**Konstantin Meyl**

part 3

Scalar waves
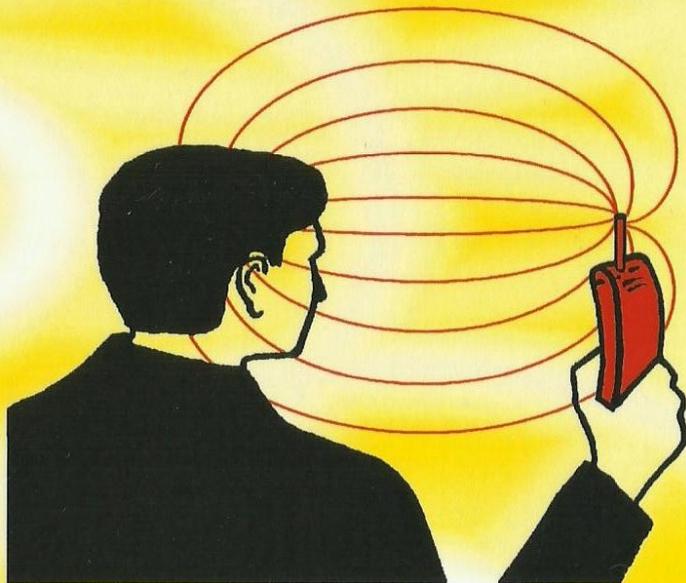
From an extended vortex and field theory
to a technical, biological and historical use
of longitudinal waves.

Edition belonging to the lecture and seminar
„Electromagnetic Environmental Compatibility"

Edition belonging to the seminar **part 3 - 3**
„Electromagnetic Environmental Compatibility"
by **Prof. Dr. Konstantin Meyl**

From Maxwell's field equations only the well-known (transverse) Hertzian waves can be derived, whereas the calculation of longitudinal scalar waves gives zero as a result. This is a flaw of the field theory, since scalar waves exist for all particle waves, like e.g. as plasma wave, as photon- or neutrino radiation. Starting from Faraday's discovery, instead of the formulation of the law of induction according to Maxwell, an extended field theory is derived, which goes beyond the Maxwell theory with the description of potential vortices (noise vortices) and their propagation as a scalar wave, but contains the Maxwell theory as a special case. With that the extension is allowed and doesn't contradict textbook physics.

Besides the mathematical calculation of scalar waves this book contains a voluminous material collection concerning the information technical use of scalar waves, if the useful signal and the usually interfering noise signal change their places, if a separate modulation of frequency and wavelength makes a parallel image transmission possible, if it concerns questions of the environmental compatibility for the sake of humanity (bio resonance, among others) or to harm humanity (electro smog).

From an extended vortex and field theory
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of longitudinal waves.

Scalar Waves

Edition belonging to the lecture and seminar
"Electromagnetic environmental compatibility"
of
Professor Dr.-Ing. Konstantin Meyl

1. Edition (2003), with 320 tables and 665 pages

Preface to the lecture, 1st Edition 1996

The theme encloses the electromagnetic compatibility of both technical and biological systems. Only part of the electromagnetic wave can be considered for function troubles, namely the part that was absorbed and has rolled up to a vortex. The activity depends on the number of created vortices and of their lifetime, their decay.
The eddy current only manifests in conducting materials. In the air and in dielectric materials on the other hand the vortex of the electric field will form, also called the potential vortex. To calculate and to measure this vortex is our goal.

First we'll carry out a survey of the problems and the usual methods. From the analysis of unsolved problems the need for the introduction of the new vortex phenomena is deducted and an adequate field-theoretical approach will be chosen. Afterwards the potential vortices are calculated and their properties are discussed and interpreted.
For the purpose of proving their existence, on the one hand the Schrödinger equation will be derived and on the other hand the quantum properties of the most important elementary particles will be calculated and compared with the well-known measured values. Measurement and calculation are in excellent agreement for weight, charge, magnetic moment and spin. So the theory not only proofs it's correctness, in addition it demonstrates it can achieve much more. The theory takes us to the unification of the well-known interactions and physical phenomena and shows itself as an unified theory.
In the practical conversion and usage of the theory there will not only be informed but by all means also be provoked as an entrance in a fruitfully discussion. Fundamental questions will be taken up like: What is information, energy, temperature or smell? The connection to the theme of the electromagnetic environmental compatibility is formed by the technical and the biological usage of the potential vortices, the energy transmission of Nikola Tesla exactly like the in a similar way functioning nerve conduction. Here we already can expect biological reactions.

This lecture, held for the first time in the winter semester of 1995/96, is available in book form, as an edition belonging to the lecture. This lecture will not deliver ready recipes or instructions. The goal is reached when the critical sense of the listeners and readers has been inspired and discussions have been set going. Everybody has to draw the consequences out of such a theory by him- or herself.
In addition to this lecture a seminar is offered, wherein several themes are supplemented or deepened, different theories are compared and possible consequences are discussed. The appearance of an edition belonging to the seminar has started in 1998 [i].
Regarding the conversion of consequences both politicians and scientists are equally addressed, because the electromagnetic environmental compatibility has developed to one of the most urgent problems of today's world. But in last consequence all of us bury the worldwide responsibility for our environment.

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[i]:   K. Meyl: Electromagnetic environmental compatibility, Part 2 and 3 of this book, Edition belonging to the seminar.

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From an extended vortex and field theory to a technical, biological and historical use of longitudinal waves.

Part 3

by

Professor Dr.-Ing. Konstantin Meyl

Edition belonging to the lecture and seminar
"Electromagnetic environmental compatibility"

(Original title: "Elektromagnetische Umweltverträglichkeit")

Translated out of the German language
by Ben Jansen
(2003)

* * *

Part 3:   Edition belonging to the information technical seminar

Scalar waves and the technical use of longitudinal waves and vortices

* * *

Preface to the seminar, part 3

With the appearing in print of the 3rd part of the series of lecture notes of the electromagnetic environmental compatibility, the collection of material can be considered to be completed for the time being. By now almost all aspects concerning the theme of the potential vortices of the electromagnetic field and their propagation as a scalar wave should have been addressed or at least indicated.

And that's what it is about in the case of the editions belonging to the seminars: In the seminars, taking place inside and outside the university, questions about the phenomena and the biological effectiveness of the fields, which surround us, are discussed. The scientifically correct procedure asks as a preparation for the seminar a voluminous collection of material and a compilation of theses with the pros and contras to them.

The argumentation, which is denoted as „textbook physics" and is generally accepted, the participant of the seminar can work out himself by means of the available journals and books. The potential vortex, which completed the field equations, however makes possible a counterstatement, which for most participants at first will be unusual. The old dispute between quantum and field physics rekindles. What is missing is a voluminous collection of material concerning the refined field physics, and this gap the editions belonging to the seminars should close.

In the case of this book the primary concern is to make sure, that all facets, properties and physical consequences of the new and unified field physics are addressed. The question, if all points can bear a strict verification, remains reserved to the seminar and its participants, of whom each should form its own judgement. The series of books should be understood as a stimulation, to make own thoughts about the various points. Who has no opportunity to participate in a seminar, by means of the lecture at least gets an idea of what is discussed here and how is struggled for scientific insights.

The herewith completed collection of material by no means may be compared or confused with a basic work about the theory of objectivity. That the editions cannot and want not afford at all. They together with the discussions at best form the basis for a scientifically basic work, at which I am working.

In the case of the collection of material concerning the electromagnetic environmental compatibility consisting of three parts, again and again new aspects have emerged. which found entrance into the book, at which I was working at that particular time, whereas the rough structure has been controlled precisely: part 1 with the chapters 1 to 9 treats the basics, part 2 with chapters 10 to 20 the energy technical aspect and part 3 with the chapters 21 to 30 the information technical aspect of scalar waves.

The here presented 3rd part starts with the wave equation and the two comprised parts of a transverse and a longitudinal wave. The historic dispute between Heinrich Hertz and Nikola Tesla with the experimental evidence of the each time used wave part is continued over the wave-particle uncertainty compromise up to the dispute about the right field description: that of Maxwell or the new dual and at the same time unified description, which builds upon Boscovich and Faraday. The aspects, which seem so irreconcilably, thereby only are two parts of a single equation, which is much older and can be traced back to Laplace: the wave equation.

Until now no derivations of this equation, which contains both wave parts, are known. This for the first time succeeds from the new and extended field approach in the summary from chapter 26. At first however is attempted to make the world of the scalar waves

plausible with models, calculations and observations. For that are used examples from high-frequency engineering, like the ground wave or the near-field area of an antenna, and from nature and medicine, which are granted two chapters. The comparison of the nerve conduction with Tesla's one wire technology is bringing it to light that scalar waves equally are used in both cases. In a frequency diagram the insights are entered concisely and is shown that considerably more unexplored domains occur than already is known, that in most cases not even gauges are available. With the design for building a scalar wave gauge the scientific verification of until now only empirically won results is stimulated, like for instance the results the radiesthesia wants to have determined with the help of the sensitivity of man as a biosensor.

Many relations will be revealed to the reader only, if he has worked through the summary, which follows. From Maxwell's field equations only the well-known (transverse) Hertzian waves can be derived. (Longitudinal) scalar waves however in the result are zero. This is a flaw of normally used field theory, since scalar waves exist for all particle waves, like e.g. as plasma wave, as photon- or neutrino radiation. Because the field pointer, in the direction of which longitudinal waves are propagating, is oscillating, the frequency will oscillate like the velocity of propagation, which again is measured as a noise signal. Any antenna noise proves the emission of scalar waves in space. But scalar waves, or whatever should be subsumed under the by mathematics minted generic term free of any value judgement, surely are more than only noise.

Starting from Faraday's discovery - instead of the formulation of the law of induction according to Maxwell - an extended field theory is derived, which goes beyond the Maxwell theory with the description of potential vortices (noise vortices) and their propagation as a scalar wave, but contains the Maxwell theory as a special case. The new field theory with that doesn't collide with the textbook opinion, but extends it in an essential point with the discovery and addition of the potential vortices.

Also the theory of objectivity, which follows from the discovery, is compared in the form of a summary with the subjective and the relativistic point of view and the consequences for variable velocity of propagation of the scalar waves, formed from potential vortices, are discussed. Like already in part 1 the unification of the electromagnetic interaction with the gravitation succeeds impressively.

Besides the mathematical calculations this book contains a voluminous material collection concerning the information technical use of scalar waves, if e.g. the useful signal and the usually interfering noise signal change their places, if a separate modulation of frequency and wavelength makes a parallel image transmission possible, if it concerns questions of the environmental compatibility for the sake of humanity (bioresonance, among others) or to harm humanity (electrosmog). With that the book again finds back to the starting point, to the open task, which made necessary an excursion through all domains of physics to answer it. I hope, the long march was worthwhile.

Villingen-Schwenningen, December 2002

Preface to the 2nd edition of part 3

In favour of chapter 30 as a complement, an introduction into the ancient broadcasting technology of the gods, the 1st edition wasn't printed anymore in the year 2002 as originally planned. Instead the individual chapters have been prepublished in different places. The chapters 21 to 25 are found among others in the book „scalar wave technology", which has been published as an instruction for an experiment to demonstrate scalar waves in 2001. Excerpts from it, as also from the chapters 26 to 28 have appeared in form of individual essays in different journals.

Again experimental successes had been intervening, which caused a renewed deferring of the date of appearance of the 3rd part of the series of books. In my laboratory the bi-directional transmission of music and of data by scalar wave was successful. We thus also can transmit information backwards from a receiver to the transmitter or to a second receiver, whereby the receivers work purely passive, thus without own power supply. The operating energy is as well supplied to them by the transmitter by scalar wave. The demonstrated technology opens completely new possibilities of a technical application. Conceivable are telemetry installations where measurement signals have to be transmitted from rotating or otherwise inaccessible places of a machine. The energy for the measurement electronics can be transmitted wirelessly by scalar waves and the signal can be sent back along at the same time, by modulating it onto the energy carrier. In this way dozens of measurement stations can be connected wireless with a single central transmitter, which supplies them all with energy.

The question was asked: Is the technology really entirely new? The answer is amazing: No, it here concerns the oldest technology of humanity, which had developed to a peak in antiquity, to send receive engineering of the gods. For this claim even a mathematical proof is available. For that the authoritative transition, the unrolling of a vortex to a wave (the transition from the near-field to the far-field) or in the reversed case the rolling up at a receiver antenna (usually denoted as standing wave) is calculated with help of the extended field theory. The result is, that at this transition the velocities of propagation resp. the wavelengths of the transverse and the longitudinal wave stand to each other in the ratio of the Golden Proportion.

With regard to the optimization of a transmitter or receiver antenna the Golden Proportion has an effect on the construction resp. the architecture of corresponding buildings. Which ones, with that deals the complementing chapter 30. But it mustn't be missing either, since after all it concerns a grandiose practical information technical use of scalar waves, from which we technologically can learn a lot [i,ii].

Villingen-Schwenningen march 2003

<i>: Note: chapter 30 provides an introduction into ancient broadcasting technology of the gods. The working off of history with respect to the use of scalar waves is so voluminous, that for that a book of its own is published with the title:

<ii>: K. Meyl: Sendetechnik der Götter, historischer Sciencefictionroman (2003), Villingen-Schwenningen, INDEL Verlagsabteilung, ISBN 3-98O2 542-5-9

21. Derivation of the scalar wave

William Thomson, who called himself *Lord Kelvin*, after he had been knighted, already in his lifetime was a recognized and famous theoretical physicist. The airship seemed him too unsafe and so he went aboard a steam liner for a journey from England to America in the summer of 1897. He was on the way in a delicate mission.

Eight years before his German colleague Heinrich Hertz had detected the electromagnetic wave in experiments in Karlsruhe and scientists all over the world had rebuilt his antenna arrangements. They all not only found confirmed the wave as such, they even could show the characteristic properties.
It was a transverse wave, for which the electric and the magnetic field pointers oscillate perpendicular to the direction of propagation. This can be seen as the reason, that the velocity of propagation is showing itself field independent and constant. It is the speed of light c.
With that Hertz had experimentally proven the properties of this wave, previously calculated in a theoretical way by Maxwell, and at the same time proven the correctness of the Maxwellian field theory. The scientists in Europe were just saying to each other: "well done!" as completely other words came across from a private research laboratory in New York: "Heinrich Hertz is mistaken, it by no means is a transverse wave but a longitudinal wave!"

Such a screwball most said and did as if they hadn't heard the criticism at all. But then one couldn't ignore it completely, because on the one hand claimed the private research scientist to have experimental proof and on the other hand it wasn't just anybody, who here reported. It was nobody but *Nikola Tesla*, the Croat experimental physicist who emigrated to America.
Him we owe the modern alternating current technology from the high-tension network for energy transmission over the alternating current transformer to the asynchronous machine. With his magnificent inventions he had earned enough money, to be able to afford a private laboratory, in which he could research and invent uncensored and free. The key to his success was lying in his purposeful, concentrated and efficient working method.
He was fast! Whereas in Europe still was being discussed about properties and theoretical possibilities of application of the wave, Tesla already presented the armed forces a remote controlled scaled-down submarine in Madison Square Garden (fig. 21.1A). To convince such a man, who only holds valid what his experiments reveal, from the opposite, should be a hopeless enterprise.
Lord Kelvin was aware of that, as he made the decision to go on the journey. He could not and did not want to put his head into the ground, as many of his colleagues, because on the one hand scientists are curious by principle and on the other hand he travelled as an official representative of science. He had been instructed to free, as Mr. Clean, the undamaged world of sciences from erroneous teachings. But it came completely different.
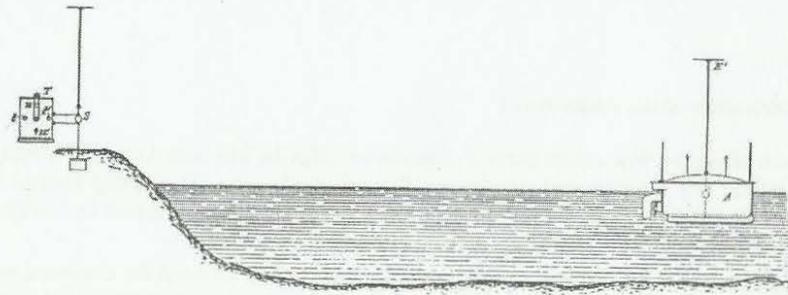
Fig. 21.1 A: The first radio remote control of the world.[i]
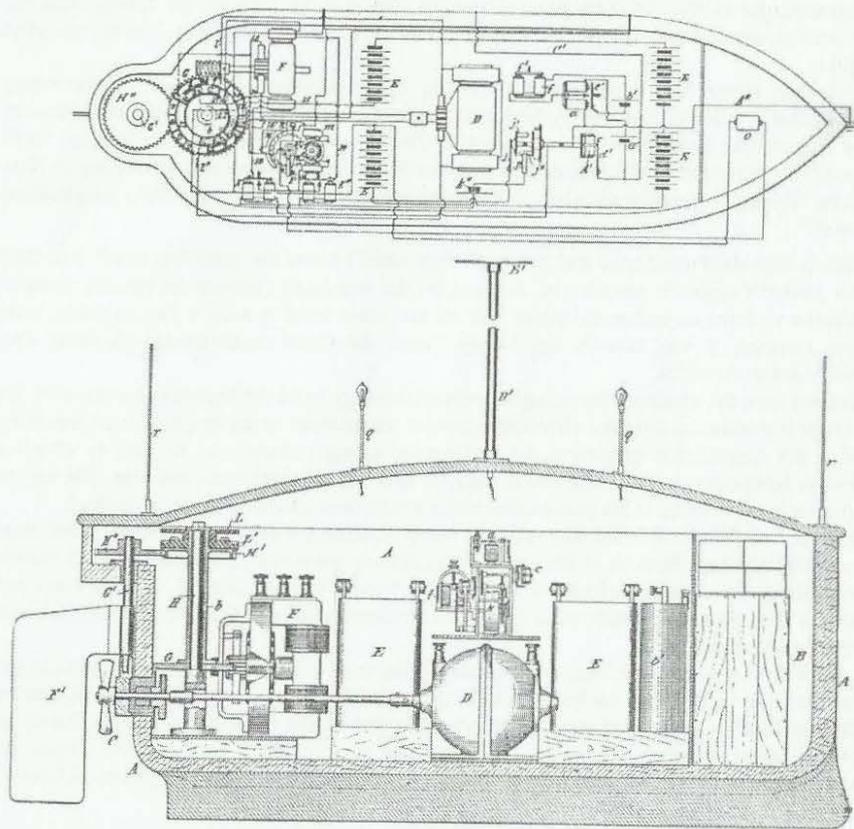
Fig. 21.1 B: Patent specification concerning the remote
controlled submarine.[i]

[ii]:   Nikola Tesla: Method of and Apparatus for Controlling Mechanism of Moving
Vessels or Vehicles, US-Pat. 1898, Nr. 613,809. Complete Patents: P. 351

21.1 Lord Kelvin in a delicate mission

The first day of his visit at Tesla Kelvin spoke the admonishing words he had been instructed to speak. He recommended Tesla warmly to publicly retract the remarks concerning the Hertzian mistake and to contribute himself to the settlement of the dispute. Seen from a specialist viewpoint they talked at cross-purposes.

But at night in his hotel room the Lord again thought about the experiments, which had been shown to him. The standing wave nature had been visible unambiguously: the oscillation nodes, the effect back on the transmitter, the high degree of effectiveness and many other things more. Such properties the Hertzian wave indeed doesn't know. Also Tesla didn't work with dipole antennas, but with flat coils, with spark gap oscillators and with a very unconventional switching technique, set up different in principle.

The next morning Lord Kelvin appeared in the laboratory again and greeted Tesla with the words: "Then you don't use Hertzian waves?" "Certainly not", Tesla answered," it are radiations. By waves no energy could be economically transmitted over a larger distance. My system works with true conduction, which theoretically seen can take place over a larger distance, without bigger losses occurring."
In the article of the "Electrical Experimenter" is noted further, that the doubting critic Kelvin suddenly turned into one of the biggest followers[i].

Kelvin deduced very fast: according to that there exist two different sorts of wave propagation. So Hertz with his transverse wave is just as right, as Tesla with the longitudinal wave.
As a representative of theoretical physics he however could pull out Tesla a decayed tooth. Maxwell had based his field description on an aether concept, which at that time in the world of sciences triggered violent discussions. Since Tesla saw such an aether as a prerequisite for longitudinal waves, he thought he and not Hertz had proven the Maxwell wave in experiment for the first time. By stating this the magnificent experimental physicist however revealed weaknesses in the area of theory. Maybe he had not read exact enough or understood the books of Maxwell, which without doubt were formulated mathematically only arduously comprehensible in the original version.
In this point Tesla had to learn otherwise by Kelvin. Maxwell's field theory provides without exception a mathematical description for the Hertzian wave. For the Tesla radiation however no field description exists! This by the way is the circumstance, why this wave could disappear from the textbooks and again fall into oblivion.
Tesla himself had problems to theoretically imagine, what happens at his wave. His models in some points perhaps were even better than the official textbook opinion, but not without contradiction to accepted regularities. That's why Tesla did without a publication of his ideas, although he in his lifetime had filed away at an own theory.

[i]:   Nikola Tesla: Famous Scientific Illusions, III. The Singular Misconception of
the Wireless, Electrical Experimenter, Feb.1919, printed in Tesla Said, p.197

Figure 21.2 A:

William Thomson, 1846 becoming Professor at Glasgow University with the age of 22 years. From 1892 on he was called Lord Kelvin.[i]
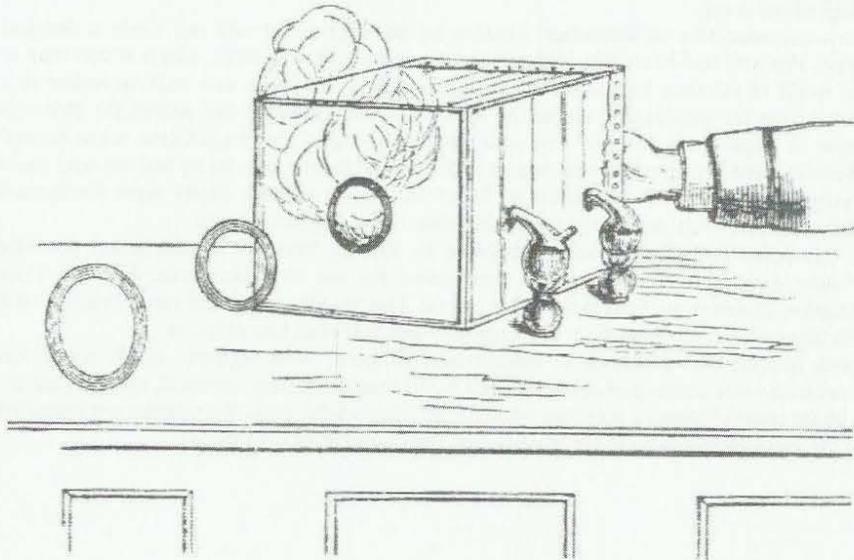
Fig. 21.2 B: Vortex rings from a smoke vortex gun.[i]

[i]:   David Ash, Peter Hewitt: Science of the gods, Gateway Books, Bath, 1990.

21.2 Helmholtzian ring-like vortices in the aether

Tesla told Kelvin at his visit from the meeting with the German Professor *Hermann von Helmholtz* on the occasion of the World's Fair in Chicago 1893. Kelvin knew him very well and had cooperated with him in the past. Now the vortex concept of his colleague and his model of stable vortex rings were very obliging.
In the case of a standing wave the impulse is passed on from one particle to the next. In the case of acoustics for instance we are dealing with a shock wave, where one air molecule knocks the next. In this way sound propagates as a longitudinal wave. Correspondingly the question is raised: What sort of quanta are the ones, which in the case of the Tesla radiation carry the impulse?

Lord Kelvin was already on the way back to Europe on the steamship and he deduced: The Tesla experiments prove the existence of longitudinal standing waves in space. In the question, what passes on the impulse, Kelvin comes to the conclusion: it are **vortices in the aether**! With that he had found an answer in experience. With his students he built boxes, with which he could produce smoke rings, to be able to study and demonstrate in experiments the special properties of ring-like vortices in their flow technical analogy (fig. 21.2[i]). But he didn't have ready a suitable field theory.

The from Germany to the Isles exported vortex physics for a short time could establish in England, before it was slaughtered and buried by the German quantum physicists. A main advocate has been *James Clerk Maxwell*, who held the vortex theory for the best and most convincing description of matter[ii]. As his successor at the Cavendish laboratory in Cambridge J. J. Thomson was appointed, who already as a young man had got a price for a mathematical treatise about vortices[iii]. He discovered the electron and imagined it, how could it be otherwise, as a field vortex.

The crucial weakness of vortex physics, the lacking of an usable field theory, was of benefit to the emerging quantum physics. This could change fundamentally with the discovery of the potential vortex, the vortex of the electric field[i4]!
In addition is the experimental proof of a vortex transmission as a longitudinal wave in air or in a vacuum, as it has been furnished by Tesla already 100 years ago, neither with Maxwell's field theory nor with the today normally used quantum theory explicable or compatible. An urgent need is present for a new field theory.

[i]:   David Ash, Peter Hewitt: Science of the gods, Gateway Books, Bath, England 1990. Daraus [ii] and [iii]:

[ii]:   James Clerk Maxwell: "...the vortex rings of Helmholtz, which Thomson imagines as the true form of the atom, fulfil more conditions than any other previous concept of the atom."

[iii]:   J.J. Thomson: "the vortex theory is of much more fundamental nature than the usual theory of solid particles."

[i4]:   Konstantin Meyl: Potentialwirbel Band 1 (1990) and Band 2 (1992), INDEL-Verlag, Villingen-Schwenningen.

Scalar waves, a mathematical reasoning (I)

1. prerequisite: **wave equation** (textbook-formulation)

$$\Delta E \;=\; \frac{1}{c^2} \cdot \frac{\delta^2 E}{\delta t^2} \qquad (21.1)$$

taking apart of the delta operator mathematically (Laplace operator) according to the rules of vector analysis (fig. 5.0):

$$\boxed{\begin{array}{l} \Delta E \;=\; \text{grad div } E \;\;-\;\; \text{curl curl } E \\ \text{wave} \;=\; \text{longitudinal} \;+\; \text{transverse} \end{array}} \qquad (21.2)$$

2. State of the art of technology: *Hertzian wave* = **transverse wave**

special case: = solution of Maxwell's field equations
no sources:

$$\boxed{\text{div } E \;=\; 0} \quad \text{und} \quad \boxed{-\text{ curl curl } E \;=\; \frac{1}{c^2} \cdot \frac{\delta^2 E}{\delta t^2}} \qquad (21.3)$$

transverse wave:
   field pointers oscillate crosswise to the direction of propagation.
   The propagation occurs with the speed of light c.

3. claim: *Tesla radiation* = **longitudinal wave**
special case:
irrotationality:

$$\boxed{\text{curl } E \;=\; 0} \quad \text{and} \quad \boxed{\text{grad div } E \;=\; \frac{1}{c^2} \cdot \frac{\delta^2 E}{\delta t^2}} \qquad (21.4)$$

longitudinal wave, shock wave, standing wave:
   field pointer oscillates in the direction of propagation.
   Velocity of propagation is variable.

Fig. 21.3:   The special cases of the wave equation

21.3 Taking apart of the wave equation

Before one plunges into the adventure of an entirely new field theory, it first of all should be traced and analysed, what the latest textbooks say about scalar waves.

There some scalar or vector potentials are introduced; there the constant of dielectricity ε is written down as a complex variable, although it physically seen concerns a material constant, only to be able to calculate with this trick artificially a loss angle, which should indicate the losses occurring in a dielectric, where in reality it concerns vortex losses. Of course one can explain the dielectric losses of a capacitor or the heating in a microwave oven entirely without vortex physics with such a label fraud, but it should be clear to anyone, that in a *complex constant* lies buried an inner contradiction, which is incompatible with physical concepts.
We are used to such auxiliary descriptions so much, that the majority of today's physicists tend to attribute physical reality to this mathematical nonsense. As pragmatists they put themselves on the standpoint, if with that experimental results can be described, then such an auxiliary description can't be so wrong after all. Doing so the circumstance is forgotten that here the ground of pure science is abandoned and is replaced by creeds.

We find everything already in the wave equation, as it can be found in all textbooks.

$$\Delta E \;=\; \frac{1}{c^2} \cdot \frac{\delta^2 E}{\delta t^2} \qquad (21.1)$$

Behind this formulation two completely different kinds of waves are hiding, because the used delta operator consists of two parts according to the rules of vector analysis:

$$\boxed{\begin{array}{l} \text{grad div } E \;\;-\;\; \text{curl curl } E \;=\; \Delta E \\ \text{longitudinal} \;/\; \text{transverse} \quad\quad \text{wave} \end{array}} \qquad (21.2)$$

We want to discuss two special cases.
If we put the left part (in eq. 21.2) to zero (div E = 0) which is tantamount to no sources of the field then the well-known radio wave remains, which also is called Hertzian wave, after Heinrich Hertz, as said, had experimentally detected it in Karlsruhe 1888:

$$\boxed{\text{div } E \;=\; 0} \quad \text{and} \quad \boxed{-\text{ curl curl } E \;=\; \frac{1}{c^2} \cdot \frac{\delta^2 E}{\delta t^2}} \quad \text{(special case)} \qquad (21.3)$$

It concerns the transverse wave, described by Maxwell, for which the field pointers oscillate crosswise to the direction of propagation. The propagation again occurs with the speed of light c. So much concerning the state of the art of technology.
But as we see, in the mathematical formulation of the wave equation is hiding, yes, even more than only the generally known electromagnetic wave. The no sources approach is a neglect, which only is valid under certain prerequisites.

Scalar waves, a mathematical reasoning (II)

3. claim: *Tesla radiation* = **longitudinal wave**

$$\boxed{\text{curl } \mathbf{E} \; = \; 0} \quad \text{and} \quad \boxed{\text{grad div } \mathbf{E} \; = \; \frac{1}{c^2} \cdot \frac{\delta^2 \mathbf{E}}{\delta t^2}} \qquad (21.4)$$

special case:

source field, because div $\mathbf{E} \neq 0$

$\Rightarrow$ sources = charge carriers (plasma waves)

$\Rightarrow$ sources = vortex structures

4. approach: (div $\mathbf{E} \neq 0$) is a scalar! $\Rightarrow$ **scalar wave**

$\Rightarrow$ E-field vector can be derived from a scalar potential φ:

$$\boxed{\mathbf{E} \; = \; - \text{ grad } \varphi} \qquad (21.5)$$

and   div $\mathbf{E} \; = \; - \text{ div grad } \varphi \; \equiv \; - \Delta \varphi$ \qquad (21.6)

inserted in eq. 21.4:   homogeneous scalar wave equation

$$\boxed{\Delta \varphi \; = \; \frac{1}{c^2} \cdot \frac{\delta^2 \varphi}{\delta t^2}} \qquad (21.7)$$

5. proof: For the case of an additional space charge density
ρ_{el} should be considered: div $\mathbf{D} \; = \; \rho_{el}$
and   div $\mathbf{E} \; = \; \rho_{el}/\varepsilon$ \qquad (21.8)

inhomogeneous scalar wave equation = **plasma wave!**

$$\boxed{\Delta \varphi \; = \; \frac{1}{c^2} \cdot \frac{\delta^2 \varphi}{\delta t^2} - \frac{\rho_{el}}{\varepsilon}} \qquad (21.9)$$

Fig. 21.4:   Derivation of the plasma wave
as an example of a scalar wave

21.4 Derivation of the equation of a 100% scalar wave

Making neglects by all means is normal and legal in science. But it may not be carried out at will and untested. In any case an error consideration is necessary, the result of which should be, that the neglect indeed is sufficiently small.

In the here presented case of the wave equation I haven't found one single textbook, in which this error consideration has been carried out. As a result of this inexcusable negligence there is the danger that exactly the aspect is neglected, which it actually concerns. This could lead to catastrophical results, e.g. that the causes for electrosmog, for numerous EMC-problems, for biological and technical effects aren't seen and understood anymore, that pure science once more dilapidates to a creed!

In the case of the wave equation the assumption of no sources describes only one side of the medal. The other side, which for the electromagnetic wave occurs as an error term, we get if we this time put the right part in equation 21.2 to zero
(curl $\mathbf{E} = 0$).

In this case a divergence of the field is present, which requires a source field. As sources some charge carriers, quanta or at least particle structures, e.g. vortex structures have to exist. Their propagation occurs, as we know it from the sound propagation, as shock wave in longitudinal manner. The air molecules, the quanta or particle structures thereby oscillate in the direction of propagation. Also the field pointer has a component in this direction:

$$\boxed{\text{curl } \mathbf{E} \; = \; 0} \quad \text{and} \quad \boxed{\text{grad div } \mathbf{E} \; = \; \frac{1}{c^2} \cdot \frac{\delta^2 \mathbf{E}}{\delta t^2}} \quad \text{(special case)} \qquad (21.4)$$

> *The occurring divergence of the field pointer (div $\mathbf{E}$) is a scalar, for which reason this wave preferably is called **scalar wave**.*

In the special case of a scalar wave (curl $\mathbf{E} = 0$) the E-field vector can be derived from a scalar potential φ:

$$\boxed{\mathbf{E} = - \text{ grad } \varphi} \qquad (21.5)$$

On the one hand this term is used in the wave equation 21.4 on the right-hand side without forming the gradient on both sides of the equation. On the other hand the divergence of the approach 21.5:

$$\text{div } \mathbf{E} \; = \; - \text{ div grad } \varphi \; \equiv \; - \Delta \varphi \qquad (21.6)$$

is applied in equation 21.4. The result is the homogeneous scalar wave equation:

$$\boxed{\Delta \varphi \; = \; \frac{1}{c^2} \cdot \frac{\delta^2 \varphi}{\delta t^2}} \qquad (21.7)$$

Scalar waves, a mathematical reasoning (III)

Proof: **plasma wave =**

inhomogeneous scalar wave equation

$$\Delta \varphi = \frac{1}{c^2} \cdot \frac{\delta^2 \varphi}{\delta t^2} - \frac{\rho_{el}}{\varepsilon} \qquad (21.9)$$

one solution[i]: $\omega^2 = c^2 \cdot k^2 + \omega_p^2$ (= Langmuir waves).

Fig. 21.5 A: Derivation of the plasma wave as an example of the existence of scalar waves in the wave equation

Hertzian oscillator with much energy at low degree of effectiveness

Grounded oscillator (according to Tesla) with little energy at high degree of effectiveness
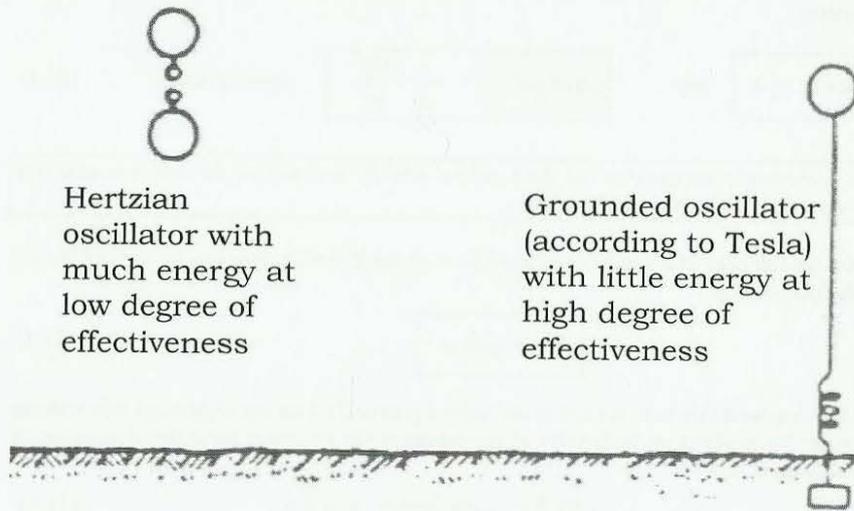
Fig. 21.5 B: Nikola Tesla explains the difference between his radiation and the Hertzian wave.[ii]

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[i]:   The solution describes dispersion relations of plasma waves; longitudinal wave movements + Langmuir oscillations of the electron density.

[ii]:   Nikola Tesla: The Problem of Increasing Human Energy, The Century Monthly Magazine, June 1900, ISBN 1-882137-00-0, Page i-15

21.5 Derivation of a plasma wave

Doing without formation of the gradient for the derivation of the homogeneous wave equation is tantamount to an integration of the equation. We hence under certain conditions must expect the occurring of an integration constant.

This is the case, if in addition a space charge density ρ_{el} occurs as source of the field, which according to Maxwell equation 4 can be considered as the divergence of a dielectric displacement **D** (fig. 21.4):

$$\text{div } \mathbf{D} = \rho_{el} ,$$

resp. with the relation of material $\mathbf{D} = \varepsilon \cdot \mathbf{E}$: $\text{div } \mathbf{E} = \rho_{el}/\varepsilon \equiv - \Delta \varphi.$ (21.8)

If we complete this contribution with possible present field sources, then the inhomogeneous scalar wave equation results:

$$\Delta \varphi = \frac{1}{c^2} \cdot \frac{\delta^2 \varphi}{\delta t^2} - \frac{\rho_{el}}{\varepsilon} \qquad (21.9)$$

For these equations solutions have been published[i]. They have the same form, as the well-known dispersion relations of Langmuir waves. That is electron plasma waves, thus longitudinal wave movements associated with Langmuir oscillations of the electron density.

With that it has been proven that **scalar waves** and longitudinally propagating **standing waves** are described by the wave equation and are contained in it. This in any case is valid in general just as in the special case of a **plasma wave**, as mathematically could be derived here.

From the example of the derivation of plasma waves from the wave equation 21.1, we see that scalar waves by all means are known and their existence isn't casted doubt on at all. After all the mathematically won solution is secured by numerous experiments. Why do textbooks concerning high-frequency engineering then ignore the scalar wave parts in the wave equation?

Our specialists seem to concentrate so much on their branch, that they are losing the view on the Big Whole. They practice one-eyed physics, where the plasma physicist keeps one eye shut and the radio technician the other eye. What the other one does and researches, they don't understand anymore for ages. It is necessary to point them to their common root.

The perhaps most important statement of the wave equation is that every emitted wave contains both longitudinal and transverse parts! Both parts in addition occur jointly, so that for corresponding boundary conditions it can be expected that one part is transforming into the other part. The HF technician then suddenly measures less field strength and comes to the conclusion that his radio wave has been damped or partly absorbed. Doing so heat is created, he says, although the wave equation by no means contains a corresponding term for the necessary thermodynamic description. He simply hasn't understood the wave equation.

Absorption means nothing but transverse waves in the case of a disturbance rolling up to vortices, to become a scalar wave in this way (fig. 1.4 and 5.3). With that they are evading every field strength measurement and what can't be measured doesn't exist in one-eyed physics. Therefore can't exist, what shouldn't exist.

ionosphere

spatial wave
= Hertzian wave

?

ground wave = scalar wave
transmitter   receiver
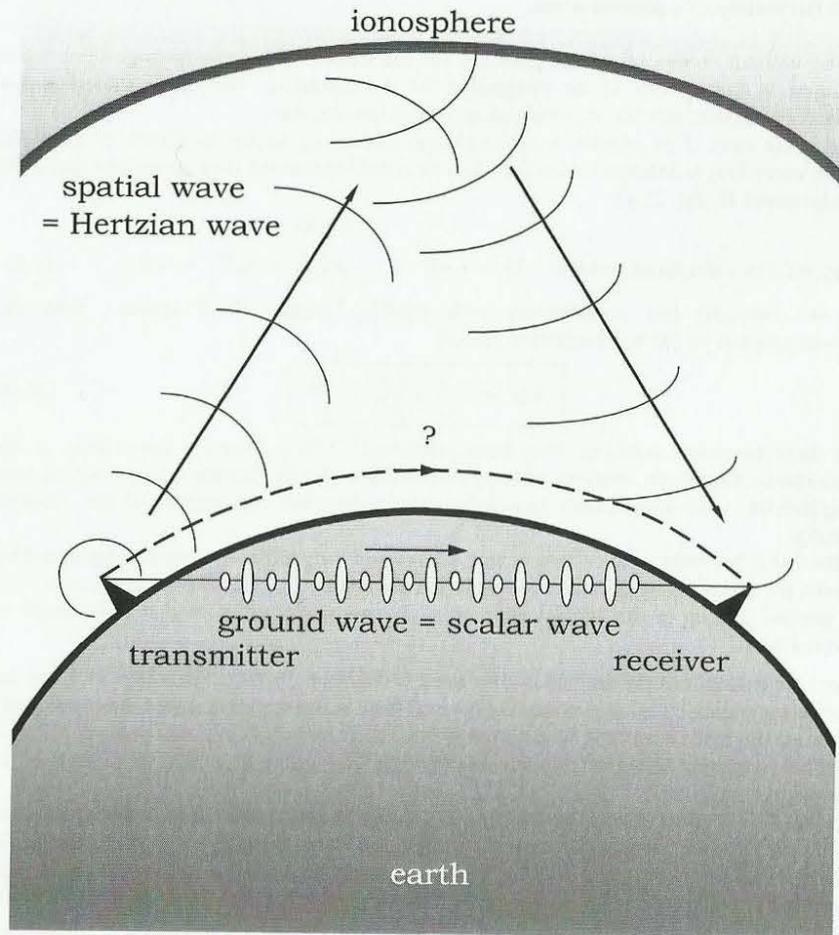
earth

Fig. 21.6:   Ground waves, which follow the curvature of the earth and radio waves reflected at the ionosphere.[i]

<i>:   Meinke, Gundlach: Hochfrequenztechnik, 4.Aufl. Springer-Verlag Berlin 1986, Seite R 18: „Lang-, Mittel- and Kurzwelle breiten sich einerseits entlang der Erdoberfläche als Bodenwellen, andererseits unter Mitwirkung der Ionosphäre als Raumwellen aus."

21.6 Mistakes of the HF technology

The devastating judgement of Tesla, Hertz was mistaken, was rash. His claim of having detected the Maxwell wave himself, proved to be untenable. With this claim in particular Tesla had the scientific world against him. If one opens encyclopedias or textbooks then one gets the impression, until the day of today science still hasn't forgiven Tesla, what once more shows how persistent prejudices are kept.

Just as little does a verdict of the American Supreme Court justice to the true circumstances, with the decision of the highest judges that Tesla and not Marconi is entitled the right to be the inventor of the radio. As we see, have both inventors in reality used completely other kinds of waves. The available transmitters of 100 years ago we would from today's viewpoint call „broadband dirt slingers". These spark flying monster have blown both parts of the wave equation, the transverse as well as the longitudinal part, into the air to ample extent. What distinguished the wave pioneers was their receiver technique, was eventually the question, which wave part they have filtered and utilized.

Marconi worked with dipole antennas, as already Heinrich Hertz. With that both could preferably track down and detect the radio wave. So they also should be entitled the right to be pioneers of radio technology. The verdict of the highest judges doesn't justice to this circumstance and should rather be judged as a nationalistically coloured political issue. Tesla however worked with two spherical electrodes, in which he preferably replaced one electrode by the globe, by grounding his devices. In this way he could receive the scalar wave parts. But that are **not radio waves**. Scalar waves have completely other properties, one even could be inclined to call them opposite properties.

To improve the degree of effectiveness of the transmission stretch one naturally was trying to also optimise the transmitting installation with regard to the respectively used wave part. Tesla optimised the scalar wave part and could record reactions of biological beings. His part represents a set of difficulties of the environmental compatibility, which should be taken serious. In the beginning the Marconists on the ships, as the radio operators were called, suffered from the so-called radio operator disease, which is unsolved until today. This phenomenon only disappeared after the radio devices on board had been optimised in favour of the used radio wave. The reached and measuring technically verifiable increase of the degree of effectiveness, primarily obtained by an improved antenna adjustment, simultaneously means a reduction of the scalar wave part, which endangers health.

But a received signal hides the receiver technician, if it has been on the way as a transverse or as a longitudinal wave. The coupling in one and the same equation leaves open both possibilities. Every radio amateur knows the so-called ground waves, which arrive faster at the receiver, than the Hertzian waves mirrored at the ionosphere, which propagate in a straight line. Allegedly the ground waves follow the curvature of the earth[i], so it is written in expert books. This explanation hurts, since who can see along the curvature of the earth with a pair of field glasses. He would see the back of his head.
No, the explanation the ground waves would run along the earth's surface is pure nonsense. The interference and the fading with which the radio amateur is fighting, are a result of the differently fast arriving wave parts, and doing so the scalar wave part tunnels at a straight line right through the earth (fig. 21.6).

amplitude
[mm]

time [s]

primary waves | secondary waves
= longitudinal waves | = transverse waves
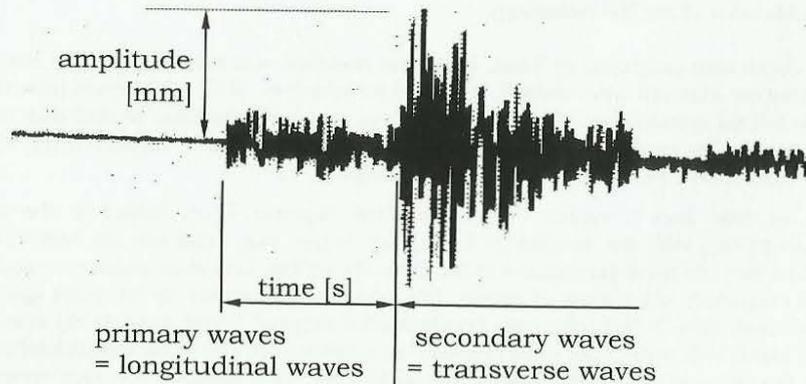
Fig. 21.7 A: Longitudinal and transverse earth quake waves.

difference
in duration
[seconds]

magnitude
(assignment
according to the
Richter scale)

amplitude
[millimeter]
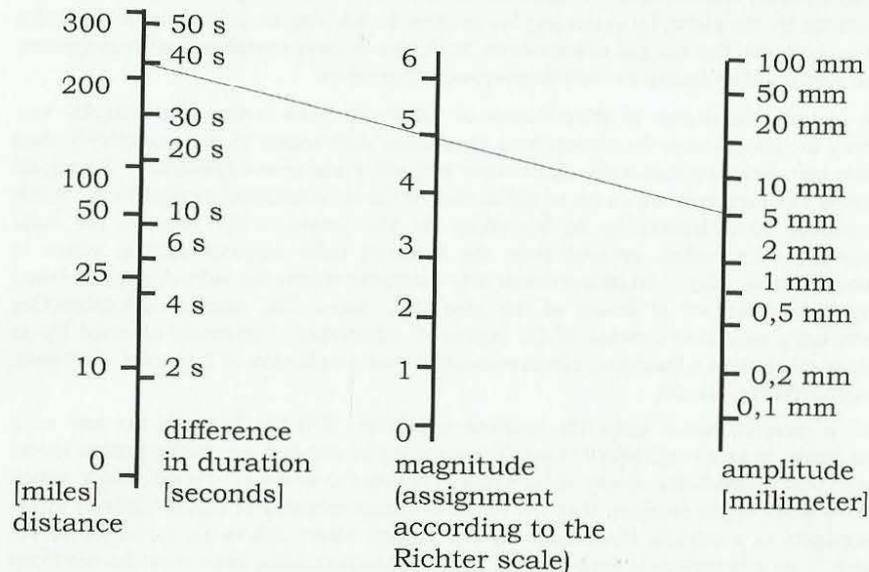
[miles]
distance

Fig. 21.7 B: Analysis according to the Richter scale.
(e.g.: 40 s duration between S- and P-waves
for 5 mm amplitude means an earthquake
of strength 5 in a distance of 220 miles.)

21.7 Coupling of the wave parts

The set of difficulties of ground waves makes clear the coupling of longitudinal and transverse waves as two aspects or parts of a wave. As the corresponding equation 21.1 mathematically taken apart into 21.2 dictates, does every transmitter emit both parts.

Exactly this circumstance the owners of allotments have used, which directly near a transmitter had illuminated their estate with freely hung up fluorescent lamps. The transmitter runners after that wanted to present them the power bill and they could obtain, that this kind of illumination technique was prohibited.
Nowadays anyone may operate a high-frequency technical installation, even if he hasn't understood at all the wave equation used by that. Actually one should have been grateful to the allotment owners, if they withdraw the scalar wave radiation, which is incompatible with the environment and biologically harmful, with their fluorescent lamps. Taken exact it even is the task of the transmitting technician to pay attention to it, that only radio waves are sent into the air, since only those should be used. The time has come to reverse the burden of proof to protect the environment, nature, the consumer and the unasked and not involved persons, which are irradiated.

From other areas, for instance from flow dynamics or for body sound is generally known that both wave parts exist and in addition occur jointly. In the case of a propagation through the earth, like for an earthquake, both parts are received and utilized. Because their propagation is differently fast, the faster oscillations arrive first and that are the longitudinal ones. From the time delay with which the transverse waves arrive at the measurement station, the distance to the epicentre of the quake is determined by means of the different velocity of propagation. For geophysicists this tool is part of everyday knowledge (fig. 21.7).

Only who keeps one eye shut, could mean that the electromagnetic wave is purely transverse and sound purely longitudinal. It is true that a transverse sound wave doesn't get too far in air, for which reason sound as a rule is considered as a purely longitudinal wave by neglecting this part, but such a neglect may not be carried out in general, it must be checked if it is legitimate from case to case and an error consideration should be carried out.

Further examples for the coupling of the wave parts are furnished by the latest tunnel experiments. Here so-called pure transverse waves are sent into a tunnel, through which they don't fit through at all. The Maxwell-theory then dictates that behind the tunnel no signal should be measurable.
But a signal is being measured, which in the tunnel in addition was faster than allowed.

In conferences again is being discussed about the wave equation. The imagination of the specialists reaches from phase velocities of an electromagnetic wave, which isn't present at all up to instantaneous tunnelling, during which the clocks should stop[i].
The wave equation however supplies the only possible answer: The tunnel filters out the scalar wave parts and lets pass from them only those, which are sufficiently small and correspondingly fast.

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[i]:   see Part 1, Chapter 6.14
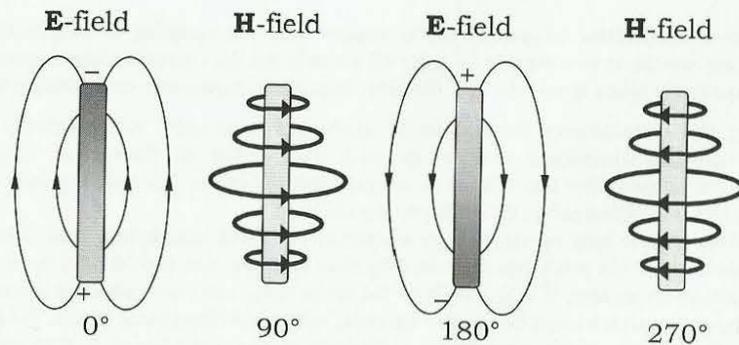
Fig. 21.8 A: The fields of the oscillating dipole antenna
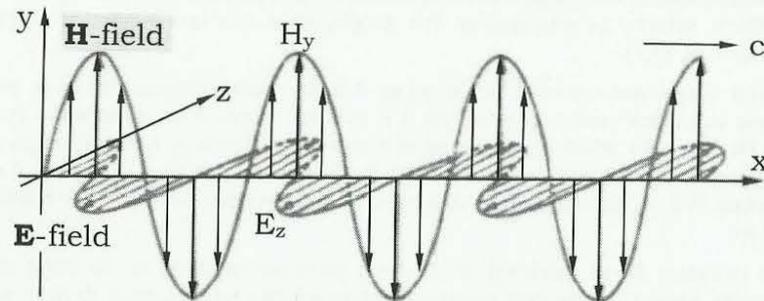
Fig. 21.8 B: The planar electromagnetic wave in the proximity

<i>:   Zinke, Brunswig: Lehrbuch der Hochfrequenztechnik, 1. Bd., 3.Aufl. Springer-Verlag Berlin 1986, Seite 335

<ii>:   dpa-message in the Südkurier of 25.11.2000: „Gefahr fürs Herz". (Translated:) Patients with a cardiac pacemaker produced in the Netherlands have been warned by the producer of the device (Vitatron) to be careful when passing anti-theft installations in stores. For devices, which were implanted between 1992 and 1998, there is the danger of the implant failing.

21.8 Set of difficulties of the near-field

In high-frequency technology is distinguished between the near-field and the far-field. Both have fundamentally other properties.

Heinrich Hertz did experiment in the short wave range at wavelengths of some meters. From today's viewpoint his work would rather be assigned the far-field. As a professor in Karlsruhe he had shown that his, the electromagnetic, wave propagates like a light wave and can be refracted and reflected in the same way. It is a transverse wave for which the field pointers of the electric and the magnetic field oscillate perpendicular to each other and both again perpendicular to the direction of propagation. It hence would be obvious, if in the case of the Hertzian wave it would concern the far-field. Besides the propagation with the speed of light also is characteristic that there occurs no phase shift between E-field and H-field.

In the proximity it looks completely different. The proximity concerns distances to the transmitter of less than the wavelength divided by 2π. Nikola Tesla has broadcasted in the range of long waves, around 100 Kilohertz, in which case the wavelength already is several kilometres. For the experiments concerning the resonance of the earth he has operated his transmitter in Colorado Springs at frequencies down to 6 Hertz. Doing so the whole earth moves into the proximity of his transmitter. We probably have to proceed from assumption that the Tesla radiation primarily concerns the proximity, which also is called the radiant range of the transmitting antenna.

For the approach of vortical and closed-loop field structures derivations for the near-field are known[i]. Doing so it must be emphasized that the structures don't follow from the field equations according to Maxwell, but the calculations are based on assumed rotation symmetrical structures. The Maxwell theory by no means is capable of such a structure shaping by principle. The calculation provides as an important result[i] that in the proximity of the emitting antenna a phase shift exists between the pointers of the E- and the H-field. The antenna current and the H-field coupled with it lag the E-field of the oscillating dipole charges for 90° (fig. 21.8). These charges form a longitudinal standing wave in the antenna rod or antenna dipole. For this reason also the fields produced by high-frequency currents at first have the properties of a longitudinal wave in the proximity of the antenna.

The near-field already is used in practice in anti-theft devices, as they are installed in the entrance area of stores. The customer walks through the scalar wave transmitters. If the coupling coil has not been removed at the cash point, then a signal from the alarm system sounds. The coils work purely passive, i.e. they are supplied with electric energy per scalar wave and stimulated 'to oscillate for their part. Then the effect back on the transmitter is being utilized. Even if the principle is functioning, people still should be warned not to use a technology, which has not been understood completely. Then not explained catastrophes are inevitable[ii].

<i>:   Zinke, Brunswig: Lehrbuch der Hochfrequenztechnik, 1. Bd., 3. Aufl. Springer-Verlag Berlin 1986, Seite 335

<ii>:   dpa-message in the Südkurier of 25.11.2000: „Gefahr fürs Herz". (quoted at the left, fig. 21.8)
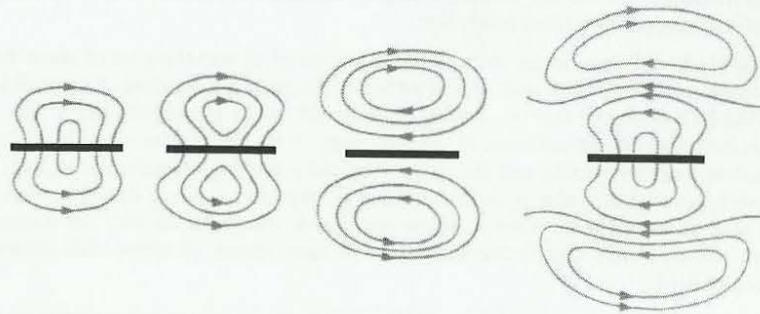
Fig. 21.9 A: The coming off of the electric field lines from a dipole
The forming vortex structures found a longitudinal
electric wave carrying impulse.

electromagnetic wave (transverse)
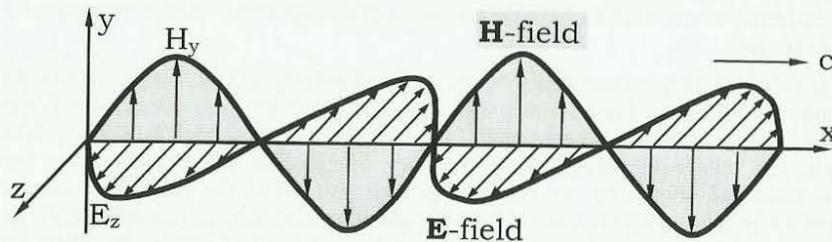
Fig. 21.9 B: The planar electromagnetic wave in the far zone

21.9 Transition to the far-field

In sufficient distance to the transmitting antenna as far-field the transverse electromagnetic wave results (fig. 21.9 B). It is distinguished by not occurring a phase shift between **E**- and **H**-field anymore. Every change of the electric alternating field is followed immediately and at the same time by a change of the magnetic alternating field and vice versa.

In the proximity however the phase shift amounts to 90°. Somewhere and somehow between the causing antenna current and the far-field a conversion from a longitudinal into a transverse wave occurs. How should one imagine the transition?

In the textbooks the coming off of a wave from a dipole is represented according to fig. 21.9 A. The fields come off the antenna, the explanation reads. If we consider the structure of the fields coming off then we see field vortices, which run around a point, which we can call the vortex centre. Such field structures naturally are capable of forming standing waves and to carry an impulse. The scalar wave field in general and the near-field in special we only will understand with suitable vortex physics and with a field theory extended for corresponding vortices we also will be able to calculate it.

Postulates cannot replace field physics.

Be that as it may, the vortex, after having left the antenna, for bigger getting distance at some time seems to unroll to propagate further as an electromagnetic wave. There takes place a transition from longitudinal to transverse, or spoken figuratively, from vortex to wave. How complete this conversion takes place, how big the respective wave parts are afterwards, on the one hand depends on the structure and the dimensions of the antenna. Information is given by the measurable degree of effectiveness of the antenna.

The vortex structures on the other hand are the stabler, the smaller and faster they are. If they are as fast as the light or even faster, then they become stable elementary particles, for instance neutrinos. Slower vortex structures however are predominantly instable. They preferably unwind to waves. Vortex and wave prove to be two possible and under certain conditions even stable field configurations.

Let's emphasize: A Hertzian dipole doesn't emit Hertzian waves. An antenna as near-field without exception emits vortices, which only at the transition to the far-field unwind to electromagnetic waves. A Hertzian wave just as little can be received with a dipole antenna! At the receiver the conditions are reversed. Here the wave is rolling up to a vortex, which usually is called and conceived as a „standing wave". Only this field vortex causes an antenna current in the rod, which the receiver afterwards amplifies and utilizes.

The mostly unknown or not understood near-field properties prove to be the key to the understanding of the wave equation and of the method of functioning of transmitting and receiving antenna.

The question is asked, how one should imagine the rolling up of waves to vortices and vice versa the unrolling?

How could an useful vortex model look like?

Circularly polarized wave (transverse)

X
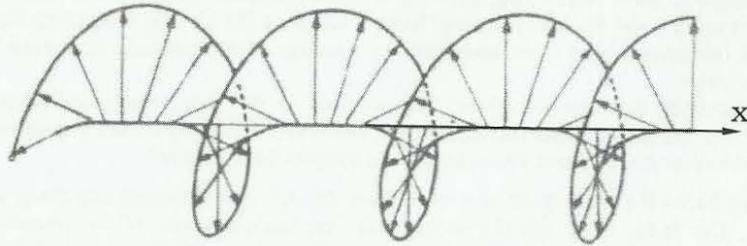
Fig. 21.10 A: Left-circular polarized wave
(as explanation for the transition to a vortex and
to a scalar wave)

electric wave (longitudinal)
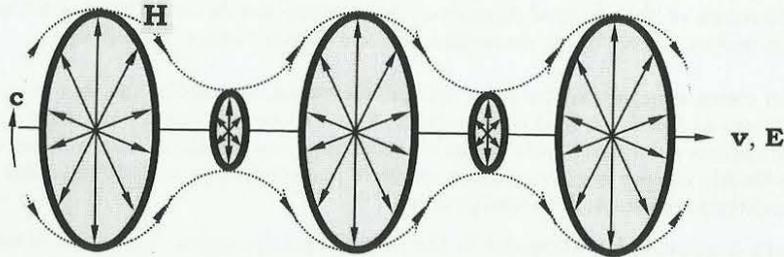
Fig. 21.10 B: Magnetic ring-vortices form an electric scalar wave.

vortex and wave	= two stable field configurations
electromagnetic wave	= transverse wave propagating in a straight line
ring-like vortex	= transverse wave running in circles
vortex velocity	= speed of light c
change of structure	= if the field is disturbed without expense of energy

21.10 Scalar wave model

The light, as electromagnetic wave, in the presence of a heavy mass or of strong fields is bent towards the field source (fig. 6.10). The wave normally propagating in a straight line thus can be diverted. The square of the speed of light further is inversely proportional to the permeability and dielectricity, short, in presence of matter it is more or less strongly slowed down. If this slowing down of the wave occurs one-sidedly, then a bending of the path can be expected as well. At the end of the antenna a reflection and a going back of the wave can occur, which at the other end again hits itself. Now the wave has found a closed-loop structure, which can be called vortex. The figures 21.10 B and 21.11 A show the two possible structures.

In technical books this vortex with the properties of a „standing wave" is explained analogously. Near-field and standing wave are two examples, how the textbooks succeed in describing mathematically right a small part of the scalar wave properties, without having to have a good look at vortex physics. With such auxiliary descriptions however the end is reached fast, if for instance it concerns understanding a pure scalar wave transmission according to Nikola Tesla (fig. 19.11) and the special properties of this wave type. With the vortex concept of an extended field physics new horizons are opening.

If we direct our look again to the sketches (fig. 21.10 B and 21.11 A). In both cases electromagnetic waves are represented which propagate with the speed of light, only that the wave doesn't go forward in a straight line but instead runs around in circles. It also furthermore is transverse, because the field pointers of the E-field and the H-field oscillate perpendicular to c. By means of the orbit the speed of light c now has become the vortex velocity. **Wave and vortex** turn out to be **two** possible and **stable field configurations**.

For the transition from one into the other no energy is used; it only is a question of **structure**. The vortex structure thus stabilizes itself by means of the field dependency of the speed of light.

By the circumstance that the vortex direction of the ring-like vortex is determined and the field pointers further are standing perpendicular to it, as well as perpendicular to each other, there result two theoretical formation forms for the scalar wave. In the first case (fig. 21.10 B) the vector of the H-field points into the direction of the vortex centre and that of the E-field axially to the outside. The vortex however will propagate in this direction in space and appear as a scalar wave, so that the propagation of the wave takes place in the direction of the electric field. I call this an **electric wave**.

In the second case the field vectors exchange their place. The direction of propagation this time coincides with the oscillating magnetic field pointer (fig. 21.11 A), for which reason I speak of a **magnetic wave**.

The vortex picture of the rolled up wave already fits very well, because the propagation of a wave in the direction of its field pointer characterizes a longitudinal wave, because all measurement results are perfectly covered by the vortex model. It even is clear that no energy has to be spent for the conversion, since merely the structure has changed. If it becomes a vortex the wave just doesn't run in a straight line anymore but in circles, to either wrap around the magnetic field vector (fig. 21.10 B), or the electric field vector (fig. 21.11 A).

magnetic wave (longitudinal)
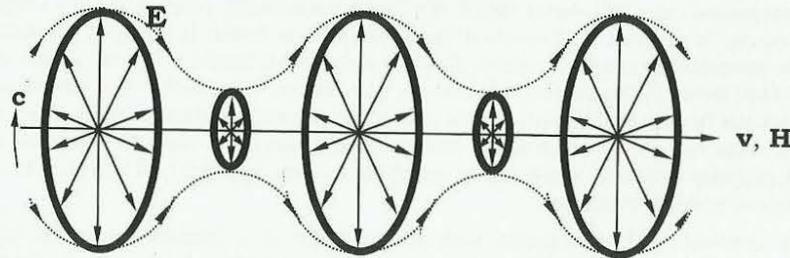
Fig. 21.11 A: The magnetic scalar wave
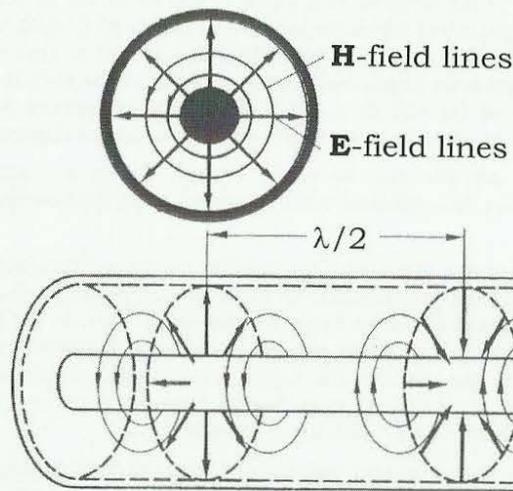
Figure 21.11 B: Wave propagation in a coaxial cable,
(Example for waveguide, horn radiator, etc.)[i]
Cross-section of coaxial conductor and field
distribution in the direction of propagation.

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[i]:   H. Armbrüster, G. Grünberger: Elektromagnetische Wellen im Hochfrequenz-
bereich, Hüthig und Pflaum Verlag.

21.11 Double-frequent oscillation of size

Because a longitudinal wave propagates in the direction of the field, the field pointer also will oscillate with the velocity of propagation v. This hence isn't constant at all, it can significantly differ from that of the light and can take arbitrary values. According to the theory of objectivity the field oscillating with it determines its momentary size:

$$\text{E, H} \sim 1/v^2 \tag{21.10}.$$

The velocity of propagation v of the scalar wave thus oscillates double-frequently and with opposite phase to the corresponding field. A detailed description would mean, if the field strives for its maximum value, the velocity v of the wave reaches its smallest value. In the field minimum the scalar wave vice versa accelerates to its maximum value. For longitudinal waves therefore only an averaged velocity of propagation is given and measured, as this for instance is usual for the sound wave, and this can vary very strong as is well-known (body sound compared to air sound, etc.).

The two dual field vectors of E and H, the one in the direction of propagation and the one standing perpendicular to it, occur jointly. Both oscillate with the same frequency and both form the ring-like vortex in the respective direction. As a result the ring-like vortex also oscillates in its diameter double-frequently and with opposite phase to the corresponding field (fig. 21.10 B and 21.11 A).

This circumstance owes the ring-like vortex its property, to tunnel. No Faraday cage is able to stop it, as could be demonstrated in experiments[i]. Only therefore the ground wave runs through the earth and not along the curvature of the earth. A further example is the coaxial cable (fig. 21.11 B). Also this acts as a long tunnel and so it isn't further astonishing, that the electric field lines have the same orientation, as for a magnetic scalar wave. As a practical consequence in this place there should be warned of open cable ends, wave guides or horn radiators with regard to uncontrolled emitted scalar waves.

At present in the press is being discussed, if the cable network runners for some channels the permission to operate again should be withdrawn, because the airline radio traffic is being disturbed. The original opening for cable frequencies, which actually are reserved for the airline radio traffic, based on the erroneous assumption, that conflicts are unthinkable. But then the planes were disturbed in their communication. As the cause TV-cables were made out, which hadn't been closed according to the rules with a resistor, as it by all means can occur on building sites and during renovation works.

On the other hand is being argued with the small current, which flows through the coaxial cable, and the large distance to the planes also is cited. According to that it actually can't concern Hertzian waves. It presumably are scalar waves, which escape from the open cable ends and which are collected by a receiver in the plane. It indeed is very little field energy, but because it again is being collected and bundled, the scalar wave is able to exceed the part of the radio wave by far just at large distances and to cause problems. For such examples from practice the scalar wave theory is fully taking effect.

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[i]:   Adolf und Inge Schneider im Interview mit Prof. Dr.-Ing. Konstantin Meyl: Durchbruch in der Freien-Energie-Forschung, NET-Journal 12/1999, S. 7-9.

1. *H. Hertz:* **electromagnetic wave** (transverse)
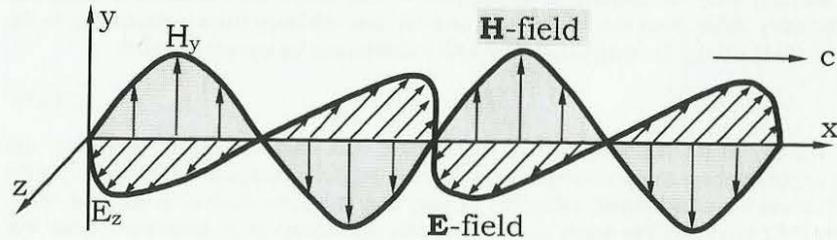
2. *Nikola Tesla:* **electric wave** (longitudinal)
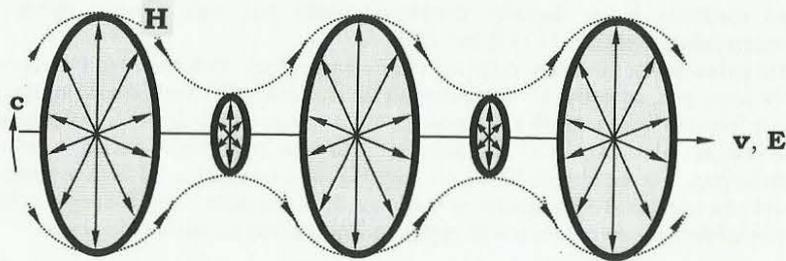
3. *(Konstantin Meyl):* **magnetic wave** (longitudinal)
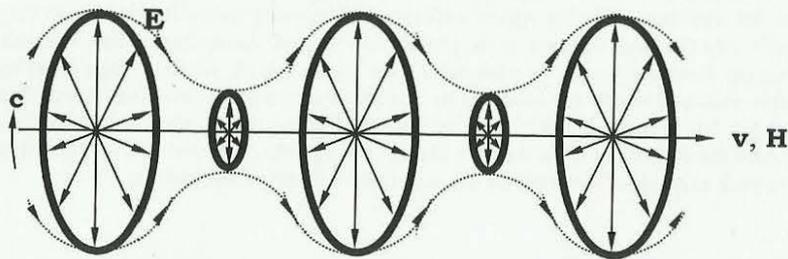
Fig. 21.12:   The three basic types according to the wave equation (21.1), (electric, magnetic and electromagnetic wave).

21.12 Electric and magnetic scalar wave

Let us record: For the wave propagation there thus are three possible and stable states (fig. 21.12): the transverse electromagnetic wave according to Heinrich Hertz (fig. 1), the longitudinal electric wave according to Nikola Tesla (fig. 2), and a longitudinal magnetic wave (fig. 3), which isn't connected yet with a name of a discoverer. The last one is a pure product of my theoretical derivation. The question is asked, which practical meaning the magnetic wave could have.

It is formed by individual electric field vortices, which I have discovered and called potential vortices 1990. I proceed from the assumption that the youngest of the three waves will play the by far biggest role in the future, because its properties are unattainable, both with regard to the energy technical and to the information technical use. One example for each should support this thesis.

The experiments concerning the electric wave according to Nikola Tesla, where is being worked with electrically charged spheres, don't show a particularly high power. Magnetic converters, so the experiences of my laboratory activities, are superior to an electrostatic converter as a collector for free energy by far. That even can be expected, because a magnetic engine is much smaller than an electrostatic engine of the same power as is well-known.

At a congress of medicines was given a talk on the basic regulation of the cells, on the communication of the cells with each other. Professor Heine in his decades of research work has found out that the cells for the purpose of communication build up channels for instance in the connective tissue, which after having conducted the information again collapse. Interestingly the channels have a hyperboloid structure, for which no conclusive explanation exists.

The structure of the data channels however is identical with the one of a magnetic scalar wave, as shown in fig. 3. Through a channel formed such, which functions like a tunnel or a dissimilarly formed waveguide, only one very particular scalar wave can run through. Waves with different frequencies or wavelengths don't fit through the hyperboloid formed tunnel at all in the first place. Through that the information transmission obtains an extremely high degree of safety for interference.

To the biologist here a completely new view at the function of a cell and the basic regulation of the whole organism is opening. The information tunnel temporarily forms more or less a vacuum, through which only potential vortices can be conducted, and that without any losses – simply perfect. From this example is becoming clear that nature is working with scalar waves namely with magnetic waves.

One other point should be recorded: The mentioned tunnel experiments, in which speed faster than light is being measured with most different devices, impressively confirm the presence of scalar waves. But if scalar waves exist which are faster than light and other ones, which are slower, then it almost is obvious that also such ones will exist, which propagate exactly with the speed of light. These then will have all the properties of the light and won't differ from the corresponding electromagnetic wave in the observable result. As scalar wave it however is formed by vortex configurations, which unambiguously have particle nature. Nothing would be more obvious than to equate these quantum structures with the photons.

Question: Is the light **wave**   or   **particle?**

Seen strictly <u>causal</u>, i.e. physically in the period between 1600 and 1900:
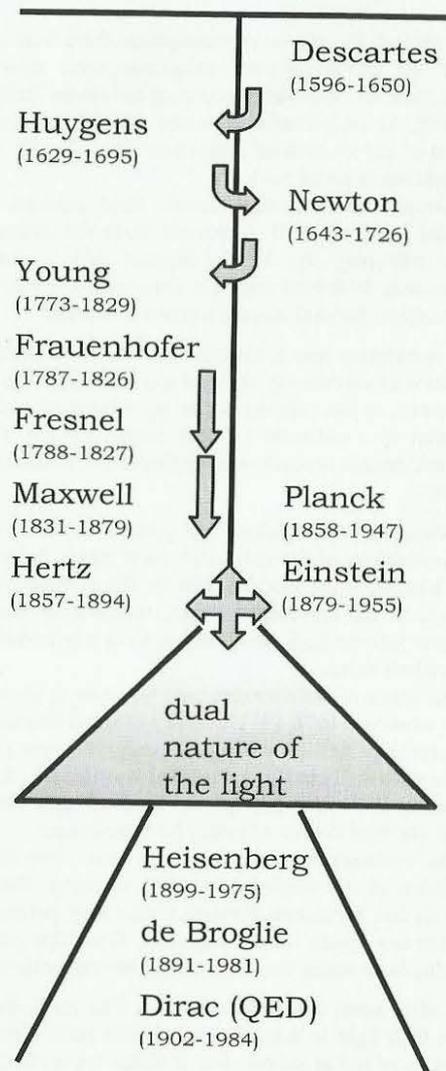
Turning away from classical physics: (removing of the principle of cause and effect)

Fig. 22.1:   <u>The view of some physicists concerning the nature of the light as wave or as particle.</u>

According to the wave equation the light is a mixture of wave and photon radiation

22 Properties of scalar waves

For the light quanta hypothesis the Nobel Prize for physics was awarded 1921. But it only was a hypothesis, an idee fixe, which was honoured here. It is quite odd, if such an important prize is awarded to a research scientist, who hasn't got the slightest idea what light quanta are anyway, of what they consist and how they are built up.

Albert Einstein cleverly used the embarrassing situation, by in his celebration speech on the occasion of the awarding of the Nobel Prize giving a talk on the theory of relativity. After the speech a member of the committee found it necessary, to point to it, that this wasn't object of the awarding of the prize and that the theory of relativity concerns a pure theory, which can't be proven by principle. A theory hence neither could be awarded the Nobel Prize.

Such words on the occasion of awarding a prize for a daredevil hypothesis give the whole event really grotesque characteristics. But it came still worse.

22.1 Wave-particle compromise

Physicists of name and rank had come together. It concerned the question if the light is wave, or particle or even both at the same time? For both variants experimental proof was present, the discussion became inflamed and the things boiled over. Finally they were as smart as before, as Werner Heisenberg presented his ideas concerning the uncertainty principle. This compromise, on which one eventually came to an agreement, with good cause may be called the worst in the history of physics. It dictates me, what I shell see and how exact I may look. With it the contradiction should be overcome that the light contrary to every causality should be wave and particle at the same time.

Such fixings not only have a funny, but also a tragic side. Since it were authorities, which have approved the compromise and the whole community of science has confidence in the statements of its authorities, which immediately and unfiltered is entered in all textbooks.

At the meeting it simply and solely concerned the wave equation and only that could have supplied the correct and only possible answer: It falls apart into two parts and this explains, why the light one time appears as an electromagnetic wave and the next time as a vortex particle, which is called photon. The conversion can take place at any time spontaneously and without putting on energy, so that depending on the used measuring technique the particle appears as wave or as particle, but of course never as both at the same time.

Looking back one can say that the funny thing about the situation was that all discussed about the wave and its properties known at that time, that all should know the wave equation. An equation as is well-known says more than a thousand words and one look would have sufficed entirely, to answer the controversial question once and for all. It would have saved us a lot.

light
source

first slit   refractive slit   detector   sample picture
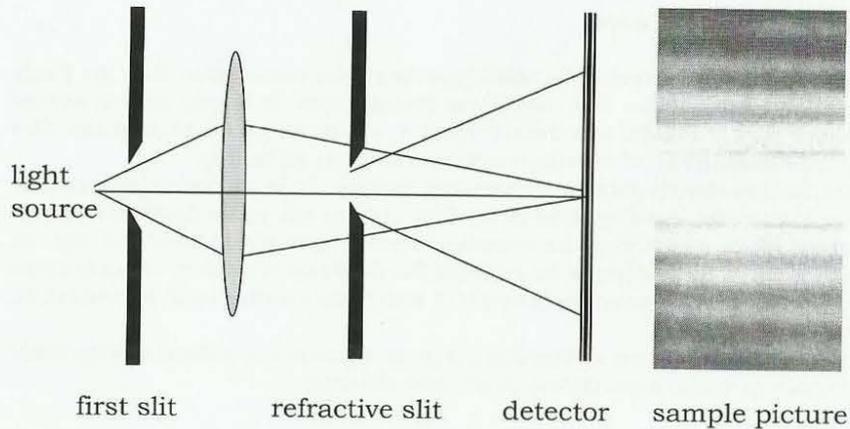
Fig. 22.2 A: Light forms interference patterns at the slit
(light stripes are formed, where the waves oscillate in phase, dark stripes, where they oscillate out of phase).

electrons   electroscope

+
+

monochromatic light
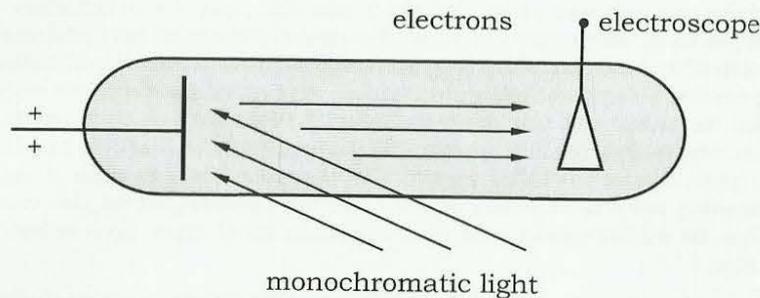
Fig. 22.2 B: The photo-electric effect

<i>:   Atome als Energiewellen. Physiker wandelten einen Strom von Natrium-atomen in Wellen um. Ill. Wissenschaft 7/1996, Seite 56 + 57

22.2 Concerning the measurement of light

The uncertainty principle with the interpretation of Heisenberg, the light is wave and particle at the same time, is incompatible with the wave equation. Heisenberg puts an *equal sign*, where in the wave equation in reality is present an *addition* of both wave parts. Fortunately in mathematics there is no need of speculating, there a derivation is right or wrong. Nothing is changed to that even if all physicists of the world should go in the wrong direction following the prevailing opinion. The wave equation exert an influence on the interpretation of the light experiments, on the one hand the ones concerning the interference and refraction of the light, where electromagnetic waves are becoming visible (fig. 22.2 A) and on the other hand the photo-electric effect, as proof of light quanta (fig. 22.2 B).

Already the wave theory of Huygens requires interference patterns of light rays, as they for instance are observed behind a slit, and demonstrates with that the wave nature. If on that occasion the particle nature is lost, if thus the photons present before the slit can't be detected behind the slit anymore, then plain and simple the measuring method, thus the slit is to blame for that. The vortices have unrolled themselves at the slit to waves.
Corresponding experiments also have been carried out with matter. At the Massachusetts Institute of Technology whole sodium atoms were converted into waves. At the detector pure interference patterns were observed, which go as evidence for the successful dematerialization[i]. But the vortex physicist they show still more: they reveal, that atoms merely are waves rolled up to spherical vortices, which at any time and spontaneously can again unroll to waves at a lattice (chapter 5 and 7).
The common interpretation, the wave nature detectable behind a slit must have been present in the same form already before the slit, is untenable and in the end wrong, as makes clear the experiment with the sodium atoms.

The photo-electric effect, which on the other hand shows the quantum nature of the light, has been discovered by Heinrich Hertz, further investigated by Lenard and finally rendered more precisely by Millikan 1916 (fig. 22.2 B). It bases on the circumstance that light of higher frequency, thus blue light, has more energy than red light of lower frequency. But if electrons are knocked out a metal plate by light, then that occurs, by the waves rolling up to vortices. Now indeed photons are at work, which are detected with an electroscope indirectly.
In the same way a photon ray in a bubble chamber can be photographed. But also here the measuring method is responsible for what is being observed.

A good example is the human eye, the rods and cones of which merely can pick up potential vortices and pass them on to the nerves as so-called reaction potentials. Incident waves can only be detected, if they first have rolled up to vortices in the corpus vitreum of the eye. For us seeing, it doesn't play a role of how many percent vortices and waves the light is consisting.
Behind a sheet of glass for instance a larger vortex part can be expected and still the light has the same brightness as without sheet; the sheet of glass is perceived as transparent. We nevertheless must assume that light with a large wave part has another quality, than such light behind glass or artificial light with a large part of photons.

wave equation (d'Alembert / Laplace):

$$\Delta \mathbf{E} = \text{grad div } \mathbf{E} - \text{rot rot } \mathbf{E} = \frac{1}{c^2} \cdot \frac{\delta^2 \mathbf{E}}{\delta t^2}$$

Nikola Tesla:

- **scalar wave**
  (electric or magnetic) =

- **longitudinal wave**

form (each time for velocity of propagation v):

- (v > c): neutrino radiation, morphogenetic fields,...

- (v = c): photons,

- (v < c): plasma wave, thermal vortices, biophotons, earth radiation,...

- (v = 0): noise,...

Heinrich Hertz:

electromagnetic wave =

transverse wave

form (each time for frequency):

- cosmic radiation

- X-rays,

- UV radiation,

- light,

- infra-red radiation,

- microwaves,

- radio waves,

- VLF, ULF,...

Fig. 22.3:   The two parts of the wave equation

22.3 Comparison of the parts of Tesla and Hertz

Light as a rule always is formed as photon radiation, even on the sun. If in the end only waves arrive on earth, then the vortices sometime on the way to us must have unrolled to waves. Photon radiation after all is a scalar wave radiation, which generally is predominant in the near-field of the source of radiation. There is no reason, why the light should act in another way than the wave radiated by a radio transmitter, which as well forms vortices in the near-field area, as we already have discussed. For different interpretations of wave properties of one and the same physical phenomenon there is no place in a unified theory.

If we stay at the comparison then it is not an individual case that an experimental setup is responsible for what is being measured and observed. A parallel case to the experiments concerning the nature of the light is the one concerning the wave propagation. Hertz has received and utilized the transverse part and Tesla the longitudinal part and either one claimed, only he is right. There doesn't exist an other equation, which has been and is being ignored and misunderstood so thoroughly, as the wave equation.

Fig. 22.3 shows in a survey the two parts of the wave equation in the assignment to the terms and forms: Right hand side the electromagnetic wave according to Heinrich Hertz and left hand side the scalar wave according to Nikola Tesla. The terms, like on the one hand transverse wave and on the other hand longitudinal wave relate to the kind of wave propagation.

If the field pointers oscillate crossways to the direction of propagation, then as a consequence the velocity of propagation is decoupled from the oscillating fields. The result in all cases is the speed of light, and that in our observation is constant.

It is usual to make a list for increasing frequency, starting at the longest waves (ELF and VLF) over the radio waves (LW, MW, SW, UHF), the TV channels (VHF, UHF), the microwaves, the infra-red radiation, the light, the X-rays up to the cosmic radiation.

It really is interesting that it concerns one and the same phenomenon despite the different forms! As long as Maxwell only had published a theory for the light, in the world of science 24 years long at first nothing at all happened. Only Heinrich Hertz with his short wave experiments opened the eyes. Now all suddenly started at the same time to research into various phenomena on the frequency scale, from Madame Curie over Konrad Röntgen up to Nikola Tesla, who primarily researched the area of long waves.

With regard to the scalar waves until now a corresponding booster detonation has failed to appear. The immense area is new ground scientifically, which is awaiting to be explored systematically. I try to make a contribution with my historic rebuild of a scalar wave transmission line according to the plans of Tesla[i].

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[i]:   Im Gespräch mit dem Fernsehmoderator und Buchautor Johannes von Buttlar weise ich auf die Chancen und technischen Möglichkeiten hin: Johannes von Buttlar im Gespräch mit Prof. Dr. Konstantin Meyl: Neutrinopower, Argo-Verlag Marktoberdorf, 1. Aufl. (2000).
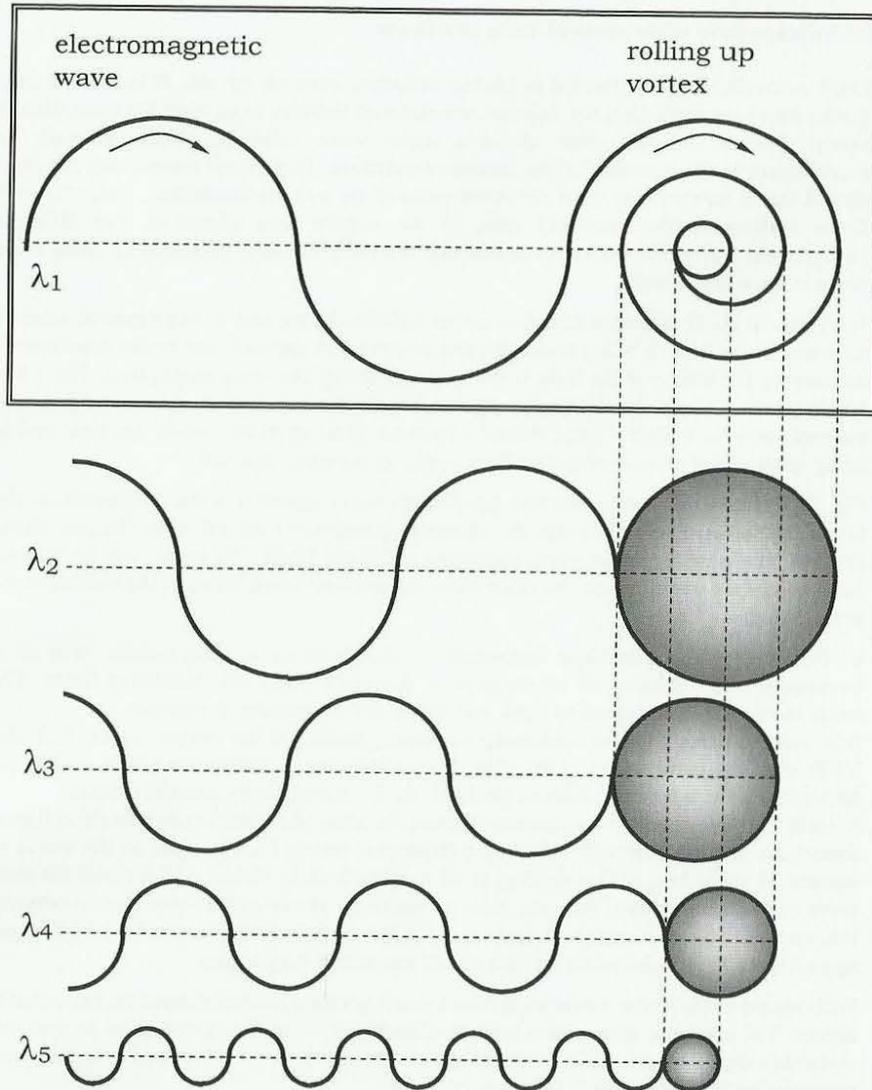
Fig. 22.4:   The wave rolling up to a vortex.

wavelength of the wave: $\lambda_1 = c/f_1$
wavelength of the vortex: $\lambda_n (n = 1,2,3,4,5) \leq \lambda_1$
$f_5 > f_4 > f_3 > f_2 > f_1$ $\lambda_5 < \lambda_4 < \lambda_3 < \lambda_2 < \lambda_1$

22.4 Noise, a scalar wave phenomenon

Longitudinal waves can take arbitrary velocities between zero and infinity, because they propagate in the direction of an oscillating field pointer and as a consequence of that their velocity of propagation oscillates as well and by no means is constant. It does make sense to list the forms of scalar waves according to their respective velocity of propagation (fig. 22.3, left column).

If we start with a localized vortex, a wave rolling up, which further is contracting. Doing so the wavelength gets smaller and smaller, whereas the frequency increases. An evenly frequency mixture distributed over a broad frequency band is observed. This phenomenon is called *noise* (fig. 1.4). But besides the localized noise, noise vortices can also be on the way with a certain velocity as a scalar wave, e.g. for the *radio noise*. In this case they show the typical properties of a standing wave with nodes and antinodes.

Also the *earth radiation* is said to have standing wave nature, which can be interpreted as slowed down neutrino radiation. If it is slowed down on the way through the earth, then the neutrino properties are changing, as this was measured in the Kamiokande detector in Japan recently. Unfortunately the proof occurs only indirect, because there still don't exist measuring devices for scalar waves. We'll talk about this problem area later and are content with the clue that already within living memory the standing wave property has been used to find water and deposits of ores and still is used today (fig. 22.4).

If we continue our considerations concerning the forms of scalar waves, as they are listed in fig. 22.3. The scalar waves, which are slower on the way than the light, are joined by the plasma waves. This is confirmed by measurements and calculations.

For thermal vortices, as they have been investigated by Max Planck and for biophotons, as they can be detected in living cells by colleague Popp, the velocity of propagation however is unknown. It was not and still is not measured at all, now more than ever. The research scientists have confidence in the assumption that all waves go with the speed of light, but that is a big mistake.

For all wave kinds there at least exists also one vortex variant, for radio waves for instance it is the radio noise, which propagates with a velocity different from c. The velocity is the product of frequency and wavelength:

$$v = f \cdot \lambda$$

(22.1)

From the three variables v, f and λ at least two must be measured, if one has a suspicion that it could concern scalar waves. At this place most errors are made in the laboratories. Countless experiments concerning the biological compatibility, concerning medical therapy methods and similar experiments must be repeated, because as a rule only the frequency is being measured and it has been omitted to at least check the wavelength or the velocity of the wave. Countless research scientists must put up with this accusation. Much too blind the scientists, who now again may start from the very beginning with their work, have had confidence in the predominance of the speed of light.

hard neutrino radiation
(small ring-like vortex)

weak neutrino radiation
(large ring-like vortex)

photon radiation (light =
individual ring-like vortex or
as an oscillating pair).

**plasma waves,
noise,
earth radiation**

(vortex balls,
consisting of
a multitude of
ring-like vortices).
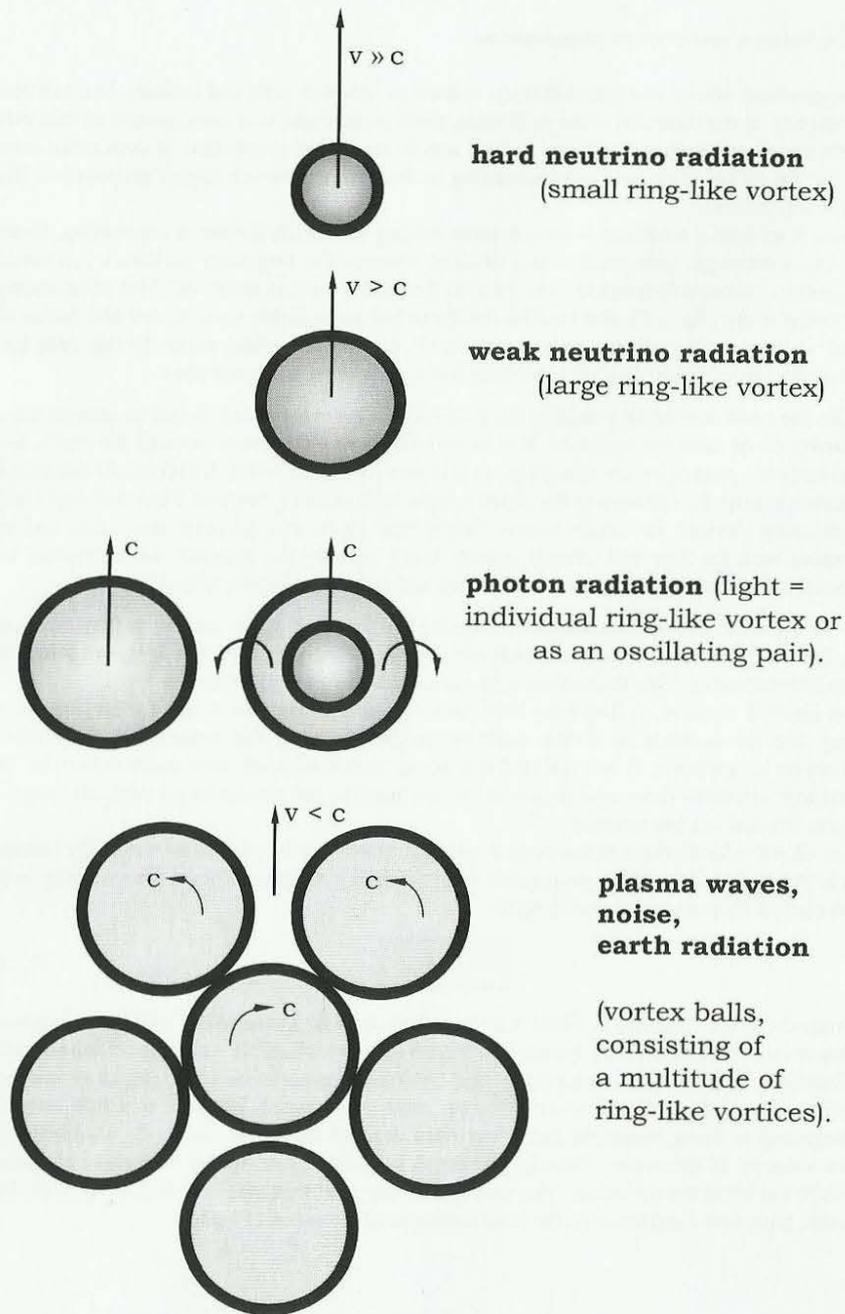
Fig. 22.5:   The ring-like vortex model of scalar waves.

22.5 Neutrino radiation

The neutrino physicists make the same error. They proceed from the assumption that their particles are on the way with a speed somewhat less than the speed of light c. This contradicts the observation according to which black holes should represent strong sources of neutrinos, which are black only for the reason that no particle radiation is able to escape them, which is on the way with c or even slower. If a black hole does hurl neutrino radiation into space, than that must be considerably faster than c, as normal neutrino physicists still by no means can imagine it today.
But the neutrino radiation only can be detected after it has been slowed down to a value, which is smaller than c. If the slowing down occurs slightly assymmetrical, then as a consequence a mean of the mass different from zero appears. The „measurement" of such a rest mass, as it at present is propagated and celebrated, is a classical measurement error! As long as a neutrino on the way to us still is faster than the light, the mean of its mass is generally zero. The effective value of the mass of a neutrino is however considerable. Only it is able to give account for the sought-for *dark matter*, as far as it must exist in the today supposed form anyway.

The Tesla radiation, that the discoverer Nikola Tesla already in own experiments had found out, is faster than light (chapter 9.7 and 17.2). Since this Tesla radiation according to the description is identical with the neutrino radiation, since it so to say forms a subset, I will call neutrino radiation all the scalar waves, which are faster than the light. This stretches from the weak radiation at low frequencies up to the hard neutrino radiation of cosmic origin. But the hardness of the radiation does not only increase with the frequency, it in particular increases with the velocity.

The neutrino radiation first of all is carrying energy. On top of this basic wave radiation in addition information can be modulated. Doing so extremely complex modulation variants are offering. Of this kind we must imagine thoughts, as being complex modulated vortices, which can propagate as scalar wave in space. Rupert Sheldrake calls this vortex field a morphogenetic field. At this place merely is pointed at his very interesting research results[i].
Thoughts can be standing in space, in the form of localized noise, but they also can move with speeds faster than light. According to that a communication with intelligent beings from other star systems by all means wouldn't be an utopia anymore.

Every fast neutrino forms an individual ring-like vortex (fig. 7.12). The slower the scalar wave is, the more dependent the vortices become. The photon already can consist of two ring-like vortices (fig. 4.6), whereas plasma waves and other slow scalar waves can form from a multitude of individual vortices, which are rotating around each other, to form vortex balls and vortex streets (chapter 4.9 - 4.11). From this circumstance already results very different scalar wave behaviour in the different areas of the velocity of propagation. This trend for small velocities can as well be observed towards lower frequencies. For a certain wavelength the frequency after all (according to eq. 22.1) is proportional to the velocity of propagation.

[i]:   R. Sheldrake: Seven experiments that could change the world. New York: Riverhead 1995

scalar wave

= energy wave:

= *Tesla radiation*

- can be modulated in a complex way

- fast, parallel image transmission

- focussing, transmission without losses

- positive use: mobile, directional radio, energy converter

- negative use electro smog, radiation weapons

- transmitter
  (+/−)
  E, v
  (−/+)
- receiver

• electromag- netic wave

= *Hertzian wave*

- can only be modulated linearly

- slow, serial image transmission

- scattering, transmission losses

- positive use: radio, TV, information distributor

- negative use: mobile, directional radio

E

c

receiver   dipole
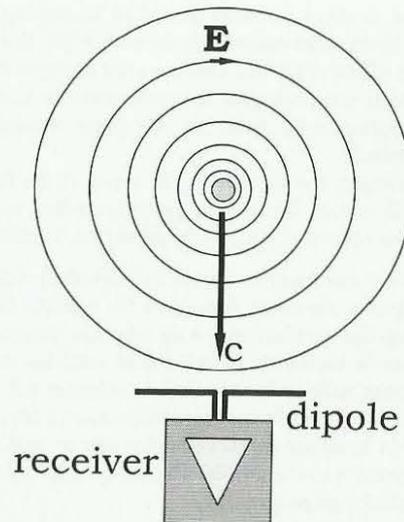
Fig. 22.6:   Scalar waves and radio waves, comparison of the properties.

22.6 Parallel instead of serial image transmission

We continue with our considerations concerning the special properties of scalar waves, represented in the left column, and compare these with the well-known behaviour of electromagnetic waves in the right column (fig. 22.3 is now followed by fig. 22.6). If we again take up the possibilities for modulation and the transmission of information, then it becomes very clear from the comparison that we today work with a technology, which we it is true master more or less, but which is everything else but optimum.

For the Hertzian wave the velocity of propagation is constant. With the frequency therefore at the same time also the wavelength is being modulated. But that strongly limits the information transmission. An image for instance must be transmitted serially point after point and line after line. The serial image transmission takes place very slowly, for which reason the velocity of the PCs permanently must be increased, so that the amount of data can be managed.

With the clock frequency on the other hand also the losses increase, so that in the end the CPU-cooler limits the efficiency of modern PCs. Something our engineers obviously do wrong, as a comparison with the human brain clarifies. Our brain works without a fan. For it a clock frequency of 10 Hertz is sufficient. It needs neither Megahertz nor Gigahertz frequencies and despite that is considerably more efficient.

Nature only works with the best technology. The second best technology, as it is put to use in our machines, in the evolution wouldn't have had the slightest chance of surviving. The strategies to optimize of nature are merciless. In a free economy that goes completely different. There the „bunglers" are joining together to companies dominating the market, buying up the innovative ideas without further ado, to let them disappear in the drawer, so that they can bungle further in the way they did until now. It after all have been the lousy products, which have made them to the companies they are today. The ego of power is incompatible with the interests of nature.

Nature works with scalar waves and their velocity of propagation is arbitrary. Wavelength and frequency now can be modulated and information can be recorded separately. In this manner a whole *dimension* is gained *to modulate*, the image transmission can take place in parallel, which means considerably faster, safer and more reliable. As anyone of us knows by own experience, assembling the image takes place all at once, the memory of past images takes place ad hoc. Nature is indescribable more efficient than technology with the scalar wave technique.

If we again take the right-hand side of fig. 22.6 with the properties of the Hertzian wave. In the opinion of Nikola Tesla it is a gigantic *waste of energy*. The broadcasting power is scattered in all directions and the transmission losses are enormous. At the receiver virtually no power arrives anymore. To receive a radio signal the antenna power has to be amplified immensely. It is a wave, which actually only can be used as radio wave, thus as a wave with which arbitrary many participants should be reached.

This wave however is completely useless, if it concerns a point-to-point connection. If I want to call someone, to talk only with him, a radio wave is the entirely wrong method, because I with that bother hunderds and thousands of people that I don't want to call at all.

Hertzian wave propagation (transverse waves):
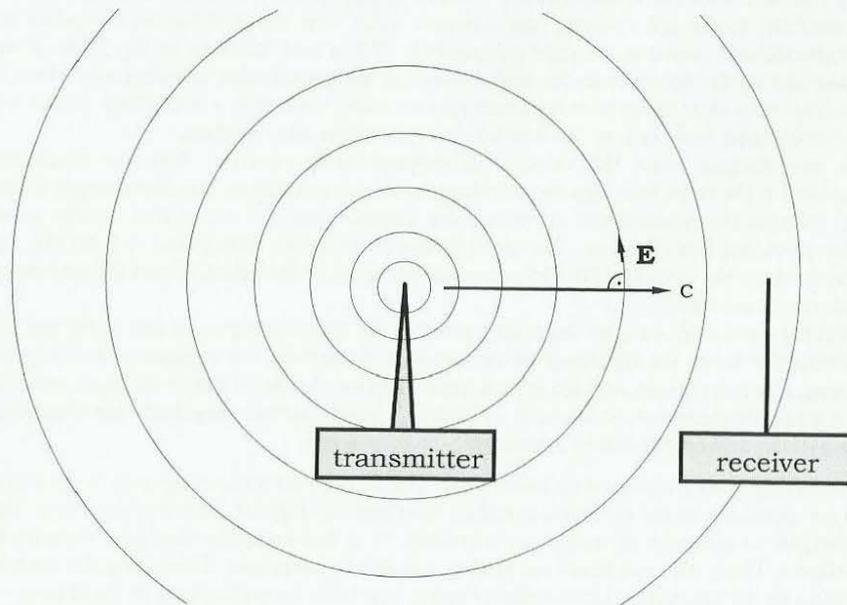
Tesla radiation (radiations) = scalar wave,

longitudinal wave propagation:
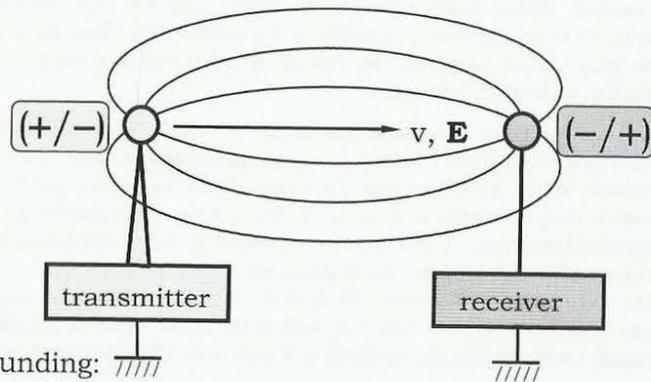
with grounding: ⊥

Fig. 22.7:   Comparison of radio waves according to H. Hertz
               and electric scalar waves according to Nikola Tesla.

22.7 Comparison of the properties

The course of the field lines clarifies the difference. For the scalar wave all field lines going away from the transmitter run together again. As long as no scattering field occurs, there also won't be any transmission losses. It is an energy wave, for which the full broadcasting power is transmitted wirelessly and which arrives at the receiver, by that focussing the field lines again.

Here one at once numerous technical applications come to mind, if energy should be transmitted wirelessly. A TV, which supplies its remote control with energy itself, telemetric installations, which are fixed at difficult accessible or rotating machine parts and which can't work without energy supply.

For a mobile with 3 Watts of broadcasting power only a few microwatt arrive at the ground station. If I would have a scalar wave mobile, which functions with resonance, then a broadcasting power of some microwatt will be completely sufficient, to carry out a telephone call right through the earth. This minimum broadcasting power suffices, because everything, what is being transmitted, arrives at the receiver - crucial is that the conditions of resonance are fulfilled. That means, both must have the same frequency and the opposite phase. In addition the modulation has to fit, so that on the one hand not several participants in the conversation are getting in each other's way. For a purely carrier wave transmission on the other hand there would be the risk of natural fields being collected also and the power at the receiver taking inadmissibly high values. This is prevented effectively by a correspondingly complex modulation. Nature solves the problem in exactly this manner.

Mobile phone technology with scalar waves of course still is a pie in the sky. A big challenge for the engineers poses the adjustment condition of opposite phase and the fitting modulation, which Tesla called „individualisation"[i]. Entirely by the way the network runners and the telephone companies are getting quite superfluous.

Telephone charges, so one perhaps can read in the history books in a hunderd years, were the indication of a century of rigorous exploitation of man and nature. With scalar waves a direct, more dimensionally modulated information transmission directly with the partner of conversation is possible and sufficient energy is available to humanity any time and any place, without being dependent on any companies. This notion is not new, but it is inconvenient for the rules; already Nikola Tesla has written about it, but obviously no-one wanted to listen to him[ii].

Scalar waves are able, that is made clear by the properties, to revolutionize both the energy technology and the information technology fundamentally. It is more than only a technology for the new century. Scalar waves are a chance for the whole millennium.

<i>:   N. Tesla: Transmission of electrical energy without wires, Electrical World
       and Engineer 7.1.1905; Edition Tesla Vol. 4, P. 131.

<ii>: N. Tesla, New York Times of 15.9.1908; Edition Tesla Vol. 6, P. 241.

f [Hz] frequency

speed of light c

cosmic radiation

wave length λ [m]

10^{24} Hz — hard — 10 pm

10^{23} Hz

10^{22} Hz   γ-radia-tion   neu- — 0,1nm

10^{21} Hz   trino — 1 nm

10^{20} Hz   radi- — 10 nm

10^{19} Hz   ation — 0,1μm

10^{18}Hz   X-rays — 1 μm

10^{17}Hz — 10 μm

10^{16}Hz — 0,1mm

10^{15}Hz   UV — 1 mm

light — 1 cm

10^{14}Hz   photons

10^{13}Hz   IR   weak — 10 cm

10^{12}Hz   neu- — 1 m

trino — 10 m

10^{11}Hz   radia- — 100 m

10 GHz   μW   tion — 1 km

1 GHz   UHF — 10 km

noise   VHF — 10^5 m

10^8 Hz

10 MHz   SW — 10^6 m

ultra-   sound   MW

1 MHz

100kHz   LW

10 kHz

1 kHz   VLF

air-   body

100 Hz   sound   sound   ELF

10 Hz

standing waves and localized vortices/noise

O [m/s] 1   10 10^2 10^3 10^4 10^5 10^6 10^7 10^8 10^9 10^{10} 10^{11} 10^{12} 10^{13}

velocity of propagation   v [m/s] = λ·f

Fig. 23.1:   Frequency diagram of longitudinal and transverse waves as they depend on the velocity v.

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23. Research of scalar waves

Scalar waves are still unexplored area, scientific new ground as it were. Individual research scientists already have selectively ventured forward in this area and have described properties of the scalar wave investigated by them in their special research area mostly in measurement technical manner. But as a rule they lack the physical relation, as it is derived in this book for the first time. If we don't proceed from individual measurements, but from the wave equation and the mathematical physical derivation of scalar waves, then we have the great chance to understand as something belonging together on the one hand noise, photons, neutrinos and lots of other known phenomena as well as on the other hand still unknown phenomena, which are called parascientific.

We should remember that we without theory of Maxwell and the representation in a frequency band today still wouldn't know that the radio waves (LW, MW, KW, UHF), the microwaves (μW), the infrared thermal radiation (IR), the light and the X-rays concern just the same phenomenon. The graphic representation of both waves in one diagram in this place is extremely helpful.

23.1 Frequency diagram

In fig. 23.1 the frequency f is shown against the velocity of propagation v with the wavelength λ as parameter. The broad line at $3 \cdot 10^8$ m/s represents the speed of light c. Here the frequency band of the transverse waves can be found again in the well-known one-dimensional representation.

Crosswise to that, somewhat unusual, the longitudinal waves run. These start at the left at localized noise, over the sound as it propagates in air, in water and in metal, over a large, to a large extent still unexplored, range of the biophotons, the heat vortices and of the dowsing rod effects and end on the other side of the speed of light at the neutrinos.

Between that the special case is settled that the particles, or said better vortices, propagating as a scalar wave have exactly the speed of light. It gives reasons for the circumstance, as already mentioned, that light can appear as wave or as photon radiation. It, according to the wave equation, after all always consists of a combination of both forms. At very high frequencies, e.g. the cosmic radiation, this combination is shifted in the direction of vortices and their distribution as a scalar wave, at low frequencies the tendency inversely goes in the direction of the normal wave.

If we assume that for the transverse wave over all frequencies a dozen of specialized gauges is necessary, each of them also can be switched over in range several times, then we can project that to record a scalar wave of a certain frequency over all velocities of propagation likewise 12 devices and for the whole field shown in fig. 23.1 approximately 12x12 = 144 devices will be necessary. Of these 144 gauges today just 12 are available. There thus still are missing 132 pieces, which should be developed.

With these gauges, so I am convinced, the many white spots in the diagram can be tapped scientifically little by little if a systematic procedure is used. My vortex theory thus will be attached a central importance.

Figure (left column):

f [Hz] frequency — speed of light c — wave length λ [m]

Frequency axis (top to bottom): 10^{24} Hz, 10^{23} Hz, 10^{22} Hz, 10^{21} Hz, 10^{20} Hz, 10^{19} Hz, 10^{18} Hz, 10^{17} Hz, 10^{16} Hz, 10^{15} Hz, 10^{14} Hz, 10^{13} Hz, 10^{12} Hz, 10^{11} Hz, 10 GHz, 1 GHz, 10^{8} Hz, 10 MHz, 1 MHz, 100 kHz, 10 kHz, 1 kHz, 100 Hz, 10 Hz

Radiation labels: cosmic radiation, γ-radiation, X-rays, UV, light, IR, μW, UHF, VHF, SW, MW, LW, VLF, ELF

Wavelength axis: 10 pm, 0,1 nm, 1 nm, 10 nm, 0,1 μm, 1 μm, 10 μm, 0,1 mm, 1 mm, 1 cm, 10 cm, 1 m, 10 m, 100 m, 1 km, 10 km, 10^{5} m, 10^{6} m

Background labels: hard neutrino radiation, photons, weak neutrino radiation, noise, ultra-sound, standing waves and localized vortices / noise

Annotations:
- Why can ultra sound be calibrated in heat degrees?
- Energy ray according to Dr.Soeder[ii]
- Wüst waves[i]
- How is it possible to receive ELF waves coupled over water at short wave?
- Operation of Magnifying Transmitter of N.Tesla in Colorado Springs 1898

Velocity axis: O [m/s] 1, 10, 10^{2}, 10^{3}, 10^{4}, 10^{5}, 10^{6}, 10^{7}, 10^{8}, 10^{9}, 10^{10}, 10^{11}, 10^{12}, 10^{13}

velocity of propagation v [m/s] = λ·f

Fig.23.2: Frequency diagram with entries concerning Wüst waves, Tesla transmitter and various not understood effects.

23.2 The reverse of the HF medal

The diagram possibly may settle disputes, like the ones between the „Wüstlingen" (note of the translator: the author here is playing with words, Wüstlingen literally means lechers) and the „high-frequency engineers".

Professor Wüst of Munich already 1934 had proven, that the Wüst waves named after him in air have a velocity of propagation of approximately 10 m/s[i]. He investigated them in the frequency range between 16 Hz (λ = 60 cm) and 500 Hz (λ = 2 cm). The high-frequency technicians immediately have converted to the speed of light, since they don't know anything else, and on the spot have shifted the phenomenon into the range of the microwaves between 0.5 GHz (λ = 60 cm) and 15 GHz (λ = 2 cm). In the diagram now can be found, at which place this phenomenon belongs actually. It presumably concerns the same „energy ray", which Dr. Soeder has observed and proven already at velocities of propagation of 55.2 km/s and wavelengths around 10 cm[ii].

Furthermore follows from the diagram (23.2), why ultra sound can be calibrated in heat degrees, and why radio reception of signals from a completely other frequency range is possible by principle, if for identical wavelength a velocity of propagation different from c occurs. Further the range of operation used by Tesla at approx. 1.6 times the speed of light is depicted.

Also the noise is such a book with seven seals. It concerns, it is true, a fixed chapter of high-frequency engineering, but without visible connection to the other chapters. That might be based on the circumstance that the relation, as it is dictated by the wave equation, isn't recognized.

Every high-frequency signal is accompanied by a noise signal; every antenna produces more or less noise. HF engineering dictates the measures, how the noise can be suppressed resp. the signal-noise distance be increased. The goal is to make the electromagnetic wave stand out in such a way from the noise that it can be received. For that the measurement setup must be choosen correspondingly, are the measurement cables dictated, and must be paid attention to power adaptation and corresponding termination resistors. For measuring HF correctly all interference influences should more or less disappear.

But what are the interference influences, which the HF-technician suppresses? According to the wave equation it are the scalar wave parts, and to that also is counted the noise. Every HF-technician thus knows the scalar parts as interfering noise signal, but doing so he completely fails to notice the technical advantages and chances, which e.g. are present in the noise.

If by means of an autocorrelation function a noise signal is compared to itself then often a hidden message comes to light. According to that, informations can be hidden in the noise and of course transmitted wirelessly. This important circumstance is known, but it is hardly used. The noise vortices thus can be modulated in an extremely complex way. There can be transmitted a lot more information in the noise as scalar wave, than with the radio wave.

[i]: J. Wüst: Physikalische und chemische Untersuchungen mit einem Ruten-gänger als Indikator. Further references in W-B-M 3/1991, S. 57.

[ii]: A. Soeder: Ohne Strom läuft neuer Energiestrahl rund um den Erdball. Raum & Zeit 59/92 Seite 62 – 67.
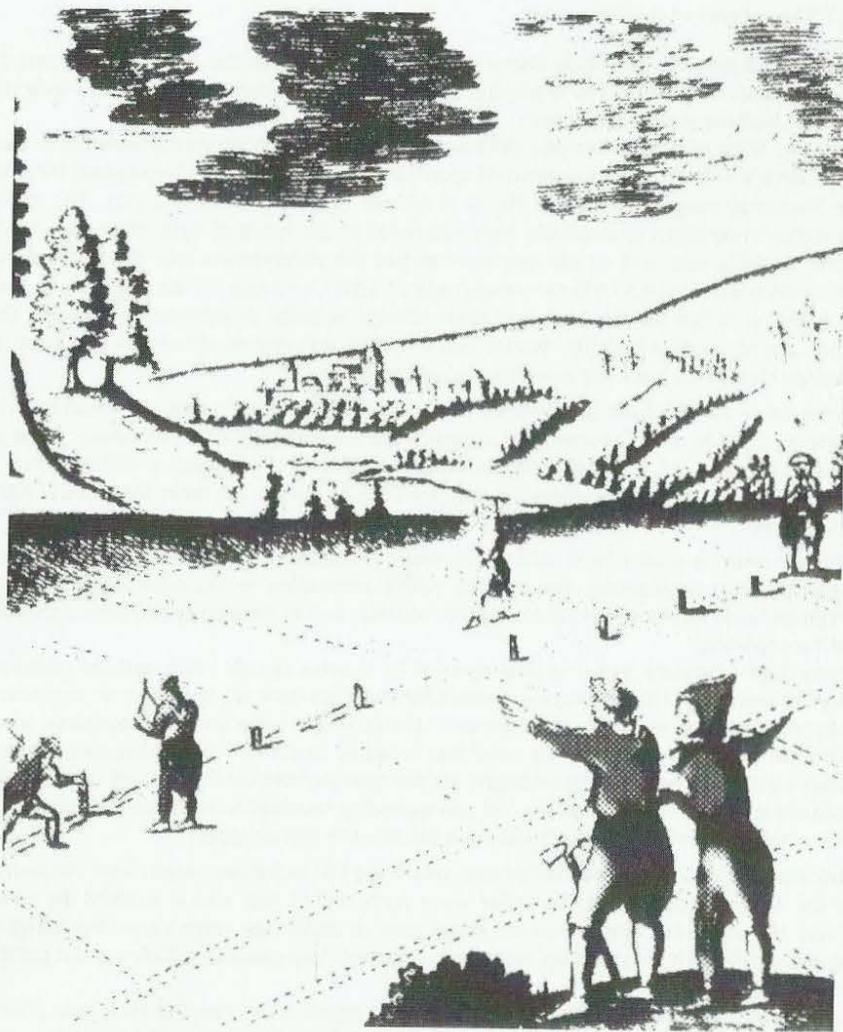
Fig. 23.3:   Dowsers dowse an ore vein.[i]
From: Speculum metallurgiae politissimum,
Rössler, Dresden 1700.

The possibility of more dimensionally modulating and parallel image transmission make scalar waves superior to the radio waves in such a way that one should seriously think about the reversed procedure, in which the noise is conceived as useful signal and the radio wave as interference signal.

In the frequency diagram (23.1 and 23.2) can be read like in a diary, in which most pages it is true still are empty, but in which some very informative marginal notes can be found for different points of difficulty. It mostly are parascientific phenomena, which, not understood and excluded by textbook physics, are waiting to be taken up in the building of physics. As an example we'll pick out an extensive area of alternative research.

23.3 Radiesthesia

A particularly broad spectrum of scalar waves is provided by the already several times mentioned *earth radiation*. An ancient science of experience, which troubles the exploration of the earth radiation, is the *geomancy.* The Roman land surveyors, the Augures, used as an aid a flat coil like also Tesla did to receive scalar waves. The Lituus, as the device was called, resembles so much that of the Etrusks that we must proceed from the assumption that the method is much older (fig. 16.10).

This part of the scalar wave research, also called *radiesthesia*, is derived of „radiare", which can be translated with „send out rays" resp. „perceive". It describes the doctrine of the sensitivity to radiation of man. Doing so the radiation sensitive uses his own nerve framework as a biosensor.

The *nerve conduction* could be derived as a biological variant of the Tesla one wire transmission, for which ring-like *potential vortices* are passed on *as action potentials* in form of standing waves (fig. 9.6). Of this kind are also the control commands, which cause a muscle to contract. If now corresponding vortices are picked up by means of a dowsing rod or similar aids in our nerves, then the contract addressed muscles contract, because they can't distinguish, from where the command comes. This unconscious nerve twitch leads to a swing of the dowsing rod and to the well-known dowsing rod phenomenon.

But man can't replace a technical gauge. Hence one speaks of dowsing and not of measuring. To this should be added the condition of resonance, which must be fulfilled. Since every person however builds up other resonances, dowsed results of others often can't be reproduced. But from this particular difficulty one cannot draw the conclusion that the phenomenon does not exist and radiesthesia is not a science. Series surveys and statistical analyses here in any case don't lead any further. It always only are individual talented dowsers, who have at their disposal really fantastic abilities and find with great certainty water, ores and even oil.

With the perception of a physical phenomenon it mostly starts. Cultural man looks after his discovery as cult, whereas modern man, guided by the wish for reproducibility and more objectivity, is troubled to design and to build a technical measurement work. With regard to the scalar wave in general and the radiesthesia in special we still are at the stage of the Stone Age.

[i]:   Lüdeling, Hartmut: Handbuch der Radiaesthesie, Verlag Eike Hensch 1994, S. 145, ISBN 3-927407-09-7.
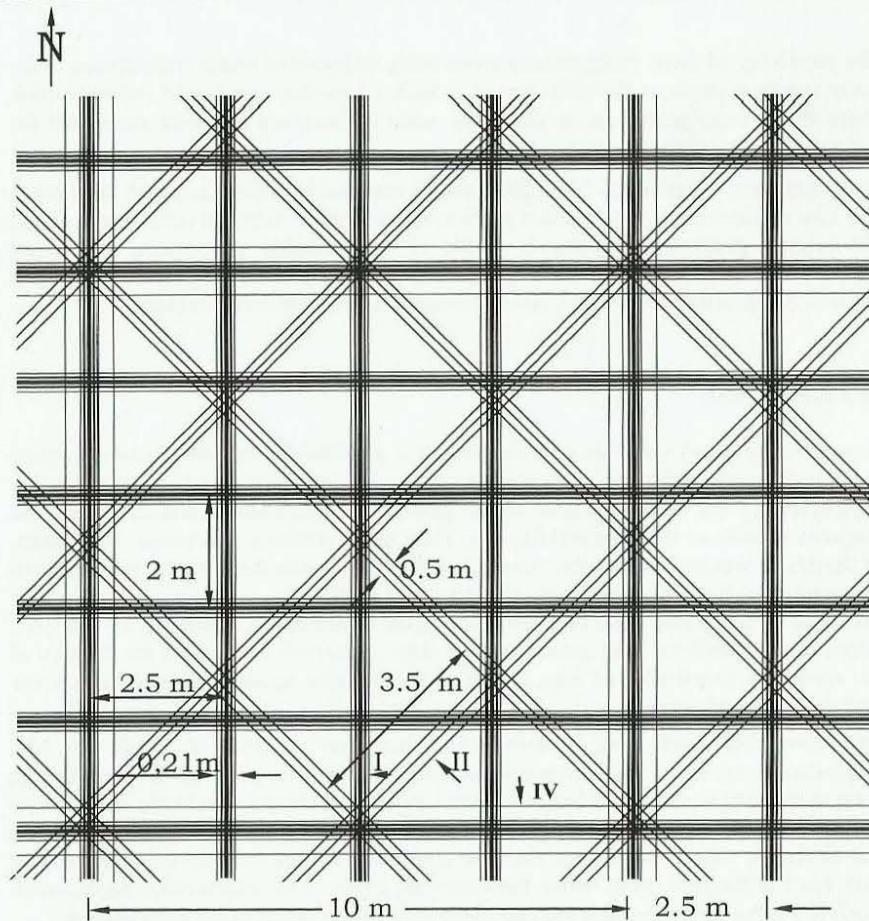
Fig. 23.4:   Nets dowsed at latitude 49.[i]

I.   net: „global net" according to Dr. E. Hartmann;
      orientation: N - S: 2 m distance and E - W: 2.5 m distance

II.   net: „diagonal net" according to Dr. M. Curry;
      orientation: NE - SW and NW - SE: 3.54 m = 2.5 m $\cdot \sqrt{2}$

[III. „lightning net" according to R. Schneider; orientation like I.]

[IV. net acc. to Benker; like I. but: N - S: 10 m and E - W: 10 m]

[V. sun/planet net acc. to W. Auer; with 3.66 m orientation S./P.]

According to Prof. E.G.Hensch et al.:

[i]:   Hensch: Radiaesthesie im ländlichen Bauen und Siedeln, Arbeitskreis zur
       Landentwicklung in Hessen, W4, Wiesbaden 1987; resp.:
       W. Auer: Erdstrahlen?... AWGEO 199, Eigenverlag 1998; resp.:
       Mayer/Winklbaur: Biostrahlen, 5. Aufl. ORAC Verlag, Wien 1989, Seite 168

23.4 Prediction of earthquakes with the help of scalar waves

The standing wave character of the earth radiation is a help. There are dowsed points and lines of maximum radiation intensity, which form nets, which encompass the whole world. On the one hand we are dealing with a net oriented in direction north-south and east-west (Hartmann net) and on the other hand with a net standing diagonally to that under 45° (Curry net). Because the angle of 45° can be derived as borderline angle from a vortex field calculation[ii], I already early have pointed to the circumstance that it here presumably concerns a vortex phenomenon[iii].

Because the nets in addition are dowsed in air, it must be vortices of the electric field, so-called potential vortices[iii], which here form regular structures. The formation of vortex lines and complete vortex streets (chapter 4.9), which consist of countless individual vortices, can be explained as follows:

Electric scalar waves propagate in the direction of the electric field strength and mediate field vortices, e.g. neutrinos. If at a certain moment the transmitter carries a positive and the receiver a negative charge, then all the particles which are positively charged are repelled by the transmitter and attracted by the receiver. All run at the same time towards the same goal, although all mediated particles carry the same charge and repel each other! This incompatibility can be compensated partly, by the vortices rotating around each other. In this circumstance can be seen the reason for the structure shaping, the formation of some lines in the countryside (fig. 23.3). The distances between the lines have characteristic values, which allow conclusions about the wavelength of the standing waves. We must assume that they dictate the structure shaping and that the spatial vortex distribution aligns with the nodes and antinodes of the respective standing wave. The distance between the lines, which corresponds to half the wavelength, becomes smaller and smaller towards the North Pole and the South Pole of the earth, the net thus narrower and narrower. Also is the net said to change strongly before an earthquake. This all are clues for the circumstance that the structure shaping radiation comes from the earth, that the cause must be sought in the earth radiation.

It should be noted marginally that with scalar wave detectors, which permanently scan the nets, a just as effective as inexpensive earthquake prediction should be possible. Such a facility would be an enormous relief and help for all earthquake warning services. It even should be possible to determine in advance the future epicentre, if there is measured at the same time at if possible many stations and the respective deviations are compared.

A further influential factor is the composition of the subsoil; e.g. ores and metals influence the earth radiation. It does collect the earth radiation. Water shows a special affinity for the earth radiation and after bundling it up releases it again. To blame is the high dielectricity of water ($\varepsilon \cong 80$), which again favours the formation of potential vortices [i].

A technical use of this effect would be the neutrinolyse (see fig. 17.6-17.8 and 18.1), the splitting of water molecules by neutrinos if these take the state of an electron, hydrogen escapes and the oxygen content in the water increases. If a neutrino however shows as a positron, then it annihilates and there is formed a light flash, which serves the „experts" in neutrino detectors as proof.

[ii]:   Meyl, K.: Wirbelströme, Dissertation Universität Stuttgart 1984

[iii]:   Meyl, K.: Potentialwirbel Band 1, INDEL Verlagsabt. 1990

Spectroid of the radiation field of a subterranean flowing water veign (according to P. Schweizer)[i]:
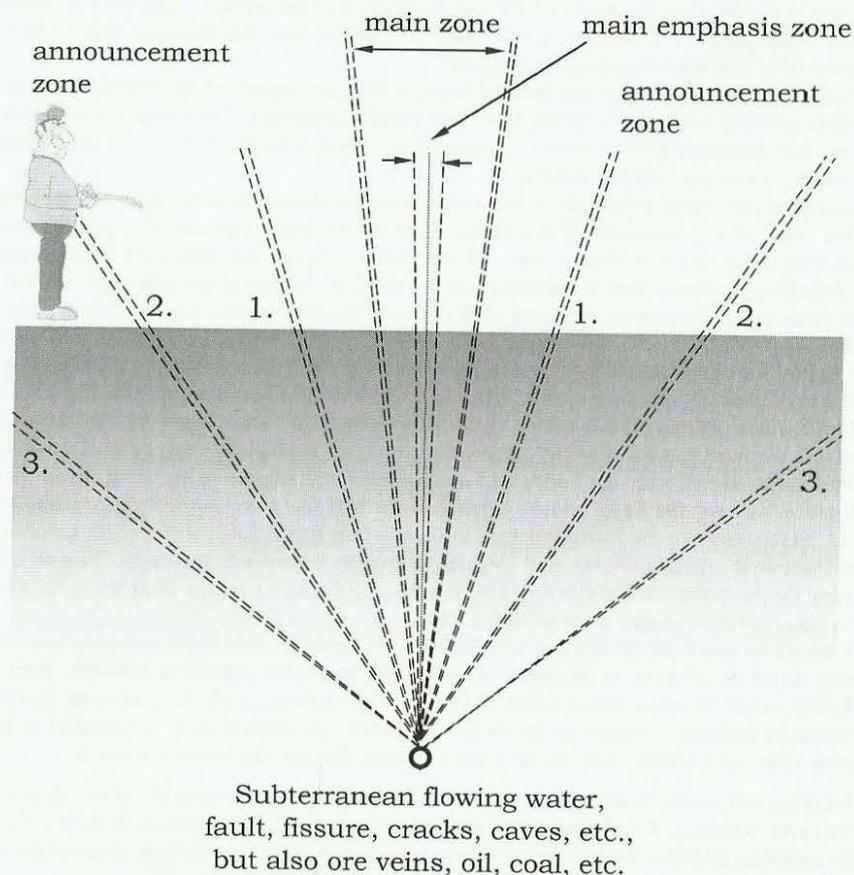
Fig. 23.5:   Radiaesthetic search for water[i],
                  (dowsing of the earth radiation)

[i]:   Lüdeling, Hartmut: Handbuch der Radiaesthesie, Verlag Eike Hensch 1994,
        S. 145, ISBN 3-927407-09-7.

23.5 Searching water with the help of scalar waves

Faults of earth's crust lead to fissures and cracks in the rock, which often fill up with standing or flowing water. Potential vortices of the earth radiation are attracted by the high dielectricity of water and are radiated again in slowed down and focussed form. On the surface of the earth the mixture of various scalar waves arriving there can be dowsed as main emphasis zone. For reason of the broad radiation spectrum the results of proficient dowsers in the main emphasis zone more often coincide.

At both sides in addition spectroids are forming, which are dowsed as parallel running vortex lines. Because every harmonic wave produces other lines and every dowser reacts to other resonances, a profound ability is required, if from the distance of the so-called announcement zones the water depth should be inferred (fig. 23.5). Some specialists indicate besides the place and the depth also the amount of deposit and if need be the water quality. For that they analyse the radiation intensity, but unfortunately many all too often overrate their abilities.

Already the Augures, the land surveyors in the age of the Romans have aligned their streets and the castles with the nets and the lines in the countryside. Even today new evidence about the central importance of the standing wave character of scalar waves can be found at excavations (fig. 16.10). Since every scalar wave also occurs coupled with a radio wave by means of the wave equation, earth rays originally could be detected conventionally with field strength gauges. But the intensive use by radio stations has made it necessary to change from the short wave range to the VHF-range and further to the UHF-range. It were indirect measurements, which could be interfered easily.

Today geologists work with ELF scanners in a range between 15 and 30 KHz if they search for water. They analyse the emitted signals of submarine transmitters, because these are attracted and amplified by water carrying layers.

Experiments also are carried out with noise receivers or unused broadband TV channels. Others analyse influences of the earth radiation on the magnetic field of the earth, but for this method the expressiveness is controversial.

Again others walk along a path with a scintillation counter measuring the inverse profile. At the places of maximum earth radiation a minimum of gamma radiation is measured. This stunning relation only can be interpreted as follows: the natural radioactive decay at these places takes place accelerated and that proves:

1. that earth radiation sets radioactivity free and causes it in the first place (chap.17.1 pp).
2. that in the case of earth radiation it actually concerns slowed down neutrino radiation.

But also this method works indirectly. It only functions in the open air and then only in the case of unspoiled nature, which sometime was covered with an even layer of radioactive dust. By cultivation or plantation the „radioactive layer" very often is changed and mixed up, whereupon the measurable profile hardly allows conclusions.

For indirect measurement methods of that kind, for which the measurement variable stands in a relation, which isn't known in more detail, to the scalar wave of interest, generally caution is advisable. Too often a message is seen in a wonderful 3-D diagram of the magnetic field strength or the radioactivity distribution, which has much more mundane causes.

Lecher air antenna according to W. Busscher[iii]:

short-circuited end of the Lecher conductor

short-circuit slider   handle
can be displaced

(man as
termination
resistor
and biosensor)

L

handle

The tuning length L of the
Lecher antenna determines
the resonator length for
standing waves. There is valid:

$$L = n \cdot \lambda/2 \quad \text{with } n = 1,2,3,...$$

Therefore the wave
length is ambiguously
determined; e.g. for:

n = 1 $L = \lambda/2$

n = 2 $L = \lambda$

n = 3 $L = 3 \cdot \lambda/2$

n = 4 $L = 2 \cdot \lambda$

Fig. 23.6:   Lecher conductor as scalar wave antenna.

Can be read at Prof. Dr. Ing. Christof Rohrbach:

[iii]: Rohrbach: Radiästhesie, Physikalische Grundlagen und Anwendung in Geobiologie und Medizin, Haug Verlag Heidelberg 1996, Seite 100.

23.6 Receiving scalar waves with the Lecher antenna

In the case of technical gauges it is normal to change the frequency tuning. For that the capacity of a capacitor is being varied, which is part of a resonant circuit. This method can simply be realized with the today available construction elements. Biological systems on the other hand, for instance a person, work primarily with a variation of the wavelength. In this case (according to eq. 22.1) the frequency is directly proportional to the velocity of propagation.

So provide for instance radiaesthetic dowsings clues for the wavelength. The frequency however can't be given, because that oscillates along with the velocity of propagation and at present the forming noise signal still can't be analysed. There can't be bought electronic construction elements, which like a body cell would be able of oscillations of length. Oscillation quartzes and piezo elements, on the basis of which *scalar wave detectors* could be constructed, form an exception.

Similar to the Lecher conductor different forms of tunable *Lecher antennas* have been developed, which are used for dowsing. Such a frame antenna, developed strictly according to the rules of high-frequency technology stems from W. Busscher (fig. 23.6)[i]. With the short-circuit slider a closed-loop antenna circuit in the upper part is tuned to half the wavelength or an integer multiple of it ($L = n \cdot \lambda/2$ with n = 1,2,3...). The person, who holds the Lecher antenna with both hands, forms the termination resistor for the attached antenna circuit. At the same time he prevents the occurring of an effect back on the tuned resonant circuit by means of damping of the Lecher conductor. The sense of this arrangement is lying in the circumstance that man as a „biosensor" should feel if standing waves, which I call vortices, are formed in the Lecher antenna.

A modification of the Lecher air antenna is the Lecher dowsing rod according to R. Schneider[ii]. It is produced as an etched board, which has a dielectricity of approx. 4. As a result the velocity of propagation and the wavelength are only half their normal value. In addition a shortening factor V is introduced, which depends on the construction of the Lecher dowsing rod[iii] ($L' = V \cdot n \cdot \lambda/4$ with V = 0.952 and n = 1,2,3...).

In fig. 23.7 some published tuning values have been drawn up. The values for want of corresponding technical gauges it is true still haven't been confirmed, but they allow a certain insight into the world of the scalar waves, as they are influenced and radiated by water, by metals, by oil or even by other planets, the sun and the moon.

Doing so some questions remain open: We for instance don't know, if the corresponding wavelength concerns the basic wave or only an mth harmonic wave. The details not only are unreliable, they moreover also are ambiguous. If however several tuning values L' are present for which resonance occurs, then if need be an integer divisor can be sought and the wavelength can be determined. But that doesn't function always.

[i]:   Will Busscher: Die Luft-Lecher-Leitung als Wünschelrute. Eine Methode um die Wellenlängen zu bestimmen. Wetter-Boden-Mensch 3/1991, Seite 46-57.

[ii]:   R. Schneider: Einführung in die Radiästhesie Teil II: Leitfaden und Lehrkurs ..., Oktogon-Verlag, Wertheim, 2. Aufl. (1984) S. 136.

[iii]: Rohrbach: Radiästhesie, Physikalische Grundlagen und Anwendung in Geobiologie und Medizin, Haug Verlag Heidelberg 1996, Seite 100.

Supposed wavelength λ of the transmitted scalar wave radiation in [cm]		
λ	of:	(with the different tuning values L´)
32	water	(L´ = 15.5 $_{n/m=2}$; 10.8 $_{4/3}$; 7.8 $_{n/m=1}$; 3.1 $_{2/5}$)
18	fault	(L´ = 12.9 $_{n/m=3}$; 8.65 $_{n/m=2}$; 4.3 $_{n/m=1}$)
13.6	net I	(L´ = 12.2 $_{n/m=4}$; 9.6 $_{n/m=3}$; 6.1 $_{n/m=2}$; 3.05 $_{r/m=1}$ 4 m = 16 x 25 cm (N-S direction) 1.7 $_{n/m=1/2}$) 5 m = 20 x 25 cm (E-W direction)
14.7	net II	(L´ = 11.4 $_{n/m=3}$; 6.9 $_{n/m=2}$; 3.5 $_{n/m=1}$; 2.2 $_{n/m=2/3}$) 7.08 m = 30 x 23.6 cm (NE-SW + NW-SE direction)
13.2	net III	(12.6 $_{n/m 4}$; 9.4 $_{n/m=3}$; 8.2 $_{5/2}$; 6.15 $_2$; 4.1 $_{4/3}$; 2 $_{2/3}$)
16.4	radon	(L´ = 7.8 $_{n/m=2}$)
28.6	oil	(L´ = 13.5 to 13.8 $_{n/m=2}$; 3.3 to 3.5 $_{1/2}$)
17.2	gold	(L´ = 8.2 $_{n/m=2}$; 4.1 $_{n/m=1}$; 2 $_{n/m=1/2}$)
13.9	silver	(L´ = 6.6 $_{n/m=2}$; 3.2-3.3 $_{n/m=1}$; 1.6 $_{n/m=1/2}$)
7.20	quartz	(6.9 $_4$; 4.1 $_{5/2}$; 3.85 $_{9/4}$; 2.9 $_{5/3}$; 2.5 $_{3/2}$; 2.2 $_{5/4}$)
4.35	sun	(L´ = 4.15 $_{n/m=4}$)
15.3	moon	(3.65 $_{n/m=1}$. thermal spectral lines: 11; 21 cm)
4.25	Mars	(4.05 $_{n/m=4}$, thermal spectral line at 3.14 cm)
4.90	Jupiter	(4.65 $_{n/m=4}$, ther.spectral lines: 3; 3.2; 3.3 cm)
5.36	Saturn	(5.1 $_{n/m=4}$, thermal spectral line at: 3.45 cm)

Fig. 23.7:   Details of not confirmed wavelengths.[i]
(derived from tuning values of a Lecher antenna
$$L´ = . V \cdot \lambda \cdot n / 4 \cdot m \quad \text{with} \quad V = 0.952$$
and n = 1,2,3... for $\lambda/4$, $\lambda/2$, $3\lambda/4$, λ, ...
and m = 1,2,3... for 1 the basic wave
and the 2nd, 3rd, ... harmonic wave

according to:

[i]:   Lüdeling, Hartmut: Handbuch der Radiaesthesie, Verlag Eike Hensch 1994, S. 161 ff. The author gives the clue: „The values have been determined empirically by different persons and predominantly could be confirmed by the author and his co-workers. There however always can occur deviations caused by different dowsing methods. Every value therefore always should be checked with own measurements."

23.7 Assignment according to wavelength

As said, the methods to determine the wavelength by means of the Lecher antenna are ambiguous and unreliable. So water should have a wavelength twice as long as a fault. But since water often is collecting or subterranean flowing in faults, one is entitled the suspicion that here $\lambda/2$ was taken, where in reality the full wavelength λ acts.

The rest of the table after that should be looked at with the same scepticism. The table nevertheless is not wholly uninteresting, because it points to certain trends and is able to furnish clues, which if need be can represent a help of orientation in the systematic research of scalar waves.

At the planets is remarkable that the Lecher conductor reacts to values, which correlate with the respective thermal spectral lines. If these spectral lines propagate with c and it actually should concern the same cause, the frequency thus should be identical, then the planets would emit scalar waves, which are faster than the light. In the case of Mars 1.35 times the speed of light c would be present, in the case of Saturn 1.55 times and in the case of Jupiter the values would lie between 1.46c and 1.63c. In the case of the moon two thermal spectral lines are being measured, which on the one hand have as a result 1.39c and on the other hand 0.73c. At this place still ample research tasks should be solved.

In the case of scalar waves the wavelength is the most important factor to refer to. The frequency however varies continually, which in electrical engineering is called noise. That again is connected to the circumstance that frequency and velocity of propagation oscillate, so that merely an average value can be given at a time. But that hardly can be measured, which again makes the assignment more difficult. We thus still aren't capable to enter the table values from fig. 23.7 into the frequency diagram of fig. 23.1.

A technical gauge for scalar waves is necessary. A practical solution could look as follows: A noise transmitter tunable in frequency and wavelength operates on top of a carried along noise receiver. The arrangement with that comes the Tesla transmission path for scalar waves very close. If the transmitted noise signal hits upon a likewise one in the surroundings then overlapping occurs, which at the receiver causes a change of the displayed value. If doing so a subtraction (extinction) or an addition (amplification) of the signals occurs is unimportant.

With this arrangement in any case statements are possible about frequency, wavelength, velocity of propagation and about the amplitude of the scanned signal, without withdrawing energy and strain the signal in doing so[i]. With such a gauge radiation conditions depending on location could be measured as well as technical devices checked for the emitted scalar wave parts (fig. 24.1).

An important use over and above that would be given in medical diagnostics. Every living being „produces noise" the technician would say, it „emits scalar waves" I would say, whereas following general usage is talked about the „aura of man". The value of an aura diagnosis still is completely unknown to most doctors and therapists, especially as the scanning of the aura at present only is possible by dowsing. But the patient expects that a doctor works with a technical gauge and not with a dowsing rod.

[i]:   First experiments, which I carried out with students in the laboratory, look very promising. Unfortunately the works at present rest for reason of lack of money.

natural
radiation field:

display

f

λ

**noise
trans-
mitter**

**noise
re-
ceiver**

+/−   −/+

coupling of phase (via the ground line)
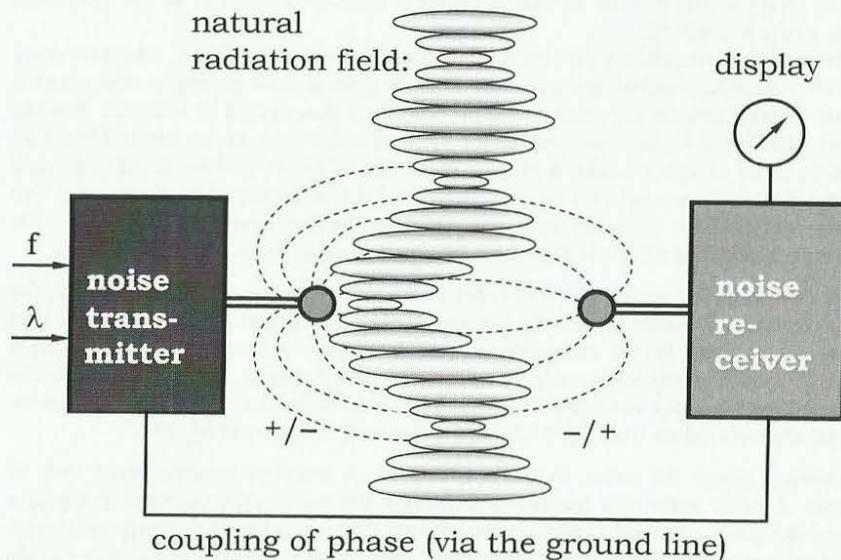
Fig. 24.1:   Concept for a device to detect scalar waves

24. Medicine of oscillation

24.1 Mediation of information with the help of scalar waves

If for the discussed scalar wave gauge the transmitted comparison signal in addition deviates from the form of a sinus, if the signal is modulated in some way, then even the transmission of information by means of the noise as scalar wave can be realized. If we as an example again take the aura of man, which is more than only a radiation field, it carries information for instance about the state of health of man. Kirlian photography is one form of making it visible (Fig. 3.6).

Not only the nerve conduction and the brain work with scalar waves. Man in this way also corresponds with his fellow people, some more, others less. There are people who „beam" and that should be interpreted in the true meaning of the word. Others opposite to that are more „receiver characters", who pick up more scalar wave radiation than they give away. But because they not only pick up positive radiation energy, they are susceptible to information, which makes sick. That's why a healthy equilibrium in the exchange of thoughts, feelings and the different forms of scalar waves is very important. All that is reflected in the aura of man. If we technically are capable to scan the aura of man, than this can be a blessing for humanity and for the public health.

The possible abuse however must not be overlooked. Unbiased research results, which can be used for the benefit of humanity, in many cases just as well can be used to harm humanity.

A connector of both these worlds is the Russian psychologist Prof. Smirnov, who has shown publicly in television, how a spoken sentence can be transformed in a noise signal, which is taken up directly by the brain as information, with the help of a computer program [i]. He with that is capable to „sodden" individuals, as he says, he in this way can take the fear away from soldiers before a combat mission and can operate the disease out of drug addicts without bloodshed. In the television film such an „operation at the open subconscious" is shown life. The patient hears the noise signal over headphones and is cured already after few minutes treatment time.

We here are getting in the domain of ethical and moral problems of scalar wave research, which aren't solved by us looking away and leaving the field up to others. According to the words of Prof. Smirnov the only thing, which can stop the research scientist, is his own moral. He doesn't say any more and that isn't exactly reassuring. One here is working with „signals resembling sound", is said in the report of the Zweite Deutsche Fernsehen [i], thus with longitudinal waves and that shows, that already more knowledge about scalar waves is present than is generally known by the masses.

Another way is leading over the bioresonance. Also here at first the possibility and chance to cure diseases is to the fore. The bioresonance is a central aid in the area of the medicine of oscillation, which is increasing in importance permanently.

[i]:   Die Zombies der roten Zaren (Besta Film Warschau im Auftrag d. ZDF 1998)

transistor amplifier
(pnp type)

tension voltage supply
(battery)

4 – 5 Volt

10µF

150 Ω

e.g.
2N3906

transformer 11:1

4,7nF

100nF

headphones output 8Ω

handle
(signal)

reference probe
(mass)

Bio-Feed-Back:

The test subject
with headphones
(input of the signal)
and hand electrodes
(taking off of
the signal)
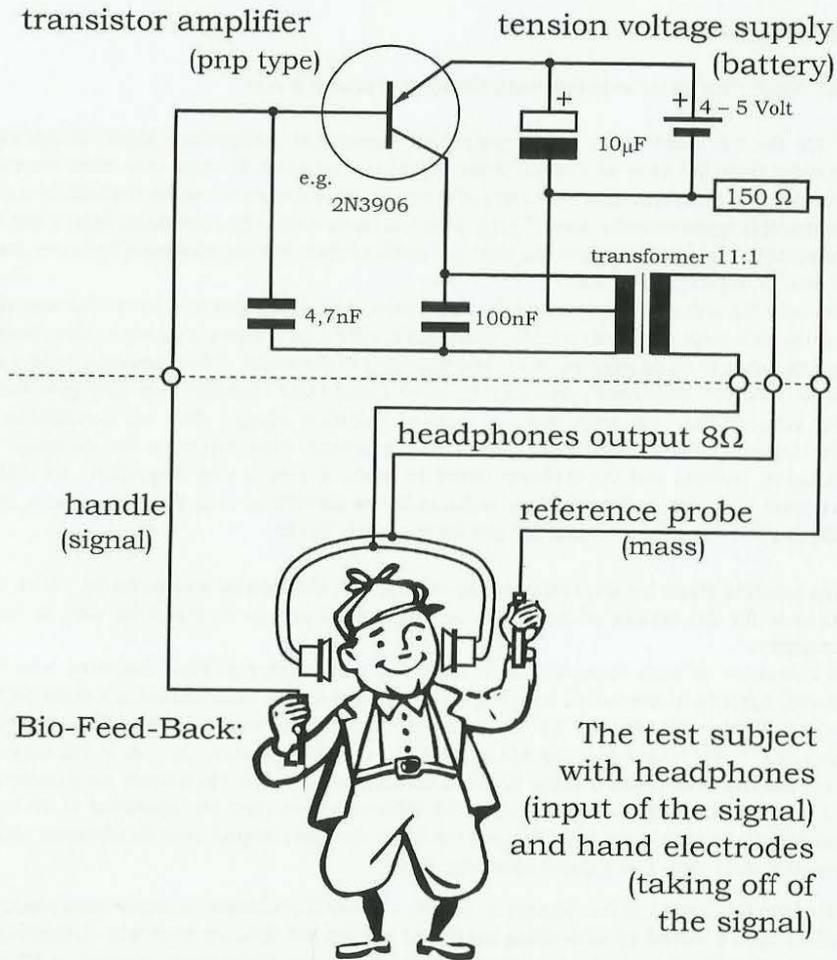
Fig. 24.2 A: Wiring diagram of the Syncrometer.[i]

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[i]:   Wiring diagram taken from: H. Clark: The Cure for All Cancers (1993) New Century Press, USA, Page 434

[ii]:   Flanagan: Hören mit der Haut anstatt mit den Ohren, Sonnenwind 1/97, S.13-17.

s.a.:   N.Begich: Towards A New Alchemy, The Millenium Science, Earthpulse Press 1996

[iii]:   Dr. Bodo Köhler: Biophysikalische Informations-Therapie, Gustav Fischer Verlag (1997), Kap. 11.6 Der individuelle Grundton, S. 239 ff.

s.a.:   Dr. Bodo Köhler: Die bipolare Farb-Ton-Therapie, CO´Med 2/2000, S.10 - 15

24.2 Systems with positive feedback

The field of oscillation of man easily can be influenced, because it concerns a vortex field. A technical measurement with the gauges available at present is almost impossible and highly inaccurate. There however exists the possibility, to apply electrodes to a person and to integrate him in the circuit of a technical device. The two of them form a feedback system with man in the return loop. The operation can take place in two different ways, depending on the sign of the feedback (Fig. 24.3):

For positive sign it concerns *positive coupling*. In this case the signals released by a person sum up, for which reason already minimum amplitudes are sufficient to produce violent reactions in the case of resonance. For resonance to occur, the system must either search independently the suitable frequency and phase, or the therapist searches the points of resonance.

24.2.1 The Syncrometer.

An independently working system is e.g. the Syncrometer. By means of two electrodes, which are held with the hands or are attached directly to the head, the noise signal emitted by a person is called off and supplied to a broadband amplifier. The test subject again hears the amplified signal via headphones, so that the circuit is closed.

Apparently unspecific and still reproducible during operation certain signals capable of resonance are emerging stronger by amplifying and swinging themselves up. The aura starts to extend or expressed in the words of a radiation sensitive, the so-called reaction distance is increasing, with which he means the distance in which he detects a dowsing rod reaction.

The test subject now increases his radiation, so this method can be valued. By strengthening his own radiation power, he works more as a transmitter and less as a receiver for scalar waves. In the last point the therapeutic use seems to lie, because by that the patient can get rid of resonances to any unpleasant persons or to technical transmitters, which are burdening him. The device consequently also is sold as aid or protection against electrosmog.

The amplified signal also can be picked up directly by the skin instead of by the headphones and still being „heard“. The reports stretch from a harmonizing and balancing effect up to „electronic telepathy“ and states similar to ecstasy of the test subject[ii].

24.2.2 The sound therapy.

The controlled variant of this method for instance is the sound therapy. Now the sounds, which the patient picks up by means of headphones, do not stem from him but from a sound generator. The therapist goes through the scale and tries to find out at which sound the aura swings up. If the eigenfrequency is found, then the patient can therapize himself, by again and again playing or humming his eigentone[iii].

It concerns here only a physical statement on the used methods of alternative medicine and not therefore, whether healing successes are actually possible.

sound frequency equally tempered	[Hz]	wavelength [cm]	colour	wavelength [nm]
F sharp´´	740	46,4	(purple)	-
F´´	698	49,1	(crimson)	-
E´´	659	52,0	(violet)	-
D sharp´´	622	55,1	indigo	421
D´´	587	58,4	bleu	446
C sharp´´	554	61,9	turquoise	472
C´´	523	65,6	green	500
H´	494	69,5	yellowgreen	530
A sharp´	466	73,6	yellow	562
A´	440	78,0	orange	595
G sharp´	415	82,6	orangered	630
G´	392	87,5	red	668

Table 24.2 B: Scale of the colour range.[i]

colour	chakra	sense organ	planet type
purple	7. (crown chakra)	epiphysis	Jupiter
indigo	6. (brow chakra)	hypophysis	Saturn
bleu	5. (throat chakra)	hearing	Mars
green	4. (heart chakra)	feeling	Sun
yellow	3. (solar plexus)	seeing	
orange	2. (sacral chakra)	taste	Venus
red	1. (root chakra)	smell	Moon

Table 24.2 C: Assignment of colours to chakras and planets.[i]

colour		metals	gems (selection):
purple	7.	tin	amethyst, fluorite
indigo	6.	lead	indigo-sapphire, azurite
bleu	5.	iron	sapphire, lapis lazuli
green	4.	gold	emerald, malachite, jade, gr. tourmaline
yellow	3.		topaz, amber, citrine
orange	2.	copper	carnelian, fire opal
Rot	1.	silver	ruby, coral, garnet, red jasper

Table 24.2 D: Assignment to a selection of gems.[i]

[i]:   Dr. Bodo Köhler: Biophysikalische Informations-Therapie, Gustav Fischer Verlag (1997), Kap. 11.6 Der individuelle Grundton, S. 190 – 194

24.2.3 The colour therapy.

Analogous to acoustics also colours each time can be assigned a wavelength and also here can be detected that every person responds to certain colours, thus wavelengths, in particular which can stimulate his aura to resonant oscillations. In practice sound and colour therapy often are used coupled[i], even succeeds more or less an assignment to each other. That in last consequence leads to a „*scale of the colour range*" (table 24.2 B)[ii]. According to statement of the treating doctors does a patient, who responds to a certain colour, also react to the corresponding sounds and vice versa.

24.2.4 The aroma therapy.

If according to that it depends less on the circumstance if sounds or colours are used, but the wavelength of an oscillation is crucial, then a stimulation also should be possible by means of the remaining sense organs, e.g. the nose, the tongue or the skin. The smell after all already could be identified as vortex information (fig. 9.0). Fragrances of natural essences can significantly influence the frame of mind. But as long as we still haven't understood the physics behind it, we technically hardly are capable to generate equivalent vortex modulations artificially.

24.2.5 The gem therapy.

Already the holy Hildegard von Bingen (1098-1179) knew and used the beneficial effect of gems. Physical background of this at first purely empirical form of therapy is the characteristic eigenfrequencies of the gems, which are picked up as stimulation over the skin. Because gems represent a mixture of various molecules, the oscillations in the atomic hull will overlap, so that overlapping and beat frequencies can form with wavelengths in biological relevant areas. There even can form modulations, which are carrying information. The effectiveness again is linked with the resonance condition, which must be fulfilled between the gem and his carrier.

24.2.6 Meditation and self-therapy.

There even exist people, who don't need any technical aid at all to get rid of unpleasant resonances. Some meditate and go into resonance with themselves, whereas others prefer to love a person, to whom they feel „attracted" or with whom they are „on the same wavelength", which means as much that they go into resonance with this person.
In the Catholic Church for instance the priests are not allowed to get married, because they should be in a resonance with the church and with God.

[i]:   Dr. Bodo Köhler: Die Coloroma-Therapie, Der außergewöhnliche Einsatz von Aromen, Co´Med 4/2000, S. 48-52

[ii]: Cousto: Die kosmische Oktave, Synthesis Verlag Essen 1984

medicine of oscillation

	positive coupling		negative coupling	
measure:				
technical goal:	amplification		effacement	
medical goal:	strengthen aura and immune system		fight centres of disease	
regulation or control:	closed circuit	open control chain	closed circuit	open control chain
in chapter: prtactical examples:	24.2.1 Synchro-meter	24.2.2-6 sound therapy	24.3.1 bio-resonance	24.3.2 frequency therapy
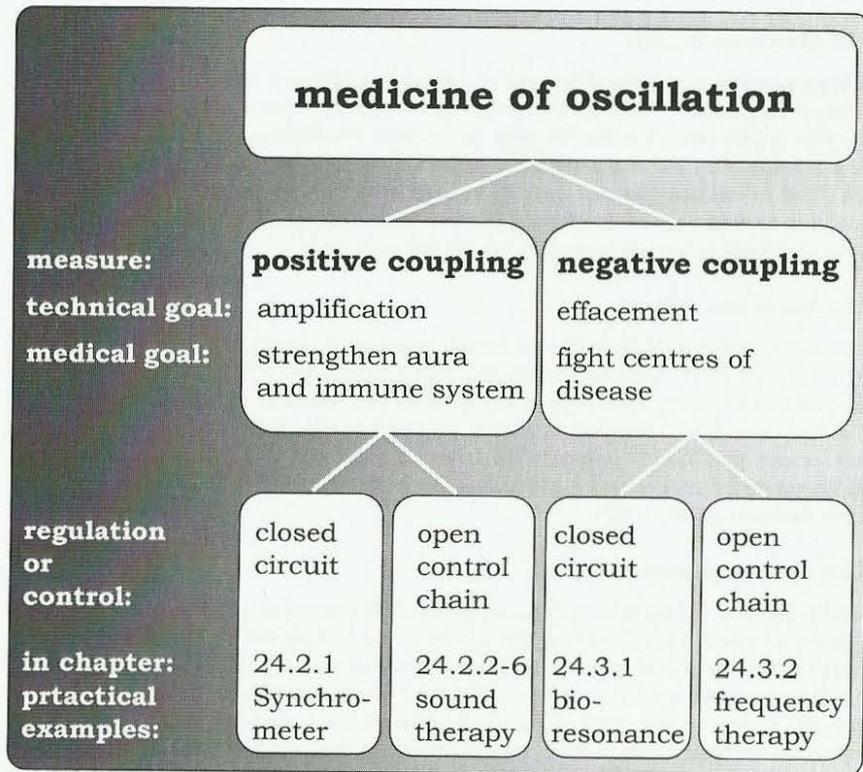
Fig. 24.3 A: Structure concerning the medicine of oscillation
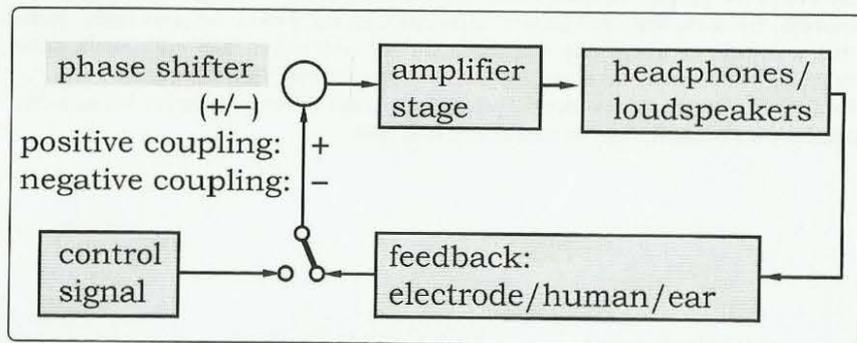
Fig. 24.3 B: Regulation or control?
                 Positive or negative coupling?

24.3 Systems with negative feedback

For negative sign it concerns *negative coupling*. In this case the signals are subtracted. The signals released by a person are played back to him with opposite phase. This method lies in the domain of the bioresonance.

24.3.1 The homeopathy

The concept, which is pursued by the medicine of oscillation in the case of the bioresonance, is that harmful or ill making oscillations should be effaced. Not the direct, but rather the indirect strengthening of the immune system is to the fore, which should be reached by relieving it. The approach with that pursues the same goal as the pill medicine, where oscillations, which should produce a wanted effect and which are bound by means of substances are supplied to the body.

The disadvantage of the administration of pills is the often toxic effect of the carrier substance. The German doctor Samuel Hahnemann (1755-1843) has demonstrated a way, in which to make the helpful and important information for the body to go over from the carrier substance to the water by diluting with water and by shaking. The water molecules now oscillate in time of the carrier molecules. Interestingly in doing so not even the information gets lost, the modulation thus is preserved. By constantly shaking there even occurs an amplification or a „potentiation", as Hahnemann expressed himself, because now every carrier molecule reaches and modulates countless water molecules. Thus the amount of water informed is bigger than the amount of the original chemical substrate.

In the case of homeopathy like is treated with like. If for instance a poison causes certain complaints at a healthy person, then in „homeopathic" administration this information helps a sick person with similar complaints. There thus occurs a disturbance activation with opposite phase, as the engineer uses to express himself. Despite a widespread scepticism the method of homeopathy indeed seems to function, and it has stood the test in countless cases.

24.3.2 The bioresonance

A technical realization is represented by the bioresonance. For that endogenous oscillations are called off by means of an ECG (electrocardiogram), an EEG (electroencephalogram) or a MEG (magnetoencephalogram) at the surface of the skin. The technical device then shifts the phase for 180 degrees and amplifies the signal to the extent that pathological frequencies are extinguished for reversely directed input. This very reasonable theoretical concept in practice of course only is as efficient, as the empirical determined pathological frequencies are the cause of a disease and not only represent an unimportant symptom as side effect.

To that technical problems are joining. Prof. Heine blames the constantly changing reaction diversity and the thermal noise for the circumstance that the „frequency spectrum permanently is fluctuating", as he writes it[i]. That hardly can realize the necessary phase inversion. We meanwhile know that vortices have a fluctuating frequency spectrum, that in the case of biosignals it concerns such field vortices, which result in a noise signal unspecific in frequency.

With this knowledge we should be able to significantly improve bioresonance procedures, and even the inversion of phase shouldn't represent an insurmountable difficulty anymore.
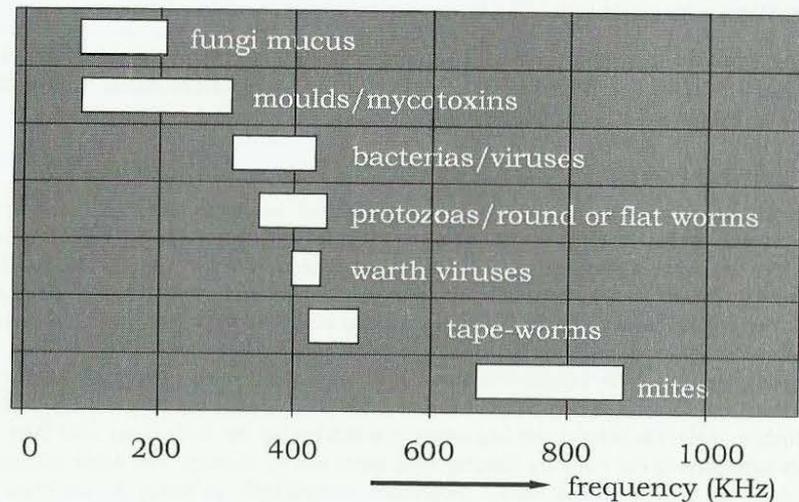
Fig. 24.3 B: Frequency spectrum
of parasites according to Clark.[i]

Labels in figure: fungi mucus, moulds/mycotoxins, bacterias/viruses, protozoas/round or flat worms, warth viruses, tape-worms, mites

X-axis: 0 200 400 600 800 1000 — frequency (KHz)
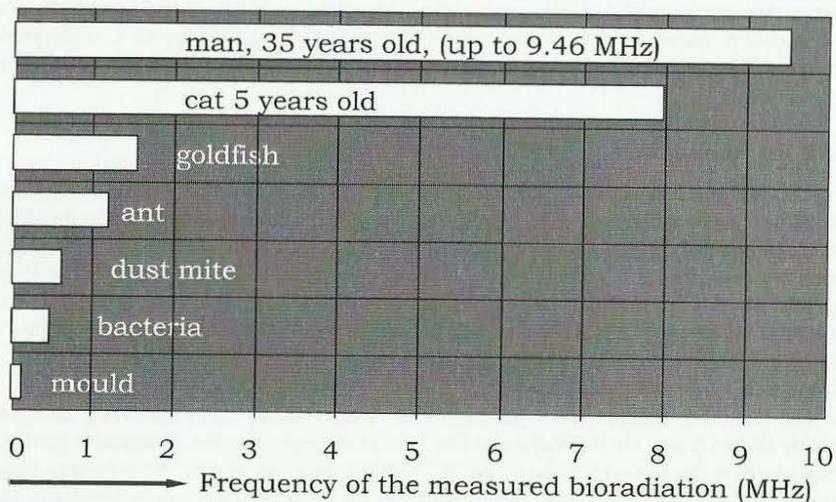
Fig. 24.3 C: Diagram of frequency ranges for some living
beings.[i]

Labels in figure: man, 35 years old, (up to 9.46 MHz); cat 5 years old; goldfish; ant; dust mite; bacteria; mould

X-axis: 0 1 2 3 4 5 6 7 8 9 10 — Frequency of the measured bioradiation (MHz)

[i]: Dr. Hulda Clark: The Cure For All Diseases (1995), Page 604-643

A further problem, which Heine addresses, can't be denied[ii]: „For communicative molecule oscillations the microwave range of 1 GHz up to above 10000 GHz is crucial. A calling off of endogenous interference oscillations in this range with the help of normally used electrodes is not possible"[iii]. It thus could happen that essential frequencies, which are directly related to a disease, aren't recorded at all and as a consequence also not treated. There even is the risk of informations being brought in, which additionally stress the immune system instead of relieving it, that the patients after a treatment are worse off than before. The doctor or therapist is burdening himself with a big responsibility, when, how and at whom he applies methods of bioresonance or if he better does without them. For the mentioned reasons the method in the therapy only plays a secondary role. The bioresonance on the other hand is quite often and with great success used in the diagnosis (Nosoden), if it for instance concerns the determination of an incompatibility or an allergy - but that is a completely different theme. For the bioresonance the transition of diagnosis to therapy is however floating.

24.3.3 The frequency therapy

If using a frequency therapy the problems are standing similarly. If we separate the closed and negatively fed back circuit of a bioresonance and form an open control chain consisting of a technical control device and the patient, then we get the structure, as it is put to use in a frequency therapy. The goal still is the same: parasites or pathogenes, which stress and burden the immune system should be fought.
But a disadvantage of every open control chain is that the treatment at first occurs blind due to the missing feedback.

The natural healer Dr. Hulda Clark has examined as support various pathogenes and parasites under the microscope, while she has varied the frequency and at the same time applied a low-tension voltage. Doing so she could observe the dying of bacterias and parasites at certain frequencies. Correspondingly she publishes tables, in which the in each case „mortal" frequencies are listed[i].
But without being able to verify the success of a treatment in the living organism, she proceeds from the assumption that by applying a low tension voltage (5-10 Volt), as it is produced at the output of a commercially available frequency generator, if a sinusoidal signal is set with the appropriate frequency exactly the associated parasites and leeches will be destroyed. Doing so a fixed rhythm of pauses and treatment times must be adhered to (7 min on, 20 min off, 7 min on, 20 min off and 7 min on).

The doctors and therapists treating with this particularly inexpensive method report amazing results, inexplicable spontaneous cancer cures, like of HIV-positive patients, who after the treatment were tested HIV-negative. But also the inverse case already should have occurred, that a HIV-negative patient afterwards was HIV-positive. Here too clear the limits of this method appear, which in practice unfortunately turns out to be relatively unspecific.

[ii]: Prof. Dr. H. Heine: Grundregulation und Extrazelluläre Matrix – Grundlagen und Systematik, Lehrbuch der biologischen Medizin, (1991) 2.Aufl. Hippokrates Verlag Stuttgart, Seite 63

[iii]: U. Warnke: Bioresonanztherapie – Wunsch und Wirklichkeit. Medizin transparent Nr.2 (1996) S. 36-37
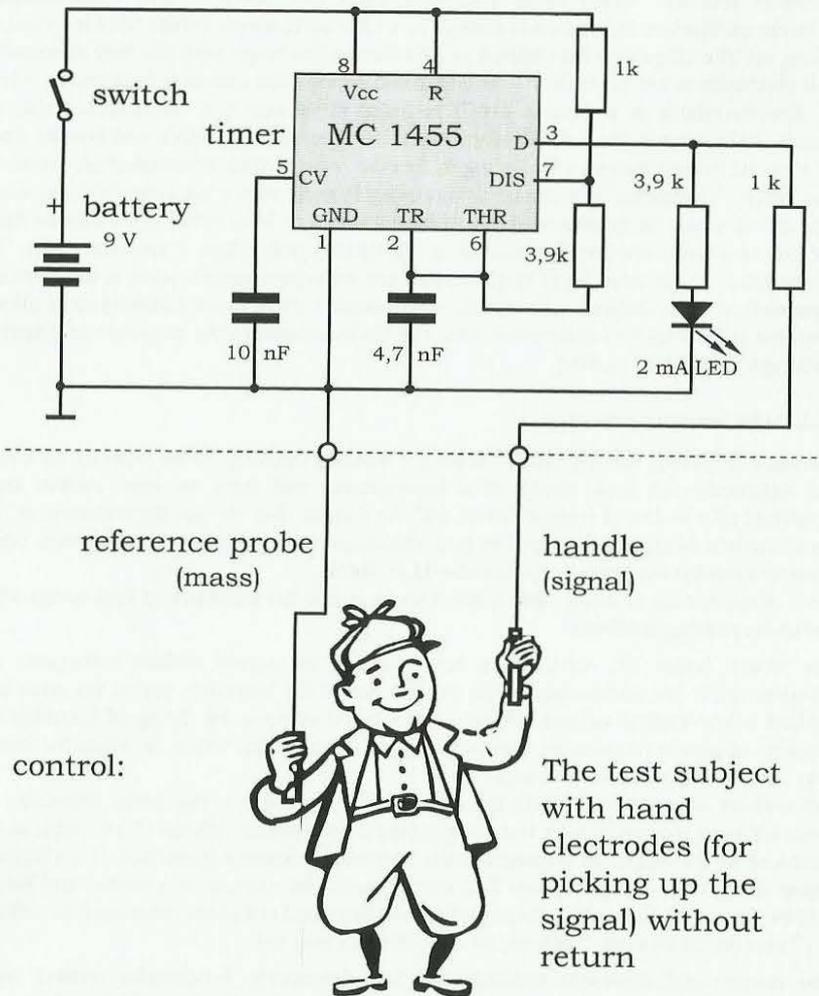
Fig. 24.4:   Wiring diagram of the Zapper.[i]

Wiring diagram taken from:

[i]:   H. Clark: The Cure for All Cancers (1993) New Century Press, USA, Page 507, resp.:

Dr. Hulda Clark: The Cure For All Diseases (1995), Page 48

24.4 The Zapper

From the point of view of physics of today the frequency therapy actually shouldn't be able to function at all. The electromagnetic waves penetrate only few millimeters into the skin at the used frequencies and wouldn't have the slightest chance, to reach a parasite, which is staying somewhere in the body. But it is said that it is possible to cure athlete's foot, by the patient taking the electrodes in his hands. How, we ask the question, does the signal of the function generator know where it should go?

It quite obviously concerns a resonance phenomenon. The likewise emitted scalar wave part tunnels undamped at those places in the body, with which it can build up a resonance and that for proper tuning are the unloved parasites. The scalar wave radiation is bundling up at the resonant receiver, so that despite the low transmission power as a consequence of the bundling up the energy density for the parasite becomes very high. It as a result is destroyed by its own ability to go into resonance. Once it is killed, the next one goes into resonance, logs off as well etc. In this way the parasites are destroyed one after another and not all at once. That's why the specified treatment cycle makes sense.

The copper electrodes should not be taken in the hands directly, Dr. Clark recommends, but before be wrapped with moist paper. By means of this insulating layer, so is my interpretation, the conventional wave part, for which the skin functions as a wave guide, is reduced whereas the desired scalar wave part is increased. Such measures crucially contribute to the success of a therapy method, even if they were determined purely empirical.

If one wants to address every possible parasite individually, then the treatment takes correspondingly long. If one on the other hand sends all relevant frequencies at once by overlapping them, then the treatment can be abbreviated to the duration of one session. If the therapist goes still further and replaces the sinusoidal signal by a rectangular signal, then infinitely much sinus functions are hidden in it, as a Fourier analysis shows. With a rectangular signal, as it is delivered by the Zapper, one as it were catches everything, Good as well as Bad. There the helpful intestine bacterias break exactly like the wrongdoers.

The treatment with the Zapper is simple, inexpensive and exactly as controversial. It is the shot with the shotgun in the forest. One always hits something. We nevertheless must ask the question, why one only hits parasites and bacterias and not the vital organs? Aren't those damaged also?

Now then, the signal of the function generator is not modulated; it doesn't carry information. That's why only monocellular parasites, which don't know information exchange, are capable of a resonance. Human cells and more than ever whole organs on the other hand work with complex modulations, which effectively prevent any formation of resonance with the technically generated basic wave, with which the question would be answered so far.

That however also means that immune reactions can be expected: If the first treatment with the frequency therapy still is successful and all simple parasites could be hit, then only further evolved parasites have been spared, which modulate their information. They now breed and can't be reached anymore in further sessions. The method suddenly doesn't function anymore, the therapist finds out, the body apparently has become immune.

scale:		diatonic	chromatic	spiral
sound:		•1/C =	equally tempered	(medieval)
octave	C´	2/1 = 2.0	2.00 ⟶	2/1 = 2
		1.07 = 16/15	1.33 = 4/3	
seventh	H	15/8 = 1.88	1.89 ⟶	3/2 = 1.5
		1.125 = 9/8	1.125 = 9/8	
sixth	A	5/3 = 1.67	1.68 ⟶	4/3 = 1.33
		1.11 = 10/9	1.07 = 16/15	
fifth	G	3/2 = 1.5	1.5 ⟶	5/4 = 1.25
		1.125 = 9/8	1.04 = 25/24	
fourth	F	4/3 = 1.33	1.33	6/5 = 1.2
		1.07 = 16/15	1.03 = 36/35	
third	E	5/4 = 1.25	1.26	7/6 = 1.17
		1.11 = 10/9	8/7 = 1.14	
second	D	9/8 = 1.13	1.12 ⟶	9/8 = 1.125
		1.125 = 9/8	10/9 = 1.11	
first	C	1/1 = 1.0	1.00	11/10 = 1.1

⟶ goes towards 1!
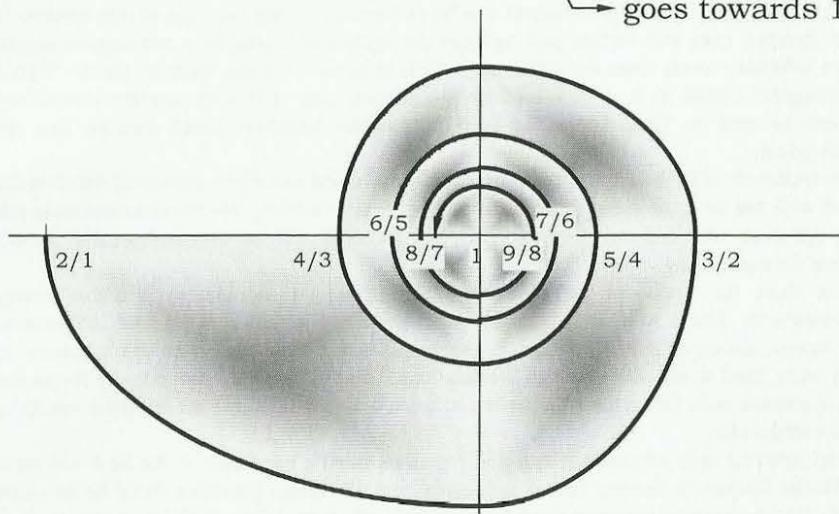
Fig. 24.5: Harmonic spiral built on the first Gregorian scale.[i]

<i>:   Dr. Manfred Doepp: Naturgemäße Frequenztherapien, Die Harmonie der Spirale, CO´Med 10/2000, S. 46 - 49

24.5 Discussion concerning the medicine of oscillation

The textbook medicine in its explanations and treatment methods is basing on the models, which it can measure and analyse and which it understands. Doing so man and whole nature is reduced to a handful of chemical reaction formulas. The whole pharmaceutic industry lives on this misleading path, which long ago has revealed to be a dead end, medical as well as financial. This health service cannot be paid anymore and we should ask the question if it actually is worth the money, if with electric signals of minimum power can be obtained effects comparable to the effects of the pill medicine.

We need a new medicine, a potential vortex medicine. First of all we should research how an organism covers its energy needs and how it communicates. There leads no way past the scalar waves and the newly discovered potential vortices. Chemical processes as they are being observed, occur by the way, that is beyond doubt, but they by no means are the cause. Hence of pills and other chemical means at most a treatment of symptoms and a ease of side effects may be expected but not a cure of a disease. Once the potential vortex medicine will be systematically explored and be put to use in practice, healing successes can be expected, which we at present can't imagine at all.

The amazing results, which already today are obtained in the medicine of oscillation and of which some doctors can report[i], dictates the direction in which the textbook medicine should develop. In the question, which kind of oscillation or which „sequence of sounds" (Fig. 24.5) is the right one, still exists considerable need for research.

Some doctors even already work with my new theory and cite whole passages from my publications until now about this theme[ii].

<i_a>:   Dr. Bodo Köhler: BITsyn, der neue Weg in der Informations-Medizin, Jubiläums-Schrift der Internationalen Ärzte-Gesellschaft für Biophysikalische Informations-Therapie, Bad Nauheim den 6.-8.10.2000, Seite 48 – 56.

<i_b>:   Bioenergetische Messverfahren in Theorie und Praxis, Vortragsband der Gesellschaft für Energetische und Informationsmedizin e.V., Universität Stuttgart am 17.7.1999.

<ii_a>:   Dr. Johann Lechner: Störfelddiagnostik, Medikamenten- und Materialtest, Teil 2 aus der Reihe: Praxis der Ganzheitlichen Medizin und Zahnmedizin, Verlag Dr. E. Wühr (2000), Kap. 2.4.2 Berührungslose skalarwellentragende Informationsübertragung S. 173 ff., bes. Kap. 2.4.2.3 Seite 175, 176.

<ii_b>:   Dr. Reichwein, Peters: Zelluläre Elektromagnetische Systemsteuerung, Der Freie Arzt 5 (2000) im Wissenschafts-Forum (Anhang, S. IV - XXIII).

<ii_c>:   Dr. M. Doepp: Tesla-Wellen, Neue Studien, CO´Med 5/2000, S. 94 - 95

Frequency spectrum of the human organism:
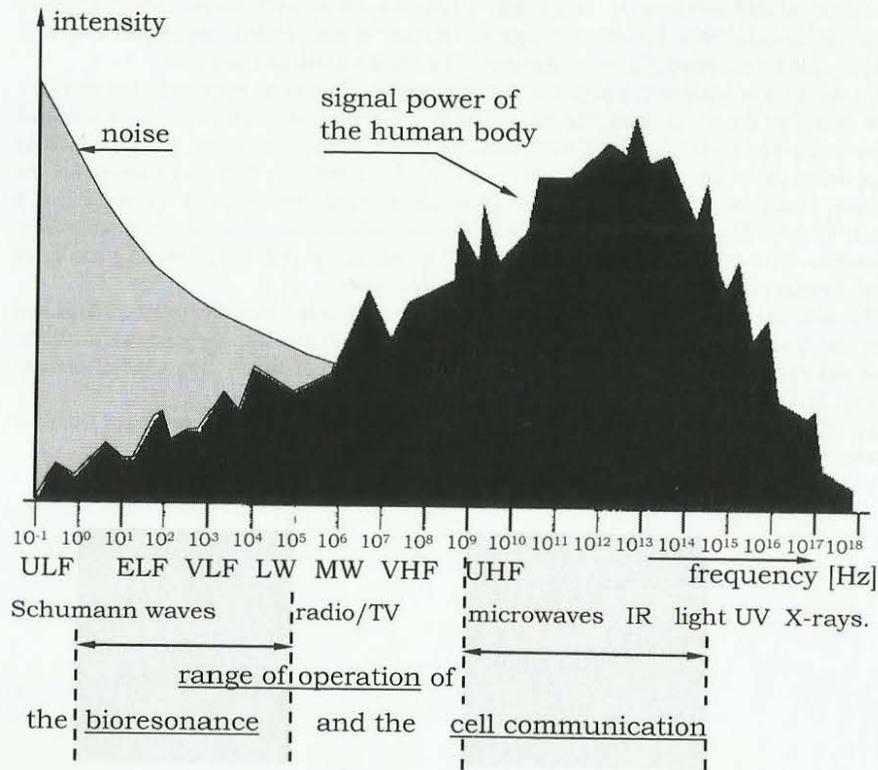
Fig. 25.1:   The measured frequency spectrum of man.[i]

25. Contributions to the discussion concerning the information technical use

The medical research predominantly takes place with statistical methods. This might be changed fundamentally, if only the physical relations have been realized and their causes found out. Only then a basic research will be possible also in the area of medicine, as it today already is usual in other disciplines.

In this chapter it concerns the question of the medical basis in general, and specifically the question of the use of the newly discovered potential vortices in biological systems. Doing so very aware is attempted to put the normally used medical view at the back and to derive the answers from the perspective of the engineer and the physicist. This approach is unfamiliar, so that some textbook physicians will have difficulties to follow. It however will prove to be very helpful. Medicine in addition needs new impulses and that justifies a new approach, like the unconventional one proposed by me.

In this connection gladly is fallen back upon the comparison of biological with technical systems, although here exist differences in principle and fundamental. It can be expected that nature has developed very appropriate strategies to solve certain tasks, as it also is teached in engineering and used in practice. At this place not only medicine benefits from new insights, engineering vice versa also can learn of nature, because natures optimization strategies are much much older and correspondingly perfect.

25.1 Window of the sensuous perception

To clarify the inner processes in man we consider his sense organs, which function as interface to the outside world. Technically seen in the case of the sense organs it concerns measurement converters to record and process certain physical values in our environment and their adaptation to pass on the information by means of the nerves. The measurement converters thereby are built more or less complex, which is related to the circumstance that the measurement factors, which a living being needs to orient itself and to be able to survive, are quite different.

It concerns little windows within the frequency spectrum shown in fig. 23.1, which should be analysed. Man for instance chooses the visible frequency window and interprets it with an assignment to the colours, because in this range the sunlight can reach the surface of the earth and the ionosphere doesn't exert an excessive damping (fig. 2.8).

The acoustic window depends on the sound propagation in air, whereas dolphins work with ultrasound, which carry considerably further in water. The associated measurement converters, the ear and the eye, have a very complex structure. From this can be inferred that here the received signal must be transformed into a different physical measurement signal, that the perceivable signals are of other nature than the signals, which our nerves are able to pass on.

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[i]:   Dr. P. Bembenek: Akupunktur und (Bio-) Resonanz, CO`med 6/98, S. 50-58
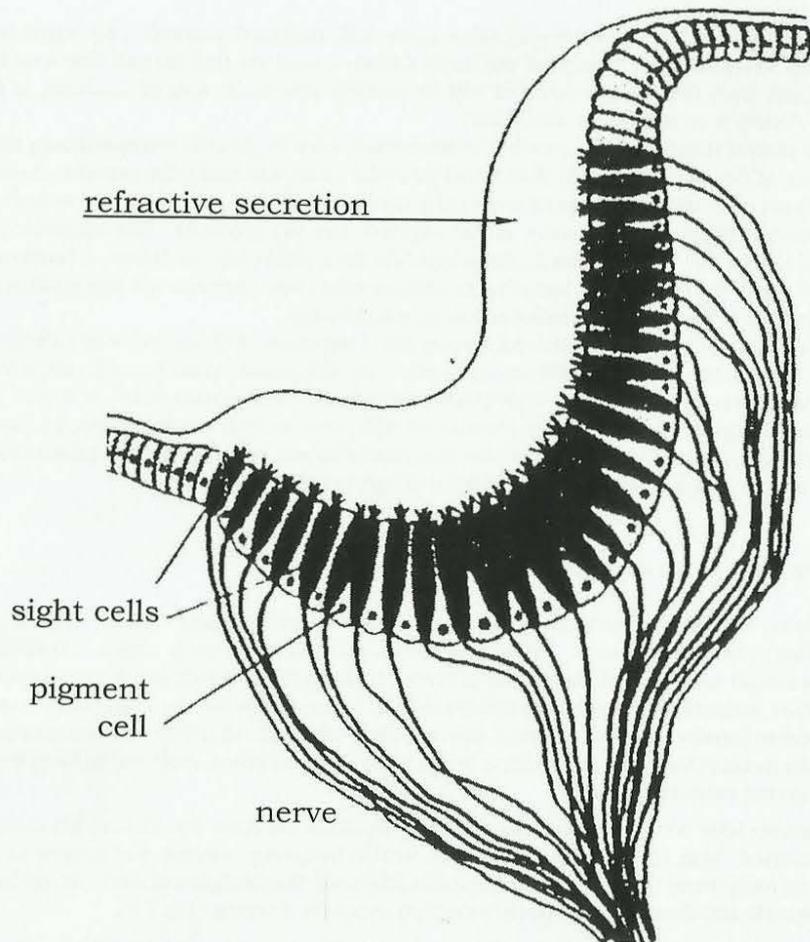
25.2 The sense organs (nose, eye, tongue)

If we want to find out something about the nature of the nerve signals, then we should more detailed consider a sense organ, which is constructed if possible simple. In that case it is possible that no signal transformation is necessary at all anymore, because the perceivable variable is exactly of the kind the nerves can process.

The primary and perhaps most ancient sense organ of the living beings is the *nose*. It is constructed extremely simple. On the one hand according to encyclopaedias it is a chemical sense for the perception of smell materials. Man on the other hand can distinguish several thousands of scents. For that a huge analysis factory with correspondingly much receptors would be necessary, which one searches in vain in the nose between the nasal hairs and the nerves. We from that infer that scent should consist of particles, which are to a large extent identical with the reaction potentials. It thus will concern potential vortices. These ring-like vortices of the electric field again are modulated and carry information, which our brain is able to analyse.

According to the derivation in chapter 9.0 Plato already 2400 years ago knew such relations. The conclusion is obvious that smell is *vortex information*, which according to the explanation of Plato forms at the transition of waves in potential vortices and vice versa. At the natural philosophers in antiquity the circle of the insights is closed. Modern science just isn't that far.

The hollow eye of the snail functions both as nose and as eye (fig. 25.2). This very ancient combined organ points to a relatively close affinity between both measurement sensors. Possibly in the course of evolution both organs have developed from such a common original form.

In the case of man the smell rods occupied with the nasal hairs of roughly 2 micrometer in length, actually remember of the rods and cones in the eye, with which photons are collected. In both cases, so we can explain the mode of action in accordance with model, the ring-like vortices settle on the rods and run as reaction potentials along the nerve to the brain, which then analyses the modulation.

In the case of the highly developed human *eye* the light rays first have to traverse the vitreous body and afterwards a pigment layer, before they reach the rods and cones. In this way the electromagnetic wave parts must roll up to vortices, since our nerves can only pass on vortices. The photons can be interpreted as corresponding vortices.

If we compare the eye with a *bubble chamber*, in which the tracks of ionized particles can be observed and photographed as thin white fog stripes. Here in collision experiments it can be proven that it concerns particles carrying impulse and not waves. But the measurement setup by no means does answer the question if it already concerned particles before they entered the bubble chamber, or if these have formed spontaneously in the presence of the saturated vapour.

It would be obvious, if for our eye the chamber water being under the inner eye pressure would take over the function of the bubble chamber and would take care of the rolling up of the light waves to light quanta.

refractive secretion

sight cells

pigment cell

nerve

Fig. 25.2:   The hollow eye of the snail

Example tongue:

taste hairs

nerve bundles
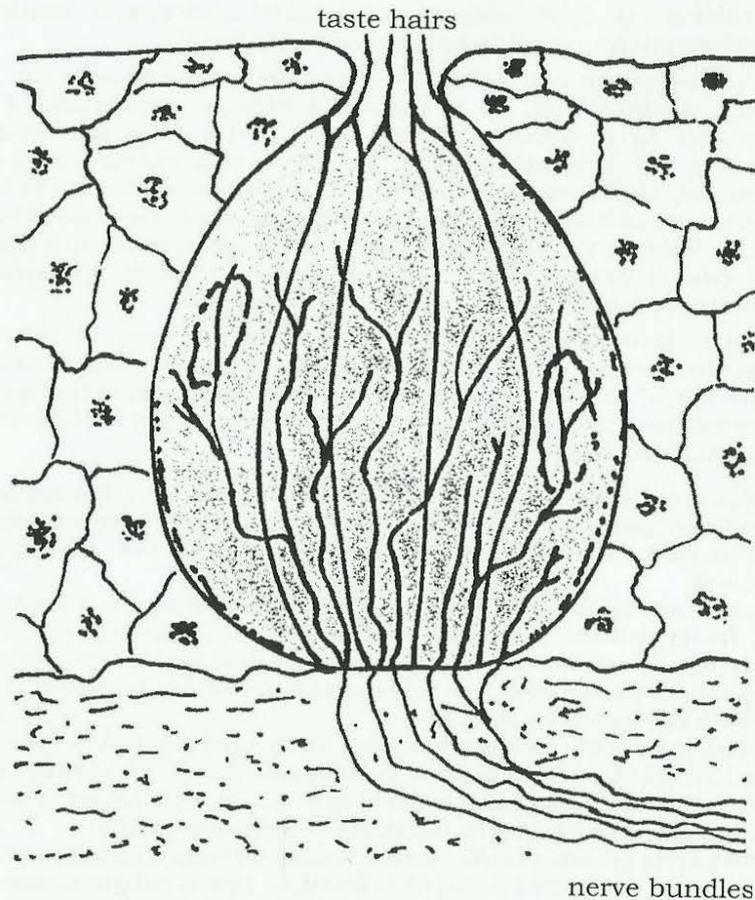
Fig. 25.3:   Taste bud of the human tongue

We optically can't detect a difference, if the light while passing through a thick glass plate increases its part of photons. At the latest in the eye in any case all the light is transformed in photons and usable vortices, so that we mustn't detect a loss of brightness. The glass plate seems transparent to us, even if the sunlight should change its composition and its biological quality, if it passes the plate.

If the *tongue* while tasting responds to dissolved substances, then it not by all means needs to be a chemical excitation. Instead fine hairs, the taste hairs resp. sense pins, serve as receiver like in the case of the nose. The similar structure of the receptors and the circumstance that for most invertebrates sense of taste and sense of smell can't be distinguished of each other at all and consist of the same primary sense cells, suggest that the tongue doesn't analyse the chemistry as such, but only the *molecular oscillation patterns*, that also the taste is nothing else but vortex information.

25.3 The nerve conduction

For the collection of the potential vortices and the extraction of their information fine hairs in the sense cells obviously play a central role. They are connected more or less directly with the end of a nerve and pass on the information without big transformation. Even in the organs of equilibrium sense hairs work.

From the comparison with the technique developed by Nikola Tesla I could show that the nerve conduction concerns a *single-wire transmission*, a kind of waveguide, for which the transport of the excitation information takes place in the insulation layer and not in the conductor itself (fig. 9.6). As proof I quoted that the thickness of the insulation determines the velocity of propagation, that as is well-known the nerve conductors with thick fat layer pass on their action potentials faster than those with thin insulation.

Particularly interesting is the observation, how the fat layer is constricted in fixed intervals, like for Wiener sausages (fig. 25.4 A). These *nodes of Ranvier* prove that only longitudinal waves are being transported, which are standing waves with nodes and antinodes, if the distance from node to node exactly corresponds to the distance from one node to the next. With that nature with the use of the potential vortices is far ahead of our power engineering. The nerve-cables determine with their structure, which signal will be transported and which not.

The technical cables on the other hand are stupid and conduct everything, the useful signal just as well as any arbitrary interference signal. Anyone, whom the computer crashes every few minutes, knows what I'm talking about.

Man isn't able to afford a crash of his think computer. It would be lethal for him. His nerve costume even tolerates short-circuits. The *acupuncture* is such a short-circuit technique by means of electrically conductive needles. There even is given a therapeutic benefit and a relaxing effect for the body.

Cut through nerve fibers even can partly regenerate again, even without a cut through nerve again growing together with its other end. The nerve conductors are so intelligent, that only the matching information arrives at the end by passing on informations from one fiber to the corresponding next with the same node interval.

A. **Nerve conduction** with nodes of Ranvier (to transmit standing waves):

magnified: $\lambda/2 \approx 1mm$

axon

action potential (potential vortex)

nodes of Ranvier

Schwann cell

insulator = Myelin hull (wound as Tesla coil)

B. **Single-wire transmission** according to Nikola Tesla[i]:

transmitter

sequential insulation

receiver

consumer

ground

ground
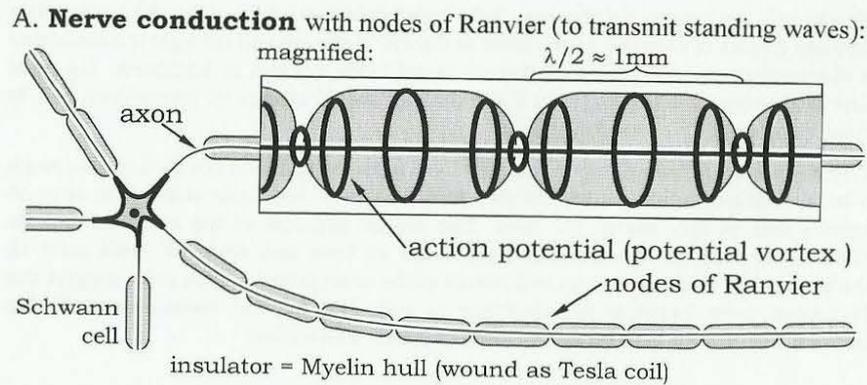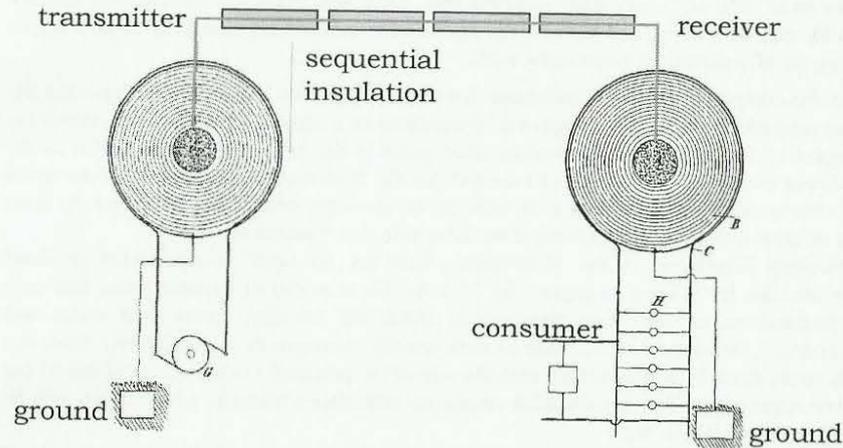
Fig. 25.4:   Selective scalar wave signal transmission

The brain works with scalar waves!   *Reasons are:*

1. *Lacking of a signal transformer between the nerves and the brain.*
2. *High performance density of the think apparatus.*
3. *The brain activity measurable from the outside with the EEG.*
4. *Spark formation and corona discharges at open top of the skull.*
5. *Insulation defect occurring in the case of epileptics.*

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[i]:   Original scetch of Tesla is situated in the Nikola Tesla Museum, Belgrado.

Nerves represent an intelligent and at the same time interference safe wiring, which is superior to any technical solution by far, or you can try to acupuncture a cable cord of your computer. You will have little pleasure of it.

Nikola Tesla also in this point was ahead of the times. He has experimented with a single conductor technology, for which the insulation layer is constructed like for a nerve fiber (fig. 25.4 B). We'll have to learn to handle such aids in the future, if we in engineering want to emulate nature and as well want to send informations as scalar wave. A normal power cable as said conducts everything, useful as well as interference signals. If however the signal should be accomodated in the noise, a selective cable is required, which should be constructed according to the example of the nerve conductors. Before a scalar wave technology can be introduced and successfully used according to that completely other cables, coupling elements, amplifiers and other components should be developed. The trouble should be worthwhile at the chances, which this genial technology offers us.

25.4 The brain, a scalar wave computer

The brain cells (neurons) are of the same kind as the nerve cells. Hence can be done without a signal transformer, can the informations transmitted by the nerves to the brain directly be processed further. From that follows that also the brain without exception works with potential vortices. There are several reasons for this hypothesis:

1. as said, the *lacking of a signal transformer*.
2. the *high performance density* of the think apparatus. (As a result of the concentration effect of the potential vortices the efficiency of the human brain is in such a way high concentrated compared to the much more space claiming computers functioning on the basis of currents).
3. the *brain activity* measurable from the outside with the *EEG*.
4. *spark formation and corona discharges* at open top of the skull. (Brain surgeons can report of such observations).
5. The *insulation defect* occurring in the case of *epileptics*. (During a fit instable potential oscillations of the nerve cells occur, which lead to strong electric blows).

With the „exciting" and the „inhibiting" synapses as separation point between the neurons both a „high-active" and a „low-active" method of operation is possible and with that a redundant, particularly interference safe signal transmission.

Safety for interference is very important not only in nature. In the operating instructions of a PC can be read: „operate only at room temperature, keep dry, don't throw or shock, take care for sufficiently cooling air, ground apparatus, pay attention to mains voltage, etc". A comparison with the range of operation of man is like scorn.

Nevertheless the consequences if errors occur are quite similar: a garage door, which opens if a mobile is switched on, by all means can be compared with a light phenomenon, which we perceive after a blow on the eye at the biological level.

Concerning signal technology:

The **comparison** of	**man** and	**engineering**
signal line:	**nerves**	**cables**
transmission:	selective (nodes of Ranvier)	indiscriminate (with interferences)
of:	scalar waves	currents
by:	potential vortices	charge carriers
running of cables: over:	1-wire technology wave guide	2-wire technology supply and return cable
signal transport:	in the insulator	in the conductor
signal form:	concentrated	expanded
the conductor:	stays cold	gets hot
result, transmission:	without losses	with losses
error signal:	muscle cramp	malfunctions
metal pins: cause:	**acupuncture** relaxation	**short-circuit** destruction
directional signal by:	synapses	diodes/ amplifier
redundancy by:	exciting and inhibiting synapses	high-active and low-active drivers
precaution: by:	skin resistance salt	shielding metal case
strategy:	vortex decay	field displacement

Fig. 25.5:   Comparison of the signal technology

25.5 Concerning signal engineering

By means of a technical analysis of biological relations completely new interpretations result also for the occurring of a disease. We permanently and everywhere are surrounded by noise signals, but as a rule they can't touch us, because the body has developed perfect strategies for defence. The nodes of Ranvier on the nerve bundles here are just as helpful as the diode effect of the synapses. By means of the salt content and the skin resistance the body in addition controls the uptake of potential vortices from its surroundings, by using that the vortex decay is determined by the conductivity.

The specialties of the by humans used signal technology come to light particularly clear if compared with the cable technology used in the technical world (fig. 25.5). So is worked with only one wire instead of with supply and return cable, are mediated potential vortices instead of charge carriers, does the transmission take place in the insulator without losses and not in an electric conductor, which as a result gets hot and produces current heat losses. Nerves thanks to their ability of selection represent an intelligent form of signal transmission, by helping to filter the asked information from the noise. This surely is necessary since with cables, which indiscriminately transmit every signal, an use of scalar waves hasn't succeeded yet. We should try to learn of nature.

A special challenge is the protection against error signals. A passive shielding by a metal case however is not possible, because scalar waves can't be shielded by principle, so that the precaution should be taken actively by means of the conductivity. That's why we sweat salt if we strain us physically, whereby the vortex decay is determined by the conductivity, which depends on the salt content of the body liquids. In the case of a sweating activity the body reduces its conductivity, so that the needed potential vortex energy will reach the cells.

If the body sometime isn't able to defend itself against interference signals, then malfunctions or pathological reactions are a possible result. During having a bath for instance a muscle cramp can occur, if the body doesn't defend itself fast enough or sufficiently against the high potential vortex activity in the water. Now vortices can be picked up in the nerves, which are of the same kind as the ones emitted by the brain, only that both muscles, biceps and triceps at the same time get the signal to contract. The result is a cramping of both muscles.

Thus the brain has developed intelligent strategies to protect itself of interspersed misinformations. It weighs the incoming signals and forgets again all unimportant ones more or less fast. We speak of the ability to learn and that means that signals rise in the valuation scale and with that are stored longer, the more frequent repeated our brain receives them. This strategy assumes that interference signals only occur sporadic, for which reason they are rated unimportant and fast are again forgotten.

A PC on the other hand doesn't have such a property. It notices everything indiscriminately and sometime will crash of overload, if not the user will constantly foster it and will administer the available memory. A PC is and stays stupid.

25.6 Stability against interference and repair mechanisms

The interference signals present in our natural environment as a rule are distributed stochastic, but not so artificial interference signals like for instance transmitters emit. If for instance in the case of mobile telephony there occur time and again identical signal patterns and if a person perceives these, then because of the continual repetitions a high importance is pretended and precious storage space in the brain is allocated. This to a special extent applies for the permanent stand-by signals, which are emitted by mobiles and cordless phones even then, if we don't phone at all. Such misdevelopments thereby would be technically avoidable just like that.

If still no gauges are available and as a result there exist neither guidelines nor limits for the radiation exposure of scalar waves, then such devices must be developed and built. For the requested electromagnetic environmental compatibility not engineering, but man should be in the centre of attention.

Let us throw a short glance at the set of difficulties of wear and tear. Most technical devices find the way into the workshop only, if they already are defect. Some aren't repaired anymore in principle and immediately sent to the rubbish, because they are worn-out and a repair isn't worth the effort anymore one says, whereas other, mostly expensive systems are being serviced by exchanging all wearing parts.

Nature has brought to perfection the last principle. It allows the body a permanent maintenance; by permanently producing new cells and replacing consumed ones. It with that obtains a considerably longer operating time and even is capable to heal wounds. Just imagine dents in our cars would disappear from alone after a few weeks and the bodywork would look like new. Such an optimal maintenance is costly and it has its price.

By means of the cell division the building plan for the spare parts is copied. The task on the other hand is transmitted to the new cells „by radio" by means of waveguide channels, as proves the matching structure of scalar wave and waveguide (chapter 21.12 and fig. 25.7). The cells hence have a kind of „decentral intelligence", which technical matter lacks completely. A comparison with engineering nevertheless makes sense, because wear and tear occurs for all systems in continuous operation. Thus strategies must be developed to provide the necessary material for operation, building-material and exchange parts.

By sizing of the hyperboloid structures of the matrix channels it should be possible to determine the wavelength of the scalar waves to enter them in the frequency diagram (23.1).

Concerning the stability against interference:

The **comparison** of	**man** and	**engineering**
in the	**brain**	**computer**
control technical interference signals:	light phenomena	miscontrol, program fault
precautions:	active, i.e. weighing of the Info by learning (repetition)	passive, i.e. shielding. (no evaluation of the input values)
unimportant (interference signal)	is forgotten	is stored
danger exists for signals	recurring interference patterns (see mobile telephony)	interference of all kinds (s.EMC-standardization)
remedy:	self-cure	restart (reset)

Concerning set of difficulties of wear and tear:

The **comparison** of	**man** and	**engineering**
repair by:	self-repair	in the workshop
	cell division permanently	exchange parts at maintenance resp. in the case of damage
required building materials:	nourishment	material / oil
waste:	compost	rubbish

<u>Fig. 25.6:</u>   Strategies against interference signals, for damages linked with operation and for wear and tear.

Tunnel structure of the basic substance according to Prof. Heine[i]:

$\lambda/4 = \phi = $
5 - 80 nm
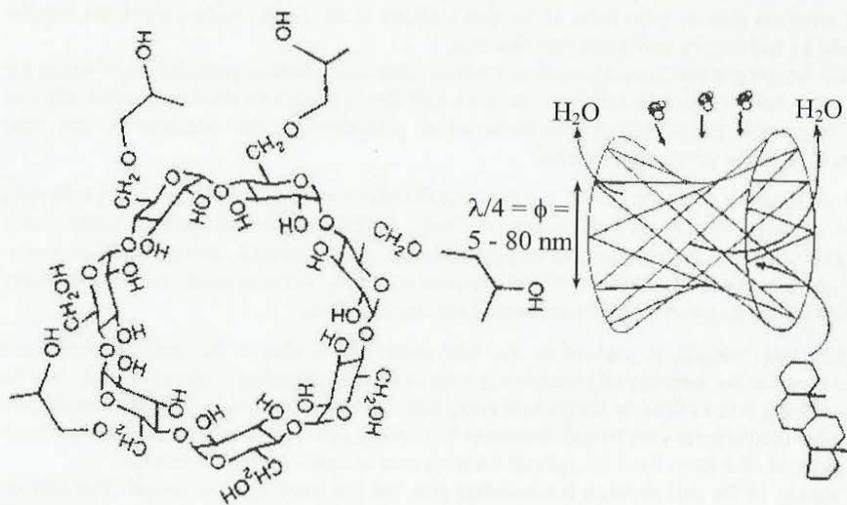
Fig. 25.7:   Information channels in the intercellular matrix.[i]

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[i]:   Hartmut. Heine: Lehrbuch der biologischen Medizin. Grundregulation und Extrazelluläre Matrix, 2. Aufl. 1997, Hippokrates Verlag Stuttgart, S. 56

25.7 The microwave window

There still is lacking information about the frequency or the velocity of propagation to be able to specify and enter in figure 23.1 the cell information. Let's take to hand the book about „Biostrahlen"[i]. In there is explained how for individual cells the emission of electromagnetic signals already could be measured, which are interpreted as circularly polarized waves (fig. 21.10 A). It is said that thereby their polarization plane is rotating with the speed of light, whereas the wave itself is propagating in longitudinal way relatively slow and according to the authors with the *speed of sound*.

The occupation with the potential vortex theory in the explanation lets immediately recognize the vortex, for this is rotating with the speed of light in circles as rolled up wave (fig. 21.10). If it is bound to the surrounding matter with closed vortex centre, then it can be expected that the propagation actually takes place with the speed of body sound.

It could concern the same signals, which Prof. A. Popp calls *biophotons* and detects measuring technically in living organisms[ii]. He however considers the phenomenon for the same wavelength with the speed of light and lands at light frequencies, even then if nothing is glowing visibly. The question is asked: Does it concern the frequency of the light or only the corresponding wavelength or actually both, thus light, as is expressed in the name biophotons?

The photomultipliers, which Prof. Popp uses as „light amplifier", however can only be tuned to certain wavelengths and not to frequencies. Even if the detected biophotons have the wavelength of the light, then nevertheless nothing will glow if the velocity of propagation and as a result also the frequency differs from that of the light for several powers of ten. In the case of the immense number of cells also the number of photons should correspondingly sum up and the body as a whole should start to glow, which is not the case.

The waveguides in the intercellular matrix serving the cell communication, which Prof. H. Heine observes microscopically, have wavelengths between 20 and 300 nanometer, which corresponds to the range of the ultraviolet radiation[iii]. But if the propagation is slower than the light for 6 powers of ten, then also the frequency will only amount to one millionth and be situated into the range of the *microwaves*. Here a biological window seems to be present, to which we should turn our attention for reasons of the electromagnetic environmental compatibility.

The thermal radiation, which reaches the earth from the sun and the planets, lies in the microwave range between 2 and 20 cm. If the sun does well to us, if we need the radiation, then it could be because of the identical frequency. But that also means that the sun and the planets are capable to have an effect on the cell communication, that they for instance could function as clock for the heart.

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[i]:   H. Mayer, G. Winklbaur: Biostrahlen, Verlag ORAC, Wien 1989, 5. Auflage S. 97: Messung von der DNS eines Gurkenkeims abstrahlenden Photonen.

[ii]:   A. Popp: Neue Horizonte in der Medizin, 2.Aufl. Haug Verlag Heidelberg 1987

f [Hz] frequency
     speed of light c   **wave length λ [m]**

cosmic radiation

10^{24} Hz   10 pm
10^{23} Hz   0,1nm
10^{22} Hz   1 nm
10^{21} Hz   10 nm
10^{20} Hz   0,1μm
10^{19} Hz   X-rays
10^{18} Hz   energy supply of the cells   1 μm
10^{17} Hz   10 μm
10^{16} Hz   0,1mm
10^{15} Hz   UV   1 mm
10^{14} Hz   light   1 cm
10^{13} Hz   IR   10 cm
10^{12} Hz   1 m
10^{11} Hz   10 m
10 GHz   100 m
1 GHz   1 km
10^{8} Hz   10 km
10 MHz 10^{5} m
1 MHz
100kHz
10 kHz
1 kHz
100 Hz
10 Hz

γ-radiation, neutrino radiation, weak neutrino radiation (hard ... radiation)

biophotons (Prof. A. Popp)[ii]

cell communication over waveguides in the basic substance at λ = 20-300 nm   acc.to[i]

range of biophotons

μW, Mars, Jupiter, Saturn, Moon

VHF, SW, MW, LW, VLF, ELF

scalar wave transmission acc. to Meyl (Demo-Set) acc. to Tesla (Magnifying Transmitter)

standing waves and localized vortices / noise

noise ultrasound

nerve conduction λ = 2mm at v = 120 m/s

Tinnitus

clocking of the brain currents (10 Hz)

O [m/s] 1   10 10^2 10^3 10^4 10^5 10^6 10^7 10^8 10^9 10^{10} 10^{11} 10^{12} 10^{13}

velocity of propagation $v [m/s] = \lambda \cdot f$

Fig. 25.8: Frequency diagram with entries concerning biologically relevant areas (Tinnitus, nerve conduction, etc.).

25.8 Discussion concerning scalar wave medicine

In the sensitive range of the supposed microwaves window however are also situated the mobile phones and their harmonic waves, which occupy a broad spectrum in particular for pulsed operation in digital nets. The D-net for instance has a wavelength of 32 cm, the E-net lies at half that wavelength. But to which frequency does this correspond at the speed of sound? Now, the frequency is 6 powers of ten smaller and now lies at 1 kHz resp. 2 kHz. To that are added the numerous harmonic waves, which form a noise signal and lie above that. With that these signals are situated completely in the audible range, there where our ears are most sensitive.

This cause we probably owe the disease of modern civilization „*Tinnitus*". Every charged particle will follow this electromagnetic oscillation and produce corresponding sound oscillations, which can hear not „sick ", but completely on the contrary „healthy" people, who as a result possibly get sick. The objection, in this range also cosmic radiation for instance from the planets is present, is legitimate. It however should be considered that planets also are going away from the earth again and in addition is present a fluctuation according to the time of day due to the rotation of the earth, while the mobile telephone masts in our vicinity radiate in continuous operation.

In this window in addition the clocking of the brain currents takes place at 10 Hz. I would recommend blocking the acoustic relevant range between 2 cm (16 kHz) and 3 m wavelength (100 Hz) for all technical use. Every operation of a transmitter in a biological window harms all people and cannot be answered for by any institution.

It further should be considered that the biological window of the plants and animals as a rule correspond to that of man, but sometimes are shifted significantly upward or downward in wavelength. We are not entitled to judge nature. The immune system of the animals now obviously has reached the breaking point and also that of man doesn't seem to be that anymore, which it originally was.

We must proceed from the assumption that many diseases on the one hand and therapy methods on the other hand partly direct and partly indirect have to do something with scalar waves. (E.g. the occurring of cancer[4i]).

[i]:   H. Mayer, G. Winklbaur: Biostrahlen, Verlag ORAC, Wien 1989, 5. Auflage, S. 97: Messung von der DNS eines Gurkenkeims abstrahlenden Photonen.

[ii]:   A. Popp: Neue Horizonte in der Medizin, 2.Aufl. Haug Verlag Heidelberg 1987

[iii]:   Hartmut. Heine: Lehrbuch der biologischen Medizin. Grundregulation und Extrazelluläre Matrix, 2. Aufl. 1997, Hippokrates Verlag Stuttgart, S. 56

[4i]:   K. Meyl: Skalarwellenstrahlung. Welche Bedeutung haben Skalarwellen für die Medizin? GNP-Vortrag am 29.04.2001, Rhein-Main-Halle Wiesbaden, see: Co´med Fachzeitschrift für Komplementärmedizin, 6/2001, pp.55-60.

I. According to the **Maxwell theory**:

1. Faraday's law of induction:

$$\text{curl } \mathbf{E} = - \delta\mathbf{B}/\delta t \qquad (26.1)$$

with $\mathbf{E} = \mathbf{E}(\mathbf{r},t)$

and $\mathbf{H} = \mathbf{H}(\mathbf{r},t)$:

$$\mathbf{B} = \mu \cdot \mathbf{H} \qquad (26.2)$$

$$- \text{curl curl } \mathbf{E} = \mu \cdot \delta(\text{rot } \mathbf{H})/\delta t \qquad (26.3)$$

2. Ampere's law:

$$\text{curl } \mathbf{H} = \mathbf{j} + \delta\mathbf{D}/\delta t \qquad (26.4)$$

with:

Ohm's law: $\mathbf{j} = \sigma \cdot \mathbf{E} \qquad (26.5)$

dielectric displacement: $\mathbf{D} = \varepsilon \cdot \mathbf{E} \qquad (26.6)$

relaxation time: $\tau = \varepsilon/\sigma \qquad (26.7)$

$$\text{curl } \mathbf{H} = \varepsilon \cdot (\mathbf{E}/\tau + \delta\mathbf{E}/\delta t) \qquad (26.8)$$

3. Inserting equation 26.8 into 26.3 yields:

$$- \text{curl curl } \mathbf{E} = \mu \cdot \varepsilon \cdot (1/\tau \cdot \delta\mathbf{E}/\delta t + \delta^2\mathbf{E}/\delta t^2) \qquad (26.9)$$

with the abbreviation: $\mu \cdot \varepsilon = 1/c^2 \qquad (26.10)$

4. Field equation of a damped transverse wave:

$$\underbrace{- \text{curl curl } \mathbf{E} \cdot c^2}_{\text{transverse}} = \underbrace{\delta^2\mathbf{E}/\delta t^2}_{\text{wave}} + \underbrace{(1/\tau) \cdot \delta\mathbf{E}/\delta t}_{\text{vortex damping}} \qquad (26.11)$$

Fig. 26.1:   Derivation of the wave damping by means of the formation of vortices![i]

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[i]:   see also EMC, part 1, chapter 5.3, 2.borderline case.

26. Recapitulation from the viewpoint of textbook physics

Now that we in the meantime have accumulated innumerable mosaic parts as inspiring contributions to the discussion for the information technical seminar, it is time to sort the ideas and to put the parts together to an overall picture.

Sceptics and orthodox scientists can only be convinced, if we start from textbook physics and completely do without postulates. Those demands will be fulfilled.

26.1 Common misinterpretation of the antenna losses

The mathematical description of physical relations leads to the well-known laws, which shouldn't be doubted anymore as soon as they are accepted to be correct. But what about the interpretation? Although a law dictates the interpretation and there is no choice, because laws must be adhered to, yet textbooks from time to time violate the mathematically dictated interpretation, a circumstance, which can't be accepted. I would like to illustrate this with an example.

Let us assume that the measured degree of effectiveness of a transmitting antenna amounts to 80 percent. There exist better antennas, but also distinctly worse antennas, but I'm not aiming at a certain construction. The statement simply says, that 80% of the fed in HF-power is transformed into Hertzian waves. Thus there arises a loss of power of 20 percent, and the question follows: of what do those 20% consist?

The answer, which is usual among experts and is supported by the textbooks, reads: the antenna wire gets hot and also the air around the antenna is heated by dielectric losses. In short, heat is formed.

But I have to point out and will furnish proof that this interpretation is predominantly wrong! It in any case isn't in accord with the laws of Maxwell. Who namely obeys the laws, comes to an entirely different result.

A short derivation brings it to light (fig. 26.1).

We start with the formulation of Faraday's law of induction according to the textbooks (26.1), apply the curl-operation to both sides of the equation (26.3) and insert in the place of rot $\mathbf{H}$ Ampere's law (26.4-26.8). The generally known result describes a damped electromagnetic wave (26.11)[i].

It on the one hand is a transverse wave, which represents 80% of the antenna power for our example. On the other hand a damping term can be found in the equation, which obviously corresponds to the sought-for 20%. With that the answer would have been found. We realize that because of a damping of the wave 20% antenna losses arise. These losses can't concern heat at all, since the damping term in the equation has got nothing in common with thermodynamics. In the equation doesn't stand anything about heat. Such a mistake.
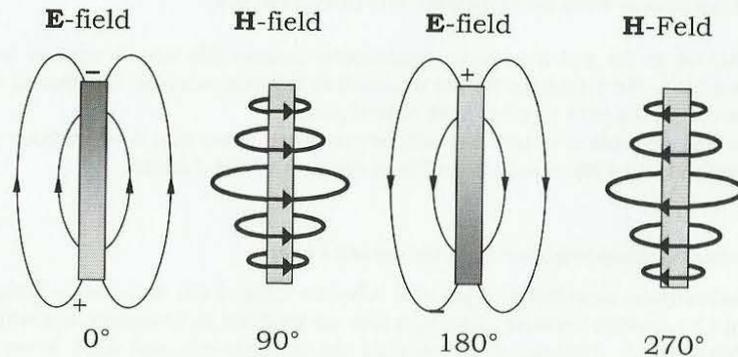
| **E**-field | **H**-field | **E**-field | **H**-Feld |
| 0° | 90° | 180° | 270° |

<u>Fig. 21.8 A:</u>   The fields of the oscillating dipole antenna.[i]
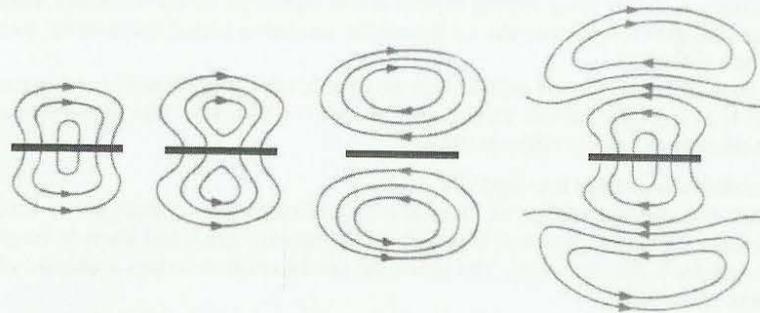

<u>Fig. 21.9 A:</u>   The coming off of the electric field lines
                    from the dipole.

26.2 Wave damping by field vortices

- **Mathematically seen** the damping term describes vortices of the electromagnetic field. This term for instance forms the basis of all eddy current calculations[ii].

- **Physically seen** some waves - in our example it is 20 percent – roll up to field vortices, with which the wave damping and the antenna losses would be explained.

In the course of time a substantial part of the generated vortices will fall apart. These thereby will produce eddy losses in form of heat. Thus eventually still heat is produced – agreed. The criticism of the textbooks consists of the circumstance that we by no means can proceed from the assumption that all vortices spontaneously fall apart and a total conversion into heat will take place. The process in addition takes place with a temporal delay. The time constant τ gives information in this respect. Field energy is buffered in the vortex, where some vortices live very long and it can't be ruled out that a few even exist as long as you like.

To find out more about these field vortices and their behaviour, one has to get deep into vortex physics. Unfortunately nothing can be found about vortex physics in the textbooks. The mistake is systematic. The following short compendium should help close the gap:

- **Mathematically seen** a closed-loop electromagnetic field vortex will show as a **scalar**. Such field vortices, which are mediated by a scalar field, are propagating exactly as charged particles in longitudinal manner as a **scalar wave**.

- **Physically seen** a closed-loop field vortex has got particle nature. If one particle kicks off the next one then an impulse is mediated, then a **shock wave** is occurring, a longitudinal undulation of the particles.

From the vortex physical view the interpretation of the antenna example now sounds entirely different:
The charge carriers in an antenna wire oscillating with high-frequency form a longitudinal shock wave. Between current and tension voltage usually a phase shift of 90^0 is present. The fields produced by these charge carriers form a scalar wave field in the immediate vicinity of the antenna, the so-called near-field zone, which likewise contains longitudinal field components and shows a phase shift of 90^0 between electric and magnetic field (fig. 21.8 A). As in textbooks is clarified by field lines, the generated fields actually form vortices, where one structure kicks off the next one (fig. 21.9 A).

The vortices in the near-field zone of an antenna consist of standing waves, which obviously are transforming with increasing distance. In our example 80% of these are unrolling and turn into transverse waves, whereby the characteristic phase angle between **E**- and **H**-field at that occasion becomes zero.
Let's turn again to those 20 percent loss.

I. According to the **Maxwell theory**:

The consistent application of textbook physics

- Longitudinal waves run in the direction of a field pointer.
- The field pointer oscillates, the vector of velocity oscillates along.
- At relativistic velocities field vortices are subject to the Lorentz contraction.
- The faster the oscillating vortex is on its way, the smaller it gets.
- The vortex permanently changes its diameter (see fig. 21.10 B).
- With the diameter the wavelength decreases (see fig. 22.4).
- The swirl velocity is constant (= speed of light c).
- The eigenfrequency of the vortex oscillates with opposite phase to the wavelength.
- The **vortex acts as a frequency converter!**
- The measurable mixture of frequencies is called **noise**.

leads to the statement:

- The antenna noise corresponds to the antenna losses.

II. Mathematical description of a wave by the **d'Alembert/Laplace equation**:

$$\Delta \mathbf{E} \cdot c^2 = - \operatorname{curl} \operatorname{curl} \mathbf{E} \cdot c^2 + \operatorname{grad} \operatorname{div} \mathbf{E} \cdot c^2 = \delta^2 \mathbf{E}/\delta t^2$$

Laplace operator	transverse (radio wave)	longitudinal (scalar wave)	wave
			(26.12)

Divergence **E** is a scalar!
The corresponding term founds a scalar wave.

Fig. 26.3:   Mathematical description of a wave according to
d'Alembert (1 dim.solution 1747) and Laplace.

26.3 Laplace versus Maxwell

Longitudinal waves as is well-known don't know a fixed velocity of propagation at all. Since they run in the direction of an oscillating field pointer also the vector of velocity will oscillate. For so-called relativistic velocities in the range of the speed of light c the field vortices are subject to the *Lorentz contraction*. That means, the faster the oscillating vortex is on its way, the smaller it gets. *The vortex*, as a mediator of a scalar wave carrying impulse, *permanently changes its diameter*.

Since, in the case of the vortices, it should concern rolled up waves, the vortex velocity will continue to be c, with which the wave now runs around the vortex centre in a circle. From that follows that if the diameter gets smaller, the wavelength of the vortex as well will decrease, whereas the eigenfrequency of the vortex accordingly increases.

If the next moment the vortex oscillates back, the frequency again decreases. The *vortex acts as a frequency converter.* The mixture of high-frequency signals distributed over a broad frequency band formed in this way, is called *noise*. A noise signal indeed is measured from the outside with the help of broadband receivers. We also speak of *antenna noise* and with this knowledge we can further specify the 20% antenna losses: The antenna produces 20 % noise, which can be put equal to the generated vortices because of the wave damping.

At this point the Maxwell theory doesn't leave us room for interpretation at all. If in the textbooks the impression is aroused, as if the noise were an independent discipline, than that is not true at all. How much the noise is connected with the electromagnetic waves, proves a short look at the wave equation.

The *wave equation* found in most textbooks *has the form of an inhomogeneous Laplace equation.* The famous French mathematician Laplace considerably earlier than Maxwell did find a comprehensive formulation of waves and formulated it mathematically (eq. 26.12), which until today is still accepted as valid.

On the one side of the wave equation the Laplace operator stands, which describes the spatial field distribution, and which according to the rules of vector analysis can be decomposed into two parts. On the other side the description of the time dependency of the wave can be found as an inhomogeneous term.

If the wave equation according to Laplace (26.12) is compared to the one, which the Maxwell equations have brought us (26.11), then two differences clearly come forward:

1. In the Laplace equation the damping term is missing. It doesn't describe the formation of vortices, and that means vortices do not exist at all, or present vortices have been there from the beginning.
2. With divergence **E** a scalar factor appears in the wave equation, which founds a scalar wave.

At this point at once hot tempered discussions concerning the question of the existence of scalar waves blaze up. But this question has already been answered clearly with the vortex consideration. Since an accepted description of longitudinal and scalar waves exists with the plasma wave and the plasma wave can be derived directly without postulate from the term of the wave equation (chapter 21.4/21.5), which founds scalar waves, there are further arguments present for their existence.

I. According to **Maxwell**:

$$\underbrace{- \text{curl curl } \mathbf{E} \cdot c^2}_{\text{transverse}} = \underbrace{\delta^2\mathbf{E}/\delta t^2}_{\text{wave}} + \underbrace{(1/\tau) \cdot \delta\mathbf{E}/\delta t}_{\text{vortex damping}}$$

(26.11)

Description of electromagnetic waves with vortex damping
Example: sunlight and the damping in the ionosphere (bleu sky).

II. According to **Laplace**:

$$\underbrace{\Delta\mathbf{E} \cdot c^2}_{\substack{\text{Laplace} \\ \text{operator}}} = \underbrace{- \text{rot rot } \mathbf{E} \cdot c^2}_{\substack{\text{transverse} \\ \text{(Hertz)}}} + \underbrace{\text{grad div } \mathbf{E} \cdot c^2}_{\substack{\text{longitudinal} \\ \text{(Tesla)}}} = \underbrace{\delta^2\mathbf{E}/\delta t^2}_{\text{wave}}$$

(26.12)

Description of transverse electromagnetic waves (Hertzian waves)
and longitudinal scalar waves (Tesla radiation).
1st example: propagation of light as a wave or as a particle.
2nd example: useful signal or noise signal of an antenna.

III. **Mathematically** seen (comparison of coefficients):

$$\underbrace{(1/\tau) \cdot \delta\mathbf{E}/\delta t}_{\text{vortex}} + \underbrace{\text{grad div } \mathbf{E} \cdot c^2}_{\text{scalar}} = 0$$

(26.13)

IV. **Physically** seen
(from the comparison of equation 26.12 with equation 26.11):

Vortices propagate longitudinally as a scalar wave

Fig. 26.2:   Comparison of the two wave descriptions.

26.4 Error term in the wave equation

From the comparison of coefficients of both wave descriptions follows even more:

- **Mathematically seen** the damping - resp. vortex term according to Maxwell can be put equal to the scalar wave term according to Laplace.
- **Physically seen** the generated field vortices form and found a scalar wave.

Here also doesn't exist any room for interpretation, as long as we work with the wave equation according to Laplace and at the same time adhere to the Maxwell theory. If however the scalar wave part is put equal to zero, as is common practise in the textbooks, then as a consequence neither vortices nor noise may exist. But that contradicts all measuring technical experience! Since every antenna produces more or less noise, the textbooks obviously only show half the truth. Science however gropes for the whole truth and that should be fathomed.

If in the case of the antenna example the vortex part amounts to 20%, then that's tantamount to 20% scalar wave part, resp. 20% noise. The scalar wave part constitutes with regard to the Hertzian useful wave something like an error term in the wave equation. The part definitely is too big, as that it might be put equal to zero. Even so all error consideration in the textbooks is missing, if the scalar wave term is assumed to be zero. That violates all rules of physics and of taught scientific methodism.

In practice this shows by a useful signal going under in the noise and reception not being possible anymore as soon as the scalar wave part gets out of control. Even in this case, for which the degree of effectiveness tends towards zero, it still is common practise to put the error term, which is dominating everything, equal to zero. But who in this point follows the textbooks, disregards with that the wave equation and doing so by no means can refer to the circumstance that all colleagues make the same mistake.

The building of physics behaves like a house of cards, where the cards mutually support each other. Perhaps that is the deeper reason why those, who have discovered a marked card, don't pull it out immediately. In addition they are hindered by the self appointed guardians of the „pure doctrine", since everyone knows what happens with the house of cards if the marked card is pulled out. Only, do we want to and can we live with that in the long run? Is it a solution of the problem, if the so-called experts among the physicists and technicians look away and don't deal with the foundation of their branch anymore? If universities crash their basis education into the wall and choke off every contradiction?

Please allow me to pull out the marked card now and place it on the table.

It concerns the question: what is the nature of the field vortices, which form a scalar wave in space. Eddy currents in the iron parts of the antenna are explained with the field equations, but not the noise, which is measured especially in the air. If an antenna on the one hand produces field vortices and as a consequence eddy losses and on the other hand dielectric losses, then we can assume that besides the eddy currents in the conductor also vortices in the dielectric must exist. Let's search for them.

Interim result (comparison of arguments):

The Maxwell equations on the one hand dictate that as the reason for a wave damping only field vortices should be considered.	On the other hand the same laws merely describe eddy currents, which can only occur in the electrically conducting parts of the antenna.
On the one hand the field vortex interpretation makes it possible to explain the noise of an antenna perfectly.	On the other hand does the noise appear in the neighbourhood of the antenna, thus in the air and not in the iron parts.
The mathematical formulation reveals, how wave and vortex, resp. noise, co-operate and how one should imagine the conversion of one form into the other form	In field physics on the other hand is missing a useful description of electric field vortices in a dielectric, which could found the noise signal.

Table 26.5:   Arguments pro and contra.

26. 5 Interim result

It shouldn't be a disadvantage, to interpret physical laws more consistently than usual, even if in the present case orthodox science through that at first should fall into a deep crisis. If the way is worthwhile, only will show at the end.

Let us try to work out the contradictions in form of a comparison of arguments:

- The Maxwell equations on the one hand dictate that as the reason for a wave damping only field vortices should be considered.
  - On the other hand the same laws merely describe eddy currents, which can only occur in the electrically conducting parts of the antenna. .
- On the one hand the field vortex interpretation makes it possible to explain the noise of an antenna perfectly.
  - On the other hand does the noise appear in the neighbourhood of the antenna, thus in the air and not in the iron parts.
- The mathematical formulation reveals, how wave and vortex, resp. noise, co-operate and how one should imagine the conversion of one form into the other form.
  - In field physics on the other hand is missing a useful description of electric field vortices in a dielectric, which could found the noise signal.

The most obvious among all conceivable solutions is the one that we have to assume the existence of dielectric field vortices, so-called **potential vortices.** We are challenged to search for a corresponding description. If the quest should be successful, then the contradictions would be overcome. In addition there is the promise of a whole number of simplifying explanations of various phenomena in the dielectric (see fig. 26.5 and fig. 26.7).

The phenomenon of noise becomes an aspect of wave physics, which is more than merely a field disturbance, which makes the reception of the useful wave more difficult. If the scalar wave nature is realized, then applications can be imagined, in which the noise is used as useful signal. In the way that the scalar part in the wave equation doesn't have to be put to zero anymore to obtain freedom of contradiction, even optimizations of antennas or of capacitors are possible with regard to the dielectric losses by means of the calculation of the scalar part.

New in any case is the idea that the dielectric losses of a capacitor are eddy losses and not a defect in material of the insulating material. With that the capacitor losses correspond to a generated noise power. We also can say, every capacitor more or less produces noise! The electric field lines point from one capacitor plate to the other plate. If one plate radiates as a transmitter and the other plate functions as a receiver, then the field propagation takes place in the direction of the electric field pointer and that again is the condition for a longitudinal wave. Here the circle closes in the conclusion, the capacitor field mediates dielectric field vortices, which following the field lines found a scalar wave because of their scalar nature. The heating of the capacitor results from the decay of vortices.

Potential vortices explain div. phenomena in the dielectric:

1. The **noise** no longer is factored out of the field theory.

2. The scalar (noise) part in the wave equation no longer has to be put to zero (div **E** ≠ 0).

3. The wave descriptions according to Maxwell (26.11) and according to Laplace (26.12) are consistent and free of contradiction.

4. The dielectric losses of an antenna can be found physically and even can be calculated with the wave equation.

5. **Also the dielectric losses** of a capacitor are **eddy losses** (and not a defect in material of the insulating material).

6. The **capacitor losses** correspond to a generated **noise power**.

7. The **dielectric constant** ε doesn't have to be written down complex as until now to give reasons for the occurring losses, and so the inner contradiction is solved, which is hidden in a complex constant. One should only remember the definition of the speed of light $c = 1/\sqrt{\varepsilon\mu}$ (eq. 26.10) and the insurmountable problems in the textbooks, which are brought by a complex ε!

8. The **field lines** point from one capacitor plate to the other plate. If one plate radiates as a transmitter and the other plate functions as a receiver, then the field propagation takes place in the direction of the electric field pointer and that again is the condition for a **longitudinal wave**.

9. The capacitor field mediates dielectric field vortices, which following the field lines found a **scalar wave** because of their scalar nature.

10. As an inhabitant of a dielectric between two capacitor plates (earth and ionosphere) also **man** is a product of these field vortices.

11. Scalar waves can be modulated moredimensionally and be used as **carrier of information**, as Prof. Sheldrake has proven with his proof of the existence of morphogenetic fields[i].

Fig. 26.6:   Advantages of a field description extended with potential vortices.

<i>:   Rupert Sheldrake: Seven Experiments That Could Change the World. Riverhead Books, 1995

26.6 Failure of the Maxwell theory

If the capacitor losses or the antenna noise should concern dielectric losses in the sense of vortex decay of potential vortices, which don't occur in the Maxwell theory at all, then we are confronted with a massive contradiction:

- For the description of the losses the Maxwell theory on the one hand only offers field vortices and those only in the conductive medium.
    - On the other hand do the dielectric losses occur in the nonconductor and in the air.

- In conductive materials vortex fields occur, in the insulator however the fields are irrotational. That isn't possible, since at the transition from the conductor to the insulator the laws of refraction are valid and these require continuity. Hence a failure of the Maxwell theory (Fig. 26.7) will occur in the dielectric.

    - As a consequence the existence of vortex fields in the dielectric, so-called potential vortices, should be required.

In electrodynamics as a help the approach of a vector potential **A** is used, which leads to a complex formulation of the dielectric constant ε and in this way makes it possible, to mathematically describe the dielectric losses of a capacitor by means of the load angle, which stretches in the complex plane. But which physical value does this approach have? How can now the inner contradiction be explained, which is hidden in a complex constant of material? One should only remember the definition of the speed of light $c = 1/\sqrt{\varepsilon\mu}$ (eq. 26.10) and its dependency of ε. For a complex ε here are resulting insurmountable problems in the textbooks.

From the viewpoint of mathematics the introduction of the vector potential at first may represent a help. The before mentioned contradictions however fast raise doubts to the model concept, which from a physical viewpoint eventually will lead to errors, if the speed of light isn't constant anymore and even should be complex.

These considerations should be sufficient as a motive to require potential vortices, even if for their description the field theory according to the textbooks has to be revised. As a supplement there is pointed to the following points:

- As an inhabitant of a dielectric between two capacitor plates also man is a product of these field vortices.

- Scalar waves can be modulated moredimensionally and be used as carrier of information, as Prof. Sheldrake has proven with his proof of morphogenetic fields[i].

The dielectric vortices moreover provide an explanation for natural events. They form the key to numerous disciplines of science, from physics over biology up to medicine.

<i>:   Rupert Sheldrake: Seven Experiments That Could Change the World. Riverhead Books, 1995

Problem of continuity in the case of the coming off of vortices

Example: hightension cable
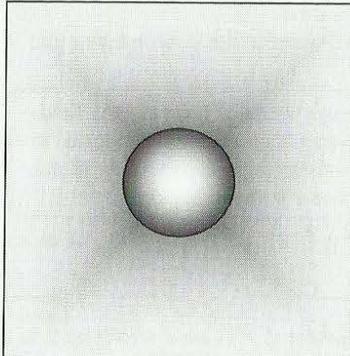
In **conductive materials vortex fields** occur in the **insulator** however the fields are **irrotational**.

That isn't possible, since at the transition from the conductor to the insulator the **laws of refraction** are valid and these require **continuity**.

Hence a **failure of the Maxwell theory** will occur in the dielectric.

Conclusion: ♦ According to the Maxwell theory there exist no vortices of the electric field (*no potential vortices*) and therefore *no scalar waves.*

♦ Without theory it is impossible to design a usable *scalar wave gauge* and to furnish *evidence*. ⇒ **Classic closed loop conclusion:**

♦ The missing of scientific evidence again „proves" the assumption of the irrotationality and „confirms" the correctness of the Maxwell theory.

♦ Hence it cannot be, what shouldn't be

<u>Fig. 26.7:</u>   Concerning the failure of the Maxwell theory

26.7. Concerning the evidence situation

In the question, if a physical phenomenon should be acknowledged as such, *experimental, mathematical and physical evidence* should be shown. In the case of the potential vortices, the vortices of the electric field and their propagation as a *scalar wave*, the historical experiments of **Nikola Tesla**[i] and the modern clone of these can be judged as **experimental evidence**[ii].

With the well-known *wave equation* a **mathematical description** for this phenomenon has been specified and discussed[iii]. It will be shown that both transverse and longitudinal wave parts are contained alongside in the wave equation, i.e. both radio waves according to Hertz and scalar waves according to Tesla. Doing so the mathematically determined scalar wave properties are identical with the experimental results.
The wave equation is an inhomogeneous Laplace equation and the first and oldest description of scalar waves. It thereby is unimportant, if the famous mathematician **Laplace** himself already may have realized and discussed this circumstance or not. The description fits perfectly and that is what counts.

At this point the third point should be put on the agenda, the **physical evidence**. This is connected very closely with the question for a suitable field theory and that again is basing on a corresponding approach.

[i]:   N. Tesla: Apparatus for Transmission of Electrical Energy, US-Patent-No.: 649,621, New York 1900, Dr. Nikola Tesla: Complete Patents pp318-321.

[ii]:   Johannes von Buttlar im Gespräch mit Prof. Dr. Konstantin Meyl: Neutrinopower, Argo-Verlag, Marktoberdorf, 1.Aufl. 2000.

[iii]:   K. Meyl: Scalar Waves: Theory and Experiments, Journal of Scientific Exploration, Vol. 15, No. 2, pp. 199-205, 2001

$$* * * \text{ Task Schedule } * * *$$

1. **Neutrino** radiation $\Rightarrow$ **energy** radiation!
   (acc. to Pauli: ν cares for missing energy in the case of the ß-decay)
2. High **neutrino** density $\Rightarrow$ high **energy** density
3. Neutrino = particle **without** charge or mass (mean),
   but because of oscillations: effective value of charge and mass $\neq$ zero
4. Interaction only in the case of **resonance**
   (e.g. weak interaction)
   (same frequency, 180° phase shift)
5. Neutrino radiation is an energy source which can be used (not a question of physics, only a question of technology)
6. Particle radiation (neutrino) $\Rightarrow$ shock wave (like sound)
                            $\Rightarrow$ longitudinal wave
                            $\Rightarrow$ scalar wave (mathem.)
7. Interaction/resonance of the ν = scalar wave problem
8. Scalar waves are a problem of the field theory.
9. Maxwell theory neglects scalar waves.

- Question: What is the Maxwell approximation?
- Search for a new approach (chap. 27.8)
- Faraday instead of Maxwell
- Derivation of the Maxwell equations as a special case (chap. 27.9)
- Derivation of scalar waves (chap. 27.13)
- Derivation of the gravitation and more (chapter 28)

Table 27.1:   Task schedule belonging to chapter 27

27. Faraday versus Maxwell

Numerous phenomena of the electromagnetic field are described sufficiently accurate by the Maxwell equations, so that these as a rule are regarded as a universal field description. But if one looks more exact it turns out to be purely an approximation, which in addition leads to far reaching physical and technological consequences. We must ask ourselves:

- What is the Maxwell approximation?
- How could a new and extended approach look like?
- Faraday instead of Maxwell, which is the more general law of induction?
- Can the Maxwell equations be derived as a special case?
- Can also scalar waves be derived from the new approach?
- Can the gravitation as well be derived and a lot else more?

On the one hand it concerns the big search for a unified physical theory and on the other hand the chances of new technologies, which are connected with an extended field theory. As a necessary consequence of the derivation, which roots strictly in textbook physics and manages without postulate, scalar waves occur, which could be used manifold. In information technology they are suited as a carrier wave, which can be modulated moredimensionally, and in power engineering the spectrum stretches from the wireless transmission up to the collection of energy out of the field.

27. 1 Energy out of the field

Neutrinos for instance are such field configurations, which move through space as a scalar wave. They were introduced by Pauli as massless but energy carrying particles to be able to fulfil the balance sheet of energy for the beta decay. Nothing would be more obvious than to technically use the neutrino radiation as an energy source.

But for a technical exploitation a useful model description of the particles and their interaction is imperative. For the sake of simplicity we imagine the neutrino to be an oscillating particle, which permanently oscillates back and forth between the state of an electron and that of a positron. With that the polarity changes from positive to negative and back again and the charge averaged over time is zero. Because of the change from a state of matter to the state of an anti-particle also next to no mass can be measured anymore.

A technical oscillator operated in resonance, which oscillates with the same frequency but opposite charge, will interact with the particle and build up an oscillating electromagnetic interaction, with which we already are familiar as the weak interaction in the proximity of a neutrino.

Tubular vortices

- Examples: drain vortex (bathtub vortex)
  whirlwind and waterspout, tornado (image).

Tafel 21
Tornado
(NOAA-Photo)
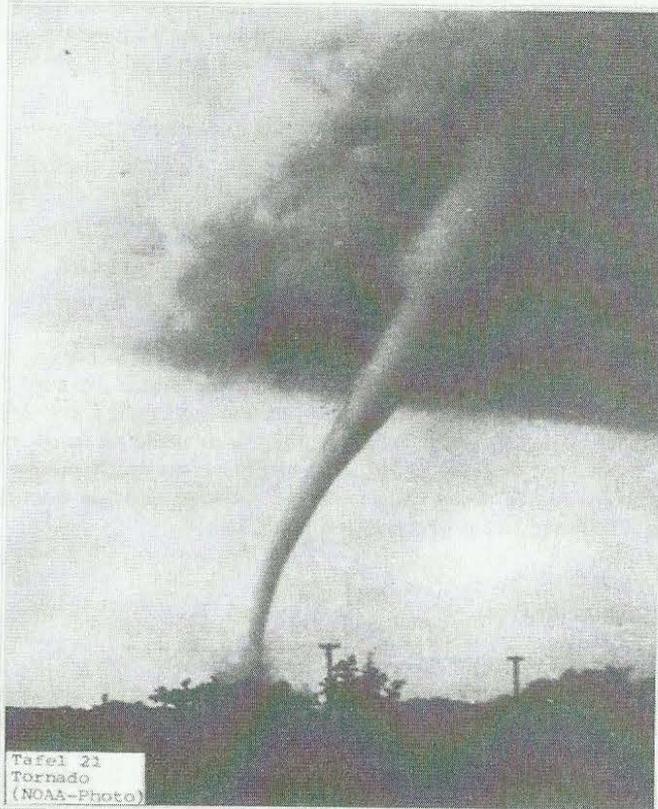
Inside: expanding vortex
Outside: contracting anti-vortex
Condition   for coming off: equally powerful vortices
Criterion: viscosity
Result: tubular structure

Fig. 27.2:   Vortex and anti-vortex - a physical basic principle

<i>:   Lugt: Wirbelströmung in Natur und Technik, G. Braun Verlag Karlsruhe
        1979, Bild „Tornado" von Tafel 21, Seite 356

The propagation of particle radiation as a longitudinal shock wave however can't be described with the normally used field theory and the Maxwell equations, so that the field theory at this point must be reworked. Connected with this is the question of what is oscillating here, a question, which often is answered with an aether of whatever nature. I speak of field vortices and call the aether a property of the field. With that the set of difficulties is shifted into the domain of vortex physics.

27.2 Vortex and anti-vortex

In the eye of a tornado the same calm prevails as at great distance, because here a vortex and its anti-vortex work against each other. In the inside the expanding vortex is located and on the outside the contracting anti-vortex. One vortex is the condition for the existence of the other one and vice versa. Already Leonardo da Vinci knew both vortices and has described the dual manifestations (chapter 3.4).

In the case of flow vortices the viscosity determines the diameter of the vortex tube where the coming off will occur. If for instance a tornado soaks itself with water above the open ocean, then the contracting potential vortex is predominant and the energy density increases threateningly. If it however runs overland and rains out, it again becomes bigger and less dangerous.

The conditions for the bathtub vortex are similar. Here the expanding vortex consists of air, the contracting vortex however of water. In flow dynamics the relations are understood. They mostly can be seen well and observed without further aids.

In electrical engineering it's different: here field vortices remain invisible and not understood. Only so the Maxwell theory could find acceptance, although it only describes mathematically the expanding eddy current and ignores its anti-vortex. I call the contracting anti-vortex „potential vortex" and point to the circumstance, that every eddy current entails the anti-vortex as a physical necessity.

Because the size of the forming structures is determined by the electric conductivity, in conducting materials the vortex rings, being composed of both vortices, are huge, whereas they can contract down to atomic dimensions in nonconductors. Only in semiconducting and resistive materials the structures occasionally can be observed directly (fig. 4.8).

Spherical vortices

Examples:	expanding vortex	contracting vortex
• quantum physics	collision processes (several quarks)	gluons (postulate!)
• nuclear physics	repulsion of like charged particles	strong interaction (postulate!)
• atomic physics	centrifugal force of the enveloping electrons	electrical attraction Schrödinger equation
• astro-physics	centrifugal force (inertia)	gravitation (can not be derived?!)

Example: elementary particles as electromagnetic field vortices

Inside:	expanding eddy current (skin effect)
Outside:	contracting anti-vortex (potential vortex)
Condition	for coming off: equally powerful vortices
Criterion:	electric conductivity (determines diameter)
Result:	spherical structure (consequence of the pressure of the vacuum)

Fig. 27.3:   Spherical structures as a result of contracting potential vortices.[i]

Demokrit (460-370 BC) equated the vortex concept with „law of nature"!
= the first attempt to formulate a unified physics.

27.3 Vortices in the microcosm and macrocosm

The approximation, which is hidden in the Maxwell equations, thus consists of neglecting the anti-vortex dual to the eddy current. It is possible that this approximation is allowed, as long as it only concerns processes inside conducting materials. If we however get to insulating materials the Maxwell approximation will lead to considerable errors and it won't be able to keep it anymore.

If we take as an example the lightning and ask how the lightning channel is formed: Which mechanism is behind it, if the electrically insulating air for a short time is becoming a conductor? From the viewpoint of vortex physics the answer is obvious: The potential vortex, which in the air is dominating, contracts very strong and doing so squeezes all air charge carriers and air ions, which are responsible for the conductivity, together at a very small space to form a current channel.

The contracting potential vortex thus exerts a pressure and with that forms the vortex tube. Besides the cylindrical structure another structure can be expected. It is the sphere, which is the only form, which can withstand a powerful pressure if that acts equally from all directions of space. Only think of ball lightning. Actually the spherical structure is mostly found in microcosm till macrocosm. Let's consider some examples and thereby search for the expanding and contracting forces (fig. 27.2).

- In quantum physics one imagines the elementary particles to be consisting of quarks. Irrespective of the question, which physical reality should be attributed to this model concept, one thing remains puzzling: The quarks should run apart, or you should try to keep together three globules, which are moving violently and permanently hitting each other. For this reason glue particles were postulated, the so-called gluons, which now should take care for the reaction force, but this reaction force is nothing but a postulate!

- In nuclear physics it concerns the force, which holds together the atomic nucleus, which is composed of many nucleons, and gives it the well-known great stability, although here like charged particles are close together. Particles, which usually repel each other. Between the theoretical model and practical reality there is an enormous gap, which should be overcome by introducing of a new reaction force. But also the nuclear force, called strong interaction, is nothing but a postulate!

- In atomic physics the electric force of attraction between the positive nuclear charge and the negatively charged enveloping electrons counteracts the centrifugal force. In this case the anti-vortex takes care for a certain structure of the atomic hull, which obey the Schrödinger equation as eigenvalue solutions. But also this equation irrespective of its efficiency until today purely is a mathematical postulate, as long as its origin is not clear.

- In astrophysics centrifugal force (expansion) as a result of the inertia and gravitation (contraction) as a result of the attraction of masses are balanced. But the „gravitation" puts itself in the way of every attempt to formulate a unified field theory. Also this time it is the contracting vortex, of which is said it can't be derived nor integrated.
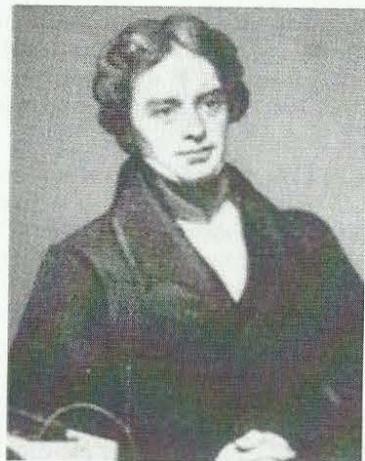
Michael Faraday,
the experimentor (1791-1867)

James Clerk Maxwell[i],
the mathematician (1831-1879)
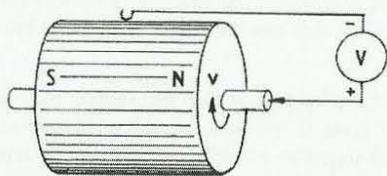
unipolar generator
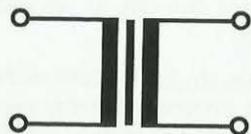
e.g.: transformer

Fig. 27.4: The fathers of the law of induction

It is remarkable how in the domain of the contracting vortex the postulates are accumulating. But this hasn't always been the case. In ancient Greece already 2400 years ago Demokrit has undertaken an attempt to formulate a unified physics. He traced all visible and observable structures in nature back to vortices, each time formed of vortex and anti-vortex. This phenomenon appeared him to be so fundamental, that he put the term „vortex" equal to the term for „law of nature". The term „atom" stems from Demokrit (460-370 BC).

Seen this way the physicists in ancient times already had been further than today's physics, which with the Maxwell approximation neglects the contracting vortex and with that excludes fundamental phenomena from the field description or is forced to replace them by model descriptions and numerous postulates.

What we need is a new field approach, which removes this flaw and in this point reaches over and above the Maxwell theory.

27.4 Faraday's law and Maxwell's formulation

In the choice of the approach the physicist is free, as long as the approach is reasonable and well founded. In the case of Maxwell's field equations two experimentally determined regularities served as basis: on the one hand Ampère's law and on the other hand the law of induction of Faraday. The mathematician Maxwell thereby gave the finishing touches for the formulations of both laws. He introduced the displacement current **D** and completed Ampère's law accordingly, and that without a chance of already at his time being able to measure and prove the measure. Only after his death this was possible experimentally, what afterwards makes clear the format of this man.

In the formulation of the law of induction Maxwell was completely free, because the discoverer Michael Faraday had done without specifications. As a man of practice and of experiment the mathematical notation was less important for Faraday. For him the attempts with which he could show his discovery of the induction to everybody, e.g. his unipolar generator, stood in the foreground.

His 40 years younger friend and professor of mathematics Maxwell however had something completely different in mind. He wanted to describe the light as an electromagnetic wave and doing so certainly the wave description of Laplace went through his mind, which needs a second time derivation of the field factor. Because Maxwell for this purpose needed two equations with each time a first derivation, he had to introduce the displacement current in Ampère's law and had to choose an appropriate notation for the formulation of the law of induction to get to the wave equation.

His light theory initially was very controversial. Maxwell faster found acknowledgement for bringing together the teachings of electricity and magnetism and the representation as something unified and belonging together[i] than for mathematically giving reasons for the principle discovered by Faraday.

Nevertheless the question should be asked, if Maxwell has found the suitable formulation, if he has understood 100 percent correct his friend Faraday and his discovery. If discovery (from 29.08.1831) and mathematical formulation (1862) stem from two different scientists, who in addition belong to different disciplines, misunderstandings are nothing unusual. It will be helpful to work out the differences.

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[i]: J.C. Maxwell: A treatise on Electricity and Magnetism, Dover Publications

Law of induction

unipolar generator	e.g.: transformer
discovery of Faraday	2nd Maxwell equation
$$\mathbf{E} = \mathbf{v} \times \mathbf{B}$$ (27.1)	$$\operatorname{curl}\mathbf{E} = -d\mathbf{B}/dt$$ (27.1*)
unipolar induction	law of induction generally
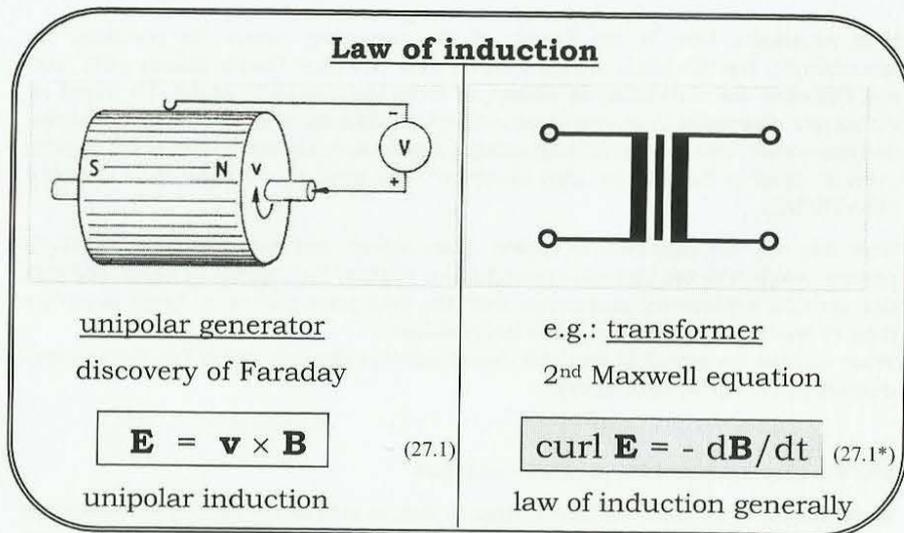
Fig. 27.5:   Two formulations for one law
As a mathematical relation between
the vectors of the electric field strength **E**
and the induction **B** (= magnetic flux density)

Consequences

(the physically mean of the „field concept"):

• The **Faraday approach** describes a field physical principle	• **Maxwell equations** describe the fields of charged particles
• field = experience: We experience the electric as a magnetic field and vice versa as a result of a relative velocity	• the electric (**E**-) field = static field of charges,
	• the magnetic (**H**-) field = field of moving charges.
• Particles do not occur in the Faraday approach	• The origin of the particles remains unsettled (postulate)
• Perfect duality between **E**- and **H**-field.	• No duality in the field description
• **v** leads to dual permutation of **E**- and **H**-field.	• Charge carriers=el. monopoles • No magnetic monopoles!

27.5 The discovery of Faraday

If one turns an axially polarized magnet or a copper disc situated in a magnetic field, then perpendicular to the direction of motion and perpendicular to the magnetic field pointer a pointer of the electric field will occur, which everywhere points axially to the outside. In the case of this by Faraday developed unipolar generator hence by means of a brush between the rotation axis and the circumference a tension voltage can be called off[i].

The mathematically correct relation **E** = **v** x **B** I call Faraday-law, even if it only appears in this form in the textbooks later in time[ii]. The formulation usually is attributed to the mathematician Hendrik Lorentz, since it appears in the Lorentz force in exactly this form. Much more important than the mathematical formalism however are the experimental results and the discovery by Michael Faraday, for which reason the law concerning unipolar induction is named after the discoverer.

Of course we must realize that the charge carriers at the time of the discovery hadn't been discovered yet and the field concept couldn't correspond to that of today. The field concept was an abstracter one, free of any quantization.

That of course also is valid for the field concept advocated by Maxwell, which we now contrast with the „Faraday-law" (fig. 27.4). The second Maxwell equation, the law of induction (27.1*), also is a mathematical description between the electric field strength **E** and the magnetic induction **B**. But this time the two aren't linked by a relative velocity **v**. In that place stands the time derivation of **B**, with which a change in flux is necessary for an electric field strength to occur. As a consequence the Maxwell equation doesn't provide a result in the static or quasi-stationary case, for which reason it in such cases is usual, to fall back upon the unipolar induction according to Faraday (e.g. in the case of the Hall-probe, the picture tube, etc.). The falling back should only remain restricted to such cases, so the normally used idea. But with which right the restriction of the Faraday-law to stationary processes is made?

The vectors **E** and **B** can be subject to both spatial and temporal fluctuations. In that way the two formulations suddenly are in competition with each other and we are asked, to explain the difference, as far as such a difference should be present.

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[i]:   Part 2, INDEL 1996, Chap. 16.1

[ii]:   among others in R.W. Pohl: Einführung in die Physik, Bd.2 Elektrizitätslehre, 21.Aufl. Springer-Verlag 1975, Seite 76 und 130

law of induction

unipolar generator

e.g.: transformer

discovery of **Faraday**

2nd **Maxwell** equation

$$\boxed{\mathbf{E} = \mathbf{v} \times \mathbf{B}}$$ (27.1)

$$\boxed{\text{curl } \mathbf{E} = - d\mathbf{B}/dt}$$ (27.1*)

Difference, e.g. in the (quasi-) stationary case (dB/dt = 0):

$$\mathbf{E} \neq 0$$

$$\mathbf{E} = 0$$

Electric and magnetic field in the stationary case are:

coupled:
mag. induction

decoupled:
neglectible

Only **E** or **B** can form an open field line.
The other field line is a closed-loop field line

Closed-loop field lines have no effect, can't be influenced and are neglected (= Maxwell approximation!)

Fig. 27.6:   Law of induction according to Faraday or Maxwell?

27. 6 Different formulation of the law of induction

Such a difference for instance is, that it is common practice to neglect the coupling between the fields at low frequencies. While at high frequencies in the range of the electromagnetic field the **E**- and the **H**-field are mutually dependent, at lower frequency and small field change the process of induction drops correspondingly according to Maxwell, so that a neglect seems to be allowed. Now electric or magnetic field can be measured independently of each other. Usually is proceeded as if the other field is not present at all.

That is not correct. A look at the Faraday-law immediately shows that even down to frequency zero always both fields are present. The field pointers however stand perpendicular to each other, so that the magnetic field pointer wraps around the pointer of the electric field in the form of a vortex ring in the case that the electric field strength is being measured and vice versa. The closed-loop field lines are acting neutral to the outside; they hence need no attention, so the normally used idea. It should be examined more closely if this is sufficient as an explanation for the neglect of the not measurable closed-loop field lines, or if not after all an effect arises from fields, which are present in reality.

Another difference concerns the commutability of **E**- and **H**-field, as is shown by the Faraday-generator, how a magnetic becomes an electric field and vice versa as a result of a relative velocity **v**. This directly influences the physical-philosophic question: **What is meant by the electromagnetic field?**

The textbook opinion based on the Maxwell equations names the static field of the charge carriers as cause for the electric field, whereas moving ones cause the magnetic field. But that hardly can have been the idea of Faraday, to whom the existence of charge carriers was completely unknown. The for his contemporaries completely revolutionary abstract field concept based on the works of the Croatian Jesuit priest Boscovich (1711-1778). In the case of the field it should less concern a physical quantity in the usual sense, than rather the „experimental experience" of an interaction according to his field description. We should interpret the Faraday-law to the effect that we experience an electric field, if we are moving with regard to a magnetic field with a relative velocity and vice versa.

In the commutability of electric and magnetic field a duality between the two is expressed, which in the Maxwell formulation is lost, as soon as charge carriers are brought into play. Is thus the Maxwell field the special case of a particle free field? Much evidence points to it, because after all a light ray can run through a particle free vacuum. If however fields can exist without particles, particles without fields however are impossible, then the field should have been there first as the cause for the particles. Then the Faraday description should form the basis, from which all other regularities can be derived.
What do the textbooks say to that?

Faraday-law   or   2nd **Maxwell** equation

(unipolar induction)

$$\boxed{E = v \times B} \xleftarrow{\quad (27.1) \quad} \begin{array}{l} \boxed{\text{curl } E = -dB/dt} \quad (27.1^*) \\ \text{resp.} \\ \boxed{U_i = -d\varnothing/dt} \quad (27.1^{**}) \end{array}$$

Discordance at the Technical University of Darmstadt

- According to Prof. Küpfmüller[i]:

special formulation $\bigg\langle$ general formulation

of the law of induction

- According to Prof. Bosse[ii]:

„equation of transformation" $\bigg\rangle$ Maxwell = special case
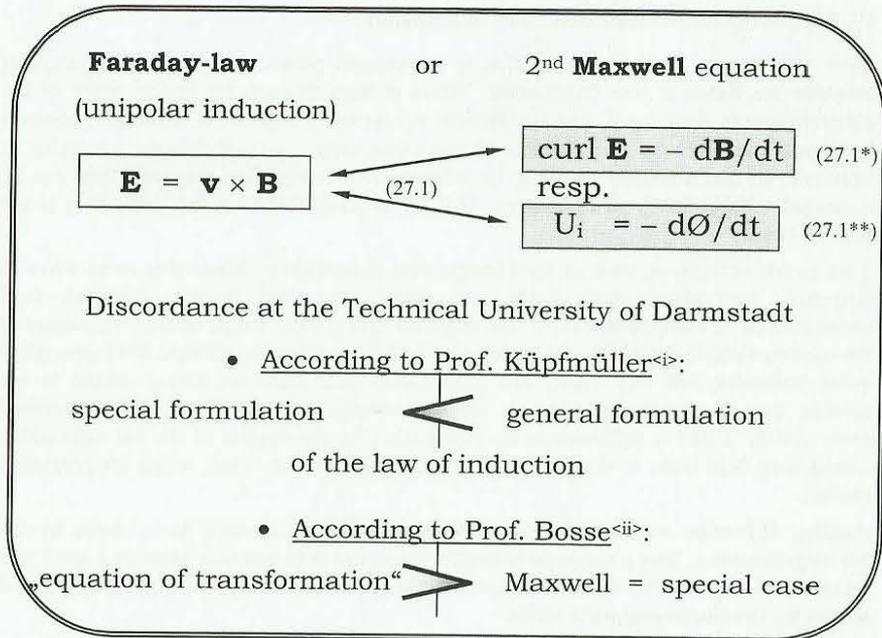
Different order in the derivation

- Acc. to the TU Darmstadt (Prof. Küpfmüller[i]/Prof. Bosse[ii])

follows from $\boxed{F = Q \cdot E}$

and $\boxed{F = Q \cdot (v \times B)}$ $\Bigg\}$ $\longrightarrow$ $\boxed{E = v \times B}$

unipolar induction can be derived !
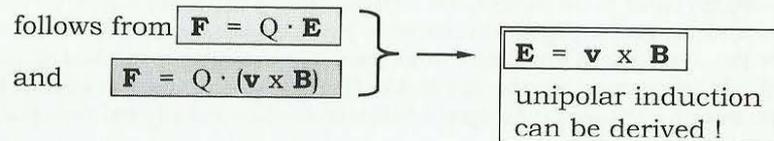
- According to the University of Göttingen (Prof. Pohl[iii])

follows from $\boxed{F = Q \cdot E}$

and $\boxed{E = v \times B}$ $\Bigg\}$ $\longrightarrow$ $\boxed{F = Q \cdot (v \times B)}$

Lorentz force can be derived !
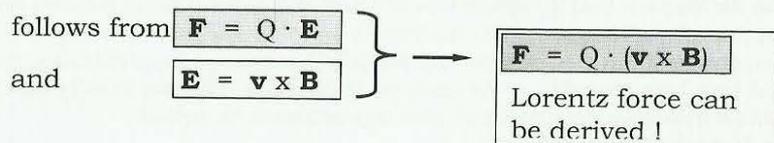
Fig. 27.7: Different opinions and derivations

[i]: K. Küpfmüller: Einführung in die theoretische Elektrotechnik, 12. Auflage, Springer Verlag 1988, Seite 228, Gl. 22.

[ii]: G. Bosse: Grundlagen der Elektrotechnik II, BI-Hochschultaschenbücher Nr.183, 1.Aufl. 1967, Kap. 6.1 Induktion, Seite 58

[iii]: R. W. Pohl: Einführung in die Physik, Band 2 Elektrizitätslehre, 21. Auflage, Springer-Verlag 1975, Seite 77

27.7 Contradictory opinions in textbooks

Obviously there exist two formulations for the law of induction (27.1 and 27.1*), which more or less have equal rights. Science stands for the question: which mathematical description is the more efficient one? If one case is a special case of the other case, which description then is the more universal one?

What Maxwell's field equations tell us is sufficiently known, so that derivations are unnecessary. Numerous textbooks are standing by, if results should be cited. Let us hence turn to the Faraday-law (27.1). Often one searches in vain for this law in schoolbooks. Only in more pretentious books one makes a find under the keyword „unipolar induction". If one however compares the number of pages, which are spent on the law of induction according to Maxwell with the few pages for the unipolar induction, then one gets the impression that the latter only is a unimportant special case for low frequencies. Küpfmüller speaks of a „special form of the law of induction"[i], and cites as practical examples the induction in a brake disc and the Hall-effect. Afterwards Küpfmüller derives from the „special form" the „general form" of the law of induction according to Maxwell, a postulated generalization, which needs an explanation. But a reason is not given [i].

Bosse gives the same derivation, but for him the Maxwell-result is the special case and not his Faraday approach[ii]. In addition he addresses the Faraday-law as *equation of transformation* and points out the meaning and the special interpretation.

On the other hand he derives the law from the Lorentz force, completely in the style of Küpfmüller[i] and with that again takes it part of its autonomy. Pohl looks at that different. He inversely derives the Lorentz force from the Faraday-law[iii].

By all means, the Faraday-law, which we want to base on instead of on the Maxwell equations, shows „strange effects[i4]" from the point of view of a Maxwell representative of today and thereby but one side of the medal (eq. 27.1). Only in very few distinguished textbooks the other side of the medal (eq. 27.2) is mentioned at all. In that way most textbooks mediate a lopsided and incomplete picture[i,ii,i4]. If there should be talk about equations of transformation, then the dual formulation belongs to it, then it concerns a pair of equations, which describes the relations between the electric and the magnetic field.

If the by Bosse[ii] prompted term „equation of transformation" is justified or not at first is unimportant. That is a matter of discussion.

[i]: K. Küpfmüller: Einführung in die theoretische Elektrotechnik, 12.Aufl., Springer Verlag 1988, Seite 228, Gl. 22.

[ii]: G. Bosse: Grundlagen der Elektrotechnik II, BI-Hochschultaschenbücher Nr.183, 1.Aufl. 1967, Kap. 6.1 Induktion, Seite 58

[iii]: R.W.Pohl: Einführung in die Physik, Bd.2 Elektrizitätslehre, 21.Aufl. Springer-Verlag 1975, Seite 77

[i4]: G. Lehner: Elektromagnetische Feldtheorie, Springer-Lehrbuch 1990, 1. Aufl., Seite 31 Kommentar zur Lorentzkraft (1.65)

The **new and dual field approach** consists of

equations of transformation

of the electric   and   of the magnetic field[i]

$$E = v \times B$$ (27.1) and $$H = -v \times D$$ (27.2)

unipolar induction   equation of convection

- Formulation according to the rules of duality

- **Grimsehl**[ii] speaks of the „equation of convection", according to which moving charges produce a magnetic field and so-called convection currents (referring to Röntgen 1885, Himstedt, Rowland 1876, Eichenwald and others)

- **Pohl**[iii] gives examples for the equations of transformation,

- he writes the equations beneath each other

$$E = \mu \cdot v \times H$$ (27.3) and $$H = -\varepsilon \cdot v \times E$$ (27.4)

- and points out that for $v = c = 1/\sqrt{\mu \cdot \varepsilon}$
  one equation changes into the other one.

The new and dual approach roots in textbook physics!

Fig. 27.8: The new and dual field approach

[i]:   see Part 1, chapter 6.5

[ii]:   Grimsehl: Lehrbuch der Physik, 2.Bd., 17.Aufl. Teubner Verl. 1967, S. 130.

[iii]: R.W.Pohl: Einführung in die Physik, Bd.2 Elektrizitätslehre, 21.Aufl. Springer-Verlag 1975, Seite 77

27.8 The field-theoretical approach

The duality between E- and H-field and the commutability asks for a corresponding dual formulation to the Faraday-law (27.1). Written down according to the rules of duality there results an equation (27.2), which occasionally is mentioned in some textbooks.
While both equations in the books of Pohl[i] and of Simonyi[ii] are written down side by side having equal rights and are compared with each other, Grimsehl[iii] derives the dual regularity (27.2) with the help of the example of a thin, positively charged and rotating metal ring. He speaks of „equation of convection", according to which moving charges produce a magnetic field and so-called convection currents. Doing so he refers to workings of Röntgen 1885, Himstedt, Rowland 1876, Eichenwald and many others more, which today hardly are known.
In his textbook also Pohl gives practical examples for both equations of transformation. He points out that one equation changes into the other one, if as a relative velocity v the speed of light c should occur. This question will also occupy us.

We now have found a field-theoretical approach with the equations of transformation, which in its dual formulation is clearly distinguished from the Maxwell approach. The reassuring conclusion is added: **The new field approach roots entirely in textbook physics**, as are the results from the literature research. **We can completely do without postulates.**
Next thing to do is to test the approach strictly mathematical for freedom of contradictions. It in particular concerns the question, which known regularities can be derived under which conditions. Moreover the conditions and the scopes of the derived theories should result correctly, e.g. of what the Maxwell approximation consists and why the Maxwell equations describe only a special case.

27.9 Derivation of Maxwell's field equations

As a starting-point and as approach serve the equations of transformation of the electromagnetic field, the Faraday-law of unipolar induction and the according to the rules of duality formulated law (eq. 27.1, 2). If we apply the curl to both sides of the equations then according to known algorithms of vector analysis the curl of the cross product each time delivers the sum of four single terms. Two of these again are zero for a non-accelerated relative motion in the x-direction with $v = dr/dt$.
One term concerns ´the vector gradient $(v \text{ grad})B$, which can be represented as a tensor. By writing down and solving the accompanying derivative matrix giving consideration to the above determination of the v-vector, the vector gradient becomes the simple time derivation of the field vector $B(r(t))$ (eq. 27.10, according to the rule of eq. 27.11).

[i]:   R.W.Pohl: Einführung in die Physik, Bd.2 Elektrizitätslehre, 21.Aufl. Springer-Verlag 1975, Seite 76 und 130

[ii]:   K. Simonyi: Theoretische Elektrotechnik, 7.Aufl. VEB Berlin 1979, Seite 924.

[iii]: Grimsehl: Lehrbuch der Physik, 2.Bd., 17.Aufl. Teubner Verl. 1967, S. 130.

As approach serve the equations of transformation (fig. 27.5) of the electric and of the magnetic field:

$$\boxed{\mathbf{E} = \mathbf{v} \times \mathbf{B}} \quad (27.1) \text{ and } \quad \boxed{\mathbf{H} = -\mathbf{v} \times \mathbf{D}} \quad (27.2)$$

If we apply the curl to the respective cross product:

$$\boxed{\text{curl } \mathbf{E} = \text{curl } (\mathbf{v} \times \mathbf{B})} \quad (27.5) \text{ and } \quad \boxed{\text{curl } \mathbf{H} = -\text{curl } (\mathbf{v} \times \mathbf{D})} \quad (27.6)$$

then according to the algorithms[i] four sum terms are delivered:

$$\boxed{\text{curl } \mathbf{E} = (\mathbf{B} \text{ grad})\mathbf{v} - (\mathbf{v} \text{ grad})\mathbf{B} + \mathbf{v} \text{ div } \mathbf{B} - \mathbf{B} \text{ div } \mathbf{v}} \quad (27.5)$$

$$\boxed{\text{curl } \mathbf{H} = -[(\mathbf{D} \text{ grad})\mathbf{v} - (\mathbf{v} \text{ grad})\mathbf{D} + \mathbf{v} \text{ div } \mathbf{D} - \mathbf{D} \text{ div } \mathbf{v}]} \quad (27.6)$$

where 2 of them are zero because of:

$$\boxed{\mathbf{v}(t) = d\mathbf{r}/dt} \quad (27.7)$$

- the divergence of $\mathbf{v}(t)$ disappears: $\quad \text{div } \mathbf{v} = 0$, (27.8)
- and will be zero as well: $\quad \partial \mathbf{v}(t)/\partial \mathbf{r} = \boxed{\text{grad } \mathbf{v} = 0}$. (27.9)
- there remain the vector gradients:

$$\boxed{(\mathbf{v} \text{ grad}) \mathbf{B} = \frac{d\mathbf{B}}{dt}} \quad \text{and} \quad \boxed{(\mathbf{v} \text{ grad}) \mathbf{D} = \frac{d\mathbf{D}}{dt}} \quad , (27.10)$$

- according to the rules[i] in general (with eq. 27.7):

$$\frac{d\mathbf{V}(\mathbf{r}(t))}{dt} = \frac{\partial \mathbf{V}(\mathbf{r}=\mathbf{r}(t))}{\partial \mathbf{r}} \cdot \frac{d\mathbf{r}(t)}{dt} = (\mathbf{v} \text{ grad}) \mathbf{V} \quad (27.11)$$

- A comparison of the coefficients of both field equations

$$\boxed{\begin{aligned} \text{curl } \mathbf{E} &= -d\mathbf{B}/dt + \mathbf{v} \text{ div } \mathbf{B} = -d\mathbf{B}/dt - \mathbf{b} \\ \text{curl } \mathbf{H} &= \quad d\mathbf{D}/dt - \mathbf{v} \text{ div } \mathbf{D} = \quad d\mathbf{D}/dt + \mathbf{j} \end{aligned}} \quad \begin{aligned} (27.12) \\ (27.13) \end{aligned}$$

with the **Maxwell equations** results in:

- for the potential density $\mathbf{b} = -\mathbf{v} \text{ div } \mathbf{B} = 0$, (27.14)
  (eq. 27.12 $\equiv$ law of induction, if $\mathbf{b} = 0$ resp. div $\mathbf{B} = 0$)

- for the current density $\mathbf{j} = -\mathbf{v} \text{ div } \mathbf{D} = -v_x \cdot \rho_{el}$, (27.15)
  (eq. 27.13 $\equiv$ Ampère's law, if $\mathbf{j} \equiv$ with v moving negative charge carriers (ρ_{el} = electric space charge density).

Fig. 27.9:   Derivation of Maxwell's field equations as a special case of the equations of transformation

[i]:   Bronstein u.a.: Taschenbuch der Mathematik, 4.Neuaufl. Thun 1999, S. 652

For the last not yet explained terms at first are written down the vectors **b** and **j** as abbreviation. With equation 27.13 we in this way immediately look at the well-known law of Ampère (1st Maxwell equation). The comparison of coefficients (27.15) in addition delivers a useful explanation to the question, what is meant by the current density **j**: it is a space charge density ρ_{el} consisting of negative charge carriers, which moves with the velocity **v** for instance through a conductor (in the x-direction).

The current density **j** and the to that dual potential density **b** mathematically seen at first are nothing but alternative vectors for an abbreviated notation. While for the current density **j** the physical meaning already could be clarified from the comparison with the law of Ampère, the interpretation of the potential density **b** still is due. From the comparison with the law of induction (eq. 27.1*) we merely infer, that according to the Maxwell theory this term is assumed to be zero. But that is exactly the Maxwell approximation and the restriction with regard to the new and dual field approach, which roots in Faraday.

In that way also the duality gets lost with the argument that magnetic monopoles (div **B**) in contrast to electric monopoles (div **D**) do not exist and until today could evade every proof. It thus is overlooked that div **D** at first describes only eddy currents and div **B** only the necessary anti-vortex, the potential vortex. Spherical particles, like e.g. charge carriers presuppose both vortices: on the inside the expanding (div **D**) and on the outside the contracting vortex (div **B**), which then necessarily has to be different from zero, even if there hasn't yet been searched for the vortices dual to eddy currents, which are expressed in the neglected term.

Assuming, a monopole concerns a special form of a field vortex, then immediately gets clear, why the search for magnetic poles has to be a dead end and their failure isn't good for a counterargument: The missing electric conductivity in vacuum prevents current densities, eddy currents and the formation of magnetic monopoles. Potential densities and potential vortices however can occur. As a result can without exception only electrically charged particles be found in the vacuum (derivation in chapter 4.2 till 4.4).

Because vortices are more than monopole-like structures depending on some boundary conditions, only the vortex description will be pursued further consequently.

Let us record: **Maxwell's field equations can directly be derived from the new dual field approach under a restrictive condition.** Under this condition the two approaches are equivalent and with that also error free. Both follow the textbooks and can so to speak be the textbook opinion.

The restriction ($\mathbf{b} = 0$) surely is meaningful and reasonable in all those cases in which the Maxwell theory is successful. It only has an effect in the domain of electrodynamics. Here usually a vector potential **A** is introduced and by means of the calculation of a complex dielectric constant a loss angle is determined. Mathematically the approach is correct and dielectric losses can be calculated. Physically however the result is extremely questionable, since as a consequence of a complex ε a complex speed of light would result (according to the definition $c \equiv 1/\sqrt{\varepsilon \cdot \mu}$). With that electrodynamics offends against all specifications of the textbooks, according to which c is constant and not variable and less then ever complex.

But if the result of the derivation physically is wrong, then something with the approach is wrong, then the fields in the dielectric perhaps have an entirely other nature, then dielectric losses perhaps are vortex losses of potential vortices falling apart?

- Maxwell's field equations:

$$\text{curl } \mathbf{E} = - d\mathbf{B}/dt \qquad \text{(law of induction)} \qquad (27.1^*)$$

$$\text{curl } \mathbf{H} = \quad d\mathbf{D}/dt + \mathbf{j} \qquad \text{(Ampère's law)} \qquad (27.13)$$

- describe the special case for $\mathbf{b} = 0$ resp. div $\mathbf{B} = 0$

$$\text{curl } \mathbf{E} = - d\mathbf{B}/dt + \mathbf{v} \text{ div } \mathbf{B} = - d\mathbf{B}/dt - \mathbf{b} \qquad (27.12)$$

$$\text{curl } \mathbf{H} = \quad d\mathbf{D}/dt - \mathbf{v} \text{ div } \mathbf{D} = \quad d\mathbf{D}/dt + \mathbf{j} \qquad (27.13)$$

The physical meaning of the introduced abbreviations **b** and **j** is:

- the **current density** $\mathbf{j} = - \mathbf{v} \text{ div } \mathbf{D} = - v_x \cdot \rho_{el}$, $\quad (27.15)$
- with Ohm's law $\quad\quad \mathbf{j} = \sigma \cdot \mathbf{E} = \mathbf{D}/\tau_1$, and $\quad (27.16)$
- the **potential density b** $= - \mathbf{v} \text{ div } \mathbf{B} = \mathbf{B}/\tau_2$, (27.17)
- with the eddy current time constant $\tau_1 = \varepsilon/\sigma \quad (27.16^*)$
- and with the potential vortex time constant τ_2

The complete field equations (27.12 and 27.13) read, with the time constants (τ_1 and τ_2) of the respective field vortex:

- completely extended law of induction (with $\mathbf{B} = \mu \cdot \mathbf{H}$): $\quad (27.18)$

$$\text{curl } \mathbf{E} = - d\mathbf{B}/dt - \mathbf{B}/\tau_2 = - \mu \cdot (d\mathbf{H}/dt + \mathbf{H}/\tau_2) \qquad (27.20)$$

- and the well-known law of Ampère (with $\mathbf{D} = \varepsilon \cdot \mathbf{E}$): $\quad (27.19)$

$$\text{curl } \mathbf{H} = d\mathbf{D}/dt + \mathbf{D}/\tau_1 = \varepsilon \cdot (d\mathbf{E}/dt + \mathbf{E}/\tau_1) \qquad (27.21)$$

Fig. 27.10:   The extension of the law of induction for vortices of the electric field (potential vortices).[i]

[i]:   see also fig. 5.1

27.10 Derivation of the potential vortices

Is the introduction of a vector potential **A** in electrodynamics a substitute of neglecting the potential density **b**? Do here two ways mathematically lead to the same result? And what about the physical relevance? After classic electrodynamics being dependent on working with a complex constant of material, in what is buried an unsurmountable inner contradiction, the question is asked for the freedom of contradictions of the new approach. At this point the decision will be made, if physics has to make a decision for the more efficient approach, as it always has done when a change of paradigm had to be dealt with. The abbreviations **j** and **b** are further transformed, at first the current density in Ampère's law $\mathbf{j} = - v_x \cdot \rho_{el}$ (27.15), as the movement of negative electric charges. By means of Ohm's law $\mathbf{j} = \sigma \cdot \mathbf{E}$ and the relation of material $\mathbf{D} = \varepsilon \cdot \mathbf{E}$ the current density **j** also can be written down as dielectric displacement current with the characteristic relaxation time constant $\tau_1 = \varepsilon/\sigma$ (eq. 27.16) for the eddy currents. In this representation of the law of Ampère (eq. 27.21) clearly is brought to light, why the *magnetic field is a vortex field,* and how the eddy currents produce heat losses depending on the specific electric conductivity σ. As one sees we, with regard to the magnetic field description, move around completely in the framework of textbook physics.

Let us now consider the dual conditions. The comparison of coefficients (eq. 27.12 + 27.17) looked at purely formal, results in a potential density **b** in duality to the current density **j**, which with the help of an appropriate time constant τ_2 founds vortices of the electric field. I call these potential vortices (in eq. 27.20).

In contrast to that the Maxwell theory requires an *irrotationality of the electric field,* which is expressed by taking the potential density **b** and the divergence **B** equal to zero. The time constant τ_2 thereby tends towards infinity. This Maxwell approximation leads to the circumstance that with the potential vortices of the electric field also their propagation as a scalar wave gets lost, so that the Maxwell equations describe only transverse and no longitudinal waves. At this point there can occur contradictions for instance in the case of the near-field of an antenna, where longitudinal wave parts can be detected measuring technically, and such parts already are used technologically in transponder systems e.g. as installations warning of theft in big stores.

It is denominating, how they know how to help oneself in the textbooks of high-frequency technology in the case of the near-field zone[i]. Proceeding from the Maxwell equations the missing potential vortex is postulated without further ado, by means of the specification of a „standing wave" in the form of a vortex at a dipole antenna. With the help of the postulate now the longitudinal wave parts are „calculated", like they also are being measured, but also like they wouldn't occur without the postulate as a result of the Maxwell approximation.

There isn't a way past the potential vortices and the new dual approach, because no scientist is able to afford to exclude already in the approach a possibly authoritative phenomenon, which he wants to calculate physically correct.

[i]:   Zinke, Brunswig: Lehrbuch der Hochfrequenztechnik, 1. Bd., 3. Auflage 1986 Springer-Verlag Berlin, Seite 335

- Under the assumption: $\mathbf{E} = \mathbf{E}(\mathbf{r},t)$; $\mathbf{H} = \mathbf{H}(\mathbf{r},t)$,

- using the relations of material:

$$\boxed{\mathbf{B} = \mu\cdot\mathbf{H}} \quad \text{and} \quad \boxed{\mathbf{D} = \varepsilon\cdot\mathbf{E}} \quad :$$

- the complete and extended law of induction reads:

$$\boxed{\text{curl } \mathbf{E} = -\,\partial\mathbf{B}/\partial t - \mathbf{B}/\tau_2 = -\,\mu\cdot(\partial\mathbf{H}/\partial t + \mathbf{H}/\tau_2)} \quad (27.20)$$

- and the well-known law of Ampère:

$$\boxed{\text{curl } \mathbf{H} = \partial\mathbf{D}/\partial t + \mathbf{D}/\tau_1 = \varepsilon\cdot(\partial\mathbf{E}/\partial t + \mathbf{E}/\tau_1)} \quad (27.21)$$

if we again apply the curl operation to eq. 27.20 and insert eq. 27.21:

$$\boxed{\begin{aligned}
-\text{ curl curl } \mathbf{E} &= \mu\cdot\partial(\text{curl }\mathbf{H})/\partial t + (\mu/\tau_2)\cdot(\text{curl }\mathbf{H}) \quad &(27.22)\\
&= \mu\cdot\varepsilon\cdot[\partial^2\mathbf{E}/\partial t^2 + (1/\tau_1)\cdot\partial\mathbf{E}/\partial t + (1/\tau_2)\cdot\partial\mathbf{E}/\partial t + \mathbf{E}/\tau_1\tau_2] \quad &(27.23)\\
&= (1/c^2)\cdot[\partial^2\mathbf{E}/\partial t^2 + (1/\tau_1 + 1/\tau_2)\cdot\partial\mathbf{E}/\partial t + \mathbf{E}/\tau_1\tau_2] \quad &(27.24)
\end{aligned}}$$

with the definition for the speed of light c:

$$\boxed{\varepsilon\cdot\mu = 1/c^2} \quad (27.25)$$

the <u>fundamental field equation</u> reads:

$$\boxed{\begin{aligned}
-\underbrace{c^2\cdot\text{curl curl }\mathbf{E}}_{a} &= \underbrace{\partial^2\mathbf{E}/\partial t^2}_{b \text{ (electromagnetic wave)}} + \\
&+ \underbrace{(1/\tau_1)\cdot\partial\mathbf{E}/\partial t}_{c} + \underbrace{(1/\tau_2)\cdot\partial\mathbf{E}/\partial t}_{d} + \underbrace{\mathbf{E}/\tau_1\tau_2}_{e} \\
&+ \text{ eddy current } + \text{ potential vortex } + I/U
\end{aligned}} \quad (27.26)$$

Fig. 27.11:   <u>Derivation of the fundamental field equation from the equations of transformation of the electromagnetic field.</u>[i]

[i]:   The fundamental field equation mathematically describes a wave damped with the vortices of the electric and the vortices of the magnetic field. It is formulated only in space and time. From it can be deduced numerous eigenvalue equations. (i.e. the equation of Schrödinger, fig. 5.1).

27.11 Derivation of the „fundamental field equation"

The two equations of transformation and also the from that derived field equations (27.20 and 27.21) show the two sides of a medal, by mutually describing the relation between the electric and magnetic field strength (between $\mathbf{E}$ and $\mathbf{H}$). We get on the track of the meaning of the „medal" itself, by inserting the dually formulated equations into each other. If the calculated $\mathbf{H}$-field from one equation is inserted into the other equation then as a result a determining equation for the $\mathbf{E}$-field remains. The same vice versa also functions to determine the $\mathbf{H}$-field. Since the result formally is identical and merely the $\mathbf{H}$-field vector appears at the place of the $\mathbf{E}$-field vector and since it equally remains valid for the $\mathbf{B}$-, the $\mathbf{D}$-field and all other known field factors, the determining equation is more than only a calculation instruction. It reveals a fundamental physical principle. I call it the „fundamental field equation".

The derivation always is the same: If we again apply the curl operation to curl $\mathbf{E}$ (law of induction 27.20) also the other side of the equation should be subjected to the curl. If for both terms curl $\mathbf{H}$ is expressed by Ampère's law 27.21, then in total four terms are formed (27.26): the wave equation (a-b) with the two damping terms, on the one hand the eddy currents (a-c) and on the other hand the potential vortices (a-d) and as the fourth term the Poisson equation (a-e), which is responsible for the spatial distribution of currents and potentials [i].

Not in a single textbook a mathematical linking of the Poisson equation with the wave equation can be found, as we here succeed in for the first time. It however is the prerequisite to be able to describe the conversion of an antenna current into electromagnetic waves near a transmitter and equally the inverse process, as it takes place at a receiver. Numerous model concepts, like they have been developed by HF- and EMC-technicians as a help, can be described mathematically correct by the physically founded field equation.

In addition further equations can be derived, for which this until now was supposed to be impossible, like for instance the Schrödinger equation (chapter 5.6-5.9). This contrary to current opinion isn't a wave equation at all, since the term (b) with the second time derivation is missing. As diffusion equation it has the task to mathematically describe field vortices and their structures.

As a consequence of the Maxwell equations in general and specifically the eddy currents not being able to form structures, every attempt has to fail, which wants to derive the Schrödinger equation from the Maxwell equations.

The fundamental field equation however contains the newly discovered potential vortices, which owing to their concentration effect (in duality to the skin effect) form spherical structures, for which reason these occur as eigenvalues of the equation. For these eigenvalue-solutions numerous practical measurements are present, which confirm their correctness and with that have probative force with regard to the correctness of the new field approach and the fundamental field equation. By means of the pure formulation in space and time and the interchangeability of the field pointers here a physical principle is described, which fulfils all requirements, which a world equation must meet.

[i]:   see also fig. 5.1

Comparison:

• The **Faraday approach** is universal	• **Maxwell's field equations** can be derived!
• It reveals a **physical principle**	• The field equations describe only a **special case**!
• The field is the cause for the particles • (Principles of causality are preserved)	• Particle and field are cause and effect at the same time • (Violation of the rules of causality)
• Particles probably are **field configurations** • Quanta can be calculated as **field vortices** (without any hypothesis) • All **quantum properties** can be **calculated** likewise	• Particles consist of hypothetic subparticles • **Quark-hypothesis** must replace missing calculation • Sorting und systematizing of the properties in the **standard-model**
• **Potential vortices** form electric field vortices (the E-field is a source free vortex field)	• The electric field is **irrotational** (the E-field is an irrotational field of sources)
• Field vortices carry momentum and form a scalar wave • Longitudinal wave with arb. velocity of propagation v	• Electromagnetic wave is a transverse wave • Constant propagation with the speed of light c
⇒ **theory of objectivity**	⇒ **theory of relativity**

Fig. 27.12:   Comparison of the field-theoretical approaches according to Faraday and according to Maxwell.

27.12 The Maxwell field as a derived special case

As the derivations show, nobody can claim there wouldn't exist potential vortices and no propagation as a scalar wave, since only the Maxwell equations are to blame that these already have been factored out in the approach. One has to know that the field equations, and may they be as famous as they are, are nothing but a special case, which can be derived.

The field-theoretical approach however, which among others bases on the Faraday-law, is universal and can't be derived on its part. It describes a physical basic principle, the alternating of two dual experience or observation factors, their overlapping and mixing by continually mixing up cause and effect. It is a philosophic approach, free of materialistic or quantum physical concepts of any particles.

Maxwell on the other hand describes without exception the fields of charged particles, the electric field of resting and the magnetic field as a result of moving charges. The charge carriers are postulated for this purpose, so that their origin and their inner structure remain unsettled and can't be derived. The subdivision e.g. in quarks stays in the domain of a hypothesis, which can't be proven. The sorting and systematizing of the properties of particles in the standard-model is nothing more than unsatisfying comfort for the missing calculability.

With the field-theoretical approach however the elementary particles with all quantum properties can be calculated as field vortices (chap. 7). With that the field is the cause for the particles and their measurable quantization. The electric vortex field, at first source free, is itself forming its field sources in form of potential vortex structures. The formation of charge carriers in this way can be explained and proven mathematically, physically, graphically and experimentally understandable according to the model.

Where in the past the Maxwell theory has been the approach, there in the future should be proceeded from the equations of transformation of the field-theoretical approach. If now potential vortex phenomena occur, then these also should be interpreted as such in the sense of the approach and the derivation, then the introduction and postulation of new and decoupled model descriptions isn't allowed anymore, like the near-field effects of an antenna, the noise, dielectric capacitor losses, the mode of the light and a lot else more.

The at present in theoretical physics normal scam of at first putting a phenomenon to zero, to afterwards postulate it anew with the help of a more or less suitable model, leads to a breaking up of physics into apparently not connected individual disciplines and an inefficient specialisthood. There must be an end to this now! The new approach shows the way towards a unified theory, in which the different areas of physics again fuse to one area. In this lies the big chance of this approach, even if many of the specialists at first should still revolt against it.

This new and unified view of physics shall be summarized with the term „theory of objectivity". As we shall derive, it will be possible to deduce the theory of relativity as a partial aspect of it (chapter 6 and 28).

Let us first cast our eyes over the wave propagation.

- Starting-point: the fundamental field equation

$$-c^2 \cdot \text{curl curl } \mathbf{B} = \frac{d^2\mathbf{B}}{dt^2} + \frac{1}{\tau_2}\frac{d\mathbf{B}}{dt} + \frac{1}{\tau_1}\frac{d\mathbf{B}}{dt} + \frac{\mathbf{B}}{\tau_1\tau_2} \qquad (27.26^*)$$

- with a magnetic flux density $\mathbf{B} = \mathbf{B}(\mathbf{r}(t))$.

1$^{\text{st}}$ condition for eq. 27.26*:
the special case, if $\sigma = 0$ and $\sigma/\varepsilon = \boxed{(1/\tau_1) = 0}$. (27.16^*)

The remaining vortex term is transformed by applying already used relations (eq. 27.10 and eq. 27.17):

$$\frac{1}{\tau_2} \cdot \frac{d\mathbf{B}}{dt} = \mathbf{v} \cdot \text{grad}\frac{\mathbf{B}}{\tau_2} \qquad (27.10) \qquad\qquad \frac{\mathbf{B}}{\tau_2} = -\,\mathbf{v} \cdot \text{div } \mathbf{B} \qquad (27.17)$$

If the velocity of propagation: $\mathbf{v} = (v_x, v_y=0, v_z=0)$; $v = dx/dt$, then the simplified field equation (if the coordinates are orientated on the vector of velocity) results in the general wave equation (involved with the x-component) in the form:

$$\|\mathbf{v}\|^2 \text{ grad div } \mathbf{B} - c^2 \text{ curl curl } \mathbf{B} = d^2\mathbf{B}/dt^2 \qquad (27.27)$$

longitudinal with v = arbitrary	transverse with c = const.	wave velocity of propagation

---

2$^{\text{nd}}$ condition for eq. 27.28: $\boxed{v = c}$.

The wave equation in the usual notation (= d'Alembert/ Laplace equation, = purely a special case) now reads:

$$\Delta\mathbf{B} = \text{grad div } \mathbf{B} - \text{curl curl } \mathbf{B} = (1/c^2) \cdot d^2\mathbf{B}/dt^2 \qquad (27.28)$$

Fig. 27.13:   Derivation of the wave equations (inhomogeneous Laplace equation) as a special case of the equations of transformation of the electromagnetic field.

27.13 Derivation of the wave equation

The first wave description, model for the light theory of Maxwell, was the inhomogeneous Laplace equation, his teacher d'Alembert has been the first giving a 1 dim. solution:

$$\boxed{\Delta\mathbf{E}\cdot c^2 = d^2\mathbf{E}/dt^2} \quad \text{with} \quad \boxed{\Delta\mathbf{E} = \text{grad div } \mathbf{E} - \text{curl curl } \mathbf{E}} \qquad (27.28^*)$$

There are asked some questions:
- Can also this mathematical wave description be derived from the new approach?
- Is it only a special case and how do the boundary conditions read?
- In this case how should it be interpreted physically?
- Are new properties present, which can lead to new technologies?

Starting-point is the fundamental field equation (27.26). We thereby should remember the interchangeability of the field pointers, that the equation doesn't change its form, if it is derived for $\mathbf{H}$, for $\mathbf{B}$, for $\mathbf{D}$ or any other field factor instead of for the $\mathbf{E}$-field pointer. This time we write it down for the magnetic induction $\mathbf{B}$ and consider the special case, that we are located in a badly conducting medium, as is usual for the wave propagation in air. But with the electric conductivity σ also $1/\tau_1 = \sigma/\varepsilon$ tends towards zero (eq. 27.16*). With that the eddy currents and their damping and other properties disappear from the field equation, what also makes sense. There remains the potential vortex term $(1/\tau_2)\cdot d\mathbf{B}/dt$, which using the already introduced relations (eq. 27.10 and 27.17) involved with an in x-direction propagating wave ($\mathbf{v} = (v_x, v_y=0, v_z=0)$) can be transformed directly into:

$$-\|\mathbf{v}\|^2 \cdot \text{grad div } \mathbf{B} \quad .$$

The divergence of a field vector (here $\mathbf{B}$) mathematically seen is a scalar, for which reason this term as part of the wave equation founds so-called „scalar waves" and that means that potential vortices, as far as they exist, will appear as a scalar wave. We at this point tacitly anticipate chapter 28, which provides the reason for the speed of light losing its vectorial nature, if it is correlated with itself. This insight however is valid in general for all velocities ($\mathbf{v} = d\mathbf{r}/dt$), so that in the same way a scalar descriptive factor can be used for the velocity ($v = dx/dt$) as for c.

From the simplified field equation (27.26*) the general wave equation (27.27) can be won in the shown way, divided into longitudinal and transverse wave parts, which however can propagate with different velocity.

Physically seen the vortices have particle nature as a consequence of their structure forming property. With that they carry momentum, which puts them in a position to form a longitudinal shock wave similar to a sound wave. If the propagation of the light one time takes place as a wave and another time as a particle, then this simply and solely is a consequence of the wave equation. Light quanta should be interpreted as evidence for the existence of scalar waves. Here however also occurs the restriction that light always propagates with the speed of light. It concerns the special case v = c. With that the derived wave equation (27.27) changes into the inhomogeneous Laplace equation (27.28).

The electromagnetic wave in both cases is propagating with c. As a transverse wave the field vectors are standing perpendicular to the direction of propagation. The velocity of propagation therefore is decoupled and constant. Completely different is the case for the longitudinal wave. Here the propagation takes place in the direction of an oscillating field pointer, so that the phase velocity permanently is changing and merely an average group velocity can be given for the propagation. There exists no restriction for v and v = c only describes a special case.

• From the dual **field-theoretical approach** are derived:	• From **Maxwell's field equations** can be derived:
⇒ **Maxwell's field equations**	⇒ ∅
⇒ the **wave equation** (with transverse and longitudinal parts)	⇒ only **transverse waves** (no longitudinal waves)
⇒ **scalar waves** (Tesla-/neutrino radiation)	⇒ ∅ (no scalar waves)
⇒ **vortex and anti-vortex** (current eddy and potential vortex)	⇒ only **eddy currents**
⇒ **Schrödinger equation** (basic equation of chemistry)	⇒ ∅
⇒ **Klein-Gordon equation** (basic eq. of nuclear physics)	⇒ ∅

Fig. 27.14:   Comparison of the efficiency of both approaches.
(as an interim result, if it concerns the question, which approach of the two is the more efficient one and which one better should be discarded. The final balance is made in chapter 28).
It here concerns partial aspects of the following theories:

⇒ **theory of objectivity**	⇒ **theory of relativity**

27.14 The new field approach in synopsis

Proof could be furnished that an approximation is buried in Maxwell's field equations and that they merely represent the special case of a new, dually formulated and more universal approach. The mathematical derivations of the Maxwell field and the wave equation disclose, of what the Maxwell approximation consists. The anti-vortex dual to the expanding eddy current with its skin effect is neglected. This contracting anti-vortex is called potential vortex. It is capable of forming structures and propagates as a scalar wave in longitudinal manner in badly conducting media like air or vacuum.

At relativistic velocities the potential vortices are subject to the Lorentz contraction. Since for scalar waves the propagation occurs longitudinally in the direction of an oscillating field pointer, the potential vortices experience a constant oscillation of size as a result of the oscillating propagation. If one imagines the field vortex as a planar but rolled up transverse wave, then from the oscillation of size and with that of wavelength at constant swirl velocity with c follows a continual change in frequency, which is measured as a noise signal.

The noise proves to be the in the Maxwell equations neglected potential vortex term, which founds scalar waves. If at biological or technical systems, e.g. at antennas a noise signal is being measured, then that proves the existence of potential vortices, but it then also means that the scope of the Maxwell theory has been exceeded and erroneous concepts can be the result.

As an answer to the question about possible new technologies is pointed to two special properties.

1st potential vortices for reason of their particle nature carry momentum and energy. Since we are surrounded by noise vortices, an energy technical use of scalar waves would be feasible, where the noise power is withdrawn of the surroundings. There is evidence that biological systems in nature cover their need for energy in this way. But at least an energy transmission with scalar waves already would be a significant progress with regard to the alternating current technology of today.

2nd the wavelength multiplied with the frequency results in the velocity of propagation v of a wave ($\lambda \cdot f = v$), and that for scalar waves by no means is constant. With that wavelength and frequency aren't coupled anymore; they can be modulated separately, for which reason for scalar waves a whole dimension can be modulated additionally compared to the Hertzian wave. In that the reason can be seen, why the human brain with just 10 Hz clock frequency is considerably more efficient than modern computers with more than 1 GHz clock frequency. Nature always works with the best technology, even if we haven't yet understood it.

If we would try to learn of nature and an energy technical or an information technical use of scalar waves would occur, then probably nobody wanted to have our today still highly praised technology anymore. In the course of the greenhouse gases and the electrosmog we have no other choice than to scientifically occupy us with scalar waves and their technical use.

Equations of transformation

of the electric and of the magnetic field[i]

$$E = v \times B \qquad (27.1) \quad \text{and} \qquad H = -v \times D \qquad (27.2)$$

with: $\quad B = \mu \cdot H \qquad (28.1) \quad$ and $\qquad D = \varepsilon \cdot E \qquad (28.2)$

$$E = \mu \cdot v \times H \quad (27.3) \quad \text{and} \qquad H = -\varepsilon \cdot v \times E \qquad (27.4)$$

Experience/observation is dependent on the relative velocity v !

Written down in general with field vectors:	Written down in components in Cartesian coordinates: (unit vectors e_x, e_y, e_z)

in e_x-direction:

$H = -\varepsilon \cdot v \times E \quad$ in e_y-direction:

$E = \mu \cdot v \times H \quad$ in e_z-direction:

$$v = v_x(x(t)) = dx/dt$$
$$H = -H_y = -\varepsilon \cdot v_x \cdot E_z$$
$$E = E_z = \mu \cdot v_x \cdot H_y$$

inserted into each other: $\qquad\qquad\qquad (28.3)$

$E = -\varepsilon \cdot \mu \cdot [v \times (v \times E)] \quad$ in e_z-direction:

$E = -(1/c^2) \cdot [v \cdot \underbrace{(v \cdot E)}_{=\,0,\text{ since }\perp} - E \cdot (v \cdot v)]$

$E = +(v^2/c^2) \cdot E \qquad\qquad$ resp.:

$$E_z = \varepsilon \cdot \mu \cdot v_x \cdot v_x \cdot E_z$$
$$E_z = (1/c^2) \cdot v_x^2 \cdot E_z$$
$$E_z = (v_x^2/c^2) \cdot E_z \quad (28.4)$$

result:[ii]

$$v = c \qquad\qquad (28.5)$$

Fig. 28.1: The equations of transformation.[i]

<i>: see part 1, chap. 6.5, eq. 60
<ii>: R. W. Pohl: Einführung in die Physik, Bd. 2 Elektrizitätslehre, 21. Aufl. Springer-Verlag 1975, Seite 77, s.a. Kommentar auf Tafel 27.8
<iii>: chapter 28 is a repetition of chapter 6

28. Objectivity versus relativity

The new and field-theoretical approach contains the Maxwell-equations, but goes over and above these in one point. It describes potential vortices and their propagation in space as a scalar wave. With that can also a conclusive answer be given to the often-asked question for the medium and the mediated particles, which is a prerequisite for every longitudinal wave. Mediated are vortex structures with particle nature and the field itself functions as a medium. Is with that also answered the question concerning the aether?[iii]

28.1 The question concerning the aether

Do you know the Maxwell-experiment? No, you wouldn't be able to, since the intellectual father fast did make a backdown, after it didn't work out. Today one speaks of the Michelson-experiment and it may be connected with any other names (Morley, etc.). Remember: In his light theory Maxwell had determined a particular and constant value for the speed of light and for that there should be a physical reason, which should have its cause in the aether. By means of proving this aether Maxwell wanted to prove his theory, but this enterprise thoroughly went wrong.

The consideration was as follows: If the Earth is spinning and is moving through the cosmos, then one should be able to detect an aetherwind and different values for c in the different points of the compass. Maxwell found support for his project at the observatory, since with the aberration of the stars Bradley previously had described an observation, which could be considered as evidence for an aether. The director of the observatory charged his assistant Dr. Michelson with the task, to carry out a corresponding proof of an aether this time in a terrestrial experiment. But such an aether couldn't be proven, what Maxwell had to accept as a severe strike against his light theory. Seven years later Maxwell got the acknowledgement, however from a completely other corner by means of the experiments concerning the radio transmission of Heinrich Hertz.

Until today the question has remained open why astrophysics can prove the aether, whereas the detection in a terrestrial laboratory fails and it looks like there doesn't exist an aether. But as definition for the cause of c the aether can't be abolished as long as it is unsettled why the light is propagating with c of all possible velocities. The question is asked, what determines the propagation of light from today's point of view? Now, by means of outside fields the light can be slowed down. At present the world record lies at less than 65 kilometers per hour in a Bose-Einstein condensate. If electromagnetic fields determine the speed of light, if in addition field or gravitational lenses should confirm this, then the field takes over the task of the aether.

At this place the new field-theoretical approach shows its capabilities. The equations of transformation say nothing but that a moving H-field transforms to a resting E-field and vice versa, that thus in the place of a moving aether, the aetherwind, a resting aether is found. Doing so the dual field partners merely exchange their places. Therefore it is a wild-goose chase, wanting to measure an aetherwind with gauges, which underlie the same field (fig. 28.2).
Michelson had to fail.

The equations of transformation say:

$$\boxed{\mathbf{E} = \mu \cdot \mathbf{v} \times \mathbf{H}}$$ (27.3) and $$\boxed{\mathbf{H} = -\varepsilon \cdot \mathbf{v} \times \mathbf{E}}$$ (27.4)

- Experience/observation depends on the relative velocity $\mathbf{v}$!
- The field takes over the function of the aether (determines c) and
- an aetherwind $\mathbf{v} \times \mathbf{H}$ is measured as a resting aether $\mathbf{E}$ and vice versa!

- for $\boxed{v = c}$ the equations of transformation turn into each other and are identical $[v = v_x(x(t))]$.

- for $\boxed{v < c}$ a motion field E_v depending on v is resulting

$$\boxed{E_v = E \cdot (v^2 / c^2)}$$ (28.6)

- for $v = 0$ also $E_v = 0$.

- the motion field overlaps the E-field

- in the case of vortex fields the effect overlaps the cause and itself is the cause for a new effect.

- The overlap reaches to infinity, where each time is valid:

$$E_{n+1} = E_n \cdot (v^2 / c^2)$$ (28.7)

- the field E_0 overlaps the motion field E_v

$$E = E_0 + E_v = E_0 \cdot (1 + v^2 / c^2)$$ (28.8)

- for infinite overlap:

$$E = E_0 + E_1 + E_2 + E_3 + E_4 + \ldots + E_n + E_{n+1} + \ldots$$ (28.9)

- results in the power series:

$$E = E_0 \cdot [1 + (v/c)^2 + (v/c)^4 + (v/c)^6 + \ldots$$
$$+ (v/c)^{2n} + (v/c)^{2(n+1)} + \ldots]$$ (28.10)

Fig. 28.2: Power series as a result of a vortex overlap.

<i>: Grimsehl: Lehrbuch der Physik, 2.Bd., 17.Aufl. Teubner Verl. 1967, S. 130.

<ii>: R.W.Pohl: Einführung in die Physik, Bd.2 Elektrizitätslehre, 21.Aufl. Springer-Verlag 1975, Seite 72 und 76, bzw. 130.

<iii>: K. Simonyi: Theoretische Elektrotechnik, 7.Aufl. VEB Berlin 1979, Seite 924.

<i4>: E. Friebe: Die Vektorprodukte der Maxwell'schen Elektrodynamik, DPG-Didaktik-Tagungsband 1995, S.396

28.2 Vortices, an overlap of the overlap

Not with any approach until now the question concerning the aether could be solved. Only the new field-theoretical approach proves with the unambiguous and free of contradiction clarification of the question concerning the aether its unmatched superiority. We hence without exception work with this approach, which is anchored tightly in textbook physics. The two equations of transformation on the one hand are the law concerning the unipolar induction according to Faraday (27.1) and on the other hand the dual formulation (27.2), which Grimsehl[i] calls *convection equation*. Grimsehl goes around the question for the correct sign by means of forming a modulus. Pohl draws detailed distinctions of cases and dictates the each time relevant formulation of the dual law[ii]. The sign eventually should be chosen according to the definition of the orientation of the field pointers. Also Simonyi gives both equations and the each time appropriate experiments[iii].

If we assume the carrier of an electric field is moving with the not accelerated relative velocity $\mathbf{v}$ with regard to the reference system used by the observer, then a magnetic H-field is observed, which stands perpendicular both to the direction of the E-field and to the direction of $\mathbf{v}$. If the motion takes place perpendicular to the area stretched by E- and H-field, then the $\mathbf{H}$-field again is observed and measured as an E-field. There will occur an overlap of the fields.

In spite of that we first consider the theoretical case, that no overlap is present, and the observer as it were sees himself. The result is trivial: the relative velocity v must be the speed of light $v = c$. (28.5) If considered at the speed of light, the two equations of transformation turn into each other. They now are identical both mathematically and in their physical expressiveness. For this case it actually is possible, to derive the dual law straight from the Faraday law. For a wave propagating with the speed of light, to name an example, the field strength propagating along is always equal to the causing field strength, which depends on position.

If besides the evaluation of the values also the circumstance is considered that it concerns vectors, then at this place a problem as a matter of principle of the Maxwell theory gets visible, to which has been pointed occasionally, e.g. at the German Physical Society[i4]. The derivation of the speed of light from two vector equations requires, that c also has to be a vector. The question is: How the velocity vector $\mathbf{v}$ suddenly becomes the scalar and not pointing, in all directions of space constant factor c? Is therefore for mathematical and physical reasons „the Maxwell theory in essential parts erroneous", according to a statement of the German Patent Office[i4]?

Now, the constancy of the speed of light is a fact, which even can be derived. We at first will be content with the clue that for every observation with the speed of light, with the eyes or a gauge constructed corresponding to our perception, the vector in all its components each time is correlated to itself, by what actually the orientation of direction gets lost. Under these for c and with equal rights also for v relevant circumstances we are entitled to calculate further with the values.

An observer, who is moving with v slower than c, will besides the original E-field also observe a motion field E_v depending on the velocity v, which disappears, if v becomes zero. What he catches sight of and is able to register with gauges in the end is the overlap of both field components.

- concerning the development of the power series:

$$E = E_0 \cdot [1 + (v/c)^2 + (v/c)^4 + (v/c)^6 + \ldots$$
$$+ (v/c)^{2n} + (v/c)^{2(n+1)} + \ldots] \quad (28.10)$$

- for $\boxed{q < 1}$ the power series with $\boxed{q = (v/c)^2}$ will converge (28.11)

$$\boxed{\sum_{n=0}^{\infty} q^n = \frac{1}{1-q}} \quad (28.12)$$

- for $(v/c)^2 < 1$ resp. for $\boxed{v < c}$ therefore is valid:

$$E = E_0 \cdot [1/1 - (v/c)^2] \quad \text{resp.} \quad \boxed{E_0 = E \cdot [1 - (v/c)^2]} \,(28.13)$$

The square root of Lorentz appears in squared form[i]:

$$\boxed{(1 - \frac{v^2}{c^2}) = \frac{E_0}{E}} \quad (28.14)$$

The derivation for the magnetic field strength analogous to that provides the identical result[i]:

$$\boxed{(1 - \frac{v^2}{c^2}) = \frac{H_0}{H}} \quad (28.15)$$

Fig. 28.3 The field dilatation depending on velocity

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[i]:   see part 1, chap. 6.6

[ii]:   Prof. Dr. H.-J. Runckel, Abteilung für Mathematik IV der Universität Ulm

28.3 Field overlap

But it doesn't abide by this one overlap. In the case of vortex fields the effect overlaps the cause and itself becomes the cause for a new effect. The overlapped cause produces a further effect, which for its part is overlapping (see chap. 3).

Vortices thus arise, if overlaps for their part are overlapping and that theoretically reaches to infinity, to which I already repeatedly have pointed (fig. 3.0). In addition do vortices represent a fundamental physical principle. The Greek philosopher Demokrit has traced back the whole nature to vortex formation and that already 2500 years ago!

In the field-theoretical approach this interpretation seems to experience a mathematical confirmation, since also the fields are overlapping in vortex structures. According to that we owe our observations and our being the relative movements and the vortex formation. If reversed there wouldn't be any movement, then there also would not exist fields, light nor matter. If we observe the sky, then everything visible follows the movement of its own of the Earth, of the solar system and the whole galaxy, which is on its way with unknown galactic velocity, and all movements take place in vortex structures (fig. 10.2).

The field overlap dictated by the Faraday-approach as well reaches to infinity, what has stimulated my colleagues of mathematics to also mathematically put into practice this physical requirement[ii]. This leads to an infinite power series, which converges under the condition that $v < c$.

As a result of the power series development the well-known square root $\sqrt{1-(v^2/c^2)}$ of Lorentz occurs in squared form (see also fig. 6.6). It determines the relation of the observed and the causing field strength of the electric or the magnetic field.
Physically the found relation describes a dilatation field depending on velocity. The field strength thus increases, if the relative velocity v increases, or inversely no difference is observable anymore, if v tends towards zero.

Whoever wants to compete with Albert Einstein (1879-1955), who has developed the theory of relativity from the length contraction, which depends on velocity, could be inclined to derive a new field physics from the field dilatation. But I must warn of such a step. The derivation of the length contraction by the mathematician Hendrik Lorentz (Lorentz contraction) assumes a number of limiting conditions. The relative velocity v for instance may not experience any acceleration. Actually however almost all motion takes place as circular vortex motion, so that due to the occurring centripetal acceleration the conditions for the theory of relativity aren't fulfilled anymore. Neglects or generalizations thereby can lead to considerable errors, of which I would like to warn.
It in general is a delicate enterprise, if one wants to provide a physical interpretation for a purely mathematically won result.

This warning to the same extent also is valid for the here shown derivation of the field dilatation. The limiting conditions practically are the same as for Einstein and the problems with a provided physical interpretation won't be less. Also here lots of paradoxes will occur, which are nothing but errors of the theory. So we won't reach our destination.
There now only one further mathematical step is necessary, which links the theory of relativity with the new notion of a field dilatation depending on velocity.

Example:
Measurement of length by means of a measurement of propagation time (sound or light) with $c = L/t$ in a vehicle moving with v.
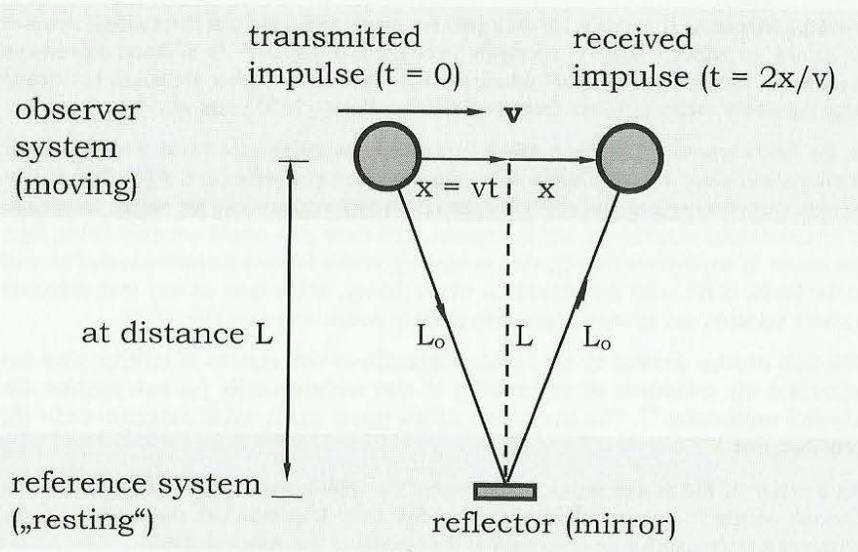
From driving time t:

$t = 2\frac{x}{v}$ = signal propagation time: $t = 2\frac{L_o}{c}$ follows $\boxed{\frac{x}{v} = \frac{L_o}{c}}$

According to Pythagoras: $L_o^2 = L^2 + x^2 = L^2 + L_o^2 \cdot (v^2/c^2)$

$$L_o^2 \cdot (1 - v^2/c^2) = L^2$$

the shortening of the rule results in:

$$\boxed{(1 - \frac{v^2}{c^2}) = (\frac{L}{L_o})^2} \qquad (28.16)$$

Fig. 28.4:   Derivation of the length contraction

Examples: contraction according to Lorentz transformation, measurable length shortening, curvature of space.

Counterexample: unsuccessful aether detection (Michelson experiment)

28.4 The derivation of the length contraction

The Lorentz transformation is the result of a purely mathematical problem. Stimulated by the surprisingly result of the Michelson experiment the Dutchman Hendrik A. Lorentz 1891 asked himself, how the equations of the Galilei-transformation would have to look like, if the propagation of light wouldn't be infinitely fast but finite and constant. He thereby proceeds from the assumption of two inertial systems moving against one another with a not accelerated velocity v, in which the laws of Newtonian physics are equally valid[i]. As a result of the relative motion a change of the length measures will occur.

This at first can be explained as a purely geometric effect in the context of nonrelativistic physics. We imagine a vehicle, which is on its way with constant velocity, and emits an optical or acoustical signal. Sideways in the countryside is standing in a perpendicularly measured distance L a reflector (mirror), which sends the signal back again. The velocity of the signal however isn't infinitely fast and from that follows that the vehicle during the propagation time of the signal as well has moved a bit further. The actual way, which the signal had to cover now amounts to L_o (> L). The distance measure thus is observed smaller as it is in reality, to be specific for the factor of the square root of Lorentz (fig. 28.4).

$$L = L_o \cdot \sqrt{1 - (v^2/c^2)} \qquad (28.16)$$

According to the principle of relativity it doesn't play a role, if the vehicle is driving or if it is standing still and the mirror is moving with a linear uniform velocity.

Initially Einstein also only spoke of an observable length contraction, which „must not necessarily occur in reality, an optical deception so to speak. Lorentz however proceeded from the assumption of a physical length change, thus a length change existing in reality, what in practice at first makes no difference. If e.g. at relativistic velocities a rocket becomes smaller, then the pilot equally shrinks, so that it would not be possible to notice a present difference.

If however the observer stands outside the events and takes a „neutral standpoint", then he will be able to see, which interpretation is the right one. Today some examples are known. In accelerators particles at relativistic fast velocities actually get smaller for the factor of the square root of Lorentz. That has been proven and this result afterwards gives the Dutchman Lorentz right! The followers of the physical length contraction also are called Neo-Lorentzians.

In the vicinity of a gravitational mass the speed of light becomes so slow, that the shortening factor plays a role and space is curved towards the mass. To understand this shortening of scale, the influence of the field also should be considered.

[i]:   Example: In a closed lift physical experiments are being carried out. Accelerations of the lift have an influence on the experiments. However no influence can be detected, if the lift is standing still or is moving with constant velocity. It with that fulfills the conditions of an inertial system. The question is: what do the experiments show someone standing outside, whom the lift passes by?

From the comparison of the <u>Lorentz contraction</u> (28.16)
with the <u>field dilatation</u> (28.14 and 28.15)

$$\boxed{\left(1 - \frac{v^2}{c^2}\right) = \left(\frac{L}{L_o}\right)^2} \quad \overset{!}{=} \quad \boxed{\left(1 - \frac{v^2}{c^2}\right) = \frac{E_o}{E} = \frac{H_o}{H}}$$

follows

$$\left(1 - \frac{v^2}{c^2}\right) = \boxed{\left(\frac{L}{L_o}\right)^2 = \frac{E_o}{E} = \frac{H_o}{H}} \qquad (28.17)$$

the proportionality (length measures depending on field):

$$\boxed{E, H \sim 1/L^2} \quad \text{and} \quad E_0, H_0 \sim 1/L_0^2 \qquad (28.18)$$

Experimental examples[i]:

- Electrostriction (piezo speaker)
- Magnetostriction
- Field or gravitational lenses
- Curvature of space, deflection of light

Conclusion[ii]:

- The field determines the length measures (what is 1 meter)
- The field determines the velocities v (in m/s)
- The field determines the speed of light c [m/s]
- Measurement of the speed of light is made with itself:

$$\boxed{c \sim r} \qquad (28.19)$$

- Measured is a constant of measurement c = 300.000 km/s
- The speed of light c is not a constant of nature.

Fig. 28.5: The dependence of the Lorentz contraction on the field

28.5 The dependence of the Lorentz contraction on the field

The two results of the field dilatation (28.14 and 28.15) and of the Lorentz contraction (28.16) must be brought together and compared (28.17). Doing so the mathematical expression of the square root of Lorentz is cancelled out. That is of utmost importance, since with that also all limits disappear and there remains a purely physical relation, a proportionality of utmost importance (28.18).

What was the sense of the limits associated with the introduction of so-called inertial systems, which are the basis of the Lorentz transformation and which were adopted for our derivation of the field dilatation? They now only are auxiliary considerations according to model. We have chosen a very simple model, which can be described mathematically, in which an observer holds in his hand gauges for distances and field strengths and with that gauges a system flying by with constant velocity. He on the one hand determines a length contraction and on the other hand a field dilatation. He compares both with each other and comes to the conclusion: **The field determines the dimensions.**

This statement is purely physical and it is generally valid. It is independent of the relative velocity and all other mathematical conditions. A centrally accelerated circular motion e.g. will falsify the length contraction to the same extent, as the at the same time occurring field dilatation. It can be expected, that in addition to the square root of Lorentz also other errors will mutually efface, so that a generalization in this case actually seems to be allowed.

The won proportionality is of most elementary importance. We use it in the case of the piezo speaker and know it from the curvature of space and deflection of light in presence of extreme fields. If we ourselves however are exposed to the field as an observer, in which also the object to be observed is situated, then we are in the dilemma, not being able to perceive the influence. If we, to stay with the example, would sit in a rocket and this would become smaller at faster velocity, then we would notice nothing, since we also would shrink along to the same extent.

That concerns every measurement of velocity in general and the speed of light c in particular, which as is well-known is measured in meters per second. But if the field determines c and in the same way the length measure, which is given in meters, then both stand in a direct proportionality to each other, then we won't have the slightest chance to measure the speed of light. If namely c is changed, then this concerns the measurement path in the same way. Now the variable is measured with itself and as a result appears c, a constant value. We neither can see the change, since our eyes scan all objects optically and that means with c.

It is the nightmare of each and every measurement engineer, if the gauge depends on the factor to be measured. No wonder, if the theorem of addition of the velocities apparently loses its validity and always the same c is being measured, independent of the direction in which the source of radiation is moving (chap. 6.11). The result is:

The speed of light is a constant of measurement and not a constant of nature!

If however the light is scanned with the speed of light, then also all components of the light vector correlated with themselves result in the same constant value c, then actually the vector of the speed of light loses its orientation in space and becomes a scalar factor. The Maxwell equations already anticipate this circumstance, but without providing an explanation why this is correct. Only the new field approach can answer the open question. With the derivation an axiom of physics – one also can say stumbling block – has been overcome.

The field strength determines the
length measure:
(the distance L between the spheres)[i]

$$E, H \sim 1/L^2 \qquad (28.18)$$

Orbital curvature
depending on field

V_{inside} $V_{outside}$

sun   Earth
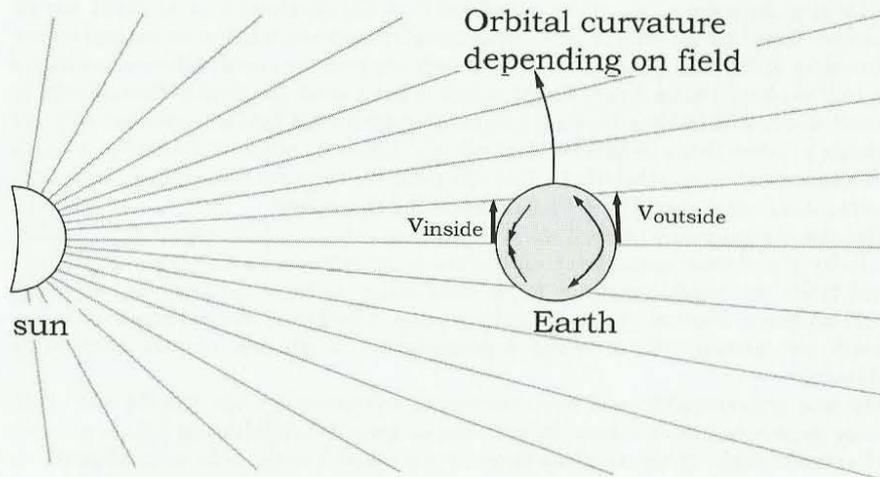
Fig. 28.6 A: The curvature of the Earth in the gravitational
field of the sun

L
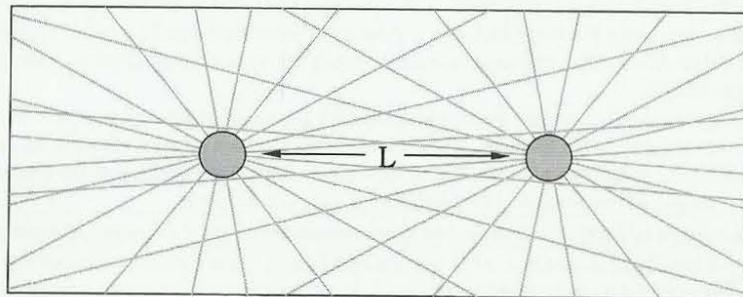
Fig. 28.6 B: Force of attraction and reduction of the distance L
as the mutual field influence of two masses.

<i>:   Repetition of part 1, chapter 6.7

28.6 Boscovich and the respiration of the Earth

Who has got a good idea, fast will find that some other scientist had the same idea already before, and for his part possibly already had to make the same experience. If in spite of that the track fast loses in history, it as a rule is because of the insufficient citing and the vanity of the discoverers, who in reality only are rediscoverers of a much older knowledge.

The dependence of the length measures on the field (eq. 28.18) in the mathematical form of the derivation however should still be quite new. But the physical consequence already was described by the Jesuit priest Roger Joseph Boscovich from Dalmatia in 1755[i]. He was Professor for mathematics and theology in Rome and spoke about the world on the one hand being deformable, similar to rubber, but on the other hand we aren't able to perceive this, since our body is made of the same material and follows all changes. „We in an absolute way can recognize neither the place, nor distances or orders of magnitude", writes Boscovich in his book about space and time and writes how these are perceived by us[ii]. He suspects that the Earth unobservable for man „is respiring".

Actually a terrestrial observer at daytime is situated closer to the sun than in the night. He by day is exposed to a slightly stronger field and as a result correspondingly smaller. He himself and all objects in his neighbourhood are subject to an identical fluctuation of size, so that this „respiration" of the Earth cannot be detected. It can be detected neither with a tape measure nor with an optical measurement and still is present in reality. Only from a neutral standpoint we can succeed to recognize the actually existing curvature of space (fig. 28.6 A).

An example is the duration of the sunshine at the equator, which is longer than can be expected from the spherical form of the Earth. This reveals, how the Earth is bending towards the sun (see also chapter 6.7).

A further example is the influence of the field on the orbital velocity of the Earth measured in meters per second. Here also the meter at daytime is smaller than in the night, for which reason the Earth is moving slower on the side turned towards the sun, like a track vehicle, which drives a turn, if the chain at the inside runs slower than on the outside. If the Earth describes an orbit around the sun, then this circumstance has to do nothing at all with centrifugal force or with a force of attraction of the sun. The circular motion simply and solely is a result of the field influence of the sun[iii].

The force idea proves to be a pure auxiliary description. In the context of Newtonian mechanics the force plays a central role. Without question it is a very efficient and subjective perceptible description, which still isn't able to reproduce the physical reality in an objective manner. What keeps the planets into their orbit is only the field of the sun, which we call gravitational field and not some force! But of which kind is the gravitation and the field, which causes masses to come closer together and following our subjective observation attract each other (fig. 28.6 B)?

<i>:   O. E. Rössler: Endophysics, the World as an Interface, World Scientific
Publishing Co. 1998, Kap. 10, S. 87-112, mit Übersetzungen aus <ii>:

<ii>:   R. J. Boscovich: De spatio et tempore, ut a nobis cognoscuntur, 1755.

The length measure (the distance L between the spheres)[i]
is determined by the field strength:
(= law oft the inverse square of a distance) $\boxed{E, H \sim 1/L^2}$ (28.18)

A. Charged mass points (electrons, positrons, ions,...):
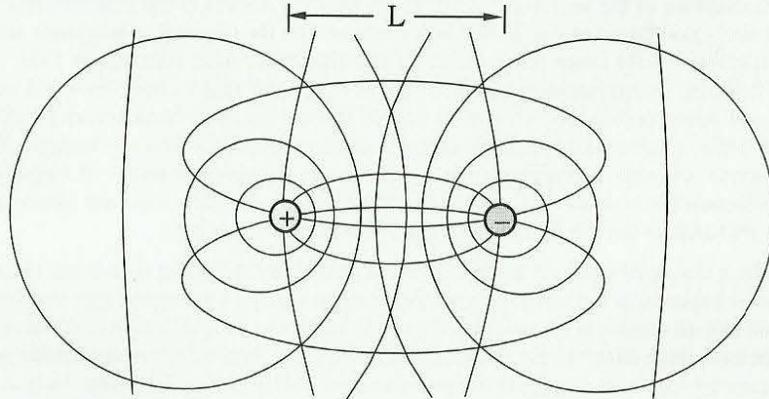
B. Uncharged mass points (neutrons, atoms, ...):
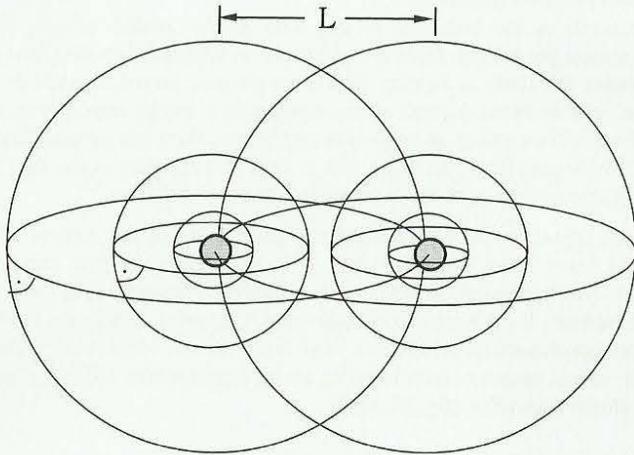
Fig. 28.7:   Observation of a mutual force of attraction because
of the effect of the fields on the distance measure.

<i>:   Repetition of part 1, chapters 6.7 – 6.9 and part 2, chapters 10.4 and 15.2

28.7 Derivation of the gravitation

In fig. 28.6B the relation between the field influence and the observed force of attraction of two mass bodies is represented. If I in my mind for instance „switch on" the field lines of both bodies, which are placed at distance L, then the fields according to equation 28.18 reduce the measure L and optically come each other closer. With increasing proximity the field line density increases, so that L further decreases. We observe a mutual attraction, which lets both bodies move towards each other.

In fig. 28.7A the two bodies carry an electric charge. For different polarity the field lines as is well-known run from the positive pole to the negative pole, to bundle up there. As a matter of principle also here an attraction can be expected, which is called electromagnetic interaction. For the reason of the bundling up of the field lines this effect however will turn out to be considerably stronger. Hence the electromagnetic interaction is for many powers of ten more powerful than the gravitation.

Furthermore there also can occur repulsion, if in the case of like charge the field lines are bent aside and between the two bodies an area is formed, where the field tends towards zero and the distance measure L (according to eq. 28.18) as a result towards infinity. The electromagnetic interaction theoretically indeed reaches to infinity. Responsible are the open field lines arising from a charged body.

Now every charged body in addition has a mass, with which it takes part in the gravitation. Let's remember the comparison of the derivations. The Maxwell theory teaches us that in the static case E- and H-field are decoupled, because each time the other field disappears. Even if as a result of the unipolar induction for every open field line the other one is taken to be standing perpendicular to the open field line, then this other line just wraps around the open field line and forms a closed-loop field line. In that way it can't be influenced anymore from the outside and can be neglected, so goes the doctrine, which is drawn from the Maxwell theory (fig. 27.5).

This is a fatal error in reasoning. The equation 28.19 naturally is valid for open field lines in the same manner as for closed ones. These fields also lead to an observable force of attraction. *If of course exactly those fields are neglected, which are responsible for the gravitation, then we need not wonder, if we don't understand the gravitation and the nature of this interaction.*

The influence of the closed field lines responsible for the gravitation is due to the missing bundling up of the lines correspondingly weak. Secondly these can't exist a force of repulsion due to the missing ability to influence closed field lines from the outside and third it can be recorded that all charged bodies also have a mass. All three statements of the field lines model perfectly cover the physical reality.

Fig. 28.7 B shows uncharged bodies, for which both the field lines of the E-field and of the perpendicular to them arranged H-field are closed-loop. Such bodies, like e.g. neutrons or whole atoms without charge behave electrically neutral to the outside, but have a mass for the reason of the closed field lines, whereby the field lines of the H-field dominate those of the E-field[i].

<i>:   Repetition of K. Meyl: EMEC part 1, chap. 6.8 + 6.9, part 2 chap. 15.1
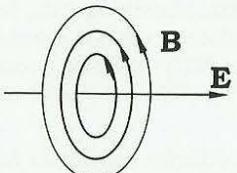
Dual field approach	/	The Maxwell field
		$\mathbf{E}$ = neglectible, $\mathbf{B}$ = constant.
E and **B** are <u>coupled</u>	/	<u>decoupled</u> (approximation)
The closed field lines by no means are without influence: They cause the **gravitation** !		If the Maxwell field neglects the field factor, which leads to the gravitation, it isn't astonishing, if the gravitation remains not understood.
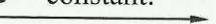
● The following physical standpoints can be distinguished:		
subjectivity (laboratory physics, observable)	**relativity** (mediator role) (transformation)	**objectivity** (not observable)
● Exemplary theories and their representatives:		
Newton Maxwell	Poincaré Einstein	Boscovich *(Meyl)*
● With the associated transformation:		
Galilei-transf. for $c = \infty$	Lorentz-transf. c = constant	*(new transf.)* c = variable

Fig. 28.8: Physical standpoints

28.8 From subjectivity to objectivity

With the field lines interpretation, which by the way already preferably was used by Faraday, the gravitation proves to be an until now neglected influence of the electromagnetic field. With that for the first time also the grand unification of the interactions was successful. The long sought-for **unified theory** with that for the first time comes within reach.

The derivation has made it possible to mathematically secure the theoretical working model of Boscovich. Already 1755 Boscovich points out the optical deception, which our observation underlies, if absolute orders of magnitude in our neighbourhood should change and our perception would change along. Then also all metric and optical measurement results would underlie this change. Following the idea of Boscovich I distinguish between subjectivity and objectivity.

The **relativity** is a compromise lying between both points of view, where a neutral standpoint is strived for, which lies outside the events. And from this standpoint the objectively taking place events are being observed. The theory of relativity consequently is a pure observer theory with strongly restricted scope on the basis of the Lorentz-transformation.

Theories of classic physics, like e.g. Newtonian mechanics, fall in the domain of **subjectivity**. The results and regularities are won in a terrestrial laboratory if possible isolated from the environment, where they have absolute validity. Here the Galilei-transformation is valid.

But if these subjectively won laws are applied to the microcosm in quantum physics or to the calculation of cosmic observations, one fast hits limits. The better the resolution of the microscopes and telescopes gets, the clearer the „outside" observer realizes, how much the laws of classic physics lose their validity.

Astrophysics successfully reaches for the **theory of relativity**, which with the curvature of space in the vicinity of mass centres delivers useful explanations. Here the dependence of the spatial dimensions on the field already could be established. In contradiction to that this fundamental relation is said to play no role whatsoever in quantum physics, or in all terrestrial laboratory experiments. But with which right may physical regularities from one domain be ignored in others? There only can exist one physics and that should be sought for.

What we need is **objectivity**. Behind all the apparently disconnected phenomena of physics work quite simple laws, which can't be observed and are until now not recognized by us. Objective physics in the words of Goethe is the one, which holds the world together in the heart of hearts. I call this, already by Boscovich suggested point of view, **theory of objectivity**. The access to the model domain of objectivity must be made mathematically by means of a transformation, since it is blocked for us by means of measurements or observations (see chapters 6.15-6.19). The transformation back into the observation domain must be made according to the same mathematical relations (fig. 28.9). In this way the quantum properties of the elementary particles can be calculated with high accuracy and agreement with the values, which until now only could be measured (chapter 7).

Approach: $\boxed{r = c \cdot t}$ (determine distance by signal prop. time)
(27.23)

$\boxed{dr = c \cdot dt + t \cdot dc}$ (total differential for a change)
(27.24)

$$\boxed{c = \frac{dr}{dt} - t \cdot \frac{dc}{dt}} \quad \text{resp.} \quad \boxed{t = \frac{dr}{dc} - c \cdot \frac{dt}{dc}} \qquad (27.25)$$

$$c = \frac{dr}{dt} - t \cdot \frac{d^2r}{dt^2} + t^2 \cdot \frac{d^3r}{dt^3} - t^3 \cdot \frac{d^4r}{dt^4} + t^4 \cdot \frac{d^5r}{dt^5} - \dots \quad (27.26)$$

resp.

$$t = \frac{dr}{dc} - c \cdot \frac{d^2r}{dc^2} + c^2 \cdot \frac{d^3r}{dc^3} - c^3 \cdot \frac{d^4r}{dc^4} + c^4 \cdot \frac{d^5r}{dc^5} - \dots \quad (27.27)$$

The Taylor-series (27.26 and 27.27) breaks off after the first term, if

$c = \text{constant}$ resp. $t = \text{constant}$

$\boxed{dr = c \cdot dt}$ resp.: $\boxed{dr = t \cdot dc}$

$\boxed{\Delta r = c \cdot \Delta t}$ resp.: $\boxed{\Delta r = t \cdot \Delta c}$ (27.28)

$\boxed{\text{theory of relativity}}$ $\boxed{\text{theory of objectivity}}$

$\boxed{\Delta r \sim \Delta t}$ resp.: $\boxed{\Delta r \sim \Delta c}$ means:
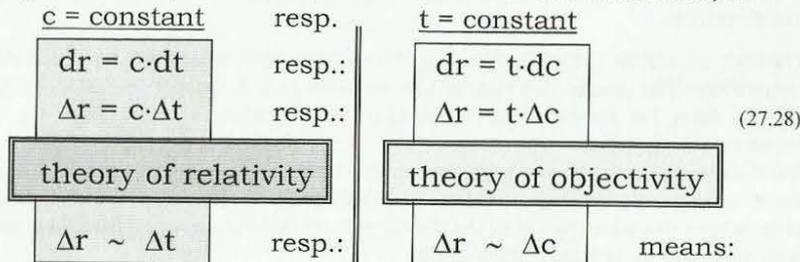
from: length contraction   variable speed of light

follows: time dilatation   dependency of meter measure

for absolute speed of the light   for absolute time

     observation domain   model domain
     (measurable)   (can only be calculated)
       $x(r)$ ○———————● $M\{x(r)\}$

Model transformation of the length measures

Fig. 28.9:   Theory of relativity and theory of objectivity
          and the model transformation between both
          physical standpoints

<i>:   Repetition of part 1, fig. 6.16

28.9 The objective standpoint

The question is asked how one gets to an objective physical standpoint, which in addition evades every observation? The way leads over a transformation, to which all perceptible and measurable relations must be submitted.

If we for instance measure the distance r to a point light source, then the propagation of the light c and the propagation time t determine the distance measure $r = c \cdot t$

If there occurs a little change of the distance, then two causes should be considered: Either the propagation time or the speed of light have changed somewhat. With that the two possible standpoints already would have been found.

The *relativistic standpoint*, which proceeds from the assumption of the speed of light being constant, says: the propagation time varies and we are dealing with a clock problem. If namely for relativistic velocities a length contraction occurs, then from that necessarily follows a time dilatation.

But actually no specific statement can be made about the constancy of the speed of light, besides that we look at, measure and scan everything with c and hence only observe the constancy. With that the theory of relativity remains a pure observer theory, exactly as Einstein originally called it into existence. This standpoint follows the motto: What can't be observed also doesn't need to interest the physicist.

The *objective standpoint* strives for more, for a description of the actually taking place processes. This time we proceed from the assumption of a universal and constant time with the argument: The time measure is an immutable definition and the physicist, who dictates this, himself determines what is simultaneousness. Then there also is no place for time travel and for clocks going wrong.

Therefore the speed of light can take all possible values always in strict proportionality to the length measures. Thus the measured length and distance measures should be transformed and that in the end is the unit „meter", which should be replaced by an objective measure.

With that the necessary *transformation for variable c* would be outlined. This transformation will be enqueued in the file of the big transformations. From it the *Lorentz-transformation for c = constant* emerges as a special case, like already from that transformation the *Galilei-transformation* follows *for c = ∞*. How now the relation of the subjective to the objective „meter" should be determined; by means of the relation of the relevant fields (eq. 28.17) or by means of the square root of Lorentz (eq. 28.16), over that should be worked and spoken. We already have successfully gone through it in a concrete example (chapter 7).

Every theory is judged according to its expressiveness. Ending this chapter the statements and derivations hence again are compared. On the one hand the Maxwell theory and from that the theory of relativity can be derived from the new approach, on the other hand a long list follows, which can't be connected with the Maxwell equations, like e.g. the gravitation. For instance the neutrino and all other elementary particles with all their specific quantum properties are derived (chapter 7), free and easy fundamental laws result, like the law of conservation of energy, and even the temperature spills its until now kept secret (chapter 8.3). Remains the conclusion: With no other approach according to the textbooks until now the efficiency of the new approach could be obtained.

• From the dual **field-theoretical approach** are derived:	• From **Maxwell's field equations** can be derived:
⇒ **Maxwell's field equations**	⇒ ∅
⇒ **Quantum properties of the elementary particles**	⇒ ∅
⇒ **Neutrino** (as an oscillating ring-like vortex)	⇒ ∅
⇒ **Gravitation** (as a result of closed field lines)	⇒ ∅
⇒ **Unified theory** (grand unification of all interactions)	⇒ ∅
⇒ **Temperature** (as an oscillation of size depending on field)	⇒ ∅
⇒ **Law of conservation of energy** (and many other fundamental laws of physics)	⇒ ∅
⇒ **Theory of objectivity**	⇒ **Theory of relativity**

Fig. 28.10:   Comparison of the efficiency of the approaches (final balance)

29. Mathematical gleanings

If, proceeding from the new field-physical approach, well-known and accepted theories are derived as special cases, this on the one hand can be valued as evidence for the correctness of the approach. On the other hand the new approach in part significantly influences the interpretation of the derived theories. That can involve a rethinking, with which not insightful people have difficulties, if for instance quantum physics, thermodynamics or the gravitation become partial aspects of electromagnetism.

Over and above that are hidden many new thing in the new approach, which are there to discover. To that are counting among others the potential vortices and the scalar waves. One can work out these phenomena physically or mathematically, where the latter way as a rule is the faster one. Hence the summary shall be concluded with a kind of mathematical gleanings.

29.1 General and special theory of relativity

Albert Einstein distinguishes between general and special theory of relativity. Whereas the special (SRT), still is linked tightly with the prerequisites of the Lorentz-transformation, the general (GRT), deals with an extension to arbitrary systems, which mustn't be inertial systems. I would like not to dwell upon the GRT, as Einstein designed it, and merely notice that every generalization represents a possible source of errors and has to be well founded.

In the case of our derivation, the general case as it were resulted of its own accord. Let's turn back: If the root of Lorentz still was a component of the derived field dilatation (28.15) and equally of the length contraction (28.16), then it fell out in the comparison of both results (28.17). With that the important result, the proportionality (28.18), which among others results in the gravitation, becomes independent of the speed of light and the relative velocity v. This last step is obvious and still completely new. It cannot be found at Einstein, who in another way finds his GRT and his description of the gravitation.

Even if here is striven for the same goal, then deviations in the result cannot be excluded because of the differences in the derivation, for which reason I additionally mark the by me derived general relativity (GRT'), to avoid confusion.

Influence of the Lorentz-transformation in the:

SRT   (special theory of relativity): one-dimensional,

GRT' (general theory of relativity): three-dimensional, to a
      large extent corresponding to the GRT of Albert Einstein,

GOT   (general theory of objectivity)

Discussion of the root of Lorentz $\sqrt{1 - v^2/c^2} = \sqrt{1 - \beta^2}$ with $\beta = v/c$
resp. the γ-factor: $\gamma = 1/\sqrt{1 - v^2/c^2}$ (29.1)

Being transformed are:		**SRT**	**GRT'**	**GOT**
Length measures (length contraction eq. 28.16)	L [m]	$\sim 1/\gamma$	$\sim 1/\gamma$	$\sim 1/\gamma$
Areas (circular motion)	A [m²]	$\sim 1/\gamma$	$\sim 1/\gamma^2$	$\sim 1/\gamma^2$
Volumes (vortical motion)	V [m³]	$\sim 1/\gamma$	$\sim 1/\gamma^3$	$\sim 1/\gamma^3$
Time measures	t [s]	$\sim 1/\gamma$	$\sim 1/\gamma$	= const.
Velocities (v = L/t)	v [m/s]	= const.	= const.	$\sim 1/\gamma$
	c [m/s]	= const.	= const.	$\sim 1/\gamma$
Constants of material (ε·μ = 1/c²)	ε [As/Vm]	= const.	= const.	$\sim \gamma$
	μ [Vs/Am]	= const.	= const.	$\sim \gamma$
Relativistic mass (increase in mass)	m [kg] [=VAs³/m²]	$\sim \gamma$	$\sim \gamma$	$\sim \gamma^2$
Energy	W [VAs]	$\sim \gamma$	$\sim \gamma$	= const.
Energy density (w = W/V)	w [VAs/m³]	$\sim \gamma^2$	$\sim \gamma^4$	$\sim \gamma^3$
E-, **H**-field strength (w = (ε·E² + μ·H²)/2)	**E** [V/m]	$\sim \gamma$	$\sim \gamma^2$	$\sim \gamma$
	H [A/m]	$\sim \gamma$	$\sim \gamma^2$	$\sim \gamma$
Power density (Poynting vector **p** = **E** x **H**)	**p** [VA/m²]	$\sim \gamma^2$	$\sim \gamma^4$	$\sim \gamma^2$
D-field, **B**-field (**D** = ε·**E** ; **B** = μ·**H**)	**D** [As/m²]	$\sim \gamma$	$\sim \gamma^2$	$\sim \gamma^2$
	B [Vs/m²]	$\sim \gamma$	$\sim \gamma^2$	$\sim \gamma^2$
Power	P [VA]	$\sim \gamma$	$\sim \gamma^2$	= const.

Fig. 29.2   Transformation table between SRT, GRT' and GOT

29.2 Transformation table

Let's speak again about the difference to the special relativity (SRT). This so to speak deals with the one-dimensional case of the uniform motion of a reference system in x-direction ($v = v_x$), as specified by the Lorentz-transformation, where only the x-components and not those in y- or z-direction are being transformed. As already mentioned this is a purely theoretical case, which in practice occurs next to never. Normal is circular and vortical and with that accelerated motion, where the velocity component permanently changes its direction.

The derived result of the general relativity (GRT') does justice to this circumstance. Even if this at first only has been derived for the x-direction it nevertheless is valid equally in y- and z-direction. It even remains valid for the case that we base on a path of arbitrary form of a spatial field vortex. In this case some components continually occur in all directions of space, so that the relative velocity v as already the speed of light c loses its vectorial nature. With that the transition of the SRT to the GRT is carried out.

By means of the spatial swirling the electric and magnetic field pointers at the same time turn into scalar factors, by taking over the function of the aether. Let us remember that even Einstein in his GRT was forced to again introduce the aether, which in the SRT still was unnecessary.

It therefore makes a difference in the transformation of physical factors, if we base on a one-dimensional (SRT) or a three-dimensional spatial description (GRT). Length measures in x-direction in both cases must be converted using the root of Lorentz. Usually the relativistic γ-factor is introduced, which is inverse to the root of Lorentz

$$\gamma = 1/\sqrt{1-v^2/c^2}) \qquad \text{with} \quad x_0/x = \gamma \qquad (29.2)$$

If thus individual length measures would be subject to a length contraction following the γ-factor, then a volume V according to the SRT must be transformed with γ, according to the GRT' however with γ^3.

As is well-known a relativistic increase in mass is converted with the γ-factor and in the same manner the to that proportional energy $E = m\,c^2$. If we however correlate the energy to the volume V and in that way determine an energy density w, then the difference between SRT ($w \sim \gamma^2$) and GRT' ($w \sim \gamma^4$) again has its maximum effect.

A relation to the field factors of E- and H-field is for instance provided by the energy density of a wave field

$$w = (\varepsilon \cdot E^2 + \mu \cdot H^2)/2 \qquad (29.3)$$

According to that the field strengths in the one-dimensional case of the SRT should be converted with the γ-factor, in the case of the GRT' however with γ^2, in accordance with the derivation in chapter 28. This circumstance willingly is overlooked, although it only concerns the textbooks and the today valid theory of relativity. I however point to the difference, since it does make a difference if we start with the SRT or the GRT when we change to the general theory of objectivity (GOT).

In the domain of the GOT all length measures should be transformed. The respective dimension gives information with which power the γ-factor occurs (fig. 29.2). The unit meter is responsible for that.

| Discussing the root of Lorentz $\sqrt{1-\beta^2}$ | | $= 1/\gamma =$ | $\sqrt{1-(v^2/c^2)}$ | |

mathematical consideration:		$v = 0$	$v < c$	$v = c$	$v > c$
Abbreviations:	$\beta = v/c$	$0 <$	$\beta < 1$	$\beta = 1$	$\beta > 1$
and:	$\gamma = 1/\sqrt{1-\beta^2}$	$1 <$	$|\gamma|<\infty$	$\gamma = \pm\infty$	imaginary
and:	$\gamma^2 = 1/(1-\beta^2)$	1	positive	$\gamma = +\infty$	negative
and:	$\gamma^4 = 1/(1-\beta^2)^2$	$1 <$	positive	$\gamma = +\infty$	positive
Examples: Increase in mass, energy $\sim \gamma$ for SRT and GRT		1	positive	$\pm \infty$	complex
Field strength in GRT': $\mathbf{E, H} \sim \gamma^2$ and mass in GOT: $\quad m \quad \sim \gamma^2$		$1 <$	$\mathbf{E, H}<\infty$ positive	$+ \infty$	$\mathbf{E, H} < 0$ negative
Energy-, power density $\sim \gamma^4$ (Poynting vector) in GRT:		$1 <$	$\mathbf{P} < \infty$ positive	$\mathbf{P} = +\infty$	$\mathbf{P} < \infty$ positive

Fig. 29.3   Discussion concerning the root of Lorentz

- The special theory of relativity SRT only is defined for $v < c$

- For $v > c$ particles with a complex mass, but with a real energy density (according to GRT') would result.

- From the point of view of the theory of objectivity (GOT) the mass should be taken negative-real (neutrino?).

29.3 Discussion concerning the root of Lorentz

Fig. 29.2 forms the basis for the transformation in the domain of the GOT, the general theory of objectivity, where it plays a role, if a subjectively measured factor should be converted from the laboratory domain or a relativistic factor according to the SRT or the GRT'. The given proportionalities thereby should be put in the respective relation. In this way results the respective valid instruction for transformation on the basis of the root of Lorentz.

Let's take a critical look at the root of Lorentz. The velocity v occurring in it, of whatever this may consist, is depending on the field according to equation 28.14 + 28.15. It strictly speaking wouldn't be constant anymore and wouldn't belong in a general instruction for transformation at all. Only, what is valid for v, is valid to the same extent for c. Since only the proportion of v/c occurs in the root of Lorentz every influence depending on field or of other nature will have no effect on v/c and the value of the root of Lorentz. It in any case will retain its value. It fulfills for itself the condition of the Lorentz invariance.

According to that in the case of the relative velocity v it doesn't depend on the absolute value, but only on the relation to the speed of light. In addition the restriction to values of $v < c$ is normal, if the speed of light is seen as an upper limit. Let's first purely mathematically draw a case distinction for different velocity domains of v. For $v = 0$ the root of Lorentz becomes one and the Lorentz transformation turns into the Galilei transformation.

Connected to this is the today well-known and technically used domain up to the limit of $v = c$. It virtually is impossible to accelerate a mass particle to the speed of light, since mass, field and energy would grow towards infinity, as is clear from the table (fig. 29.2). Particles as fast as light, like photons, hence cannot have a mass. At $v = c$ a singularity is present.

In a field theory, which also deserves this name, however an upper limit must not be present. Hence also the case for $v > c$ should be required theoretically. Only later we will be able to judge if this makes sense physically. We at first only want to examine the case mathematically. Mass, field and energy now again have a finite value, there however results a complex, purely imaginary mass, a negative field and doing so, as already before a positive energy and power density.

There sometime has been the textbook opinion that it is physically impossible to fly faster than sound. This erroneous statement even could be proven „scientifically", because such a supersonic airplane would fly off the observation space and with that wouldn't be real anymore, thus from a mathematical viewpoint would be complex. Anyone, who in New York gets off a Concorde, can confirm that everything at any moment of the flight was real. Only the observer is deceived, if the airplane flies somewhere else, than he perceives it. Is the speed of light also such a „sonic barrier", which by the majority of the scientists since Einstein until today still is thought to be insurmountable?

How should one physically imagine a complex mass? Let us remember the alternating current teachings, where it is normal to work with complex values, since the mean values of the oscillating alternating currents, tension voltages and fields are zero. Calculating with mean values would result in zero energy and power. Hence complex factors are introduced and the root mean square values are calculated and measured instead of the mean values. Could a complex mass analogously not concern an oscillating particle, a particle, which in addition is faster than the light?

- Physical example:

neutrino = mean of the oscillating mass ≈ zero
            RMS value of the complex mass ≠ zero
            E- and **H**-field with inverse sign
            carrier of positive energy and power

ν-model: ring-like vortex oscillating from e^- to e^+ [i]
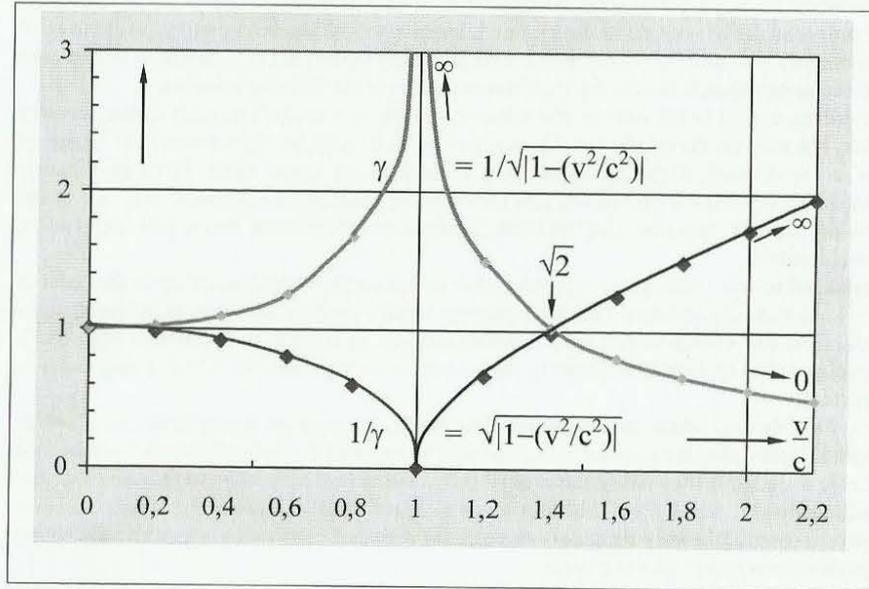
Examples from the general theory of relativity (GRT):

(28.16):   length contraction $L \sim 1/\gamma = \sqrt{1-(v^2/c^2)}$

(6.19):   increase in mass $m \sim \gamma = 1/\sqrt{1-(v^2/c^2)}$

(6.6, 28.15) field dilatation $\mathbf{E} \sim \mathbf{H} \sim \gamma^2 = 1/(1-v^2/c^2)$

Fig. 29.4:   Root of Lorentz for speeds faster than light (v > c)

29.4 Mathematical derivation of the neutrino

In the domain of speeds faster than light, for v > c, the power series (28.12) does not converge anymore and every observer theory and every observation (fig. 28.4) will fail, because particles faster than light run away of their own visible appearances. Every measurement and every observation inevitably is behind and hardly can be assigned to the actual cause. That way for instance measured neutrino events are being connected with celestial observations, with which they haven't got anything to do at all.

If we however describe the domain v > c in the complex plane, then astonishing results are found, which could be verified physically: a complex length dilatation with increasing velocity goes along with a loss of complex mass. The oscillating fields, energy and power density however would be real with negative sign.

Thus there would result particles carrying energy with an oppositely poled field, with an oscillating mass and if necessary also an oscillating charge. Without static mass and charge these particles hardly would interact with normal matter, which leads to an enormous ability of penetration. The only physical particles, which have such a property, are the neutrinos. With that a usable and an extremely efficient model description has been found for these particles. Also the energy of these particles can be calculated, which has considerable orders of magnitude and is available as an energy source everywhere and any time.

If for instance in a converter for space energy a neutrino should be converted into a resting charge carrier (with v = 0), then two steps are necessary (see part 2 of this series of books):

1. First the neutrino must be slowed down to 1.414 times the speed of light (fig. 28.9). Doing so energy is spent and not won. The converter for instance can cool down.

2. Afterwards the characteristic rotation of its own, with which the ring-like vortex spins around itself by permanently putting its inside to the outside and vice versa, has to be taken away from the neutrino. In that way the vortex centre is closed and the particle acquires localization. It becomes a charge carrier.

Even if the representation in the complex plane represents only an auxiliary description, the model nevertheless seems to be efficient, because despite its complex mass and charge the neutrino nevertheless carries a real energy. It in any case is represented in that way to an observer, who measures the relation with the speed of light, who in the relativistic scheme of things scans the relation.

Today, as already said, even the sonic barrier has become permeable and no scientist dares to physically deny this fact and even prove his mistake mathematically anymore. No, on the contrary, he always did know that as an expected consequence the sonic barrier runs after the supersonic plane. The once physically unthinkable and scientifically fought has become normality.

What should hinder an oscillating particle, like a neutrino, to be faster than the light? Some time one also will accustom to that.

- Starting-point:
  the fundamental field equation
  (derivation in chapter 27.10)

$$- c^2 \cdot \text{curl curl } \mathbf{B} = \frac{\partial^2 \mathbf{B}}{\partial t^2} + \frac{1}{\tau_1}\frac{\partial \mathbf{B}}{\partial t} + \frac{1}{\tau_2}\frac{\partial \mathbf{B}}{\partial t} + \frac{\mathbf{B}}{\tau_1 \tau_2}$$ (27.26)

- Example:

antenna

+

r
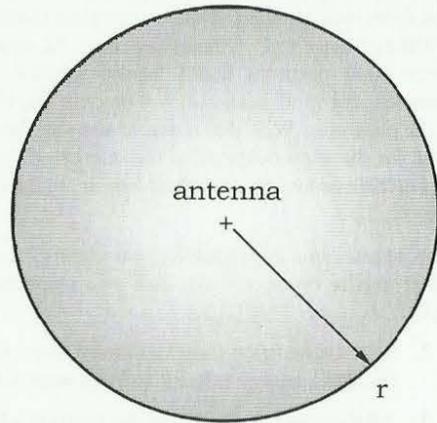
Spherical propagation of an
electromagnetic wave in space

- The number π: $\pi = 3.14159$

straight $(\pi\cdot)$		**circular**		**spherical**
r $\cdot$ **line**	$\pi\cdot 2 =$	$2r\cdot\pi$ **circum-ference**	$\cdot\, 2r =$	$\pi\cdot r^2\cdot 4$ **surface**
r $\cdot$ **line**	$\pi\cdot r =$	$r^2\cdot\pi$ **area**	$\cdot\, r\cdot 4/3 =$	$\pi\cdot r^3\cdot 4/3$ **volume**

(29.4)

Fig. 29.5: The number π

29.5 Universal constants and constants of nature

Strictly speaking fundamental or universal constants can't exist in pure field physics at all. For the example of the speed of light has been shown that it merely are measurement constants (fig. 6.11). The numerical size is a consequence of the definition. The speed of light for instance has the today well-known value as a consequence of the fixing of a length unit and a time unit. If we change a unit, if we take „feet" instead of „meters", then another value results. If however the velocity changes, then the reference measure of our gauge changes along and we get the identical reading.

Electric and magnetic field constant depend directly on the speed of light c ($\varepsilon \cdot \mu = 1/c^2$), which solely by the fixing of the electric units takes a certain value.

The inner structure of the potential vortices leads from Planck's quantum of action, to the elementary charge and to the countless atomic „constants", which all objectively seen aren't constants at all. They virtually all can be derived (chapter 7).

Sooner or later even the last natural scientist will realize, that nature does not provide „constants" at all. If „constants of nature" did exist, as listed in textbooks and encyclopaedias, then they aren't consistent with causality, since we don't know the cause, why the factor should have exactly this size and no other. Behind every so-called constant of nature unnoticed is hiding a physical closed loop conclusion.

Fundamental constants only exist in mathematics. This can be shown very nicely for the example of the „fundamental field equation" (eq. 27.26), which has been derived from the new field theoretical approach (fig. 27.10). It is the description of waves and vortices in space and time, which indeed carries features of a „world equation". If one searches this equation for fundamental constants, then one altogether can find three: the number π, the number e and the Golden Proportion Φ. The speed of light c however occurs only as the mathematical factor characterizing the wave as a result of the defined units. If one would choose the units different, c as well could be made 1. With the fundamental numbers that procedure won't work. They don't depend on the definition of the units!

Let's consider the number π. The number π occurs every time as a proportionality factor if we transition from a straight line to a circle or further to a sphere, from a line to the circumference or further to the surface of a sphere and exactly so from a line to the area of a circle or further to the volume of a sphere. Since for all the special cases, which are derived from the fundamental field equation (the structure of the elementary particles, the atomic structure and in the same way again in the universe), the spherical symmetry dominates, the mathematical solution is determined by a corresponding spatial configuration of the number π. It has its cause neither in a physical relation of interactions, nor in the choice of the units, but only in the geometry.

<u>The number e:</u>

$$e = \lim_{n \to \infty} (1 + 1/n)^n = 2.71828 \qquad (29.5)$$

for $n = 2$ is $(1+1/n)^n = 1.5^2 = 2.25$
for $n = 1$ is $(1+1/n)^n = 2^1 = 2$
for $n = 0.5$ is $(1+1/n)^n = \sqrt{3} = 1.73$
for $n = 0$ is $(1+1/n)^n = \infty^0 = 1$
for $n = -0.25$ is $(1+1/n)^n = 1/(-3)^{0.25}$ gives a complex solution
for $n = -0.5$ is $(1+1/n)^n = 1/\sqrt{-1} = -i$, thus again complex
for $n = -0.75$ is $(1+1/n)^n = 1/(-3)^{0.75}$ as well complex
for $n = -1$ is $(1+1/n)^n = 1/0 = \pm\infty$
for $n = -2$ is $(1+1/n)^n = 2^2 = 4$

no real
solution
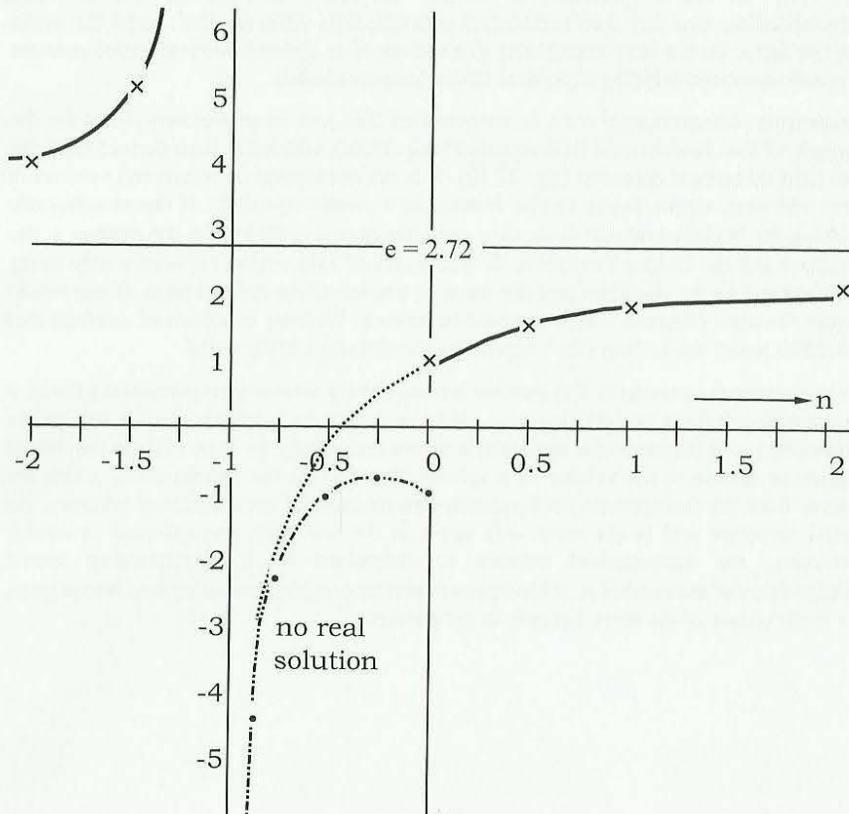
Fig. 29.6: Forming the limiting value of the number e

29.6 The fundamental number e

In the fundamental field equation (27.26) a further irrational number is concealed, the number e. Whereas the left side of the equation (a) gives the spatial distribution, the right side (b-e) describes the temporal course of events. Besides the term constant in time (e) also first time derivations (c and d) and a second time derivation (b) occur.
For a solution of this differential equation a function should be found, the derivations of which are again the function itself. This condition strictly speaking is fulfilled only by one single function, the e-function.
We used this property of the e-function already for the derivation of the Schrödinger-equation in chapter 5.6 and 5.7. There with the help of the e-function an approach was chosen, which leads to the well-known solutions of the Schrödinger-equation, which are considered to be secured experimentally. With that the number e controls the temporal relations of the fundamental field equation.

It might be helpful to take a closer look at the origin of the number e. It results from a consideration of limiting values:

$$e = \lim_{n \to \infty} (1 + 1/n)^n = 2.71828 \qquad (29.5)$$

If one varies n and allows different values between -∞ and +∞, then a strange behaviour is showing. One indeed more and more approaches the well-known value of   e = 2.72, as dictated by the definition of limiting values according to equation (29.5), the larger n is chosen. But in the opposite direction it looks less tidied:

	for	$n = 1$	is	$(1+1/n)^n$	$=$	2^1	$=$	2
	for	$n = 0.5$	is	$(1+1/n)^n$	$=$	$\sqrt{3}$	$=$	1.73
	for	$n = 0$	is	$(1+1/n)^n$	$=$	∞^0	$=$	1
	for	$n = -0.5$	is	$(1+1/n)^n$	$=$	$1/\sqrt{-1}$	$=$	$-i$, thus complex
and	for	$n = -1$	is	$(1+1/n)^n$	$=$	$1/0$	$=$	$\pm\infty$

(29.6)

Since the e-function inside the fundamental field equation is responsible for the temporal sequence, the interpretation of my colleague Prof. Dr. Preußker[i] gets a deeper sense. He says, it starts outside our imagination (at n = −1). Afterwards at first big chaos prevails. Mathematically seen some imaginary solutions arise. Finally the system is putting in order (from n = 0), to more and more approach the value e = 2.72 .

The number e is of fundamental importance and thereby holds unforeseen secrets. More mysterious and until now entirely misunderstood is the meaning of the Golden Proportion. Also this indivisible number can be found in the fundamental field equation. Since it is less known and more complicated to handle, it first shall be introduced.

[i]:   H. Preußker: Der Wirbelring, Halstenbeck 2002

Graphical construction at a right-angled triangle (Pythagoras):
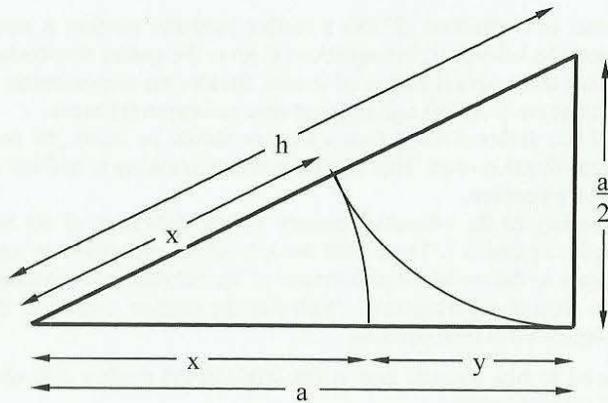
Golden Proportion of length a = x + y :

$$\frac{x}{a} = \frac{y}{x}$$

with the proportion:

$$\frac{x}{a} = \Phi = 0.618 \quad (29.9) \quad \text{and} \quad \frac{a}{x} = \frac{1}{\Phi} = \Phi + 1 = 1.618 \quad (29.10)$$

The pentacle
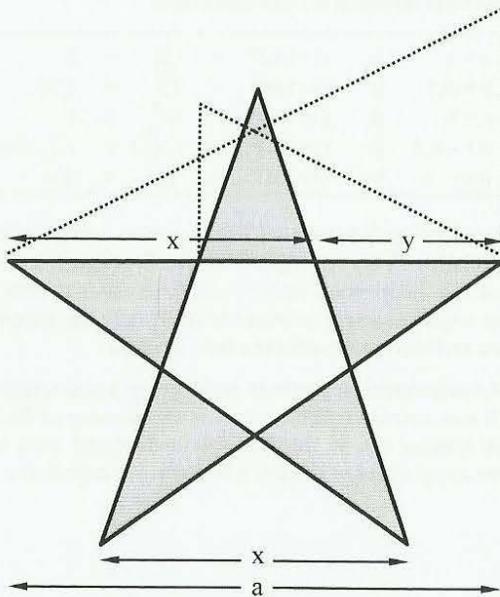
Fig. 29.7: Constructions for the Golden Proportion

29.7 The pentacle

During his visit of the Egyptian pyramids already two and a half thousand years ago the history writer Herodotus by his guide had been called attention to the circumstance that the Golden Proportion has been realized for the proportions of scale.

In the case of the pyramid of Cheops it even has been taken into account manifold, as we know today, but we hence still don't know why. There must be an intention behind it. Anyway a coincidental use can be eliminated, since the Golden Proportion cannot be handled in an easy way, neither graphically nor mathematically.

The Golden Proportion in addition plays an important role in the whole ancient architecture and not only there. It for instance occurs in the case of a very old symbol, the five edged star, which we can draw with one line without taking off. The well-known symbol also is called pentacle.

In the case of the Golden Proportion a straight line a is divided into two unequal halves. The larger half x thereby is 61.8 % of the straight line a. Already Pythagoras has researched and taught about this. Maybe he did know more about the purpose of this classification than all the mathematicians, archaeologists and art historians of today together.

For a graphical solution we assume a right-angled triangle. The task is to divide one leg of length $a = x + y$ according to the Golden Proportion into two parts, the larger part x and the smaller part y. The second leg has the length a/2. According to the theorem of Pythagoras the length of the hypotenuse h is

$$h = \sqrt{a^2 + (a/2)^2} = (a/2)\sqrt{5} \quad (29.7)$$

If the length of the second leg (a/2) is subtracted from the hypotenuse, then this is the sought length $x = h - a/2$:

$$x = (a/2) \cdot (\sqrt{5} - 1) \quad (29.8)$$

The proportion of both length measures gives the constant Φ, which is characteristic for the Golden Proportion:

$$\Phi = x/a = (\sqrt{5} - 1)/2 = 0.618 \quad (29.9)$$

This proportional number has a special property. If one adds 1 to the number and forms the reciprocal value of that, then the same number comes out again, thus:

with $\Phi = x/a$:   with $a = x + y$:

$$\Phi + 1 = \frac{1}{\Phi} \quad \text{and} \quad \frac{x}{a} + 1 = \frac{a}{x} \quad \text{resp.} \quad \frac{x}{a} = \frac{a-x}{x} = \frac{y}{x} \quad (29.10)$$

With that the ratio of the length a and the larger section x is the same as the ratio of x and the smaller section y.

- Starting-point: the fundamental field equation

$$-c^2 \cdot \text{curl curl } \mathbf{E} = \frac{\partial^2 \mathbf{E}}{\partial t^2} + \frac{1}{\tau_1}\frac{\partial \mathbf{E}}{\partial t} + \frac{1}{\tau_2}\frac{\partial \mathbf{E}}{\partial t} + \frac{\mathbf{E}}{\tau_1 \tau_2} \qquad (27.26)$$

- <u>for the special case:</u> because of missing conductivity ($\sigma = 0$) e.g. in air no eddy current damping: $\qquad \sigma/\varepsilon = \boxed{(1/\tau_1) = 0}$

- and no currents (eq. 27.15+27.16): $\mathbf{j} = \sigma \cdot \mathbf{E} = -\mathbf{v}\cdot\varepsilon \cdot \text{div } \mathbf{E} = 0$

- resp. $\quad \Delta \mathbf{E} = \text{grad div } \mathbf{E} - \text{curl curl } \mathbf{E} = -\text{curl curl } \mathbf{E}$

$$\Rightarrow \quad \boxed{c^2 \cdot \Delta \mathbf{E} = \frac{\partial^2 \mathbf{E}}{\partial t^2} + \frac{1}{\tau_2}\frac{\partial \mathbf{E}}{\partial t}} \qquad (29.11)$$

Standard case of a wave damped with potential vortices

In the case of a perturbation this wave rolls up to a vortex, with
- the vortex radius $\qquad$ r
- the swirl velocity $\qquad c = \omega \cdot r$
- the angular velocity $\omega = 1/\tau_2 = c/r$

The vortex itself runs with the velocity $\quad v(x(t)) = dx/dt$

as a longitudinal wave in direction of the **E**-field: $\Delta \mathbf{E} = \partial^2 \mathbf{E}/\partial x^2$

$\Rightarrow \quad \partial \mathbf{E}/\partial t = (\partial \mathbf{E}/\partial x)\cdot(dx/dt) = v\cdot\partial \mathbf{E}/\partial x \qquad$ and

$\qquad \partial^2 \mathbf{E}/\partial t^2 = v^2\cdot(\partial^2 \mathbf{E}/\partial x^2); \; (\partial v/\partial t = 0,$ since not accelerated)

$$\Rightarrow \quad \boxed{c^2 \cdot \partial^2 \mathbf{E}/\partial x^2 = v^2\cdot(\partial^2 \mathbf{E}/\partial x^2) + v\cdot(c/r)\cdot \partial \mathbf{E}/\partial x} \qquad (29.12)$$

- with the exponential approach: $\mathbf{E} = \Psi \cdot e^{-x/r} \qquad$ are:

$\Rightarrow \quad \partial \mathbf{E}/\partial x = -(1/r)\cdot\mathbf{E} \quad$ and $\quad \partial^2 \mathbf{E}/\partial x^2 = (1/r^2)\cdot\mathbf{E}$

$$\Rightarrow \quad \boxed{(c^2/r^2)\cdot\mathbf{E} = (v^2/r^2)\cdot\mathbf{E} - (v\cdot c/r^2)\cdot\mathbf{E}} \qquad (29.13)$$

- resp.: $\qquad \boxed{c^2 = v^2 - v\cdot c} \qquad (29.14)$

<u>Fig. 29.8:</u>   The calculation of an electromagnetic wave, which is rolling up to a potential vortex.

The big mystery concerning the harmony of the Golden Proportion gets a sober technical-physical dimension with the theory of objectivity. It determines within the „fundamental field equation" (27.26) the rolling up of a wave into a vortex and vice versa. The Golden Proportion mathematically describes the process known as **wave damping**, as we can make ourselves clear.

29.8 The vortex, which is rolling up

For the case of a wave propagation in air or in vacuum, if no electric conductivity is present ($\sigma = 0$), the fundamental field equation is reduced to the two parts: the description of the electromagnetic wave and the potential vortex as a damping term. Now a solution of this partial differential equation (29.11) is sought. This only succeeds for a very particular course of spatial and temporal field.

If a wave for a field perturbation rolls up to a vortex, which we had worked out as a model concept, then the field oscillation continues to run with the speed of light, but this time in circles. With this consideration the relation between the angular velocity resp. the time constants and the radius of the circular vortex has been described ($\tau_2 = r/c$).

$v(x(t)) = dx/dt$ is the not-accelerated velocity of propagation of a vortex. In that case v points in the x-direction radially to the outside. For the time derivation of the field vector $E(x(t))$ the chain rule should be applied. With that the field equation (29.11), defined in space and time, can be converted into an equation determined in v and x (29.12).

Finally we use the mentioned property of the e-function, which for first and second derivation again turns into itself, by choosing the approach of an exponential damping with $e^{-x/r}$. There remains a quadratic equation to determine the velocity v (29.14 and 29.15). From the two solutions of the quadratic equation only the one with positive velocity should be considered (29.17) and that would be 1.618 times the speed of light (29.18).

If we subtract 1 from this value or form the reciprocal value, then in both cases the factor $\Phi = 0.618$ results, which is called the Golden Proportion (29.19).

Behind this clear, mathematically won result is hiding a deeper physical meaning. Obviously nothing can hinder a longitudinal wave and its vortices to be slower or faster than just with $v = 1.618\cdot c$. Let us take the case that $v = c$, for which there even exist calculations in some textbooks[i]. Then as a result gets out that the longitudinal parts decrease very quickly and already can be neglected after $\lambda/2\pi$. I in any case interpret the near-field zone of an antenna (fig. 29.9) such that within one sixth of the wavelength the vortices to a large extent have decayed.

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[i]:   Zinke, Brunswig: Lehrbuch der Hochfrequenztechnik, 1. Bd., 3.Aufl. Springer-Verlag Berlin 1986, Seite 335

- The quadratic equation 29.14:
$$v^2 - v \cdot c - c^2 = 0 \qquad (29.15)$$

- has the solution:
$$v = c/2 \pm \sqrt{c^2/4 + c^2} \qquad (29.16)$$

- for the proportion v/c:
$$v/c = (1 + \sqrt{5})/2 = 1.618 \qquad (29.17)$$

- The result $\quad v/c = \underline{1.618}$ $\hspace{5cm}$ (29.18)

- resp.: $c/v = \Phi = \underline{0.618} = $ „**Golden Proportion**" (29.19)

- acc. to that is: $1 + \Phi = 1.618 = 1/\Phi = 1/0.618$ (29.18*)

- Concerning the <u>physical meaning of</u> $\;v/c = 1.618$ $\hspace{2cm}$ (29.17)

In the domain:	vortex decay:	description:
$v = c$	within $\lambda/2\pi$	near-field zone
$v < 1.618 \cdot c$	only later	noise
$v = 1.618 \cdot c$	stability limit	direct conversion
$v > 1.618 \cdot c$	stable, no decay	neutrino radiation

⇒ In the ideal case at 1.618 times the speed of light at the stability limit, the natural and spontaneous conversion from vortex to wave and vice versa occurs.

⇒ Scalar wave antennas have their optimum degree of effectiveness in the Golden Proportion.

<u>Fig. 29.9:</u> $\quad$ <u>Derivation of the Golden Proportion from the fundamental field equation.</u>

For larger velocities, as Tesla has produced already 100 years ago, the stability of the vortices, but also their biological effectiveness increases. From a high-frequency technical viewpoint this is the domain of the noise, the domain of instable oscillating noise vortices. From a biological and medical viewpoint especially here the answers should be sought to questions concerning the electromagnetic environmental compatibility.

This domain stretches from $v = c$ to $v = 1.618 \cdot c$, the boundary case, where a spontaneous conversion of the wave into the vortex is possible. The Golden Proportion describes the stability limit, where the field vortices after they have been formed, don't decay anymore. From this velocity on the antenna resp. radiation source hasn't got a limited near-field zone anymore, since that now reaches to infinity. Only from this distinct velocity on I give the field vortices the name „neutrino".

29.9 The Golden Proportion

Whereas traditional antennas, which should emit electromagnetic waves, are optimized for signals with the speed of light, do scalar wave antennas have their optimum degree of effectiveness in the Golden Proportion. Thereby the goal of an emission of oscillating ring-like vortices is pursued. Vortices, which with a velocity of propagation of $v = 1.618 \cdot c$ remain stable and make possible a spatially unlimited transmission of energy and information by scalar waves.

The velocity of propagation v is calculated from the product of wavelength times frequency: $v = \lambda \cdot f$. If the frequency of a transmitter is prescribed, then the geometry of the transmitting antenna decides on the degree of effectiveness of the antenna and on how many parts of transverse waves are emitted in relation to longitudinal waves. In the case of a broadcast antenna usually λ or $\lambda/2$ is chosen. For a scalar wave however the optimum is reached with

$$\lambda_{vortex} = 1.618 \cdot \lambda_{wave} = 1.618 \cdot c/f. \qquad (29.20)$$

With that the electrotechnical problem becomes a geometrical one, if it concerns the use of scalar waves. Crucial is the antenna geometry, and the Golden Proportion provides the necessary constructional instruction. Were the buildings in antiquity, which were constructed according to the Golden Proportion, technical facilities for scalar waves[i]? Did the builders have physically explainable and mathematically provable guidelines?

At this place, by the derivation of the Golden Proportion from the fundamental field equation, there arise completely new aspects for the judgement and interpretation of buildings especially from antiquity. If we have understood their way of functioning, then we will be able to learn much from that for our own future and for the future construction of scalar wave devices. Concluding the seminar we hence deal with antiquity.

ancient temple	=	short wave station
dedicated to one god	=	fixing of the frequency
supreme god Zeus, father of all gods	=	range of the short wave, all SW wave bands
priest, representative of the god	=	amateur radio operator, with licence to transmit
high priest	=	chief intendant
Pontifex Maximus, „topmost bridge builder"	=	chairman of the authority and the telegraph offices
oracle[i]	=	telegraphy receiver
runes, cuneiform writing	=	telegraphy symbols
metre, hexameter	=	increase of redundancy
oracle priest	=	telegraphy interpreter
tripod[ii]	=	reception key, electro-acoustical converter
looking at intestines, rite of sacrificing	=	reading off convulsions, electro-optical converter
temple books	=	news-notes
seer, who looks into the god world	=	amateur radio operator, at telegraphy reception
Homer	=	ancient radio reporter

Fig. 30.1:   Little dictionary for ancient radio engineering (1).

[i]: Lamer: Wörterbuch der Antike, Kröner Verl. Bd.96 under „oracle" stands: „Lat. oraculum = site of speaking; particularly: site, where a god speaks; then: that, what the god says". According to the encyclopaedia oracle priests inspired by a god „simply were frauds, who lived of the ignorance of the public".

30. Scalar wave technology in antiquity

The end of the book about potential vortices and their propagation as a scalar wave shall form an impressive example, where as many of the derived wave aspects as possible have an effect. It shall be proven that already in antiquity radio engineering based on scalar waves has been used. The proof starts with a thesis.

30.1 Thesis:

The temples in antiquity all were short wave broadcasting stations. And energy from the field served as an energy source, so e.g. the earth radiation in the case of temples of terrestrial gods. In the case of the solar god the radiation of the sun was used, whereas for the temples, which were dedicated to the planetary gods, the neutrino radiation arriving from the planets served as an energy source.

If the temple was dedicated to a particular god, then the name of the god was representing the used frequency of the broadcasting company. The corresponding wavelength, resp. the respective god, understandably was „immortal".

Not so the broadcasting technicians on duty, who as human beings naturally were mortal, who took turns in the studio as members of the priest council and who merely had to impersonate the god Apollo, Poseidon etc. by the name of the broadcasting company, if they went on air. Only for the news editor Homer and for few of his colleagues we actually know the names of the persons behind the scenes.

In the temple books the texts have been recorded, which a god and its broadcasting company have received. The chosen metre served the easier detection and correction of transmission errors.

Here often a lot of fantasy was necessary, for which reason the reception facilities commonly were described as oracle[i]. The reception of the news as a rule took place on an altar. Thereby the direct effect of scalar waves on man e.g. in the case of the so-called temple sleep or the indirect influence on biological systems, e.g. on the intestines of slaughtered animals, was evaluated.

A further development of the telegraphy was the tripod technology[ii], in which case by turning of the polarization plane individual symbols and letters were transmitted up to the transmission of the spoken word with the help of a special wavelength modulation. That far the thesis reaches, which now should be proven.

[ii]: Lamer: Wörterbuch der Antike, Kröner Verl. Bd.96 under „tripod" stands: „the tripod is a dedication gift to gods, a honorary gift for winners. That one pleased them with the gift of a cooking pot, is strange; one has tried to find the reason, but until now without success". In the encyclopaedia further is advised: „tripod as a means for spiritual insight?!"

godology	= high frequency technology
god name	= RDS, station identification
members of a family of gods	= broadcasting studios of a broadcasting company
Pantheon, temple of all gods	= extremely broadband FM broadcast station
crown	= antenna netting
gifts for sacrificing	= broadcasting fees
place of sacrificing	= place of a node of the standing wave
earth radiation	= power supply
homage of a weekday	= time restriction of the operation of the station
Zeus „forges" thunderbolts	= electrostatic blows, when a temple is oscillating
ritual act	= technical provision for transmission and reception
Pythia of Delphi[i]	= radio telephone operator, receptionist
Cella (marrow of temple)	= tuned cavity
obelisk[ii]	= antenna rod

Fig. 30.2:   Little dictionary for ancient radio engineering (2).

[i]: Lamer: Wörterbuch der Antike, Kröner Verl. Bd.96, under „Pythia"(gr.=the asker): In the temple of Delphi was a chasm. A tripod was standing over it, on which the Pythia was seated, if she gave oracle. Comment: "It was flashy how odd the Pythia was sitting; inconveniently enough, on the cooking pot of the tripod. Ancient pictures, which show her that way, still weren't proven, that it was this way ..."

[ii]: Lamer: under „Obelisk" stands: „The obelisks probably were clocks".

30.2 Prerequisites

The argumentation has to be made on mathematical-physical foundation. The prerequisite for that are the 29 chapters of before. The following points could be demonstrated and derived:

1. The wave equation (inhomogeneous Laplace equation) describes the sum of two wave parts, where
2. every antenna emits both parts,
3. the transverse part, known as electromagnetic wave (Hertzian wave)
4. and the longitudinal part (Tesla radiation) termed scalar wave by the discoverer, better known as antenna noise.
5. The wave equation mathematically describes the connection of both wave parts in general and the conversion of one part into the other in particular, thus
6. the rolling up and unrolling of waves in field vortices (measurable as noise).
7. The transition takes place proportionally to the Golden Proportion, as resulted from the derivation (chapter 29.7 – 29.9)

With the last point the electrotechnical problem becomes a geometrical problem, if it concerns the use of scalar waves. The geometry of the antenna is crucial. Thereby the Golden Proportion provides the necessary direction for construction.

That justifies the assumption that the buildings in antiquity, which were built according to the Golden Proportion, were technical facilities for scalar waves. Maybe the builders had specifications that had physical reasons and could mathematically be proven.

At this place there result completely new aspects for judging and interpreting buildings especially from antiquity through the derivation of the Golden Proportion from the fundamental field equation. If we have understood their way of functioning, then we will be able to learn much from that for our own future and for the future construction of scalar wave devices.

As a further prerequisite for the ancient broadcasting technology enough field energy should be at disposal. We proceed from the assumption that

1. the earth magnetism and the cosmic neutrino radiation are tightly hanging together by the processes in earth's core,
2. the earth magnetism in antiquity verifiably was approx. thousandfold stronger than today (proven by gauging of pieces of broken pot),
3. as a consequence the neutrino radiation in antiquity as well must have been thousandfold stronger and
4. the cosmic neutrino radiation has served the transmitting plants of antiquity as an energy carrier,

any thought is absurd to reject the technical function of a temple only because it today can't be reproduced anymore. The artistic and aesthetical viewpoints, which are put into the foreground by art historians because of ignorance about the true function, rather are secondary.

The terms used to describe the broadcasting technology in antiquity in the last 2000 years have experienced a shift of meaning, so that a translation in our linguistic usage of today is necessary. The adjacent dictionary should help in that case.
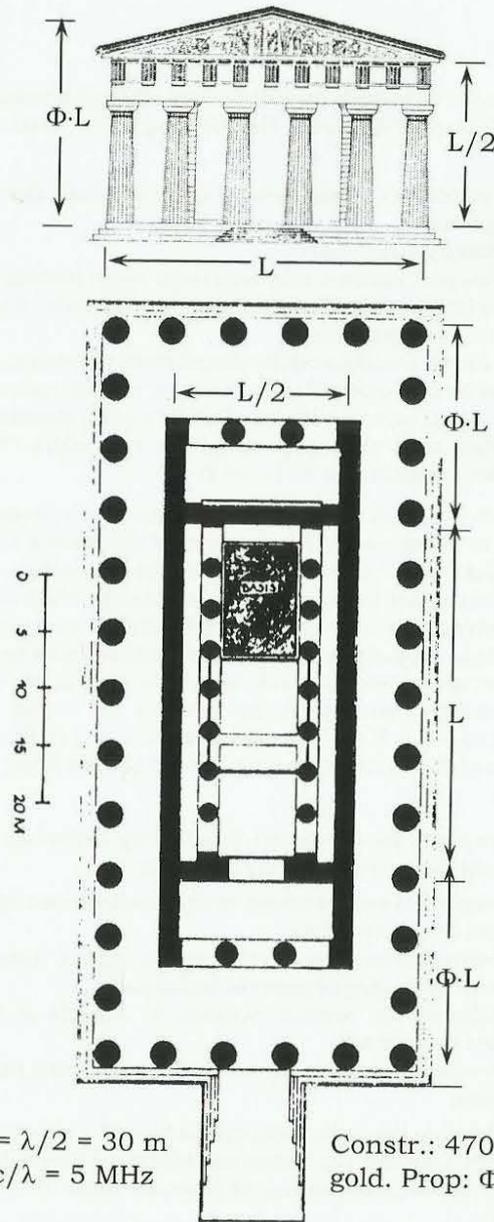
Cella-Length: L = λ/2 = 30 m
frequency: f = c/λ = 5 MHz

Constr.: 470-456 B.C.
gold. Prop: Φ = 0,618

Fig. 30.3: The Golden Proportion of Zeus-temple in Olympia.[i]

<i>: K. Schefold: Die Griechen und ihre Nachbarn, Propyläen Kunstgeschichte
    Berlin Bd. 1, Abbildungen von Seite 249

30.3 Approach

Let's to some extent proceed from the knowledge of textbook physics currently present in high frequency engineering and give a well trained engineer the following task, which he should solve systematically and like an engineer: *He should build a transmitter with maximum range at minimum transmitting power,* thus a classic task of optimization. *Doing so, the material expenditure doesn't play a role.*

After mature deliberation the engineer will hit upon it that only one solution exists: He decides on a telegraphy transmitter at the long wave end of the short wave band, at f = 3 MHz, which corresponds to a wavelength of λ = 100 m. There less than 1 Watt transmitting power is enough for a radio communication once around the earth. That also has something to do with the conditions of reflection of the radio waves at the ionosphere. Our engineer learned:

$$\text{the index of refraction} \quad n = \sqrt{1 - K \cdot N / f^2} \tag{30.1}$$

with:
$$K = 80.5 \cdot 10^{-6} \ [cm^3/sec^2] \ (= constant)$$
$$N = \text{electron concentration [electrons/cm}^3]$$
$$f = \text{frequency of the transmitter [MHz]}$$

Put into words: the refraction of a radio wave in the range of the short waves is the larger, the smaller the frequency is. The end of the short wave range is reached at 3 MHz. That thus explains the choice of frequency.

And he optimises further. Next the engineer remembers that at high frequencies, e.g. for microwave radiators, not cables but waveguides are used, since these make possible a considerable better degree of effectiveness. In the case of the waveguide the stray fields are reduced by an alignment and concentration of the fields in the inside of the conductor. In the case of antennas however the fields scatter to the outside and cause considerable stray losses. He draws the conclusion that his transmitter should be built as a tuned cavity and not as an antenna!

As a result the engineer puts a building without windows in the countryside with the enormous dimensions of 50 m length (= λ/2) and 25 m (= λ/4) resp. 12.5 m (= λ/8) width. The height he calculates according to the Golden Proportion to increase the scalar wave part. Those approximately are the dimensions of the Cella without window of Greek temples.

For the operation of such a transmitter in antiquity apparently the noise power of the cosmic radiation was sufficient, which arrived at the earth starting from the sun and the planets. By increasing the floor space also the collected field energy and the transmitting power could be increased, so that also from the perspective of the power supply the temple with the largest possible wavelength at the same time promised the largest transmitting power, so at least in antiquity.

Our engineer further determines, that he will switch the carrier frequency on and off at a predetermined clock pulse. Thus he decides for radiotelegraphy. The advantage of this technique is a maximum increase of the reception range. For that the signals at the transmitter have to be coded and at the receiver again deciphered. By means of the encryption of the contents these are accessible only to the „insiders", who know the code; prerequisite for the emerging of hermetism and eventually a question of power.
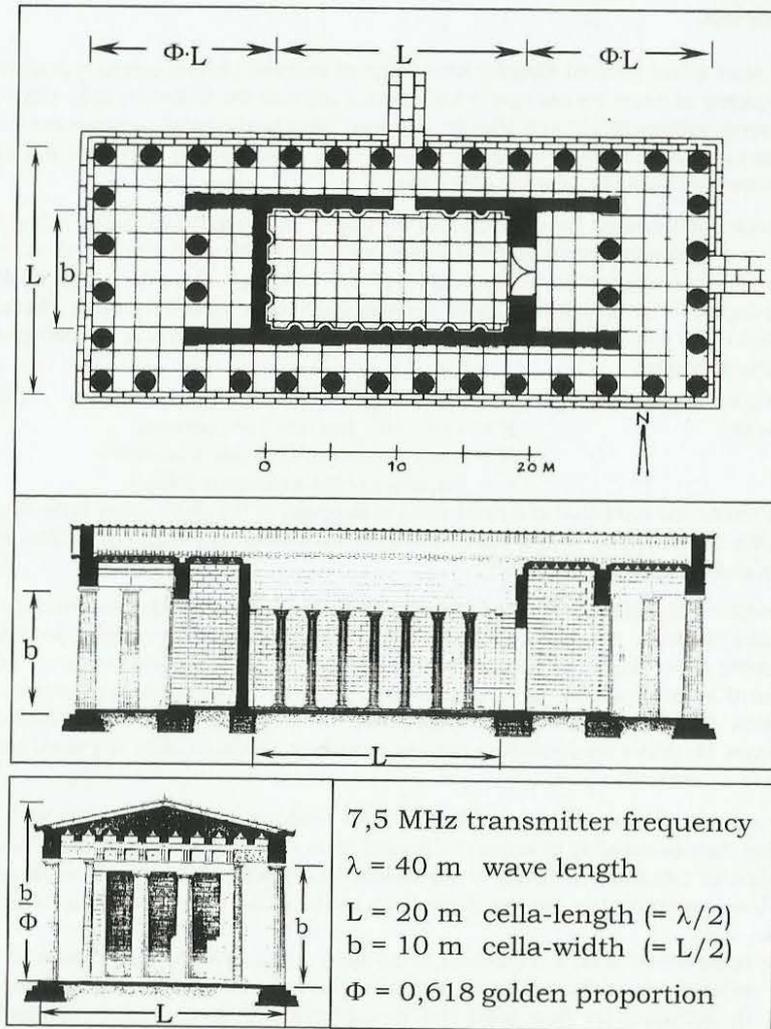
Example Tegea, temple of Athena Alea.[i]
Built 350/340 B.C.

7,5 MHz transmitter frequency

λ = 40 m   wave length

L = 20 m   cella-length (= $\lambda/2$)
b = 10 m   cella-width (= L/2)

Φ = 0,618 golden proportion

[i]: G. Gruben: Die Tempel der Griechen, Wissenschaftliche Buchgesellschaft Darmstadt 1986, 4. Aufl. Seite 130

[ii]: E. Horst: Konstantin der Große, Eine Biographie, Classen Verlag 1985 Düsseldorf, 2.Aufl., S. 89.

[iii]: E. Horst: Konstantin der Große, Eine Biographie, Classen Verlag 1985 Düsseldorf, 2.Aufl., S. 33.

30.4 Circumstantial evidence

Not everyone, somehow participating in send receive engineering, at the same time also was inaugurated in the entire secret knowledge. Most priests only knew as much as they necessarily needed to know to fulfill their tasks. Thus a temple priest, who was presented an enciphered text and who should bring this on the air, not necessarily at the same time needed to know the content of the text or the code. The same of course also was valid for the sacrificing priest acting in the receiving station. The Vestal virgins for instance had to present the received text to the Augures, by whom they were supervised and controlled.

But who wanted to introduce a new god in the gods heaven and perhaps even himself be worshipped as a god, should have complete command of both the broadcasting technique and the reception technique. In ancient Egypt the Pharao at least once a year had to prove, that he still was in command of the technique. Otherwise he was replaced. For a person with security clearance that at the same time was a death sentence.

In the historical facts numerous pieces of circumstantial evidence can be found, which can be considered to be evidence for the thesis of the operation of send receive engineering in antiquity. One now perhaps understands, why the rulers were put an antenna netting over their head, a so-called crown, or why the Augures could survey the land with a flat Tesla coil in their hands (fig. 16.10).

Direct evidence is present as well. It can be found in ancient texts. But it is questionable if historical texts concerning ancient radio engineering have been translated correctly. The talk is about oracles, mystery cult and earth prophesy if the receiver is meant. The predominantly technically uneducated historians attest the Romans a defective sense of time, because their couriers surely could not cover the long ways across the Roman empire so fast at all, if they read in the Latin texts: "They sent by courier to the emperor in Rome and got for answer...". The answer of the emperor namely already arrived at the squad at the latest in the following night. The correct translation should read: "they cabled" or "they broadcasted to the emperor in Rome and got for answer..."[ii].
Such a big empire as the Roman Empire actually only could be reined by means of an efficient communication. Cicero coined the word: "We have conquered the peoples of the earth owing to our broadcasting technology..."[iii]! The term broadcasting technology from ignorance is translated with piety. If engineers however rework the incorrect translations, then one will discover that numerous texts tell of the broadcasting technology, that thus correspondingly much direct evidence exists concerning the practical use of this technology.

For the Roman military transmitters, which formed the backbone of the administration of the empire, the reading off of the information from observations of nature like the bird flight or from felt signals of a geomanter was too unreliable. They read off the information from the rhythm of the convulsions of the intestines of freshly slaughtered animals. In the case of the dead animals on the altar every extrinsic influence was excluded. But the enormous need of slaughter cattle was a disadvantage. Who wanted to have information, first of all had to bring along an animal, which then was „sacrificed" the god, or better say, which was abused as a receiver for a particular transmitter. Thereby the innards served as a biosensor and as a receiver for the news.

Cellular phone.

- *Network:* All „telephone cabins" are transmitter and receiver at the same time.
- *Advantage:* Anyone can communicate with every network participant.
- *Characteristic:* The stations are strikingly similar in form and size of building.
- *Power structure:* All stations as a rule have equal rights among each other.
- *Disadvantage:* Innovations hardly are possible. The system is inflexible.
- *Examples:* Temple towers (Iraq); cellular phone network.

Broadcasting.

- *Network:* Many receivers listen to the news of one powerful transmitter.
- *Advantage:* The system is very flexible and permanently experiences improvements.
- *Characteristic:* Monotheism. Big diversity among the receiver constructions.
- *Power structure:* Central power concentrated in the hands of the chief intendant.
- *Disadvantage:* Feedback from receiver to transmitter is not desired.
- *Examples:* God Ammun Re (Egypt); ABC daily news.

Dispatch service.

- *Network:* Network of broadcast stations supplies an agency (receiver) with information.
- *Advantage:* Optimal financing, since information is given away only for broadcasting fees in cash.
- *Characteristic:* Treasury stores have to be built because of the immense riches.
- *Power structure:* The power is concentrated in the hands of the receiver-agency.
- *Disadvantage:* In the case of overcharge or overload a system crash is impending.
- *Examples:* Pythia (Delphi); German Press Agency (dpa).

Fig. 30.5:   Three radio technical network structures, with an example from antiquity and from present time.

30.5 Radio technical concepts

In planning and constructing radio technical networks only a few possible concepts exist. It is interesting that at least one historical example can be specified for every concept. That shows that all possibilities were tried at least once. The three most important concepts are presented here:

A. Cellular phone.

Every bigger city between Euphrates and Tigris, which thought the world of itself, had at its disposal already in antiquity a temple tower. Such a temple tower was a „telephone cabin" in the form of a pyramid as a transmitter and a receiver temple at the top, to where the receptionist adjourned to the so-called temple sleep. Discipline was required, since all the time only **one** priest was allowed to broadcast. All others could listen to him doing so. If he was ready, he closed his contribution with a fixed symbol or term („over") and the next one could continue. This is a classic link-up, where anyone communicates with every network participant.

The stations all were strikingly similar in form and size of building, like one phone box resembles another. In that way a further development of the cellular phone system hardly was possible and that has a technical reason, as the building of a tower in Babylon has shown us. This tower namely had gotten the ambitious builders too big, so that the frequency of the Mesopotamian radio network had been left and instead a foreign network could be received, the code of which no-one could understand. The result was a confusion of language and the order to stop the building.

B. Broadcasting.

Millions of TV spectators every evening look in the ABC news or another daily journal of a TV Channel. In the case of broadcasting thus many receivers listen to the news of a powerful transmitter. With that the whole plenitude of power is concentrated in the hands of the chief intendant. In antiquity he called himself high priest. If he went on the air, he used the logo of the god that he had to represent. Today the logo of the broadcasting company is shown in a corner of the TV screen. Even this very day feedback from the receiver to the transmitter hardly is possible contingent on principle. The problems with nationally controlled broadcasting, with politics controlled by the media all are not new. The monotheism in ancient Egypt with the claim of lordship of the main god Ammun Re is an example from antiquity.

C. Dispatch service.

In ancient Greece the technical structures and with that also the power structures had been turned around. At that time a big network of broadcast stations, which continually was extended by a policy of settlement ordered by the gods, supplied a central and correspondingly powerful agency with information per radio.

Who wanted up to date news, could call for these in the agency with seat in Delphi, but he had to pay for it. To accommodate the broadcasting fees in form of gold and gifts whole treasury stores had to be built. Measured by the commercial success the ancient news network has remained unmatched, and can't be compared with pay-TV or todays dispatch services, like dpa. If the network however becomes too big, uncontrollable and it lacks discipline, then it sometime will crack and the system crashes.
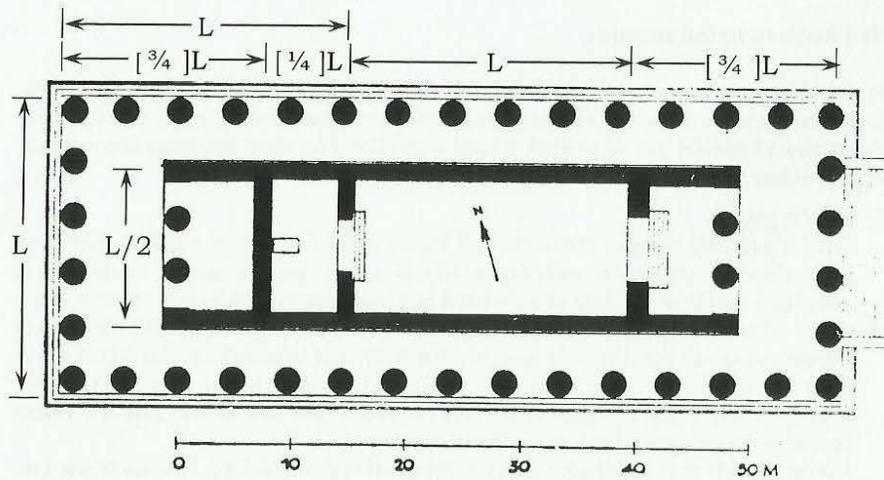
Fig. 30.6 A: Hera-temple of Selinunt 460-450 B.C.[i]
(Corresp. to the plans of the Roman architect Vitruvius)
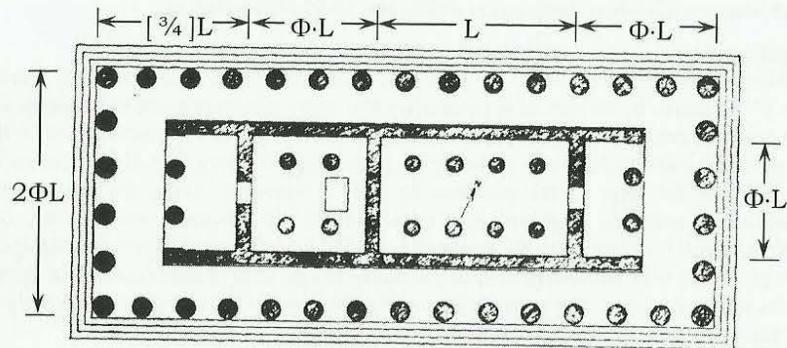
Cella length L
L = λ/2 = 16,7m

frequency f = 9 MHz
about 540 B.C.

Fig. 30.6 B: Apollo-temple of Korinth[i]
(Alternative interpretation, use of the Golden Proportion Φ).

[i]: K.Schefold: Die Griechen und ihre Nachbarn, Propyläen Kunstgeschichte Berlin Bd. 1, Abbildungen von Seite 241, 250

[ii]: Vitruvius (Marcus Vitruvius Pollio): Zehn Bücher über Architektur, Übers. von Dr. K. Fensterbusch, Wissenschaftl. Buchges. Darmstadt 1987, 4. Aufl., 3. Buch, 1. Kap.: Von den Symmetrien der Tempel, Seite 137

[iii]: Vitruvius (dito), 4.book, 4.Chap.: Vom Tempelinnern und dem Pronaon, p.187

30.6 Wireless telegraphy

Radio engineering 100 years ago also started with telegraphy. Thereby the high frequency carrier is switched on and off. With this technique Marconi succeeded in a radio transmission over the English Channel (1899) and over the Atlantic Ocean (1901).

As next step the amplitude modulation (AM) followed. Thereby the HF-carrier is overlapped with the low-frequency signal of a sound carrier in such a way, that the amplitude fluctuates on the beat of the LF-signal. As a disadvantageous effect, also noise signals will overlap, from which the quality of reception will suffer.

Only the frequency modulation (FM), where the LF-signal is transmitted as temporal fluctuation of the frequency, brings an improvement. The annoying amplitude noise hence has no effect in the case of FM.

It easily can be recognized, how the development of the modulation techniques follows the urge for technical improvement and optimization. That in antiquity hasn't been different, for which reason the progress of development took place in the same order.

The broadcasting technology of the ancient gods started with the wireless telegraphy. This is expressed in the architecture. Since electric resonant circuits or other frequency determining equipment weren't at the disposal of the engineers in antiquity, the determination and allocation of the broadcasting channels had to take place by means of the wavelength. The formation of a standing wave in the Cella, the innermost sanctuary of a temple, occurs if its length corresponds to half the wavelength of the HF-carrier.

The Roman architect Vitruvius calls the wavelength the „basic measure", from which results „the system of the symmetries". He writes: „The design of the temples bases on symmetry, to which laws the architects should adhere meticulously."[ii]. „The length of the temple is partitioned in such a way that the width is equal to half the length, the Cella itself including the wall, which contains the door, is one fourth longer than wide. The remaining three fourths, which form the Pronaon, should protrude until the antae of the wall and the antae should have the thickness of the pillars"[iii].

If we recalculate ourselves, then the partitioning in 3/4 to 5/4 produces a proportion, which comes quite close to the Golden Proportion. In building a temple nothing is left to chance, after all it concerns the construction of a tuned cavity, capable of self-resonant oscillations with favourable emission behaviour.

From the outside one can't see if a telegraphy transmitter has been changed over to speech transmission with AM. The HF-carrier merely isn't switched off anymore, i.e. the priests let the temple oscillate without interruption. Newly added for AM is an electroacoustic coupling. For that many temples were retrofitted with a mouthpiece. Newly built AM transmitter temples conclude the Cella with a round apse. Because of this acoustically conditioned construction the Cella length didn't have a fixed value anymore and the transmission frequency had become variable. Measured in the middle of the apse the wavelength was larger than at the sides, so that on the beat of the spoken word not only the amplitude of the field distribution in the interior of the temple, but in addition also the frequency of the selfresonant oscillation was changed.

A typical example of such an architectonic hybrid form of AM and FM is situated in Rome. Because due to the frequency variation more than only one wave band was occupied and the temple consistently carries the names of two deities. It is the temple of Venus and Roma.
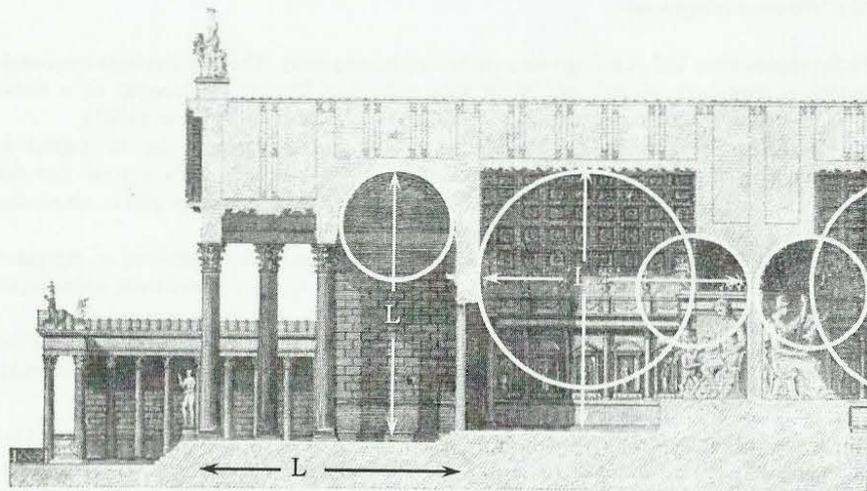
Diameter bigger circle D_1= 22 m (6,8 MHz),
small circle D_2 = 11 m; und L = D_1 + ½ D_2 = 27,5 m (5,5 MHz)
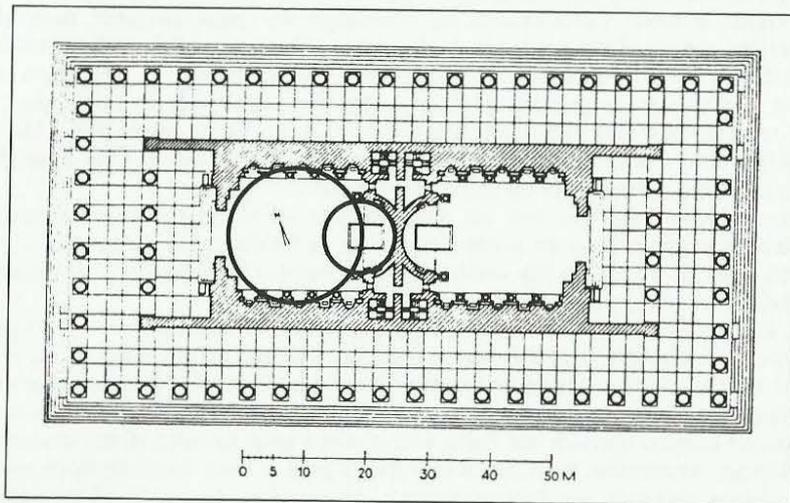
Fig. 30.7:   Temple of Venus and Roma; Rome 136/37 A.D. [i,ii]

<i>: A. Springer: Das Altertum, A. Kröner Verl. Leipzig 1915, 10. Aufl., S. 518

<ii>: T. Kraus: Das römische Weltreich, Propyläen Kunstgesch. Berlin Bd. 2, S. 161

<iii>: Lamer: Wörterbuch der Antike, Kröner Verl. Bd.96 unter „Tempel", Häufigkeit

30.7 AM temple technology

The low-frequency signal (LF), which should be transmitted by a transmitter with amplitude modulation, lies in the range between 16 Hz and 16 kHz. If it only concerns the transmission of speech information, then the bandwidth can be reduced to 300 to 3000 Hz. In the case of mixing the low-frequency useful signal with the HF-carrier, thus in the case of the modulation of the carrier in the rhythm of the LF, two side bands arise. These lie close to the carrier frequency and are formed from this once by the addition and once by the subtraction with the frequency of the LF-signal. Let's take the temple of Venus and Roma with a transmission frequency of 6.8 MHz. If sound of 3 kHz should be transmitted clearly understandable, then the dimensions of the Cella had to be varied for just 8 mm for a corresponding Cella length of $\lambda/2 = 22$ m. As a curiosity the niches in the side walls in the case of this temple however allow a considerably larger bandwidth of more than 10% instead of the necessary 0.04% in the case of AM.

In the case of the Greek originals, the Cella however has smooth walls, from which follows that the temples were designed ideally narrow band. The Greeks apparently operated predominantly telegraphy transmitters, for which the side bands coincide with the carrier.

The argumentation indeed has remained unchanged: The modulator being narrow band and simple to realize speak in favour of the telegraphy being the "original form" of all modulation techniques. Also the rediscovery of the broadcasting technology by Heinrich Hertz succeeded as telegraphy signal. In addition the range is bigger than for any signal modulated with sound frequency.

As the calculation example has shown, also pure AM transmitters work very narrow band, and this is particularly important for low transmission frequencies, if many transmitters want to use the favoured SW band between 3 and 10 MHz at the same time. With AM one thus accommodates the maximum number of broadcasting channels in a particular frequency range, for instance the 80-meter band, without these interfering with each other too much. But that also was badly needed. Conclusions about the everyday life of broadcasting in antiquity by all means are possible because of the enormous number of temple installations, which logically were permanently used. Only in Rome there existed up to 200 temples[iii].

Who goes in search of broadcasting stations with a modern short wave receiver, for instance in the 80 m band between the countless telegraphy transmitters, fast gets an idea of what had been up in the air already 2000 years ago. No ancient city would build several temples on a single Acropolis, if only one single one could have been used. All temples broadcasted with each time another carrier frequency because of different dimensions. For this reason the temples, which stood side by side, as a rule were dedicated different gods.

An acknowledgement, "the air just being free", in addition hardly was possible, because of the often-found spatial distance between the temple installations and the respective oracle. Between the transmitter of the god Apollo in Didyma and the receiver, the oracle of Milet, for example lie approx. 20 kilometres. The only possible conclusion is that in antiquity there was broadcasted on all channels simultaneously regardless of other gods and their transmission frequencies. As is well-known there rather prevailed a situation of competition between the gods, since like today a large number of listeners meant great importance, influence and power and eventually also worship, more gifts and more receipts from broadcasting fees.

A.   B.
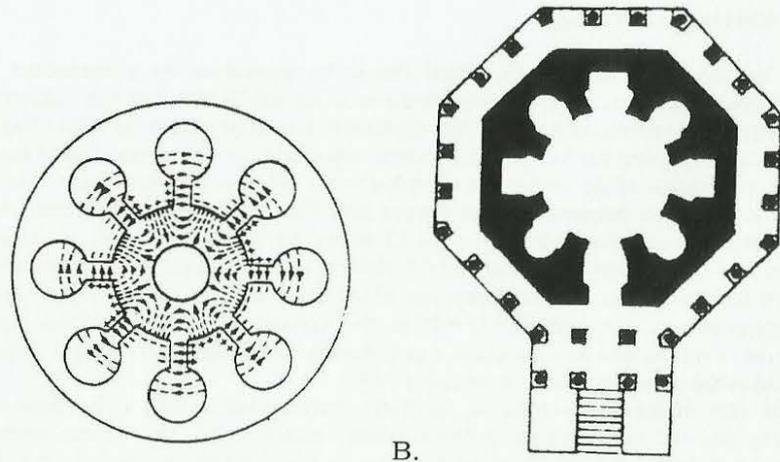
Fig. 30.8:   Comparison of a magnetron (A), a microwave radio tube[i] and the temple (B) in the palace of the emperor Diokletian, Split.[ii]
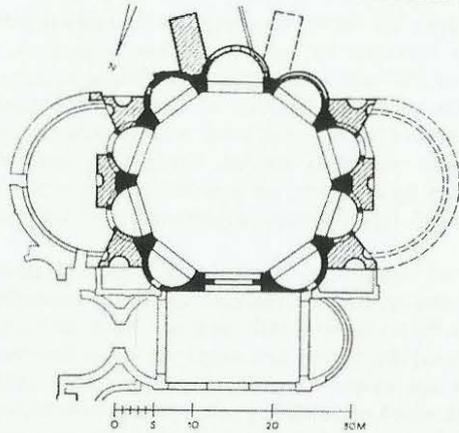
Fig. 30.8.C: Temple of Minerva Medica, Rome, 320 A.D.[ii]

[i]:   K. Simonyi: Physikalische Elektronik, 8.4 Das Magnetron, S. 665

[ii]:   T. Kraus: Das röm. Weltreich, Propyläen Kunstgesch. Bd. 2, S. 194, 196

[iii]:   If one however wants to verify this, in antiquity already common manner of PM broadcasting technology, then we need a broadband short wave receiver with phase-demodulator. With such a receiver even today any time a conclusive argumentation should be possible that this sort of SW-PM technology actually works.

30.8 Modulation of acoustic signals

In the case of sound it in essence concerns longitudinal waves, which propagate in all directions in space with the velocity of sound. But this merely is an average velocity, since the air molecules strictly speaking oscillate with the sound frequency in the direction of propagation. In this way the velocity of sound one time is increased and the next moment to the corresponding extent reduced. If the molecules already carry out oscillations of themselves, e.g. thermal motion, then both oscillations overlap; i.e. the motion of itself is modulated with the sound frequency.

Following the here presented derivation potential vortices are formed in every dielectric, thus also in air, and these are modulated if overlapped with sound waves. Vortices however do not form a distinct frequency, but entirely on the contrary a uniform frequency mixture in the form of white noise.

The overlap thus also is noise unless certain noise frequencies are favoured. This can be effected by means of a spatial body tuned to a certain wavelength. To be considered are cuboid cavities, as in the case of Greek temples or waveguides and cylindrical objects as in the case of round temples or magnetrons. The building form causes the favouring of a certain frequency and the integer harmonic frequencies belonging to it.

If this frequency now lies in the high frequency range, then it is emitted by the spatial body as an electromagnetic wave, in the case of waveguides and resonant circuits for reason of the small dimensions as microwave radiation and in the case of the Greek temples as short wave radiation. If one in addition produces an acoustic signal in the frequency determining spatial body, then this signal automatically will modulate the high-frequency signal.

The result of the modulation is the overlapping of the sound wave with the high-frequency carrier wave. The change of the active length, thus the wavelength of the HF-carrier causes a change of frequency. Such a change on the beat of the sound frequency is called FM (frequency modulation). For that we imagine a spatial body being excited because of its length by potential vortices to a high-frequency oscillation at the self-resonant frequency.

From flow dynamics is known, how easy the distribution of vortices in space can be disturbed. Already words spoken in space are able to influence the potential vortices, which in the case of the temples were used as energy carrier. The longitudinal sound waves reflected at and thus returning from the Cella wall rigid for sound of a Greek temple will push these potential vortices back on the beat of the sound and with that shorten the active length. This means, that the carrier frequency is modulated with the sound frequency. The carrier oscillation thus permanently changes its phase on the beat of the sound signal, for which reason this particular kind of modulation is described as PM, as phase modulation.

Nowadays PM is used only seldom and in the SW-range not at all because of the big need of wave bandwidth. Merely at higher frequencies PM occasionally is used in radiotelephony. In the case of the frequency modulation usual in broadcasting (e.g. UHF), the change of frequency takes place on the beat of the sound amplitude and not of the sound frequency as with PM. Therefore it is not possible to receive phase modulated signals, which are produced by means of the acoustic coupling of appropriately formed spatial bodies[iii] with commercial FM receivers.
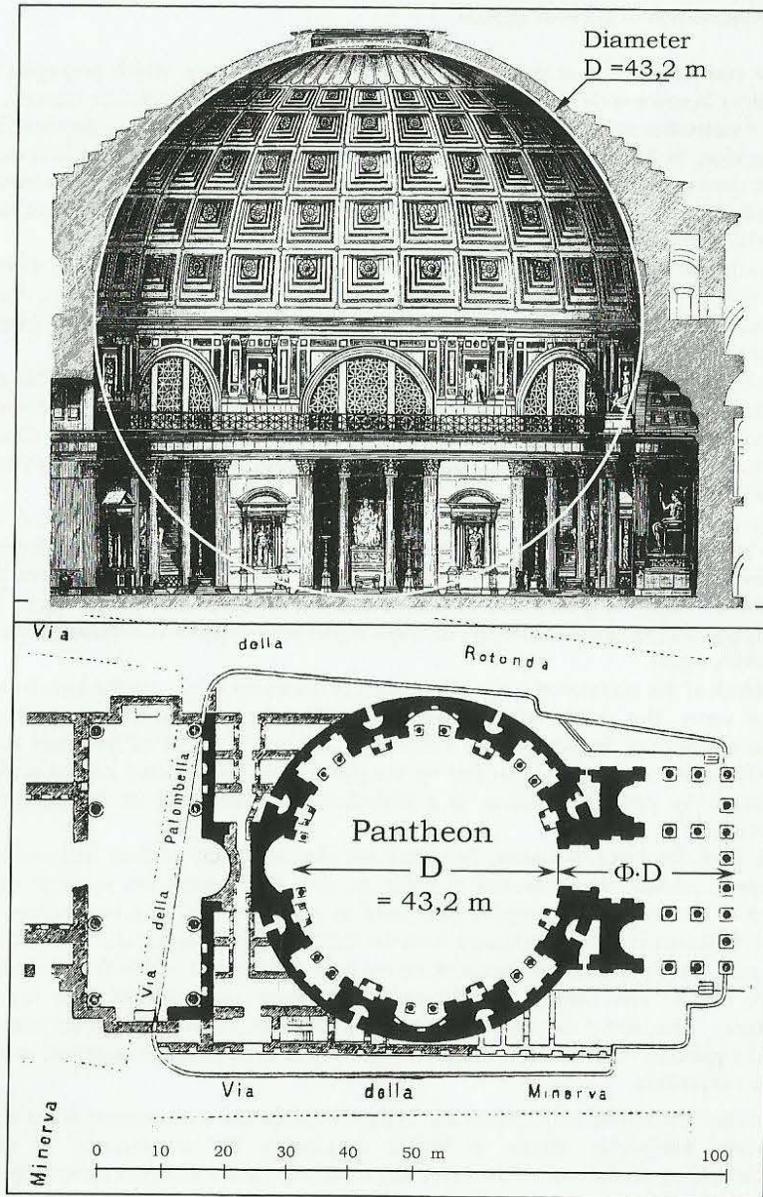
30.9 Broadband FM broadcasting technology

If I speak against a flat wall, then every point on the wall has another distance to my mouth. The sound waves thus aren't reflected simultaneously, what leads to big modulation distortions. Therefore the sound wall should be curved in such a way, that all signal paths are the same length (barrel vault, apse, etc.). In the case of point sound sources there results as an optimum a hemisphere, for instance a dome. The building hence even today tells us, which frequency and which modulation method had been put to use. The architecture of sacral buildings, e.g. pointed arch or round arch, thus hardly has been a question of aesthetics.

For his temple of Venus and Roma designed by himself emperor Hadrian had to listen to severe criticism among others of Apollodor of Damascus. The temple was too broadband for an AM transmitter, however with a modulation depth of just 11 percent not broadband enough for a phase modulated FM transmitter.

Emperor Hadrian however also had the courage to build midst in Rome a temple calculated completely new and designed as a pure FM transmitter, the Pantheon, which means temple of all gods. In the language of the technician it is a transmitter for all frequencies.

This domed structure indeed doesn't leave out one single frequency. With a modulation depth of almost 100 percent it is designed for maximum loudness. With that the Pantheon uses all available frequencies, for which reason the name temple of all gods really is no exaggeration. Into the Pantheon exactly fits a sphere with a diameter of 43.2 meter. That corresponds to a minimum frequency of 3.47 MHz, situated in the range of the short waves. The floor however is not domed, but horizontal. That, up to the basis of the dome, results in exactly half the height and a maximum frequency of 6.94 MHz.

The construction ensures that between the simple and the double diameter any desired wavelength can be produced. Above the given maximum frequency of the basic oscillation the harmonic waves, which are produced as well and can't be avoided at all, are attached without a break. These occupy the wave bands up to the double, triple, quadruple frequency and so forth.

For this and only for this reason a maximum frequency was chosen, which corresponds to exactly the double value of the minimum frequency. The operation takes place to the limit, where the transmitter would interfere with itself, in the way that the used basic oscillation would overlap its own harmonic waves. That then sounds like two people talking at the same time. The voices would be distorted out of recognition, as can't be expected else in the range of the harmonic waves.

The Pantheon has been planned and built as a phase modulated basic wave transmitter according to purely academic rules of Hadrian. The temple impressively demonstrates the precise engineering detailed knowledge of the Pontifex Maximus and his broadcasting priests in ancient Rome[ii].

<div align="center">***</div>

Fig. 30.9:   The Pantheon in Rome, the „temple of all gods".[i]
Diameter D = 43,2 m, Golden Proportion: Φ = 0.618
Pronaon-(atrium-)length: Φ·D = 0.618 · 43.2 = 26.7 m
Built under emperor Hadrian 118/119-125/128 A.D.

[i]:   A. Springer: Die Kunst des Altertums, A. Kröner Verl. Leipzig 1915, 10. Aufl., S. 517/518, daraus: die Zeichnungen vom Pantheon in Rom, 115-125 n.Chr.

[ii]:   The collection of material concerning scalar wave technology here is aborted and continued in an own book in narrative and with that easier to read writing style. The title is: „Broadcasting Gods".

approach	derivation	result
b:= postulate [potential vortices Vol.1]	what if **b ≠ 0 ?**	**derivation** of the **Schrödinger eq.**
duality vortices replace quanta [potential vortices Vol.2]	from **H ⇔ E** from **j ⇔ b** [and chapter 3.3]	**calculation** of the **quantum** **properties** [potential vortices V.2]
causality [see chap. 3]	<u>gen.</u> ⇔ special case **field** ⇔ quanta cause ⇔ consequence (instead of: quanta ⇔ field)	vortex field free of quanta (instead of: irrotational field of quanta)
vortex physics analogous to flow dynamics [chap. 3.4 - 3.5]	**vortex + anti-** **vortex** (Demokrit/cosmology) [chap. 3.6 + 27.2]	coming off of vortices if $\tau_1 = \tau_2$ **model of atom** [chap. 5.5 + 5.8]
equations of **transformation:** **E = v x B** **H = - v x D** [chap.6.5 + 27.8]	for $\mathbf{E}(\mathbf{r}(t))$ and for $\mathbf{H}(\mathbf{r}(t))$: curl **E** = curl (**v x B**) curl **H** = curl (**D x v**) [chap. 27.9]	extended **field** **equations:** curl **E** = **-b** $-\partial \mathbf{B}/\partial t$ curl **H** = **j** $+ \partial \mathbf{D}/\partial t$ [chap. 27.10]
equations of **transformation:** **E = v x B** **H = - v x D** [s.a. chap. 16.1]	**wave equation** inhom. Laplace eq. $\Delta \mathbf{E} = \text{graddiv } \mathbf{E} - \text{curlcurl } \mathbf{E}$ $\Delta \mathbf{E} = (1/c^2)\cdot\partial^2 \mathbf{E}/\partial t^2$ [chap. 27.13] [chap.22.4]	transverse + longitudinal wave parts: **scalar waves,** noise, etc.
equations of **transformation:** [chap. 28]	vortex overlap **length measures** **depending on field**	**gravitation,** **temperature,** theory of objectivity

Fig. 30.10:   (All) Many roads lead to Rome.

30.10 Epilogue

The preparation for a seminar or a lecture always starts with a collection of material. This should be considerably more detailed than the material to be communicated, since it doesn't get well at the students and also other participants, if the state of knowledge of the lecturer already is exhausted with the scope of his lecture. For this reason the collection of material must also include alternative derivations and areas of knowledge, which thematically rather are marginal, about which mustn't be reported, which possibly not even can bear criticism but still are in the public discussion. For a collection of material, which wants to be considered to be comprehensive and complete, it is important that no area and no theme has been overlooked.

The here presented collection of material with its 650 pages has become correspondingly voluminous. After all the material has been collected over an 8 year period and has been strung into the book in the order of working. That of course complicates reading the book, because individual aspects are repeated several times, but often also in a different context and each time lighted from another side. If the reader somewhere has the feeling, he only has turned in a circle, then has deceived himself. He indeed moves spirally in a circle, like in real life, but he doesn't come out there, where he started. After one turn he is richer with the experience of this spiral turn. In whole science the advancement takes place as a spiral movement and one can count oneself fortunate, as long as the spiral has an ascending slope! This notion should solace the reader, who has undertaken the torture to work through the complete collection of material.

Students also have reported, they had devoured my book like a thriller and a colleague, who had acquired it at a conference in Switzerland, was digging so much in the lecture that he forgot to get off the train timely.

It is a special concern to give reasons for the necessity of an extension of available field theory. To achieve this goal several derivations (fig. 30.10) can be found in my books: from a postulate, from duality, from vortex physics, from the equations of transformation, etc. added are at least a dozen derivations of other authors from various publications, who at most are cited. With that the goal is pursued that all approaches, which are conceivable and worth discussing, can be put side by side and tested for their efficiency.

Since it isn't the task of a collection of material to answer this question, this must be done by the hearer resp. the reader of the books. He is prompted to find the answer himself! That leads to an intense contention with the theme and that exactly is the reason for the otherwise rather unusual step to make a collection of material open to the public. Objections and criticism of the content of a relation of matters or also only of the representation of the context is wished explicitly. This also isn't valued as criticism of the author or of the superordinated set of difficulties, which in principle isn't possible at all for a collection of material.

Honorary functions of

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Physik, Köln)

Präsident
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Wissenschaften**, Hechingen,
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Zweiter Vorsitzender im Vorstand
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Fig. 30.11:   Honorary functions of the author
(December 2003, selection).

There in principle is no necessity at all to discuss with everybody a collection of material, which I have compiled exclusively for own events. It is absolutely sufficient, if few, but then qualified experts have thoughts about the content and communicate them to me. They can feel certain that I don't hand down their judgement to other persons. For that I also have been blamed by ignorant colleagues, who in complete self-overestimation have the opinion, they should be informed about everything. Right is rather, that my private correspondence is of no concern to anybody, since I find it important that as much readers as possible express themselves frank, what only functions, if they can feel certain that they afterwards won't be involved in public mud-wrestling. Therefore I keep still as regards other persons however curious they might be.

Indeed over and over again pseudo scientists turn up, who have the erroneous opinion that scientific arguments would take place on some internet-forums, where one can descant at will and anonymous, hidden behind an alias, where the intellectual firebug can feel safe, not afterwards being blamed for his crimes.

No, science takes place entirely different. A new theory will be able to establish, if it is right and important and if it is used for practical uses. Losers are those authors of a theory, for the elaboratation of which nobody is interested. What does a publication in a journal, however renowned, mean, if nobody reads it and nobody needs it? Most new ideas and approaches go under without notice in today's flood of publications, for who has got the time to read all essays in full?

Desperate they turn to me hoping, at least I could understand their concern. I then invite these scientists to a congress of the „Society for the Advantage of Physics", of which I am the president and offer them a forum, where they are able to present their ideas to an expert public. Not all lectured ideas prove to be sound, but not seldom a physical concern, which should be taken very serious, is behind it.

For a long time the real scientific controversy doesn't take place anymore at the universities and their congresses, where hardly someone dares to lecture arguments against the convention. Too fast he would be expelled as outlaw from the honourable society. From time to time however also from these circles colleagues dare anonymously or privately, as they emphasize, into the alternative events of lobbies or clubs, to astonished find out that real science there still is practised and that there is discussed about ideas, which they have given up thinking or have forbidden themselves to think about. The employment activity, so they excuse their thinking prohibition, allegedly doesn't allow it.

Taken from
textbook physics:

equations of transformation
$$\mathbf{E} = \mathbf{v} \times \mathbf{B} \qquad \mathbf{H} = -\mathbf{v} \times \mathbf{D}$$

can not be
derived

derived with $\mathbf{E}(\mathbf{r}(t))$ and $\mathbf{H}(\mathbf{r}(t))$

new:
extended
field theory

law of induction
extended with **b**

Ampère's
law

with:
b = 0
resp.

with **b** ≠ 0

$\operatorname{div} \mathbf{B} = 0$
3rd Max-
well eq.

potential
vortex
τ_2

vortex
structure
$\tau_2 = \tau_1$

eddy
current
τ_1

$\operatorname{div} \mathbf{D} = \rho_{el}$
4th Maxwell
equation

field physics
free of postulates!

quantum physics
everything postulates!

law of
induc-
tion, 2nd
Max-
well eq.

standard
model
of ele-
mentary
particles

neu-
trino
(ring-
like
vortex)

unification
of all
inter-
actions

tem-
pera-
ture

gra-
vita-
tion

law of
conser-
vation
of
energy

law of
Ampère
1st
Maxwell
equation

Fig. 30.12:　　Derivations of postulates and axioms (part 1).

Be that as it may, the approaches and derivations contained in my collection of material are considered to be controversial, and that is good that way! The public takes notice and professional circles are occupied with the ideas. With that half the way to success already is brought off! It now concerns to knock off all points for their soundness individually, because the next step will be to search a way to the goal as unassailable as possible, which is able to convince also the biggest sceptic. The final version, which then should appear in accredited peer-reviewed journals and in a scientific book concerning the theory of objectivity, goes in this direction. From the numerous approaches in the end only one will be used, and from the countless, in the collection of material listed aspects only the noncontentious ones will remain.

The dispute, which in the current stage can't be avoided, yes even is desired, however shouldn't deceive about the fact that it here doesn't concern persons, improper vanity or some image cultivation, but simply and solely concerns the matter!

In fig. 30.12 and 30.13 is represented, what it concerns. Field physics and quantum physics don't form, as in common practise, an insurmountable opposite, but even complement each other! Below the stripline a little selection of the today in current use quantum physical postulates can be found. The number of newly introduced „constants of nature" and postulates permanently is increasing, a circumstance, which hardly can be mediated to the common sense. The bracket is missing, which interlinks all postulates, or the common source from which they can be derived causally.

In the progress of the three-part edition in this question, essential for physics, already a satisfying and in addition real efficient answer has been found in the domain of field physics. The coupling marked by individual derivations can be found above the stripline and it is entirely new, apart from the dashed indicated derivation (fig. 30.13), as given by Prof. Bosse (TU Darmstadt) in his textbook.

An approach in principle can be chosen freely. In the case of the superordinated field theory two equations of transformation form the approach, which already is laid down in textbooks and secured experimentally. That's why the whole field theoretical derivation manages without one postulate! It is pointed to the fact that these equations on their part can't be derived and should be interpreted rather philosophically than physically.

From this approach the extended field theory is derived directly, without a need to add or discard a term. The extended field theory consists of the well-known law of Ampère extended with the dielectric displacement **D** by Maxwell, and of Faraday's law of induction, which experiences an extension with the vector of potential density **b** by means of the derivation. Doing so we assume that the field pointers of the electric and the magnetic field strength depend on the spatial coordinate **r** and through this indirectly also on the time t: $\mathbf{E}(\mathbf{r}(t))$, $\mathbf{H}(\mathbf{r}(t))$.

Taken from textbook physics:

equations of transformation

$$E = v \times B \qquad H = - v \times D$$

can not be derived

derived with $E(\mathbf{r}(t))$ and $H(\mathbf{r}(t))$

new: extended field theory Meyl: **b** (without postulate!)

law of induction extended with b   **Ampère's law**

extended by Maxwell: **D**

derived with $E(\mathbf{r},t)$ and $H(\mathbf{r},t)$

new: world equation:

fundamental field equation

derivation of Prof. Bosse

field physics
free of postulates

quantum physics
everything postulated

wave-equation / Laplace

law of induction / law of Ampère / Maxwell's field eq. of charged particles

Klein-Gordon equation / Sturm-Liouville equation / Schrö-dinger equation

scalar wave, (Tesla) longi-tudinal / el.magn. wave, (Hertz) trans-verse / eddy currents / potential vortex / basic eq. of nuclear physics / chaos theory / basic equation of quantum physics + chemistry

vortex structures

Fig. 30.13:   Derivations of postulates and axioms (part 2).

If the somewhat more general case is counted up, in which case apart from the spatial a direct temporal dependency is present ($E(\mathbf{r},t)$ and $H(\mathbf{r},t)$), then further additional terms appear in addition to the extended field equations, which need an explanation also for the case that they are zero. The physical interpretation would implicate a longer treatise, which however can be circumvented, as shown here, by constraining the field pointers, which absolutely is allowed according to the slogan: for the case $E(\mathbf{r}(t))$ and $H(\mathbf{r}(t))$ chosen from many possibilities the extended field equations come out exactly in the form, as they are required and suitable for the further calculations. Who has got to calculate other cases, can do that as he likes, but doing so he should not get lost.

Maxwell's field equations are contained in the solution and with that also continue to be valid. Their disadvantage however is that without the extension **b** not a single quantum physical postulate can be derived. If we add this extension and insert the equations into each other without addition and without cuts also this time a central solution is the result, which is called **fundamental field equation**.

The derivation is known as well from the Maxwell theory, in which case it is common practise, to use the general approach ($E(\mathbf{r},t)$ and $H(\mathbf{r},t)$), what we in accordance with the textbooks can do in the same manner. The extension however brings two additional and extremely significant terms. Since the fundamental field equation has eigenvalues under certain boundary conditions and describes structures, various quantum postulates come out from it, from the quantum properties of the elementary particles over the Schrödinger equation and the inhomogeneous Laplace equation up to the derivation of the Golden Proportion. That justifies the assumption that this possibly is the long sought-for **world equation**.

Even I, as the initiator, was totally surprised by the found derivation of the most important quantum physical postulates and axioms. One just is doing it the right way and already everything fits together. I am not aware of any theory, which would be able to achieve something roughly comparable. The since long sought-for „**Theory of Everything**", the big unification theory really falls into ones lap. The known interactions are the free and easy result of analysing the field lines of electric and magnetic field strength (fig. 30.12).

Physical phenomena, which until now were considered to be incompatible, like e.g. waves, noise or the temperature with the utterly insufficient concepts of the mechanisms for the conversion of one form of energy into another, can be represented consistently with the fundamental field equation as the rolling up of a wavelike field oscillation to a vortex oscillation and as conversion of the noise vortices in the case of a vortex contraction down to atomic dimensions as thermal oscillation, which we treat as vortex losses.

There exists no alternative to such unified schemes of things, as makes it possible in abundance the theory that I have founded, considering the two conditions, that on the one hand in the case of the derivation only known regularities are used, by completely doing without postulates and that on the other hand laws are applied and adhered to, also physical laws.

The new schemes of things, which sound unfamiliar, thus already were contained in the laws of physics. After this now having been realized, the tables turn. Now the explanations by postulates, as they at the moment still are being taught, should be replaced by the newly derived ones, if one doesn't want to become a breaker of the law! There doesn't lead a way past the overdue reform of physics anymore.

* * *

If you want to correspond with me or if you want to get one of my books from the bibliography, then please consult my Transfer Centre in the Technology Parc of Villingen (Black Forest, D).

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email: meyl@k-meyl.de   or: prof@meyl.eu

Internet: www.meyl.eu > shop: get more information to the books

The list of deliverable books (for ordering books over the above given address, Fax, Mail or postcard suffices):

*   Wirbelströme, Diss. University Stuttgart 1984, ISBN 3-9802 542-0-8,   14 €

*   Potentialwirbel Band 1, 1990, ISBN 3-9802 542-1-6 (German),   14 €

*   Potentialwirbel Band 2, 1992, ISBN 3-9802 542-2-4   14 €

*   Elektromagnetische Umweltverträglichkeit, Teil 1, 2 and 3 (German), ISBN 3-9802 542-8-3, 3-9802 542-9-1 and 3-9802 542-7-5.   Each 16 €

*   Scalar wave technology, 2003, documentation and manual to the demonstration-kit and to the experimental-kit (translated and copied).

*   Sendetechnik der Götter, historischer Sciencefictionroman, (in German) 1.Aufl. 2004, ISBN 3-9802 542-5-9,   14 €

*   Neutrinopower, Johannes von Buttlar im Gespräch mit Prof. Dr. Konstantin Meyl, (Discussion in German) Argo-Verlag 2000,   23 €

Fig. 30.14:   Contacting address and list of deliverable books

Table of formula symbols

Electric field		
E	V/m	Electric field strength
D	As/m^2	Electric displacement
U	V	Tension voltage
ε	As/Vm	Dielectricity: $\varepsilon = \varepsilon_r \cdot \varepsilon_o$
Q	As	Charge
e	As	Elementary charge
τ_2	s	Relaxation time constant of the potential vortices

Magnetic field		
H	A/m	Magnetic field strength
B	Vs/m^2	Magnetic induction
I	A	Current
μ	Vs/Am	Permeability: $\mu = \mu_r \cdot \mu_o$
ϕ	Vs	Magnetic flux
m	kg	Mass
τ_1	s	Relaxation time constant of the eddy currents: $\tau_1 = \varepsilon/\sigma$

other symbols:

A	m^2	Area	Q	Nm = J	Heat energy
a	m	Distance	r, R	m	Radius, radius of the earth
b	m	Width			
c	m/s	Speed of light	r_e	m	Radius of the electron
c_o	m/s	Speed of light in vacuum	s	Nms	Spin
C_e	As/V	Capacity of the electron	t	s	Time, time to orbit
C_p	J/K	Heat capacity	T	K	Temperature
d	m	Thickness	U	Nm	Potential energy
E,W	Nm	Energy	U_e	V	Tension voltage of the electron
f	1/s	Frequency			
F	N	Force	v	m/s	Velocity
G	$m^3/kg \cdot s^2$	Gravitational constant	V	m^3	Volume
g	m/s^2	Gravitational acceleration of the earth	W	Nm	Energy
			w	N/m^2	Energy density
h	m	Height	W_e	Nm	Energy of the electron
h	Nms	Planck's quantum of action	z_e	-	Number of the involved elementary vortices
$\hbar$	Nms	Quantum of angular momentum: $\hbar = h/2\pi$	λ	m	Wave length
j	A/m^2	Current density	ω	s^{-1}	Angular frequency, angular velocity
J	$kg \cdot m^2$	Moment of inertia			
$J \cdot \omega^2$	$kg \cdot m^2/s$	Angular momentum	σ	A/Vm	Specific electric conductivity
k	Nm/K	Boltzmann constant			
l	m	Length	ρ	kg/m^3	Density $\rho = m/V$
m	kg	Mass	ρ_{el}	As/m^3	Electric space charge density
M	kg	Mass of the earth			
$n,\nu = 1,2,3..$		Running parameters	$\psi\,(r,t)$		Complex wave function
N	-	Constant	$\phi\,(r)$		Function of space coordinates
O	m^2	Surface area			
p_m	Am^2	Magnetic moment	Φ		Golden Proportion

Definitions:

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
Moment of inertia (orbit)	$J = m \cdot r^2$	$kg \cdot m^2$
Mom. of i. (homogeneous sphere)	$J = (2/5)m \cdot r^2$	$kg \cdot m^2$
Angular velocity	$\omega = v/r = 2 \cdot \pi/t$	1/s
Surface area of a sphere	$O = 4 \cdot \pi \cdot r^2$	m^2
Volume of a sphere	$V = (4/3) \cdot \pi \cdot r^3$	m^3

Concerning vector analysis:

Bold print = field pointer (vector);   further information in fig. 5.0 in part 1

Prof. Dr.-Ing. Konstantin Meyl:

Scalar wave technology

for the transmission of electric scalar waves

Abstract: 1. Auflage 2000, 2. Auflage and 1st English edition 2003

This book is recommended to people, who search the entry into the world of the by the author discovered potential vortices and their propagation as a scalar wave by experimental means. It starts with the instructions to six extraordinary experiments. Doing so an electric radiation is proven, which transmits energy, and that even faster than the light. Also more energy can arrive at the receiver then is put into the transmitter. Who entertains a doubt, will be able to understand the experiments with this book in his hand, to afterwards test the experiments with the gauges, which he is familiar with.

The 1st edition in English at first only includes the instructions for the experiments. In a subsequent edition it will be complemented with a collection of test protocols and progress reports. These are organized into three groups: one group is striving to explain the behaviour of the transmission line conventionally, a legitimate concern, which in a number of points also is able to convince. A second group only is interested in those phenomena of the experiment, which can't be explained conventionally and which prove the existence of scalar waves, whereas the third research group continually strives for new spectacular experiments and practical applications.

Documentation

Belonging to the experimentation and demonstration kit for the transmission of electric scalar waves

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