e^- and e^+ is of the same magnitude with a spin of each time ½ ħ. There should be paid attention to the fact that for the case of an opposite sense of direction of the respective rotation around the common z-axis the spin on the average will be zero.

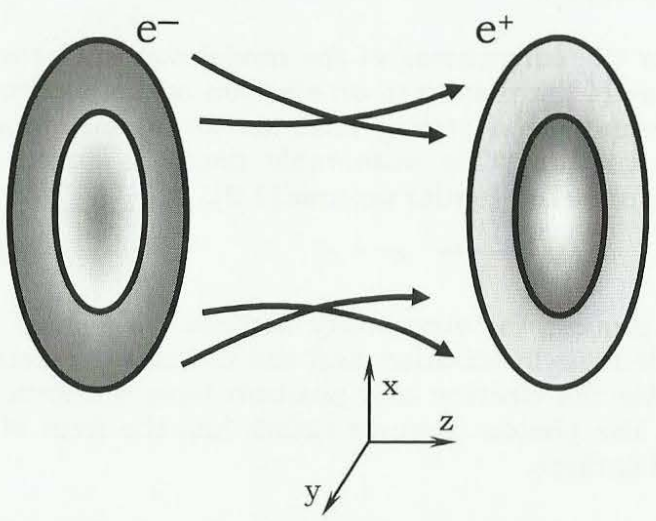


Fig. 2.4: *The photon as oscillating electron-positron-pair.*

In addition the particle is characterized by an outstanding property: *a periodically taking place oscillation with any frequency, but that frequency has to be constant.*

We now only have to take a table of particles to hand. Actually we will find a corresponding particle that has all these properties: the γ-quanta, also called photon.

2.5 Pair creation

Proof for the correctness of the model concept provides the decay of the photon in an electron and a positron in the presence of a strong field, as for instance in an atomic nucleus. This observable decay is called pair creation or Bethe-Heitler process [2-2]:

$$\gamma \longrightarrow e^- + e^+ \quad . \qquad (2.2)$$

In this process the elementary vortices for a short time get back their localization and are therefore detectable. Otherwise the electron and positron have the form of a sphere, the photon however rather has the form of two oscillating discs.

The photon doesn't participate in the electromagnetic interaction, because the electric field lines run from one disc to the other (from + to –). The field lines are not open as they are for e^- or e^+ (fig. 2.2).

To open up the field lines an energy is necessary that corresponds to the sum of the two formed particles. But from this it by no means follows that this amount of energy will be released in the reversed and much better known process, where matter and anti-matter annihilate under emission of γ-quanta. At the end of the derivation the vortex model will provide us the desired answers on questions of the energy of photons. Here first of all only the properties will be concerned.

Experiments, in which *light* shows *as a particle*, are the photoelectric effect, the Compton effect and a lot more. According to the by Maxwell developed classical theory of light however is *light an electromagnetic wave* that is

not quantized in any way, neither as sphere nor as disc. the *wave nature of light* as well has a physical reality and is secured by experiment. This is witnessed by the interference patterns of overlapping coherent light beams.

A concept in which light could exist at the same place and the same time both as wave and as corpuscle could never be brought into accord with the principle of causality. Formulas of compromise, like the *uncertainty principle* of Heisenberg that refers to the point of view of the observer, can't change anything about this dilemma.

The *dual nature of light*, that in this context is gladly spoken of, rather consists of the fact that dependent on the local field conditions, any time and spontaneously *the wave can roll up to a vortex*.

In the spontaneous transition of the wave to the particle all the important properties are conserved: the *propagation with the speed of light, the characteristic frequency of the oscillation and the mentioned polarizability*.

The process of rolling up possibly takes place already in the laboratory, in a bubble chamber and at the latest in our eyes. To receive the electromagnetic wave, we had to have antennas. We actually see the photons. It therefore would be obvious if our cells to see only could perceive vortices, in this case photons. We don't possess a sense organ for fields and waves.

2.6 Law of conservation of energy

Let the starting-point for our considerations be the electromagnetic wave in a particle-free vacuum. Here no vortices appear, so that the plane wave can propagate undamped with the speed of light, and in this way a transport of energy takes place. Electric and magnetic energy each are the same magnitude.

Let's now imagine the symmetry is disturbed as the wave is "slowed down" on one side. As a possible result *the wave rolls up to a spherical vortex.*

As we will see such a process is possible, for instance at impact on a strong field. Thus part of the energy is bound in the inside. This part from now on withdraws itself from every possibility to measure it. We can only measure the second part of the field energy, with which the particle interacts with its neighbourhood.
We can assume that:

The amount of energy bound in the inside of the particle is identical with the free and measurable amount of energy on the outside of the particle.

The same energy W_e = 0,51 MeV, we attribute to the electron for reason of its mass with the help of the Einstein relation (2.1), is also bound in its inside. This conclusion is also applicable to other elementary particles and with that to all matter.
We here again recognize the principle of the duality between the to the outside striving eddy current in the inside of the elementary vortex and the concentrating potential vortex on the outside. Thus also seen energetically both are of the same magnitude.

Whereas in the case of the electromagnetic wave it concerns a symmetrical oscillation around "zero", by the process of quantization, by the rolling up to a spherical vortex, there forms an energetic state of space different from zero. The order of magnitude is determined by the number of elementary vortices, of which the particles and all matter consist.
Anti-matter forms the opposite energetic state and this again is for the particles of matter available in their inside in a bound form.
As long as we do not artificially produce new elementary vortices and thus keep the number of available vortices constant, the energetic state will not change, or as it is formulated in text books:

In an isolated system the sum of the energy is constant.
(If the number of particles is left unchanged)

The law of conservation of energy is not an axiom, but follows without compulsion from the vortex theory.
It is not elementary, but a consistently derivable consequence of the field-theoretical approach, according to which solely the field acts as cause for all other physical phenomena, also for the conservation of energy!
Because the cause of it is the electromagnetic field, the following has to hold:

Energy is a state description of electromagnetism.
(of electromagnetic vortices).

Now we finally can explain why energy can be converted. Different forms of energy only are different forms of formation of the same phenomenon.

2.7 Radius of the electron

For the crucial process, in which the electromagnetic wave rolls up to a vortex, it is for reasons of continuity to be expected that the *velocity of propagation* remains equal that thus for the vortex oscillation exactly like for the electromagnetic wave the speed of light is determining. The *direction of propagation* in the case of the vortex takes place perpendicular to the in fig. 2.5 shown field direction of the electric field strength. Not even in that both field-phenomena differ.

Elementary Vortex with circumference:

$U = 2\pi r \sim c$

with the vortex speed c

is valid:

$$\boxed{r \sim c} \qquad (2.3)$$

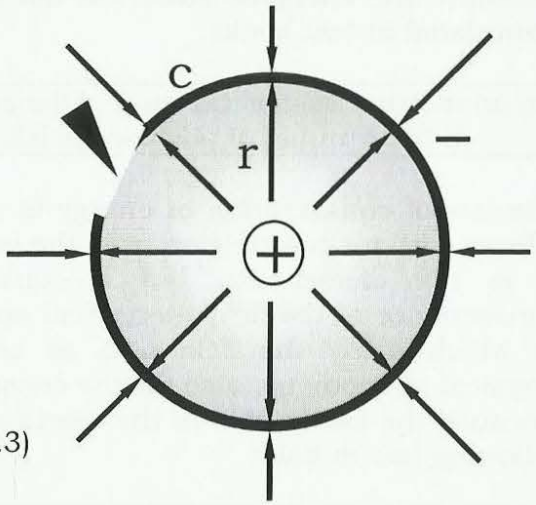


Fig. 2.5: *The electron as a spherical capacitor (see fig.2.2).*

Summarizing: the propagation takes place with the speed of light c along a circular path with the perimeter $U = 2\pi r$.

Therefore holds:

$$\boxed{r \sim c} \qquad (2.3)$$

According to this equation the radius and with that the size *of the electron is determined by the speed of light.* Therefore the question of the size of the electron is raised.

The energy interpretation predicts that for the theoretical case of a change of size the energy density in the inside of the particle is influenced that however the quantity of the included energy remains unchanged. We therefore can further proceed from the assumption that the *bound amount of energy is independent of the size of the particle*.

Consequently for the elementary quantum the energy $W_e = 0{,}51$ MeV is assumed, which it has according to the Einstein relation:

$$W_e = e^2/C_e = m_e c^2 = 0{,}51 \text{ MeV} \qquad (2.4)$$

For the electron of mass m_e the with measuring techniques determined value is inserted.

The spherical electrode of a *spherical capacitor* with the above given energy W_e and the capacity C_e

$$C_e = \varepsilon_o \cdot 4\pi r_e \qquad (2.5)$$

represents a very realistic model of the negatively charged particle.
In this manner the "*classical radius of the electron*" is calculated to be [2-3]:

$$r_e = 2{,}82 \cdot 10^{-15} \text{ m}. \qquad (2.6)$$

But in the case of Kuchling it only is half this size[2-4],

$$r_e = 1{,}41 \cdot 10^{-15} \text{ m}. \qquad (2.7)$$

what according to equation 2.3 would mean that in the case of Kuchling the light would be on the way only half this fast (Difference is called *"Thomas factor"*).

Not only the electron but also all the other elementary particles are according to the field-theoretical approach formed from concentrated potential vortices. For these equation 2.3 hence has to hold in the same manner, so that more generalized we can conclude:

The speed of light determines the size of the elementary particles.

This statement is incompatible with the assumption of a constant speed of light. Because then all elementary particles would have identical size. As is known, however, are the building parts of the atomic nucleus, the protons and neutrons very much smaller than individual electrons.

The constancy of the speed of light is to be questioned.

But if, according to the proportionality 2.3, c - measured in [m/s] - and every tape measure [m] are in the same relation to each other, then we are not longer able to measure the alleged constancy or even to prove it. We can't see an impact either, since we observe with the speed of light.

This question is of such an elementary importance that we are not content with these considerations and in addition undertake a mathematical derivation in the sense of the field approach.

Thereby exists an urgent need to take an objective point of view and to give up the relativistic observer status.

3. Theory of objectivity

An extensive derivation, which obeys the rules of the vortex physics, is to be found in the second volume to this book series. There the superposition of a superposition of field vortexes is mathematically developed via a power series. To avoid repetitions, here the same result is being intended on a shortened calculation method.

3.1 Equations of transformation

The equations of transformation of the electromagnetic field shall form the starting-point for the coming up considerations, as given among others by Simonyi [3-1]:

$$\boxed{\mathbf{E} = \mathbf{v} \times \mathbf{B}} \quad \text{und} \quad \boxed{\mathbf{H} = -\mathbf{v} \times \mathbf{D}} \qquad (3.1)$$

Thus magnetic phenomena can be traced back to electric phenomena and vice versa. The mathematical formulation reveals us the two sides of the same medal and points to a perfect duality between both fields and their factors of description.

Curious researchers opens up the message behind the transformation equations, if we complete the relations of material:

$$\boxed{\mathbf{B} = \mu \cdot \mathbf{H}} \quad \text{and} \quad \boxed{\mathbf{D} = \varepsilon \cdot \mathbf{E}} \qquad (3.2)$$

$$\boxed{\mathbf{E} = \mathbf{v} \times \mu \cdot \mathbf{H}} \quad \text{and} \quad \boxed{\mathbf{H} = -\mathbf{v} \times \varepsilon \cdot \mathbf{E}} \qquad (3.3)$$

The here presented equations state, that we measure an electric field strength **E**, if we are moving with regard to a magnetic field **H** with the speed **v** and vice versa.

The electric and the magnetic field therefore prove to be an *experience* of the observing person and we can say:

We experience the magnetic field as electric field and the electric field as magnetic field simply and solely for reason of the relative motion.

Let's assume, $v = dx/dt$ is the component of the relative velocity, which stands perpendicular to the area defined by the field pointers $E = E_z$ and $H = H_y$, then the equations of transformation now read:

$$E = v \cdot \mu \cdot H \quad \text{und} \quad H = -v \cdot \varepsilon \cdot E \qquad (3.4)$$

If we are moving with the velocity v in a basic field which is present with the field strength E, then we observe a magnetic field, which again is to be interpreted as an additional electric field E_v:

$$E_v = -v^2 \cdot \mu \cdot \varepsilon \cdot E = -(v^2/c^2) \cdot E \qquad (3.5)$$

In duality the magnetic field strength provides a corresponding additional field H_z dependent on v:

$$H_v = -v^2 \cdot \mu \cdot \varepsilon \cdot H = -(v^2/c^2) \cdot H \qquad (3.6)$$

We obviously owe the measurable overlap fields in a laboratory simply and solely to the relative velocity v with which the laboratory is moving.

But now we must pay attention to the fact that a terrestrial laboratory rotates along with the earth, that the earth orbits the sun and the sun again rotates around the centre of the milky way. Eventually the whole milky way is on the way in the cosmos with a galactic, for us hardly understandable speed. If we further take into consideration that for every subsystem an additional field occurs as a consequence of the relative motion with regard to the super ordinate system, then one additional field follows after the next and overlaps this one.

Let's imagine, the relative velocity could be reduced towards zero - *and maybe we are moving around such a cosmic point* - then here no overlapping field would be measurable.

3.2 Field overlap

Field vectors can be superpositioned. In this manner the additional field E_z resp. H_z which depends on the velocity, according to equation 3.4, overlaps the respective basic field (E resp. H) to produce the measurable overall field (E_0 resp. H_0):

$$E_0 = E + E_z = E \cdot (1 - v^2/c^2) \qquad (3.7)$$

$$H_0 = H + H_z = H \cdot (1 - v^2/c^2) \qquad (3.8)$$

In the result something surprising the factor $(1-v^2/c^2)$ appears, which is well-known from the special theory of relativity and for instance appears in the Lorentz contraction.
If we rewrite both equations for the characteristic factor and compare with the in a purely mathematical way, over the Lorentz transformation, won length contraction:

$$(1 - v^2/c^2) = (L/L_0)^2 \quad , \qquad (3.9)$$

then it becomes clear that the Lorentz contraction physically seen should have its cause in the changed field conditions which a with relativistic speed moving body finds with regard to a resting body.

$$1 - \frac{v^2}{c^2} = \frac{E_0}{E} = \frac{H}{H} \overset{!}{=} \left(\frac{L}{L_0}\right)^2 \qquad (3.10)$$

The equation is a compulsionless consequence of known physical laws. In this derivation actually no new factor was introduced and nevertheless a completely new picture for the natural scientific reality results.

In our observer system, where the field E_0 exists, a rule has its proper length L_0. In another system, which is moving with the speed v relative to the observer, as a consequence of the here prevailing field E the corresponding rule has a length L. In which relation the factors stand to each other, is described by equation 3.10. Accordingly the following proportionality holds:

$$\boxed{E, H \sim 1/L^2} \quad \text{und} \quad \boxed{E_0, H_0 \sim 1/L_0^2} \qquad (3.11)$$

If we are exterior to a very fast moving body with velocity v, we immediately can observe how this body for reason of its relative velocity experiences the calculated additional field and in this way experiences a length contraction. If the observer is moving along with the body, then he purely subjective seen doesn't detect a length contraction, because he himself and his entire measuring technique is subjected to the same length contraction.

3.3 Aether

From the axiomatic approach what would be, if the field, which itself only represents an experience, would determine perceptible space and its dimensions, quickly a fundamental realization can develop if the described experiences should coincide with real observations (as for example the gravitational force, derived from eq. 3.11 in the 2nd edition about the potential vortex).

As is known does the speed of light have a certain value, and therefore the question is raised, what determines is size. Exactly for this purpose a luminiferous aether had been introduced, however it is constituted.

As has been derived in the last chapter, will for a relative velocity v arise a field, which according to proportionality 3.11 determines the length [m] and the speed of light [m/s] as well, according to eq.2.3: ($c \sim L$).

$$\boxed{E, H \sim 1/L^2} \quad \text{und} \quad \boxed{E, H \sim 1/c^2} \qquad (3.12)$$

With that we have derived completely:

The field takes over the function of the aether.

The equations 3.3 also answer the question, why no aetherwind is being observed, although such a wind actually is present: we experience, as we have discovered, an E-field with „head wind“ as a resting H-field and vice versa and therefore we aren't capable to detect the head wind in the aether.

Michelson had to fail.

3.4 Spin

Only with the field dependency of the speed of light (3.12) we can understand, why the *elementary quanta* can form *as spheres*, like is drawn in the fig. 2.5. We ask again the key question, quantum physics has not found any answer till today:

IV. Why do the particles have the form of spheres?

Answer: In the *centre* the field lines run together, i.e. the *field increases and the speed of light decreases.* Only in this way it will be possible for the vortex oscillation to everywhere occur with the speed of light, even in the inside of the particle.
In the centre of the vortex particle the field in theory will become infinitely large and the *speed of light zero.* This circumstance again is the foundation why the *elementary particles are localized* and it answers key question VIII of quantum physics.

VIII. Why is the elementary quantum localized?

Answer: as in the vortex centre c = 0. The absence of a speed after all is the characteristic of an immobile thing.

The field dependency of the speed of light answers also further basic and up to today unanswered key questions of quantum physics, like why the elementary particles have a spin (IX) and why the magnitude of the spin is quantized (X).

IX. Why do the elementary particles have a spin?

Answer: the spherical form demands field compensation.

X. Why is the magnitude of the spin quantized?

Answer: cosmic basic field determines the need of E_v.

A vortex particle after all does not exist alone in the world, but it is in the field of other particles. We can call this the cosmic basic field (E resp. H).
This basic field overlaps the self-field and takes effect the strongest in the area of the spherical shell, where the self-field is correspondingly small.

In order to keep the form of a sphere, this influence of the basic field has to be compensated. The *additional field* (E_v resp. H_v according to eq. 3.5 resp. 3.6) *necessary for the compensation* is produced by the particle, by rotating in a spiral around itself with a speed v which increases towards the outside of the spherical shell. Therefore does the elementary particles have a spin.

The electron spin is therefore determined by the cosmic basic field.

Another effect of the field dependent speed of light is the tunnel effect [3-2].

XI. Why can speeds faster than light occur in a tunnel?

Answer: a reduction of the cosmic basic field can only be realized locally in a tunnel.

3.5 Definition of the speed of light

If a light signal propagates in space, then as a consequence of the velocity of propagation c, it at a certain point in time t is in a distance r of the light source:

$$r = c \cdot t \qquad (3.13)$$

Should the speed of light become smaller for instance by Δc, then the light signal obviously has covered a distance less by Δr or the time interval has changed by Δt:

$$r + \Delta r = (c + \Delta c) \cdot (t + \Delta t) \qquad (3.14)$$

By writing out the multiplication and subtraction of equation 3.13 the change in distance considered for itself is:

$$\Delta r = c \cdot \Delta t + t \cdot \Delta c + \Delta c \cdot \Delta t \qquad (3.15)$$

The change in distance can have its cause in a change in time, in a change of speed or in both. We now have a closer look at the two possibilities, in which either c or t is to be taken constant.

In the <u>first case</u> **(relativity)** the speed of light c is constant and as a consequence the change Δc = zero. The mathematical formulation (according to eq. 3.15) therefore reads:

case 1 ($\Delta c = 0$): $$\boxed{c = \frac{\Delta r}{\Delta t}} \qquad (3.16)$$

If in this conception world a change in distance is observed, for instance the Lorentz contraction, then inevitably a change in time, for instance a time dilatation, has to make the compensation.

For the time dilatation experiments are given. But for the measurement of time always only atomic clocks are available and their speed of running of course could also be influenced by the Lorentz contraction. In any case it can't be claimed the time dilatation is proven experimentally as long as we do not know the mechanisms of decay of atoms (see Chapter 5 in Vol. 2).

In the <u>second case</u> **(objectivity)** the time t is constant and consequently the change Δt = zero. At a closer look this case is much more obvious, since why should time change. After all time has been *stipulated by definition:*

After all, we are the ones who tell, what simultaneity is.

The mathematical formulation for this case reads:

case 2 ($\Delta t = 0$): $$\boxed{\Delta c = \frac{\Delta r}{t}} \qquad (3.17)$$

This equation does open up for us a fundamentally other way of looking at the physical reality. Contained in it is the proportionality (2.3) we just have derived:

$$\boxed{\Delta c \sim \Delta r} \qquad (2.3 = 3.18)$$

This Equation unconcealed brings to knowledge that any change of the speed of light c [m/s] in the same way leads to a change of the radius r [m], the distance between two points in space or even the length of an object, e.g. a rule. Such a rule after all consists of nothing but spherical atoms and elementary particles and for their radius r again the proportionality 2.3 holds.

3.6 Relativity and objectivity

The first case describes the subjective perception of an observer. It contains the *definition of reality, according to which only is real what also is perceptible.* The theory of relativity of Poincaré [3-3] and Einstein is based on this definition.

With the second case, the case with a variable speed of light, we however get serious problems, since we observe with our eyes, and that works with the speed of light. If that changes, we can't see it. If we could see it, then "reality" would have a completely different face and we surely would have great difficulties, to find our way around. In this "objective world" neither electromagnetic interactions nor gravitation would exist, so no force effects at all. Because all distances and linear measures depend on the speed of light, everything would look like in a distortion mirror.

The concept of an "objective world" at first has not a practical, but rather a theoretical and mathematical sense. The distinction between an observation domain and a model domain is founded in pure usefulness.

The *observation domain* should correspond to *case 1* and the *model domain to case 2.* The mathematical derivation tells us, how we can mediate between both domains. This mediation amounts to a *transformation,* which provides us the instruction, how a transition from the observation into a not perceptible model concept, from the relativity into an objectivity has to.

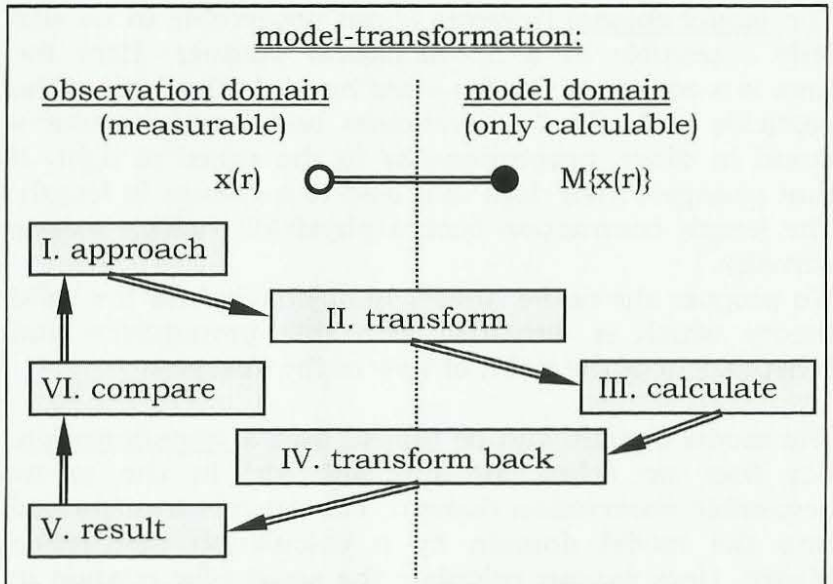


Fig. 3.1: *Theory of relativity and theory of objectivity. The way, how to calculate the particles.*

3.7 Transformation

The *observation domain* is, as the name already expresses, perceptible (observable) with the help of our sense organs and measurable with corresponding apparatus.
The special theory of relativity for the most part provides us the mathematics needed for that. And in that is assumed a constant speed of light. Because a length contraction is being observed and can be measured, a time dilatation must arise as a consequence. Such is the consistent statement of this theory.
Because we already could make us clear that it concerns a subjective theory, of course caution is advisable if generalizations are being made.

The *model domain* however is not observable to us and only accessible in a mathematical manner. Here the time is a constant. On the other hand do the radii of the particles and all other distances and linear measures stand in direct proportionality to the speed of light. If that changes, then does that lead to a change in length. The length contraction occurs physically, which means actually.
We propose the name "theory of objectivity" for the valid theory which is derivable with this prerequisite and independent of the point of view of the observer.

The model domain can be tapped over a *transformation*. For that we select an approach x(r) in the to us accessible observation domain. This then is transformed into the model domain by a calculation instruction M{x(r)}. Here we can calculate the sought-for relation in the usual manner and transform back again the result according to the same calculation instruction $M^{-1}\{x(r)\}$ but in the reversed direction. After being returned in our familiar observation domain, the result can be compared and checked with measurement results (fig. 3.1).

In this way we will derive, calculate and compare the quantum properties of the elementary particles with the known measurement values. Here we remind you of the fact that all attempts to calculate the quantum properties conventionally, without transformation, until now have failed. Not even a systematisation may succeed, if it concerns for instance explanations for the order of magnitude of the mass of a particle.

3.8 Transformation table

A transformation at first is nothing more than an in usefulness founded mathematical measure. But if a constant of nature, and as such the quantum properties of elementary particles until now have to be seen, for the first time can be derived and calculated with a transformation then this measure with that also gains its physical authorization.

We now stand for the question: how does the instruction of transformation M{x(r)} read, with which we should transform the approach and all equations from the observation domain into the model domain?

The attempt to write down at this point already a closed mathematical relation as instruction of transformation, would be pure speculation. Such an instruction first must be verified by means of numerous practical cases, i.e. be tested for its efficiency and correctness. But we not even know the practical examples necessary for this purpose, if we apply the transformation for the first time.

For this reason it unfortunately is not yet possible, to calculate absolute values in a direct way. We have to be content to work with proportionalities and to carry out comparisons. In fig. 3.2 the proportionalities are compared in the way, how they would have to be transformed: on the left side, how they appear and can be observed in the view of the special theory of relativity, and on the right side, how they can be represented and calculated in the theory of objectivity.

general relations:	special theory of relativity	theory of objectivity	
domain of validity:	observation domain	model domain	
* speed of light	$c = c_0$		(2.3 ≡)
c [m/s]:	= constant	$c \sim r$	(3.18)
* field strengths	(acc. to eq. 3.12):		
H [A/m] :	$H \sim 1/r^2$	$H \sim 1/r$	(3.19)
E [V/m] :	$E \sim 1/r^2$	$E \sim 1/r$	(3.20)
* because of eq.(1.14):	$\varepsilon \cdot \mu = 1/c^2$:		
μ [Vs/Am] :	μ_0 = const.	$\mu \sim 1/r$	(3.21)
ε [As/Vm] :	ε_0 = const.	$\varepsilon \sim 1/r$	(3.22)
* relations of material:			
$B = \mu \cdot H$ (3.2): B [Vs/m²]	$B \sim 1/r^2$	$B \sim 1/r^2$	(3.23)
$D = \varepsilon \cdot E$ (3.2): D [As/m²]	$D \sim 1/r^2$	$D \sim 1/r^2$	(3.24)
e.g. spherical capacitor			
* capacity: C[As/V]	$= \varepsilon 4\pi r$ (2.5)	C = const.	(3.25)
* charge: Q [As]	$= C \cdot U$ (3.27)	Q = const.	(3.26)
* energy: W [VAs]	$= Q^2/C$ (2.4)	W = const.	(3.27)
with energy-mass relation:	(2.1)		
* mass:	m [kg = VAs³/m²]	$m \sim 1/r^2$	(3.28)
* relaxation time	τ_1 [s] $= \varepsilon/\sigma$ (3.31)	τ_1 = const.	(3.29)
* specific conductivity	σ [A/Vm]	$\sigma \sim 1/r$	(3.30)

Fig. 3.2: *Transformation of the dependencies on radius (as: f([m]))*.

The change, which here would have to be transformed, is the physical length contraction, which is the change in length as it depends on the speed of light. For spherical symmetry the length l becomes the radius r, of which is to be investigated the influence.

In the observation domain we had derived the proportionality: (3.12)

$$E \sim 1/r^2 \quad \text{und} \quad H \sim 1/r^2.$$

The field of a point charge or of a spherical capacitor confirms this relation:

$$E = Q/\varepsilon 4\pi r^2 . \qquad (3.31)$$

Because the speed of light in our observation is constant, also both constants of material which are related to it ($\varepsilon \cdot \mu = 1/c^2$, after eq. 1.14), the dielectricity ε and the permeability μ, are to be taken constant.

With that the same proportionality as for the field strengths also holds for the induction B and the dielectric displacement D:

$$B \sim 1/r^2 \quad \text{und} \quad D \sim 1/r^2.$$

In the model domain everything looks completely different. Here the radius and any length stands in direct proportionality to the speed of light. In this way we get problems with our usual system of units, the M-K-S-A-system (Meter-Kilogram-Second-Ampere). The basic unit Meter [m] and as a consequence also the unit of mass Kilogram [kg = VAs³/m²] appear here as variable. It would be advantageous, to introduce instead the Volt [V] as basic unit.

But in any case does the dimension of a quantity show us, in which proportionality it stands to the unit of length.

This in the model domain then is authoritative. As an example does the speed of light have the dimension Meter per Second. In the model domain there consequently has to exist a proportionality to the length r [m].

The speed of light determines with equation 1.14 again the constants of material: (3.21 and 3.22)

$$\mu\,[Vs/Am] \sim 1/r \quad \text{and} \quad \dot{\varepsilon}\,[As/Vm] \sim 1/r$$

According to the model holds unchanged: (3.23 + 3.24)

$$B\,[Vs/m^2] \sim 1/r^2 \quad \text{and} \quad \dot{D}\,[As/m^2] \sim 1/r^2.$$

But if we insert the proportionalities 3.21 and 3.23 (resp. 3.22 and 3.24) into the equations of material 3.2, then holds for the field strengths:

$$H\,[A/m] \sim 1/r \quad (3.19) \quad \text{und} \quad E\,[V/m] \sim 1/r. \quad (3.20)$$

Further dependencies of the radius can be read in the same manner either by inserting into well-known laws or immediately from the dimension.

The transformation should tell us, what we would see if the variable speed of light would be observable to us. Doing so highly interesting results come out.

3.9 Derivation of the law of conservation of energy

The energy density of a field is as is known

$$w = (\varepsilon \cdot E^2 + \mu \cdot H^2)/2 \quad . \qquad (3.32)$$

In the <u>*observation domain*</u> will the energy density w decrease proportional to $1/r^4$.

Multiplied with the respective volume we obtain for the energy itself the proportionality:

$$W \sim 1/r \quad . \qquad (3.33)$$

If we make use of the Einstein relation

$$W = m \cdot c^2 \qquad (2.1)$$

with c = constant holds also for the mass m:

$$m \sim 1/r \quad . \qquad (3.34)$$

In this manner we finally find out, why the small nucleons (protons and neutrons) subjectively seen are heavier than the very much larger electrons. As a consequence does a relativistic particle experience the increase of mass (with the length contraction according to equation 3.9):

$$\boxed{\frac{m}{m_0} \overset{(3.34)}{=} \frac{r_0}{r} \overset{!}{=} \frac{L_0}{L} \overset{(3.9)}{=} \frac{1}{\sqrt{1 - (v/c)^2}}} \qquad (3.35)$$

This result is experimentally secured. Our considerations therefore are entirely in accord with the Lorentz-transformation.

In the <u>*model domain*</u> we with advantage assume a spherical symmetry. As easily can be shown with equations 2.5 and 3.26, are the capacity and charge of a

spherical capacitor independent of the radius (3.25 and 3.26). In that case also the from both values calculable energy (2.4) must be constant.

We come to the same conclusion, if take we the above equation 3.32 for the energy density of a field or if we carry out a verification of dimensions:

$$W\,[VAs] = \text{konst.} \qquad (3.27)$$

This simple result is the physical basis for the *law of conservation of energy*. With that we have eliminated an axiom.

The result states that the energy stays the same, even if the radius, the distance or the speed of an object should change. To the subjectively observing person it shows itself merely in various forms of expression.
Consequently is the energy, as is dictated by the here presented field theory, formed by binding in the inside of the quanta the same amount of energy but of the opposite sign. The amount of energy therefore is bound to the number of the present particles, as we already had derived.

Under the assumption of a constant time there results for the electric conductivity σ, by calculating backwards over the equation of the relaxation time (3.29), the proportionality:

$$\boxed{\sigma\,[A/Vm] \sim 1/r} \quad . \qquad (3.30)$$

Maybe the result surprises, because it can't be observed.

Actually we know that the macroscopically observed conductivity in reality only represents an approximated averaged measure for the mobility of free charge carriers. In a particle-free vacuum however this well-known interpretation doesn't make sense anymore.

Hence it is recommended, to only work with the relaxation time constants.

Who nevertheless wants to continue to work with σ as a pure factor of description can do this. But he mustn't be surprised, if in the model domain with decreasing radius the conductivity suddenly increases.

But this is necessary, because otherwise the elementary particles would collapse. Only by the increase of the conductivity, which is produced by the spherical vortex itself, will the expanding eddy current build up in the inside of the particles, which counteract the from the outside concentrating potential vortex.

As a consequence all elementary particles have a defined and computable size (see vol.1: derivation of Schroedinger's equation, in the case of $\tau_1 = \tau_2$).

Ample evidence is available for the correctness of the theory of objectivity. The field dependent change in length is observed and used as *magnetostriction or electrostriction*. If a ferromagnetic material, e.g. a nickel rod, is brought into an alternating magnetic field, then *field dependent longitudinal length oscillations* are observed. In the same manner barium titanate or quartz crystal oscillates in the electric field if a high-frequency alternating voltage is applied. A practical application forms the *production of ultrasound*.

In the next chapter are, as already announced, the *quantum properties of the elementary particles calculated* and in this way is furnished perhaps the most convincing *proof for the existence of potential vortices and for the correctness of the field-theoretical approach* and the theory which is based on it.

4. Structural analysis of two elementary vortices

A special challenge represents the *calculation of the particle mass*. This mass stretches from 207 electron masses of the myon over 1839 of the neutron into the order of magnitude of 18513 electron masses (Y^0).
Doing so not only can be tested, if the calculated values correspond with the measured ones. Also the gaps have to correspond, i.e. where there doesn't exist a discrete mathematical solution also no particle should exist.

The fig. 4.1 anticipates the result and shows that even this strict condition is fulfilled. The agreement of the calculated with the measured results is excellent. If in individual cases small deviations become visible, we always have to bear in mind that the measurements as a rule are analysed statistically and the results are falsified if small particles creep in unrecognized. Particle physics nowadays has at its disposal extremely precise gauges, but even here remaining errors can't be excluded.

Quantum physics is occupied with further taking apart the elementary particles into hypothetic particles, the quarks, and to sort these according to properties and symmetries. Seen strictly causal this procedure thus corresponds to the *quantum physical approach.*

We however have taken the *field-theoretical approach,* and this excludes the introduction of hypothetic particles from the start. It should be our goal to derive and to explain the quantum structure as a field property.

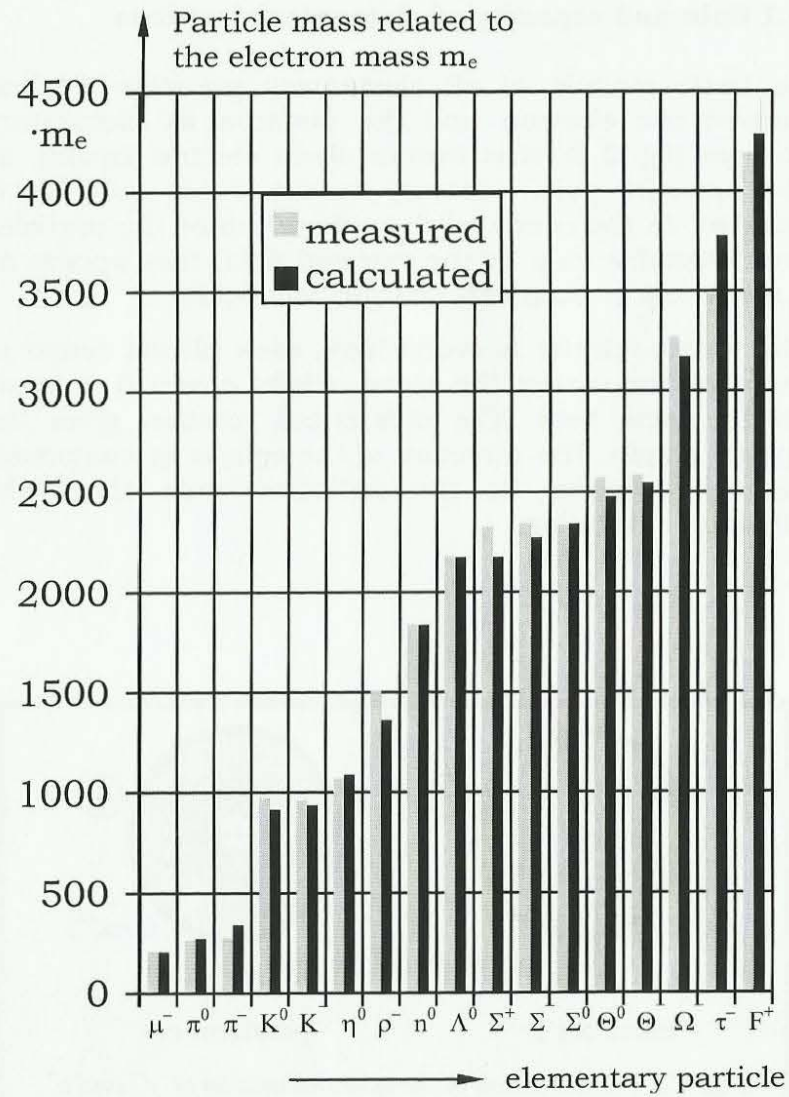


Fig. 4.1: *The comparison with power of proof:*
the measured particle mass
the calculated particle mass

4.1 Spin and capacity of elementary vortices

As basic module of all elementary particles we had derived the electron and the positron as elementary vortices (fig. 2.2). It is insofar about electric dipoles, as the opposite pole, contrary to the outer polarity, is "hidden" in the center of the sphere. Since the particles are detectable only by the external field, they appear as a negatively or positively charged monopole.

The vortex velocity is everywhere, even till the center of the spherical vortex, the speed of light c, which depends on the local field. The differential rotation gives the sphere a spin. The direction of the spin is in customary manner specified by the corkscrew rule about the direction of rotation.

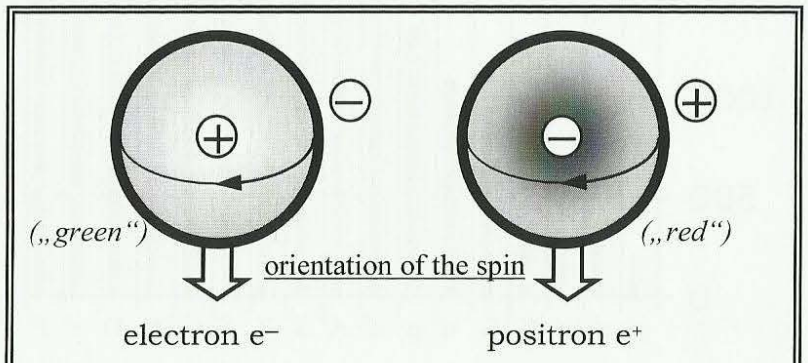


Fig. 4.2: *The definition of the spin-orientation of e^- and e^+*

The size of the vortex sphere is determined by the speed of light and this again by the local field strength; its stability is founded in the concentration effect of the potential vortex.

The whirling takes place everywhere with the speed of light, even in the vortex centre, where all field lines run together, where the field increases infinitely and the speed of light goes to zero. This last circumstance owes the elementary vortex its localization.

We can attribute a charge to this vortex for reason of the field lines which on the outside run towards infinity and which we can measure. This is the smallest indivisible unit, the elementary charge e. Structure and course of the field lines suggest to understand and to calculate the elementary vortex as a spherical capacitor. By basing on the classical radius of the electron r_e given in fig. 2.5 the capacity according to equation 2.5 is calculated to be:

$$C_e = \varepsilon_0 \cdot 4\pi r_e = 3{,}135 \cdot 10^{-25}\ \mathrm{F} \qquad (4.1)$$

Here the theory of objectivity has provided us the realization that even for a change of the radius of the electron the capacity remains unchanged constant (3.25), and this entirely corresponds to our observation.

Between the hull of the elementary vortex, measured at the radius r_e, and its centre, respectively also with regard to infinity, there exists according to equation 3.26 the tension voltage of:

$$U_e = e/C_e = 511\ \mathrm{kV} \qquad (4.2)$$

It as well is constant and independent of the size of the elementary vortex.

4.2 Pauli-principle

We'll have to assume that all elementary particles consist of an integer multiple of elementary vortices. For that the accumulation, like closely packed tennis balls, or the overlapping of individual vortices in the form of shells, like in the case of an onion (phenomenon of transport) can be considered.

The among each other occurring forces of attraction can be traced back to the fact that every elementary vortex is compressed by the field of its neighbour as a consequence of the field dependent speed of light. This field as a rule is for the small distances considerably larger than the field on the outside. Therefore do compound elementary particles not have the twofold or triple mass, but at once the 207-fold (myon) or the 1836-fold (proton) mass. After all there is no other explanation for the fact that there don't exist lighter particles (with a mass less than 207 electron masses).

When adjacent particles can not coincide with all quantum properties, as had been recognized by Pauli, then this has its cause in the vortexes. The Pauli forbiddance is handled as a pure postulate, although a plausible explanation is obvious.

Applied to the spin of an electron pair an undisturbed rotation is only possible if both spherical vortexes rotate in opposite directions. The spin axis must therefore point in the opposite direction. Classically treated the contact at the equator of the rotating spheres is done without friction (figure 4.3 above). Spin, but also the magnetic moment annul each other in this system.

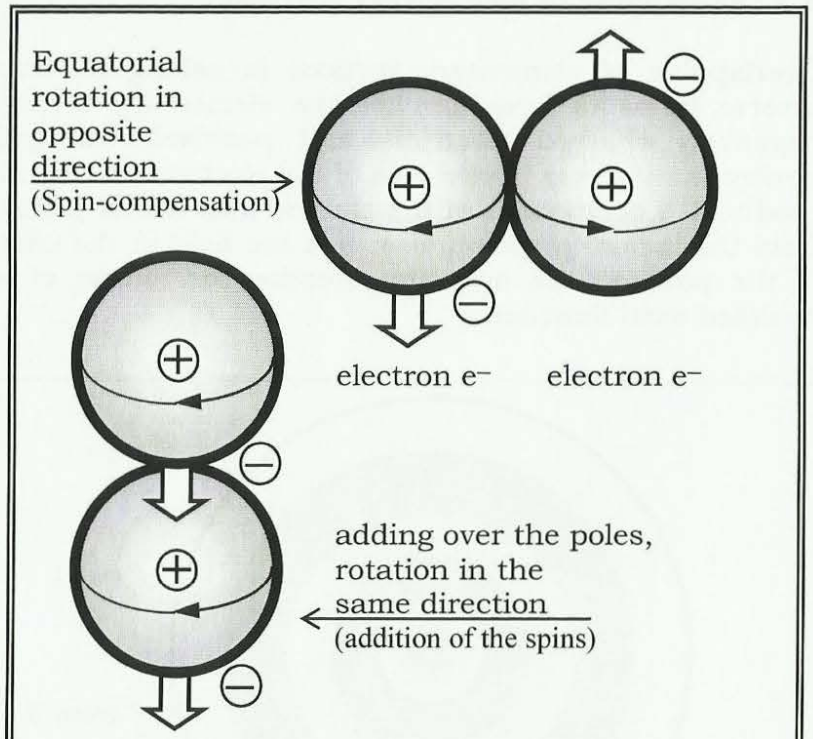


Fig. 4.3: *The Pauli-principle by accumulation of two e^-.*

In addition, another accumulation via the poles is conceivable, in which all spins and all magnetic moments add up respectively. In this alternative, the particles for an undisturbed operation must rotate in the same direction.

In this way, conclusions about the number of involved elementary vortexes are possible. So the spin of an electron is: s = ½, in the upper case, at equator coupling: s = 0, in the lower case, at pole-to-pole accumulation: s = 1, at three vortexes s = 1.5 ; etc.

4.3 Overlapping of elementary vortices

Overlapping of elementary vortices is asking for two inverse forms of formation for the elementary vortex: negatively charged electrons and positively charged positrons. Whereas in the case of the electron the vortex produces a component of the electric field which points from the inside to the outside, has the field in the case of the positron the opposite direction for reason of a reversed swirl direction.

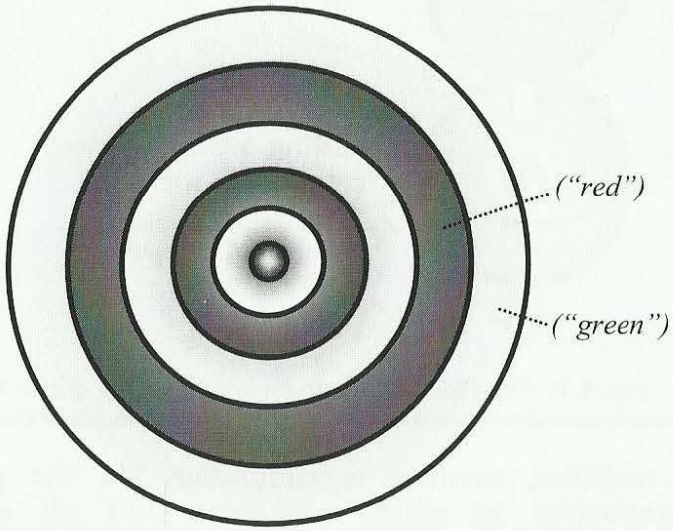


Fig. 4.4 *Overlapping, the phenomenon of transport of vortices*

If we consider the elementary particles from the outside, then we assign the particles with a swirl direction identical to that of the electron to the world of matter and call the particles with the opposite swirl direction

anti-matter. It now is strongly recommended, to take colours to hand, in order to optically clarify the properties of vortices. The electron will be marked as a green sphere and the antiparticle, the positron, as a red sphere.

The green electron is red in its interior, and vice versa, the red positron is green on the inside. Is therefore a positron inside of an electron, then there the red color comes together. This means identical vortex direction, which guarantees an undisturbed operation. In the positron could be absorbed again an electron and in it again a positron, etc.

In this structure all elementary vortexes rotate in the same direction, which is why the magnetic moments add up. For the spin and the "color", however, is only the outermost vortex responsible.

4.4 Matter and antimatter

If we now look into the world of matter, then appears our world of matter to us "green", the world of anti-matter however "red". The uniform green colour of all the in our world existing elementary particles however doesn't exclude that red anti-vortices can exist hidden in the inside of the green vortices, where we can't discover them. But they must be completely covered, otherwise a disastrous reaction occurs, the pair annihilation, as a consequence of the oppositely directed property of the vortices which cancel out.

By means of the *pair annihilation* a dematerialization can occur, because every elementary vortex keeps in its

inside the same amount of energy with opposite sign and the fusion of two inverse particles can result in a zero sum of the energy.

The best known example is the annihilation of an electron-positron pair under emission of radiation discovered by Klemperer in 1934.

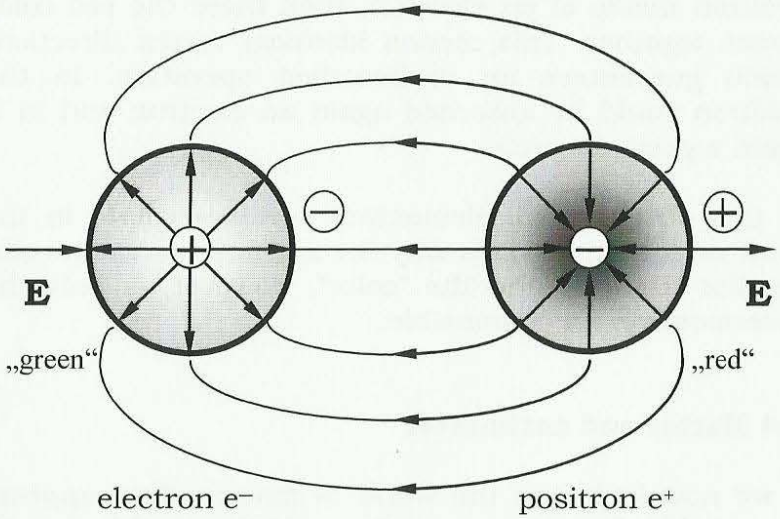


Fig. 4.5 *The electron-positron-pair*

In this representation the elementary vortices still are symmetrical, but the outside field lines already are "bent" and linked together in such a way that, with the exception of the ones in the direction of the axis, no interaction takes place which can be measured.

The two particles for reason of the different charge approach each other quickly, and the closer they are, the larger the mutual force of attraction becomes; a

vicious circle, which leads to the asymmetry shown in the next sketch and only comes to rest, if both particles have destroyed themselves mutually.

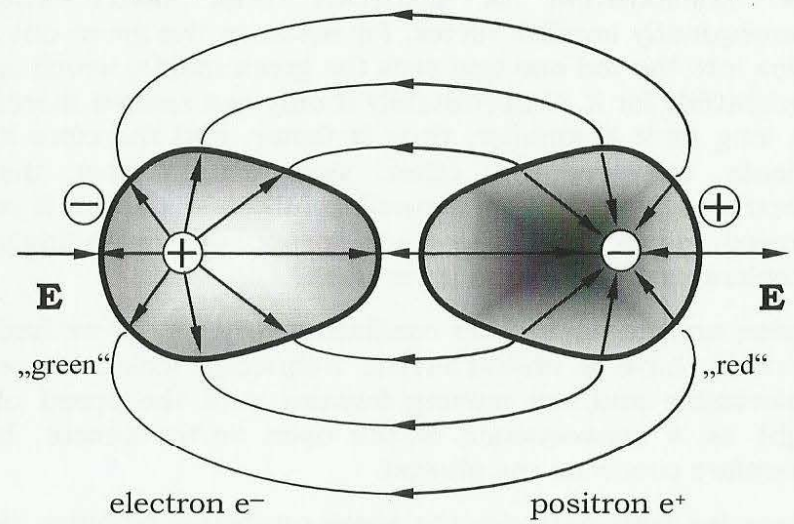


Fig. 4.6 *The electron-positron-pair for a small distance*

The electron and the positron had the same amount of, but oppositely directed swirl activity, so that purely arithmetically seen a zero sum of the rest energy results. But it should be paid attention to both particles having some kinetic energy on the occasion of the relative motion to each other and if they rotate around their own axis also rotational energy. An emission of annihilation radiation occurs, is the explanation of particle physics.

4.5 Annihilation

With the knowledge of the photon (fig. 2.4) we can interpret the annihilation radiation as a consequence of the phenomenon of transport. The faster and consequently smaller vortex, for instance the green one, slips into the red one and sees the green inside, which is compatible for it. Unfortunately it only can remain there, as long as it is smaller, thus is faster, and therefore it shoots out on the other side again. Now the electromagnetic force of attraction fully takes effect. It is slowed down and the red vortex correspondingly accelerates. The process is reversed.

These around each other oscillating vortices, so we had derived, have a characteristic frequency (colour), are polarizable and are moving forward with the speed of light as a consequence of the open vortex centre. It therefore concerns the photon.

Since for both partners the same rotational direction is required, the two spins of each s = ½ add up to 1, oriented in the direction of flight.

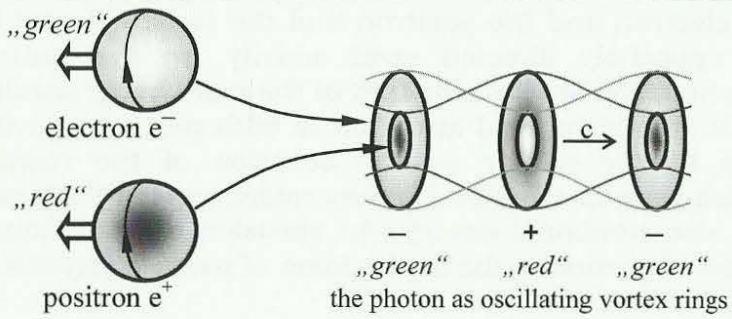


Fig. 4.7: *Annihilation radiation of e^- and e^+ to a photon with spin s = 1, charge Q = 0, mass m = 0*

But before the two elementary vortices, the electron and the positron, are annihilated under emission of radiation, they will for a short time take a shell-shaped, a bound state, in which one vortex overlaps the other.

4.6 Positronium

Its formation known as a positronium we can imagine as follows: an electron, flying past a resting positron, is cached by this for reason of the electromagnetic attraction and spirals on an elliptic path towards the positron. In doing so its angular velocity increases considerably. It will be pulled apart to a flat disc for reason of the high centrifugal forces, to eventually lay itself around the positron as a closed shell.
Now the red positron sees the electron vortex so to speak "from the inside" and doing so it sees as well red; because the green vortex has a red centre and vice versa! The result is the in fig. 4.8 given configuration.

The number of electric field lines, which run from the red border of the positron in the direction of the centre, is identical to the number, which point towards the green border of the electron. Here already the same state has been reached as in the centre, which corresponds to the state at infinity. That means that no field lines point from the green border to the outside; seen from the outside the particle behaves electrically neutral. It doesn't show any electromagnetic interaction with its surroundings.

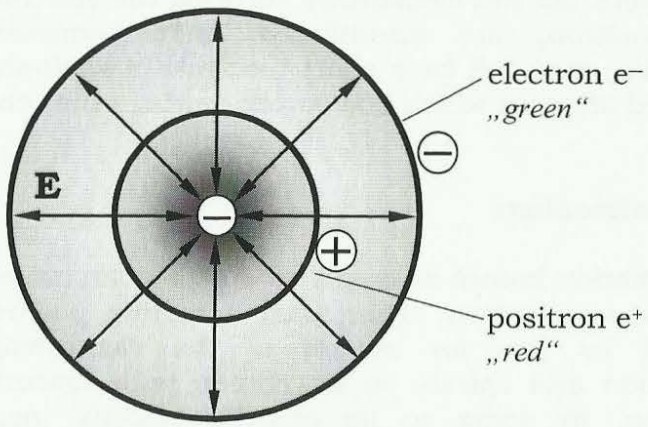


Fig. 4.8 *The positronium = static γ – quant (photon). with spin s = 1, charge Q = 0, mass m = 0*

By measuring the two spherical vortexes, two distinct versions occur. At the orthopositronium the spins of electron and positron are aligned, which is why the total spin of the system is 1. At the parapositronium however they put their spin axes relative to each other, whereby the total spin becomes 0. If the particle were long-living, then it undoubtedly would be the lightest elementary particle besides the electron; but without stabilizing influence from the outside the positronium can't take the in fig. 4.8 shown state at all.

The positron takes up the kinetic energy which is released if the electron becomes a shell around it. But before the bound state can arise, which would identify the positronium as an elementary particle, the equal rights of both vortices comes to light. With the same right, with which the electron wants to overlap the positron, it itself vice versa could also be overlapped.

If the stabilization of the one or the other state from the outside doesn't occur, then the stated annihilation under emission of γ-quanta is the unavoidable consequence.

4.7 Dipole moment

As electrically charged spheres elementary vortices have a magnetic dipole moment along their axis of rotation as a consequence of the rotation of their own (fig. 4.9). This is measurable very precisely and for the most important elementary particles also known quantitatively. In contrast to the angular momentum the magnetic moment can't be constant according to the here presented theory. It should slightly change, if we increase the field strength in the laboratory.

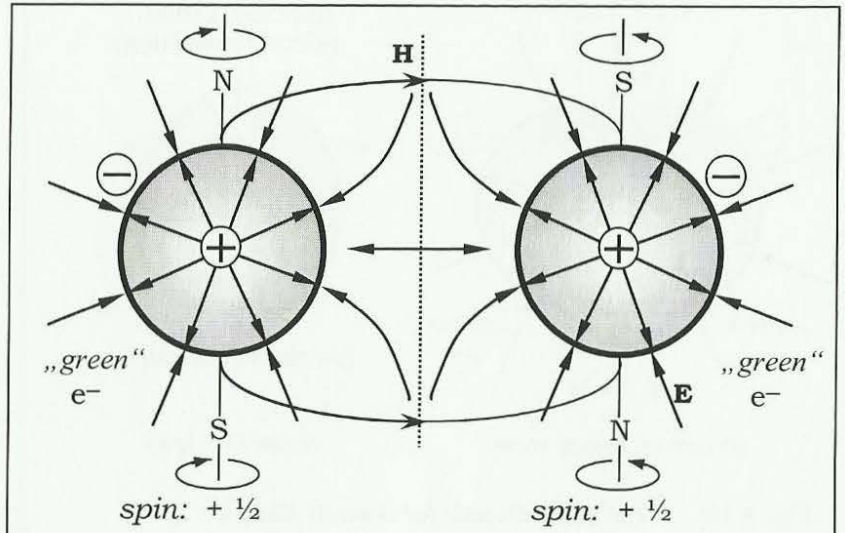


Fig. 4.9 *The electron pair (drawn in cross-section), with spin s = 0, charge Q = -2, mass = $2m_e$*

In a particle consisting of several elementary vortices the vortices mutually increase the local field strength. Therefore we measure at the proton, which consists of three vortices, not the triple, but only the 2,793-fold of the nuclear magneton which can be expected for reason of its mass. Also the neutron has instead of the double only the 1,913-fold nuclear magneton. The deviations therefore are explicable as a consequence of the surrounding fields.
The elementary vortex, as a consequence of the spin along its axis, forms a magnetic north pole (N) and a south pole (S). Another possibility to interact with an external field or with other particles is founded on this property. This shall be studied by means of two electrons, which form an *electron pair*. (Fig. 4.9 + 4.10).

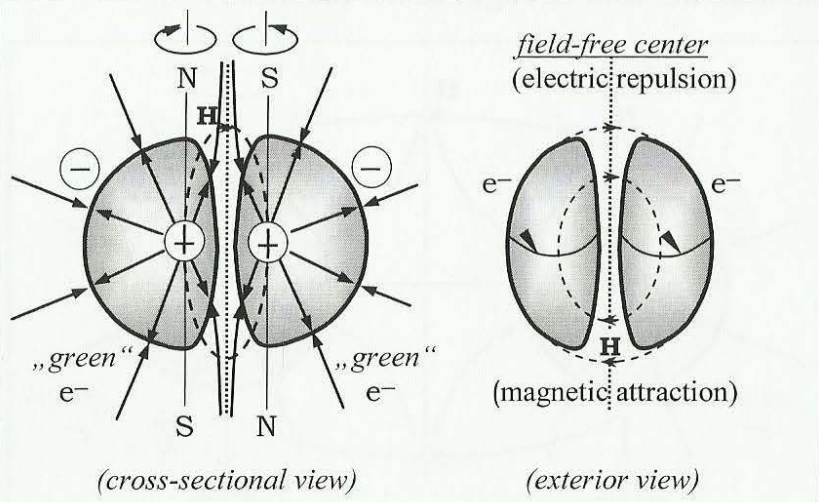


Fig. 4.10: *The electron pair for a small distance frictionless rotation with opposite spin*

4.8 The pair of electrons

For reason of the equal charge the two electrons at first will repel each other. If they rotate of their own they however will mutually contract, which, seen from the outside, is interpreted as a force of attraction. And in addition will they align their axes of rotation antiparallelly. While they now rotate in the opposite direction, a magnetic force of attraction occurs.
As is shown in fig. 4.10, the magnetic dipole field in this way is compensated towards the outside, as is clarified by the field line (H) with a closed course. Between both electrons a space free of E-field stretches. If both vortices are a small distance apart they lay themselves around this space like two half-shells of a sphere. A particle forms which seen from the outside is magnetically neutral, but it carries the double elementary charge.

The exceptional affinity is always restricted to two vortices of equal charge with an opposite direction of rotation. Further vortices can't be integrated anymore and are repelled. This property of vortices covers the quantum condition (Pauli's exclusion principle) for the spin quantum number perfectly.

The calculation of the effective forces shall bring clarity. On the one hand we are dealing with an electrical repulsion, according to Coulomb's law:

$$F_{el} = e^2/4\pi\varepsilon_o \cdot y^2 \qquad (4.3)$$

with the distance $y \approx 4r_e$ in figure 4.9. If the spheres touch each other, the force is quadrupled to $y = 2r_e$. It amounts to maximal:

$$\boxed{F_{el} = e^2/16\pi\varepsilon_o \cdot r_e^2} \qquad (4.4)$$

Next, we estimate the magnetic attraction force that counteracts the electrical repulsion. If we look over the pole on one of the two spherical vortexes, thus replacing the elementary charge e, rotating with the speed of light c, by an assumed loop conductor with radius r_e, then the Lorentz force acts on the other charge carrier respectively

$$\mathbf{F} = Q\,(\mathbf{v} \times \mathbf{B}) \quad \text{or} \quad F_{magn} = e \cdot c \cdot B_x \quad . \qquad (4.5)$$

In this case, the pointer of the induction B_x points in the direction of the axis of rotation (x-direction), the pointer of force F_{magn}, perpendicular to it, in the direction of the spin partner. According to the law of Biot-Savart, the flux density at distance $x = r_e$ on the pole above the conductor loop is:

$$B_x = \mu_o \cdot M / 2\pi x^3 \quad \text{or} \quad B(r_e) = \mu_o \cdot M / 2\pi\, r_e^3 \qquad (4.6)$$

with the magnetic dipole moment m, as the product of the wire current I and the area of the loop:

$$m = I \cdot \pi\, r_e^2 \quad \text{is} \quad B(r_e) = \mu_o \cdot I / 2 \cdot r_e \quad . \qquad (4.7)$$

The current, flowing in the conductor loop with the length of $2\pi r_e$, consists of the elementary charge e, which rotates with c:

$$I = Q \cdot f \quad \text{and} \quad f = c / 2\pi r_e \quad \text{or} \quad I = e \cdot c / 2\pi r_e \qquad (4.8)$$

The magnetic force with which the electrons affect each other is (with $c^2 = 1/\varepsilon_o \cdot \mu_o$):

$$\boxed{F_{magn} = e^2 \cdot c^2 \cdot \mu_o / 4\pi r_e^2 = e^2 / 4\pi\varepsilon_o \cdot r_e^2} \qquad (4.9)$$

If this result is compared with that from equation 4.4, then the magnetic attraction force is at least 4 times stronger. The electrical repulsion of the similarly charged particles is however without a chance:

$$\boxed{|F_{magn}| = 4 \cdot |F_{el}|} \qquad (4.10)$$

4.9 Calculation rules

So far many calculation rules have been used, which are taken partially from vortex physics and partially from traditional physics. We close the chapter with a compilation:

1. The sole component of all elementary particles is the elementary vortex.
2. The elementary vortex, which was identified as a coiled spherical vortex, becomes, viewed from the outside, the color green assigned in case of the electron, and red in case of the positron.
3. In our material world all stable components must have the same vortex direction; that means all are green, so they do not annihilate each other.
4. Since inside of a green materialized vortex a red counter vortex exists, only red antiparticles may have a seat here and vice versa (principle of superposition).
5. Due to the concentration effect of the Potential Vortex the elementary vortices take spherical shape, which is made possible by a quantized spin rotation (field compensation).
6. As a rotating electrical dipole, a magnetic moment is created in the direction of the axis of rotation. The magnetic force is considerably stronger than the Coulomb force (more than 4 times greater).
7. In case of the attachment of two equally charged particles at the reversed spinning equator the spins annihilate each other (Pauli principle); the magnetic

attraction force occurs against the electrically repulsive, but weak, Coulomb force.

8. With attachment via the poles (N to S or vice versa) the spins and magnetic moments sum up, if they have the same direction of rotation.
9. In both cases of an attachment the magnetic force dominates and the spherical vortexes become deformed as a result of the field-dependent dimensions.
10. Fermions with spin ½ · (1, 3, 5, ...) are composed of an odd number of elementary vortexes (1, 3, 5, ..).
11. Bosons spin (0, 1, 2, ...) consist of an even number of elementary vortices (2, 4, 6, ...).
12. At superposition the total spin is determined only by the external elementary vortex.
13. Angular momentum and spin conservation are only valid as long as neutrinos are not involved (closed sytem).
14. Electrically charged particles always consist of an odd number of elementary vortices.
15. Electrically neutral particles always consist of an even number of elementary vortices.
16. Deviations from these requirements usually lead to oscillations (photon) or breakup.

For the particle decay further rules are to be derived.

5. Calculation of the nucleons p^+ and n^o

We now have discussed all conceivable possibilities, which two elementary vortices can form: the creation of a pair for like charge and the annihilation for unequal charge under emission of photons via the formation of the positronium as an intermediate result.

Next another elementary vortex shall be added and all different possibilities and configurations will be derived, which can be formed by amassing or overlapping of 3 or even more elementary vortices.

5.1 Myon

The positronium can, as said, only take the in fig. 4.8 shown bound structure, if it is stabilized from the outside. This task now a further electron shall take over. According to the shell model the innermost elementary vortex an electron (e^-), is overlapped by a positron (e^+) and that again overlapped by an electron (e^-).

With an in the sum single negative charge, a completely symmetric structure as well as a half-integer spin this particle will show a behaviour corresponding to a large extent to that of the electron. Merely the mass will be considerably larger, because every vortex each time compresses the other two.

It therefore concerns the myon (μ^-), which also is called *"heavy electron"*. The myon was discovered 1937 in the cosmic radiation (Anderson and others).

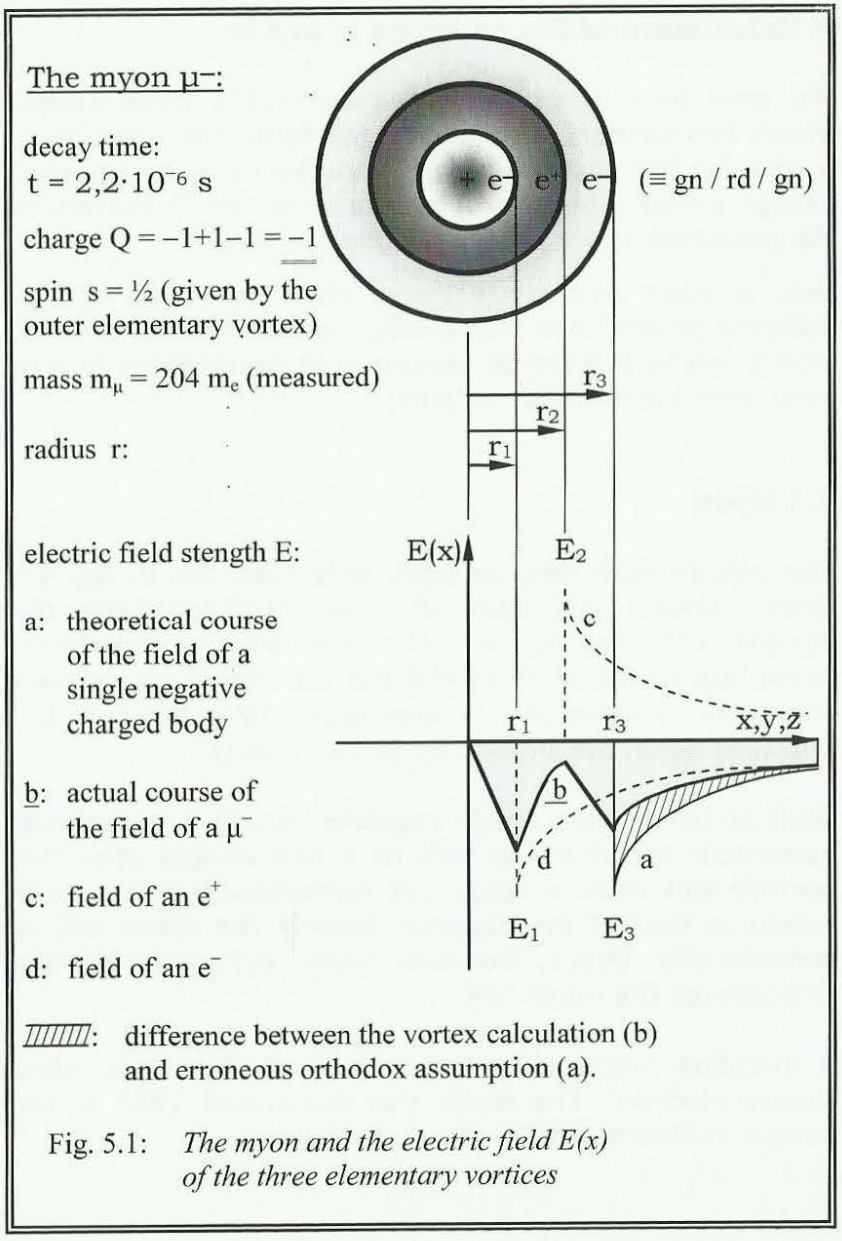


Fig. 5.1: *The myon and the electric field E(x) of the three elementary vortices*

In fig. 5.1 is drawn the shell-shaped structure of the myon from inside. Below that is the electric field E(x) of the three elementary vortices plotted, which is identical in all directions due to the symmetrical structure.

It is visible that merely in the proximity of the particle the actual course of the field deviates from and is smaller, than the course which theoretically can be expected for a single negatively charged body. The difference is marked by a hatching.

5.2 Calculation of the vortex fields

We now can tackle the calculation of the myon. For that the following considerations to begin with are useful:

Mass is an auxiliary term founded in usefulness, which describes the influence of the electromagnetic field on the speed of light and with that on the spatial extension of the "point mass".
Without exception the local cosmic field E_0 has an effect on a free and unbound elementary vortex, thus on an individual e^- or e^+, and determines so its size and its mass. But as long as we haven't determined this field strength, the calculation of its quantum properties won't succeed.

Instead the masses of compound particles will be compared to each other, which are so heavy that the field strength of the neighbouring vortices is predominant over the basic field E_0, so that a neglect of E_0 seems to be allowed. The course of the calculation is made for all elementary particles in the same manner, which is explained hereafter.

The tension voltage of an elementary vortex, like for a spherical capacitor, is determined by integrating over the electric field strength from the inner radius r_i up to the outer radius r_a:

$$U = \int_{r_i}^{r_a} E\,dr \qquad (5.1)$$

For the electron ($r_i = 0$ und $r_a = r_e$) we already have carried out the integration and determined the tension voltage to be 511 kV (equation 4.2).

Doing so we further had discovered that it won't change, if the radius r varies. Even for a shell configuration, in which electrons and positrons alternately overlap, the approach is valid:

$$U_1 = U_2 = U_3 = U_4 = \ldots = U_n \qquad (5.2)$$

At a certain radius all elementary vortices show the same density of field lines and with that also the identical field strength, so that we can solve the integral (5.1) for the each time neighbouring vortex shells and can compare the results:

At the radius r_1 with $E(r_1) = E_1$ the agreement is valid for the innermost and the overlapped vortex shell:

$$U_1 = \int_0^{r_1} E_1\,dr = E_1 r_1 \overset{!}{=} U_2 = \int_{r_1}^{r_2} E_1\,dr = E_1 (r_2 - r_1) \qquad (5.1^*)$$

At the radius r_2 with $E(r_2) = E_2$ the agreement is valid analogously for the 2nd and 3rd shell:

$$U_2 = \int_{r_1}^{r_2} E_2\,dr = E_2 (r_2 - r_1) \overset{!}{=} U_3 = \int_{r_2}^{r_3} E_2\,dr = E_2 (r_3 - r_2) \qquad (5.1^{**})$$

If still more shells are present, then we can arbitrarily repeat this procedure. For the radius of each shell we always obtain

$$\Delta r = r_1 = r_2 - r_1 = r_3 - r_2 = \ldots = r_n - r_{n-1}\,, \qquad (5.3)$$

a relation, which, related to the innermost radius, provides the following simple expression for the individual radii:

$$r_2 = 2 \cdot r_1; \quad r_3 = 3 \cdot r_1; \quad \ldots; \quad r_n = n \cdot r_1 \qquad (5.4)$$

From the comparison of the integration results 5.1* and 5.1** follows further that all elementary vortices produce the same field strength:

$$E_1 = E_2 = E_3 = \ldots = E_n \qquad (5.5)$$

5.3 Calculation of the myon

Basis of every particle calculation is the theory of objectivity. We infer from the transformation table (fig. 3.2, eq. 3.19 and 3.20) that the field strengths E and H decrease with 1/r. In fig. 5.1 the decrease of the fields with 1/r is shown. Up to the radius r_3 the field of the innermost vortex E_1 has worn off to the value.

$$E_1(r_3) = E_{31} = -E_1 \cdot (r_1/r_3)$$

It is overlapped by $E_2(r_3) = E_{32} = E_2 \cdot (r_2/r_3)$
as well as the cosmic basic field E_0:

$$E(r_3) = E_{31} + E_{32} + E_0 = E_1 \cdot (r_2 - r_1)/r_3 + E_0 \qquad (5.6)$$

The local basic field E_0 is not known, but it is very small with regard to the field of the neighbouring vortex shells, so that a neglect seems to be allowed.

From equation (5.6) in this way follows with the radius relation (5.4):

$$\frac{E(r_3)}{E_1} = \frac{2 \cdot r_1 - r_1}{3 \cdot r_1} = \frac{1}{3} \qquad (5.7)$$

For the shell-shaped configuration of the myon (fig. 5.1) relation (5.7) indicates, which field the outside vortex shell is exposed to. From this can already be seen, how much it is compressed thanks to the field dependent speed of light and how much its mass as a consequence is increased.

5.4 Structure of the proton

If we again remember the affinity of two elementary vortices, which form a very probable, but not particularly tight bound pair, by perceiving a mutual attraction force through their magnetic dipole field against the electrical repulsion. As a result, there is an attachment of the two spherical vortexes (within the meaning of fig. 4.3).

If we this time start with a positron pair, then does this pair have a double positive elementary charge. The two e^+ hence exert a particularly big force of attraction on electrons flying past them. If they have cached one and put it round as a shell, like a coat, then they will never again give it back! To again remove the electron, a triple positive charge would be necessary. But such a particle can't exist at all. The new particle therefore has an absolute stability and a very big mass, because the positron pair is considerably compressed by its outer

shell. The total charge is single positive. With these properties it actually only can concern the proton.

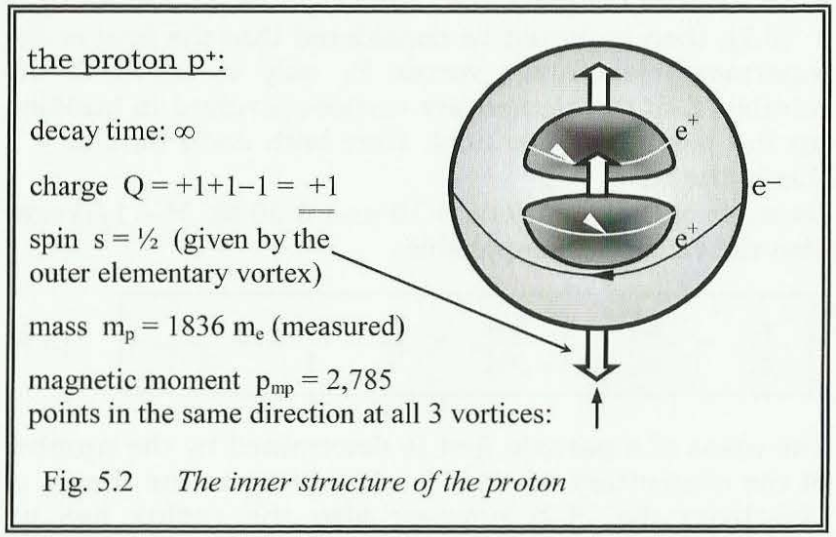


Fig. 5.2 *The inner structure of the proton*

5.5 Calculation of the proton

We can start from the assumption that both positrons are very close together in the inside and thus each forms the half of a sphere. For the calculation of the proton mass we then can assume as an approximation a structure of two shells, in which the inner vortex will have the double charge and the double field $(2 \cdot E_1)$.

With equation 5.4 the field strength at the outer radius r_2 is:

$$E(r_2) = 2 \cdot E_{21} = 2 \cdot E_1 \cdot (r_1/r_2) = E_1 \qquad (5.8)$$

If we want to compare the results of the p^+ (5.8) and the μ^- (5.7), then it should be considered that the field of the innermost elementary vortex E_1 only is equal, if the number z_e of the elementary vortices involved in building up the particle is identical. Here with each time $z_e = 3$ this is the case.
Because of the equations 3.19 and 3.20 ($E, H \sim 1/r$) now also the radii are comparable:

$$\boxed{\frac{r_p}{r_\mu} = \frac{z_{e\mu}}{z_{ep}} \cdot \frac{E_\mu(r_3)}{E_p(r_2)} = \frac{3}{3} \cdot \frac{1/3}{1} = \frac{1}{3}} \qquad (5.9)$$

The mass of a particle first is determined by the number of the elementary vortices z_e. According to the theory of objectivity (fig. 3.2) however also the radius has an influence on the mass:

$$m \sim 1/r^2 \qquad (3.28)$$

This proportionality should be applied to the p^+-μ^--comparison.

$$\boxed{\frac{m_p}{m_\mu} = \frac{z_{ep}}{z_{e\mu}} \cdot \left(\frac{r_\mu}{r_p}\right)^2 = \frac{3}{3} \cdot \left(\frac{3}{1}\right)^2 = 9} \qquad (5.10)$$

The calculation provides a nine times bigger mass for the proton with regard to the mass of the myon. Therefore the mass of the proton related to the mass of the electron is:

$$\boxed{m_p/m_e = 9 \cdot (m_\mu/m_e) = 9 \cdot 207 = 1863} \qquad (5.11)$$

It would be favourable, to start from the with measuring techniques determined value for the mass of the proton $m_p/m_e = 1836$ and calculate backwards the related mass of the myon.

Instead of the Measurement value:

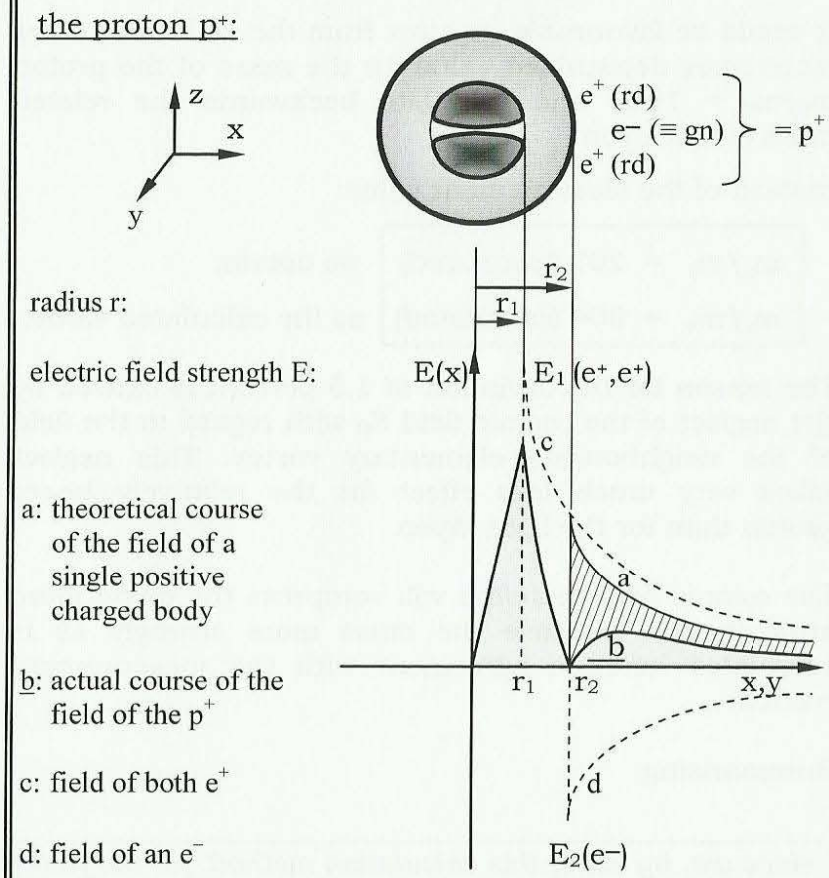
$m_\mu/m_e = 207$ (measured)	we obtain:
$m_\mu/m_e = 204$ (calculated)	as the calculated value.

The reason for the deviation of 1.5 percent is caused by the neglect of the cosmic field E_0 with regard to the field of the neighbouring elementary vortex. This neglect takes very much less effect for the relatively heavy proton than for the light myon.

The cosmic field therefore will compress the myon more strongly and increase the mass more strongly as is calculated here, in agreement with the measurement results.

Summarizing:

since we, by using this calculation method, for the first time succeeded in deriving the mass of an elementary particle from that of another particle, the <u>particle mass isn't a constant of nature</u> anymore.



: discrepancy between the measurement (b) ≡ the vortex calculation (b) and the classical calculation resp. assumption (a).

Fig. 5.3: *The proton and the electric field E(x,y) of the three elementary vortices in x- and y-direction*

5.6 "Strong interaction"?

A central question of nuclear physics concerns the forces which keep the atomic nucleus, which consists of many neutrons and protons, together and give it its very good stability in spite of the like positive charge.

According to today's textbook opinion (course of the field indicated with a in fig. 5.3) the forces of repulsion between the individual protons increase further as the distance gets smaller, to obtain immense values within the nucleus. They theoretically had to be overcome by new and unknown nuclear forces. Therefore physicists assume the hypothesis of a "strong interaction". But they are mistaken.

The answer to this open question is provided by the course of the field (b) for the proton, sketched in fig. 5.3. We see that the electric field at first indeed still increases if we approach the proton, but in the proximity it contrary to all expectations decreases again until it is zero. With that then also any force of repulsion has vanished! But the course of the field follows without compulsion from the overlap of the three individual elementary vortex fields.

The field direction in the z-direction even is reversed! In this topsy-turvy world, in theory, an electromagnetic force of attraction between two like charged protons can occur.

We conclude:

A strong interaction doesn't exist at all.

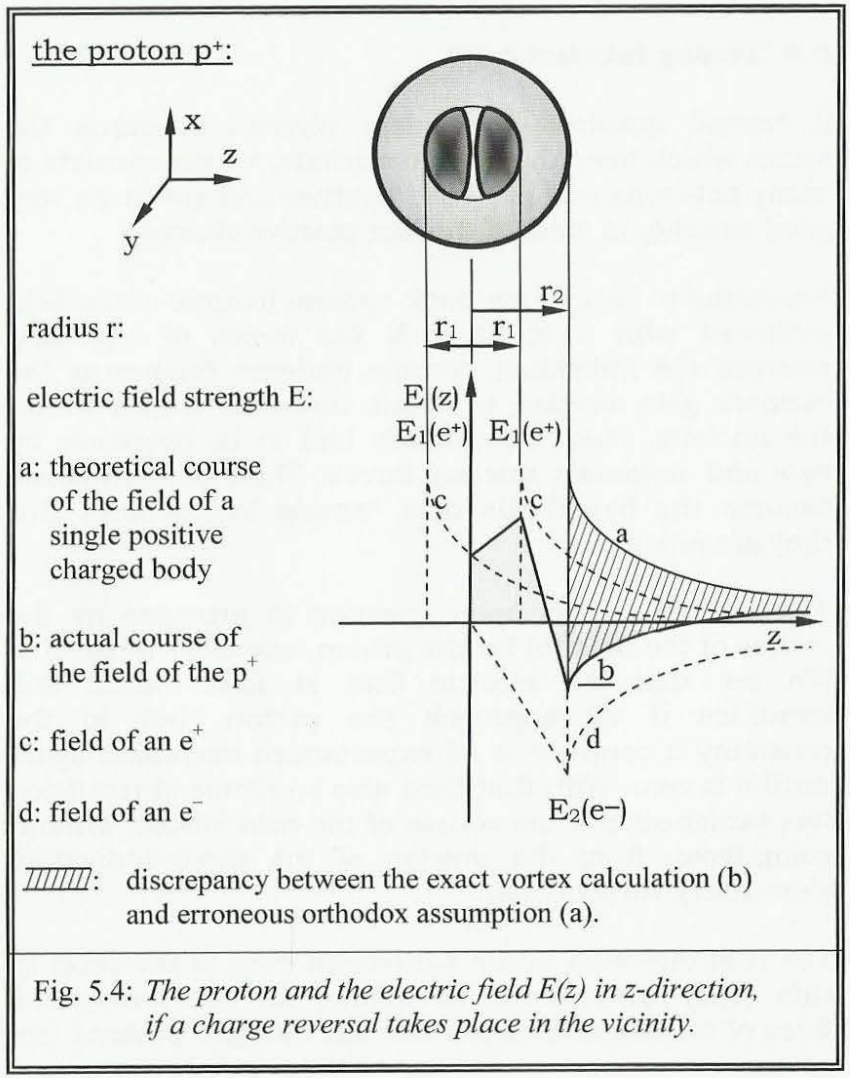


Fig. 5.4: *The proton and the electric field E(z) in z-direction, if a charge reversal takes place in the vicinity.*

The usually given values for "range" and "strength" just represent a misinterpretation. The hatched drawn area marks the difference which is misinterpreted by quantum physics.

5.7 Magnetic moment of the proton

The model concept over and above that answers another mysterious property of the proton. As an electrically charged particle with a spin it first of all should form a magnetic moment for reason of the rotating charge. But until now the measurable order of magnitude couldn't be explained.

If the inner positrons rotate around each other with oppositely pointing spin, then the magnetic field line is already closed within the particle and no effect in x- or y-direction is observable from the outside.

As pair they however still can rotate together around the z-axis and they'll do that. The overlapping electron for reason of its rotation of its own will likewise build up a magnetic dipole moment along its axis of rotation. It also will align its axis in the z-direction, so that now all three elementary vortices have one field axis. Being comparable to individually "elementary magnets" aligned in the same direction they produce a triple magnetic moment.

If we namely would start with a single positively charged body according to the theory of quantum mechanics, then we would have expected the value of the nuclear magneton

$$\mu_N = e \cdot \hbar/2m_p = 5{,}0508 \cdot 10^{-27}\ \mathrm{Am}^2 \qquad (5.12)$$

as the magnetic moment for the proton. Opposite to that provide experiments with protons the approx. threefold value as already predictable by the new vortex theory.

It should be noted for completeness that, well known, all measured values of magnetic moments always lie below the theoretical values, in the case of the proton at 2.785 (instead of $3 \cdot \mu_N$) because of the neglect of the magnetic stray field lines, which run partially already inside the spherical vortex from the north to the south pole and thus are no longer accessible to the measurement technique.

In addition does the direction of the vector μ_{mp} correspond with the spin-axis, so as if the proton were negatively charged. The reason for that is that only the outermost elementary vortex determines the spin of the particle, and that is actually a negatively charged electron. Also this excellent agreement in the case of the proton can be judged as proof for the correctness of the vortex model.

The mathematically calculated size of the proton, according to the theory of objectivity, can hardly be compared with measured values. The reason for the differences I see in the neglect of the field dependence of the linear dimension. In the interpretation of modern physics is this saying that when scanning a particle with the help of another usually very fast particle mutual interference occurs, making a neutral or even "objective" measurement impossible.

So far one has assumed that the radius of the proton is 0.883 fm at the point of maximum charge. After the latest measurements, where heavy muons instead of electrons have been used for scanning, the value was corrected to 0.841 fm [5-1].
(see the derivation in volume 2 on page 39 – 42).

5.8 Structure of the neutron

Until now could not be solved, why despite its missing charge also the neutron n^0 has a magnetic moment. The experimentally determined value is approx. the double of the nuclear magneton.
(exact at $-1{,}93 \cdot \mu_N$).

Further was with measuring techniques an only 0,14% bigger mass with regard to the proton determined. The difference is approximately two and a half electron masses. And how reads the answer in the view of the potential vortex theory?

It is obvious that a positively charged proton and a negatively charged electron mutually attract and amass together (fig. 5.5).

By all means, that would be an obvious configuration to begin with. A pair annihilation can't occur, because the electron, which jackets both positrons, prevents this. The formation of an outer shell is not permitted by the high stability of the proton. It would have to be a positron shell, which instead of neutrality would produce a double positive charge.

Conceivable is another configuration, in which one of the two e^+ of the proton takes up the e^- in its inside and overlaps it (fig. 5.6). This will keep us busy afterwards.

At first appears the amassing of p^+ and e^- to be the obvious answer to the structure of the neutron also in view of the small increase in mass. Since both elementary particles (p^+ and e^-) have a spin, will they align their axes of rotation antiparallelly and rotate

against one another, exactly like an electron pair. But we now have unequal conditions: the proton brings the triple magnetic moment, the electron however only the single, and its field line will be closed by the proton. The difference which remains is the measurable double nuclear magneton, with which the open question would be answered exhaustively.

the neutron n° (p^+ with added e^-):

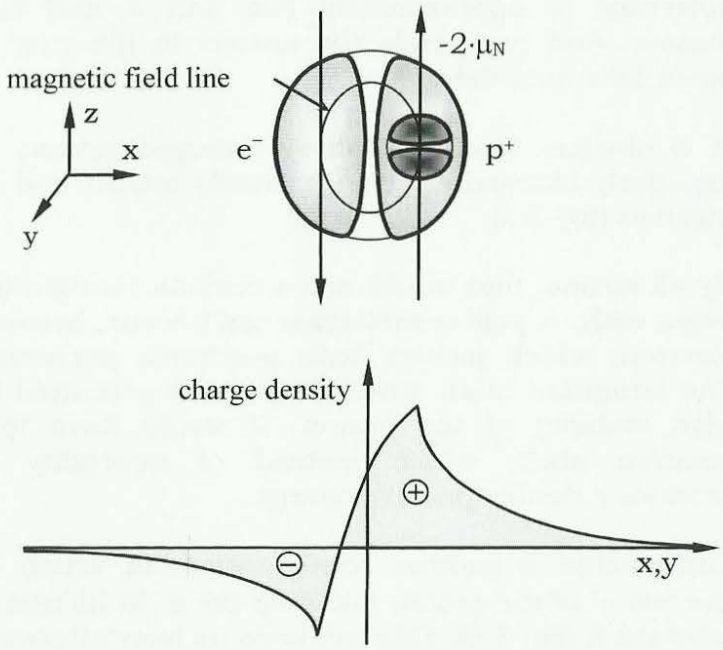


Fig. 5.5: *The neutron with local charge density distribution consisting of proton and attached electron (a structure, which is only possible in the combound structure of an atomic nucleus or in a neutron star.)*

5.9 The attached electron

This structure is shown in fig. 5.5 and has as rest mass the by only one electron mass increased proton mass, but it will deviate from this value, when the unequal partner come closer. Doing so the electron will be more strongly compressed by the heavier proton as vice versa. Consequently, the increase of neutron mass to that of the proton is obtained mainly from the attached electron.

For the calculation we consult the pairing of two electrons (according to figure 4.10) under the assumption that the entire radius r_e remains unchanged while only half the radius is available for each partner: $r_e^*=r_e/2$.

In terms of equation 5.10 the mass m_e^* of the e^--pair can be compared with the mass m_e of a single electron vortex:

$$\frac{m_e^*}{m_e} = \frac{z_e^*}{z_e} \cdot \left(\frac{r_e}{r_e^*}\right)^2 = \frac{2}{1} \cdot \left(\frac{2}{1}\right)^2 = 8 \qquad (5.13)$$

Now the two paired electrons weigh as much as 8 free electrons or an electron has quadrupled its mass due to the attachment.
The mass of the neutron with an attached electron is calculated with the simple sum:

$m_p = 1836\ m_e$	mass of the proton
$+\quad 4\ m_e$	mass of the added e^-
$m_n = 1840\ m_e$	mass of the neutron calculated
$m_n = 1839\ m_e$	mass of the neutron measured

Mass, magnetic moment and charge thus correspond to a large extent with the measurement values. Problems are seen concerning the spin and the stability.

Set of problems concerning *spin*: both the e^- and the p^+ have a half-integer spin, for which reason this configuration should have an integer spin, for the case of a pole attachment (in direction of the z-axis of the p^+). Or in case of an attachment at the equator, shown in figure 5.5, where proton and electron rotate in opposite directions, as required by the condition for the magnetic moment, the spin would result to zero.

Set of problems concerning *stability*: the neutron decays as is well-known in a p^+ and an e^-, but this object should be shorter-lived as determined by experiments. If namely the partner come each other very close, then the field strength of the p^+, contrary to expectation, doesn't increase but decreases, as is shown in fig. 5.3. The e^- therefore can only be bound very, very loosely; in z-direction it even will be repelled (fig. 5.4).

For these reasons is the open structure, which is shown in fig. 5.5, not feasible as an isolated elementary particle, but only in a spatially extended network, like it is present in an atomic nucleus. In this case the neutron is, as is well-known, lighter by the mass defect, which is interpreted as binding energy.

Possibly it only concerns an intermediate stage. The heavier final product of the n^0 then could look like is shown in fig. 5.6. For this version the line of the magnetic field already is closed partly within the particle, so that also here the approx. double nuclear magneton remains as a rest with a sense of orientation, as if the neutron were negatively charged.

the neutron n^o (p^+ overlapped e^- in one of the e^+):

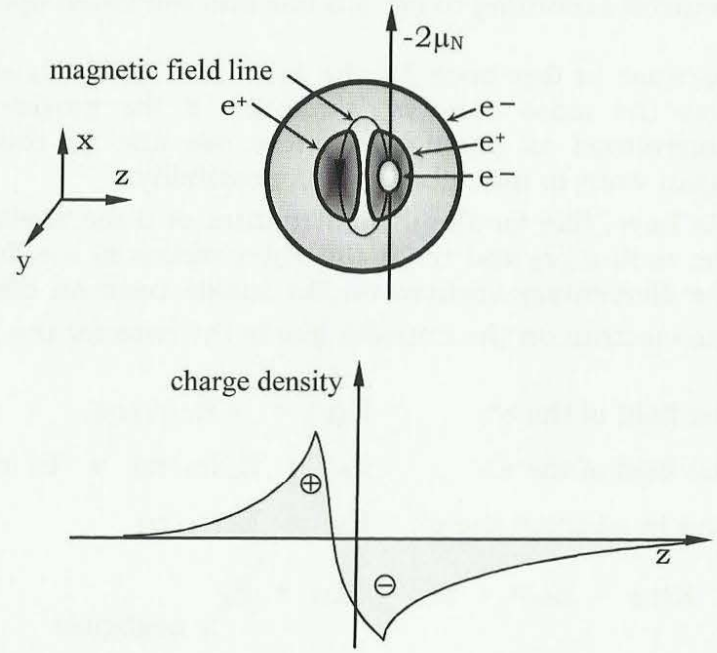


Fig. 5.6: *The neutron with local charge density distribution, consisting of proton and superimposed electron, (structure of a free neutron), with the values:*
charge: $Q_{averaged} = 0$, *spin:* $s = ½$,
magnetic momentum: $\mu_{mn} = -1{,}93 \cdot \mu_N$
calculated mass: $m_n = 1{,}05 \cdot m_p = 1934 \cdot m_e$

Without charge and with the ½ spin it in this configuration fulfils all important quantum properties of the neutron, even that of the stability.

5.10 Calculation of the neutron

The calculation of the mass for the structure of the neutron according to fig. 5.6 has still remained open.

Because in this book for the first time has been shown, how the mass can be calculated, if the particles are understood as potential vortices, we also in this case again want to make use of this possibility.

We have, like for the μ^-, a structure of three shells with the radii r_1, r_2 and r_3. At the outer radius r_3 the fields of the elementary vortices on the inside have an effect on the electron on the outside: like is the case for the μ^-

the field of the e^-: $E_{31}^{(-)} = -E_1(r_1/r_3)$,

the field of the e^+: $E_{32} = E_2(r_2/r_3) = E_1(r_2/r_3)$

and in addition the e^+: $E_{31} = E_1(r_1/r_3)$.

$$E(r_3) = E_{31}^{(-)} + E_{32} + E_{31} + \cancel{E_0}$$

negligible

With the radius relation (equation 5.4):
$r_2 = 2\,r_1$ und $r_3 = 3\,r_1$ the total field is:

$$\boxed{\frac{E(r_3)}{E_1} = -\frac{r_1}{r_3} + \frac{r_2}{r_3} + \frac{r_1}{r_3} = -\frac{1}{3} + \frac{2}{3} + \frac{1}{3} = \frac{2}{3}} \qquad (5.14)$$

If we compare the neutron, in which now $z_e = 4$ elementary vortices are involved, with the proton:

$$\boxed{\frac{r_n}{r_p} = \frac{z_{ep}}{z_{en}} \cdot \frac{E_p(r_2)}{E_n(r_3)} = \frac{3}{4} \cdot \frac{1}{2/3} = \frac{9}{8} = 1{,}125} \qquad (5.15)$$

then we infer from the arithmetically determined result that the neutron according to the radius is 12,5 % bigger than the proton.

The mass is calculated to:

$$\boxed{\frac{m_n}{m_p} = \frac{z_{en}}{z_{ep}} \cdot \left(\frac{r_p}{r_n}\right)^2 = \frac{4}{3} \cdot \left(\frac{8}{9}\right)^2 = 1{,}05} \qquad (5.16)$$

The particle therefore has a mass which is 5% larger than for the proton, slightly more as has been measured for the neutron. The difference is acceptable. The particle after all is structured very asymmetrically, in which the reason is to be seen, why the uncharged particle, looked at from close up, nevertheless shows an observable charge distribution. Such has been measured with great effort and frequently been published as an unsolved mystery of particle physics [5-2].

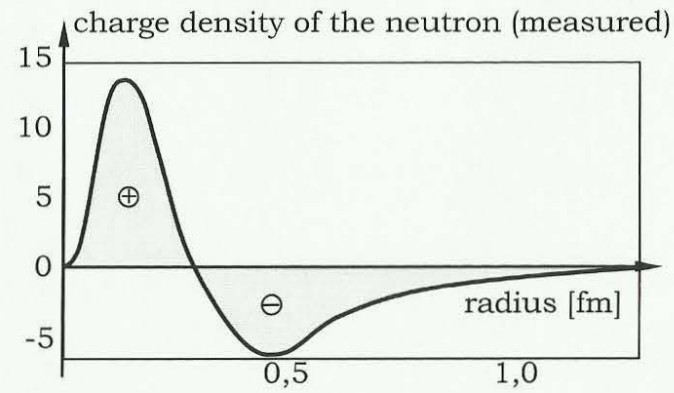


Fig. 5.7 measured distribution of the charge density [see lection: Teilchenphysik, Uni Giessen].

The high correlation between measured (figure 5.7) and calculated charge density distribution (figure 5.5 and 5.6) has once more validity for the accuracy of the vortex model. Solely the internal structure explains why the neutron has a positive charge, offset to the side in its center, while to the outside, especially at the side, where the e^+ has "swallowed" the e^-, the negative charge outweighs.

Wit this asymmetry the neutron is really no longer neutral. It is capable of entering an electrical interaction with the surrounding as a result of the charge distribution, and a magnetic interaction with its magnetic poles. In an atomic nucleus, where this is necessarily needed, the feature contributes at the same time to the stability of the neutron.

Outside of an atomic nucleus is, however, off all things the ability to interact the doom of the neutron. It becomes unstable and breaks down into individual components, which in turn allow conclusions about the participating elementary vortexes.

6. Pattern of the elementary particles

With several hundred known elementary particles, whose number is constantly growing, should one come to doubt the assumption that they are really elementary and each mass is one physical constant of nature.

Following the new field theory only the Potential Vortex is elementary itself. The particles on the other hand are made up of individual potential vortex arrays that attach or overlap each other. At it very specific configurations are justified for creation and existence. We're going to consider them one by one, to derive their quantum properties and to calculate their mass in order to search, for the attribution and nomenclature after that, the appropriate particle in a current table of the known elementary particles with the matching properties, determined by measurement [6-1].

In addition, the attribution can be proofed with the aid of decay products, which are also obtained from measurements of more or less "durable" elementary particles.

6.1 β-decay

In the case of the calculated quasistable particles, the μ^- and the n^0, the verification by means of the well-known decay processes is still due. Free neutrons, those which are not bound in an atomic nucleus, decay with an average life of 918 seconds. By this property they are by far the longest living among the quasistable elementary particles.

Should the neutron decay be triggered by neutrinos, then obviously a distant flying past does not suffice. For that the electron is bound in the proton too tight. There probably has to occur a direct "crash", in which a neutrino is used, since the decay equation reads:

$$n^0 \longrightarrow p^+ + e^- + \overline{\nu}_e \qquad (6.1)$$

As could be expected a proton p^+, an electron e^- and the mentioned electron-antineutrino $\overline{\nu}_e$ are formed. What here is written down as the emission of an antiparticle, is equivalent to the absorption of the particle [6-2], in this case of the neutrino. The reaction equation 6.1 can be reformulated accordingly:

$$\boxed{n^0 + \nu_e \longrightarrow p^+ + e^-} \qquad (6.2)$$

Also for the decay of the myon an electron-neutrino is used. In both cases it provides the energy necessary for the decay. But we can really understand the β-decay only, after we have got to know these particles better.

6.2 Electron-neutrino

Without charge and without mass neutrinos show hardly any interactions with matter and as a consequence they possess the enormous ability of penetration - as is well-known.

They are said to participate in the „weak interaction", which should trigger a conversion of the concerned particles, which is their decay. Pauli already has postulated the neutrino 1930 theoretically, because the transition from a half-integer spin to an integer spin for the n^0-decay otherwise wouldn't have been explicable. The balance of energy not even has been fulfilled.

If we imagine an elementary vortex is being born, but the local field strength and energy isn't sufficient for obtaining a quantized state. The result is an incomplete potential vortex , which has an open vortex centre and as a consequence shows no localization at all. In the form of a vortex ring it oscillates around itself, while it continually turns its inside to the outside and then again to the inside.

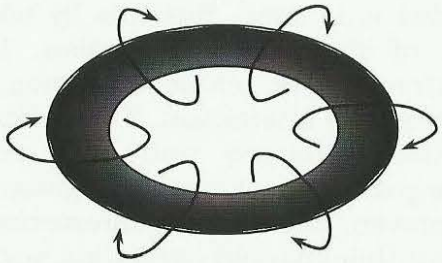


Fig 6.1: *The electron-neutrino as a ring-like vortex*

One moment the vortex ring is "green", then it is "red" again, one moment matter, then anti-matter, one moment positively charged and the next moment negatively charged. In contrast to the photon the number of the involved elementary vortices z_e for the neutrino is odd ($z_e = 1$ for the ν_e). Perpendicular to the direction of propagation the neutrino has a spin ($s = ½$) for reason of a rotation, which overlaps the pulsating oscillation.

This vortex ring is, as said, not a member of stationary matter, because it doesn't form a „black hole" in its centre, where the speed of light becomes zero. But it has an absolute stability like every elementary vortex, even if it only occurs incomplete and hence not in any quantized form.
This concept of the electron-neutrino as an open oscillating elementary vortex in the form of a ring-like vortex covers the experimentally determined realizations unexpectedly well.

6.3 "Weak interaction"?

Let's now look again at the ß-decay of the neutron, in which a neutrino ν_e is used. But this by no means will be a process of the weak interaction. Instead will neutrinos, contrary to the textbook opinion, participate in the electromagnetic interaction. They after all are one moment positively charged and the next moment negatively charged. With slow-acting gauges this it is true can't be proven, because the interaction is zero on the average. But this charged oscillating vortex ring can exert a considerable effect while approaching a neutron, which is based solely on the electromagnetic interaction.

The neutron is stimulated to synchronous oscillations of its own by the high-frequency alternating field of the neutrino, until it in the case of the collision releases the bound electron, which takes up the energy provided by the neutrino and transports it away.
The interaction obviously is only very weak due to the oscillation. But a physical independency of it has to be disputed.

The weak interaction only is a special case of the electromagnetic interaction which appears in a weakened form.

The finite range, which is given in this context, indicates the reaction cross-section around the n^0-particle, within which the "crash" and as a consequence the β-decay occurs. This range is considerable larger as the particle itself.

The electromagnetic interaction for such small distances after all is so violent, even if it only occurs in pulses, that the neutrino is thrown out of its path and can fly directly towards the neutron.

6.4 Myon neutrino

Perhaps we now understand also the β-decay of the myon. It actually were to be expected that without outside disturbance an absolute stability could exist because of the ideal symmetry of the μ^-. On our planet we however are in every second bombarded with approx. 66 billion neutrinos per cm^2 [6-3].

Obviously it takes 2,2 μs on the average till a neutrino ν_e flies past a myon so close that it decays. In doing so it stimulates the outside elementary vortex to violent oscillations by trying to synchronize it.
In this case the electron-neutrino ν_e carries away with it the two outer, and therefore weaker bound, elementary vortices of the myon, which meanwhile are oscillating synchronously. The innermost vortex, an electron e^-, is left behind. The decay of the myon which takes place with a probability of almost 100 % reads:

$$\mu^- \longrightarrow e^- + \overline{\nu}_e + \nu_\mu \qquad (6.3)$$

resp.

$$\mu^- + \nu_e \longrightarrow e^- + \nu_\mu \qquad (6.4)$$

Thus a different neutrino ν_μ, is formed which can be distinguished from the ν_e and is called myon-neutrino since it forms from the μ^-. Actually it even has a similar structure of three shells, as is shown in fig. 5.1. But the vortex centre is open and the particle isn't stationary anymore. In the picture now only a momentarily state is shown, in which the ν_μ appears green on the outside and red in its open centre.

As already for the ν_e oscillates also here the inside to the outside and vice versa, this time merely as a packet of three shells, so that also this particle shows all the typical neutrino properties discussed for the example of the ν_e.

The for potential vortices typical and already discussed phenomenon of transport here has an effect. In particular in connexion with vortex rings this property is known from hydrodynamics.

It thus can be observed, how vortex rings bind matter and carry away with them.
Because the neutrino is not quantized, it neither is restricted with regard to its ability to transport elementary vortices. Consequently even bigger configurations are conceivable, like configurations of 5 shells, 7 shells etc..

6.5 Tau particle

In the table of the leptons after the e^- and the μ^- as the next particle the tau particle τ^- is found with its accompanying neutrino ν_τ.. The obvious solution for the tau particle is the structure of five shells, as is shown in fig. 6.2a. With that the electron would have another particularly heavy relative with otherwise very similar properties.

For the myon the neutrino was stable, the particle itself however instable. We after all have explained the particle decay as a consequence of an outside disturbance, and disturbances always are based on interactions. Correspondingly should, with the small possibility for an interaction, also the neutrino ν_τ. of the tau particle have a better stability than the particle τ^- itself.
Without doubt this structure of 5 shells fulfils all known quantum properties like spin, charge etc. Merely the check of the mass is still due. This we now want to calculate for the structure shown in fig. 6.2a.

$$\boxed{m_5 = m_p \cdot \left(\frac{z_{e\tau}}{z_{ep}}\right)^3 \cdot \left(\frac{r_1}{r_5} + \frac{r_2}{r_5} - \frac{r_3}{r_5} + \frac{r_4}{r_5}\right)^2} \qquad (6.5)$$

$$m_5 = 1836 \cdot (\frac{5}{3})^3 \cdot (\frac{2}{5})^2 \cdot m_e = \underline{\underline{1360 \cdot m_e}} \qquad (6.6)$$

But the for the tau particle measured value is considerable higher.

colour of the elementary vortices
from the outside to the inside

gn/rd/gn/rd/gn

i.e.

$e^-/e^+/e^-/e^+/e^-$
$= \nu_\tau$

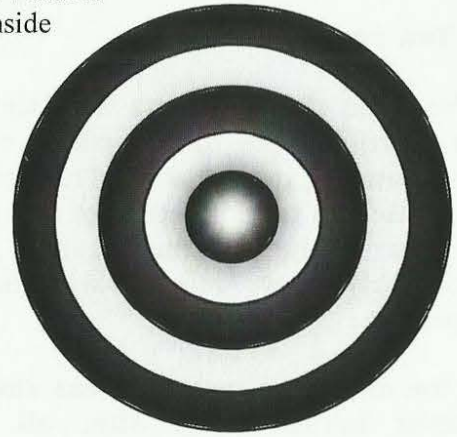


Fig 6.a: *The structure of the tau-neutrino ν_τ with 5 shells.*

Even if this structure is the only possible in the case of the neutrino ν_τ for reason of the complete symmetry, will the tau particle however change its structure by itself if another structure exists, which is more stable, thus in which the particle can take a bigger mass.

Such a maximum provides the structure shown in fig. 6.2b after checking all possible configurations with five elementary vortices:

(gn/rd + gn/rd)gn

resp.

$(e^-/e^+ + e^-/e^+)e^-$
$= \tau^-$

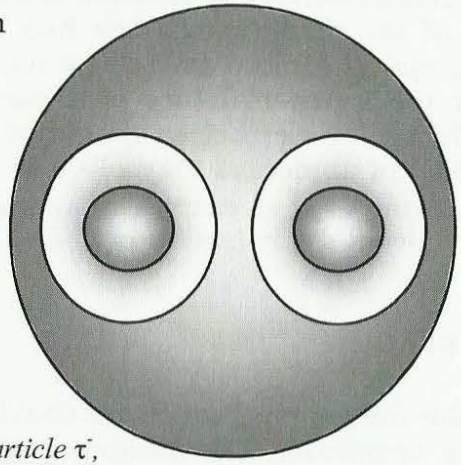


Fig 6.2b: *The tau particle τ^-, the heavy and stable variant*

The calculation of this structure gives:

$$m_\tau = m_p \cdot (\frac{z_{e\tau}}{z_{ep}})^3 \cdot ((\frac{r_1}{r_3} + \frac{r_2}{r_3}) \cdot 2)^2 \qquad (6.7)$$

$$m_\tau = 1836 \cdot (\frac{5}{3})^3 \cdot (\frac{2}{3})^2 \cdot m_e = \underline{\underline{3778 \cdot m_e}} \qquad (6.8)$$

This value now lies 8% above the measurement values. It would be obvious, if unbound tau particles predominantly would take the structure shown in fig. 6.2b. The remaining error becomes explicable, if a very small number of tau particles in the lighter structure according to fig. 6.2a are involved with a correspondingly smaller probability.

The enormous variety of kinds of decay, and not a single one of the dominating ones has a probability of over 50%, makes it more difficult for us, to be able to directly infer the inner structure of a particle from the decay products. It nevertheless should be mentioned that after all 35% of all decays take place by taking up and using a neutrino ν_e or ν_τ, entirely in accordance with the model of the myon decay (equation 6.4).

6.6 Pions

Unlike the leptons, which we could derive and calculate fairly completely, the mesons don't have a half-integer spin. With this characteristic property they therefore can't represent an individually overlapped elementary particle and they probably will consist of the amassing in pairs of individual configurations of potential vortices. This kind of bond can't be particularly tight.

Consequently we don't know any stable mesons.

The most important basic building part of the mesons we have got to know over the positronium in fig. 4.8. It necessarily has to amass to another particle, otherwise it annihilates under emission of a γ-quanta, as already mentioned. This γ^0-particle, as it will be named here, has the mass of:

$$m_{\gamma 0} = (2/3)^3 \cdot (1/2)^2 \cdot 1836 \cdot m_e = 136 \cdot m_e \ . \qquad (6.9)$$

which only can be determined arithmetically.

As a partner, to which the γ^0-particle can amass, first of all another γ^0-particle should be considered. Because both partner will rotate against one another, this new

particle would not have a spin and moreover would be uncharged. The mass now would be twice as big with:

$$m_{\pi 0} = 2 \cdot m_{\gamma 0} = 272 \cdot m_e \ . \qquad (6.10)$$

But the two γ^0-particles will come very close together and mutually feel the local, in the same direction orientated, distribution of the field, which will lead to a weakening of the field and as a consequence to a slight reduction of the mass.

With these properties it probably concerns the uncharged pion π^0. This model concept finds an excellent confirmation in the two possible kinds of decay, which can be regarded as equivalent:

$$\pi^0 \longrightarrow \gamma + \gamma \qquad \text{with a probability of } 99\ \%$$

and:

$$\pi^0 \longrightarrow \gamma + e^- + e^+ \qquad \text{with a probability of } 1\ \% \ .$$

Also in the case of the charged pion $\pi^\pm$ the observable decay offers a big help, which will take place with a frequency of almost 100 %:

$$\pi^\pm \longrightarrow \mu^\pm + \gamma \qquad \text{with a probability of } 100\ \%$$

The equation doesn't state anything about the fact, if a neutrino ν_e is used in the process. But it points at the circumstance that the partner of the γ^0-particle for the $\pi^\pm$ most likely is a myon $\mu^\pm$. The mass should be smaller than the sum of both building parts:

$$(204 + 136) \cdot m_e = 340 \cdot m_e \ . \qquad (6.11)$$

6.7 Table of vortices of the mesons

The numerous kinds of decay for K-mesons suggest that these strange particles will consist of various combinations of amassed together and in pairs rotating γ^0- and $\mu^{\pm}$-particles. The possibilities of combination now already have increased in such a way that for every kaon and other mesons several solutions can be proposed. To avoid unfounded speculations, only a few clues will be given.

Besides the γ^0-particles also heavier arrangements should be considered as partner for the spin and as a building part for kaons and other mesons.
If for instance a π^0 is overlapped by a γ^0, then this particle has an arithmetically determined mass of 918 m_e. It therefore can concern a building part of the uncharged kaon K^0.

The likewise with three γ^0 formed configuration of 6 shells however, if it actually would stay stable for the duration of a measurement, would have the mass of 3672 electron masses. It could e.g. concern the D^0-meson.

A very much better detectability must be attributed to the configuration of 4 shells which consists of two γ^0, so to speak a heavy relative of the γ^0 and the π^0. It among others should be able to decay like a π^0. With this property and with an arithmetically determined mass of 1088 m_e it actually only can concern the η^0-meson. Solely according to the numeric value the η^0-meson could also consist of four π^0-mesons; but the decay in only two light quanta speaks against it.

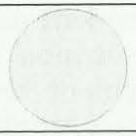
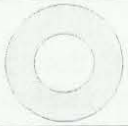
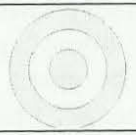
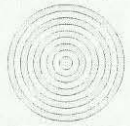
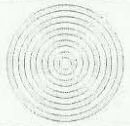
name	mass (m/m_e) measured	mass (m/m_e) calculated	el.-vortices z_e	charge Q	radius r/r_p	inner structure of the elementary vortices colour (gn=green; rd=red, from the inside to the outside
e^-	1	-	1	-1	-	 fig. 2.5 page 26 gn
γ^0	-	136	2	0	3	 fig. 4.8 page 60 rd/gn
μ^-	207	204	3	-1	3	 fif. 5.1 page 68 gn/rd/gn
η^0	1072	1088	4	0	1,5	rd/gn/rd/gn
(ρ^-)	1509	1360	5	-1	1,5	fig. 6.2a page 96 gn/rd/gn/rd/gn
D^0	3650	3672	6	0	1	rd/gn ... rd/gn
D^+ oder F^+	3658 bis 4188	4284	7	+1	1	gn/rd ... rd/gn
(B^0)	10321	8704	8	0	0,75	rd/gn ... rd/gn

Fig. 6.3 to be continued two pages ahead

The kaon-puzzle in addition is made more difficult by the spontaneously possible ability to change of the involved γ^0-particles during a process of decay, as is made clear by the numerous kinds of decay.
These dependent pion halves can be "swallowed" or "spit out" by neutrinos in the process, they can form from incident light or be emitted as photons and eventually they even can break up in their individual parts.

In fig. 6.3 the possible configurations of potential vortices are sketched and the respective, according to the new theory calculated, mass is given. If above that the other decay products and quantum properties, which can be given for the vortex structures, are added, like e.g. charge, spin and if need be magnetic moment, then an assignment without doubts to the until now only from measurements known elementary particles is possible. In order to better be able to assess the efficiency of the potential vortex theory, the measurement values are compared to the calculated values.

Some terms are put in brackets, because it can be assumed that the calculated part only concerns the dominating part, to which further γ^0 or other small configurations of vortices will amass for reason of its high mass. Correspondingly should the mass in that case be corrected slightly.

name	mass (m/m_e) measured	mass (m/m_e) calculated	el.-vortices z_e	charge Q	inner structure of the elementary vortices colour (gn=green; rd=red, from the inside to the outside	
(B^-)	11194	9793 + ?	9 + ?	-1		$r/r_p = 0,75$ gn/rt ... rt/gn
(Y^0)	18513	17001 + ?	10 + ?	0		$r/r_p = 0,6$ rt/gn ... rt/gn

Some compound configurations

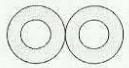
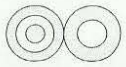
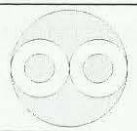
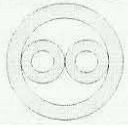
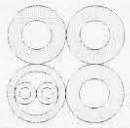
π^0	264	272	4	0		2x fig. 4.8 $\gamma^0 + \gamma^0 = \pi^0$ rd/gn + rd/gn
π^-	273	340	5	-1		fig. 4.8 + 5.1 $\mu^- + \gamma^0 = \pi^-$ gn/rd/gn + rd/gn
τ^-	3487	3778	5	-1		fig. 6.2b page 97 rd/gn ... rd/gn
(K^0)	974	918 + ?	6 + ?	0		$r/r_p = 2$ (2x rd/gn)/rd/gn
(K^-)	967	939 + ?	11 + ?	-1		(rd/gn + gn)/rd/gn + $3\gamma^0$

Fig. 6.3: *Table of vortices of the calculated leptons and mesons compared with measurement values.*

6.8 Table of vortices of the baryons

The number of possibilities of combination quickly increases, if only a few elementary vortices extend the structure of a particle. This probably is the reason for the large number of observable hyperons, which recently have been produced artificially and observed with the help of particle accelerators.

Both the neutron and the lambda particle can exist in a lighter and a heavier variant. At the moment of the decay, as it for instance is observed in a bubble chamber, according to expectation the state with the smaller mass takes the bigger probability. But in the amassing with further particles as building part of bigger and heavier hyperons the heavier structure is more likely. This circumstance should be considered in calculating the mass of the hyperons.

In figure 6.4 the most important baryons are listed, which are characterised in the way that one of the amassed together packets of vortices is a nucleon, thus a proton or a neutron.

The given, from measurements known, kinds of decay are able to confirm the inner structure pretty good. Of course an infinitely lot of combinations are conceivable and numerous predictions are possible. But speculations are unnecessary from the time on where we are able to calculate the particles.

The restriction to the few in the table listed particles seeming to be important hence doesn't limit the universal importance of the theory of objectivity in any way.

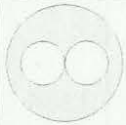
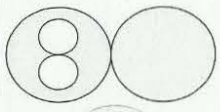
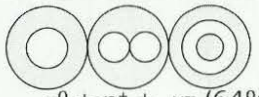
name	way of decay ⇒ (probability)	mass (m/m_e) measured	mass (m/m_e) calculated	el.-vortices z_e	charge Q	inner structure of the baryon vortices
p^+	stable	1836	-	3	+1	 fig. 5.2, p.73 $r/r_p = 1$ $(2x\ e^+)/e^-$
(n^0)	⇒ $p^+ + e^- + e^-$ (100%)	1839	1840	4	0	 fig. 5.5 p. 82 $p^+ + e^-$
n^0		1839	1934	4	0	fig. 5.6 page 85 $r/r_p = 1{,}13$
Λ^0	⇒ $p^+ + \pi^-$ (64%)	2183	2176	8	0	 $\gamma^0 + p^+ + \mu^-$ (64%)
	⇒ $n^0 + \pi^0$ (36%)		2206	8	0	$\gamma^0 + n^0 + \gamma^0$ (36%)
Σ^+	⇒ $p^+ + \pi^0$ (51%)		2108 + ?	7 + ?	+1	$\gamma^0 + p^+ + \gamma^0$ (+?) (51%)
	$n^0 + \pi^0$ (49%)	2328	2177	9	+1	$\gamma^0 + e^+ + p^- + \mu^+$ (49%)
Σ^-	⇒ $p^+ + \pi^-$ (100%)	2343	2274	9	-1	$\gamma^0 + n^0 + \mu^-$ (100%)

Fig. 6.4 to be continued on the next page

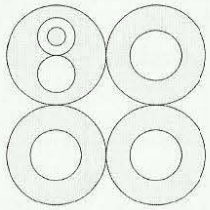
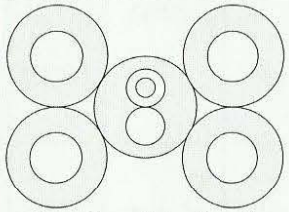
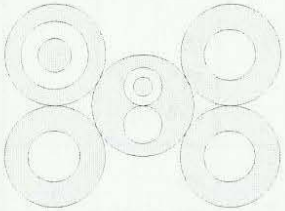
name	way of decay ⇒ (proba-bility)	mass (m/m_e) measu-red	mass (m/m_e) calcu-lated	el.-vor-tices z_e	char-ge Q	inner structure of the baryon vortices
Σ^0	⇒ $\Lambda^0 + \gamma^0$ (100%)	2334	2342	10	0	 $n^0 + \gamma^0 + \gamma^0 + \gamma^0$
Θ^0	⇒ $\Lambda^0 + \pi^0$ (100%)	2573	2478	12	0	 $n^0 + \gamma^0 + \gamma^0 + \gamma^0 + \gamma^0$
Θ^-	⇒ $\Lambda^0 + \pi^-$ (100%)	2586	2546	13	-1	 $n^0 + \gamma^0 + \gamma^0 + \gamma^0 + \mu^-$
(Ω^-)	⇒ $\Lambda^0 + K^-$ (69%)	3273	3172 + ?	17 + ?	-1	$n^0 + \gamma^0 + \gamma^0$ (+?) (? = miscellaneous)

Fig. 6.4: *Table of vortices used for the calculation of the most important baryons with suggestions for the structure*

6.9 Result

A strong interaction doesn't exist. The electric field in the proximity of the proton goes to zero within the range which is determined with measuring techniques.

Further key questions of quantum physics, that until now have stayed a mystery to science (with my answers):

XII: Why does the proton have approximately 3 times the magnetic moment which can be expected for reason of the only single charge?

(3 elementary vortices)

XIII: Why does the neutron as an uncharged particle anyway have a magnetic moment?

(Structure of the n^0)

XIV: What owes the atomic nucleus, which consists of like charges, its stability?

(the field of the p^+, instead of "strong interaction")

XV: Why does the free neutron decay, although it is stable as a particle of the nucleus?

(Interaction with neutrinos)

XVI: Why do neutrinos nevertheless participate in the "weak interaction", although they have no mass and no charge?

(Oscillating charge)

XVII: How can be given reasons for the finite range of the "weak interaction"?

(Reaction cross-section for particle decay)

oOo·oOo·oOo·oOo·oOo·oOo·oOo·oOo·oOo·oOo·oOo·oOo·oOo·oOo

7. Table of formula symbols

Electric field			Magnetic field		
E	V/m	electric field strength	**H**	A/m	magnetic field str.
D	As/m^2	electric displacement	**B**	Vs/m^2	flux density
U	V	tension voltage	I	A	current
b	V/m^2	potential density	**j**	A/m^2	current density
ε	As/Vm	dielectricity	μ	Vs/Am	permeability
Q	As	charge	ϕ	Vs	magnetic flux
e	As	elementary charge	m	kg	mass
τ_2	s	relaxation time constant of the potential-vortices	τ_1	s	relaxation time constant of the eddy currents
			$\tau_1 = \varepsilon/\sigma$		

other symbols and definitions:

specific electric conductivity	σ	Vm/A
electric space charge density	ρ_{el}	As/m^3
dielectricity	$\varepsilon = \varepsilon_r \cdot \varepsilon_o$	As/Vm
Permeability	$\mu = \mu_r \cdot \mu_o$	Vs/Am
speed of light	$c = 1/\sqrt{\varepsilon \cdot \mu}$	m/s
speed of light in a vacuum	$c_o = 1/\sqrt{\varepsilon_o \cdot \mu_o}$	m/s
speed	v	m/s
quantum of angular momentum	$\hbar$	Nms
spin	s	Nms
length, radius	L, r	m
radius of particles (electron)	r_e	[fm = 10^{-15} m]
number of the involved elementary vortices	z_e	-

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